Vermont Building Energy Code Collaborative
Cross Cutting Meeting #2

6/8/21 11am – 1 pm

Participants

Team

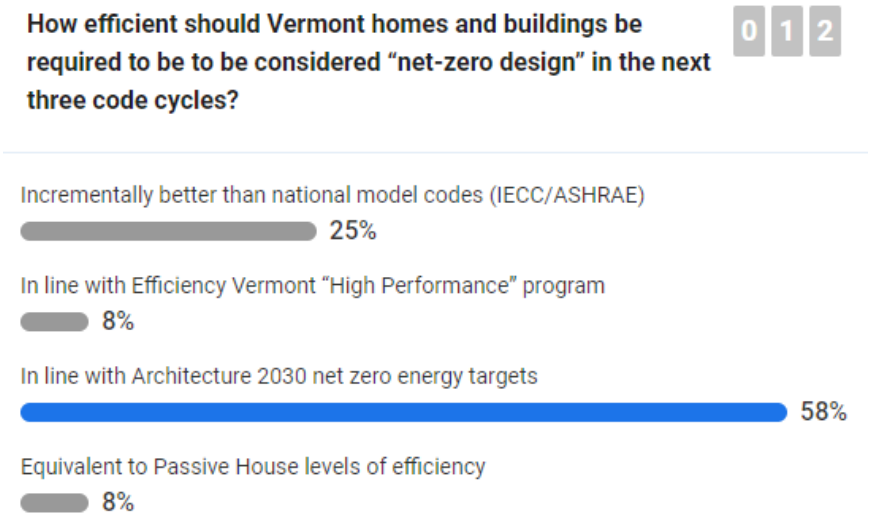
Liz Bourguet- Energy Futures Group
Keith Downes- Guidehouse
Jim Edelson- New Buildings Institute
Richard Faesy- Energy Futures Group
Eveline Killian- Cx Associates
Kelly Launder- Vermont Department of Public Service
Keith Levenson- Vermont Department of Public Service
Mark Lyles- New Buildings Institute
Barry Murphy- Vermont Department of Public Service
Gabrielle Stebbins- Energy Futures Group

Stakeholders

Walter Adams- Commercial Buildings - Essex
Laura Bailey- Maclay Architects, Waitsfield, Architecture
Jesse Beck- AIA, NCARB FFF Architects Burlington, VT
Matt Cota- VT FUEL
Jeff Forward- Forward Thinking Consultants, LLC
Karen Horne– Vermont Gas Systems
Eric Lacey- Responsible Energy Codes Alliance
Brian Leet- Freeman French Freeman - Burlington, VT - Architecture
J.C. McCann- Burlington Electric Department
Kai Palmer-Dunning- NEEP
Elizabeth Peebles- Vermont Division for Historic Preservation
Craig Peltier- Vermont Housing & Conservation Board
Rob Pickett- Rob Pickett & Associates, LLC
Darren Port- NEEP
Bill Powell - WEC
Jacob Racusin – New Frameworks
Jason Webster- Huntington Homes
Chris West - Eco Houses of Vermont

