ENERGY FUTURES GROUP

# VERMONT RESIDENTIAL ENERGY CODE ADMINISTRATION PLAN

## Final

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Efficiency Vermont

VAPDA
Vermont Association of Planning & Development Agencies

Burlington Electric Department

VGS

VERMONT

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# LIST OF ACRONYMS

| | |
|---|---|
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| BECWG | Building Energy Code Working Group |
| BPI | Building Performance Institute |
| CBES | Commercial Building Energy Standards |
| CPHC | Certified Passive House Consultant |
| CO | Certificate of Occupancy |
| CR | Circuit Rider |
| DFS | Division of Fire Safety (Vermont) |
| DOE | U.S. Department of Energy |
| ECA | Energy Code Administration |
| EEN | Efficiency Excellence Network |
| EEU | Energy Efficiency Utility |
| EFG | Energy Futures Group |
| EP | Energy Professional |
| EPA | U.S. Environmental Protection Agency |
| GWP | Global Warming Potential |
| HERS | Home Energy Rating System |
| HVAC | Heating, Ventilation, and Air Conditioning |
| ICC | International Code Council |
| IECC | International Energy Conservation Code |
| OPR | Office of Professional Regulation (Vermont) |
| PHIUS | Passive House Institute U.S. |
| PSD | Public Service Department (Vermont) |
| RBES | Residential Building Energy Standards |

| | |
|---|---|
| RECI | Resilient and Efficient Codes Implementation |
| RESNET | Residential Energy Services Network |
| RNC | Residential New Construction |
| TA | Technical Assistance |
| ZERH | Zero Energy Ready Home |

## ABOUT THE AUTHORS

Energy Futures Group (EFG) is a clean energy consulting firm based in Hinesburg, Vermont. EFG specializes in the design, implementation and evaluation of programs and policies to promote investments in energy efficiency, renewable energy, other distributed resources, and strategic electrification. EFG staff have worked on these issues on behalf of energy regulators, other government agencies, utilities and advocacy organizations across the United States, Canada, Europe, and China.

**Zack Tyler** is the primary author of this plan. He has 15 years of experience in the energy industry with a focus on energy efficiency program evaluation, market research, and market transformation efforts. He specializes in building decarbonization and building energy codes, having held certifications as a HERS rater, Passive House Consultant, BPI MF Building analyst, and Infrared Thermographer. Zack has contributed to research in a wide range of jurisdictions across the United States and Canada and is adept at working with wide ranging stakeholder groups. He holds a BA from the University of Colorado in Environmental Studies and an MA from Boston University in Energy and Environmental Analysis. Contact: ztyler@energyfuturesgroup.com; 802-305-0355

**Richard Faesy** is the principal investigator for the DOE RECI award under which this work was funded. He is a principal and co-founder of Energy Futures Group in Hinesburg, Vermont. With more than 35 years' experience in the clean energy industry working with hundreds of clients and programs throughout the U.S. and Canada, he is highly regarded as a national expert and reliable project manager. Having held certifications as a Certified Energy Rater, LEED Accredited Professional, and DOE Home Energy Score Assessor, he specializes in residential buildings, technologies and markets, with expertise in residential new construction and retrofits, energy rating and labeling, building codes, financing, green building, the integration of renewables and energy efficiency, and effective energy efficiency policy, program design and implementation. He was a founding member of the Residential Energy Services Network (RESNET) and the Northeast Home Energy Rating Systems (HERS) Alliance. He currently works with clients in Connecticut, Massachusetts, Rhode Island and Vermont and the U.S. DOE. Prior to founding EFG, Richard worked at the Vermont Energy Investment Corporation for 21 years. Contact: rfaesy@energyfuturesgroup.com; 802-355-9153

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# EXECUTIVE SUMMARY

Vermont's Residential Building Energy Standard (RBES) represents the minimum standard of energy efficiency for new and renovated residential buildings in the state. Though following the RBES standards is mandatory, compliance has been declining over time as the stringency of the energy code has increased with each subsequent version. Residential energy code compliance with the 2015 RBES was most recently measured at 54%; it's likely that compliance has declined even further since that time as the 2024 RBES requirements represent an increase in stringency. The lack of compliance with the energy codes is detrimental to Vermont builders and homeowners, and underscores larger problems, including the lack of an Authority Having Jurisdiction (AHJ) for Vermont energy code administration and enforcement. Absent some form of organized energy code administration, compliance rates will not increase significantly enough for Vermont to achieve its goal of net zero ready new construction by 2030.

This plan was funded through a U.S. Department of Energy Resilient and Efficient Codes Implementation (RECI) award.[1] This award is helping to initiate activities that can and should persist into the future as Vermont pursues a new phase of sustainable residential energy code administration. RECI activities include the following:

- Development of an overall Energy Code Administration (ECA) plan to help guide the state to higher energy code compliance rates
- 20 unique trainings with at least 200 unique attendees. Audiences include designers, developers, builders, real estate professionals, and Energy Professionals.
- 3 presentations and 30 building site visits from Circuit Riders providing technical assistance on the energy code to building professionals
- 5 presentations to municipal audiences, energy committees, and regional energy planners focused on the RBES requirements and municipal obligations
- Assist the Vermont Office of Professional Regulation (OPR) as they stand up a voluntary RBES certification for registered contractors
- Coordinate with the Energy Efficiency Utilities (EEUs) around code support activities

[1] This award has two budget periods, the first of which expires on June 30, 2025. At the time of this writing, the activities associated with the second phase of this project have not been approved. Approval of the second phase would result in additional trainings and site visits.

- Coordinate with the Vermont Division of Fire Safety (DFS) to help increase awareness of Energy Professional services and benefits

These activities will be used to help the State of Vermont (State) determine a pathway forward and to increase residential building energy code compliance rates at a time when the State is implementing policies to encourage more residential housing construction with a focus on affordability. This plan proposes three pathways for consideration:

1) A 'Technical Assistance Pathway' (from here on referred to as the TA Pathway), where there is no statewide energy code enforcement and the primary mechanism through which compliance rates can be influenced is training and education. This is "business as usual" and consistent with how the state currently operates.
2) An 'Energy Professionals Pathway' (from here on referred to as the EP Pathway), where legislation requires that all RNC projects include an Energy Professional to demonstrate RBES compliance; the Division of Fire Safety (DFS) would provide minimal review and oversight.
3) A 'DFS Administrative Pathway' (from here on referred to as the DFS Pathway) where the State administers an energy code administration process for all residential buildings, including single-family owner-occupied homes.[2] DFS staff would put processes in place to ensure residential builders and contractors are building to the current RBES requirements.

The RECI project team recommends that the State prioritize steps that will ultimately lead to the adoption of the DFS Pathway; these include using strategies outlined in the EP Pathway as steps towards comprehensive DFS administration. This position is predicated on the following:

- The TA Pathway is largely a continuation of activities that have historically taken place in Vermont. As the energy codes have become more stringent, compliance rates have fallen. Our presumption is that we will need to do more to achieve higher compliance rates for RBES.
- Vermont already has a network of existing Energy Professionals that could be leveraged to support energy codes, particularly in Chittenden County where most of the new construction activity is happening. EEU rebates can be used to subsidize the fees associated with Energy Professional services to make them

[2] DFS does not currently have jurisdiction over single-family owner-occupied homes with respect to RBES.

more palatable to builders and contractors. We have been informed that if there were more demand, existing Energy Professionals would staff up and others would enter the market.

- A DFS Pathway is the ideal structure for ensuring residential energy code compliance, but it will take time to negotiate the details associated with this approach and to train DFS staff. Using elements of the EP Pathway 1) will provide the necessary ramp time for a DFS Pathway to be fully implemented, 2) will facilitate improvements in residential energy code compliance rates in the near term, and 3) could serve in a supporting role for the DFS Pathway if Energy Professions continue to support energy code compliance for the DFS going forward.

Based on these points, we offer the following recommendations for the State of Vermont to move forward with the DFS Pathway:

- Plan for a transition to the DFS Pathway by 2030.[3] In the interim leverage the skills of local Energy Professionals to support residential energy code compliance activities.
    - Begin DFS oversight with public buildings, training DFS staff for project review and site inspections regarding the energy codes. This will facilitate ramping up residential administration in the coming years.
    - In the near term, encourage the use of Energy Professionals by residential builders and contractors. Emphasize the subsidies available for their services and the energy bill savings associated with code compliant new construction.
    - Explore ways in which Energy Professionals can support a DFS Pathway in the long-term; examples include leveraging Energy Professionals to train DFS staff on RBES requirements, reducing the energy code compliance review process for projects that include an Energy Professional and/or serving as "deputies" for DFS in an on-going capacity.
- Monitor the status of negotiations between the EEUs and the PSD with respect to the ability of the EEUs to claim energy savings for their support of energy code compliance activities. It seems likely that these parties will be able to agree on an implementation framework for these efforts absent legislation. However, should

[3] Vermont has established a goal for all new buildings to be constructed to net-zero standards by 2030.

that not be the case, we recommend the State consider passing enabling legislative language that would allow for the EEUs to claim energy savings for their code compliance support work. This would help ensure the EEUs can offer continued support to market actors in the form of training and incentives.

- Set up a DFS database[4] to include RBES certification and serve as a statewide repository of all RBES certificates.
    - Eliminate the requirement to file RBES certificates with Town Clerks and the Vermont Public Service Department (PSD) when there is a statewide, publicly accessible DFS database.
    - Establish a quality assurance process that includes review of RBES Certificates to ensure accuracy.
- Provide workforce development support systems and training opportunities to ensure there are enough Energy Professionals to serve the Vermont market.
- Encourage the EEUs to promote Energy Professional services through marketing matchmaking with builders.
- Develop a sustainable funding model that supports energy code administration from DFS; this may consist of new permit fees for residential builders and contractors, or alternatives such as an addition to the property transfer fee.

If there is significant resistance to the DFS Pathway, then we recommend that the State adopt the Energy Professionals pathway, where the involvement of an Energy Professional in each RNC project is mandated by statute. We believe this is the best approach to achieving increased compliance rates outside of a DFS-led energy code administration process.

[4] The DFS database is also known as the "record management system" or (RMS).

# INTRODUCTION

This plan was developed by Energy Futures Group (EFG) through a Resilient and Efficient Codes Implementation (RECI) award that is funded by the U.S. Department of Energy (DOE). This Energy Code Administration (ECA) plan is intended to help lay the groundwork for the implementation of a residential energy code compliance administration system in Vermont, ultimately resulting in significant and sustained reductions in energy use. The emphasis of Vermont's RECI award is on residential buildings since energy code compliance rates in this sector have been dropping as the energy code stringency has been increasing.

The RECI project team consists of the following members:

- Energy Futures Group (https://energyfuturesgroup.com/) - prime on RECI award
- Vermont Secretary of State / Office of Professional Regulation (https://sos.vermont.gov/opr/)
- Vermont Energy Investment Corporation dba Efficiency Vermont (https://www.efficiencyvermont.com/)
- Vermont Association of Planning and Development Agencies (https://www.vapda.org/)
- Vermont Gas Systems (https://vgsvt.com/)
- Burlington Electric Department (https://www.burlingtonelectric.com/)

The following activities are included in this effort:

- Developing an energy code administration plan
- Recruitment, training, and support of an Energy Professionals workforce to assist energy code administration, including outreach to communities not typically represented in the energy industry
- Development of energy code support materials and trainings
- Training and support of builders, designers, trade associations, and other stakeholders
- Establishment of circuit riders to ensure widespread information sharing and support
- Municipality outreach training, resources, and support
- Establishment and coordination with project advisory committee, including technical experts and representatives from community-based organizations (CBOs).

The RECI project team has been coordinating with local stakeholders, including, but not limited to, state agencies, builders and contractors, architects, design engineers, real estate professionals, training administrators, Energy Professionals, regional energy planners, municipal energy committees, municipal staff, and other stakeholders to understand what energy code administration should encompass in Vermont. What role should different market actors play? What are the pain points with respect to residential energy code compliance? The goal of this plan is to answer these questions by proposing roles for key market actors and funding strategies that can support energy code administration in Vermont while helping to increase residential code compliance rates.

This plan offers three potential pathways to energy code administration and, ultimately, improved compliance rates, resulting in reduced energy consumption. These are the Technical Assistance (TA) Pathway, the Energy Professionals (EP) Pathway, and the DFS Pathway. The three pathways allow for this plan to be leveraged under a wide range of policy scenarios that may play out over the coming years.

This plan is primarily focused on Vermont's Residential Building Energy Standards (RBES), also referred to as the residential energy code, which covers all new homes and all additions, alterations, and repairs to residential buildings three stories or less above grade with some exceptions.[5] The Commercial Building Energy Standards (CBES) are the other arm of Vermont's energy code, covering all commercial and residential buildings four stories or greater above grade.[6] Although some recommendations in this plan may be relevant to the commercial market, opportunities are more limited due to the sector's recent 87% compliance with the 2015 CBES.[7]

[5] https://publicservice.vermont.gov/efficiency/building-energy-standards/residential-building-energy-standards
[6] https://publicservice.vermont.gov/efficiency/building-energy-standards/commercial-building-energy-standards
[7] https://publicservice.vermont.gov/sites/dps/files/documents/VT%20Market%20Assessment%20Report%202021%20FINAL.pdf

# BACKGROUND

The background information presented below includes excerpts from both the Vermont Act 47 Building Energy Code Study Committee Report and the Vermont Act 151 Building Energy Code Working Group Report. [8,9] These working groups were convened by the Vermont Legislature to address issues related to declining compliance rates with Vermont's mandatory energy codes.

## VERMONT ENERGY CODE BACKGROUND

Vermont statute 30 V.S.A. § 51 established residential building energy standards.[10] The statute was initially passed by the Vermont Legislature in May 1997 and sets a minimum standard of energy efficiency for new and renovated residential buildings three stories or less. RBES includes two levels of stringency: base code and stretch code. The base code is the standard level of energy efficiency that all new and renovated residential buildings three stories or less (with some exceptions) must meet. The stretch code is the required level of energy efficiency for all Act 250 projects and in Vermont municipalities that choose to implement a higher energy standard.[11] Act 250 is Vermont's land use and development law. The stretch code includes higher points requirement to achieve compliance.[12]

Vermont statute indicates that the Commissioner of the Vermont Department of Public Service (PSD) *may* direct the timely and appropriate revision of the RBES and/or CBES after the issuance of updated standards from the International Energy Conservation Code (IECC) and/or the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Updates to the energy code are designed to provide reductions in energy use and emissions over the life of a building. RBES has been updated in 2006, 2011, 2015, 2020, and most recently in 2024. CBES was enacted into law in 2006 by statute 30 V.S.A. § 53 and took effect January 1, 2007.[13] It is the energy code for all commercial buildings and residential building four stories or

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[8] https://legislature.vermont.gov/Documents/2024/WorkGroups/House%20Environment/Reports%20and%20Resources/W~Building%20Energy%20Code%20Study%20Committee%20~Act%2047%20Building%20Energy%20Code%20Study%20Committee%20Report%20to%20The%20Vermont%20Legislature~1-3-2024.pdf

[9] https://legislature.vermont.gov/assets/Legislative-Reports/Act-151-BECWG-Final-Report_2024.11.15.pdf

[10] https://legislature.vermont.gov/statutes/section/30/002/00051

[11] https://act250.vermont.gov/act250-program

[12] https://publicservice.vermont.gov/sites/dps/files/documents/VT_Energy_Code_Handbook%202024%2010-17-2024%20web_v.1.24.25_clean.pdf

[13] https://legislature.vermont.gov/statutes/section/30/002/00053

greater above grade in Vermont. CBES has been updated in 2011, 2015, 2020, and most recently in 2024.

## ENERGY CODE BENEFITS

Building energy codes ensure that energy efficiency is considered in both new construction and renovations. Vermont justifies adoption of energy codes with the benefits they provide for building occupants and environmental and climate goals. For the most recent updates to RBES, the construction costs and energy cost savings were calculated to ensure that the savings cover the incremental cost of moving from the 2020 RBES to the 2024 RBES.[14] The results of that analysis are shown in Table 1 and Table 2 below, with key assumptions detailed in Table 3.

*Table 1. Energy Cost Savings and Incremental Cost of Moving from 2020 RBES to 2024 RBES Base Code*

| 2024 RBES | Average Annual Weighted Savings | Package Costs (over 2020 RBES) | Simple Payback | ROI | Cash Flow |
|---|---|---|---|---|---|
| Standard Low Cost | $83 | $1,018 | 12.2 | 8% | **$9** |
| Standard All Electric | $785 | $2,951 | 3.8 | 27% | **$570** |
| Standard Blended (Fossil & Electric) | $216 | $1,385 | 6.4 | 16% | **$116** |

*Table 2. Energy Cost Savings and Incremental Cost of Moving from 2020 RBES to 2024 RBES Stretch Code*

| 2024 RBES | Average Annual Weighted Savings | Package Costs (over 2020 RBES) | Simple Payback | ROI | Cash Flow |
|---|---|---|---|---|---|
| Stretch Low Cost | $158 | $1,718 | 10.9 | 9% | **$33** |
| Stretch All Electric | $908 | $4,551 | 5.0 | 20% | **$577** |
| Stretch Blended (Fossil and Electric) | $301 | $2,256 | 7.5 | 13% | **$137** |

[14] Please note these were calculated at the time of the analysis. The underlying assumptions associated with construction costs, among other inputs, have changed since that time.

