Market Scan in Select Industries for the BC Energy Step Code

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August 2017

RESEARCH HIGHLIGHTS

- Manufacturers of air barriers and heat recovery ventilators (HRVs) generally saw the BC Energy Step Code as an opportunity rather than a barrier, and reported that they would be able to increase supply in response to growing demand. For these manufacturers, gaps in education and strong installation practices were identified as a bigger barrier to achieving better energy performance than limitations in the materials/equipment.
- While some window manufacturers can achieve, or believe they can achieve, adequate window performance for the BC Energy Step Code, there is a range of sophistication and capacity in the industry. Smaller window manufacturers would likely struggle to interpret and attain the window performance necessary for each Step. Insufficient education and training in window installation also creates barriers to improved energy performance in windows.
- Manufacturers were generally supportive of the use of the performance path approach and use of Certified Energy Advisors (CEAs). However, potential concerns raised included:
  - The level of knowledge CEAs would have with respect to mechanical systems and windows, and their ability to provide guidance to builders in these areas.
  - The ability of CEAs to model energy performance accurately.
  - The possible lack of independence of CEAs, as they are employed by the builder.
  - Building inspectors may struggle with the performance path and enforcement may be easier using prescriptive requirements.
  - Window manufacturers want to know what U-value they need to achieve under the BC Energy Step Code, which is not prescribed by the performance path approach.
- A need for more training and education among builders, trades, and building inspectors was identified by most manufacturers. In particular, participants were concerned about inadequate or inconsistent enforcement by some local building inspectors, reporting that the lack of uniform enforcement made poor installation possible, prevented the use of higher performance building products and techniques, and allowed for non-compliant products to be used. Concern was particularly high among window manufacturers, who felt that inconsistent enforcement created a serious disadvantage for businesses that expended the resources to comply with regulations.
- All manufacturers agreed communication will be essential to ensure smooth adoption of the BC Energy Step Code, including providing information on which Steps have been adopted by which municipalities, how the Step has been adopted, and what Steps are being planned for the future. This information would help the industry anticipate and plan for future demand for their products.

INTRODUCTION

RESEARCH PURPOSE AND METHODOLOGY

Building on the work undertaken for the Capacity Scan for the Energy Step Code in Select BC Communities, the Market Scan report provides insight into current and anticipated challenges from the perspective of manufacturers and suppliers. This report also provides background information on market supply and demand, pricing considerations, and training opportunities provided by industry.

Research focused on air barrier systems, heat recovery ventilators (HRVs), and windows, as these components are important in achieving greater energy performance in British Columbia (BC). Interviews were conducted with local suppliers, manufacturers, and industry associations. Representatives from 22 different businesses and industry organizations were interviewed between February and March 2017, including 4 local hardware stores supplying builders, 5 window manufacturers, 5 air barrier system manufacturers, and 8 HRV manufacturers and representatives. While efforts were made to conduct interviews with a broad range of manufacturers, research limitations meant that not all desired interviews could be conducted.

This report documents the experience and observations of the participants, and as a result focuses on new construction and Part 9 Buildings, although some observations on Part 3 Buildings have been included.

MOVING FORWARD WITH THE BC ENERGY STEP CODE

CHALLENGES IN PROMOTING ENERGY EFFICIENT HOMES AND THE BC ENERGY STEP CODE

Interview participants were asked about current challenges in achieving higher energy performance in new homes, and challenges they anticipate specific to the adoption of the BC Energy Step Code. It should be noted that many of the current challenges identified may persist and affect implementation of the BC Energy Step Code.

Air Barriers/Insulation

Current Challenges	Anticipated Challenges with BC Energy Step Code
Risk Aversion	
▪ The leaky condo crisis in BC was identified as making the building industry very risk averse to change. A considerable amount of effort must be made to get builders comfortable with new products.	▪ Builders' concerns about water penetration into the wall assembly and the ability to allow water to escape may create resistance to adopting new practices in general, and impede adaptation to the BC Energy Step Code.
Information and Training Gaps	
▪ There is still confusion between air barriers and vapour barriers in the industry. In addition, many builders are still not using air barriers properly due to a misperception that "we are building too tight". ▪ A lack of education for the siding industry was identified as an issue by one manufacturer, particularly around building envelope construction. ▪ While builders may receive training on building envelope construction through their Continuing Professional Development requirements, the trades have no similar education requirements. ▪ One interviewee noted an information gap about roofs and ceilings, including how to make the roof and ceiling air tight and on general building science. ▪ Although air barrier manufacturers are providing 'systems', there was a general sense that some builders may mismatch products no matter how much education and support is provided.	▪ When a new product is required to meet energy performance, it is not always clear which trade is responsible for it and/or may require a new trade. Exterior insulation was identified as one area where a shortage of trained labour could create issues and increase costs.

