Residential Building Energy Standards
Comments on Specific Changes to make to the Code language and PSD Responses

Insulation

- R-5 continuous insulation in Climate Zone 6 is not good science. The prescriptive requirement of table R402.1.2 should include the R13+10 option.
    - *We have added the R13+10 option to table R402.1.2 and also added clarifying language on the building science issue raised here to section R402.2.15. CODE CHANGE MADE BASED ON COMMENT*

- Recommend adding clarification for the R25 wall assembly that there is no specific requirement for continuous exterior insulation. Also add language that would only require completely filling existing stud cavities on Rehab projects.
    - *We have addressed both of these issues. There is new language in Table 402.2.1 footnote f: R-25 can be met through any combination of insulation R-values, cavity, or cavity and continuous insulation. In Chapter 5 we have added language that would only require completely filling wall, floor and roof cavities in building alterations in section 503.1.1. CODE CHANGE MADE BASED ON COMMENT*

- Table 402.1.2- Eliminate Note F, it does not appear to be applicable.
    - *This now applies due to the addition of the R13 + 10 option (package #1 in table R402.1.2). Footnote f now reads: The first value is cavity insulation, the second value is continuous insulation, so "13+10" means R-13 cavity insulation plus R-10 continuous insulation… CODE CHANGE MADE BASED ON COMMENT.*

Snow and Ice Melting Systems

- 403.9 - Requiring all snow and ice melting systems energy to be provided by on site renewable energy is not realistic or cost effective. Failure to provide snowmelt opens the developer to increased insurance liability and workman's compensation claims.
    - *Retracted this requirement. CODE CHANGE MADE BASED ON COMMENT.*

- The size of the melting system should be considered as well as the energy source if all other energy code requirements are met. For instance, if the melting system is considerably small in size and the development utilizes natural gas for the energy source, the cost and required maintenance of a renewable energy system for only the melting system is unreasonable.
    - *Retracted this requirement. CODE CHANGE MADE BASED ON COMMENT.*

Controls

- Section 403.1.1- Programmable Thermostats - These are too complicated for the average person to figure out. Recommend thermostats with the ability to be set for an upper limit maximum be able to be substituted for programmable thermostats in affordable multifamily units. The increased level of property management and oversight warrants an exemption from this requirement.
    - *Programmable thermostats will save energy when used properly. The requirement is to install a thermostat that has the capacity to be programmed. However, there is no requirement to enable the thermostat. NO CHANGE MADE BASED ON COMMENT.*

Mechanical Ventilation

- Section 304.3 – Whole house ventilation. It should be clarified whether "whole house ventilation" pertains to individual units or buildings in multi-family housing.
    - *Clarified in language that this applies to homes and dwelling units. CODE CHANGE MADE BASED ON COMMENT.*

- More research is needed on ventilation. HRV & ERV equipment only works if well-maintained. They tend to be high electricity users and have a history of needing replacement every 5 to 10 years. HRV equipment should not be recommended in the stretch code given the lack of useful information on the ventilation of multi-family buildings.
    - *Ventilation is required for all buildings. There is no requirement for HEVs or ERVs in either base or stretch. However, there is energy efficiency credit recognized in a HERS rating when using this equipment that may help with compliance. NO CHANGE MADE BASED ON COMMENT.*

Building Design General Comments

- R101.4.1- Include underground parking garages for tenant use only in multi-family buildings as nonliving spaces in the residential building to be governed by RBES.
    - *We left the language as is so that underground parking garage lighting and any other energy uses fall under compliance with the Commercial Building Energy Standards (CBES) since RBES does not address such uses. NO CHANGE MADE BASED ON THIS COMMENT.*

- R302.1- The proposed interior temperature design conditions are not appropriate for housing, especially for elderly and/or disabled people with limited mobility and/or health issues requiring higher and/or lower set points on the HVAC system. Many people for health reasons need higher room temperatures than 72 degrees for heating and lower than 75 degrees for cooling.
    - *These interior temperatures are just for design purposes, actual set back requirements have the option to be different if the situation calls for that. NO CHANGE MADE BASED ON THIS COMMENT.*

- Drain water heat recovery units, in most cases, are difficult or impossible to install. Not all layouts of buildings are beneficial for this system.
    - *Drain water heat recovery units <u>are not required</u>. What is specified is the conditions that must be met if they are installed. However, we did clarify the intent by adding "where installed" to make this point clear. CODE CHANGE MADE BASED ON THIS COMMENT.*

- All historic buildings should be exempt from the energy code. Demonstrating whether a required provision would threaten, degrade, or destroy the historic form, function, or fabric of the buildings is subjective and a difficult process to navigate.
    - *The Vermont Division for Historic Preservation has developed a simple two page form to be filled out to request an exemption from the energy code. We do not believe the process will be too onerous. NO CHANGE MADE BASED ON THIS COMMENT.*

- Eliminate RA since it is not intended to be required by the code.
    - *It was not clear what "RA" meant and we didn't receive a clarification from the commenter when we asked what was meant, so no change was made. NO CHANGE MADE BASED ON THIS COMMENT.*

- The definition of biomass should be clear on whether it includes wood pellets and wood chips that are commonly used in Vermont.
    - *Changed language in definition to include wood pellets and wood chips. CODE CHANGE MADE BASED ON COMMENT.*

- Recommend specifying that Solar PV and Thermal are renewable energy and count towards any point system that may be created.
    - *Added language to renewable energy definition "including, but not limited to solar hot water, solar hot air, solar PV, wind, and hydro." CODE CHANGE MADE BASED ON COMMENT.*

- There should be an exemption for supplemental electric resistant heat if installing heat pumps and solar PV is part of the energy supply system.
    - *Clarified section 403.1.2 that the electric resistance disallowance is only for the heat pump by changing the language to: "Ductless air-source heat pumps shall not have supplementary electric-resistance heat integral to the unit". Builders can install supplemental electric resistance heat, except in Burlington. CODE CHANGE MADE BASED ON COMMENT.*

Existing Buildings Comments:

- How do existing buildings comply using a performance approach?
    - *Added new sections: "R501.1.2 Compliance Approaches. Thermal efficiency can be achieved through any of the compliance paths including any one of the following approaches: prescriptive packages, REScheck™ software or a Home Energy Rating System (HERS) rating." CODE CHANGE MADE BASED ON COMMENT.*

