

# Decarb Lunch Series

zebox

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**DISCUSSION EDITION**

## **Resilient Code Updates: Cooling for Part 9 Homes**

Wed May 15, 2024,  
from 12- 1pm PST  
Free Webinar | [zebx.org](http://zebx.org)



# zeic

ZERO EMISSIONS INNOVATION CENTRE



## Building Decarbonization Team



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**NearZero**

**BC Retrofit  
ACCELERATOR**



Carbon  
Leadership  
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Columbia**

**zeb<sub>x</sub>**



POLL 1

**Tell us about yourself!**

Three-part anonymous poll

# Part 9: 26°C Design Temperature

**ZEBx Decarb Lunch**

**Scott Williams P.Eng, Senior Code Engineer,  
BSSB**

**May 15, 2024**

**ENERGY**  
**STEPCODE**  
BUILDING BEYOND THE STANDARD

**ZERO CARBON**  
**STEPCODE**

### BC Building Code 2024 – Overheating

- Mandate
- Process
- Regulation
  - What it is
  - What it isn't
  - Demonstrating compliance
- Resources/Supports
- Synergies with the Step Code

## Mandate

*.....ensure that the 2024 release of the BC Building Code incorporates both passive and active cooling requirements in new housing construction,.....*

Extreme heat events in the summer of 2021 in British Columbia had devastating impacts, attributing to 619 deaths. Similar weather episodes are projected to become hotter, longer, and more frequent as B.C.'s climate changes.

**Extreme Heat and Human Mortality:  
A Review of Heat-Related Deaths in B.C.  
in Summer 2021**

Report to the Chief Coroner of British Columbia  
Release Date: June 7, 2022

### Process

- National – Task Group for Housing and Small Buildings
  - Research presented by NRC
  - Defined a range of indoor temperatures associated with safety of occupants 26.9°C to 28°C
- Review of current methods of compliance for Part 9
- Stakeholder engagement via the Step Code Council, technical subcommittees and working groups

### Regulation

- Changes incorporated into the BC Building Code 2024 – Effective March 8, 2024
- **9.33.2.1. Required Heating and Cooling Systems**
  - 2) Except where determination according to Article 9.33.5.1. or good engineering practice according to Article 6.2.1.1. can show it to be unnecessary, *dwelling units* intended for use in the summer months on a continuing basis shall be equipped with cooling facilities conforming to this Section. (See Note A-9.33.2.1.(2).)



### Regulation

- **9.33.3.1. Indoor Design Temperatures**
  - 2) At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each *dwelling unit*.

### Regulation

#### **9.33.5.1. Capacity of Heating and Cooling Appliances**

1) The required capacity of heating and cooling *appliances* located in a *dwelling unit* and serving only that *dwelling unit*, shall be determined in accordance with CSA F280, "Determining the required capacity of residential space heating and cooling appliances" except that the design temperatures shall conform to Subsection 9.33.3.

#### **1.1.3.1. Climatic and Seismic Values**

5) The outside summer design temperatures determined from Appendix C shall be those listed for the July 2.5% dry values.

## Part 9 26°C Design Temperature

### What it is:

- Safety threshold
- Regulation intended for new construction
- Residential only – dwelling units
  - One living space
- CSA F280 analysis – heating/cooling load calculation

### What it is: (Cont'd)

- Historical climate data
- Mechanical cooling unless can be shown otherwise
- A means of reducing potential health risks and increasing awareness
- Integrated design – holistic building design
- Improved resiliency

### What it is **not**:

- Thermal comfort criteria
- Not intended for existing buildings
- Accounting for extended heat waves or extreme heat events
- Plug-in systems
- Demonstrating compliance via HOT2000

