



2019 BC ENERGY STEP CODE MARKET RESPONSE STUDY

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About this Report

The BC Energy Step Code is a provincial regulation that local governments may use to incentivize or require a level of energy-efficiency in new construction that goes above and beyond the requirements of the *BC Building Code*. It consists of a series of steps, representing increasing levels of energy-efficiency performance. By gradually adopting one or more steps of the standard, local governments can increase building performance requirements in their communities. The Province of British Columbia has set a goal that all new buildings must reach a net-zero energy ready level of efficiency by 2032; the BC Energy Step Code serves as the policy pathway to reach that goal.

At time of writing, the standard is applied to new Part 9 residential construction province wide as well as Part 9 and Part 3 residential, office, and retail buildings in the Lower Mainland and southern Vancouver Island. Part 3 may be expanded in future years.

The purpose of this research project is to better understand the BC Energy Step Code's impact on housing design and costs over time. Information collected will be used to better support industry stakeholders across B.C. in adapting to the BC Energy Step Code.

Credits and Acknowledgments

This report was funded by BC Housing, BC Hydro and the Province of BC and was prepared by BTY Group. BTY would also like to thank the local chapters of the BC Home Builders Association for distributing the survey to their members.

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1.0 Research Purpose and Methodology

1.1 Research Questions

The purpose of the BC Energy Step Code Market Response Monitoring Project is to better understand how the BC Energy Step Code impacts residential construction practices and costs over time and across British Columbia (B.C.). The initial research questions identified were:

- What is the number of homes built in B.C. to each step of the BC Energy Step Code?¹
- To what extent is the BC Energy Step Code affecting residential construction costs in B.C.?
- How are construction costs for homes built under the BC Energy Step Code changing over time across different Steps, housing archetypes (Part 3 and Part 9), and regions?
- As relevant, what is causing construction costs to change for homes built under the BC Energy Step Code?
- How much is attributable to the BC Energy Step Code requirement compared to other regulatory or market factors?
- How is the BC Energy Step Code changing the way the industry builds homes?
- What are the challenges affecting construction cost under the BC Energy Step Code that require addressing?

Specific energy saving measures (ESMs) were also identified for tracking:

ENVELOPE PERFORMANCE	MECHANICAL SYSTEMS	ELECTRICAL SYSTEMS
<ul style="list-style-type: none"> • High performance windows and doors 	<ul style="list-style-type: none"> • Type of HVAC systems, including HRVs and heat pumps 	<ul style="list-style-type: none"> • Occupancy sensors
<ul style="list-style-type: none"> • Air barriers and insulation 	<ul style="list-style-type: none"> • Sophisticated control systems 	<ul style="list-style-type: none"> • LED light fixtures
<ul style="list-style-type: none"> • Window to wall ratio 	<ul style="list-style-type: none"> • Wastewater heat recovery 	<ul style="list-style-type: none"> • Building control systems
<ul style="list-style-type: none"> • Sun shading devices 	<ul style="list-style-type: none"> • Individual unit metering 	
	<ul style="list-style-type: none"> • Domestic Hot Water Systems 	

1.2 Methodology

Many factors inform construction costs, including but not limited to the cost of materials, labour costs and cost of land. In turn, these costs can be influenced by economy-wide factors such as trade disputes, labour supply and availability of natural resources², as well as project-specific details such as location, design and contractor/supplier-relationships. As a result, each project and each builder have their own set of costs, which makes tracking the specific impact of the BC Energy Step Code on construction costs at an industry-wide level a unique challenge.

¹ Data for this question was not available in 2019 but will be included in subsequent reports.

² In B.C., construction costs have fluctuated over time in response to such factors as lumber shortages due to lack of supply and increased demand in the U.S., a drywall price spike due to tariffs imposed on U.S. producers and widespread skilled labour shortages unrelated to the introduction of the BC Energy Step Code.

The initial research methodology was to conduct information interviews with active builders representing different regions and community sizes throughout B.C. For this survey, “builders” was defined broadly, to include builders, developers and those undertaking both roles. Potential respondents were emailed, and interviews were done over the phone. Upon piloting this methodology however, initial uptake of interviews was low with seven interviews completed between January 11 and March 13, 2019. To better streamline the process, the interview guide was converted into an online survey and shortened. The revised online survey (referred to subsequently as the “monitoring survey”) was distributed by email to members of local home builder association chapters. Between May and July 2019, 62 online surveys were completed. In total, 69 builders responded to the monitoring survey and all participating builders who requested one received 1 CPD point in compensation for their time.

It is important to acknowledge that the final survey methodology will bias the results of the monitoring survey, as builders who are members of local associations are generally more engaged compared to the average builder population. For example, the 2018 BC Residential Building Statistics & Trends Report³, which is distributed to all licensed residential builders in B.C., reported that 25% of builders had built to the BC Energy Step Code in the past year compared to 46% of respondents to the monitoring survey. These results indicate that the monitoring survey respondents on average have considerably more experience with the BC Energy Step Code compared to the general residential builder population. Readers should also be aware that while the results of the monitoring survey provide useful insights, they are not statistically significant and should be interpreted with appropriate caution.

1.3 Monitoring Survey Participant Profile

The monitoring survey respondents were primarily drawn from the membership of local home builder association chapters across B.C., who distributed the on-line survey link to their members. Other salient features of the respondents are:

- Builders reported undertaking residential projects across B.C., with many working across different communities and regions and two stating they worked B.C.-wide. By region, 33% of respondents reported they worked in the Lower Mainland/Southern Coast, 35% on Vancouver Island, 39% in the Southern Interior and 14% in northern B.C. (refer to Q4 in Appendix 1 for map).⁴
- Close to 85% of respondents reported building single family homes. Of these, 72% built custom homes and 42% built spec homes, i.e. without a purchaser already on board. Of the nearly 50% that reported building multi-family homes, 82% built townhouses, 64% built low-rise apartments and 27% built high-rise.⁵
- By experience, 4% of builders reported they had 0-5 years of experience, 13% 5-10 years, 30% 10-20 years, 35% 20-30 years, and 17% builders 30+ years. Due to the lower response rate among less experienced builders, the responses for those with 10 years or less experience have been combined.
- Close to half (45%) of respondents reported that they built to the BC Energy Step Code in the past 12 months and provided information on the Steps they had experience with. Of these builders, 6% only had experience with Step 1, 13% had experience with Step 2 or lower, 39% with Step 3 or lower,

³ BC Housing website - 2018 BC Residential Building Statistics & Trends Report: <https://bchousing.org/research-centre/housing-data/new-homes-data>

⁴ In instances where builders reported working in more than one region, they have been counted in all regions listed. As a result, the regional breakdown for builders does not sum to 100%.

⁵ Many builders reported that they built both single and multi-family homes, and in these instances, responses have been included in both categories. As a result, the breakdown for builders by building type does not sum to 100%.

13% with Step 4 or lower and 29% with Step 5 or lower. Due to the limited number of responses for some Steps, the analysis focuses on Lower and Higher Step⁶ builders.

2.0 Key Findings

2.1 Preparedness for the BC Energy Step Code

- Among all survey respondents, 73% reported feeling prepared for BC Energy Step Code, followed by 17% who were unsure and 10% not prepared.
 - Segments that were most likely to report feeling prepared included high-rise builders (100%) and builders with 1-10 years' experience (83%).
 - Segments that were less likely to report feeling prepared included spec builders (54%) and builders with over 30 years' experience (58%).
- Among those who had built to the BC Energy Step Code in the previous 12 months, 79% reported feeling prepared, with those building to the Higher Steps at over 90%.

2.2 Energy Saving Measures

- The most frequently implemented Energy Saving Measures (ESMs) among respondents were higher performance HVAC systems (84%), LED light fixtures (82%), higher performance windows and doors (75%), and reducing thermal bridging (71%). This pattern persisted across regions and residential building types.
- Some variations in reported ESM adoption were found between Higher Step and Lower Step builders, with higher performing windows and doors and reduced thermal bridging more prevalent among those building to Higher Steps, and LED lights among those building to Lower Steps.

2.3 Construction Costs

- The majority of survey respondents (88%) indicated that construction costs had increased in the past year, with material costs (95%) and trade/skilled labour (83%) being the two most common cost drivers identified. Specific materials that were mentioned include insulation, mechanical equipment, lumber, drywall, metals, concrete, and oil/fuel.
- The proportion of builders reporting cost increases was similar between those who had built to the BC Energy Step Code in the past 12 months (88%) and those who had not (86%). The percentage of builders reporting cost increases for Lower Step (89%) builders and Higher Step (85%) builders was also close.
- Close to 20% of builders commented on energy performance impacting construction costs, identifying better envelope details, air tightness, insulation requirements, increased HVAC controls, and mechanical efficiencies specifically. Three builders mentioned the BC Energy Step Code directly

⁶ Lower Step builders are those reporting Step 3 as the highest they have experience with, while Higher Step builders are those with experience at Step 4 and/or Step 5.

as a cost driver, with one noting that the change in the calculations for colder climates was a particular challenge.

3.0 Research Results

3.1 Implementation of the BC Energy Step Code

As of February 2020, 31 local governments were referencing the BC Energy Step Code and a further 29 were in the process of consulting with industry out of a total of 162 municipalities incorporated in B.C.⁷ Of those local governments that implemented the BC Energy Step Code, 48% were in the Lower Mainland/Southern Coastal region, followed by 25% on Vancouver Island, and 25% in the Southern Interior. No communities from Northern B.C. were referencing the BC Energy Step Code, but the local governments of Prince George and Terrace were in consultation.

According to the 2019 Local Government Survey⁸, 88% of participating local governments indicated having moderate, good or excellent knowledge of the BC Energy Step Code. This is an increase compared to results in 2018 (82%) and in 2017 (61%). When asked about barriers to referencing the BC Energy Step Code, local governments were most likely to identify lack of information on local Energy Advisors (35%), lack of capacity to implement (34%), and lack of capacity to enforce (32%).

3.2 Builder Experience with the BC Energy Step Code

This section provides an overview of the extent to which the B.C. residential construction industry is aware of, prepared for and using the BC Energy Step Code.

3.2.1 Builder Awareness

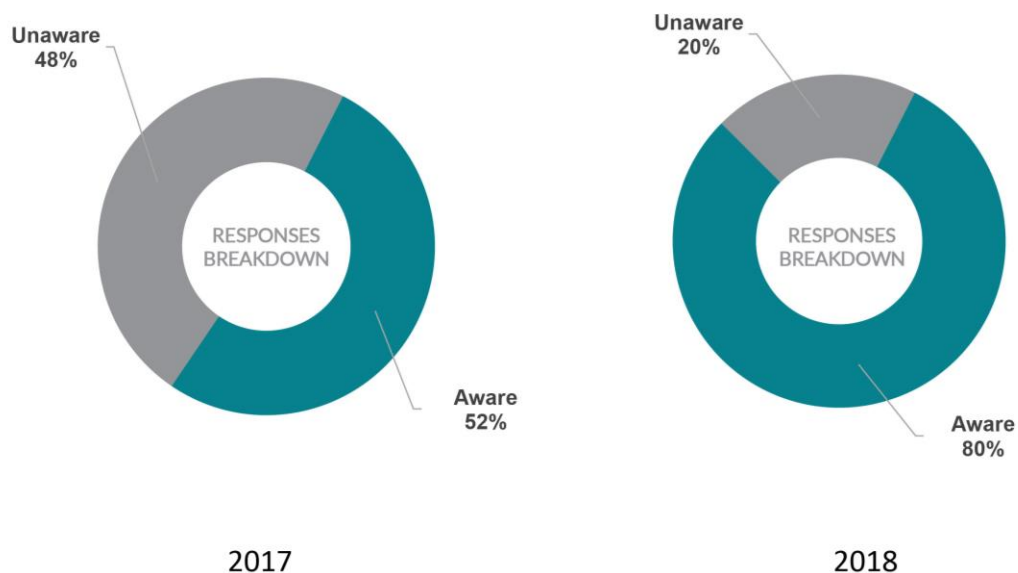
According to the 2018 BC Residential Building Statistics & Trends Report⁹, nearly 80% of builders were aware of the BC Energy Step Code in 2018, up from 52% in 2017. Builders with more experience were more likely to report being aware, with 83% of those with over 20 years' experience being aware compared to 71% of builders with two years or less experience.

⁷ BC Energy Step Code website - Implementation Updates: https://energystepcode.ca/implementation_updates

⁸ BC Energy Step Code website - Local Government Survey 2019: <http://energystepcode.ca/app/uploads/sites/257/2019/07/FINAL-BC-Energy-Step-Code-Local-Government-Survey-Report-July-2019.pdf>

⁹ BC Housing website - 2018 BC Residential Building Statistics & Trends Report: <https://bchousing.org/research-centre/housing-data/new-homes-data>

Figure No. 1: Awareness of BC Energy Step Code 2017-2018



Source: 2018 BC Residential Building Statistics & Trends Report

3.2.2 Builder Training and Preparedness

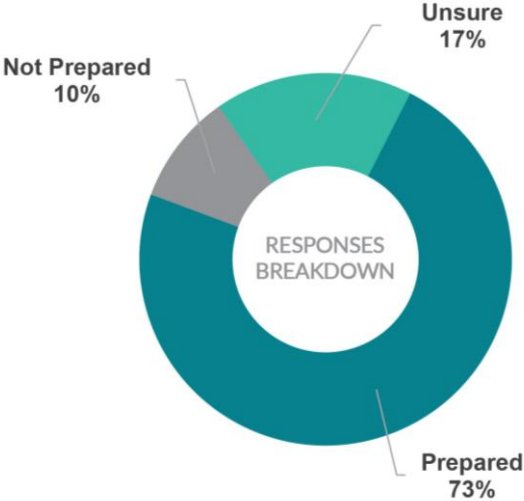
According to the 2018 BC Residential Building Statistics & Trends Report¹⁰, close to half of builders (48%) reported that they had participated in training on the BC Energy Step Code in 2018, up from 19% in the previous year.