Discussion

Poll

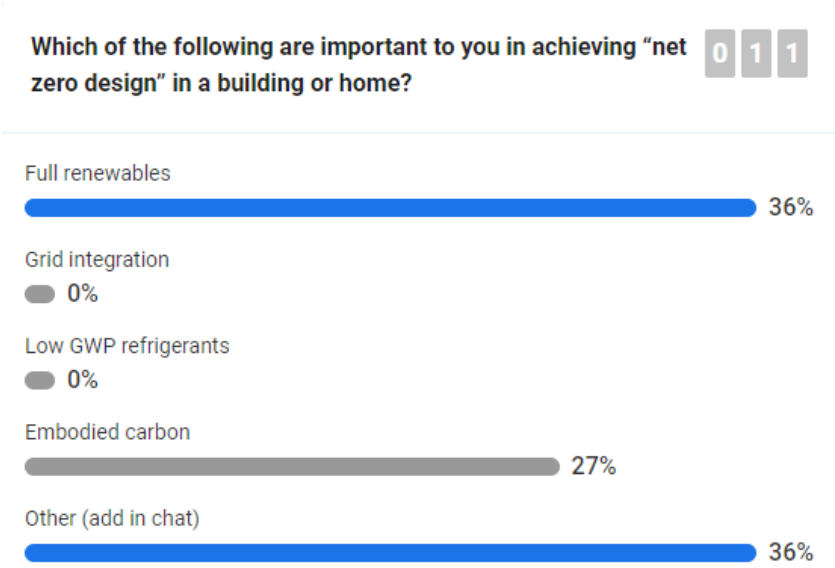


- Jeff- chose the EVT option. This is a program that can help builders understand and meet the code. But I'm frustrated that the EVT program doesn't currently offer any hands-on help for meeting the base code. In a new code cycle, the builders are not going to be up to speed or meet the base code without help. My understanding is that EVT program can't book savings without exceeding base code. Having a statewide program to help meet compliance is useful.
    - Richard- is it still the case that EVT can't claim any savings for building to code/ supporting builders building to code level?
    - Kelly – they do support building to code, still run an assistance center, and still provide technical assistance to base code. They provide trainings, but they don't connect it with savings.
- Jesse Beck – architect – has been focusing on the Architecture 2030 challenge for years. If you take cost aside, we need to bend the curve as hard and fast as we can – there is precedent for the Architecture 2030 challenge. I'm focused on large commercial buildings, and I think we can do it easier with these buildings than with residential buildings. The problem is the lack of support and money to achieve goals.
- Chris West – chose Architecture 2030 – I think that the Architecture 2030, passive house, and high performance targets are equally good goals. With 2030, there are more people who understand the program and may lead to more adoption than others. Any of those three targets would get us to move towards a more stringent movement. We have a huge gap between RBES now and the Comprehensive Energy Plan (between reality and what we want to get to). Also, I like that the EVT program would result in high adoption.
- Jeff Forward (in the chat) - The challenge for builders even trying to meet the base code is that this code update in particular is more difficult and the best way to teach builders is through the HERS path. Since EVT cannot book savings for the base code, they do not offer HERS services for base code. One cannot find a HERS rater outside of VEIC and therefore the average builder attempting to build to base code cannot practically use the HERS compliance path.
- Walt Adams- I chose incrementally better than national code. I agree that our codes have been better than national code. I see no reason why Vermont should spend the money (he is concerned about substantial cost) to get their buildings to be net zero by 2030 if the national

model can't get its act together. Vermont should lead the pack. If you want net zero in Vermont's climate, we will need a major change in the cost of PV or will need to find another way to help people get there.

- Brian Leet- I want to encourage thinking about source energy, including energy production associated with building that is not on-site and still within Net Zero. I don't think our code should be encouraging sprawl development. Ideally, we would be including commute and transport energy in our considerations. We need options for urban infill sites that allow them to be called net zero buildings.
- Jim Edelson – the question of offsite procurement of renewable energy is just being ironed out now elsewhere. Archi 2030 and Ashrae 189 and CA title 24 has approaches to these. We do want offsite options and we don't want to encourage infill.

National/Global Trends and Drivers



- Jeff Forward- we need to find the balance point when more insulation gets to be more costly than adding more renewables. We should not be building any building that is not net zero ready. Should be able to accommodate solar and electrical service. I hope that no one is building a home with 100 amp service. There needs to be analysis between breakpoint between renewables and more insulation.
- Brian Leet (in the chat)- Optimize EUI vs. production on a case-by-case basis. Best strategy can vary and is highly dependent on economic inputs.
- Brian Leet– the code is minimum performance. We need to balance what's in code to allow for flexibility to optimize use intensity to reach net zero.
- Richard- should we be trading off envelope efficiency against renewable generation?
- Brian- my view is to transition from prescriptive to some sort of modeling to look at a project: how much production can we put on building? How do we optimize building to meet it? For

more common buildings, this may look a lot like passive house standards – but this isn't net zero, there is still production.