- Do empty walls need to meet Table 402.1.2 requirements?
    - *Added to R503.1.1: "Empty wall, floor and roof building cavities that will be filled with insulation only need to fill that cavity with insulation and are not required to meet the R-value requirements in Table R402.1.2 or R407.1." CODE CHANGE MADE BASED ON COMMENT.*

- For new additions need additional clarity, particularly with respect to connections to existing mechanical systems, and better definition of where work defined as maintenance or repairs, crosses into the realm of code compliant work.
    - *Added to section 501.1.1: "Connections or repairs to and maintenance of existing mechanical systems do not constitute an alteration to that system." CODE CHANGE MADE BASED ON COMMENT.*

- It is not simple in regards to Sections R5021.1.2 and R5021.1.3 to see what is new and what is not. There is often not a bright line in HVAC systems as there is in a wall. 502.1.1.2 and .3 both cite previous requirements in the code regarding systems. It is not clear where the line is drawn. A new copper line carrying hot water for a HWBB system goes back to the existing boiler. How much of R403 is triggered?
  Alterations- The same comments as above apply to the applicable sections (R503.1.2 and R503.1.3)
    - *Sections 502.1.1.2, 502.1.1.3 and 503.1.2 now all have: "Connections or repairs to and maintenance of existing mechanical systems do not constitute an alteration to that system." CODE CHANGE MADE BASED ON COMMENT.*

- There are conflicting requirements throughout this chapter regarding the use of existing components or systems in additions or alterations, or requiring all new components or systems to be used in additions or alterations.
    - *Sections 502.1.1.2, 502.1.1.3 and 503.1.2 now all have: "Connections or repairs to and maintenance of existing mechanical systems do not constitute an alteration to that system." CODE CHANGE MADE BASED ON COMMENT.*

- There appears to be a conflict with the requirement for mechanical systems in alterations. If they are required to be new, how will the systems interface with the existing system in the rest of the building?
    - *Sections 502.1.1.2, 502.1.1.3 and 503.1.2 now all have: "Connections or repairs to and maintenance of existing mechanical systems do not constitute an alteration to that system." CODE CHANGE MADE BASED ON COMMENT.*

- The definition of Repairs should be clarified since the items that are considered Repairs are limited. It is difficult to understand the Repairs section R504.
    - *Clarified the language to make it clear that items listed are exempt from meeting RBES requirements. CODE CHANGE MADE BASED ON COMMENT.*

- The definition of Alteration should include construction, retrofit, and repair that require a permit. Alteration definition- should include the original IECC text "that requires a permit".
    - *Due to the inconsistency in the state on the requirement of permits, this suggested change would allow non-compliance with RBES is all locations that do not issue permits. Therefore, language was kept as is. NO CHANGE MADE BASED ON COMMENT.*

HERS

- Current RBES base is HERS 75; changing the base to 60 is too much of a change for a 3 year update. For rehab projects, the HERS target of 60 may not be obtainable.
    - *Based on field studies in 2011, the average HERS Index scores for 100 random new homes was HERS 70. Efficiency Vermont average scores for program homes from 2012-2013 was HERS 52. We believe the change to HERS 60 is a reasonable and achievable next step for Vermont builders based on this evidence along with the State's goals of improving the energy efficiency of new housing stock. In addition, this level of energy improvement provides significant net cost savings relative to the increase in mortgage payments to cover the improvements, making HERS 60 quite cost-effective. For retrofit projects you only need to bring the areas that are worked on up to code, not the entire building up to HERS 60. Cannot use the HERS Compliance path for Rehab projects, only new construction (unless a gut-rehab). NO CHANGE MADE BASED ON THIS COMMENT.*

- R406.5 - Who are the certified HERS energy raters working under the authority of the Vermont PSD approved accredited HERS Provider? What are the qualifications required to be approved by the PSD?
    - *Currently VEIC is the only accredited HERS Provider in Vermont. To seek accreditation an organization must submit an Accreditation Application to PSD. A HERS provider must meet minimum standards including the following: rater training standards, requirements for home energy rating reports, and quality control requirements. A full description of the accreditation process and requirements is available upon request from the PSD. Efficiency Vermont coordinates with the Northeast HERS Alliance to maintain a list of HERS Raters at www.nehers.org. NO CHANGE MADE BASED ON THIS COMMENT.*

- The increased targets will likely result in more homes using the Energy Rating Index compliance path, which requires blower door testing. This seems counterintuitive considering the perceived lack of capacity in the state to perform this testing.
    - *The Building Performance Professionals Association (BPPA) has reported about 90 (BPI or HERS) certified individuals qualified to use blower doors in Vermont. However, for the base code using the HERS Compliance Path is an option, but is not required in case there isn't adequate capacity in a particular area to perform the testing. For stretch code, where it is required, the blower door testing requirement will apply to Act 250 projects and therefore are much more likely to be in areas that are more densely populated and will have adequate blower door availability. Additionally, PSD is also delaying the effective date of stretch to December 2015 to allow for training and qualification of blower door testers statewide in order to support any future blower door testing requirements and to provide builders with the opportunity to incorporate blower doors into their construction process.. NO CHANGE MADE BASED ON THIS COMMENT.*

Log Homes

- The upper walls of log homes are often framed as opposed to solid wood (e.g., gable ends, dormer walls). Where vaulted/cathedral ceilings make the connection of the log wall to frame wall visible, there is a concern that the requirement for width of cavity necessary to achieve R25 will be undesirable. Assuming a common insulation product with an R-value of 3.7/inch, a 6-3/4" cavity is required, so that would require a 2x8 wall. I assume that would be permitted in 16" o/c framing. 2x6 framing with R21 insulation has been a common practice, and the need for added cost for R25 wall insulation is questionable.

