



BC Energy Step Code Capacity Study

July 30, 2021

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The “BC Energy Step Code Capacity Study” was commissioned by the Province of British Columbia. This work is designed to provide accurate and authoritative information but is not intended to provide professional advice. Users are responsible for exercising professional knowledge and judgement in the application of the information.

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Timeline for Energy Efficiency Regulatory Requirements in the BC Building Code

Here's what the province's CleanBC plan will mean for new-construction requirements.



BC ENERGY STEP CODE – SCOPE AND TIMEFRAME

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PURPOSE OF STUDY

REVIEW the educational elements in place to support key construction professionals to acquire knowledge and skills to successfully implement ESC requirements through to 2032

ASSESS the current “state of readiness” of key construction professions to implement the ESC

IDENTIFY barriers hinder key professions from acquiring the knowledge and skills they need

RECOMMEND how capacity building efforts can best be directed in the coming year(s) to support the development of needed knowledge and skills



Research Methodology





Identifying key professions



Engaging with institutes, associations, warranty providers and certification bodies



Engaging with organizations that support training and capacity building.



Identifying existing competency frameworks



Identifying learning resources



Identifying degree to which training is encouraged/mandated, as well as obstacles to training.



Clarifying differences between Part 3 and Part 9 construction.



Interview

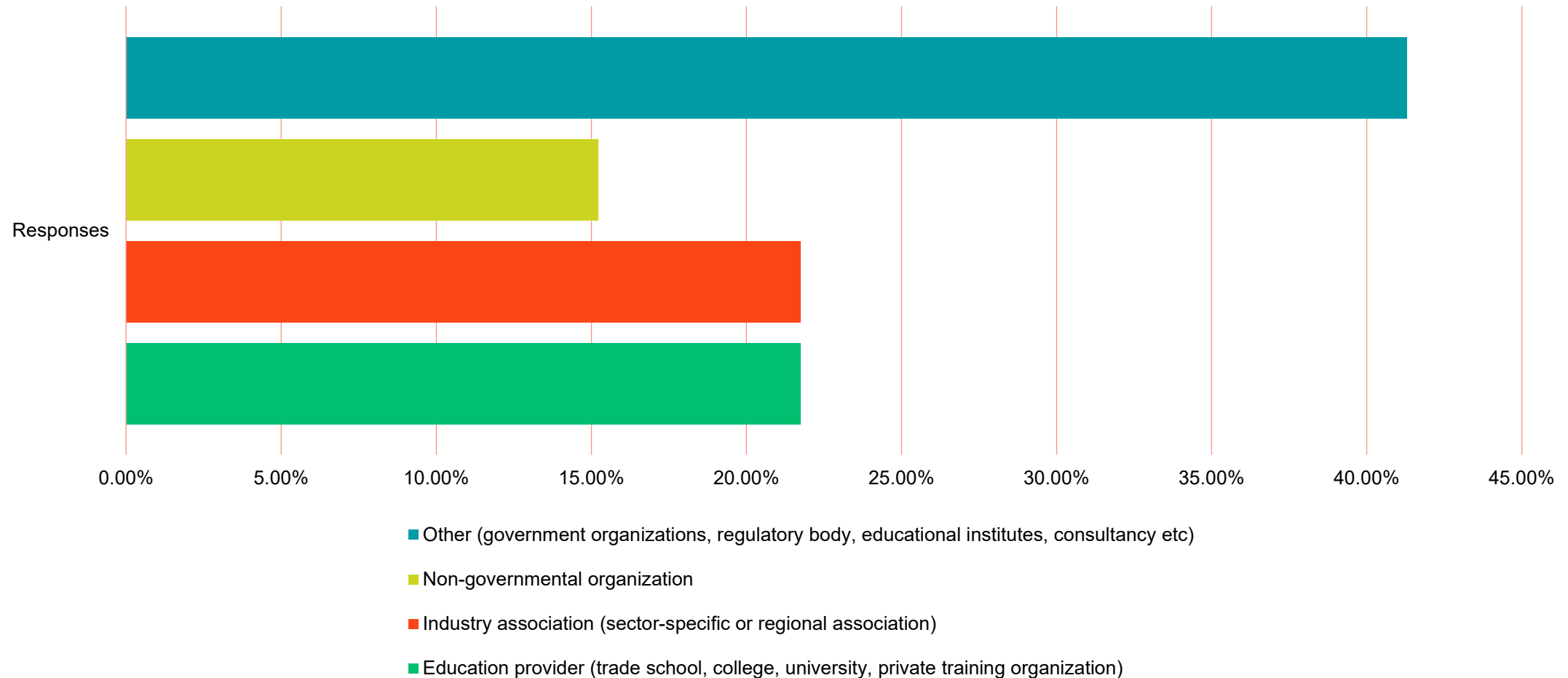
- **21 interviews** were conducted
- Included professionals in management and training roles from relevant BC organizations, industry professionals
- Questions on general preparedness, training and availability, hiring qualified workers, incentives, under-served populations, regional differences, barriers and challenges



