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Codes Market Progress Evaluation Report #4

Prepared by:

Cadmus
720 SW Washington St. #400
Portland, OR 97205
503-467-7100

Northwest Energy Efficiency Alliance
PHONE
503-688-5400
FAX
503-688-5447
EMAIL
info@neea.org

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Executive Summary

This is the fourth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance (NEEA) Codes Program. Since 1997, NEEA has conducted activities to support building energy codes and has funded several studies of these activities. In 2010 and 2011, Cadmus researched the program's code support activities, logic model, and the building codes market. NEEA's current code efforts focus on three distinct, but interrelated, code support stages—development and adoption, implementation, and compliance—and this study assesses the Codes Program activities since 2011 in each of these stages.

Objectives

The objective for this study is to "evaluate the effectiveness of NEEA's efforts to develop and affect the implementation of the most recent code in Montana, Idaho, Oregon and Washington, both in the residential and commercial sectors." In addition, this study reviewed NEEA code efforts related to development and adoption of the national model code. To meet these objectives, Cadmus' used interviews and document research focused on the following four areas:

- Review the Codes Program logic model
- Review the Alliance Cost Effectiveness (ACE)[1] model's current methods of counting multifamily homes
- Assess progress of the Codes Program toward achieving its intended outcomes
- Assess the effectiveness of the Codes Program processes for the three initiative stages

Overall Conclusions

NEEA's Codes Program has made a significant contribution to the Northwest region through its support of energy code development and adoption, and implementation, as well as the Program's efforts on the national model code.

Cadmus finds that the environment in which the Codes Program operates differs between the more populous states of Washington and Oregon and the less populous states of Idaho and Montana. Idaho and Montana have large, rural geographic areas that create unique challenges to adopting and implementing the energy code, including access to the equipment and professionals capable of conducting performance tests.

In Washington, the evaluation team concludes that the program has made excellent progress: a strong infrastructure is in place, code processes are working well, and the Program is heavily involved in many activities that are advancing the Washington State Energy Code, one of the most stringent energy codes in the nation. Cadmus' analysis shows that Washington is achieving or making progress in eight of the eleven outcomes identified in the program logic model.

[1] Alliance Cost-Effectiveness (ACE) Model: Methodology NEEA uses to calculate energy savings forecasts and cost-effectiveness metrics for NEEA initiatives.

In Idaho, the Codes Program has made good progress with no major issues. The Program has been especially successful in creating and supporting an energy code infrastructure, including both the Code Collaborative and the successful circuit rider position. Cadmus' analysis shows that Idaho is achieving or making progress in nine of the eleven program outcomes.

The evaluator concludes that the Codes Program is making progress in Montana despite the unique adoption and enforcement process throughout the state. Cadmus found that the organizations and associations supported by NEEA are creatively and proactively targeting segments of the design and construction communities that could benefit most from energy code training and education, including home builders and home buyers.

In Oregon, Cadmus notes that the program made good progress in early years of the evaluation period and found evidence that the program made a significant contribution to the 2014 residential and commercial energy codes. More recently, however, progress has stalled due to confusion regarding the role of various parties and the perceived absence of support from the state's Building Codes Division. Cadmus concludes that the evolving political landscape, the six year code cycle, and uncertainty of the future direction energy codes will take, have created new barriers and opportunities and recommends that the program direct its efforts to address them.

Recommendations

Cadmus makes the following recommendations to enhance Program progress and structure:

National Model Code

Because of NEEA's past success in supporting the International Energy Conservation Code (IECC) (national model codes), the primary recommendation from this study is to continue code support activities directed at a national level, particularly code development support through the Northwest Energy Codes Group.

Target Code Efforts More Precisely

Customize Code Program offerings and approaches by state and by jurisdiction size.

- Evaluate specific needs of smaller jurisdictions. In Montana, use of NEEA-provided performance testing equipment is limited in rural jurisdictions. In Washington, lack of resources and access to equipment and professionals are identified as obstacles to code enforcement in smaller cities.

Use legislative processes and the governor's office as influence channels when the public codes process is not well-functioning.

- In Oregon, the public code update process appears to limit participation by interested parties.
- In Idaho, builders are taking cost concerns to state legislators.

Improve effectiveness of public processes.

- In Oregon, work with the Building Codes Department to clarify and document eligible participants in code development and adoption processes to address general confusion regarding stakeholder roles.

Provide Support and Resources

Provide support (such as interns, budget) to bolster staff in states to conduct technical and economic analyses/research

- In Washington, the State Building Codes Council resource needs.
- Fund a Montana Circuit Rider, modeled on Idaho's, as a resource for home builders.

Strengthen Relationships

Continue to support and expand collaboration forums. Build relationships with market actors that sometimes oppose code development. Use the collaboration forums (or create other opportunities) for dialogue on issues with code development proposals.

Develop an explicit win/win negotiating strategy with market actors. Segment and rank code proposals based on expected opposition and present them in order to gain agreement to the greatest degree possible.

Identify strategic rollback needs. For example, revisit requirements to tighten air leakage levels and to conduct blower door tests in certain states. Or use state-specific research on payback for smaller, entry-level homes to address builders concerns about this specific home type.

Improve Communication

Collaborate with Oregon Building Codes Department to create a communication mechanism for state building code officials to report code issues, request tracking, and receive code updates.

Educate builders and home buyers about code requirements by distributing outreach material to building supply locations and providing labeling that indicates code compliant products.

- Provide this information to hard-to-reach builders in Montana and areas in Washington especially where department stores are known to sell noncompliant material.

Create specific analyses/tools to share with market actors that determine and demonstrate payback resulting from implementing the code.

- This is especially relevant in Montana, Idaho, and Washington.

Improve Training Effectiveness

Adopt a "Continuous Improvement" approach to training efforts. Establish more regular and rigorous assessments of the quality and impact of training efforts in order to optimize their effectiveness. This applies to NEEA-sponsored training in all states.

Tailor timing of training to align with code status and code officials' needs. Supply training at building officials' offices. This applies especially to small and remote jurisdictions in all states.

Develop targeted training on compliance.

Logic Model

Cadmus identified recommendations for each program stage and revised the logic model accordingly. Both the original and revised models are included in Appendix F.

- Significant differences exist between development and adoption and the evaluation team recommends separating these activities and associated barriers.
- Because NEEA actively participates in national model code proceedings and the four NEEA states have either adopted or are moving toward adopting a version of the national model codes, Cadmus recommends including NEEA's national model code efforts in the logic model.
- The evaluator found that NEEA has increased integration of its initiatives with the Codes Program. This is an important step and, as such, Cadmus recommends the revised logic model include linkages and connections between NEEA initiatives and the Codes Program
- The current logic model does not reflect a resources barrier to implementation, even though NEEA conducts activities to address this barrier. Cadmus recommends adding the lack of resources for code training and code enforcement to the logic model.
- NEEA performs implementation activities (such as code officials training) to support code enforcement; the evaluation team recommends including NEEA's efforts to support code enforcement in the logic model.
- Because compliance studies can provide useful information to guide other Code Program activities, Cadmus recommends including linkages from compliance studies in the logic model, especially for development of training, tools, and a regional energy index.
- The American Recovery and Reinvestment Act (ARRA) requirement to meet 90% energy code compliance to qualify for federal funding is no longer operational; the evaluator recommends removing language that refers to 90% compliance requirements.

1 Introduction

This is the fourth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance (NEEA) Codes Program. Since 1997, NEEA has conducted activities to support building energy codes and has funded several studies of these activities. In 2010 and 2011, Cadmus researched the program's code support activities, logic model, and the building codes market. NEEA's current code efforts focus on three distinct, but interrelated, code support stages—development and adoption, implementation, and compliance—and this study assesses the Codes Program activities since 2011 in each of these stages.

1.1 Objectives

The objective for this study is to "evaluate the effectiveness of NEEA's efforts to develop and affect the implementation of the most recent code in Montana, Idaho, Oregon and Washington, both in the residential and commercial sectors." In addition, this study reviewed NEEA code efforts related to development and adoption of the national model code.

To meet these objectives, Cadmus' work focused on the following four areas:

- Review of the Codes Program logic model
- Review of the ACE model's current methods of counting multifamily homes
- Assess progress of the Codes Program toward achieving its intended outcomes
- Assess the effectiveness of the Codes Program processes for the three program stages

Upon completion of the review and analysis, Cadmus developed recommendations for ways that NEEA can enhance activities in each stage. Recommendations related to the logic model, the national model code, and the process evaluation are included in their respective chapters. All discussion of the ACE model (including recommendations) is included in Appendix K. Conclusions and high-level recommendations regarding Program progress are provided in Chapter 6, while detailed findings and recommendations are in the state-specific appendices.

1.2 Current State Codes

The Codes Program focuses on the current and future codes in each of the Northwest states. Table 1 provides a summary of the residential and commercial codes.

Table 1. Summary of Current Codes and Expected Updates in the Northwest States

Description	WA	OR	ID	MT
Current Code	2012 WA Energy Code – both Residential and Commercial	Commercial – 2014 Specialty Code 2014 Oregon Residential Specialty Code	2012 IECC for Commercial 2012 IECC amended to 2009 for Residential	2012 IECC for both Commercial and Residential with residential amendments.
Basis for Current Code	2015 IECC with amendments	Commercial: 2012 IECC with amendments Residential code is OR-developed and prescriptive	2012 IECC	2012 IECC

Description	WA	OR	ID	MT
Next Update	The 2015 WA Energy code will go into effect July 1, 2016. The 2018 development cycle begins in 2016.	Oregon is the only northwest state on a 6-year code cycle. The next residential cycle is tentatively scheduled for early 2017 and the next commercial cycle for early 2018.	The Idaho energy code collaborative has scheduled meetings to discuss a 2015 proposal to the Idaho Building Code Board. Board hearings begin the spring of 2016.	No decision has been announced on timing of the next code change process.

Sources: NEEA website http://neea.org/initiatives/codes-standards/codes and the Oregon Building Codes Division website http://www.cbs.state.or.us/bcd/programs/online_codes.html

2 Methodology

This chapter describes the methods used to assess the Codes Program logic model and to evaluate the Codes Program progress and process.[1,2]

2.1 Review of the Energy Codes Program Logic Model

NEEA staff, in collaboration with stakeholders from Idaho, Montana, Oregon, and Washington, designed the Codes Program logic model to provide an overview and theory behind the NEEA processes and activities used to support energy codes. The model identifies barriers during stages of the code cycle and details activities NEEA undertakes to overcome the barriers and achieve desired outcomes.

The logic model has lost some utility over time as NEEA has started new activities and developed different strategies related to energy codes, so a review was included in this study.

2.1.1 Initial Review

To develop an initial set of findings and recommendations for the Codes Program logic model, each Cadmus team member reviewed the model separately, providing independent input. The team combined comments and developed a guide for interviewing NEEA staff regarding the history, context, and purpose of the logic model.

On October 13, 2015, Cadmus conducted a group interview with the program manager and two other NEEA staff members. The evaluation team then developed the findings and recommendations included in the *Logic Model Review* memo delivered to NEEA on November 6, 2015, and provided in Appendix M.

[1] As part of the MPER, Cadmus completed a review of the ACE model's methods for counting multifamily homes. Cadmus delivered findings and recommendations to NEEA in a memo, *NEEA Codes MPER: Task 3 Review ACE Model*, on January 22, 2016. The memo can be found in Appendix K.

[2] One Cadmus' staff member worked for NEEA on the National Model Code in recent years and on Idaho code training prior to 2011. For this reason, Cadmus included TRC Energy Services in the project team to conduct all research and assessment in these areas. While the report refers to what Cadmus has done in these sections for simplicity, TRC Energy Services staff completed the work.

2.1.2 Final Review and Revised Logic Model

Cadmus considered information from the interviews, comments on the memo, and new information gathered during the study to produce the revised logic model findings and recommendations. Cadmus also produced a revised logic model that incorporates the findings with regard to barriers, activities, outputs, and outcomes. These findings and recommendations are provided in the following chapters; the revised logic model is provided in Appendix F.

2.2 Assess Codes Program Progress and Process

Cadmus used interviews and document research to assess the Codes Program progress based on the elements of the original program logic model (provided in Appendix F). Cadmus designed the research to gather information about barriers, activities, and outcomes identified in the logic model.

The evaluation team discussed the research design with NEEA staff and noted through these discussions that NEEA supports some Codes Program activities in which NEEA's support is not overtly communicated to stakeholders. For this reason, some stakeholders might know of the activity, but not NEEA's role. Given this situation, Cadmus designed an interview guide specifically for those individuals—referred to as "NEEA Contacts"[3]—that work directly on the Program's behalf.

Cadmus interviewed the NEEA Contacts to develop complete lists of activities in each state. Using these lists, Cadmus was able to interview other stakeholders who may not be aware of NEEA's role, but who were able to report whether they were aware of the activity. NEEA and Cadmus identified these other stakeholders, which included employees of state agencies, members of state building code committees, leaders of associations (such as the state's Home Builders Association), university professors, consultants, and utility representatives.

To collect data on the Program progress in the Northwest states, Cadmus completed 51 interviews with individuals in the various categories shown in Table 2. Appendix G provides a detailed breakdown of interviews attempted and completed in each of the states.

Table 2. Summary of Completed Interviews by Category and State

Interviewee Category	WA	OR	ID	MT	Total
NEEA Contacts	3	3	2	2	10
Other Stakeholders	5	3	7	2	17
Trainers	2	3	1	1	7
DOE Certifications	2	1	1	1	5
Trainees	4	3	3	2	12
Total	16	13	14	8	51

In addition to NEEA Contacts and the Other Stakeholders, Cadmus interviewed individuals in

[3] These individuals were aware of NEEA's support and were able to provide the evaluators with information about most or all NEEA-supported activities in a state. NEEA identified two or three NEEA Contacts in each state.

three additional categories for the state-specific data collection. These were:

- **Trainers** since they carry out development of training materials and delivery of training to code officials and market actors as part of the implementation model
- **Trainees** since they are able to provide valuable feedback on the effectiveness of the training delivered
- **DOE Certifications** since these individuals are familiar with the processes that report state code compliance to the U.S. Department of Energy (DOE) as required by the American Recovery and Reinvestment Act (ARRA).

In addition to these state-specific interviews, the Cadmus team interviewed three individuals with knowledge of the national model code process. One of these was a NEEA Contact and the others could be described as Other Stakeholders.

To assess the Codes Program process, Cadmus interviewed five NEEA employees that either work directly on the Codes Program or have familiarity with the Program and its activities. Chapter 5 discusses Cadmus' assessment of the program's processes.

3 Logic Model

This section describes the structure and purpose of NEEA's current Codes Program logic model and summarizes both Cadmus' overall findings and recommendations and findings by each program stage—development and adoption, implementation, and compliance. Appendix F includes both the current logic model and a revised logic model. The revised model reflects the findings and recommendations discussed in this chapter.

NEEA uses logic models to summarize program theory, including barriers (to program objectives), program activities, specific outputs, and more general outcomes over time. In order to determine impact, the model should include Market Progress Indicators (MPIs). Cadmus proposed a set of Market Progress MPIs for NEEA's ongoing measurement of program progress.

3.1 Development and Adoption

Finding: The existing logic model combines development and adoption into one stage. Cadmus found code development and adoption to be highly integrated, but to face different barriers that affect each separately, resulting in significantly different activities and outputs.

Recommendation: Cadmus recommends that the logic model separate development and adoption activities and barriers, present the logic model steps unique to both activities in the stage, and create linkages between the two where they exist.

Finding: The Codes Program supports setting up a regional energy use intensity (EUI) trends database to help track progress and show code energy impacts over time. During interviews, NEEA staff emphasized the importance of outcome-based codes and actualized energy use; while this is mentioned in the current logic model, the model does not adequately convey the barriers and expected outcomes from supporting activities. NEEA staff also stated that the codes

logic model did not adequately convey the Program's emphasis on EUI and actualized energy savings, and noted barriers in NEEA's efforts to achieve these outcomes.

Recommendation: Add and incorporate activities and barriers related to developing EUI metrics and outcome-based codes.

Finding: NEEA's strategy includes national model code advocacy as a means to provide a basis for adopting consistent and stringent Northwest state codes with minimal resources.

Recommendation: Include NEEA activities that support the development and adoption of national model codes and outcomes.

Finding: During interviews, staff indicated that NEEA engages in new code development activities not currently captured in the logic model. For example, NEEA works with utility program managers to communicate upcoming proposals and address utility concerns regarding how codes affect efficiency programs' savings claims. Additionally, NEEA has worked to develop code collaboratives in states and facilitate meetings to agree on new code versions.

NEEA views code adoption as a means for locking in savings from NEEA initiatives, with codifying an energy-efficient measure or practice as the final step in achieving market transformation. To accomplish this, NEEA has moved to integrate some initiatives with its Codes Program. For example, NEEA works with emerging technologies staff to identify what should be included in the next code iteration. In the past, initiatives were not very systematically linked to code updates. Presently, NEEA integrates its Codes Program more closely with its initiatives in terms of market transformation efforts.

Recommendation: The logic model should include NEEA's new activities outside the Program that support code development and adoption, such as efforts to help utilities prepare the market for the next iteration of codes.

Recommendation: The logic model should reflect the linkages and connections between other NEEA initiatives and the Codes Program.

3.1.1 Proposed MPI's for Development and Adoption

To develop MPIs for NEEA's Codes Program, the evaluation team identified MPIs reflecting key outcomes in the revised logic model. Table 3 and Table 4 show proposed MPIs for development and adoption.

Table 3. MPI's for Energy Code Development

Output/Outcome	Market Progress Indicator
Sphere of regulation expanded to include whole buildings based on actual energy use	Progress made toward energy use performance measures and codes
Lessons learned, case studies completed	Case studies, lessons learned, and linkages between other initiatives and Code Program documented systematically
Develop / submit (national model) code change proposals	Number of IECC proposals submitted by NEEA and NEEA's contractors and number of proposals that were adopted.

Table 4. MPI's for Energy Code Adoption

Output/Outcome	Market Progress Indicator
National model code adopted; Jurisdictions piloting concepts	NEEA influence on national model code adoption recognized
Develop/submit code change proposals	Code changes accepted or adopted in jurisdictions

3.2 Implementation

Finding: Cadmus found that some logic model barriers for the implementation stage should be revised. The "NEEA provides" line in the barrier row proved confusing and unnecessary (See Appendix F). Also, evidence indicates a "belief that energy codes are different than other codes" (shown in the current logic model as a development/adoption barrier) is a barrier to implementation, though not currently included in the implementation stage.

Recommendation: In the logic model, the "NEEA provides" line should be removed from implementation barriers. "Belief that energy codes are different than other codes" should be reworded to "Lower prioritization of energy codes than life/safety codes" to better characterize the barrier and it should be included as an implementation barrier.

Finding: The current logic model does not reflect resource barriers to implementation, even though NEEA designed a portion of its activities to address these barriers, such as developing a compliance tool and providing funding for diagnostic equipment.

Recommendation: Add barriers to the logic model reflecting the lack of resources dedicated to code training and code enforcement.

Finding: The present logic model does not sufficiently identify barriers to code enforcement, such as lack of understanding regarding enforcement responsibilities and lack of enforcement materials and documentation. NEEA performs implementation activities to support energy code enforcement as part of increasing third-party quality assurance by looking at what was submitted to building departments and providing feedback to the department and the architect or builder.

Recommendation: Include NEEA's efforts in the logic model implementation stage supporting code enforcement, such as providing compliance documentation tools and trainings.

Finding: The current logic model does not sufficiently capture existing links between various activities in different Program stages and implementation stage outputs—for example, the effect of technical support activities on code officials' ability to enforce new codes.
Recommendation: Identify linkages between implementation and other code stages (such as compliance, as discussed below) and, where appropriate, show these in the logic model**.**

3.2.1 Proposed MPI's for Implementation

Cadmus developed MPIs for implementation based on key Program outcomes listed in Table 5.

Table 5. MPI's for Energy Code Implementation

Output/Outcome	Market Progress Indicator
Enhanced enforcement capabilities for code officials	Code officials indicate code enforcement is becoming less difficult
Building industry compliance with code is improved	Plan review / inspection compliance failure rates decline

3.3 Compliance

Finding: NEEA staff stated that compliance information serves as a feedback mechanism for market acceptance of code. This feedback can be used during the next code cycle to inform and improve code and implementation efforts. This linkage is not shown in the current logic model.

Recommendation: The logic model should reflect the feedback of compliance studies in future code program activities.

Finding: NEEA finds information on both compliance of individual measures and whole buildings to be useful. Information on measures can inform where training, tool, and material development should be focused. The current logic model does not make this linkage clear.

NEEA is moving toward a regional energy index for measuring whole building performance so information on whole building compliance is useful. The current logic model does not call out this activity and linkage.

Recommendation: Ensure that linkages in the logic model capture how feedback from compliance studies can inform training, materials, and tools and provides a basis for developing a regional energy index.

Finding: NEEA staff indicated that the requirement under ARRA to meet 90% energy code compliance to qualify for federal funding is no longer operational.

Recommendation: Remove the language in the logic model that refers to 90% compliance requirements in ARRA.

3.3.1 Proposed MPI's for Compliance

Cadmus developed MPIs for implementation based on Program key outcomes shown in Table 6.

Table 6. MPI's for Energy Code Compliance

Output/Outcome	Market Progress Indicator
Compliance rates	Overall reduction in energy usage in buildings.
EUI of actual energy savings in buildings	Develop method to measure overall compliance and EUI, then track these indicators.

4 Findings: Code Program Progress

As part of the market progress evaluation, Cadmus used the current logic model to guide an assessment of the Codes Program's progress toward achieving its intended outcomes in regional

code development and adoption, implementation, and compliance. The following sections provide findings observed across all states, followed by state-specific findings.

4.1 Code Development and Adoption

Cadmus assessed NEEA's progress towards achieving the following code development and adoption outcomes as outlined in the current logic model:

- New state codes are in place
- Lessons learned and case studies are completed
- Shows details of jurisdictions/states code scope expansion
- The stage is set for increased stringency in next code cycle
- The sphere of regulations was expanded to include whole buildings, based on actual energy use[4]

Cadmus developed interview questions to evaluate NEEA's progress toward these outcomes. These included questions about developing and submitting code change proposals; conducting technical and economic analyses; participating in technical advisory groups and code hearings; organizing energy code advocates; and reducing opposition to energy codes. Cadmus asked interviewees to identify any additional significant development and adoption activities, as well as any barriers experienced throughout the development and adoption process. All interview guides can be found in Appendix L.

4.1.1 Development and Adoption Trends

Interviewees indicated that development and adoption barriers were mostly consistent with the barriers identified in the logic model. However, commercial code respondents were generally more concerned about how the code applies to existing buildings than is reflected in the logic model, and said that states lacked resources more than expertise to conduct technical/economic analyses. No respondents were concerned over incorrect economic tests, although the bias against increased first costs is strong, especially with respect to home builders.

Other barriers mentioned by respondents from all states included code complexity, lack of market readiness, lack of consumer support, and home builder resistance (except in Oregon).

The evaluation team also found a general consensus reported across all states that NEEA's activities have a positive impact on development and adoption.

4.1.2 National Model Code Development

Although the logic model identifies development of code change proposals as an output leading to adoption as an outcome, the existing logic model does not explicitly recognize the Program's role in national model code development. NEEA participates in developing the International Energy Conservation Code (IECC) with funding from the Northwest Energy Codes Group

[4] NEEA staff and Cadmus had difficulty determining the meaning and intent of this outcome.

(NWECG). The NWECG has developed a regional voice at the national level by convening multiple state code officials into a cohesive, technically proficient group of energy code experts. The goal is to influence code development at the national level so that Northwest states can adopt these codes with few amendments. Both Idaho and Montana have adopted the IECC with state-specific amendments as the state code.

To assess progress toward the development and adoption objectives at the national level, Cadmus focused interviews with key national model code contacts on NEEA's impact on the IECC over the last two adoption cycles. Overall, Cadmus found that NEEA's work on national model codes had a significant impact on the development of both the residential and nonresidential IECC. Interviewees reported that NEEA's main contributions have been supporting IECC code change proposals, primarily based on best practices from Washington and Oregon, and opposing roll-back proposals from other organizations that would revert the code to previous IECC editions. As further evidence of NEEA's impact, the IECC has adopted many of the proposals submitted by NEEA, as described in Section 4.8.

4.2 Code Implementation

Based on the current logic model, Cadmus evaluated the progress NEEA has made towards achieving the following implementation outcomes:

- Building officials are able to enforce new codes
- Market actors are able to design and construct code compliant projects
- Code compliance increases

Cadmus focused the interview questions on implementation activities outlined in the logic model, including developing training curricula and compliance tools; providing building officials with code overview trainings, targeted trainings, and jurisdiction visits; providing market actors with code overview and targeted trainings; establishing avenues for technical assistance; and ensuring codes resources are available online. Interviews also focused on the key barriers jurisdictions have faced when implementing the energy code. All interview guides can be found in Appendix L.

4.2.1 Implementation Trends

In general, interviewees identified implementation barriers consistent with those in the current logic model. Additional barriers regularly identified by respondents included lack of participation/interest by industry and the time it takes the market to adjust to a code change. While the time it takes following a code change for the market to adjust may not be a barrier NEEA can directly address with the Codes Program, this issue was frequently mentioned as a key implementation barrier.

There was a general consensus that NEEA's activities have a positive impact on energy code implementation.

4.3 Code Compliance

The code compliance outcomes included in the logic model that Cadmus assessed are:

- Data on how to modify education and training to be more effective
- Data for states to comply with DOE certification requirements
- Energy savings

Cadmus focused interviews for the compliance stage on key compliance activities, perceived barriers to compliance, and the use of compliance studies in training development and implementation. Additionally, Cadmus interviewed representatives from state agencies responsible for verifying that the state has met DOE certification and reporting requirements to determine how useful information from the code compliance studies was in meeting reporting requirements. All interview guides can be found in Appendix L.

4.3.1 Compliance Trends

When asked to identify compliance barriers, respondents from all states cited one or more barriers not included in the logic model. Respondents noted the following compliance barriers: lack of education and training, lack of enforcement and resources to enforce compliance, and distance from resources, such as performance testing equipment and third party professionals, and services.

NEEA sponsored a residential code compliance study in each of the four Pacific Northwest states between 2012 and 2014, and the logic model includes assessment of code compliance as an activity and output. NEEA staff indicated they intend to use the assessments results to inform training and other opportunities to address gaps in enforcement and compliance. However, Cadmus found that the completed assessments have not been used in either of these ways.

4.4 Washington Evaluation

This section summarizes findings specific to Washington and includes an overall progress summary and a description of barriers and activities used to guide the evaluation. Cadmus provides detailed findings and information in Appendix A.

The Washington State Energy Code (WSEC)[5] is a state-written, state-specific code based on the IECC. Changes to the WSEC are instituted on a three-year cycle that corresponds with the International Code Council (ICC) International Building Code cycle. Code change proposals are submitted for review to the Washington State Building Code Council (SBCC), which forwards approved proposals to a Technical Advisory Group with a specialty related to the code change for additional review. The Technical Advisory Group then makes recommendations and submits the proposal back to the SBCC. Proposed amendments authorized by the SBCC and recommended for public hearing are filed with the Code Reviser and published in the

[5] Available online: http://neea.org/docs/default-source/reports/washington-residential-energy-code-compliance.pdf?sfvrsn=11

Washington State Register. This filing includes a summary of the proposed rules, the complete text of the proposed changes, public hearing dates and locations, and any economic impact statements required by law. Once public hearings have concluded, the SBCC reviews testimony and makes a final determination about whether to accept the proposal into the newest code after the next legislative session.

4.4.1 Progress Summary

Table 7 summarizes progress in Washington since 2011 toward achieving the outcomes identified in the logic model. The following sections discuss barriers, activities, and Program progress in each process stage (see Appendix A for more detail).

Table 7. Washington Progress Summary

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency			X	
Sphere of regulation expanded	X			
Implementation				
Building officials able to enforce codes		X		
Market actors able to design and construct to codes			X	
Increased code compliance			X	Anecdotal info
Compliance				
Data on how to modify education, training	X			
Data for states to comply with DOE requirements			X	
Energy savings			X	

4.4.2 Development and Adoption

4.4.2.1 Key Barriers

In addition to the barriers included in the logic model, respondents noted that a lack of staff and resources, as well as organized opposition from both the private industry and builder associations, constitute the key barriers to energy code development and adoption in Washington. The lack of staff is most notable at the SBCC, where the manager and four staff members are funded by the state and tasked with facilitating all of the buildings codes in Washington, including the residential and commercial energy codes. One respondent noted that the lack of staffing has resulted in "an unsustainable dependency on NEEA and other volunteer efforts to actually be able to do the technical work to make the code development process work. NEEA has been filling the breach and this is one area where NEEA is of great assistance to us."

A lack of funding is also seen as an obstacle by those involved in the process for developing and adopting the energy codes. Respondents noted that funding insufficiencies often stifle new ideas,

as the cost to show the economic value in code proposals often exceeds available budget resources.

Organized opposition to the code is a barrier to both the residential and commercial processes as well. On the commercial side, opposition is largely experienced through "objection from the private industry that constructs new buildings." Respondents noted that "there is a very organized coalition that fights us constantly," making the need for sound data and economic analysis even more important.

On the residential side, and as was concluded in the Building Codes Market Assessment performed by Cadmus in 2011, builder associations, particularly the Building Industry Association of Washington (BIAW), remain a main barrier to the development and adoption of residential energy codes. However, respondents noted that the BIAW has recently broadened opportunities for industry leaders to work with the BIAW and other homebuilders on their energy code questions and concerns. As a result of improved working relationships, the BIAW and NEEA-funded contractors are now working together to advance the energy code in ways that are satisfactory to both.

4.4.2.2 Key Activities

Each respondent identified industry leaders that NEEA both funds and supports as the driving force behind energy code development and adoption in both the residential and commercial sector. These industry leaders include:

- SBCC
- Northwest Energy Efficiency Council (NEEC)
- WSU Extension Energy Program
- Ecotope
- Integrated Design Lab
- Michael (Mike) Kennedy, Consultant

Respondents also identified NEEA-funded data and analyses—including the analysis that ensures code changes are defensible and cost-effective, as well as the compliance and energy savings analysis—as having the most influence on code development and adoption.

Cadmus found that NEEA and its contractors were exceedingly successful with changes to the 2015 WSEC; over 90% of WSU's residential code proposals supported by NEEA were adopted in the last code cycle. NEEA's support for the early development of energy-efficient technology is also notable.

Respondents listed Senate Bill 5854 as a motivating force for energy code development and adoption. State agency, university, and consultant interviewees noted that Senate Bill 5854,[6] passed in 2009, is the only statute in the United States that requires a state to reduce building

[6] http://apps.leg.wa.gov/billinfo/summary.aspx?year=2009&bill=5854

energy use over a period of time (seventy percent by 2031). Senate Bill 5854 greatly reduces the barriers to development and adoption.[7]

New Buildings Institute, with funding from NEEA, created a Washington State Energy Code Roadmap[8] that identifies strategies and documents the progress toward meeting Washington's long-term energy performance goals in the commercial sector. Respondents indicated that the energy savings achieved by the provisions of the newly adopted 2015 WSEC are on target, if not ahead, of the savings projected throughout the roadmap.

4.4.2.3 Progress toward Adoption Outcomes

This evaluation found that the Codes Program is instrumental in the development and adoption of the WSEC. Based on the evaluation, NEEA is making progress towards achieving the short-term and mid-term outcomes in the logic model, including setting the stage for increased stringency in the next code cycle and adopting the 2015 WSEC. Respondents also indicated that the code's scope is increasing slowly.

Cadmus found no evidence about completion of lessons learned or case studies, a short-term goal, and there was no clear indication that the sphere of regulation is expanding to include whole buildings based on actual energy use, a long-term goal. Respondents noted that Washington "just isn't there yet" when it comes to tracking actual energy use.

4.4.3 Implementation

WSU and NEEC, both funded by NEEA, are the industry leaders primarily responsible for developing and executing implementation strategies and activities in Washington. WSU organizes implementation activities for the residential energy code while NEEC organizes commercial energy code implementation.

4.4.3.1 Key Barriers

In general, interviewees responded with the barriers listed in the logic model when asked to identify obstacles to energy code implementation. One indicated that the only real barrier to both residential and commercial implementation is time: "It takes a few years to comply after a code change, but there are no real barriers if we are consistent with training and allow time for people to adjust to understanding the new code." However, a respondent from a state agency noted that the commercial 2015 WSEC provisions are more challenging[9] and will be harder to implement than in previous years.

[7] Respondents noted that Senate Bill 5854 reduces opposition to the code as it provides code advocates legal justification for periodic efficiency increases.
[8] https://newbuildings.org/wp-content/uploads/2015/11/WashingtonEnergyCodeRoadmap2015091.pdf
[9] Interview respondents indicated that the commercial 2015 WSEC includes technologies and concepts that are new to the industry, such as dedicated outdoor air systems, and will require a change in both design and construction practices. Respondents indicated that when code changes require design professionals to adjust the way they design systems, the time and effort to implement the change increases.

4.4.3.2 Key Activities

Key implementation activities for both the residential and commercial energy codes largely follow those outlined in the logic model and include technical assistance, training, and available resources. Respondents overwhelmingly mentioned the technical assistance available for both the residential and commercial energy code as the most important, beneficial, and successful implementation activity occurring throughout the state. In 2015 alone, NEEA-funded WSU technical assistance staff received over 2,500 code-related questions from inspectors and designers in the form of phone calls or emails.

The technical assistance provided by WSU and NEEC offers insight into the areas of the code that are most challenging to the design and construction industries, as well as issues that code officials are having in both plan review and on-site inspection. Technical inquiries are becoming increasing complex, which is a sign that the level of code compliance is increasing; as individuals and building departments become more attuned to code requirements and more attentive to nuances of the code, they seek a more thorough understanding of the more difficult provisions. The number of technical assistance calls increase following code training as well, which indicates to WSU and NEEC that training attendees are thinking about complex code requirements and looking into how to implement the changes into their current processes.