- *There are options for meeting R-25 through spray foam insulation in 2x6 framing, or by framing with 2x4 R-13 and adding R-10 foam sheathing that would not necessitate framing with 2x8s. NO CHANGE MADE BASED ON THIS COMMENT.*

- The second sentence in Table 402.1.5 footnote d. should be changed to "Non-log exterior walls shall be insulated in accordance with Table 402.1.2." This change maintains the intent of the footnote but removes the requirement to change the footnote with changes to the Table. If this table must stand alone, the footnote needs to reflect the final action taken for Table 402.1.2.
  - *Change was made. CODE CHANGE MADE BASED ON THIS COMMENT.*

Stretch Code

- The code requirements as written are not currently clear for a rehab project that is required to meet the stretch code (either because it is required by Act 250 or because of Town requirements where the project is located). Is a HERS rating required for rehab projects? Can these requirements be clarified? If it is proposing a HERS rating of 54 for rehab projects, many buildings may fail to meet this target due to the many unknowns in a building envelope when doing less than a gut rehab.
  - *HERS ratings are not required for rehab projects. This was clarified in R501.1.2 "Compliance Approaches. Thermal efficiency can be achieved through any of the compliance paths including any one of the following approaches: prescriptive packages, REScheck™ software or a Home Energy Rating System (HERS) rating." Rehab projects do not necessarily need to meet HERS 54, but can comply through the other compliance approaches mentioned here.*

- Existing Buildings- Chapter 5- Will existing buildings that fall under ACT 250 jurisdiction be required to meet the stretch code?
  - *If work being done to an existing building that requires an amendment to an existing Act 250 permit, then the components being altered would need to comply with stretch code.*

- Applying the stretch code provision to existing building rehabilitations is problematic. We believe that achieving the stretch provision in new construction is fairly straightforward and achievable. Applying the same numbers to a rehab is difficult, since one never knows exactly what one will find when the siding comes off. Existing conditions can easily chew up contingency funds and make it difficult to go as deep with shell improvements as one would want to.
  Compliance can be achieved by either planning to meet the stretch code building component requirements in Table R407.1 or filling any empty cavities with insulation.
  - *Added to R503.1.1: "Empty wall, floor and roof building cavities that will be filled with insulation only need to fill that cavity with insulation and are not required to meet the R-value requirements in Table R402.1.2 or R407.1." CODE CHANGE MADE BASED ON COMMENT.*

- Section R501, stretch code for existing buildings, will result in many complications for rehab projects which either trigger new A250 jurisdiction, or the amendment of an existing A250 permit. Rehab projects, which require an A250 permit, should not be subject to the stretch code until the Department has carefully thought through the many issues of applying the stretch code to rehab. For example, R501.1.1 states that unaltered portions of an existing building or building system shall not be required to comply with this code. However, section R502.1.1, and R503.1.2 states that new heating and cooling systems must comply. An addition or alteration to a building frequently will involve using an existing heating/cooling system. It appears that under this section, the building owner would need to bring the entire building up to code for its mechanical system, if an addition or alteration tied into an existing system.
  - *Existing heating systems in existing buildings will not necessarily need to be replaced. Clarifying language was added to section R501.1.1 that states: "Connections or repairs to, or maintenance of*

existing mechanical systems do not constitute an alteration to that system." This should help to clarify that unless those systems are "altered" (as defined in RBES), they would not need to be changed. CODE CHANGE MADE BASED ON COMMENT.

- R407.3 Electric Vehicle Charging Facilities. Not clear what is being required for the "charging socket". NOTE: This was a comment received at the public hearing.
    - *Only a standard outlet is required. Clarification has been added by deleting "charging" and changing the language to the following: R407.3 Electric Vehicle Charging. For multifamily developments of 10 or more dwelling units,4% of parking spaces (rounded up to the nearest whole number) shall have a socket capable of providing either a level 1 or level 2 charge (see below) within 5 feet of the centerline of the parking space ("EV Charging Parking Space"). CODE CHANGE MADE BASED ON COMMENT.*

- R407.3 The requirement of charging sockets for 4% of parking spaces is too high given the current rate of EV sales.
    - *The PSD expects that adoption will increase over the coming years. The state's vehicle air emission regulations are expected to require approximately 25,000 plug-in vehicles in Vermont by 2025, or about 4% of all vehicles. Overnight charging for residents of all kinds of buildings will enable purchase (new or used) or lease of these vehicles by an increasing number of Vermonters who would otherwise depend on potentially expensive public charging. NO CHANGE MADE BASED ON COMMENT.*

- R407.3 Affordable multi-family rental housing tenants cannot afford plug in hybrids.
    - *The PSD expects the cost of plug-in vehicles will decline over time, and especially that the availability of used plug-in vehicles (such as those which have completed their lease) will enable a wider range of Vermonters to purchase these vehicles, benefitting from their low cost per mile of operation. NO CHANGE MADE BASED ON COMMENT.*

- R407.3 - Multifamily building owners will have to absorb the cost of the electrical use for the charging, or install a credit card charging station at $13,000 each. This requirement should be eliminated.
    - *There are multiple low cost options for the recovery of electricity costs; commercial-grade cellular-connected charging payment systems are not required. These include: key-pad based access systems (such as http://www.clippercreek.com/store/product/cs-40-with-liberty-plugin-enabled-access-control/); partnering with a third-party EV charging equipment supplier such as evGo; and building operational options such as dedicating the EV parking space to the EV owner and charging a set fee per month for access to charging, sufficient to recover electricity costs. NO CHANGE MADE BASED ON COMMENT.*

- A Level 1 system (a 20 amp, 115 volt outlet) would cost from $1000 to $2000 per outlet, depending on the distance and difficulty involved.
    - *There is typically power to parking areas for lighting, or building exterior lighting, from which the charging socket can run. There may be an additional circuits, and conduit, likely costing less than $1,000. NO CHANGE MADE BASED ON COMMENT.*

- More time is needed for the regulated community to discuss the statutory changes to Criterion 9f of Act 250. The addition of the stretch code to Criterion 9f was done with little to no input from the regulated community. The rule adoption process should slow down, to allow the regulated community the chance to have such a policy discussion with the legislature.
    - *The PSD will propose an effective date of December 30, 2015 for the stretch code to provide time for the regulated community to have the requested policy discussion with the legislature. CODE CHANGE MADE BASED ON COMMENT.*

- If the Stretch Code is adopted it should apply to all new construction projects, not just Act 250 applicants.

