Responsible Contractor Policy for EE Programs: Market Intelligence Study

Energy Division
California Public Utilities Commission

Final

December 2017

CALMAC Study ID: CPU0178

Prepared by

Opinion Dynamics Corporation

Responsible Contractor Policy for EE Programs: Market Intelligence Study

Prepared under the direction of the **Energy Division** for the

California Public Utilities Commission

Submitted by:

Ellen Steiner, Ph.D.
Opinion Dynamics
1999 Harrison Street, Suite 1420
Oakland, CA 94612
esteiner@opiniondynamics.com
(720) 262-5857

Additional contributors to the study:

Reese Rogers, CPUC Project Manager
reese.rogers@cpuc.ca.gov
(415) 703-2168

Jenny Watters, Opinion Dynamics Lead Analyst
jwatters@opiniondynamics.com
(617) 301-4641

The study effort is co-funded under California Public Utilities Commission (CPUC) Contracts 12PS5093 and 12PS5095. The research effort is covered under work orders ED_O_WET_2 and ED_D_Res_19.

Acknowledgements

This project was a collaborative effort under contract to the CPUC. We would like to thank the CA Commission Staff and Investor-Owned Utilities for guidance and input throughout project planning and execution. We would also like to express our sincere gratitude to the one hundred plus individuals who participated in individual and groups interviews and data collection efforts.

Legal Notice

Opinion Dynamics

Table of Contents

Opinion Dynamics

Table of Tables

Table of Figures

Opinion Dynamics

1. Executive Summary

The Responsible Contractor Policy as mandated by Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015 (SB-350) states that the:

> *Commission shall adopt, implement, and enforce a responsible contractor policy for use across all ratepayer-funded energy efficiency programs that involve installation or maintenance, or both installation and maintenance, by building contractors to ensure that retrofits meet high-quality performance standards and reduce energy savings lost or foregone due to poor-quality workmanship.*

This study was designed as an exploratory qualitative inquiry aimed at uncovering insights and ideas that can be used to inform the development and implementation of a Responsible Contractor Policy. As such, this report is intended to summarize the information collected and does not provide recommendations.

This study looks at:

- The **current state** of contractor requirements in Program Administrator's (PAs) retrofit installation and maintenance programs;
- The **future state** of what elements could be considered for inclusion in the Responsible Contractor Policy; and,
- The **opportunities and challenges** related to these potential elements and their potential feasibility.

1.1 Research Methods

Opinion Dynamics employed several different data collection and analysis activities to address the research objectives.

- We initially conducted an extensive **secondary data analysis** that involved a review of PA retrofit installation and maintenance program data, policy, and literature.
- We then conducted **semi-structured in-depth interviews** with 78 key stakeholders including the California Energy Commission (CEC), California Public Utilities Commission (CPUC), California State License Board (CSLB), Program Administrators (PAs), WE&T staff, PA policy teams, PA program staff, other PA staff, training providers, unions, equity organizations, credentialing organizations, and contractor organizations.
- Following our interviews, we conducted an **initiative review** with other organizations outside of California with specific experience with responsible contractor policies or specific elements that could be included in a responsible contractor policy.
- We finally conducted two **focus groups** with contractors – one with HVAC contractors and one with lighting contractors.

1.2 Key Findings

This study covered a wide-range of topics and provided key findings related to the current state of contractor policies, what elements could be considered for inclusion in the policy, and the opportunities and challenges related to these potential elements. We outline the major report findings in the next sections.

1.2.1 Current State of Contractor Policies

CSLB Requirements

- By law, all businesses or individuals who construct or alter any building, highway, road, parking facility railroad, excavation, or other structure in California must be licensed by the CSLB if the total cost (labor and materials) of one or more contracts on the project is $500 or more. Each license requires a "qualifying individual" who must undergo a background check and meet experience and exam requirements. In addition, the licensee must submit documentation to prove they meet insurance and bond requirements.
- CSLB licenses are separated into three classifications – Class A (General Engineering Contractor), Class B (General Building Contractor) and Class C (Specialty Contractor). Within the Class C license classification, there are 42 Class C licenses for work that requires specialized skills. Contractors who hold a Class B license have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor could bid on a job that included HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but could not bid on a project that was exclusively HVAC installation or exclusively lighting work unless they held specialty licenses for those trades.
- C10 contractors must ensure that electricians working under them hold an electrical certification card issued by the Department of Industrial Relations' Division of Apprenticeship Standards (DAS). Technicians and laborers working under other C-Class contractors do not require certification specific to their trade.
- Contracting without a license could result in jail time or a fine. The CSLB has a Statewide Investigative Fraud Team that conducts stings and sweeps on a regular basis focusing on the underground economy, which is estimated annually to be between $60 and $140 billion.

Program Eligibility Requirements

- In the state of California, 94 PA energy efficiency programs currently involve a contractor that performs retrofit installation and/or maintenance work on existing buildings. Lighting and HVAC equipment are the most common equipment types included in these programs – with 51% of programs involving one equipment type, the other, or both.[1] Consequently, C10 Electrical (General) and C20 Warm-Air HVAC are the most common license classifications held by contractors completing work for PA programs. This study looks at 83 of these programs in which contractors holding the most common CSLB licenses are performing the installation and/or maintenance work. We excluded the remaining 11 programs which indicated a contractor is involved in retrofit installation and/or maintenance work on existing buildings, but did not specify a license type in response to our data request.
- Nearly all of the 83 programs explicitly require, stated in in writing, that the contractor comply with all federal, state, and local laws including CSLB licensure laws. Approximately half of the 83 programs have contractor requirements addressing permitting, insurance, warranties on work performed, and professional conduct. About a third of these programs have requirements related to past experience and less than a quarter of these programs require a background check. Contractor participation requirements

[1] Note that this study only looked at whether or not contractors perform maintenance and/or installation related to a given equipment type, and did not look at the degree of focus a program places on that equipment type or the amount of projects, or savings related to that equipment type.

tend to deviate based on whether or not contractors are required to be pre-approved and sign a participation agreement or other contract with the PA or implementation contractor. Programs in which contractors are required to be pre-approved—as opposed to programs in which customers are free to select any contractor--tend to have more stringent requirements than those that do not require pre-approval.

- When compliance with federal, state and local laws, and permitting are specified, programs often require a signature from either the customer or contractor, certifying that the contractor is a licensed contractor and has adhered to applicable federal, state and local laws including permit requirements.
- Nearly two-thirds of the 83 programs require an installation contractor to be pre-authorized to perform work for the program. Under this scenario a PA or third-party implementer typically reviews the contractor's qualifications and requires the contractor to sign a participation agreement or other contract with the program administrator or third-party implementer.

1.2.2 Policy Elements

Our research revealed four key elements, identified through an analysis of in-depth interviews with stakeholders, for consideration in operationalizing the Responsible Contractor Policy. Listed from most frequently mentioned to least frequently mentioned, these are: training and credentialing, code compliance and enforcement, wages and employee benefits, and workforce diversity. In this subsection, we summarize our findings by each element. Other elements were mentioned such as licensure requirements, bonding, safety, and OSHA Compliance, but outside of mentioning these elements little substantive discussion occurred. Seemingly most stakeholders appear to think these four elements have already been largely addressed in the marketplace.

Training and Credentialing

- Stakeholders expressed two high-level viewpoints related to the effect training has on quality. On one hand, some stakeholders are of the opinion that contractors who support their employees in continuing their education tend to be the ones who strive to provide the best possible service to their customer, including quality work. On the other hand, some stakeholders believe training and credentials on their own do not necessarily ensure quality work. For example, one stakeholder pointed out that you can have someone who is highly credentialed who may still cut corners or someone who is un-credentialed who does the job correctly.
- Consistency in job definitions, skill requirements, and training standards were challenges brought up repeatedly. Concerns center on defining how jobs are defined and what key knowledge, skills, and abilities (KSA's) are needed to perform a particular task. Who defines these KSA's? How do we ensure KSA's are kept current with quickly changing technology? How do you keep knowledge and content up-to-date when faced with contractors who are providing on-the-job training and instructors who are teaching courses for equipment that was not around when they were certified? How do you ensure that training includes skill sets that are relevant to energy efficiency when energy efficiency is not necessarily a focus of credentialing organizations? Since projects and jobs vary, how can we ensure proposed KSAs can be consistent across skills and job categories?
- Stakeholders generally agree that certification needs to demonstrate both retained knowledge and application of skills. Stakeholders acknowledge the barrier that performance-based certifications are costly.
- The Guidelines for Home Energy Professionals Project provides an example of how the U.S. Department of Energy (DOE), along with the home energy upgrade industry approached the challenge of aligning work quality expectations with quality training and quality workers. The project developed resources which

define quality work, quality training, and quality workers to support the quality driven home energy upgrade industry. This collaborative project conducted job task analyses, defined standard work specifications that address minimum acceptable outcomes, developed accredited training programs, and created Home Energy Professional certifications. These guidelines are currently utilized by the DOE's Weatherization Assistance Program (WAP). Staff involved in the development and implementation of these guidelines shared key lessons learned. These lessons include:

  - **Stakeholder Input**: It is important to engage stakeholders, especially the stakeholders that will likely resist the potential outcomes of the project.
  - **Incentives:** To properly incent quality work, contractor and technician time must be valued appropriately when designing program processes.
  - **Streamline Paperwork**: Data collection and transfer between contractors and programs should be as seamless as possible.
  - **Business Model:** Businesses need to internalize how quality work in the energy efficiency industry can increase revenue potential.
  - **Defining Success:** Stakeholders in programs (e.g. implementers, program staff, contractors, evaluators, etc.) need to all share a common definition of what success means.

- Stakeholders discussed the need for different types and levels of training. These options are needed to accommodate varying equipment types, equipment standards across regions and climate zones, experience levels, and career aspirations.
- Stakeholders identified that workers need both 1) requisite specialized task level skill expectations and 2) broad training that allows workers to take a holistic view of the systems they work with-- enabling them to make situational, systems-based decisions.
- Our research uncovered a gap in technician state level credentialing for all licensing categories except C10 electricians. In the other categories, the contractor must be licensed, but the technicians working under them do not. Some stakeholders contend that this gap may not support a workforce sufficiently trained to do quality work.
- Our research also uncovered a gap in the Class B General Building Contractor license. A Class B General Building Contractor is defined by the CSLB as "a contractor whose principal contracting business is in connection with any structure built, being built, or to be built, for the support, shelter, and enclosure of persons, animals, chattels, or movable property of any kind, requiring in its construction the use of at least two unrelated building trades or crafts, or to do or superintend the whole or any part thereof."[2] Contractors who hold a Class B license have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor can bid on a job that includes HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but cannot bid on a project that was exclusively an HVAC installation or exclusively lighting work unless they hold specialty licenses for those trades. According to interviews with CSLB staff, the theory behind the requirement is that Class B contractors' principal business is related to remodels and/or new construction work, therefore they should at least know how to frame for structural safety reasons. The

[2] Business & Professions Code - Division 3, Chapter 9; Contractors, Article 4, Classifications. Retrieved November 2, 2017, from: http://www.cslb.ca.gov/About_Us/Library/Licensing_Classifications/B_-_General_Building_Contractor.aspx

requirement that they bid on jobs with at least two unrelated building trades prevents them from marketing themselves as experts in a specialty trade. It is expected, although not required, that they will likely subcontract with a contractor holding the appropriate specialty license to complete the part of the job with which they do not hold the specialty license. Some stakeholders believe that requiring contractors with a Class B license to also have the applicable specialty licenses for the corresponding specialty work they, or their technicians are completing, rather than subcontracting out; would support increased work quality in the field.

- Multiple stakeholders identified contractor values--including valuing energy efficiency, meeting customer's needs, and striving to do 'the right thing'--as key drivers to quality work. Program administrators noted that contractors who are engaged in the customer experience, who have a keen sense of how to keep and retain customers, who are thoughtful about the customer's property, and who are quick to resolve complaints if they arise, tend to be contractors who they view as 'high performers'. As such, stakeholders believe that training and credentialing need to address both technical skills as well as soft skills.
- Contractors identified barriers to training their employees if such a requirement was included in the Responsible Contractor Policy, including cost, time, and fear of retaining employees after investing in them.

Code Compliance and Enforcement

- Compliance with pulling requisite building permits in the large commercial sector is perceived to be occurring for most jobs. However, permit compliance in the small commercial and residential sectors is perceived to be very low and a significant issue.
- There is a vast amount of data indicating that compliance with permitting requirements is an appreciable concern in the HVAC industry.[3] HVAC residential permit rates lie between 10% and 38%--far from the state's goal of meeting 90% permit compliance by 2020.
- Contractors drive the decision to pull a permit in the small commercial and residential sectors.
- There is a market disincentive to pull permits due to several market conditions. Four reasons for not pulling permits were uncovered including: 1) lack of understanding of complex energy codes, 2) permit cost and perceived return on investment, 3) local government budget limitations and process standardization, and 4) fear of inspectors uncovering other code violations not related to the current project.
- A culture seemingly has developed where the HVAC industry views enforcement as nothing more than a "slap on the wrist" in California. There is a very real concern among contractors and their representatives that if compliance enforcement is not improved, legitimate contractors may be forced to go underground potentially leading to an increase in unrealized energy savings. Most stakeholders indicated that an effective enforcement mechanism needs to be a top priority to increase compliance rates and in turn, realize additional energy savings. However, past research suggests that under current market and enforcement conditions, permitting does not lead to increased work quality.
- Most of the stakeholders interviewed believe that it is not the PA's sole responsibility to enforce permit compliance. They believe permit enforcement is the responsibility of the CSLB and the building departments. However, most stakeholders believe the PA should play a role in supporting compliance. PA stakeholders consistently reported that enforcing or policing work or labor standards was not in their

[3] See studies cited in section 5.2.1.

purview; however, they did see a role for the PA in educating customers and contractors about such requirements.

- Our research identified six strategies for improving the compliance rate. These include: (1) streamlining compliance processes; (2) training and technical support programs; (3) stretch code programs; (4) limited self-verification permit programs; and specifically for HVAC, (5) sales tracking and (6) technology innovation. (See section 5.2.6 for full details)
  - Massachusetts adopted an above-code appendix to the "base" building energy code for buildings in July of 2009. As of September 2017, two hundred and seven (207) municipalities out of 351 have adopted the Board of Building Regulations and Standards Stretch Code. The Stretch code achieves on average a 20% greater building efficiency than base code. The top two reasons for municipalities adopting the stretch code are the desire to be environmentally responsible, and the Green Community Designation which provides access to state funding.
  - Overseen by National Grid, the Massachusetts Code Compliance Support Initiative & Rhode Island Code Compliance Enhancement Initiative are similar programs which are designed to close the gaps between critical energy code requirements and project requirements. These programs include three elements: training, technical assistance and documentation. According to interviews with program staff and the implementer, these programs have been successful. They identified the following as lessons learned:
    - **Key is to simplify.** Simplifying the process, documentation, and training ensures that codes are not daunting. Pocket guides and simplified application forms have been successful.
    - **Meeting audience where they are.** Tailor training content to specific audiences. Gauge audience background knowledge and understanding.
    - **Target training on installation quality**. Focus training not just on the basics but emphasize quality of installations to increase realization of energy savings.