Among respondents to the monitoring survey, 73% reported that they felt prepared for the BC Energy Step Code, followed by 17% who were unsure and 10% not prepared. By experience levels, those who were most likely to report feeling prepared had 1-10 years' experience (83%) while those with 30+ years' experience felt the least prepared (58%). By building type, high rise builders were most likely to feel prepared at 100%, followed by custom builders and townhouse builders at 69%. Spec builders¹¹ were the least likely to report feeling prepared at over half (54%). By region there was less variation in reported preparedness at between 70% and 80%.

¹⁰ BC Housing website - 2018 BC Residential Building Statistics & Trends Report: <https://bchousing.org/research-centre/housing-data/new-homes-data>

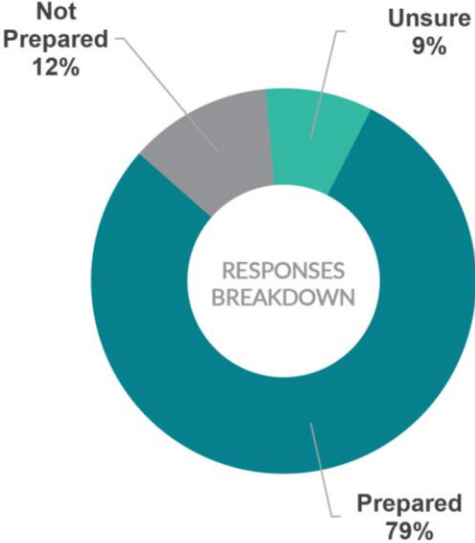
¹¹ Spec is short for speculative, i.e. a builder who purchases a site and erects or partially erects a residence without having already found a buyer.

Figure No. 2: Preparedness for the BC Energy Step Code among Survey Respondents



For those who used the BC Energy Step Code in the past 12 months, 79% reported feeling prepared followed by 12% not feeling prepared and 9% unsure. Builders with experience at the Higher Steps were more likely to feel prepared at over 90% compared to Lower Step builders at less than 70%. For those reporting they did not use the BC Energy Step Code, close to 72% reported feeling prepared.

Figure No. 3: Preparedness for BC Energy Step Code among BC Energy Step Code Users



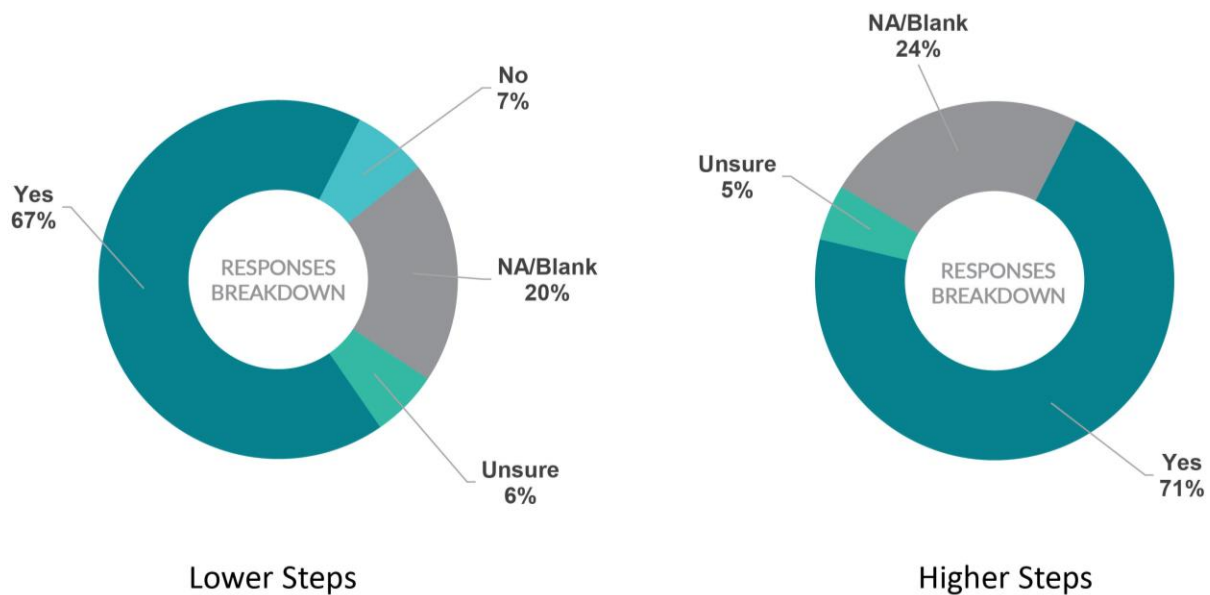
Builders with experience in other energy-performance programs were more likely to report being prepared for the BC Energy Step Code. All of those who had built to the Passive House standard in the previous 12 months expressed readiness, while those that had built to LEED or Net-Zero standard were at 87% and 90% respectively. A total of 80% of Energuide users expressed readiness, with Energy Star participants slightly less.

3.2.3 Building to BC Energy Step Code

As reported in the 2018 BC Residential Building Statistics & Trends Report¹², close to half of builders (48%) reported they had participated in training on the BC Energy Step Code and a quarter (25%) reported building to the BC Energy Step Code. Of those building to the BC Energy Step Code, approximately 80% were building to Lower Steps (Steps 1, 2 and 3).

For the monitoring survey, 31 builders reported that they built to the BC Energy Step Code in the past 12 months and provided information on the Steps they had experience with. Among these builders, approximately 70% of both Lower (67%) and Higher (71%) Step builders reported that they had achieved their target Step. Only one Lower Step builder reported they did not achieve their target, but approximately a quarter of both Lower (20%) and Higher (24%) Step builders left this question either blank or answered NA¹³. Lower (7%) and Higher (6%) Step builders were also similarly likely to report they were unsure.

Figure No. 4: Builders meeting their step, not meeting their step, unsure or NA/blank



¹² BC Housing website - 2018 BC Residential Building Statistics & Trends Report: <https://bchousing.org/research-centre/housing-data/new-homes-data>

¹³ It is unclear if builders leaving the question blank or NA did so because their project had not been evaluated yet, they were unsure of the results, or for other reasons.

3.3 Energy Saving Measures and Construction Costs

This section focuses the results from the monitoring survey on ESMs adoption and construction costs.

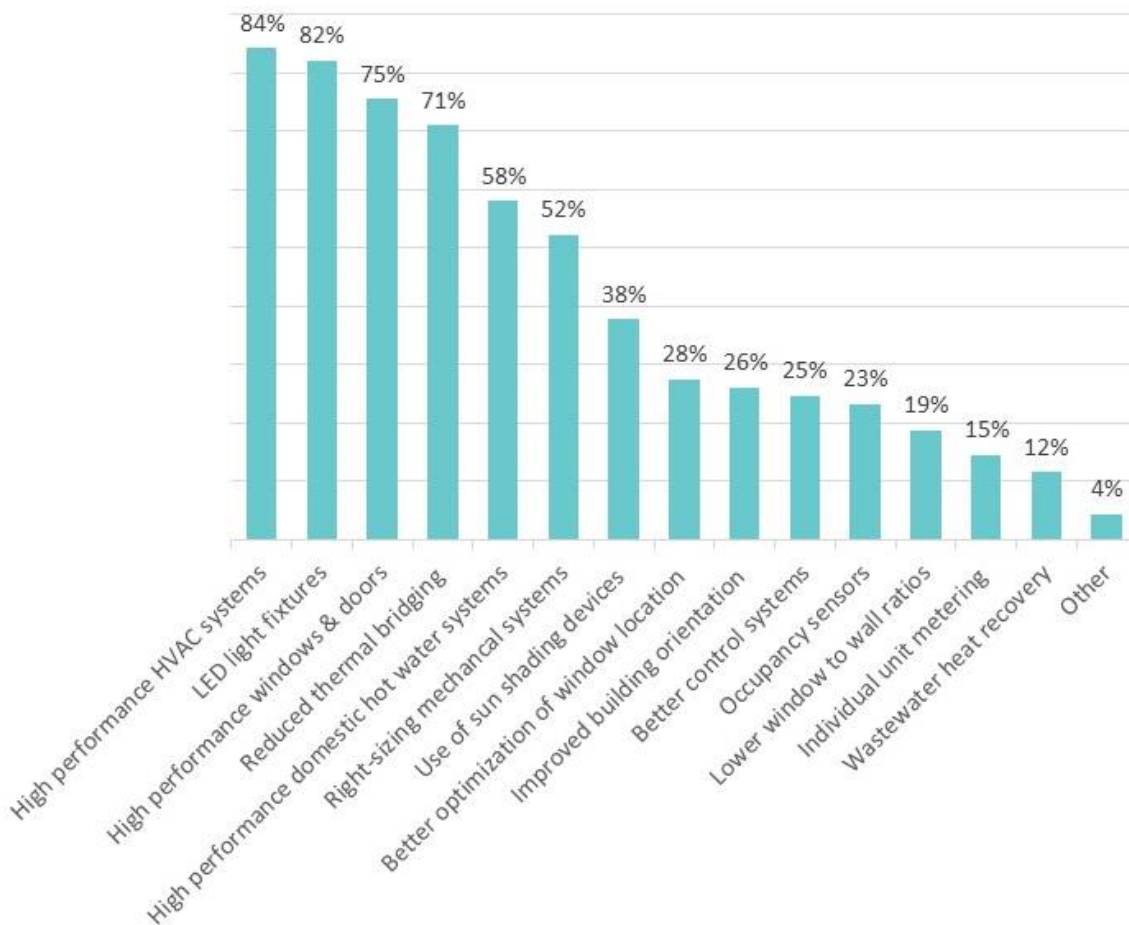
3.3.1 Energy Saving Measures

Across all surveyed builders, the most commonly used ESMs were higher performance HVAC systems (84%), LED light fixtures (82%), and higher performance windows and doors (75%).

Close to three-quarters of builders reported reducing thermal bridging (71%), while over half reported that they right-sized the mechanical system (52%) and used higher performance domestic hot water systems (58%).

Less than a third of builders cited using individual metering (15%), lower window to wall ratios (19%), occupancy sensors (23%), better control systems (25%), improved building orientation (26%), and better optimization of window location (28%).

Figure No. 5: Use of Energy Saving Measures Among Survey Respondents



3.3.1.1 Energy Saving Measures by Region

Across regions, the top three ESMs cited remained the same (higher performance HVAC systems, LED light fixtures, and higher performance windows). However, identified regional variations by ESM include:

- Windows and Doors:
 - Northern B.C. builders were most likely to report using higher performance windows and doors at 90% but were the least likely to report better optimizing of window location at 20%.
 - Both Lower Mainland/Southern Coast and Northern B.C. builders were most likely to report using lower window to wall ratios at over 25%.
 - Vancouver Island builders were the most likely to report optimizing window location at 33%, but the least likely to use lower window to wall ratios (13%).
 - Southern Interior builders were the least likely to report using higher performance windows at under 70%, and the second least likely to report using lower window to wall ratios (19%) and optimizing window location (23%).
- Thermal Bridging: Close to 90% of Vancouver Island and 80% of Northern B.C. builders reported reducing thermal bridging as an ESM practice, followed by almost 75% of Lower Mainland/Southern Coast builders and approximately 60% of Southern Interior builders.
- Right sizing mechanical systems: Around 60% of Northern B.C. and Vancouver Island builders reported right sizing the mechanical system as an ESM practice, followed by approximately 50% of Lower Mainland/Southern Coast builders and less than 15% of Southern Interior builders.
- Higher Performance HVAC systems: The only region to have less than 80% of builders report using higher performance HVAC systems was the Southern Interior. Vancouver Island and Northern builders were the most likely at around 90%.
- Higher Performance Domestic Hot Water Systems: Vancouver Island builders were most likely to report using higher performance domestic hot water systems at around 80%, while Lower Mainland/Southern Coast and Southern Interior builders were the least likely at around 50%.
- Sun Shading Devices: Approximately 50% of builders in the Lower Mainland/Southern Coast and Vancouver Island reported using sun shading devices, followed by nearly a third in the Southern Interior and 20% in Northern B.C.
- Improving Building Orientation: Vancouver Island builders were the most likely to report improving the building orientation at close to a third, while Northern BC and Lower Mainland/Southern Coast builders were around 20%. Southern Interior builders were the lowest at 15%.
- Individual Unit Metering¹⁴: At 30%, builders in Northern B.C. were the most likely to report implementing individual metering. Builders in the other regions reported using individual metering between 17% and 19%.

