BAY AREA Regional Energy Network

Bay Area communities working together for a sustainable energy future.

BayREN Codes & Standards

2015 Annual Report

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Prepared by

Association of Bay Area Governments
BKi
Benningfield Group, Inc.

Confidentiality Note: The information collected for this report will inform BayREN efforts to provide Bay Area local governments with targeted tools and training to help comply with the California Building Energy Efficiency Standards. To ensure confidentiality, project-level information will remain anonymous. No project-specific information included within this report (such as building owner, occupant, project address, contractor, jurisdiction, or staff names) will be disclosed in any public reporting. Any questions or concerns about this confidentiality note can be addressed to BayREN by email at codes@bayren.org.

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1. Executive Summary

San Francisco Bay Area building professionals and building departments are on the front lines of ensuring that residential and nonresidential construction in one of the country's largest metropolitan areas is completed in accordance with California's Building Standards. Specifically when it comes to energy use in buildings, California's Title 24 Part 6 represents the most aggressive, and complicated energy code in the United States. As these Building Energy Efficiency Standards become more stringent in support of California's climate and energy goals, the San Francisco Bay Area Regional Energy Network ("BayREN") seeks to support building professionals and building departments to achieve full compliance with provisions of the California Energy Code.

The BayREN is a collaboration of the nine counties that make up the Bay Area. Led by the Association of Bay Area Governments (ABAG), BayREN implements effective energy saving programs on a regional level and draws on the expertise, experience, and proven track record of Bay Area local governments to develop and administer successful climate, resource, and sustainability programs. Since its inception, the BayREN has been addressing the three areas indicated by Decision 12.11.015 in the formation and implementation of programs: filling gaps that the Investor Owned Utilities are not serving; developing programs for hard to reach markets; and exploring new approaches to programs that may have the ability to scale and offer innovative avenues to energy savings. The BayREN has taken on these challenges with customized and innovative programs that build on local government values and mission, serving their constituents needs. Included in the BayREN portfolio is a Codes and Standards program that seeks to identify and share best practices and improve building code enforcement and building performance rates within the region. Since 2013, the Codes & Standards Program has engaged with building departments and building professionals representing over 75 Bay Area jurisdictions. Program activities focus on energy code compliance tools and services, specialized and focused training and mentoring, and policy development activities.

This report details the findings and recommendations derived from the Codes & Standard activities in 2015 while also building upon the more comprehensive Permit Resource Opportunity Program ("PROP") Final Report and Energy Code Resource Guide released earlier in the year. Key findings from the 2015 program year include:

- Building department staff were generally unfamiliar with HERS Registries, reinforcing the notion that the Registries are under-utilized for code compliance verification
- Electronic tools that can filter or automate the code enforcement process warrant further study for how to effectively scale tool use by building department staff and building professionals
- Over-the-counter permit guides must be appropriate for the local jurisdiction (e.g., climate zone specific and addressing common local permit cases)
- There are many opportunities to improve compliance and enforcement with Nonresidential Tenant Improvement projects, including: specification of daylighting

zones, specification of proper switching or lighting controls, understanding of track lighting requirements, specification of HVAC equipment and controls

- Preliminary results from BayREN's work with Electronic Compliance Improvement tools indicate opportunities for process improvements and efficiencies through software
- BayREN Forums allowed attendees to share best practices and explore code compliance issues with colleagues from local jurisdictions and state agencies
- Home inspectors participated in early BayREN efforts to increase uptake in Home Energy Score Assessments
- The standard Home Energy Score recommendations report needs customization to be compatible with Energy Upgrade California rebate programs
- Realtors may be more supportive of Home Energy Score if it is promoted as a resource for new homebuyers, as opposed to a requirement that may delay a home sale
- Building Energy Saving Ordinance BESO is a model ordinance being considered by other BayREN jurisdictions

Based on these and other findings documented in this report, BayREN recommends 2016 C&S activities include:

- Developing Residential HERS Registry training.
- Improving the 2015 Regional Plan Check program by adding participating jurisdictions, expanding the types of projects supported, and providing assistance to field inspectors.
- Expanding work with Electronic Compliance Improvement tools to serve other agencies throughout the BayREN region to further evaluate its effectiveness.
- Recording webinars so they can be viewed on demand.
- Continue leveraging PG&E and Build it Green (BIG) efforts to provide technical assistance and cost-effectiveness research related to the local government adoption of single measure reach codes.
- Expanding Home Energy Score assessors support services.
- Working with the U.S. Department of Energy and the California Energy Commission to ensure that Home Energy Score supports both national and local policy objectives.
- Providing support to jurisdictions adopting new RECO policies.

2. Introduction

The objective of the Codes & Standards Program, part of the portfolio of programs offered by BayREN, is to improve enforcement of Title 24 Part 6 of the California Code of Regulations, California Building Energy Efficiency Standards (known as Title 24 Part 6, or the Standards) in the San Francisco Bay Area. The nine counties—Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma—and their local governments represent 110 different building departments, or jurisdictions, serving a regional population of approximately seven million. Each county has its own building department that typically serves the smaller towns and unincorporated areas, and each city usually has its own building department that governs building activity within its geographic limits.

The 110 Bay Area building departments oversee a significant volume of new construction and remodeling in the residential and nonresidential markets. For new residential construction in 2014, 7,056 buildings representing 21,389 living units and over $5 billion in construction costs were permitted in the Bay Area.[1] Considering the scale of building activity in the region, the Codes & Standards Program seeks to reduce energy use in buildings by:

- Assisting in the creation and promotion of best practices at individual jurisdictions to ensure compliance with energy codes and green building standards
- Directing building department staff and building professionals to available trainings related to the energy codes, and developing and providing solutions for unmet training needs
- Promoting reach code ordinances that strengthen local agency efforts to improve energy efficiency standards and encourage greater use of renewable and sustainable materials in building construction

BayREN Codes & Standards Program Overview

In 2012, the California Public Utilities Commission (CPUC) provided the nine Bay Area Counties, through the Association of Bay Area Governments, with an unprecedented opportunity to use ratepayer public goods funds to develop strategies for improving building energy efficiency by working directly with local governments. In 2013, BayREN planned and launched four programs: Financing, Multifamily, Single Family, and Codes & Standards. These programs were continued in 2014 and 2015 and are approved for funding in 2016 and beyond[2].

[1] Information compiled from Annual 2014 Permit Data for the 9 Bay Area Counties as reported by the U.S. Census: http://censtats.census.gov/bldg/bldgprmt.shtml

[2] D.15-10-028

Since 2013, the Codes & Standards Program has engaged with building departments and building professionals representing over 75 Bay Area jurisdictions. Program activities focus on three primary tasks:

- Energy Code Compliance Tools and Services: BayREN's energy code experts work with self-selected Bay Area building departments to evaluate and characterize energy code enforcement processes, learn first-hand about enforcement barriers and challenges, and identify successful energy code enforcement processes and strategies
- Specialized and Focused Training and Mentoring: BayREN provides to building department staff and private sector professionals energy code training that focuses on enforcement processes and best practices
- Stakeholder Engagement and Policy Development Activities: local government policymakers, sustainability staff, and building professionals are engaged through regional forums, local council meetings, and other opportunities to learn about and receive resources related to policy and program design issues on energy efficiency and energy code compliance improvement

Purpose of this Report

This document supports three primary goals:

1. Reporting on the results of 2015 Program activities
2. Identifying best practices to help local jurisdictions enhance their enforcement of energy codes
3. Identifying 2016 activities that build on 2015 findings

The primary audience for this document is chief building officials (CBOs), who can use these findings, best practices, guides, and resources to help inform energy code enforcement at their local building departments. This report is also intended for local government policy leaders and state regulatory agency staff who influence energy code programs, policies, and resources across the state.

3. Energy Code Compliance Tools and Services

Energy codes and standards transform the new construction and building retrofit market to reduce the wasteful, uneconomic, inefficient, and unnecessary consumption of energy,

including the energy associated with the use of water.[3] But to realize potential energy savings embedded within energy codes, building professionals such as contractors, building department staff and energy consultants must first adhere to the energy codes. For building officials, a robust code enforcement program that includes comprehensive code compliance training is necessary. Such a program requires technical knowledge of building science, knowledge of allowed processes, procedures, and code triggers, and, as well as the ability to prioritize plan review and field inspection tasks.