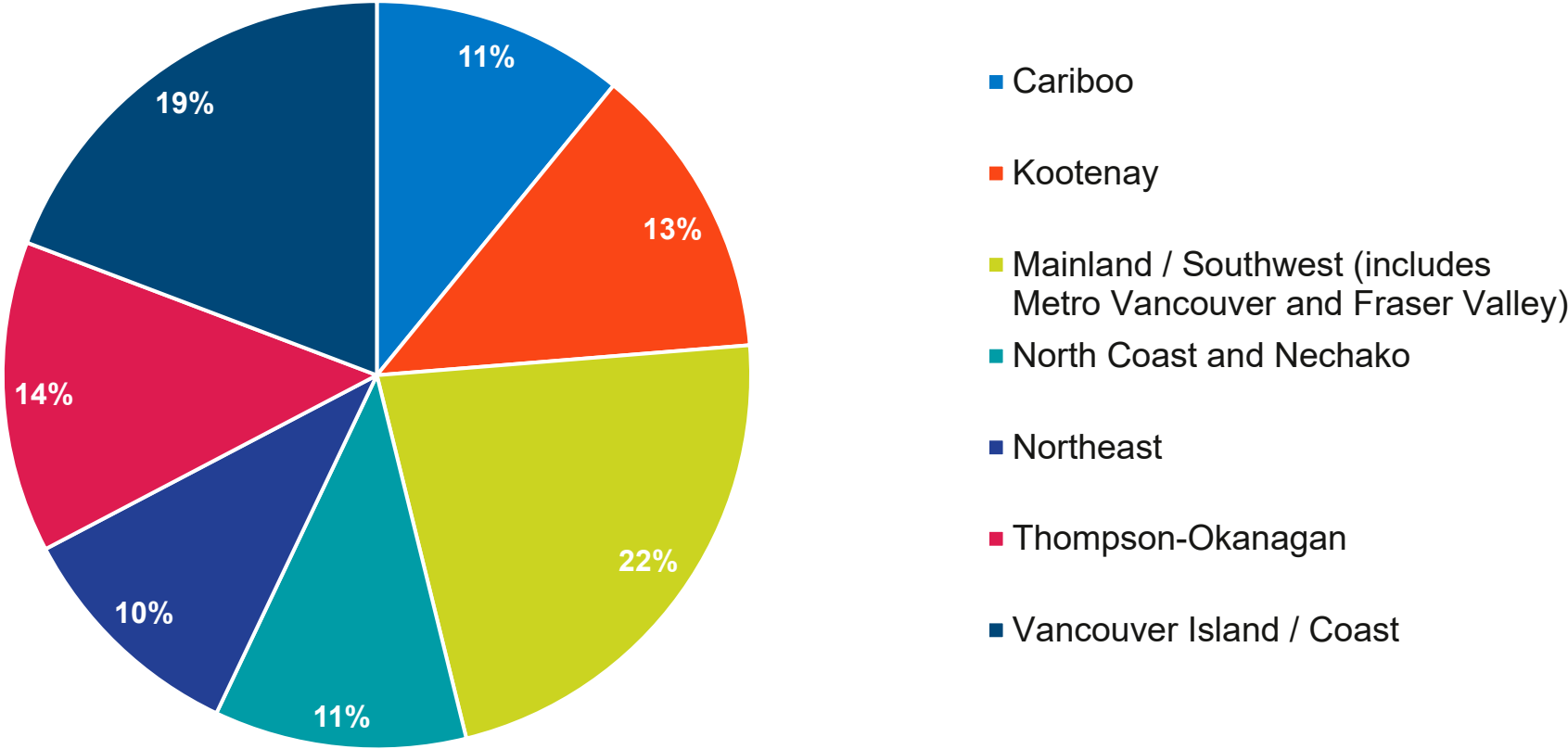
Survey

- A BC Building Code Capacity Survey was conducted in **March and April 2021**
- The survey was disseminated directly via email through SurveyMonkey platform to over **300 individuals and organizations**
- **56 responses** were received after approximately **5 weeks**.
- Questions on general preparedness, training and availability, hiring qualified workers, incentives, under-served populations, regional differences, barriers and challenges

Which one of the following categories best describes your organization? (N=46)



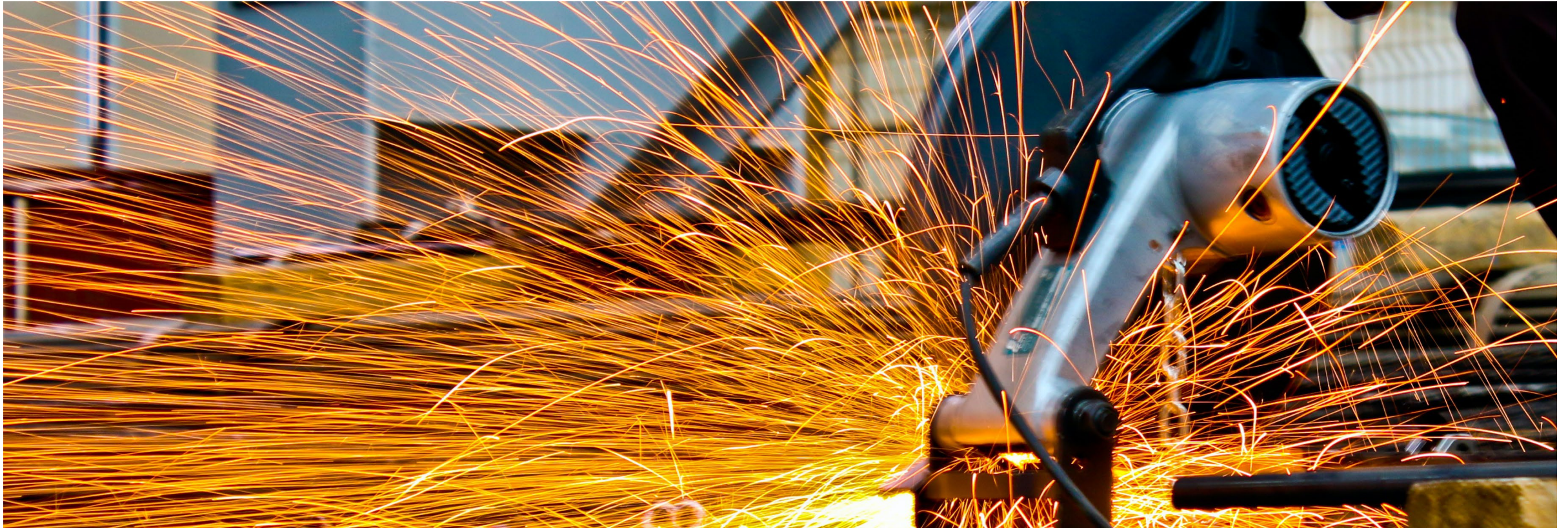
Select any regions that fall within your organization's main scope and reach (N=46)