Training provided by WSU and NEEC is also a crucial element in energy code implementation. The three-year mandatory code cycle dictates when training activities commence, as they generally begin as soon as the legislative session adopting the code ends. On the residential side, WSU begins with a statewide training program that covers the code changes and familiarizes builders, building departments, and design professionals with the code before it goes into effect. WSU provided 215 trainings throughout the 2009-2012 code cycle to 5,164 participants. WSU training opportunities include energy code overviews, targeted training, and on-site training with an emphasis on fulfilling air leakage testing certification requirements.[10]

Similarly, commercial training begins after the legislative session and includes code overview training, training on new code requirements, and targeted trainings. During the 2009 to 2012 code cycle, NEEC provided training to approximately 2,500 participants.[11] One respondent indicated there are not enough courses for the number of people interested in attending them.

A respondent experienced with both the residential and commercial energy codes explained that the increasingly strong response to offers of training indicates that compliance is increasing. “We are getting a lot of requests from jurisdictions to provide training in their areas, especially from peninsula areas we wouldn’t necessarily normally prioritize because of the level of build activity. If they aren’t going to enforce [the energy code], they wouldn’t ask for training.”

Based on Cadmus’ interviews and assessment of sample training material, training in Washington has been well received and training material is satisfactory and accurate, well organized, covered the intended topics, and sufficient in length (see Appendix A). Additionally, the resources made available by both WSU and NEEC supporting the residential and commercial

[10] http://database.aceee.org/state/washington
[11] Ibid.

WSEC are invaluable to the implementation process. Webinars, factsheets, and compliance forms that support the codes are readily available online. Tracking information indicates that over 95% of jurisdictions use the compliance forms and checklists developed by WSU and NEEC; training opportunities on the forms and checklists are available on a regular basis.

4.4.3.3 Progress toward Implementation Outcomes

The Program has been successful at achieving the short-term and mid-term implementation outcomes identified in the logic model. Cadmus found the Program is training building officials and market actors sufficiently in areas that impact the building officials' ability to enforce the code and the market actors' ability to design and construct code-compliant projects. Respondents generally assume that building officials are able to enforce the residential code and that building departments in larger cities are able to effectively enforce the commercial energy code. However, respondents indicated that smaller jurisdictions have a more difficult time enforcing the code due to a lack of expertise and lack of experience with complex buildings. Respondents provided anecdotal information to attest to builders' ability to construct code-compliant homes and buildings, as well as design professionals' ability to design code-compliant buildings.[12]

The mid-term implementation outcome of the logic model is increased code compliance. Although respondents indicated that it was hard to estimate compliance without a formal study, many provided anecdotal information for both the residential and commercial sectors to demonstrate that compliance is increasing.

4.4.4 Compliance

Cadmus conducted a residential compliance study for Washington that addressed the 2009 WSEC and found compliance was high. While a full commercial compliance study has not been conducted, studies at the building system level are completed intermittently.

4.4.4.1 Key Barriers

Respondents indicated that there were barriers to code compliance beyond those recorded in the logic model. For residential energy codes, the greatest compliance barriers are associated with homebuilders. Multiple respondents explained that homebuilders are concerned primarily with cost and are generally disinterested in innovation and achieving compliance with the energy code in ways that are unfamiliar to their current building practices.

For the commercial code, respondents indicated that significant compliance barriers are found in unfunded mandates from the state, misinformation regarding how to achieve compliance, and apathy from building departments. While an increase in resources, including funding and training opportunities, could potentially help alleviate the barriers to commercial compliance, "there will always be apathetic people who are disinterested in enforcing the code." Other barriers to

[12] Respondents provided anecdotal examples of an increase in compliance in both the residential and commercial sectors. One cited an increase in the number and complexity of technical assistance questions as an indication that compliance is increasing. A second residential interviewee mentioned observing increased compliance with the code while onsite.

commercial code compliance in Washington include distance from services, such as third party providers and specialized professionals, and lack of expertise in smaller jurisdictions. A state agency contact indicated that building officials in rural areas generally do not have the same experience as those in major cities, due to the limited volume and simplicity of new buildings.

Finally, respondents identified big-box stores selling materials that do not comply with the code and uneducated consumers buying non-code compliant materials as barriers to compliance with both the commercial and residential codes.

4.4.4.2 Key Activities

When asked to identify activities that impact energy code compliance in Washington, respondents noted activities in addition to those listed in the logic model. As with code implementation, the majority of interviewees stated that access to resources, particularly the resources available through both WSU and NEEC's websites, is critical to code compliance.

Training also impacts compliance by providing building officials and other market actors with the necessary skills to properly perform plan reviews, an activity that residential and commercial respondents identified as having a significant impact on compliance.

4.4.4.3 Progress toward Compliance Outcomes

NEEA funded a residential compliance study, as well as commercial compliance studies at the system level, which are logic model activities intended to both produce data used to modify education and training and to help the state meet DOE certification requirements (formerly ARRA requirements). The results of the residential compliance study, coupled with various other NEEA-funded activities, did help Washington meet DOE certification requirements. However, respondents generally agreed that the results of the compliance studies are not being used to modify training efforts. The results of the compliance study have been shared nationally and NEEA-funded contractors are often asked to speak about the success of the WSEC as a result of the study.

The long-term outcome of increased compliance is energy savings. Cadmus' prior compliance study showed high compliance with the 2009 WSEC. Respondents estimated a minimum of an eight percent reduction in energy use for the 2015 WSEC over the 2012 WSEC, amounting to a total energy reduction of at least thirty percent in residential sector and twenty percent in the commercial sector since 2006. [13]

4.5 Oregon Evaluation

The following section summarizes progress findings specific to Oregon. Appendix B presents detailed findings, including commentary from interviewees and recommendations.

[13] Respondents tasked with tracking energy savings resulting from codes provided these estimates. The estimates are based on preliminary energy savings from adopted amendments. A more exact number will be available once the 2015 WSEC goes into effect in July 2016 and energy savings are analyzed.

The 2014 Oregon Residential Specialty Code (ORSC) and the 2014 Oregon Energy Efficiency Specialty Code (OEESC) are mandatory, state-specific energy codes written and developed by the State of Oregon. Changes to the codes may be submitted at any time to the Oregon Building Codes Division (BCD) for consideration. The Residential Structures Board reviews the proposed residential changes, while the Building Codes Structures Board reviews the proposed commercial changes. Under delegated authority from the Director of the Department of Consumer and Business Services, the BCD administrator makes a final determination about acceptance of any proposal. Once a proposal is accepted, rulemaking begins. The BCD, through the Oregon Revised Statutes, has authority to write rules that affect energy conservation in all regulated buildings.[14] Oregon is the only Northwest state on a six-year code cycle.

4.5.1 Progress Summary

Progress in Oregon toward achieving the outcomes identified in the logic model is summarized in Table 8.

Table 8. Oregon Progress Summary

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
	Adoption			
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope	X			
Stage set for increased stringency		X		Advocating
Sphere of regulation expanded	X			
	Implementation			
Building officials able to enforce codes	X			
Market actors able to design and construct to codes			X	
Increased code compliance	X			Unknown
	Compliance			
Data on how to modify education, training	X			
Data for states to comply with DOE requirements			X	
Energy savings				Unknown

4.5.2 Development and Adoption

4.5.2.1 Key Barriers

The current political environment surrounding energy codes in Oregon is the key barrier to code development and adoption, according to interview respondents. Residential and commercial respondents from all professions, including agencies and utilities such as the Oregon Department of Energy (ODOE) and the Energy Trust of Oregon (ETO), expressed that this is a time of great confusion for energy code advocates throughout the state. The BCD is tasked with overseeing the energy code and, according to respondents, has limited the role that other associations,

[14] https://www.energycodes.gov/adoption/states/oregon

agencies, and organizations may have in code development and adoption. As a result, all of the Oregon interviewees said there is confusion over who is supposed to and who is allowed to handle code development.

Respondents indicated that they felt as if their participation in the public code process was limited by the insufficient amount of notice given before code hearings, which results in minimal time for organizations to gather and provide analyses needed to engage actively, and limits the time organizations have to present findings.

Additionally, several Oregon respondents identified the lengthened six-year code cycle as an obstacle to code development and adoption, adding that the increased length affects all aspects of the market. Discussions over increasing the code cycle to twelve years are occurring and interviewees stated that further lengthening the code cycle "would be devastating to the energy code community."

As a result of the lengthened code cycle, issues between the industry and leadership at the BCD, and "narrowly focused code committees," respondents have noticed a "major cultural change" throughout Oregon. Interviewees noted a general lack of enthusiasm from previously passionate advocates, as well as a decrease in participation with the code process at the jurisdiction level.

The BCD elected not to provide an interview or participate in the market progress evaluation, stating that it was a conflict of interest to remark on activities for which they are responsible.

4.5.2.2 Key Activities

Although respondents indicated that energy code development and adoption activities are currently at a standstill, they noted that NEEA's funding of contractors, involvement in code hearings, funding and support of code changes, analyses of energy code features, and advocacy for more progressive policies have played a critical role in development and adoption in the past. Additionally, interviewees recognized NEEA's continued effort to provide support and advocacy despite pushback from state agencies.

Interestingly, and unlike the other states in the Northwest, residential builders are supportive of the energy code and have been noteworthy advocates for increased efficiency in the code.

4.5.2.3 Progress toward Adoption Outcomes

Respondents indicated that the Codes Program is actively supporting the development and adoption of more stringent energy codes in Oregon. Due to increasing pushback by the state agency responsible for code adoption, however, little is currently happening to advance the energy code. Respondents did indicate that NEEA had a significant, positive influence on the development and adoption of the energy codes implemented in 2014. There was no consensus among respondents on whether the scope of the code is expanding or if the sphere of regulation is expanding to include whole buildings based on actual energy use. Additionally, Cadmus could not locate any NEEA-funded case studies or lessons learned.

4.5.3 Implementation

4.5.3.1 Key Barriers

Respondents identified three key barriers to code implementation in Oregon: limitations that impact the effectiveness of the technical assistance hotline, restrictions on who may contact building officials, and disinterest in focusing on implementation at the jurisdiction level. NEEA funds a technical assistance hotline through ODOE to help answer questions regarding energy code issues. While two interviewees said the hotline has a positive impact on code compliance since it establishes a single point of contact for questions, other respondents described the hotline as unresponsive, adding that "you can't actually talk to someone with helpful advice." A contact responsible for operating the hotline explained that the hotline is limited in its authority to provide advice or direction, and instead is allowed to offer only limited interpretations of the code. The restrictions imposed on the hotline are a barrier to implementation as they greatly impact the reliability and effectiveness of the hotline. Respondents further attributed the limitations of the hotline to restrictions on who may contact building officials. Currently, the BCD is directly responsible for communication with building code officials and sharing the needs of building officials with those responsible for implementing the code is not perceived as a priority for the BCD at this time.

4.5.3.2 Key Activities

NEEA provides funding for training and outreach, the two activities identified by residential and commercial respondents as having an impact on energy code implementation. ODOE, with funding from NEEA, provides commercial energy code training to architects and engineers throughout the state. NEEA also supports the Oregon Home Builders Association (OHBA) in providing residential energy code training to contractors and building officials.

Cadmus interviewed residential and commercial training attendees, all of whom said the trainings were refresher courses, presenting little or no new information. While respondents found the training helpful for some items, such as COMcheck overviews and updates to other compliance forms, respondents generally remained neutral on their overall significance. This finding is consistent with interviews with trainers, one of whom stated that they had learned over the last year or so that it was "hard to fill a room since there are no changes happening [in the code]," adding that "the industry is just not interested." Agencies are actively working on ways to encourage attendance; for example, ODOE recently cold-called architects and engineers in an effort to increase participation. Cadmus also reviewed course material used for both residential and commercial energy code training and found it to be generally thorough and accurate. Additional information can be found in Appendix B.

Respondents spoke positively of NEEA's role in developing and distributing outreach materials. Some respondents attributed success in the energy code market in the last few years strictly to NEEA's ongoing outreach efforts and their funding of ODOE, which is active within the energy codes market solely because of NEEA's support.

4.5.3.3 Progress toward Implementation Outcomes

In discussing implementation, respondents generally agreed that designers are able to design code-compliant projects and builders are able to build code-compliant buildings. Organizations and agencies throughout the state are currently providing training and technical assistance through NEEA funding, both of which are activities that influence implementation outcomes. The inability for any entity outside of the BCD to contact and develop relationships with building officials has proven to be an issue, as most respondents are not aware of activities occurring at the jurisdictional level that may be influencing implementation. As a result, respondents noted that they are unaware of the ability of building officials to enforce the code.

4.5.4 Compliance

Cadmus conducted a residential code compliance study on the 2011 ORSC and found code compliance was very good overall.

As part of the Comprehensive Commercial Lighting Initiative, NEEA also funded a high level, commercial lighting compliance study in 2013. Respondents noted that although the study itself was not widely distributed, there has been general agreement with the methodology. A contact from the ETO added that the compliance study was a missed opportunity because the BCD did not help promote it or encourage training around the results.

Interview respondents for the current MPER were hesitant to remark on activities that encourage or influence compliance throughout the state. One respondent estimated compliance with the residential energy code to be "greater than ninety percent," while respondents indicated that commercial code compliance varies by jurisdiction and that there was no data to provide an accurate estimate. Few respondents offered insight into how to encourage compliance in the future. However, a contact from the ETO and another from ODOE recognized that supporting the building officials would be most effective. Respondents did not think NEEA could provide more support in this area at this time.

4.5.4.1 Progress toward Compliance Outcomes

According to participants, compliance studies in the state are not being used to modify or inform energy code training; however, they assumed the studies were used to meet DOE certification requirements. Cadmus was unable to locate reports on energy savings of the 2014 ORSC and 2014 OEESC. However, energy savings estimated for the previous residential and commercial energy codes, the 2011 ORSC and 2010 OEESC, were roughly ten-percent and fifteen-percent over the 2008 ORSC and 2007 Oregon Structural Specialty Code, respectively.[15]

4.6 Idaho Evaluation

The following section summarizes progress findings specific to Idaho. Appendix C provides detailed findings, including commentary from interviewees and recommendations.

[15] http://energycodesocean.org/code-information/2014-oregon-energy-efficiency-specialty-code-oeesc

4.6.1 Progress Summary

Progress in Idaho since 2011 toward achieving the outcomes identified in the logic model is summarized in Table 9.

Table 9. Idaho Progress Summary

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency		X		Achieving for nonres; Not achieving for res
Sphere of regulation expanded towards whole building based on actual energy use		X		Code moving towards whole building, but not actual energy use
Implementation				
Building officials able to enforce codes			X	
Market actors able to design and construct to codes		X		Achieving for nonres; Not achieving for res
Increased code compliance			X	
Compliance				
Data on how to modify education, training	X			
Data for states to comply with DOE requirements			X	Data is available, but not clear if market actors are using compliance data
Energy savings			X	

4.6.2 Development and Adoption

4.6.2.1 Key Barriers

All respondents identified increased home builder opposition as the primary barrier to the adoption of new residential energy codes, reporting that:

- Builders oppose code change primarily because of costs, and argue that increasing code requirements will price lower-income buyers out of the market.
- Some builders are unreceptive to any kind of energy code changes and push back on the frequency of the three-year code cycle.
- Treasure Valley builders are particularly resistant to code changes, and a few vocal builders are dominating the Idaho Energy Code Collaborative ("the Collaborative"). Jurisdictions in Northern Idaho who are in closer proximity to Washington, as well as those in Eastern Idaho, including Idaho Falls, have more stringent codes and builders in those areas are more receptive to code changes.

Multiple respondents mentioned that builders are particularly resistant to reducing the maximum air leakage and requiring a blower door test.

Respondents said there is much less resistance to commercial code changes. The evaluator probed interviewees on why this was the case. Respondents could not answer definitely, but hypothesized that it may be because they viewed nonresidential designers and builders as meeting higher requirements for licensure.

4.6.2.2 Key Activities

NEEA's primary activity for supporting Idaho code development and adoption is funding the Collaborative. This group of various stakeholders (including builders, engineers, building officials, and utility staff) brainstorm, vet, and develop residential and nonresidential code proposal recommendations. An Association of Idaho Cities (AIC) staff member facilitates the discussions through NEEA funding. Once the Collaborative comes to unanimous agreement on a code recommendation, they provide it to the Idaho code board, which then sends it to the Idaho legislature. Interviewees reported that since NEEA began the Collaborative, there has been much less resistance from the code board and legislature, which has greatly advanced the adoption of new code requirements. In addition, NEEA provides analysis, such as cost information, and funds studies to support code proposals.

4.6.2.3 Progress toward Development and Adoption Outcomes

Interviewees reported that NEEA has had a major impact on Idaho building energy codes. One interviewee said that NEEA has likely had the biggest impact on code development in Idaho of any organization, saying "NEEA is priceless in the advancement of code in Idaho."

4.6.3 Implementation

4.6.3.1 Key Barriers

For residential buildings, the biggest barrier to code implementation identified by respondents is the lack of builder willingness to attend training. Even free trainings are perceived as a potential net opportunity cost to builders as it detracts from their time building homes. Three interviewees reported that code enforcement varies considerably by jurisdiction and one interviewee reported that some jurisdictions have no code officials.

Interviewees did not identify barriers to commercial code implementation in Idaho. As with code adoption questions, Cadmus probed interviewees on why this was the case. Respondents reported that nonresidential building professionals have more continuing education unit (CEU) requirements, are generally more knowledgeable about code updates, and are more willing to attend training. Respondents also reported that commercial buildings are easier to inspect because they include building plans that contractors generally follow. It was beyond the scope of this evaluation to investigate whether these claims by interviewees were correct.

4.6.3.2 Key Activities

To support Idaho code implementation, NEEA's primary activity is providing and supporting training. NEEA funds an Idaho circuit rider and part of the salary for a Division of Building Safety (DBS) staff member to train building officials, builders, and subcontractors. The Idaho circuit rider provides a mix of classroom seminars, one-on-one training with contractors, and "ride-alongs" with building officials. The DBS staff member has historically focused on training code officials, but is shifting to also directly train builders and subcontractors. Interviewees reported that both building official and contractor training are critical. Trained building officials pay more attention to energy code compliance and can educate builders when they identify non-compliance at inspections. Direct builder education is also critical so that builders can understand new code and the rationale for code changes.

NEEA also funds building departments to support code implementation. Building officials said this funding is critical to enabling them to train more officials and contractors, and/or purchase equipment such as blower doors, flow hoods, and infrared cameras for builders to borrow and for officials to use for training.

NEEA-funded seminars are often free and target building officials and/or builders and subcontractors. Cadmus found that interviewee and trainee survey respondents reported that training offerings provide the right content and are valuable. Trainees indicated that they are using the information from the training in their jobs and sharing the information with colleagues.

To try to increase residential training attendance, NEEA contractors have switched some of their trainings from comprehensive, half- or full-day classes to one-hour modules focused on specific topics. They also began offering classes at 7:00 a.m. and will soon offer night trainings. These adjustments have increased builder attendance somewhat, but not significantly. A few jurisdictions, including Idaho Falls, have requirements for builder CEUs and respondents reported increased builder training attendance in these jurisdictions. However, as part of their opposition to a proposed bill that would have required licensing for contractors, builders supported passage of a law making it illegal for Idaho jurisdictions to require CEUs (although jurisdictions with existing CEU requirements were grandfathered in).

The evaluation team also reviewed residential and commercial training material used in Idaho and found that the presentations were accurate, thorough, well organized, and sufficient in length. The duct and envelope testing training material is outstanding, and it was designed to encourage audience participation and provide opportunities for attendees to practice what is taught.

4.6.3.3 Progress toward Implementation Outcomes

Respondents were generally very positive about NEEA-funded implementation efforts to support compliance. They reported that NEEA-funded training has significantly improved code implementation, reduced builder opposition to code change, and led to higher compliance rates, particularly for residential buildings. NEEA-funded training has also caused building officials to pay more attention to checking energy measures. However, one interviewee reported that NEEA

could improve its coordination to notify partner utilities of upcoming trainings, so those partner organizations can help promote these events. One interviewee also requested that NEEA improve its state coverage for training, reporting that the Treasure Valley area has been overlooked for commercial code training.

4.6.4 Compliance

NEEA has funded and conducted several compliance studies that targeted or included Idaho. NEEA funded an Idaho residential compliance study (performed by Cadmus in 2013), which assessed compliance with Idaho's residential energy code at the time (an amended version of the 2009 IECC). The study found average compliance overall was relatively good and identified requirements that showed low compliance, including wall insulation, duct design, lighting, and infiltration.[16]

Interview respondents for the current study reported that residential code compliance has increased, partially due to NEEA activities. They reported that building officials typically check for compliance with energy requirements and that officials still view life safety issues as more critical, but many had ignored energy requirements prior to NEEA-sponsored training. Literature also shows that Idaho residential code compliance has increased.[17]

A few respondents mentioned the Cadmus study when reporting that overall residential code compliance is high. In addition, at least some of the NEEA-sponsored training is addressing measures that the Cadmus and DOE-funded studies identified with low compliance, including sealing to address duct leakage and infiltration. The Cadmus team could not ascertain whether this training focus was in response to the findings of the compliance studies.

Respondents reported that commercial building compliance is at or very close to one-hundred percent. However, results of two DOE-funded studies indicate that compliance may be less than one-hundred percent. In the NEEA Commercial Lighting Study, DOE found that lighting designers and local code officials lack proficiency in the lighting power density calculations and lighting control requirements of their local energy code. In the NEEA Jurisdictional Study (presented in DOE 2013), DOE found noncompliance with some nonresidential energy code requirements, including envelope sealing, duct sealing, and lighting controls. Both studies were based on small sample sizes, but indicated that commercial compliance may be less than one-hundred percent.

4.6.4.1 Progress toward Compliance Outcomes

The NEEA-funded residential compliance study, conducted by Cadmus (2013), found a ninety percent overall compliance rate with the Idaho residential code and identified areas of noncompliance, including wall insulation, floor insulation, lighting requirements, duct leakage, and whole house air leakage testing. When asked about the level of code compliance in Idaho,

[16] The current Idaho code does not require air leakage testing, but a previous version did.
[17] A Quantec (2008) study found compliance rates of forty-seven percent and twenty-six percent for Idaho single family and multifamily homes, respectively, with code, much lower than the ninety percent compliance rate found in the Cadmus (2013) study.

several interviewees cited the high overall compliance value found in the Cadmus (2013) study, indicating at least some awareness of the report. However, interviewees did not mention the measures identified with low compliance, so it was not clear if NEEA-funded trainers or market actors are using results of the study to inform training efforts.

4.7 Montana Evaluation

The following section summarizes findings regarding the Program's market progress in Montana. Appendix D provides further detail on the findings, including commentary from interviewees and recommendations.

Montana's Building Codes Bureau reviews and adopts the set of codes that are to be enforced at the state level, including the energy codes. The commercial energy code applies to all buildings that are not otherwise considered residential within the state. On the residential side, local jurisdictions (cities and counties) are not mandated to enforce any codes. However, if a local jurisdiction chooses to adopt a code, it must be the state code without modification. It is estimated that roughly forty percent of new homes are constructed within jurisdictions that enforce the energy code; the remaining sixty percent are constructed in areas outside of those jurisdictions.[18] The state provides electrical and plumbing inspections only to such homes. State law requires that homes constructed outside of jurisdictions that enforce the code comply with the energy code through a "self-certification" process in which builders must provide the homeowner with a written statement that the home meets the state energy code requirements.[19] The Energy Code Compliance label provided by the state may be used to demonstrate a home meets self-certification requirements. Montana's Department of Labor and Industry (DLI) maintains a list of certified jurisdictions that have adopted building codes.[20]

4.7.1 Progress Summary

Table 10 summarizes progress in Montana since 2011 toward achieving the outcomes identified in the logic model.

Table 10. Montana Progress Summary

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency			X	
Sphere of regulation expanded	X			
Implementation				

[18] The Montana Residential Energy Code Compliance report, prepared by Cadmus for NEEA in 2012, estimates that two-thirds of new construction in the state occurs within self-certifying areas. Respondents from NCAT provided an updated estimate of 60% of new construction occurring within self-certifying areas.
[19] All new homes in Montana are by law required to meet the energy code. However, those in the self-certification areas do not receive plan review or inspection.
[20] http://bsd.dli.mt.gov/building-codes-permits/certified-government

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Building officials able to enforce codes	X			
Market actors able to design and construct to codes		X		
Increased code compliance		X		
	Compliance			
Data on how to modify education, training	X			
Data for states to comply with DOE requirements		X		
Energy savings			X	

4.7.2 Development and Adoption

4.7.2.1Key Barriers

When asked to identify barriers to code adoption, Montana commercial building respondents agreed in large part with the barriers included in the logic model. Because the code is mandatory for all commercial buildings, respondents explained that development and adoption occur regularly and with few obstacles. The residential sector respondents also mentioned the barriers in the logic model and provided state-specific barriers as well, most of which can be attributed to the rural population of the state. These barriers include resistance to regulation, lack of interest and participation in the adoption process by home builders, and the impracticality of code measures.

Many respondents from all professions in both the residential and commercial sectors characterized Montana as having a general disinterest in regulation and change. A commercial sector respondent remarked that the state has "angst against regulation of any kind," while a state agency contact added that there is a "general anti-regulation mentality across the state." The resistance to regulation, coupled with the lack of enforcement at the jurisdiction level, has resulted in little interest in, and general opposition to, the code in general, particularly by home builders. Active resistance coupled with disinterest in code has impacted participation in the residential code development and adoption process.

Many builders and code officials expressed uncertainty about the practicality of many of the code measures in the rural setting, particularly performance testing. As a result, opposition to a code that has mandatory third-party requirements has increased.

4.7.2.2 Key Activities

Montana respondents indicated that the main drivers of energy code development and adoption are the industry leaders funded and supported by NEEA. Most notable are the National Center of Appropriate Technology (NCAT) and the Department of Environmental Quality (DEQ). Through contracts, NEEA's primary energy code effort is the Montana Energy Code Collaborative, a stakeholder advisory group modeled after the Idaho Collaborative.

The Montana Energy Code Collaborative meets four or five times each year and comprises agents from the state government, representatives from utility investors and electric cooperatives, environmental advocates, green building advocates, members of home builder associations, and

various other stakeholders depending on the meeting topics. The facilitator of the collaborative noted the absence of builders at these meetings. The code collaborative focuses on a wide variety of energy-code-related issues, including updating the energy code, promoting code compliance, and building relationships within the industry. Respondents agreed that the code collaborative was the key to adopting the 2012 IECC, due in large part to the constructive working environment the collaborative created between the Montana Building Industry Association (MBIA) and energy code advocates.

Additionally, respondents noted that NEEA's involvement in advisory meetings, relationships with stakeholders and utilities, influence on the ENERGY STAR and Next Step Homes programs, and thoughtful participation in the code development process are key to successful energy code adoption in the state.

4.7.2.3 Progress toward Adoption and Development Outcomes

Montana successfully adopted the 2012 IECC with few amendments, due in large part to NEEA's support of the code collaborative. Respondents indicated that while the industry is preparing for the next adoption cycle, there is not yet a consensus on whether the state aims to adopt the 2015 IECC or the 2018 IECC. Progress is being made in ensuring all of the jurisdictions are capable of meeting recent and future code requirements, such as the blower door testing requirement that recently became mandatory for all homes. Respondents indicated that the scope of the code is expanding in that they are slowly looking at system components and technologies that were not previously in the code. However, there is no indication that case studies are being conducted or that the sphere of regulation is expanding.

4.7.3 Implementation

4.7.3.1 Key Barriers

Montana's commercial energy code is supported at the state level and mandatory for all nonresidential buildings. Commercial building respondents indicated that there are no standout barriers to implementation; market actors understand that the energy code is mandatory and welcome training and education as a means to complying per their professional responsibilities.

A key barrier to the residential code is the self-certification option outside of jurisdictions that adopt and enforce the code. Residential code respondents indicated that there are "significant differences between jurisdictions and how they enforce the code." Jurisdictions that are not actively enforcing the code have little interest in energy code training, technical assistance, or any of the other implementation activities offered by the agencies and organizations providing code support. Respondents identified that getting code officials to attend training is especially difficult.

The other significant barrier to residential implementation is the rural setting of the state. Montana is "geographically challenged," explained a state agency contact, which has resulted in "no infrastructure" to support the implementation of many energy code provisions, such as performance testing requirements. Respondents noted that there are fewer than a dozen blower

door capable contractors in the entire state and no more than two HERS raters, so access to qualified energy professionals is limited.

Finally, Montana has the unique barrier of homebuyers building their own homes in areas outside of city limits, where the majority of growth is occurring.[21, 22] In many cases, as explained by a state agency respondent, "homebuyers are the home builders, so education is low. They often forgo the design process to save costs or because they don't think they need it and they are harder to reach with training."

4.7.3.2 Key Activities

As with the other states, NEEA is actively funding different organizations to educate and provide training to various audiences throughout Montana. The primary activities driving residential and commercial energy code implementation include training, outreach, and technical assistance. DEQ, NCAT, DLI, and NorthWestern Energy provide the majority of the training opportunities and outreach throughout Montana, often collaborating to create and distribute relevant material. The DEQ and NCAT offer energy code overview trainings, code update trainings, site visits to code officials, webinars, conference workshops, and performance equipment training, including the use of infrared cameras and blower door testing. DEQ, NCAT, and DLI develop and distribute outreach material to building departments and code officials, including code summary booklets for both the residential and commercial energy codes.

Respondents noted that Montana is doing exceptionally well targeting the areas of the market that could benefit most from energy code training, and is doing so in creative ways to overcome state-specific barriers, as outlined in Appendix D.[23]

Unlike many other training providers in the Northwest, DEQ provides course evaluations and tracks feedback from training participants. A Montana trainer noted that "training has been well accepted and evaluations have been positive." Cadmus also interviewed training attendees. These attendees reported they were satisfied with the material covered, are sharing knowledge with the people they interact with, and would recommend the training to colleagues. Cadmus evaluated training and outreach material provided by a Montana training contact and found that the materials were satisfactory and thoroughly covered the topics, were well organized, and sufficient in length. Additional information on training feedback and material review can be found in Appendix D.

[21] Data for the percentage of homes being built by homebuyers (homebuyers building their own homes) is difficult to quantify in Montana for several reasons, although primarily a result of untracked self-certifications in jurisdictions that do not enforce and energy code. Respondents estimate around 2% of homeowners are building their own home entirely with another 3-4% building 30 – 70% of their home. Most homeowners building their own homes will likely hire one or more of the following contractors: foundation, framing, plumbing, electrical, insulation, or HVAC. Additionally, respondents noted that Montana Habitat for Humanity and Mutual Self Help programs build between 70 and 100 new homes each year throughout the state, which are typically 60-70% homeowner and volunteer built.

[22] The Montana Residential Energy Code Compliance report, prepared by Cadmus for NEEA in 2012, estimates that two-thirds of new construction in the state occurs within self-certifying areas.

[23] Respondents noted inventive ways of providing training and outreach to home builders, design professionals, and real estate professionals, including engaging electrical inspectors, attending local engineer and architect conferences, and offering performance testing training.

4.7.3.3 Progress toward Implementation Outcomes

Montana excels at identifying and targeting training and outreach efforts to the market actors with the most need, including home builders and buyers in self-certification areas. However, respondents identified inconsistencies with certified jurisdictions enforcing the code, and while respondents assume that designers and architects are designing to the code, there is both little plan review on the commercial side and frequent occurrences of not using a designer on the residential side.

4.7.4 Compliance

NEEA previously contracted with Cadmus to assess compliance with Montana's previous residential energy code, an amended version of the 2009 IECC. The study found that compliance overall was moderately good, ranging from approximately fifty percent to seventy-two percent, depending on the calculation methodology. Compliance was significantly higher in jurisdictions that enforced the code rather than allowing self-certification.

4.7.4.1 Key Barriers

Similar to adoption and implementation, the lack of energy code enforcement is the greatest obstacle to residential compliance. A state agency contact remarked, "[Montana has] good compliance in towns and counties that enforce the code, but outside of those cities...not so much." As noted by respondents, there is little desire to comply with a code that is not enforced. In jurisdictions that are enforcing the code, the lack of involvement with and knowledge of code provisions also adversely impact compliance.

Competition in the market and cost also affect residential compliance. The builder market in Montana is large and competitive, with over 2,000 active builders throughout the state.[24] Builders are concerned about the cost associated with meeting code requirements, such as air sealing and HVAC sizing. In jurisdictions without enforcement or a drive from consumers for energy efficiency, builders are not building to code to spare any increase in expense.

On the commercial side, respondents indicated that the greatest barriers to compliance are that building departments are not reviewing building plans and specifications and that on-site inspections are deficient.

4.7.4.2 Key Activities

According to respondents, the key to compliance in Montana is the proactive effort by DEQ and NCAT, funded by NEEA, to target segments of the market with strategic implementation activities. The effort to train and educate home builders and homebuyers is increasing market awareness and preparing the market for greater compliance with the energy code.

[24] The DEQ sent letters to over 2,300 builders in December 2015.

In jurisdictions that are already enforcing the residential energy code, respondents recognized the requirement for documentation, such as REScheck, as a way to influence compliance. Additionally, utilities such as NorthWestern Energy are offering utility savings to residential customers that build homes better than code, creating a market for increased energy efficiency.

4.7.4.3 Progress toward Compliance Outcomes

Although a residential compliance study was performed in Montana and was useful in providing a snapshot of energy code enforcement in the state, respondents indicated that it was not used in training or education. A respondent from DEQ added, "we don't use the compliance study for anything. We never refer to it because we don't think it accurately represents our state."[25] The 2012 IECC with Montana amendments is achieving energy savings throughout the state. In a cost-effectiveness study performed by Pacific Northwest National Laboratory (PNNL), a comparison between the 2012 IECC with Montana amendments and the DC Energy Conservation Code found that the net annual consumer savings—including energy savings, mortgage cost increases, and other associated costs in the first year of ownership—average $180 when following the 2012 IECC.[26]

4.8 National Model Code

NEEA has played an active role in helping to develop both the residential and nonresidential IECC, which has an important role in the states served by NEEA. Idaho and Montana have adopted a version of the IECC for residential and nonresidential buildings. Washington and Oregon also have a heavily amended IECC as a basis for their code. By influencing the national model code process through its advocacy work, NEEA has influenced building codes in the Northwest.

4.8.1 Key Barriers

Interviewees focused on the successes of NEEA advocacy work for national model code adoption more than the barriers. However, two interviewees noted that there is growing resistance from homebuilding associations to any type of changes to the residential IECC and that the influence of homebuilding associations appears to be increasing.