- *The PSD does not have jurisdiction over what the stretch code applies to, it is dictated in the residential building energy standards statute (30 V.S.A. § 51). NO CHANGE MADE BASED ON COMMENT*

Compliance / Enforcement:

- Exemption for historic buildings – unclear what the requirements are for the "report by a registered design professional...demonstrating that compliance would destroy historic fabric…" in order to have the exemption approved. Can this be clarified?
  - *The PSD has been working with the VT Division for Historic Preservation on a two page form that will need to be submitted for the "exemption report". Along with some basic project information (Name, address, etc.) the builder will need to state what provisions of the code are of concern and describe how compliance will adversely affect the historic building. The VT Division for Historic Preservation will review the information and issue a determination on whether they concur that the provisions will likely have an adverse effect on the historic building. This will be made available prior to the RBES effective date. We have also changed the language in section 501.6 to make this more clear. The section now reads, "R501.6 Historic buildings. No provision of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall be mandatory for historic buildings provided a "Historic Building Exemption Report" obtained from the State Historic Preservation Office, has been submitted to the State Historic Preservation Office and signed by either the owner, an owner's agent, a registered design professional, or a representative of the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic fabric or function of the building. The State Historic Preservation Office, upon receipt of the report, will review and validate the exemption request. " CODE CHANGE MADE BASED ON COMMENT*

- The base code specifically indicates that a blower door test is not required. The packages that were shown for meeting base code during the code review meeting on 9/19/14 all showed a number for a maximum air changes per hour. This appears to be a conflict. If these packages are shown as examples for meeting the base code, there should not be a requirement for a maximum air changes per hour, or a blower door test should be required for all buildings.
  - *Clarified in language by adding: "R402.4 Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4. Installing these air leakage measures should result in an air leakage rate, if tested with a blower door, to not exceed three air changes per hour, if tested in accordance with ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Alternatively, the building may be tested with a blower door to not exceed three air changes per hour at 50 Pascals." CODE CHANGE MADE BASED ON COMMENT.*

- I have a concern about compliance and allowing builders to sign off on a building unless they have been certified to do so. Verification will require a blower door and in the case of hot air systems a duct blaster.
  - *The RBES Statute (30 V.S.A. § 51) designates a self-certification process for verification that homes meet the standards and allows a builder, a licensed professional engineer, a licensed architect, or an accredited home energy rating organization to complete that certification. The blower door/air leakage testing will be required to be conducted by a Building Performance Institutes (BPI) Professional or Air Conditioning/Heat Pump Professional, a Home Energy Rating System (HERS) Energy Rater, HERS Field Inspector, or a VT PSD approved air leakage tester. PSD is currently discussing appropriate certification for other PSD approved air leakage testers. It's our understanding that the blower door testing requirements can be taught in half-a-day training, as such the PSD may designate a group to conduct this training and issue a completion certificate for the participant. For duct testing the test must be signed by an individual certified as either a*

Building Performance Institutes (BPI) Professional, a Home Energy Rating System (HERS) Energy Rater, HERS Field Inspector, or a VT PSD approved duct leakage tester. NO CHANGE MADE BASED ON COMMENT.

- The verification of meeting RBES or the stretch code is now tied to the certificate of occupancy (if a town has a C.O. process). If there is a delay in getting the C.O., due to the energy code certification process, money and time will be lost. Is there an adequate number of HERS raters in the state to meet what will become a growing need?
    - *The PSD will propose an effective date of December 30, 2015 for the stretch code to provide time for additional training, stretch code logistics, dissemination of information on blower door certified individuals, etc. We have also added prescriptive path options (in Table R407.1 and in the accompanying RBES 2015 Handbook, to be developed) so a HERS rating isn't required. A builder can get trained to do the blower door themselves as an option for meeting the blower door testing requirements, following the self-certification process for verification called for in the enabling RBES Statute (30 V.S.A. § 51). CODE CHANGE MADE BASED ON COMMENT.*

- We have heard and share concerns for the process being proposed, requiring all projects subject to Act 250 to meet stretch code and are required to submit "evidence of compliance" in order to receive approval. It has not been made clear what will constitute "evidence of compliance", but if that requires a developer to produce construction drawings, plans and specifications, that is a significant issue and an unrealistic expectation at that stage of the permit process. VHFA recommends that this provision be revisited, clarified, and vetted with the development community. VHFA encourages very careful consideration of anything that affects the cost of housing, without the commensurate offset. Offsets may include an accelerated permitting process, versus layering on other criteria or appealable provisions.
    - The PSD is expecting that the Natural Resources Board (NRB) will provide guidance regarding "evidence of compliance". *NO CHANGE MADE BASED ON COMMENT.*

- Projects receiving Act 250 permits are required to meet the performance-based HERS rating. What happens to the permit if the building fails to meet the HERS requirement at the end of construction when the building is tested and a HERS rating is determined? Also, it would be difficult to use ResCheck at the time of the Act 250 permit application since the building design is schematic and specific details have not been determined. A prescriptive path is preferred.
    - *In addition to HERS, stretch code can also be demonstrated with prescriptive packages, in Table R407.1. We will also be developing additional prescriptive package options that will be included in the 2015 RBES Handbook.*

- What is the effective date of the code? The ACT 250 permit process is lengthy in VT. Projects that are expected to start construction in March of 2015, have most likely been submitted to ACT 250 or will be in the next couple of months.
    - *The effective date will be dependent on the adoption date as the effective date cannot be set less than 3 months after the adoption date. The PSD would plan to set the effective date for the minimum 3 months from the adoption date. After the adoption date the revised energy code language will be made available so anyone submitting Act 250 applications for construction that will start after the effective date can plan accordingly. As well, the PSD will propose an effective date of December 30, 2015 for the stretch code.*

- While the two public presentations by the PSD about the new code made it clear that there are three tracks to compliance, it is not clear at all in the proposed code that there are options.
    - *Added new sections: "R501.1.2 Compliance Approaches. Thermal efficiency can be achieved through any of the compliance paths including any one of the following approaches: prescriptive packages, REScheck™ software or a Home Energy Rating System (HERS) rating." CODE CHANGE MADE BASED ON COMMENT.*