Key Professions	Key Organization Responsible or 'Natural or Potential Lead'	Related or Supporting Organizations	Step Code Competency Framework Available?	Learning Resources available to Support Competencies?	Learning Resources List for this Profession	Step Code Status	Differences Part 3 vs Part 9	Regional Differences	Identified obstacles	
Metric	Name (Green - required to operate, Orange - vol. membership, Red -	Name	Green - Yes, Orange - Partial / In Progress, Red - No	Green - Yes, Orange - Partial / In Progress, Red - No	Green - Yes, Orange - Partial / In Progress, Red - No	Green - Strongly encouraged, Orange - Info available but not explicitly encouraged.	Major, Minor, None	Major, Minor, None	Major, Minor, None	Comment
Consultants										
Developers and project managers (Part 3)	UDI	AIBC, CHBA-BC, VRCA, ICBA, EGBC	No	Partial	In progress	No	N/A	Minor; experienced developers concentrated in cities	Minor	Prepared in the short term. Will require training on the implications of ESC on building configuration, form and cost.
Architects	AIBC	RAIC, ASTTBC, CAGBC, Passive House Canada	Partial - Modelling Guidelines	Yes	Yes	Accredited (LCU) = Strongly encouraged	Minor	Minor; experienced Architects unavailable outside of cities - retirements eminent	Major	Shortage of experienced architects outside of cities is a major issue - which will critically affect compliance in regions
Engineers involved in construction of buildings, including mechanical, electrical, building envelope	EGBC	ASHRAE, BCBECE, CSME, IEEE Canada	Prof. Practice Guidelines & Modelling Guidelines	Yes	Yes	Self-reporting LCU = Not explicitly encouraged	Minor	Minor; experienced engineers concentrated in cities	Minor	Prepared in the short term. However, ability to support/advise construction activities is limited in some areas. Shortage of experienced mechanical engineers may become a problem in the future.
(Home) Designers (i.e., Part 3 buildings not requiring an architect)	BC Association of Building Designers	AIBC, ASTTBC, CAGBC, Passive House Canada	Partial (generic)	Yes	Partial	No	N/A	Minor; experienced designers unavailable outside of cities - retirements eminent	Major	Shortage of experienced Home Designers outside of cities is a major issue - which will critically affect compliance in regions
Estimators and Cost Consultants	CIQS	RICS, AIBC, VRCA, ICBA, NRCA, SICA, VICA, CHBA-BC	No	No	No	No	N/A	N/A	Major	CIQS has no education related to energy efficiency or ESC - interviews varies widely on the relevance and impact of cost advice for ESC.
Energy Advisors & Modellers - Part 3	CACEA	IBPSA BC Chapter, Passive House Canada	Yes	Yes	Yes	Not explicitly encouraged	N/A	Major; Canada is suffering a shortage of Energy Advisor with practical construction experience	Major	Shortage of Advisors (esp. in rural locations); Training needed to help EAs better support/advise construction and building officials - which will critically affect compliance
Energy Modellers - Part 3	IBPSA BC Chapter	ASHRAE BC, Passive House Canada, EGBC	Yes	Yes	Yes	Not explicitly encouraged	N/A	Minor; experienced engineers concentrated in cities	Minor	Prepared in the short term. However, ability to support/advise construction activities is limited. Lack of training on whole building airtightness testing a challenge.
Builders and Trades/subcontractors										
General contractors (Part 3)- CMs, PMs and Superintendents	None	BCCA, VRCA, ICBA, NRCA, SICA, VICA	Partial (2017 generic)	Yes	Partial	No	N/A	Minor; experienced Contractors concentrated in cities	Major	Experience in coordination, management and knowledge application required for Energy Codes is mixed
Licensed residential builders (Part 3) - CMs, PMs and Superintendents	BC Housing Licensing	CHBA BC, HAVAN	Partial (2017 generic)	Yes	Yes	Yes	N/A	Minor; key gap is lack of local projects offering hands-on experience.	Minor	Training available. Lack of local projects in rural locations offering hands-on experience will become a bigger problem if not addressed
Carpenters, Framers, AVM Barrier Installers & Envelope Trades (inc. steel stud and drywall)	None	VRCA, NRCA, SICA, VICA, ICBA, CHBA-BC, BCRC (Union)	Partial (2017 generic)	Partial	No	No	Major	Major; trades with relevant experience or training concentrated in cities, with poor training availability in rural regions	Minor	Building envelope training needed - level of expertise dependent on trade/company experience applying skills to project and envelope types. Lack of local projects in rural locations.
Insulators	NAIMA, BCICA	VRCA, NRCA, SICA, VICA, CHBA-BC	Partial (2017 generic)	Partial	Partial	No	Minor	Minor; experienced installers concentrated in cities, but the skill difference is considered minor	Minor	Mechanical insulators are ready. Envelope insulators may require cross-training, training on air barrier and functional requirements.
Electricians	Technical Safety BC	ECA BC, VRCA, NRCA, SICA, VICA, ICBA, CHBA-BC, BC Hydro, FortisBC	Partial (2017 generic)	No	No	No	Minor	Minor; uncommon equipment familiarization	None	Generally prepared; core practices are not expected to change. However, renewable energy systems (although not technically required for ESC) require training.
HVAC Installers/Mechanical Design and Installers, and Plumbers	Technical Safety BC	TECA, MCABC, HRAI, FortisBC, BCSEA, SMACNA BC, BC Hydro, FortisBC	Partial (2017 generic)	Partial	No	No	Major	Minor; uncommon equipment familiarization	Minor	Lack of familiarity with some new equipment and systems. Training required on "grey areas" relating to testing, commissioning, balancing, etc.
Gas Fitters	Technical Safety BC	FortisBC	Partial (2017 generic)	Partial	No	No	Minor	Minor; uncommon equipment familiarization	Major	Although ESC allows for gas appliances, the introduction of other policies relating to GHG emission reductions (as anticipated in the BC Electrification Roadmap) will result in a limited role in future codes.
Roofers	RCABC	VRCA, NRCA, SICA, VICA, CHBA-BC, ICBA	Partial (2017 generic)	Partial	No	No	Minor	Minor; some roof systems suited to ESC uncommon outside of cities	None	Generally prepared.
Glaziers, Window & Glass Door Installers	Fenestration BC	VRCA, NRCA, SICA, VICA, CHBA-BC, ICBA	Partial (2017 generic)	Partial	No	No	Major	Major; experienced installers concentrated in cities, availability in other regions is uncertain	Minor	Required additional "environmental separators" training; uncertain envelope responsibility means some overlap with Envelope trades
Policymakers and regulators										
Building officials	BOABC	PIBC, EGBC, AIBC, ASTTBC	Yes	Yes	Yes	Accredited (CPD) = Strongly encouraged	Major	Major; the experience applicable with Energy Codes is concentrated in cities, with the leaders "few and far between"	Major	Energy Foundations Program available that supports all SC competencies but consistent ability to apply it in practices is considered limited - possibly constraining (esp. outside urban centres).
Local Govt. Planning Department Staff &/or Sustainability Staff support Step Code	PIBC		Partial (2017 generic)	Partial	Yes	Accredited (CPD) = Strongly encouraged	Major	Major the experience applicable with Energy Codes is concentrated in cities, with the leaders "few and far between"	Minor	Ability to articulate the practical implementation of ESC Regulations may be limited - especially within those AHJs that have not formally adopted ESC.