In 2015, the BayREN team conducted energy code compliance improvement activities[4] consisting of three primary components:

1. *Permit Resource Opportunity Program (PROP):* BayREN representatives visited participating building departments to share recommended compliance improvement activities, train staff on how to implement them, and discuss the best ways to best integrate the improvements into their existing review process

2. *Regional Plan Check Program*:, Contra Costa County Department of Conservation & Development —a BayREN lead agency and building department—led an effort to mentor plans examiners on their energy code plan review of nonresidential tenant improvement (TI) permit applications

3. *Electronic Compliance Improvement Tools*: CodeCycle[5], an online design assistance tool and iPad inspection application, analyzed the potential for new tools to improve compliance of Title 24 2013 Commercial Lighting Standards in 32 commercial buildings in five Bay Area jurisdictions

Permit Resource Opportunity Program

The Permit Opportunity Resource Program (PROP) was a continuation of 2014 efforts to provide on-site support to building departments interested in improving their energy plan review skills and processes. BayREN consultants worked with departments that were interested in learning how to better apply energy codes and willing to make necessary changes to achieve a higher compliance level. Referred to as PROP visits, BayREN consultants met with building department staff to share compliance improvement strategies and BayREN-developed

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[3] Strait, Peter et al. "California's Building Energy Efficiency Standards: Policy Objectives, Participation and Outreach." California Energy Commission. Santa Clara County Charcot Training Center, San Jose, CA. 25, August 2015. BayREN August Regional Forum Presentation.

[4] The term *compliance* can be characterized differently. Compliance can be viewed as a target minimum; i.e., a building constructed to meet its energy budget can be seen as fully compliant with the energy code. Alternatively, compliance can be viewed as a relative point on a spectrum; i.e., a building can be more compliant or less compliant with the energy code. BayREN's 2014 Permit Resource Opportunity Program Final Report discusses energy use implications of these different approaches: https://www.bayren.org/codes/prop-final-report

[5] www.codecycle.com

customizable tools (e.g., worksheets, checklists, and guides) that focused on the needs of building departments as identified in 2014 PROP activities (Figure 1). During these visits, departments were encouraged to submit sample plans or projects to use as examples to better explain compliance improvement strategies.

Figure 1. Building department needs identified in 2014 PROP activities

General Needs	Detailed Description
Provide assistance with alterations	Many alteration permits are issued over the counter with little or no technical review. Yet the work scopes of these projects frequently trigger energy code requirements. In addition, many of the contractors involved in alterations are relatively new to the Energy Code and need help determining which requirements apply.
Find ways to improve communication between plan review and field inspection to ensure that what is promised during plan review is delivered during construction	Inspectors, who have limited time, will be more effective if they receive written 'prompts' from plan review staff that highlight the important items to inspect. In addition, plan review staff can help building inspectors determine which third-party inspection forms must be collected and reviewed on site.
Encourage building departments to focus upon the compliance improvement activities that are most appropriate for their jurisdiction	Building department staff understand their own needs and are more likely to embrace change when they have helped identify the problem and craft the solution. In addition, they are more willing to provide feedback on the usefulness of tools and strategies recommended during the visits.

Background

In 2014, BayREN consultants visited 15 building departments to help them improve their efficiency and effectiveness at enforcing California's energy code. During these one or two day visits BayREN consultants analyzed permit data, interviewed staff, reviewed plans of permitted projects, accompanied inspectors to construction sites, and delivered a report on the findings.

Results showed building departments throughout the Bay Area region were unable to effectively enforce codes due to shortages of time, technical know-how, and access to quick reference resources. In 2015, PROP activities were limited to six strategies focused on increasing building departments' understanding of how to best enforce the code, and improving the process based on the ability to prioritize work and save time while still properly enforcing the energy codes. Compliance improvement strategies and supporting tools developed include:

- Use BayREN Permit Guides for associated permits issued at counter to educate applicants and make inspection more efficient.

- Use BayREN residential and nonresidential prioritized worksheets to make energy code plan review and building inspection more efficient.
- Use BayREN Quick Reference Guides to streamline review and verification of these measures.
- Download and review completed compliance forms from the HERS registry prior to each inspection to make verification of installed features that are NOT HERS-verified more efficient.
- Collect all applicable Certificates of Acceptance for Nonresidential Lighting Controls.

Methodology

In 2015, BayREN members solicited building departments that participated in 2014 PROP activities to participate in returning PROP visits and learn about one or all of the compliance improvement strategies (Figure 1Figure 2). Additionally, building staff were asked to implement a method of tracking how often associated tool(s) were used, and provide feedback on the usefulness of the activities and tools. Building departments selected strategies to engage based on the types of permits issued and the level of interest for systemic changes.

Figure 2. Jurisdictions participating in 2015 PROP Visits

Compliance Improvement Strategies Covered During PROP Visits	Jurisdictions					
	BD1	**BD2**	**BD3**	**BD4**	**BD5**	**BD6**
Strategy 1. Use Prioritized Worksheets	X	X		X	X	X
Strategy 2. Use Permit Guides		X	X	X	X	X
Strategy 3. + 4. Use Quick Reference Guides		X		X	X	X
Strategy 5. Reference HERS Registries		X		X	X	X
Strategy 6. Collect Acceptance Test Forms		X		X	X	X

Findings

Six building departments participated in returning PROP visits. Although tools and tracking methods were accepted, building departments were unwilling to commit to tracking and reporting on how often tools were used. Implementing a universal and effective reporting was also difficult because each department's process for tracking projects through intake, permitting, inspection, and final phases is unique.

It was also evident that participating building departments had not used HERS Registries, reinforcing the notion that HERS Registries are an under-utilized resource for building

departments to verify energy code compliance. In response, BayREN members plan to emphasize this compliance improvement strategy in 2016 and will add it to the list of existing trainings available to all building departments upon request.

Comments from building department staff during PROP visits also reinforce the notion that electronic tools that can filter or automate the code enforcement process would be welcomed. BayREN is currently exploring the automation of nonresidential lighting through the use of electronic tools in target building departments, with plans to expand the scope and scale of this effort in 2016.

The small but important changes represented by these efforts indicate various opportunities to achieve improved compliance in new and existing buildings. Building department staff achieve a level of comfort and understanding of the Energy Code that enables them to both advocate for the standards and bring consistency to their interpretation and enforcement of the Energy Code. The process also builds internal competencies creates relationships that can be leveraged to enact additional program elements.

BayREN compliance improvement activities are intentionally focused on ease of use and minimal intrusion, helping to ensure that the tools are well received and utilized. However, this does not dismiss the importance of validating the savings from compliance improvement with an agreed-upon system. This issue is being addressed by the CPUC, the California Energy Commission, the IOUs, BayREN, and others.

Regional Plan Check Program

The Regional Plan Check Program was created to provide on-site support to building departments interested in improving their skills with a particular type of commonly seen permit, namely tenant improvements. Tenant improvement projects typically take an existing space and remodel or repurpose it for a new use, such as from one type of retail store to another. Tenant improvement also encompasses first-time improvements in an existing building shell. For example, a tenant-initiated project to finish an unfinished retail space store within a new strip mall would be considered a tenant improvement. Many Bay Area communities see relatively high volumes of this type of permit.

BayREN initiated a 10-week project with the Contra Costa County Department of Conservation and Development Building Inspection Division (Contra Costa County Building Inspection) to conduct on-site mentoring for plans examiners, with an emphasis on how to examine commercial tenant improvement projects. The following were assessed:

- The effectiveness of providing reviewers with the nonresidential tenant improvement resource guide and the potential to scale this across the 110 Bay Area jurisdictions
- The effectiveness of using third-party Certified Energy Analysts to train plans examiners on project review
- The opportunity for expanding the on-site mentoring approach to cover other project types

- Whether the projects reviewed provided sufficient data to be used by BayREN members as third-party quality assurance verification
- The effectiveness of post-mentoring compliance for targeted project groups

Methodology

The 2015 Regional Plan Check project was designed at helping plan review staff identify important components of the plan review by performing detailed reviews. Feedback from the reviews was provided to staff at Contra Costa County Building Inspection, who chose to focus on nonresidential tenant improvement projects because these occur with high frequency and have varying levels of difficulty.