Wages and Benefits

- Some stakeholders perceive there is a direct link between paying livable wages and providing benefits and attracting and retaining a skilled workforce. Contractors who are willing to pay a living wage and/or provide health benefits are also the contractors who are willing to invest in training their employees since retaining their workers is less of an issue. On the other hand, some stakeholders point out that wages do not necessarily correlate with quality.
- Contractors have found that higher pay results in attracting and retaining employees who view the job as a career and are happier employees who do better work. They believed that a wage requirement could potentially have a positive effect on work quality, but a neutral to negative effect on their business' profitability.
- Stakeholders cautioned that the benefit to participating in a PA program would need to outweigh the additional cost to the contractor associated with a wage requirement. The Seattle Community Power Works and Clean Energy Works Oregon programs provide examples of how two residential programs have

addressed the challenge of incorporating wage and benefit requirements into program policy.[4] It should be noted that both programs have contracting relationships, called High Roads Agreements, with the contractors performing the work. A High Roads Agreement (HRA) is a multi-stakeholder agreement that lays out specific goals related to the quality and accessibility of economic opportunities; strategies for supporting these goals in the contractor selection process; and requirements that contractors and other stakeholders must agree to adhere to in order to support the goals throughout their involvement in the program. Contractors are admitted into a pool of approved contractors; and agree to adhere to requirements set out in the High Roads Agreements, including wage and insurance standards. Interviews with program staff revealed that while contractors initially were resistant to the wage requirements, ultimately contractors complied because they wanted to participate in the programs. According to the Clean Energy Works Oregon Final Technical Report, contractors found that investing in their crews resulted in better quality work, less turnover, and more stability for their business. Staff from both programs point to collaboration with a stakeholder advisory committee, which included contractors and labor unions, as a key factor in striking a balance between effectiveness in achieving goals and limiting contractor burden.

- Stakeholders who are against a wage requirement fear that establishing higher wage and benefit requirements beyond what is required by law will result in increased program costs without increasing energy savings. Our literature review revealed a rich history debating whether increasing wages results in increased project costs.[5]

Diversity

- As with other program elements, we did not provide definitions or specify what a diversity requirement might entail. In some cases, stakeholders discussed requirements that could encourage or lead to increased diversity, in other cases they interpreted a diversity requirement more literally as requiring diversity. A few stakeholders feel that at least some level of requirement that encourages workforce diversity should be part of a responsible contractor policy. They feel that it is appropriate to set a high standard for diversity, particularly when public rate-payer dollars are involved. The rest either did not comment on whether a diversity requirement was important or were strongly opposed to such a requirement. Those who oppose, argue that while they generally want to support access and reach to disadvantaged workers, a diversity requirement does not align with the primary goals of energy saving programs, which are to contribute to the state energy goals.
- Contractors do not see how encouraging diversity would lead to better quality work. They fear not being able to find people who meet diversity requirements with the required skills, which could potentially have a negative effect on quality. They also feel that it would be unfair to give jobs to individuals just because they meet certain diversity requirements. Ultimately, they say that a diversity requirement would prevent them from participating in a PA-sponsored energy efficiency program as they want complete control over who they hire.
- Some stakeholders suggest limiting diversity requirements to larger scale projects, such as projects with a budget of $100,000 or more.

[4] Clean Energy Works Oregon is a residential energy efficiency program offering financing and rebates for energy efficiency upgrades. The Seattle Community Power Works program offers financing and rebates for residential weatherization upgrades.
[5] See studies cited in section 5.3.4.

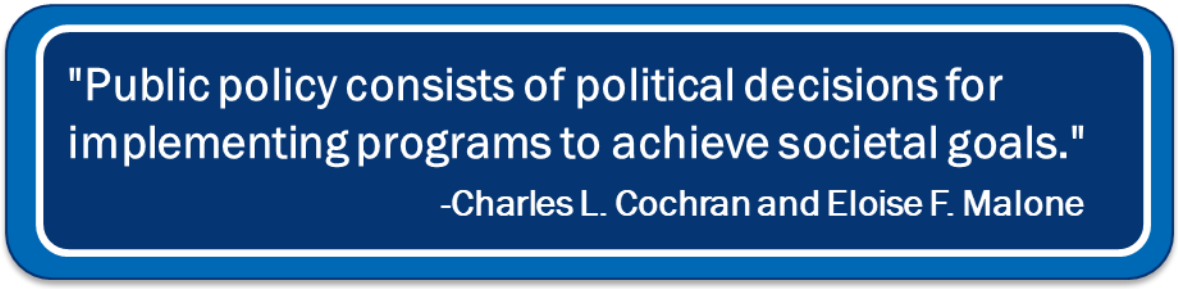
- Clean Energy Works Oregon provides an example of how programs have addressed the challenge of incorporating diversity requirements into program policy. As mentioned earlier, the program has contracting relationships, High Roads Agreements, with contractors performing work. Contractors are admitted into a pool of approved contractors; and agree to adhere to requirements set out in the High Road Agreements, including hiring standards that support the program's diversity goals throughout their involvement with the program. In addition, the program prioritizes diversity in the contracting process. This program uses a Best Value Contracting Process to assemble its contractor pool. This process uses a two-step qualification process, first screening contractors for minimum requirements, and then awarding additional "High Roads" points for various criteria that support High Roads agreement objectives, including supporting a diverse workforce, being a historically underrepresented business, or contracting with a historically underrepresented business. The higher a contractor applicant scored on high roads objectives, the more PA-acquired leads were allocated to that firm. The program also requires participating contractors to adhere to hiring standards that support the program's diversity goals throughout their involvement with the program. While the program initially faced pushback from contractors related to the hiring standards, the program overcame this barrier by providing a source for qualified workers who met the diversity requirements. In interviews, program staff stress the importance of collaborating with contractors and with training centers to align a pipeline of qualified candidates with contractor needs.

1.2.3 Policy Considerations

- Our research identified many factors that should be considered when operationalizing the responsible contractor policy in relation to the PA energy savings programs. These include impacts on program cost-effectiveness, program design, contractor capacity and type, project scale, administrative challenges, and workforce data collection.
- Some stakeholders are very concerned about the impact of a responsible contractor policy on energy efficiency program cost-effectiveness. These concerns revolve around increased training and administrative costs as well as a responsible contractor policy limiting the contractor pool resulting in higher project costs without higher energy saving benefits.
- Other stakeholders disagree with these cost-effectiveness concerns, stating that contractors who do not comply with requirements now are driving energy savings down by improperly installing energy efficiency measures, thus impacting cost-effectiveness calculations. A few stakeholders suggested that including responsible contractor benefits in non-energy benefit calculations would balance out any increase in program costs. However, the CPUC does not currently accept non-energy benefits in its cost-effectiveness framework.
- Numerous stakeholders discussed concerns around how a responsible contractor policy would be applied to programs where the PA has a direct contracting relationship with the contractor versus those that do not. This is a large factor that must be weighed heavily in any responsible contractor policy. About a third of programs are currently in an indirect contracting relationship with contractors where customers are allowed to hire the contractor of their choice as long as they meet the program requirements, which most often require only a valid CSLB license. PAs or third-party program implementers are directly hiring and overseeing the work of contractors when they enter into a direct contracting relationship with the contractors, e.g. CA's Energy Savings Assistance Program, and in that relationship the PAs have much more control over who does the work and how it is done.
- Some stakeholders feel that one of the potential unintended consequences of imposing more contractor requirements is that such requirements may give a competitive advantage to larger firms who have the resources to adopt additional requirements and remain competitive and profitable.

- Some stakeholders believe that contractor standards should vary based on the scale of projects; using thresholds at which different criteria take effect. For example, larger and more complicated commercial and industrial projects should have more stringent requirements than small residential projects. Similarly, enforcement strategies should vary based on the scale of the project. For example, for larger projects, it might make sense to require customers to hire contractors from a pre-approved list. For smaller projects, it may be sufficient to have the contractor submit a form with a contractor affidavit.
- The Seattle Community Power Works program and Clean Energy Works Oregon, both learned that developing and implementing High Roads Agreements is a complicated process with many moving pieces. These administrative challenges require time to implement.

2. Study Overview



SB-350 states that the:

> *Commission shall adopt, implement, and enforce a responsible contractor policy for use across all ratepayer-funded energy efficiency programs that involve installation or maintenance, or both installation and maintenance, by building contractors to ensure that retrofits meet high-quality performance standards and reduce energy savings lost or foregone due to poor-quality workmanship.*

This study was designed as an exploratory qualitative inquiry aimed at uncovering insights and ideas that can be used to inform the development and implementation of a Responsible Contractor Policy. The methodology employed, budget allocated, and overall approach did not support the analysis of representative quantitative data on the topic. As such, this report is intended to summarize the information collected and does not provide recommendations.

This study looks at:

- The **current state** of contractor requirements in Program Administrator's (PAs) retrofit installation and maintenance programs;
- The **future state** of what elements could be considered for inclusion in the Responsible Contractor Policy; and,
- The **opportunities and challenges** related to these potential elements and their potential feasibility.

2.1 Background

California's Long Term Energy Efficiency Strategic Plan (Strategic Plan) was publicly released in 2008, and updated in January 2011, to "create a framework to make energy efficiency a way of life in California by refocusing ratepayer-funded energy efficiency programs on achieving long-term savings through structural changes in the way Californians use energy."[6] The plan sets forth a roadmap for energy efficiency in California through the year 2020 and beyond. "It articulates a long-term vision and goals for each economic sector and identifies specific near-term, mid-term, and long-term strategies to assist in achieving those goals."[7] The Strategic Plan addresses many key issues related to this report including WE&T as well as code compliance and permitting.

Workforce Education & Training (WE&T)

The Strategic Plan states that "By 2020, California's workforce is trained and fully engaged to provide the human capital necessary to achieve California's economic efficiency and demand-side management potential." The Strategic Plan called for a Needs Assessment to "more thoroughly define, initiate, and drive long-term WE&T development and strategic planning" (pg. 75). In November 2009, the IOUs contracted with the Donald Vial Center for Labor in the Green Economy (DVC), to complete a Needs Assessment study. The California Workforce Education & Training Needs Assessment study (Needs Assessment) was completed in March 2011 and addressed three key elements of demand-side management: [8] energy efficiency, demand response, and distributed generation. Key findings from the Needs Assessment study include:[9]

- As of early 2011, two major problems were impacting the California economy: 1) California's unemployment rate overall was 12%, with significantly higher rates in construction jobs; and, 2) bifurcation of the construction labor market into higher skilled jobs and lower skilled jobs with little growth in the middle;[10]
- The predominance of energy efficiency work is in traditional construction trades, rather than in narrow specialized emerging occupations, disproving the view that such jobs are fundamentally different than other construction trades jobs and highlighting the importance of greening the traditional trades;
    - A key obstacle to achieving energy goals is the prevalence of low-quality energy retrofit work, especially in the HVAC sector;
    - Poor quality work is not simply a consequence of a lack of training of construction trades workforces, but also due to market dynamics in residential and small commercial markets including lax

[6] California Public Utilities Commission. (January 2011 Update). California Long Term Energy Efficiency Strategic Plan. Retrieved January 27, 2017, from http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf
[7] Ibid.
[8] Demand-side management refers to policies and programs developed to influence the energy usage of customers.
[9] Donald Vial Center on Employment in the Green Economy. California Workforce Education and Training Needs Assessment. Institute of Research on Labor and Employment. University of California, Berkeley, March 4, 2011.
[10] As of October 2017, the California unemployment rate was 4.9% as cited on the State of California Employment Development Department Labor Market Information website. Retrieved December 13, 2017 from http://www.labormarketinfo.edd.ca.gov/

enforcement of building permits, codes and standards, employment laws, and contractor licensing requirements;

- The current lack of consistent work quality standards and/or their enforcement undermines employers' incentives to invest in training and to recruit and retain a qualified workforce; and
- The lack of agreed upon industry skills to train for energy efficiency related occupations; due to the lack of industry recognized credentials.

The Needs Assessment study provided targeted recommendations that "fit into two overarching prescriptions that are driven by the state's intertwined clean energy and workforce goals." These are:

1. Create and enforce standards to expand the higher quality segments of energy efficiency sectors; and,
2. Improve WE&T planning and coordination.

On November 8, 2012, in D.12-11-015, *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets* was issued, indicating that "given the amount of funding devoted to energy efficiency programs in this state, and the level of unemployment in the economy in general, this [WE&T] is an area in dire need of more focused attention. This is not to say that there is anything wrong with the activities currently being undertaken by the IOUs; we simply expect a higher level of focus and attention." The Decision ordered the IOUs to hire an expert entity to develop a comprehensive approach to WE&T, in accordance with the Strategic Plan Goals and the Needs Assessment study recommendations. Through a competitive solicitation process and with the help of a network of stakeholders, the IOUs issued a Request for Proposal for a consultant to develop that comprehensive approach. On May 30, 2013, the contract was awarded to DVC. On May 2, 2014, DVC finalized its recommendations in the document *Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities* (Guidance Plan). This report was designed to transfer the analysis and higher level recommendations from the Needs Assessment discussed earlier into "specific concrete actions that the IOUs can take to address workforce issues in their EE programs."[11]

In this report, DVC recommended a Responsible Contractor Policy that states:

> *Recommendation 1.1 Adopt a responsible contractor policy for use across all resource programs where contractors work directly with the IOU or where a customer receives an incentive for equipment or service.*
>
> > 1.1.1 Require and verify that all firms (and subcontractors) working on ratepayer subsidized projects meet pre-established, clearly defined minimum standards relating to contractor responsibility, including: all applicable licenses, bonding and insurance (including workers' compensation), wage and labor law compliance, no OSHA violations, and permitting that includes passing code inspections.

[11] Donald Vial Center on Employment In The Green Economy - Institute for Research on Labor and Employment - University of California, Berkeley. (May 2014). Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities. Retrieved January 27, 2017, from http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf.

> 1.1.2 Pre-qualify all firms (and their subcontractors) meeting any of the following conditions: (1) have contract(s) with the IOU greater than $1,000,000; (2) implement individual projects with total costs greater than $100,000; or (3) participate in programs for which contractor pre-approval is required (e.g., HVAC Quality Installation/Quality Maintenance, Energy Upgrade California). In addition to the baseline requirements, pre-qualify firms based on:
>
> - History of performance requirement: (a) documented history of full compliance with state, health, safety, and work standards; and (b) references from five different clients for five similar past projects.
> - Skilled workforce requirement: 60 percent of jobsite workforce is comprised of journey persons or apprentices from a registered apprenticeship program in California, or other proof of skilled workforce.
> - OSHA requirement: 60 percent of jobsite workers are OSHA 10-hour General Industry Safety and Health Certified and at least one jobsite worker is OSHA 30-hour General Industry Safety and Health Certified.