*Table 3. Key Assumptions from 2024 RBES Analysis*

| Key Assumptions | Value |
|---|---|
| Mortgage Interest Rate | 6% |
| Delivered Fuel Cost | |
| Fuel Oil | $3.56 per gallon |
| Propane | $3.60 per gallon |
| Natural Gas | $1.21 per ccf |
| Electricity | $.20 per kWh plus $.52 per day |
| Cord Wood | $300 per cord |
| Wood Pellets | $310 per ton |
| Fossil Fuel vs. Electric Blended Costs/Savings | |
| Fossil | 81% |
| Electric | 19% |

In all cases, the energy savings with very short payback periods outweigh the incremental costs. For example, the standard low-cost approach was estimated to increase construction costs by $1,018 over the 2020 RBES to achieve 2024 RBES standards, resulting in $83 per year average annual energy savings (weighted by fuel type and cost). This would generate a 12.2-year simple payback, 8% return on investment (ROI) and $9 per year cash flow. The cash flow analysis assumes the $1,018 was financed in the home purchase mortgage, increasing annual mortgage payments by $74 but offset by $83 in annual energy cost savings, resulting in $9 annual positive cash flow.

If the home complied with the 2024 RBES using an all-electric approach, the customer economics would be much more beneficial. The incremental cost of achieving compliance with the 2024 RBES would be $2.951, resulting in $785 annual energy cost savings. The impact of this investment would result in a simple payback of 3.8 years, a return on investment of 27%, and annual positive cash flow of $570.

The “standard blended approach” assumes a mix of fossil fueled homes using the “standard low cost” approach and “standard all electric approach”. The results fall in between those discussed above and continue to provide positive cash flow for the customer.

For those homes that need to be built to the stretch code for compliance with Act 250 or in municipalities that require a higher energy code level, the costs to achieve the 2024 RBES stretch code relative to 2020 RBES are higher across the board, but they also result in greater energy cost savings. For the stretch code low cost, all-electric, and blended approaches, all paths result in simple paybacks between 5.0 and 10.9

years, a return on investment of between 9% and 20%, and annual positive cash flow between $33 and $577 per year.

More general information on the benefits of energy codes along with more detailed explanations of some of the metrics Vermont uses to justify our energy codes can be found in a 2024 Northeast Energy Efficiency Partnerships (NEEP) publication, "Energy Codes and Affordability". [15]

## LEGISLATIVE AND WORKING GROUP HISTORY

Below we summarize some of the key legislative activities and working groups that have influenced the energy codes in Vermont.

### Act 89 Legislation

RBES and CBES are the law in Vermont. They are not optional for the buildings to which they apply. Vermont Act 89, passed in 2013, strengthens the provisions of RBES and CBES by providing guidance to municipal officials for local support and administration. Specifically, Act 89 requires the following:

- Municipal officials must provide RBES and CBES information when a building or zoning permit is applied for.
- Any building that requires a Certificate of Occupancy (CO) must be certified for RBES or CBES compliance and recorded in the municipal land records before the CO is issued.
- Municipalities have the option of adopting the RBES Stretch Code to increase the energy efficiency of local construction. However, Vermont statute does not clearly give municipalities the ability to enforce building energy standards.

Additional details regarding Act 89 requirements can be found in the recently published *Municipal Guide for VT Energy Codes*.[16]

### Code Collaboratives

Local and regional stakeholders convened in 2015 and again in 2021 as part of two separate code collaboratives focused on energy code development, administration, and compliance in Vermont. The 2015 collaborative was focused on how the State might achieve 90% compliance by 2017.[17] The 2021 collaborative was more focused on

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[15] https://neep.org/sites/default/files/media-files/neep_energy_codes_and_affordability_final.pdf
[16] https://www.efficiencyvermont.com/Media/Default/docs/trade-partners/code-support/municipal-guide-for-vermont-energy-codes.pdf
[17] https://neep.org/sites/default/files/resources/VCC%20May%201%202015Final1.pdf

the goals of Vermont's building energy codes, pathways and options to increase compliance, and how these items (and many others) might be addressed in future code updates.[18]

## Act 47 Legislation and Committee

Governor Scott signed Act 47, also known as the "HOME Act", into law on June 5, 2023, to enable new opportunities for housing development. Section 23 of Act 47 named an "Energy Code Compliance; Study Committee" with a goal "to recommend strategies for increasing compliance with the Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES)." Powers and duties included the following three charges (re-ordered for clarity):

1. Assess how the building energy codes interact with the fire and building safety codes.

2. Consider and recommend strategies to increase awareness of and compliance with the RBES and CBES, including the potential designation of the Division of Fire Safety (DFS) in the Department of Public Safety as the statewide authority having jurisdiction for administration, interpretation, and enforcement, in conjunction with DFS' existing jurisdiction, over building codes; and

3. Evaluate current cost-effectiveness analyses for the RBES and the CBES, whether they include or should include nonenergy benefits such as public health benefits and the cost of carbon, and how that impacts the affordability of housing projects and provide recommendations.

The Building Energy Code Study Committee ultimately produced a report for the Legislature with a series of recommendations surrounding each of these topics.[19] The majority of the Committee recommended naming DFS as Vermont's AHJ to administer all energy codes, acknowledging that this change would need to go through the legislative process. The Committee also made a series of recommendations regarding strategies to increase awareness and compliance with the energy codes. Notably, DFS, the PSD, and the Association of General Contractors (AGC) provided dissenting comments against DFS servicing as the AHJ for all energy

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[18] https://publicservice.vermont.gov/sites/dps/files/documents/Code%20Collaborative%20Memo%208-31-21.pdf

[19] https://legislature.vermont.gov/Documents/2024/WorkGroups/House%20Environment/Reports%20and%20Resources/W~Building%20Energy%20Code%20Study%20Committee%20~Act%2047%20Building%20Energy%20Code%20Study%20Committee%20Report%20to%20The%20Vermont%20Legislature~1-3-2024.pdf

codes. They cited a lack of existing resources to support energy code administration, an increase the cost of housing, and permit delays as reasons for providing dissenting comments.

### Act 151 Legislation and Working Group

The Act 151 Building Energy Code Working Group (BECWG) was convened by the 2024 Vermont Legislature to address issues related to declining compliance rates with Vermont's mandatory energy codes (i.e., RBES and CBES). Specifically, the Working Group was asked to examine three "charges":

1. Recommend strategies and programs to increase awareness of and compliance with the RBES and CBES, including the use of appropriate certifications for contractors trained on the energy codes.
2. Develop plans and recommendations for a potential transition to a comprehensive program for the RBES and CBES at the Division of Fire Safety, including potential funding sources.
3. Consider whether or not the State should adopt a statewide [residential][20] building code.

This effort built off the work conducted by the Act 47 Building Energy Code Study Committee. The Act 151 Working Group members produced a report for the Legislature in late 2024 that responded to each of the three charges.[21] As was the case with the Act 47 Committee, the Act 151 Working Group recommended that DFS be designated as the statewide AHJ over all building construction, including the energy code. Again, DFS, the PSD, and AGC provided dissenting comments citing increased housing costs, a lack of capacity, and a preference for training and education programs as opposed to energy code enforcement. As directed in the enabling legislation, the Act 151 Working Group will meet again in 2025 to continue deliberations on the charges listed above.

## CURRENT APPLICABILITY AND ADMINISTRATION OF BUILDING AND ENERGY CODES

The State of Vermont uses provisions of the National Fire Protection Association (NFPA) 101 and International Building Code (IBC) of the International Codes Council

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[20] The word "residential" was inadvertently omitted from the bill and act. Vermont already has a statewide building code for commercial and multifamily public buildings.
[21] https://legislature.vermont.gov/assets/Legislative-Reports/Act-151-BECWG-Final-Report_2024.11.15.pdf

(ICC) for commercial and residential projects. See Figure 1 for a summary of the use of energy codes and building codes in Vermont, and a summation of the oversight authority, or lack thereof.

*Figure 1. Current Scope of Building and Energy Codes by Building Type*


| | | | |
|---|---|---|---|
| **Energy Code** | **CBES** | **RBES** | |
| DFS Requirement[1] | Filing and Posting Certificate before Occupancy | | *None* |
| Municipal Requirement[1] | Filing and Posting Certificate before Occupancy | | |
| On-site Verification | Verification of Energy Code Compliance: ***None***<br>Verification of EEU program compliance: EEU's - for some projects | | |
| **Building Code** | **NFPA 101 + IBC** | **NFPA 101** | Plumbing Only[2] |
| Enforcement Authority (DFS) | Yes | | *No* |
| On-site Verification | DFS Inspections | | *None* |

1. While there are no inspections for compliance or penalties for violations, filing the RBES or CBES certificate by builder or energy specialist assuring compliance is required by statute.
2. A plumbing permit is required for homes using public water and/or public sewer. No plubming permit is required for well or septic systems (besides a Vermont wastewater permit).

Vermont's building energy codes interact with multiple state agencies in different ways. Figure 2 summarizes the current roles and responsibilities of these various agencies.

*Figure 2. Key Players in Vermont's Energy Code Administration*

| | **PSD**<br>Dept of Public Service | **DFS**<br>Dept of Public Safety<br>Division of Fire Safety | **OPR**<br>VT Secretary of State office<br>Office of Professional Regulation | **EEU**<br>Energy Efficiency Utilities |
|---|---|---|---|---|
| **Rule-Making / Promulgation** | Responsible for regular review and updates of RBES & CBES. Receives DOE funding for energy code update and support. | VT Fire and Building Safety Code (NFPA, ICC); Electrical Rules; Elevator Rules; Access Rules; Plumbing (etc) | -- | Review and support of RBES Handbook. |
| **On-site Verification Activities** | Estimates code compliance rates through periodic market characterization studies. | Conducts building, life safety & accessibility plan reviews & inspections for commercial, multi-family projects, duplexes and rentals. Verifies CBES/RBES certificate is in place before issuing a C.O. for public buildings. | -- | EEU's conducts site visits focused on EEU program compliance for some projects registered with an EEU program |
| **Technical Support** | The Energy Code Assistance Center is a project of VT PSD | Offers interpretation of code, code conflict resolution, appeals, and variances. Oversees municipal authorities. Oversees training of building trades. Occasionally trains design professionals and builders. | -- | Operates the Energy Code Assistance Center (call center)<br>Provides technical assistance and training to builders, architects, engineers, etc.<br>Develops and distributes educational materials<br>Provides tools and resources, such as REScheck software<br>Better Building by Design Conference |
| **Professional registrations, certificatons and/or licensing** | -- | (required)<br>**licenses building trades**:<br>Electricians, Plumbers, Elevator Installers, Gas, Oil, Sprinkler, Fire Alarms, Chemical Suppression, Fire Sprinklers, Chimney Sweeps, Generator Installers. Most require continuing education. Offers voluntary certifications for trades. | (required)<br>**registers residential contractors**<br>for fraud purposes (no certification or licensure). Building inspectors, architects and energy raters are also registered by OPR. | (voluntary)<br>**registers trade groups**<br>in *Efficiency Excellence network* (EEN). 8 Hrs of energy efficiency education per year required. |

There are two activities that are being explored, but not yet in place, which would impact the roles and responsibilities outlined above.

1) The DFS is currently working on updating their permit database and as part of this process they have agreed to store RBES and CBES compliance certificates for buildings currently under their jurisdiction (i.e., all public buildings). This will add a new layer to the role of DFS as their database will now serve as a central repository for these certificates.
2) There are ongoing discussions and draft legislation regarding the EEUs ability to claim energy savings from energy code compliance support activities, which may unlock supplemental funding for energy code compliance support activities. This would increase the role of the EEUs with respect to contractor training, education, and outreach on energy code-related matters.

## COMPLIANCE HISTORY

Vermont's RBES represents the minimum construction standard of energy efficiency for new and renovated residential buildings in the state. RBES lacks a formal enforcement mechanism and compliance has been declining over time as the stringency of the energy code has increased with each subsequent version. The lack of compliance with the energy codes is detrimental to Vermont builders and homeowners, and underscores larger problems, including the lack of an Authority Having Jurisdiction (AHJ) for Vermont energy code administration and oversight. In 2012, the State developed a plan to achieve 90% compliance with the energy code by 2017. [22] Unfortunately, as discussed below, that compliance rate did not materialize and instead compliance rates are declining.

The latest residential compliance study, sponsored by the PSD, showed that 54% of newly constructed residential buildings surveyed complied with the technical components of the 2015 RBES, the standard set three code cycle updates ago.[23] This is down from a 66% compliance rate with the 2011 RBES. Please note that the sample used to develop the most recent code compliance rates was small (n=27) and not statistically representative. Since that study, the RBES has been updated twice. All this should be taken into consideration when discussing residential compliance rate trends.

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[22] https://publicservice.vermont.gov/sites/dps/files/documents/Vermont_Energy_Code_Compliance_Plan%20FINAL.pdf
[23] https://publicservice.vermont.gov/sites/dps/files/documents/VT_2020_SF_RNC_Baseline_Final_Report_Jan242023.pdf

Compliance rates with the 2024 RBES are unknown, but local Energy Professionals and contractors suggest non-compliance issues are prevalent and perhaps more severe than in the past.

## RNC PROGRAM AND ENERGY PROFESSIONAL HISTORY

### Efficiency Vermont's RNC Program[24]

The current iteration of Efficiency Vermont's Residential New Construction (RNC) program provides training, technical assistance, home certification, and various financial incentives for products and technologies that support builders developing energy efficient homes that are resilient and cost-effective.[25] Efficiency Vermont RNC certification, which results in a net zero ready home that is resilient and healthy, requires a Home Energy Rating System (HERS) energy rating along with pre-drywall and final inspections. Efficiency Vermont currently offers an incentive of 50% of the cost of the energy rating up to $750 to Efficiency Excellent Network (EEN) RNC builders. Participation in the RNC program also offers financial incentives to participants for drain water heat recovery, balanced ventilation systems, low global warming potential (GWP) insulation, triple pane windows and a bonus incentive for all-electric projects and for projects meeting the comprehensive 'standard of excellence'. Projects can also qualify for prescriptive rebates for residential heating, domestic hot water, and air conditioning (HVAC) equipment and appliances.

Efficiency Vermont is one of three Energy Efficiency Utilities (EEUs) in the state. Burlington Electric Department (BED) and Vermont Gas Systems (VGS) deliver services in their respective service territories while Efficiency Vermont provides statewide coverage.

### Energy Professionals Market

Energy Professionals represent an underutilized resource in the context of energy code administration. Energy Professionals are trained in building science principles that are at the core of energy code requirements, and many possess the training and certification required to provide diagnostic testing services to residential builders and contractors. With the support of state agencies and EEU funding, we believe that Energy Professionals can be utilized to increase residential compliance rates in the

[24] https://www.efficiencyvermont.com/services/renovation-construction/residential-new-construction
[25] https://www.efficiencyvermont.com/Media/Default/docs/services/rnc/efficiency-vermont-residential-new-construction-program-overview.pdf

near term. Specifically, a combination of EEU subsidies and advocacy/support from state agencies could lead to an increase in the number of residential contractors utilizing Energy Professionals on their projects. We also believe that Energy Professionals could play a role in supporting DFS under a statewide energy code administration; this could come in the form of training and education for DFS staff, assistance with plan review or onsite inspections, or other technical assistance.

While we envision significant opportunities for Energy Professionals to support energy code compliance in the future, there is general agreement among RNC industry stakeholders that the current role of Energy Professionals in Vermont's energy code administration is limited. This is driven by limited demand from the state's builders and contractors.

This has led to the state currently having only eight active HERS raters, two of which are based outside of Vermont. The raters located in Vermont are generally located in the northwestern part of the state, near Chittenden County, which is the largest county in Vermont with the most RNC activity.

**Drivers of Current Limited Demand for Energy Professionals**

- There is no statewide enforcement mechanism in place for RBES for owner-occupied single-family homes
- Some builders have acquired the tools they need (e.g., blower door) to meet code requirements on their own
- Energy Professional services are viewed as value-add, not a necessity
- The current economic climate makes it challenging to incorporate add-on services
    - Standard HERS rater fees for simple projects typically range between $1,500 and $2,500 per home
    - Blower door testing (~$400) and plan review services (~$200) may be available for lesser fees, but are not currently eligible for EEU incentives
    - Actual pricing varies based on the complexity and geographic location of the home, as well as the scope of services provided

In addition to the eight active HERS raters, Vermont currently has 74 Energy Professionals with some form of certification from the Building Performance Institute

(BPI) and 16 Certified Passive House Consultants (CPHCs).[26] While these Energy Professionals have been trained in building science, many would need additional training to provide technical assistance on the energy code. That said, these professionals have the foundational knowledge base necessary to understand and interpret RBES requirements more quickly than other trade professionals. Additionally, it should be noted that there is almost certainly an overlap with these counts, as many Energy Professionals have multiple certifications. Relatedly, not all these professionals would have the bandwidth to provide energy code compliance support. *Table 4* presents a matrix of Energy Professionals by certification type and the services they may be able to provide with respect to energy code administration.

