



**City of Surrey**  
**Energy Step Code and Climate Action**

**Virtual Builder Session Breakout – Dec. 8, 2020**  
Lise Townsend, Climate & Energy Manager



Welcome to the Surrey break-out session.

Introductions: Lise Townsend, Climate and Energy Manager; joined by Jason Owen (Manager of Sustainability and Energy Services) and Tao Jiang (Building Energy Specialist).

## Agenda



1. Introductions – who’s in the room? **Please click on link in Chat!**
2. Policy Context
3. Energy Step Code evolution and new directions
4. Approach under consideration
5. Questions



In this presentation we will present some context for Surrey’s climate policy and Step Code, some new directions and shift in focus in Step Code from the Province, and share some preliminary proposals that Surrey is considering for future Step Code updates.

## Policy Context

Energy Step Code adopted July 2018 – in effect April 2019  
Climate Emergency Declaration – Nov. 2019  
Community GHG Reduction Targets – Net Zero before 2050



GHG Modelling and Climate Plan Update - in Progress



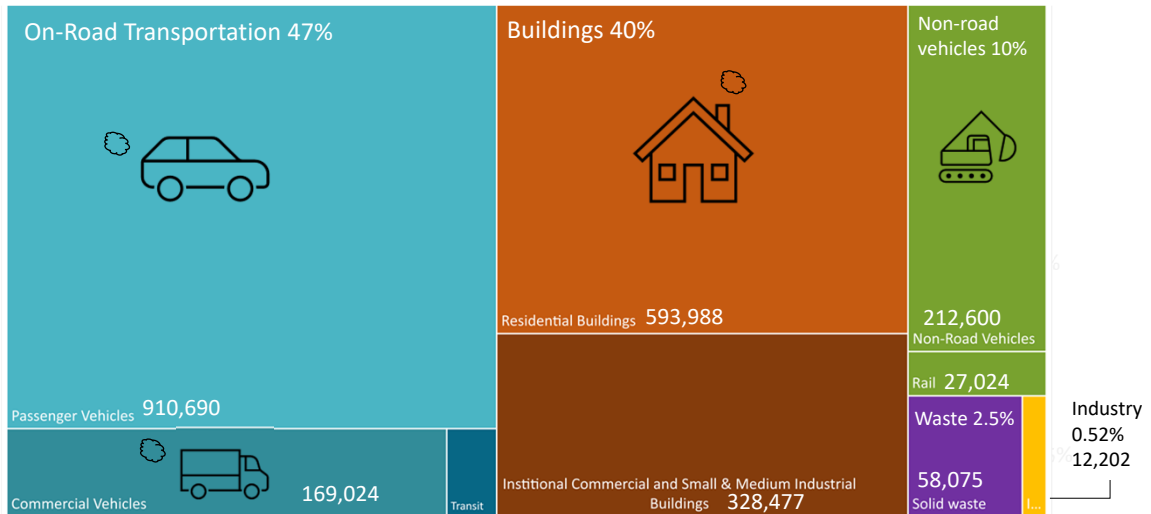
Energy Step Code Policy Update - Proposed Quick Action

Since Step Code was adopted in 2018, Surrey City Council has declared a “Climate Emergency” and established ambitious targets to get to net zero city-wide carbon pollution by 2050. We are currently in the process of updating the Climate Strategy with a roadmap to reach these targets. And updating the Step Code policy is emerging as a possible “quick action” to help reduce emissions from buildings.

# Emissions Inventory - 2020

Total: 2.3M tonnes per year

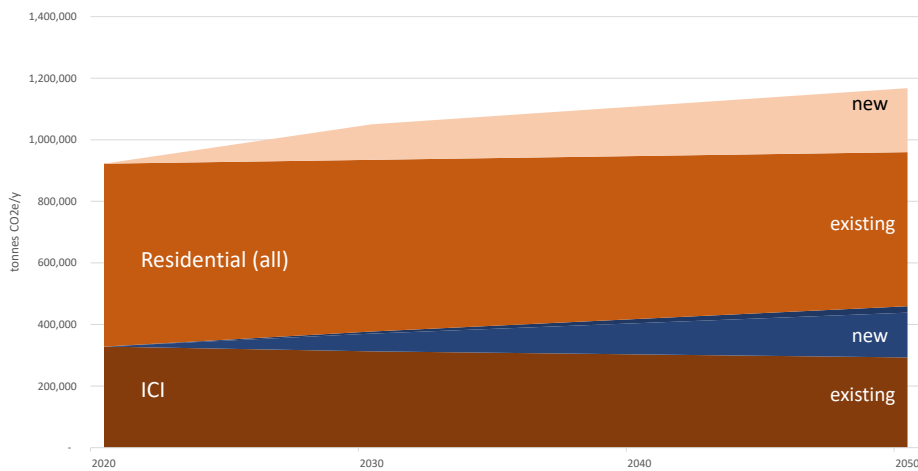
\*Preliminary results



This graph shows where carbon pollution comes from across Surrey. Buildings are responsible for 40% of this pollution, mostly from burning fossil fuels for heating.