BayREN developed a Plan Review Resource Guide and a Nonresidential Tenant Improvement Energy Code Compliance Checklist with help and input from the county's senior plans examiner. This Resource Guide contains a chapter for each of a nonresidential building's major energy systems, Energy Code Ace Trigger Sheets[6], and the applicable code sections. The Guide was designed to provide plans examiners with a single source of information to reference while reviewing plans, thus reducing the time spent referencing the full body of the Energy Code. The Compliance Checklist leads the plans examiner through a list of common tenant improvement design components and work scopes that require attention to the Energy Code, such as a change in occupancy. For each potential energy code requirement applicable to the project, the user is referred to the relevant code section. Each section of the Guide includes a trigger sheet, followed by the relevant mandatory and prescriptive requirements. The Guide is organized as follows:

- Additions and Alterations
- Envelope
- Mechanical
- Indoor Lighting
- Outdoor Lighting
- Plumbing
- Process

For the first four weeks of small-scale demonstration, the BayREN code experts met with the County's senior plans examiners and mentored them on the use of the guide and project review checklist using newly submitted nonresidential tenant improvement projects awaiting permits. The team walked through each project with the plans examiners step-by-step to demonstrate

[6] http://energycodeace.com/content/resources-trigger-sheets/

where to find key energy features, how to verify them on the plans, and how to use the Checklist and Resource Guide to reference energy code requirements.

During the last six weeks of the project, the team continued to conduct on-site visits with the intent of comparing the plans examiners project review notes to the notes from the BayREN team for the same project. Both the plans examiners and the BayREN code experts used the Checklist and Resource Guide to review the projects. The goal of this exercise was to compare like notes and document any oversights by the plans examiner. Challenges observed during the course of the 2015 Regional Plan Check on-site visits included:

- *Lack of available projects to review.* Because the department received fewer new permit applications for nonresidential tenant improvement projects than originally anticipated, the BayREN team was unable to review the volume of projects expected during the time frame.
- *Timing.* The BayREN team's on-site visits were scheduled with the intent of completing an independent review following the plans examiners' reviews. Because project turnaround time is very short for tenant improvements, the projects were often not reviewed prior to the scheduled meetings. Thus reviews were conducted jointly by the plans examiners and the BayREN team.
- *Staff availability.* Because meeting times were scheduled during normal business hours, plans examiners were frequently called to the permit counter to help applicants.
- *Project scope.* The BayREN team was asked to help review several nonresidential new construction projects. Documenting the review process for these projects was challenging because the Guide was not intended to cover a new construction project.

In parallel to the on-site mentoring, the BayREN team conducted off-site reviews of projects that had been issued permits in the last 12 months. These reviews were intended to collect information about common errors found on projects and serve

"BayREN's Regional Plan Check program has greatly improved County staff's understanding and enforcement of the Energy Code. Expansion of this program will assist local governments in meeting California's energy efficiency goals. Thank you, BayREN!"

Jason Crapo
Deputy Director - Building Division
Contra Costa County Department of Conservation and Development
Building Inspection Division

"CodeCycle is a tablet-based platform that seeks to achieve a worthwhile goal: make the most complicated part of the energy code simpler and easier to verify at plan check and inspection in the field. It attempts to strike the appropriate balance between accuracy, rigor, real-time feedback, and realistic time constraints that building officials face in their daily jobs. Early results show very good results that warrant further investigation in 2016 and beyond."

Wes Sullens
Program Manager
Alameda County Energy Council
(aka StopWaste)

as a baseline to compare with the post-mentoring project review results. In total, 12 projects were reviewed. The team found that issues identified during off-site and on-site reviews were consistent.

Findings

The 2015 Regional Plan Check small-scale demonstration gave Contra Costa County Building Inspection staff increased opportunity to review nonresidential projects with in-person mentoring. Participating staff stated this mentoring improved their confidence and competence in reviewing nonresidential projects. The short duration of the project prevented a large number of projects from being reviewed. However, the BayREN team was still able to identify a shortlist of issues that seemed to occur regularly. The most common challenges for all reviewed projects include:

- Lighting
- Daylighting zones were either incorrectly or almost never specified in the plans.
  - Lighting switching was not usually specified in the plans or was incorrectly identified in the plans.
  - Calculations for track lighting were either incorrect or not included. Separate mentoring on track lighting was provided during one of the on-site visits.
  - Mandatory lighting controls were frequently confused with controls that were eligible for a compliance credit.
- HVAC
  - In general, HVAC was consistently labeled correctly and efficiencies specified correctly on the plans.
  - One plan specified equipment that did not match the plans or energy calculations in the cut sheets.

The Resource Guide will continue to be used in Contra Costa County and BayREN is evaluating the expansion of this initiative to other jurisdictions and permit types based on the lessons learned during initial efforts. Other jurisdictions willing to use the guide would need two-three days of training to understand its purpose and use. Expansion options may include:

- Identifying another jurisdiction interested in testing the Regional Plan Check Program and working with their

staff for 8 to 10 weeks or provide "on call" service when their permit volume increases

- Developing resource guides similar to the nonresidential tenant improvement guide for multifamily low-rise, high-rise, and mixed-use development,
- Following up review of projects to help assess and track progress toward improved and focused plan review. This "circuit rider" concept would provide ongoing mentoring on projects requiring building department attention
- Adding a coordination component in the mentoring to facilitate an information handoff between building inspectors and plans examiners
- Adding an additional offering for field inspection ride-along to assist inspectors on what to look for and how to verify installation
- Recruiting building departments to test automating components of certain types of permits

Electronic Compliance Improvement Tools

In October, 2015, BayREN began collaboration with five Bay Area building departments to test the effectiveness of Electronic Compliance Improvement tools. Through a competitive bid process, BayREN contracted with CodeCycle to conduct a small-scale demonstration of its online design assistance tool and iPad inspection application. CodeCycle's prototype is focused on the Title 24 2013 Commercial Lighting Standards. With the demonstration, CodeCycle analyzed 32 commercial buildings in the five collaborating jurisdictions. Preliminary demonstration results are being reviewed to determine potential significance related to building department business processes, enforcement activities, and energy code compliance.

Testing over a longer duration will be critical due to the typical time frame of any design, construction, and inspection sequence. This will be the first technology of its kind to be tested at a regional scale, and BayREN is interested to determine if this type of tool could be integrated with existing building department processes to increase the efficiency of plan review and inspection for all part of Title 24.

4. Beyond Traditional Training

The BayREN Codes & Standards Program offers trainings designed to educate both local officials and the private sector building community about new energy code development and best practices to improve code compliance and enforcement. Training topics pre-identified through BayREN engagement with local building departments (i.e., PROP visits or other outreach) have been developed as condensed 90-minute Brown Bag sessions or as more detailed day

workshops. These existing trainings were first developed by BayREN in 2014, and were augmented in 2015 by specialty trainings developed to address more specific building departments training needs within individual jurisdictions. BayREN trainings focus on the needs of local governments in the San Francisco Bay region and are intended to complement training efforts delivered by IOUs (Energy Code Ace) or the California Association of Building Officials (CALBO).

Existing Trainings

In 2015, BayREN offered a suite of refined energy code trainings, initially designed in 2014 for building department personnel (Figure 3). Based on participant feedback from the 2014 trainings, 2015 training updates were intended to meet the following objectives:

- Deliver trainings at building department offices and schedule them for the convenience of the building department staff to optimize attendance and eliminate the time and expense of traveling to an off-site training venue
- Focus trainings on building types and energy end uses that:
    - Represent significant potential energy savings
    - Are the least understood or enforced
    - Are specific enough to be able to cover the topic in depth within the available time frame
- Design and provide handouts of training materials for future reference
- Use real-world building plans and energy code compliance documentation in the trainings
- Allow time for audience questions, requests, and discussions of related topics
- Include hands-on scenario-based exercises whenever possible
- Emphasize the importance of coordination and communication of key building energy features between permit technicians, plan reviewers, and inspectors
- Compile written evaluations to inform continuous training improvement
- Encourage host building departments to invite neighboring jurisdictions and contractors to their trainings. This encourages networking and information sharing, and extends the impact of each training.