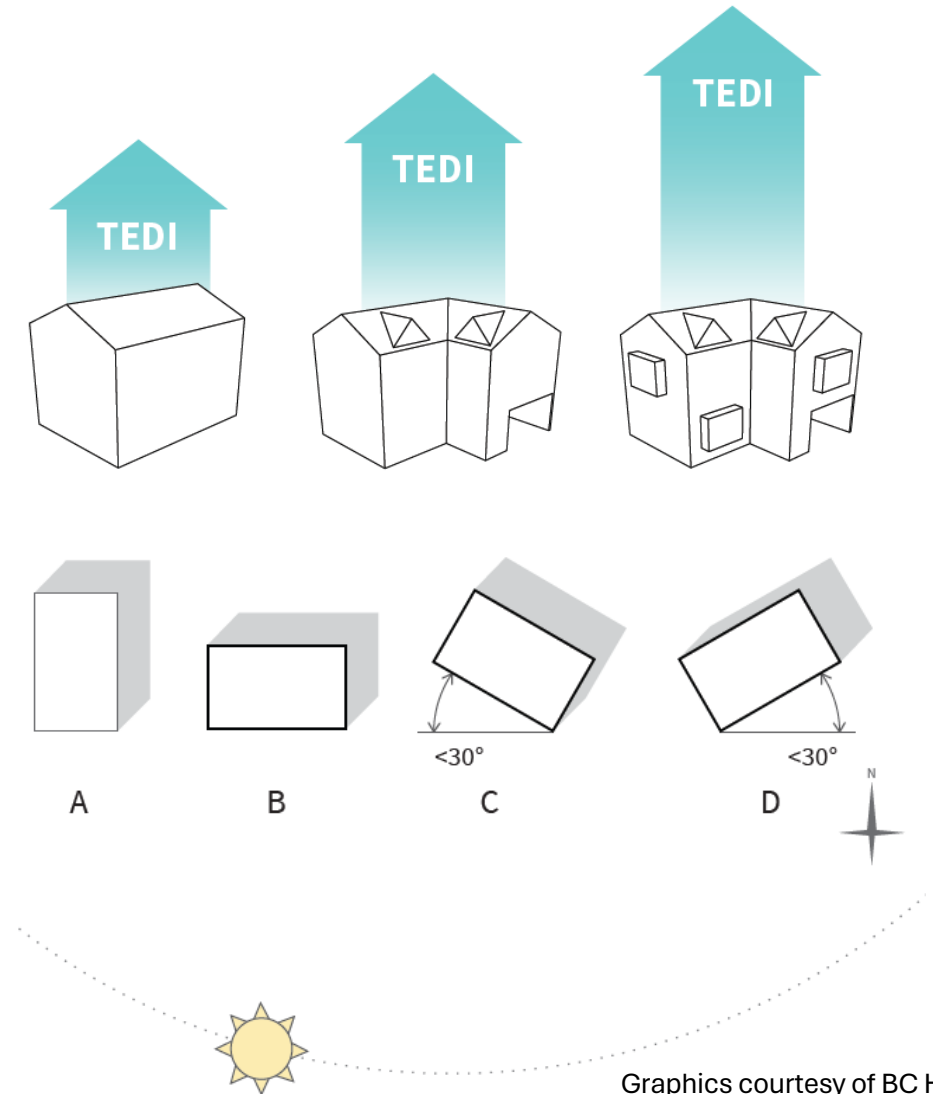
### Demonstrating Compliance

- Heat loss/heat gain calculation via CSA F280
  - Room by room analysis
  - F280 uses 24°C as the default for the upper temperature threshold – this will need to be overwritten
  - CSA F280 Excel spreadsheets or approved software
- Potential future use of mechanical permits and/or standardized outputs

# Part 9 26°C Design Temperature

## Demonstrating Compliance

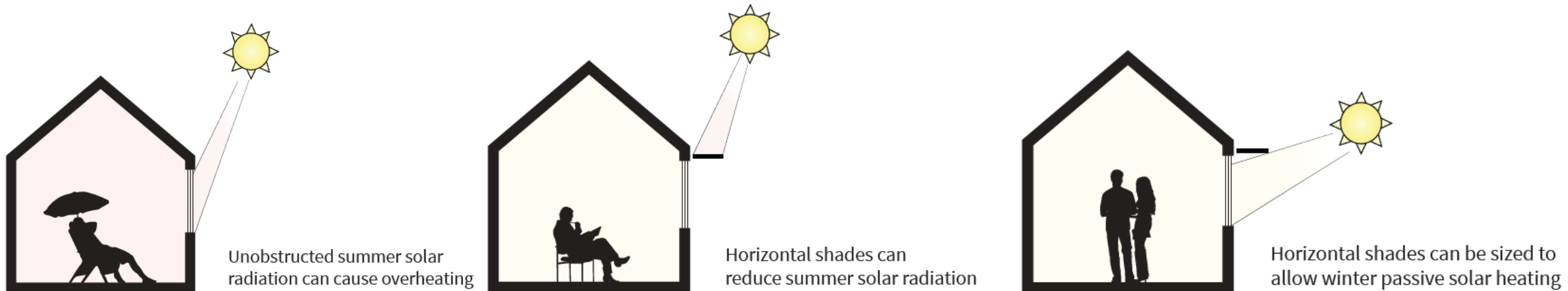
- Passive Measures
  - Building form
  - Building orientation