On October 16, 2014, in D.14-10-046, *Decision Establishing Energy Efficiency Savings Goals and Approving 2015 Energy Efficiency Programs and Budgets,* the IOUs were directed to file a Tier 2 advice letter to Energy Division describing which of the Guidance Plan recommendations would be initiated in 2015 and provide a program implementation plan.

On January 16, 2015, the IOUs hosted a Stakeholder Engagement Forum to review and solicit feedback on the IOUs' 2015 efforts regarding the recommendations. As a result of that feedback, the IOUs modified and clarified their approach on a number of recommendations, including defining disadvantaged workers, work quality standards, and responsible contractor policies that were ultimately captured in the advice letter.

On February 23, 2015, the Joint Utilities filed the required advice letter in conformance with D.14-10-046. Three parties protested the Joint Utilities' Advice Letters. On March 23, 2015 the Joint Utilities replied to these protests. The Joint Utilities' Advice Letter was suspended on March 23, 2015 to allow Energy Division staff time to review the protests. On April 14, 2015 one of the original protesting parties filed a response to the Joint Utilities' reply. On June 18, 2015, Energy Division staff found that the Advice Letter filings were in conformance with the directions provided by the CPUC and approved the joint advice letter effective March 23, 2015. They also concluded that the "protests provide comments that require higher level policy considerations that are not within the purview of Energy Division's authority" and dismissed, without prejudice, these protests—noting that "the protest and accompanying comments are now a matter of public record and may be referenced in future policy considerations of the utilities' WE&T related program strategies."

In the joint advice letter that was submitted, the IOUs selected recommendations from the Guidance Plan to initiate in 2015 based on the following considerations: regulatory requirements, alignment with current activities and external organizations, marketplace realities, financial impacts, contracting details, and legal factors. As a result of that feedback, the IOUs modified and clarified their approach on a number of recommendations, including responsible contractor policies. The IOU modification stated:

> *Revised Recommendation 1.1 - Adopt a responsible contractor policy for use across all resource programs where contractors work directly with the IOU.*

> 1.1.1 Require that all ratepayer-subsidized projects meet pre-established, clearly defined minimum standards relating to contractor responsibility, including: all applicable licenses, bonding and insurance (including workers' compensation), wage and labor law compliance, OSHA compliance, and permitting that includes passing code inspections.

The revised recommendation removes the requirement that IOUs establish contractor policies for resource programs where contractors do not work directly with the IOUs (such as upstream programs that incent manufacturers to stock energy efficient equipment) and to remove the requirement for IOUs to verify that all firms (and subcontractors) working on ratepayer subsidized programs meet pre-established standards, including applicable laws. Regarding verification, the IOUs indicated that it was not feasible to verify the work of all firms working on EE projects. The advice letter further explains that the term "verify" is a "legal team of art, invoking a specific legal standard. This standard would likely add significant administrative and oversight costs as well as liability to EE programs". They also point out that for some of these requirements, enforcement agencies already exist (e.g. the California Division of Occupational Safety and Health set and enforce OSHA standards).

The concept of a Responsible Contractor Policy was then added to legislation on October 7, 2015 as part of SB-350 to ensure retrofits meet high-quality performance standards in all rate-payer funded energy efficiency retrofit installation and maintenance projects. As evidenced in this discussion, significant work has been completed leading up to the inclusion of the responsible contractor language in SB-350. The objective of this work is to build on that research.

Code Compliance and Enforcement

The other area addressed in the Strategic Plan that is germane to this report is code compliance and enforcement, an element that most stakeholders in this study felt should be included as part of a responsible contractor policy. The Strategic Plan puts forth a clear call to action related to this issue stating that "Many actors must work together to ensure building code compliance. Strengthening building codes without improving local on-the-ground compliance leads to illusory progress. Concerns have arisen regarding whether HVAC compliance issues already undermine the effectiveness of Title 24 standards, and increasingly the stringency and coverage of state standards is likely to add to these issues." The Strategic Plan sets a goal that 80% of transactions that trigger Title 24 requirements will comply with all applicable requirements.

Title 24 is the 24th title within the California Code of Regulations (CCR). The CCR is divided into 28 separate titles numbered 1 through 28, each based on subjects or state agency jurisdictions. State regulations should not be confused with state laws enacted through the legislative process. State regulations in the California Code of Regulations are developed by state agencies as determined necessary to implement, clarify and carryout the requirements of state law. The state agencies must have authority in state law to adopt regulations.

The California Title 24 Building Energy Efficiency Standards sets minimum energy performance specifications that new construction and retrofitted residential and non-residential buildings must meet. These measures are listed in Title 24, Part 6 of the CCR. These standards are designed to save energy, increase electricity supply reliability, increase indoor comfort, avoid the need to construct new power plants and help preserve the environment. The CEC is responsible for adopting, implementing, and updating building energy efficiency standards. The CEC is required by law to update standards incorporating new energy efficient technologies and construction methods that are cost-effective for owners over the 30-year lifespan of a building every three years.

Compliance with building and energy codes is a legal requirement. State law requires local government to enforce the California Building Standards Code (CCR Title 24) through a local building department and or fire district. The current mechanism in California to ensure that new construction, and existing building additions and alterations are compliant with all governing state and local codes involves licensed contractors and/or property owners pulling appropriate permits. Permitting ensures buildings are safe, healthy, efficient, and accessible environments for human occupancy and habitation. Legitimate contractors have repeatedly expressed the need to "level the playing field" so they can compete with other providers who purposely avoid pulling permits to keep their prices artificially low.

HVAC Permitting

Permitting related to HVAC equipment is a particularly big issue. As the Strategic Plan states, "Failure to ensure quality at the time of cooling system installation results in 20 to 30 percent increase in the peak energy needed by systems."[12] The Strategic Plan sets a goal that 90% of HVAC systems are installed to code and optimally maintained for a systems' useful life. In September 2016, California Senate Bill 1414 (SB-1414) became law. This bill:

- Requires the CEC by January 1, 2019 to approve a plan that will promote compliance with specified regulations in the installation of central air conditioning and heat pumps.
- Authorizes the CEC to adopt regulations to increase compliance with permitting and inspection requirements for central air conditioning and heat pumps, and associated sales and installations, consistent with the plan.
- Requires that a customer or contractor receiving a rebate or incentive offered by a public utility for purchasing or installing central air conditioning or a heat pump and their related fans, to provide additional proof of permit closure.

Program Administrators had to address this new legislation in programs designs submitted as part of their 2017 business plans. Program Administrators acknowledge the legislation in the following ways:

- PG&E notes in their business plan, that they "will collect proof of permit closure before paying rebates or incentives for all downstream central air conditioning or heat pumps and their related fans, in accordance with SB-1414."[13] PGE's Business Plan also notes that "WE&T will provide training and support for contractors to right-size HVAC installations and complete proper permits as required by the recent approval of SB-1414."[14]
- SCE references a Navigant study[15] in their business plan and acknowledges that "permit rates are still low for new units and existing efficiency potential in the market resides largely in older HVAC units and their proper installation and maintenance." SCE also notes that the need to provide training to contractors and other market actors to sell energy efficiency is important; citing the fact that the electrical industry is going

[12] California Public Utilities Commission. (January 2011 Update). California Long Term Energy Efficiency Strategic Plan. Retrieved January 27, 2017, from http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf
[13] Pacific Gas & Electric. 2018-20125 PG&E Energy Efficiency Business Plan. January 17, 2017. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_cbeb1d9e14cf4575845e8d5cd6bce57f.pdf
[14] Ibid.
[15] Navigant Consulting. (April 2016) AB 802 Technical Analysis Potential Savings Analysis. Retrieved November 11, 2017, from: http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M159/K986/159986262.PDF

through a period of "significant change including technological advances, policy changes, market characteristics, and customer expectations.[16] SCE uses SB-1414 as an example of this change.

- **SDG&E** only discusses permitting and SB-1414 in Appendix F: External Stakeholder Observations in their business plan. They note that "SB-1414 is now law and program implementation plans will need to incorporate."[17]
- **SCG** indicates that there are "several approaches that can be used to address improper HVAC replacement and maintenance" and notes that "Consistent and effective enforcement and verification of applicable building and appliance standards" is one approach. They explain that "California law requires contractors to obtain permits for the installation of new HVAC equipment, however fewer than 10 percent of contractors obtain such permits."[18]
- **Bay Area Regional Energy Network** notes requiring "proper permitting and code compliance for program projects incorporating SB-1414 regulations" as well as integrating "proper permitting and code compliance into program specific training and QA/QC."[19]
- **Marin Clean Energy** does not mention SB-1414 in its business plan.[20]
- **Southern California Regional Area Network** acknowledges their support of permitting for the residential sector in their business plan stating they will "educate building departments, contractors and homeowners about the value and need for closed permits for related energy efficiency work" and "collect proof [of] permit closure before paying rebates or incentives to customers or contractors."[21] They also state "As SB-1414 requirements make permit closure a requirement for HVAC incentives programs, the Codes & Standards program will deliver key education to public agencies that supports residential incentives."

The objective of this work is to build on the code compliance and enforcement goals outlined in the Strategic Plan as well as the subsequent research related to these goals.

2.2 Research Questions

Opinion Dynamics employed the following research methods to address the research objectives and associated research questions: secondary research, stakeholder in-depth interviews, an initiative review, and two focus groups. Table 2-1 provides a crosswalk between the methods by objective and research questions. Please note, as is expected with the qualitative research process, some of the research questions that were

[16] Southern California Edison. (February 2017) Southern California Edison Company's Amended Energy Efficiency Rolling Portfolio Business Plan for 208-2025. Retrieved November 11, 2017, from https://docs.wixstatic.com/ugd/0c9650_9bf95393f6e9424db1686bdf67bdf13c.pdf

[17] San Diego Gas & Electric. (January 2017). SDG&E Energy Efficiency Business Plan, "Building a Better Energy Efficiency Future, 2018-2025. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_52c02da4469c4213b0974b412b3f85ad.pdf

[18] Southern California Gas Company. (January 2017). Energy Efficiency Plan. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_a9135c638d974c04ac7e99449d310d56.pdf

[19] Bay Area Regional Energy Network. (January 2017). BayREN Energy Efficiency Business Plan 2018-2015. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_5cc67ae2072945eeae78111e36b74d36.pdf

[20] Marin Clean Energy. (January 2017). Energy Efficiency Business Plan. Retrieved November 11, 2017, from https://www.mcecleanenergy.org/wp-content/uploads/2017/01/EE-BusinessPlan2017_20160105_filing.pdf

[21] Southern California Edison. (January 2017). SoCalREN Energy Efficiency Rolling Portfolio Business Plan, 2018-2015. Retrieved November 11, 2017, from https://docs.wixstatic.com/ugd/0c9650_c3d9a5b446704389bdff9cd0db785dc7.pdf

identified in the work plan did not yield meaningful data in the interviews, best practice review, or focus groups. These research questions have been removed from this study.

Table 2-1. Methods by Objective and Research Question

Research Question	Secondary Research	Stakeholder Interviews	Best Practice Review	Focus Groups
Objective 1: Identify the Contractor Policies Required in Today's PA Programs (Current State)				
1. Using the list of CSLB Classification Titles, what CSLB Classifications participate in installation, maintenance, or both installation and maintenance PA retrofit programs?	☑	☑		
2. What CLSB license requirements exist for pertinent CSLB Classifications identified above?	☑			
3. What PA programs, that include installation, maintenance, or both installation and maintenance, currently have eligibility requirements that could be considered a type of Responsible Contractor Policy? What are those requirements? Why were they selected? What other requirements were considered but not implemented? Why? How have they benefited or detracted from the programs?	☑	☑		
4. How do PA retrofit programs, that that include installation, maintenance, or both, consider contractors' work performance (i.e. program theory, training, feedback loops, incentive structures, commitment to safety practices, contractor professionalism, etc.)?	☑	☑		
5. Who is involved in verifying the current requirements (PAs, Implementers, CSLB, Other Agencies?) How are current requirements validated?	☑	☑		
6. What do other similar organizations (such as other states and utilities) require from their contractors that can inform the development of this policy?	☑	☑	☑	
Objective 2: Determine Elements that Could be Considered for Inclusion				
7. What elements should be considered for inclusion in a responsible contractor policy?	☑	☑	☑	☑
8. What is the role of industry-recognized credentials in a responsible contractor policy? How do we ensure these credentials have true utility and value and are quality measures of skill attainment?	☑	☑	☑	☑
9. Should bonding, insurance, worker's compensation, wage and labor law compliance, OSHA violations, and permitting compliance be included in the Responsible Contractor Policy? Which of these elements are included in California licensing requirements as set by the California Contractor State License Board (CSLB)?	☑	☑	☑	☑
10. What are the pros and cons of the Responsible Contractor Policy as it may apply to contractors, subcontractors, contractor laborers, technicians, etc.?	☑	☑	☑	☑

Research Question	Secondary Research	Stakeholder Interviews	Best Practice Review	Focus Groups
Objective 3: Contractor Policy (Future State)				
11. What are the potential impacts to contractor participation? Customer participation?	☑	☑	☑	☑
12. How should the elements of the responsible contractor policy potentially be enforced? Who will potentially play the enforcement role(s)?	☑	☑	☑	☑

We removed the following research questions that were identified in the work plan but did not yield meaningful data from this study:

- What research has been conducted on the impacts of the current requirements on contractor participation or program effectiveness?
- Are there other lines of business (outside of EE) within the PAs that have such policies that can inform the development of this policy?
- What is the data that we need to make a yes/no decision on a specific Responsible Contractor Policy?
- What data would potentially be (a) required or (b) useful to monitor the implementation and effects of enforcing a responsible contractor policy?
- What are the legal implications of such a policy? Contractual implications?
- What should be considered when deciding if the policy is implemented at the portfolio level or a program level?
- What are the implications on programs in which the PA does not have the direct relationship with the contractor (i.e. upstream and midstream programs)?
- What might be a realistic timeline for implementing a responsible contractor policy?