Additional Cost and Effort

- Although some manufacturers reported trying to communicate to builders and consumers the benefits of greater air tightness, several emphasized that legislation was key for moving towards higher performance.
- Improving the detailing in the air barrier was identified as the "low-hanging fruit" that is not yet realized by many builders.
- Step 4 (Part 9) was identified as the performance level where challenges are most likely to occur because it will involve greater trades integration and attention to details such as doors, weather stripping, locks, lights, and vents. Most homes are not currently built as a system, and it is unclear what trade is responsible for transition points, which may create challenges.
- One interview participant was concerned that as siding assembly becomes more complex, contractors may have to pay trades on an hourly basis. Under such circumstances, those who misjudge costs under the BC Energy Step Code could run into financial difficulties.

Monitoring, Enforcement, and Certified Energy Advisors

- One manufacturer noted that the different code interpretations by local building officials were challenging.
- Two manufacturers highlighted issues with the CCMC standards, with one describing the CCMC as expensive and time consuming.
- No new potential challenges were identified.

Materials and Equipment

- No current issues were identified.
- Interviewed suppliers believed their products could be used under the BC Energy Step Code and did not identify issues with increasing supply to meet demand.

Heat Recovery Ventilator (HRV)

Current Challenges	Anticipated Challenges with BC Energy Step Code
Risk Aversion	
▪ Trades have an incentive to prioritize "quick response to thermal demands" over energy efficiency to ensure a reduction in call backs. This can result in over-sizing the mechanical systems and setting "trip points" higher than what is most energy efficient.	▪ No new potential challenges were identified.
Information and Training Gaps	
▪ Incorrect balancing of HRVs was identified as a common installation issue in BC. ▪ A lack of knowledge about ventilation among local building inspectors was identified as a significant challenge for improving efficiency in HVAC installation. Building officials were seen as critical for ensuring HRVs are installed and balanced correctly. ▪ There is a disconnect between architects and engineers, resulting in HVAC requirements not being considered early enough in the design process. ▪ There is insufficient understanding on the different HRV sizing requirements for a simplified versus fully ducted system. ▪ Poor consumer education was identified, with manufacturers reporting that, even in more developed HRV markets such as Ontario, they still receive calls by consumers who are confused by their HRV and its purpose. ▪ There is a lack of information on how the energy efficiency of HRVs changes after installation, and that the efficiency could decline over time. ▪ Although homeowners can adapt to a lack of good ventilation, the long-term consequences on health is not well understood or researched. However, new devices that measure air quality are coming onto the market, which may raise awareness and help hold builders accountable.	▪ There is currently no specific training available on HRV installation in BC for HVAC trades, though the Thermal Environmental Comfort Association (TECA) is working to develop such a course and Heating, Refrigeration and Air Conditioning Institute (HRAI) has a course that could be modified for BC.
Additional Cost and Effort	
▪ The prevalence of leaky ducting presents the "low-hanging fruit" of improving energy efficiency in ventilation, with how the ducts are insulated and sealed having a greater impact than HRV efficiency.	▪ Installers indicated that the cost of the HRV unit is not a concern, but the cost of finding space for it and the insulation materials involved could become an issue in places like the Lower Mainland where floor space is expensive and unit sizes are small.

- Installation was identified as more expensive than the manufacturing of HRVs, with the HRV unit representing about 10% to 15% of total manufacturing and installation costs. Installation costs were reported to be high due to the cost of floor space in an insulated area and/or the cost to insulate properly (which often requires spray foam).
- The loss of mechanical rooms in residential buildings has resulted in HRVs placed in closets and closer to living spaces. At this point, HRV sizing and installation become very important to avoid noise, as consumers tend to unplug the HRV if it is too loud.
- For manufacturers importing components into Canada, costs have increased as the exchange rate has weakened. However, because of strong competition in the Canadian HRV market, prices have remained relatively stable and even decreased.
- One manufacturer wanted to see a requirement for a dedicated ductwork system for HRVs in the BC Building Code (BCBC).
- One manufacturer observed that consumers usually see the cost of an HRV before they experience the benefits, making it a hard sell.
- One manufacturer was concerned that the cost of HRV manufacturing could go up over time as 1) use of circuit boards increase in response to demand for more features and control from smart phones and 2) use of EC motors increase in response to greater energy efficiency requirements.
- One manufacturer observed that a homeowner will likely see energy savings with an HRV if they have been venting properly, but an HRV may increase the use of energy if the homeowner was not venting their home properly prior to HRV installation.
- Some installers opined that it does not make sense to use HRVs in all climates, including the Lower Mainland where the temperature difference between indoor and outdoor air is small. It was also noted that HRVs may not make sense in very cold climates where the HRV needs to be turned off for significant periods of time during the winter due to freezing.

