

# Vermont Building Energy Code Collaborative Commercial & Industrial Meeting #3

## Participants

### Team

Liz Bourguet- Energy Futures Group  
Keith Downes- Guidehouse  
Richard Faesy- Energy Futures Group  
Eveline Killian- Cx Associates  
Kelly Launder- VT Department of Public Service  
Keith Levenson- VT Department of Public Service  
Barry Murphy- VT Department of Public Service  
Gabrielle Stebbins- Energy Futures Group

### Stakeholders

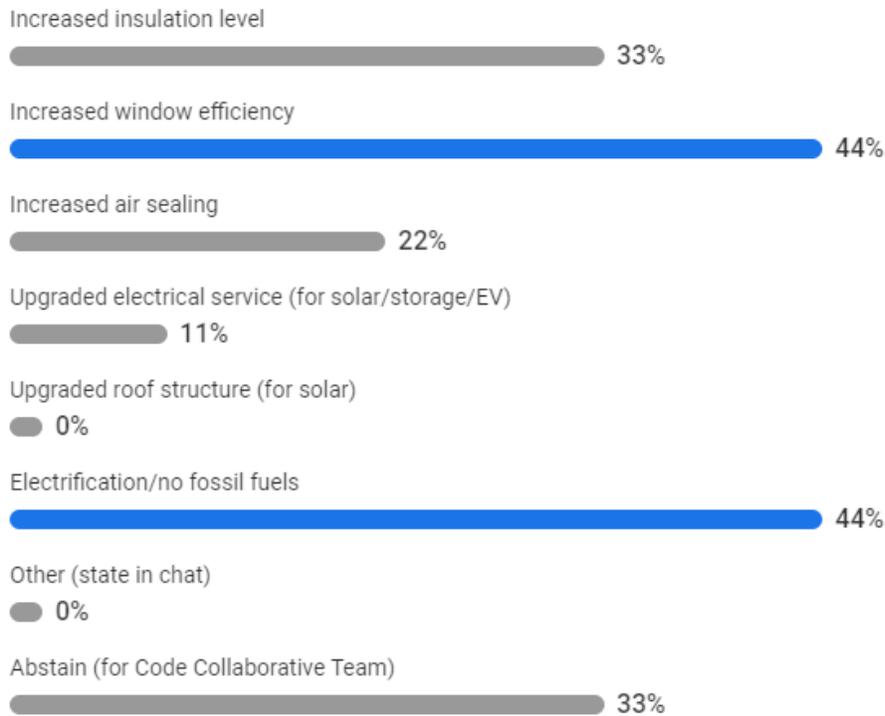
Walter Adams - Building Design and Construction  
Bob Bolin - Burlington Electric Department (BED)  
Enrique Bueno – Vermont Passive House  
Charlie Carpenter- Efficiency Vermont. Williston. Code interpretation & Sustainability  
Brian Leet- Freeman French Freeman, Burlington - PM, Building Science, Sustainability  
Steve O'Malley- Efficiency Vermont  
Tim Perrin- VGS South Burlington, Energy Efficiency & Innovation Manager (and member of South Burlington Energy Committee)  
Darren Port- NEEP  
Nick Thiltgen- Dubois & King, S. Burlington, Energy & Mechanical  
Jake Yanulavich- Burlington Electric, Energy Services

## Discussion

### Net Zero Ready

- Poll (9 people responded)

**What lifetime costs are you most concerned about in making Vermont commercial buildings "net-zero ready" in the next code cycle?**



- Enrique Bueno (in the chat)- Why can't we jump all the way to the end right now in new buildings instead of going incrementally?
- Walt- concerned with the definition of net zero ready because it doesn't tell us what production equipment will be included or which servers for a building. The better we make the building, the more the equipment/ energy use the building is absorbing.
  - Also, concerned about upgrading the electric services for solar/ storage/ EV. If you can't make it fit in the service that the building needed in the first place, unless you're going to sell a huge amount of solar to someone else. No one is going to include 200amp service in their building and if you've got that much solar on your roof, you have an awfully big roof.
  - Keith- process loads/ plug loads are generally not included in energy code. Could tighten definition to include. Regarding electrical service, there is an Appendix which talks about solar ready and discussion of electrical service, the definition of which came from IECC. We would be using this as a starting point.
- Enrique- why do we have to do it incrementally in terms of building energy efficiency? Instead of making buildings that will be substandard in 5 or 10 years, go all the way to the goal right away.
  - Enrique- also, what are lifetime costs?
  - Keith- lifetime costs include energy costs, not just the initial cost
  - Enrique- chose increased levels of insulation and window efficiency. Plus, increased air sealing would be the best place to invest money.