## Business as Planned Emissions – 2020 to 2050

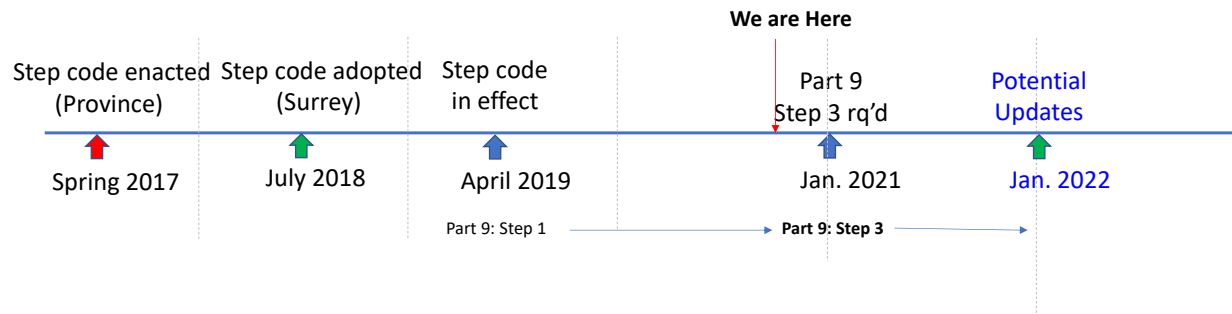
- Carbon Pollution from Buildings is projected to increase
- Will need massive retrofit program, and avoidance of new emissions, to reach net-zero targets



Looking out to 2050, building emissions are projected to increase. This “business as planned” scenario includes Step Code, and other approved regulations.

This shows that we need to do two things: avoid adding to the problem, by making new buildings zero emissions as soon as possible, and retrofitting existing buildings. This will be a huge challenge, which is why we want to focus on reducing emissions in new buildings.

# Surrey Step Code Timeline



This shows the Step Code timeline. As noted, it was adopted in Surrey in 2018, and took effect in 2019. Initially Part 9 buildings were subject to Step 1, and starting January 2021 (in a few weeks) STEP 3 will be required. The potential updates we will share here could take effect in about a year.

## Surrey: Current Requirements

Current Requirements, as per [www.surrey.ca/stepcode](http://www.surrey.ca/stepcode)

	Building Bylaw		Future Anticipated	
	Apr. 1, 2019	Jan. 1, 2021	2023	2025
Part 9 residential	Step 1	Step 3	Step 4	Step 5
Part 3 residential	Step 3, or Step 2 with LCES*		Step 4, or Step 3 with LCES	
Part 3 Group D&E	Step 2		Step 3	

LCES = low carbon energy system\*  
Currently defined based on GHG intensity @ max. 6 kg/m<sup>2</sup>/y,  
or connection to Surrey City Energy DES

This is a summary of what is currently in effect, in the Building Bylaw, and what has been “signalled” for future adoption in Council reports and on the City’s website.

As noted previously, Step 3 is in effect for Part 9. For Part 3 residential, there are two options: Step 3, or Step 2 with a low-carbon energy system, an approach I will discuss in a bit more detail in a moment.

# Roadmap to Net-Zero Energy-Ready Buildings

Timeline for Energy Efficiency Regulatory Requirements in the BC Building Code  
 Here's what the province's CleanBC plan will mean for new-construction requirements.

2032

STEP 5

STEP 4

NET-ZERO ENERGY-READY

UP TO:  
80%

2027\*

STEP 4

STEP 3

40%

2022\*

STEP 3

STEP 2

20%

\* NEW TARGET DEADLINES



PART 9 BUILDINGS



PART 3 BUILDINGS

Energy-efficiency improvement above 2018 BC Building Code requirements

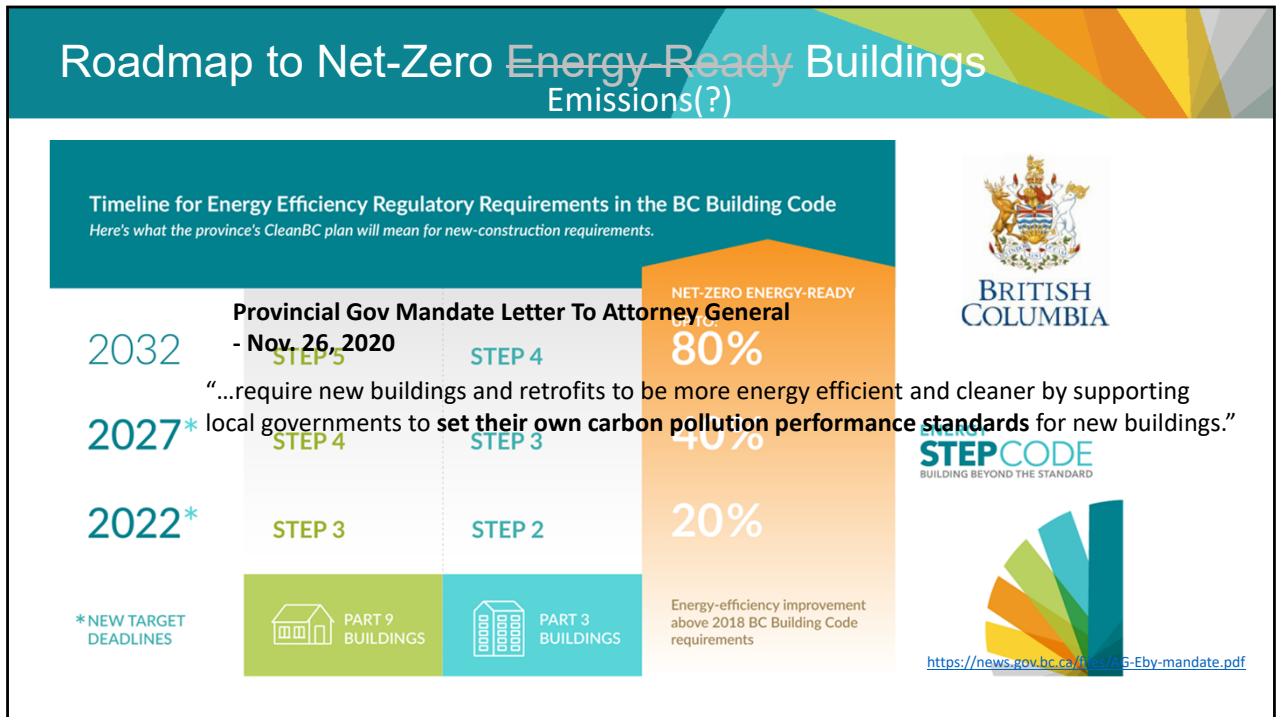
ENERGY  
STEP CODE  
BUILDING BEYOND THE STANDARD