- Richard- passive house has stringent performance metrics?
    - Chris- in passive house, you cannot negotiate air tightness or envelope.
- Richard- should there be the ability to trade off renewable production against building envelope? Should it be open-ended as long as a home meets the standard? Or a combination of minimum efficiency standards before renewables are added?
- Jeff – HERs compliance addresses this issue. But the problem with this path is you can't do it. There are no HERs raters in Vermont outside of EVT. And the only way to use them is if you participate in a higher standard.
    - If you're trying to meet code with renewables, prescriptive and the ERI with Rescheck are not adequate for compliance and educating builders. The HERs rating path does that (he thinks this is where we should go to).
- Chris- EVT has been the center for HERS raters in the state and there is a huge deficit with the number of people certified in the state.
    - Chris- How to transition HERS rater capacity in the state with EVT no longer providing HERs services in the state?
    - Jeff- I appreciate the EVT program, but I'm not sure that the HERs service should be housed within EVT. Instead, it should be a market-based approach. If you wanted to become HERS rater outside of EVT, most of business is already absorbed by EVT.
    - Chris- agreed 100%. We must find a way to get HERs raters trained.
- Richard– for commercial, does existing infrastructure capacity provide what's necessary to meet a performance-based code?
- Jesse – we are on a good path with current CBES, though it could be strengthened. They use energy modelling to balance so, go for as much insulation as possible until model tells us its levelling off.
    - Embodied carbon is also important. Let's get the best building shell envelope, then apply the renewables.
- Jacob Racusin has a proposal for embodied carbon
- Jacob– looking at insulation / installation materials and keeping it relevant to energy code. Relationship between embodied carbon and insulation. Correlation with climate impacts of insulation materials. At a higher level, to have the explicit intention of code to be in support of Climate Action Plan.
    - Advocating for the Net Zero definition to be focused on Net Zero Carbon. "Energy" is not far enough. Material property impact of insulation materials must be addressed. Their proposal is minimum voluntary accounting in order to introduce the concept as a bridge to getting folks familiar with the process.
- Jacob (in the chat)- Would love to present at a future meeting, thanks for the opportunity Richard. Comparative embodied carbon emissions of insulation, along with a very simple calculator, is part of our proposal and we can make that available for review.
- Jeff – would appreciate a comparison of embodied carbon in insulation materials. And include that on a voluntary basis so people understand climate impact of insulation materials. For Commercial buildings, I'm concerned about snow loads on roofs. When you see flat roofs, you think, why aren't there solar panels? Because buildings were built to minimum snow loads and

to increase the structural capacity is oftentimes too expensive. We shouldn't be building buildings that cannot get to net zero in the first place.

- Walt- it doesn't make sense to build solar panels on buildings that are not efficient. I'm unhappy to install tiny PV system to get points in an effort to increase value of building, but it means next to nothing when the amount of solar won't even cover the lights. Also, frustrated with 200 amp electric service and concerned about an electric bill if we required 200 amp service and using enough electricity to justify this 200 amp service.
- Jeff Forward (in the chat) - My point on 200 amp service is more about space in the panel for additional breakers. I have a 100amp service and it is just about full. To add a level 2 charger, a heat pump, a heat pump dryer, an electric stove or solar service would necessitate me adding a service panel. This should not be the case any longer. We want to electrify everything, we need breaker room in the panels.
- Bill Powell (in the chat) - and the real limit is not the ampacity of the service entrance, it's the transformer, and whether this is a single or multiple use transformer (for sizing, overloading issues)

Zero Energy/Carbon Considerations for Vermont's Code Goal

- Proposed definition from NBI to be used for discussion: "A building or home that is highly energy efficient and fully powered, on an annual basis, by on-site and/or off-site renewable energy."
- Walt- I'm frustrated by concept that we would abandon the fossil fuel world completely. It seems that the real effort should be to increase efficient fuel-burning sources. Then, the net zero definition should be the EUI should be zero or less. This would take into account burning a little bit of fossil fuel but creating onsite BTUs to offset energy uses. 2030 is only 9 years away. What are we supposed to tell gas/ fuel companies?
- Jeff- I like this definition. But a challenge with on-site/ off-site is that the link is going to be PSD. On one hand, PSD supports offsite energy. But the public utilities commission does not support. It's difficult to do offsite community solar and they don't recognize off takers as a societal benefit. All they see is direct impact on rates and visual impacts.
    - Jeff- For combustion, I do support biomass being included and definition of high efficiency equipment. Biomass equipment (pellet stoves) compliments heat pumps well.
    - Jeff- Also, I'm proud of high penetration of smart meters in the state – one of highest in the country. We need to use them more and figure out how to make better use of building automation systems and data that can be collected by smart meters.
- Jason Webster- where in the Vermont legislation that we have a goal zero net energy and no fossil fuels?
    - Kelly – that's not in legislation – the goal in the Comprehensive Energy Plan (CEP) is to reach net zero design by 2030.
    - Jason- how does the CEP dovetail into RBES?
    - Kelly- CEP includes policy directions and goals including for building energy standards.
    - Jason- if I go back to legislation, I don't see any language that says that fossil fuels and net zero is part of Vermont energy code.
    - Kelly- correct, the specifics are not in statute. It's through the goals in the CEP, which is part of state energy policy. Nothing in CEP is mandatory via statute.