*Table 4. Potential RBES Services by EP Certification Type*

| | Home Energy Rating System (HERS) | Building Performance Institute (BPI) | Certified Passive House Consultant) (CPHC) |
|---|---|---|---|
| *# of Professionals in VT (as of Jan 2025)* | *8* | *74* | *16* |
| Diagnostic testing | x | x* | |
| RBES certificate population and filing | x | x | x |
| Prescriptive Package plus Points pathway certification | x | x | x |
| HERS pathway certification | x | | |
| REScheck pathway certification | x | x | x |

*Depending on the certification type.

As shown, HERS raters have the most comprehensive skillset when it comes to energy code support. HERS raters are trained in building science principles, diagnostic testing, and energy modeling. HERS raters are also typically focused on new construction, which is the focus of most energy code compliance support. BPI professionals' skillsets will vary depending on the specific BPI certification.[27] These professionals are typically more focused on weatherization services and retrofit activities, but they do have building science training and often have been trained in diagnostic testing as well. CPHCs, who are certified through the Passive House Institute U.S. (PHIUS), are focused on new construction, they are trained in energy modeling, and they have extensive in-depth knowledge of building science principles.

[26] There are additional Energy Professional certifications that may exist within the Vermont market and are relevant for energy code support services (e.g., any Passive House Institute certifications). Our research was restricted to these certifications as they are the most prevalent and easily tracked.
[27] https://www.bpi.org/certified-professionals/certification-grid/

That said, CPHCs do not receive any training in the field, and they are not trained by PHIUS in diagnostic testing.

The current demand for Energy Professional services is concentrated among high-end energy conscious builders and a few large production builders. Production builders are often required to build to the stretch code requirements of the RBES, which are more stringent than the base code. The stretch code is required for projects built under Vermont Act 250[28], which is triggered by large housing developments. One local Energy Professional indicated that production builders are treating Energy Professionals as members of the project team. They are often brought into the process early on and they are tasked with coordinating compliance with the RBES and providing builders with pathways towards compliance. This model is consistent with our vision, and something we hope to expand.

The size and scope of the Energy Professional market has evolved over time. Until December of 2021, Efficiency Vermont provided free HERS rating services for all projects achieving certification through their RNC program. Data indicates this was a popular service among builders.[29] Up to that point, the HERS rater market in Vermont was primarily made up of Efficiency Vermont staff. At the end of 2021, Efficiency Vermont stepped out of the rater market and began supporting an independent HERS rater market in Vermont. Beginning in January 2022, Efficiency Vermont began offering an incentive of 50% of the cost of a rating, up to $750, for builders pursuing Efficiency Vermont certification that are a part of the Efficiency Excellence Network (EEN).[30] These incentives are still in place, and Efficiency Vermont is exploring a program offer to extend the rater incentive to EEN builders only pursuing RBES compliance using the HERS compliance pathway in 2025. A typical HERS rating for a multifamily housing unit or a simple single-family home costs around $1,500-$2,500, so these incentives will help make these services more accessible to builders.[31] Other Energy Professionals services, such as blower door testing or plan review, can be completed for a smaller fee but they are not currently eligible for Efficiency Vermont incentives. One local Energy Professional indicated they charge $400 for a blower door test and would charge an additional $200 for a plan review or to assist with REScheck.

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[28] https://act250.vermont.gov/act250-program
[29] According to the most recent SF RNC baseline study, program penetration in the RNC program was 33% in 2015 and declined to 12% in 2020 as these changes were taking place.
[30] https://www.efficiencyvermont.com/trade-partners/efficiency-excellence-network
[31] https://publicservice.vermont.gov/sites/dps/files/documents/HERS%20Raters%20research.pdf. Larger single-family homes, projects with more complex geometry, and homes in remote locations may cost quite a bit more.

In addition to the three energy-specific certifications highlighted, licensed professional engineers and architects may also have expertise and skills that could be leveraged for possible energy code compliance support. However, it is unclear how much building science and diagnostic testing expertise these professions have.[32] More research and discussion would need to take place to determine the optimal combination of credentials and additional training to serve in an energy code compliance role.

Relatedly, the ICC now offers a Residential Energy Inspector/Plans Examiner credential. This credential tests an individual's knowledge of the IECC. Like the CPHC certification, this credential does not provide diagnostic testing experience, but it does provide expertise in the IECC.

[32] It is worth noting that licensed engineers and architects are well positioned to obtain energy-specific certifications to enhance their building science knowledge and skills.

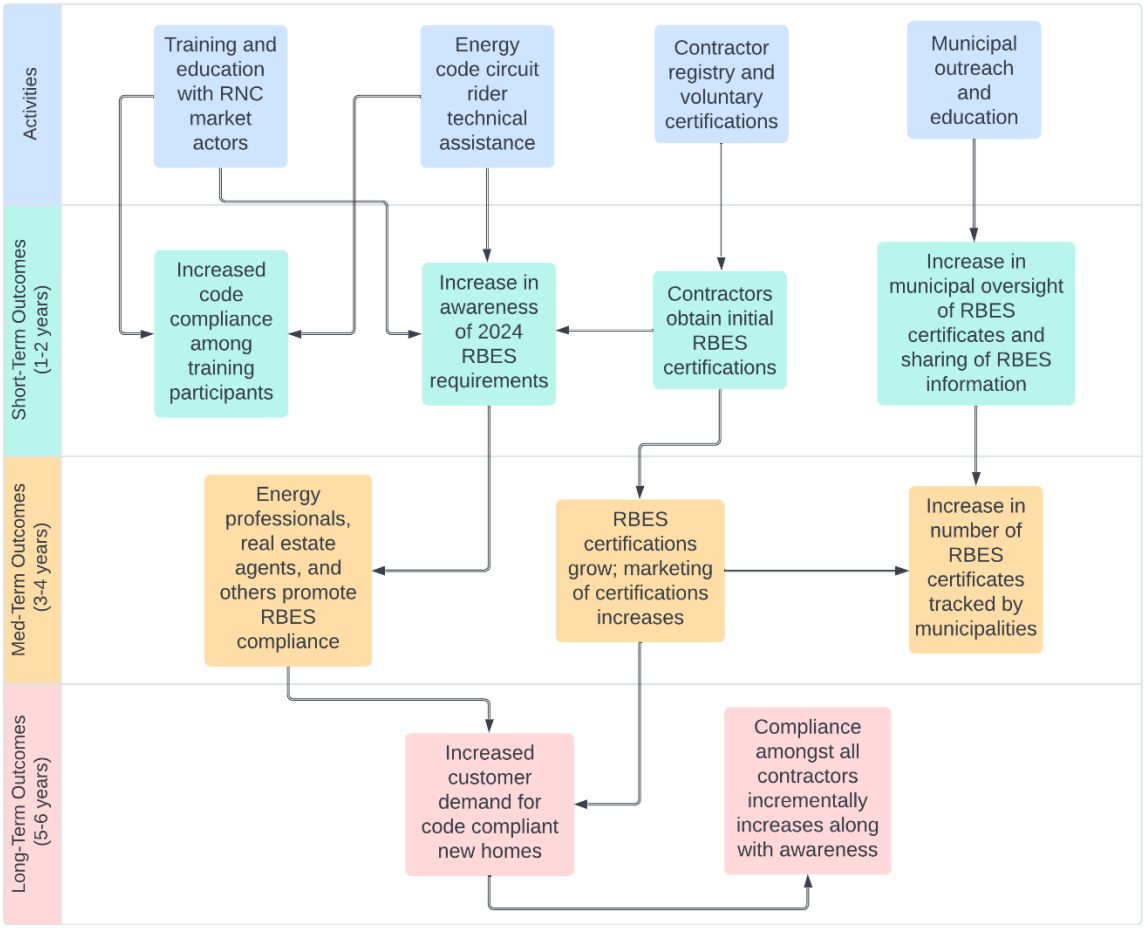
# SUMMARY OF RECI ACTIVITIES

This RECI award, which covers 2024 through 2026, is helping to initiate activities that can and should persist into the future as Vermont pursues a new phase of sustainable residential energy code administration. RECI activities include the following:

- Development of an overall Energy Code Administration (ECA) plan, including a sustainable funding model, to help guide the state to higher energy code compliance rates.
- 20 unique trainings with at least 200 unique attendees. Audiences include designers, developers, builders, real estate professionals, and Energy Professionals.
- 3 presentations and 30 building site visits from Circuit Riders providing technical assistance on the energy code to building professionals.
- 5 presentations to municipal audiences, energy committees, and regional energy planners focused on the RBES requirements and municipal obligations.
- Assist the Vermont Office of Professional Regulation (OPR) as they stand up a voluntary RBES certification for registered contractors.
- Coordinate with the EEUs around code support activities.
- Coordinate with the Vermont Division of Fire Safety (DFS) to help increase awareness of Energy Professional services and benefits.

Please note that the activities listed above are those associated with the first budget period of this project (covering January 1, 2024, through June 30, 2025). The outcomes listed below assume that RECI activities will continue through 2026. As of the writing of this plan, the second phase of this project (covering July 1, 2025, through December 31, 2026) has not been approved. *Figure 3* presents an overview of the RECI activities and the anticipated short-term, medium-term, and long-term outcomes.

*Figure 3. RECI Award Activities and Outcomes*




Below we describe how the RECI activities will influence each of the anticipated outcomes.

**Short-Term Outcomes (1-2 Years)**

- ***Increase in awareness of 2024 RBES requirements*** – training with residential builders, Energy Professionals, real estate agents, and others will help to increase overall awareness of the RBES requirements. This outcome will also be influenced by the initial group of residential contractors receiving voluntary RBES certification.
- ***Increased code compliance among training participants*** – we expect to see an immediate improvement in compliance amongst building professionals that attend RECI sponsored training activities.

- ***Increase in municipal awareness of the of RBES certificate of compliance requirement and the obligation to share RBES information with builders and contractors –*** as VAPDA conducts municipal training and education activities we anticipate more municipalities understanding their statutory obligations as they pertain to the RBES. This includes providing information about the RBES to prospective builders and contractors when they apply for a zoning permit and ensuring that certificates of compliance are filed in the land records before issuing a certificate of occupancy (CO).
- ***Contractors obtain initial RBES certifications –*** the first phase of residential contractors, registered with the State through OPR, will begin to receive their RBES certifications.

**Medium-Term Outcomes (3-4 years)**

- ***Energy Professionals, real estate agents, and others promote RBES compliance –*** the RECI training and outreach efforts include market actors such as Energy Professionals and real estate agents. The expectation is that these market actors will help promote the benefits of RBES compliance to homeowners in a meaningful way over the next 3-4 years.
- ***RBES certifications grow; marketing of certifications increases –*** over the next 3-4 years we anticipate the number of residential contractors obtaining voluntary RBES certifications will continue to grow. Along with that growth we expect residential contractors to market their newly acquired certifications to homeowners to differentiate themselves from the competition.
- ***Increase in the number of certificates tracked by municipalities –*** the number of RBES certificates being tracked by municipalities should increase as 1) municipal staff become more aware of their filing requirements, 2) municipal staff share RBES information with prospective contractors, and 3) more contractors pursue voluntary RBES certification making them more likely to file certificates with municipalities.

**Long-Term Outcomes (5-6 years)**

- ***Increased customer demand for code compliant new homes –*** customer demand for code compliant homes should increase as 1) the number of residential contractors receiving voluntary RBES certifications increases and 2) RNC market actors such as real estate agents and Energy Professionals advocate for the benefits of RBES compliant new construction.

- ***Compliance amongst all contractors incrementally increases along with awareness –*** we anticipate all the activities and outcomes detailed above ultimately culminating in incremental increases in residential code compliance rates across the state.

The RECI activities are robust and are injecting information and resources into the RNC market that otherwise would not exist. We anticipate these activities will make a meaningful difference, as detailed in the activities and outcomes discussed above. Some initial returns from the training activities are highlighted in the call-out box to the right. However, the RECI activities alone will not be sufficient to achieve Vermont's stated goal of having all newly constructed buildings be net-zero ready by 2030.[33] For that to take place these activities will need to be supplemented with legislative action that addresses an authority having jurisdiction combined with enforcement, workforce development, and ongoing coordination across key market actors.

**Examples of Positive Outcomes from Trainings to Date**

- Feedback from municipality on RBES training and EV parking requirement
  - *"Thank you for passing this on. It seems like it might be a good idea to make sure that this is shared as part of a development application submittal."*
- Reference to minimum energy efficiency requirements added to Municipal Energy Resilience Program (MERP) – Project Permitting Guide
  - *https://bgs.vermont.gov/sites/bgs/files/documents/Permitting%20Guide%20for%20VT%20MERP%20Projects.pdf*

[33] https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan_0.pdf

# PATHWAYS FOR COMPLIANCE

With the goal of improving the state's compliance with RBES, we have identified three potential pathways Vermont could take toward residential energy code compliance administration:

1) A 'Technical Assistance Pathway' (from here on referred to as the TA Pathway), where there is no state support for energy code enforcement and the primary mechanism through which compliance rates can be influenced is training and education. This is "business as usual" and consistent with how the state currently operates.
2) An 'Energy Professionals Pathway' (from here on referred to as the EP Pathway) where legislation requires that all RNC projects include an Energy Professional to demonstrate RBES compliance; DFS would provide minimal review and oversight.
3) A 'DFS Administrative Pathway' (from here on referred to as the DFS Pathway) where the State supports some level of energy code oversight and enforcement for the residential sector, including single-family owner-occupied homes. DFS would be responsible for most plan review and site inspection tasks.

Many activities, including the RECI activities detailed above, will influence compliance whether the state moves forward under a TA Pathway, an EP Pathway, or a DFS Pathway. The RECI activities cover many of the efforts that would influence compliance under any pathway. However, it is unclear at the time of this writing whether these RECI activities will continue after June 30, 2025. Other activities with widespread influence include the following:

- Legislation supporting the EEUs claiming savings from energy code support activities.
- In the 2025 legislative session, there were two bills, H.181[34] and S.65[35], that were introduced through the House and Senate, respectively, but neither came to fruition. Each of these included language that would have allowed the EEUs to claim energy savings from energy code compliance support activities. This would help the EEUs increase the level of training and support available to residential

[34] https://legislature.vermont.gov/Documents/2026/Docs/BILLS/H-0181/H-0181%20As%20Introduced.pdf
[35] https://legislature.vermont.gov/Documents/2026/Docs/BILLS/S-0065/S-0065%20As%20Introduced.pdf

builders and contractors while helping to maintain or increase subsidies for Energy Professional services.

- DFS implementing a new permit database covering all "public buildings" (this includes multifamily properties and single-family rentals)
- As part of the Vermont Act 151 BECWG, the DFS indicated that they are open to incorporating RBES and CBES certificates into their permit database expansion. The DFS database will cover all public buildings but may be open to including RBES data on single-family owner-occupied homes.
- Changes to mortgage or insurance standards
- In May 2024, the US Department of Agriculture (USDA) and the US Department of Housing and Urban Development (HUD) updated their minimum standards for new construction to be consistent with ASHRAE 90.1-2019 and the 2021 IECC.[36] However, the current federal administration may not be supportive of future regulations of this kind.
- Increased construction industry training that includes content on energy codes.
    - Vermont has seen recent growth in construction industry training centers with two new brick-and-mortar facilities coming online in 2025[37] in Winooski and Barre in addition to the existing Association of General Contractors' training facility in Montpelier. Energy codes will likely be part of--or a focus of--many of the future trainings in these facilities.

This a not a comprehensive set of activities influencing residential energy code compliance rates, but each of these highlight activities outside of the RECI award that will influence compliance under each of the potential compliance pathways.

Table 5 presents a summary of the proposed compliance pathways, each of which are discussed in more detail in the sections below.

[36] https://www.federalregister.gov/documents/2024/04/26/2024-08793/final-determination-adoption-of-energy-efficiency-standards-for-new-construction-of-hud--and

[37] Associated Building Contractors New Hampshire/Vermont's "Vermont Construction Academy" in Winooski and the Office of Economic Opportunities' Weatherization Training Center in Barre.

*Table 5. Summary of Compliance Pathways*

| Compliance Approach | Description | State Role | Compliance Mechanism | Oversight |
|---|---|---|---|---|
| **Technical Assistance Pathway (TA Pathway)** | "Business as usual" model with no formal state administrative support. Promote Energy Professionals and provide training and education to improve compliance rates. | No formal administration; supports education/training | Technical assistance support | Minimal |
| **Energy Professionals Pathway (EP Pathway)** | Requires an Energy Professional on every RNC project to ensure RBES compliance. DFS provides limited oversight. | Minimal role; verification of Energy Professional involvement and RBES certificate | Mandatory use of certified professionals | Moderate (third-party driven) |
| **DFS Administrative Pathway (DFS Pathway)** | DFS takes on direct responsibility for plan review and site inspections for residential energy code compliance. | Direct administration and oversight by DFS | State-led inspections and reviews | High (state-administered) |

## TECHNICAL ASSISTANCE PATHWAY

The TA Pathway represents a continuation of Vermont's current energy code administration. This pathway is unlikely to result in the State achieving its goal of having all new construction meet net-zero ready by 2030. That said, activities associated with this pathway can be used to maintain momentum developed through the RECI award to ensure continued progress towards improved residential energy code compliance rates.