4.8.2 Key Activities

Interviewees reported that NEEA (or a NEEA contractor) has been involved in all major aspects of the model code adoption process. Based on feedback from interviewees, one of NEEA's key

[25] Respondents did not feel as though the sampling method was appropriate for Montana given the rural landscape and discussed the difficulty in finding homes in the right stage of construction to effectively conduct the study. One interviewee stated: "Finding builders willing to participate, the right mix of houses, and getting houses at the right time is a major challenge for compliance studies. It is easier where there are building permits and houses are in smaller geographic area, but still not easy. We had all of those challenges." Another said, "There were many obstacles to the study—it was hard to get builders outside of the jurisdictions to agree to a compliance study and even harder to find houses at the right time of construction in rural areas. The study isn't given a lot of credibility due to the issues in sampling."

[26] https://www.energycodes.gov/sites/default/files/documents/MontanaResidentialCostEffectiveness.pdf

activities is funding and facilitating the NWECG. This group develops code proposals ideas, identifies which proposals have merit, provides supporting data and analysis to develop a "reason statement" for proposals, and submits proposals to the ICC. The NWECG has developed many code proposals, several of which the ICC has adopted. The NWECG bases many of its proposals on the Washington and/or Oregon codes.

NEEA also participates in DOE meetings in which stakeholders discuss code proposals, review the list of code proposals published by the IECC, and screen proposals for those that will affect the Northwest. For proposals that do not align with NWECG proposals or are counter to NEEA goals, NEEA will develop arguments against their adoption. When NEEA proposals are similar to another organization's proposal, NEEA will often work with the other advocates to collaborate on one proposal.

NEEA works to support the NWECG code proposals throughout the process. The ICC holds code hearings to discuss code proposals. Before the code hearing, NEEA contractors work with other advocates and market actors to encourage them to support the NWECG proposal. For organizations that they believe may oppose the NWECG proposal, NEEA will reach out prior to the hearing to listen to their concerns. Where acceptable (e.g., if the concerns will not affect the Northwest, or if the organization proposes simple wording revisions), NEEA will adjust code proposals to address concerns. If this is not possible, these conversations help NEEA prepare for code hearings as they enable NEEA to prepare arguments to counter the opponents' concerns.

Once the code is published, interviewees reported that NEEA contractors have been valuable in identifying errors and providing recommended improvements for the next cycle. In addition, NEEA contractors occasionally provide support for developing or reviewing "code commentary." The commentary describes what the new code means and how it integrates with other code requirements. The ICC publishes this commentary as a reference companion to the code.

4.8.3 National Model Code Findings and Recommendations

Finding: NEEA's involvement in the national model code development process has had a significant impact. Interviewees reported that the main outcomes of NEEA's involvement in the national model code development are – in roughly decreasing order of significance:

1. Proposing best practices from Washington and Oregon as code proposals
2. Opposing roll-backs that revert code to previous IECC requirements
3. Helping to make code more understandable through activities such as fine-tuning code in the next iteration and supporting companion references to the code.

As evidence of NEEA's impact, Table 11shows the number of code proposals that the NWECG submitted for the 2015 IECC adoption process and the number accepted. The ICC adopted two of the nine residential and six of the eleven nonresidential code proposals submitted by NWECG.

Table 11. Number of 2015 IECC Code Proposals Submitted by NWCEG

Indicator	Residential	Nonresidential	Total
Proposals submitted that NEEA helped develop	9	11	20
Accepted proposals that NEEA helped develop	2	6	8

Notes: Summary provided by NEEA contractor, and the Cadmus team spot-checked NWCEG involvement using an ICC publication: http://www.iccsafe.org/wp-content/uploads/03-IECC-C.pdf

Recommendation: Because of NEEA's past success in supporting the IECC codes, NEEA should continue these code support activities, particularly support through the NWECG.

Finding: Home builder associations are putting increased pressure on state legislatures to not adopt new codes and/or to roll-back current code requirements. Respondents indicated that NEEA has focused more on nonresidential national model code in recent years due to home builder resistance to residential code adoption.

Recommendation: Increase support of residential IECC development by expanding collaboration with builder organizations to reach reasonable solutions or by countering builder opposition to code changes. Focus on measures that have significant energy impacts for which cost savings can be shown and implementation is feasible (e.g., minimal contractor training is needed) and advocate for these measures heavily during each phase of the IECC process.

Finding: NEEA has focused its efforts on influencing the IECC rather than ASHRAE Standard 90.1, which is a model code for nonresidential buildings and provides an avenue for additional energy efficiency advocacy.

Recommendation: Increase NEEA's engagement in the ASHRAE 90.1 development process.

5 Findings: Code Program Process

This section summarizes NEEA's Codes Program process assessment. Cadmus reviewed the program design, administration and resources, implementation and delivery, and market satisfaction.

5.1 Program Design

Cadmus evaluated the design of NEEA's Codes Program by researching current and previous NEEA employees' perceptions of the program goals and objectives. Overall findings include:

1. The goals and objectives of the Program are well designed and understood by NEEA employees
2. Program goals and objectives, as well as the success of the Program, are measurable
3. NEEA is achieving the Program goals and objectives.

The employees interviewed have the same general idea of the program goals and objectives and described these in a fairly consistent manner. According to respondents, the Program aims to:

- Advance the stringency of relevant, enforceable energy codes across the region
- Ensure, measure, and encourage a higher level of compliance with the codes in place
- Identify and use best practices for continuous market transformation
- Enable states to provide effective programs to support code development, adoption, implementation and compliance through education, technical assistance, and analysis.

Respondents indicated that there are several additional subsidiary goals related to energy codes that the NEEA Codes Program is always striving to achieve, including assessing the market to ensure it is ready and capable of transformation, laying the groundwork for future code proposals, and supporting other NEEA initiatives.

NEEA accomplished the program goals through the development, adoption, implementation, and compliance activities it supports in each state. The funding of contracts with industry leaders and energy efficiency experts, a successful aspect of the Program's process, has been particularly useful in achieving program goals. Respondents further agreed that the goals of the program are measurable, and listed the following as indicators of program success:

- Adoption of residential and commercial energy codes in each state
- Increased efficiency of the energy codes each code cycle
- Number and impact of code changes supported by NEEA
- Incorporation of best building practices and technologies into the energy codes
- Feedback from NEEA-funded contractors
- Number of compliance studies completed in each state

The Codes Program has dedicated funds for evaluation, which helps NEEA ensure that the states are continually achieving greater energy efficiency and identify and address issues if they are not.

NEEA employees overwhelming agreed that the Program is currently achieving its intended outcomes due to well-implemented support processes, including effective research efforts, successful partnerships with utilities and governing bodies, and the accomplishment of the WSEC as the most stringent state code in the nation.. One respondent added, "we have set up very effective pilot demonstrations and training programs that allow us to both advance capabilities and demonstrate to the code setting bodies what is possible, both of which will increase their comfort level with increasing stringency of codes." Respondents also noted that although the program has been successful in Oregon in the past, current support processes are no longer effective due to the issues described in Section 4.5 above.

5.2 Program Administration and Resources

Cadmus evaluated respondents' perceptions of the administration of the Codes Program, including oversight, communication, and adequacy of resources. Respondents generally agreed that the program has sufficient oversight, an appropriate level of staffing and resources, is reporting on measurable outcomes, and receives feedback on its activities.

When asked to describe the program oversight, NEEA employees detailed many levels of both internal and external oversight. Each year, the Codes Program goes through an operations planning process in which NEEA presents the major goals and objectives of the program, along with the resources needed and projected timing for accomplishing the goals. The result is the Operations Plan, which is reviewed and approved both internally and by funders through advisory committees. The program goals and budget, including spending and forecasting, are managed at the department and organizational level, with quarterly meetings scheduled to ensure the program is on track. The Codes Program manager provides oversight to the contracts and contractors within each state and informs advisory committees, utility task forces, and funding organizations of the program progress on a regular basis. The program as a whole is reviewed yearly. Respondents indicated that there are no issues within the various levels and processes of oversight and that each level performs well to ensure the goals of the program are accomplished.

The Codes Program is primarily staffed using contracts and contractors within each state. Respondents agreed that the current number of contracts is adequate, especially for residential activities. One respondent added that, although NEEA often receives support from national laboratories and organizations such as the New Buildings Institute, "there could be more support for research and development on the commercial side." Internally, the NEEA Codes Program is staffed with experienced industry professionals and often leverages the expertise of NEEA's standards program and other internal initiatives. Respondents indicated that the Codes Program manager's ability to recognize staffing needs, capability to effectively manage contracts, and personal involvement in all program activities is key to program success.

Most respondents assume the Program has enough resources to effectively complete Program activities and that few, if any, opportunities are missed because of a lack of resources. The senior program manager, however, said that the Program "could always use more resources; there are always really good ideas out there but we would need more money to pursue them all." The issue is somewhat alleviated by the ability within NEEA to redistribute funds to various initiatives and programs when needs change or when there are opportunities to participate in innovative activities. Respondents indicated that all of NEEA's initiatives meet on a quarterly basis for a detailed discussion of current and future activities and whether resources are sufficient to complete those activities. NEEA's director of market strategy and execution added, "If we identify new research or another project or area that will benefit from a greater budget, we will shift money in the budget to accommodate the need. We are constantly balancing and making sure the money ends up where there is the most need."

Respondents said the Program activities are reported in a timely manner and reporting is adequate in terms of the amount of information provided. The senior program manager publishes a quarterly report available on NEEA's Conduit website,[27] meets monthly with Program-contracted agencies and individuals, and updates the Program funders on a regular basis. Additionally, respondents recognized reports on state adoptions, energy savings, and compliance as a means to report on the Program activities. However, several respondents noted that they are generally unaware of how well the reports are received, if there are any implications to the reports, and whether the target audiences find reporting efforts to be useful.

[27] http://neea.org/get-involved/conduit-overview

Finally, NEEA respondents said the Program is receiving sufficient feedback on its activities. On the industry side, the Codes Program receives informal feedback from the building and manufacturing community, often in the form of pushback, which allows the Program to reassess the market. Respondents also noted that the Program receives "very thoughtful feedback from industry supporters" on activities, including both the positive and negative impacts the activities have on the target market. The Program also receives feedback on its processes and activities from compliance and enforcement studies. Respondents noted that feedback for the Codes Program is not as broad as for other NEEA initiatives, although they attribute that to the perceived obscurity of the program and that fewer people are involved in the program across the region.

5.3 Program Implementation and Delivery

Cadmus conducted interviews with contractors, trainers, trainees, and utility representatives, as well as NEEA employees, to evaluate the effectiveness of Program implementation and delivery. The evaluation team found that:

1. Training content and material are well received across the region
2. Timing of program activities is adequate although there is room for improvement
3. Communication with contractors is excellent
4. Better coordination and communication is needed with utilities in parts of the region.

Cadmus asked trainer, trainee, and program contact interviewees to discuss the relevancy and accuracy of NEEA-sponsored training, including the content covered, materials provided, and delivery format. Respondents across all interview types noted that they were satisfied or highly satisfied with the training supported by the Codes Program. Specifically, respondents felt as though the Program put a lot of effort into ensuring the content is relevant to the audience it is targeting and in a format that is most conducive to achieving the intended results; onsite courses for training building inspectors and building department visits for training plan reviewers, for example. Trainees that have attended NEEA-sponsored training several times over multiple years noted a maturity in training material and remarked on the growing impact of targeted training as system complexity increases. Generally, training attendees are using the training in their current positions, have shared the information with colleagues, and would recommend training to others.

The evaluation team also evaluated the timing of activities through interviews with a wide variety of participants, including trainers, trainees, and program contacts. Cadmus found that training opportunities are occurring at times that are most beneficial to the market, including after code adoptions and following the release of updated materials, such as compliance worksheets. There is a great effort made by the Codes Program to stay ahead of regulation, as indicated by the timing of training efforts. The timing of other Program activities also appears to be adequate in most instances, with Oregon respondents indicating that the length of the code cycle makes coordination of activities more difficult and often causes confusion in the industry. However, interviewees did not think this was an issue that could be easily solved by NEEA.

Montana respondents also felt as though the timing of activities is adequate although two respondents suggested better coordination between the Codes Program and local utilities,

agencies, and organizations when implementing activities. One respondent added, “as someone involved with implementing on the ground level, I wish they would listen to the local comments a little bit more and spend more time talking to local folks about how they are going to roll out their programs.”

Cadmus also asked program contacts to describe their interactions with the Codes Program staff or NEEA-sponsored contractors and to offer opinions on the effectiveness of that communication. Respondents from all states spoke positively about the communication of the program, saying that the Codes Program is always open to new, innovative ideas and understands the needs of the individual states. When speaking of interactions with NEEA staff, respondents described staff members and contractors alike as knowledgeable, reasonable, and adaptable. Contractors themselves mentioned that they are always kept privy to activities of the program and that the program staff responds to questions and other inquiries in a timely and professional manner.

However, feedback from various interviews indicated that there are a few communication shortcomings in the Program. When asked how well NEEA communicates with stakeholders in the community, a Montana association contact critiqued how the Program handled the ENERGY STAR program and their contractor, although few details were provided beyond that.

Several respondents, as well as a NEEA employee, identified the greatest area for growth to be communication between the Codes Program and utilities. In general, utilities expressed a desire, or Program contacts perceived a desire from utilities, for more involvement in all code related activities than currently offered by the Codes Program. However, one contact from a large utility in Washington said that utilities in general have to be careful to remain “neutral” when it comes to energy codes, but that supporting and vetting energy code proposals is one area where the utilities could be of better service. A respondent stated that utilities often have tools to determine cost-effectiveness that could be leveraged by NEEA in the future: “We have a calculation process in place that quickly and easily tells us if something is cost effective. This capability is often overlooked, or maybe we don’t offer it enough, but checking a proposal against our cost effectiveness protocol would give it credibility among several organizations.”

Additionally, a Montana contact noted that NEEA’s relationship with the local utilities was outstanding and hoped that in the future, the Codes Program could help forge the relationship between utilities, the Collaborative, and other organizations and agencies supporting energy codes in the state. Oregon respondents also indicated that communication between NEEA and the utilities, ETO in particular, is excellent.

5.4 Market Awareness and Satisfaction

As described in the methodology section, Cadmus conducted interviews with a wide range of stakeholders. NEEA expected that there would be a general lack of awareness of NEEA Codes Program activities; however, the evaluator found that respondents across all groups were well aware of NEEA’s funding of the contractors, activities, and processes in the Northwest. Moreover, respondents from all groups indicated that they are highly satisfied with NEEA’s efforts in each of the states and throughout the region. Respondents explained that NEEA is the

driving force behind the WSEC, has been instrumental in organizing advocates in Idaho, and is the reason the 2012 IECC is in place in Montana. Oregon respondents have attributed the success of the previous energy code to NEEA as well as keeping the advocacy effort going despite the strained relationships between the BCD and other energy code advocates in the state.

A contact from Washington provided a good summary of most respondents' view of NEEA's involvement in the energy code market, saying, "I always tell people when they ask how we are able to achieve such a high level of compliance with the energy code that the key is [NEEA's code program]. NEEA's funding is the reason our energy codes not only exist but are understood, enforced, and complied with. All of the pieces fit together. I tell people [to] get a program in place that is dependable, give people a way to reach a live body when they have questions, train them every time there are code changes, and establish long term relationships people come to depend on. It takes consistency but it also takes funding- both of which NEEA has provided us."

5.5 Process Findings and Recommendations

The following findings and recommendations reflect the issues and needs of the Program's process:

Finding: NEEA is not receiving formal feedback from NEEA-sponsored training courses.

Recommendation: Improve training evaluations and create a formal feedback process. Collect and analyze end-of-course surveys for course effectiveness and suggestions for improvement. Periodically follow-up with selected courses to see how and when the training is being used by participants.

Finding: Greater utility involvement in NEEA-sponsored activities is desired by both the utilities and NEEA-funded contractors.

Recommendation: Continue growing the relationship between NEEA and utilities, ensuring that utilities are aware of NEEA activities and how code changes will impact their programs. Use NEEA's current relationships with utilities to connect utilities and NEEA-funded contractors in an effort to collaborate on energy code programs in the Northwest.

Finding: Cadmus found that, in terms of program design, the processes that work effectively in other states are not working in Oregon due to the current political environment surrounding energy codes. While respondents indicated that NEEA's ongoing efforts are crucial to any progress made recently, they are also eager to share their needs, wants, and ideas for improvements to the process for the future.

Recommendation: Work closely with advocates throughout Oregon, including the ETO and ODOE, to establish a course of action for reforming the political process established by the BCD. Determine where NEEA efforts will have the most impact and focus on re-establishing a fair, functional code process where duties and responsibilities

Finding: NEEA employees, NEEA-funded contractors, and interviewees from all other occupations are generally pleased with the Program process and the successes in the energy code market that have resulted from the Program.

Recommendation: Continue current activity and process activities.

6 Conclusions and Recommendations

6.1 Overall Conclusions

NEEA's Codes Program has made a significant contribution to the Northwest region through its support of energy code development and adoption, implementation, and compliance, as well as the Program's efforts on the national model code.

Cadmus finds that the environment in which the Codes Program operates differs between the more populous states of Washington and Oregon and the less populous states of Idaho and Montana. Idaho and Montana have large, rural geographic areas that create unique challenges to adopting and implementing the energy code, including access to the equipment and professionals capable of conducting performance tests.

In Washington, the evaluation team concludes that the program has made excellent progress: a strong infrastructure is in place, code processes are working well, and the Program is heavily involved in many activities that are advancing the Washington State Energy Code, one of the most stringent energy codes in the nation. In Table 7 above, Cadmus' analysis shows that Washington is achieving or making progress in eight of eleven outcomes in the logic model.

In Idaho, the Codes Program has made good progress with no major issues. The Program has been especially successful in creating and supporting an energy code infrastructure, including both the Code Collaborative and the successful circuit rider position. In Table 9 above, Cadmus' analysis shows that Idaho is achieving or making progress in nine of eleven program outcomes.

The evaluator concludes that the Codes Program is making progress in Montana despite the unique adoption and enforcement process throughout the state. Cadmus found that the organizations and associations supported by NEEA are creatively and proactively targeting segments of the design and construction communities that could benefit most from energy code training and education, including home builders and home buyers. Cadmus also identified several areas in which there are opportunities for the program to direct its efforts toward making progress in the future. These are summarized below and detailed in Appendix D.

In Oregon, Cadmus notes that the program made good progress in early years of the evaluation period and found evidence that the program made a significant contribution to the 2014 residential and commercial energy codes. More recently, however, progress has stalled due to confusion regarding the role of various parties and the perceived absence of support from the state's Building Codes Division. Cadmus concludes that the evolving political landscape, the six year code cycle, and uncertainty of the future direction energy codes will take, have created new

barriers and opportunities and recommends that the program direct its efforts to address them. These recommendations are summarized below and in Appendix B.

6.2 Recommendations

Cadmus developed recommendations for each major aspect of this study. Recommendations related to the logic model, the national model code, and the process evaluation are included in Chapters 3, 4, and 5, respectively. The evaluators present work related to the ACE model in Appendix K. Cadmus summarized recommendations to enhance Program progress in this section while detailed findings and recommendations are included in the state-specific appendices.

Tailor Code Efforts to Address Different Needs

Customize Code Program offerings and approaches by state and by jurisdiction size.

- Evaluate specific needs of smaller jurisdictions. In Montana, use of NEEA-provided performance testing equipment is limited in rural jurisdictions. In Washington, lack of resources and access to equipment and professionals are identified as obstacles to code enforcement in smaller cities.

Use legislative processes and the governor's office as influence channels when the public codes process is not well-functioning.

- In Oregon, the public code update process appears to limit participation by interested parties.
- In Idaho, builders are taking cost concerns to state legislators.

Improve effectiveness of public processes.

- In Oregon, work with the Building Codes Department to clarify and document eligible participants in code development and adoption processes to address general confusion regarding stakeholder roles.

Provide Support and Resources

Provide support (such as interns, budget) to bolster staff in states to conduct technical and economic analyses/research

- In Washington, the State Building Codes Council resource needs.
- Fund a Montana Circuit Rider, modeled on Idaho's, as a resource for home builders.

Strengthen Relationships

Continue to support and expand collaboration forums. Build relationships with market actors that sometimes oppose code development. Use the collaboration forums (or create other opportunities) for dialogue on issues with code development proposals.

- This responds to home builders opposed to more stringent codes in Washington and Idaho.

Develop an explicit win/win negotiating strategy with market actors. Segment and rank code proposals based on expected opposition and present them in order to gain agreement to the greatest degree possible.

Identify strategic rollback needs. For example, revisit requirements to tighten air leakage levels and to conduct blower door tests in certain states. Or use state-specific research on payback for smaller, entry-level homes to address builders concerns about this specific home type.

Improve Communication

Collaborate with Oregon Building Codes Department to create a communication mechanism for state building code officials to report code issues, request tracking, and receive code updates.

Educate builders and home buyers about code requirements by distributing outreach material to building supply locations and providing labeling that indicates code compliant products.

- Provide this information to hard-to-reach builders in Montana and areas in Washington especially where department stores are known to sell noncompliant material.

Create specific analyses/tools to share with market actors that determine and demonstrate payback resulting from implementing the code.

- This is especially relevant in Montana, Idaho, and Washington.

Improve Training Effectiveness

Adopt a “Continuous Improvement” approach to training efforts. Establish more regular and rigorous assessments of the quality and impact of training efforts in order to optimize their effectiveness. This applies to NEEA-sponsored training in all states.

Tailor timing of training to align with code status and code officials’ needs. Supply training at building officials’ offices. This applies especially to small and remote jurisdictions in all states.

Develop targeted training on compliance.

National Model Code

Because of NEEA’s past success in supporting the IECC (national model codes), the primary recommendation from this study is to continue code support activities directed at a national level, particularly code development support through the Northwest Energy Codes Group.

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Appendix A. Washington Progress Evaluation - Additional Detail

A.1 Development and Adoption

The Washington State Energy Code (WSEC)[28] is a state-written, state-specific code based on the IECC. Changes to the WSEC are instituted on a three-year cycle that corresponds with the International Code Council (ICC) International Building Code cycle. Code change proposals are submitted for review to the Washington State Building Code Council (SBCC), which forwards approved proposals to a Technical Advisory Group with a specialty related to the code change for additional review. The Technical Advisory Group then makes recommendations and submits the proposal back to the SBCC. Proposed amendments that are authorized by the SBCC and recommended for public hearing are filed with the Code Reviser and published in the Washington State Register. This filing includes a summary of the proposed rules, the complete text of the proposed changes, public hearing dates and locations, and any economic impact statements required by law. Once public hearings have concluded, the SBCC reviews testimony and makes a final determination about whether to accept the proposal into the newest code after the next legislative session.

A.1.1 Key Barriers

In addition to the barriers included in the logic model, respondents noted that a lack of staff and resources, as well as organized opposition from both the private industry and builder associations, constitute the key barriers to energy code development and adoption in Washington.. The lack of staff is most notable at the SBCC, where the manager and four staff members are funded by the state and tasked with facilitating all of the buildings codes in Washington, including the residential and commercial energy codes. One respondent from the SBCC noted that the state government provides an inadequate level of financial support and, as a result, professional staffing is insufficient. He added that the lack of staffing has resulted in “an unsustainable dependency on NEEA and other volunteer efforts to actually be able to do the technical work to make the code development process work. NEEA has been filling the breach and this is one area where NEEA is of great assistance to us.”

As with the lack of staff, a lack of funding resources is often seen as an obstacle by those involved in the process for developing and adopting the residential and commercial energy codes. Respondents noted that funding insufficiencies often stifle new ideas, as the cost to show the economic value in code proposals often exceeds available budget resources. A program contact stated “We need to be able to do the analysis to show that all of our ideas make economic sense. The people that are most motivated [to oppose an idea] are the people who feel threatened and they are most likely going to attack on economic grounds. This is a big obstacle for us and one that we are constantly fighting, but we have no budget and no staff capable of this.”

Organized opposition to the code is also a barrier to both the residential and commercial processes, as noted by respondents from both sectors. On the commercial side, opposition is

[28] Available online: http://neea.org/docs/default-source/reports/washington-residential-energy-code-compliance.pdf?sfvrsn=11

largely experienced through "objection from the private industry that constructs new buildings." Respondents noted that "there is a very organized coalition that fights us constantly," making the need for sound data and economic analysis even more important.

On the residential side, and as was concluded in the Building Codes Market Assessment performed by Cadmus in 2011, builder associations, particularly the Building Industry Association of Washington (BIAW), remain a barrier to the development and adoption of residential energy codes. Additionally, respondents perceive builders and design professionals as generally disinterested in the code development process. A state agency contact noted that NEEA is persistent about involving all affected parties in the development process, but that builders, engineers, and architects "dislike being told what to do" and "they are not all that involved except to fight." He further explained that home builders have channeled their frustration and are "quite organized in their opposition," but are not helping move energy efficiency along. "In general, the building industry doesn't contribute at all to [development or adoption]."

However, respondents noted that the BIAW has recently broadened opportunities for industry leaders to work with the BIAW and other home builders on their energy code questions and concerns. As a result of improved working relationships, the BIAW and NEEA-funded contractors are now working together to advance the energy code in ways that are satisfactory to both. A WSU respondent added that "Changes in code cost money so it's important to work together to make sure we get the efficiency we want and [builders] don't feel like we've hit them in the pockets."

While respondents indicated success in lessening opposition through data, analysis, and strengthened relationships, several respondents stated that there would always be opposition to both residential and commercial energy codes. One contact from a state agency added "Some [people] see [the code] as unnecessary, some can't get behind it when there are life and safety codes that need more attention, some can't understand the economics. I could go on, but the truth of the matter is that there are always going to be people that hate the energy code. We can't change all of those minds, but we are doing all that we can."

State agency, university, and consultant interviewees noted that Senate Bill 5854[29] greatly reduces the barriers to development and adoption. One state agency contact stated that "Washington has legislation in place from a decade ago that says we have to make continual progress with the energy code – that is fundamental to our process." A consultant added that Senate Bill 5854 is "especially useful to reducing barriers because it helps us justify the changes we are continually making to those that oppose our efforts."

A.1.2 Key Activities

Cadmus asked respondents to identify key activities that influence both the development and adoption of energy codes throughout Washington. Each respondent identified industry leaders

[29] http://apps.leg.wa.gov/billinfo/summary.aspx?year=2009&bill=5854

that NEEA both funds and supports as the driving force behind energy code development and adoption in both the residential and commercial sector. These industry leaders include:

- Washington State Building Code Council
- Northwest Energy Efficiency Council (NEEC)
- WSU Extension Energy Program
- Ecotope
- Integrated Design Lab
- Michael (Mike) Kennedy, Consultant

Recently, members of each of these groups collectively received the Jeffrey A. Johnson Award Honoring Excellence in the Advancement of Building Energy Codes, an award that recognizes an individual or team in the U.S. for leadership in building energy codes in the pursuit of energy efficiency goals, given at DOE's 2016 National Energy Code Conference.

In addition to funding and supporting key industry leaders, respondents also identified NEEA-funded data and analyses—including the analysis that ensures code changes are defensible and cost-effective, as well as the compliance and energy savings analysis—as having the most influence on code development and adoption. An energy policy specialist noted that the contractors funded by NEEA to provide data and analysis to move code changes forward are also advocating for energy codes, adding "most of the technical people doing the analysis are also very good advocates. All of that impacts adoption in a really positive way."

Another respondent further explained that "the folks that do the compliance studies are also active in code development. They learn through [residential and commercial building stock assessments], they develop code changes, compliance studies are done, and then it all starts again—it's a full circle. This has been very useful and beneficial to both compliance and adoption."

NEEA and its contractors were exceedingly successful with code changes to the 2015 WSEC; over 90% of WSU's residential code proposals supported by NEEA were adopted in the last code cycle.

NEEA's support for the early development of energy-efficient technology is also notable. A program contact said that "development also includes long-term development of early technologies. Heat pump water heaters, for example, are an option which we believe will be used increasingly to meet code. [NEEA] support for the early development of these systems made it possible to move them into code."

Finally, respondents listed Senate Bill 5854, the only statute in the United States that requires a state to reduce energy from buildings over a period of time, as a motivating force for energy code development and adoption. Senate Bill 5854, passed in 2009, requires the State of Washington to reduce building energy use by 70% by 2031 compared to the 2006 state energy code.

New Buildings Institute, with funding from NEEA, created a Washington State Energy Code Roadmap[30] that identifies strategies and documents the progress toward meeting Washington's long-term energy performance goals in the commercial sector. Respondents indicated that the energy savings achieved by the provisions of the newly adopted 2015 WSEC are on target, if not ahead, of the savings projected throughout the roadmap.

A.1.3 Progress Toward Adoption Outcomes

The NEEA Codes Program is instrumental in the development and adoption of the WSEC. Based on Cadmus' interviews with key market actors and document review, NEEA is making progress towards achieving the short-term and mid-term outcomes outlined in the logic model, including setting the stage for increased stringency in next code cycle and adopting the 2015 WSEC. Respondents also indicated that the scope of the code is increasing slowly.

Cadmus could not identify the completion of lessons learned or case studies, a short-term goal, and there is no clear indication that the sphere of regulation is expanding to include whole buildings based on actual energy use, a long-term goal: respondents noted that Washington "just isn't there yet" when it comes to actual energy use.

A.2 Implementation

WSU and NEEC, both funded by NEEA, are the industry leaders primarily responsible for developing and executing implementation strategies and activities in Washington. WSU organizes implementation activities for the residential energy code while NEEC organizes commercial energy code implementation. The most significant implementation activities, as well as barriers to implementation, are listed below.

A.2.1 Key Barriers

In general, interviewees responded with the barriers listed in the logic model when asked to identify obstacles to energy code implementation. One respondent indicated that the only real barrier to both residential and commercial implementation is time. "It takes a few years to comply after a code change, but there are no real barriers if we are consistent with training and allow time for people to adjust to understanding the new code." A commercial respondent from a state agency added that the commercial 2015 WSEC provisions will be harder to implement than in previous years due to the latest code changes, stating "Commercial code changes this time are particularly challenging. There is a huge market change [i.e., dedicated outdoor air systems] so [the code] will be harder to implement."[31]

[30] https://newbuildings.org/wp-content/uploads/2015/11/WashingtonEnergyCodeRoadmap2015091.pdf

[31] Interview respondents indicated that the commercial 2015 WSEC includes technologies and concepts that are new to the industry, such as dedicated outdoor air systems, and will require a change in both design and construction practices. Respondents indicated that when code changes require design professionals to adjust the way they design systems, the time and effort to implement the change increases.

A.2.2 Key Activities

Key implementation activities for both the residential and commercial energy codes largely follow those outlined in the logic model and include technical assistance, training, and available resources. All types of interview respondents overwhelmingly mentioned the technical assistance available for both the residential and commercial energy code as the most important, beneficial, and successful implementation activity occurring throughout the state. A state agency contact concluded: "Most importantly, though, and what I [attribute] much of our success to, is the technical assistance available through WSU and NEEC and funded by NEEA. The industry finds much comfort in knowing that they can pick up a phone and call someone and get a real answer to their questions."

In 2015 alone, WSU technical assistance staff received over 2,500 code-related questions from inspectors and designers in the form of phone calls or emails. A key to the success of the technical assistance is the relationships that WSU has established through years of hard work, consistency, and by providing thorough, accurate responses to inquiries. A contractor added that technical assistance "has created well established relationships between key players and the industry. People know what to expect and when—and they count on that. It's really key. Relationships are key."

Technical assistance provided by WSU and NEEC also provides insight into the areas of the code that are most challenging to the design and construction industries, as well as issues that code officials are having in both plan review and on-site inspection. They also indicate that the level of code compliance is increasing, as inquiries are shifting in complexity, and that code trainings are effective since the number of technical assistance calls increase following code training. When explaining the calls from their technical assistance line, a respondent from WSU stated: "The questions they are asking tell us that they are really thinking about the nuances of the energy code and want to learn about code requirements and how to comply with them. We are finding the number of questions coming through our technical assistance are increasing all of the time and they are becoming more thoughtful and thorough."

In addition to technical assistance, the training provided by WSU and NEEC is a crucial element in energy code implementation. The three-year mandatory code cycle dictates when training activities commence, as they generally begin as soon as the legislative session adopting the code ends. On the residential side, WSU begins with a statewide training program that covers the code changes and familiarizes builders, building departments, and design professionals with the code before it goes into effect. A trainer noted, "In some cases, homes will be designed before the adoption date but permitted after, so it's important these market players know the code ahead of time. WSU provides training and gets educational material out as soon as [it is] allowed."

WSU provided 215 trainings throughout the 2009-2012 code cycle with a total of 5,164 participants. WSU training opportunities include energy code overviews, targeted training, and on-site training with an emphasis on fulfilling air leakage testing certification requirements.[32]

[32] http://database.aceee.org/state/washington#sthash.QVDJrMiL.dpuf

Similarly, commercial training begins after the legislative session and includes code overview training, training on new code requirements, and targeted trainings. During the 2009 to 2012 code cycle, NEEC provided training to approximately 2,500 participants.[33] A commercial respondent explained that the only issue with commercial code training is that there simply are not enough courses for the amount of people interested in attending them: "NEEA funds NEEC and they provide great [commercial] training opportunities across the state**.** Their classes are always sold out; this is telling me that the builders and building officials are all really eager. They take advantage of the training and realize that everyone could use more education and more explanation of the code."

The data received from trainee interviews supports the claim that training in Washington has been well received by trainees. Cadmus interviewed three residential training attendees and three commercial training attendees. Respondents generally said the training was informative, useful, and relevant to their current positions. Respondents are sharing the information they learned from the trainings and noted that the training provided by WSU and NEEC is their primary source of code-related information, followed by building officials and the energy code itself.

While the training has not changed how respondents perform their jobs, trainees said that having general knowledge of the code has been useful and that the training has prepared them to better enforce the code. An attendee of both the residential and commercial training said, "Sometimes, even though we're inspectors, we still don't know it all. It takes a long time to learn the caveats of the code, so any information I can gain helps. That's what I get from these trainings: information."

Representatives from both WSU and NEEC provided Cadmus with sample training material to review as part of the market evaluation. The residential training material was satisfactory and accurate, well organized, covered the intended topics, and was sufficient in length. The course, however, did not clearly define training objectives or provide clear opportunities for participants to discuss or practice the course information. Cadmus found that one course was designed with several examples to illustrate code provisions, which works well for a builder, designer, and enforcement agency audience. There were no specific sections to encourage class discussion, but the materials were designed to promote questions and discussion from the audience.