3. Research Methods

All research for this study was qualitative and exploratory in nature. The study was aimed at uncovering insights and ideas that can be used to inform the development and implementation of the Responsible Contractor Policy. We initially conducted an extensive secondary data analysis that consisted of a review of PA retrofit installation and maintenance program data, a policy review, and a literature review. We then conducted semi-structured in-depth interviews with key stakeholders including the CEC, CPUC, CSLB, PA WE&T staff, PA policy teams, PA program staff, other PA staff, training providers, unions, equity organizations, credentialing organizations, and contractor organizations. We then conducted a best practice review with other organizations outside of California with specific experience with responsible contractor policies or specific elements that could be included in a responsible contractor policy. We finally conducted two focus groups with contractors–one with HVAC contractors and one with Lighting contractors. After summarizing these four research methodologies, this chapter concludes with a discussion of the limitations of the research. This chapter is organized accordingly in the following sections:

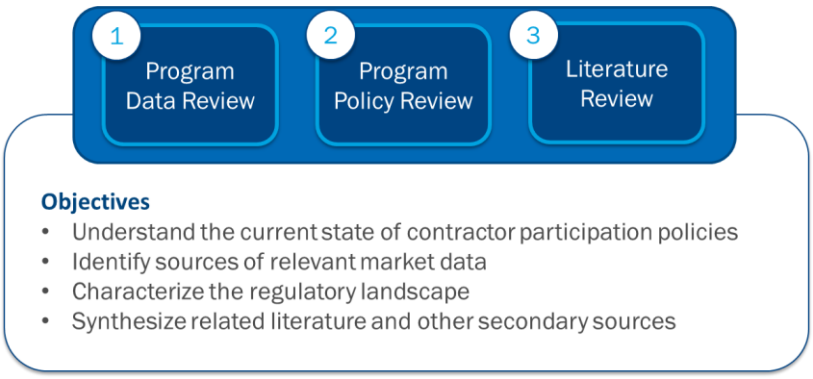
- Secondary Data Analysis
- In-Depth Interviews
- Initiative Review
- Focus Groups
- Research Limitation

As this study progressed, we perceived that the polarizing nature of the subject matter became more and more acute. After much careful deliberation, we have decided not to formally name each of the 78 interviewees, but instead identify the organizational types represented. Our intention of this decision is to focus the report on the thoughts and ideas expressed instead of inviting speculation on the source's agenda. It is our hope that the data, along with the many related reports that precede it, can act as an evidence-based foundation for discussion moving forward.

3.1 Secondary Data Analysis

To address several of the research questions outlined above, the research team completed a review of secondary data sources. The secondary data review consisted of three efforts: (1) a review of PA retrofit installation and maintenance program data, (2) a policy review, and (3) a literature review. The objective of these activities is summarized in the graphic below.

Figure 3-1. Secondary Data Analysis Objectives



3.1.1 Review of Installation and Maintenance Program Data

We submitted a data request to seven California PAs which included a list of programs we thought might be touched by a responsible contractor policy as described by SB-350. The seven PAs included: Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric, Southern California Gas Company, Bay Area Regional Energy Network, Marin Clean Energy, and Southern California Regional Energy Network. For each program, the PAs identified: 1) Which programs involve installation and/or maintenance by a contractor and 2) Which CSLB classifications contractors who perform the maintenance and/or installation tasks for this program hold. They also attached relevant documents that identify the current eligibility requirements for contractors who perform the work.

3.1.2 Program Policy Review

We reviewed eligibility requirement documentation provided by the PAs as part of the program data request, focusing on the 83 programs in which contractors holding the most common CSLB Classifications participate in installation and/or maintenance.[22] We reviewed the materials with an eye to understand: 1. current contractor requirements and protocols for PA programs that include installation, maintenance or both; and 2. how PA retrofit programs currently consider contractors' work performance. We also reviewed CSLB license requirements for the most common CSLB Classifications that participate in installation and/or maintenance programs to understand what CLSB license requirements exist for pertinent CSLB classifications.

3.1.3 Literature Review

The research team completed a literature review of 51 resources relevant to the responsible contractor study to inform the development of primary data collection instruments and to provide context for this study. These resources were identified through a systematic search of evaluation conference proceedings (e.g. ASHRAE, ACCA, ACEEE, IEPEC, and AESP), regional report databases (e.g., CALMAC, NEEA), Google Scholar, web searches, and academic databases (e.g., Academic Search, EconLit, PsychINFO). We also identified additional resources through our in-depth interviews. In addition, Opinion Dynamics studied the many policies and

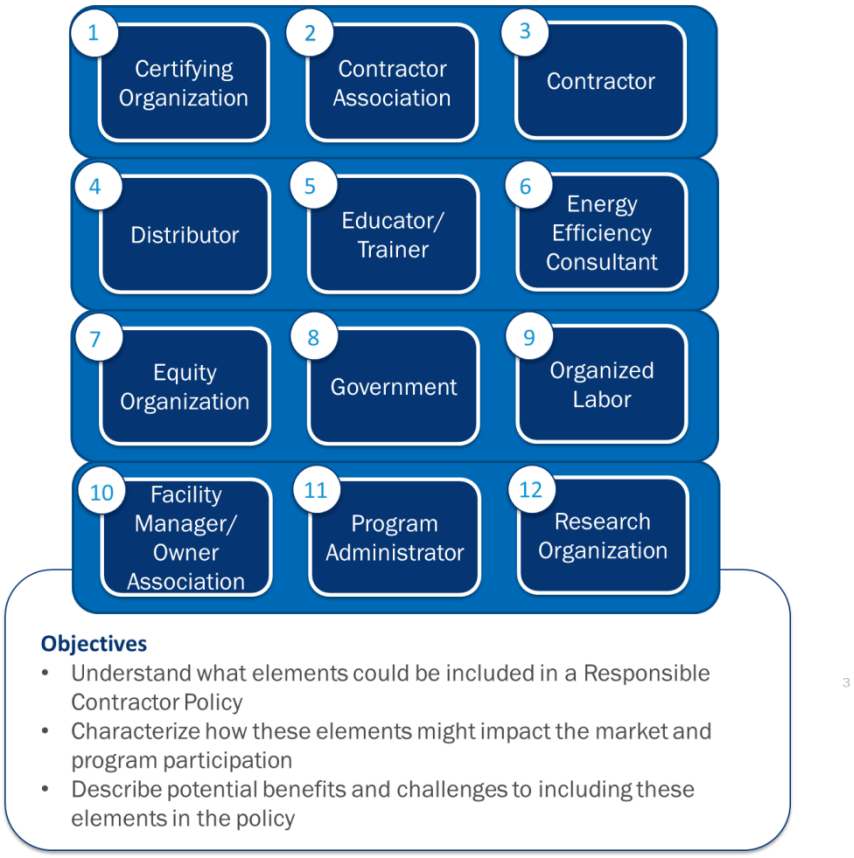
[22] CSLB licenses C10, C20, C38, B, C4, C36, C2

regulatory filings related to Responsible Contractors. We imported these documents into NVIVO where we thematically coded them. We provide a full list of documents included in Appendix A.

3.2 In-Depth Interviews

Opinion Dynamics interviewed 78 key stakeholders either individually or as part of a group interview. Figure 3-2 illustrates the organizational categories included in these interviews.

Figure 3-2. Organizational Categories



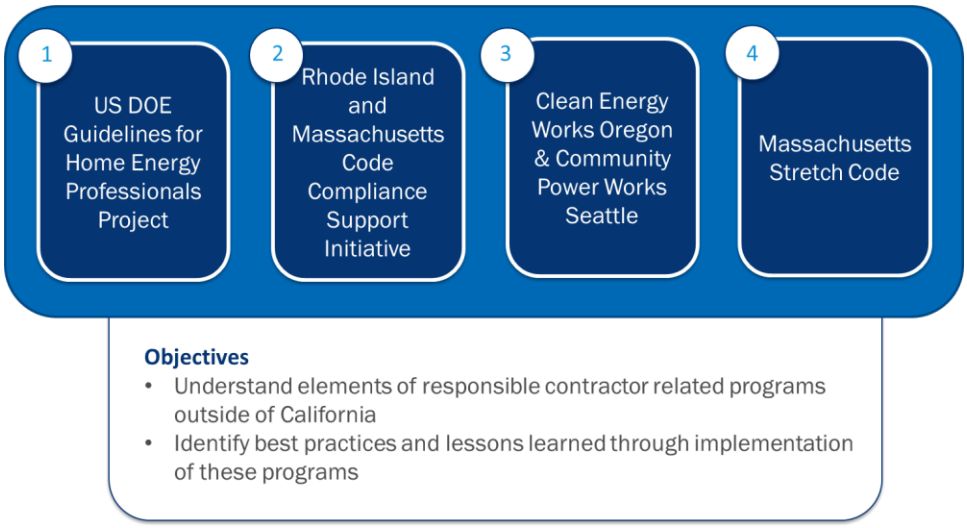
The purpose of these interviews was to understand what elements should be considered for inclusion in the Responsible Contractor Policy, how these elements might impact the market and program participation, the potential unintended consequences of the policy, who should "owns" and enforce the policy, and the legal and contractual ramifications of such a policy. We selected interviewees who are keenly knowledgeable about the intent of this policy mandate as well as those who will be directly or indirectly affected by the mandate. In an effort to include opinions from a wide range of stakeholders, we also reached out to additional contacts suggested by interviewees as contacts they thought should be included in this key stakeholder interview process. We include a basic guide that contains examples of the types of questions we asked stakeholders during the interview in Appendix B. These interviews were intended to be exploratory in nature. Because we were speaking to stakeholders with expertise in differing areas, and offered open ended questions, the conversation often veered in different ways based on the respondent's areas of expertise. Therefore, we did not explore all questions to the same degree with all stakeholders. In addition, as the study progressed, new topics of discussion often emerged.

Where recording was allowed, we transcribed these interviews and import them into NVIVO. Otherwise, we utilized detailed notes from the interviews in our analysis. We used NVVIVO to query all of the data sources to identify recurring themes and relevant information on a topic or how many times and in what contexts an idea was mentioned.

3.3 Initiative Review

Opinion Dynamics conducted a review of four responsible contractor related initiatives outside of California (Figure 3-3). In the case of the Code Compliance Support Initiative, the program was implemented in two states: Rhode Island and Massachusetts. The Clean Energy Works Oregon and Community Power Works Seattle are also two related programs.

Figure 3-3. Reviewed Initiatives

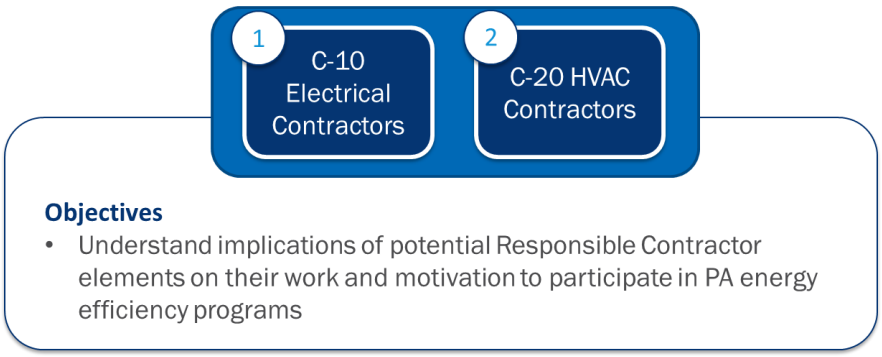


These initiatives were identified as examples of initiatives related to responsible contractor potential elements either through stakeholder interviews or our literature review. Stakeholders and literature review sources perceived these initiatives as examples in which elements of a responsible contractor policy have been implemented and can therefore provide relevant lessons. While the research team believes these initiatives provide relevant lessons, consideration should be given as to how to apply these lessons within the framework of PA programs. The research team conducted interviews with 8 people from 6 different organizations as part of the assessment and reviewed documentation related to these programs. Interview transcriptions, interview notes, and key documentation were imported into NVIVO and thematically coded.

3.4 Focus Groups

Opinion Dynamics conducted two focus groups on October 19th, 2017 in San Francisco with electric contractors who perform retrofit installation and maintenance work of lighting equipment and HVAC contractors who perform retrofit installation and maintenance work of HVAC equipment. Figure 3-4 describes the objective of these focus groups.

Figure 3-4. Focus Groups



The focus groups lasted 90 minutes and participants were paid a $350 incentive. The table below summarizes the participant profiles for each of the two groups.

Table 3-1. Description of Focus Group Participants

Group Description	Schedule	Number of Participants	Profile
Electric Contractors	8pm October 19th	6	• Hold a C-10 license • Number of Employees: 2-50 • Tenure in business: 3-109 years • Perform 100-10,000 projects involving lighting equipment annually • Work on a mix of residential and commercial buildings • Four participate or have participated in PA sponsored energy efficiency programs, 2 have not participated
HVAC Contractors	6pm October 19th	6	• Hold a C-20 license • Number of Employees: 2-80 • Tenure in business: 7- 112 years • Perform 40-700 projects involving HVAC equipment annually • Work on a mix of residential and commercial buildings • Three participate or have participated in PA sponsored energy efficiency programs, 3 have not participated

Topics discussed during the focus groups included:

- Familiarity with and perceptions of current PA program requirements
- Initial reactions to SB350 language
- Group brainstorm of characteristics that should be used to predict a contractor's ability to deliver retrofits that meet high-quality performance standards.
- Perceptions around potential elements that could be considered for inclusion in a responsible contractor policy: permitting and permit closure, training and credentialing, licensure, safety, wages and employee benefits, and workforce diversity.

We include the discussion guide in Appendix C.

3.5 Study Limitations

When interpreting this report, the reader should take into account the following methodological limitations. This study involved gathering a large amount of qualitative data; and thus, our research faced a few important limitations consistent with qualitative research:

- **Generalizability:** A common limitation often cited in relationship to qualitative research is the lack of generalizability – the extent to which findings from a study apply to a wider population.
- **Volume of Data:** Our numerous interviews and secondary data review produced a significant amount of data, which made data analysis challenging. To mitigate this limitation, we utilized NVIVO, a powerful software for qualitative data analysis, to ensure all data were tracked, coded, and synthesized.
- **Social Desirability Bias:** Given the nature of interviews, participants may respond more favorably to questions thus not representing their true feelings.
- **Political Nature of Topic:** As we conducted the study, the interviews seemingly became more and more politicized. At times, it was challenging for the interviewer to "get past the party line" and engage interviewees in a conversation about potential elements of the responsible contractor policy. For example, one program administrator set up a facilitated group interview session to discuss elements of a responsible contractor policy and then canceled the meeting 30 minutes before and instead submitted written comments based on their legal team's intervention.
- **Depth of Coverage**: Given the complexity of the subject matter and the resources available for this study, topics were often discussed at a general level—for example, discussing ratepayer-funded energy efficiency programs in aggregate as opposed to discussing simple residential program separately from complex non-residential programs. It is important to note that not all nuances of these unique program types are addressed.
- **Researcher Knowledge:** Given that the study director has significant experience with the HVAC market, accessing key national HVAC representatives for interviews was particularly effective. The researchers, despite many attempts, had only marginal luck accessing national lighting/electrical market representatives.

4. Current State of Contractor Policies

One of the objectives to this study is to identify the current state of requirements for contractors participating in PAs current retrofit programs that involve installation, maintenance, or both. To answer this question, Opinion Dynamics submitted a data request to the four California IOUs, two Regional Energy Networks (RENs) and one Community Choice Aggregator (CCA). We asked the PAs to identify: 1) which programs involve installation and/or maintenance by a contractor and 2) which CSLB classifications contractors possess who perform the maintenance and/or installation tasks for these programs, from a list of programs we thought might be impacted by SB-350. We also asked for relevant documentation that identify the current eligibility requirements for contractors who perform the work.

In the section that follows, we identify the most common CSLB license classifications held by contractors performing installation, maintenance, or both for PAs. We also identify themes across CSLB license requirements and program eligibility requirements for the most commonly identified CSLB license classifications.