This is the Province's published schedule for when various Step Code levels are anticipated to take effect in the minimum Building Code. Cities have the option to adopt higher steps at a sooner date. The end-goal in 2032 has previously been stated as "net zero energy ready" buildings, meaning performing at near Passive-House levels of efficiency.



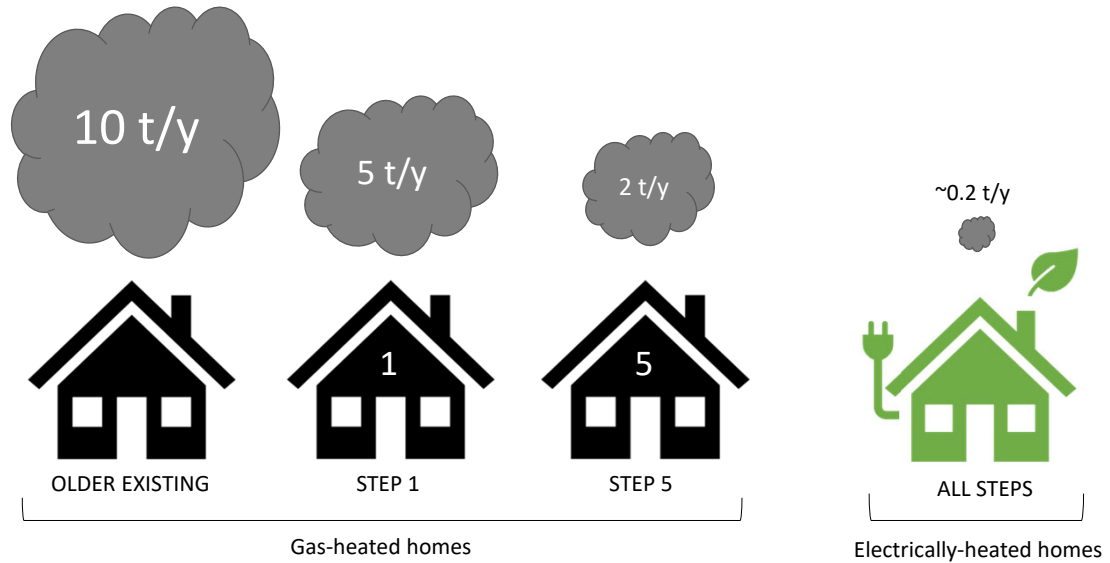
# Roadmap to Net-Zero Energy Ready Buildings Emissions(?)



Recently, the NDP government has issued some new direction on Step Code, stating that Local Governments are to be allowed to set their own “carbon pollution performance standards”. This is something that local governments, including Surrey, have been advocating for, for some time. The reason is that just achieving higher levels of energy efficiency will not be sufficient for reaching our climate targets.

This is an important change, suggesting that there is a shift occurring from a focus only on energy efficiency, to also address carbon pollution (emissions).

## Carbon pollution by Step and heating type (avg size Surrey SFD)



This graph shows how much carbon pollution is emitted by gas-heated homes at various levels of energy efficiency (Steps). Going from an older existing home to the highest Step does achieve a significant pollution reduction. However, using electricity for heating has a much bigger impact, having very low levels of pollution at ANY step. This is because of BC's green electrical grid.

The data for these estimates is from two different studies by Integral Group.

