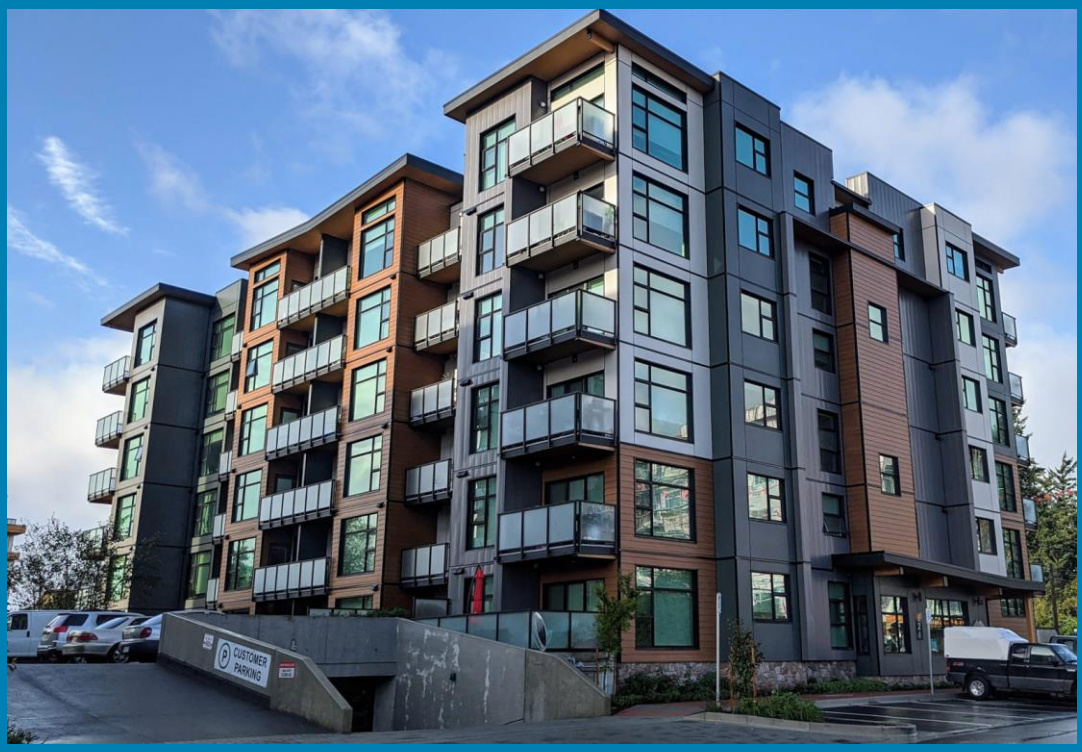
2022

# Step Code: Interim Engagement Report

Charting a Path to Net Zero Emissions Buildings in the Victoria Region




June, 2022

# Executive Summary

The City of Victoria, District of Saanich and District of Central Saanich are engaging building industry on the upper steps of the BC Energy Step Code and the implementation of low carbon energy systems in new buildings. This project is being undertaken with the support of the Capital Regional District (CRD).

This Step Code Regional Engagement Project is focused on determining the best way for local governments to use the regulatory tools available to reduce operating carbon emissions from new construction. The local governments noted above have specific carbon emission targets and Council direction that requires emissions reductions from new construction. These emission reductions need to be achieved using the BC Energy Step Code and the newly drafted Carbon Pollution Standards, which are expected to be included in the BC Building Code at the end of 2022. The mandate to advance the Step Code and the Carbon Pollution Standards is rooted in the community engagement conducted as a part of our respective Climate Plans and Council direction.

The CRD has worked closely with the noted local governments in addition to the Urban Development Institute (UDI) - Capital Region, the Canadian Home Builders Association (CHBA) - Vancouver Island and the Vancouver Island Construction Association (VICA) in designing and delivering the engagement process. The final recommendations for how to adopt the higher steps of the BC Energy Step Code and the Carbon Pollution Standard will be informed by this engagement process, which has included information sessions, an industry survey, and solutions labs to date. The final phase of engagement will include two virtual workshop sessions, a survey and the opportunity for one-on-one discussions with municipal staff. The building industry is the primary audience for this engagement effort given their key role in implementing the new standards.

This Interim Engagement Report summarises the feedback from the first phases of engagement. It will be updated following the final round of broad engagement, posted publicly and accompany local government reports to Council that present final recommendations for adoption.

The key messages communicated through the engagement to date include:

- There is agreement on the need for carbon emission reductions,
- There is support for focussing regulation on greenhouse gas emissions reduction, efficiency is secondary,

- Current Step Code requirements do not fundamentally change how homes are built, accelerating to higher step could,
- Significant lead time and grandfathering before new regulations come into effect is desired – lead time needed varies by building type,
- Construction costs a key concern,
- Simplicity in messaging -- should keep Step Code and GHGi together,
- Education/Training – labor market restrictions a concern,
- The housing availability and affordability challenge is a core consideration that forms a backdrop for this work,
- Decarbonizing is technically possible and the building industry can achieve these goals,
- Consumer understanding is lagging: consumers don't typically understand the benefits of efficiency and decarbonisation.
- Builder and trades training would support new efficiency and carbon regulations
- Regional consistency remains a priority.
- How the FortisBC grid and RNG will contribute is an open question
- BC Hydro grid capacity and connection process is an ongoing concern.

# Contents

# 1.0 Industry Engagement Overview

## 1.1 Objectives

Engagement objectives for this project were to:

1. Establish a cohort of municipalities who intend to participate in the engagement and who are interested in adopting additional Step Code and Carbon Pollution Standards to accelerate greenhouse gas (GHG) emission reductions from new construction;
2. Develop a fulsome understanding of the opportunities and challenges associated with several Step Code and GHGi adoption scenarios by providing varied opportunities for feedback from industry members; and
3. Identify a preferred adoption scenario for Councils in the Capital Region to consider through a collaborative solutions-oriented process that will achieve the greenhouse gas (GHG) emissions reductions required to meet our climate targets.

## 1.2 Engagement Process

The engagement process builds upon extensive regional industry engagement conducted in 2017 and 2018 for the initial Step Code adoption and considerable public and stakeholder engagement completed during the development of the climate action plans. The engagement has followed the process outlined in Figure 1.

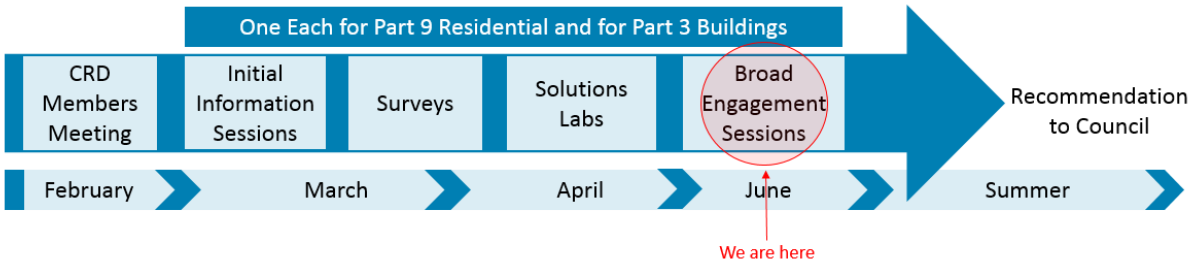



*Figure 1: Engagement Process*

**Part 9 residential buildings are residential buildings which are three stories or less, 600m² or smaller, Part 3 buildings are all buildings larger than three stories and/or larger than 600m².*

# 2.0 Engagement Opportunities

## 2.1 Industry Associations

The CRD, City of Victoria, District of Saanich and District of Central Saanich have worked closely with the Urban Development Institute (UDI) - Capital Region, the Canadian Home Builders Association (CHBA) - Vancouver Island and the Vancouver Island Construction Association (VICA) in designing and delivering the engagement process. Several meetings were held with these associations at different points throughout the project, from pre-project development through to drafting the final recommendations. This was valuable to understand industry engagement needs, identify additional stakeholders, inform the webinar and workshops/solution labs contents, advise on suitable venues/format/timing, raise awareness of the engagement and share information with their members in addition to providing valuable feedback on information gaps and areas of potential concern. The Victoria Residential Builders Association were invited to participate several times, however they declined. A letter submitted on the association's behalf by their Executive Director is attached to this package as Appendix A.

## 2.2 CRD Members Meeting

A Capital Region Local Government Step Code Workshop was held on February 9, 2022. The purpose was to ensure all local governments and electoral areas in the region were aware of the future BC Energy Step Code changes to be implemented as part of the BC Building Code and the opportunity presented by the forthcoming provincial Carbon Pollution Standards. They were also invited to collaborate or participate in the industry engagement process. The meeting sought to accomplish the following outcomes:

- Provide a background on Step Code incorporation into future Provincial Building Code updates;
- Summarize Step Code adoption, design implications, and compliance in the Capital Region (City of Victoria and District of Saanich in particular) to date;
- Provide an overview of the approaches taken to integrate GHG emissions reductions into Step Code by other local governments in BC;
- Summarize local government direction and targets for adoption of higher steps of the Step Code and GHG emissions/Low Carbon Energy Systems performance standards; and
- Outline the proposed industry engagement process and next steps.

While the project has continued to be led by the CRD, City of Victoria, District of Saanich and District of Central Saanich, several other local governments in the region have expressed interest in following the engagement process, receiving the results and understanding the final recommended pathways. Some have indicated the potential for alignment with the implemented approach.

## 2.3 Initial Industry Information Sessions

Two two-hour long virtual sessions were held with industry in early March to provide background information on the BC Energy Step Code and provincial Low Carbon Pollution Standards as a basis for the engagement process. The Part 3 building industry information session was held on March 2, 2022 and the Part 9 residential building industry was held on March 9, 2022. Each session focussed on the challenges and opportunities specific to these major building types.