## Demonstrating Compliance

- Passive Measures (cont'd)
  - Shading
  - Low SHGC
  - Window to Wall Ratio & Window Orientation

**\*\*Integrated design is key to positive outcomes\*\***





### Resources/Supports

- Overheating Bulletin
- *BC Energy Step Code Design Guide Supplement*
- *UBC - Designing Climate Resilient Multifamily Buildings*
- CSA F280 Compliant Software
  - HVAC Designers of Canada
- Thermal Environmental Comfort Association (TECA)
- The Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI)

### Regulatory Synergies:

- Energy Step Code – Step 3
- Zero Carbon Step Code
- 26°C Design Temperature



# Township and Zero Carbon Step Code

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Kevin Ramlu – Manager, Green Buildings Department

# Who Is Green Buildings?

## Green Buildings Department:

- Support deployment of the BC Energy Step Code
  - Incoming priorities such as the brand new Zero Carbon Step Code
- Support policy development within the buildings and resiliency scope
- Strong emphasis on education



Keira Lai –  
Technical  
Assistant



Ajeen Surendran –  
Building Energy  
Specialist



Kevin Ramlu –  
Green Buildings  
Manager

# Township of Langley Building Bylaw

This is why we are here today

#5385  
25/06/18

#5966  
04/12/23

1. April 1st **2024** - Part 9 Group C Occupancy:
  1. Step 4 + EL-2
2. April 1st **2025** - Part 9 Group C Occupancy:
  1. Step 4 + EL-3
3. Reminder – Group C Part 3, Step 3 (since 2022)