Assumptions:

Average Surrey house size: 4600SF  $\approx$  430m<sup>2</sup>

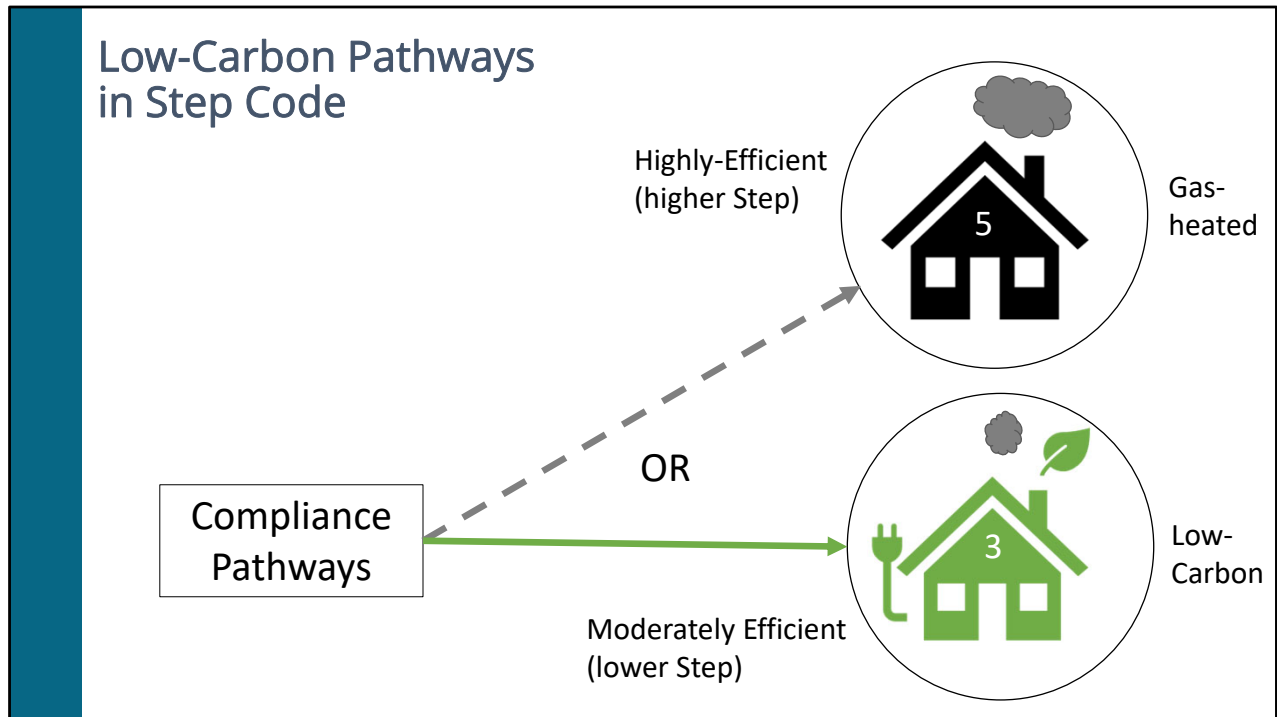
GHGI older home gas (from Richmond Integral study): 24 kg/m<sup>2</sup>/y

GHGI Step 1 gas (from Integral GHGI Implications of Step Code study): 12 kg/m<sup>2</sup>/y

GHGI Step 5 gas ( "" ): 4.3 kg/m<sup>2</sup>/y

GHGI heat pumps ( "" ): 0.38 kg/m<sup>2</sup>/y

## Low-Carbon Pathways in Step Code



In part to address this limitation of Step Code, to date a number of municipalities have put in place an option to comply with one of two pathways. This is the kind of approach Surrey has for Part 3 Residential buildings, and a number of other governments have recently also put this in place for Part 9 homes. The way it works is you can comply by building to a higher Step (using any type of heating system), OR a lower step with low-carbon heating.

## Low-Carbon Pathways in Energy Step Code

Local Governments that have enacted this type of approach to date include:

- **Part 3:** Surrey, Vancouver, Burnaby, Richmond, New Westminster, Port Moody...
- **Part 9:** Vancouver, Dist. West Van, City of N. Van, Dist. Of N. Van, Victoria, Richmond

Surrey (Part 3 Residential): Meet Step 3, OR Step 2 with a “Low Carbon Energy System”



The two-pathways approach has been enacted (or is pending) in a number of other local governments, as shown here.