Figure 3. BayREN 2015 Existing Training Series: Topics and Variations of Training Offerings

Improving Energy Code Compliance in Residential and Nonresidential New Construction	
Brownbag #1	Coordinating Plan Check with Field Inspection for Residential New Construction
Brownbag #2	Coordinating Plan Check with Field Inspection for Low-rise Nonresidential New Construction
Workshop	Prioritizing Plan Check and Field Inspection for Residential and Nonresidential New
Energy Code Forms and Permit Submittals for Residential Additions	
Brownbag	Understanding 2013 Compliance Documentation for Residential Additions
Workshop	Aligning Energy Code Documentation with Designed and Installed Features
Improving Energy Code Compliance of Residential Envelopes	
Brownbag	Envelope Compliance Forms and Processes
Workshop	Improving Compliance of Envelope Assemblies and Fenestration Performance
Improving Energy Code Compliance of Nonresidential Envelopes	
Brownbag	Envelope Compliance Forms and Processes
Workshop	Improving Compliance of Fenestration Performance and Site-built Fenestration
Improving Energy Code Compliance of Nonresidential Mechanical Systems	
Brownbag	Ventilation Compliance Forms and Processes
Workshop	Mechanical Ventilation, Outdoor Air, and Demand Control Ventilation
Improving Energy Code Compliance of Nonresidential Lighting	
Brownbag	Indoor Lighting Forms, Processes, and Acceptance Tests
Workshop	Lighting Power Density, Controls, and Daylit Spaces

Specialty Trainings

In addition to BayREN's existing trainings, in 2015 BayREN worked internally and coordinated with the Statewide Investor-Owned Utility (IOU) Codes & Standards team to develop trainings on topics specifically requested by individual Bay Area building departments. Referred to as specialty trainings, topics included:

- HERS Registry Training for Building Departments
- Nonresidential Electrical & Commissioning
- Nonresidential Plumbing
- Nonresidential Tenant Improvements

Upon receipt of a specialty training request, BayREN consultants worked with building departments to better understand the purpose and scope of the training request, and to find a suitable subject-matter expert to develop and deliver the training. When possible, existing curricula were leveraged to build and customize specialty trainings. For example, the HERS Registry strategy offered during PROP visits was the basis for the HERS Registry specialty training.

Summary

In 2015, three BayREN instructors delivered 49 existing and five specialty trainings to 16 jurisdictions. Building professionals participated in trainings delivered by neighboring county jurisdictions nine percent of the time, e.g. contractors located in the City of Vacaville participated in a Forms and Permit course delivered in Napa County. In total, building professionals, primarily building department staff, representing 32 jurisdictions within the Bay Area region, participated in one or more of the trainings (Figure 4). The number of building professionals per training ranged from five to 42, for a total of 552 individuals, including duplicates (Figure 5). The total number of unique participating professionals was 232.

Figure 4. Distribution and Total Number of BayREN Training Participants and Topics in 2015

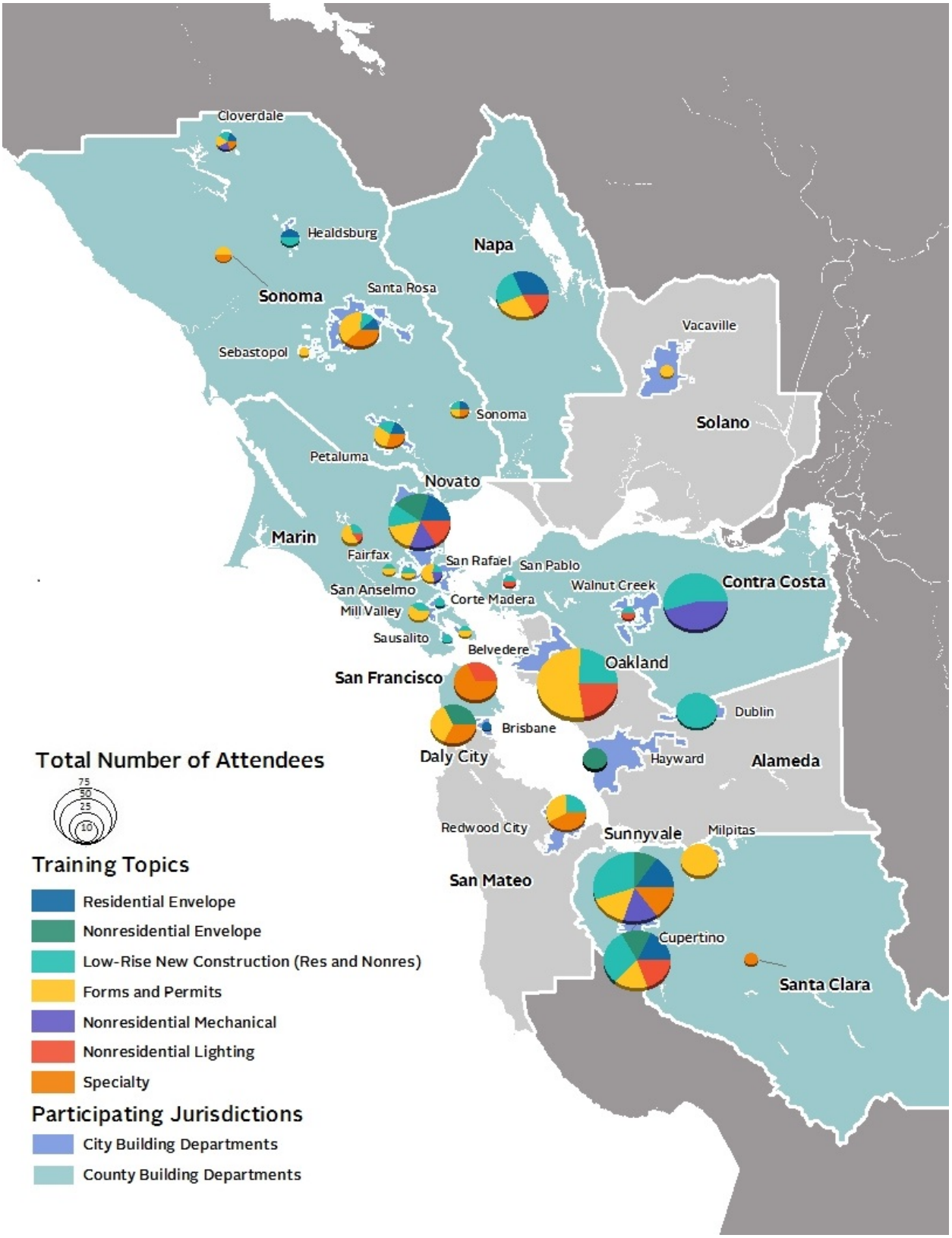

Figure 5. Detailed Summary of BayREN Existing & Specialty Trainings Delivered in 2015

BayREN County	Number of Existing Trainings		Number of Specialty Trainings	Number of Participants	Number of Unique Participants
	Brown Bags	Workshops			
Alameda	3	1	0	68	50
Contra Costa	0	6	0	102	38
Marin	2	6	0	73	29
Napa	0	8	0	44	21
San Francisco	1	0	1	29	28
San Mateo	3	3	2	54	23
Santa Clara	12	1	1	140	23
Solano	0	0	0	0	0
Sonoma	3	0	1	42	20
Total	24	25	5	552	232

Findings

BayREN's 2015 C&S Training continues to benefit from direct and honest feedback shared by attendees at the training sessions themselves and in written follow-up surveys. Trainings were often scheduled based upon the request of specific departments; training attendees themselves were the strongest advocates for additional training sessions and topics. For example, three jurisdictions participated in all of BayREN's existing trainings, specialty trainings, and even requested training on additional identified topics. BayREN trainers discovered that the keys to a successful training include:

1. **Inviting willing attendees who have a direct influence in code improvement.** Permit technicians, plan checkers, and field inspectors are the primary audience; however, they are more likely to change their work processes if directed to do so by a supervisor. This indicates the importance of building official participation in trainings. Also, some departments have one or two people who are much more

knowledgeable and/or appreciative of the energy codes than the rest of the department. These people can serve as "ambassadors" within the department and should be encouraged to train from within.

2. **Creating materials that are responsive to the specific needs of participants.**
   Several departments commented that they already used worksheets/checklists similar to those offered by BayREN. These departments either did not want to add more checklists to their existing resources or did not like to use third-party checklists. Future BayREN efforts will attempt to gain prior access to such existing internal building department resources to inform any BayREN hosted training.

3. **Using illustrations and examples from the permits and projects of participants, thus providing context for the training concepts.**
   Walking through a set of plans that is familiar and comfortable helps keep the training ground in permit scenarios that are relevant to attendees.

4. **Providing extensive real-world examples and scenarios.**
   Instructors that are experienced in the building professions are seen as more credible by attendees and maintain the attention of attendees and provide valuable context for the importance of the energy code with real-world examples and anecdotal evidence.

5. **Allowing attendees to ask about actual projects they have worked on.**
   Invite participants to bring examples to the training and make time before and after the trainings to specifically address those examples.