4.1 Participating CSLB License Classifications

According to the responses to our data request, 94 PA programs in California involve a contractor that performs retrofit installation and/or maintenance work on existing buildings. Lighting and HVAC equipment are the most common equipment types included in these programs – with 51% of programs involving one, the other, or both (Table 4-1). Other common measures include water heaters (15%), weatherization (14%) and refrigeration (12%). In addition, most programs involve installation only (70%) or both installation and maintenance work (21%). Few programs include maintenance only.

Table 4-1. Measures Included in PA Programs

Measure	%
Lighting	51%
HVAC	51%
Water Heaters	15%
Weatherization	14%
Refrigeration	12%
Whole House	4%
VFD/VSD	4%
EMS	3%
Aerator/Showerheads	3%
Other Measures	23%
“Unknown Measures”[a]	12%
n=	94

[a] Specific measures not identified.

The table below summarizes the CSLB license classes held by contractors completing work for these programs. We found that C10 Electrical (General) and C20 Warm-Air HVAC are the most common licenses held by contractors completing work for the PA programs reviewed.

Table 4-2. CSLB Licenses Held by Contractors

CSLB License	Total % of Programs
C10 Electrical (General)	62%
C20 Warm-Air HVAC	48%
C38 Refrigeration	26%
B General Building	24%
C-4 Boiler, Hot Water Heating and Steam Fitting	20%
C36 Plumbing	20%
C-2 Insulation and Acoustical	13%
C-7 Low Voltage Systems	10%
C43 Sheet Metal	10%
A General Engineering	7%
C17 Glazing	6%
C53 Swimming Pool	4%
C39 Roofing	4%
C55 Water Conditioning	4%
C16 Fire Protection	3%
C46 Solar	2%
C Specialty Contractor	1%
C27 Landscaping	1%
C61 Limited Specialty	1%
C28 Lock and Security Equipment	1%
Not Specified [a]	12%
N	94

[a] Specific measures were not identified in PA response (Commercial, Industrial and Agricultural Calculated or Deemed incentive programs).

4.2 Contractor Requirements

The sections below summarize CSLB license requirements and program eligibility requirements that currently exist.

4.2.1 CSLB Requirements

The Contractors State License Board (CSLB), under the Department of Consumer Affairs, protects California consumers by licensing and regulating the state's construction industry. The CSLB was established in 1929 and today licenses about 290,000 contractors in 44 different licensing classifications. All businesses or individuals who construct or alter any building, highway, road, parking facility railroad, excavation, or other structure in California must be licensed by the CSLB if the total cost (labor and materials) of one or more contracts on the project is $500 or more. Licenses are issued to individuals, partnerships, corporations, joint ventures, and limited liability companies (LLCs). Each license requires a "qualifying individual" who must undergo a background check and meet experience and exam requirements. In addition, the licensee must submit documentation to prove they meet insurance and bond requirements. CSLB licenses are separated into three classifications – Class A (General Engineering Contractor), Class B (General Building Contractor) and Class C (Specialty Contractor). Within the Class C license classification, there are 42 Class C licenses for work that requires specialized skills.

A Class B General Building Contractor is defined by the CSLB as "a contractor whose principal contracting business is in connection with any structure built, being built, or to be built, for the support, shelter, and enclosure of persons, animals, chattels, or movable property of any kind, requiring in its construction the use of at least two unrelated building trades or crafts, or to do or superintend the whole or any part thereof." Contractors who hold a Class B license have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor can bid on a job that includes HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but cannot bid on a project that was exclusively an HVAC installation or exclusively lighting work unless they held specialty licenses for those trades. According to interviews with CSLB staff, the theory behind the requirement is that Class B contractors' principal business is related to remodels and/or new construction work, therefore they should at least know how to frame for structural safety reasons. The requirement that they bid on jobs with at least two unrelated building trades prevents them from marketing themselves as experts in a specialty trade. It is expected, although not required, that they will likely subcontract with a contractor holding the appropriate specialty license to complete the part of the job with which they do not hold the specialty license. All CSLB licensed contractors meet the basic eligibility requirements listed in the table below, regardless of license class.

The CSLB enforces California's Contractors' State License Law by investigating complaints against licensed and unlicensed contractors. The CSLB may penalize non-compliant contractors with varying levels of disciplinary action including citations, suspension or revocation of license, jail time, or fines. The CSLB has a Statewide Investigative Fraud Team that conducts stings and sweeps on a regular basis focusing on the underground economy, which is estimated annually to be between $60 and $140 billion.[23]

Table 4-3. CSLB License Eligibility Requirements- All License Classes

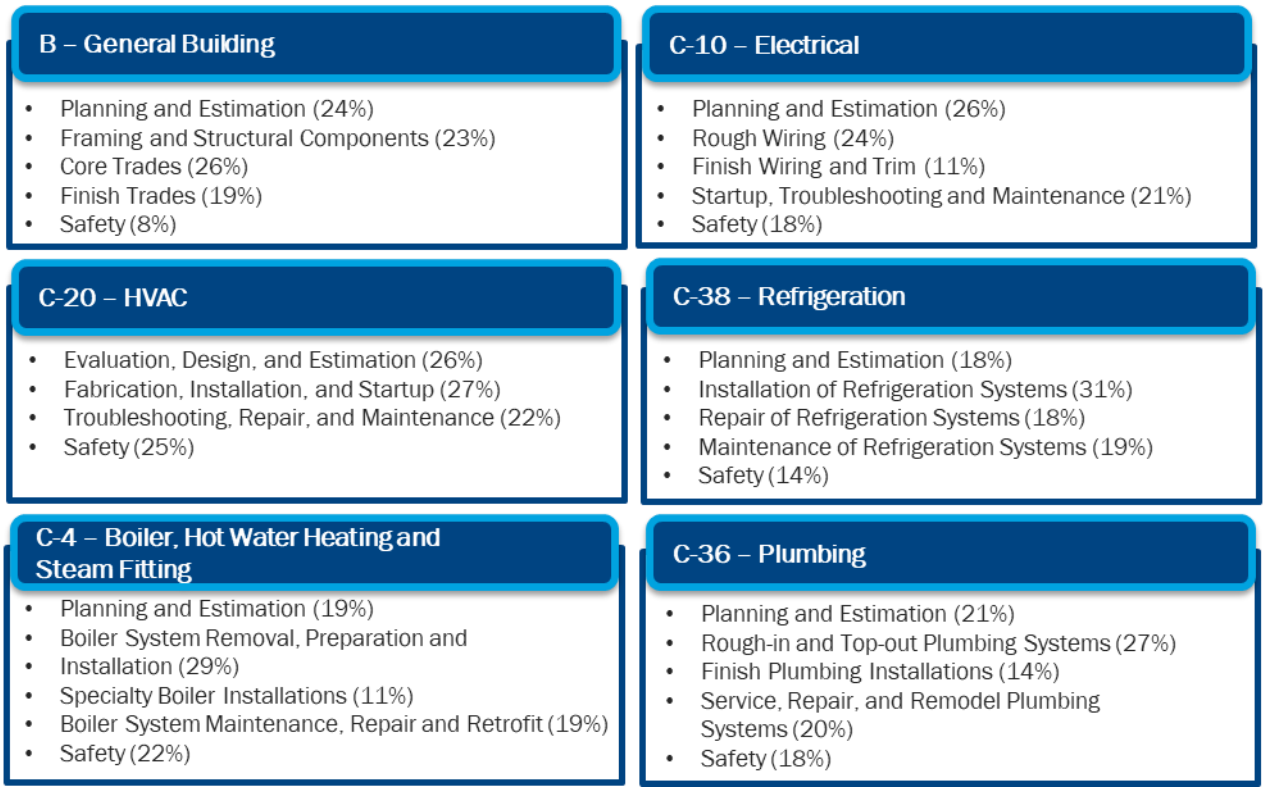
Requirement	Description
Previous Experience	• Practical Experience: Qualifying individual must have four years journey-level experience within the last 10 years.

[23] California State License Board. (No Date). Report Unlicensed Activity. Retrieved November 11, 2017, from http://www.cslb.ca.gov/Consumers/Report_Unlicensed_Activity/.

	• Education: No education requirements for qualifying individual, but education can reduce the required practical experience.
Examination	• Qualifying individual must pass written law and trade examinations which are classification specific. These examinations are developed and administered through the CSLB
Background Checks	• Qualifying individual must undergo a criminal background check. • Qualifying individual must be fingerprinted.
Insurance	• Must provide valid certificate of Workers' Compensation Insurance.
Bond	• Contractor license bond of $15,000 or cash deposit • Bond of Qualifying Individual or cash deposit of $12,500 for each responsible managing employee and each responsible managing officer. • Additional Surety bond of $100,000 required for LLC license. • Disciplinary bonds are required if the license has been previously revoked.

The trade exam is the main point of differentiation between the various license classes. Qualifying individuals for all license classes must pass a written trade examination designed to test their knowledge related to the license's area of specialty. The test covers topics related to planning and estimation, and safety in addition to trade specific content. Figure 4-1 summarizes the topics covered in in the trade examination, and percent of the examination that each topic comprises, for the most common CSLB licenses held by contractors performing work for retrofit programs in California.

Figure 4-1. License Examination Content - Class Specific



Source: Contractors State License Board License Examination Study Guide

Table 4-4 summarizes additional requirements, in addition to eligibility requirements, contractors must adhere to as mandated by California Contractor's License Law. It is important to note that the technician certification is only applicable to technicians working under a C10 Electrical Contractor. Technicians and laborers working under other C-Class contractors do not require certification specific to their trade.

Table 4-4. California Contractors License Law Requirements

Requirement	Description
Technician Certification	• Electricians working under a C-10 Electrical contractor are required to hold an electrical certification card issued by the Department of Industrial Relations' Division of Apprenticeship Standards (DAS).
Permit Requirements	• Contractors must comply with applicable permitting requirements. • Failure to obtain building permits could result in suspension or license, revocation of license, or a fine.
Warranty on Work Performed	• Licensed contractor is required to honor a four-year warranty on the work performed. • Failure to honor the warranty could result in revocation of license or a fine.
Professional Conduct	• Contractors are required to include their license number where ever they advertise their services. • Anyone who acts as a salesperson for a licensed contractor outside of the contractor's normal place of business must be registered by CSLB as a Home Improvement Salesperson.

4.2.2 Program Eligibility Requirements

We reviewed program documentation which included eligibility and contractor requirements for 83 programs in which contractors holding the most common CSLB licenses are performing the installation and/or maintenance work.[24] Program documentation included a variety of formal and informal documents such as, program applications, contract language, and participating contractor agreements. We identified common requirements across programs using the qualitative analysis software, NVIVO.

Figure 4-2 summarizes the relative frequency of specifically stated requirements across the reviewed programs. Nearly all programs explicitly require in program documentation that the contractor comply with all federal, state, and local laws including CSLB licensure laws. Many programs also have contractor requirements surrounding, permitting, insurance, warranties on work performed, and professional conduct. Requirements related to previous experience and background checks are less common. When compliance with federal, state and local laws, and permitting are specified, programs often require a signature from either the customer or contractor, certifying that the contractor is a licensed contractor and has adhered to applicable federal, state and local laws including permit requirements.

[24] We excluded programs from the analysis if the data request response did not specify a license type.

Figure 4-2. Common Requirement Themes in PA Programs

Contractor participation requirements tend to deviate based on whether or not contractors are required to be pre-authorized to perform work for the program. Under this scenario, a PA or third-party implementer typically reviews the contractor's qualifications and requires the contractor to sign a participation agreement or other contract with the PA or implementation contractor. Programs in which contractors are required to be pre-approved tend to have more stringent requirements than those that do not require pre-approval. About two thirds of PA programs we reviewed require an installation contractor to be pre-authorized by the PA or third-party program implementer which allows them to perform work through the program. Under this relationship, contractors are typically required to adhere to additional requirements including submitting documentation to verify license, certification and insurance requirements, and signing a participation agreement. Programs that pre-approve contractors may also require the contractor to uphold a warranty on work performed or equipment installed, adhere to professional conduct, provide proof of previous experience and run background checks on their employees. These programs may also require that a contractor participate in program specific training. Contractors who have been pre-approved for program participation, who do not adhere to the standards outlined in the participation agreement, may face disciplinary action including removal from the program. It is important to note that many of these program requirements support California's Contractors' State License Law requirements. Therefore, requirements that may be absent at the program level, may already be required at the state level. However, as we describe after the table, some program pre-authorization requirements exceed what is required through state law. Table 4-5 summarize the common requirements identified in program documentation and CSLB license requirements in greater detail.

Table 4-5. Themes in Program Eligibility Requirements

Requirement	Description	Typical in programs that...	
		Require Pre-approval	Do Not Require Pre-approval
Compliance with Federal, State, and Local Laws*	• Program application typically requires that either the contractor or the customer provide a signature to certify that a licensed contractor performed the work and that the project complied with federal, state and local laws. • Fewer programs (over a third, but under half) explicitly require that a CSLB license number be supplied or that certificates must be provided.	Yes	Yes
Permitting*	• Contractors must comply with applicable permitting requirements.	Yes	Yes

Requirement	Description	Typical in programs that...	
		Require Pre-approval	Do Not Require Pre-approval
	• Requirement primarily present for programs involving HVAC equipment. • In some instances, primarily when HVAC equipment has been installed, contractors are required to provide the permit number and the name of the permitting agency. • In cases where equipment other than HVAC is installed, the contractor (or the customer) is required to certify with a signature, that they complied with applicable permitting requirements.		
Insurance Requirements*	• Contractors must carry insurance. • General liability, worker's compensation, and auto liability insurance are most common. • Proof of insurance is often required.	Yes	No
Warranty on Work Performed*	• Contractors must honor a warranty on the work performed, or provide warranty information to the customer.	Yes	No
Professional Conduct	• Rules related to how contractor and employees present themselves (no falsification/ misrepresentation, use of IDs/badges, confidentiality, use of PA marketing and logos).	Yes	No
Previous Experience*	• Practical Experience: Specify that the contractor has or can demonstrate a certain number years of relevant work experience. • A few programs require the contractor to provide references. • Program which require contractor pre-approval often require contractors performing work on the program complete training offered by the PA or program implementer.	Yes	No
Background Checks*	• Contractors must ensure that all employees have undergone a criminal background check.	Yes	No

*Support California's Contractors' Sate License Law requirements

Program requirements related to compliance with federal, state and local laws; permitting; insurance; warranty on work performed; previous experience and background checks, support California's Contractors' State License Law requirements. In some cases, program requirements exceed what is required through state law. For example, in their insurance requirements, programs often require contractors maintain general liability insurance and auto insurance in addition to worker's compensation insurance, while the CSLB license requires only workers compensation insurance. A few programs also require contractors to run background checks on all employees. While, CSLB license requires that a contractor undergo a criminal background check, it does not require that employees undergo them.