The information sessions covered the following:

53 People attended the Part 9 Information Session, 66 attended the Part 3 Information Session

- Background on the BC Energy Step Code and its adoption in the capital region;
- A summary of data analysis for Step Code implementation to date (focused on the City of Victoria and District of Saanich);
- An overview of low carbon energy systems and Greenhouse Gas emission intensity (GHGi) - including the forthcoming provincial Carbon Pollution Standards;
- Provincial timeline and local government direction on implementing higher steps of the BC Energy Step Code and Carbon Pollution Standards;
- Provincial direction for 100% equipment efficiency requirements;
- Grid carbon intensity regulation (gas and hydro);
- Examples of approaches taken to achieve higher steps of the Step Code and low carbon energy systems;
- Opportunity for questions through a Q&A panel; and
- Overview of the Step Code industry engagement process and timeline, ways to provide input and next steps.

Speakers included the CRD, local government project leads and key subject matter experts, including the co-chair of the Local Government Step Code Peer Network, the Director of Electric Mobility & Low Carbon Strategies at AES Engineering who is on contract to provide technical support for local governments on matters related to the Step Code, Energy Advisors, builders, designers and architects.

Participants were encouraged to provide feedback via the industry survey and participate in future rounds of engagement, including the Solutions Labs.

## 2.4 Industry Survey

The survey focussed on identifying technical and process constraints that the industry might face with the adoption of higher steps of the Step Code, developing an understanding of industry knowledge of the GHG intensity (GHGi) metric and Carbon Pollution Standards regulation, and establishing a baseline for how challenging the Step Code has proven to be to date. The survey was hosted by the CRD and open for feedback from March 2 – March 27.

The industry survey was distributed to the attendees of the initial information sessions, emailed to the full stakeholder project list (with approximately 260 industry contacts), promoted through the construction industry association newsletters and posted on local government webpages and planning/building inspection counters. 31 industry members completed the survey.

## 2.5 Solutions Labs

The Solutions Labs involved convening small groups of industry members to discuss the feedback from the survey and a short-list of adoption scenarios to determine an optimal path forward to decarbonize new construction. Two three-hour in-person sessions were held on April 20, 2022 - one focussed on Part 9 buildings and one on Part 3 buildings. There were 15 people in addition to municipal staff at the Part 9 workshop, they included Energy Advisors, Builders, and home designers. There were 18 people in addition to municipal staff at the Part 3 workshop, they included energy modellers, developers, Builders, Architects, and mechanical engineers.

*Recruitment*

The Solutions Labs participants were recruited by invitation. Those who completed the survey had the opportunity to volunteer for the solutions lab they were interested in and all of those who volunteered received an invitation to participate. Recruitment via direct contact (email and phone) followed. Companies that were relatively frequently either submitting or supporting the submission of building permits were invited to attend. A balance between design professionals (e.g. architects, home designers, Energy Advisors, energy modellers and engineers) and builders and developers was sought to ensure a fulsome and informed discussion.

## 2.6 Final Phase - Broad Engagement Sessions, Survey & Indivdiual Meetings

The final broad engagement sessions are open to all industry stakeholders (including local government staff) who wish to attend and will seek feedback on the proposed adoption pathways.

The format of these sessions will include a presentation that will cover the engagement to date, a recap of the Carbon Pollution Standard and the proposed adoption pathways. After the presentation there will be breakout room discussions, followed by a plenary Q&A and several polls.

The engagement sessions will be supported by a final survey that will collect additional feedback on the proposed adoption pathways. Individual meetings with local government staff leading the project will also be offered to increase reach and the opportunity to provide feedback.

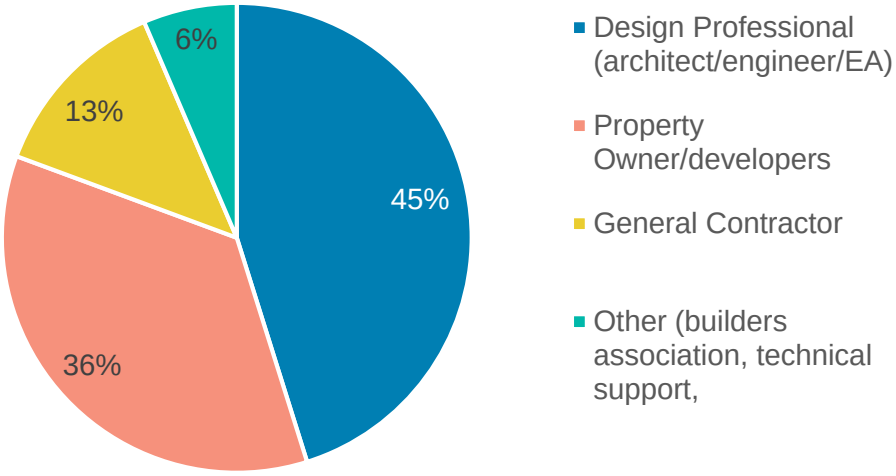
Feedback from this final phase of engagement will be used to review and finalize a recommended pathway for adoption that will be presented to the noted local government Councils for their consideration in early summer 2022.

# 3.0 What We Heard

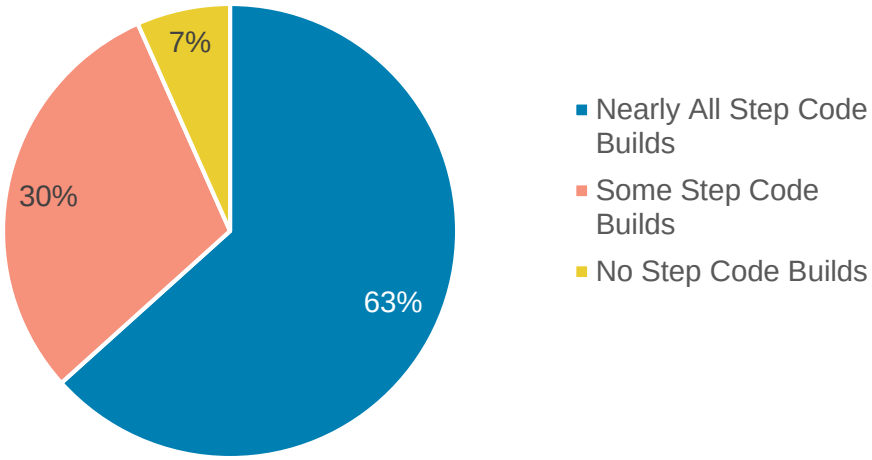
The following sections summarize the feedback that has been received throughout the engagement efforts to date (phase 1 and 2 – this does not include the final round of engagement).

## 3.1 Industry Survey Results

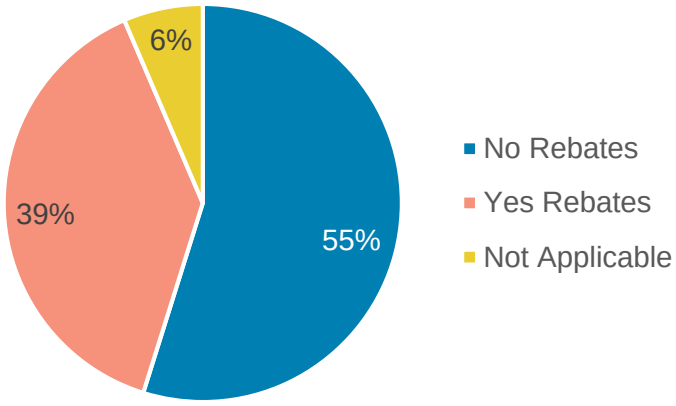
**How would you describe your role as it relates to development and buildings?**




**Do you currently build or contribute to the design of new buildings that achieve (or are designed to achieve) Step Code compliance?**



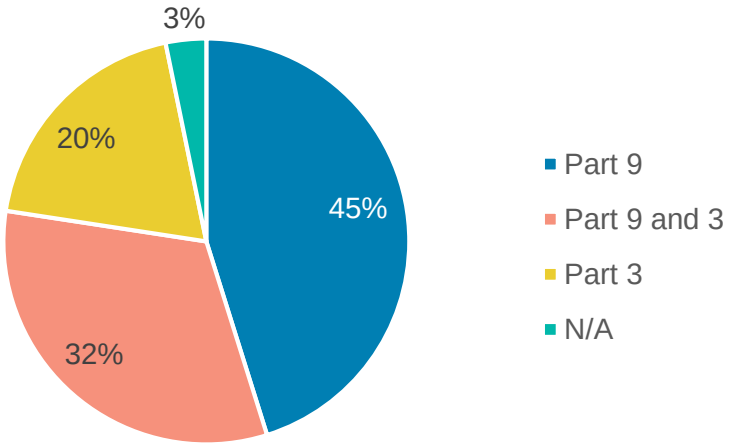
**Have you accessed any rebates to comply with Step Code?**




**Which rebates have you accessed?**

| Program Identified | Number of Responses |
|---|---|
| CleanBC Better Homes New Construction Program | 11 |
| CleanBC Commercial New Construction Program | 2 |
| Local government Step Code implementation | 4 |
| FortisBC New Home Program | 8 |
| Mid-construction blower door test rebate | 4 |
| FortisBC Commercial New Construction Performance Program | 2 |

**What type of buildings do you construct or design?**



### 3.1.1 Part 9 Residential Specific Responses

**For Part 9 residential Step 3 compliance, which of the following is the most challenging part of a project?**

| Building Component | Responses |
|---|---|
| ACH | 4 |
| All Equally Challenging | 6 |
| Enclosure | 3 |
| Not Challenging | 8 |
| Mechanical | 3 |
| No Answer | 7 |

**Please explain why (optional):**

The common themes for this open-ended question were:

- Step 3 is an achievable standard
- Cost is a top concern
- Design is key to meeting targets
- Consumer demand lags creating challenges for contractors
- Heat pumps are not the only option for GHG reduction

See Appendix B: Completed Open Ended Question Responses for complete comments.

**For Steps 4 and 5 compliance, which of the following is likely to be the most challenging part of a project?**

| Building Component | Response |
|---|---|
| ACH | 8 |
| All Equally Challenging | 6 |
| Enclosure | 3 |
| It wasn't challenging | 2 |
| Mechanical equipment and systems | 5 |
| No Answer | 7 |

**Please explain why (optional):**

The common themes for this open-ended question were:

- Concern related to higher technical difficulty
- The need for education was emphasized
- Air tightness in particular was identified as a challenge
- Lack of consumer demand was mentioned
- Concern about unintended consequences of higher efficiency was raised

See Appendix B: Completed Open Ended Question Responses for complete comments.