¹⁴ This applies only to multi-unit buildings.

- **Better Control Systems:** Builders in the Southern Interior and Northern B.C. reported using this approach most frequently, with 30% of respondents citing it. Builders in the Lower Mainland/Southern Coast and Vancouver Island were at 26% and 21% respectively.
- **Occupancy Sensors:** The Lower Mainland/Southern Coast led the regions in implementing occupancy sensors at 35% of respondents. Vancouver Island was close to 30%, with the remaining regions around 20%.
- **LED Light Fixtures:** LED light fixtures proved popular among Vancouver Island and Northern BC builders with 96% and 90% respectively installing them on their projects. Just under three-quarters of builders in the Lower Mainland/Southern Coast and Southern Interior reported the same.

3.3.1.2 Energy Saving Measures by Building Type

Across building types, the top three ESMs used remained the same (higher performance HVAC systems, LED light fixtures and higher performance windows). However, when compared with single family builders, multi-family builders were more likely to report using:

- Occupancy sensors (36% compared to 16%)
- Individual unit metering (24% compared to 10%)
- Sun shading devices (49% compared to 36%)
- Lower window to wall ratios (27% compared to 16%)

Custom builders of single-family homes were more likely than spec-home builders to incorporate better control systems (24% compared to 7%).

Among the multi-family building types, high-rise builders were most likely to report using occupancy sensors (67%) and better control systems (33%) compared to builders of low-rises and townhomes. However, high-rise builders were less likely to report using higher performance domestic hot water systems, better optimization of window location, reduced thermal bridging, improved building orientation, LED light fixtures, sun shading devices, and individual metering.

3.3.1.3 Energy Saving Measures by Builder's Level of Experience

While there is considerable variation between builders by experience, reducing thermal bridging was the only ESM that was consistently more likely to be reported as experience increased. By experience level, other findings included:

- **10 Years or Less Experience:** Over 90% reported that they used higher performance HVAC systems, which was followed by higher performance windows and doors and use of LED light fixtures at over 80%. Compared to other experience levels, these builders were the least likely to report reducing thermal bridging (around 60%), optimizing window location (less than 10%), using sun shading devices (25%), right sizing the mechanical system (33%), and using higher performance domestic hot water systems (over 40%).
- **Between 10 and 20 Years' Experience:** Over 80% of builders reported using higher performance HVAC systems, followed by over 70% reducing thermal bridging, and over 65% using higher performance windows and doors as well as LED light fixtures. Compared to other experience levels, these builders were the least likely to report using individual metering (around 5%) and LED light fixtures (over 65%).

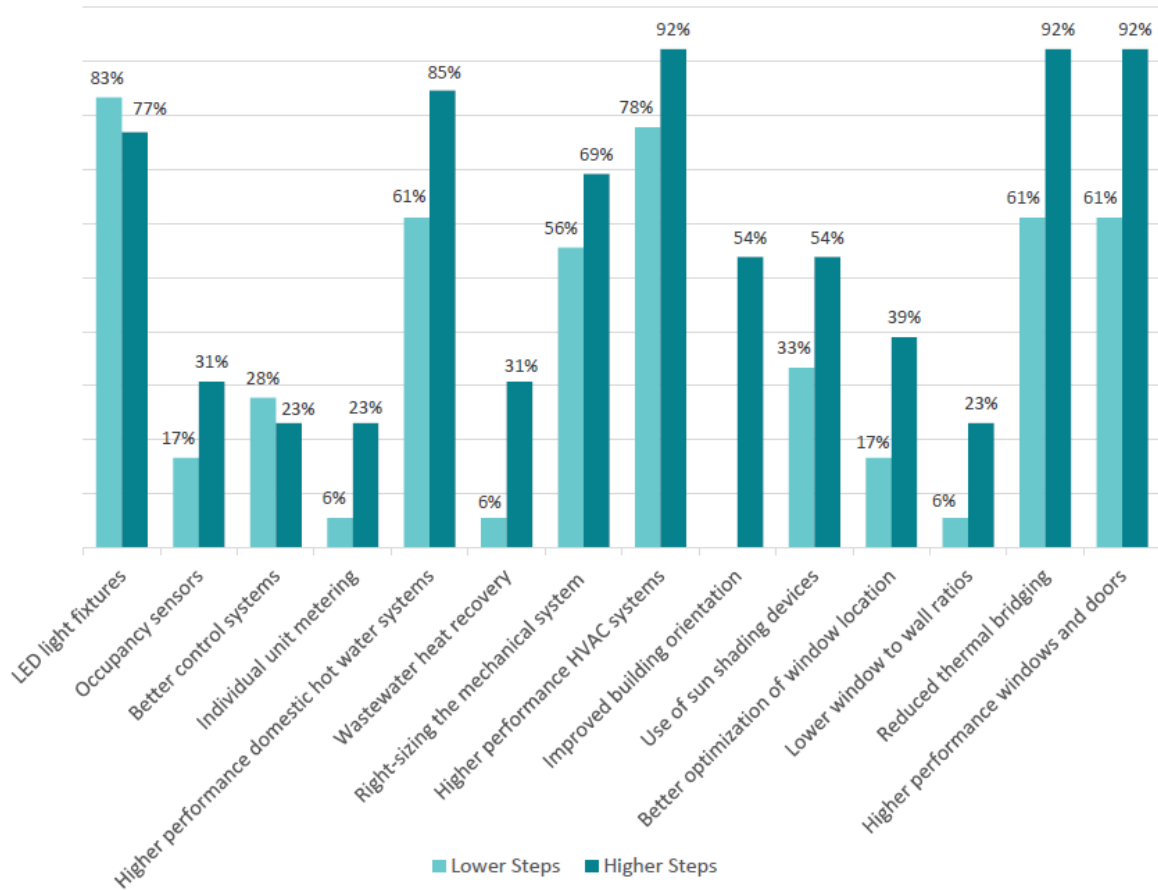
- Between 20 and 30 Years' Experience: Over 90% reported using higher performance HVAC systems and LED light fixtures, and close to 85% reported using higher performance windows and doors. For many ESMs, these builders were the most likely to report adoption across experience levels, including reducing thermal bridging (75% - tied), higher performance domestic hot water systems (71%), right sizing the mechanical system (nearly 65%), better building orientation (40%), better window location optimization (over 38%), and better control systems (over 33%).
- Over 30 Years' Experience: These builders were most likely to report using LED light fixtures (83%), followed by reduced thermal bridging (75%) and higher performance windows and doors (67%). However, relative to the other experience levels, this demographic was also the least likely to report using higher performance HVAC systems (67%) or better control systems (less than 10%).

3.3.1.4 Energy Saving Measures by Step

Compared with other factors, there was more variation in ESMs when comparing Lower and Higher Step builders. Higher Step builders were most likely to report using higher performance windows and doors, reduced thermal bridging, and higher performance HVAC systems (all over 90%). In comparison, Lower Step builders were most likely to report using LED light fixtures (over 80%) and higher performance HVAC systems (78%). Overall, Higher Step builders were more likely than Lower Step builders to report adoption for all ESMs except LED light fixtures (83% compared to 77%) and better control systems (28% compared to 23%).

The largest differences between Lower and Higher Step builders were in their adoption of improved building orientation (0% compared to 54%), followed by reduced thermal bridging (61% compared to 92%), higher performance windows and doors (61% compared to 92%), wastewater heat recovery (6% compared to 31%), higher performance domestic hot water systems (61% compared to 85%), better optimization of window location (17% compared to 39%), and use of sun shading devices (33% compared to 54%).

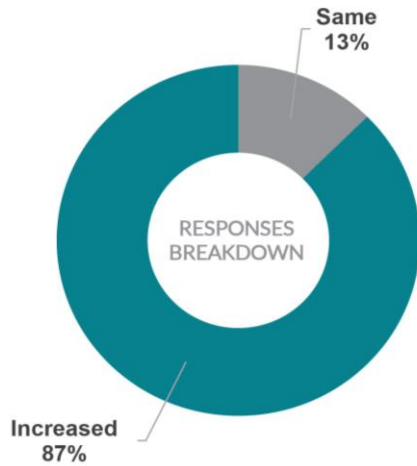
Figure No. 6: Energy Saving Measures by Step



3.3.2 Construction Costs

When asked how their construction costs had changed in the past 12 months, 88% of surveyed builders reported that construction costs had increased. No builders reported costs declining, but 13% reported they stayed the same.

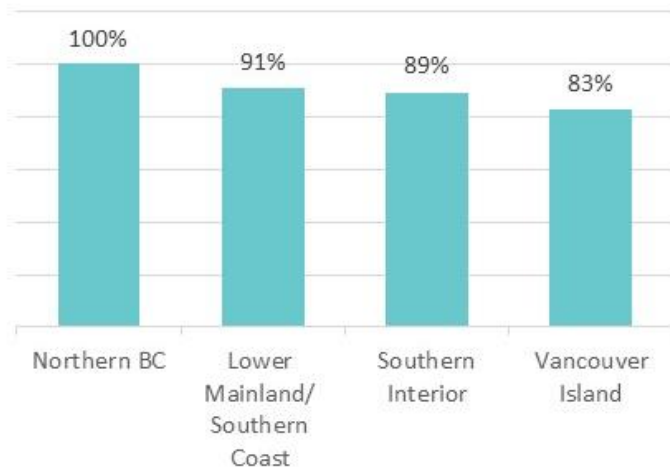
Figure No. 7: Overall Change in Construction Cost in the Previous 12 Months



3.3.2.1 Construction Costs by Region

All Northern B.C. builders reported that costs had increased, followed by 91% of Lower Mainland/Southern Coast builders, 89% of Southern Interior builders, and 83% of Vancouver Island builders.

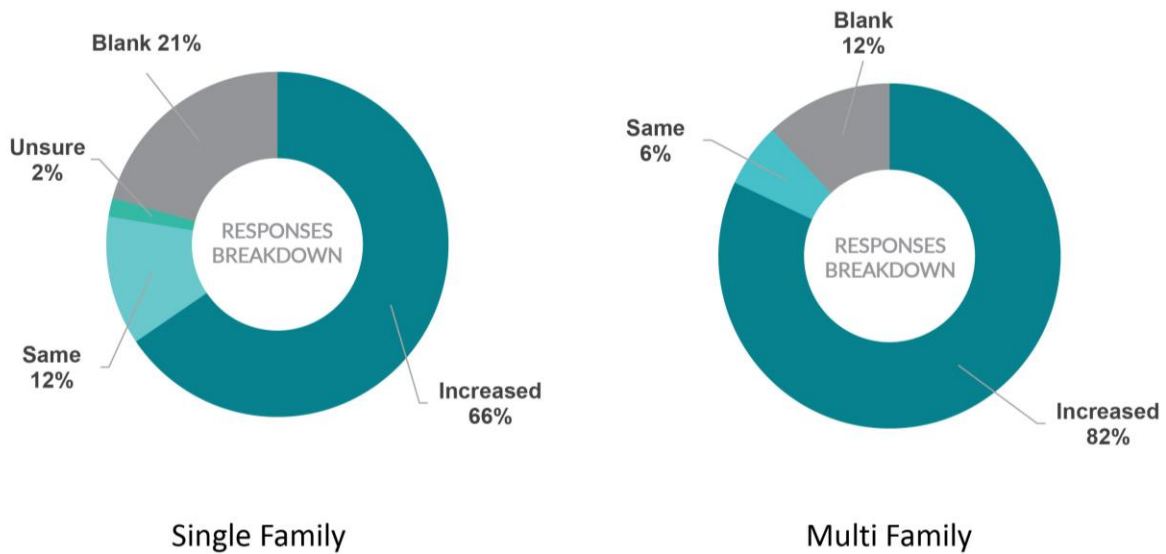
Figure No. 8: Reporting of Cost Increases by Region of B.C.



3.3.2.2 Construction Costs by Building Type

When asked about cost changes for specific building types, builders were more likely to report cost increases for multi-family homes (82%) compared to single family homes (66%).

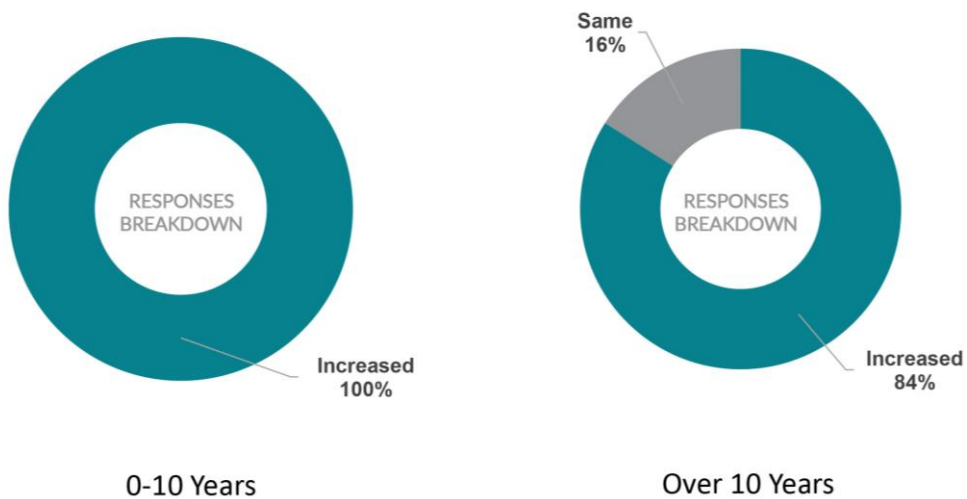
Figure No. 10: Change in Construction Cost in Previous 12 Months by Building Type



3.3.2.3 Construction Costs by Builder Experience

All builders with 10 years' or less experience reported that costs had increased, while 84% of builders with over 10 years' experience reported the same.