5. Potential Future Responsible Contractor Policy Elements

Our research revealed four key elements, identified through an analysis of in-depth interviews with stakeholders, for consideration in operationalizing the Responsible Contractor Policy. Listed from most frequently mentioned to least frequently mentioned, these are: training and credentialing, code compliance and enforcement, wages and employee benefits, and workforce diversity. In this section, we summarize our findings by each element. Please note that other elements were mentioned including licensure requirements, bonding, safety, and OSHA Compliance, but outside of mentioning these elements, little substantive discussion occurred. Seemingly most stakeholders appear to think these four elements have already been largely addressed in the marketplace.

5.1 Training and Credentialing

Nearly all stakeholders discussed the topic of training and credentialing, revealing opposing views on the efficacy of using training, in its current state, as a lever in increasing work quality. Discussions touched on the current lack of consistency in training standards, the potential need for differing tiers of training, the gap in contractor and technician credentialing at the state level, and the potential value of more training on professional and business development topics.

5.1.1 Relationship between Training and Work Quality

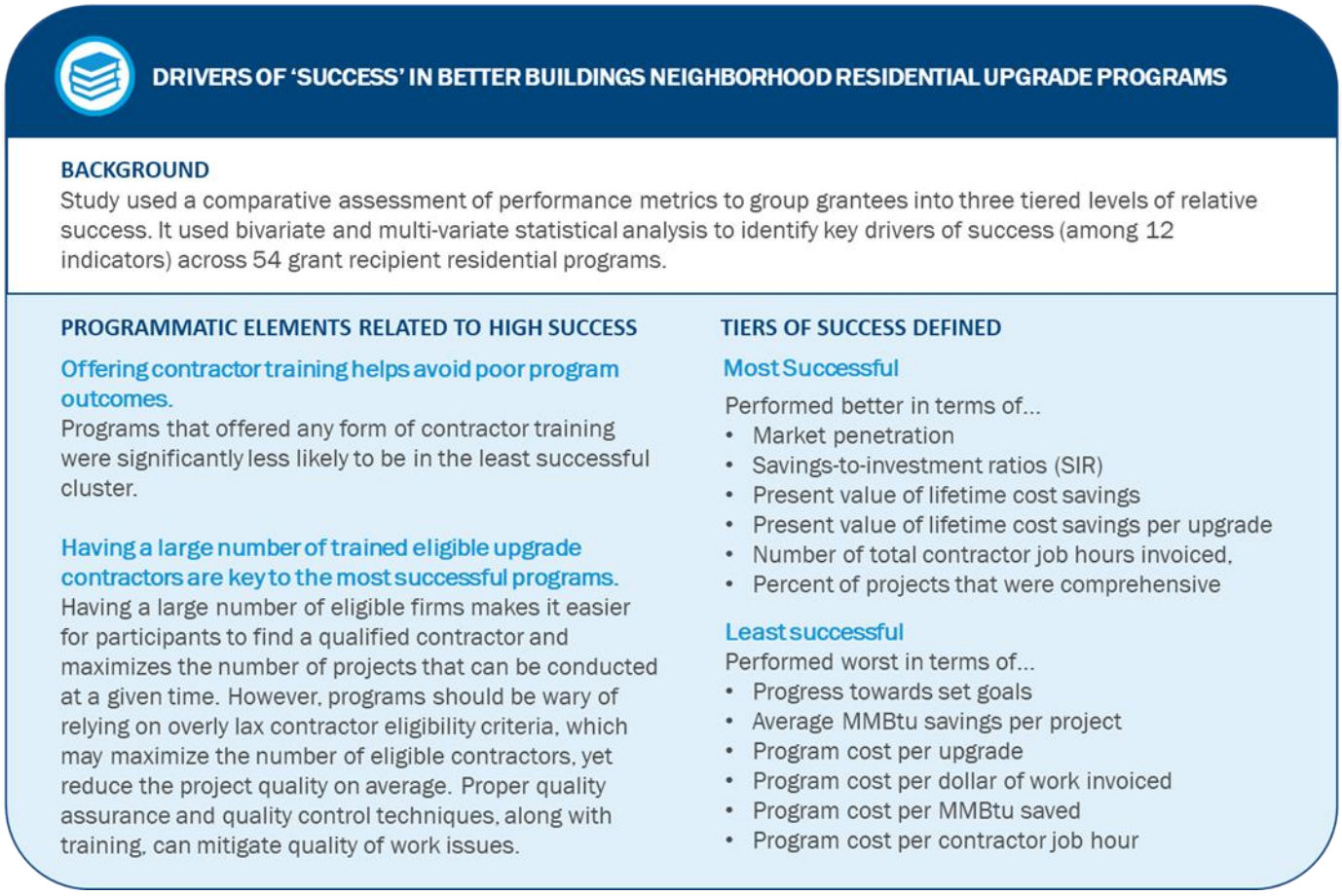
Stakeholder interviews revealed two high level viewpoints related to the effect training has on quality. On one hand, contractors who support their employees in continuing their education tend to be the ones who strive to provide the best possible service to their customer, including quality work. On the other hand, training and credentials on their own do not necessarily ensure quality work. You can have someone who is highly credentialed who may still cut corners or someone who is un-credentialed who does the job correctly. It should be noted that these viewpoints are not necessarily in conflict. Stakeholders indicated that some PA programs address this issue through project inspection and verification procedures to address the challenge that training may not always lead to quality project outcomes.

We reviewed multiple resources that discussed contractor certification and training from different angles. These resources tended to claim connections between training and quality, although data to support this claim in the literature we uncovered was limited to the 2010-2014 evaluation of the Department of Energy's Better Buildings Neighborhood Program (BBNP).[25] The evaluation identified contractor training of any type (for example, building science training relevant to auditing, measure installation, and selling energy efficiency upgrades) that is offered through the program as a driver to success.[26] Figure 5-1 describes findings from the BBNP evaluation in more detail.

[25] Research Into Action. (June 2015). Drivers of Success in the Better Buildings Neighborhood Program – Statistical Process Evaluation: Final Evaluation Volume 3. Retrieved February 3, 2017, from https://energy.gov/sites/prod/files/2015/08/f25/bbnp_volume_3_drivers_of_success_statistical_071715_0.pdf.

[26] This evaluation used bivariate and multi-variate statistical analysis to identify key drivers of success (among 12 indicators) across 54 grant recipient residential programs.

Figure 5-1. Findings form Better Buildings Neighborhood Program Statistical Process Evaluation: Drivers of Success



Contractors in the focus groups, particularly in the HVAC group, view employee training as an effective driver to achieve enhanced quality. While some feel confident in their ability to effectively transfer training knowledge through on the job training, they also support trainings through manufacturers and PA energy efficiency programs that are provided at low or no cost to them. Focus group contractors see the benefit training has for their employees and their business including the positive effect training has on the quality of service they provide to their customers. Doing a job correctly the first time and efficiencies learned in training courses can ultimately save them time and money.

Contractor Focus Groups

"I think it's always good, that your guys have more training. I mean, there's never a negative to that, so, if they can get into any of those type of classes to learn a little bit more, it benefits them, it benefits us, right?"

Our secondary review also included materials supporting the opposing argument--that training and credentials on their own do not *necessarily* ensure quality work. Energy Market Innovations' *California HVAC Contractor and Technician Behavior Study* completed in 2012 included an online survey looking at behaviors related to HVAC maintenance, installation, and service and a field observation examining how technicians actually

provide HVAC services in the field.[27] While findings from the field study are not generalizable due to low sample size, the study suggests that just because a contractor has a stated level of technical knowledge it does not necessarily mean that it will be executed in the field. In particular the HVAC technicians who were observed in the field during the study performed below ACCA 4 and industry standards regardless of level of certification, training, years on the job, and participation in PA programs.

5.1.2 Consistency in Training Standards

Consistency in job definition, skill requirements, and training standards were challenges brought up repeatedly by stakeholders. Concerns center on defining how jobs are defined and what key knowledge, skills, and abilities (KSA's) are needed to perform a particular task. Who defines these KSA's? How do we ensure KSA's are kept current with quickly changing technology? How do you keep knowledge and content up-to-date when faced with contractors who are providing on-the-job training and instructors who are teaching courses for equipment that was not around when they were certified? How do you ensure that training includes skill sets that are relevant to energy efficiency when energy efficiency is not necessarily a focus of credentialing organizations?

Stakeholder Interviews

"If I had this really, really fly-by-night air conditioning guy teaching me air conditioning, I'm probably not going to have the best skillset when I go out and do it myself."

This sentiment was also echoed in the focus groups. Contractors indicated that they often retrain technicians during the onboarding process since there are variables that a contractor may not be able to account for--such as how long ago they actually worked on the equipment they received training for. Contractors typically can see right away based on the technician's job performance whether or not the training was sufficient.

Contractor Focus Groups

"Even if the guy comes in [with a certificate], we just retrain them. We don't know how long ago they actually worked on that particular piece of equipment…you can see for yourself too, like the very first project that the person does, you can see right away if they're qualified or they're unqualified"

Stakeholders generally seem to agree that to be an effective measure of skill attainment, certification needs to be able to demonstrate both retained knowledge and application of skills. Training programs and organizations need to ensure that individuals can do the same work, regardless of where they received training. At the same time, stakeholders discussed how cost may be a challenge when trying to improve consistency across various training organizations.

The Guidelines for Home Energy Professionals Project (Figure 5-2) provides an example of how the U.S. Department of Energy (DOE), along with the home energy upgrade industry approached the challenge of aligning work quality expectations with quality training and quality workers. This project conducted job task analyses, defined standard work specifications that address minimum acceptable outcomes, developed accredited training programs, and created Home Energy Professional certifications. These guidelines are currently utilized by the DOE's Weatherization program (WAP). Through WAP, DOE provides grants to states

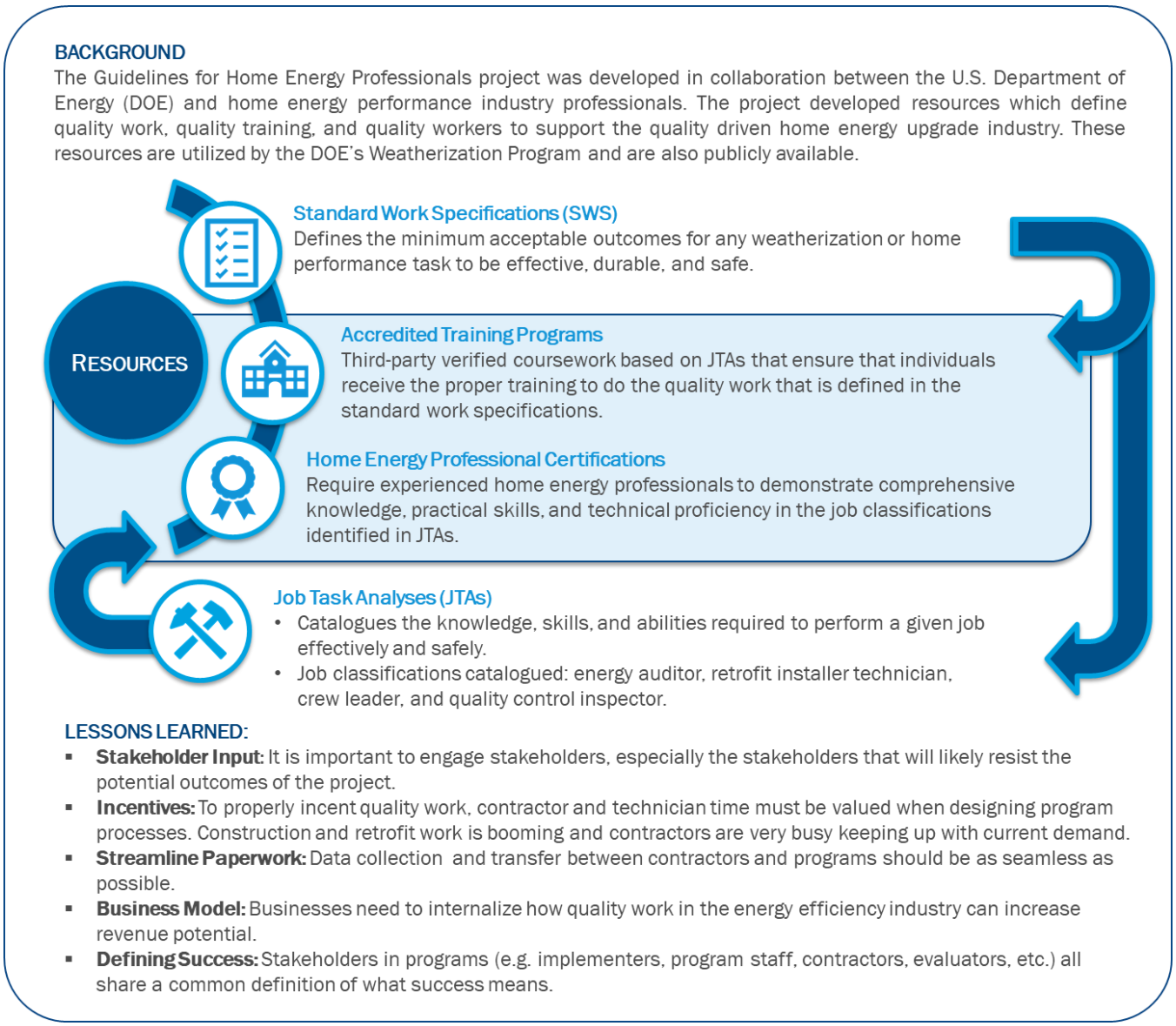
[27] Energy Market Innovations, Inc; Western Cooling Efficiency Center; Verified, Inc; Bettering Buildings, Inc. (September 2012). California HVAC Contractor & Technician Behavior Study. Retrieved February 10, 2017, from http://www.calmac.org/publications/CA_HVAC_Behavior_Study_FinalReport_2012Sept14_FINAL.pdf

across the country to fund the weatherization of low income homes.[28] States provide grants to local weatherization agencies (Subgrantees) to deliver weatherization services by conducting whole house energy audits, install weatherization measures, and conducting inspections once the work is completed.

In order to define quality training, the DOE developed home energy professional job task analyses (JTAs) that catalogue the knowledge, skills and abilities that a worker needs to effectively perform a given job. They developed separate JTAs for the four most common job classifications in the home energy upgrade industry: energy auditor, quality control inspector, crew leader, and retrofit installer/technician. The JTAs allowed training providers to develop coursework and offer training that could be verified and accredited by a third party. The Interstate Renewable Energy Council (IREC), a leading provider of training program accreditation, offers accreditation based on the JTAs to weatherization and home performance training programs. Further, the JTAs were used as an input, in conjunction with the Standard Work Specifications, to developing advanced certifications that meet American National Standards Institute (ANSI) accreditation under the ISO 17024 standard for personnel certification programs.

[28] The program weatherizes all types of homes, including single-family, mobile and large multi-family buildings. Weatherization measures include air sealing, wall and attic insulation, duct sealing, and furnace repair and replacement.