- Nick Thiltgen- what is the reasoning behind defining the EUI piece of it? They have found it difficult to define an EUI because of the variability of different factors. For example, a building being operated 24/7 vs for just one shift. Or a fast food restaurant, which has high EUI. Setting a EUI across the board would be difficult.
  - Also, regarding electrification, this is challenging for certain buildings. For example, buildings with domestic hot water, makeup air, different equipment (cooking, laundry). These may have opportunities for electrification, but they're not available or common or they are extremely expensive. It is not reasonable to electrify some applications.
  - Keith- is there an alternative target you suggest?
  - Nick- a percent reduction applied to all different types of buildings. But you still have to pick a baseline for all codes moving forward. ASHRAE may have information for baseline
  - Keith- we could run some models for prototypical buildings to judge EUI (to get building baseline).
- Brian Leet- discussions have been about "Net Zero" up until now, but at end of last meeting terminology shifted to "Net Zero Ready". Concerned that we are not hearing the perspectives of people who are not at these meetings. Concerned about all the other energy uses other than ASHRAE regulated envelope/ mechanical and electrical systems.
  - A recently published Building Green article describes the drawbacks of Net Zero buildings and how they can be counterproductive to carbon reduction goals.
  - Feels that we are struggling in prescriptive code to deal with the nuance of buildings. We are already at the limits of universally applicable prescriptive requirements without consideration and inclusion of energy generation as part of net zero solution.
  - It's hard to know how to do this without an EUI target and some understanding of how level of electricity use is going to change over the next years. If the point is net zero, don't know how to disregard nonregulated loads.
  - Concerned that we are getting ahead of ourselves with the ability to model the outcomes of the changes.
  - Also, we need to address the immense amount of existing building stock in the state.

## Embodied Carbon

- Presentation from Jacob Racusin
- Enrique (in the chat) – excellent approach the one presented by Jacob
- Poll (9 people responded)

## Should the Additional Efficiency Packages code section C406 include points for embodied carbon?

Yes



No



Abstain (for Code Collaborative Team)



- Walt- in the example given from Jacob, he could get rid of insulation from under the floor and could get a better score. Example of a building he's worked on: heated floor, 4 inches of XPS- biggest amount of embodied carbon was under the floor. Interesting conundrum: you will have to consider raising the amount of insulation under the floor to get near Net Zero [but the insulation has embodied carbon].
- Enrique- appreciates Jacob's approach and the premise that we're not going to penalize operational energy consumption towards embodied energy. The first thing we have to achieve is good performance in operational energy. In doing that, you can select different materials. Not getting rid of insulation under slab, just reducing embodied carbon. But first, good operational savings, then choose the correct materials.
- Richard- is a good subslab insulation alternative currently available?
- Enquire- unfortunately, no. There is gravel/ glass which can be used/ produced in Vermont. But standard insulation is EPS instead of XPS. Just choosing EPS over XPS, you can achieve better embodied carbon. You may have to use more EPS, but it's a good tradeoff.