### Training and Education

Under the TA Pathway we envision ongoing training and education as one of the primary mechanisms through which compliance rates would be influenced. Historically, these efforts have been led by the EEUs, in particular Efficiency Vermont and their Energy Code Assistance Center (ECAC). This work would represent a continuation of the training and education activities that have historically taken place in Vermont. Ideally, this would represent a continuation of the RECI award activities, though the State would need to identify funding to support that level of investment in technical assistance. As of this writing, the second phase of the RECI project has not been approved and alternative funding sources will be required to support the same level of activity that has taken place over the last 18 months.

Training and education opportunities under the TA Pathway may include the following:

- A series of webinars on the adopted RBES requirements
- A series of webinars on upcoming code requirements if and when a new code is enacted
- Ongoing call center support for technical questions through the ECAC.
- Advanced technical support for EEN RNC builders and contractors
    - Building design and mechanical system review
    - Materials and equipment selection
    - Code compliance and carbon modeling
- Circuit rider support
- Training sessions at Efficiency Vermont's annual Better Buildings by Design Conference and other educational opportunities.

### Engaging Energy Professionals

One key aspect of training and education efforts under the TA pathway to builders, developers, municipalities, and others would be to highlight the services offered by third-party Energy Professionals. Third-party certified Energy Professionals that are trained in building science fundamentals that consider the building as a system and diagnostic testing are well positioned to support the builder community in adapting to evolving code requirements. In fact, as part of the RECI activities, the RECI team created an entire plan dedicated to Energy Professionals; the draft can be found in *Appendix B: Energy Professionals Plan*.

While Energy Professionals in other states that recognize third-party energy code certification are typically HERS Energy Raters and compliance is mostly HERS ratings, we have a broader vision for Vermont. HERS Energy Raters are certainly the best qualified to deliver energy code support services, but becoming an Energy Rater can be a time consuming and expensive journey. We envision recognizing HERS Raters but also broadening the definition of an "Energy Professional" to include certain BPI certifications, Certified Passive House Consultants (CHPC), and potentially licensed architects and engineers with certain additional performance testing credentials to ensure sufficient statewide coverage. Specific recognition of all these certifications and professions should be the focus of a future state-sponsored discussion.

Beyond recognizing these certifications for individuals, we also envision broadening the current RBES compliance pathways (i.e., Prescriptive Package plus Points, REScheck, and HERS rating pathways) that each of these individuals could support. For instance, a builder may opt for a simple "Prescriptive Package plus Points" approach from a HERS rater who could offer that service at a lower cost than a full HERS rating; while the typical price for a full HERS rating is $1,500 to $2,500, services such as blower door testing ($400) or plan review ($200) may be associated with a lesser fee.[38] Again, the specifics of who could offer which compliance path should be the focus of a future state-sponsored discussion.

Under the TA pathway we have the following vision for Energy Professionals:

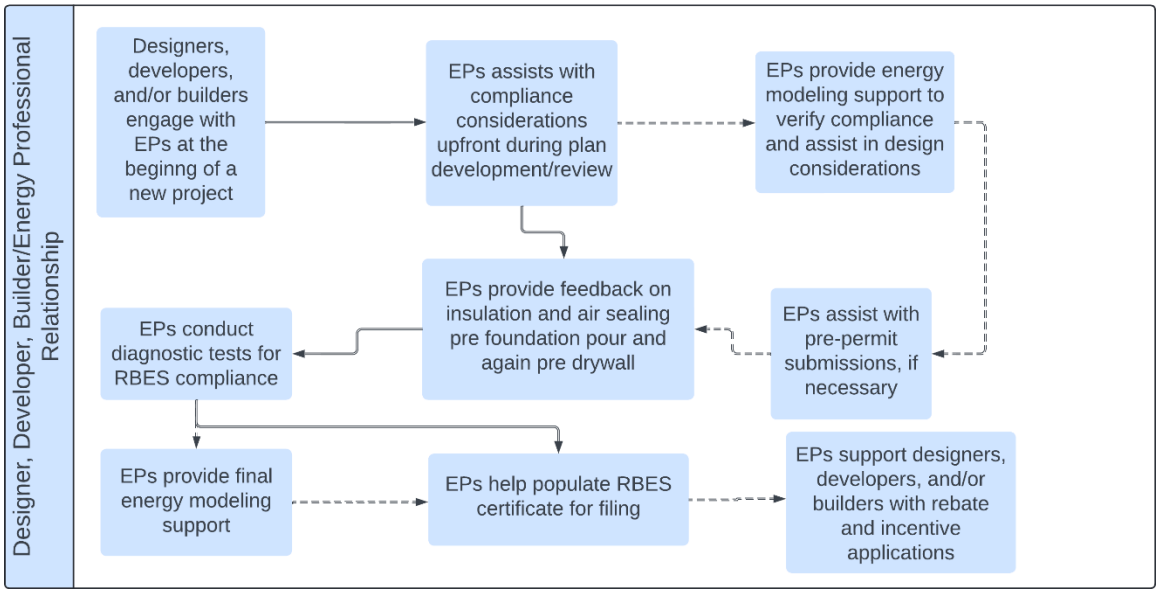
- Energy Professionals are welcomed to the project by designers/developers/builders/contractors[39]
- Energy Professionals are considered a member of the project team
    - Incorporated into the overall workflow of the project
    - Involved early on at the design stage, not as an afterthought at the end of the project
- Assist with key tasks related to energy performance and energy code compliance
    - Project design considerations
    - Modeling and analysis of construction and equipment options
    - Value engineering decisions
    - On-site diagnostics testing
    - On-site quality assurance for key components such as insulation installation, thermal boundary placement, air sealing details, building science considerations, etc.
    - RBES certificate population and filing
- Provide technical assistance to builders and contractors, not enforcement

[38] One local Energy Professional indicated they charge $400 for a blower door test and would charge an additional $200 for a plan review or to assist with REScheck.
[39] It's possible that architects, engineers, or contractors themselves could hold Energy Professional certifications and double in that role on a project.

- Help market the value of HERS ratings, REScheck completions and professional compliance support to builders and homeowners alike
    - Optimized and customized energy code compliant designs
    - Decreased operational costs
    - Non-energy benefits (indoor air quality, noise, etc.)
    - Improved resilience to extreme weather and other climate change effects

*Figure 4* presents a flow chart of the vision for an ideal designer/developer/builder interaction with an Energy Professional in the context of RBES compliance support.

*Figure 4. Designer/Developer/Builder and Energy Professional Flow Chart*




## Funding Mechanism

There are four primary funding mechanisms that come into play when considering the TA Pathway. These funding mechanisms are described below, and the TA Pathway activities that they might influence are summarized in Table 6.

- EEU funding
    - As previously mentioned, multiple bills have been introduced to the Legislature proposing that the EEUs be able to claim energy savings for energy code compliance support. This would help the EEUs achieve

their energy savings goals and facilitate additional support for the RNC market

- EEU funding could be increased to provide training and education content to RNC market actors as a means of influencing code compliance and subsequently generating energy savings that warrant financial compensation.[40]
  - Please note that EEU funding is listed separately from incentives. Here we are referring to EEU content and labor. EEU incentives are covered separately in the 'Incentives' bullet below.

- PSD funding
  - Historically, the PSD has provided funding to support energy code development along with training and education efforts. We anticipate this will continue, though the ultimate availability and level of any such funding is unknown at this time.
  - The PSD may be able to help support the voluntary RBES contractor certification being set up through OPR. Support could include helping cover administrative costs to run the program, subsidizing exam fees, or both. The availability of federal funding will dictate whether the PSD can support this effort.

- Incentives
  - Efficiency Vermont certification, which results in a net zero ready home that is resilient and healthy, requires a Home Energy Rating System (HERS) rating along with pre-drywall and final inspections. Efficiency Vermont currently offers an incentive of 50% of the cost of the HERS rating up to $750 to Efficiency Excellent Network (EEN) RNC builders.
    - This incentive is being extended to EEN RNC builders pursuing compliance with the HERS compliance pathway in 2025.[41]
    - Additional incentives of up to $9500 are currently provided by Efficiency Vermont to EEN RNC Builders plus heating, cooling, domestic hot water, and appliance rebates.

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[40] Training and education activities might also include financial support to subsidize the fees associated with pursuing various Energy Professional certifications.
[41] https://www.efficiencyvermont.com/Media/Default/docs/services/rnc/efficiency-vermont-residential-new-construction-program-overview.pdf

- There may be modest additional incentives available from the local distribution utility, especially for electric heat pump equipment for water and space heating and cooling.
- The 45L tax credit applies to new homes achieving ENERGY STAR or DOE Zero Energy Ready Home (ZERH) certification. These programs offer tax credits between $2,500 and $5,000 per dwelling unit depending on the housing type and certification achieved.[42] According to the American Council for an Energy Efficiency Economy (ACEEE), the tax credit has been extremely effective, assisting with the construction of over 350,000 efficient new homes in 2024 and resulting in average annual bill savings of roughly $450 per home.[43]

- Contractor fees
  - Contractors will likely need to invest some of their own funds to pursue working with an Energy Professional, which is a requirement to obtain Efficiency Vermont RNC certification, ENERGY STAR certification, or DOE ZERH certification.
    - While an initial investment may be necessary, the cost savings associated with these certifications should lead to relatively short payback periods.
  - Contractors will likely need to invest in exam fees or training courses to pursue the voluntary RBES certification.

Below we outline how the key components of the TA Pathway might be funded moving forward.

*Table 6. TA Pathway Activities and Potential Funding Mechanisms*

| | EEUs | PSD | Incentives | Contractor Fees |
|---|---|---|---|---|
| Training and Education | x | x | | |
| Energy Professional Services | | | x | x |
| RBES Certification | | x | | x |

[42] https://www.energy.gov/eere/buildings/section-45l-tax-credits-zero-energy-ready-homes
[43] https://www.aceee.org/sites/default/files/pdfs/the_45l_tax_credit_for_new_energy-efficient_homes_has_been_exceptionally_effective.pdf

## ENERGY PROFESSIONALS' PATHWAY

The EP Pathway would include most if not all the elements outlined in the TA Pathway. The difference would be that the EP Pathway adds a new legislative requirement that all RNC projects include a third-party certified Energy Professional to engage in each project to provide at least a plan review and perform on-site diagnostic testing to confirm compliance. If the State is serious about improving compliance with RBES, and if there were a mechanism to check and ensure that each new home being built received an RBES Certificate, then requiring the engagement of Energy Professionals with each new home could have a significant impact on compliance.

One of the barriers to implementing energy code enforcement at the state level is the lack of knowledgeable staff that would be required to adequately oversee the residential energy code. This is an issue that has been raised as part of the Act 47 and Act 151 legislative working group sessions. There are both cost and timing implications associated with staffing and education/training decisions that would be required to implement statewide energy code enforcement.

Energy Professionals represent a highly trained group of market actors with expertise in building science, and, at times, the residential energy code. It's possible to leverage their expertise to minimize the impact that state supported energy code enforcement may have on groups such as the DFS. There is precedent for this type of setup. For example, in both Maine and Pennsylvania, municipalities and/or builders may use a Third-Party Inspector (TPI) in some scenarios to conduct inspections for the purposes of compliance with the local energy codes.[44,45]

Similarly, in Massachusetts, most municipalities have adopted the State's Stretch Energy Code or Specialized Energy Code.[46] Both the Stretch and Specialized Energy Code require performance testing, inspections, and energy modeling be performed by a third-party Energy Professional. In most of these municipalities, the majority of energy code inspection and reporting work is conducted by local HERS Raters. HERS Raters provide the relevant compliance information to builders and/or code officials to show compliance with the energy code. Ultimately, this results in a more limited scope of work for local code officials with respect to the energy code. Rather than

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[44] https://www.maine.gov/future/sites/maine.gov.dps.fmo/files/inline-files/laws/documents/MUBEC_Ch_1.pdf
[45] https://www.pa.gov/agencies/dli/programs-services/labor-management-relations/bureau-of-occupational-and-industrial-safety/tpa-buildings.html
[46] https://www.mass.gov/doc/building-energy-code-adoption-by-municipality/download

spending hours documenting the efficiency specifications of a home, code officials can rely on the reporting of third-party Energy Professionals who are already required to have their own quality control process in place through the energy rating industry.

In Vermont, DFS already uses third party inspectors for certain systems such as boilers and elevators. This model could potentially be extended to energy code inspections.

These are compliance enforcement options that may make sense for Vermont as the state looks to increase residential code compliance rates over time.

### Legislation

At the core of the EP Pathway is an assumption that a requirement to include a third-party certified Energy Professional in all RNC projects is required by statute. At a minimum, Energy Professionals would be responsible for diagnostic testing (a mandatory requirement in RBES). For the purposes of this plan, an ***Energy Professional*** is defined as someone who works in the residential housing sector and has received formal training and certification on building science principles and diagnostic testing (e.g., air and duct leakage testing) from a national or regionally recognized organization. Some example organizations include the Residential Energy Services Network (RESNET), Building Performance Institute (BPI), and the Passive House Institute U.S. (PHIUS). This list could also be extended to licensed architects and engineers with relevant credentials. The ICC recently began offering a Residential Energy Inspector/Plans Examiner certification that might also be a fit in terms of allowable credentials. The details of a third-party role should be worked out through a future stakeholder process.

As part of an update to the legislative language surrounding RBES, we recommend that DFS be given the role of quality control and oversight of the Energy Professional requirement associated with RBES certification, including certification or licensure of the Energy Professionals themselves. Our vision is that this oversight would be minimal and consist of spot checking RBES certificates to ensure that 1) a certified Energy Professional was involved in the project and 2) the certificate displays compliance with the current version of RBES. It's possible that this type of verification could be automated in the DFS record management system (RMS). Under the EP Pathway, the builder or contractor would still be responsible for submitting RBES certificates; the RBES certificate itself may need to be revised to include details (e.g., Energy Professional name and credentials) that could be used by DFS staff for verification purposes.

## Funding Mechanism

One of the greatest strengths of the EP Pathway is the fact that the funding mechanism would be market driven. Under this scenario, statute would require that builders use a third-party Energy Professional to verify energy code compliance. The cost of that service would be up to the builder and the Energy Professional and would likely vary depending on several factors including the compliance pathway being pursued and the size and complexity of the project.

Beginning in January 2022, Efficiency Vermont began offering an incentive of 50% of the cost of a HERS rating, up to $750, for builders pursuing Efficiency Vermont certification that are a part of the Efficiency Excellence Network (EEN).[47] These incentives are still in place, and Efficiency Vermont plans to extend the rater incentive to EEN builders only pursuing RBES compliance using the HERS compliance pathway in 2025. A typical HERS rating for a multifamily housing unit or a simple single-family home costs around $1,500-$2,500, so these incentives will help make these services more accessible to builders and homeowners.[48] The price associated with more complex or geographically remote single-family homes may be more likely to fall in the $2,500-$5,000 range. It's important to note that these prices and incentives are for a full HERS rating; an Energy Professional may charge a lower amount for a more limited scope focused on compliance support using the RBES Prescriptive plus Points or REScheck software pathways.[49] That said, the Efficiency Vermont incentives referenced for full HERS ratings may not apply to the more limited scope associated with these alternative compliance support services.

If the EEUs can claim energy savings from energy code support services, it will help them to maintain and perhaps even increase the financial support available Energy Professional services. The inclusion of Energy Professionals in these projects would help the EEUs generate savings with a certain level of certainty, which is valuable when forecasting progress towards performance-based goals.

Under the EP Pathway, any incremental costs associated with Energy Professional services or the materials necessary to achieve compliance would presumably be passed onto the homeowner. Under such a scenario, it is likely that the energy savings (and associated bill savings) would cover the additional upfront costs.

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[47] https://www.efficiencyvermont.com/trade-partners/efficiency-excellence-network
[48] https://publicservice.vermont.gov/sites/dps/files/documents/HERS%20Raters%20research.pdf
[49] One local Energy Professional indicated during ECA Plan drafting they charge $400 for a blower door test and would charge an additional $200 for a plan review or to assist with REScheck.

## DFS ADMINISTRATIVE PATHWAY

The DFS Pathway encompasses all the components outlined above for the TA Pathway. The key difference between the two is the introduction of state-supported administration. The DFS Pathway incorporates state-supported energy code administration through compliance document reviews, plan reviews, and onsite inspections. The scope of administration may vary, but this pathway assumes state staff (likely additional DFS staff) would be responsible for most energy code compliance verification activities.

The DFS Pathway and EP Pathway are similar in that they would both require legislation introducing state-supported administration. However, there are some key differences that are highlighted below:

- Most energy code compliance verification activities would eventually be supported by state staff under the DFS Pathway. However, Energy Professionals could also play an ongoing role beyond a transition period to help roll out any statewide program by offering subcontracted services and/or training DFS staff. As with other states, Energy Professionals could be "deputized" by the DFS to help support with plan inspections, on-site testing, and energy code verification.
- Funding for the DFS Pathway would primarily come through an increase in fees associated with new construction projects. These could be the State's construction permit fees, an increase in the Property Transfer Tax, or another fee.

One strategy for the DFS Pathway might be to incorporate elements of the EP Pathway. For example, DFS might acknowledge the involvement of an Energy Professional as proof of code verification, minimizing the need for DFS oversight on such projects. This type of approach might help DFS prioritize the allocation of staff resources.