6. **Meeting attendees at their facility to minimize travel time and scheduling trainings at times that works for the department.**
   Building department staffs generally do not have significant free time or flexibility within their daily schedule. Scheduling sessions on site at times that are best for the department's regular schedule (e.g., before morning inspections or when the front desk is closed) offer department staff the greatest access to training.

7. **Revisiting the same group with new or reinforced concepts.**
   BayREN is seeking ways to further reinforce training content; including ways to make reminder/refresher information more accessible to attendees and ways to integrate

training material into the BayREN Forums and other stakeholder engagement activities.

Though BayREN's 2015 specialty classes were often initiated by the individual request of a specific building department, BayREN is considering adding some specialty topics to its existing training series, including HERS Registry Training for Building Departments and Nonresidential Tenant Improvements.

5. Supporting Stakeholder Engagement and Policy Development

Despite organizational differences, Bay Area building departments and a spectrum of private, nonprofit, and government building industry stakeholders share many of the same goals for the improvement of our built environment. For example, helping building and home professionals build and retrofit greener homes is a common goal for several stakeholders. Yet, rather than collaborating organically, stakeholders are challenged by the engagement process. Engagement challenges stem from time and budget constraints; generational differences in attitudes toward electronic tools and online training; and jurisdictional variations in energy code interpretation and enforcement. An overarching issue is how to ensure collaboration and coordination of all stakeholders toward a common goal.

To begin solving these challenges, BayREN representatives, with input from the CPUC, developed a series of policy support activities aimed at engaging stakeholders on codes and climate action planning, adoption of green building codes, and benchmarking ordinances. The main activities included BayREN's Regional Forums; coordination with Pacific Gas & Electric (PG&E) and Build It Green (BIG) on reach code support; and initiatives to support the Berkeley, Residential Energy Conservation Ordinance and expand market uptake of Home Energy Score. Each activity had a distinctive purpose, methodology, and set of outcomes.

Regional Forums

Regional Forums are focused on resolving regional policy and program design issues from a high-level perspective. These free half-day events are held once every two months. They bring together elected officials, appointed policy board members, local building department Chief Building Officials, and regional codes and standards advocates, who network and share best practices and lessons learned. The selected topic determines the intended audience, invited speakers, and agenda activities. In 2015, BayREN representatives took turns serving as forum-planning leaders responsible for developing an agenda, opening slides, and other materials. The location of the forum alternated in order to accommodate all stakeholders within the 7,000 square miles of the Bay Area at least once.

Summary

There were 6 forums in 2015 attended by a total of 225 building industry professionals representing private, nonprofit, and public sectors, including building departments, attended from the nine county Bay Area (Figure 6). There were 147 unique forum attendees representing 87 private, nonprofit, and public agencies, including 35 local governments, located in 37 jurisdictions within the Bay Area region. Of the 147 unique attendees, 29% attended more than one forum. Forum topics ranged from best practices for improving code compliance to showcasing code compliance tools and resources (Figure 7). The average forum evaluation score was 4.4 out of 5.

Figure 6. Distribution and Total Number of Forum Attendees in 2015 per Jurisdiction

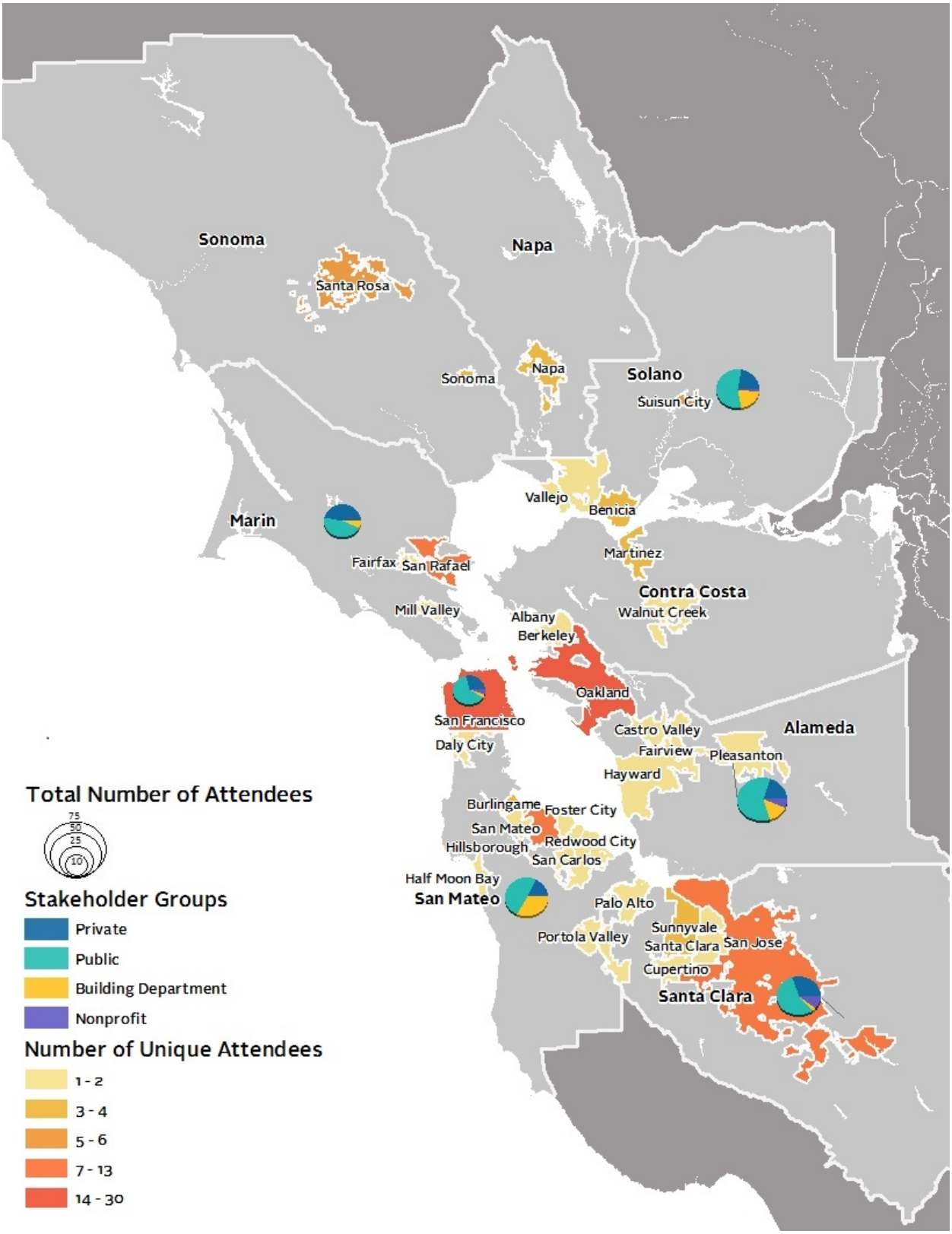

Figure 7. Summary of 2015 Regional Forums

Creating a Sustainable Built Environment | February 24, 2015 | Total Number of Attendees: 50

Location	Intended Audience	Speakers and/or Panelist	Activities
Alameda County	Building department personnel, local government policy leaders, and energy consultants	• ARUP • Benningfield Group, Inc. • Build It Green • City of Berkeley • City of Palo Alto • PG&E • San Francisco Department of the Environment • StopWaste	Three Panel Sessions

Recommendations, Best Practices, and Future Considerations for Improving Energy Code Compliance | April 21, 2015 | Total Number of Attendees: 40

Location	Intended Audience	Speakers and/or Panelist	Activities
San Mateo County	Building department personnel, local government policy leaders, and energy consultants	• Benningfield Group, Inc. • Center for Sustainable Energy • Contra Costa County • San Mateo County, Office of Sustainability • Santa Clara County	Two Panel Sessions

Policy and Implementation: Improving Energy Code Compliance for Small Cities | June 16, 2015 | Total Number of Attendees: 41

Location	Intended Audience	Speakers and/or Panelist	Activities
Solano County	Local and state government policy leaders, building department personnel, and energy consultants	• Association of Bay Area Governments • Benningfield Group, Inc. • California Energy Commission • City of Benicia • Contra Costa County	One Panel Session and Three Speaker Presentations

		• Solano County • StopWaste	

Stakeholder Engagement in Energy Code Development | August 25, 2015 | Total Number of Attendees: 40

Location	Intended Audience	Speakers and/or Panelist	Activities
Santa Clara County	Building department personnel, contractors, architects, policy makers, and energy consultants	• American Institute of Architects • Benya Burnett Consultancy • California Association of Building Energy Consultants • California Energy Commission • Efficiency First • San Francisco County • Santa Clara County • TRC, Inc.	One Panel Session