## Mechanical Equipment

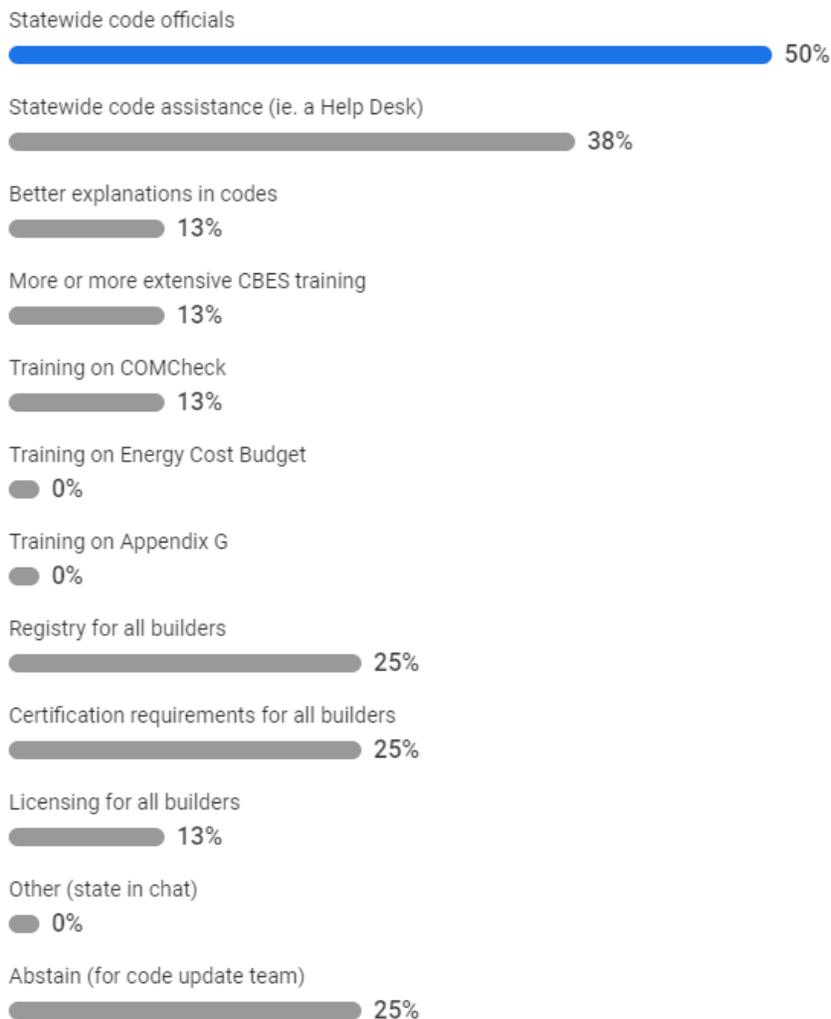
- Eveline presents summary of major changes in 2020 code and ventilation air clarification
- Walt- in current code C406.6 (outside air systems)- reads from the code- 100% outside air to each occupied space, etc. What does this really say? With ERV in building, I bring fresh air, run the fan, circulate air, and I don't worry the temperature. I just bring in the air and I move on. Is there something else happening here?
  - Eveline- would like to follow up in writing. Think the intent is what you're describing.
- Enrique- you have to recondition the incoming air in the ERV because, if outdoor air is too cold, you may freeze the core. When doing cooling/ dehumidifying with ERV with Dx coil, you may need to condition the supply air in order to warm it up. Ventilation should be 100% fresh air. Should get rid of recirculation air. With passive house equipment, in schools, supply 100% fresh air and extract 100% of stale air with very high efficiency. The key is efficiency of equipment.
- Nick- has a lot of respect for IECC and 90.1. Each requirement is really complicated. I advise caution in trying to change things when it seems like things are wrong- things are interconnected.
  - Regarding ventilation- energy code is based on IECC and requires ventilation on mechanical code. Every building in VT has ventilation air as part of it. What are we

required to do by code? I think the best solution is to implement IMC throughout state and inspections.

## Compliance

- Eveline reviews market baseline studies and compliance approach
- Poll:

What do you think would be helpful to achieve more compliance? (Make up to 3 selections)



- Brian Leet- my concern is the unlevel playing field generated when some people do the right thing and some people are just trying to make a buck. The challenge with training/ education is that it add further knowledge burdens on people who are trying to do the right thing and puts them at a competitive disadvantage compared to people who are just not doing it. It's not just a level of bad actors, it's also that the code has gotten so complex, it is difficult even for those who are trying to comply.

- We need to decide: is this topic considered a public welfare topic? Like a driver's license, which is enforced – not reliant on self-certification of compliance. This becomes increasingly a problem as code gets more stringent.
- Walt- comment on statewide code officials – if they behave like fire marshals, then it's a waste of time and energy. Yes, I attended almost all CBES training sessions.
  - Next time code book is published, certifications need to be printed in first 10 pages of the book. Someone will be more interested in making sure ventilation system is installed if it's right up front. Frustrated with number of mechanical/ electrical people who want to do value engineering.

### Solar Ready and On-Site Renewables

- Keith recaps summary of major changes in 2020 code
- First poll – solar-ready zones (8 people responded)

#### Should solar-ready zones be required in code?

Yes



No



Abstain



- Walt- if you're going to require it, then the entire building has to have extra 5 pounds on it. Get away from how many zones there are, etc. Put them [solar panels] wherever you can because the roof is filled with mechanical equipment. I don't like that you can put a tiny solar system on the roof to get extra points when it won't make any difference.
  - Keith- are you suggesting a requirement in specifications that points out that load is built in for future solar array?
  - Walt- Yes- if not, it won't be identified on the front page, and you should be ask for that specifically. Makes it easy for code official and the solar installer to know that the load exists.
- Brian- challenge of what "solar ready" means in the code vs what "solar ready" means for any clients that end up with solar installer/ net metering requirement. Structural capacity vs net metering equipment. I'm not recommending mandating net meter ready buildings (would be additional space and cost) but it is an issue in the field. Agrees that it needs to be summarized in the document somewhere.
- Second poll

Should solar or on-site renewables be required (with exceptions) for roof areas over 50,000 SF?