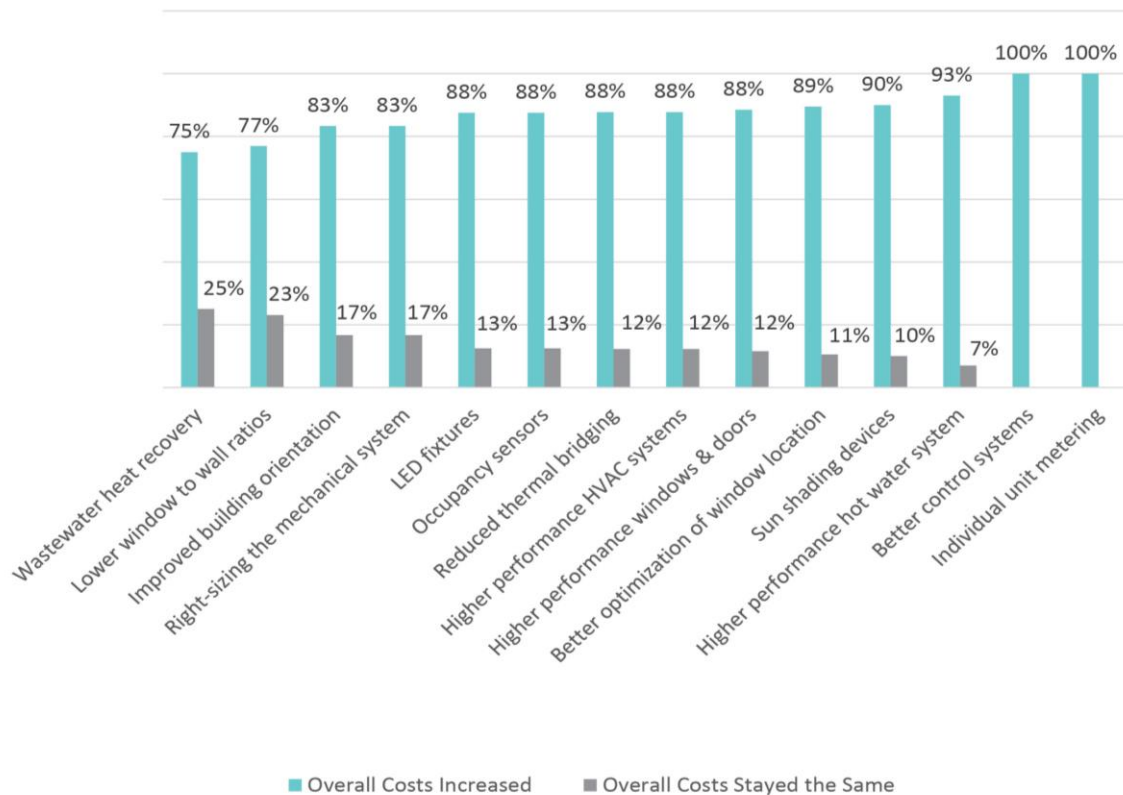
Figure No. 9: Change in Construction Cost in Previous 12 Months by Builder Years of Experience



3.3.2.4 Cost Changes by Energy Saving Measure

Builders reporting the use of higher performance domestic hot water systems (93%), better control systems (100%), and individual metering (100%) were the most likely to report cost increases by ESM.

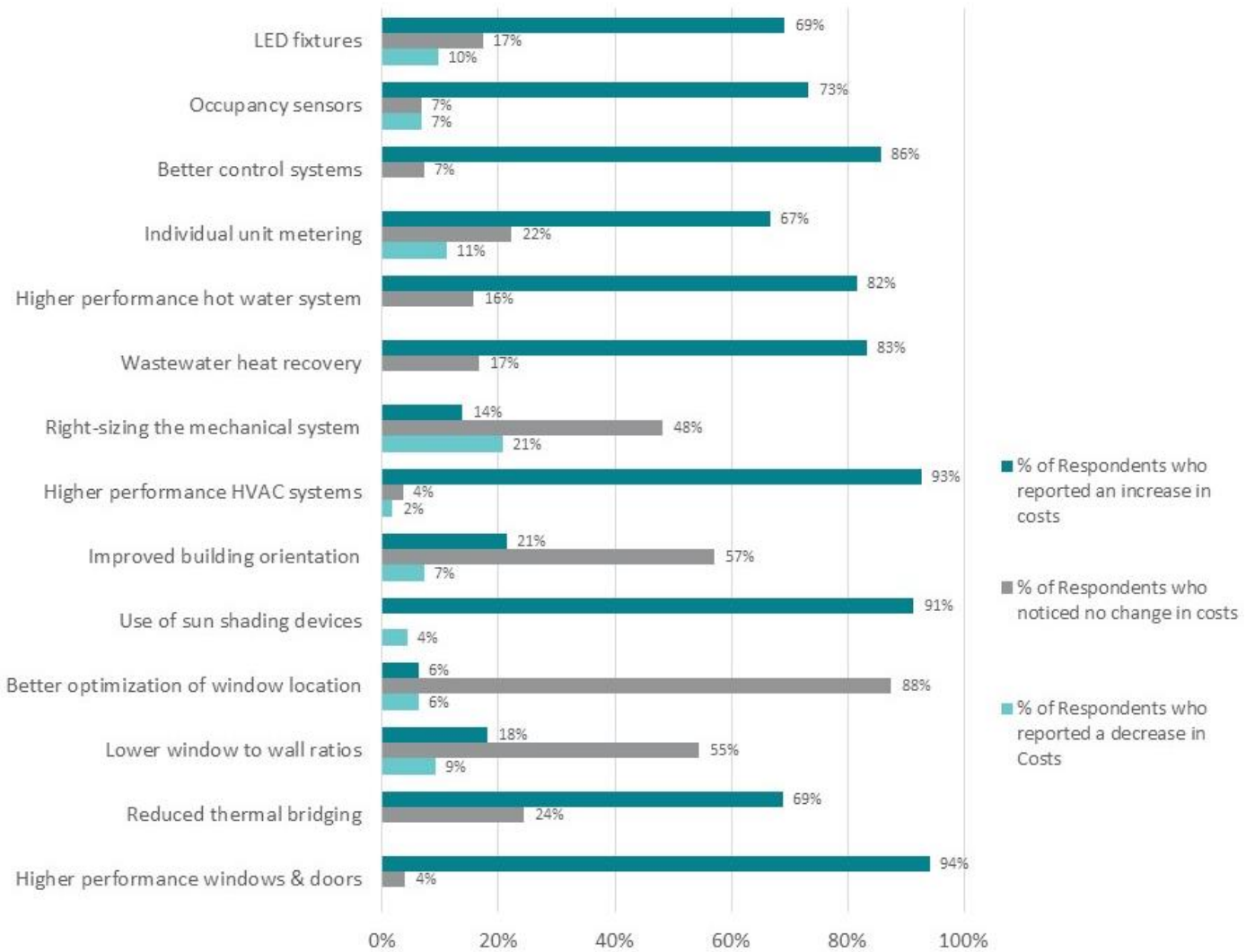
Figure No. 11: Each Measure and the % of Builders who Used it also Reporting Overall Costs Increased



However, when asked directly about how specific ESMs used in the past 12 months impacted costs, builder responses appear inconsistent with the above results. Among builders using better optimization of window location, only 6% reported that this ESM resulted in a cost increase. This is followed by 14% of builders right sizing the mechanical systems reporting the same, 18% of builders using lower window to wall ratios, and 21% using improved building orientation. On the higher end, 83% of builders using wastewater heat recovery reported it increased costs, while over 90% reported the same for higher performance windows and doors (94%), higher performance HVAC systems (93%) and sun-shading devices (91%).¹⁵

¹⁵ Builders were also asked to select a cost change range for each measure used, broken into labour and material costs, but the results were particularly inconsistent and difficult to interpret. As a result, the results are not presented here.

Figure No. 12: Each Measure and the % of Builders who Used it Reporting the Specific Measure increased costs



3.3.2.5 Cost Changes by Step

For builders that did not report building to the BC Energy Step Code in the past 12 months, 86% responded that their costs had increased and 14% that they stayed the same. Similarly, 88% of builders who had built to the BC Energy Step Code in the past 12 months also reported cost increases. When comparing across Steps, the percentage of builders reporting cost increases was also reasonably close between Lower (89%) and Higher (85%) Step builders.

3.3.2.6 Reported Causes of Cost Changes

Over half of builders (57%) provided feedback on their top three cost drivers. Most of these respondents referred to material costs (95%) and trade/skilled labour (83%), but also indicated code changes (including seismic) (21%), taxes/fees (21%), and regulation (19%) were cost drivers. Specific materials highlighted include insulation, mechanical equipment, lumber, drywall, metals, concrete and oil/fuel.

Close to 20% also made comments regarding energy performance, including better envelope details, air tightness, insulation requirements, increased HVAC controls and mechanical efficiencies. Three builders mentioned the BC Energy Step Code specifically as a primary cost driver, with one noting that the change in the calculations for colder climates was a challenge.

4.0 Challenges and Opportunities

Of the 43 builders providing information on the most challenging aspects of implementing ESMs, the most common issue identified was cost increases and convincing potential buyers to pay the premium (28%). A shortage of educated professionals was commonly identified (26%), with some specific comments focusing on the difficulty of quality control. Issues around building envelope was the third most highly cited challenge (19%), with several comments focused on the challenges of achieving airtightness.

The BC Energy Step Code was specifically identified by 19% of these respondents as a challenge, with comments including:

- Issues with metrics being incorrect and/or changing (3 comments)
- Difficulty in achieving TEDI (thermal energy demand intensity) targets (1 comment)
- Higher Steps being difficult to achieve in colder climates (1 comment)
- Challenges because of different municipalities adopting different Steps (1 comment)
- Lack of general knowledge in the area (1 comment)

4.1 Identified Solutions

Of the 45 builders that provided feedback on how to address identified issues¹⁶, 40% noted the need for more education and training among builders, trades, designers, energy advisors and home buyers. Intertwined with these observations were comments that it would take time for the industry to learn best practices.

The next most common theme identified by approximately 29% of those responding was modifying elements of the BC Energy Step Code. Specific comments include:

- Issues with TEDI specifically (3 comments)
- BC Energy Step Code should be universally applied/mandatory for everyone (3 comments)
- BC Energy Step Code should stop at Step 3 (2 comments)
- Adjust metrics for row/town homes (1 comment)
- There should be no BC Energy Step Code (1 comment).

¹⁶ Responses here include answers to the questions "Do you have any suggestions as to how this/these issue(s) could be addressed?" and "Is there anything we didn't cover that you would like to add?". This is because some respondents provided answers to the first question under the second.

Over 10% of the comments referred to a need for government incentives, subsidies and grants. A few builders also commented that industry will adapt to changes over time and with practice.

5.0 Research Conclusions

Key conclusions of this report are:

- The profile of the BC Energy Step Code is increasing among local governments and builders alike. The number of local governments either referencing the BC Energy Step Code or in the process of consulting with industry continues to increase. All builders surveyed were aware of it and 73% felt prepared for it.
- Other factors appear to have had a larger impact on construction costs than the BC Energy Step Code. Reports of cost increases vary more by region, experience and building type than by involvement with the BC Energy Step Code. As well, a relatively small number of builders (19%) identified the BC Energy Step Code as a primary driver of cost increases relative to material costs (95%) and trade/skilled labour (83%).
- The variation in responses regarding the cost impact of different ESMs may be the result of individual builders not using detailed cost monitoring or builders each facing unique costing based on their relationship with and/or availability of suppliers (for example, volume of orders, pay bills on time, location of work, etc.).
- ESMs most reported as leading to cost increases are higher performance windows and doors, HVAC systems and domestic hot-water systems. These options are simple substitutions of higher quality components, such as triple-glazed windows, heat pumps and high-efficiency boilers.
- Low-cost opportunities are still available to builders to achieve their BC Energy Step Code objectives. There is low reporting of ESMs such as decreasing window-to-wall ratios, optimizing window location, improving building orientation and right-sizing the mechanical system. These measures all require consideration during the design phase and an understanding of the interplay between systems. It may be that under-use of these approaches is related to perceived or actual purchaser preferences, in addition to a need for further education and training.
- Almost 90% of builders surveyed in most regions of B.C. have taken training on the BC Energy Step Code. Nonetheless, builders requested more education and training to enable the industry to address issues raised by the BC Energy Step Code, such as increased air tightness.
- When asked if they had met their target step, over a quarter of builders who built to the BC Energy Step Code in the past 12 months either reported they were unsure, responded NA or left the question blank. The reasons for this are unclear and bear further investigation in future phases of this research.

APPENDIX 1

Survey Questions and Results

Q1. What is the name of your company?