**Please pick the top two challenges you anticipate for achieving the required Air Changes per Hour (ACH50) for the upper steps (Steps 4 and 5).**

| Challenges | First Choice | Second Choice |
|---|---|---|
| Availability of appropriate building materials | 2 | -- |
| Availability of required expertise | 13 | 1 |
| Ensuring performance at completion | 1 | 5 |
| Incremental cost increase | 1 | 9 |
| Time to master construction details | 2 | 4 |
| Design impacts related to building form and exposure | 5 | 2 |
| No second choice | -- | 3 |
| No Answer | 7 | 7 |

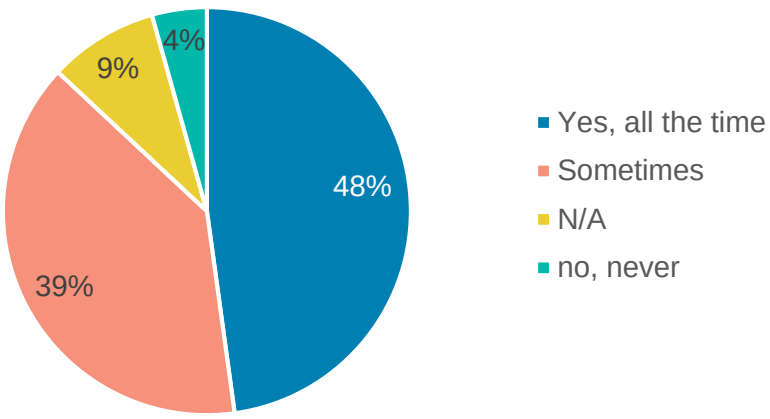
**Please explain why (optional):**

The common themes for this open-ended question were:

- Mid-construction blower door tests are critical to success
- Achieving the ACH target is difficult
- Education is essential
- Consumer education will be needed

See Appendix B: Completed Open Ended Question Responses for complete comments.

**Do you typically conduct a blower door test?**




**Please pick the top two challenges you anticipate for achieving the required enclosure/envelope efficiency targets for the upper steps (Steps 4 and 5).**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Availability of appropriate building materials | 2 | -- |
| Availability of required expertise | 8 | 1 |
| Design impacts relating to building form | 9 | 2 |
| ensuring performance at completion | 2 | 2 |
| Incremental cost increase | 3 | 10 |
| Time to master construction skills | -- | 5 |
| no second choice | -- | 4 |

**Please explain why (optional):**

The common themes for this open-ended question were:

- Detailed planning and design important
- Education should come before higher standards
- Increase costs a concerns

See Appendix B: Completed Open Ended Question Responses for complete comments.

**Please pick the top two challenges you anticipate for achieving the required mechanical equipment and systems efficiency for the upper steps (Steps 4 and 5).**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Availability of Appropriate Equipment | 7 | -- |
| Considering design of building as whole system | 9 | 1 |
| Incremental Cost Increase | 2 | 7 |
| Installation expertise | 2 | 2 |
| Meeting DHW Demand | 1 | 2 |
| Meeting Space Heating Demand | 2 | 1 |
| Meeting Ventilation | 1 | -- |
| No second choice | -- | 5 |
| Electrical Energy on Grid | -- | 1 |

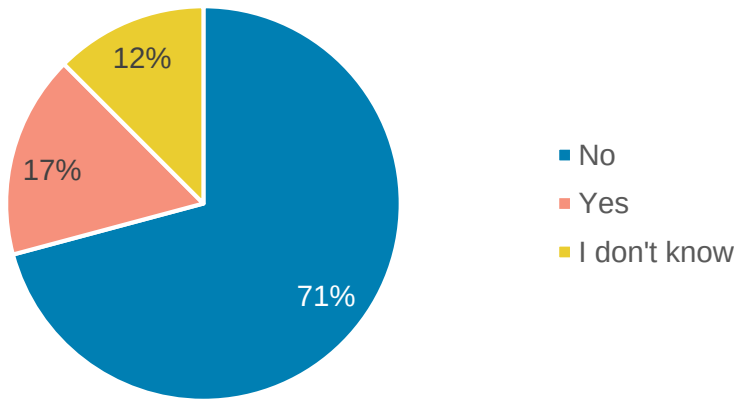
**Please explain why (optional):**

The common themes for this open-ended question were:

- Challenges with supply chain and access to equipment such as air to water heat pumps were the primary points raised
- Conflicting regulatory standards (zoning bylaws) a challenge for some sites

See Appendix B: Completed Open Ended Question Responses for complete comments.

**Do you feel there are barriers to implementing low carbon energy (electric) space heating systems in new buildings?**



**If Yes - What are the barriers to implementing low carbon energy (electric) space heating systems in new buildings?**

| Challenges | Responses |
|---|---|
| Incremental cost increase | 3 |
| Electrical service | 2 |
| Operating costs | 2 |
| Availability of appropriate equipment | 2 |
| Confidence in relatively new practices/equipment | 1 |
| increased electrical loads | 1 |
| Would require business model change | 1 |

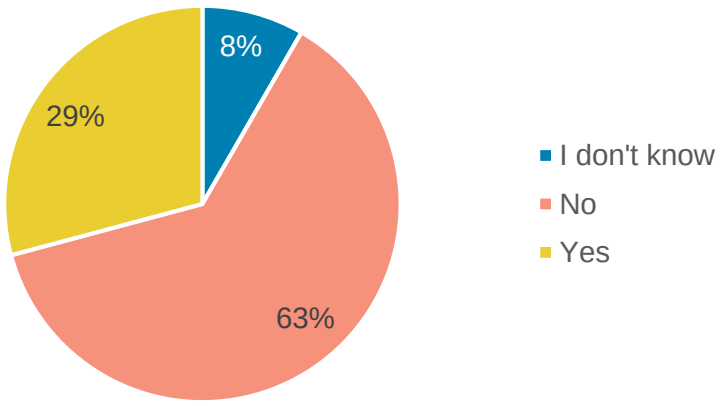
**Please explain why (optional):**

The common themes for this open-ended question were:

- Increased installation and operating costs
- Heat pumps already common practice

See Appendix B: Completed Open Ended Question Responses for complete comments.

**Do you feel there are barriers to implementing low carbon energy (electric) <u>domestic hot water systems</u> in new buildings?**



**If Yes - What are the barriers to implementing low carbon energy (electric) domestic hot water systems in new buildings?**

| Challenges | Responses |
|---|---|
| Availability of appropriate equipment | 3 |
| Confidence in relatively new practices/equipment | 3 |
| Electrical service | 3 |
| Incremental cost increase | 3 |
| Operating costs | 3 |
| Design (availability of required expertise) | 1 |
| Market demand for gas boilers won't change any time soon | 1 |

**Are there other challenges or opportunities related to Low Carbon Energy Systems (electric) that you would like to share?**

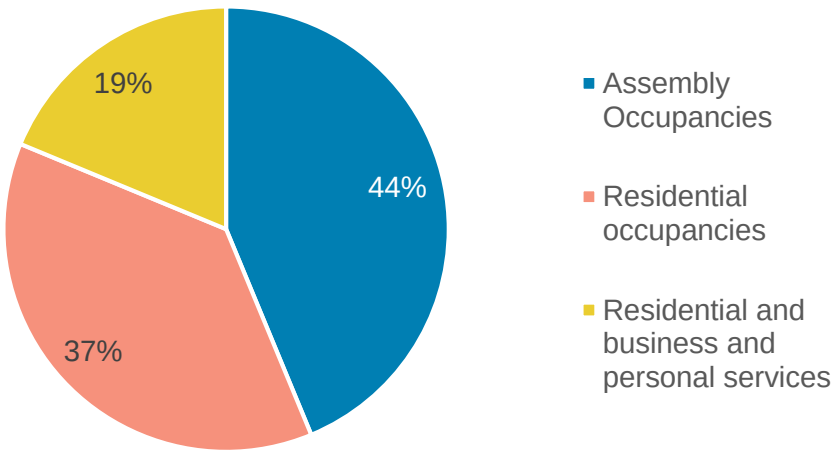
The common themes for this open-ended question were:

- Increased cost
- Electrical service costs a concern
- Heat pumps and electric hot water already common

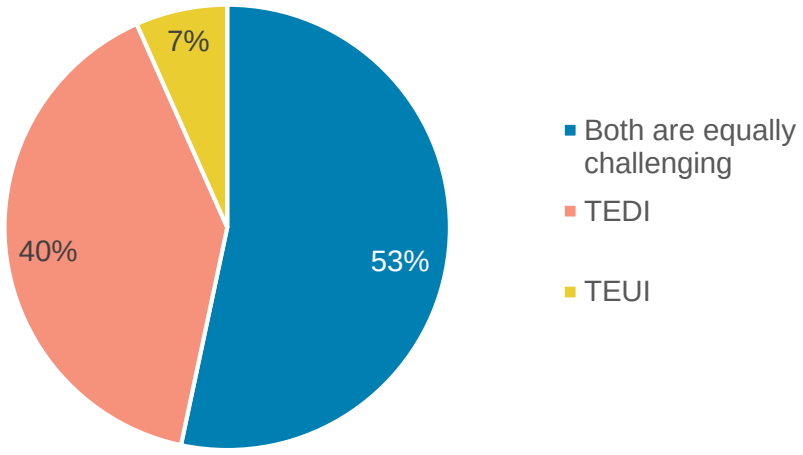
See Appendix B: Completed Open Ended Question Responses for complete comments.