## What is a low-carbon energy system (LCES)?

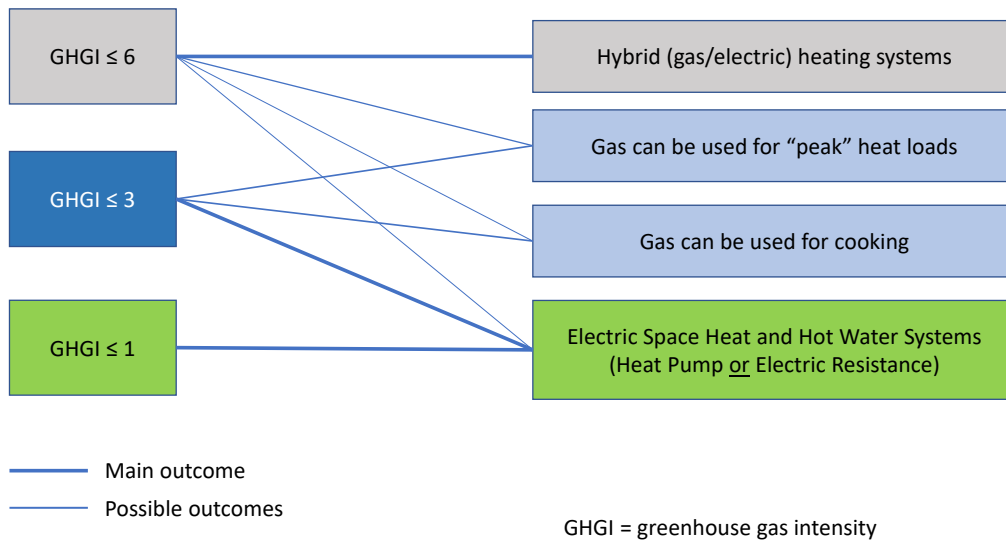
- An energy system capable of providing the **primary source** of space and hot water heating using energy that **emits very little carbon pollution**, and meets the City's greenhouse gas intensity (GHGI) limits.
- Thanks to BC's green electrical grid, this usually means electric heat.
- Electric systems can be in the form of electric resistance OR heat pump systems.
- Future GHGI Limits under consideration:

	2022	2025
Part 9 Residential	GHGI ≤ 3 kg/m <sup>2</sup> /y	All electric
Part 3 (All)	GHGI ≤ 3 kg/m <sup>2</sup> /y	GHGI ≤ 1 kg/m <sup>2</sup> /y

Surrey defines a low-carbon energy system as stated here. GHG limits are based on a “GHG intensity” (GHGI).

A GHGI of 3 is being consistently applied in most recently adopted local government policies, and is what Surrey is considering for its updated policy, potentially targeting a date of 2022. In the future, the idea would be to get to near-zero emissions with a standard specifying a GHGI of 1, or “all-electric” systems.

## Effect of GHGI



This graphic shows what kinds of systems can be used with various GHGI limits.

A GHGI of 6 allows for combined systems using some mix of electricity and gas for space and hot water heating (of course, higher proportions of electricity can also be used).

A GHGI of 3 generally means that space and hot water systems are predominantly electric.

Gas can still be used for cooking and other ancillary uses.

A GHGI of 1 means all-electric buildings.



One of the technology advances that makes an all-electric standard achievable and cost-effective is electric heat pumps. They are highly efficient, often around 300%, whereas electric resistance heating is 100% efficient, and gas furnaces and boilers are typically around 85% efficient. This means that, even though gas is currently cheaper on a per unit of energy basis, electric heat pumps are cost-competitive to operate because of their higher efficiency.

# Heat Pumps



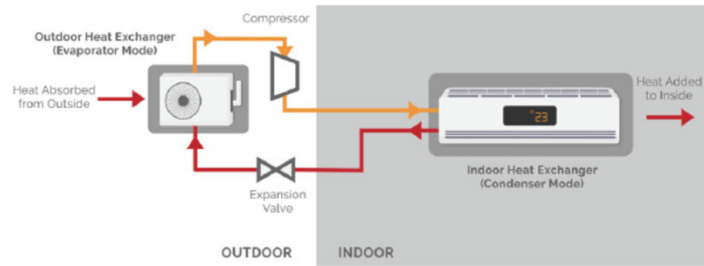
LOW-CARBON MECHANICAL SYSTEMS FOR HOUSES IN LOWER MAINLAND, B.C.

## TECHNICAL PRIMER

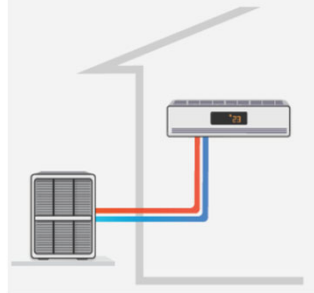
This technical primer provides an overview of the opportunities, challenges, and considerations for the use of heat pumps as a low-carbon solution for heating, cooling, and domestic hot water production for high-performance houses in the Lower Mainland, B.C.