Monitoring, Enforcement, and Certified Energy Advisors

- Unlike electrical and plumbing where municipalities have specialized inspectors and fees to support this, there is no “heating permit fee” or specialized ventilation inspector.
- Installers were concerned about relying on CEAs to confirm compliance with the BC Energy Step Code because some CEAs may be unfamiliar with mechanical systems, may lack industry experience, and may be unable to provide builders with support in this area.
- One manufacturer was concerned with reliance on energy modeling software to validate energy savings potential, because it may be assumed that the furnace runs all the time and would under value the energy savings from HRVs.

Access to Materials and Equipment

- No current issues were identified.
- Should the BC Energy Step Code necessitate HRV’s with efficiency beyond requirements in Ontario, the industry would need sufficient time to develop, test, and certify new HRV models for the market. At the moment, HRV manufacturers estimated it would take one to three years to comfortably develop higher efficiency HRVs.

Windows

Current Challenges	Anticipated Challenges with BC Energy Step Code
Risk Aversion	
▪ One manufacturer reported that industry lacked trust in the building code process because of previous bad experiences. Delayed implementation of previous code changes hurt industry leaders who were prepared with product that met the new requirements but lacked demand. ▪ Another manufacturer indicated that they had retooled and retested their window lines to meet new requirements, but afterwards the requirements were lowered. This left the manufacturer with over-engineered windows, unless they decided to retool and retest the windows at additional cost.	▪ Delaying adoption of the Steps into the BCBC could harm industry leaders at the expense of "heel draggers" that may not adapt until forced to do so.
Information and Training Gaps	
▪ Window flashing and installation has no recognized trade, and may be performed by the least qualified person on the job site. ▪ It is difficult to get consensus on the best window installation practices among industry participants. ▪ Building inspectors were identified as lacking the knowledge to enforce proper window installation because they are unsure what to look for. ▪ Doors were identified as a particularly weak area of energy performance, with many manufacturers not meeting current requirements.	▪ The weight of tripane windows has been raised as a concern by some interviewees, and builders with little experience may not understand how to address this properly.
Additional Cost and Effort	
▪ Window manufacturers have found it challenging to keep up with changes in the BCBC, as even small changes can require retool and testing of existing products. In addition, it can be difficult to ensure employees are aware of which products meet requirements, including sales staff and employees in charge of monitoring orders. However, this is getting easier as they develop experience with the City of Vancouver. ▪ Manufacturers reported spending more on testing and development of new window technology since NAFS was introduced in 2012. Although difficult to quantify, two manufacturers reported having additional overhead costs and staff, with one reporting they went from one person managing test results to a staff of four full-time employees managing the administration of code compliance.	▪ Window manufacturers have kept up with performance requirements by increasing the performance of the glass, and once this is maximized will need to change the framing, which is expensive. ▪ Some manufacturers may be unable to keep up with higher energy performance requirements and may leave the market entirely. ▪ The price difference between a tripane window and a dual pane window can be influenced by different factors. For example, if a window has additional features such as frame colour, this would reduce the percentage cost increase resulting from an additional pane. However, if comparing a dual pane slider window to a tripane casement or awning window, the percentage cost difference increases.

- One manufacturer found that the demand for Energy Star windows has declined in favour of "high performance" windows because the "Energy Rating" path can allow windows with poor U-values and too much solar heat gain during the summer. Other manufacturers believed declining interest in Energy Star certification was the result of Section 9.36 requirements in Part 9 of the BCBC and lack of incentive programs tied to Energy Star windows.
- Aside from energy modeling, BC manufacturers outside the Lower Mainland face additional costs when testing and certifying windows as they have to include the cost of shipping windows to the labs.

Monitoring, Enforcement, and Certified Energy Advisors

- Building inspectors in some communities are not enforcing window and door performance due to lack of resources and time, considering it less important because they are not structural or safety considerations. Inconsistencies in enforcement were perceived to have increased since the introduction of BCBC 2012.
- Concerns were raised about the enforcement of performance testing and labeling, allowing some window manufacturers to avoid meeting performance requirements. Specific issues identified included:
  - Lack of enforcement or inconsistent enforcement
  - NAFS does not require third party certification
  - Lack of impartiality of third party testers because they are paid by the manufacturer
- Under the *Energy Efficiency Act*, when a provincial inspector identifies a violation by a window manufacturer, the only enforcement power available is to recommend criminal charges. This enforcement mechanism has limited effectiveness due to the difficulty and general reluctance to press criminal charges.
- As costs to comply with the BC Energy Step Code increase, the incentive to evade enforcement may also increase.
- Concerns were raised that some CEAs may not be well trained on window performance, may not be fully independent as they are employed by the builder, and may not be sufficiently thorough in their energy modeling.
- One manufacturer thought the CEAs could act as someone with authority and knowledge at transition points to improve communication between general contractor, sub-trades and owner, ensuring that desired outcomes are met.
- Some participants noted that for the window industry, less sophisticated manufacturers and building inspectors would likely prefer a prescriptive path, as they do not have the resources to interpret performance path requirements.