### 3.1.2 Part 3 Residential and Commercial Responses

**What part 3 occupancies do you typically build?**



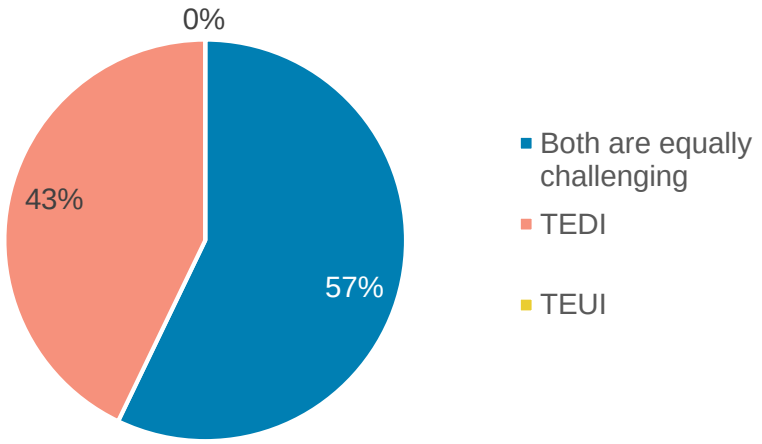
**For the lower steps (Steps 2/3) which Step Code metric presents the greatest challenge to comply with?**




**Please explain why (optional): (all submitted comments)**

- The cost impact of step code was vastly underestimated by governments. With the rising cost of materials, there is no such "Affordable housing." Talk to builders about the real costs of windows, doors, insulation.
- The lower steps are not difficult to achieve but there are costs associated with choices. However as global warming accelerates, we will be going to an emphasis on cooling versus heating and we should be weighing how new buildings should be designed to either meet or be adapted for these scenarios.
- Energy required for ventilation is often a big hurdle.  ERVs are an easy solution. Buildings with unfavorable geometry can make TEDI an issue.
- Depends on the building type and density. High density buildings almost get a free pass on TEDI while the TEUI is a challenge. Low density buildings have a challenge to meet TEDI

**For the upper steps (Steps 3/4) which Step Code metric do you anticipate will present the greatest challenge to comply with?**




**Please pick the top two challenges you anticipate for achieving the required Thermal Energy Demand Intensity (TEDI) for Step 4 (for Part 3 mid-rise/wood-frame buildings 6 storeys and under) or Step 3 (for Part 3 concrete high-rise residential buildings 7+ storeys or commercial).**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Design impacts relating to building form and exterior insulation | 5 | 2 |
| Incremental cost increase | 2 | 6 |
| Ensuring performance at completion | 2 | 2 |
| Availability of appropriate building materials | 2 | -- |
| Availability of required expertise | 2 | -- |
| Time to master construction details | 1 | -- |
| No Second Choice | -- | 3 |

**Please explain why (optional): (all submitted comments)**

- One of our commercial office projects was used as a Step Code case study. The buildings were designed before the Step Code but they were targeting better-than-Code energy performance for LEED certification. One part of the building had been constructed using a raised floor and the energy saved by displacement ventilation helped the project meet Step 3 requirements; the part of the project without the raised floor could only achieve Step 2. The raised floor is an expensive system and also some Clients are not yet comfortable with it from an occupant experience point of view. We know designing to Step 3 for concrete buildings is going to be challenging and will require us to take a more simplified approach to building shape & articulation.
- Appropriate building materials are available, but the additional cost for additional insulation, additional steps in construction, or more efficient products is unpalatable to many clients.
- Airtightness is such a high contributor to heat loss that it CAN'T be ignored for a high-performance building, however many contractors don't have a good grasp on what results they can achieve and what is required to achieve them. I have gathered a personal collection of results over the past few years and know the team can pursue lower airtightness with a particular pre-fab builder, but generally don't have confidence in any other builder meeting any result higher than the default assumption give in CoV modelling guidelines.
- The cost impact of step code was vastly underestimated by governments. With the rising cost of materials, there is no such "Affordable housing." Talk to builders about the real costs of windows, doors, insulation.
- Basically this is now crucial in schematic design and requires more input from the whole design team.

**Please pick the top two challenges you anticipate for achieving the required Total Energy Use Intensity (TEUI) for Step 4 (for Part 3 mid-rise/wood-frame buildings 6 storeys and under) or Step 3 (for Part 3 concrete high-rise residential buildings over 6 storeys)**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Design (availability of required expertise) | 3 | 1 |
| Availability of appropriate equipment | 3 | -- |
| Incremental cost increase | 1 | 4 |
| Meeting cooling demand | 2 | 2 |
| Confidence in relatively new practices/equipment | 2 | 1 |
| Common area make-up air units | 1 | 1 |
| Domestic hot water demand | 1 | 1 |
| Common Area Space Heat | -- | 2 |
| Unit space heat | 1 | -- |
| Ventilation | -- | 1 |

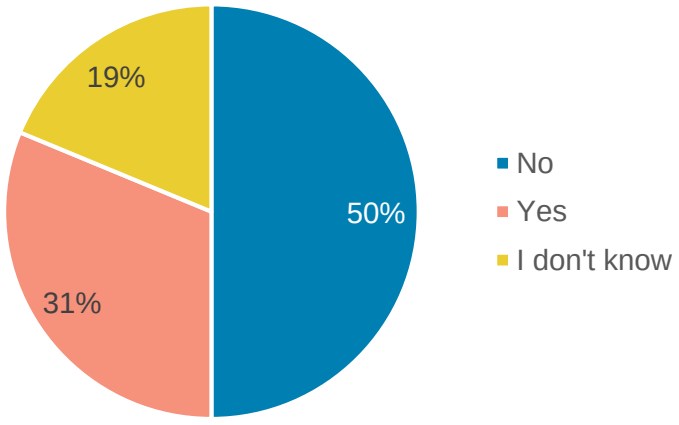
**Please explain why (optional): (all submitted comments)**

- In a seniors housing project we were looking at common floor lounges to be air conditioned as an area of refuge during summer heat waves and the challenge of working within the parameters.
- We currently have a TEDI/TEUI reduction factor for corridor pressurization, but this is still real-world energy that is being consumed (and usually on-site gas combustion). Improving airtightness of internal partitions between suites and ventilating the corridors and common areas with a heat-recovery system represents a significant real-world (and modelled) energy savings (even with the reduction factor).
- Pressurization of MURB corridors with door undercuts at each suite is so ingrained to prevent odours that a learning curve is needed to shift toward more efficient strategies.
- Domestic hot water energy consumption requires newer and more expensive tech to improve.
- Designing for complex urban sites will be a challenge, in terms of site orientation and building articulation to address fit to context.

**Overall, what do you feel are the top two key barriers to adopting the higher steps of the Step Code?**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Additional construction costs | 9 | -- |
| Knowledge of energy efficient building practices among architects | 5 | 2 |
| Lack of consumer demand for energy-efficient buildings | -- | 6 |
| Potential compliance challenges | 1 | 2 |
| Difficulty coordinating developers, builders trades, architects, and energy modellers | 1 | -- |
| Knowledge of energy efficient building practices among the trades | -- | 3 |
| Lack of information and training on the BC Energy Step Code | -- | 2 |

**Do you feel there are barriers to implementing low carbon energy (electric) space heating systems in new buildings?**



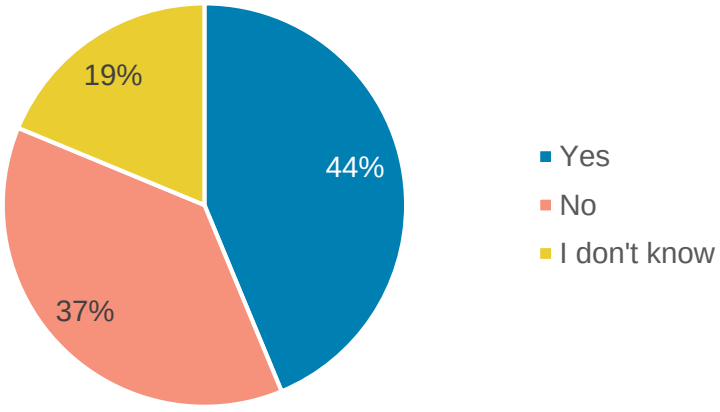
**Please pick the top two challenges you anticipate for using low carbon energy (electric) space heating systems in new buildings.**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Availability of appropriate equipment | 3 | -- |
| Confidence in relatively new practices/equipment | 3 | -- |
| Electrical service | -- | 5 |
| Common area make-up air units | 2 | -- |
| Design (availability of required expertise) | 1 | 2 |
| Incremental cost increase | 1 | 2 |
| Operating costs | 1 | 2 |
| Meeting cooling demand | 1 | 1 |
| Ventilation | 1 | -- |
| Installation | 1 | -- |
| Common area space heat | 1 | -- |
| Unit space heat | -- | 1 |
| No second choice | -- | 1 |
| None | 1 | 1 |

**Please explain why (optional): (all submitted comments)**

- On a project to avoid gas use, all systems are electric including central hot water. This required bringing 3 phase power to the site from 4 blocks away.
- We're seeing more MURBS designed with heat pumps to provide cooling, (out of concern for summer heat dome risks). Routing of services and locating units on the roofs is challenging.