July 2020

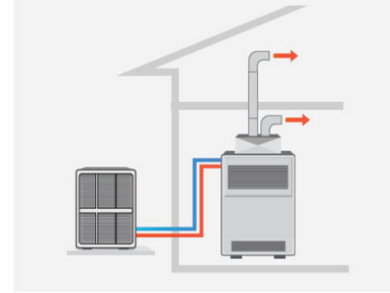
PREPARED BY



## MINI-SPLIT HEAT Pumps



## CENTRAL AIR-AIR HEAT Pumps



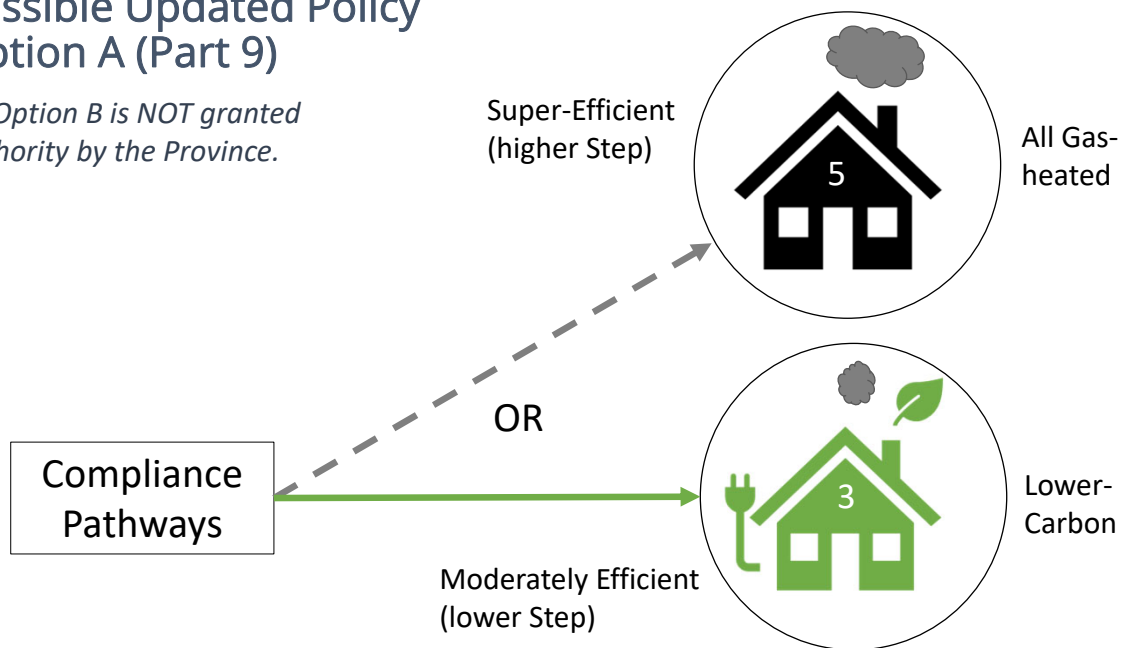
<https://zebx.org/resources/#reports>

There are many different types of heat pumps, such as air-to-air (air source heat pumps), and air-to-water. There are ductless minisplit systems used to heat smaller spaces, and central systems that can be plumbed throughout the house. Heat pumps can also be used to heat hot water, either independently or as an integrated system with space heating. This guide is an excellent resource to become better acquainted with heat pumps.



## Possible Updated Policy Option A (Part 9)

*\*If Option B is NOT granted authority by the Province.*

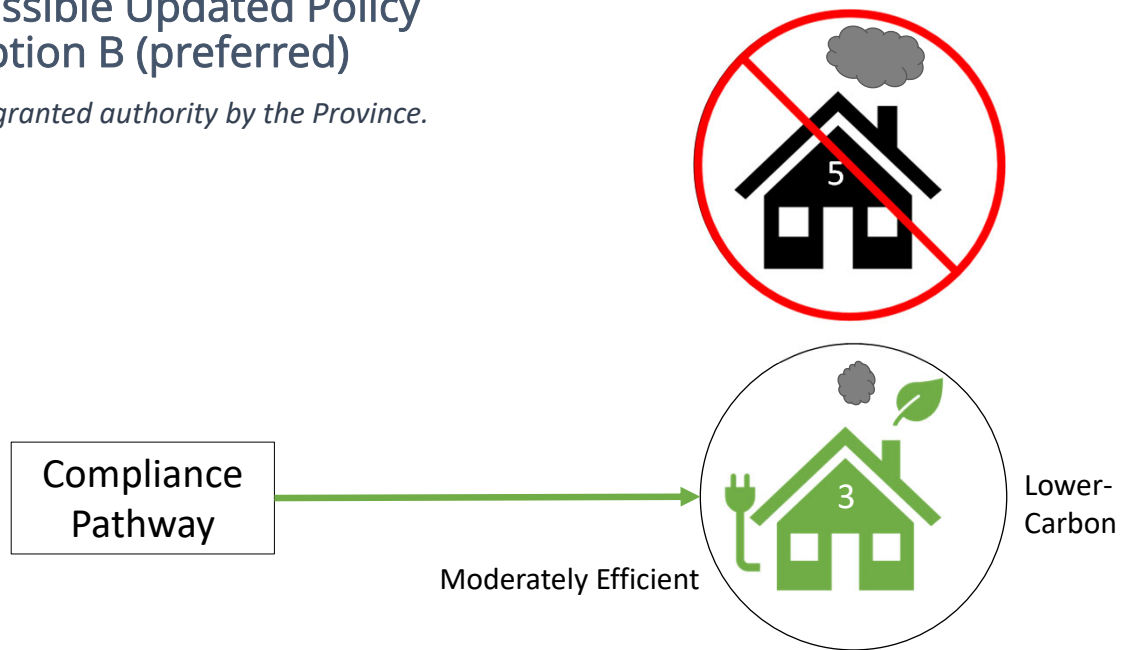


Currently, Surrey is exploring two possible options for a future policy update. It should be noted that these are preliminary proposals, and have not yet been approved by Council. We are sharing this information in order to get feedback from the community and industry, which will inform the policy.