The commercial training material was accurate, well organized, thorough, and sufficient in length. However, there were several areas where the training could use improvements, particularly in opportunities for class participation.

Finally, the resources made available by both WSU and NEEC supporting the residential and commercial WSEC are invaluable to the implementation process. Webinars, factsheets, and compliance forms that support the codes are readily available online. The compliance forms and checklists developed by WSU and NEEC are used in over 95% of jurisdictions, and training opportunities on the use of the forms and checklists are available on a regular basis.

[33] Ibid.

A.2.3 Progress Toward Implementation Outcomes

The NEEA Codes Program, implemented by NEEA-funded contractors, has been successful at achieving the short-term and mid-term implementation outcomes identified in the logic model. Through an assortment of effective implementation activities, Cadmus found that building officials and market actors are being sufficiently trained in activities identified in the logic model as having an impact on both the building officials' ability to enforce the code and the market actors' ability to design and construct code-compliant projects. Respondents generally assume that building officials are able to enforce the residential code and that building departments in larger cities are able to effectively enforce the commercial energy code. However, respondents also assume that smaller jurisdictions have a more difficult time enforcing the code due to a lack of expertise and lack of experience with complex buildings. Respondents provided anecdotal information to interviewers to attest to builders' ability to construct code-compliant homes and buildings, as well as design professionals' ability to design code-compliant buildings.[34]

The mid-term implementation outcome of the logic model is increased code compliance. Although respondents indicated that it was hard to estimate compliance without a formal study, many provided anecdotal information for both the residential and commercial sectors to demonstrate that compliance is increasing.

A.3 Compliance

NEEA funded Cadmus to conduct a residential compliance study for Washington in 2013. Major findings from the study included:

- Code compliance was very good overall
- Average energy consumption across the sample was better than if homes just met the code, but thirty percent of homes consumed more energy than they would if they just met the code
- Compliance was poorest for floor and foundation insulation

An energy policy specialist noted that the "high compliance rate came after [Washington] implemented duct testing, blower door testing, [a] system of extra credit… those are tricky requirements and [Washington] *still* got that high of a compliance rate."

While a full commercial compliance study has not been conducted, studies at the building system level are completed intermittently.

A.3.1 Key Barriers

Respondents also indicated that there were barriers to code compliance beyond those recorded in the logic model. For residential energy codes, the greatest barrier to compliance is the home builder. Multiple respondents explained that home builders are concerned with cost, first and

[34] Respondents provided anecdotal examples of an increase in compliance in both the residential and commercial sectors. One cited an increase in the number and complexity of technical assistance questions as an indication that compliance is increasing. A second residential interviewee mentioned observing increased compliance with the code while onsite.

foremost, and are generally disinterested in innovation and achieving compliance with the energy code in ways that are unfamiliar to their current building practices. On the commercial side, respondents indicated that compliance is hindered mostly by unfunded mandates from the state, misinformation regarding how to achieve compliance, and apathy from building departments. While an increase in resources, including funding and training opportunities, could potentially help alleviate the barriers to commercial compliance, "there will always be apathetic people who are disinterested in enforcing the code."

Other barriers to commercial compliance in Washington include distance from services, such as third party providers and specialized professionals, and lack of expertise in smaller jurisdictions. As explained by a state agency contact, building officials in more rural areas in Central and Eastern Washington generally do not have the same experience as those in cities such as Seattle and Bellevue, due to both the limited volume and simplicity of new buildings. "As buildings get larger and increasingly complex, smaller jurisdictions have a harder time handling enforcement," a state agency respondent noted, adding that "a lack of opportunities to use third-party inspectors, for instance," compounds the issue. At the same time, "you aren't seeing a lot of complicated buildings in these areas either, so their need is less that way, but so is their exposure."

Finally, residential and commercial building respondents identified big-box stores, such as Home Depot and Lowe's, selling materials that do not comply with the code, and uneducated consumers buying non-code compliant materials, as barriers to compliance.

A.3.2 Key Activities

When asked to identify activities that impact energy code compliance in Washington State, respondents recognized activities beyond those listed in the logic model. Although also mentioned by respondents when asked about energy code implementation, the majority of interviewees stated that access to resources, particularly the compliance resources available through both WSU and NEEC's websites, is critical in code compliance.

Training also impacts compliance by providing building officials and other market actors with the necessary skills to properly perform plan reviews, an activity that residential and commercial respondents identified as having a significant impact on compliance. As stated previously, the link between code development and compliance studies is also a critical activity that ensures the market is both ready for and able to comply with code provisions, as well as providing insight into compliance issues during plan review and in the field.

Although a residential compliance study was conducted as recently as 2013, respondents provided anecdotal examples of an increase in compliance in both the residential and commercial sectors. WSU, for example, cited an increase in the number and complexity of technical assistance questions as an indication that compliance is increasing. A second residential interviewee mentioned observing an increased compliance with the code while onsite.

A respondent experienced with both the residential and commercial energy codes explained that the increasingly strong response to offers of training also indicates that compliance is increasing.

"We are getting a lot of requests from jurisdictions to provide training in their areas, especially from peninsula areas we wouldn't necessarily normally prioritize because of the level of build activity. If they aren't going to enforce [the energy code], they wouldn't ask for training."

A.4 DOE Certification Requirements

Cadmus asked a subset of respondents to identify activities supported by NEEA that have had the greatest influence on meeting DOE's certification requirements. The certification contact in Washington noted that: "NEEA funds all of the programs that make compliance with DOE certification requirements, and with the energy code in general, possible. They provide funding for technical assistance, development of compliance forms, general training, training associated with the compliance forms, field visits, and follow-up building department visits. NEEA funds the whole package and it takes the whole package to comply with the code."

The same respondent noted that the residential compliance study supported by NEEA was useful in meeting DOE requirements. When asked if there were areas where additional information would have been useful in meeting the reporting requirements, the respondent stated: "I can't think of any areas where more information would have been helpful. In general, we are currently at the forefront of energy codes and energy code compliance in the U.S. We aren't having trouble meeting DOE compliance requirements and we have solid plans in place for anything we need to submit to DOE in the future."

A.4.1 Progress Toward Compliance Outcomes

NEEA funded a complete residential compliance study, as well as commercial compliance studies at the system level, which are activities identified in the logic model as producing data that can be used to modify education and training and helping the state meet DOE certification requirements (formerly ARRA requirements). The results of the residential compliance study, coupled with various other NEEA-funded activities, did help Washington meet DOE certification requirements. However, respondents generally agree that the results of the compliance studies are not being used to modify training efforts, which may be due to the high level of compliance noted in the study. The results of the compliance study have been shared nationally and NEEA-funded contractors are often asked to speak about the success of the WSEC as a result of the study.

The long-term outcome of compliance is energy savings. Respondents estimated a minimum of an eight percent reduction in energy for the 2015 WSEC over the 2012 WSEC, amounting to a total energy reduction of at least thirty percent in residential sector and twenty percent in the commercial sector since 2006.[35]

[35] Respondents tasked with tracking energy savings resulting from codes provided these estimates. The estimates are based on preliminary energy savings from adopted amendments. A more exact number will be available once the 2015 WSEC goes into effect in July 2016 and energy savings are analyzed.

A.4.2 Washington Findings and Recommendations

Table 12 summarizes Washington's progress since 2011 toward achieving the outcomes identified in the logic model. Currently, Washington is not developing case studies or lessons learned and data from compliance studies is not being used to inform training and education.

Table 12. Washington Logic Model Outcomes Progress

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency			X	
Sphere of regulation expanded	X			
Implementation				
Building officials able to enforce codes		X		
Market actors able to design and construct to codes			X	
Increased code compliance			X	Based on anecdotal info
Compliance				
Data on how to modify education and training	X			
Data for states to comply with DOE requirements			X	
Energy savings			X	

The following findings and recommendations highlight the ongoing issues and needs respondents noted throughout the state:

Finding: The SBCC desires additional funds to perform necessary technical and economic analyses and/or to bring one or two interns on staff dedicated to progressing the energy code. Additionally, Puget Sound Energy (PSE) respondents indicated that they have a cost-effectiveness tool that is underused for supporting code change proposals.

Recommendation: Leverage NEEA's relationships with both the SBCC and PSE to initiate their collaboration on economic analyses. Provide staffing resources to the SBCC for an intern with an exclusive focus on energy code research, perhaps for a pilot period of time to test the effectiveness of a designated staff member.

Finding: Builders and design professionals are involved in a limited manner in code development and adoption and are organized in their opposition to advances in the code.

Recommendation: Explore further opportunities to form relationships with the opposing organizations, such as question and answer sessions, targeted webinars, opportunities for them to

provide input or review economic analyses before it is made public, or co-sponsor training or other learning opportunities for home builders and building officials.

Finding: Industry experts are expecting commercial energy code changes in the 2015 WSEC to be especially challenging for the market to effectively implement. Additionally, the number of commercial trainings offered is limited and the market desires more opportunities to attend.

Recommendation: Offer a greater number of commercial trainings throughout the state. Continue targeting training at problematic code provisions. Use professional organizations, such as the American Institute of Architects, to promote training and education opportunities.

Finding: Training is not evaluated by participants in a meaningful way.

Recommendation: Provide participants with an end of course survey and use the survey to modify courses as needed. Perform a training evaluation six to twelve months after a course is offered to determine whether participants are using the information obtained from training and identify gaps in knowledge that could be targeted by future training efforts.

Finding: Home builders are opposed to increased costs and complex compliance options.

Recommendation: Support analyses and create and circulate resources targeted at showing the payback for increased costs. Provide targeted training on compliance options and create resources designed for promoting and cultivating innovation in the built environment.

Finding: Smaller jurisdictions are having a harder time than large jurisdictions enforcing the energy code, in part due to do limited access to resources and services.

Recommendation: Evaluate the specific needs of smaller jurisdictions in terms of access to resources and services. Invest in equipment and training, if needed, similar to NEEA providing blower door infrared cameras and training in jurisdictions throughout Montana.

Finding: Big-box department stores, such as Home Depot and Lowe’s, are selling materials that are not compliant with the energy code.

Recommendation: Work with big-box department stores to promote the energy code by placing energy code educational material and resources at the contractor and help desks. Collaborate with big-box stores to create and implement a tagging or labeling system for the shelves of the stores to indicate which materials meet the energy code.

Appendix B. Oregon State Progress Evaluation - Additional Detail

B.1 Development and Adoption

The 2014 Oregon Residential Specialty Code (ORSC) and the 2014 Oregon Energy Efficiency Specialty Code (OEESC) are mandatory, state-specific energy codes written and developed by the State of Oregon. Changes to the codes may be submitted at any time to the Oregon Building Codes Division (BCD) for consideration. The Residential Structures Board reviews the proposed residential changes, while the Building Codes Structures Board reviews the proposed commercial changes. Under delegated authority from the Director of the Department of Consumer and Business Services, the BCD administrator makes a final determination about acceptance of any proposal. Once a proposal is accepted, rulemaking begins. The BCD, through the Oregon Revised Statutes, has authority to write rules that affect energy conservation in all regulated buildings.[36] Oregon is the only northwest state on a six year code cycle.

B.1.1 Key Barriers

The current political environment surrounding energy codes in Oregon is the key barrier to code development and adoption, according to interview respondents. Residential and commercial respondents from all professions, including agencies and utilities such as the Oregon Department of Energy (ODOE) and the Energy Trust of Oregon (ETO), expressed that this is a time of great confusion for energy code advocates throughout the state. The BCD is tasked with overseeing the energy code and, according to respondents, has limited the role that other associations, agencies, and organizations may have in code development and adoption. As a result, all of the Oregon interviewees said there is confusion over who is supposed to and who is allowed to handle code development. A respondent from the ODOE further noted “The codes division is not charged directly with code development and neither is anyone else. We aren’t encouraged to participate. The construction industry believes it isn’t their job to think of the next code. So who is doing the adoption and development? Or who is allowed to? We don’t know.”

Two additional respondents added that “there is not a lot of pressure to increase efficiency” and that there is a general perception that the “[BCD] doesn't want to advance the energy code” at this time. Respondents indicated that they felt as if their participation in the public code process was limited by the insufficient amount of notice given before code hearings, which results in minimal time for organizations to gather and provide analyses needed to actively engage, and limits the time organizations have to present findings.

Additionally, several Oregon respondents identified the lengthened six-year code cycle as an obstacle to code development and adoption, adding that the increased length affects all aspects of the market including consumers, owners, design professionals, vendors, and the construction industry. Discussions over increasing the code cycle to twelve years are occurring and interviewees stated that further lengthening the code cycle “would be devastating to the energy code community.”

[36] https://www.energycodes.gov/adoption/states/oregon

As a result of the lengthened code cycle, tension between the industry and the BCD, and "narrowly focused code committees," respondents have noticed a "major cultural change" throughout Oregon. Interviewees noted a general lack of enthusiasm from previously passionate advocates, as well as a decrease in participation with the code process at the jurisdiction level. One respondent noted, "even jurisdictions that were eager and excited about energy codes no longer have that drive."

The BCD elected not to provide an interview or participate in the market progress evaluation, stating that it was a conflict of interest to remark on activities they are responsible for.

B.1.2 Key Activities

Although respondents indicated that energy code development and adoption activities are currently at a standstill, they noted that NEEA's funding of contractors, involvement in code hearings, funding and support of code changes, analyses of energy code features, and advocacy for more progressive policies have played a critical role in development and adoption of the Oregon energy codes. A utility contact noted "NEEA has put a lot of effort into code development and implementation, but because the actual state institutions are confused on who is responsible and have no interest in energy code adoption, the state hasn't been able to make any real progress as of late."

Additionally, interviewees recognized NEEA's continued effort to provide support and advocacy despite pushback from the BCD. A utility contact added, "NEEA has offered to fund staff and provide resources to get things ahead, but the building codes division says no. [NEEA is] trying to help us move forward."

Interestingly, and unlike the other states in the Northwest, residential builders are supportive of the energy code and have been noteworthy advocates for increased efficiency in the code. Respondents are hoping that continued political pressure—by NEEA, utilities, home builders, and other energy code advocates—will get the state back on track to being energy efficiency leaders.

B.1.3 Progress Toward Adoption Outcomes

Respondents indicated that with the Codes Program, NEEA is actively supporting the development and adoption of more stringent energy codes in Oregon. Due to increasing pushback by the state agency responsible for code adoption, little is currently happening to progress the energy code. However, respondents did indicate that NEEA had a significant, positive influence on the development and adoption of the energy codes implemented in 2014. There was no consensus among respondents on whether the scope of the code is expanding or if the sphere of regulation is expanding to include whole buildings based on actual energy use. Additionally, Cadmus could not locate any NEEA-funded case studies or lessons learned.

B.2 Implementation

B.2.1 Key Barriers

According to respondents, the ORSC and OEESC are currently in a period of the code cycle where implementation activities are limited. Respondents indicated that training opportunities seem to be infrequent and inconsistent. A utility contact expressed concern over multiple agencies offering one-day training opportunities without any follow-up courses offered, adding "this is not a convenient mechanism for the market to get consistent information regarding the code. When actively designing buildings, [designers] may be getting a variety of interpretations. That's a challenge." Respondents expressed a desire for consistent training offered by the same agency on a dependable schedule.

NEEA funds a technical assistance hotline through ODOE to help answer questions from the market regarding energy code issues. Two interviewees said the hotline has a positive impact on code compliance since it establishes a single point of contact for questions. However, multiple other respondents described the hotline as unresponsive, adding that "you can't actually talk to someone with helpful advice." A contact responsible for operating the hotline explained that the hotline is limited in its authority to provide advice or direction, and instead is only allowed to offer limited interpretations of the code.

This contact further attributed the limitations of the hotline to restrictions on who may contact building officials in jurisdiction offices. Currently, the BCD is directly responsible for communication with building code officials and sharing the needs of building officials is not perceived as a priority for the BCD. The hotline contact further explained "The [ODOE] anticipated that the codes division would be able to tell us what jurisdictions are saying are their compliance issues. We aren't allowed to talk to building officials ourselves and it is hard to understand their struggles if we can't talk to them."

B.2.2 Key Activities

NEEA provides funding for training and outreach, the two activities identified by residential and commercial respondents as having an impact on energy code implementation. ODOE, with funding from NEEA, provides commercial energy code training to architects and engineers throughout the state. NEEA also supports the Oregon Home Builders Association (OHBA) in providing residential energy code training to contractors and building officials. Respondents who provide training in Oregon indicated that NEEA funding has enabled them to reach most of the market with training and education.

Cadmus interviewed residential and commercial training attendees, all of whom said the trainings were refresher courses, presenting little to no new information. While respondents found the training helpful for some items, such as COMcheck overviews and updates to other compliance forms, respondents generally remained neutral on their overall significance. This finding is consistent with interviews with trainers, one of whom stated that they had learned over the last year or so that it was "hard to fill a room since there are no changes happening [in the code]," adding that "the industry is just not interested." Agencies are actively working on ways

to encourage attendance, for example, ODOE recently cold-called architects and engineers in an effort to increase participation.

Cadmus reviewed course material used for both residential and commercial energy code training. The residential training was thorough, accurate, and provided good examples for code provisions. There are opportunities throughout the videos to include more sophisticated graphics and the narrator is slow at times; however, the video format is a great way to reach a large audience with material that is useful to all experience levels. Cadmus found the commercial training material to be accurate and of a sufficient length for the topic; however, there is too much information on each slide and little opportunity to exercise learning objectives or interact with the material (unless initiated by the instructor). Attendees must have fairly extensive knowledge of the code or previous experience to fully benefit from the training.

Respondents also spoke positively of NEEA's role in developing and distributing outreach materials. "NEEA develops resources for everyone to better understand the science and reason behind energy efficiency and future code changes," a residential trainer contact said, "and this has had a positive impact on acceptance of the code by builders." Other respondents attributed success in the energy code market in the last few years strictly to NEEA's ongoing outreach efforts and their funding of the ODOE, which is active within the energy codes market solely because of NEEA's support. NEEA and ODOE meet annually to discuss outreach strategies. However, an ODOE contact expressed the need for more resources as there is "not a huge outreach budget."

B.2.3 Progress Toward Implementation Outcomes

In discussing implementation, respondents generally agreed that designers are able to design code-compliant projects and builders are able to build code-compliant buildings. Organizations and agencies throughout the state are currently providing training and technical assistance through NEEA funding, both of which are activities that influence implementation outcomes. The inability for any entity outside of the BCD to contact and develop relationships with building officials has proven to be an issue, as most respondents are not aware of activities occurring at the jurisdictional level that may be influencing implementation. As a result, respondents noted that they are unaware of the ability of building officials to enforce the code.

B.3 Compliance

Cadmus previously examined compliance with the 2011 ORSC and found that code compliance was very good overall. Respondents from the commercial sector indicated that NEEA, as part of the Comprehensive Commercial Lighting Initiative, also conducted a high level, commercial lighting study in 2013. Respondents noted that although the study itself was not widely distributed, there seems to be general agreement with the methodology. A contact from the ETO added that the compliance study was a missed opportunity because the results were not promoted nor were there training efforts around the results.

When asked about the recent compliance studies, respondents were generally unaware of the studies and the findings. Respondents indicated that the compliance studies have had little to no

impact in the state, with a contact from the ETO adding "[the commercial study] is not used for training currently and I doubt it will be used in the future, especially since there is always so much confusion and frustration on who should train people and who is allowed to train people." Residential and commercial interviewees said the state missed an opportunity to use the compliance studies to their full potentials.

Respondents were hesitant to remark on activities that encourage or influence compliance throughout the state. One respondent estimated compliance with the residential energy code to be "greater than ninety percent," while commercial respondents indicated that it varies jurisdiction to jurisdiction and that they do not have data to provide an accurate estimate. Few respondents offered insight into how to encourage compliance in the future. However, a contact from the ETO and another from ODOE recognized that supporting the building officials would be most effective. Respondents did not think NEEA could provide more support in this area at this time.

B.3.1 DOE Certification Requirements

The DOE certification contact from Oregon acknowledged NEEA activities as having an influence on compliance throughout the state, and assumes that the activities have supported meeting DOE certification requirements. However, the respondent did not know whether the NEEA-funded compliance studies affect DOE reporting requirements and could not identify areas where additional information would have been helpful in meeting the requirements.

B.3.2 Progress Toward Compliance Outcomes

According to participants, compliance studies in the state are not being used to modify or inform energy code training; however, they assumed the studies were used to meet DOE certification requirements. Energy savings of the 2014 ORSC and 2014 OEESC could not be located; as a result, Cadmus could not attribute savings to the current code. However, energy savings estimated for the previous residential and commercial energy codes, the 2011 ORSC and 2010 OEESC, were roughly ten-percent and fifteen-percent over the 2008 ORSC and 2007 Oregon Structural Specialty Code, respectively.[37]

B.3.3 Oregon Findings and Recommendations

Table 13 summarizes the progress Oregon has made since 2011 toward achieving the outcomes identified in the logic model. Currently, Oregon is not developing case studies or lessons learned and the scope of the energy code is not increasing, according to respondents. Building officials are also not able to enforce the code, and data from compliance studies is not being used to inform training and education.

[37] http://energycodesocean.org/code-information/2014-oregon-energy-efficiency-specialty-code-oeesc

Table 13. Oregon Logic Model Outcomes Progress

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope	X			
Stage set for increased stringency		X		Advocating for increased stringency
Sphere of regulation expanded	X			
Implementation				
Building officials able to enforce codes	X			
Market actors able to design and construct to codes			X	
Increased code compliance				Unknown
Compliance				
Data on how to modify education and training	X			
Data for states to comply with DOE requirements			X	
Energy savings				Unknown

The following findings and recommendations highlight the ongoing needs and issues respondents noted throughout the state:

Finding: Interview respondents would like NEEA to put greater political pressure on the BCD to reform the code cycle process. Additionally, respondents feel as though their participation in the public code process is limited at this time.

Recommendation: Bring concerns of respondents to the governor or state legislature. Use the legislative process, rather than the public process, to advocate for codes.

Finding: There is general confusion over who is supposed to and who is allowed to handle code development and adoption.

Recommendation: Work with the BCD to create a document outlining who may participate in code development and adoption and distribute this information to state agencies, associations, organizations, and utilities. Lead, or support a contractor in leading, the development and adoption efforts outside of the BCD.

Finding: The six-year code cycle process is unfavorable to market actors and industry experts.

Recommendation: Submit, or support a contractor in submitting, a rule outlining a three-year code cycle to the BCD on a regular basis for reconsideration.

Finding: The code environment is static due to the lengthened code cycle. As a result, training opportunities are sporadic and inconsistent for all market actors. Those offering training find it difficult to encourage participation since the material is not new and there are no advances in the code to provide training on.

Recommendation: Offer webinars and other self-study training opportunities to professionals that desire refresher courses. Use training funds to educate different audiences, such as the construction board and unions, on new technologies and practices that could be introduced into the code and would benefit them.

Finding: Respondents from all professions, including utilities, state agencies, and associations are unable to directly contact or interact with building code officials, which limits the transfer of information and effectiveness of many implementation activities.

Recommendation: Collaborate with the BCD to create a reporting mechanism for building code officials to report issues with the code, request training, ask code-related questions, and receive important information from various energy efficiency advocates, including utilities. This may be a fillable form on a website, a monthly bulletin distributed via email to jurisdictions, or an expansion of authority for organizations outside of the BCD to contact building officials.

Finding: Compliance studies are completed; however, the results are not well distributed throughout the state and are not being used to modify training, provide education, or create outreach.

Recommendation: Follow up compliance studies with targeted training, factsheets, or other educational resources based on results of the studies.

Appendix C. Idaho State Progress Evaluation - Additional Detail

Idaho currently follows the 2012 IECC for nonresidential buildings and the 2012 IECC with amendments for residential buildings (in particular, the residential building envelope tables and lighting requirements reference the 2009 IECC). In addition, Idaho is a home rule state, so jurisdictions can choose to adopt higher requirements than the state. One interviewee reported that four Idaho jurisdictions have adopted the full version of the 2012 IECC for residential, which has more restrictive air leakage requirements than the state code.

C.1 Development and Adoption

Interview respondents reported that, overall, Idaho has been successful in adopting building energy codes. For commercial buildings, respondents believe this trend will continue and anticipate that Idaho will adopt the nonresidential 2015 IECC without amendments. For residential buildings, respondents voiced concern about the state's ability to adopt new energy codes in the near future due to home builder resistance, as described in further detail below.

C.1.1 Key Activities

NEEA's primary activity for supporting Idaho code development and adoption is funding the Idaho Energy Code Collaborative ("the Collaborative"). This group of various stakeholders, which includes builders, engineers, building officials, and utility staff, work together to brainstorm, vet, and develop residential and nonresidential code proposal recommendations. An Association of Idaho Cities (AIC) staff member facilitates the discussions through NEEA funding. Once the Collaborative comes to unanimous agreement on a code recommendation, it is sent to the Idaho code board, which then sends it to the Idaho legislature. Interviewees reported that since NEEA began the Collaborative in 2001, there has been much less resistance at the code board and legislature level, which has greatly advanced the adoption of new code requirements.

In addition, NEEA provides analysis, such as cost information, and funds studies to support code proposals. For example, NEEA recently funded an Idaho cost study to investigate the cost-effectiveness of different air exchange rates.

Interviewees reported that NEEA also hosts an Idaho energy code conference covering a variety of energy-code-related topics, and that NEEA periodically provides forums for various market actors from different states to discuss challenges and opportunities to the adoption and implementation of energy codes. Interviewees reported that these forums were helpful in sharing ideas across state lines. Finally, NEEA has developed and maintained a website pertaining to the Idaho energy code.[38] These activities support code adoption as well as implementation.

[38] : http://www.idahoenergycode.com

C.1.2 Key Barriers

All respondents identified increased home builder opposition as the primary barrier to the adoption of new residential energy codes, reporting that:

- Builders oppose code change primarily because of costs, and argue that increasing code requirements will price lower-income buyers out of the market. Builders generally do not believe national cost-effectiveness data, such as DOE studies, and want Idaho-specific (and sometimes Idaho *city* specific) data.
- Some builders are unreceptive to any kind of energy code changes and push back on the frequency of the three-year code cycle.
- Treasure Valley builders are particularly resistant to code changes, and a few vocal builders are dominating the Collaborative. Builders in Northern and Eastern Idaho are often more receptive to code changes. This is because Northern Idaho builders also tend to work in Washington state, and eastern Idaho builders are active in Idaho Falls; both Washington state and Idaho Falls have more stringent codes than Idaho state.
- Push back comes both from laggard builders and from above code (such as ENERGY STAR) builders. The latter group may be concerned that they will lose their market differentiation.
- Interviewees also reported that homebuilding associations are speaking directly with lawmakers and expressing cost concerns. Respondents were concerned that lawmakers are receiving a biased perspective if they only hear from builders.

Multiple respondents mentioned that builders are particularly resistant to air leakage requirements—both for reducing the maximum leakage acceptable and for requiring a blower door test. The current requirement (or default value, if the exchange rate is not tested) is seven air changes per hour at 50 Pascals (ACH50). Interviewees reported there had previously been a blower door testing requirement, but builders removed it in the last code cycle. Builders' main concern is the cost to achieve a tighter building envelope and to conduct (or hire a contractor to conduct) a blower door test. Two interviewees also mentioned indoor air quality concerns, such as insufficient natural ventilation and resulting condensation from homes being "too tight."

Respondents said there is much less resistance to code changes for nonresidential buildings. Cadmus probed interviewees as to why this was the case. Respondents could not answer definitively, but hypothesized that it may be because nonresidential designers and builders must achieve higher requirements for licensure. Cadmus also speculates that there may be a greater willingness to accept potential cost increases due to code changes in commercial buildings, because the relative cost to meet energy codes (compared with total design and construction costs) may be lower for nonresidential buildings.

C.1.3 Progress Toward Development and Adoption Outcomes

Interviewees reported that NEEA has had a major impact on Idaho building codes. One interviewee said that NEEA has probably had the biggest impact on code development in Idaho of any organization, saying "NEEA is priceless in the advancement of code in Idaho." Another interviewee reported, "It is hard to move code [in Idaho] without NEEA support."

A DOE study estimated that national energy savings average twenty-one-percent between the 2012 IECC and 2009 IECC, and estimated annual energy cost savings of $409 and $523 for IECC climate zones 5 and 6, respectively.[39] These DOE estimates assume that the 2012 IECC is adopted in full, although Idaho retained some code requirements at the 2009 IECC level.

C.2 Implementation

C.2.1 Key Activities

To support Idaho code implementation, NEEA's primary activity is providing and supporting training. NEEA funds an Idaho circuit rider and part of the salary for a DBS staff member to provide training for building officials, builders, and subcontractors. The Idaho circuit rider provides a mix of classroom seminars, one-on-one training with contractors, and "ride-alongs" with buildings officials to educate contractors, subcontractors, and building officials on energy code requirements. The DBS staff member has historically focused on training code officials, but is shifting to also directly train builders and subcontractors.

As another activity, NEEA provides funding for building departments to support code implementation. The building official respondents said this funding is critical to enabling them to train more officials and contractors, and/or purchase equipment such as blower doors, flow hoods, and infrared cameras for builders to borrow and for officials to use for training.

By providing funding for the Idaho circuit rider, DBS staff member, and building departments, NEEA helps deliver seminars that ensure the market is aware of code updates. These seminars are often free of charge and are typically targeted to building officials and/or builders and subcontractors, although generally available to anyone. One NEEA contractor is also working with manufacturers to pair the NEEA training with a manufacturer presentation so that builders are aware of available technologies to meet new code requirements. However, respondents said it is difficult to get contractors to attend these classroom trainings.

Program contacts and trainee respondents reported that training opportunities provide the right content and are valuable. Trainees indicated that they are using the information from the training in their jobs and are sharing the information with colleagues. One trainee said they "shared the whole-house fan information with [his] entire staff and gave some demonstrations," activities he said have had a positive impact on his ability to comply with the code.

Cadmus evaluated residential and commercial training material used throughout Idaho. The presentations were accurate, thorough, well organized, and sufficient in length. The duct and envelope testing training material is particularly excellent, and the most notable of all trainings evaluated for this study; it was designed to encourage audience participation and provide opportunities for attendees to practice what is taught.

Interviewees reported that both building official and contractor training are critical. Trained building officials pay more attention to energy code compliance, and can educate builders when they identify non-compliance at inspections. Interviewees reported that direct builder education

[39] https://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf

is also critical, so that builders can understand the code, why code has changed (the supporting building science), and how to implement the code, and that they are often most responsive to this one-on-one education from the circuit rider or DBS staff member. Interviewees reported that most builders comply in future projects after an official identifies a noncompliance issue.

C.2.2 Key Barriers

For residential buildings, the biggest barrier to code implementation identified by respondents is the lack of builder willingness to attend training. Even free trainings are perceived as a potential net opportunity cost to builders as it detracts from their time building homes. To try to address this barrier, NEEA contractors have switched some of their trainings from comprehensive, half- or full-day classes to one-hour modules focused on specific topics. They also began offering classes at 7:00 a.m. and will soon offer night trainings. These adjustments have increased builder attendance somewhat, but not hugely.

A few jurisdictions, including Idaho Falls, have requirements for builder continuing education units (CEUs), and respondents reported significantly higher builder training attendance in these jurisdictions. However, as part of their opposition to a proposed bill that would have required licensing for contractors, builders supported the passage of a law making it illegal for Idaho jurisdictions to require CEUs (although jurisdictions with existing CEU requirements were grandfathered in). However, one respondent reported that, at a recent Collaborative meeting, builders raised the idea of CEU requirements at the state level, so NEEA and its partners may revisit the CEU model for increasing builder attendance. As described in the Recommendations section, Cadmus recommends that NEEA consider supporting a requirement for builder CEUs.

As a secondary barrier, a few interviewees reported a lack of consistency within Idaho because it is a home rule state. Jurisdictions have a mix of requirements, which some interviewees reported leads to market confusion. Three interviewees reported that code enforcement varies considerably by jurisdiction.

Interviewees did not identify barriers for commercial code implementation in Idaho. They reported that licensed professionals—some of whom have CEU requirements—design and build commercial buildings and are generally more knowledgeable about code updates and willing to attend training. Interviewees also reported that commercial buildings tend to be easier to inspect because they typically include building plans that contractors generally follow. It was beyond the scope of this evaluation to verify whether these claims are correct.

C.2.3 Progress Toward Implementation Outcomes

Respondents were generally very positive about NEEA-funded efforts to support compliance. They reported that NEEA-funded training has significantly improved code implementation, reduced builder opposition to code change, and led to higher compliance rates, particularly for residential buildings. NEEA-funded training has also caused building officials to pay more attention to checking energy measures. There are more details below on the impact of NEEA efforts on Idaho code compliance.

However, one interviewee reported that NEEA could improve its coordination to notify partner utilities of upcoming trainings, so those partner organizations can help promote these events. One interviewee also requested that NEEA improve its state coverage for training, reporting that the Treasure Valley area has been overlooked for commercial code training.

C.3 Compliance

NEEA has funded and/or conducted several Idaho compliance studies:

- NEEA Codes and Standards Support Project: Market Progress Evaluation Report (Quantec 2008)
- Cadmus assessed compliance with Idaho's residential energy code, which is an amended version of the 2009 IECC
- DOE-funded compliance study: NEEA Commercial Lighting Study (presented as part of the DOE 2013 report)
- DOE-funded compliance study: NEEA Jurisdictional Study, which surveyed jurisdictions in NEEA's four states for compliance (presented as part of the DOE 2013 report)

The Cadmus (2013) study found that overall residential code compliance is high, although there was some measures with lower compliance rates, including minimum levels of wall insulation, floor insulation, and lighting requirements; and maximum levels of air leakage[40] and duct leakage. A few respondents mentioned the Cadmus (2013) study when reporting that overall residential code compliance is high, which indicates that these interviewees were aware of the study results. However, it was not clear if respondents were using the outcomes of the study; for example, it was not clear if respondents were focusing training on the measures identified with low compliance rates. Besides air leakage testing, respondents did not mention any specific areas as topics where NEEA-funded training focused its education.