**Do you feel there are barriers to implementing low carbon energy (electric) domestic hot water heating systems in new buildings?**



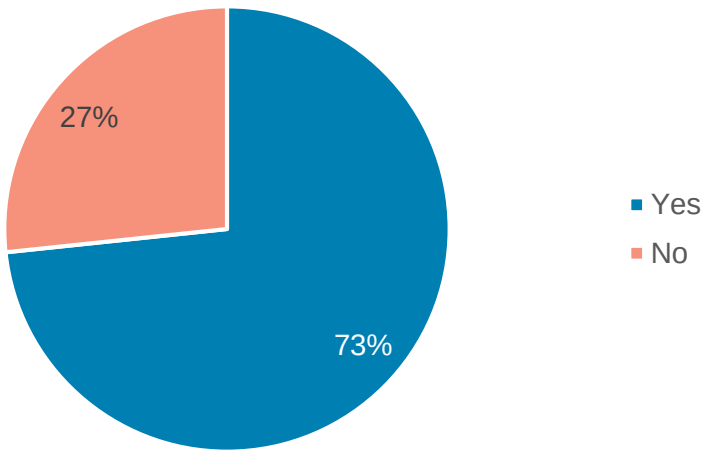
**Please pick the top two challenges you anticipate for using low carbon energy (electric) domestic hot water systems in new buildings.**

| Challenges | Choice 1 | Choice 2 |
|---|---|---|
| Operating Costs | 5 | -- |
| Electrical Service | -- | 6 |
| confidence in relatively new practices/equipment | 3 | 1 |
| Incremental cost increase | 2 | 4 |
| Availability of approriate equipment | 3 | -- |
| Design (availability of required expertise) | 2 | 2 |
| No second choice | -- | 2 |

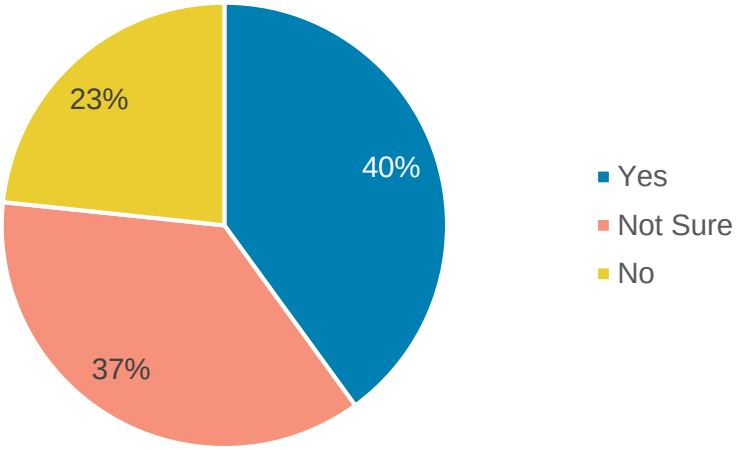
**Are there other challenges or opportunities related to Low Carbon Energy Systems (electric) that you would like to share? (all submitted comments)**

- On demand hot water is a must have for every new home. I do not believe an electric unit can operate at the required level
- The opportunity is that industry will rise to the challenge so moving to a Low Carbon legal requirement will spur on the industry. Of course hydrogen is still an opportunity.

**Have you participated in any Step Code specific training or training that would support you in developing higher steps of the Step Code or implementing Low Carbon Energy Systems?**



**Is there sufficient training available to support you in adopting higher steps of the BC Energy Step Code and Low Carbon Energy Systems?**




### 3.1.3 All Building Types Responses

**Do you have any other comments or suggestions on how local governments within the capital region could support industry in adopting higher steps of the BC Energy Step Code and Low Carbon Energy Systems? (all submitted comments)**

- Educate consumers about energy efficiency and comfort.
- The cost impact of step code was vastly underestimated by governments. With the rising cost of materials, there is no such "Affordable housing." Talk to builders about the real costs of windows, doors, insulation. I have priced out homes where the window cost increased by nearly $8000.
- The tighter we build homes, with more dependency on mechanical ventilation, puts that house at risk to be non functional/ dangerous/ unhealthy during periods without energy or emergencies. Say compared to a log home heated with wood? Are we building better? Is more complicated, greater engineering a better solution? or should we perhaps look from different angles. And perhaps have a few paths to choose? Easy to build super high efficient homes when money is not an issue, but with the housing market hitting all time highs, how does the future look. Good for people with bottomless pockets, not so good for average working family who can't afford maintenance/repairs or upkeep and will let systems deteriorate due to their income status. Perhaps we should look a lower cost and or simpler alternatives at the same time. If you add in all the

energy it takes to build the components needed for construction, it's possible you'd not break even with cost/energy/ carbon footprint?

- This is a phased solution and timing is critical. BC Housing projects are getting industry to rise to the challenge and Governments should legislate min Step Code requirements (also needs to adopted province wide).
- Not currently building.
- Steps 4 and 5 should not be considered until mandatory training has taken place through BC Housing for Steps 4 & 5. In addition. the steps should not be implemented at the local govt level before being mandated in the BC Building Code. fast-tracking energy efficiency leads to unintended consequences like leaky condo, asbestos & urea formaldehyde in the past.
- Follow the National Building Code, do not leap forward without proper diligence.
- The most bureaucratic, and costly municipalities are only ones pushing this, STOP, it costs more to build and takes 3X as long to get permits in these jurisdictions, you wont save the world but you add to the number families that have to move to westshore or up island for affordable and timely construction. Whole seminar and this survey are BIASED and leaders have no intent to listen to majority of industry saying enough is enough...
- Speed up DP permits for high performance buildings to incentivize higher steps. Considering how long the DP processes take, if it is possible to fast-track buildings that meet higher performance targets it might be worth the additional costs.
- Allowing flexibility to conform with a lower step if a LCES is used.
- Stability - i.e - sufficient notice of when requirements will increase, early notice of the intended path.
- Some flexibility to reduce window sizes from development permit submission drawings without restarting the process. Development permit applications are often done before an energy modeller is engaged and the drawings are submitted with WWR>40%. When I ask if reducing some window sizes is possible in some key locations to improve energy performance, the response is that we can't change the external design of the building from the development permit application. This results in inefficient buildings when the architect sends in a preliminary fancy looking rendering for development permit with huge windows.
- In this Survey, there is nothing on updating or improving older homes that are far worse GHG pigs then new homes. Some older homes are 15-20 Air Changes per hour 30- 40 times more then a Step Code 5 home. GHG is still GHG right. Why do condo buildings with up to 200 plus units only have to achieve a Step Code 2 in the same municipalities that have Step Code 3?
- give info to home owners.

- This is tricky.  LG's can require Step Code compliance for issuing permits and occupancy, but it's more like negative attitudes that hinder the implementation of higher steps.
- Offer more training for air barrier installations and details.
- More hands-on training will demystify the process, increase industry uptake, and improve quality of final construction details.

## 3.2 Solutions Labs

The Solutions Labs convened two small groups of building and development industry professionals to discuss in detail several proposed Step Code and Carbon Pollution Standard adoption timelines and approaches. These sessions were small groups by design to facilitate in-depth discussions.

Both Solutions Labs followed this agenda:

- Welcome and Introductions
- Impromptu networking
- Introductory Presentation
    - Survey Results
    - Current Policy Options
- Challenge Identification
    - Individually
    - Table
- Whole group discussion
- Whole group agreement certainty matrix exercise

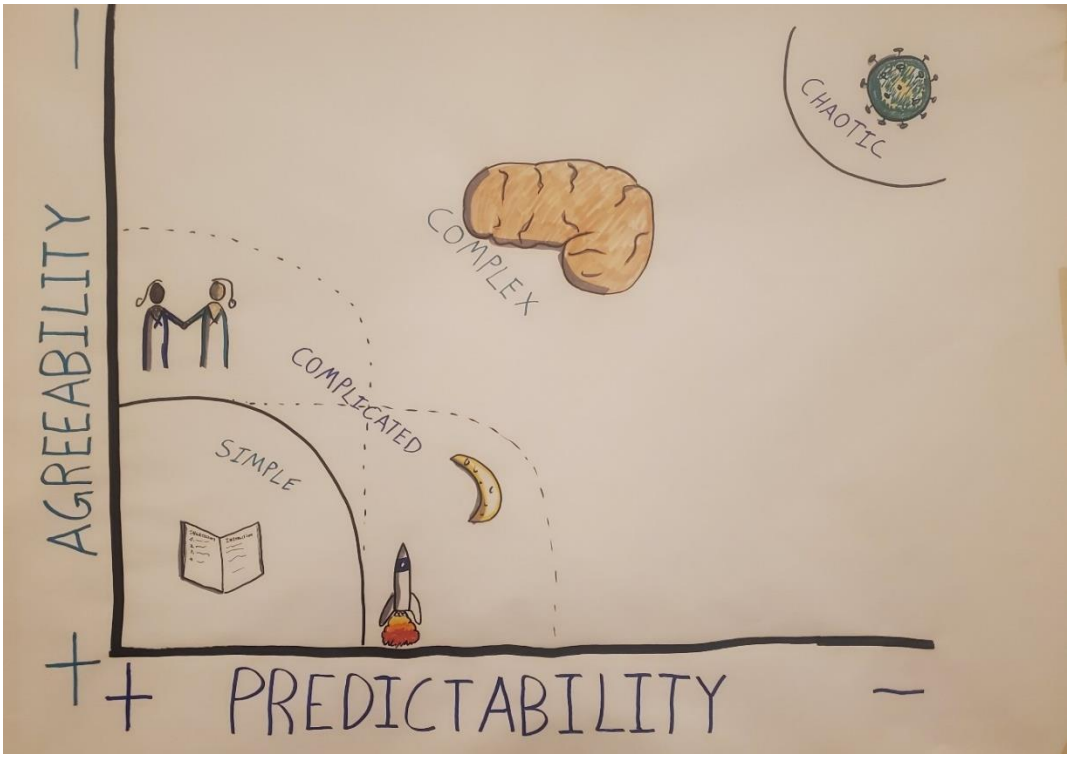
### 3.2.1 Agreement Certainty Matrix

The purpose of the agreement certainty matrix was to help the groups make sense of the challenges that were identified in the first half of the solutions labs.

The agreeability axis represents the likelihood that the building industry would agree to solutions presented for the challenges that have been identified. The predictability axis represents the degree to which solutions for the identified challenges have predictable outcomes.

First people were asked to identify the predictability of solutions. To do this, people were tasked with dividing the challenges into the four categories: simple, complicated, complex, and chaotic. This exercise was intended to clarify the potential responses to the challenges. A problem is defined as simple when it can be solved reliably with practices that are easy to duplicate that have predictable results. It is complicated when experts are required to devise a sophisticated

solution that will yield the desired results predictably. A problem is complex when there are several valid ways to proceed but results are not predictable in detail. Chaotic is when the context is too turbulent to identify a path forward and trial and error is likely the only way to find a solution.




The following analogy's may be used to further clarify the differences;

- simple challenges – can be solved with simple solutions, like following a recipe;
- complicated challenges – can be solved with technical expertise, like sending a rocket to the moon;
- complex challenges – may require unique solutions, e.g. like raising a child where a technique that worked on one child doesn't necessarily work on another;
- chaotic challenges – an example could be like the beginning of the COVID19 pandemic; a fast-changing issue with very limited data and understanding but where immediate action is required.