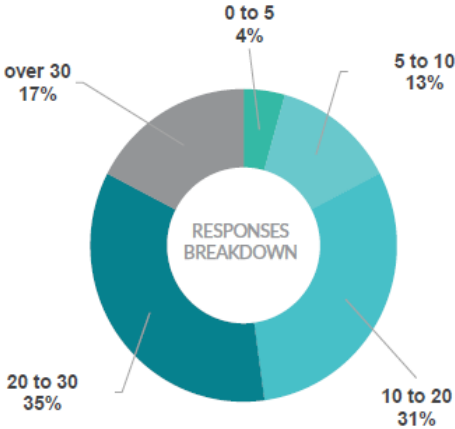
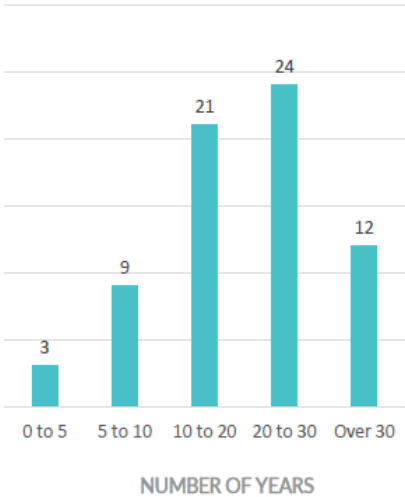
There were 73 responses to this question.

Q2. What is your role/title at your company?

There were 67 responses to this question.

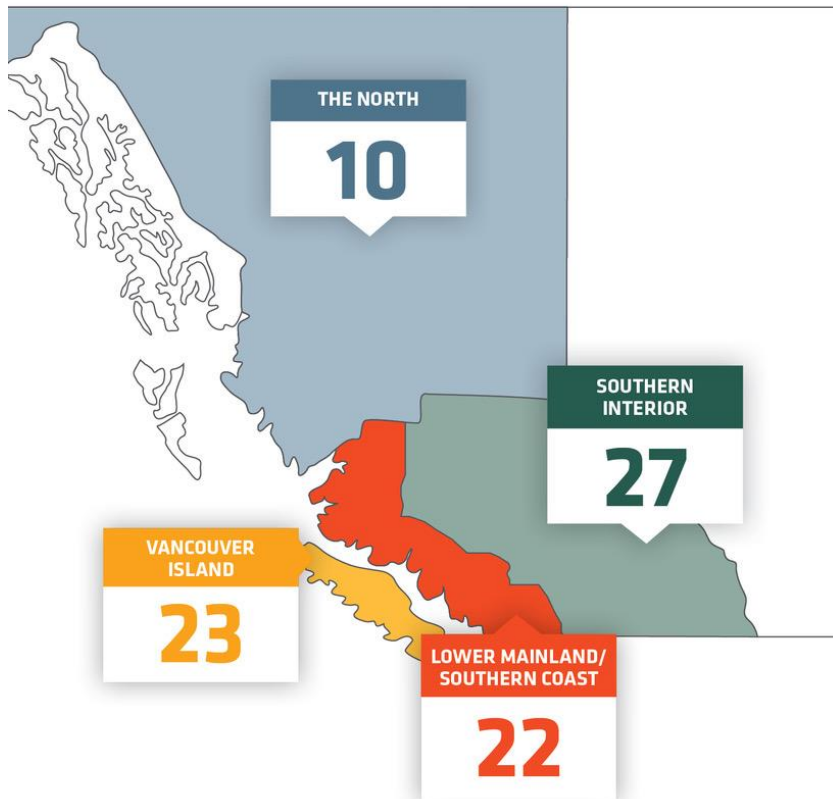
Q3. How long have you worked in new home construction?

69 responses



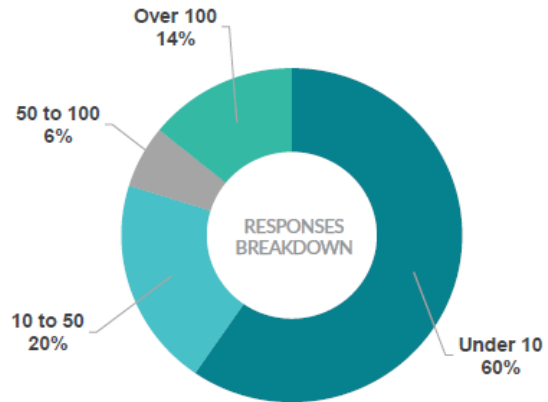
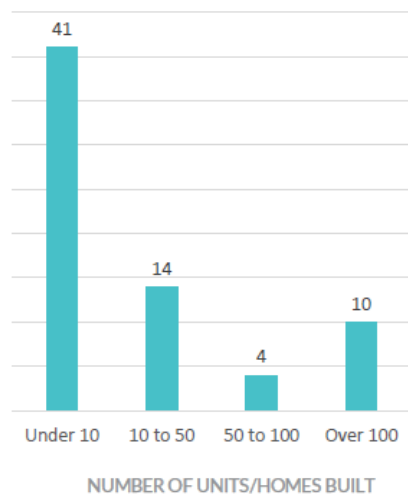
Q4. In British Columbia, which communities does your company work in?

There were 73 responses to this question. Respondents who reported activity in more than one region were counted for each of those regions.



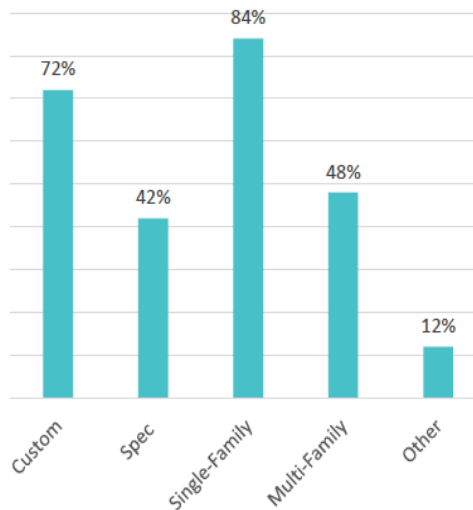
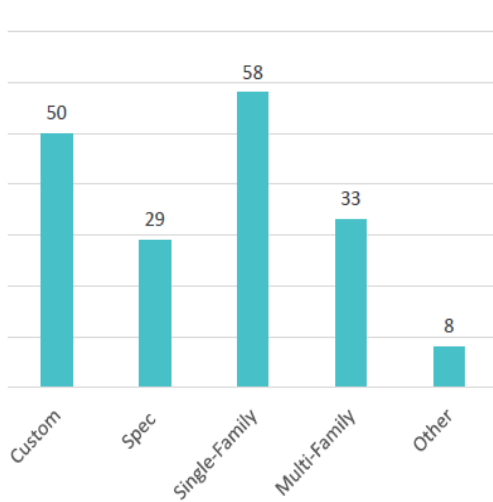
Q5. How many housing units/homes did your company build in BC in the past 12 months?

69 responses



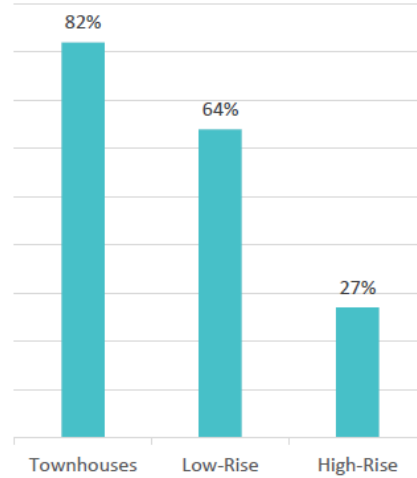
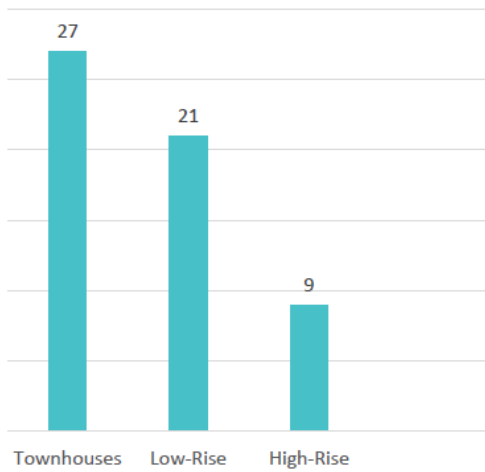
Q6. What types of housing does your company build in BC? (Check all that apply)

69 responses



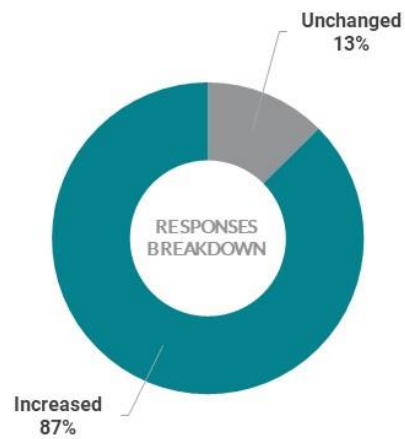
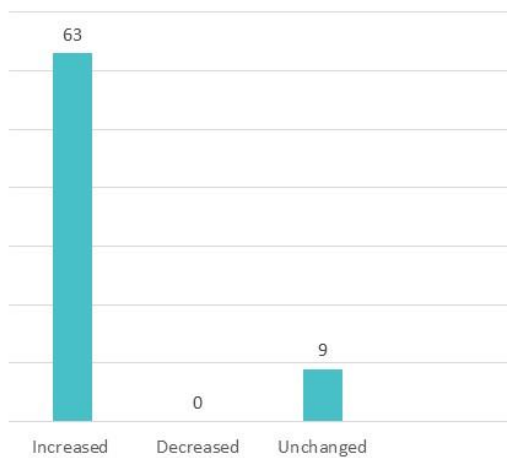
Q7. What types of multi-family housing do you work on? (Please check all appropriate boxes)

33 responses



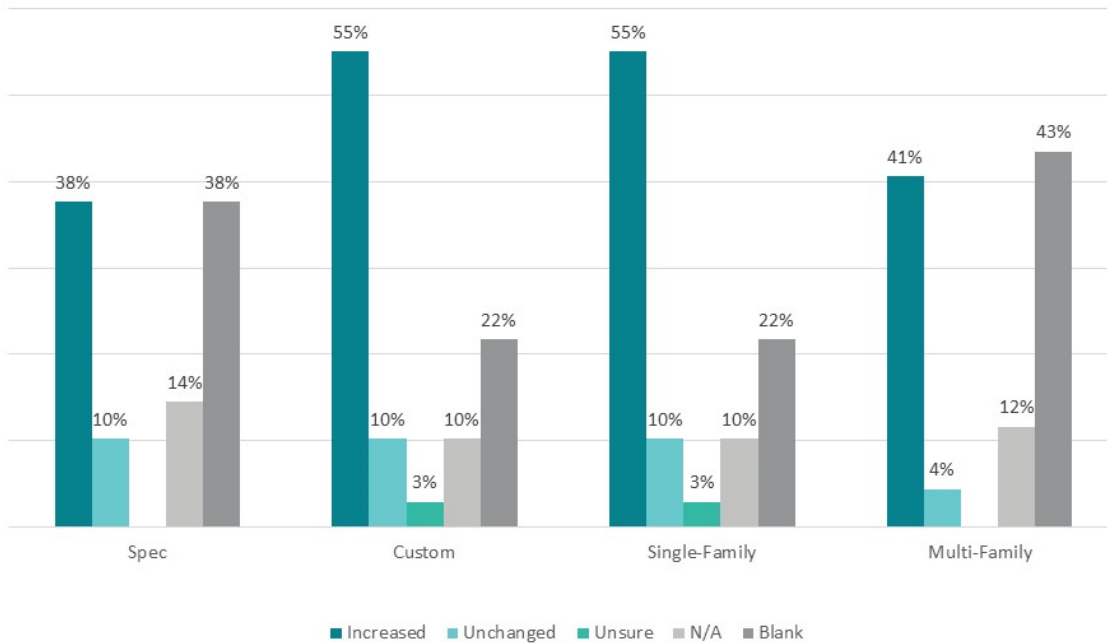
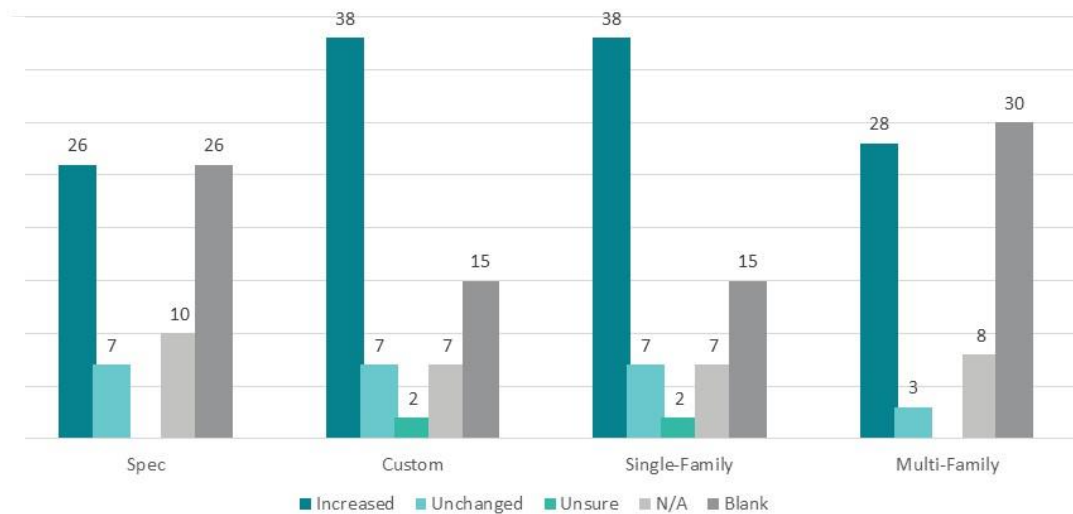
Q8. In your experience, have your overall construction costs changed at all over the past 12 months?