Respondents reported that nonresidential (particularly commercial) building compliance is at or very close to 100%, because design professionals are involved. However, results of the two DOE-funded studies indicate that compliance may be less than one-hundred percent. The NEEA Commercial Lighting Study (DOE 2013)found that lighting designers and local code officials lack proficiency in the Lighting Power Density calculations and lighting control requirements of their local energy code. The NEEA Jurisdictional Study (DOE 2013) found noncompliance with some nonresidential energy code requirements, including for envelope sealing, duct sealing, and lighting controls. Both studies were based on small sample sizes, but indicate that commercial compliance may be less than one-hundred percent.

Interviewees reported that overall compliance with residential code is high, but not one-hundred percent. This agrees with findings from Cadmus (2013), which estimated compliance at ninety percent. Interviewees reported that compliance lags in some parts of Idaho, particularly the Treasure Valley area. Northern and Eastern Idaho have high compliance, perhaps because builders in Northern Idaho tend to also work in Washington state, and eastern Idaho builders are active in Idaho Falls; both Washington state and Idaho Falls have more stringent codes than

[40] The current Idaho code does not require air leakage testing, but a previous version did.

Idaho state. Several respondents said that builders who are active in regions with more stringent code requirements tend to build homes to that higher level even in jurisdictions without these requirements.

Respondents reported that residential code compliance has increased, partially due to NEEA activities. They reported that building officials typically check for compliance with energy requirements, and that officials still view life safety issues as more critical, but many had ignored energy requirements prior to NEEA-sponsored training. Respondents also reported that NEEA training has increased implementation of code by builders.

Literature reveals that Idaho residential code compliance has increased. The Quantec (2008) study found compliance rates of forty-seven percent and twenty-six percent for Idaho single family and multifamily homes, respectively, with the 2003 IECC in effect at the time. This is much lower than the ninety percent compliance rate found in the Cadmus (2013) study.

C.3.1 Idaho Findings and Recommendations

Overall, respondents were very positive regarding NEEA's activities supporting the development, adoption, and implementation of energy codes in Idaho, and Idaho's adoption of the 2012 IECC for nonresidential and residential code (albeit with amendments) illustrates the success of NEEA's activities. As directly stated by two respondents, and paraphrased by many others, NEEA should "keep doing what they're doing." One respondent said, "NEEA's programs are invaluable to the state of Idaho." Regarding the staff, he said, "I couldn't praise them more," and another respondent reported, "NEEA's been great to work with."

All respondents viewed NEEA's role in Idaho code development as critical, and all reported that the training provided by NEEA (through NEEA-funded contractors and through grants to building departments) has made a major impact on increasing compliance with code. One building inspector, in describing the NEEA-funded code training activities, stated, "We wouldn't be where [we are] now in terms of energy codes without them."

Table 14 shows progress for Idaho relative to NEEA logic model outcomes.

Table 14. Idaho Logic Model Progress Summary

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency		X		Achieving for nonres; Not achieving for res
Sphere of regulation expanded towards whole building based on actual energy use		X		Code moving towards whole building, but not actual energy use
Implementation				
Building officials able to enforce codes			X	
Market actors able to design and construct to codes		X		Achieving for nonres; Not achieving for res
Increased code compliance			X	
Compliance				
Data on how to modify education & training	X			
Data for states to comply with DOE requirements			X	Data is available, but not clear if market actors are using compliance data
Energy savings			X	

The following findings and recommendations highlight the ongoing needs and issues respondents noted throughout the state:

Finding: Overall, respondents were very positive regarding NEEA's activities and viewed NEEA's role in Idaho code development as critical. One respondent said, "NEEA's programs are invaluable to the state of Idaho," and training was viewed as very effective.

Recommendation: As stated by several respondents, NEEA should "keep doing what they're doing." However, there are opportunities for NEEA to make adjustments or expansions to its Codes Program to meet the needs of an evolving market (described below).

Finding: The NEEA-funded Collaborative has successfully supported the adoption of new residential and nonresidential codes. However, due to increasing builder opposition—particularly from a few Treasure Valley builders—interviewees are concerned that the Collaborative will not be able to achieve similar success with residential code adoption in the near future. Several respondents said the Collaborative appears to be stagnated in terms of residential code adoption.

As one important example, builders have raised strong opposition to changing the air leakage requirement from the current residential code for Idaho – three ACH50 (from IECC 2009) and allowing a visual inspection, to seven ACH50 (in both IECC 2012 and IECC 2015) and mandatory blower door testing. However, Idaho-specific research shows that decreasing air leakage is cost-effective, especially for smaller homes.

Recommendations: To break stagnation, dedicate at least a portion of Collaborative time to code changes that should be less contentious (such as for clarifying language). For more contentious measures, if there appears to be no Collaborative consensus for adopting the 2015 IECC requirement this cycle, consider options between the current Idaho code requirement (2012 IECC for most measures) and 2015 IECC. Continue to highlight at Collaborative meetings (and other forums that include builders and other market actors) the cost-effectiveness of proposed energy measures, and highlight studies showing that consumers want greater energy efficiency and are willing to pay for it. For the example of air leakage, consider recommending a maximum air leakage value between three and seven ACH50, with mandatory blower door testing. Leverage the Idaho-specific research and clearly communicate paybacks, particularly for smaller homes. As part of implementation, work with building officials and/or HERS raters to track blower door results to inform future code requirements.

Finding: NEEA's primary activity has been supporting the Collaborative. Respondents reported that builders are speaking directly with lawmakers and expressing cost concerns.

Recommendation: Work directly with the governor's office or with the state legislature to ensure they have information from more than one source. Highlight the cost-effectiveness of energy measures and other benefits (such as comfort and indoor air quality).

Finding: Overall, interviewees reported that NEEA's activities have been tremendously helpful in increasing code implementation and compliance. Respondents identified NEEA's key impacts as funding code training (through the Idaho circuit rider and part of a DBS staff member's salary) and providing grants to building departments. However, respondents said it is difficult to convince builders to attend training, even if it is free, because of builders' perception that training time represents an opportunity cost. NEEA has increased builder participation somewhat by adjusting training delivery, including offering shorter modules early in the day. Idaho Falls requires CEUs for contractors and has higher builder attendance at training sessions than other parts of Idaho, but there is a state ban on CEU requirements in jurisdictions that do not already have them in place.

Recommendation: Collaborate with trainers from other states to identify successful strategies, such as online training modules.[41] Support a requirement for builder CEUs or provide an incentive for builders that meet CEU requirements. For example, discuss with building departments the feasibility of offering faster permitting times or reduced permitting fees for builders that meet a minimum training requirement. In addition, discuss with manufacturers the possibility of providing in-field training to builders, to illustrate how builders can use manufacturers' products to meet code requirements.

Finding: NEEA provides some opportunities for code market actors from different states to discuss their challenges and opportunities for code adoption, development, and implementation (e.g., forums and conferences). Interviewees found these forums extremely valuable.

[41] This information is based on a personal communication between Cadmus and Matt Baker, supervisor of the Pacific Gas & Electric Energy Training Center in Stockton, California. Based on Cadmus' experience, the Energy Training Center has strong training attendance from residential contractors and subcontractors.

Recommendation: Continue to support, and to increase if possible, collaboration forums. Focus discussions on challenges facing each state served by NEEA to transfer lessons learned. To inform Idaho, include discussions on successful strategies for countering builder opposition to code changes, and methods to increase builder attendance at code training.

Finding: A small study found that both commercial lighting designers and local code officials in states served by NEEA lack sufficient proficiency in the lighting power density calculations and lighting control requirements of their local energy code (DOE 2013).

Recommendation: Particularly as Idaho (through the IECC) adopts new and more nuanced commercial lighting requirements, investigate the market's implementation and compliance with these measures. Conduct a code compliance study for nonresidential commercial lighting code requirements to verify findings of the small study.

Appendix D. Montana State Progress Evaluation - Additional Detail

D.1 Development and Adoption

Montana's Building Codes Bureau reviews and adopts the set of codes that are to be enforced at the state level, including the energy codes. The commercial energy code applies to all buildings that are not otherwise considered residential within the state. On the residential side, local jurisdictions (cities and counties) are not mandated to enforce any codes. However, if a local jurisdiction chooses to adopt a code, it must be the state code without modification. It is estimated that roughly forty percent of new homes are constructed within jurisdictions that enforce the energy code; the remaining sixty percent are constructed in areas outside of those jurisdictions.[42] The state provides electrical and plumbing inspections only to such homes. State law requires that homes constructed outside of jurisdictions that enforce the code comply with the energy code through a "self-certification" process in which builders must provide the homeowner with a written statement that the home meets the state energy code requirements.[43] The Energy Code Compliance label provided by the state may be used to meet the self-certification requirements. Montana's Department of Labor and Industry (DLI) maintains a list of certified jurisdictions that have adopted building codes.[44]

D.1.1 Key Barriers

When asked to identify barriers to code adoption, Montana commercial respondents agreed in large part with the barriers included in the logic model. Because the code is mandatory for all commercial buildings, respondents explained that development and adoption occurs regularly and with few obstacles. The residential sector also mentioned the barriers in the logic model and provided state-specific barriers as well, most of which can be attributed to the rural population of the state. These barriers include resistance to regulation, lack of participation in the development and adoption process, and impractical code measures.

As with many rural states, Montana was characterized by many respondents from all building professions in both the residential and commercial sectors as having a general disinterest in regulation and change. A commercial respondent remarked that the state has "angst against regulation of any kind," while a state agency contact added that there is a "general anti-regulation mentality across the state." The resistance to regulation, coupled with the lack of enforcement at the jurisdiction level, has resulted in little interest in, and general opposition to, the code in general.

Active resistance coupled with disinterest in code has impacted participation in the residential code development and adoption processes. A state agency respondent explained that participation by home builders is especially impacted: "basic builders are harder to reach and

[42] The Montana Residential Energy Code Compliance report, prepared by Cadmus for NEEA in 2012, estimates that two-thirds of new construction in the state occurs within self-certifying areas. Respondents from NCAT provided an updated estimate of 60% of new construction occurring within self-certifying areas.
[43] All new homes in Montana are by law required to meet the energy code. However, those in the self-certification areas do not receive plan review or inspection.
[44] http://bsd.dli.mt.gov/building-codes-permits/certified-government

harder to bring along in the development process because of how rural the state is." Lack of participation decreases builder agreement with the code, as noted by respondents, and many builders continue to view adoption as voluntary and unnecessary.

Lastly, many builders and code officials are uncertain of the practicality of many of the code measures in the rural setting, particularly performance testing. As a result, opposition to a code that has mandatory third-party requirements has increased.

D.1.2 Key Activities

Montana respondents indicated that the main source for energy code development and adoption are the industry leaders funded and supported by NEEA. Most notable of these organizations are the National Center of Appropriate Technology (NCAT) and the Department of Environmental Quality (DEQ). Through contracts with these organizations, NEEA's primary energy code effort is the Montana Energy Code Collaborative, a stakeholder advisory group formed in 2012 and modeled after the successful Idaho Energy Codes Collaborative.

The Montana Energy Code Collaborative meets four or five times each year and comprises agents from the state government, representatives from utility investors and electric cooperatives, environmental advocates, green building advocates, members of home builder associations, and various other stakeholders depending on the meeting topics. The facilitator of the collaborative noted the absence of builders at these meetings. The code collaborative is focused on a wide variety of energy-code-related issues, including updating the energy code, promoting code compliance, and building relationships within the industry.

Respondents agreed that the code collaborative was the key to adopting the 2012 IECC, due in large part to the constructive working environment the collaborative created between the Montana Building Industry Association (MBIA) and energy code advocates. According to an association contact, the MBIA "has always been [the] most influential voice opposing energy codes becoming more stringent." The collaborative weakened opposition to the code by encouraging compromise and building trust between advocates and the MBIA, resulting in the adoption of the 2012 IECC. A state agency contact stated "the energy code would possibly have not been adopted without NEEA's contributions to the collaborative." While the MBIA is "still cautious and not supportive of added regulation," they are now "using the code collaborative as a resource for information and training," a result of the strengthened relationship.

Additionally, respondents noted that NEEA's involvement in advisory meetings, relationships with stakeholders and utilities, influence on the ENERGY STAR and Next Step Homes programs, and thoughtful participation in the code development process are key to successful energy code adoption in the state. NEEA "develops code changes alongside the people we trust," an association contact remarked, a concept that surfaced during many of the interviews. Respondents indicated that NEEA understand and caters to the specific needs and ideals of the state, acting as an advisor rather than a rule maker in an effort to overcome the fear of regulation. "NEEA is the voice of reason," observed a collaborative participant, "they do a good job of aiding us in our decisions. They give us all of the information and explain the benefits so we can draw our own conclusions; we are well informed and feel empowered."

D.1.3 Progress Toward Adoption and Development Outcomes

Montana successfully adopted the 2012 IECC with few amendments, due in large part to NEEA's support of the code collaborative. Respondents indicated that while the industry is preparing for the next adoption cycle, there is not yet a consensus on whether the state aims to adopt the 2015 IECC or the 2018 IECC. Progress is being made in ensuring all of the jurisdictions are capable of meeting recent and future code requirements, such as the blower door testing requirement that recently became mandatory for all residential homes. Respondents indicated that the scope of the code is expanding, in that they are slowly looking at system components and technologies that were not previously in the code, such as mechanical ventilation. However, there is no indication that case studies are being conducted or that the sphere of regulation is expanding.

D.2 Implementation

DEQ, NCAT, DLI, and NorthWestern Energy, through funding from NEEA, provide the most significant implementation activities across the state, including training, outreach, and technical assistance. As was the case with energy code adoption, Montana's rural setting and the differences in enforcement among the jurisdictions are the greatest barriers to implementation identified by interview respondents.

D.2.1 Key Barriers

Montana's commercial energy code is supported at the state level and mandatory for all nonresidential buildings, which, according the interview respondents, makes a significant difference in implementation when compared to the residential code. Residential respondents indicated that there are "significant differences between jurisdictions and how they enforce the code." Jurisdictions that are not actively enforcing the code have little interest in energy code training, technical assistance, or any of the other implementation activities offered by the agencies and organizations providing code support. Respondents identified that getting code officials to attend training is especially difficult and that, as explained by a state agency contact, there is a "perception amongst home builders that [they] don't have to build to codes at all."

The other significant barrier to residential implementation is the rural setting of the state. Montana is "geographically challenged," explained a state agency contact, which has resulted in "no infrastructure" to support the implementation of energy code provisions, such as performance testing requirements. "There won't be testing done because of proximity," a code collaborative member stated, "certified professionals and equipment are four to six hours away [from rural areas]. No one is willing to make that distance work."

Respondents also noted that there are fewer than a dozen blower door capable contractors in the entire state and no more than two HERS raters, so access to qualified energy professionals is limited.

Finally, Montana has the unique barrier of homebuyers building their own homes in areas outside of city limits, where the majority of growth is occurring.[45] In many cases, as explained by a state agency respondent, "homebuyers are the home builders, so education is low. They often forgo the design process to save costs or because they don't think they need it, and they are harder to reach with training."

Commercial respondents indicated that there are no standout barriers to implementation; market actors understand that the energy code is mandatory and welcome training and education as a means to complying per their professional responsibilities.

D.2.2 Key Activities

As with the other states, "NEEA is actively funding different organizations to educate and provide training to various audiences" throughout Montana; the primary activities driving residential and commercial energy code implementation are training, outreach, and technical assistance. DEQ, NCAT, DLI, and NorthWestern Energy provide the majority of the training opportunities and outreach throughout Montana, often collaborating to create and distribute relevant material. The DEQ and NCAT offer energy code overview trainings, code update trainings, on-site visits to code officials, webinars, conference workshops, and performance equipment training, and they cover the use of infrared cameras and blower door testing. DEQ, NCAT, and DLI develop and distribute outreach material to building departments and code officials, including summary booklets for both the residential and commercial energy codes.

Respondents noted that Montana is doing exceptionally well targeting the areas of the market that could benefit most from energy code training, and is doing so in creative ways to overcome state-specific barriers:

- **Home Builder Training.** DEQ "pay[s] particular attention to providing training to builders and homebuyers outside of city limits in an attempt to show them the benefits of the energy code," an employee of DEQ noted, adding that DEQ attends "many home shows since there is a large market of people building their own homes or just meeting with a contractor." DEQ sends energy code mailings[46] to new construction and subdivisions and has engaged electrical inspectors in the code process by enlisting them to pass out compliance material and energy component labels to all new construction.

[45] Data for the percentage of homes being built by homebuyers (homebuyers building their own homes) is difficult to quantify in Montana for several reasons, although primarily a result of untracked self-certifications in jurisdictions that do not enforce and energy code. Respondents estimate around 2% of homeowners are building their own home entirely with another 3-4% building 30 – 70% of their home. Most homeowners building their own homes will likely hire one or more of the following contractors: foundation, framing, plumbing, electrical, insulation, or HVAC. Additionally, respondents noted that Montana Habitat for Humanity and Mutual Self Help programs build between 70 and 100 new homes each year throughout the state, which are typically 60-70% homeowner and volunteer built. Although researching self-built homes any further is out of the scope of this project, respondents suggested the following contacts and resources for homeowner self-built information: Montana Building Industry Association; permit data from larger building code departments; onsite code inspectors; state electrical permits taken out by homeowners; and larger building supply retailers, such as ProBuild, BMC West, Home Depot, Lowe's, Kenyon Noble, Western Building Supply, and Sliders.

[46] The DEQ sent letters to over 2,300 builders in December 2015.

DEQ also partners with the utilities to demonstrate how to receive utility credit for above-code homes.

- **Design Professional Training.** DEQ regularly attends local annual engineer and architect conferences, as participants and presenters. Additionally, DEQ regularly mails energy code outreach materials targeting the Montana chapter for the American Institute of Architects.
- **Performance Testing Training.** Following complaints by major building departments that there is a limited number of local professionals capable of providing blower door tests, NEEA purchased and provided seven blower door infrared cameras and duct blasting equipment to seven builder associations throughout Montana with the intent of making the equipment more accessible. NCAT provides training on how to use the equipment, which is mandatory for anyone interested in checking the equipment out.
- **Real Estate Professionals Training.** To maintain their licenses, real estate professionals are required to take ongoing education courses. DEQ offers two-hour energy code training courses to meet these requirements. DEQ estimates that forty percent of the real estate sales staff in Montana have attended one or more of the training sessions.[47]

Unlike many other training providers in the Northwest, DEQ provides course evaluations and tracks feedback from training participants. The Montana training contact interviewed for the market evaluation observed "training has been well accepted and evaluations have been positive." Cadmus also interviewed training attendees, who were satisfied with the material, are sharing knowledge with the people they interact with, and would recommend the training to colleagues. The trainee that attended an on-site DEQ training stated that it given them the ability to demonstrate blower door tests to other contractors in the field. The only critique provided by the respondents is to offer the field training more often.

Cadmus also evaluated the training and outreach material provided by a Montana training contact, an employee of DEQ. The material consisted of informational reference documents for those in the residential building, design, and enforcement industry, as well as a guide for prospective homebuyers on what makes a home energy efficient. The materials were satisfactory and thoroughly cover the topics, are well organized, and are sufficient in length. The documents will be very useful to educate the industry and can be used as a handout in classroom training programs to enhance presentation material.

However, the materials missed opportunities to discuss the importance of energy measures. For example, the materials mention basement wall insulation but not the benefit of insulating the walls, and describe high efficacy lighting but not the benefit of more efficient lighting. In some instances, the handout materials have descriptions that may violate other building codes. In one case, the handout states that a heated crawlspace with vents should have the vents sealed shut; this is a violation of the International Residential Code foundation requirements, which state that you cannot provide vents in a crawlspace that is heated.

[47] http://database.aceee.org/state/montana

D.2.3 Progress Toward Implementation Outcomes

Montana excels at identifying and targeting training and outreach efforts to the market actors with the most need. Respondents identified inconsistencies with certified jurisdictions enforcing the code, and while respondents assume that designers and architects are designing to the code, there is both little plan review on the commercial side and frequent occurrences of not using a designer on the residential side.

D.3 Compliance

NEEA contracted with Cadmus to assess compliance with Montana's residential energy code, which is an amended version of the 2009 IECC. Although many local governments enforce the code in Montana, many jurisdictions allow builders to self-certify compliance. Average compliance overall is moderately good, ranging from approximately fifty percent to seventy-two percent, depending on the calculation methodology. Compliance was significantly higher in jurisdictions that enforce the code rather than allowing self-certification

D.3.1 Key Barriers

Similar to adoption and implementation, the lack of energy code enforcement is the greatest obstacle to residential compliance. A state agency contact remarked, "[Montana has] good compliance in towns and counties that enforce the code, but outside of those cities...not so much." As noted by respondents, there is little desire to comply with a code that is not enforced. In jurisdictions that are enforcing the code, the lack of involvement with and knowledge of code provisions also adversely impacts compliance. A contact from DEQ offered, "there are forty-some jurisdictions that enforce the code, but in three-fourths of those, the code officials have limited knowledge and limited ability."

Competition in the market and cost also impact residential compliance. The builder market in Montana is large and competitive, with approximately 2,300 active builders throughout the state[48]. Builders are concerned about the cost associated with meeting code requirements, such as air sealing and HVAC sizing. In jurisdictions without enforcement or a drive from consumers for energy efficiency, builders are not building to code to spare any increase in expense. The Montana training contact added, "in a competitive market and if there are no consequences, builders just won't [comply]."[49]

Lastly, residential respondents identified homebuyers and consumers as a barrier to compliance, adding that the buyer market is not currently creating the demand for energy efficiency, so builders are not trying to comply.

[48] The DEQ sent letters to over 2,300 builders in December 2015.
[49] The Montana Residential Energy Code Compliance report, prepared by Cadmus for NEEA in 2012, found the average yearly number of housing starts from 2008 to 2010 to be 3,337 (important to note that the economic downturn that began in late 2008 likely effected the average number of housing starts over this period of time). With approximately 2,300 builders building just over 3,000 homes, it is assumed most builders build very few homes and that increased cost is a great concern.

On the commercial side, respondents indicated that the greatest barrier to compliance is that building departments are not reviewing building plans and specifications. An association contact remarked, "code officials feel that if it has an architect or engineer stamp on it, it's compliant." There is a general consensus that buildings designed and constructed for the state or federal government are compliant, but outside of state buildings, "no one is checking plans for commercial so there's a good chance of noncompliance." Respondents also said on-site inspections are deficient; a member of the collaborative stated, "for commercial, much goes unexamined. [Inspectors] check onsite when they can, but they don't put a lot of effort into it."

D.3.2 Key Activities

According to respondents, the key to compliance in Montana is the proactive effort by DEQ and NCAT, funded by NEEA, to target segments of the market with strategic implementation activities. The effort and outreach put towards the training and education home builders and homebuyers is increasing market awareness and preparing the market for greater compliance with the energy code. A respondent from DEQ remarked, "we do a lot of outreach to homebuyers hoping that they will create the demand for energy efficiency and code compliance." This outreach is a creative and influential means to increasing compliance, though positive results are not yet evident.

In certified jurisdictions that are already enforcing the residential energy code, respondents recognized the requirement for documentation, such as REScheck, as a way to influence compliance. Additionally, utilities such as NorthWestern Energy are offering utility savings to residential customers that build homes better than code, creating a market for increased energy efficiency.

D.3.3 DOE Certification Requirements

The DOE certification contact from Montana recognized NEEA's efforts through contracts with NCAT and DEQ as having a positive influence on meeting DOE's certification requirements, which have helped improve compliance overall. However, he feels as though "DOE's ninety percent compliance [target] is a moot point."

The same respondent noted that the residential compliance study supported by NEEA was beneficial to improving compliance in the state overall. He added, "the compliance studies are useful in providing a picture of energy code enforcement in the state. It was important to do the study and it helped us see and explore varying compliance characteristics." He indicated that the study was an excellent investment, but sees little benefit in doing another: "I wouldn't say we are ready for another [study] or that we would learn anything different from one in the future."

D.3.4 Progress Toward Compliance Outcomes

Although a residential compliance study was performed in Montana, respondents indicated that it is not used in training or education. A respondent from DEQ added, "we don't use the compliance study for anything. We never refer to it because we don't think it accurately

represents our state."[50] The 2012 IECC with Montana amendments is achieving energy savings throughout the state. In a cost-effectiveness study PNNL performed for the State of Montana, they compared the 2012 IECC with Montana amendments to the DC Energy Conservation Code and found that the net annual consumer savings—including energy savings, mortgage cost increases, and other associated costs in the first year of ownership—average $180.00 when following the 2012 IECC.[51]

D.3.5 Montana Findings and Recommendations

Table 15 summarizes the progress Montana has made since 2011 toward achieving the outcomes identified in the logic model. Currently, Montana is not developing case studies or lessons learned, building officials are not able to enforce the code, and data from compliance studies is not being used to inform training and education.

Table 15. Montana Logic Model Outcomes Progress

Logic Model Outcome	Not Currently Achieving	Progress Towards Achieving	Achieving	Other / Notes
Adoption				
Lessons learned, case studies	X			
New state codes in place			X	
Expansion of code scope		X		
Stage set for increased stringency			X	
Sphere of regulation expanded	X			
Implementation				
Building officials able to enforce codes	X			
Market actors able to design and construct to codes		X		
Increased code compliance		X		
Compliance				
Data on how to modify education and training	X			
Data for states to comply with DOE requirements		X		
Energy savings			X	

The following findings and recommendations highlight the ongoing issues and needs respondents noted throughout the state:

[50] Respondents did not feel as though the sampling method was appropriate for Montana given the rural landscape and discussed the difficulty in finding homes in the right stage of construction to effectively conduct the study. One interviewee stated: "Finding builders willing to participate, the right mix of houses, and getting houses at the right time is a major challenge for compliance studies. It is easier where there are building permits and houses are in smaller geographic area, but still not easy. We had all of those challenges." Another said, "There were many obstacles to the study—it was hard to get builders outside of the jurisdictions to agree to a compliance study and even harder to find houses at the right time of construction in rural areas. The study isn't given a lot of credibility due to the issues in sampling."

[51] https://www.energycodes.gov/sites/default/files/documents/MontanaResidentialCostEffectiveness.pdf

Finding: Home builders are not participating in code development and adoption processes, nor are they participating in or sending an adequate number of representatives to the Energy Code Collaborative meetings.

Recommendation: Support an energy code circuit rider position modeled after the Idaho circuit rider position, which has proven successful in a rural state. Market the circuit rider as a representative for home builders, particularly with respect to participation in the collaborative meetings.

Finding: Use of the blower door testing equipment provided by NEEA is limited.

Recommendation: Support the contractor in advertising and marketing the training and equipment available to smaller jurisdictions to use to meet performance testing requirements. Further, fund a training effort in which the testing equipment is taken to each jurisdiction and used on-site to train and educate builders, code officials, and other energy professionals.

Finding: Homebuyers and consumers are not educated in energy efficiency or the energy code and are frequently acting as home builders.

Recommendation: Since efforts are currently being made to educate homebuyers, and respondents indicated that homebuyers are hard to reach with training, distribute outreach information where homebuyers are purchasing materials, such as supply companies and home improvement stores. Work with the local stores to label code compliant materials on store shelves and offer educational material at the contractor desk of big-box stores. Continue to fund free blower door tests for new homes, mail information, and attempt to reach home builders through training.

Finding: Building departments are not reviewing plans for commercial buildings.

Recommendation: Visit building departments and offer plan review training. Also perform plan reviews on a random sample of buildings across the state to determine if design professionals are generally complying with the code. These case studies can then be used to inform training for both the design professionals and plan reviewers.

Finding: Home builders are not building to code in order to cut costs and to remain competitive in a large market.

Recommendation: Collaborate with utilities or other organizations to develop a rebate or incentive for building above code.

Finding: There are over 40 jurisdictions that enforce the code, but code officials may be limited in knowledge and ability to enforce. (Respondent estimated 75% of code officials in certifying jurisdictions are unable to effectively enforce the code).

Recommendations: Focus efforts on making certifying jurisdictions more effective. Provide training to code officials, onsite training, and support.

Finding: Homeowners are not aware of or educated about HERS ratings and the number of HERS raters in Montana is very low (respondents estimate 1 – 2 certified HERS raters).

Recommendation: Educate homeowners and other interested parties on the value of HERS ratings to prepare them for required HERS ratings in future code versions. Support utility interest in new construction and HERS ratings and encourage utility incentives for HERS scores. For example, a utility could offer $500 for a home with a HERS rating under 70. This would show builders that there is interest in code compliance and would also encourage growth in the HERS rater field.

Appendix E. Document Review and Research Resources

Cadmus reviewed the following resources and training material to gain general knowledge of the energy code markets in each northwest state.

Table 16. Additional State Resources

Washington	
2015 Commercial WSEC Code Text	http://lawfilesext.leg.wa.gov/law/wsr/2016/03/16-03-072.htm
2015 Residential WSEC Code Text	http://lawfilesext.leg.wa.gov/law/wsr/2016/02/16-02-127.htm
2012 Seattle Energy Code Overview	http://www.seattle.gov/dpd/codesrules/codes/energy/overview/
2012 Seattle Energy Code Text	http://www.seattle.gov/dpd/cs/groups/pan/@pan/documents/web_informational/p2235344.pdf
2015 Seattle Energy Code Draft Text	
Northwest ENERGY STAR Program	http://www.northwestenergystar.com/
Northwest Energy Efficiency	http://www.neec.net/energy-codes
NEEC Air Barrier Management Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NREC-Air-Barrier-07-2011.pdf
NEEC Continuous Insulation Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NREC-Continuous-Insulation-07-2011.pdf
NEEC Daylighting Controls Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NEEC-Day-Lighting-07-2011.pdf
NEEC Economizer Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NEEC-Economizer-11-2011.pdf
NEEC Energy Recovery Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NEEC-Energy-Recovery-11-2011.pdf
NEEC Solar Gain Management Fact Sheet	http://neec.net/sites/default/files/neec_codes_training/NEEC-Solar-Gain-07-2011.pdf
2012 WSEC Envelope Compliance Forms Webinar	http://www.neec.net/2012-wsec-envelope-compliance-forms-webinar-recording
2012 WSEC Lighting Compliance Forms Webinar	http://www.neec.net/2012-wsec-lighting-compliance-forms-webinar-recording
Washington State University Extension Energy Program	http://www.energy.wsu.edu/Home.aspx
WSU Energy Code Hotline	http://www.energy.wsu.edu/InformationCenters.aspx https://www.energycodes.gov/sites/default/files/documents/ECodes2015_13_02_Rosenow.pdf
Senate Bill 5854 Text	http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/Senate%20Passed%20Legislature/5854-S2.PL.pdf
Status of the WA State Energy Code	https://www.energycodes.gov/adoption/states/washington
Washington State Building Code Council	https://fortress.wa.gov/ga/apps/sbcc/default.aspx
Puget Sound Energy	https://pse.com/Pages/default.aspx
Integrated Design Lab	http://idlseattle.com/
Ecotope	http://www.ecotope.com/
ACEEE State Score Card	http://database.aceee.org/state/washington
Oregon	
Oregon Building Code Division	http://www.cbs.state.or.us/external/bcd/programs/online_codes.html

2014 OEESC Code Text	http://ecodes.biz/ecodes_support/free_resources/Oregon/14_Energy/14_OREnergy_main.html
2014 OEESC Summary of Amendments	http://www.bcd.oregon.gov/programs/energy/2014oeesc_amendments/2014_OEESC_new_amendments.pdf
Energy Interpretations	http://www.bcd.oregon.gov/programs/energy_interps.html
Oregon Reach Code Text	http://www.bcd.oregon.gov/committees/11reachcode/Oregon_Reach_Code.pdf
Senate Bill 79	https://olis.leg.state.or.us/liz/2009R1/Downloads/MeasureDocument/SB79/Enrolled
Status of State Energy Code	https://www.energycodes.gov/adoption/states/oregon
Energy Trust of Oregon	https://energytrust.org/
Oregon Home Builders Association	http://oregonhba.com/
ACEEE State Scorecard	http://database.aceee.org/state/oregon
Oregon Energy Efficiency Code Committee	http://www.cbs.state.or.us/bcd/committees/14oeesc.html
Oregon Department of Energy	http://www.cesa.org/membership/cesa-member-profiles/oregon-department-of-energy/
Idaho	
Idaho Energy Code	http://www.idahoenergycode.com/about-idaho-energy-code
Blaine County BuildSmart	http://www.co.blaine.id.us/vertical/sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/BuildSmart_Scenarios.pdf
Blaine County BuildSmart Text	http://www.co.blaine.id.us/vertical/Sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/2012_IBC_IRC_ISPSC__2-24-16_final.pdf
Idaho Energy Collaborative	http://idahoenergycollaborative.weebly.com/about-us.html
Idaho Division of Building Safety	https://dbs.idaho.gov/
Idaho Code Collaborative	http://www.idahoenergycode.com/idaho-energy-code-resources/marketing-plan-idaho
EcoEdge	http://www.buildingecoedge.com/index.html
Idaho Power	https://www.idahopower.com/
Status of State Energy Code	https://www.energycodes.gov/adoption/states/idaho
ACEEE State Scorecard	http://database.aceee.org/state/idaho
Association of Idaho Cities	http://idahocities.org/
Idaho Association of Building Officials	http://www.idabo.org/
Idaho Governor's Office of Energy Resources	http://energy.idaho.gov/
Montana	
Montana Department of Environmental Quality	http://deq.mt.gov/
DEQ Residential Energy Code Website	http://deq.mt.gov/Energy/EnergizeMT/energycode
	https://deq.mt.gov/portals/112/Energy/EnergizeMT/Conservation/MTESG2015.pdf
Montana Energy Savers Guidebook	https://deq.mt.gov/portals/112/Energy/EnergizeMT/Conservation/MTESG2015.pdf
Montana Residential Energy Code Handbook	https://www.ncat.org/energy_services/docs/MT_Resid_Energy_Code_Checklist_121514.pdf
Energy Code Guide for New Home Construction	http://deq.mt.gov/Portals/112/Energy/EnergizeMT/Conservation/Energy%20Code/EnergyCodeGuideChecklistDEC2014.pdf