CAPACITY MATRIX SNAPSHOT

Sample Key Professions Readiness Summary



Key Profession Snapshot – Engineers (Mechanical, Electrical, Building Enclosure)

State of readiness	2022	2027	2032
Urban centres – Part 3	Yes	Yes	Yes
Province-wide – Part 3	Yes	Yes	Yes
Urban centres – Part 9	Yes	Yes	Yes
Province-wide – Part 9	Yes	Yes	Yes

Responsible Organization	Engineers and Geoscientists of British Columbia (EGBC) – regulatory body that requires continual professional development.
Related or Supporting Organizations	ASHRAE, BCBEC, CSME, IEEE Canada
Step Code Competency Framework	Yes - There are Professional Practice Guidelines relating to building enclosure and whole building energy modelling services.
Learning Resources to Support Competencies	Yes - There are a total of 32 courses directly addressing all aspects of ESC and a further 24 complementary resources. 90% are offered online and available across the province. The majority of the courses address envelope and enclosure, there are fewer related to mechanical and electrical design.
Learning Resources List for this Profession	Yes - EGBC lists numerous institutional and industry resources, although does not specifically call out resources related to ESC

Step Code Status	Partial - Engineers are required to track and report their education , but ESC training is not explicitly encouraged.
Differences Between Part 3 and Part 9	Minor – engineers are required to maintain their professional credentials and apply EGBC codes of practice irrespective of the type of project.
Regional Differences	Minor - experienced engineers may be unavailable outside of urban centres although most firms travel province-wide, especially for larger projects.
Identified Obstacles	Minor – possible shortage of engineers due to retirements could affect readiness over the next decade (i.e., by 2032) – especially outside of cities.
Additional notes on readiness:	<ul style="list-style-type: none"> • The biggest change for engineers will be in how project teams are structured and how risk related to building performance is allocated. • Issues around constructability and trade coordination design could impact readiness since these issues directly affect cost, schedule and construction outcomes. • As builders push for more collaborative and lean project delivery methods to improve productivity, engineers will need to become familiar with digital tools, componentized and prefabricated solutions.