### 3.2.2 Part 9 Solutions Lab

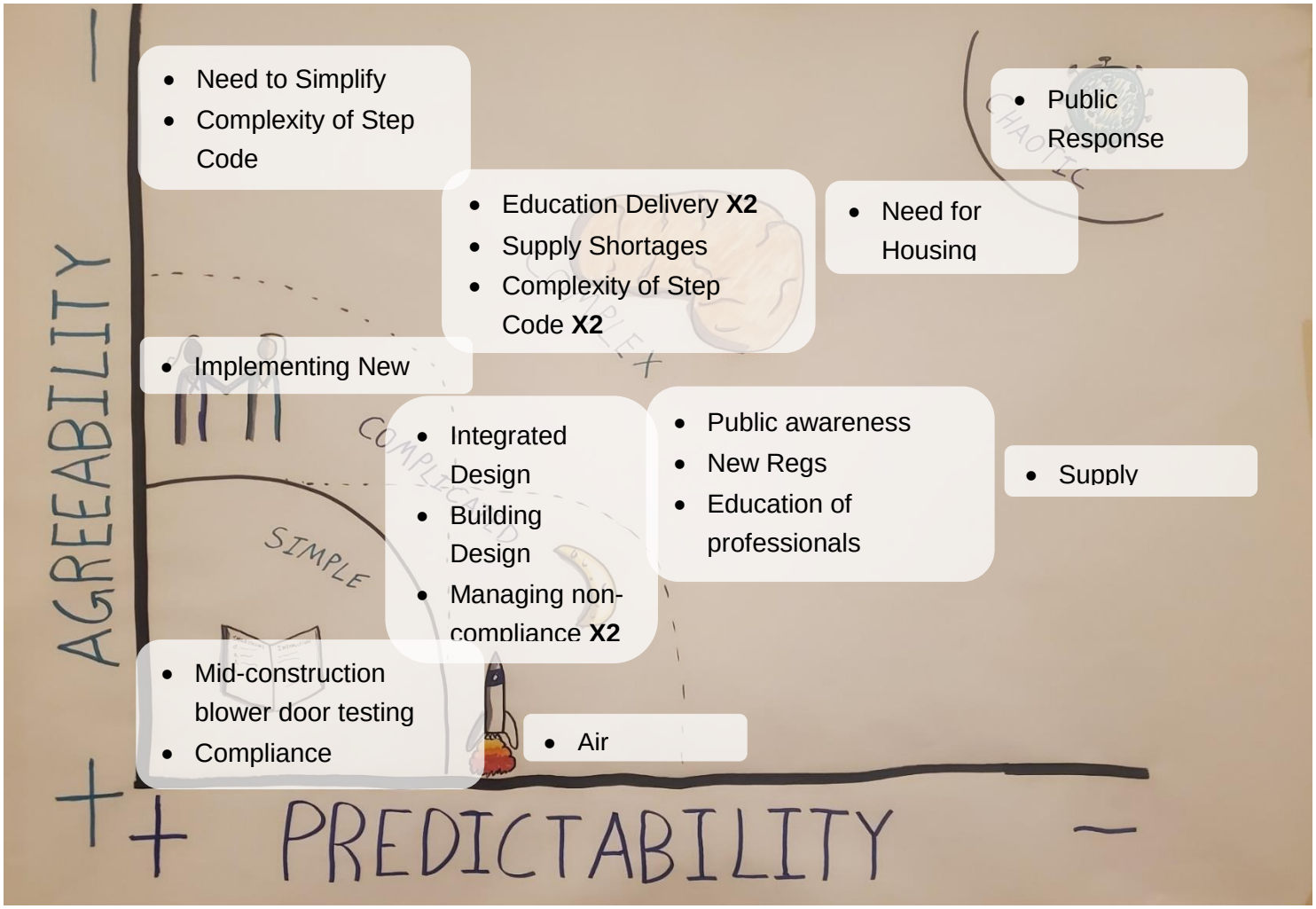
The following feedback was provided during the first half of the Part 9 solutions lab. Challenges that stood out to attendees were then plotted on the agreement certainty matrix which is presented below in Table 1.

**Table1: Part 9 Solutions Lab Feedback**

| | | |
|---|---|---|
| **Ways to Support** | **Education** | • Education is needed for industry and home buyers<br>• Challenge delivering education with consistent messaging<br>• Education EA's and builders, needs to be free and readily available<br>• Share knowledge (with other local governments) |
| | **Education Outcomes** | • Quality control key during building<br>• Open dialogue regarding building form<br>• Motivate action<br>• EA's need to be involved earlier<br>• Integration<br>• How do I actually do this?<br>• Quality Control |
| | • Incentives for highest steps and Zero Carbon (Floor area ratios)<br>• Consistency with messaging, don't switch standards | |
| **Timing** | **Concerns** | • Step jumps have design implications<br>• Home design 2-3 years out<br>• 2023 is too soon for higher Step Changes<br>• Lead time is critical +1 |
| | **Move Fast** | • Can't afford to wait, but not all voices are in the room – those that aren't participating probably don't want change<br>• No time to waste |
| **Regulatory Guidance** | **General Principles** | • Need to simplify<br>• Consistency of application (of Step Code regulation by AHJ)<br>• Focus<br>• Balance (Municipal) objectives<br>• Focus on what we can do today<br>• We need homes people can afford<br>• Safe, low carbon and affordable housing (in the context of concern regarding complex design standards) |
| | **Regional Consistency** | • Is this all municipalities in CRD, or just those here?<br>• I want to see consistency across the region |
| | **Likely Policy Outcomes** | • Seems likely zero carbon would drive higher steps (by virtue of the carbon intensity of electricity) |

| | | |
|---|---|---|
| | | • Step 3 requires very efficient home |
| | **Motivation for Change** | • How can we make the world a better place<br>• GHGs need to be addressed and we need direction<br>• Prevent Greenhouse Gas Emissions |
| | Mid-construction blower door test should be mandatory | |
| **Policy Guidance** | **Possible Policy Outcomes** | • Step 4 is a departure (of what is currently being built), Low Carbon less so<br>• Pushing low carbon can push cooling |
| | **Requests for Policy** | • Keep it simple<br>• Simple and Clear +1 |
| | **Specific Suggestions** | • Introduce measurement requirement ASAP<br>• "Or" allows workaround in the interim |
| **Challenges** | **Regulatory** | • Complexity of Step Code<br>• How to ensure compliance and how to manage non-compliance<br>• Some things out of Municipalities control |
| | **Public** | • Managing public response<br>• Public resistance to change |
| | • Supply shortages<br>• Observed entropy with agreement matrix<br>• Push back from fortis would be strong (for option 3)<br>• (Challenges with) implementing new regulations | |
| **Option Specific Feedback** | **Observations** | • Option 3 – flexibility<br>• Option 3 might help small houses while meeting targets – the more comfortable option<br>• Options 1&2 seem to provide an out for builders (to avoid meaningful emission reductions)<br>• Option 2 is also very flexible<br>• Option 2&3 Give us the chance to stay at Step 3 |
| | **Suggestions** | • Option 3 Is best – we don't have time (referring to global climate change)<br>• Step 4 – 2024, OR Low Carbon Construction (suggested alternative Option)<br>• Observed agreement with Option 3 |

### 3.2.3 Agreement Matrix – Part 9 Residential




Each table was asked to select the challenges that had been identified by the group that resonated the most with them and then to plot them on the agreement certainty matrix. Each group then plotted the challenges as they saw fit which is reflected by the same challenges appearing multiple times, sometimes in different parts of the matrix. This demonstrates a lack of agreement on the level of predictability and agreeability of different challenges.

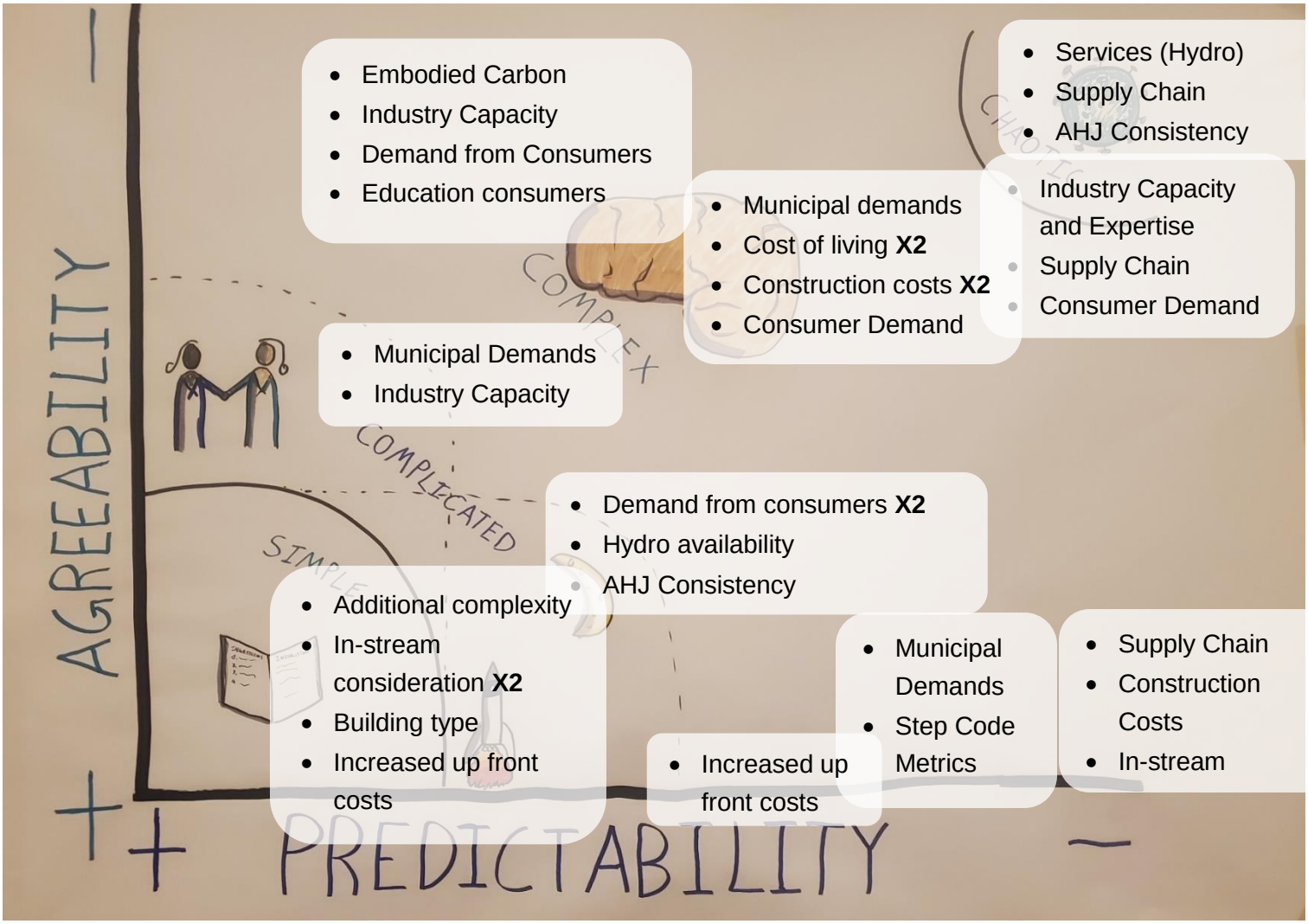
### 3.2.4 Part 3 Solutions Lab

The following challenges and points were identified during the first half of the Part 3 solutions lab. The challenges that really stood out to attendees were then plotted on the agreement certainty matrix which is presented below this table.