- R101.6 - If there is no authority having jurisdiction does one not need to comply with RBES? This section is confusing.
    - *This section is stating that where sections of the code require involvement of a state or local code official or other authority having jurisdiction and there isn't such an entity those sections of the code do not apply. For example for section R103 regarding the submittal of construction documents, if the town where the residential building is being constructed does not have code officials or other authorities having jurisdiction and it doesn't fall under the jurisdiction of any other state authority having jurisdiction, then that section of the code does not apply. This section now states: "**R101.6 Authority having jurisdiction.** In any instance where there is no state or local code official or other authority having jurisdiction, where one exists, the PSD is not considered to be the "other authority having jurisdiction, where one exists," and those sections of this code requiring involvement by that entity do not apply. All other code requirements still apply." Additionally, for clarity, throughout the code, we changed the language from "code official or other authority having jurisdiction" to "code official or other authority having jurisdiction, where one exists" to make this applicable to more situations in Vermont where there may not be code officials or other authorities having jurisdiction. CODE CHANGE MADE BASED ON COMMENT.*

- R102.1.1- this is particularly troubling, allowing the authority having jurisdiction to require the builder to exceed a measure or measures from what's required by the code.
    - *This is not what this section states. It allows a national, state, or local energy efficiency program that exceeds the energy efficiency levels required by the RBES to be deemed as being in compliance with the RBES. NO CHANGE MADE BASED ON COMMENT.*

- R103.1- The process for review and approval of the construction documents for compliance with RBES should be clarified. Who is the "authority having jurisdiction?" When are they required and who reviews them?
    - *Only if a code official or other authority having jurisdiction exists in a community, are they required to review and approve construction documents. If they do not exist, these requirements do not pertain. NO CHANGE MADE BASED ON COMMENT.*

- R103.4 (Amended construction documents) & R103.5 (Retention of construction documents) - what is the intended purpose of these two sections?
    - *103.4 directs documents to be resubmitted for approval as an amended set of construction documents if any changes are made during construction that are not in compliance with the approved construction documents. 103.5 requires a set of approved construction document to be retained by the code official or other authority having jurisdiction for a period of 180 days OR as required by state or local laws. This is intended to provide guidance to local officials, where they exist, to make sure that these documents are not destroyed in case any issues or questions arise later. NO CHANGE MADE BASED ON COMMENT.*

- R104.1- Add that it will be the duty of code official to act promptly in their inspections so as not to hold up the progress of the work.
    - *The Department does not have jurisdiction to oversee code officials and access whether they have acted promptly so we have elected not to add this recommended language. NO CHANGE MADE BASED ON COMMENT.*

- R104.4- Who is deciding who is qualified to do the testing and inspections referenced in this section and what is the criteria for qualifying? Is there a list of qualified companies available to the public? Who is expected to pay for these services? The PSD in their response from the initial round of questions said they do not expect third party inspections will be required. If that is true, then remove this language from the code.
    - *The code official or other authority having jurisdiction (which would <u>not</u> be the PSD) would determine who is qualified to do the testing and inspections referenced in this section. The PSD's previous response on third*

party inspections not being required was regarding air leakage testing, not in regards to Section R104. NO CHANGE MADE BASED ON COMMENT.

- R304.5.4- Who is expected to perform and pay for the performance verification testing referenced?
  - *The builder can perform this verification testing after training or hire a qualified tester to perform the test. NO CHANGE MADE BASED ON COMMENT.*

- R401.3- Requiring a certificate of compliance at the project completion doesn't achieve energy savings. It is added layer of paperwork with no tangible benefit, and costs time and money. While the filing of the RBES certificate has been in effect for years, the PSD states that there's only about 50% participation.
  - *The PSD believes it is appropriate to have a builder certify that they built a residence to the code. The certificate is a relatively simple one page form to complete. The PSD has not made any statements that there's only "50% participation". The completion and filing of a certificate is also required in statute (30 V.S.A. § 51) NO CHANGE MADE BASED ON THIS COMMENT.*

- R402.4.1.1- Air Leakage Testing- Who, and under what circumstances, will third party inspections be required? Who is expected to bear the costs of these inspections? Is there a published copy of the approved list of qualified leakage testers? What are the qualifications for the testers?
  - *The PSD will establish criteria for air-leakage testers. It will likely include BPI and HERS certified individuals, plus others approved through a PSD supported training and qualification process. This could include builders or others interested in being qualified. Builders would bear the cost of hiring these individuals, unless they participated in a program that offered those services or covered those costs. There is no published list at this time, but the Building Performance Professionals Association (BPPA) has compiled a list of existing BPI and HERS raters. NO CHANGE MADE BASED ON THIS COMMENT.*

- Section 405.4.2.1 addresses the Certificate of Occupancy though the information is included in Section 405 Simulated Performance Alternative.R405 appears to be mandatory and require an excessive amount of reporting at time a permit issued, as well as when certificate of occupancy is granted. Section R405.4.2.2 appears to add another step to receiving the CO: the RBES certificate must also include a "site specific energy analysis report". R405.4.2 goes on to state that a compliance report on the proposed design must be submitted with the application for a building permit. Upon completion, a compliance report on the as-built condition of the building will be submitted. This will add time and costs to receiving the CO….which is a very important issue for our tax credit housing.
  - *Section 405 has been significantly modified. Most of it was removed since it was largely irrelevant to Vermont. Added for clarification was: "R405.3 Performance-based compliance. Compliance is based on documentation from REScheck™ modeling software that indicates the home meets or exceeds the target UA for that building." CODE CHANGE MADE BASED ON THIS COMMENT.*

- The PSD has not adequately addressed compliance or enforcement for these codes and what happens for those that do not comply.
  - *Per RBES Statue (30 V.S.A. § 51) there is a self-certification process for verification that a residential building meets the requirements. Additionally provision of a RBES certificate is a condition precedent to issuance by the VT Public Safety or a municipal official acting under 20 V.S.A. Â§ 2736 of any final occupancy permit or issuance by a municipality of a certificate of occupancy if the municipality requires such a certificate. As dictated in statute the action for damages is that a person aggrieved by noncompliance may bring a civil action against the person who has the obligation of certifying compliance. The PSD also has a code compliance plan that can be found at http://www.leg.state.vt.us/reports/2012ExternalReports/280507.pdf . NO CHANGE MADE BASED ON THIS COMMENT.*

- Regarding blower door testing: NEEP suggests incorporating a phased in air leakage tightness requirement. Given the perceived lack of statewide blower door coverage, a phased in approach would provide the State with time grow

this workforce through a robust training program. The direct alternative to capitalizing on this opportunity to develop the state's green building workforce is the burdening of Vermont homeowners with higher energy and health costs due to the loss of conditioned air leaking out of the home and the decreased control over the source and quality of the air leaking in through.