Figure 5-2 Initiative Review: Guidelines for Home Energy Professionals Project



The JTA development process was collaborative in nature, involving a group of 12 subject matter experts. Guided by a trained psychometrician, the group met to develop the JTAs and to create an examination blueprint that would serve as the basis for the worker certification. In addition, the group used an online survey with energy auditors, retrofit installer technicians, crew leaders, and quality control inspectors to validate JTA results and finalize the exam blueprint. Through the JTA development process, the DOE learned that it is critical to invite all of the key players to be involved in the development process.

Single-family residential JTAs can be found at the following locations:

- **Retrofit Installer/Technician:** https://energy.gov/eere/wipo/downloads/nrel-job-task-analysis-retrofit-installer-technician-revised

- **Energy Auditor:** https://energy.gov/eere/wipo/downloads/nrel-job-task-analysis-energy-auditor
- **Quality Control Inspector:** https://energy.gov/eere/wipo/downloads/nrel-job-task-analysis-quality-control-inspector
- **Crew Leader:** https://energy.gov/eere/wipo/downloads/nrel-job-task-analysis-crew-leader

5.1.3 Tiers of Training

Stakeholders discussed the need for different types and levels of training. These options are needed to accommodate for variances such as equipment types, equipment standards across regions and climate zones, experience levels, and technician career aspirations.

Stakeholders identified that workers need both 1) requisite specialized task level skill expectations and 2) broad training that allows workers to take a holistic view of the systems they work with--enabling them to make situational, systems-based decisions. No two situations are the same, and technicians should be enabled to make decisions that will allow them to achieve deeper savings, or select the proper equipment based on a customer's needs and situation.

5.1.4 Gap in Contractor and Technician State Level Credentialing

Multiple stakeholders discussed the gap between a contractor being licensed and the training level of their technicians as an area for consideration. As described in Section 4.2.1, California law currently requires one qualifying individual within an organization to hold a contractor license. Except for electricians working under a C-10 Electrical contractor--who must hold an electrical certification card issued by the DAS--by law individual technicians are not required to be credentialed at the state level. Some stakeholders contend that this gap may not support a workforce sufficiently trained to do quality work. The two primary arguments that came up in this study are:

- Requiring additional technician certification, would be very resource intensive and is not necessarily the answer to ensuring technicians are properly trained and are performing quality work as this assumes that having a license equates to quality work. Expanding technician certification beyond electricians would require the development of new industry specific requirements, testing, administration, and enforcement--all of which would be costly, require additional staff, and be time intensive. To work, a certification would require strict enforcement which has been a challenge for the existing electrician certification.

> **Stakeholder Interviews**
>
> *"It's not that it's not necessarily a bad idea, but unless it's going to be really enforced—and quite frankly, to make something like that work is very expensive. Who's going to pay for the enforcement of this? Because that's what happened [with electrical technicians]."*

- Other states require that technicians, including HVAC technicians, hold certifications similar to what California requires of all electricians. Some stakeholders believe that state contractor licensing standards should be expanded to require technician certification beyond electricians—including both initial and continuing education requirements.

Another area of concern expressed by some stakeholders was specific to the Class B General Building Contractor license. As described above, contractors who hold a Class B license must have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor could bid on a job that included HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but could not bid on a project that was

exclusively HVAC installation or exclusively lighting work unless they held specialty licenses for those trades. Some stakeholders believe that requiring contractors with a Class B license to also have the applicable specialty licenses would support increased work quality in the field.

5.1.5 Professional and Business Development Training

Multiple stakeholders we spoke with talked about contractor values including valuing energy efficiency, meeting the customer's needs, and striving to do 'the right thing' as key drivers to quality work. They argue that contractors work for referrals and want to avoid the need to redo poor quality work at all costs because it could mean that they are losing a huge percentage of their profit. They argue that contractors who are doing a good job are worried about their reputation and about their future. They want to know that the job is being done right, that it's being done right the first time, and that the customer is satisfied and has the evidence desired to know it was a high-quality job.

Stakeholder Interviews

"I do believe that when we talk about responsible, it's not just doing what's legally required. It's about doing the right thing, if you will. I would define doing the right this as doing what's in the best interest of the consumer, whoever's paying the bill. Contractors who generally follow that process are successful, because they get referrals from homeowners."

Some of the PAs notice that the contractors who are engaged in the customer experience, who have a keen sense of how to keep and retain customers, who are thoughtful about the customer's property, and who are quick to resolve complaints if they arise, tend to be contractors who they view as 'high performers'. They find that these contractors are working to build customer relationships over time and create recurring customers. As such, stakeholders believe that training and credentialing need to address both technical skills as well as soft skills.

As part of the secondary literature review, we looked at the *PY2013-2014 California Statewide Workforce Education and Training Program: Contractor Training Market Characterization Study*.[29] This study identified primary training gaps in California's PA sponsored Residential Home Upgrade Program, Residential HVAC Program, and Non-residential Lighting Program including:

[29] Opinion Dynamics. (June 2016). PY2013-2014 California Statewide Workforce, Education and Training Program: Contractor Training Market Characterization. Retrieved February 14, 2017, from CALMAC database (CPU0134.01)

- Understanding the value of energy efficiency, how different systems work together, and how to communicate these values to customers;
- Understanding customer's needs; and,
- Effectively bidding, managing, and supervising work

> **Best Practice Review: Community Power Works Staff**
>
> *"Some of the more successful contractors who were sort of the general contractors, design builders who brought this in and wanted to really revamp their side of the industry. And they knew how to sell. They knew how to market. They knew how to present themselves to clients much better than some of these like full proprietors."*

Two programs we reviewed outside of California--Clean Energy Works Oregon and Community Power Works--both found that the programs benefited from and contractors appreciated the trainings related to business support and sales that were components of these programs (See Figure 5-3). Clean Energy Works Oregon worked with local vendors to provide cultural competency and business trainings such as marketing, management, accounting, sales, customer service techniques, and other topic area trainings. Community Power Works provided in-house sales trainings and reimbursement for outside trainings and conferences.

5.1.6 Effect on Contractors

Contractors in the focus groups face barriers to educating their employees. While a few feel that it is only fair to pay properly trained workers what they are worth--since they are bringing value to the company--many worry about investing time and money on skilled workers who either fail to acquire useful knowledge from the trainings or subsequently leave the company. Contractors in the focus groups also face the challenge of motivating their employees to commit to training as many lack the time or desire to do so after a full day of work. Some contractors, who strongly value training, attempt to provide employee support including paying their technicians for time spent attending training.

A training requirement may prevent contractors in our focus groups from participating in a PA energy efficiency program if it significantly decreases their company's profit margin. From their perspective, there would need to be a balance between how much it costs to train their employees and any additional paperwork versus how much benefit the company receives from the training. One of the lessons stakeholders involved in the DOE's Guidelines for Home Energy Professionals Project is that contractors are not short on work. In order to encourage program participation, contractors need incentives that are commensurate with the wages they would earn if they were working in the field.

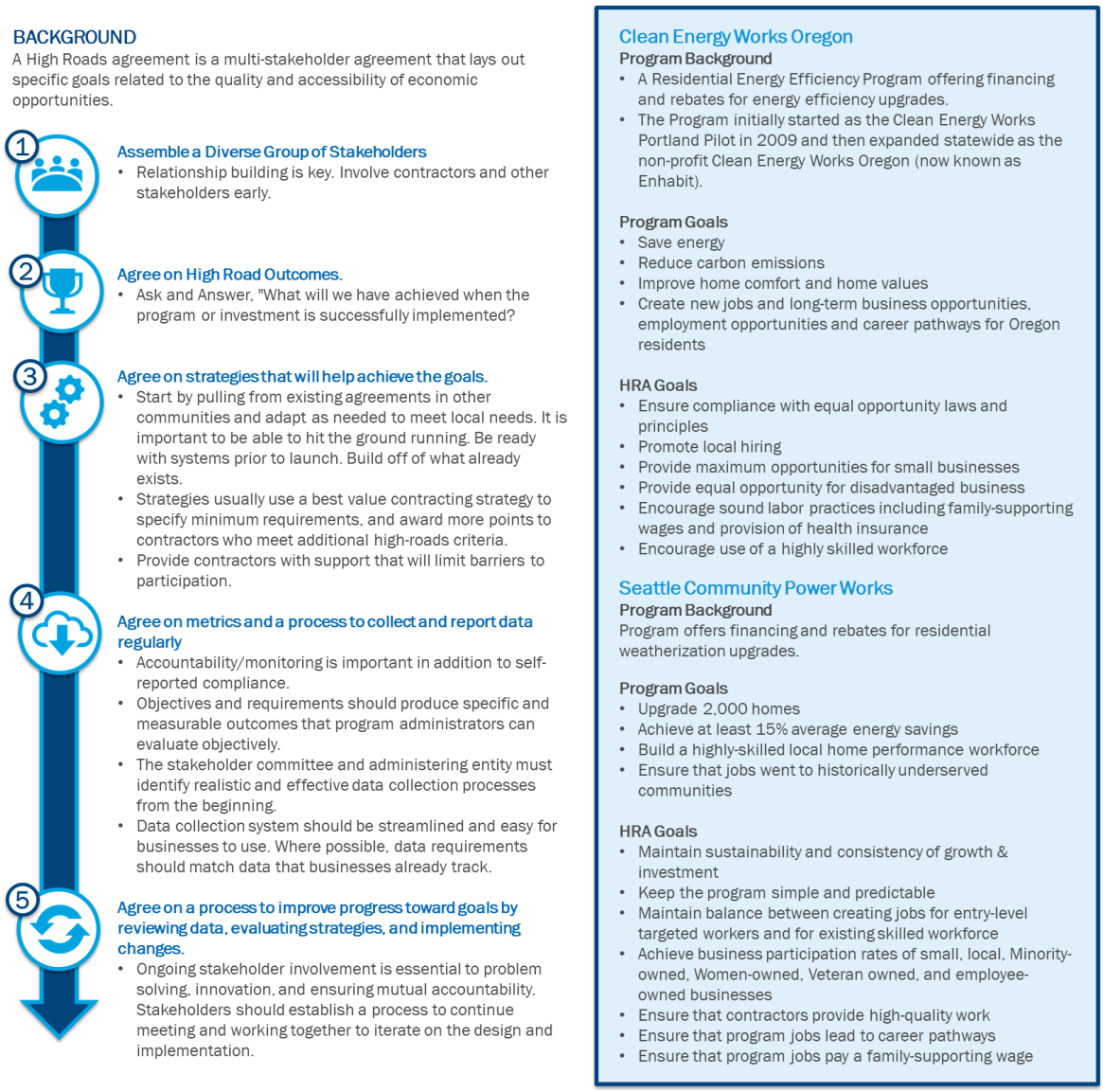
> **Contractor Focus Groups**
>
> *"I feel like if it's a really involved thing, people are gonna go, I don't really need it, as a contractor…It depends on how much work you have to put into it. Because, you, you know, is it worth the work or is it not, what's the benefit?"*
> *…"Is there a stipend?"*
> *…"If it takes a month, then I have to take all my guys off that might be a problem."*

5.1.7 Training Requirements: Approaches from High Roads Agreements

A High Roads Agreement (HRA) is a multi-stakeholder agreement that lays out specific goals related to the quality and accessibility of economic opportunities; strategies for supporting these goals in the contractor selection process; and requirements that contractors and other stakeholders must agree to adhere to in order to support the goals throughout their involvement in the program. We looked at two programs-- Clean Energy Works Oregon and Seattle Community Power Works--that developed and implemented HRAs that incorporated training requirements. It should be noted that both programs have contracting relationships, with contractors performing work. This relationship is similar to some PA programs in California which require an installation contractor to be pre-approved and sign a participation agreement or other contract with the PA or

implementation contractor. Contractors are admitted into a pool of approved contractors; and agree to adhere to requirements set out in the High Road Agreements.[30] Below, we provide an overview of the major steps involved in establishing and implementing High Roads agreements as described in Green For All's "High Roads Agreements: A Best Practice Guide" as well as key lessons learned from the Clean Energy Works Oregon and Seattle Community Power Works programs. [31]

Figure 5-3 Initiative Review: High Roads Agreement Development Process



[30] We describe the process for developing and maintaining the contractor pools for these programs in greater detail in section 6.2.
[31] Green for All. (2012). High Road Agreements: A Best Practice Brief. Retrieved September 29, 2017, from https://www.greenforall.org/high_road_agreements_a_best_practice_brief_by_green_for_all

The High Roads agreements used in Clean Energy Works Oregon and Seattle Community Power Works programs require contractors to meet minimum hiring standards and agree to adhere to these standards throughout their involvement with the program in order to be admitted into the contractor pool. Both programs further prioritize training during the contracting process by granting contractors additional points for certain training related characteristics. We provide a summary of training requirements for both programs in Table 5-1. Of particular note, both programs have a minimum requirement around hiring new entry level workers who are graduates of Qualified Training Programs as defined by the High-Roads Agreements. Complementary to the training requirements for contractors, the programs identified and worked with Qualified Training Providers to support contractors in achieving hiring goals. Table 5-2 summarizes requirements for training providers to be deemed a Qualified Training Provider for each program.

Table 5-1. Training Requirements in Community Power Works and Clean Energy Works Oregon High-Roads Agreements

Requirement	Community Power Works	Clean Energy Works Oregon
Minimum Standards		
Employer Funded Training	• Workers who are enrolled in state-registered apprenticeship programs shall receive employer-funded training as specified by the program.	
Hiring Standard	• Ensure that 100% of New Entry-Level Hires are graduates of Qualified Training Programs. (See Table 5-2 for qualified training program designation requirements).	• Ensure that 100% of new entry level worker/installer weatherization employees will be hired from a designated training provider until 50% of contractor's total non--supervisory worker/installer weatherization employee monthly work hours on covered projects are performed by graduates of a designated training provider program. (See Table 5-2 for qualified training program designation requirements)
Skills		• Contractors must have at least one Building Performance Institute (BPI) certified technician on staff. Contractors will be asked to provide a roster of all employees listing the certification and/or trainings of each employee.
Safety		• Contractors will utilize a safety trained workforce in which all on-site workers have completed an OSHA 10-hour safety course and an Environmental Hazard Awareness Course through a qualified training provider.
Additional Points in the Application Process		
Quality-assurance certifications	• Quality-assurance certifications beyond the program minimums, including employing a certified workforce and other quality indicators.	
Employer Funded Training	• Demonstrated provision for continuing education for all employees.	
Apprenticeship Support	• Demonstrated utilization of state registered apprentices.	• Participation in registered apprenticeship and other credential-granting programs.