### Administration Options

There are various levels of energy code administration that could be considered by the state. Our vision is that the depth and breadth of energy code administration would evolve over time. This evolution could entail a change in the types of buildings that are covered over time, a change in the scope or level of detail associated with inspections and enforcement, or some combination of these two factors. Our expectation is that any initial statewide energy code enforcement would start with public buildings that are currently covered under the jurisdiction of DFS. Over time, we would expect that jurisdiction to expand to single-family owner-occupied

buildings. Figure 5 provides an example of how the roles of key stakeholders engaged in building energy code administration might evolve over time.

Below we present various levels of energy code administration that might be appropriate for residential properties in Vermont. To be clear, these are not our suggestions for what the scope should be. Rather, these are examples of how the scope may vary. The scope of any administration activities will ultimately be dictated by policy directives and the level of funding available. The funding strategies considered by the team are presented in the following section.

- Low Scope
    - Public buildings:
        - Incorporate energy code verification into the existing building permit process.
        - Review plans, submittals, and RBES certificates to ensure compliance with all projects.
        - Log RBES certificates in DFS permit database.
        - Delegate these activities to some municipal offices as part of the memoranda of agreement.
    - Single-family owner-occupied:
        - Allow for RBES certificates to be filed in the DFS permit database.
- Medium Scope
    - Public buildings:
        - Everything from 'Low Scope'.
        - Include on-site energy code inspections along with other construction inspections.
    - Single-family owner-occupied:
        - Continuation of 'Low Scope' activities.
- High Scope
    - Public buildings:
        - Continuation of 'Medium Scope' activities.

- Single-family owner-occupied
    - Review plans, submittals, and RBES certificates to ensure compliance with all projects.
    - Include on-site energy code inspections for a sample of priority buildings and/or developments.
    - Oversee Energy Professionals' administration of performance-based and stretch-code projects.
    - Create agreements with municipalities that wish to administer RBES.

Figure 5 presents a set of proposed responsibilities and authority for building and energy code administration over time under a DFS Pathway. This figure was developed by VBRA and AIA-VT as part of the Vermont Act 151 BECWG. As shown, the figure proposes an evolution of responsibility over time, culminating with comprehensive building and energy code administration for all building types by 2030. The last building type to be covered would be single-family owner-occupied homes as these are the only new construction projects not currently under the jurisdiction of DFS. The evolution of code administration outlined here is consistent with the low, moderate, and high scopes discussed above.

*Figure 5: Proposed Responsibilities and Authority for Building and Energy Code Administration under a DFS Pathway*

| | |
|---|---|
| PSD | Department of Public Service |
| OPR | Office of Professional Regulation |
| DFS | Division of Fire Safety |
| EEU | Energy Efficiency Utilities |
| EP | Energy Professionals |

| | Current | by 2026 | by 2028 | by 2030 |
|---|---|---|---|---|
| **General Authority** | | | | |
| Commercial building codes *(note 1)* | DFS | DFS | DFS | DFS |
| Commercial energy codes (CBES) | PSD | **DFS** | **DFS** | **DFS** |
| Residential building codes: rentals and duplexes | DFS | DFS | DFS | DFS |
| Residential building codes: owner-occupied SFH | none | none | **DFS** | **DFS** |
| Residential energy codes (RBES) | PSD | **DFS** | **DFS** | **DFS** |
| **Rule-Making / Promulgation** | | | | |
| Promulgation of CBES | PSD | PSD | **DFS**+PSD | **DFS**+PSD |
| Promulgation of RBES | PSD | PSD | **DFS**+PSD | **DFS**+PSD |
| Develop targets for future energy codes | PSD | PSD | PSD | PSD |
| **Verification & Technical Support** | | | | |
| Building code compliance *(note 1)* | DFS | DFS | DFS | DFS |
| Energy Code compliance: | | | | |
| Site visits for EVT projects / high performance | EEU | EEU | EEU | **DFS**+EEU |
| Site visits for commercial + multi-family | none | EP | **DFS** | **DFS** |
| Site visits for duplexes + rentals | none | EP | **DFS** | **DFS** |
| Site visits for OO-SFH | none | none | EP | **DFS** |
| Variances & code-conflict resolution *(note 2)* | none | **DFS** | **DFS** | **DFS** |
| Appeals process | none | **DFS** | **DFS** | **DFS** |
| Ability to stop work | none | **DFS** | **DFS** | **DFS** |
| Energy Code call center | PSD>EEU | PSD>EEU | **DFS>EEU** | **DFS>EEU** |
| **Documentation** | | | | |
| Confirm CBES/RBES certificate is on site | DFS | DFS | DFS | DFS |
| Issue Certificates of Occupancy (C.O.s) | DFS | DFS | DFS | DFS |
| Statewide database of permits & C.O.s | none | **DFS** | **DFS** | **DFS** |
| Filing of RBES+CBES certificates (inc. SFH) | VT towns | **DFS** | **DFS** | **DFS** |
| Online application for RBES+CBES - public bldgs | none | none | **DFS** | **DFS** |
| Online application for RBES+CBES - SFH | none | none | none | **DFS** |
| **Certification, Training & Education** | | | | |
| License building trades *(note 3)* | DFS | DFS | DFS | DFS |
| Residential Contractor Registry *(note 4)* | OPR | OPR | OPR | OPR |
| Residential Contractor Certifications (voluntary) | none | **DFS** | **DFS** | **DFS** |
| Establish RBES+CBES training standards | none | **DFS+EEU** | **DFS** | **DFS** |

| | |
|---|---|
| note 1 | Non-energy codes: Building (IBC), Fire Safety (NFPA), Accessibility (ADA), Plumbing (IPC), Electrical, Elevators, Existing Buildings. |
| note 2 | No variance process is currently outlined in RBES. Division for Historic Preservation currently has some authority over historic homes and should retain this authority. |
| note 3 | DFS currently licenses building trades: Electricians, Plumbers, Elevator Installers, Gas, Oil, Sprinkler, Fire Alarms, Chemical Suppression, Sprinklers, Chimney Sweeps, Generator Installers. Most require continuing education. Solar installers, energy consultants & HERS raters are not regulated. |
| note 4 | Currently OPR registers homebuilders for fraud purposes (no certification or licensure). Building inspectors and Architects are also registered by OPR. |

## Funding Mechanism

### *Public Buildings*

Funding for the DFS Pathway would most likely come from the State's construction permit fees paid for by the developer or builder. As part of the Act 151 BECWG, DFS presented a series of high-level preliminary estimates of what the costs would be to implement a comprehensive energy efficiency program for public buildings that are currently under DFS jurisdiction.[50] As part of their presentation, DFS provided the historical data on permits, inspections, and overall construction cost associated with public buildings from 2021 to 2023 (Table 7).

*Table 7. Historical Data for Public Buildings*

| Year | # of Permits | # of Inspections | Construction Cost |
|---|---|---|---|
| 2021 | 2,422 | 6,000 | $500,000,000 |
| 2022 | 2,637 | 5,673 | $550,000,000 |
| 2023 | 2,741 | 6,189 | $672,000,000 |

Based on the information in Table 7, we calculated the average construction cost per permit, the average permit fee, and the total revenue generated from permits for public buildings (Table 8). As shown, based on the data from the DFS presentation, the average permit fee was $1,652 in 2021 and rose to $1,961 in 2023. The average permit fee and total permit revenue calculations are based on a permit fee of $8 per $1,000 of construction value.[51, 52]

*Table 8. Average Construction Cost, Permit Fee, and Permit Revenue from Public Buildings*

| Year | Average Construction Cost/Permit | Average Permit Fee/Project | Total Permit Revenue |
|---|---|---|---|
| 2021 | $206,441 | $1,652 | $4,000,000 |

[50] Division of Fire Safey presentation to BECWG September 10, 2024 https://publicservice.vermont.gov/sites/dps/files/documents/DFS%20Presentation%20to%20BECWG_2024.09.10.pdf

[51] Construction and Occupancy Permit Information based on 20 VSA Ch. 173 https://dec.vermont.gov/sites/dec/files/permit-handbook/sheet49_1.pdf

[52] The metric of dollars per $1,000 of construction cost is used in many jurisdictions to calculate permit fees for new construction.

| | | | |
|---|---|---|---|
| 2022 | $208,570 | $1,669 | $4,400,000 |
| 2023 | $245,166 | $1,961 | $5,376,000 |

As part of their presentation, DFS provided the following cost estimates to provide comprehensive energy code administration for public buildings (Table 9).

*Table 9. Estimated Annual Costs for Energy Code Administration of Public Buildings*

| Position/Equipment | Quantity | Total Cost | Cost per Position/Equipment |
|---|---|---|---|
| Plan reviewers | 4 | $440,000 | $110,000 |
| EE inspectors | 4 | $440,000 | $110,000 |
| EE program manager | 1 | $130,000 | $130,000 |
| Admin service coordinator | 1 | $98,000 | $98,000 |
| Training coordinator | 1 | $120,000 | $120,000 |
| Cars | 4 | $120,000 | $30,000 |
| Mileage | na | $11,122 | na |
| Laptops | 5 | $15,000 | $3,000 |
| Indirect costs | na | $200,000 | na |
| **Total Annual Cost** | | **$1,574,122** | |

Using the average number of permits from 2021 to 2023, along with the average construction cost for those years, we estimated that the following incremental permit fees would be required to cover the $1.57 million cost associated with energy code administration for public buildings.

- $605 incremental cost per project, on average
- $2.74 per $1,000 of construction cost incremental increase in permit fees, on average
    - On top of the current $8 per $1,000 construction cost, this would result in total permit fees of $10.74 per $1,000 of construction cost
- These values represent a 34% increase in permit fees
- Permit revenue as a percentage of overall construction cost would rise from 0.8% to 1.1%

### *Single-Family Owner-Occupied*

The RECI team used a combination of publicly available data and DFS pricing for public buildings to estimate the incremental permit fees that would be needed to include single-family owner-occupied homes in a comprehensive energy code administration program that is overseen by the state. Single-family owner-occupied homes are not currently under the jurisdiction of DFS and as a result they were excluded from the DFS pricing estimates.

We used the International Code Council's (ICC) per square foot construction costs associated with residential one- and two-family dwellings to estimate the construction costs for Vermont's single-family owner-occupied homes.[53] We adjusted the ICC values based on Vermont's typical home price compared to the typical price of a home nationally.[54] This helps account for the fact that Vermont real estate is more expensive than the national average. Ultimately, a value of $229.25 per square foot was used to estimate construction costs.

We then applied a series of assumptions around home sizes (and subsequent construction cost), construction activity, and energy code administration scope to estimate the gross costs of energy code administration for single-family owner-occupied homes and the permit fees required to generate that revenue. Below we summarize these assumptions. Please note that the home size assumptions are used to estimate overall construction costs; specifically, we multiplied the modified ICC per square foot construction costs ($229.25 per square foot) by the square footage assumptions in Table 10 to calculate a range of potential construction costs.

[53] ICC Building Validation Data – February 2024 https://www.iccsafe.org/wp-content/uploads/BVD-BSJ-FEB2024.pdf

[54] The Zillow Home Value Index (ZHVI) was used for this analysis. From October to December of 2024 a typical home value in the United States was $356,782 and in Vermont it was $390,220. Source: https://www.fool.com/money/research/average-house-price-state/

*Table 10. Single-Family Owner-Occupied Funding Input Assumptions+*

| Scenario | Administration Scope | Home Size (Construction Cost) | Single-family Owner-occupied Permits++ |
|---|---|---|---|
| Low | * Monitor RBES certificates and maintain database<br>* 2 DFS Staff | 2,000 sq. ft. ($458,510) | 1,097 |
| Moderate | * Monitor RBES certificates and maintain database<br>* Sample-based plan review and/or onsite inspections<br>* 4 DFS Staff | 3,000 sq. ft. ($687,765) | 1,529 |
| High | * Monitor RBES certificates and maintain database<br>* Onsite inspections at all sites<br>* 7 DFS Staff | 4,000 sq. ft. ($917,020) | 1,961 |

+Each scope scenario was combined with different home size and market size estimates to present a wide range of potential outcomes.

++Single-family owner-occupied permits were estimated based on a combination of historical permit counts from the U.S. Census, pre- and post-pandemic housing needs reported by the Vermont Housing Needs Assessment, and an assumption that 90% of one-unit dwellings are owner occupied.

Ultimately, all this information was used to estimate a wide range of permit fees under different combinations of permit growth, construction cost, and energy code administration scope. The average results from this analysis (across all combinations of project scope, home size, and market size) are presented in the bullets below and additional details can be found in *Appendix A: Funding Model Details*.

- $534 per project, on average, in incremental permit fees
- $0.85 per $1,000 of construction cost in incremental permit fees

# RECOMMENDATIONS

The RECI project team recommends that the State prioritize steps that will ultimately lead to the adoption of the DFS Pathway; these include using strategies outlined in the EP Pathway as step towards comprehensive DFS administration. This position is predicated on the following:

- The TA Pathway is largely a continuation of activities that have historically taken place in Vermont. As the energy codes have become more stringent, compliance rates have fallen. Our presumption is that we will need to do more to achieve higher compliance rates for RBES.
- Vermont already has a network of existing Energy Professionals that could be leveraged to support energy codes. EEU rebates can be used to subsidize the fees associated with Energy Professional services to make them more palatable to builders and contractors. We have been informed that if there were more demand, existing Energy Professionals would staff up and others would enter the market.
- A DFS Pathway is the ideal structure for ensuring residential energy code compliance, but it will take time to negotiate the details associated with this approach and to train DFS staff. Using elements of the EP Pathway as an interim strategy will 1) provide the necessary ramp time for a DFS Pathway to be fully implemented, and 2) facilitate improvements in residential energy code compliance rates in the near term.

Based on these points, we offer the following recommendations for the State of Vermont to move forward with the DFS Pathway:

- Plan for a transition to the DFS Pathway by 2030.[55] In the interim leverage the skills of local Energy Professionals to support residential energy code compliance activities.
    - In the near term, encourage the use of Energy Professionals by residential builders and contractors. Emphasize the subsidies available for their services and the energy bill savings associated with code compliance construction.

[55] Vermont has established a goal for all new buildings to be constructed to net-zero standards by 2030.

  - Explore ways in which Energy Professionals can support a DFS Pathway in the long-term; examples include leveraging Energy Professionals to train DFS staff on RBES requirements and/or reducing the energy code compliance review process for projects that include an Energy Professional.

- Monitor the status of negotiations between the EEUs and the PSD with respect to the ability of the EEUs to claim energy savings for their support of energy code compliance activities. It seems likely that these parties will be able to agree on an implementation framework for these efforts absent legislation. However, should that not be the case, we recommend the State consider passing enabling legislative language that would allow for the EEUs to claim energy savings for their code compliance support work. This would help ensure the EEUs can offer continued support to market actors in the form of training and incentives.
- Set up a DFS database to include RBES certification and serve as a statewide repository of all RBES certificates.
  - Eliminate the requirement to file RBES certificates with Town Clerks and the Vermont Public Service Department (PSD) if there is a statewide, publicly accessible DFS database.
  - Establish a quality assurance process that includes review of RBES Certificates to ensure accuracy.
- Provide workforce development support systems and training opportunities to ensure there are enough Energy Professionals to serve the Vermont market.
- Encourage the EEUs to promote Energy Professional services through marketing matchmaking with builders.
- Develop a sustainable funding model that supports energy code administration from DFS; this may consist of new permit fees for residential builders and contractors, or alternatives such as an addition to the property transfer fee. See Appendix A for *Funding Model Details* based on a permit fee funding mechanism.

If there is significant resistance to the DFS Pathway, then we recommend the State to adopt the Energy Professionals pathway, where the involvement of an Energy Professional in each RNC project is mandated by statute. We believe this is the best approach to achieving increased compliance rates outside of a DFS-led energy code administration process.

# APPENDIX A: FUNDING MODEL DETAILS

Table 11 presents a summary of the single-family owner-occupied permit fee analysis. The details associated with the permit growth, construction cost, and scope scenarios can be found in Table 10.