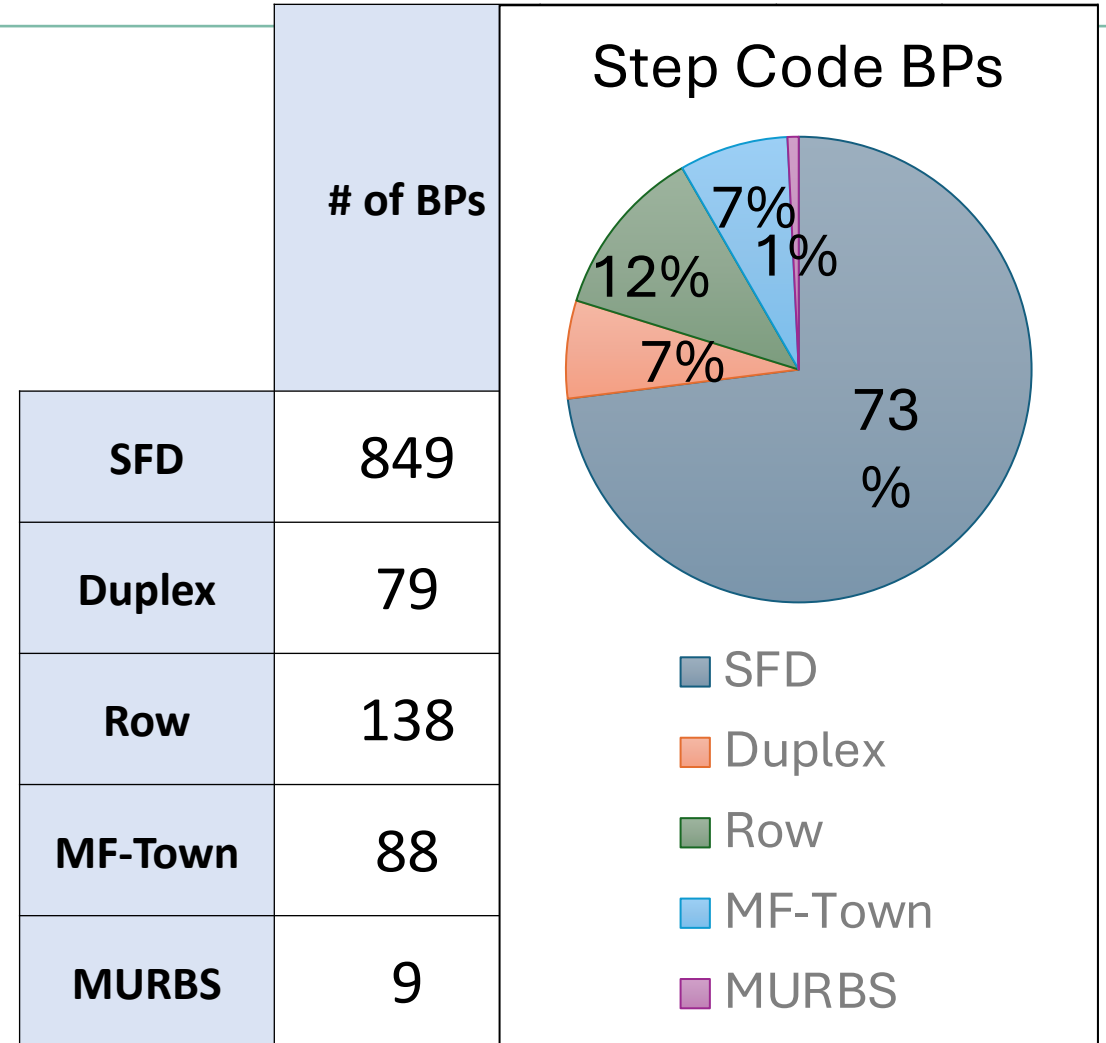
## 7.5 ENERGY STEP CODE

- a) Any new Part 9 Building constructed after March 31, 2024 containing a residential occupancy shall be designed and constructed to meet the specified requirements of the Energy Step Code and Zero Carbon Step Code as defined by the BC Building Code to a level of:
  - i. Step Code 4 and EL-2 where the Permit Application is dated after March 31, 2024.
  - ii. Step Code 4 and EL-3 where the Permit Application is dated after March 31, 2025.
- b) Any new Part 3 Building constructed after 2022 containing a residential occupancy shall be designed and constructed to meet the specified requirements of the Energy Step Code as defined by the BC Building Code to a Level of Step 3.
- c) For a Part 9 Building that is required to be designed and constructed to meet a specified level of the Energy Step Code as above, but where the as constructed Building does not achieve the performance requirements of the applicable Step of the Energy Step Code, after all reasonable mitigation measures are implemented to the satisfaction of the Building Inspector, the Building Inspector may issue an accepted final inspection notice for the Building if it is verified by a Registered Professional or an energy advisor registered in good standing with Natural Resources Canada that the Building is constructed in compliance with the prescriptive or performance requirements otherwise set out in Part 9 of the BC Building Code for Energy Efficiency.

Step 4 + EL2/EL3 Requirements Adopted December 2023

# Step 4 Background

- 2023 Council motioned to amend Building Bylaw to require Step 4(P9)
- Green Buildings completed consultation in 2022
  - Most responses were neutral
  - Some said *too slow*
  - Some said *give us more time (6 months)*