- *Stretch code which requires blower door testing will be phased in December 2015. Approximately one-third of new Vermont homes fall under Act 250 and will be required to meet the stretch code. NO CHANGE MADE BASED ON THIS COMMENT.*

Residential Building Energy Standard
Comments and Responses

(<u>NOTE:</u> These were received prior to PSD filing the RBES rule)

General Comments:

Extend the comment deadline until August 30.

- While we were unable to extend the initial comment period we plan to extend the next comment period in September from one week to at least four weeks.

Awareness of the energy code and its requirements needs to be improved.

- Once the code is finalized there will be a series of outreach training opportunities to educate professionals on what is contained within the new code. Additionally Efficiency Vermont holds code education training events on a continual basis.

The 3-month window between adoption and effective date is not adequate for projects that will already be designed and permitted for construction in 2015.

- The Department appreciates the issues created by the code update process in terms of planning and permitting. The estimated effective date is March 2015 with the adoption date as a **minimum** of 3 months prior to the effective date. The Department will work towards an adoption date as early as possible to allow the maximum amount of time between adoption and the effective date. We don't want to extend the effective date beyond March 2015 as it would then be well into the construction season. The Department will also request that the International Codes Council (ICC) allow a final draft version of the code to be posted on the PSD website as soon as it is completed.

Tying RBES certification to the certificate of occupancy could lead to delays in getting a COO.

- It has always been a requirement that a RBES certificate be completed and posted on-site. The certificate is a fairly simple, one-page form to fill out. Builders should be able to complete the certificate well in advance to ensure it can be submitted to a municipality or the Department of Public Safety if required, in a timely fashion so there is no delay in the COO issuance.

Tying the code certificate to the certificate of occupancy may lead to a future marketable title issue.

- The energy code statute specifies that " A defect in marketable title shall not be created by a failure to issue a certificate, or to provide a copy of a certificate to the Department of Public Service; or to record and index a certificate in the town records." Thus the statute makes absolutely clear that regardless of the status of the real property with respect to code compliance or COO issuance, the property can be sold. However, the absence of a Certificate of Occupancy or a Code Certificate could improve the chance that a seller or prospective purchaser will work to get the property into compliance, and this is what the linkage between the Certificate and the COO, and the recordation of the Certificate in the land records was designed to achieve.

Who is the code official or authority having jurisdiction?

- Municipalities have the option of designating an official responsible for codes. The state designated the Public Service Department to have general responsibility for the codes. We have gone back through the code language and made language changes when necessary to make it more clear who has authority.

Energy Code certificates should be required at time of sale.

- Energy Code certificates are required within 30 days following the sale of a property.

Can Efficiency Vermont provide incentives based upon the base code and/or the stretch code?

- Efficiency Vermont can provide incentives for going beyond base code or stretch code for Act 250 projects. The Department believes the purpose of incentives should be to motivate actions beyond what is mandated or required by code.

General Building Comments:

There should be a Solar Ready Roof requirement in the energy codes.

- It was determined not to include solar ready provisions in the code at this time but instead to introduce renewable energy as an option for meeting a portion of the HERS of 60 for base and 54 for stretch. So you can get credit for renewable energy, but it's not required.

There shouldn't be multifamily meter requirements.

- In the proposed code there is no requirement for separate metering for dwelling units within multifamily buildings.

A higher percentage of windows should be allowed on the south side to increase natural light and radiant heat.

- The choice for the number and location of the windows is up to the designer as long as they follow code and appropriate U-values for the windows.

The code should permit electric resistance heating equipment if it can be shown to exhibit the lowest life-cycle cost.

- Currently there is no prohibition on electrical resistance heating equipment, except in the City of Burlington where it must be shown to exhibit the lowest life-cycle cost.

The use of electrical supplementary heat might be appropriate for certain projects including buildings with heat pumps as the primary heat source.

- In this case the electrical supplementary heat being discussed is that used in some less efficient air source heat pumps to boost the supply air temperature when there is not enough heat produced by the heat pump. "Cold climate" air-source heat pumps are able to operate when outside temperatures are well below zero degrees without any internal electric resistance heating. There is prohibition of supplementary electric-resistance heat for heat pumps.
- Stand-alone electric resistance heat is not prohibited (except in the City of Burlington) although it is encouraged to only be used when there is no other viable option. In the City of Burlington electric-resistance heat is prohibited except where such equipment can be shown to exhibit the lowest life-cycle cost.

Are there systems available to allow charging to be billed to the owner of electric vehicles?

- Yes there are currently electric charging systems available that would allow charging for electric vehicles to be billed to the vehicle owner.

Historic Building definition should include: "buildings that are listed in or eligible for listing in the National Register of Historic Places."

- This change has been made.

Add "Historic Buildings" to the list of exempt buildings under R101.5.2 with a reference to Chapter 5 – Existing Buildings.

- Historic buildings are now only exempt if it is demonstrated that compliance with a particular provision would threaten, degrade, or destroy the historic form, fabric or function of the building, so historic buildings as an entire class of buildings shouldn't be listed under exempted buildings.

Type A-1 and A-2 residential buildings need to be defined.

- This was an error in the draft language where "A-1" and "A-2" are referenced. It has been corrected to "R-1" and "R-2", which is defined in Chapter 2/definitions.

Definition of renewable energy for the adder should include biomass.

- We have modified the definition to be clear that biomass is included.

High-efficacy lighting should be defined.

- This is defined in Chapter 2/definition section.

HERS Comments:

Comments were submitted that the proposed HERS was both too high and too low.