69 responses



Q9. For each housing type built in the past 12 months, how have costs changed?

69 responses

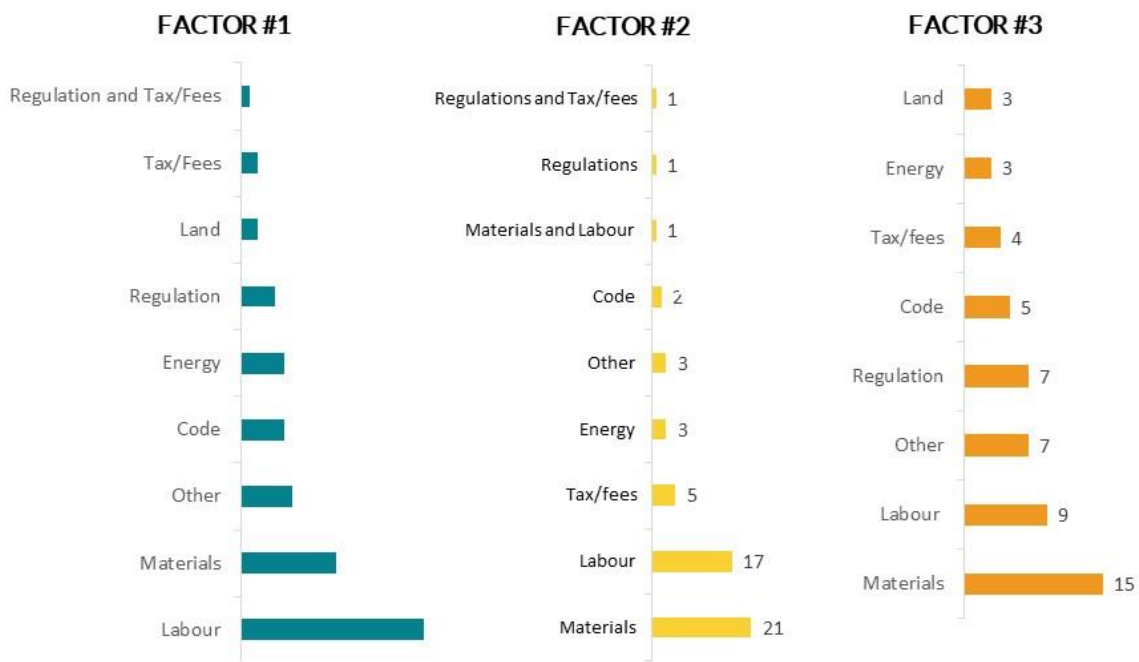


Q10. What are the three most important factors currently driving cost decreases?

There were no responses to this question, as none of the respondents answered that costs had decreased.

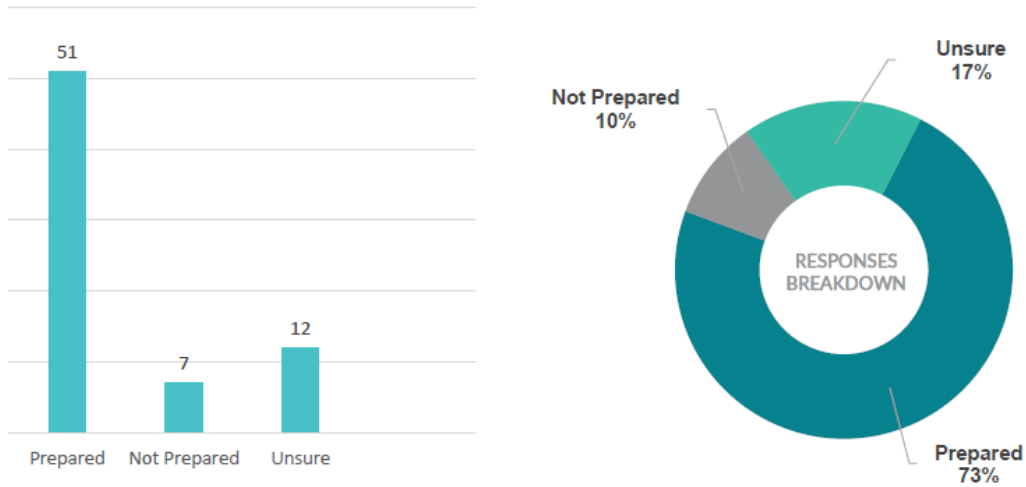
Q11. What are the three most important factors driving cost increases?

Responses per Factor Group



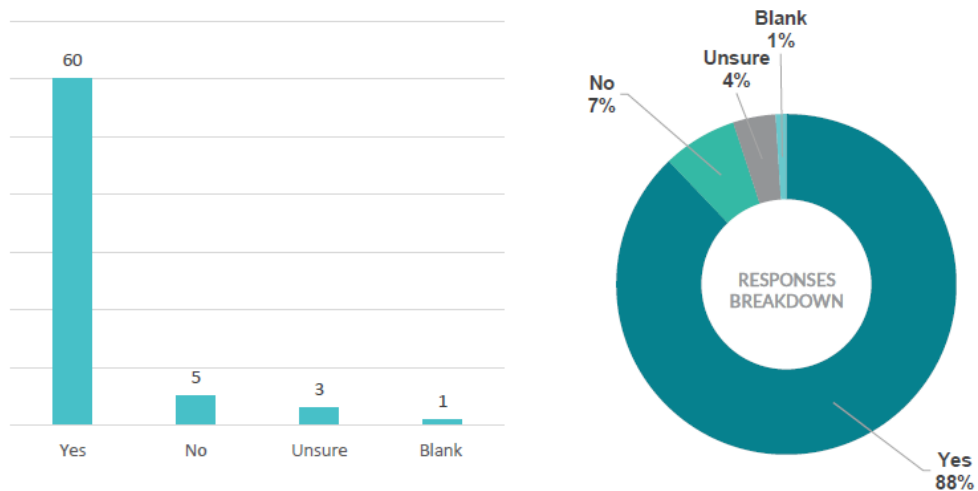
Q12. Do you feel prepared for the BC Energy Step Code?

70 responses



Q13. Have you or other members of your firm undertaken any training or accessed other resources in preparation for the BC Energy Step Code?

69 responses

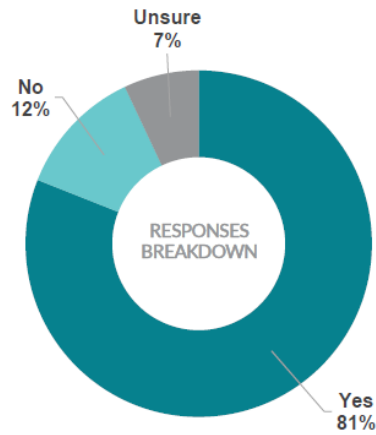
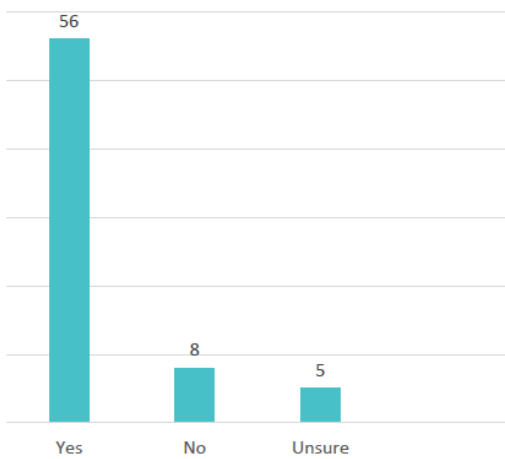


Q14. What type of BC Energy Step Code training has your company participated in?

There were 62 responses to this question. This was an open-ended question, so we classified the responses into categories.

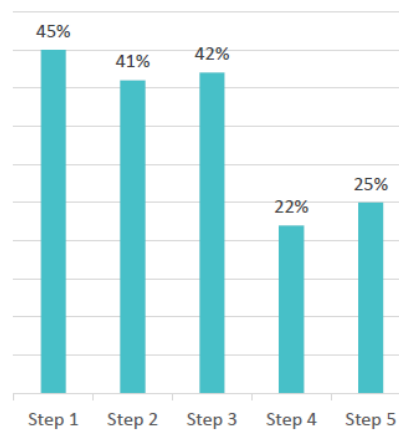
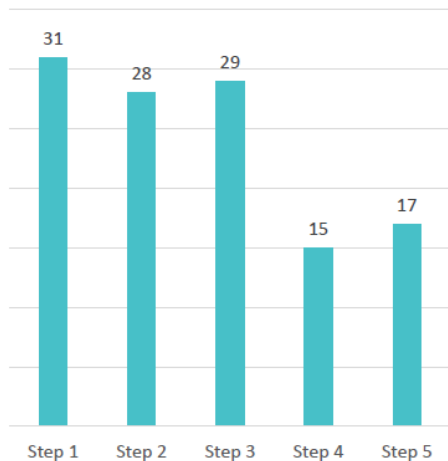
Q15. Have you built or are currently building to BC Energy Step Code standards?

69 responses



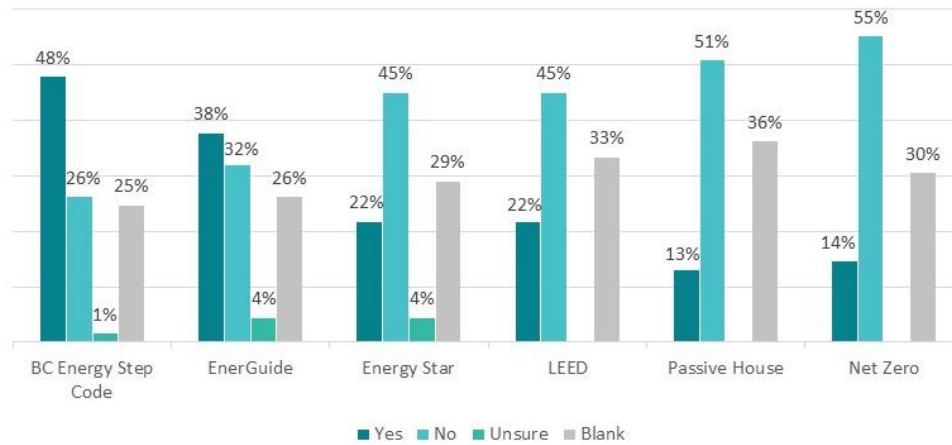
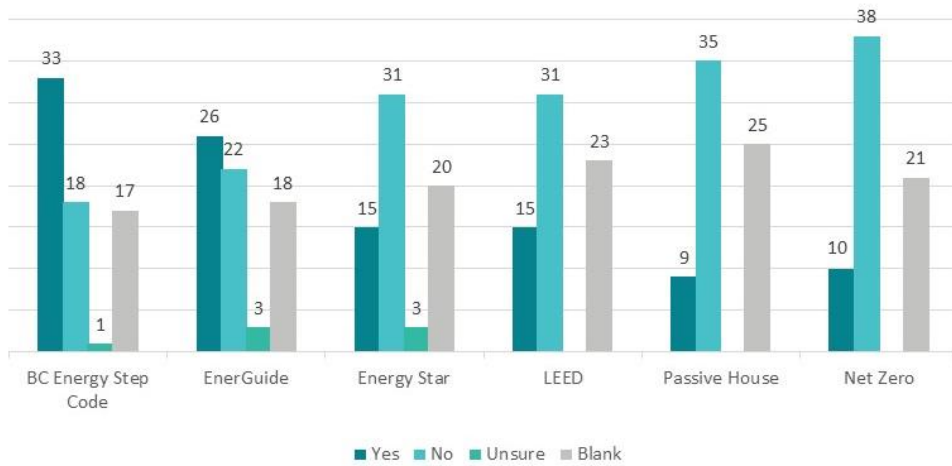
Q16. What steps do you have experience with? Check all that apply