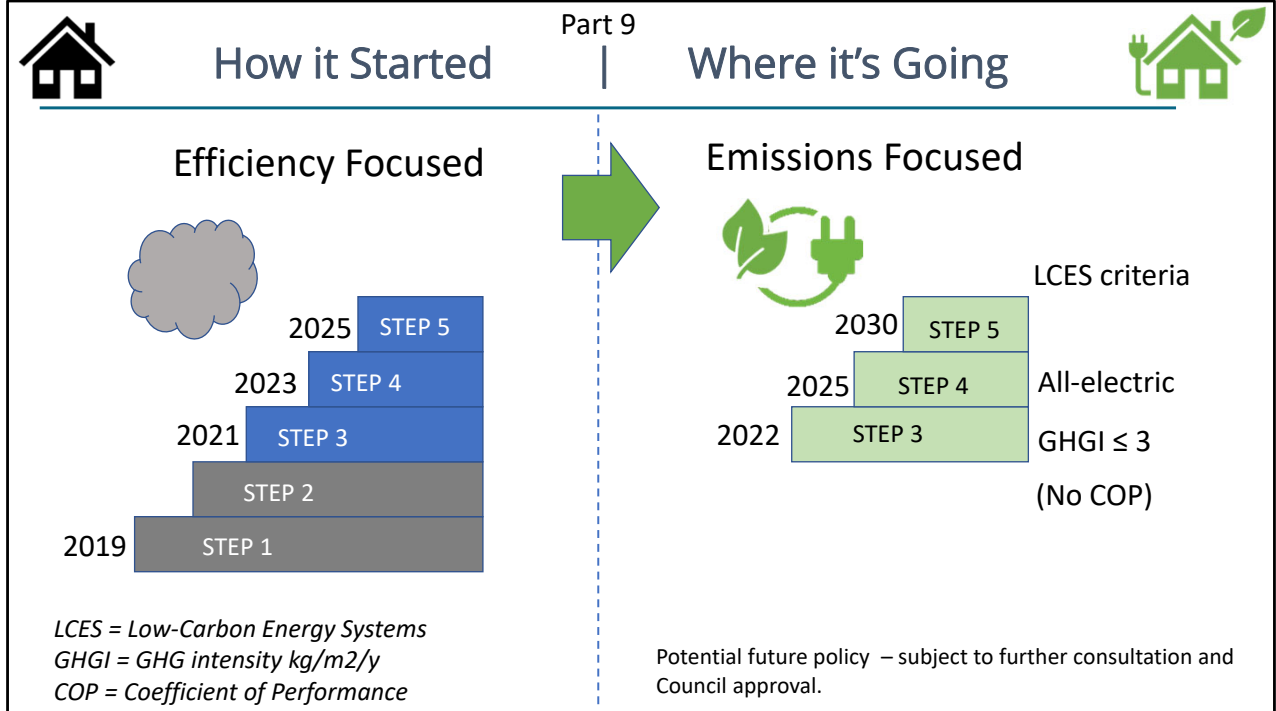
The first option being considered is the “two pathway” option that I mentioned earlier. For Part 9 homes, this approach is generally consistent with what other local governments have enacted so far. It would require Step 3 (as currently required) WITH a low-carbon energy system; alternatively, if gas is the desired heating fuel, then a higher Step (Step 5) would be required. This option assumes that the Province does not allow for Option B.