Yes



No



Abstain



- Eveline- would this be different for future code? Or are we just not ready for next code cycle?
- Enrique- solar and on-site renewables are a good strategy for grid resilience. We should incentivize those. Also, for building resilience. Solar plus battery storage can provide survivability in emergencies that the grid may experience.
- Nick- I think they're generally a good idea. Is there already some language from another source that thinks through the requirement or the details more? Why 50,000 sq ft? Cost effectiveness perspective? If an owner is already maxed out, there isn't an incentive to put solar on a new building. Probably needs to be thought through how this would work.
  - Keith- current plan is not to require on-site renewables.
- Enrique- the more energy efficient the building is, the more on-site renewables can provide energy for the building and additional energy for transportation or grid supply. So, make the buildings energy efficient as possible, which will make on site renewables more effective.
- Walt- compared to three years ago, solar systems cost less but the incentives are gone. In MA, you will get more money for solar than VT. These systems are a huge upfront cost. From my analysis, payback is about 15 years, which is better than other alternatives that will have longer payback. If client wants it, I'll do it. Also concerned with EV stations on building energy use.

## Electric Vehicle Charging Stations

Poll

## What is the right level of charging station requirements?

Remove all requirements

0%

Keep EV requirement, but remove EV only parking requirements

0%

Keep EV requirement but reduce the number required

0%

Keep EV requirement unchanged

56%

Increase the EV requirement

11%

Abstain (for code collaborative team)

33%

- Walt- if you connected EV station to building, then I can buy a \$500 EV charging station. But the next choice involves substantially bigger equipment. Confused about how EV charging station systems work (about the kind of chargers that connect to the internet, etc).
- Brian- it seems this is where code is trying to protect owners from their future selves. The value of the EV requirement is bringing up the conversation. It's up to building owners what amount or proportion the need is going to be. Especially in the future when you can't buy a car that isn't EV. It feels like a dumb hammer for what will someday be a complicated conversation. But no one can anticipate which locations or uses will need the charging stations.
  - Keith- do you recommend increasing the number of charging station ready spots?
  - Brian- no. If looking at multifamily buildings, in 30 years, you might need every space in MF lot to have charging station. Given costs, that would be an exceptional cost even just to say EV ready. We're going to be retrofitting. Reluctant to demand building owners to incorporate costs today that may not be helpful for tomorrow.

## Final poll – Takeaways from Code Collaborative

- Enrique- urgency to get to the final goal. I don't see the reason why we should be doing this incrementally. Passive house has existed for past 30 years, we don't have to invent the wheel. High performance buildings from EVT. We are far behind in code standards to all of those levels. Our biggest challenge is to retrofit existing stock. Can't afford to build buildings that will be retrofit candidates. Lowest point of energy waste we can go. I'm talking about this for the planet. If we don't address these challenges right away, we're going to miss the boat.

**What is the one thing you want the Energy Code team to remember when the code update cycle begins?**

enforcement

---

Blunt increases in requirements are reaching a point of diminishing or negative returns in protecting environment through carbon reduction. Consistent enforcement and interpretation of code at state level is needed for a fair market. "Net Zero / Ready" language creates differing expectations and can really only be met by modeling, not simple prescriptive code on many complex building types. Energy code risks driving more building to suburban and rural settings through solar and similar requirements, consider impact of travel costs in new construction. Model code is designed to work with national mechanical code which Vermont has not yet adopted, should adopt supporting national codes. Different standards in Vermont from adjacent states creates confusion and well intentioned non-compliance. Focus on maintaining code in line with national standards or regional variations to greatest extent possible.

---

Try to use the base IECC base language as much as possible. The more amendments and changes for VT will make the code more complex than it needs to be.

---

The urgency to upgrade the Code to the point where any energy waste is eliminated. To the point of High Performance or Passive House Standards

---

Goal needs to be more holistic including embodied energy, code enforcement, grid impacts, State requiring International Mechanical Code with enforcement, etc. Remaining reasonable "typical" efficiency opportunities are few.

---

Just pick the poison and do it. No one will be happy, because of the increased cost but that's "progress".

---

Definition of zero energy and the end point for the code

---

- Eveline- What did people think of the virtual format?
- Walt appreciates the virtual – better solution than driving 45 minutes to Montpelier. Not a fan of what's been happening in energy code cycle.
- Charlie Carpenter- Virtual works for me. Maybe some in person meetings as well.
- Brian- this format has been good for him. Concerned that there are people who are tuning in and not participating. Really small slice of market giving input on potentially major changes.