| | | |
|---|---|---|
| **Ways to Support** | **Authorities Having Jurisdiction Action** | • Tax Exemptions for better buildings<br>• Making DP Process more predictable<br>• AHJ enforcement consistency |
| | **Consumer Education** | • Consumer Education Key<br>• (Lack of) demand from consumers<br>• Educate Consumers |
| | • (increase) Industry capacity<br>• (increase) Economic Activity | |
| **Timing** | **Implementation Lead Time** | • Projects with shorter cycles can move faster<br>• (proposed) Timelines way too short<br>• 2-3 year lead time for commercial projects<br>• Potentially move faster with low rise |
| | **In Stream Projects** | • Timeline - # of projects in midstream is a concern<br>• ·DP pipeline should be considered in stream |
| | **Principles** | • Move standard once, bigger jump, later.<br>• Phased approach based on buildings<br>• Flexibility and notice helps with supply challenge |
| **Challenges** | **Authorities Having Jurisdiction Related** | • Additional metric adds complexity to permitting and design<br>• (multiple) demands from municipalities<br>• (how to handle) in stream projects |
| | **Incremental and Shifting Costs** | • Additional upfront cost – increases carrying costs<br>• Construction Costs<br>• Unpredictable Cost |
| | **BC Hydro** | • Hydro capacity a big issue<br>• Availability of hydro<br>• Hydro approvals can be 18 months |
| | • Supply Chain<br>• Cost of Living<br>• Different implications for different building types | |

| | | |
|---|---|---|
| **Policy Guidance** | **Possible Policy Outcomes** | • Step 4 is a departure (of what is currently being built), Low Carbon less so<br>• Pushing low carbon can push cooling |
| | **Requests for Policy** | • Keep it simple<br>• Simple and Clear +1 |
| | **Specific Suggestions** | • Introduce measurement requirement ASAP<br>• "Or" allows workaround in the interim |
| **Option Recommendations** | • Option 2 because of the "or" – more choice<br>• Too many options with option 2<br>• Option 3 provides certainty<br>• Low Carbon by 2025 instead of zero carbon | |
| **Where are we at now?** | • (we want to) Do Better<br>• (we want to) Understand<br>• Desire for consumer choice<br>• Sense of inevitability<br>• Feel we all agree at the high level, disagree in detail<br>• Optimistic RE: local successes<br>• Sense of Urgency | |

### 3.2.5 Agreement Matrix – Part 3



# Appendix A – Letter from Victoria Residential Builders Association

VICTORIA RESIDENTIAL BUILDERS ASSOCIATION

***Community Builders...***

***Building Communities***

April 12, 2022

Matt Greeno, Community Energy Specialist
Capital Regional District
625 Fisgard Street,
Victoria, BC V8W 2S6

Dear Mr. Greeno,

**Re: Solutions Lab to Accelerate Step Code in the CRD**

The Victoria Residential Builders Association will decline to attend the CRD's " Solutions Lab" to "accelerate implementation of higher steps of the Step Code." The BC government plans to make Step Code 3 mandatory by year-end. Fast-tracking the BC Step Code beyond this level only undermines consumer protection and housing affordability. Numerous flaws in the BC Step Code have been discovered including:

- Lack of research into toxic radon issues and mitigation in energy efficient homes. Radon levels exceeding the maximum established by the World Health Organization have been detected in Victoria;
- No prescriptive path to address high modeling costs and no mandatory Step Code education;
- Wildly inaccurate cost estimates and dysfunctional energy efficiency metrics;
- Net-zero is achievable at Step 4 making BC's costly Step 5 unnecessary adding to unaffordability.

Much of this information was revealed by the National Building Code's due diligence. BC Step Code's significant flaws undermining both consumer protection and affordability are the direct result of "accelerating" energy efficiency in BC's Building Code.

The Solutions Lab is at the "direction" of several councils to "accelerate implementation of higher steps of the Step Code." Municipalities do not possess the expertise, experience nor resources to do the necessary research and diligence for major code changes to ensure health and safety.

Codes Canada recently released energy efficiency changes in the National Building Code including a prescriptive option to address affordability. However, Codes Canada has not completed research on very high Step Code levels proposed by the CRD's "Solutions Lab."

VRBA continues advising municipalities to wait for the BC government to establish mandatory levels of energy efficiency combined with education rather than use local bylaws to fast-track energy efficiency. A local "Solutions Lab" does not replace National Building Code expertise, research and due diligence.

If you require more additional information, feel free to contact me at 250-383-5044.

Sincerely,

Casey Edge
Executive Director

# Appendix B - Complete Open-Ended Responses

## Part 9, Step 3 Compliance

**For Step 3 compliance, what is the most challenging part of a project? Open ended responses:**

- Implementation of readily available systems make it easy to achieve this Step. The biggest hurdle is cost.
- Step 3 compliance is not as difficult to design or build. Smart pre-design makes this easily attainable with minimal changes to standard materials, design strategies, especially in a forgiving climate like our own.
- The few Part 9 buildings we have working on under the Step Code have been custom homes on view properties for Clients that want a large amount of glazing in their home but don't want to pay for triple glazing and/or don't like the appearance of triple glazing and coatings to reduce solar heat gain.
- Construction industry has limited experience with airtightness. Assumptions at the pre-design and design phases need to be conservative to allow for this.
- The bias towards hydro power is limiting for mechanical heating systems in terms of overall occupancy comfort. One unintended (hopefully) consequence is GHG boilers won't be able to achieve higher then Step 3 Metrics even though Fortis will be able to carbon capture neutral gas generation for consumer use in the near future for hose new and in use boilers. Heat pumps are not the only answer to GHG reduction. As homes start to use out side insulation to achieve higher step codes B.C. hydro has fallen behind in improving their metering products to help reduce Air Change efficiency by business as usual methods and cutting a 16"x 20" hole in the side of a home and then filling that cavity with concrete to protect the exposed conduit. Step Code 5 allows a .5 Air Change max tolerance. For a perspective .5 Air Changes is allowing a hole smaller then a golf ball in total around the whole home to be exposed to outside circulation. The industry has fallen behind keeping up with Step Code 3 implementation and municipalities that chose the step code are not allowing fair expectations of the Steps. The Step Code started 4 years ago and in 2022 BC Housing has only made in mandatory for Home Builder's to participate in Step Code training. Passive Homes only have to achieve 1 Air Change per hour which is the Step Codes hard stick yet in Step Code 5 it is .5. Energy

Efficiency and reduction in GHG's is without question, Step Code 3 in my experience ( being a home builder for 16 years adds 35000 effectively to a home. The Provincial governments figures around Step Code 3 adages are way to low and not realistic. I'm currently building my home to Step Code 5 standards and the costs are not yet completed but heading to the low $70000.00 just for Step Code. One recommendation is to use the National Building codes vetted tried and true new energy efficiency option and ha e some prescriptive options to chose from. This gives the builder more flexibility around costs and the right method to chose for them. Of course, as a builder will tell you these costs are passed down to the first time home buyer or custom home client.

- contractors that are rooted in ancient construction sequencing and techniques. complex, antiquated housing designs. housing designers who design without regard for air barrier detailing
- It is not difficult to build a step code compliant house if you pay attention to detail
- The building envelope is a system where air tight buildings may experience earlier hygrothermal failure using traditional materials ( findings of National Code Task Group), or where depressurization may cause greater radon ingress. Houses are getting tighter and exhaust fans more powerful. The result is more frequent and severe depressurization of houses. Radon is site specific and cannot be identified on a map. An SFU radon scientist says there has been insufficint testing in Greater Victoria. These issues are being reviewed by the National Building Code committees and were not addressed by the BC govt for the Step Code. The BC Step Code circumvented due diligence.
- I work 'ocassionally' on residential, garden suites, secondary suites; basically reno's.
- I can hit the ACH, and I'm good with the enclosure efficiency. Having clients on board with better mechanicals is the hardest part. Paying more for better equipment can be a tough sell. Heat pumps are fine, but the HRV's are the challenge. The price point is high and they'd rather spend it on countertops, etc.
- The climate here in Victoria is mild and a little air leakage is actually good for the home. Building them so air tight causes additional problems for the home occupants. Introducing a fan that exhausts warm air out of the home is not a solution. New homes are very energy efficient as is and introducing further costs to the builder is not a good solution. A lot of research needs to go into these types of decisions. Your target should be homes built prior to 2010 and have the government implement energy efficient standards on these existing homes and place all of the costs on the home owners. This system is flawed as new homes are not the problem the old homes are the biggest problem.
- The pre-construction energy modelling determines what goes into the building, and as long as the plans and the BCESC report are followed there is no concern. However, the

air tightness is entirely built on site, and almost all builders and contractors have growing pains. Most people fail the first one or two tests trying to meet BCESC Step 3, and have to learn through trial and error.

