

## Q&A from September 21, 2021 Builder Forum Series on Step 5 and Form

Presented by the Township of Langley (TOL), Ezgi Yuruk (UBC Scholar), and Mark Bernhardt (Bernhardt Contracting)

- Q: Langley wants to wait 10 years to get to Net Zero Energy. Can you think of a good reason to wait 10 years or should we simply do it now. It is already well known that it will produce great benefits
- TOL (Kevin): The federal government will require all new buildings to be at the highest step of the Step Code (NZER) by 2032. The Township of Langley has adopted Step Code in an effort to ensure that our communities have the capacity and resources available to them to meet each step successfully.
- We agree that Step Code/NZER construction has multiple benefits and as we take steps to map out an adoption plan to the highest steps/NZER, we will open dialogue with our communities to hear their thoughts.
- Q: My basic understanding of the Step Code is if they have a crawlspace that is 4' high this can be considered a basement for the purposes of volume calculations. We are experiencing a lot of people now proposing 4' crawl spaces to enhance their calculations and now a Step 2 house is coming out at step 3. Is there a proposed fix for this? Seems to me they would now be using more energy to condition the crawlspace. It would be nice to close this loop hole.
- Mark: You are correct about this loop hole. A committee is working on this at the provincial level. That rule comes from Energiguide and is difficult for the province to change on its own. But it is being worked on to find a fair solution.
- Q2: Is there an ETA as to when this might be fixed? We are getting garden suites built with 4' crawl spaces just so they can meet Step 3.
- Mark: No ETA that I know of. In my talk I'll get into a few ways we can make that suite meet Step 5 without using the crawl loop.
- Q: Can you talk about the fresh air make up requirements for step 3/5?
- Mark: Step Code does not have any make up air requirements; those remain the same as previous code versions. Makeup air is only required if there is a risk of combustion gas spillage - more air tight homes may have more of a risk. In a case where there is a question about needing it, the home can be tested by a combustion spillage test. Any EA can do this test and it typically costs less than \$200.
- Q: I am a bit late with this question but regarding air tightness, are you asking questions regarding the sealing of the ductwork when it pertains to HRV supply and exhaust?
- TOL (Ajeen): The question regarding the sealing of ductwork is specifically for ductworks and mechanical boxes that come in contact with the envelope assemblies only.
- Q2: Poor duct work in the home without proper sealing of the sheet metal will impact the performance of the HRV and the efficiency of the heating system. Sealing the duct work for the HVAC equipment and the HRV will provide greater efficiency. Is this not required in the Step Code?

TOL (Kevin): Unless the ductwork at the envelope is compromised, internal ductwork gaps will not impact Step Code as it would not impact the air tightness test and it is not modelled. That being said - absolutely, ensuring the ductwork is designed thoughtfully (less elbows and appropriate transitions etc) and sealed properly (and for the long term) will result in much better mechanical performance and energy efficiency.

TOL (Ajeen): Yes that is true, but the intent of the survey was about airtightness only and factors that impact the overall air tightness value. Even though Step Code does not address sealing duct work directly, BC Building Code does have requirements under section 9.33

Q: Zoning Bylaws need to catch up with the Step Code. The obvious items are incentives for extra insulation by excluding the extra insulation from FSR or Building Height. Another significant problem in some jurisdictions is when they require that the 2nd floor be less than 75% of the 1st floor area. This increases the surface area of the building envelope and makes it much more difficult to achieve higher energy performance.

Brendan McEwen (from chat): from Brendan McEwen to everyone: 9:57 AM @Erica - Great point. FYI, there is guidance for local governments on how to update their Zoning Bylaws for Green Buildings - [https://docs.communityenergy.ca/wp-content/uploads/2021-03-19 BCH LCB Toolkit Final-1.pdf](https://docs.communityenergy.ca/wp-content/uploads/2021-03-19_BCH_LCB_Toolkit_Final-1.pdf)

Q: What is the effect of window vs wall area on energy efficiency?

TOL (Kevin): The window to wall ratio has a significant impact on energy performance - every building is unique however and being strategic with design (made up of many factors such as insulation, shape/form, mechanical systems etc) will leave you with more options around WWR.

Q: In relation to area and energy performance, is a flat roof better than a gable or peaked roof?

Mark: Roof shape doesn't matter. What matters is the shape of the insulation under that roof. If the insulation also forms a vault then that adds surface area. For a regular truss with flat insulation over the ceiling the models consider that a flat roof regardless of the truss shape.