Residential Buildings Energy Code Summary	http://deq.mt.gov/Portals/112/Energy/EnergizeMT/Conservation/Energy%20Code/EnergyNotes_RESID_DEC%202014.pdf
National Center for Appropriate Technology	https://www.ncat.org/
Montana Residential Energy Code Update – 2014 Presentation	https://www.ncat.org/energy_services/code/residential/
Montana Commercial Energy Code Update – 2014 Presentation	https://www.ncat.org/energy_services/code/commercial/
Montana Residential Energy Code Update	https://www.ncat.org/wp-content/uploads/2014/04/Resid_En_Code_4Hour_Clean_041015.pdf
Montana Residential Energy Code Checklist	https://www.ncat.org/energy_services/docs/MT_Resid_Energy_Code_Checklist_121514.pdf
Montana Energy Code Update 2012 IECC Commercial: Overview and Changes	https://www.ncat.org/energy_services/docs/Handout_Section_1_MT_Com_En_Code_Update_2012_IECC.pdf
Commercial 2012 IECC VS ASHRAE 90.1-2010: A Summary Comparison for Montana	https://www.ncat.org/energy_services/docs/Handout_Section_3_MT_Com_En_Code_2012_IECC_VS_ASHRAE_90_1.pdf
Montana Energy Code Update 2015: ASHRAE 90.1 – 2010 Overview of Changes	https://www.ncat.org/energy_services/docs/Handout_Section_2_MT_Com_En_Code_90_1_Update.pdf
NCAT Trainings	https://www.ncat.org/energy-code-trainings /
Montana Department of Labor and Industry	http://dli.mt.gov/
NorthWestern Energy	http://www.northwesternenergy.com/
ACEEE State Energy Scorecard	http://database.aceee.org/state/montana
Status of State Energy Code	https://www.energycodes.gov/adoption/states/montana

Appendix F. Logic Model Detail

Figure 1. Codes Program Logic Model, Original Provided by NEEA

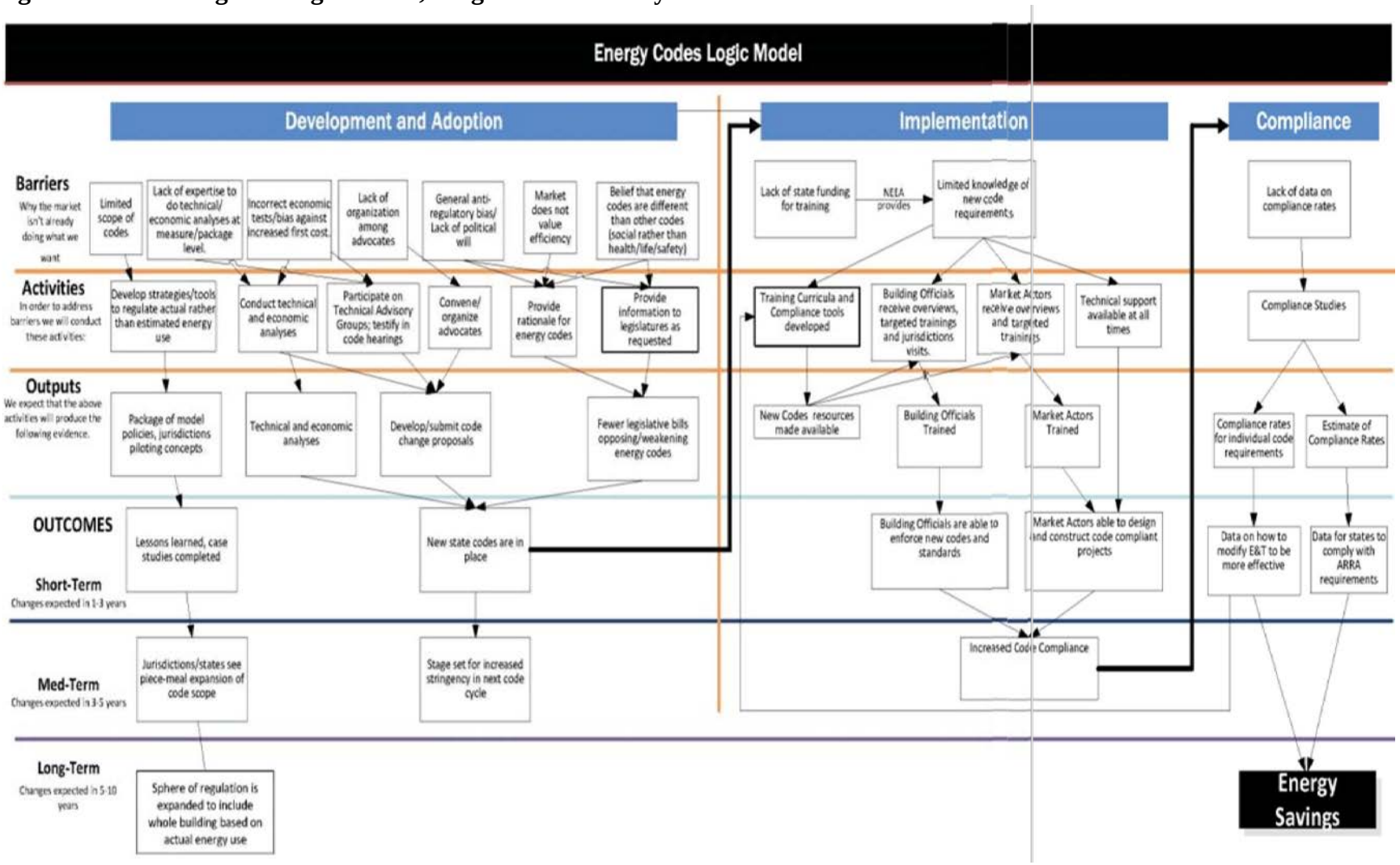
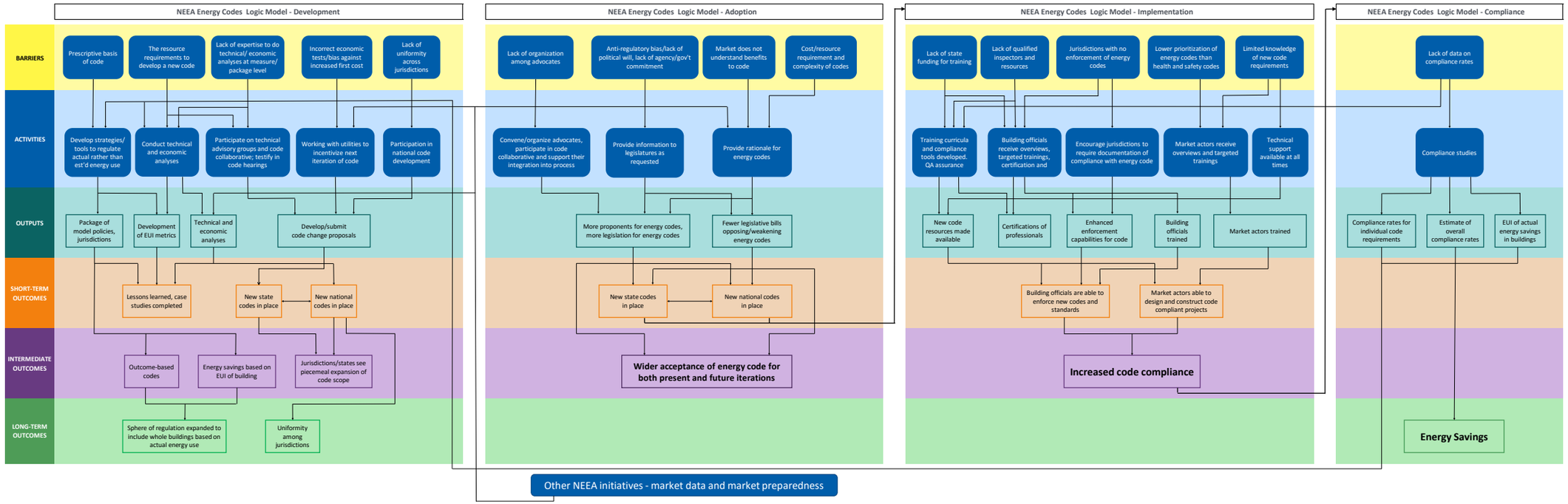


Figure 2. Codes Program Logic Model, Revised by Cadmus



Appendix G. Methodology Detail for Evaluation of Progress and Process

Table 17 provides additional detail on the interviews conducted to assess Codes Program progress and the program's processes. Each row in the table represents an interview candidate although names are not shown to protect confidentiality. Cadmus team interviewers were able to complete interviews with all but seven of the candidate interviewees.

An "X" indicates the candidate was interviewed due to the role indicated by the column label. For NEEA Trainers, an "R" or "C" indicates that the candidate delivered residential or commercial training, respectively.

Table 17. Detail on Interviewee Roles in State-Specific Interviews

State	State Agency	State Committee	Assoc./University	Consultant	Utility	NEEA Trainer	DOE Certification	NEEA Activity	Agencies/Organizations/ Committees/Consulting Firms	Status
WA	X								Washington State Building Code Council	Completed
	X							X	Dept. of Commerce - Appliance Standards	Completed
			X						Northwest Energy Efficiency Council	Completed
			X			R	X	X	WSU Cooperative Extension	Completed
				X					Ecotope	Did not complete
				X					NEEA Consultant	Completed
					X				Puget Sound Energy	Completed
					X				Puget Sound Energy	Completed
									Building Industry Assoc. of Washington	Did not complete
				X		C	X	X	Putnam Price	Completed
OR	X						X		Oregon Building Codes Division	Did not complete
	X								Oregon Energy Efficiency Code Committee	Did not complete
	X								Oregon Dept. of Energy	Completed
				X					Pacific Northwest National Laboratory	Completed
					X				Energy Trust of Oregon	Completed
	X					R	X	X	Oregon Dept. of Energy	Completed
			X			R		X	Oregon Home Builders Association	Completed
	X					C		X	Oregon Dept. of Energy	Completed
ID	X								Idaho Division of Building Safety	Completed
		X							Idaho Building Codes Board	Completed

State	State Agency	State Committee	Assoc./University	Consultant	Utility	NEEA Trainer	DOE Certification	NEEA Activity	Agencies/Organizations/ Committees/Consulting Firms	Status
			X					X	Idaho Energy Codes Collaborative	Completed
				X		R, C	X	X	Idaho Circuit Rider	Completed
				X					EcoEdge/Green Steps Consulting / Educ.	Completed
					X				Idaho Power	Completed
	X		X						Office of Energy Res., Codes Collaborative	Completed
			X						Idaho Association of Building Officials	Completed
			X						Idaho Association of Building Officials	Completed
MT	X						X		Montana DLI Building Codes Bureau	Did not complete
	X								Montana DLI Building Codes Bureau	Completed
	X					R, C			Dept. of Environmental Quality	Completed
								X	Dept. of Environmental Quality	Completed
		X							Montana Building Contractor Association	Did not complete
			X				X	X	Montana Natl. Center for Appropriate Technology	Completed
				X					Reg. Support Services, Northwestern Energy	Did not complete

Appendix H. Training Material Evaluation Guide

To following guide was used by Cadmus to evaluate training material in each of the four states.

Training Material Evaluation Form

Course Title:
Agency/Organization:
State: **Date:**

Instructions: Cadmus will use the following evaluation form to assess the clarity, accuracy, and effectiveness of training material developed to support energy codes in the Northwest. Material has been provided to Cadmus by NEEA contractors and is assumed to be funded by the NEEA codes program. Evaluators will circle the response below that best describes their assessment of the training. If a question is not applicable to a training course or if there is not sufficient information to answer, select N/A.

Section I: Training Material Content

	Not Appli-cable	Strongly Disagree	Disagree	Cannot Decide	Agree	Strongly Agree
1. The training clearly defined learning objectives and/or course goals.	N/A	1	2	3	4	5
2. The training material supported the learning objectives.	N/A	1	2	3	4	5
3. The training material was accurate.	N/A	1	2	3	4	5
4. The training material thoroughly covered the topic.	N/A	1	2	3	4	5
5. The training material was organized appropriately / in a logical order.	N/A	1	2	3	4	5
6. The training material was relevant to the intended audience.	N/A	1	2	3	4	5
7. The training material length was sufficient to deliver the content.	N/A	1	2	3	4	5
8. The training material was at an appropriate level to understand the learning objectives.	N/A	1	2	3	4	5

Section II: Training Material Design

9. The training material contained quiz questions or discussion opportunities that enhanced the course information.	N/A	1	2	3	4	5
10. The course design (i.e., materials and learning activities) encouraged participation by the class.	N/A	1	2	3	4	5
11. The course provided opportunities to practice and reinforce what was taught.	N/A	1	2	3	4	5

12. This training material was for a (circle one): Beginner / Intermediate / Advanced

13. Overall, this training material (circle one): Needs Improvement / Is Satisfactory / Is Excellent

Additional Comments:

Appendix I. Conduit Site Codes Program Quarterly Report Summaries

As part of the document review, Cadmus researched the quarterly reports written by the Senior Codes Manager and published on NEEA's Conduit website, from Quarter 3 in 2011 to Quarter 4 in 2015. A summary of each quarter is listed below.

Table 18. Quarterly Report Summaries

Quarter	Summary
Q3 2011	• In Idaho, NEEA is coordinating energy code training on the 2009 IECC as well as a review of 15 building departments. • Oregon is implementing a reach code to give builders additional compliance options. • NEEA has coordinated several energy code trainings in the state of Montana. Montana will also host a residential compliance study. • Washington has just completed extensive code development for the 2009 Washington code after working with WSU. There is discussion that Washington may switch to the IECC code instead of the state amended code.
Q4 2011	• NEEA developed the role of state circuit rider. Their role includes builder and inspector training, telephone assistance, and resource dissemination. • In Oregon, the head of the energy code is now shifted to the Building Codes Division. • Montana has just completed an extensive residential energy study (the first one in 15 years). • In Washington, the code has officially shifted from the state developed code (WSEC) to the IECC. Training has begun in different jurisdictions to aid in the code shift.
Q1 2012	Report not found.
Q2 2012	• Washington is developing a technical advisory board that works to integrate the WSEC with the IECC. • NEEA proposed the Circuit Rider position to the Idaho Codes Collaborative. There is also discussion of adopting the 2012 IECC. • Montana has been reviewing the implications of the recently completed compliance study -- they concluded that Montana lacks a code enforcement infrastructure. • NEEA is working with the Oregon HBA's to coordinate residential energy code training.
Q3 2012	• In Washington, a package of new code changes was submitted to the hearings. The result of the adoption would increase savings for both residential and commercial. • In Idaho, the circuit rider has begun trainings and jurisdictional support. Idaho has decided to keep the energy code at the 2009 level while updated the IBC and IEBC to the 2012. • In Montana, there are negotiations with the Montana Building Industries Association to institute an energy code compliance study in the self-certification areas. • On a national level, NEEA convened to determine which of the 40 concepts for energy efficiency innovations should be submitted as code proposals to ICC.

Quarter	Summary
Q4 2012	• In Washington, the new package of code changes was adopted allowing 7-8% additional savings for residential and commercial buildings. • In Oregon, NEEA has begun collaboration with Energy Trust and discussion regarding scope of collaboration are ensuing. Howard Asch will be brought on as the Oregon Circuit Rider. On the commercial side NEEA has pulled together new proposals. There will also be training on envelope and mechanical features. • In Idaho, the codes collaborative met and discussed the benefits of having the full un-amended 2012 IECC; there was also a draft of a compliance study that was presented. • In Montana NEEA decided that a compliance program would not work and ceased any action. • On a national level, NEEA submitted 20 code change proposals to ICC to amend the code for the 2015 Copy.
Q1 2013	• In Washington, results from a residential compliance study yielded rates around 96%. Washington is working to change a code adoption issue. They thought they the 2012 code was going to raise the furnace efficiency to 90%, but it didn't. Washington has to go back and amend its tables to bring it back down to an 80%. NEEA is discussing with DOE to make a Washington specific REScheck. • In Oregon, they have submitted 6 code change proposals. NEEA's work with Energy Trust has yielded 3 new prototype energy models for current residential buildings. These will be used for calculation energy impact in the state. Howard Asch has begun his training in Oregon. • In Idaho, a pilot compliance study yielded rates around 80-90%. The Circuit Rider has begun training in Idaho. The codes collaborative has submitted to the Idaho Building Code Council that they adopt the 2012 Commercial IECC as written and adopt the 2012 residential IECC as amended back to the 2009 IECC. • In Montana, NEEA met with stakeholders to develop a long term plan (nothing decided). • On a national level, NEEA reviewed 600 code change proposals and determined stance for code hearing.
Q2 2013	• In Washington, there was push to remove an extra climate zone from the code (grandfathered in from the WSEC). NEEA also developed a commercial prescriptive path for buildings with 40% glazing. • In Oregon, Howard Asch is still training. Oregon is almost done with finalizing the 2014 commercial energy code, just waiting on public hearings. Finalized energy models developed with ETO for economic impact analysis in Oregon. • The Idaho Building Code Board accepted code adoption proposal and is now waiting for legislation to approve. In Idaho, Circuit rider is doing well and will play strategic role post code adoption. • In Montana, The Montana Department of Labor & Industry held discussions regarding the adoption of the full 2012 Code Suite. The Building Code Council reviewed the discussions and there was little talk of the energy code. • On a national level, NEEA submitted public comments on many proposals.
Q3 2013	• In Washington, PNNL developed a Washington specific REScheck for use. The state accepted the climate zone shift for the energy code. Efforts are focused on technical support and implementation. • In Oregon, adoption of the 2012 commercial energy code has been finalized. Oregon department of energy may resume role of being in charge of energy codes (Oregon Building codes division is currently in charge). Howard Asch is still conducting trainings. Working on revisions to Oregon residential energy code. OHBA is not receptive. • In Idaho, the Circuit Rider has begun testing houses to create air leakage baseline. This served 2 purposes, exposer to make circuit rider the face of energy codes and created understanding of gap in house leakage compliance. • Montana has pushed to adopt 2012 commercial IECC outright. Still in discussions regarding Residential.

Quarter	Summary
	• On a national level, 2015 IECC was finalized; this included many feature such as an additional residential compliance path and revisions to commercial equipment controls.
Q4 2013	• David Cohan left and Ken Baker took over. • Washington is focusing its efforts on implementation. • NEEA is pushing for updates on the Oregon residential emery code (Officially called the residential specialty code). Oregon "reach-code" isn't taking off. Oregon DOE is looking for someone to conduct training for commercial energy code. • In Idaho, Circuit rider compared blower door results to the City of Boise's documented results (which has required testing on all new construction). The average leakage was 3.6 AC50 even though the state only requires 7ACH50. • In Montana, NEEA is working on implementation measures for current code. • On a national level, everyone is eager to observe the long term effects of having the HERS approach in the new code.
Q1 2014	• In Oregon, NEEA is working to bring in an energy code trainer specifically for Stakeholders. Proposed to require air sealing on interior walls that meet attic. Howard Asch switched to using webinars for training -- this yielded a much larger turn out. Energy Trust is working on implanting "Reach-code" for commercial buildings. • In Washington, implementation efforts have taken off. WSU is handling residential and Northwest energy codes group is handling commercial. • In Idaho, the codes collaborative is working on a residential marketing plan to leverage efficiency. Eastern jurisdictions are considering pilot study of implementing more stringent code. Commercial code will begin implementation shortly. • In Montana, NEEA has supplied jurisdictions equipment to inspect the residential leakage requirements. Implementation in slow process. Training on 2012 Commercial code will commence shortly.
Q2 2014	• In Oregon, NEEA has contracted with Oregon DOE to conduct commercial energy trainings and is still working with Howard Asch from the OHBA to handle residential trainings. Since he has shifted to webinars, his attendance has roughly doubled (from 150 to 350 in attendance this last quarter). • In Washington, still working on implementation. NEEA has contracted with many technical support groups to develop proposals for the next code change. • In Montana, NEEA has worked with 2 other organizations to share cost of equipment and training of local jurisdiction to execute testing. • In Idaho, a homeowner survey was conducted resulting in 65% of the market favoring energy codes. NEEA is pushing to update whole-house ventilation requirements.
Q3 2014	• In Oregon, Howard Asch is excelling at residential outreach and training. OHBA is developing energy video to be disseminated to builders. Oregon DOE has hired Blake Shelide to conduct commercial energy outreach. • In Washington, implementation is still happing. There has been an emphasis on commercial implementation. Washington needs more support on training homeowners to operate ventilation system correctly. • In Idaho, circuit rider is doing well. The state has adopted ventilation requirements for homes too tight. Idaho codes collaborative is working on branding. • In Montana, new code is not gone into effect yet. Still focusing on training for residential testing.
Q4 2014	Report not found.

Quarter	Summary
Q1 2015	• In Washington, technical advisory groups have met to develop new code changes. NEEA has worked to create commercial appendix for simple systems. • In Oregon, meeting with stakeholders to update residential specialty code (energy code). Howard and Blake are doing well on their respective trainings. • In Idaho, jurisdictions in the east are adopting codes that are at least as stringent as the 2012 IECC. Circuit rider is doing well. Idaho will hold an energy conference. • In Montana, Stakeholders have met and have coordinated to develop trainings for the upcoming code implementation. • On a national level- Contracting with Britt/Makela Group to develop proposals for 2018 IECC. First national energy codes conference was held after 4 years. NEEA was well represented.
Q2 2015	• In Oregon, training and outreach for both residential and commercial is going well. Working on code updates for next edition. • In Washington, they have successfully disseminated videos to jurisdiction regarding proper ventilation operations. Training and outreach is going well. • In Idaho, the circuit rider is conducting certifications for jurisdictions for testing houses. Discussion of adopting 2012 un-amended for the city of Boise. Discussions of 2015 adoption. • In Montana, training modules have been developed for realtors. Montana codes collaborative meeting will be convened soon.
Q3 2015	• On a national level, code development is in mid-process. Working on vetting proposals for the code hearings in 2016. Contracting with Cadmus to conduct market evaluation. • In Oregon, OHBA is holding stakeholders meeting to prepare and advocate for a new energy code adoption. Oregon DOE is working on trainings for commercial and residential design professionals. • In Washington, the code development process has come to a close. Waiting on public hearing. WSU has been very instrumental in the process. • Idaho is preparing for the 26th Idaho Energy and Green Building Conference in Boise. They are working on developing presentations for commercial air-barriers and mechanical requirements. • In Montana, the codes collaborative meet and discussed how to remedy the self-certification regions and how to change political ethos of energy codes in Montana.
Q4 2015	• On a national level, code proposals have been finalized for the 2018 code. Currently working on a methodology for commercial compliance study. Reviewing methodology of DOE Residential Energy Code study for future implementation. • In Washington, the code development process is over. Washington should have most stringent code in the nation as of July1st 2016. • In Oregon, OHBA has disseminated a video interview with common compliance issues as seen by building officials. • In Idaho, the state is looking at adopting the 2012 IECC as un-amended (instead of 2015) for residential. There is no opposition for 2015 commercial code. • Montana technical advisors developed residential code compliance guide.

Appendix J. Summary of Above Code Programs

Table 19. Summary of Above Code Programs

State	Title	Description	Program Website
Washington	Seattle Energy Code	The current Seattle Energy Code (SEC) is based on the 2012 WSEC with amendments specific to Seattle, including metering, renewable energy, plug load controls, and an outcome-based compliance path. The SEC also includes additional provisions specific to existing buildings. The city is preparing to adopt the 2015 SEC which will be more efficient than the newly adopted 2015 WSEC.	Code Text http://lawfilesext.leg.wa.gov/law/wsr/2016/03/16-03-072.htm 2015 Draft Energy Code, February 2016 http://www.seattle.gov/DPD/cs/groups/pan/@pan/documents/web_informational/p2395485.pdf
Oregon	Oregon Reach Code	The 2014 Oregon Reach Code, effective July 1, 2014, is based on the 2012 International Green Construction Code (IgCC) and can be voluntarily adopted by jurisdictions. The Reach Code was developed by BCD to fulfill the 2009 mandate of Senate Bill 79. The Reach Code does not contain the comprehensive green building sustainability requirements of the IgCC and instead only includes provisions directly related to high-performance building efficiency.	Code Text http://www.bcd.oregon.gov/committees/11reachcode/Oregon_Reach_Code.pdf Senate Bill 79 https://olis.leg.state.or.us/liz/2009R1/Downloads/MeasureDocument/SB79/Enrolled
Idaho	Blaine County BuildSmart Energy Code	The current Blaine County BuildSmart Energy Code, adopted in 2011, is based on the 2009 IECC without the state-specific amendments in Idaho. Blaine County is in the process of updating the BuildSmart Energy Code to the provisions of the 2012 IECC, making it more stringent than the current Idaho statewide code.	2011 BuildSmart Ordinance http://www.co.blaine.id.us/vertical/sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/2009_IECC_Ordianance_2011_02.pdf 2016 Draft amendments to the 2011 BuildSmart Energy Code http://www.co.blaine.id.us/vertical/Sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/2012_IECC_Title_7_-_Ch_6_Hearing_Draft.pdf
Montana	Coming soon	The 2012 IECC, as adopted in Montana, allows jurisdictions to implement above code energy programs. NEEA is working closely with agencies and organizations to ensure success of above code legislation. No jurisdictions currently have a stretch or above code program.	
All States	Northwest ENERGY STAR	The Northwest ENERGY STAR Homes program is an initiative of NEEA's intended to promote the construction of energy efficient homes using the guidelines set forth by the Environmental Protection Agency.	http://www.northwestenergystar.com/building-better-future

Appendix K. ACE Model Memo

MEMORANDUM

To: Steve Phoutrides, NEEA
From: Lakin Garth, Peter Schaffer, and Dan Groshans, Cadmus
Subject: NEEA Codes MPER: Task 3 Review ACE Model
Date: January 22, 2015

Introduction

During preparation of the Codes Market Progress Evaluation Report (MPER), Cadmus periodically submits a memo providing updates, findings, and recommendations following the completion of a task or deliverable. This memo provides NEEA with a summary of Cadmus' findings after reviewing the reasonableness of data used to determine the number of multifamily units to which residential energy code savings can be applied. The Cadmus team developed this memo to become a section of the MPER.

Research Questions and Approach

The key research question is to determine if NEEA's methodology for counting units that must comply with multifamily residential codes in Montana, Idaho, Oregon, and Washington is reasonable. The data NEEA identified as its source of total, newly constructed multifamily units - U.S. Department of Housing and Urban Development (HUD) permit data[52] - does not identify the number of units constructed in multifamily structures by the number of stories. However, that information is required in order to apply the correct savings rate: the residential multifamily code only applies to structures of less than four stories.

Specifically, NEEA asked Cadmus to investigate the following questions:

1. Are the percentages NEEA applies to estimate the number of unit in buildings of less than four stories reasonable?
2. Is the approach reasonable?

NEEA's methodology for estimating the number of newly constructed multifamily units to which residential energy savings can be applied relies on (1) the HUD data to determine the total number of multifamily units constructed in a given year, (2) Dodge data to estimate the proportion of newly constructed multifamily units in buildings of less than four stories, and (3) the same Dodge data for a forecast of new multifamily construction in order to project future, expected savings.

[52] HUD data is analogous to the U.S. Census Bureau's American Community Survey (ACS) data set that Cadmus reviewed for this task. The actual source is the ACS that the Census oversees. This information is also available via HUD.

Cadmus reviewed the following sources of data for the purpose of determining the reasonableness of data used by NEEA to estimate the number of multifamily units to which residential energy code savings can be applied.

- Dodge Data and Analytics. NEEA is using Dodge "Starts" data which represents the start ("ground-breaking") of new construction projects;
- Northwest Power and Conservation Council's (Council) Draft Seventh Power Plan forecast workbook using ACS permit data;
- HUD/ACS data for newly constructed residential housing units based on permit data; and
- Multifamily Housing Council (MHC) data for newly constructed residential housing units, which relies on ACS permit data.

We note that the Dodge data is developed through an independent process while the other three sources are all based on the U.S. Census' ACS building permit data.

Except for the Dodge data, only the Council's data set includes an estimate of the percentage of newly constructed multifamily units in structures by the number of stories as well as a forecast of new units. The Council's forecast period is for the duration of the 7th Plan study horizon, from 2016 through 2035.

Findings

Cadmus compared multiple secondary data sources to NEEA's multifamily new construction data to assess the reasonableness of overall new construction levels and the proportion of newly constructed multifamily units in buildings of three or fewer stories.

NEEA presently relies on HUD/ACS permit data to estimate the number of newly constructed multifamily units on an annual basis. A key limitation of HUD/ACS data is that it does not provide the proportion of newly constructed multifamily units in buildings with three or fewer stories. This is problematic from a codes perspective as the nonresidential building code applies to multifamily buildings that are built with more than three stories. To estimate the proportion of newly constructed multifamily units that fall under the residential code, NEEA uses Dodge data, which provides the number of multifamily units by the number of stories in buildings to measure the proportion of new units that fall under the residential portion of the code. Dodge data is the only source examined by Cadmus that relies on actual construction starts and not construction permits[53]. Multifamily starts with three or more units are gathered through Dodge's regional reporters. The reporters regularly contact key players in the construction industry for information about the projects that they have under consideration. When a multifamily project enters the start stage (within 60 days of ground-breaking), it is entered into the Dodge database as a multifamily start. One key difference between Dodge data and ACS data is that Dodge data counts single-family attached homes (townhomes and row houses for example) as multifamily, whereas ACS does not.

[53] Cadmus met with Dodge Global Accounts Manager Kyle Camp on 1/22/2016 to collect information about Dodge processes and the construction database.

Cadmus reviewed data from the Northwest Power and Conservation Council's (Council) Draft Seventh Power Plan supply curve workbooks as a point of comparison and to test the reasonableness of the data currently used by NEEA. Two key inputs to the development of the residential sector potential are the number of existing units and a forecast of the number of units in the low-rise, mid-rise, and high-rise multifamily segment. Conveniently, the Council's definition of low-rise units matches the same definition required by NEEA's ACE model to determine the proportion of units to which the residential energy code savings should be applied, thereby allowing for a direct comparison. Furthermore, the Council data is also segmented by state in addition to a regional total and includes both a historical perspective (annual data going back to 1985) and a forecast through the end of the study period (2035)[54].

After reviewing the Council's data, Cadmus reached out to the Council staff member responsible for load forecasting—Massoud Jourabchi—to inquire about the data sources used in the draft 7th Plan supply curve workbooks. He informed Cadmus that the Council data uses ACS data to populate the total levels of new construction and then relies on the Residential Building Stock Assessment (RBSA) to estimate the proportion of multifamily units that fall under the residential code[55].

Cadmus reviewed the multifamily RBSA report[56] in an attempt to determine the genesis of the data presented. Table 5 from that report—Distribution of Units by Building Size and Vintage—provides the percentage of existing units in low-rise multifamily buildings. As the data source was not readily apparent, we then emailed the past president and founder of Ecotope—Dave Baylon—to ask how the estimates were developed. Dave informed us that the RBSA result was based on a Random Digit Dialing (RDD) phone survey based on census population data. The multifamily targets were set in each geographic segment assuming equal probability of selection of a multifamily unit with no screen for building size. Mr. Baylon also told us that the RBSA data relied heavily on sample from the Puget Sound utility service territories and may not be representative of the region as a whole from a building size standpoint[57].

Cadmus also reviewed ACS data from 2013 and 2014 to assess the overall number of multifamily units constructed in the four Northwest states. ACS data is collected on a monthly basis by a voluntary survey of building departments. In 2014, ACS data collected 20,100 sample points from permit issuing jurisdictions. Annual new construction estimates are revised each month to reflect late reports received or corrections made to reports from prior months in the year[58].

Finally, Cadmus also reviewed data for 2014 from the MHC, which provided total new construction by state. MHC data is analogous to ACS data and the only differences in totals are

54 From "7p-forecasts-d2.xlsx," accessed from http://www.nwcouncil.org/energy/powerplan/7/technical#Conservation

55 Emails from Massoud Jourabchi (Council) to Lakin Garth (Cadmus) on December 4th and 9th, 2015

56 Ecotope Inc. 2012. 2011 Residential Building Stock Assessment: Multi-Family Characteristics and Energy Use. Seattle, WA: Northwest Energy Efficiency Alliance.

57 Email from Dave Baylon (Ecotope) to Lakin Garth (Cadmus) on December 15th, 2015

58 More detail available at https://www.census.gov/construction/bps/how_the_data_are_collected/

due to the definition of a multifamily unit, which MHC defines as being five units or more and ACS defines as three units or more. Cadmus also investigated how data was collected and interpreted for each source of data. ACS data is analogous to HUD data as they both come from the same source of permit data.

Comparisons

Cadmus identified only two sources of data that provide the relative proportions of the number of newly constructed units in low-rise multifamily buildings with three or fewer stories: (1) the Dodge data provided by NEEA and (2) the Council's 7th Power Plan forecast. Figure 3 shows the total number of newly constructed units in multifamily building of three or fewer stories in 2013 for each of the four Northwest states from the two aforementioned data sources.