69 responses



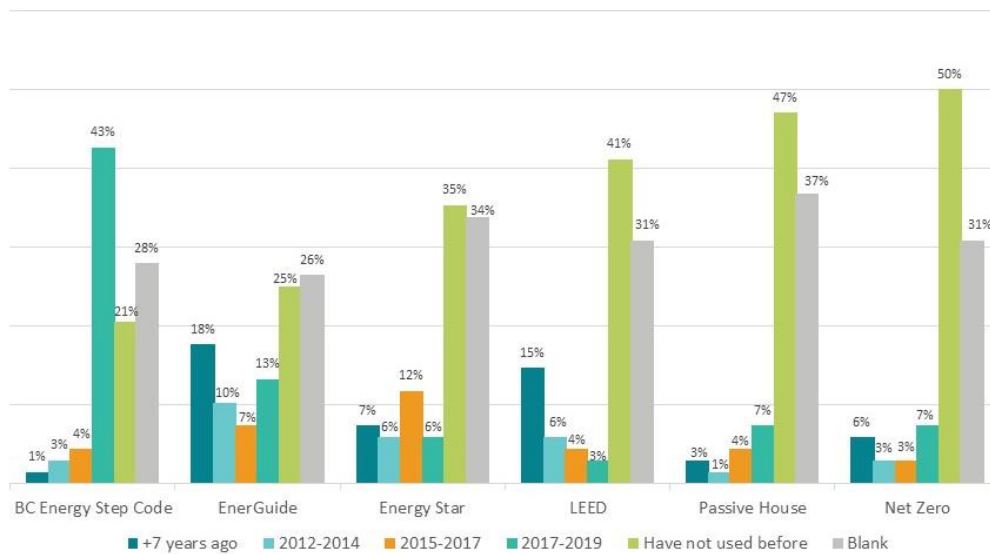
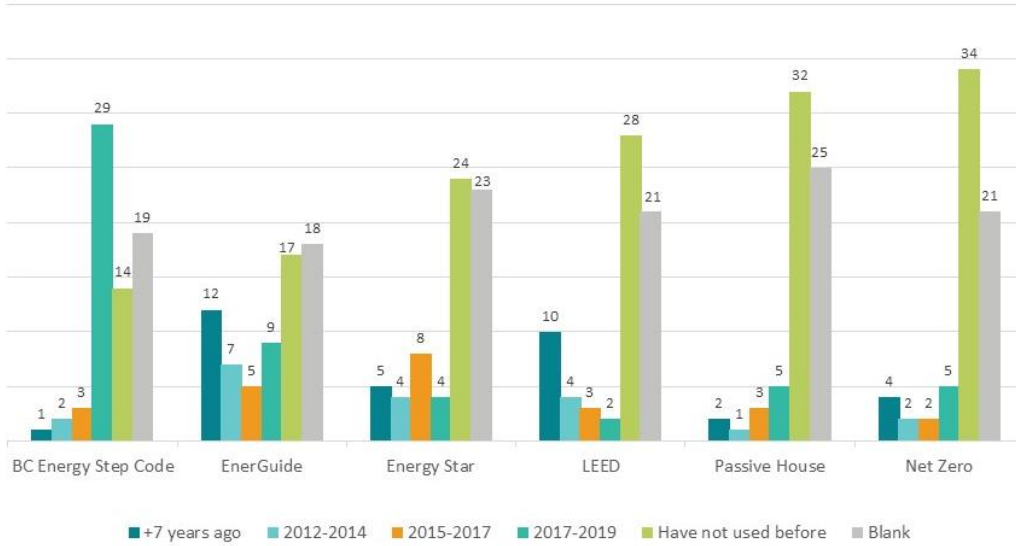
Q17. Which energy performance programs have you used in building projects over the past 12 months?

69 responses



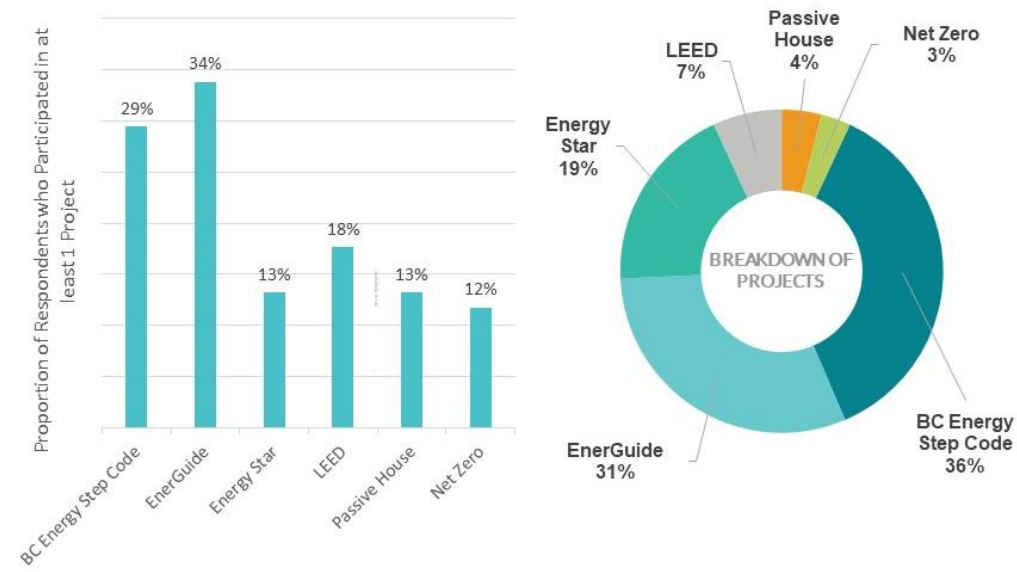
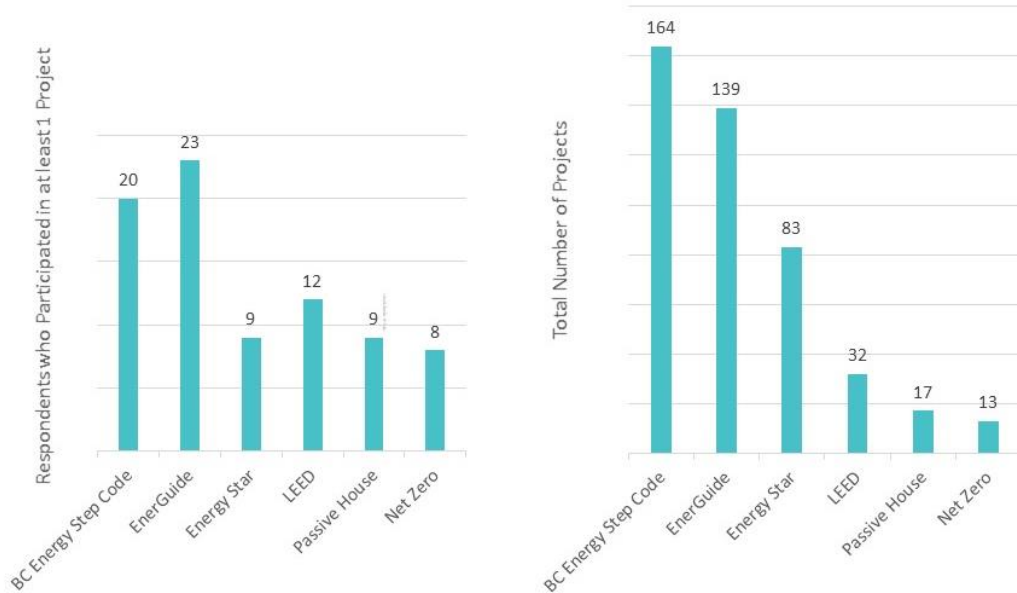
Q18. When did you first start building using these energy performance programs?

68 responses



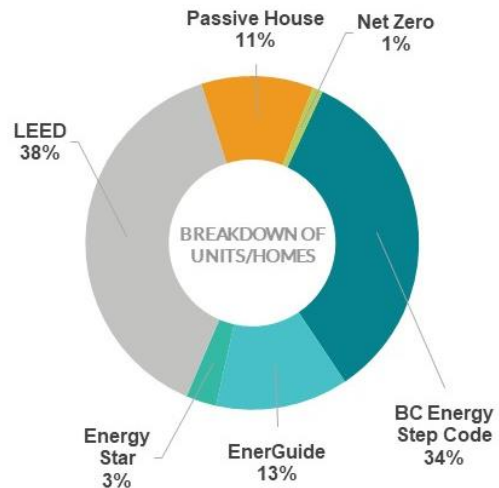
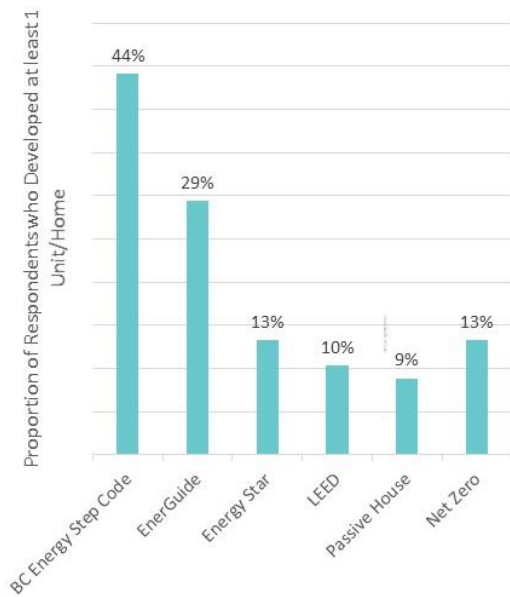
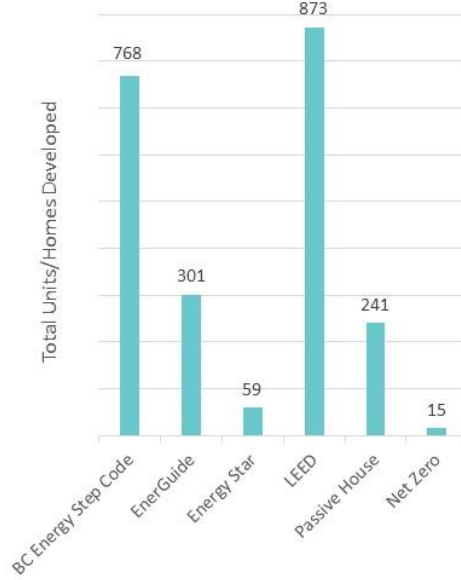
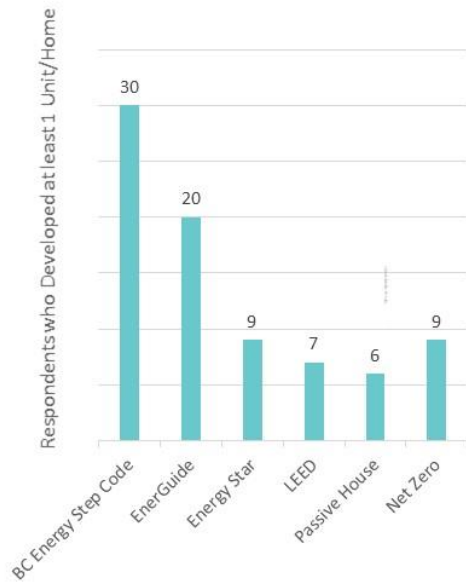
Q19. In the past 12 months, approximately how many projects have you participated in that used these energy performance standards?

68 responses



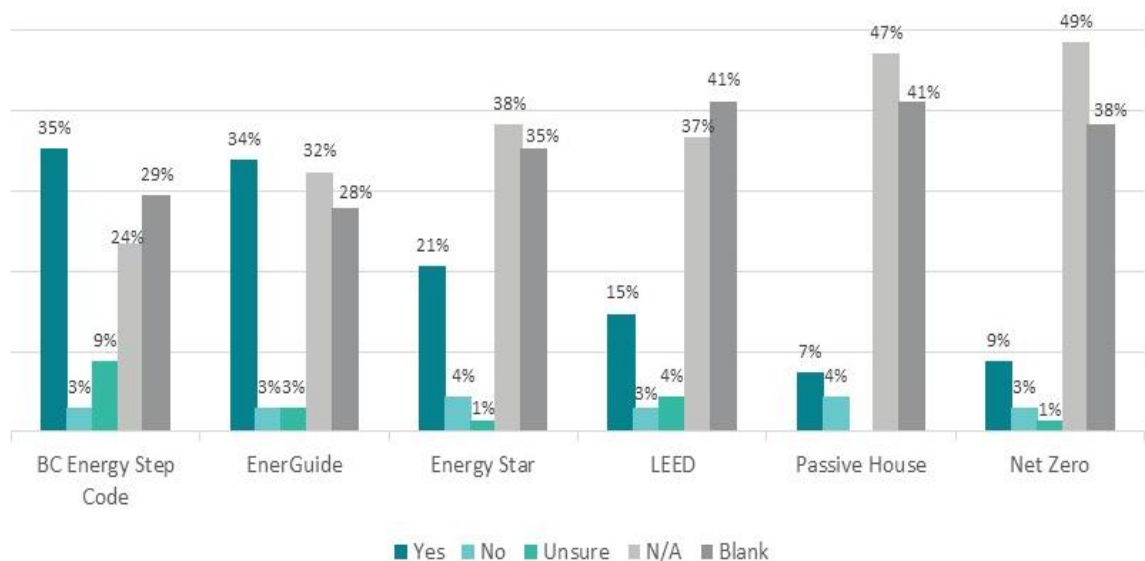
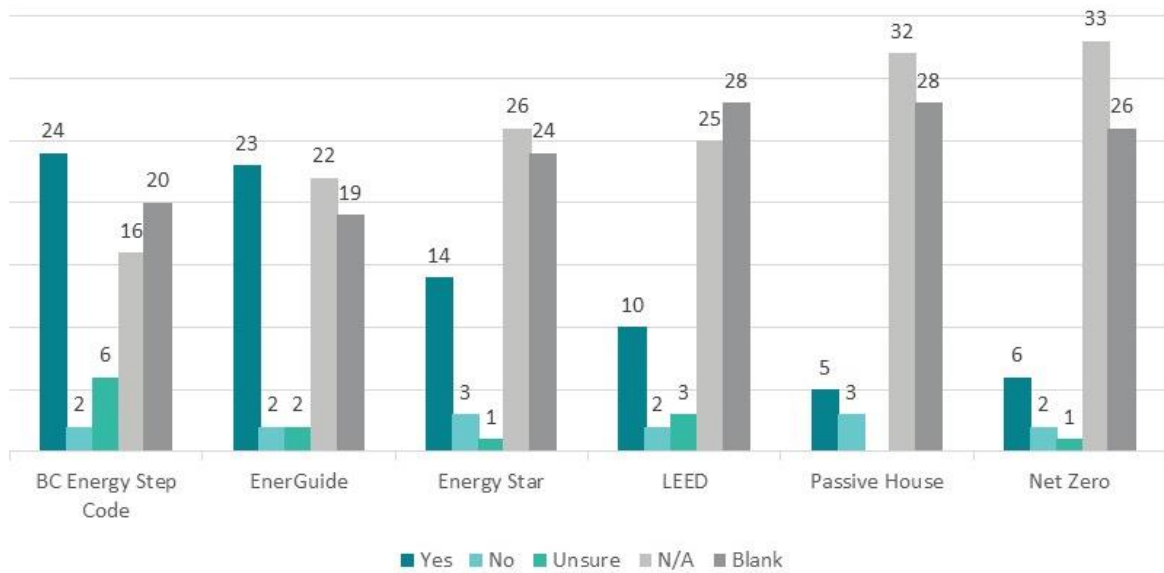
Q20. In the past 12 months, approximately how many individual units/homes have been developed that used the following energy performance standards?

