



# Updated Energy Step Code and Zero Carbon Step Code Compliance and Incentive Options for New Single Detached and Duplex Homes

**City of Richmond – Climate & Environment**

# GP Committee Referral

This report responds to GP Committee Referral Motion dated July 15, 2024:

*That, in relation to the Zero Carbon Step Code and Energy Step Code in the Building Regulation Bylaw and OCP, for single-detached and duplex residential buildings, staff be directed to:*

- *Provide options for Council consideration related to the current implementation timeline; and,*
- *Clarify the role of natural gas for space heating and domestic hot water, and provide options for Council consideration.*

# Community Energy and Emissions Plan 2050

## Overall GHG reduction targets:

- Reduce community GHG emissions **50% below 2007 levels by 2030**, and
- Reach **net zero GHG emissions by 2050**

## *CEEP 2050 also includes sector-specific targets:*

### *Carbon Neutral New Buildings 2030 target:*

- “All new buildings will be serviced by low carbon energy systems and built to the top performance level of the BC Energy Step Code by 2027.”

# BC Energy Step Code

- Introduced in 2017 as a step-by-step building efficiency strategy to help the Province achieve its target of all new homes being net-zero energy ready by 2032.
- For Part 9 homes and buildings, the BC Energy Step code set five performance levels or “steps” that exceeded the base BC Building Code, with the higher steps being more energy efficient through thicker walls, more insulation, triple-pane windows to reduce energy demand.
- The process began with Step 1 as the minimum energy efficiency requirements of the BC Building Code and in 2023 minimum code requirements increased to Energy Step Code Step 3.
- Step 5 indicated the home has been constructed as net-zero energy ready.

# Zero Carbon Step Code

Introduced in May 2023 as an update of the BC Building Code to help the Province achieve net zero GHG emissions in all new buildings by 2030.

The Zero Carbon Step Code is an opt-in performance standard that sets out three levels to reduce GHG emissions from space and water heating systems:

- Moderate Carbon Performance (Emission Level [EL]-2) – must have electric hot water or space heating
- Strong Carbon Performance (EL-3) – must have electric hot water and space heating, gas ok for appliances
- Zero Carbon Performance (EL-4) - must have electric hot water and space heating, no natural gas equipment

# Current Provincial intentions for future BC Building Code minimum requirements

## Energy efficiency requirements:

- 20% more energy efficient by 2022 (~ ESC Step 3)
- 40% more energy efficient by 2027 (~ ESC Step 4)
- 80% more energy efficient by 2032 which is the net-zero energy ready standard (~ ESC Step 5)

## GHG emission requirements:

- The Province will start to mandate different Zero Carbon Step Code Levels as early as 2024 (no requirements are currently in place)
- Zero carbon new construction by 2030 (~ ZCSC EL-4)

# Richmond adoption of BC Energy and Zero Carbon Step Codes

*For new construction only Richmond has adopted:*

**BC Energy Step Code (ESC)** adopted June 2017. In force: Sept. 2017

- Increments to ESC requirements for detached houses & duplexes: 2020, 2022, and 2023

**BC Zero Carbon Step Code (ZCSC)** adopted Sept. 2023. In force: Oct. 31, 2023

# Richmond's Current Regulatory Pathway

## City's current approach:

Generally, the overarching approach is to incentivize low carbon buildings ie. allow a pathway for lower efficiency that require electric heating and cooling.

**2023 – 2024:** Natural gas is possible for space heating AND hot water for Step 5

**2025 - 2026:** Natural gas is possible for hot water ONLY for Step 5

**2027 and onward:** Natural gas is NOT possible for space heating OR hot water

**Natural gas stoves and ornamental fireplaces permitted in all options and timelines**



# Summary of proposed options

- |                 |   |
|-----------------|---|
| <b>Option 1</b> | Continue with the City's existing regulatory approach and delay next set of Step Code requirements for detached and duplex houses that is scheduled to occur as early as January 2025.  |
| <b>Option 2</b> | Continue with the City's existing approach and delay next steps to match Provincial timelines, including extending the next two increments in Step Code requirements for single-detached houses and duplexes to 2027, 2030 and 2032; providing three full years between each increment. |
| <b>Option 3</b> | Revert the City's current approach to Provincial timelines for detached and duplex houses that minimizes energy efficiency requirements within the BC Building Code increase from Step 3 to Step 4 in 2027, to ZCSC EL-4 in 2030 and from Step 4 to Step 5 in 2032.                     |

# Space Heating – Builder and Homeowners costs

Space Heating Equipment	Builder Affordability		Homeowner Affordability		
	Capital Costs	Incremental Costs	Total Lifecycle Costs (capital + operating)		
In-floor radiant systems	Gas-fired Boiler + Cooling (base case)	\$70,000	-	\$81,592	-
	Electric Boiler + Cooling	\$66,500	-5%	\$80,460	-1%
	Air-to-water Heat Pump (with cooling) & Gas Boiler as backup	\$66,000	-6%	\$75,822	-7%
	Air-to-water Heat Pump with Cooling	\$65,667	-6%	\$74,285	-9%
Forced air system	Air-to-Air Heat Pump (no gas backup)	\$34,000	-51%	\$43,908	-46%

# Hot water – Builder and Homeowners costs

Hot Water Equipment	Builder Affordability		Homeowner Affordability	
	Total Costs	Incremental Costs	Total Lifecycle Costs (capital + operating)	
Standard Efficiency Gas-Fired Water Heater <b>(base case)</b>	\$2,139	-	\$8,040	-
High Efficiency Gas-Fired Water Heater	\$4,682	<b>54%</b>	\$8,740	<b>9%</b>
Electric Water Heater	\$1,732	<b>-23%</b>	\$7,820	<b>-3%</b>
Heat Pump Water Heater	\$5,137	<b>58%</b>	\$6,900	<b>-14%</b>

Source: RDH Building Science: *Updating Efficiency Standards for Water Heaters in Existing Detached Homes* – Prepared for City of Vancouver (2024)

# Step Code Costing Estimates

Metrics	Step 3	Step 4	Step 5
Cost per square feet	\$ 430.00	\$ 432.00	\$ 438.00
Incremental cost in comparison with BC Building Code*	1.10%	1.40%	2.70%

\* Baseline is \$425 / sqft

Note: Estimated costs refer to the upfront capital costs to build a home to each Step Code level. Operating and maintenance costs are expected to decrease when building to higher levels of the Step Code.

# Potential GHG Emissions Modelling

Impact	Option 1	Option 2	Option 3
GHG emissions increase (t CO <sub>2</sub> e / year)	265	455	2,242

\*Estimated annual increase as of 2030