Residential Building Energy Standard
Comments and Responses

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.