- Air tightness requires quality control, and supervisions of trades. Many contractors offer little to no supervision for Step 3 and lower projects.
- The air tightness component will be the hardest aspect for people to meet, especially at the higher Steps.
- Canada contributes very little in comparison to Asia, this race to self inflict cost for virtue signalling is detrimentally affecting building cost and those inflicting it are wrongly imposing their will on others will little tangible result and huge tangible cost... build well and be done. Gas is a very viable energy source, heat pumps are poor if they use electric backup... Stop encouraging misguided objectives, muny govt and energy advisors are enabling and dont recognize cost increases, obvious from the presenter... Data was very SKEWED, majority of SFDs in CRD are NOT at step 3, Almost no Westshore data used, the four jurisdictions pushing this dont even contribute 20% of SFD housing stock, JUST STOP this ridiculous panacea...
- Step 3 is standard practice
- The targets are easily accomplished. The main challenge is; finding ways to accomplish the same targets with less skilled workers, at volume, and reduced cost.

## Part 9 Step 4/5 Compliance

**For Step 4/5 compliance, which of the following is the most challenging part of a project**
**Open ended responses:**

- It takes a little more creativity to hit the higher end targets.
- I believe air changes per hour will be the most difficult for builders as the knowledge is not quite there yet and there are many different strategies. This is why a mid construction blower door is a necessity for early adoption.
- If you have a smart envelope/mechanical designer, they can typically tweak design to meet requirements.
- Everyone likes expansive windows and currently their performance values are going to make this difficult to achieve the targets.
- Might be a bit off the questions topic
  However Relying on mechanical means which rely on consistent energy, and being part of the bigger grid. Is risky I tend to prefer independent systems that can operate within their own individual smaller groups which when large scale disasters happen cannot affect a larger group. Ie blackouts floods, natural disasters such as earthquakes.

- I expect builder familiarity with construction techniques & quality control to be challenging on custom homes.
- Same reasons as above
- Limited options and limited choices to achieve Step Code 4 and 5 without prescriptive method.
- contractors that are rooted in ancient construction sequencing and techniques. complex, antiquated housing designs. housing designers who design without regard for air barrier detailing
- Again, the house is a system where mechanicals, materials and their application must work together. Very few people understand the issues and some don't know the difference between an air barrier and vapour barrier. Fast-tracking higher levels of the Step Code is a recipe for major unintended consequences and liability for local govts. This is especially true when it's a local bylaw and not mandatory BC code. Delta was successfully sued for $3 million over a leaky condo issue. The BC govt is planning to require CPD builder education for Step 3, which should have been done before introducing Step Code in 2017. There is no mandatory education and training for Step 4 & 5.
- I can hit the ACH, and I'm good with the enclosure efficiency.  Having clients on board with better mechanicals is the hardest part.  Paying more for better equipment can be a tough sell.  Heat pumps are fine, but the HRV's are the challenge.  The price point is high and they'd rather spend it on countertops, etc.The units only get more expensive.
- I am opposed to fast-tracking energy efficiency without due diligence by the National Code committee, including cost-benefit analysis in the real world of construction, review of potential unintended consequences such as radon, etc. BC Step Code needs to follow the National Code and leaping forward to Step 4 and 5 without understanding all of the diligence is not achieving anything.
- The pre-construction energy modelling determines what goes into the building, and as long as the plans and the BCESC report are followed there is no concern.  However, the air tightness is entirely built on site, and almost all builders and contractors have growing pains.  Most people fail the first one or two tests trying to meet BCESC Step 3, and have to learn through trial and error.
- The air tightness component will be the hardest aspect for people to meet, especially at the higher Steps.
- energy advisor stated heating solutions that didnt include moving air but neglected the cost of necessary air change equipment ...
- Canada contributes very little in comparison to Asia, this race to self inflict cost for virtue signalling is detrimentally affecting building cost and those inflicting it are wrongly imposing their will on others will little tangible result and huge tangible cost...  build well

and be done. Gas is a very viable energy source,  heat pumps are poor if they use electric backup...  Stop encouraging misguided objectives, muny govt and energy advisors are enabling and dont recognize cost increases, obvious from the presenter... Data was very SKEWED, majority of SFDs in CRD are NOT at step 3,  Almost no Westshore data used,  the four jurisdictions pushing this dont even contribute 20%  of SFD housing stock,  JUST STOP this ridiculous panacea...

- Step 4 is best practice
- Accomplishing better ACH doesn't require unique assemblies, only improved existing ones. But envelope efficiency requires new upfront design considerations and processes and/or unique assembles that require more education from all parties.

## Part 9 Air Tightness Compliance

**What do you anticipate challenges for achieving the required Air Changes per Hour (ACH50) for the upper steps (Steps 4 and 5), open responses:**

- I believe air changes per hour will be the most difficult for builders as the knowledge is not quite there yet and there are many different strategies and trades that will have an effect on the air barrier. This is why a mid construction blower door is a necessity for early adoption.
- Sub-trades are used to punching holes through the building as needed to accommodate services. This can lead to reduced performance between the mid-construction and final blower door tests.
- A more elegant solution is needed for domestic kitchen air make-up when the kitchen hood is used. Ventless dryers help with depressurization in airtight construction, but kitchen hoods exhausting to the exterior are causing depressurization leading to whistling under doors, poor performance of the kitchen exhaust, and increased uncontrolled air infiltration.
- Why are the Air Changes more difficult to achieve then a Passive Home when this seems to be the bench mark.
- building and design culture. homeowners who think they can do whatever they want without consequence.
- Supply chain issues are making materials hard to get in a timely manner
- Education should come first before implementing major code changes. This has not been done with Step Code. All are issues ranging from no formal education to construction detailing to very high costs to supply issues.
- Making sure that clients understand the importance of simpler building form.
- The orientation on the lots can be out of the designer and builder's hands.

- Mid construction blower test will verify ACH, and hopefully the "big picture" in the end will all come together to confirm targets were hit.
- This whole presentation and survey is skewed and BIASED... options in 12 should include large cost increases, so many presenters sit in offices and dont see the real costs....
- Zoning requirements and design guidelines contradict with high performance design
- Low ACH is technically quite simple to achieve in application once the construction design accounts for it and there is awareness of the problem areas during planning.

## Part 9 Envelope/Enclosure Compliance Steps 4/5

**What do you anticipate challenges for efficiency for the upper steps are? (Steps 4 and 5), open responses:**

- Building form is often limited by lot shape & orientation. Some designers do not prioritize efficient building shapes prior to development permit applications.
- Developers and contractors are concerned with the cost increase to build high performance wall systems (i.e - additional labour and materials for continuous exterior insulation on wood frame). Upgrading larger windows to triple pane can lead to large increases in installation cost, as additional equipment may be required to lift the heavier product.
- complex building geometry requires detailed oriented planning and protecting. the building industry typically relies on insulators to complete this work. insulators are not known for being the most responsible trade. shifting building culture is extremely difficult.
- The house is a system. Education should come first before implementing major code changes. This has not been done with Step Code, especially 4 & 5.
- Making sure that clients understand the importance of simpler building form.
- The orientation on the lots can be out of the designer and builder's hands.
- Mid construction blower test will verify ACH, and hopefully the "big picture" in the end will all come together to confirm targets were hit.
- Unnecessary given how inhabitants will in the end use/live in the home..
- Finding trades willing to do quality work is a problem but not really limited to step code.
- The variety of possible assemblies and products requires fairly deep and also broad experience to ensure quality and affordability aren't completely sacrificed.

## Part 9 Mechanical Equipment Compliance Steps 4/5

**What do you anticipate challenges for achieving the required mechanical equipment and systems efficiency for the upper steps are? (Steps 4 and 5), open responses:**

- Need more hot water heat pumps.
- The house is a system. Education should come first before implementing major code changes. This has not been done with Step Code especially 4 & 5.
- A more elegant solution is needed for domestic kitchen air make-up when the kitchen hood is used. Ventless dryers help with depressurization in airtight construction, but kitchen hoods exhausting to the exterior are causing depressurization leading to whistling under doors, poor performance of the kitchen exhaust, and increased uncontrolled air infiltration. Buildings with high domestic hot water demand relative to the floor area can struggle to achieve the total and mechanical energy use intensity targets. Limited products are available with efficiencies about 100% (i.e - heat pumps with COPs>1) for domestic hot water. Contractors and developers are often wary of new products, and also wary of more expensive products.
- Some sites have limited electrical services available which pushes the domestic hot water system toward gas.
- A mixture of energy supplies to power a home is beneficial to occupant comfort.
- supply chain issues, misinformation from FORTIS, high energy draw from increased electrification.
- Everything needs to come together: Enclosure and mechanicals.
- HRV's and ERV's would be necessary (no more continuous bathroom fans)
- Sometimes I wonder if it could be "prescriptive". Certain size houses with a certain shape might be able to have similar mechanicals, and enclosure details/insulation.
- Location of air-to-water heat pumps is challenging on smaller lots due to noise impacts, visiblity and bylaw restrictions. Geothermal for heat pumps is very expensive on Vancouver Island due to the cost of bring the drilling rig to the Island (this has been the case previously, it may have improved recently).

## Barriers to Low Carbon (Electric) Space Heating?

**What are the barriers to implementing low carbon energy (electric) space heating systems in new buildings?**

- Seems that solar energy should be far more integrated into homes than it is now. Should be more incentives offered. Should be no barriers or “hurdles” for home owners. Especially new construction. Taking pressure of the main grid to ensure our future generations are able to have an affordable future.
- BC Hydro cannot meet peak demand. Also see above response.
- Yes again cost, is this a survey or an attempt by a few to brainwash and have every intent to implement regardless of survey results ??
- All electric is already the cheaper option
- Huge demands on power servicing, equipment is very expensive. Size of electrical service at some sites is not sufficient to allow electric domestic hot water systems. Operating costs are a concern. Heat pump options which reduce operating costs are still developing in North America and developers / contractors are wary or new tech and additional cost.
- Not with the MUEI metric.
- I like Rheem Marathon tanks. Pair them with recirc pumps, and you're golden!
- Electric DHW is already typical.
- Many Clients still prefer gas cooktops and fireplace