Learning Resources Available to Support Competencies

Building Enclosure Engineers

	Design, construction & regulatory process	Building Science	Energy modelling & metrics	Airtightness	Building envelope assemblies	Insulation (building envelope)	Windows, skylights & doors	Supply chain
ESC COURSES - Pt 3	24	16	8	2	18	6	3	0
ESC COURSES - Pt 9	21	15	5	2	16	6	3	0
ALL APPLICABLE COURSES - Pt 3	30	16	8	2	20	7	4	1
ALL APPLICABLE COURSES - Pt 9	38	19	6	5	22	10	7	2

Mechanical and Electrical Engineers

	Design, construction & regulatory process	Building Science	Energy modelling & metrics	Insulation (mechanical)	Supply chain	Mechanical systems & equipment (heating, cooling and ventilation)	Electrical systems & equipment
ESC COURSES - Pt 3	24	16	8	6	0	1	5
ESC COURSES - Pt 9	21	15	5	6	0	0	5
ALL APPLICABLE COURSES - Pt 3	30	16	8	7	1	7	6
ALL APPLICABLE COURSES - Pt 9	38	19	6	10	2	10	6

ENGINEERS (MECHANICAL, ELECTRICAL AND BUILDING ENCLOSURE)

Key Profession Snapshot – General Contractors - Part 3 (CMs, PMs and Superintendents)

State of readiness	2022	2027	2032
Urban centres	Yes	Partial	Partial
Province-wide	Yes	Partial	Partial

Responsible Organization	None – There are multiple associations to which membership is voluntary. Part 3 builders are not required to be licensed.
Related or Supporting Organizations	BCCA, ICBA, VRCA, NRCA, SICA, VICA
Step Code Competency Framework	Partial - There is no ESC competency framework specifically for General Contractors, although the updated 2017 framework is applicable.
Learning Resources to Support Competencies	Partial - There are 9 courses directly addressing all aspects of ESC and a further 17 complementary resources. The majority of the courses are offered online and available across the province. Among the competencies, “design, construction and regulatory process” competency is most widely covered. There is at least one course covering each competency. Many of the courses are not clear about applicability to Part 3 / multi-family construction.
Learning Resources List for this Profession	Partial – All the construction associations promote education courses generally and sometimes include ESC related events on an ad-hoc basis. There is no centralized list.
Step Code Status	No - There are no incentives or means of encouragement for general contractors to take training. Contractors do not require CPD credits.

Differences Between Part 3 and Part 9	NA
Regional Differences	Minor - Experienced contractors are usually more concentrated in cities, but travel province-wide.
Identified Obstacles	<p>Major</p> <ul style="list-style-type: none"> • There are not enough training resources for contractors, and they are one of the top groups who were identified as struggling with implementation and needing further support. • The courses that do exist are difficult for contractors to find. • There is confusion about whether Part 9 courses are applicable to Part 3 projects. Some may be, but most courses are not sufficiently well described. • The experience in coordination, management and knowledge application that required for Energy Code is mixed.

Learning Resources Available to Support Competencies

	Design, Construction & regulatory process	Building Science	Energy modelling & metrics	Airtightness	Building envelope assemblies Insulation (Building envelope & mechanical)	Windows, skylights & doors	Supply chain	Mechanical systems & equipment (heating, cooling and ventilation)	Electrical systems & equipment	
ESC COURSES	9	4	0	2	6	4	1	1	2	1
ALL APPLICABLE COURSES	17	9	1	3	8	4	2	3	6	

State of Readiness for Key Professionals



State of Readiness by Profession for Part 3 Construction

	Urban Centres			Province-wide		
	2022	2027	2032	2022	2027	2032
Developers	Yes	Yes	Partial	Yes	Yes	Partial
Architects	Yes	Yes	Partial	Yes	Yes	Partial
Engineers (Mechanical, Electrical, Building Enclosure)	Yes	Yes	Yes	Yes	Yes	Yes
Estimators and Cost Consultants	Partial	Partial	Partial	Partial	Partial	Partial
Energy Modellers	Yes	Yes	Yes	Yes	Yes	Partial
General Contractors (Construction Managers, Project Managers and Superintendents)	Yes	Partial	Partial	Yes	Partial	Partial
Carpenters, Framers, AVM Barrier Installers & Envelope Trades	Yes	Yes	Partial	Partial	Partial	Partial
Insulators	Yes	Yes	Partial	Yes	Yes	Partial
Electricians	Yes	Yes	Yes	Yes	Yes	Yes
HVAC Installers, Mechanical Design/Installers and Plumbers	Yes	Yes	Partial	Yes	Partial	Partial
Gas Fitters	Yes	Partial	No	Yes	Partial	No
Roofers	Yes	Yes	Yes	Yes	Yes	Yes
Glazers, Window and Glass Door Installers	Yes	Yes	Partial	Yes	Yes	Partial
Building Officials	Yes	Yes	Partial	Yes	Partial	Partial
Local Government Planning and Sustainability Staff	Yes	Yes	Partial	Yes	Partial	Partial

State of Readiness by Profession for Part 9 Construction

	Urban Centres			Province-wide		
	2022	2027	2032	2022	2027	2032
Architects	Yes	Yes	Partial	Yes	Yes	Partial
Engineers (Mechanical, Electrical, Building Enclosure)	Yes	Yes	Yes	Yes	Yes	Yes
Designers (i.e., Part 9 buildings not requiring an architect)	Yes	Yes	Partial	Yes	Yes	Partial
Energy Advisors & Modellers	Yes	Yes	Partial	Partial	Partial	Partial
Licensed Residential Builders (CMs, PMs and Superintendents)	Yes	Yes	Partial	Yes	Yes	Partial
Carpenters, Framers, AVM Barrier Installers & Envelope Trades	Yes	Yes	Partial	Partial	Partial	Partial
Insulators	Yes	Partial	Partial	Yes	Partial	Partial
Electricians	Yes	Yes	Yes	Yes	Yes	Yes
HVAC Installers, Mechanical Design/Installers and Plumbers	Yes	Yes	Partial	Yes	Partial	Partial
Gas Fitters	Yes	Partial	No	Yes	Partial	No
Roofers	Yes	Yes	Yes	Yes	Yes	Yes
Glazers, Window and Glass Door Installers	Yes	Yes	Partial	Yes	Yes	Partial
Building Officials	Yes	Yes	Partial	Yes	Partial	Partial
Local Government Planning and Sustainability Staff	Yes	Yes	Yes	Yes	Yes	Partial