Collaboration on Energy Code Interpretations: Shared Challenges and Solutions | October 20, 2015 | Total Number of Attendees: 24

Location	Intended Audience	Speakers and/or Panelist	Activities
San Francisco County	Building department personnel, contractors, and other building industry peers	• Benningfield Group, Inc. • CodeCycle • San Francisco County • San Francisco Department of Building Inspection	Two Speaker Presentations and Two Breakout Discussions

Energy Code Compliance for the 21st Century: A Showcase of Electronic Tools | December 10, 2015 | Total Number of Attendees: 30

Location	Intended Audience	Speakers and/or Panelist	Activities
Marin County	Building department officials, architects, and contractors	• Autodesk • BKi on behalf of BayREN • CodeCycle • Essential Habitat • Energy Code Ace	Key Note Speaker, Four Product Snapshot Presentations, and Mini-Expo

"The BayREN Codes and Standards Regional Forum is impressive with its breadth and depth of topics and audience, all in support of California's ambitious sustainability goals while engaging building officials, state and local agencies and policy leaders, along with architects and consultants involved in the design and construction of the built environment. The American Institute of Architects California Council and its 11,000 members recognizes this important opportunity to be included as a stakeholder in this vital discussion."

Linda Derivi
Director of Design & Practice
American Institute of Architects

Findings

Forum findings are varied, due to the wide range of topics and attendees. Completed surveys from attending stakeholders revealed an appreciation for the opportunity to discuss code compliance issues directly with their colleagues, with an example being California Energy Commission staff valuing comments presented from staff with smaller jurisdictions such as the City of Half Moon Bay. Attendees preferred stakeholder engagement, panel sessions, and breakout groups that were most successful at sparking insightful discussions about jurisdiction-specific problems and region-wide solutions.

Case Study: County of Santa Clara's Stakeholder Engagement in Energy Code Development Forum

Held on August 25, 2015, in the County of Santa Clara, the Stakeholder Engagement in Energy Code Development Regional Forum was developed as a result of building industry concerns about the complexity of 2013 California Energy Code enforcement. The Forum served as a call to action (CTA) aimed at building department staff, contractors, and architects to engage with California Energy Commission staff and other policy implementers on which efforts (e.g., strategies, resources, or support networks) could support the advancement of productive and inclusive discourse about energy code development, with consideration to resource barriers. Additionally, the Forum presented an opportunity for the BayREN Codes & Standards Program to further support industry stakeholders as a potential facilitator or advocate in this regard.

As part of the Forum, panelists representing different stakeholder groups within the building community were invited to share their recommendations on how policy implementers could better engage with building department staff, contractors, and architects, regardless of jurisdiction size or budget. Panelists included:

- Cathy Chappell, TRC
- Charles Cormany, Efficiency First
- Heriberto Rosales, California Energy Commission
- Peter Strait, California Energy Commission
- Jeff Pollock, California Association of Building Energy Consultants (CABEC)

- Jim Benya, Benya Burnett Consultancy
- Linda Derivi, American Institute of Architects (AIA)

Panelists identified the following as key barriers to stakeholder engagement during the code development process:

- Complexity and inconsistencies in the code
- Lengthy and onerous compliance and enforcement documentation
- Disconnect between policy development and compliance/enforcement implementation
- Variations in jurisdictional energy code interpretation and enforcement

Afterward, panelists facilitated attendee breakout groups to strategize on how to overcome these barriers. Three major takeaways were identified:

1. **Participation is critical to ensure consistent, enforceable standards.**
   Participation in code development can be as simple as submitting a letter or e-mail with comments to the California Energy Commission during a public comment period. The Energy Commission also holds staff workshops and hearings throughout the standards development process. These can be attended remotely via the internet or by phone.

2. **BayREN's role is evolving.**
   BayREN has the opportunity to lead collaborative efforts with building department officials, contractors, architects, policy makers, and energy consultants. Common goals brought up during the Forum include educational and marketing materials, creative training courses, contractor rating systems, code compliance checklists, and drafting public comments to present to the Energy Commission on behalf of stakeholders.

3. **Forums and workshops are important for connecting stakeholders.**
   Whether online or in-person, stakeholders value Forums and workshops for networking. However, to warrant people's attendance as the economy improves and workloads become heavier, Forum and workshop topics must remain relevant and provide clear value to attendees. Pre-recorded, engaging and high quality webinars that can be viewed at any time can provide a more accessible medium for sharing information.

Reach Code Support

In 2015, BayREN representatives worked to provide resources and support to local governments interested in developing and implementing reach codes, local standards that require construction projects to exceed the requirements set forth in the California Building Energy Efficiency Standards. Reach codes have frequently been adopted by Bay Area jurisdictions during past code cycles to advance local environmental and sustainability goals.

BayREN undertook efforts to assess the needs of local agencies for reach code development, and provide BayREN counties with the resources to effectively support their local agencies in

this work. The goal of this work was to assist local agencies as they navigated the path to adopt energy related policies, including support in the development of required reach code application materials and cost-effectiveness studies for the California Energy Commission.

An essential first step in reach code development is to conduct a cost-effectiveness study to demonstrate that a simulated construction project required to exceed a performance level equivalent to the State's Building Energy Efficiency Standards would be cost- effective. A study for a local agency's climate zone must be included in any application to the California Energy Commission to qualify as a Local Energy Ordinance per Section 10-106 of Title 24, Part 6: Locally Adopted Energy Standards. BayREN members worked with the consulting firm ARUP to develop cost-effectiveness studies for all Bay Area climate zones with simulated single family low-rise residential, single family low-rise residential additions and alterations, and multifamily low-rise residential construction projects.[7]

Being uniquely positioned to communicate and garner interest from local government stakeholders, BayREN members created a reach code matrix of local jurisdictions in the nine Bay Area counties. The matrix included information on the regional status of reach code development, implementation, and relative interest for receiving technical support from BayREN. This matrix supported coordination efforts and served as the framework for follow-up work with local Bay Area governments.

BayREN educated interested stakeholders by providing various levels of technical support/resources to advance energy efficiency policy in a jurisdiction. Support included the development of presentation materials, staff reports, access to the developed cost-effectiveness studies, and a template of the required California Energy Commission reach code application.

As BayREN worked directly with its local government stakeholders to identify local reach code interests and needs, BayREN was also coordinating with PG&E's reach code support efforts. PG&E and its program implementer Build it Green (BIG, a nonprofit organization comprised of building industry veterans working to support building professionals in the adoption of green practices by their local governments) pledged support for addressing identified needs through BIG's technical assistance and cost-effectiveness research related to the local government adoption of single measure reach codes. Both BayREN and PG&E recognize that the most efficient way to approach and support local jurisdictions in reach code adoption is to leverage respective work already in progress.

Case Study: Marin Reach Code Support

Marin County launched an initiative to provide assistance to its local governments in the development and implementation of reach codes. Reach codes have a long history of being adopted by Marin County jurisdictions. The County adopted its first reach code in 2003 and

[7] The studies can be viewed at https://www.bayren.org/codes/resources.

pioneered an innovative approach whereby the required percentage above the code was increased as the square footage of the project increased. In 2009, under a collaborative approach led by the City of San Rafael, additional cities and towns adopted reach codes to create consistency between agencies and their local green building requirements.

The County identified the need for ongoing leadership during the 2013 code cycle to assist local agencies with navigating the ever-changing requirements for adopting reach codes and to continue coordination efforts. The County also identified an increased need for reach codes as local agencies adopted Climate Action Plans and explored the implementation of programs to decrease greenhouse gas emissions.[8]

Marin County has the unique advantage of being able to leverage existing relationships to connect with local agencies on a peer-to-peer basis to identify opportunities and barriers to energy efficiency policy adoption. Marin County is also poised to provide needed staff support and access to a wealth of resources offered by PG&E/BIG that would otherwise not be available to local governments.

The County leveraged its existing relationship with the Marin Climate and Energy Partnership to give a presentation on BayREN's available assistance for reach code development during its March 5, 2015, meeting. The Partnership, which includes a representative from each of the County's cities and towns, works to implement policies and programs aimed at reducing greenhouse gas emissions. The presentation served to introduce available resources and planned next steps for interested agencies. Twelve local cities and towns were present, in addition to County representatives.