Q: Are the Step Code consultants working with the code consultants regarding the requirements for flashing details? Currently the code says the exterior building wrap needs to overlap the flashing by 2". This would mean in a lot of cases you would need to cut the external air barrier to tuck the flashing up behind it to meet code. Flashing tapes are now becoming more common yet the code has not caught up with this. Is there some sort of consultation going on between the parties to allow flashing tapes instead of cutting the air barrier to lap over the flashing?

Mark: Yes we do. Ideally early in the project before details are settled. An integrated design approach is one of the best ways to build high performance cost effective housing. There are many solutions for the flashings - the best one will depend on the project.

- Q: Who monitors window manufacturers?  
They assembled glass on spots and chances less uv/energy efficient
- TOL (Kevin): The Township of Langley monitors window labelling/stamps to confirm its energy performance or other BCBC related criteria; the Township does not monitor the manufacturer.
- Q: Can you please make some comments on the impact of SHGC value on your energy modeling design? You only spoke of U value.
- TOL (Kevin): High SHGC will allow you to benefit from solar gain to reduce your heating needs. However, conversely, it adds to cooling needs. It is better to choose a lower SHGC and address heating demand with insulation or other manners.
- Q: Can you please expand on the definition of "floor area" and "building envelope" in reference to the form? Also, are there specific 'target' ratios (ie. volume to floor area, surface area to floor area, other???)
- Mark: There is a technical definition of floor area in the step code builder and designer guides which are available on the Energy Step Code website. In short it is any floor that is heated inside the home if the basement is over 4 ft tall that is also counted as floor space. There are no recommended ratios that I am aware of for step code but generally the lower the ratio the better a building will perform. It can be measured by any of the above ratios for Passive house the most common ratio we see is Area of envelope to Volume of heated air.
- Q: For the Passive Home, 6-plex in Victoria (If I recall correctly) does the building orientation and roof type/orientation contribute to meeting Passive House and Net Zero? Thank you
- Mark: Not necessarily the roof type although it was sloped specifically to be a good PV angle. A flat roof would have also worked for the PV and passive house. The Dormers interfered with that since they took useable space away. That building happened to be on a street that we could get the front façade in full sun but that is not a requirement.
- Q: Are there added costs associated with cooling homes in the summer with walls that have a higher effective R value?
- Mark: Yes generally the cooling load will go up a bit with higher R values so it becomes very important to manage shading of windows to compensate.
- Q2: Thank you for your clear answer. Is the added energy used to cool Step 4 and 5 houses in the summer taken into account when calculating the energy efficiency of these homes? Or only energy used to heat?
- Mark: Yes it is taken into account and is part of the MEUI metric. TEDI is heat only. There are discussions about adding a cooling specific metric to the Step code that is not expected to happen any time soon.
- Q: I wonder how insulating the edge of the roof from outside could help.
- Mark: Yes using raised heel trusses makes a good difference and costs very little, this is recommended for all step code builds
- Q2: Thanks Mark. In regards to adding insulation at the edge of the roofs from outside does this work as well for flat roofs?
- Mark: Flat roofs tend not to have reduced insulation at the eave so they work well

Q: Can you speak to the difference in designing a home to the absolute Step Code metrics vs. the relative, percentage metrics?

Mark: This is a longer story here is an article on it.  
[Policy Series #5 – The Reference Building Approach - Passive House Canada | Maison Passive Canada](#)

Q: Given the winter rainy days in the Lower Mainland, should roof shingles be light coloured to reduce summer solar gain and cooling load?

Mark: Makes very little difference in a wood frame structure with a ventilated attic. In passive house we measure this and it is tiny, in step code it is ignored. This really only matters in solid mass roofs such as concrete.

Q: Is the Township looking at implementing the Step Code with a similar timeline to the Province? Or is the Township considering moving forward with it ahead of schedule?

TOL (Kevin): Technically, the province does not have a schedule outside of what is regulated through the BCBC through minimum energy requirements (update coming in BCBC 2022). Through the province, and per Step Code, technically, the only schedule is that by 2032, all new buildings will be at the final Step/NZER.

That being said, we are already at Step 3 for all residential buildings and investigating adoption for P3 non-residential buildings. The Upper Steps will be evaluated for adoption at some point and when being considered, we will hold consultation with our communities/industry to hear their thoughts.

Q: What is the Township's timeline for implementing Step Code for Part 3 Buildings?

TOL (Kevin): Currently, the Township requires Step Code for P9 and P3 residential buildings. For the remaining applicable occupancy types, the Township had held consultation in September 2021 for P3 non-residential adoption. Consultation is now complete and a recommendation will be made for adoption some time in 2022.