*Table 11. Summary of Single-family Owner-occupied Permit Fee Analysis*

| Permit Growth Scenario | Construction Cost Scenario | Scope | # of Permits | Construction Cost per Home | Inspection Cost | Total Construction Cost | Incremental Permit Fee/$1,000 construction cost | Incremental Permit Fee per Project |
|---|---|---|---|---|---|---|---|---|
| BAU | Low | Low | 1,097 | $458,510 | $374,000 | $502,963,273 | $0.74 | $341 |
| BAU | Low | Moderate | 1,097 | $458,510 | $640,000 | $502,963,273 | $1.27 | $583 |
| BAU | Low | High | 1,097 | $458,510 | $1,303,122 | $502,963,273 | $2.59 | $1,188 |
| BAU | Moderate | Low | 1,097 | $687,765 | $374,000 | $754,444,909 | $0.50 | $341 |
| BAU | Moderate | Moderate | 1,097 | $687,765 | $640,000 | $754,444,909 | $0.85 | $583 |
| BAU | Moderate | High | 1,097 | $687,765 | $1,303,122 | $754,444,909 | $1.73 | $1,188 |
| BAU | High | Low | 1,097 | $917,020 | $374,000 | $1,005,926,545 | $0.37 | $341 |
| BAU | High | Moderate | 1,097 | $917,020 | $640,000 | $1,005,926,545 | $0.64 | $583 |
| BAU | High | High | 1,097 | $917,020 | $1,303,122 | $1,005,926,545 | $1.30 | $1,188 |
| Moderate | Low | Low | 1,529 | $458,510 | $374,000 | $700,941,815 | $0.53 | $245 |

| Permit Growth Scenario | Construction Cost Scenario | Scope | # of Permits | Construction Cost per Home | Inspection Cost | Total Construction Cost | Incremental Permit Fee/$1,000 construction cost | Incremental Permit Fee per Project |
|---|---|---|---|---|---|---|---|---|
| Moderate | Low | Moderate | 1,529 | $458,510 | $640,000 | $700,941,815 | $0.91 | $419 |
| Moderate | Low | High | 1,529 | $458,510 | $1,303,122 | $700,941,815 | $1.86 | $852 |
| Moderate | Moderate | Low | 1,529 | $687,765 | $374,000 | $1,051,412,722 | $0.36 | $245 |
| Moderate | Moderate | Moderate | 1,529 | $687,765 | $640,000 | $1,051,412,722 | $0.61 | $419 |
| Moderate | Moderate | High | 1,529 | $687,765 | $1,303,122 | $1,051,412,722 | $1.24 | $852 |
| Moderate | High | Low | 1,529 | $917,020 | $374,000 | $1,401,883,630 | $0.27 | $245 |
| Moderate | High | Moderate | 1,529 | $917,020 | $640,000 | $1,401,883,630 | $0.46 | $419 |
| Moderate | High | High | 1,529 | $917,020 | $1,303,122 | $1,401,883,630 | $0.93 | $852 |
| Aggressive | Low | Low | 1,961 | $458,510 | $374,000 | $898,920,357 | $0.42 | $191 |
| Aggressive | Low | Moderate | 1,961 | $458,510 | $640,000 | $898,920,357 | $0.71 | $326 |
| Aggressive | Low | High | 1,961 | $458,510 | $1,303,122 | $898,920,357 | $1.45 | $665 |
| Aggressive | Moderate | Low | 1,961 | $687,765 | $374,000 | $1,348,380,535 | $0.28 | $191 |
| Aggressive | Moderate | Moderate | 1,961 | $687,765 | $640,000 | $1,348,380,535 | $0.47 | $326 |

| Permit Growth Scenario | Construction Cost Scenario | Scope | # of Permits | Construction Cost per Home | Inspection Cost | Total Construction Cost | Incremental Permit Fee/$1,000 construction cost | Incremental Permit Fee per Project |
|---|---|---|---|---|---|---|---|---|
| Aggressive | Moderate | High | 1,961 | $687,765 | $1,303,122 | $1,348,380,535 | $0.97 | $665 |
| Aggressive | High | Low | 1,961 | $917,020 | $374,000 | $1,797,840,714 | $0.21 | $191 |
| Aggressive | High | Moderate | 1,961 | $917,020 | $640,000 | $1,797,840,714 | $0.36 | $326 |
| Aggressive | High | High | 1,961 | $917,020 | $1,303,122 | $1,797,840,714 | $0.72 | $665 |

# APPENDIX B: ENERGY PROFESSIONALS PLAN

Below we provide a copy of the final Energy Professionals plan that was put together as part of the RECI award activities.

ENERGY FUTURES GROUP

# PLAN FOR THE ROLE OF ENERGY PROFESSIONALS

## Final

March 31, 2025

Energy Futures Group

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# LIST OF ACRONYMS

| | |
|---|---|
| BECWG | Building Energy Code Working Group |
| BPI | Building Performance Institute |
| CPHC | Certified Passive House Consultant |
| CR | Circuit Rider |
| DFS | Division of Fire Safety (Vermont) |
| DOE | U.S. Department of Energy |
| ECA | Energy Code Administration |
| EEN | Efficiency Excellence Network |
| EEU | Energy Efficiency Utility |
| EFG | Energy Futures Group |
| EP | Energy Professional |
| EPA | U.S. Environmental Protection Agency |
| EVT | Efficiency Vermont |
| HERS | Home Energy Rating System |
| HVAC | Heating, Ventilation, and Air Conditioning |
| IECC | International Energy Conservation Code |
| OPR | Office of Professional Regulation (Vermont) |
| PHIUS | Passive House Institute U.S. |
| PSD | Public Service Department (Vermont) |
| RBES | Residential Building Energy Standards |
| RECI | Resilient and Efficient Codes Implementation |
| RESNET | Residential Energy Services Network |
| RNC | Residential New Construction |
| TA | Technical Assistance |
| ZERH | Zero Energy Ready Home |

## ABOUT THE AUTHORS

Energy Futures Group (EFG) is a clean energy consulting firm based in Hinesburg, Vermont. EFG specializes in the design, implementation and evaluation of programs and policies to promote investments in energy efficiency, renewable energy, other distributed resources, and strategic electrification. EFG staff have worked on these issues on behalf of energy regulators, other government agencies, utilities and advocacy organizations across the United States, Canada, Europe, and China.

**Zack Tyler** is the primary author of this plan. He has 15 years of experience in the energy industry with a focus on energy efficiency program evaluation, market research, and market transformation efforts. He specializes in building decarbonization and building energy codes, having held certifications as a HERS rater, Passive House Consultant, BPI MF Building analyst, and Infrared Thermographer. Zack has contributed to research in a wide range of jurisdictions across the United States and Canada and is adept at working with wide-ranging stakeholder groups. He holds a BA in Environmental Studies from the University of Colorado and an MA in Energy and Environmental Analysis from Boston University. Contact: ztyler@energyfuturesgroup.com; 802-305-0355

**Richard Faesy** is the principal investigator for the DOE RECI grant under which this work was funded. He is a principal and co-founder of Energy Futures Group in Hinesburg, Vermont. With more than 35 years of experience in the clean energy industry, working with hundreds of clients and programs throughout the U.S. and Canada, he is highly regarded as a national expert and reliable project manager. As a Certified Energy Rater, LEED Accredited Professional, and DOE Home Energy Score Assessor, he specializes in residential buildings, technologies, and markets, with expertise in residential new construction and retrofits, energy rating and labeling, building codes, financing, green building, the integration of renewables and energy efficiency, and effective energy efficiency policy, program design and implementation. He was a founding member of the Residential Energy Services Network (RESNET) and the Northeast Home Energy Rating Systems (NEHERS) Alliance. He currently works with clients in Connecticut, Rhode Island, and Vermont along with the U.S. DOE. Prior to founding EFG, Richard worked at the Vermont Energy Investment Corporation for 21 years. Contact: rfaesy@energyfuturesgroup.com; 802-355-9153

# INTRODUCTION AND BACKGROUND

This plan was developed by Energy Futures Group (EFG) through a Resilient and Efficient Codes Implementation (RECI) grant that is funded by the Department of Energy (DOE). The overall goal of the project is to develop an Energy Code Administration (ECA) plan for Vermont, including a proposed funding mechanism, that will lay the groundwork for future implementation of a code compliance support system, ultimately resulting in significant and sustained reductions in energy use.

The purpose of this plan is to outline the role that Energy Professionals (EPs) might play in Vermont's energy code compliance ecosystem. This plan addresses the potential roles, responsibilities, and business opportunities for Energy Professionals in Vermont with respect to the Residential Building Energy Standards (RBES), otherwise referred to as the residential energy code. This EP Plan will become one component of the higher-level and broader ECA Plan, which will consider the EP Plan as one of its key components to increasing Vermont's energy code compliance.

For the purposes of this plan, an ***Energy Professional*** is defined as someone who works in the residential housing sector and has received formal training and certification on building science principles and diagnostic testing (e.g., air and duct leakage testing) from a national or regionally recognized organization. Some example organizations include the Residential Energy Services Network (RESNET), Building Performance Institute (BPI), and the Passive House Institute U.S. (PHIUS).

The activities and outcomes discussed in this plan will help create incremental progress in Vermont's residential energy code system. However, we acknowledge a need for fundamental structural change (i.e., legislation) in Vermont's energy code systems before Energy Professionals can be incorporated into the process at a scale that will create meaningful and long-lasting impacts. The broader ECA plan is where we will discuss the system-wide changes that will be necessary to fully incorporate Energy Professionals into the residential energy code processes. That said, this plan discusses the steps that can be taken, absent state-level energy code support, to position Energy Professionals to take on a more significant role in the current energy code landscape and to be prepared to support a more robust code compliance support system in the future.

## RBES HISTORY

The RBES, also known as the residential energy code, was first passed by the Vermont Legislature in 1997 as the minimum standard of energy efficiency applied to residential new construction (RNC) in Vermont. In the early 2000s, the state began basing the RBES requirements on new iterations of the International Energy Conservation Code (IECC). Up until the most recent release, the 2024 RBES, the RBES was updated regularly to be consistent with the IECC model energy codes. In 2023, the Vermont Legislature adjusted the statutory language that called for energy code updates every three years from "shall" to "may." As a result, it is not guaranteed that the RBES will be updated on a consistent cycle with the IECC moving forward. However, in Vermont's 2022 Comprehensive Energy Plan, the state set a target to achieve net-zero-ready construction for all newly constructed buildings by 2030.[1] This goal should help clarify the state's direction regarding energy codes, even absent formal updates that are specifically aligned with the IECC.

Compliance with the RBES has been measured over time through Residential Market Baseline Assessments conducted by the Vermont Department of Public Service (PSD). The most recent study, which looked at homes built under the 2015 RBES, found that just over half (54%) of new single-family homes complied with the RBES.[2] This is a 12% decrease in compliance compared to the previous residential code compliance evaluation. It's important to note that current compliance is likely even lower considering the 2024 RBES is substantially more stringent than the 2015 iteration of the code.

There is no formal enforcement of the RBES in Vermont. While compliance is required by law, there is no statewide oversight of the energy code in the form of plan reviews or onsite inspections. Builders and contractors are required to fill out a certificate of compliance with the RBES and submit it to the Vermont Department of Public Service and the town clerk where the property is located. The Division of Fire Safety (DFS) has oversight over all RNC activity outside of owner-occupied single-family homes, however they do not oversee the residential energy code (i.e., RBES). Builders working on RNC projects may be required to provide an RBES certificate by some local municipalities to receive a Certificate of Occupancy, but there is no oversight from a statewide agency ensuring this occurs.

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[1] https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan_0.pdf
[2] https://publicservice.vermont.gov/sites/dps/files/documents/VT_2020_SF_RNC_Baseline_Final_Report_Jan242023.pdf

## WHY ENERGY PROFESSIONALS?

As the stringency of the RBES has increased over the years, the importance of understanding building science fundamentals has become amplified. Creating well insulated and air-sealed structures increases the energy efficiency of residential buildings, but it also requires builders and contractors to think about the building as a system. As buildings become tighter and more insulated, the risk of unintended consequences around issues such as mold and moisture damage become more prevalent. This is especially true in a State that does not have a residential building code with requirements built-in to protect the integrity of the building. The importance of these issues is highlighted by the inclusion of a new chapter in the 2024 RBES Handbook that is focused on moisture management for durable buildings. Third-party certified Energy Professionals trained in building science fundamentals, thinking about the building as a system, and diagnostic testing, are well positioned to support the builder community in adapting to these changes.

In addition to understanding building science fundamentals, Energy Professionals are trained and certified to conduct air leakage tests (i.e., blower door tests) which are required under the RBES. Energy Professionals can assist builders with these tests and the subsequent compliance documentation required to complete an RBES certificate. Beyond air leakage testing, Energy Professionals have many other diagnostic tools in their toolkit that can be used to improve home efficiency, building durability and ultimately lower energy costs. These include, but are not limited to, duct leakage testing, zonal pressure testing, ventilation air flow testing and infrared imaging. These diagnostic tools can be used to confirm the as-built conditions of a home match the intended design and/or the performance requirements of the energy code.

The involvement of a Home Energy Rating System (HERS) rater, a popular certification for Energy Professionals, is required to comply with the RBES using the Home Energy Rating Compliance Method. As one of three compliance pathways[3] in the RBES, this pathway provides the most flexibility to builders in terms of compliance options as it is focused on whole home performance. Because this pathway is focused on whole home performance, trade-offs are allowed, and builders can choose which areas to focus on when it comes to energy performance; this ultimately provides flexibility to

[3] Compliance pathways in the RBES include the Prescriptive, ResCheck, and Home Energy Rating compliance methods.

the builders as they consider the best way to incorporate energy efficiency into the project.

Beyond the Home Energy Rating Compliance Method, Energy Professionals are well positioned to support builders with the other compliance pathways and with the administrative requirements associated with the RBES. There is potential for an Energy Professional to serve as a core member of a builder's overall project team and to take the lead on all things related to energy code compliance, building science, and energy performance.

Finally, beyond RBES compliance, Energy Professionals can help builders certify homes through state and federal programs that will help to offset the costs of Energy Professional services through financial incentives and tax credits. These programs include Efficiency Vermont's (EVT) RNC program, the Environmental Protection Agency's (EPA) ENERGY STAR Homes program, and DOE's Zero Energy Ready Homes (ZERH) program. It is important to note that the Energy Professional credentials required by these programs may vary, and some local Energy Professionals would likely need additional training and education to support some of these incentive programs.

## BACKGROUND INTERVIEWS

Between September and October of 2024, EFG conducted interviews with six market actors regarding the role that Energy Professionals might play in residential energy code administration in Vermont. EFG conducted interviews with the following market actors:

- A local HERS rater and real estate home inspector
- A national codes organization
- An organization focused on the needs of rural Vermonters
- A municipal planner seeing lots of new construction activity
- A municipal Sustainability Director
- A local co-op focused on high-performance building using locally sourced materials

The results of these interviews were used to frame the challenges and opportunities associated with integrating Energy Professionals into the energy code administration landscape as part of this plan. Notes from these interviews can be found in *Appendix A: Energy Professional Interview Notes*

# CURRENT ROLE IN ENERGY CODE ADMINISTRATION

There is general agreement among RNC industry stakeholders that the current role of Energy Professionals in Vermont's energy code administration is limited. This is driven by limited demand from the state's builders and contractors.

This has led to the state currently having only eight active HERS raters, two of which are based outside of Vermont. The raters located in Vermont are generally located in the northwestern part of the state, near Chittenden County, which is the largest county in Vermont with the most RNC activity.

In addition to the eight active HERS raters, Vermont currently has 74 Energy Professionals with some form of certification from the Building Performance Institute (BPI) and 16 Certified Passive House Consultants (CPHCs). While these Energy Professionals have been trained in building science, many would likely need additional training to provide technical assistance on the energy code. It should be noted that there is almost certainly an overlap with these counts, as many Energy Professionals have multiple certifications. Table 1 presents a matrix of Energy Professionals by certification

**Drivers of Limited Demand for Energy Professionals**

- There is no statewide enforcement mechanism in place for RBES for owner-occupied single-family homes
- Some builders have acquired the tools they need (e.g., blower door) to meet code requirements on their own
- Energy Professional services are viewed as value-add, not a necessity
- The current economic climate makes it challenging to incorporate add-on services
    - Standard HERS rater fees typically range between $1,500 and $2,500 per home
    - Actual pricing varies based on the complexity of the home and the scope of services provided

type and the services they may be able to provide with respect to energy code administration.[4]

*Table 1. Potential RBES Services by EP Certification Type*

| | HERS | BPI | CPHC |
|---|---|---|---|
| *# of Professionals in VT (as of Jan 2025)* | *8* | *74* | *16* |
| Air leakage testing | x | * | |
| RBES certificate population and filing | x | x | x |
| Prescriptive plus points pathway certification | x | x | x |
| HERS pathway certification | x | | |
| REScheck pathway certification | x | x | x |

*Depending on the certification type.

As shown, HERS raters have the most comprehensive skillset when it comes to energy code support. HERS raters are trained in building science principles, diagnostic testing, and energy modeling. HERS raters are also typically focused on new construction, which is the focus of most energy code compliance support. BPI professionals' skillsets will vary depending on the certification. These professionals are typically more focused on weatherization services and retrofit activities, but they do have building science training and often have been trained in diagnostic testing as well. CPHCs, who are certified through the Passive House Institute U.S. (PHIUS), are focused on new construction, they are trained in energy modeling, and they have extensive in-depth knowledge of building science principles. That said, CPHCs do not receive any training in the field, and they are not trained by PHIUS in diagnostic testing.

The current demand for Energy Professional services is concentrated among high-end energy conscious builders and a few large production builders. Production builders are often required to build to the stretch code requirements of the RBES, which are more stringent than the base code. The stretch code is required for projects built under Act 250[5], which is triggered by large housing developments. One interview respondent indicated that production builders are treating Energy Professionals as members of the project team. They are often brought into the process early on and they are tasked with coordinating compliance with the RBES

[4] The exact number of Energy Professionals available to the market is smaller than those presented in Table 1 as some of these professionals work for EVT and others are engaged in weatherization services and may not have the bandwidth to take on additional work.

[5] https://act250.vermont.gov/act250-program

and providing builders with pathways towards compliance. This model is consistent with our vision, and something we hope to expand.