As a follow up to the meeting, the County hosted a green building policy workshop on July 9, 2015, to discuss changes to the State green building and energy code, results of the cost-effectiveness studies, and reach code policy options. Seven local agencies discussed their needs for implementing a green building reach code. The workshop provided policy toolkits and presentation support for local governing bodies.

In 2016, the County plans to continue providing assistance to its local agencies for the development of reach codes in collaboration with PG&E/BIG.

[8] To date, 11 of the 12 local governments in Marin County have adopted Climate Action Plans

Residential Energy Conservation Ordinances and Home Energy Score

A Residential Energy Conservation Ordinance (RECO) that requires certain property upgrades at various trigger points such as the sale of a home is a potentially powerful strategy to help cities meet their Climate Action Plan goals. However, RECOs have proven to be difficult for cities to adopt and implement. The RECO policy support provided by BayREN intends to help local governments overcome the two main obstacles: the high cost of local enforcement to a jurisdiction and political opposition from the real estate community. BayREN's support of a RECO toolkit s builds upon the groundwork provided by the City of Berkeley's RECO ordinances to help facilitate replication by other jurisdictions.

Berkeley Energy Savings Ordinance Implementation Support

Among California jurisdictions, the City of Berkeley has the most experience in adopting and enforcing a RECO. The City's lessons learned are valuable for other jurisdictions, even those with differing political circumstances. In 2015, Berkeley adopted the Berkeley Energy Savings Ordinance (BESO), which replaced its former Residential Energy Conservation and Commercial Energy Savings Ordinances. BayREN, in collaboration with the Energy Council[9], has provided support for the single family sector requirements of the BESO. The BESO requires that single family homes that undergo a sales transaction must obtain a Home Energy Score or equivalent rating. BayREN, through its Codes and Standards Program, provided technical and workforce development support to ensure that Berkeley was prepared for full implementation as of September 2015, when the single family requirements went into effect.

The single family sector is a difficult market to reach for energy efficiency programs. Moreover, the analytical tools that are more readily available in the commercial sector are lacking in the single family sector. Currently available tools, such as HERS II and Green

"The City of Berkeley finds Home Energy Score to be a very useful tool, allowing us to standardize assessment requirements and streamline data collection for all residential properties subject to the City's new Building Energy Saving Ordinance (BESO)."

Billi Romain
Sustainability Program Manger
City of Berkeley

[9] The Energy Council is a Joint Powers Agency that seeks to develop and implement programs and policies that reduce energy demand, increase energy efficiency, advance the use of clean, efficient and renewable resources, and help create climate resilient communities.

Point Rated for Existing Homes, are too costly for a local government to mandate for single family homes. Following a small-scale demonstration of HERS II during 2010-2012 and a review of alternatives, the City of Berkeley decided to use the Department of Energy's Home Energy Score. Home Energy Score creates an asset rating for single family homes, ranking each home on a 1 to 10 scale and providing recommendations for upgrades. Home Energy Score (the "Score") is a low-cost asset-rating program that engages home inspectors, contractors, and raters to offer Home Energy Scores during home sales transactions or upgrades. The Score can support policy initiatives like Berkeley's BESO or other types of state and local policies.

A major barrier to the adoption of RECOs has been the lack of a trained workforce to inspect the existing conditions or improvements made to single family homes. The City of Berkeley, for example, contracted directly with a provider to verify compliance with its former RECO. The ongoing expense of training, managing, and paying for RECO inspectors is a significant burden for jurisdictions to shoulder individually. Of the few RECOs adopted by jurisdictions, some were not enforced. For example, the City of Roseville does not verify that required efficiency improvements have been completed.[10] By adopting Home Energy Score as the requirement for its new BESO, Berkeley sought to leverage a broader workforce and shift the cost of compliance to the market. Home Energy Scores can be included in the MLS listing at time of sale. National and international research has demonstrated that higher scores on asset ratings tend to result in higher home values over time.

In parallel to the recruitment of assessors that meet BESO requirements, BayREN has provided training and mentoring for interested and qualified assessors who provide Home Energy Scores to single family homes located within the nine county Bay Area region. This regional workforce development activity will support other jurisdictions that may be interested in adopting a RECO. It also creates broader awareness in the real estate community about Home Energy Scores and energy efficiency improvements.

Building the Home Energy Score Assessor Market

To determine the market receptivity for Home Energy Score in the Bay Area, the program sought stakeholder input from local realtors, home inspectors, and industry experts familiar with the asset-rating programs. The program held four in-person stakeholder roundtables with two local realtor associations (San Mateo County Association of realtors and Bay East County Association of Realtors in Alameda County) and two local Home Inspection trade groups (InterNACHI and ASHI). Several industry leaders were also consulted. Key takeaways include:

- The Bay Area's high home values and low utility bills (due to a mild coastal climate) mean that energy consumption is not a major factor in the value of a home, especially in today's real estate market where some buyers are waiving home inspections entirely.

[10] Steele, K. (2010). Options for Hayward's Residential Energy Conservation Ordinance. Mills College Master's Thesis.

- Realtors are wary of the Score; they don't perceive a demand for energy ratings in the current real estate market, and they are cautious about promoting anything that could delay or jeopardize the sales transaction. They are interested, however, in promoting resources for efficiency to past clients.
- Home inspectors were more interested in the Score, and many said that they were interested in the training to become an assessor. They also expressed concerns over a lack of interest in energy savings during a home inspection. They rely on referrals from realtors, and do not necessarily have an opportunity to upsell to clients. Only a small percentage of their clients would be interested in paying for a Home Energy Score at this time (approximately $150 incremental cost).

Home inspectors' biggest constraint is time. It would not be economically feasible for them to offer a low-cost add-on service if the extra time investment would limit their ability to perform additional standard home inspections in the same day. Lessons learned included:

- Industry professionals (contractors, home inspectors, and raters) are interested in adding Home Energy Score to their skills set.
- Home inspectors could likely deliver Home Energy Scores at the lowest cost, but they need more support to become familiar with the tool and generate recommendations.
- In the current overheated Bay Area real estate market, incentives would help generate an inventory of scored homes outside of the City of Berkeley.
- The standard Home Energy Score recommendations report needs customization to be compatible with Energy Upgrade California rebate programs.
- Other jurisdictions are interested in how BESO is working, and in potentially adopting similar ordinances.
- Realtors may be more supportive of Home Energy Score if it is promoted as a resource for new homebuyers, as opposed to a requirement that may delay a home sales transaction.

Other Opportunities for Collaboration

Beyond policy support activities, the BayREN Codes & Standards Program collaborated with PG&E, the California Energy Commission, the Tri Chapter Uniform Code Committee, and CALBO on other activities in support of green buildings and energy code compliance and enforcement improvements within the Bay Area region. As energy efficiency practices advance, leveraging respective expertise and resources becomes increasingly important to ensure BayREN can offer a wide range of support to building departments and industry professionals.

1. PG&E

In addition to reach code support, BayREN and PG&E held bi-monthly meetings to share common program objectives and coordinate on an as-needed basis. For example, when plumbing inspectors from the City and County of San Francisco specifically requested training on residential and nonresidential water heater code requirements for new construction and water heater replacements, BayREN and PG&E worked together to develop a Nonresidential Plumbing specialty training. The agencies leveraged expertise and training materials previously developed for the Energy Code Ace and BayREN programs to deliver a training that was aligned with the plumbing inspectors identified need. BayREN and Energy Code Ace will continue collaborating on additional training topics, including HVAC change outs, in 2016.

2. California Energy Commission

BayREN members worked closely with the California Energy Commission to bridge the gap between policy development and implementation. Energy Commission staff participated in all BayREN regional forums for the opportunity to speak with industry stakeholders and provide technical expertise and updates regarding policy and energy code development. As a follow up to the *Collaboration on Energy Code Interpretations: Shared Challenges and Solutions* Regional Forum in San Francisco, BayREN and the Energy Commission are pursuing a strategy to provide public input, filtered through BayREN representatives, on educational materials being developed to enhance 2016 Energy Code compliance. These materials will be available at the Energy Commission's Online Resource Center in 2016.