- While the current HERS target for base code is 75 a residential baseline assessment conducted when the 2005 RBES code was in effect found that the average HERS rating for non-ENERGY STAR homes was 65, so setting the HERS target at 60 seemed reasonable.
- The stretch code HERS target was set based on the IECC HERS score of 54. Additionally, research showed that many builders who are currently building Act 250 projects (where the stretch code will be applicable) are currently achieving a HERS of 54 or less.

Verification of HERS rating by a "certified HERS rater" would add cost to projects.

- There isn't a requirement to use HERS, its only one of the possible compliance paths.

A payback analysis on a HERS of 54 should be completed.

- A recent study conducted by the Florida Solar Energy Center for the Residential Energy Services Network (RESNET) found that for Vermont's climate zone (6), the average first cost of meeting the stretch code (HERS 54) would be approximately $2,700, resulting in an average annual savings of $461 and a savings to investment ratio of 2.05. (See http://www.resnet.us/blog/wp-content/uploads/2014/08/Cost-Effectiveness-of-RE-188.pdf).

ACT 250 and Stretch Code Comments:

Evidence of compliance with the energy code shouldn't be required during the initial permit process for Act 250, as it is too early in the process to know all the required detailed information.

- The Department has had discussions with the Natural Resources Board (NRB) on this issue and they have submitted comments that includes the following statement: "The NRB is also aware that applicants may not always be able to specify particular energy efficiency measures at the time of initial application review, thus complicating Criterion 9(F)'s requirement that an applicant 'shall provide evidence that the subdivision or development complies with the applicable building energy standards under 30 V.S.A. § 51 or 53'. The Board supports the development of a 'package' or 'packages' of standards, to the extent possible, which could be used to demonstrate Code compliance. The Board could then assess compliance with criterion 9(F) at the permitting stage based on the submission of (1) a building envelope that meets the applicable code package(s), and (2) a proper representation that the proposed project will be completed in conformance with the mechanical systems and lighting provisions of the code. Any final determination of compliance, if necessary, could be met later

through a variety of methods including: certification, HERS, Rescheck, Comcheck, modeling, inspection, or other method. This (or a similar) approach would allow flexibility with reasonable assurance that standards would be met." The DPS will work to develop the package or packages suggested by the NRB and make them available for those going through the Act 250 process."

What happens if a building fails to perform at the required HERS 54 upon construction? How will that impact the Act 250 permit?

- This is part of the reason that blower door testing is a requirement for stretch code. This would allow any defects in the construction to be identified and fixed prior to a rating taking place. There are also other compliance path options (such as the prescriptive paths) for stretch code that would ensure compliance.

Act 250 projects should not require a different/more stringent energy code.

- ACT 250 is a conservation code and therefore has many additional requirements above those required for the rest of the state. The legislature deemed it appropriate to include additional requirements for energy efficiency by adding stretch codes as the presumption for meeting the Act 250 9F criteria.

The phrase "may be adopted by municipalities" should be removed from the definition of stretch code.

- This language is included in statute and would require a legislative change. Additionally, it is our understanding that municipalities have always had the ability to adopt other codes and standards at the municipal level (such as ENERGY STAR, Vermont Builds Greener, or LEED for homes) prior to the addition of this language through Act 89. The option for municipalities to adopt the stretch code does provide an option for a consistent standard to be adopted should municipalities choose to require something beyond base code.

Adding stretch codes that require an even higher level of efficiency will lower compliance with the code.

- Due to the Act 250 permitting oversight we do not believe that the stretch code will result in lower compliance rates.

Blower Door/Air leakage comments:

Blower doors should be required in the base code.

- Without hard evidence that there is adequate blower door coverage statewide and in order to work with the market to get ready for requiring blower door testing at the next update of the energy code, we have chosen to require blower door testing only for stretch codes (or as part of a HERS rating, if that compliance path is chosen). The blower door testing requirement will apply to Act 250 projects and therefore are much more likely to be in areas that will have adequate blower door availability. This will also allow for certification training to be designed and implemented prior to this requirement applying to all new construction projects, which will allow those who wish to be trained the time to do so. Additionally we will be able to complete further analysis to ensure that all areas will be adequately served and/or develop remedies to ensure there will be adequate blower doors/testers available in all areas when the requirement applies to all new construction.

PSD should allocate funds to support blower door testing.

- The Department doesn't have funding available to fund blower door testing on all residential new construction projects, but will explore the possibility of purchasing blower doors and making them available for rent (possibly through building supply stores, etc.) with a focus on areas of the state that doesn't have adequate supply/testers.

Who can conduct the air leakage testing? Is there a published copy of the approved list of qualified leakage testers? What are the qualifications for the testers? Will third-party inspections be required?

- The proposed code language states that the testing shall be conducted by a BPI Professional, a Home Energy Rating System Field Inspector or Rater or a PSD approved tester. PSD is currently discussing appropriate certification for other approved testers. It's our understanding that the blower door testing requirements can be taught in half-a-day training, as such the PSD may designate a group to conduct this training and issue a completion certificate for the participant. Efficiency Vermont has a list of BPI and HERS Field Inspectors and Raters on their website. We don't anticipate third-party inspections being required.

Addition, alteration, renovation, and repair comments:

There should be more of a focus on making older buildings more efficient.

- The code has been reorganized to better demonstrate the requirements of additions, renovations, and repairs. Supplemental materials, like the handbook, will also likely have a section dedicated to existing buildings.

The definition of "alternation" should only include construction, retrofit, and repairs that require a permit.

- Municipalities in Vermont have different requirements in regards to permits (with some not requiring permits at all). To maintain consistency for this requirement throughout the state we did not make this suggested modification.

To what extent are alteration projects required to comply with the code? Is compliance limited to the specific areas that are being constructed, retrofitted, or repaired? (sections 502.1, 503.1 &504.1)

- In the case of additions, alterations, renovations, and repairs only the building component being worked on would need to meet the code requirements. For example: if you were building an addition onto your home it would need to meet the code but there is no requirement to bring the rest of your home up to the current building energy code standard.

It is not clear how the code is to be applied to renovations/energy conservation retrofit projects.

- *Chapter 5 has been added to specifically address how the code applies to additions, alterations, repairs, and change of occupancy. Also PSD is currently discussing the utility of the handbook or other supplementary material being expanded to further address renovations.*

In the handbook it should be made clear that package 1 is the requirement for alteration and renovations. Packages 2 through 4 contain tradeoffs that are not applicable in the case of most additions, alteration or repairs.