- Bill Powell- no words about code or meeting a standard – no prescription that you have to act through code. We need to extend reach beyond equipment. We need an open protocol that control intelligent devices that can be used by utilities to manage peak load. We don't have a protocol to speak to communicating devices. Right now each manufacturer has its own protocol.
    - Richard- we should consider buildings being connected somehow?
    - Bill- Yes, integrated controls – transition from fossil fuels to electric but not mutually exclusive. Two different equipments, they need to be bonded and have an interface to the utility to be included in integrated management.
- Jesse- the Climate Action Committee is charged with ideas for new legislation. Hopefully, there will be further bills passed to enact what we're talking about. Good definition but would recommend a footnote describing what "highly energy efficient" means and also get rid of on-site/ off-site and have a footnote for "renewable energy". I like the idea of the state banding together for renewable energy for all buildings in Vermont.
    - Richard- we want to be explicit that renewable energy could come from offsite. Also, there is effort underway to develop a Clean Heat Standard, which would be like RPS for electricity, renewability percentage for other fuel providers over time. This could mean opportunities for alternative approaches beside just electricity if our fuel source is renewable (biomass, liquid and gas fuels).
    - Jesse – we are all trying to electrify our projects and we come up against the question of what is back up heat is going to be? Complex issue and engineers are coming up with many different solutions, some of which I don't like.
- Richard- Where does biomass fit? Viable solution/ other renewable fuels?
- Walt- EVT is pushing cold climate heat pumps. Hardly anyone would buy one because they're not efficient and they cost a lot of money to purchase and service.
- Chris – you cannot look at producing BTUs/ watt or fuel and say that a heat pump is not efficient. You just need to consider where is a heat pump a good fit or not a good fit? We need to look at the life cycle costs of extracted oil/ natural gas (cost of extraction). There's an entire industry that needs to be re-formed. I like the definition that starts with reducing loads. We will get the code to a place where we are no longer talking about getting efficiencies from the envelope.
- Jason – I'm pushing back on advocacy that's happening inside for the code, of the move to all electric, no fossil fuels. This is not what the legislation says what the code is supposed to be. We are building to the code and we're at a competitive disadvantage to other companies who are not building to code. The unlevel playing field has gotten so severe, to get PSD of developing a code for the legislation. I would encourage not barreling down path of high-performance, net zero all electric. If that's what clients/ economics pull us to, but why is PSD/ this working group?
    - Richard- CEP does lay this out. We anticipate the Climate Council will go this way.
    - Jason- but none of those are part of the legislation for the energy code.
    - Kelly- just to be clear that just because items are being discussed (ex- net zero definition), that doesn't mean that that's a decision that's been made. The CEP recommendation is not to have Net Zero buildings by 2030. The goal/or recommendation is to have buildings as efficient as possible so the rest could be met with renewable energy. I would say the definition on the slide is more a net-zero definition not net zero design.

- Jeff- I want to say that why we're talking about net zero is because it's the technology for decarbonization. Because our world is on fire. Not everything is going to be accomplished through code, but we're going to have to do everything we can to stave off climate change.
- Brian Leet- For codes, net zero design independent of net zero targets, we're getting close to the limit on the benefits that we see from universally prescriptive targets for Commercial buildings. Simply raising R values is dependent on the use and function of the building. There is a challenge in trying to address the efficiency side without considering options for production for reaching net zero.