# Step 4 Analysis

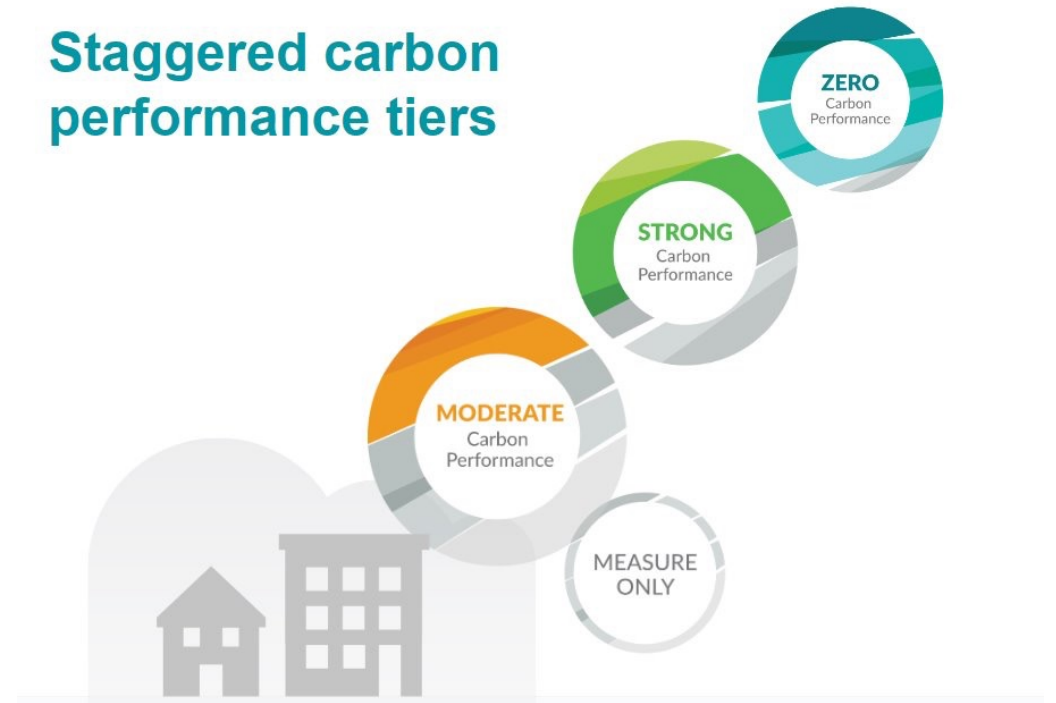
- Green Buildings analysis indicated design needs higher efficiency equipment:
  - Heat pumps
  - High efficiency furnaces
  - HRVs
  - Higher performing envelope
  - Lower ACH

Did anyone exceed requirements?		
Total Buildings	Buildings with ACH < 1.5 (Step 4)	Buildings with ACH < 1 (Step 5)
874	What % met Step 4 ACH requirements?	

# Zero Carbon Step Code (previously the Carbon Pollution Standard)

- BSSB introduced framework to address carbon emissions:
  - Similar to Step Code
  - Generally simpler to understand
    - Performance Path = options
    - Prescriptive options = predictable approval
  - Prior to release, lots of attention

## Staggered carbon performance tiers





# Complimentary Compliance

1. Step 4 was coming
  1. Heat pumps support meeting targets
2. Mandatory cooling
  1. Options for compliance
  2. Heat pumps = generally auto compliant
3. ZCSC compliance =
  1. Mandatory Cooling
  2. Supports Step 4

Table 9.37.1.3.  
Greenhouse Gas Emissions  
Forming Part of Sentence 9.37.1.3.(1)

GHG Emission Level	GHG Emission Compliance Options <sup>(1)</sup>					
	Maximum GHG Emissions by House, Expressed in kg CO <sub>2e</sub> /year	or	Maximum GHG Emissions by House <sup>(2)</sup>		or	Reduction of GHG Emissions by Energy Source of Building Systems
			Maximum GHGI of the House, Expressed in kgCO <sub>2e</sub> /m <sup>2</sup> /year	Maximum GHG Emissions by House, Expressed in kgCO <sub>2e</sub> /year		
EL-1	measure only		measure only			N/A
EL-2	1050		6.0	2400		Energy sources supplying heating systems have an emissions factor ≤ 0.011 kgCO <sub>2e</sub> /kWh
EL-3	440	or	2.5	800	or	Energy sources supplying heating and service water heating systems have an emissions factor ≤ 0.011 kgCO <sub>2e</sub> /kWh
EL-4	265		1.5	500		Energy sources supplying all building systems, including equipment and appliances, have an emissions factor ≤ 0.011 kgCO <sub>2e</sub> /kWh