Figure 3. Number of 2013 Newly Constructed Units in Multifamily Buildings of 3 or Fewer Stories

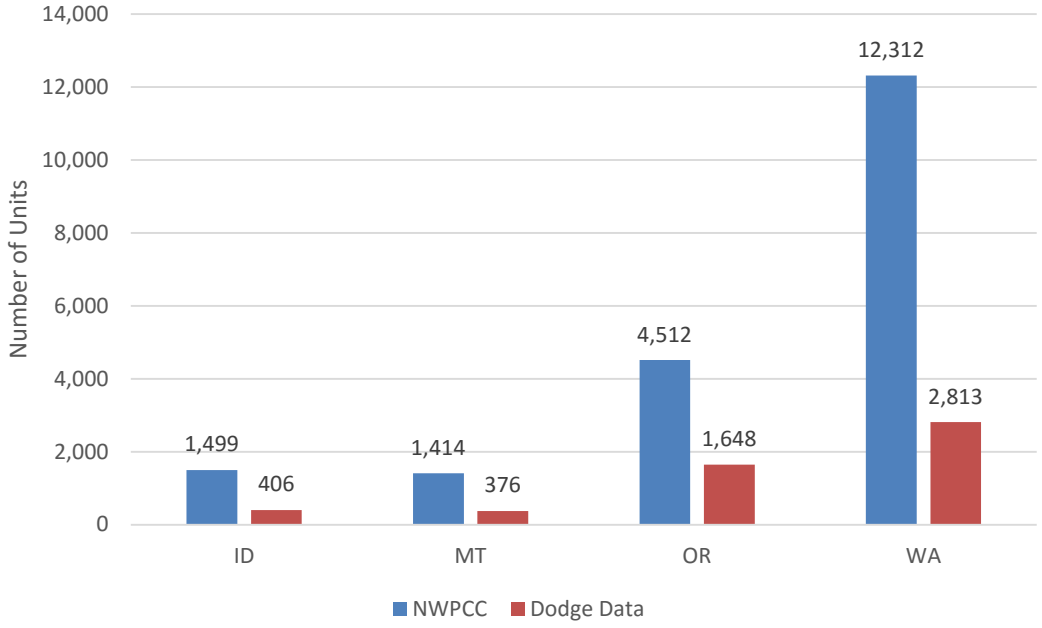
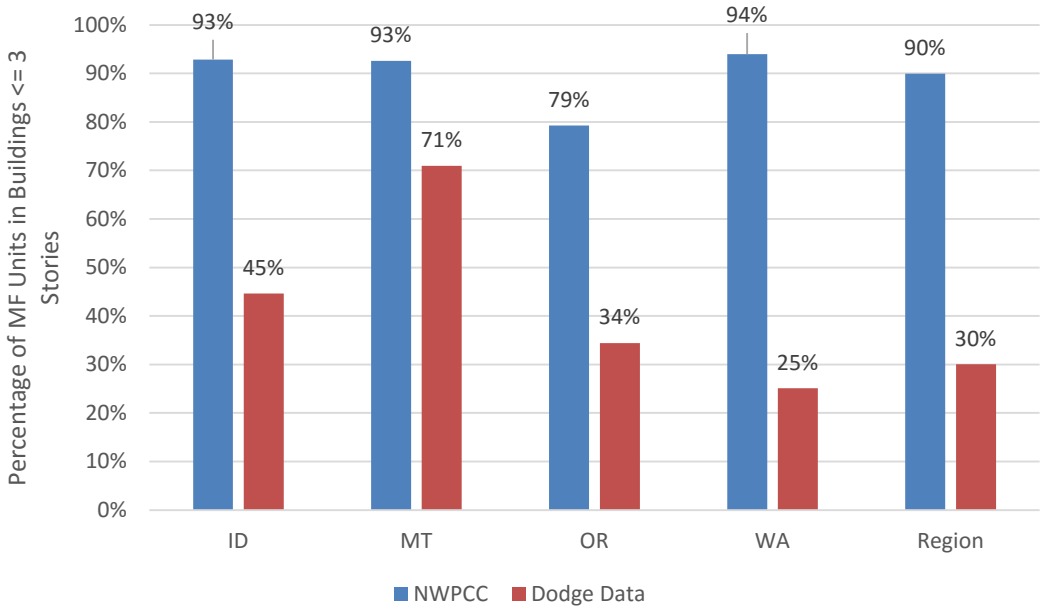


Figure 4 provides the relative proportions of the number of units in newly constructed multifamily buildings in 2013 for each of the four Northwest states and the region in total.

Figure 4. Proportion of 2013 Newly Constructed Units in Multifamily Buildings of 3 or Fewer Stories



Cadmus found that the proportion of units in 2013 that were less than three stories in the NWPCC's data were consistently higher than the proportion of units represented in the Dodge data. The largest difference in proportions of units was in Washington and the smallest difference in proportion was in Oregon.

Figure 5 and Figure 6 provide similar comparisons as Figure 3 and Figure 4, but for 2014 data.

Figure 5. Number of 2014 Newly Constructed Units in Multifamily Buildings of 3 or Fewer Stories

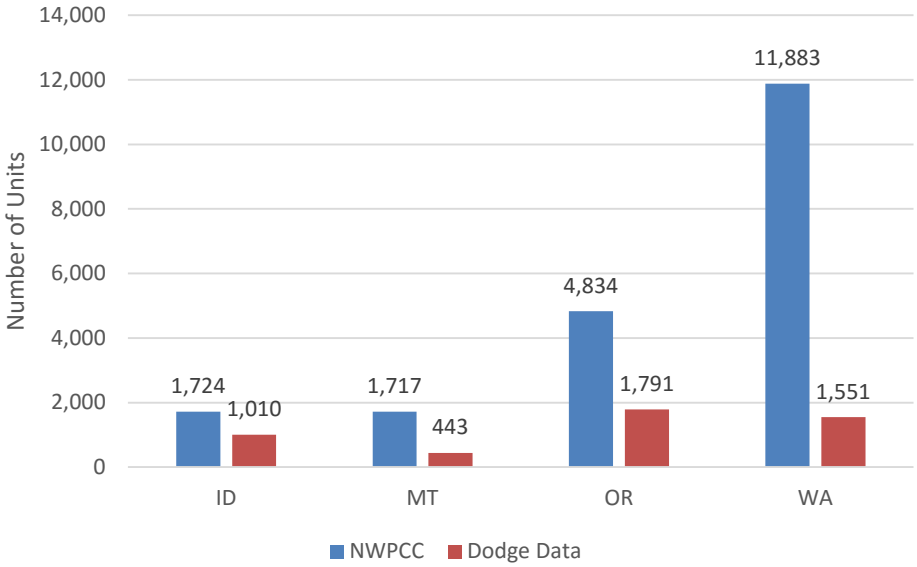
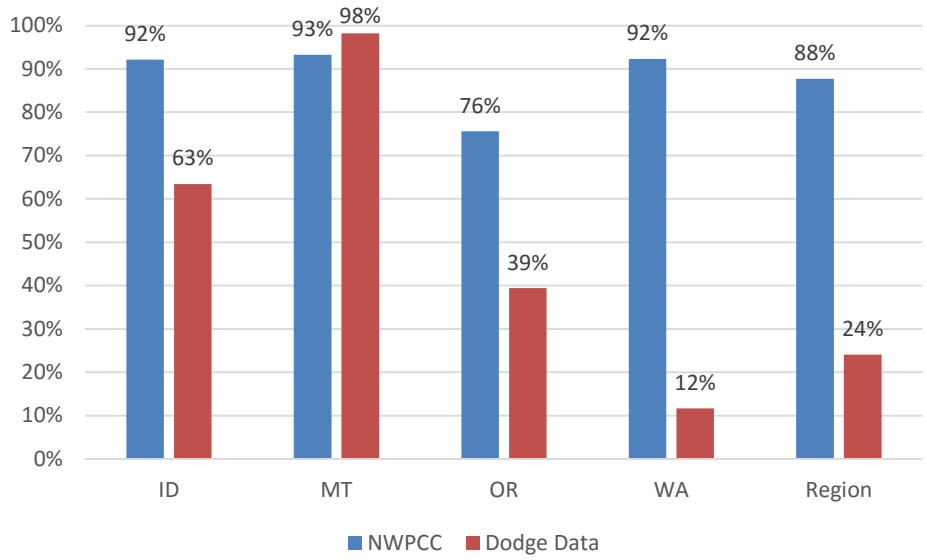


Figure 6. Proportion of 2014 Newly Constructed Units in Multifamily Buildings of 3 or Fewer Stories



Similarly to the 2013 data, the difference in the proportions of newly constructed units in multifamily buildings of three or fewer stories between the Council and Dodge data sources is significant. For example, in the state with the largest percentage of newly constructed multifamily units – Washington—the Council's 7th Plan data indicates an almost eightfold difference in the proportion of units in buildings of three or fewer stories to which the state's residential energy code would apply.

In addition to the proportions of newly constructed multifamily units in low versus medium or high-rise buildings, Cadmus also reviewed multiple secondary data sources for the total number of newly constructed multifamily units to assess the reasonableness of Dodge data. We found that both the ACS and Council had higher numbers of multifamily units across the four states for both 2013 and 2014.

Figure 8 and Figure 7 depict comparisons between data sources for the total number of newly constructed multifamily units in 2013 and 2014. Figure 6 also includes MHC data for new multifamily units, which is only available for 2014.

Figure 8. Total Number of Newly Constructed Multifamily Units (2014), by State

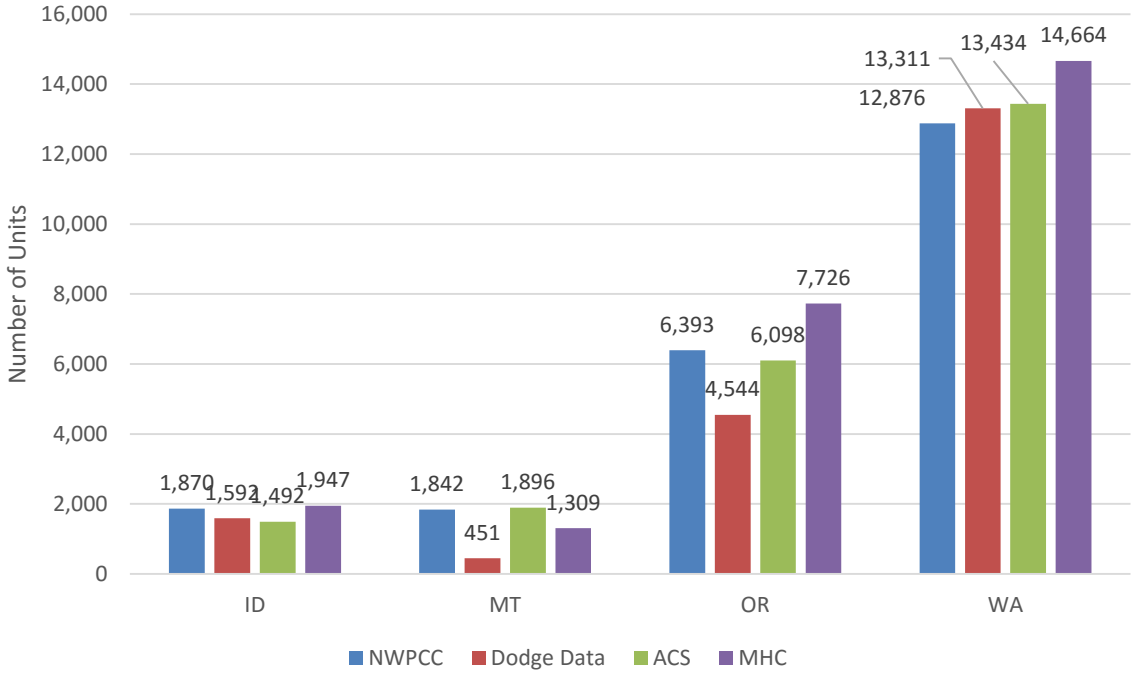
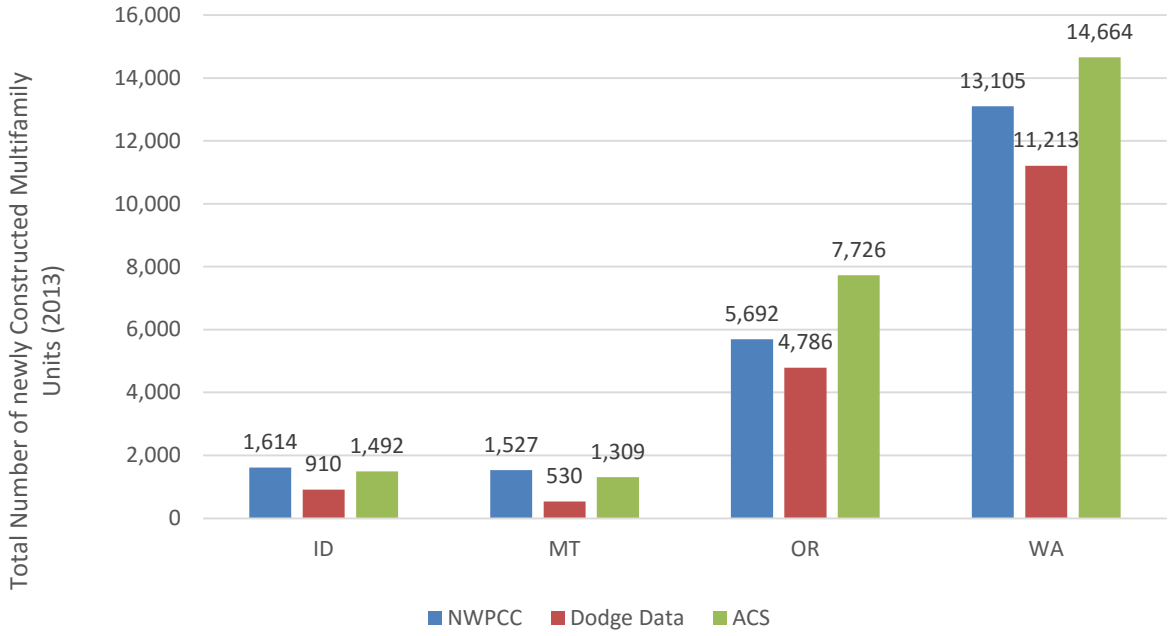
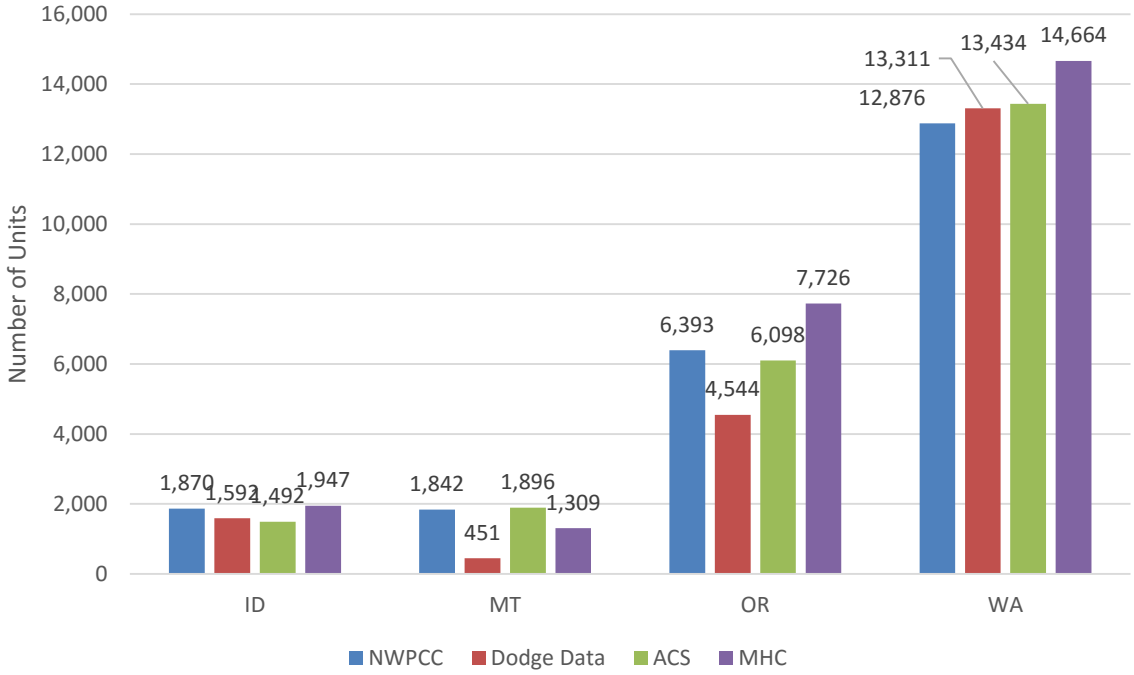


Figure 7. Total Number of Newly Constructed Multifamily Units (2013), by State



In 2013, the Council's data indicates that the number of newly constructed multifamily units in the region is 26% greater than the number of units in the Dodge data. The ACS data indicates an even greater disparity with its data showing that the number of units is 44% higher than the Dodge data.

Figure 8. Total Number of Newly Constructed Multifamily Units (2014), by State



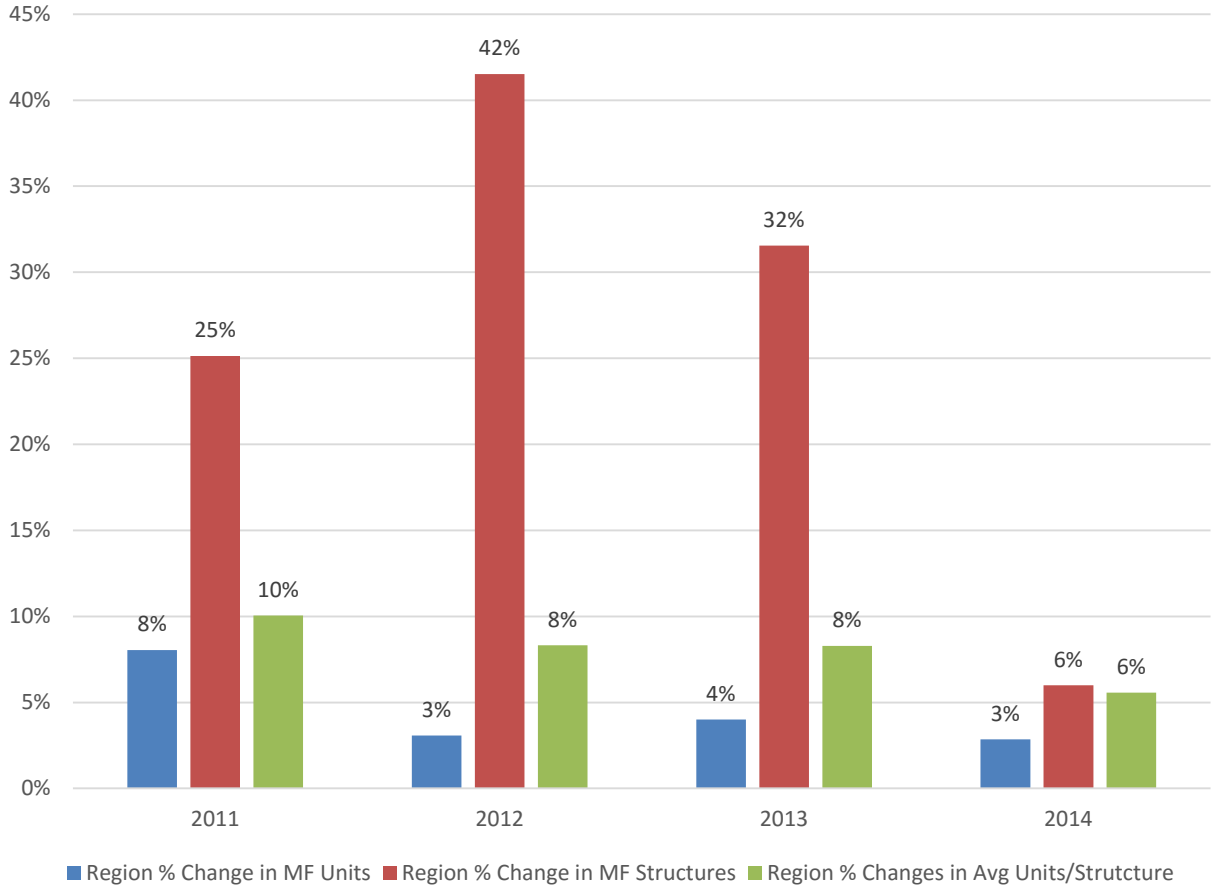
In 2014, the Dodge data is again lower than the other three data sources in terms of the number of newly constructed multifamily units for the region in total. The MHC total is 25% higher, the Council value is 22% higher, and ACS' estimate is 15% higher than the Dodge data.

Finally, Cadmus examined trends in newly constructed multifamily units in an attempt to provide additional indications of whether more multifamily high-rise buildings were being constructed in recent years. Based on ACS data, the number of structures with five or more units has risen steadily in the last four years for which data are available, from 2011 to 2014. ACS Housing Reports showed that - for the West[59] region - the proportion of newly constructed multifamily buildings with five or more units was 53% for 2014 and 48% for 2013.

Although the ACS data does not provide the number of newly constructed units by the number of stories in multifamily buildings, it does present data by the number of units in buildings with five or more units, as well as the number of buildings with five or more units. As Figure 10, the annual percentage growth in multifamily units, multifamily structures, and the number of units per structure has increased over each of the last four years.

[59] Cadmus to confirm that ACS' West region includes California, Oregon, and Washington state.

Figure 9. Trends in Multifamily Construction from American Community Survey



Conclusions and Recommendations

As previously noted, except for the Dodge data, only the Council's data set includes an estimate of the percentage of newly constructed multifamily units in structures by the number of stories as well as a forecast of new units.

However, the Council's data differs significantly from the Dodge data that NEEA uses for estimating the proportion of units to which residential energy code savings will apply. After discussions with the Council staff responsible for the forecast and the principal investigator responsible for the construction of the underlying sample used by the Council, Cadmus believes that the Council's 7th Plan forecast supply curve workbook is not a suitable replacement for determining the number of units to which the residential code savings should be applied because it is may be based on a sample that is not representative of the region's building population. After reviewing all the data, Cadmus believes that NEEA's methods for estimating the number of newly constructed multifamily units to which residential energy code savings are applied is reasonable and uses the best available data. Furthermore, given the relatively low proportion of units in buildings of three or fewer stories in the Dodge data compared to the Council's data, NEEA's method also results in a lower or more conservative savings estimate. Given the relatively low number of independent data sources, it is recommended that NEEA use the

proportion of units in buildings of three stories or less from the Dodge data to count savings from multifamily building construction.

Appendix L. Interview Guides

NEEA Codes Market Progress Evaluation Report #4: Interview Guide for Program Contacts/NEEA Employees FINAL

Research Questions for Internal Use	Interview Question(s)	
Progress Evaluation	**Program Contacts**	**NEEA Staff / Process**
What code-related activities does NEEA support in your state?	A1, A2, A4, B1, B2, C1, C2	
Did NEEA effectively complete the adoption activities/outputs identified in the logic model?	A6, A7, A8, A9, A10, A11, A15, A16	
Did NEEA achieve the adoption outcomes identified in the logic model?	A12, A13, A14	
What are the perceived barriers to development and adoption?	A3, A5	
Did NEEA effectively complete implementation activities/outputs identified in the logic model?	B4, B5, B7, B8	
Did NEEA achieve the implementation outcomes identified in the logic model?	B6, B9, B10, C6	
What are the perceived barriers to implementation?	B3	
Did NEEA effectively complete the compliance activities/outputs identified in the logic model?	C4	
Did NEEA achieve the compliance outcomes identified in the logic model?	C5	
What are the perceived barrier to compliance?	C3	
Process Evaluation		
Program Design. Assessment of the components and processes, goals and objectives, and activities of the program. [Logic Model review will carry over here as well]	E1 – E5	E1-E5
Program Administration. Assessment of the oversight and review, staffing, resources, and reporting practices of the program.	E6 – E11	E6-E11
Program Implementation and Delivery. Assessment of the program's management, communication, delivery, timing and quality control.	B5, B8, D1 – D4	A1-A5, B1-B3, C1-C3, D2-D4
Interaction with Market. Assessment of market satisfaction and effectiveness of the program.	A3, A17, B3, B11, C3, C7	A1-A5, B1-B3, C1-C3, D2-D4

Respondent Name:

City, State:

Email:

Title/Occupation:

Telephone:

Interview Date:

Interviewee is participating in this interview as a (check all that apply):

- ☐ Program Contact/NEEA Employee
- ☐ ARRA/DOE Certification Representative
- ☐ Other (please list):

Interviewee will be answering questions pertaining to:

- ☐ Residential energy codes
- ☐ Commercial energy codes
- ☐ Both residential and commercial
- ☐ N/A

Example NEEA Activity List (Residential) for Interviewer's Reference

1. Participate in state code development processes.
2. Provide and review concepts and proposals for national and regional code development processes.
3. Develop a draft Oregon code based on the 2015 Washington code now in process.
4. Provide a minimum of thirty (30) residential code trainings on energy code topics throughout the state.
5. Develop training curriculum as necessary, such as when a new code is implemented for the state.
6. Provide a minimum of twenty (20) building department visits per year beginning in Q1 of 2016.
7. Track all trainings on the NEEA provided spreadsheet and submit monthly.
8. Maintain technical support documents for the Residential Energy Code, including compliance forms, web pages that contain code materials and resources, and electronic newsletters.
9. Manage a phone hotline for direct code support to code jurisdictions and the building industry.
10. Work with NEEA's commercial code delivery contractor to coordinate activities.
11. Work with NEEA and the region to develop above-code training modules that identify best practices and materials that solve code compliance issues.
12. Work with NEEA and contractors to implement a statewide energy code Quality Assurance program.
13. Work with NEEA and contractors to implement a Regional Code Index (yearly EUI study to develop energy use trends in code buildings).

Introduction

Hello, my name is _____ and I am with Cadmus. On behalf of the Northwest Energy Efficiency Alliance (NEEA), we are conducting interviews with NEEA's key contacts and employees to assess the progress NEEA has made in its program supporting building energy codes. I will be asking you a series of questions that relate to activities sponsored by NEEA that support development and adoption, implementation, and compliance with energy codes throughout the Northwest.

For reference, the most recently adopted energy code in your state is the:

- Idaho: 2012 IECC
- Montana: 2012 IECC
- Oregon: 2014 Oregon Energy Efficiency Specialty Code (OEESC) and 2014 Oregon Residential Specialty Code (ORSC)
- Washington: 2012 Washington State Energy Code (WSEC)

A. Development and Adoption of Energy Codes

The following questions pertain to NEEA's role in the ***development and adoption*** of energy codes in [state].

A1. To begin, please describe how the state is doing in developing and adopting energy codes.

A2. Please also describe NEEA activities that impact energy code development in [state].

A3. What do you see as the main barriers to energy code development in your state?

a) Do NEEA activities properly address barriers to adoption? Please explain.

A4. Please also describe NEEA's activities impacting energy code adoption in [state].

A5. What do you see as the main barriers to energy code adoption in your state?

a) Do NEEA activities properly address barriers to adoption? Please explain.

A6. How has NEEA influenced the development of code change proposals in [state]?

A7. Please describe any participation NEEA has/has had in technical advisory groups.

A8. Please describe any participation NEEA has/has had in code hearings.

A9. Please describe any participation NEEA has/has had in organizing advocates for code changes.

A10. Please describe any code related technical and economic analyses provided by NEEA that you are aware of.

a) What impact, if any, have the analyses had on code development?

b) What influence have the analyses had on code adoption?

A11. Please consider the most recently adopted energy code in [State].
How much influence did NEEA's code change proposals have on getting the code adopted?

a) If NEEA had influence, were the proposals adopted into code?

A12. Is the sphere of regulation expanding to include whole building based on actual energy use? (i.e., Outcome-based codes).

A13. In general, do you think the scope of the code is expanding?
(i.e., moving toward being based on actual rather than estimated energy use?)

a) If yes, can this shift be credited to any NEEA-sponsored activities? Please explain.

b) If not, why is it that NEEA activities didn't have any impact on this shift?

A14. Are codes becoming more stringent with each code cycle?

a) If yes, what role has NEEA played in increasing stringency?

A15. Are you aware of any efforts NEEA has put into reducing legislative opposition to the code?
If yes, please explain.

A16. Is there anything you can point to that suggests the market's perception of the value of energy efficiency has improved?

a) If yes, has NEEA had a role in this change? How?

A17. What additional activities would encourage code development and adoption?

B. Implementation of Energy Codes

The following questions pertain to NEEA's role in the ***implementation*** of energy codes in [state].

B1. Please describe how the state is doing in implementing energy codes.

B2. Please also describe activities that NEEA engages in that support energy code implementation in [State].

B3. What do you see as the main barriers to implementation in your state?

a) Do NEEA activities properly address barriers to implementation? Please explain.

b) What more could be done?

B4. Please describe NEEA-sponsored energy code training available to designers and architects in your state.

a) Are other trainings available that are not sponsored by NEEA?

B5. Please give me your overall assessment of NEEA-sponsored training for designers and architects by indicating whether the following components of training met your expectations and ways the areas could be improved:

a) Content covered

b) Materials provided

c) Delivery format (classroom, on-site training, jurisdiction visit, etc.)

d) Timeliness

B6. Are designers and architects in your state generally designing energy code compliant buildings?

a) If yes, which NEEA activities have supported them in designing compliant buildings?

b) What more needs to be done to ensure building designs are compliant?

B7. Please describe NEEA-sponsored energy code training available to builders in your state.

a) Are other trainings available that are not sponsored by NEEA?

B8. Please give me your overall assessment of NEEA-sponsored training for builders by indicating whether the following components of training met your expectations and ways the areas could be improved:

a) Content covered

b) Materials provided

c) Delivery format (classroom, on-site training, jurisdiction visit, etc.)

d) Timeliness

B9. Are builders in your state generally constructing energy code compliant buildings?

a) If yes, which NEEA activities have supported them in constructing compliant buildings?

b) What more needs to be done to ensure building construction is compliant?

B10. Are building officials in your state generally able to enforce the energy code?

a) If yes, how has NEEA assisted building officials in enforcing the energy code?

b) What more needs to be done to help ensure the energy code is enforced?

B11. What additional activities would encourage implementation?

C. Compliance with Energy Codes

The following questions pertain to NEEA's role in code ***compliance*** studies in [state].

C1. Please describe how the state is doing in terms of compliance with energy codes.

C2. Please also describe the activities conducted by NEEA that measure energy code compliance in [State]?

C3. What do you see as the main barriers to compliance in your state?

a) Do NEEA activities properly address barriers to compliance? Please explain.

C4. To the best of your knowledge, has NEEA calculated or estimated compliance rates in [state]?

a) If yes, were the compliance rates for individual code requirements also?

C5. In your experience, are the results of compliance studies shared with jurisdictions to inform training development and/or modify existing training?

C6. Is there anything you can point to that suggests compliance with the energy code is increasing?

a) If yes, have NEEA activities played a role in the increase? Please explain.

b) What activities, NEEA or otherwise, have been most effective at ensuring compliance is achieved?

C7. Are there additional activities or processes that could be used to further increase compliance?

D. Program Implementation and Delivery

The interview will now shift focus to NEEA's Energy Codes Program as a whole. The following questions will assess satisfaction with the implementation and delivery of NEEA's activities.

D1. Please describe any direct interaction you have had with NEEA staff or NEEA sponsored consultants related to the energy code.

a) Thinking about these interactions, please describe how satisfied you are with them.

D2. What is your perception of how well NEEA communicates with stakeholders in the code community?

a) Are there gaps in communication?

b) What can be improved?

D3. Are NEEA activities being implemented at the right time?
(For example, are training efforts taking place when they will be most effective and reach the most participants? Are code change proposals developed and submitted on time?)

D4. How satisfied are you with the delivery of NEEA's activities, including training content, technical support, and participation in technical advisory committees?

a) What could be improved?

E. Program Design and Administration [NEEA Staff Only]

The following questions will assess the internal processes of the program and pertain to both program design and program administration.

E1. What are the goals and objectives of the energy codes program?

E2. Please outline what is/has been done to accomplish the goals and objectives of the program.
(Note: NEEA-sponsored activities may already have been described above.)

E3. Are the goals and objectives of the energy codes program clear and measureable?

E4. In your opinion, is the program achieving the intended outcomes? Why or why not?

a) What, specifically, is working well?

b) What in particular can be improved?

E5. How is program success measured? How do you think it should be measured?

E6. Characterize the oversight of the program. What does it look like? Is it sufficient? How often is the program and its objectives reviewed?

E7. Is the program adequately staffed?

E8. Are there enough resources to fulfill the activities of the program?

E9. Is it difficult to obtain resources for program activities?

E10. Does the program adequately report on measurable outcomes?

a) What should be reported on that isn't?

E11. Is the program receiving feedback on its activities?
(i.e., feedback on pilots, training, compliance studies)

F. Closing

F1. Is there anything you would like to add that we did not cover today?

F2. We are looking for other individuals who may be able to provide insight into NEEA's role in code development, adoption, implementation, and compliance. Do you have any colleagues or acquaintances you would recommend that we contact for an interview?
(When asking this question, have the interview contacts list available.)

Thank you for your time!

NEEA Codes Market Progress Evaluation Report #4: Interview Guide for State Agencies, Committees, Associations/Universities, Consultants, and Utilities

FINAL

Research Questions for Internal Use	Interview Question(s)
Progress Evaluation	
What code-related activities does NEEA support in your state?	A2, A6, A9, A10
Did NEEA effectively complete the development/adoption activities/outputs identified in the logic model?	A1, A5, A6, A9, A11
Did NEEA achieve the development/adoption outcomes identified in the logic model?	A1, A2
What are the perceived barriers to development and adoption?	A3, A4, A7, A8, A12
Did NEEA effectively complete implementation activities/outputs identified in the logic model?	B2, B3, B5, B6, B8
Did NEEA achieve the implementation outcomes identified in the logic model?	B1, B2, B3, B7, B9, B10
What are the perceived barriers to implementation?	B4
Did NEEA effectively complete the compliance activities/outputs identified in the logic model?	C1, C2, C5, C7, C8
Did NEEA achieve the compliance outcomes identified in the logic model?	C1, C4, C6
What are the perceived barriers to compliance?	C3, C4

Respondent Name:

City, State:

Email:

Title/Occupation:

Telephone:

Interview Date:

Interviewee is participating in this interview as a (check all that apply):

- ☐ State Agency
- ☐ State Committee
- ☐ Association
- ☐ University
- ☐ Consultant
- ☐ Utility
- ☐ Other (please list):

Interviewee will be answering questions pertaining to:

- ☐ Residential energy codes
- ☐ Commercial energy codes
- ☐ Both residential and commercial
- ☐ N/A

Introduction

Hello, my name is _____ and I am with Cadmus. On behalf of the Northwest Energy Efficiency Alliance (NEEA), we are conducting interviews with key energy code contacts throughout the Northwest. I will be asking you a series of questions that relate to activities that support the development and adoption, implementation, and compliance with energy codes throughout your state.

For reference, the most recently adopted energy code in your state is the:

- Idaho: 2012 IECC
- Montana: 2012 IECC
- Oregon: 2014 Oregon Energy Efficiency Specialty Code (OEESC) and 2014 Oregon Residential Specialty Code (ORSC)
- Washington: 2012 Washington State Energy Code (WSEC)

A. Development and Adoption of Energy Codes

The following questions pertain to the ***development and adoption*** of energy codes in [state].

A1. To begin, in your opinion, how well is [state] doing in the development and adoption of energy codes?

A2. Please describe activities occurring in [state] that impact energy code development.

[Probe if necessary: SEE LIST OF ACTIVITIES]

a) Of the activities we have discussed, which ones would you say have had the most impact on code development?

A3. What do you see as the main barriers to energy code development in your state?

A4. Are the barriers being addressed properly?

a) If not, what additional activities would encourage code development?

A5. Is the building industry sufficiently involved in the code development process?

a) What could be improved?

A6. Please also describe activities that impact energy code adoption in [state].