Key Performance Indicators



To be useful, the measures and reporting mechanisms for performance management systems should be:



Acceptable



Meaningful



Unambiguous & Easily Understood



Repeatable



Show trends over time



Suitable



Feasible



Effective



Aligned

CHARACTERISTICS OF EFFECTIVE KPI

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KPIs for responsible organizations can be used to gauge capacity of their member professions

Presence of Competency Framework for Key Profession

- **Survey question** - Do you have a competency framework or profile that describes what skills and expertise are required to meet the energy efficiency requirements of the BC Building Code and the BC Energy Step Code?
- **Rationale** - Competency frameworks describe skills and expertise required to achieve ESC.

Existence of ESC-specific education programs and resources

- **Survey question** - “What proportion of the competencies required to meet the energy efficiency requirements of the BC Energy Step Code are covered by currently available training programs?”
- **Rationale** - Key professions can develop the skills needed.

Quality of ESC-specific learning resources

- **Survey question** - Do you have assessment programs in place to ensure the education programs and/or learning resources are meeting the needs of your members effectively?
- **Rationale** - Training is effective and meets needs of key profession.

Key profession – Builders

Responsible organization	BC Housing
Question	“How confident are you that you have in your company (or can find people with) the required technical skills to build a Step 3 building? (Step number adjusted as appropriate).”
Question Format	Ranking (1= not confident, 5 = very confident). Option to add a comment
Considerations	<ul style="list-style-type: none">• Indicates readiness of trades since many are not represented by an organization• Include regional information if possible• Leading indicator

Key professions – Architects, Engineers, Builders

Responsible organization	BC Housing , AIBC , EGBC
Question	“What proportion of the projects you have worked on over the past 12 months have targeted and/or achieved Step Code 3? (Step number adjusted as appropriate).”
Question Format	Percentage of projects (0%, 10%, 20%, ...100%). Option to add a comment
Considerations	<ul style="list-style-type: none">• Professionals who have completed or are in progress of completing Step Code projects considered ready or in process of becoming ready.• Include regional information if possible• Lagging indicator

Findings and Recommendations



Four goals to improving the state of readiness of key professions in BC

Improve
Communications
and
Engagement

Tackle Technical
Challenges

Address
Regional Issues

Resolve
Profession-
specific Issues

Findings

Recommendations

Incentives to participate in-training needed to increase enrollment



- Offer financial incentives to address real cost of training
- Facilitate partnerships between project developers, training providers and industry associations to provide hands-on training
- Adopt system of “Best Practice Advisors”

Lack of clarity about technical requirements of the 2022 ESC and BCBC update



- Launch a province-wide campaign on details of Building Code changes through to 2032.
- Develop communications materials for local governments

Confusion about courses addressing appropriate topics at right level of experience; lack of profession-specific competency frameworks.



- Sponsor a centralized online hub listing current and relevant training offerings by region and by profession.
- Develop a dedicated telephone hotline to provide support and advice
- Consider reviews and testimonials system for courses
- Work with training providers to develop and deliver training focused on subject matter in demand

Findings

Recommendations

Uncertainty about course quality; lack of credentials/training for trainers



- Develop a standardized evaluation tool for courses
- Establish a “Certificate in Training in Low Carbon Buildings” targeted at professionals and instructors who are delivering training.

Hiring practices prioritize those with practical experience - lack of mentoring and ambiguity around value of credentials



- Develop a “Prior Learning Assessment and Recognition credential” to recognize successful prior site experience with low carbon buildings.

Delivering information in bite-sized pieces may make it more accessible.



- Develop a series of short and focused training options

Findings

Recommendations

Retirement of experienced workforce -
“experience vacuum”.



- Develop knowledge sharing and mentorship opportunities

Lack of cooperation, collaboration, and
communication between trades.



- Combine curricula related to effective communication, teamwork, and collaboration with “building as a system” courses and “soft skills” training.

Cross-training between trades important
for higher steps



- Engage multiple disciplines in collaborative, hands-on training projects to solve technical issues

Tailored education needed for
underserved populations with language
barriers



- Develop training materials in other languages commonly spoken on construction sites.

Findings

Incentives and customized training
needed in areas outside urban centers



Recommendations

- Where local experts do not exist in a specific profession, sponsor experienced leaders to visit regions of the province and share their knowledge.
- Develop hands-on training opportunities specific to cold climate construction by sponsoring higher step “showcase” projects in Northern BC and other parts of the interior.
- Consider incentives for workers in rural regions to overcome barriers in accessing training opportunities and projects.

ADDRESS REGIONAL ISSUES

Findings

Major obstacles exist for some professions in meeting higher levels of ESC.



Energy Advisors are scarce in rural regions



Recommendations

- Develop marketing materials aimed at **Developers and Owners** that explain benefits, requirements, and costs to achieve compliance with the ESC.
- Develop training for **Building Officials** that covers the practical aspects of design and construction
- Combine revamped suite of training resources for **General Contractors** with an incentive program or regulatory requirements to take training.
- Develop training for **Estimators and Cost Consultants** that clarifies knowledge of ESC enhancements and requirements, to help support more accurate and consistent pricing and estimating services.