# Heat Pumps and Compliance

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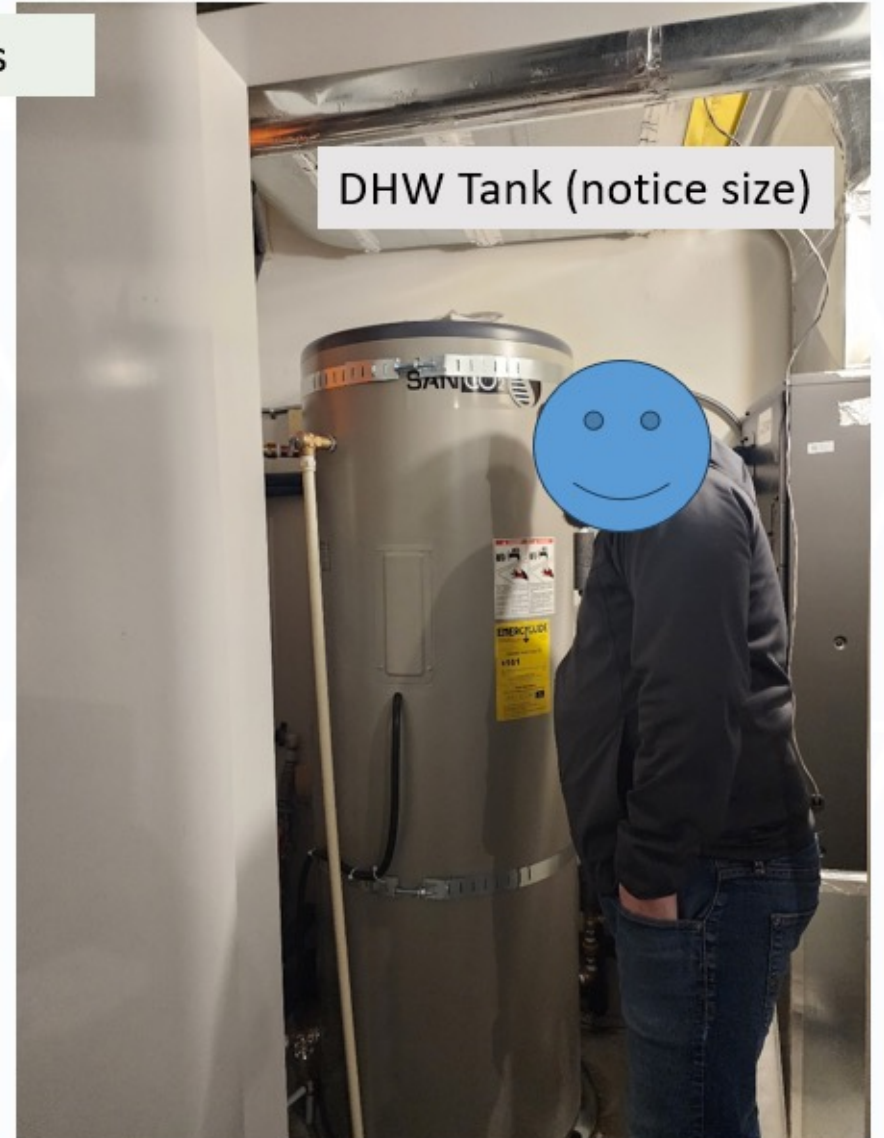
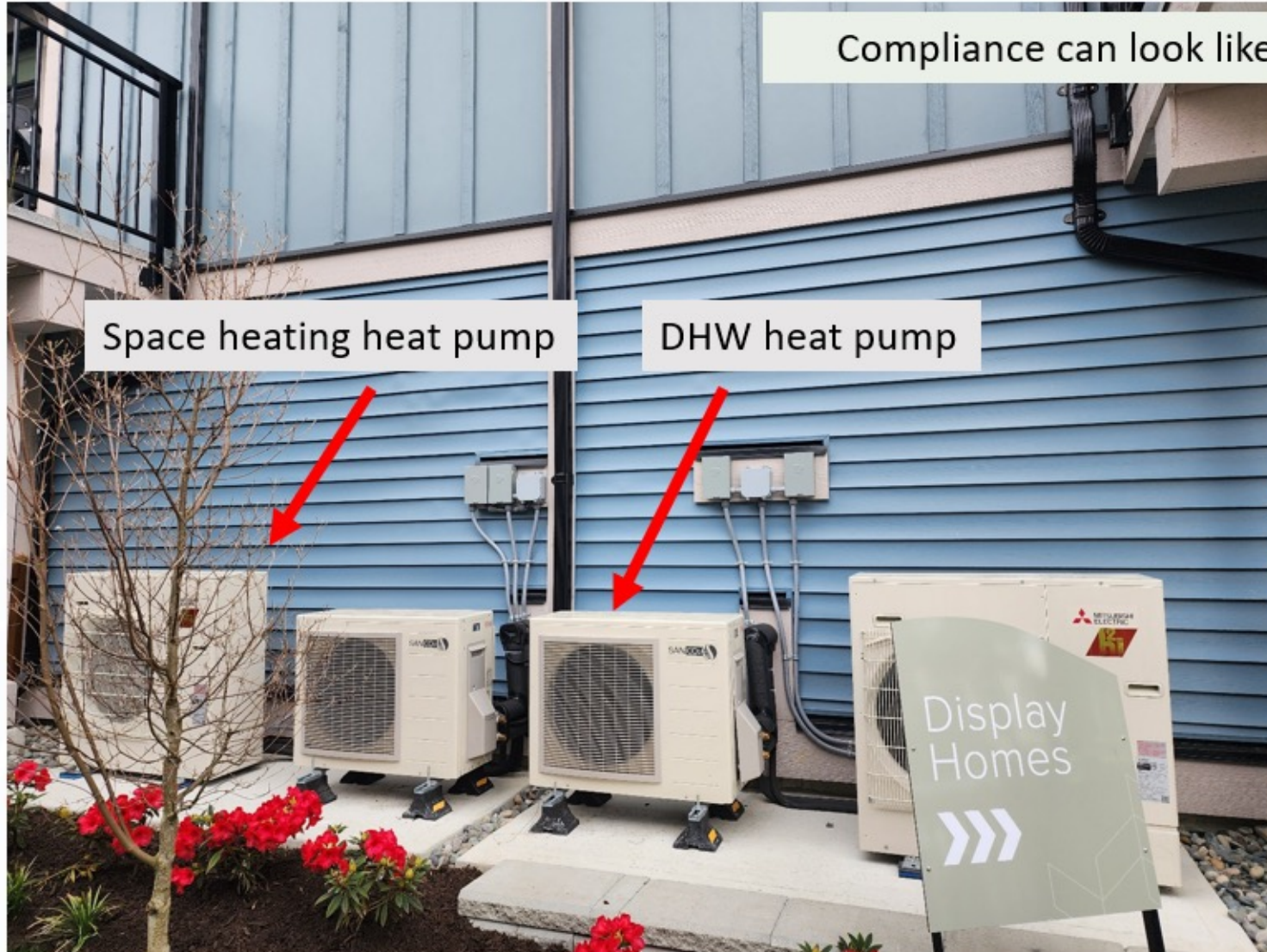
## Heat pump =