A7. What do you see as the main barriers to energy code adoption in your state?

A8. Are the barriers being addressed properly?

a) If not, what additional activities would encourage code adoption?

A9. Which associations or organizations, local or otherwise, would you identify as “key players” in [state] when it comes to energy code development and adoption?

a) Why would you say they are the most significant or influential?
b) In your opinion, are the activities the key players are implementing well-aligned with the needs of your state?

A10. [MT and ID respondents only] Please describe to me any interaction you have had with the Codes Collaborative.

a) What successes of the collaborative are you aware of?

b) What could make it more effective?

A11. Are you aware of any above code programs or pilot programs in your state? Please briefly explain.

A12. In your opinion, how well are utilities and [state] working together on energy code programs?

B. Implementation of Energy Codes

The following questions pertain to the ***implementation*** of energy codes in [state].

B1. Please describe how well the state is doing in implementing energy codes.

B2. What activities best support energy code implementation in [State].

B3. What additional activities could be done, or which activities could be done better, to support implementation?

B4. What do you see as the main barriers to implementation in your state?

a) Are the barriers being properly addressed?

B5. Are you aware of technical assistance to implement the energy codes available in your state?

a) If yes, please explain how useful it is in code implementation and compliance.

B6. Please describe energy code training available to designers and architects in your state.

B7. Are designers and architects in your state generally designing energy code compliant buildings? [Probe for residential and commercial]

a) If yes, which activities have supported them in designing compliant buildings?

b) If yes, what proportion of buildings are energy code compliant as designed?

c) What more needs to be done to ensure building designs are compliant?

B8. Please describe energy code training available to builders in your state.

B9. Are builders in your state generally constructing energy code compliant buildings? [Probe for residential and commercial]

a) If yes, which activities have supported them in constructing compliant buildings?

b) If yes, what proportion of buildings are energy code compliant as constructed?

c) What more needs to be done to ensure building construction is compliant?

B10. Are building officials in your state generally able to enforce the energy code? [Probe residential and commercial]

a) If yes, which activities have assisted building officials in enforcing the energy code?

b) What more needs to be done to help ensure the energy code is enforced?

C. Compliance with Energy Codes

The following questions pertain to code ***compliance*** studies in [state].

C1. Please describe how the state is doing in terms of compliance with energy codes.

a) Residential

b) Commercial

C2. What activities have been most effective at ensuring compliance is achieved?

C3. What do you see as the main barriers to compliance in your state?

a) Are the barriers being property addressed?

C4. Does proximity to resources or services (for example, third party providers) impact compliance? [Note: Clarify if necessary that the concern is that rural areas may have limited access to such services]

a) Will this be a greater issue once code provisions that require performance testing, (for example, duct testing, blower door tests, commissioning) are implemented?

C5. Are you aware of any energy code compliance studies for the state of [state]?

C6. In your experience, what impact has the compliance study/studies had on the state? For example, are the results of compliance studies shared with jurisdictions to inform training development and/or modify existing training?

C7. Is there anything you can point to that suggests compliance with the energy code is increasing?

C8. Are there additional activities or processes that could be used to further increase compliance?

D. Closing

D1. Is there anything you would like to add that we did not cover today?

D2. We are looking for other individuals who may be able to provide insight into NEEA's role in code development, adoption, implementation, and compliance. Do you have any colleagues or acquaintances you would recommend that we contact for an interview?
(When asking this question, have the interview contacts list available.)

Thank you for your time!

NEEA Codes Market Progress Evaluation Report #4: Interview Guide for Code Officials, Market Actors, and NEEA Staff January 2016

Research Questions for Internal Use	Interview Question(s)
Progress Evaluation	
What is NEEA's role in the national model code?	A1 – A6

Respondent Name:

City, State:

Email:

Title/Occupation:

Telephone:

Interview Date:

Interviewee is participating in this interview as a (check all that apply):

☐ National Model Code Contact

☐ Other (please list):

Introduction

Hello, my name is _____ and I am with Cadmus. On behalf of the Northwest Energy Efficiency Alliance (NEEA), we are conducting interviews with building officials, builders, design professionals, and other market actors to assess the progress NEEA has made in its program supporting building energy codes. I will be asking you a series of questions that relate to activities sponsored by NEEA that support national model code development.

Interviewer: Please prompt respondents to answer with respect to residential and commercial energy codes.

A. National Model Code

A1. To begin, please describe NEEA's efforts in the last four years to submit or sponsor energy code change proposals at the national level for both residential and commercial energy codes.

A2. Please describe NEEA's participation in national model code technical advisory groups for residential energy codes.

A3. Please describe NEEA's participation in national model code technical advisory groups for commercial energy codes.

A4. Please describe NEEA's participation in testifying at residential and commercial national model code hearings.

A5. Are you aware of any examples of NEEA organizing advocates for residential or commercial national model code changes? Please explain.

A6. What more could NEEA do to influence residential and commercial national model codes?

B. Closing

B1. Is there anything you would like to add that we did not cover today?

Thank you for your time!

NEEA Codes Market Progress Evaluation Report #4: Interview Guide for DOE Certification Representatives FINAL

Research Questions	Interview Question(s)
Progress Evaluation	
Did NEEA achieve the compliance outcomes identified in the logic model pertaining to DOE Certification requirements?	A1 – A3

Respondent Name:

City, State:

Email:

Title/Occupation:

Telephone:

Interview Date:

Interviewee is participating in this interview as a (check all that apply):

☐ DOE Certification Representative

☐ Other (please list):

Introduction

Hello, my name is _____ and I am with Cadmus. On behalf of the Northwest Energy Efficiency Alliance (NEEA), we are conducting interviews with building officials, builders, design professionals, and other market actors to assess the progress NEEA has made in its program supporting building energy codes. I will be asking you a series of questions that relate to activities sponsored by NEEA that support DOE certification reporting requirements. Please answer the following questions to the best of your ability.

A. NEEA's Role in DOE Certification Requirements

A1. Please explain how NEEA has supported [state] in meeting DOE certification requirements.

A2. Were the compliance studies conducted by NEEA useful in meeting DOE reporting requirements? [Was certification made easier through compliance studies?] Please explain.

A3. Please identify areas where additional information would have been useful in meeting reporting requirements.

NEEA Codes Market Progress Evaluation Report #4: Interview Guide for Trainers/Instructors and Trainees January 2016

Researchable Questions	Item
What were the objectives of the training? Code implementation (knowledge of code requirements), code compliance (methods to determine compliance), other?	B1, B6
How does NEEA know if the course reached its objectives? Any metrics?	C1, C2, C3, I6
What are the main problems and issues in implementing, enforcing and complying with the energy code? What are barriers to providing training?	D1, D2,I7
Does the training effectively address these problems and issues?	D1, D2, I7
Are the trainings relevant, focused, etc.?	B3, B8, G1-G9
Do the trainings reach building officials as well as design professionals, builders, and contractors?	B2, B5, B7, B10
Were trainers/trainees satisfied with the course?	K1
Are trainees using the information from the course?	H1, I1, I2, I3, J3, J7
Has the training influenced enforcement and/or compliance?	B4, B9, I4, I5, J4, J8
Are building officials and market actors aware of and/or using technical assistance?	H4

CADMUS

Respondent Name:

City, State:

Email:

Title/Occupation:

Telephone:

Interview Date:

Interviewee is participating in this interview as a:

☐Trainer/Instructor

☐Trainee building official

☐Trainee industry professional

☐Other (please list):

Interviewee will be answering questions pertaining to:

☐ Residential energy code training

☐ Commercial energy code training

☐ Both residential and commercial training

☐ N/A

Hello, my name is _____ and I am with Cadmus. On behalf of the Northwest Energy Efficiency Alliance (NEEA), we are conducting follow-up interviews with professionals identified as either training instructors or training participants. Your feedback in this interview will be used to gather information regarding NEEA's energy code training efforts, the relevance of the courses offered, and how training has impacted the built environment, particularly in respect to energy code compliance. Your responses will be kept confidential and will be combined with those of other respondents for the findings and analyses we present to NEEA.

[Verify occupation, title, role as instructor or trainee, and whether the respondent will answer with respect to commercial energy code training, residential energy code training, or both]

For reference, the most recently adopted energy code in your state is the:

- Idaho: 2012 IECC
- Montana: 2012 IECC
- Oregon: 2014 Oregon Energy Efficiency Specialty Code (OEESC) and 2014 Oregon Residential Specialty Code (ORSC)

- Washington: 2012 Washington State Energy Code (WSEC)

Trainer/Instructor

A. Introduction

A1. To begin, you have been selected for this interview because you were identified as the instructor of the following NEEA-sponsored training course(s):

Course: Date:

Course: Date:

Course: Date:

a) Is this correct?

A2. Please describe the relationship you have, if any, with NEEA.

Great, thanks for the introduction and clarification. The remainder of this interview is focused on course specifics, including topics, audience, and application, as well as your opinion on the barriers to energy code training.

B. Course Topics and Audience

[Commercial Trainers and Com/Res Trainers Only for Questions B1-B5] Please briefly describe the commercial topics covered and objectives of the NEEA-sponsored courses of which you were the instructor.

B1. Please describe the general audience for each of the commercial trainings (i.e., building officials, design professionals, contractors, third parties, etc.).

B2. Do you feel the course materials adequately covered the course topic(s) and ensured the objectives of the course were met? Please explain.

a) Were the materials appropriate for the audience?

b) Were the materials at the right level for the audience to understand?

B3. What information do you have about how the training has influenced code enforcement and compliance?

B4. Are you familiar with NEEA-sponsored commercial trainings other than the one(s) you have conducted?

a) If yes, do you feel they cover the needs of all parties involved in energy code enforcement and compliance (i.e., building officials, design professionals, contractors, inspectors, etc.)?

B5. [Residential Trainers and Com/Res Trainers Only for Questions B6-B10]. Please briefly describe the residential topics covered and objectives of the NEEA-sponsored courses of which you were the instructor.

B6. Please describe the general audience for each of the residential trainings (i.e., building officials, design professionals, contractors, third parties, etc.).

B7. Do you feel the course materials adequately covered the course topic(s) and ensured the objectives of the course were met? Please explain.

a) Were the materials appropriate for the audience?

b) Were the materials at the right level for the audience to understand?

B8. What information do you have about how the training has influenced code enforcement and compliance?

B9. Are you familiar with NEEA-sponsored residential trainings other than the one(s) you have conducted?

a) If yes, do you feel they cover the needs of all parties involved in energy code enforcement and compliance (i.e., building officials, design professionals, contractors, inspectors, etc.)?

C. Course Feedback

C1. Did you provide participants with an end-of-course survey?

a) If yes, to the best of your knowledge, was the feedback used to modify code material to be more effective?

C2. Did you receive any feedback from the course that was not recorded by an end of course survey? (i.e., a participant speaks with you after the session or sends an email).

a) If yes, and you are comfortable with sharing, please describe the feedback.

C3. What kind of data would be useful to track the effectiveness of NEEA's training in the future?

D. Barriers to Code Implementation and Compliance

D1. What do you perceive as barriers to energy code implementation, enforcement, and compliance?

a) Is the NEEA-sponsored training helping overcome those barriers? How?

b) Is NEEA helping overcome those barriers in other ways? How?

c) What could NEEA do to improve its role in overcoming barriers?

D2. Are there any barriers you can identify ***to training*** the parties responsible for energy code enforcement and compliance? Please explain. (i.e., time/schedules, resources, distance to training, costs/fees, lack of interest).

a) If yes, to the best of your knowledge, what actions has NEEA taken to address the barriers?

b) Has NEEA been successful in addressing these issues?

E. Closing

E1. What suggestions do you have for NEEA on how to improve the training process or training courses?

E2. Is there anything you would like to add that we haven't covered?

Thank you for your time!

Trainees/Participants

F. Introduction

F1. You have been selected for this interview because you were identified as a participant in in the following NEEA-sponsored training courses.

Course 1: Date:

Course 2: Date:

Course 3: Date:

a) Is this correct?

G. Training Feedback

G1. [Course 1 Questions G1-G3] To the best of your recollection, can you tell me which part(s) of the [Course 1] training were most useful and why?

G2. What topics needed to be more thoroughly explained?

G3. What topics weren't covered that you would have liked included?

G4. [Course 2 Questions G4-G6] To the best of your recollection, can you tell me which part(s) of the [Course 2] training were most useful and why?

G5. What topics needed to be more thoroughly explained?

G6. What topics weren't covered that you would have liked included?

G7. [Course 3 Questions G7-G9] To the best of your recollection, can you tell me which part(s) of the [Course 3] training were most useful and why?

G8. What topics needed to be more thoroughly explained?

G9. What topics weren't covered that you would have liked included?

[REPEAT FOR ADDITIONAL COURSES]

H. Sharing and Sources of Information

H1. Please think of different parties you interact with, such as building officials, colleagues from other jurisdictions, builders, contractors, and others. Have you shared information from the trainings with others?

a) If yes, can you tell me what information you shared and the party (ies) involved?

b) If yes, can you tell me how they are using this information?

H2. Other than the NEEA-sponsored training you attended, have you attended other trainings, webinars, or gatherings discussing the most recently adopted building energy code?

a) [IF YES] What was the focus of these events?

b) What information or processes from these events do you think could be used to improve the NEEA training?

H3. Other than the [TRAINING(S)], what are your main sources of information on building energy codes?

H4. Are you aware of the technical assistance offered in your state?

a) If yes, have you used it?

b) How useful has it been and how could it be improved?

I. Use of Training

I1. About what percentage of your work since attending the training has made use of the information you learned at the training?

a) How have you used the training?

I2. Have you changed how you perform your job tasks as a result of the training you attended?

a) If yes, please explain.

b) If no, why would you say the training has not affected how you fulfill the responsibilities of your job? (Was the training relevant? Has there not been enough time to incorporate what you have learned?)

I3. Do you expect what you have learned at the training to influence how tasks are fulfilled in the future?

I4. [For design professionals/Builders] Do you believe the training has prepared you to achieve compliance with the energy code?

a) Why or why not?

I5. [For Building Officials] Do you believe the training has prepared you to better enforce the energy code?

a) Why or why not?

I6. Have you provided any feedback to the trainer or NEEA regarding the training? If so, please describe when and how you provided the feedback and what the feedback was.

I7. What do you perceive as barriers to energy code implementation, enforcement, and compliance?

a) Is the NEEA-sponsored training helping over those barriers? How?

b) Is NEEA helping overcome those barriers in other ways? How?

c) What could NEEA do to improve its role in overcoming barriers?

J. General

J1. [For Builders/Contractors/Design Professionals] Would you say compliance with the commercial energy code is a low, medium, or high priority in your projects, relative to other things you have to comply with? (N/A if not familiar with commercial code).

a) How did the priority change when the latest code was adopted?

J2. [For Builders/Contractors/Design Professionals] Would you say compliance with the residential energy code is a low, medium, or high priority in your projects, relative to other things you have to comply with? (N/A if not familiar with residential code).

a) How did the priority change when the latest code was adopted?

J3. [For Builders/Contractors/Design Professionals] Have you put in more effort and/or spent more time since the latest code was adopted complying with the energy code than previously?

J4. [For Builders/Contractors/Design Professionals] How much effect has the NEEA-sponsored training had on your ability to comply with the code? (very much, some, not much at all, none)

J5. [For Building Officials Only] Would you say enforcement of the commercial energy code is a low, medium, or high priority in your code enforcement activities (N/A if not familiar with commercial code).

a) How did the priority change when the latest code was adopted?

J6. [For Building Officials Only] Would you say enforcement of the residential energy code is a low, medium, or high priority in your code enforcement activities? (N/A if not familiar with residential code).

a) How did the priority change when the latest code was adopted?

J7. [For Building Officials] Have you put in more effort and/or spent more time since the latest code was adopted enforcing the energy code than previously?

J8. [For Building Officials] How much effect has the NEEA-sponsored training had on your ability to enforce the code? (very much, some, not much at all, none)

J9. In your opinion, is compliance with energy codes increasing? Why or why not.

K. Closing

K1. Would you recommend that your colleagues attend NEEA sponsored trainings?

a) Why or why not?

K2. What suggestions do you have for how NEEA can improve training to ensure codes are implemented and compliance is achieved?

K3. Is there anything we have not covered that you would like to add?

Thank you for your time!

Appendix M. Logic Model Memo

As described in Section 2.1 above, Cadmus produced and delivered a memo to provide NEEA with a summary of Cadmus' initial findings and recommendations for NEEA's energy codes program logic model. This memo is provided in its entirety below.

NEEA responded to the memo with comments in the document and in a follow-up meeting attended by the Cadmus project manager and the NEEA evaluation leader. Cadmus considered these comments and later research in the revised logic model assessment included in Chapter 3 of this report. In the event of any conflict, the report chapter supersedes the *Logic Model Review* memo.

MEMORANDUM (DRAFT)

To: Northwest Energy Efficiency Alliance
From: Allen Lee, Peter Schaffer, Cadmus
Subject: Logic Model Review
Date: November 6, 2015

Introduction

As part of the Codes Market Progress Evaluation Report, Cadmus periodically submits a memo providing updates, findings, and recommendations following the completion of a task or deliverable. This memo provides NEEA with a summary of Cadmus' findings and recommendations for NEEA's energy codes program logic model. The Cadmus team developed this memo to become a section of the MPER.

Methodology/Background

In developing recommendations and findings for the energy code program logic model, Cadmus had each team member separately review the model. Following the team members' independent review and input, Cadmus combined comments and developed a series of questions for NEEA regarding the history, context, and purpose of the logic model.

Cadmus used these questions to develop an interview guide to provide additional clarification on the logic model's design and purpose. That interview with NEEA staff took place on October 13, 2015, with Ken Baker, John Jennings, and Kathryn Bae in attendance on NEEA's behalf. The team then developed the findings and recommendations detailed below.

Developed by David Cohan and Charlie Stephens of NEEA, in collaboration with stakeholders from Idaho, Montana, Oregon, and Washington, NEEA's energy code logic model has been designed to provide an overview of the processes and activities NEEA has in place to support energy codes. The model identifies barriers during various stages of the code cycle and details NEEA's activities taken to overcome the barriers and achieve desired outcomes.

The model has lost some utility over time, as NEEA has started new activities and developed different strategies related to energy codes. The following sections detail Cadmus' findings and recommendations, intended to make the logic model a more useful and relevant tool for staff and stakeholder reference.

Findings and Recommendations

This section provides Cadmus' findings regarding the logic model and recommendations for enhancing it and increasing its accuracy. Cadmus based the findings on the team's review of the logic model and on insights provided by NEEA program staff. Cadmus developed the recommendations in response to these findings and provides them for NEEA's consideration in revising the logic model.

Development and Adoption

Findings: NEEA views code adoption as the end result for some NEEA initiatives,[60] with codifying an energy-efficient measure or practice as the final step in achieving market transformation and ensuring continued savings. Prior code program processes, however, did not undergo systematic design intended for initiatives to lead to periodic code updates. Currently, the codes program more closely communicates and coordinates with NEEA initiatives as part of market transformation efforts. NEEA recently has designed initiatives explicitly to facilitate code changes and to provide a basis for preparing the region to reach Net Zero by 2030.

Since creation of the logic model, the program has begun new adoption activities that the logic model did not initially include. For example, the program now works with utility program managers to communicate upcoming code proposals and to address utility concerns regarding codes making it more difficult for existing efficiency programs to capture energy savings. NEEA's current strategy focuses towards outcome-based codes that regulate overall energy use, as reflected in programs encouraging builders to build above code in preparation for upcoming code iterations.

Additionally, the codes team supports setting up a regional energy-use intensity (EUI) trends database to help provide a rationale for codes. NEEA's strategy also targets national code advocacy, as all four states begin with national model commercial codes (IECC) as the basis for their code. During interviews, Cadmus found that staff felt the codes logic model did not adequately convey the current breadth of activities that encompass code adoption and development; in particular, respondents stated that the logic model does not capture the growing integration of the code program with the other NEEA initiatives.

Recommendation: The logic model should include code adoption and development activities performed on a national or regional level.

Recommendation: The logic model should reflect the relationships between other NEEA initiatives and the code program activities.

[60] Many findings related to code adoption also apply to NEEA's efforts supporting standards adoption.

Findings: Cadmus noted that the current logic model combines development and adoption activities and inquired whether there was any basis for separating development from adoption in the logic model. NEEA's code development efforts focus on establishing the economic justification for codes and demonstrating market readiness to stakeholders. As codes periodically update, NEEA's development efforts ensure robust code proposals, well understood among builders and code officials. Code adoption efforts, on the other hand, focus on market and governmental actors, working with the building community to explain the rationale and theory behind codes. Adoption activities include political advocacy building support for code adoption and developing a consensus for code acceptance. The NEEA program staff noted that the recent shift to linking NEEA's other initiatives to code activities primarily involved code development, but not code adoption. While related, code development and adoption also have specific activities that distinguish them from one another.

Recommendation: NEEA should consider separating development and adoption in the logic model, as these involve distinct steps and activities in each category. The logic model should incorporate linkages between categories where activities overlap.

Findings: The current logic model includes activities and outputs regulating actual energy use for buildings, allowing a more flexible, outcome-based approach to energy codes. NEEA staff noted that, for this to occur, infrastructure must be developed using an agreed-upon measurement method to document and enforce energy codes. Additionally, NEEA staff commented that successes of outcome-based code pilot programs must be documented and used as "proving grounds" to demonstrate this strategy will work from an energy-savings perspective. The regional EUI database currently under development is intended to address this issue.

Recommendation: The logic model should include activities that address barriers to outcome-based codes and clearly identify activities designed to support code adoption and development.

Implementation

Findings: NEEA staff indicated that some components of the logic model's implementation section should be revised. The "NEEA provides" line in the barrier row proved confusing and unnecessary, and it should be removed. Also, "belief that energy codes are different than other codes" presented an implementation barrier, though not currently included in the implementation section of the logic model. NEEA staff helped clarify that their activities supporting energy code implementation in the Northwest also should be included.

Recommendation: NEEA should remove the "NEEA provides" line from implementation barriers.

Recommendation: "Belief that energy codes are different than other codes" should be includes as an implementation barrier and the differences should be identified.

Findings: Depending on the jurisdiction, NEEA conducts a variety of activities directed towards supporting implementation of energy codes. Implementation activities include trainings for builders and code officials that explain the code and discuss its changes from prior codes.

Training activities vary by state. For example, in Idaho, NEEA conducts training for general code requirements and modules, addressing topics such as nonresidential lighting and HVAC systems; conducts annual training for market actors and code officials; and provides ongoing technical assistance. In Washington, NEEA uses a contractor who meets with a minimum number of jurisdictions to present residential code training, education, and technical assistance, and provides tools for builders to document energy code compliance.

Additionally, NEEA presently leverages contractor work for all states in the region and tries to create more uniform code across the region. Currently, NEEA is developing an online concept for commercial compliance submittals in Washington. This could then be used for data collection and possibly for regional tracking. Looking forward, NEEA is developing programs to provide additional information to market actors, such as best practice, solution-oriented education and a quality assurance program.

Recommendation: The logic model's implementation section should provide greater detail on specific activities that NEEA supports for code implementation, and additional categories to cover types of activities that are not reflected in the current model.

Findings: During interviews, NEEA helped to clarify implementation activities performed to support enforcement of energy codes. As with a majority of NEEA activities, the interaction and assistance level depends on the jurisdiction.

For example, in Oregon, the state building code division trains building officials, and NEEA has contracted with the Oregon Department of Energy (ODOE) to train architects on code. ODOE cannot, however, train building officials as this falls within the building code division's purview. In Idaho, NEEA funds building code officials' organizations to provide trainings and to provide voluntary certifications for HVAC contractors or code officials regarding duct and envelope testing and HVAC balancing.

Cadmus finds the present logic model assumes education/training will help participants develop code knowledge, but this does not guarantee code enforcement simply because participants understand code provisions. Confusion or lack of understanding and knowledge often occurs regarding enforcement responsibilities (and at what levels), compliance requirements (e.g., documentation or inspections), and code support actors (i.e., third parties).

Cadmus finds the logic model's present form does not sufficiently illustrate linkages between the various activities and outputs in the implementation stage. For example, linkages likely occur between technical support and development of training curricula and compliance tools. A link likely exists between technical support and building officials enforcing new codes. NEEA staff remarked that they wish to use best practices education and trainings to help the market prepare for additional code iterations

Recommendation: Enforcement support activities should be clarified in the logic model, along with a clear linkage between increased code knowledge and better enforcement.

Recommendation: Linkages should be identified between implementation and other code cycle areas (such as compliance, as discussed below), and, where appropriate, should be shown in the logic model**.**

Compliance

The NEEA evaluation group—not the codes program—funds compliance activities, as compliance activities are primarily measurement activities. NEEA staff stated that compliance serves as a feedback mechanism for market acceptance of code. This feedback can be used during the next code cycle to inform and improve code and implementation efforts. Currently, this linkage is not shown in the logic model.

Cadmus believes an important linkage occurs between compliance rates for individual code requirements and identification of code change proposals in the logic model's development portion, but the logic model does not include this relationship. In addition, the Cadmus team expects that compliance findings would be useful to inform the design and conduct of training. As discussed above, NEEA works to develop mechanisms allowing code officials and builders to document and demonstrate code compliance; consequently, these efforts could be listed in the compliance activities section or linked to compliance activities in the logic model.

Recommendation: Linkages should reflect feedback delivered through compliance studies used to help develop future code revisions and educational priorities.

Findings: NEEA staff indicated that the requirement under the American Recovery and Reinvestment Act (ARRA) to meet 90% energy code compliance to qualify for federal funding is no longer operational.

Recommendation: The language that refers to 90% compliance requirements in ARRA should be removed.

Market Progress Indicators

This section provides Cadmus' findings regarding market progress indicators (MPIs) to track program performance. MPIs are associated with either program outputs or outcomes and provide effective metrics for tracking program progress and effectiveness in satisfying its objectives. In addition to being effective and meaningful indicators of progress, MPIs should be measurable and parsimonious so that they do not require an excessive tracking effort. Cadmus developed an initial draft set of potential indicators for NEEA's consideration, as shown in the following tables, and will finalize the set based on NEEA's comments. Cadmus selected MPIs based on the team's review of the logic model and on insights provided by NEEA program staff.

Development and Adoption

For development and adoption, Cadmus proposes the MPIs in Table 1 to measure progress in meeting objectives of the code development and adoption activities. The outputs/outcomes identified by "NEW" are those added as a result of our review of the existing logic model and recommendations revisions.

Table 20. MPIs for Development and Adoption

Output/Outcome	Market Progress Indicator
State codes adopted reflecting NEEA proposals	1. Number of state code proposals submitted or co-authored by NEEA 2. Number of code technical or economic analyses prepared by NEEA and presented to states
Increased stakeholder buy-in to code adoption	1. Number of meetings held with utilities, legislators, and other stakeholders 2. Number of parties testifying for and against NEEA's code changes
NEW: New outcome-based and other code requirements developed and adopted	1. Number of new code requirements developed based on other NEEA initiatives 2. Number of products developed supporting outcome-based codes 3. Number of jurisdictions piloting new code requirements
NEW: National model codes adopted reflecting Pacific Northwest inputs	1. Number of code changes submitted to latest model codes 2. Proportion of submitted code changes adopted in model code.

Implementation

For the implementation stage, Cadmus proposes the MPIs in Table 2 to measure progress for outputs generated from implementation activities. Cadmus also includes enhancing enforcement capabilities as an output based on our logic model review and assessment.

Table 21. MPIs for Implementation

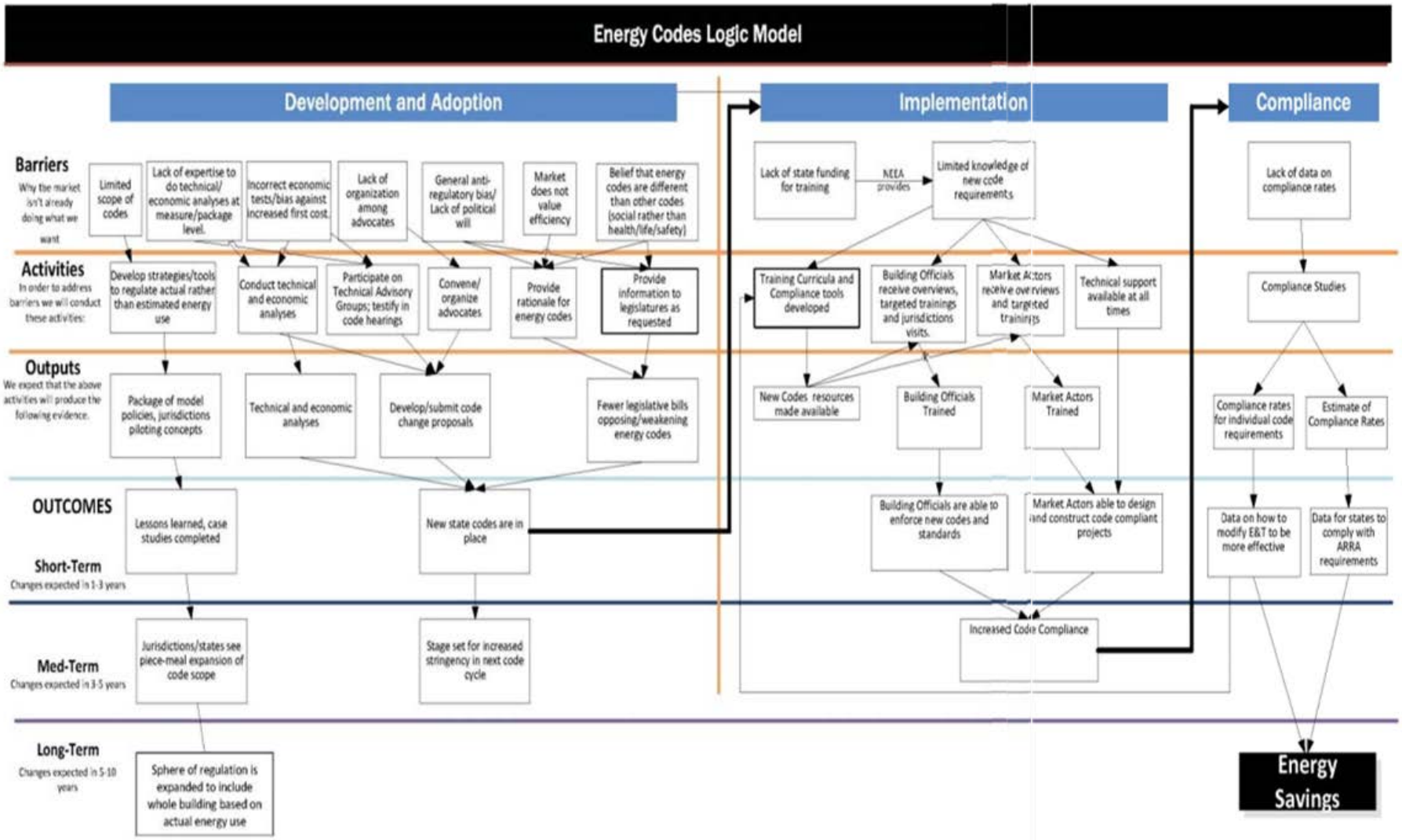
Output/Outcome	Market Progress Indicator
Code enforcement is improved	1. Number of building officials providing positive reviews of NEEA-sponsored training, materials, data, and tools 2. Proportion of buildings complying with the code 3. Number of changes to enforcement procedures resulting from compliance studies
Building industry compliance with code is improved	1. Number of market actors providing positive reviews of NEEA-sponsored training, materials, data, and tools 2. Proportion of buildings complying with the code on first pass 3. Number of changes in building practices resulting from compliance studies

Compliance

Compliance activities and outputs are limited relative to other portions of the code cycle and, as noted earlier, are defined more in terms of evaluation than outputs. However, Cadmus believes compliance outputs have important connections to implementation, development, and adoption of energy codes. The MPIs referenced in Table 3 can be reflective of other outputs in the code cycle as well. For example, jurisdictions with the capability to track EUI would be an indicator for model policies.

Table 22. MPIs for Compliance

Output/Outcome	Market Progress Indicator
NEW: Compliance rate findings influence code development, adoption, and implementation	1. Feedback from compliance studies is linked to code development and adoption 2. Training and materials are modified to reflect feedback from compliance studies
NEW: Meaningful measures of compliance rates	1. Number of individual requirements for which useful metrics for determining compliance are developed 2. Useful metric for measuring overall compliance is developed 3. Number of jurisdictions with capability to track EUI of buildings


Energy Codes Logic Model
Development and Adoption
Implementation
Compliance
Barriers
Why the market isn't already doing what we want
Limited scope of codes
Lack of expertise to do technical/ economic analyses at measure/package level.
Incorrect economic tests/bias against increased first cost
Lack of organization among advocates
General anti-regulatory bias/ Lack of political will
Market does not value efficiency
Belief that energy codes are different than other codes (social rather than health/life/safety)
Activities
In order to address barriers we will conduct these activities:
Develop strategies/tools to regulate actual rather than estimated energy use
Conduct technical and economic analyses
Participate on Technical Advisory Groups; testify in code hearings
Convene/ organize advocates
Provide rationale for energy codes
Provide information to legislatures as requested
Outputs
We expect that the above activities will produce the following evidence.
Package of model policies, jurisdictions piloting concepts
Technical and economic analyses
Develop/submit code change proposals
Fewer legislative bills opposing/weakening energy codes
OUTCOMES
Short-Term
Changes expected in 1-3 years
Lessons learned, case studies completed
New state codes are in place
Med-Term
Changes expected in 3-5 years
Jurisdictions/states see piece-meal expansion of code scope
Stage set for increased stringency in next code cycle
Long-Term
Changes expected in 5-10 years
Sphere of regulation is expanded to include whole building based on actual energy use
Lack of state funding for training
NEEA provides
Limited knowledge of new code requirements
Training Curricula and Compliance tools developed
Building Officials receive overviews, targeted trainings and jurisdictions visits.
Market Actors receive overviews and targeted trainings
Technical support available at all times
New Codes resources made available
Building Officials Trained
Market Actors Trained
Building Officials are able to enforce new codes and standards
Market Actors able to design and construct code compliant projects
Increased Code Compliance
Lack of data on compliance rates
Compliance Studies
Compliance rates for individual code requirements
Estimate of Compliance Rates
Data on how to modify E&T to be more effective
Data for states to comply with ARRA requirements
Energy Savings