- Provide incentives for regional colleges to deliver and students to complete Energy Advisor training

Findings

Recommendations

Lack of training for building operations and commissioning to maintain performance



- Develop and provide training and ongoing support for building commissioning that enables participants to learn how to operate HVAC and other building systems to achieve desired energy-performance outcomes.

Future for gasfitters is evolving



- Provide targeted incentives for gas fitters to take training on heat pump installation and electrification of buildings.

Thank you!



APPENDIX



Research Methodology



Category	Description	Data entered
Key Professions	Client	Developers
	Designers and consultants	Architects
		Engineers involved in construction of buildings, including mechanical, electrical, building envelope
		Estimators and cost consultants
		(Home) Designers (i.e., Part 9 buildings not requiring an architect)
		Energy Advisors & Modellers (Pt 9)
		Energy Modellers (Part 3)
		Estimators and cost consultants
	Builders & Trades	General contractors (Part 3)
		Licensed residential builders (Part 9)
		Carpenters, Framers, AVM Barrier Installers & Envelope Trades (inc. steel stud and drywall) - Part 3 & Part 9
		Insulators - Part 3 & Part 9
		Electricians - Part 3 & Part 9
		HVAC Installers/Mechanical Design and Installers - Part 3 & Part 9
		Gas Fitters - Part 3 & Part 9
		Roofers - Part 3 & Part 9
		Plumbers - Part 3 & Part 9
		Glazers, Window & Door Installers

Category	Description	Data entered
	Regulators	Building Officials Local Govt. Planning Department Staff &/or Sustainability Staff support Step Code
Key Organization Responsible or 'Natural or Potential Lead'	Associations, unions, warranty providers and NGOs responsible for and/or certify key construction professionals	Organization name Required to operate Voluntary membership None identified
Related or Supporting Organizations	Associations, unions, warranty providers and NGOs that may be important points of contact with key professions, offer training and or voluntary certification (e.g., Passive House Canada, NAIMA, some equipment manufacturers).	Organization name
Step Code Competency Framework Available?	Does the organization have a competency framework on their website or otherwise easily available for its constituents?	Yes Partial, In Progress (references the 2017 framework) No
Learning Resources available to Support Competencies?	Are there resources available for the key professions based on evaluation of course list per key profession?	Yes Partial, In Progress No
Learning Resources available to Support Competencies?	Is there a resource list for this profession available on the key organization's website?	Yes Partial, In Progress No

Category	Description	Data entered
	Regulators	Building Officials Local Govt. Planning Department Staff &/or Sustainability Staff support Step Code
Key Organization Responsible or 'Natural or Potential Lead'	Associations, unions, warranty providers and NGOs responsible for and/or certify key construction professionals	Organization name Required to operate Voluntary membership None identified
Related or Supporting Organizations	Associations, unions, warranty providers and NGOs that may be important points of contact with key professions, offer training and or voluntary certification (e.g., Passive House Canada, NAIMA, some equipment manufacturers).	Organization name
Step Code Competency Framework Available?	Does the organization have a competency framework on their website or otherwise easily available for its constituents?	Yes Partial, In Progress (references the 2017 framework) No
Learning Resources available to Support Competencies?	Are there resources available for the key professions based on evaluation of course list per key profession?	Yes Partial, In Progress No
Learning Resources available to Support Competencies?	Is there a resource list for this profession available on the key organization's website?	Yes Partial, In Progress No

Key Performance Indicators



KPIs for responsible organizations can be used to gauge capacity of their member professions

KPI	Survey question	Rationale / considerations
Presence of Competency Framework for Key Profession	Do you have a competency framework or profile that describes what skills and expertise are required to meet the energy efficiency requirements of the BC Building Code and the BC Energy Step Code?	The key profession knows what they need to be able to do to meet the BC ESC.
Existence of ESC-specific education programs and resources	What proportion of the competencies required to meet the energy efficiency requirements of the BC Energy Step Code are covered by currently available training programs?	Key professions can develop the skills they need.
Quality of ESC-specific learning resources	Do you have assessment programs in place to ensure the education programs and/or learning resources are meeting the needs of your members effectively?	The training is effective and meets the needs of the key profession.

Additional survey questions customized to key professions

Key profession	Responsible organization	Question	Rationale
Builders	BC Housing	How confident are you that you have in your company (or can find people with) the required technical skills to build a Step 3 building? (Step number adjusted as appropriate).	<ul style="list-style-type: none"> This will indicate readiness of trades since many are not represented by an organization. Data should be saved with region information if possible. Leading indicator of confidence in skillset of available labor in near term.
Architects, engineers and builders	BC Housing, AIBC and EGBC	What proportion of the projects you have worked on over the past 12 months have targeted and/or achieved Step Code 3? (Step number adjusted as appropriate).	<ul style="list-style-type: none"> Professionals who have completed or are in progress of completing Step Code projects can be considered ready or in process of becoming ready. Data should be tagged with region information if possible. Lagging indicator of readiness
Architects, engineers and builders	BC Housing, AIBC and EGBC	The next update to the energy efficiency requirements of the BC Building code will be in 2022 (adjust year as appropriate). What are your challenges in meeting future Steps?	<ul style="list-style-type: none"> Qualitative information regarding technical barriers and gaps in preparedness can be gathered. Anticipated popular responses could be provided as check boxes, with other issues able to be added. Leading indicator of readiness that may help shape future actions.
Architects, engineers, builders, building officials	BC Housing, AIBC, EGBC, BOABC	How many training courses relevant to the Energy Step Code have you taken over the past 12 months?	<ul style="list-style-type: none"> When combined with responses to the number of projects and challenges faced, this data would provide insight into the correlation of training, its effect on readiness, and continued challenges in meeting performance requirements.