1. Generally, mandatory cooling compliance
2. Automatic EL-2 compliance
3. Supports Step Code compliance

Talk to your EA = Better compliance outcomes



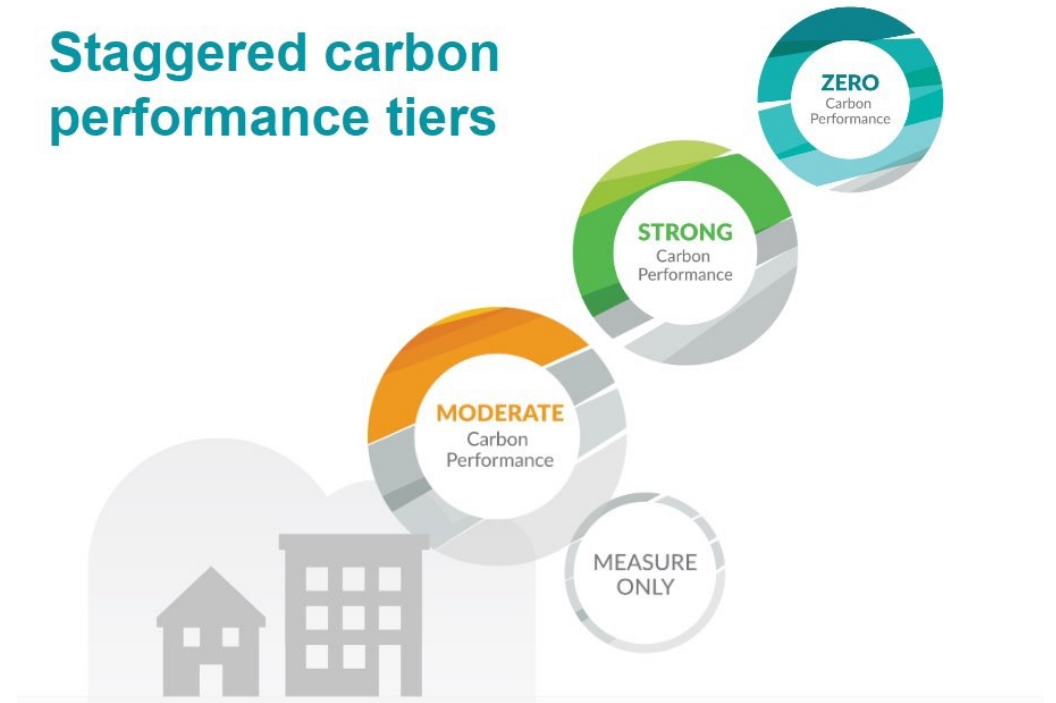
# What ZCSC Can Look Like



# Township and ZCSC/Mandatory Cooling

- Step 4 was being examined for adoption
- ZCSC pairing with Step 4 promoted compliance
- ZCSC supported Mandatory Cooling compliance
- RTC included *Alternative Recommendation: That Council approve Step 4 + EL-2 (P9)*

## Staggered carbon performance tiers



# Mandatory Cooling

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1. Work HVAC EARLY – avoid issues
  1. BP delays *can* happen
2. Work with Energy Advisor EARLY – find solutions ahead of time: ESC, ZCSC, Cooling
3. Seek resources: [tol.ca/gblearn](http://tol.ca/gblearn)



# Thank you!

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Questions?

[Greenbuildings@tol.ca](mailto:Greenbuildings@tol.ca)



# Decarb Lunch Series

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## The Cost of Zero Carbon Development

Mon May 27, 2024,  
from 12- 1pm PST  
Free Webinar | [zebx.org](http://zebx.org)

EVENT



# JOIN OUR SOCIAL

## **ZEBx Retrofit Canada Conference Social**

**Mahony's Tavern  
Vancouver Convention Centre**

**Wed Jun 12, 2024  
From 7pm PDT  
Register via Eventbrite**





YING YING GAO  
RILEY'S FISH & STEAK



ANGUS AN  
FAT MAO NOODLES



KEN NAKANO  
AURA WATERFRONT  
RESTAURANT AND PATIO



CLAIRE LIVIA LASSAM  
LIVIA FORNO E VINO



MICHAEL VARGA  
@vargacooks



# INDUCTION EATS

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from five  
gourmet chefs**

**Download the  
free cookbook** ✓



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**Blomberg**



**B2E**  
Building to  
Electrification

## Embodied Emissions

 **Stream 2**

**An applied research project for low-rise homes that minimize embodied emissions.**

## Utility Data

**Stream 4**

**A ZEBx utility data collection initiative to determine the real emissions and energy profiles of BC homes.**



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NearZero: Reaching the Top Step

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**REACHING THE TOP STEP**

Presented By:

Watch on YouTube **cleanBC**

### NearZero: Reaching the Top Step

How are homeowners, builders and designers already reaching the highest step of emission reduction requirements? We found some of them from ZEBx's NearZero program, listen to them here.

Overview

Playbooks & Winners

Is BC Ready for Electrification? B2E w BC Hydro, Sep 2023

Watch Later Share

**B2E Webinar** **BC Hydro Power smart**

**Is BC Ready for Electrification?**

Watch the Event Recorded Sep 29, 2023

Watch on YouTube

### Is BC Ready for Electrification? B2E w BC Hydro, Sep 2023

B2E, a program alongside ZEBx and part of the ZEIC family, collaborated with BC Hydro in Sep 2023 to help answer the question 'Is BC Ready for Electrification?'

Overview

B2E Resources

Life Cycle Assess...

Climati chan...

### Life Cycle Assessment Process to Estimate Embodied Carbon in Buildings

From ZEBx's Net-Zero Energy-Ready Playbook Series

Overview

Read This Playbook

Planning Airtight ...

### Planning Airtight Buildings

From ZEBx's Net-Zero Energy-Ready Playbook Series

Overview

Read This Playbook

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