- This has been clarified in the code. Also any supplementary code material developed to support RBES will make sure this requirement is clear.

Insulation Comments:

Include exception under "additions, renovation & repairs" to allow any amount of insulation to be added to the foundation.

- The proposed code, as well as the existing code, does not require that basements be insulated as part of an "addition, renovation or repair" unless that work was already being done. If it is being done as part of a project then it triggers the code requirement equal to new construction.

There shouldn't be insulation requirements for existing building upgrades.

- The code allows existing building walls unable to attain the required code value to just have insulation sufficient to fill the framing cavity. We have removed the R-19 minimum requirement. See Table R402.1.2 note e.

It should be clearly stated that filling existing empty or partially filled cavities with insulation is satisfactory in a retrofit.

- As stated above this is now the requirement in the code language.

Need a provision in the code to address situations where the cavity or sheathing is exposed, but where physical characteristics of the existing structure make meeting the R value requirements in 402.1.1 difficult and/or very expensive.

- Removed the R-19 minimum, so will now just require that the cavity be filled with insulation.

Table 402.1.2 footnote F allows R30 in slopes for up to 500 square feet or 20% of the total, whichever is less doesn't work for older existing buildings as the ceiling/roof geometry is already established and the framing is already in place.

- Existing buildings are exempted and just required to fill the cavity (see section 503).

Table 4.2.1.2 footnote I may result in an increased risk of frost damage to the foundation in the case of rubble-stone foundations.

- In this situation you can take a performance approach, which allows for trade-offs

Foam insulation is more costly than fiberglass, and the long term effects of foam insulation on wiring is unknown.

- Spray foam insulation is only one method to achieve proposed levels of insulation and air barrier requirements. Fiberglass batting and solid foam sheathing to achieve the required levels of insulation will also work with an appropriate air barrier material. It is up to the customer/builder to choose what they determine to be cost effective and the best choice for their project. As to the issue of the long-term effects of foam insulation on wiring, there appears to be some evidence that wires encased in foam when overloaded may degrade. It is recommended that builders choose insulation and circuit breakers appropriately and make sure to not overload circuits. We will discuss this issue during the energy code trainings.

Is R-38 still acceptable if maintained to the outside edge of the tops plates?

- Yes. We will add a footnote in Table 402.2.1 to clarify.

R-20+5 continuous insulation could create moisture conditions within walls.

- The specification has been changed to R-25. Achieving R-25 will be left up to the designers and builders based on sound building science, but best practices for achieving R-25 will be presented in the handbook and at code trainings.

R-15/20 should be maintained for basement and crawlspace walls. (table 402.1.2)

- This change has been made.

Reduce the R-15 requirement for edge of slab insulation to R-10. (table 402.1.2)

- This change has been made, but retained for log homes.

Remove the exception for site built components of mobile homes, such as conditioned basements and crawlspaces.

- There was never an intention to exempt these components. 101.5.2 has been changed to clarify that onsite components are not exempt. However, if these site-built components are outside of the thermal envelope of the mobile or manufactured home, then they do not need to comply.

The R-value requirements for ductwork in unconditioned spaces are not achievable on a cost effective basis, especially when the ductwork is elevated high above the attic insulation plane.

- This requirement is meant to encourage placing the ductwork within the insulation or moving it within the thermal envelope. Running ductwork through attics in our climate is not good practice.

Programmable Thermostat Comments:

Remove the programmable thermostat requirement.

- We have kept the programmable thermostat requirement as they have been studied and proven to be cost effective and promote energy efficiency. (additional information at: http://energy.gov/energysaver/articles/thermostats)

The proposed set points are not appropriate for elderly and/or disabled people with limited mobility and/or health issues. (section 403.1.1)

- We have added language to allow for other setbacks if needed due to these or other issues.

Other Technical Comments:

There are issues of over ventilating buildings with tight envelopes with the use of HRV/ERV's. ASHRAE 62.2 should be used as the basis for this section of the code.

- We have changed the language to also allow the use of ASHRAE 62.2-2013, if the builder chooses to comply with this approach rather than the Vermont ventilation standard.

There is no mention of kitchen ventilation.

- ASHRAE 62.2-2013 has been added as an option, which addresses kitchen ventilation.

Units with 4+ bedrooms should not be required to have a centrally ducted system.(table 304.6)

- There is no requirement for 4+ bedrooms homes to have a centrally ducted system. A centrally ducted system is listed as an option requiring a minimum of one fan to operate; all other systems would require two or more fans to meet the minimum whole house airflow rates. We have modified Table 304.6 to make it clear that the prescriptive fan requirements could be met with two fans or one centrally-ducted system.

Non-ridged air barriers should be allowed.

- The proposed code does allow for flexible air barriers.

The use of foam as an air barrier should be defined in detail.

- That information is included in Table 402.4.1.1

Compliance Comments:

Energy code development and compliance should be moved to the Department of Fire Safety as they are best positioned to provide enforcement.

- The primary mission of DFS is life and building safety, energy code doesn't fall into either category. DFS staff is charged with enforcing a wide variety of building safety elements which requires broad based knowledge, adding a non-safety inspection element would shift the focus away from their mission. Moving the energy codes

to DFS would require a statue change and additional resources allocated to DFS to allow them to add this function.

Vermont needs to enact a contractor/builder license requirement.

- This is beyond the scope of the Departments authority and would require legislative action. We are aware that the Homebuilders and Remodelers Association of Nothern Vermont have worked on this issue in the past.

Without enforcement the energy codes sets up a disadvantage for builders who comply. There is no entity/resources to enforce this code.

- The PSD agrees that there is an issue where those who do not comply with the energy codes can reap benefits at the expense of those who do follow the legal requirements. The PSD outlined an extensive compliance plan to achieve further statewide compliance with the energy codes, which can be found on the PSD website. We have implemented most of the components of the plan that could be accomplished at little to no additional cost, but would need more resources to fully activate the plan.

Are Zoning Administrators required to confirm the presence of an energy certificate during an occupancy inspection?

- Municipalities must receive a copy of the energy code certificate and confirm that it has been filed in the land records before they issue a COO.