The size and scope of the Energy Professional market has evolved over time. Until December of 2021, EVT provided free HERS rating services for all projects seeking certification through EVT's RNC program. Not surprisingly, this was a popular service among builders. Up to that point, the HERS rater market in Vermont was primarily made up of EVT staff. At the. end of 2021, EVT stepped out of the rater market and began supporting an independent HERS rater market in Vermont. Beginning in January 2022, EVT began offering an incentive of 50% of the cost of a rating, up to $750, for builders pursuing EVT certification that are a part of the Efficiency Excellence Network (EEN).[6] These incentives are still in place, and EVT plans to extend the rater incentive to EEN builders only pursuing RBES compliance using the HERS compliance pathway in 2025. A typical HERS rating costs around $1,500-$2,500, so these incentives will help make these services more accessible to builders.[7]

# VISION FOR ENERGY PROFESSIONALS

A variety of activities inform the proposed vision for energy professionals. These include, but are not limited to, the following:

- Background interviews with market actors engaged with the energy code, the new construction market, and/or new construction market actors
- Participation in the Act 151 Building Energy Code Working Group (BECWG) that was convened by the 2024 Vermont Legislature
- Consultation with our DOE RECI grant partners and Advisory Committee members
- Conversations with the Vermont Division of Fire Safety (DFS), who is responsible for overseeing the construction of all public buildings

[6] https://www.efficiencyvermont.com/trade-partners/efficiency-excellence-network
[7] https://publicservice.vermont.gov/sites/dps/files/documents/HERS%20Raters%20research.pdf

These activities have led our team to produce the following vision for Energy Professionals with respect to energy code administration in Vermont:

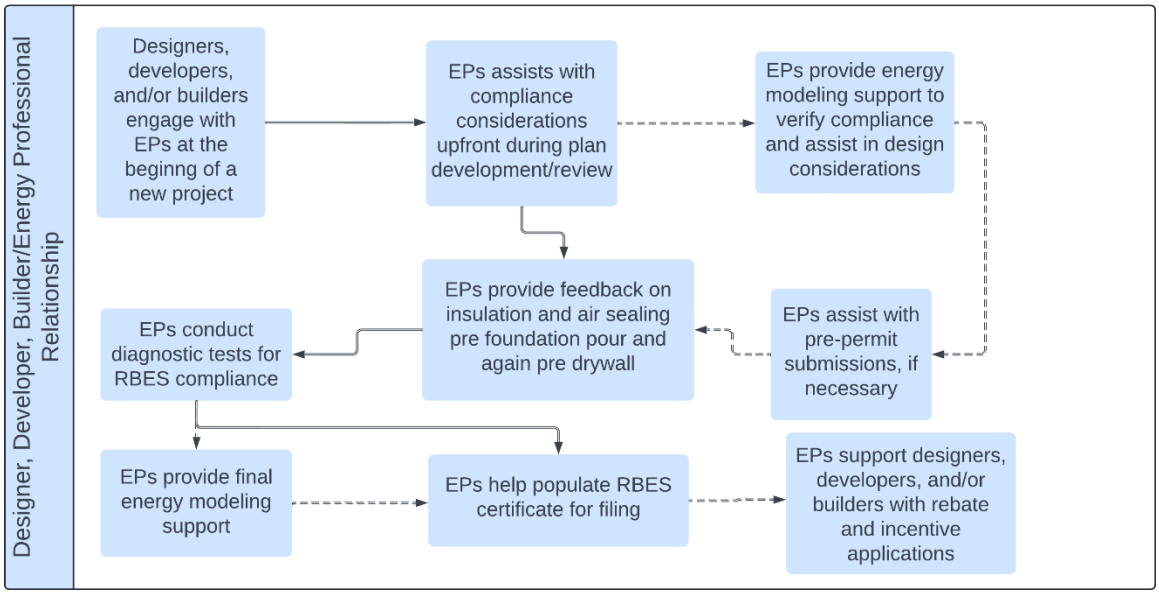
## Vision for Energy Professionals

- Energy Professionals are welcomed to the project by designers/developers/builders/contractors
- Energy Professionals are considered a member of the project team
  - Incorporated into the overall workflow of the project
  - Involved early on at the design stage, not as an afterthought at the end of the project
- Assist with key tasks related to energy performance and energy code compliance
  - Project design considerations
  - Modeling and analysis of construction and equipment options
  - Value engineering decisions
  - On-site diagnostics testing
  - On-site quality assurance for key components such as insulation installation, thermal boundary placement, air sealing details, building science considerations, etc.
  - RBES certificate population and filing
  - Provide technical assistance to builders and contractors, not enforcement
- Help market the value of HERS ratings, ResCheck completions, and professional compliance support to builders and homeowners alike
  - Optimized and customized energy code measures
  - Decreased operational costs
  - Non-energy benefits (indoor air quality, noise, etc.)
  - Improved resilience
- Legislation requiring Energy Professionals involvement in all RNC projects.

The vision detailed in the bullets on the previous page has general support among a wide range of stakeholders that EFG has engaged with over the course of the RECI project. The question then is not what role Energy Professionals should play but rather what needs to happen to facilitate their involvement in more projects so that the state can achieve increased residential code compliance rates.

Figure 1 presents a flow chart of the vision for an ideal designer/developer/builder interaction with an Energy Professional in the context of RBES compliance support.

*Figure 1: Designer/Developer/Builder and Energy Professional Flow Chart*




While Energy Professionals in other states that recognize third-party energy code certification are typically HERS Energy Raters and compliance is mostly HERS ratings, we have a broader vision for Vermont. HERS Energy Raters are certainly the best qualified to deliver energy code support services, but becoming an Energy Rater can be a time consuming and expensive journey. We envision recognizing HERS Raters but also broadening the definition of an "Energy Professional" to include certain BPI certifications, Certified Passive House Consultants (CHPC), and potentially licensed architects and engineers with certain additional performance testing credentials to ensure sufficient statewide coverage. Specific recognition of all these certifications and professions should be the focus of a future state-sponsored discussion.

Beyond recognizing these certifications for individuals, we also envision broadening the RBES compliance pathways (i.e., Prescriptive Package plus Points, ResCheck, and

HERS pathways) that each of these individuals could provide for building projects. For instance, a builder may opt for a lower cost "Prescriptive Package plus Points" approach from a HERS rater who could offer that service at a lower cost than a full HERS rating. Again, the specifics of who could offer which compliance path should be the focus of a future state-sponsored discussion.

# WHAT'S NEEDED TO EXECUTE THE VISION?

There are a variety of activities that can help facilitate the vision for Energy Professionals becoming a reality. The process is one that will take time and require participation and compromise from key RNC industry stakeholders. Below, we outline key steps that can be taken to integrate Energy Professionals into the energy code administration process. Many of these will be kickstarted by the activities planned to take place under EFG's DOE RECI grant. The plan for the role of Energy Professionals is broken down into four key categories detailed below: Marketing and Awareness, Workforce Development, Training and Education, and Funding.

## MARKETING AND AWARENESS

One of the challenges associated with RBES compliance is a general lack of awareness of the RBES requirements on behalf of designers, developers, builders, subcontractors, and homeowners alike. The state will likely need to engage in energy code enforcement and oversight to address this knowledge gap. However, absent that, Energy Professionals can play a key role in educating builders and subcontractors about the requirements associated with RBES and the benefits of building to such a standard. The energy code is complex, and Energy Professionals are well positioned to digest requirements, understand the benefits, and relay that information to other market actors.

In addition to supporting designers, developers, and builders from an awareness standpoint, Energy Professionals can assist these market actors in marketing the benefits of code-compliant homes to their prospective buyers. Building to the RBES specifications requires attention to detail and is associated with an upfront incremental cost. That said, the increased costs can often be recovered relatively quickly and are associated with several benefits (e.g., lower operational costs, increased comfort, improved indoor air quality, and durability) that will last for the life

of the buildings. Marketing these benefits is key to moving the market towards one that considers RBES compliance advantageous. If Energy Professionals can help designers, developers, and builders 1) understand the costs and benefits of RBES compliance and 2) market these benefits to homeowners, then the market overall is likely to make progress toward increasing demand for RBES compliance. Ultimately, generating demand for RBES compliant homes at the homeowner level will generate demand for Energy Professional services at the builder level.

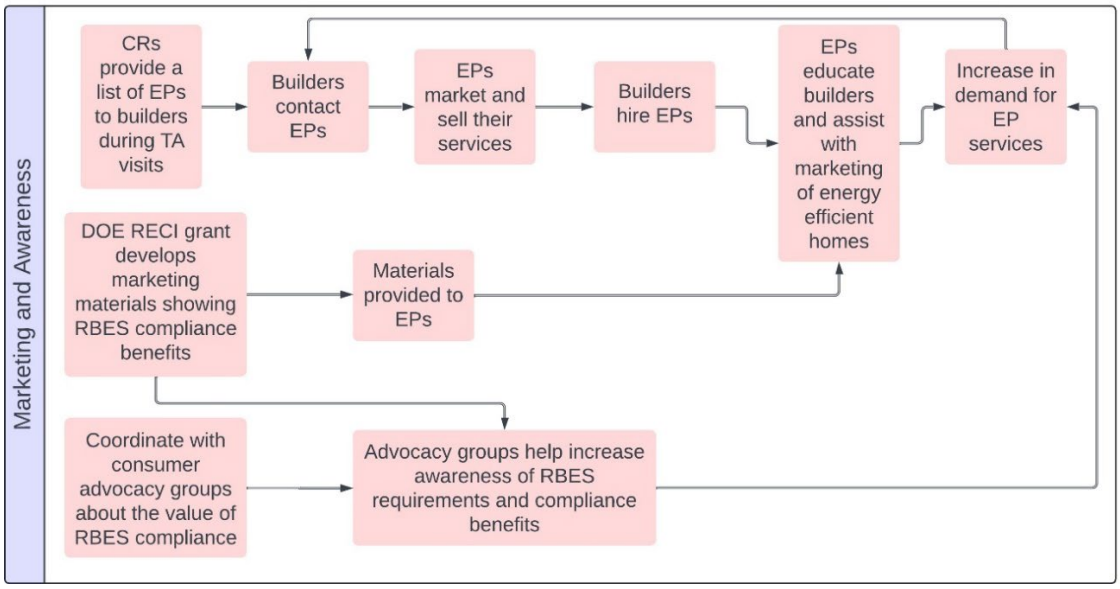
Figure 2 presents a proposed list of marketing and awareness activities and shows the anticipated outcomes and relationships we would expect to see. The initial marketing and awareness activities include, but are not limited to, the following:

- Circuit riders (CRs) provide a list of Energy Professionals to builders during Technical Assistance (TA) visits.[8]
- DOE RECI grant develops marketing materials showing RBES compliance benefits (e.g., lower energy bills, increased comfort, improved indoor air quality, and durability)
- Coordinate with consumer advocacy groups about the statutory requirements of RBES and the value of RBES compliance

[8] Circuit riders could also provide Energy Professionals with a list of builders. In this scenario the Energy Professionals could proactively reach out to builders to see if they are interested in additional support.

These activities will help increase the awareness of RBES requirements and benefits, ultimately helping to increase overall demand for Energy Professional services.

*Figure 2. Marketing and Awareness Activities*




## WORKFORCE DEVELOPMENT

As highlighted previously, the existing Energy Professional workforce in Vermont is relatively robust with roughly 100 professionals being certified as a HERS rater, BPI professional, or CPHC. That said, we know that there are only eight active HERS raters in the state, and HERS raters are the Energy Professionals with the most comprehensive skillset to provide energy code support services. The small HERS rater pool is being driven by a lack of demand for rating services across the state.

Based on the Vermont Housing Needs Assessment for 2025-2029[9] and historical building permit counts from the U.S. Census Bureau[10], we estimate that Vermont will need to add between 3,500 and 4,500 housing units per year between 2025 and 2029 to meet the state's housing needs. If HERS raters were involved in every RNC project, each current HERS rater would need to manage between 437 and 563 housing units per year. The size and scope of those projects would vary, but that volume of projects

[9] Vermont Housing Needs Assessment: 2025-2029
[10] https://www.census.gov/construction/bps/index.html

would likely exceed the annual working capacity for many raters. Of course, HERS raters are only one faction of the Energy Professionals market in the state. With BPI professionals and CPHCs, the state likely has enough energy professionals to support the energy code in an environment where demand increases significantly. As previously mentioned, BPI professionals and CPHCs are unable to provide the same suite of services as HERS raters, and they may need additional training to provide energy code support, but they have the foundational skills necessary to support this market.

One key point with respect to BPI professionals is that they may not be available to support the new construction market in a meaningful way due to the demand for their services in the retrofit market. In fact, Vermont is facing a shortage of weatherization contractors that will be needed to meet the goals set out in the state's Climate Action Plan.[11] As a result, in the face of increasing demand for energy code support, the state may need to build out the number of Energy Professionals with a focus on new construction.

One of the challenges in assessing the workforce development needs of Energy Professionals in Vermont is determining how those needs vary across the state. Interview respondents indicated that demand for Energy Professional services is even more limited in rural parts of the state. Rural communities have much lower volumes of construction activity than urban parts of the state. In addition, rural communities are much less likely to have developments that trigger Act 250 and therefore stretch code requirements.

Figure 3 presents a proposed list of workforce development activities and shows the anticipated outcomes and relationships. The state currently has enough Energy Professionals to provide energy code support services when they are requested, so the activities outlined below are not necessary at this moment in time. However, in an environment where demand increases drastically, the workforce would likely need to be built out. These issues will be addressed in more detail in the overarching ECA plan.

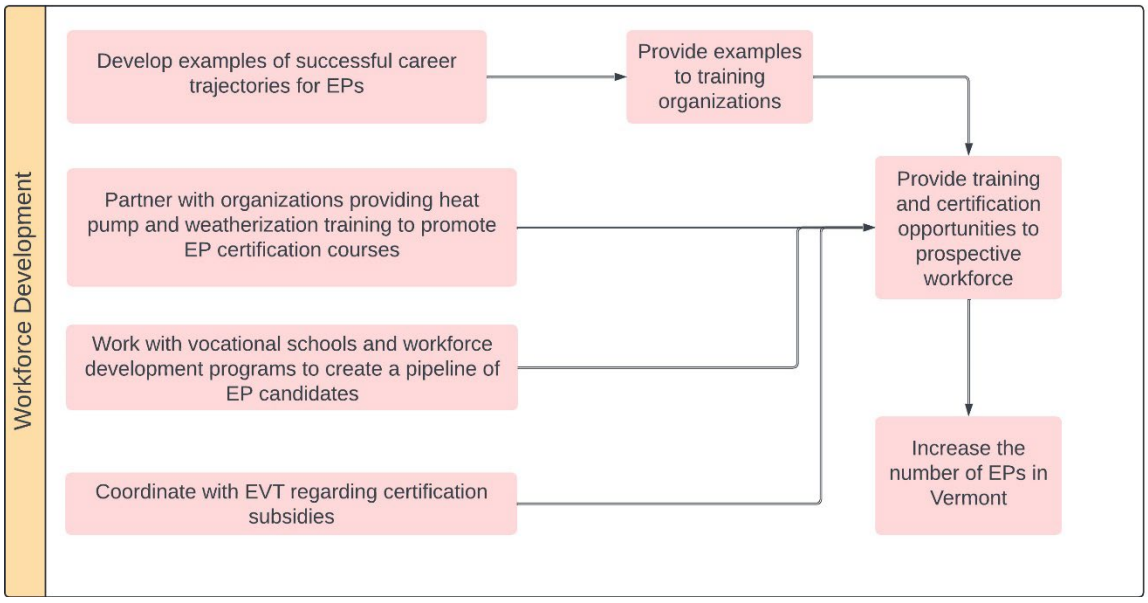
The following activities are shown in Figure 3:

- Develop examples of successful career trajectories for Energy Professionals

[11] https://www.sevendaysvt.com/news/workforce-shortage-imperils-burlington-weatherization-goals-42257738#:~:text=Energy%20Action%20Network%2C%20a%20nonprofit,weatherizing%20120%2C000%20homes%20by%202030.

- Partner with organizations providing heat pump and weatherization training to promote Energy Professional certification courses
- Work with vocational schools and workforce development programs to create a pipeline of Energy Professional candidates
- Coordinate with EVT regarding certification subsidies

*Figure 3. Workforce Development Activities*




## TRAINING AND EDUCATION

Training and education are essential for many market actors in the RNC energy code landscape. Energy Professionals, designers, developers, builders, insulation contractors, and Heating, Ventilation, and Air Conditioning (HVAC) contractors, among others, should all receive training and education on the RBES. For Energy Professionals specifically, there are two aspects to training and education – receiving and providing.

### Receiving Training

Energy Professionals should receive robust third-party training and certification to distinguish themselves as experts in the fields of building science and energy code compliance. Most Energy Professional certifications require ongoing professional

development to ensure their knowledge base remains up-to-date and relevant to the issues of today. Pursuing certification and maintaining it through professional development is part of the cost of doing business as an Energy Professional; the last section of this plan discusses potential funding to support Energy Professional workforce development.

As previously mentioned, many current Energy Professionals may need additional training on new construction practices and RBES requirements to provide energy code support to designers, developers, and builders. It will be important to advocate the need for Energy Professionals to increase their knowledge as it pertains to the new construction market and the RBES  The current Circuit Rider work supported by the DOE RECI grant can provide training, including site visits, to help jump start this activity with current Energy Professionals.