3. Tri Chapter Uniform Code Committee

To reach a wider audience, BayREN attended regular meetings with the Tri Chapter Uniform Code Committee (TUCC), a committee made up of local and regional building officials, code consultants, architects, engineers, and industry representatives from the three Bay Area International Code Council local chapters (East Bay Chapter, Monterey Bay Chapter, and Peninsula Chapter). During these meetings, TUCC members addressed concerns and recommendations with regards to code compliance. BayREN's engagement with the TUCC resulted in the following:

- Development of the Stakeholder Engagement in the Energy Code Development Process Forum
- Development of the Tenant Improvements specialty training
- Delivery of the Tenant Improvements specialty training and all existing trainings to the Sunnyvale Building Department

4. California Building Officials

In 2015, building department officials and staff regarded the energy code enforcement process as onerous and problematic, when coupled with staff shortages. In response, BayREN offered customized PROP trainings, code compliance tools, and strengthened its engagement with California Building Officials (CALBO) members. CALBO is a non-profit corporation advocating for and representing local California Building Officials, local building departments, local government entities, and public safety. Coordination between BayREN and CALBO ensured leveraging of expertise and resources, and simultaneously avoided duplicative or competing training modules and code compliance resources.

In 2016, BayREN plans to organize energy-related trainings developed and administered by CALBO as additional offerings free of charge to building departments in order to complement BayREN's existing curriculum and provide a broader suite of relevant training options for industry stakeholders (Figure 8).

Figure 8. BayREN-CALBO Training Resources and Benefits Matrix

CALBO Resources & Benefits	BayREN Resources & Benefits	Combined Resources & Benefits
Valuable and effective training resources on a variety of Building Code- related topics	Training, resources, and tools for customized, practical energy code enforcement and compliance	Leveraged resources, advocacy, and technical expertise for training development
Established and respected technical expertise and statewide political advocacy for building officials and the building community	Ability to leverage, promote, and expand related training efforts throughout the Bay Area	Expanded bandwidth for delivering wraparound training to stakeholders
Expansive stakeholder membership and representation	Region-wide stakeholder access (industry; professional)	Increased training responsiveness, feedback loops, and efficiency
	Marketing and technical expertise	
	Able to meet customized training needs	

6. Next Steps for the BayREN C&S Program in 2016

In 2016, BayREN will build and expand on code compliance, training, and stakeholder engagement efforts implemented in 2015. While the components will be structurally similar, some changes will be made in consideration of findings presented in this report and in consultation with the CPUC and other critical BayREN stakeholder groups.

Electronic Plan Check and Related Services

As energy codes become increasingly lengthier and more complex, building departments are expressing greater interest in online and electronic tools. Now more than ever, electronic tools are becoming essential for achieving and enforcing code compliance. HERS raters and Acceptance Testing Professionals already recognize the value of certain online tools and will soon be required to utilize them.

BayREN will continue to serve the needs of building departments by investigating new technologies at a regional level; offering opportunities, such as forums, for building industry representatives to learn about already available resources and tools designed to simplify compliance; and, working with HERS providers to ensure building department staff and clients can better utilize information delivered to or obtained from registries. Any well designed electronic tool closely follows the process flow, identifies and filters unneeded steps, and autofill's repetitive information. Jurisdictions who are not accustomed to the use of electronic tools will be offered simplified electronic or paper version of such tools, so time saving benefits can still be realized.

BayREN will continue to explore electronic tools and support services that can enhance compliance with the 2013 California Energy Code throughout the Bay Area in a robust, consistent, and cost-effective manner. Currently, BayREN consultants are assessing the feasibility of a regional third party plan check and electronic/online permit services that local government building plan check and inspection agencies could use on a fee-for-service, opt-in basis. The feasibility study will include market-analysis, ability of service providers, and cost-benefit analysis. The study is expected to be complete before Q2 2016.

Consolidation of PROP Strategies, Existing and Specialty Trainings

To ensure BayREN is responsive to constantly changing demands from building departments, the BayREN consulting team will be consolidating a total of 23 PROP strategies, existing and specialty trainings, and resource materials into a limited number of non-duplicative short (60-90 minute) and long (3-4 hours) training sessions. Changes to modules will be based on 2015 patterns and findings (as previously discussed in Section 4). – Beyond Traditional Trainings. Workshop modules for *Improving Energy Code Compliance of Nonresidential Envelopes* and *Mechanical Ventilation, Outdoor Air, and Demand Control Ventilation* will no longer be offered; however, short sessions (Brown Bags) will still be available. Short Session topics on Residential HERS Registry, Nonresidential Acceptance Testing and Nonresidential Tenant

Improvement/Alterations will be converted to existing trainings, available upon request. As for materials, Easy-to-use PROP checklists will be the new standard, replacing old checklists for all trainings. In general, our training materials and course offerings will continue to be flexible and adaptable to accommodate the needs of small and remote jurisdictions, as well as those with specialized needs.

Furthermore, to improve transparency, topic descriptions will be revised. This comes after participants showed up to trainings with false learning expectations. Lastly, to meet the goal of 30 trainings in 2016, trainings will be suggested in a sequential order or as part of combination, e.g., *Residential HERS Registry Training for Building Departments* and *Residential Alterations Compliance* will be recommended consecutively.

Regional Support for Local Stakeholder Engagement

In 2015, collaborations between BayREN and local and regional groups continued to gain traction and increase regional and local engagement on T24 Part 6, Reach Code, and Energy Ordinance development and implementation. This included reach code support activities, such as the case with the Marin Climate and Energy Partnership, and identified training and forum topics, such as the case with Tri Chapter Uniform Code Committee.

Modeled after the success of these and other engagements, BayREN will develop a customizable menu of BayREN Codes & Standards tools and resources that BayREN representatives can offer to local groups during their regular meetings. The menu will include not only available trainings and code compliance materials, but also opportunities for building professionals to participate in small-scale demonstrations such as CodeCycle or Home Energy Score, call for support in adoption of new RECO policies, or request speakers and panelist presentations from previous forums.

To support the adoption of residential energy ordinances by local governments outside of Berkeley, BayREN is developing a policy toolkit that will provide jurisdictions with context on the benefits and drawbacks of different requirements. The regional policy toolkit will focus on residential energy assessment and disclosure as a market transformation tool to make home energy information more transparent to owners and prospective renters or buyers.

Key regional policy toolkit components will include:

- Standardized Home Energy Score assessment tool and program protocols
- Workforce development to support HES assessors with training, mentoring, QA/QC
- Custom recommendation form that aligns with Energy Upgrade California rebate programs
- Referral to BayREN Home Upgrade advisors, incentives, and rebates
- Support for developing data protocols
- Building awareness in the real estate community about Home Energy Score and energy efficiency improvements

- Marketing, education, and outreach to building professionals
- Presentations and forums for elected officials and agency staff
- Model READ ordinance language
- Guidance on rental RECOs

It is anticipated that additional tools will be added over time to address subsectors of the market that are lacking tools to support existing building ordinances, such as 2-4 unit buildings. BayREN will be sharing lessons learned from the BESO implementation at a future forum. There are at least four other jurisdictions in the Bay Area that have indicated interest in working on residential energy ordinances in 2016.

Other planned actions for 2016 will be focused on:

- Continue to support Home Energy Score assessors with mentoring, QA, and tools.
- Work with the U.S. Department of Energy and California Energy Commission to ensure that Home Energy Score supports both national and local policy objectives.
- Provide support to jurisdictions adopting new RECO policies and coordinate with Berkeley on BESO implementation to refine program tools.

7. Appendix A: BayREN-Developed Resources

Guides

A. Permit Guides

   a. 2013 Residential Water Heater Alteration (Replacement)

   b. 2013 Residential New or Replacement Windows

   c. 2013 Residential Re-Roofing

   d. 2013 Residential Fenestration Alteration

   e. 2013 Nonresidential Re-Roofing

B. Quick Reference Guides

   a. 2013 Gas Domestic Hot Water Heater

   b. 2013 HVAC

   c. 2013 Mandatory Residential Lighting

C. Building Science Guides

   a. 2013 Cool Roofs and Radiant Barriers

   b. 2013 Verifying Energy Efficiency Requirements

   c. 2013 Residential Mechanical Ventilation

Compliance Enhancement Tools

A. Suggested Guidelines for Building Departments to Handle HVAC Alterations

B. 2013 Residential Mandatory Measures Summary

C. 2013 Nonresidential Mandatory Measures Summary

D. Residential Compliance Process Flow Chart

E. Nonresidential Compliance Process Flow Chart

F. Fenestration Flow Chart

G. Ventilation Flow Chart

H. What to Inspect on a NRCC-PRF-01

I. What to Inspect on a CF1R-PRF-01

J. What to Inspect on a CF2R-ENV-01, 02, 03

K. Acceptance Testing with Checklists