## Possible Updated Policy Option B (preferred)

*\*If granted authority by the Province.*

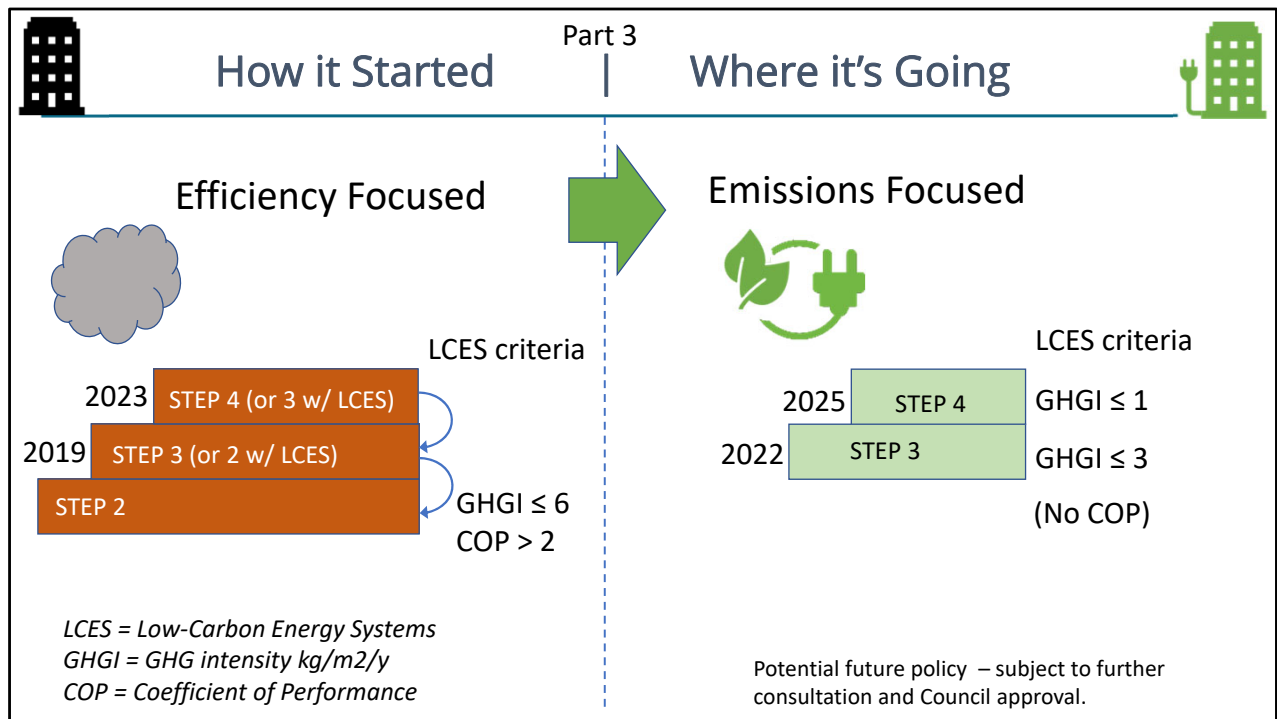


The “preferred” approach from the point of view of the City is to have just one compliance path – that is, the modest Step with a low-carbon system. This would be simpler to implement, and would better support the City’s climate targets. It would also help homeowners avoid retrofits in the future that would be needed eventually to phase out fossil fuels. This option depends on the Province following through with the recent change in authority mentioned near the start of this presentation.



Looking ahead, future requirements might look like this. Broadly speaking, we are moving from a focus exclusively on energy efficiency, to one more strongly focused on emissions reduction. On the left, we are at Step 3 in 2021. The previous schedule anticipated adopting higher Steps in 2023 and 2025. On the right, we may be looking at a slightly slower pace in adopting higher Steps, alongside standards for lower emissions. Again, this is preliminary and would be subject to further consultation and Council approval

A note on COP: Some local governments have a COP requirement, meaning that only heat pump systems (not electric resistance heating) could be included. At this time, we are contemplating NOT having a COP requirement, meaning either type of electric heating (resistance or heat pumps) could be implemented. This would allow for greater flexibility (there are pros and cons for each type of system).



A similar regime could be adopted for Part 3 residential.

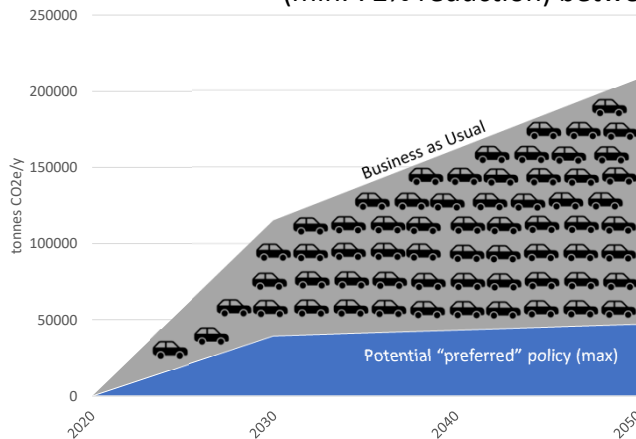
On the left, currently we are at a requirement for Step 3 or Step 2 with a low-carbon energy system; higher Steps could be in effect as soon as 2023.

Under the proposed framework, a requirement for Step 3 with low-carbon energy systems could be in effect in 2022, and moving to the highest step slightly later than previously proposed .

A note on COP: Currently Surrey’s low carbon energy system policy for Part 3 buildings has a requirement that user-owned on-site LCES meet a COP of greater than 2, meaning only heat pump systems would be allowed. We are contemplating removing this requirement to allow for greater flexibility in system design (there are pros and cons for each type of system).

## Avoided carbon pollution – preferred policy

At least 2.7M tonnes total avoided carbon pollution  
(min. 72% reduction) between now and 2050



*Equivalent to (on average),  
taking **19,444** cars off the  
roads every year for 30 years!*

*Based on Surrey GHG modelling using GHGI from Step Code Report, and Surrey buildings forecast*

This graph illustrates the potential reduction in carbon pollution that the proposed approach could achieve. The top of the grey graph shows the expected emissions with no change to the Step Code policy (“business as usual”). The “preferred policy” approach (meeting a GHGI of 3 for all residential buildings by 2022, and a GHGI of 1 or all-electric by 2025) would result in at least a 72% reduction in emissions between 2020 and 2050. Of course, emissions will continue beyond 2050, so this is conservative. This is equivalent to taking (on average) 19,444 cars off the road every year!

## We Want to Hear from You!

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- Clarification questions?
- Menti quick poll – please click on link in chat.
- Please complete our survey online before Dec. 31<sup>st</sup>
  - See link posted on website below
- Additional comments/questions can be sent to:  
[stepcode@surrey.ca](mailto:stepcode@surrey.ca)
- Stay tuned! Sign up for Step Code newsletter at  
[www.surrey.ca/stepcode](http://www.surrey.ca/stepcode)



We provided a quick poll during the session, to tell us “generally, do you support the proposed policy approach?”.

Please complete the questionnaire, and send any questions to [stepcode@surrey.ca](mailto:stepcode@surrey.ca); also stay tuned by signing up for our Step Code newsletter on the website.