### Providing Training

Select Energy Professionals (i.e., those with the relevant training and credentials) should consider providing training and education on building science principles and code requirements to designers, developers, builders and their subcontractors. These Energy Professionals are considered experts in this field, and their engagement in the provision of training and education offers numerous potential benefits:

- Designers, developers, builders and their subcontractors will learn which aspects of the energy code compliance process could benefit from Energy Professional assistance.
- Designers, developers, and builders will learn how to integrate Energy Professionals into their overall workflow. This will improve the process for all parties involved.
- Designers, developers, and builders will learn about the flexibility that is created when an Energy Professional is brought onto the project. Design decisions have more flexibility when using a performance pathway, such as the HERS compliance path.
- By providing training to these other market actors, Energy Professionals position themselves as code compliance experts and highlight the value of their services.

In addition to participating in the formal classroom training and education process for builders and contractors, Energy Professionals should work with their clients on each job to increase knowledge around energy code requirements, proper techniques to ensure compliance, and the benefits of such building practices.

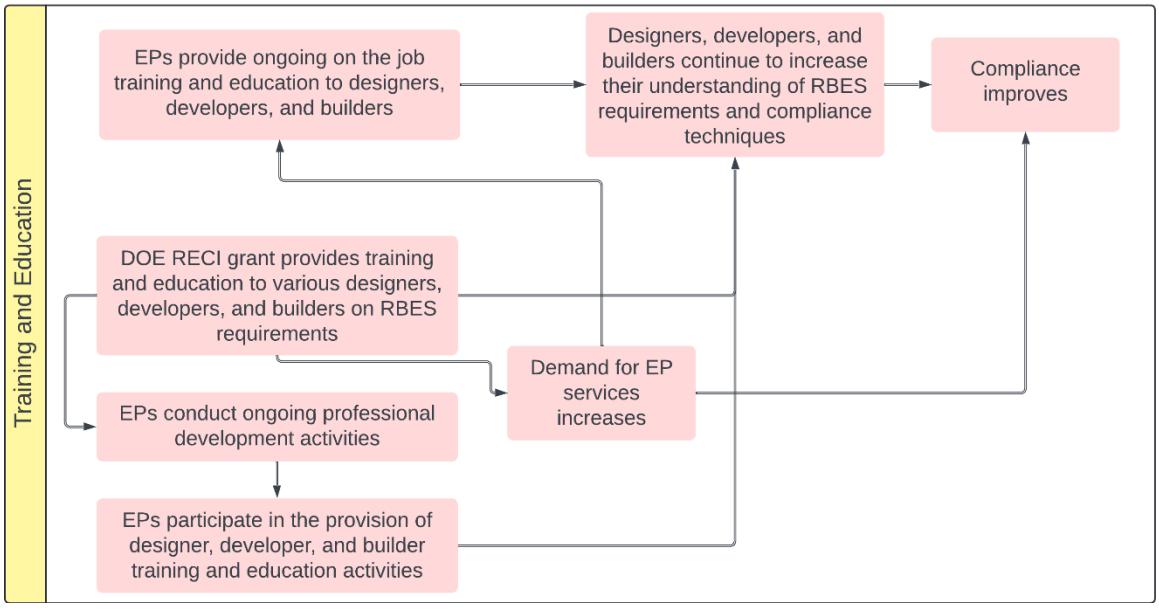
provides an overview of proposed training and education activities that should help ensure confidence in the Energy Professional industry and increase demand for Energy Professional services by educating market actors about the value of efficient building practices and code compliance.

The following activities are covered in Figure 4.

- Energy Professionals provide ongoing on-the-job training and education to designers, developers, and builders
- DOE RECI grant provides training and education to Energy Professionals, designers, developers, and builders on RBES requirements
- Energy Professionals conduct ongoing professional development activities

Energy Professionals participate in the provision of designer, developer, and builder training and education activities

*Figure 4. Training and Education Activities*




## FUNDING

In an environment where Energy Professionals provide technical assistance to designers, developers, and builders, those groups will most likely pay their services directly. In this scenario, and absent any utility or other incentives to cover costs, the

designer/developer/builder may adjust the price of the home to reflect the increased cost associated with Energy Professional services. There are several things to keep in mind when considering the increased costs associated with adding an Energy Professional to a job:

- Their services will provide operational cost savings to homeowners
- Their services will increase the non-energy benefits (e.g., indoor air quality, noise, comfort) associated with the home
- Building to code will reduce the builder's liability; building to code is required by law and any builder failing to meet RBES requirements may be subject to a lawsuit on behalf of the homeowner

Beginning in 2025, EVT will be offering a $750 rebate for EEN RNC member builders who hire a HERS rater for EVT home certification ***OR*** for the HERS code compliance pathway.[12] The introduction of a rebate for HERS rater services, specifically for the purpose of code compliance, is new and is a welcome step on the path to more fully integrating Energy Professionals into the energy code landscape in Vermont.

It is possible that the Energy Efficiency Utilities (EEUs) may be able to help subsidize the cost of Energy Professionals in the future. If the EEUs can claim savings from energy code compliance support activities, it may be possible to subsidize the costs of Energy Professionals as their involvement in these projects will almost assuredly generate energy savings beyond code or at least ensure code compliance. Beyond EEU support, it is possible that state offices or other entities identify grant funding that could, at least in part, be used to help subsidize Energy Professional services.

Vermont is not yet ready to adopt formal enforcement of the energy code. However, that remains a possibility for the future. It is possible within an enforcement environment that Energy Professionals could support the state or local municipalities with energy code enforcement. A 'user fee' model focused on permit fee revenue generation is a practical way to fund Energy Professional services in this scenario. Alternatively, legislation could require Energy Professionals to be involved in all RNC projects. In this scenario the funding could be market driven and supported through a variety of mechanisms such as EEU incentives, contractor fees, and federal tax credits.

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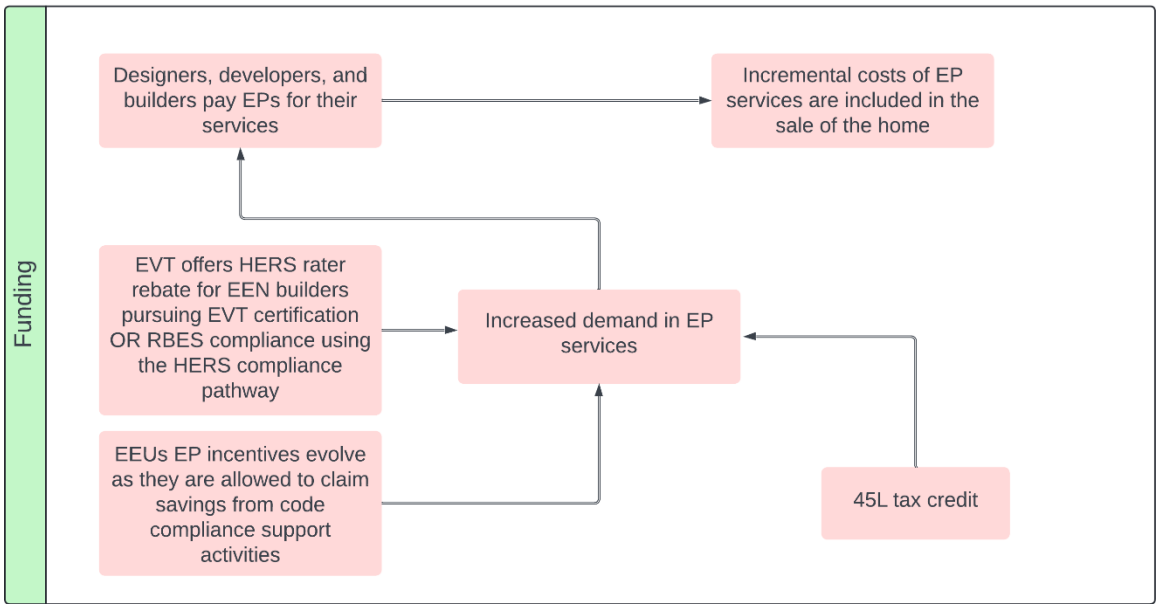
[12] The Efficiency Excellence Network is sponsored by Efficiency Vermont and offers free technical training, project support, lead generation, special financing, and web listings and marketing support. Details can be found here: https://www.efficiencyvermont.com/trade-partners/efficiency-excellence-network

Figure 5 presents an overview of potential funding activities and the associated outcomes and relationships. The proposed activities detailed in the figure are as follows:

- Builders pay Energy Professionals for their services
- EVT offers HERS rater rebate for EEN builders pursuing EVT certification OR RBES compliance using the HERS compliance pathway
- Energy Efficiency Utilities (EEUs) Energy Professional incentives evolve as they are allowed to claim savings from code compliance support activities
- The 45L tax credit can help offset the incremental costs associated with Energy Professional services for builders pursuing ENERGY STAR or Zero Energy Ready Homes

*Figure 5. Funding Activities*




# NEXT STEPS

EFG's DOE RECI grant, which covers 2024 through 2026, is being used to set this plan into motion. Grant activities include the following:

- Development of an overall Energy Code Administration (ECA) plan, including a sustainable funding model, to help guide the state to higher energy code compliance rates
- 30 unique trainings with at least 300 unique attendees. Audiences include designers, developers, builders, real estate professionals, and Energy Professionals.
- 18 presentations and 180 building site visits from Circuit Riders providing technical assistance on the energy code to building professionals
- 10 presentations to municipal audiences focused on the RBES requirements and municipal obligations
- Assist the Vermont Office of Professional Regulation (OPR) as they stand up a voluntary RBES certification for registered contractors
- Coordinate with the EEUs around code support activities
- Coordinate with the Vermont Division of Fire Safety to help increase awareness of Energy Professional services and benefits

Collectively, these activities should help to increase demand for Energy Professional services and, as a result, improve RBES compliance rates. As demand increases, we anticipate workforce development activities to increase in response. The ECA plan will include additional details on potential funding strategies and scenarios. In addition, the ECA plan will lay out additional details regarding market-wide activities and relationships that will improve RBES energy code compliance moving forward.

# APPENDIX A: ENERGY PROFESSIONAL INTERVIEW NOTES

Between September and October of 2024, Energy Futures Group (EFG) conducted interviews with six market actors regarding the role that energy professionals might play in residential energy code administration in Vermont. EFG conducted interviews with the following groups:

- *A local energy auditor and real estate home inspector*
- *A national codes organization*
- *An organization focused on the needs of rural Vermonters*
- *A municipal planner seeing lots of new construction activity*
- *A municipal Sustainability Director*
- *A local co-op focused on high-performance building using locally sourced materials*

These interviews were conducted to inform the draft plan for the role of energy professionals and to fulfill milestone 5.1 from the Statement of Project Objectives (SOPO). Below, we summarize our findings, organized by the following subject areas:

- *Overall findings*
- *Current role of energy professionals in Vermont's residential energy code administration*
- *Potential for energy professionals to support an Authority Having Jurisdiction (AHJ) over residential energy codes*
- *Role of energy professionals in energy code marketing and awareness efforts*
- *Workforce development needs and opportunities for energy professionals*
- *Training and education needs for energy professionals*
- *Funding strategies for energy professionals*

The results of these interviews will be used to inform the overall draft plan for the role of energy professionals (milestone 5.3 in the SOPO).

## OVERALL FINDINGS

- *The current role of energy professionals is limited*

    - *Low demand amongst smaller builders and rural communities*
    - *Niche is currently with production builders and high-end 'green' builders*
- *Energy professional roles could vary moving forward*
    - *Technical assistance to builders and contractors*
        - *Seems to be the preferred role for energy professionals*
        - *Questions about what drives demand and where funding comes from*
    - *Enforcement assistance*
        - *For a statewide AHJ*
        - *For regional and/or municipal-level enforcement*
- *Marketing and awareness needs are high*
    - *Builders/contractors need to be aware of 2024 RBES requirements and the benefits of compliance*
    - *Creating demand at the homeowner level will help generate awareness elsewhere*
    - *Campaign ideas*
        - *Focus on health and safety, resilience, and disaster preparedness benefits of code compliance*
        - *Work with consumer advocacy groups to understand compliance benefits and generate greater demand for energy code compliance*
        - *Align with production builders and ESG needs*
- *Workforce development*
    - *Limited number of energy professionals in VT*
    - *Chicken and egg situation with limited demand*
    - *Need to develop the workforce, but also need to develop a career path for energy professionals*
- *Training and education*
    - *Needed for energy professionals, builders/contractors, and municipalities*
        - *Ensure energy professionals understand the details of RBES requirements*
        - *Teach builders/contractors how to integrate energy professionals into their processes*
        - *Help municipalities understand their statutory obligations*
- *Funding*
    - *Long-term funding is likely to be driven by permit fees*
    - *Grants can be used as a form of supplemental funding*

## CURRENT ROLE IN ENERGY CODE ADMINISTRATION

- *The current role of energy professionals is limited*

    - *Insufficient demand for full-time energy consultants in VT; very few full-time energy professionals currently*
    - *There is no enforcement mechanism in place for residential energy codes*
    - *Some builders have acquired the tools they need (e.g., blower door) to meet code requirements without including an energy professional in the process*
    - *Services are seen as a value-add, not a necessity*
    - *Limited demand and the demand that exists is for optimization, not minimum compliance*
- *Where energy professionals are being used*
    - *With production builders focused on meeting RBES requirements*
        - *Energy professionals act as another subcontractor on the project team*
        - *More flexibility for the project team in complying with code*
    - *With high-end 'green' builders*
    - *Predominantly in Chittenden county*
    - *With projects being built under Act 250 (and therefore stretch code)*

## POTENTIAL TO SUPPORT AN AHJ

- *As technical assistance*
    - *Preferred approach by the industry*
    - *Code interpretation*
    - *Onsite assistance*
    - *Energy modeling support*
- *As enforcement assistance*
    - *Plan review*
    - *Pre-drywall and final inspections*
    - *Could make sense in a regional or municipal level enforcement scenario*
        - *Flexibility to hire ad hoc for small populations of projects*
    - *Stamp or seal for energy professionals involved in performance-based projects*
        - *Stamp or seal could be proof of compliance*
    - *In rural areas of the state, that would be challenging for state-level AHJ staff to access*
        - *Would help avoid issues with timing and delays in rural communities*

## MARKETING AND AWARENESS

- *There is a need for energy professional support with respect to increasing awareness of RBES requirements amongst the builder community*
    - *RBES is complex*
    - *Need for hands-on training for things like air barriers, ductwork and moisture management, health and safety in tight buildings*
    - *Lack of familiarity with requirements, particularly for smaller builders*
        - *Combination of lack of awareness and lack of motivation to figure it out*
    - *Lack of awareness amongst rural builder community and municipal staff*
- *Potential to use pilot projects to demonstrate energy/cost savings of code-compliant homes*
- *Creating demand at the homebuyer level will help increase awareness amongst other market actors*
- *Engage with consumer advocacy groups to represent the need for code enforcement as a consumer protection mechanism*
- *Frame energy code compliance around durability, health, safety, and resilience rather than just energy savings to broaden appeal and align with post-disaster recovery efforts*
- *Align with production builders' interests in ESG reporting to help drive change in the industry*
- *Explore opportunities to associate energy code compliance with resilience and disaster preparedness, which has broad political and social support*

## WORKFORCE DEVELOPMENT

- *There is a need for workforce development with respect to energy professionals in VT*
    - *Very few energy professionals*
        - *Partner with VT Adult Learning who provide heat pump and weatherization training*
        - *Opportunity for current rater businesses to grow their services and bring on new staff*
    - *Need multiple things/services to offer to make it as an energy professional in VT in the current environment*
    - Insufficient number of trained energy professionals to meet potential demand if compliance were more strictly enforced
    - Work with vocational schools and workforce development programs to create a pipeline of energy professionals, ensuring job prospects are clear before investing in training

    - The importance of having clear job prospects and market demand before investing in training programs to ensure sustainable career paths

- *Much less of a need in rural parts of the state in the current landscape*
    - *The scale of building in Chittenden County is not applicable in rural communities, and therefore there is limited workforce development needs currently*
    - *Struggle for energy auditors to generate a sustainable business model from new construction right now*
- *Lack of a general contractor licensure program in Vermont, which could otherwise provide a framework for integrating energy code*

## TRAINING AND EDUCATION

- *Suggestion that having a base energy code to focus on could make it easier to bring builders and contractors up to speed*
- *Develop comprehensive training materials on integrating energy professionals into construction workflows, addressing specific friction points and communication challenges*
- *Needed for municipalities*
- *Needed for energy professionals to provide credibility*
    - *Need a clear career pathway and training program in energy auditing*
    - *There are no central employers of energy auditors in VT to support jobs for those receiving/achieving training*
    - *Difficult to overcome entrenched practices and company setups in this industry*
- *Highlight the liability that exists for contractors*

## FUNDING STRATEGIES

- *'User fee' model of permit fees is the most commonly used*
    - *Consider a tiered fee structure based on home value – low-income pay a much smaller share than moderate to high income customers*
    - *Existing state-level permit fees that can be added to*
- *Utilities claiming savings for code support*
- *BRIC grants*
    - *BRIC plus-up program*
    - *Grant funding can be used for enforcement purposes*
- *Potential to incorporate a 'clean heat standard' type of equivalent model for the construction industry?*