Access to Materials and Equipment

- One manufacturer indicated that they would like to have greater ability to conduct thermal modeling in BC.
- One manufacturer reported that shipping small quantities of windows to northern BC is a challenge, and that shipping costs can equal the cost of the windows.
- It was estimated that most window manufacturers can keep using their current lines for Steps 1 and 2. Some manufacturers may need to redesign their products or drop product lines.
- The Fenestration Market Study[1] estimated that the industry would require a minimum of four to five years of advance notice of future requirements so that the cost can be spread out over time.

FACTORS FOR SUCCESS

Communication

To help ensure smooth adoption of the BC Energy Step Code, interview participants identified communication between different stakeholder groups and levels of government as a priority.

Communication to Industry

All interview participants were interested in information on:

- Which municipalities are adopting which Steps from the BC Energy Step Code.
- How municipalities are adopting Steps, including any incentives provided.
- Which Steps municipalities/BC are planning to adopt in the future.

Ongoing access to the above information would allow industry to better anticipate demand for products, as well as the demand for education and training support they provide. Based on input from interview participants, an annual report and webinar may be the most effective means of communicating with manufacturers, and ongoing engagement with industry associations would help ensure information reaches a wide audience. **To provide industry and manufacturers with the information they need, it will be important to establish how to collect information from municipalities on their current and planned Steps.**

Communication from Industry

For smaller and more remote communities, adoption of the BC Energy Step Code should consider local suppliers' ability to obtain the necessary materials and equipment. This would require coordination with other local municipalities and engagement with local suppliers and manufacturers. **Guidance for municipalities on how to coordinate with other communities and engage local suppliers to ensure they are prepared to adopt the BC Energy Step Code would be valuable. Consideration should also be given to how monitoring information on industry capacity may be of use to municipalities and how this can be best communicated.**

Energy Step Code Implementation

The performance path approach of the BC Energy Step Code was generally supported by interviewees, but some industry participants may lack the resources to understand how best to adapt. Air barrier and HRV manufacturers both typically operate on an international level, and noted that other jurisdictions in North America are also pushing product performance and demand. As a result, these manufacturers were confident they could increase supply in response to growing demand in BC and that performance standards would not be an issue.

With respect to window manufacturers however, there is considerably more variety in terms of size, capacity, and sophistication, and many window manufacturers could struggle to understand how the BC Energy Step Code will affect them. **Window manufacturers will likely need more guidance than other industries, including information on potential U-value ranges required for each Step and climate zone.**

Steps 4 and 5 will likely pose the greatest challenge for the building industry, and **strong communication about timelines for adoption into the BCBC and other expectations will be important**. Lack of clarity and/or

code change delays could make window industry leaders wary of developing new products before BCBC requirements change. Once a timeframe is announced, changes to the timeline should be avoided as much as possible to minimize the risk of disadvantaging industry leaders for the benefit of "heel draggers".

Training and Education

Training and education was also identified as a key priority for the stakeholder groups as outlined in Table 5. **Some manufacturers and local suppliers are already involved in providing education, and were enthusiastic about potential opportunities to collaborate and provide more education on the BC Energy Step Code and higher performance products.**

Manufacturers and suppliers did not have strong recommendations on what form training and education should take, but one participant suggested that an online tool be developed to allow users to look up their community and find information on the required Step and guidance on how to achieve that Step.

Table 5. Training and Education Needs

Stakeholder Group		Description
Local Government	**Building Officials**	▪ Education, training, and tools to support building inspectors to inspect windows, particularly with respect to labeling and window performance requirements, and to inspect mechanical systems. ▪ Education and training on the building science of building more airtight homes, with emphasis on how to prevent mold and moisture issues and materials available to address these issues.
Building Community	**CEA**	▪ Education and training to ensure 1) the modeling assumptions made about mechanical and window performance are correct and 2) CEAs are qualified to provide builders with guidance in these areas. Graduated CEA certification could help answer concerns around CEA qualifications.
	Builders and Trades	▪ HRV balancing and ducting, including better home design for HVAC installation and heating system requirements. ▪ Building science of airtightness, with emphasis on how to prevent mold and moisture issues and materials available to address these issues. A lack of knowledge on airtight roofs and ceilings was also noted. ▪ Use of exterior insulation and how to build better insulated walls. ▪ Window and door installation, including flashing and shimming. ▪ Costing guidance as Steps are initially adopted, as builders and trades may not know how to price using new building techniques.
Consumers and Realtors	**Consumers**	▪ Benefits of higher performance homes, including health and comfort. ▪ Information on HRVs, including what they are and how to maintain them.