Key profession	Responsible organization	Question	Rationale
Building Officials	BOABC	<p>When you think about the projects you were involved with over the past twelve months, what proportion of those projects required blower door / air tightness?</p> <p>Of these, what proportion passed the blower door / air tightness test first time?</p>	<ul style="list-style-type: none"> Identifies how frequently these tests are passed A lagging indicator of builders' readiness to build to the intended performance and how much rework is required to achieve goals. Data should be tagged with region information if possible.
Building Officials	BOABC	<p>What percentage of occupancy permits were NOT issued on the first attempt as a result of energy step code related issues?</p>	<ul style="list-style-type: none"> Occupancy permits are a general indicator of construction quality and performance but will not pinpoint issues that are related to energy efficiency A lagging indicator of skillset readiness to achieve performance goals. Data should be tagged with region information if possible.
Building Officials	BOABC	<p>The next update to the energy efficiency requirements of the BC Building Code will be in 2022 (adjust year as appropriate). Do you have access to training you need to be able to evaluate buildings as will be required by the next level of the Code?</p>	<ul style="list-style-type: none"> Indicates readiness of building officials A leading indicator of training availability to prepare building officials for future code updates. Data should be tagged with region information if possible.
Building Officials	BOABC	<p>Are you prepared to evaluate buildings at a higher Step Code level than what is currently required?</p>	<ul style="list-style-type: none"> A leading indicator of effectiveness of training resources available. Data should be tagged with region information if possible.

KPIs for jurisdictions (such as provincial and regional policy makers and stakeholders) can be used to monitor overall progress:

KPI	Data and collection strategy	Rationale / considerations
<p>Predicted TEDI (Thermal Energy Demand Intensity) and EUI (Energy Use Intensity) for new projects</p>	<p>Annual collection of building permit data</p>	<p>TEDI (Thermal Energy Demand Intensity) and EUI (Energy Use Intensity) are key performance criteria for energy efficient new construction projects.</p> <p>This would provide a leading indicator of readiness for project teams by recording intended building performance and comfort level with new Steps.</p> <p>This data is not routinely collected by local governments and resources would need to be made available to assist.</p>
<p>Overall availability of training by region</p>	<p>Survey questionnaire - The survey that accompanied this report can be performed annually to determine if key professions are getting access to the training necessary to deliver ESC compliant projects effectively.</p>	<p>This data would be a leading indicator. Enrollment statistics and student demographics may also be requested from the providers or may be available through statistics on Employer Training Grants.</p> <p>Costs may be incurred to collect this data from course providers, as well as to compile and analyze the data and host the results.</p> <p>Quality would be dependent upon response rate.</p>

KPI	Data and collection strategy	Rationale / considerations
<p>Industry satisfaction with training / training effectiveness</p>	<p>Survey questionnaire to course participants:</p> <ul style="list-style-type: none"> • What version of the building code (or Step Code) was referenced for this course? (Check box) • To what extent did the course content align with your expectations when you signed up for it? (1 = it was not what I expected at all - 5 = it was exactly what I expected) • Will the information you learned in this course improve your ability to deliver projects at higher levels of the Energy Step Code than you were previously able to? (Yes, No, Not sure) • Did the instructor(s) have a good understanding of the practical requirements and challenges on a standard job site? (1 = not at all – 5 = very knowledgeable) • What other training would you like to see offered that is not currently available or accessible and would help you in your job delivering high-performance buildings? (Comment) 	<p>Training providers need to deliver training effectively – i.e., in formats, time frames and pedagogical approaches that suit the trainees.</p> <p>Exit surveys and/or feedback forms can be used to gather participants feedback on course effectiveness. The data provides leading indicators of:</p> <ul style="list-style-type: none"> • Students are able to find the training they need • Students are satisfied with the training • Potential technical challenges and gaps.

The number of certified projects under a variety of building standards broken out by type of building and region.

- **Pros:** Easily accessible, historic data
- **Cons:** Not representative of mainstream construction, only captures top percentage who seek certification. Residential projects may not be accurately represented (often included into “mixed, use, retail, etc.)

Price per square foot of projects in different areas based on different levels of ESC adoption

- **Pros:** Check of incremental price premiums and if they are normalizing based on readiness
- **Cons:** Data broken out by building type, not by region, so no data on ESC adoption.

The number of housing starts by region

- **Pros:** Indicator of impacts of ESC requirements
- **Cons:** Not an indicator of ESC demand; does not address readiness.

Energy use and GHG emissions related to residential, commercial & institutional buildings in BC

- **Pros:** Meta-level indicator that the impacts of buildings are reducing overall.
- **Cons:** Not possible to break out new construction projects; does not address readiness.

Building permit values, broken out by local government.

- **Pros:** Meta-level indicator of industry health and issues affecting construction economy.
- **Cons:** No indication of ESC level of buildings; does not address readiness.

Number of LCUs/CPD credits awarded for energy efficiency related training programs.

- **Pros:** Indication of key professions' choice of training to fulfill education requirements.
- **Cons:** currently not public data - Information may not be currently recorded by type of course.

Number of projects that receive high performance building incentives.

- **Pros:** Leading indicators of how many builders hit the targets early.
- **Cons:** Currently not public data. May not be representative of the mainstream; data may be proprietary; does not address readiness by profession.