68 responses



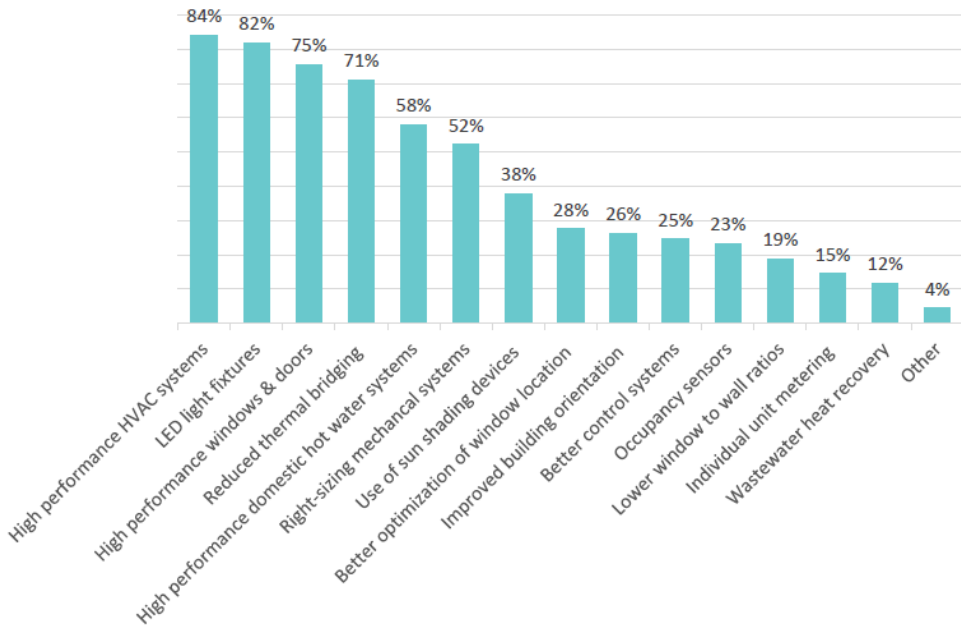
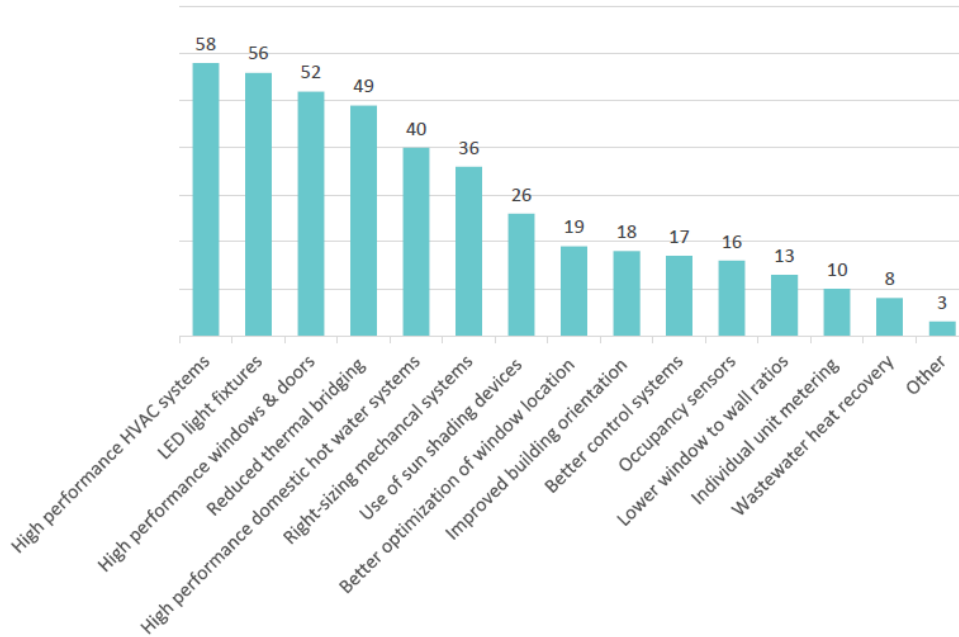
Q21. Did you attain your energy performance target for your most recently completed project?

68 responses



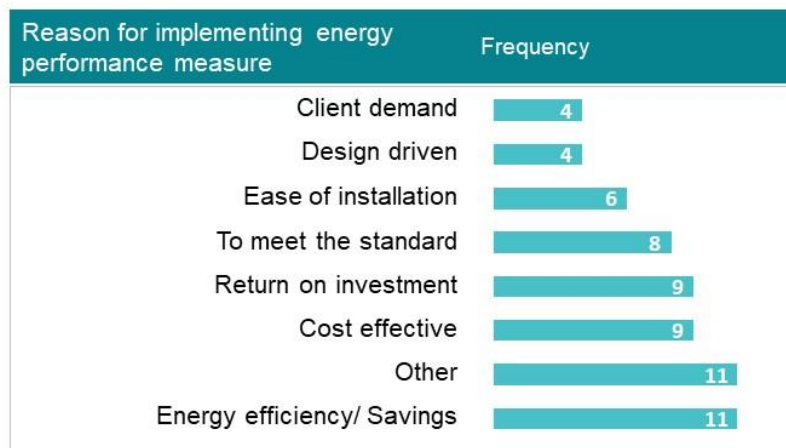
**Q22. Which of the following measures have you used in the past 12 months?
 Check all that apply**

69 responses



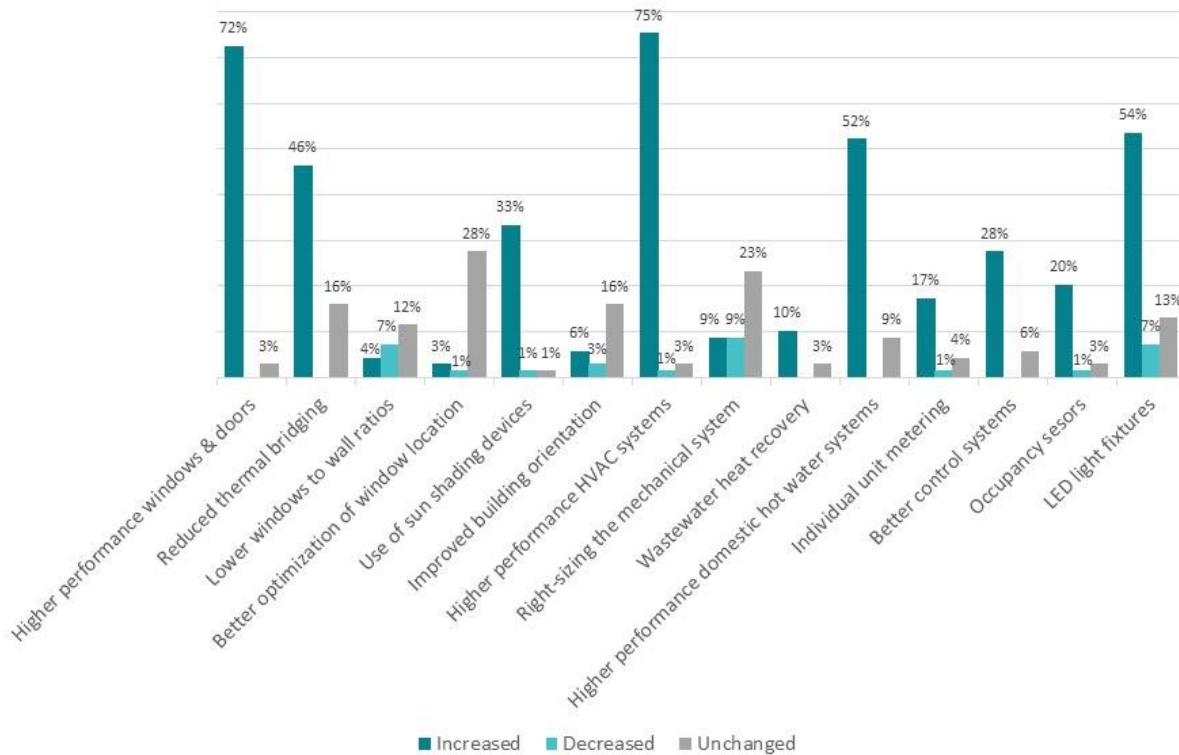
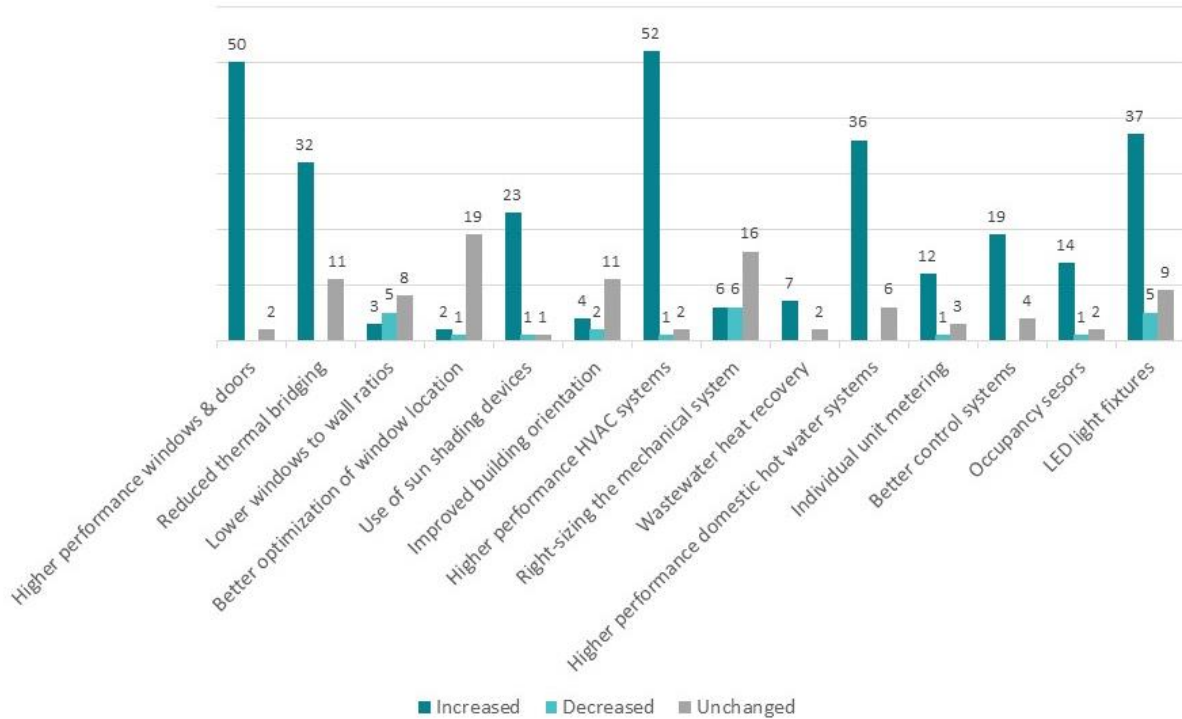
Q23. Why did you select these particular measures for implementation?

56 responses



Q24. For the energy performance measures implemented, did your costs increase or decrease?

69 responses



Q25. If the costs of the measures implemented increased or decreased, can you specify by how much (%) and whether it affected the cost of labour or materials?

There were 68 responses to this question.

Q26. Which aspects of implementing energy saving measures do you find most challenging?

There were 49 responses to this question.

Q27. Do you have any suggestions as to how this/these issue(s) could be addressed?

There were 44 responses to this question.

Q28. Is there anything we didn't cover that you would like to add?

There were 6 responses to this question.