Table 5-2. Qualified Training Program Requirements in Community Power Works and Clean Energy Works Oregon High-Roads Agreements

Requirement	Community Power Works	Clean Energy Works Oregon
Curriculum Standards	• Provide weatherization technician training that meets competencies set by the Guidelines for Home Energy Professionals Project and includes an appropriate level of "job readiness" training.	• Provide weatherization training based on curriculum developed by an accredited organization that aligns with or exceeds BPI standards.
Testing	• Ensure that all graduates pass an approved test of WAP competencies.	
Safety	• Provide training that includes health & safety, including lead safety and OSHA 10 for participants who lack experience in these areas.	• Provide training that includes health & safety, as well as hazardous material recognition, as defined by the BPI standards or equivalent, including Combustion Appliance Zone (CAZ), carbon monoxide (CO) monitoring, ventilation requirements, and Material Safety Data Sheets (MSDSs) of worksite materials.
Mentoring	• Offer or refer participants to programs that offer mentoring, follow-up monitoring, and/or other support to assure retention of participants in the program and in weatherization and/or construction careers.	• Offer mentoring, follow-up monitoring, and/or other support to assure retention of participants in the program and in weatherization careers.
Continued Skill Development	• Offer the possibility of continued skill development along an education/training pathway in which skill sets build upon each other in a sequentially-ordered career.	
Job Access		• Agree to list their current graduates with Worksource Oregon, the state's network that connects skilled workers to employers, thereby providing a centralized resource for contractors.
Targeted Workers	• Have defined partnerships with pre - apprenticeship programs or community organizations aimed at providing Targeted Workers the background to maximize chance of success in vocational training and construction careers. • Agree to take all available steps to recruit and support progress of Targeted Workers, with a goal of having Targeted Workers as at least 50% of the program's metro Seattle area graduates. • Ensure that the program charges no fee or a modest fee to Targeted Workers.	• Have at least one defined partnership with state recognized pre-apprenticeship programs or signatory community organizations that serve historically underrepresented or economically disadvantaged populations. • In conjunction with those partner organizations, ensure that a majority of its trainees are historically underrepresented or economically disadvantaged people. • Demonstrate a track record of graduating and placing trainees from historically underrepresented or economically disadvantaged populations.

5.2 Code Compliance and Enforcement

Almost all stakeholders indicated that a Responsible Contractor Policy should include code compliance and enforcement provisions. Discussions included permit rates, compliance and energy goals, motivations for not pulling permits, PA's role in compliance and strategies for improving compliance.

5.2.1 Permit Rates

Overall, our research indicates compliance with pulling building permits in the large commercial sector is not perceived as a concern. However, permit compliance is a significant issue in the small commercial and residential space. Lighting contractors spoke specifically about Title 24 being triggered if 70+ total fixtures are converted, noting that the requirement had been 40+ fixtures, but that it had recently been increased. Customers are choosing to spread their lighting upgrades over multiple years, to avoid triggering the need to pull a permit. Lighting contractors spoke about how competing with contractors who do not pull permits on jobs happens all the time, especially in retrofit lighting, with one lighting contractor describing the topic as, "That's a nasty…. That's a nasty subject." We were unsuccessful in finding any studies that attempt to codify the permit and code compliance rates around Title 24 lighting requirements.

Contractor Focus Groups

"[The 70 fixture rule] is basically taking away from the fact that they would do [the entire lighting upgrade] now and get a lot more energy savings over the next five years, if it wasn't a permitting factor."

In HVAC, compliance with codes via permitting is a significant concern, especially in the residential sector. Existing data suggests that energy savings are being lost or forgone due to poor quality workmanship in this sector. Since 2005, Title 24 has required that new and replacement HVAC components and systems be installed by state-licensed contractors. When installing or replacing an HVAC system, the homeowner, resident, or HVAC contractor must obtain a building permit from the appropriate local building department. Title 24 requires Home Energy Rating System (HERS) Raters to perform on-site testing and verification as part of the permitting process. In the 2011 California Long-Term Energy Efficiency Strategic Plan,[32] the CPUC set goals to increase the permit rate to 50% by 2015 and to 90% by 2020.

While there have been many programmatic efforts to increase the HVAC permit rate, most industry professionals believe this number remains low. In September 2017, DNV GL published an HVAC Permit and Code Compliance Market Assessment.[33] This study found for residential single family central HVAC replacements in PA service territories that:

- Permitting rates are low. DNV GL estimates that the true permit rate is between 8% and 29%.[34]

[32] California Public Utilities Commission. (January 2011 Update). California Long Term Energy Efficiency Strategic Plan. Retrieved January 27, 2017, from http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

[33] DNV GL. (September 2017). 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6). Retrieved November 6, 2017, from http://www.calmac.org/publications/HVAC%5FWO6%5FDRAFT%5FREPORT%5FAPPENDICES%5FVolumeII%5F22Sept2017%2Epdf

[34] The large variance results from two different approaches used to estimate compliance rates. The "top-down" method paired state-level estimates of total HVAC units installed with statewide estimates of total permitted units. The "bottom-up" method relied on

- Under current market and enforcement conditions, permitting does not lead to increased energy efficiency of HVAC changeouts. DNV GL found similar levels of efficiency for equipment at permitted and non-permitted sites in a representative statewide sample.
- There were documentation gaps for permitted installations. Three-quarters of permitted installations had the required HERS compliance forms. Among the forms submitted, only a subset contained a complete set of the required tests. Additionally, performance tests replicated by DNV GL found some systems out of compliance with HERS documentation that indicated that these units were in compliance.

Results from other studies estimate that the permit rate lies between 10% and 38%:

- A 2014 study suggests that PG&E customers obtained permits for 38% of residential cooling equipment purchased without energy efficiency program incentives, although the findings from that study were not statistically significant.[35]
- A Center for Sustainable Energy survey in 2013 found that 38% of HVAC contractors believe that it is very common or common for permits to be pulled when required.[36]

Stakeholder Interviews

"A perfect analogy of the situation is to imagine the Energy Codes as a large dam. This dam is very sophisticated and expensive to maintain. A lot of very talented people have invested a huge amount of time and effort into designing and building it taller and stronger. The problem is that the canyon walls around the dam are full of caves, tunnels and holes that allow water to leak all around the dam. Because of this, the dam is only able to retain less than 10% of its storage capacity. Unless we fix these leaks, it is a complete waste to invest any more time or resources into strengthening the dam."

- In 2013, the Institute of Heating and Air Conditioning Industries (IHACI) asserted only 10% of the work that is supposed to be regulated under the Standards is permitted.[37]
- In 2012, Proctor Engineering Group conducted a study that estimated that customers obtained permits for less than 30% of air conditioning units in the Sacramento region.[38]

customer surveys that asked respondents to identify whether they changed out an HVAC unit in 2010 or later. While the gap between the two estimates indicates continued uncertainty, the report makes it clear that the state is far short of its goal of 90% compliance by 2020.

[35] DNV GL. (October, 2014). HVAC Permitting: A Study to Inform IOU HVAC Programs. Retrieved November 6, 2017, from CALMAC database (PGE0349.01).

[36] Center for Sustainable Energy. (2014). HVAC Permit Compliance Survey Results. Retrieved November 6, 2017, from https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf

[37] Institute of Heating and Air Conditioning Industries. (2013). Supplementary comments on the AB 758 - Comprehensive Energy Efficiency Program for Existing Buildings: The View from a White Truck: A C-20 contractor perspective on Title 24 Compliance. Retrieved November 11, 2017, from http://www.energy.ca.gov/ab758/documents/2012-10-08-09_workshop/comments/The_Institute_of_Heating_and_Air_Conditioning_Industries_Additional_Comments_2013-07-19_TN-71687.pdf

[38] Proctor Engineering Group, Ltd. (October 2012). In Response to the Request For Comments On The Comprehensive Energy Efficiency Program For Existing Buildings (AB 758 Program) Scoping Report Docket No. 12-EBP-1. Retrieved November 6, 2017, from http://www.energy.ca.gov/ab758/documents/2012-10-08-09_workshop/comments/Proctor_Engineering_Group%20Ltd_Comments_2012-10-29_TN-68241.pdf

Collectively, all of these studies support that common belief that the state is far from meeting its goal of 90% permit compliance by 2020.

5.2.2 Compliance and Energy Goals

Our interviews of stakeholders and HVAC and lighting contractor focus group data strongly suggest that contractors drive the decision to pull a permit. How a contractor positions pulling a permit and the benefit of pulling a permit at the time of sale strongly impacts the probability a permit is pulled. Our research indicates that some contractors include permits as a line item in their price quote with a statement that all permits and other regulations required by the local municipality are beyond the scope of the work, but these contractors do not assign a dollar value to that line item. Other contractors research the cost of permitting for the locality and include it in their quote. While other contractors tell the owner that even though a permit is required, the chances of being discovered for non-compliance is low and you can save money if you opt to forego the permit. The HVAC Permit and Code Compliance Market Assessment—through HERS rater interviewers and limited interviews with homeowners—also found that contractors are key to ensuring the homeowner pulls a permit. Through ten interviews with homeowners, this study found that lack of awareness of the permitting requirement was the primary barrier to obtaining a permit.

Stakeholder Interviews

"Until compliance with regulations by HVAC contractors ceases to be the exception, and instead becomes the rule, there is little chance that any of the goals and objectives established in the Long Term Energy Efficiency Strategic Plan will be reached."

Many stakeholders discussed the need to increase compliance to meet California energy goals, especially in the HVAC sector. They expressed concern that continuing to increase regulations on compliant contractors will make it even more difficult for the contractors "who are doing the right thing" to comply and compete. Contractors and their representatives who participated in this study had a strong concern that if compliance enforcement was not improved, legitimate contractors might be forced underground leading to a potential increase in unrealized energy savings. Some stakeholders expressed frustration regarding the little progress made in addressing the lack of compliance in the HVAC industry since the update of the Strategic Plan in 2011. In a whitepaper released on November 8, 2017, the Western HVAC Performance Alliance (WHPA) also identifies that a culture had developed where the HVAC industry views enforcement as nothing more than a "slap on the wrist." They also identify that an effective enforcement mechanism is a top priority to increase compliance rates and in turn, realize additional energy savings.

Stakeholder Interviews

"Additional regulations are not going to impact those that are already working below the radar. They will continue what they are doing. So it's not going to move the needle in the right direction. It's actually going to focus more people to get around pulling permits."

5.2.3 Motivations for Not Pulling Permits

There were many reasons cited for not pulling permits. The four most frequent reasons provided for not pulling permits include: lack of understanding of complex energy codes, permit cost and perceived return on investment, local government budget limitations and process standardization, and fear of inspectors uncovering other code violations not related to the current project.

- **Lack of Understanding Complex Energy Codes.** Some stakeholders discussed the complexity of the energy code and it increasing stringency as driving low code compliance. Stakeholders also talked about the small number of building department officials who understand the energy codes. This lack of understanding of codes—by design and construction professionals as well as code officials--has been identified as a barrier to code compliance across the country prompting the offering of energy code training and technical support programs to address this barrier. Figure 5-4 describes two innovative code support programs in Massachusetts and Rhode Island. However, as a 2012 ACEEE paper - Successful Strategies for Improving Compliance with Building Energy Codes[39] points out, "While educated personnel are an underlying necessity, alone it will not solve the problem of low compliance rates. Local government support and resources are also needed."

> **Stakeholder Interviews**
>
> *"Simplicity is key to understanding energy efficiency standards. The more complicated the energy codes become, the more complicated enforcement becomes."*

[39] Western HVAC Performance Alliance. (July 2017). Understanding the Residential HVAC Compliance Shortfall. Retrieved November 11, 2017, from http://www.performancealliance.org/Portals/4/Documents/Committees/Goal1/WHPA%20Compliance%20White%20Paper%20DRAFT2_7.12.17%20with%20Comments.pdf.

Figure 5-4. Code Compliance Support Initiatives

- **Permit Cost and Perceived Return on Investment.** Our research indicates that for many stakeholders, there is little perceived value to complying with the Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6). Many stakeholders explained that the decision to pull a permit in most cases comes down to cost. The WHPA's whitepaper - "Understanding the HVAC Residential Shortfall" posits that there actually might be a disincentive to pull a permit because pricing into the quote the cost of permitting may actually cost

Contractor Focus Groups

"When you sit down, like us guys in the field do, and you're across the table from a consumer in a residential change out and it's an extra thousand bucks and they say well what do I get for that, you say you get a piece of paper showing an inspector came out and that rater came out and we fulfilled the requirements of the law, they just don't see they are getting anything of value out of that. It's not even negotiable."

the contractor work."[40] This market disincentive was also echoed in our interviews and focus groups. This concept of the need for a "level playing field", especially in the HVAC sector, is not a new one. Many contractors talk about the fact that the lack of an efficient enforcement mechanism translates to little risk for contractors that do not comply with codes making it challenging for the contractors who are "doing the right thing" to compete and stay in business. As one contractor discussed, if pulling permits became the norm and not the exception, permits would not be viewed as "extra cost". He explained that is everyone pulls a permit, then the cost associated with permit pulling will be equal across job quotes. Another contractor also pointed out in the focus groups that the inspections associated with pulling a permit can protect contractors from liability by findings errors or mistakes before they potentially cause significant issues.

- **Local Government Budget Limitations and Process Standardization.** There are 593 individual jurisdictions that are responsible for managing the local permitting process. Past research indicates enforcement of building requirements varies among local building departments. Anecdotal information from contractors that serve on the Compliance Committee in the WHPA indicate that requirements and document compliance with Title 24 varies across jurisdictions. One example provided was that some jurisdictions require certain HERS compliance forms while others do not. In the 2014-2016 HVAC Permit and Code Compliance Market Assessment, researchers found gaps and some discrepancies in the documentation for some of the permitted sites that they visited as part of the study.

> **Stakeholder Interviews**
>
> *"Local code enforcement agencies are overworked and underfunded. They are unable to stop the underground installation market that consists of unlicensed contractors and unpermitted work . Enforcement therefore must happen at a more concentrated point in the process: at the point of sale."*

It is not uncommon that contractors serve a customer base that span multiple jurisdictions. A survey conducted by the WHPA in early 2017 with C-20 licensed contractors found that, of the 35 contractors who responded, 89% (n=31) want a standardized permitting system across California, something that the Air Conditioning Contractors of America (ACCA), and the Institute of Heating and Air Conditioning Industries, Inc. (IHACI) have been advocating for in California. A similar survey conducted by the WHPA in early 2017 with California Building Jurisdiction representatives indicated that, of the 43 building jurisdiction respondents, 81% (n=35) said that if an "apply for permit system" were made available, they would expect personnel within the jurisdiction to fully embrace it. The Strategic Plan also notes that local building officials may not have the resources or knowledge to develop streamlined permitting systems.

[40] Western HVAC Performance Alliance. (July 2017). Understanding the Residential HVAC Compliance Shortfall. Retrieved November 11, 2017, from http://www.performancealliance.org/Portals/4/Documents/Committees/Goal1/WHPA%20Compliance%20White%20Paper%20DRAFT2_7.12.17%20with%20Comments.pdf.

- **Fear of Uncovering Other Code Violations.** Many stakeholders indicated that another reason for customer and contractor's not wanting to pull permits is the fear that the inspector will find other code violations unrelated to the project being permitted. It is important to note that customers were not part of this study but this sentiment was expressed by contractors in the focus groups and stakeholder interviews.

> **Contractor Focus Groups**
>
> *"I mean, they [customers] don't do it [pull permits], and sometimes will just say, you know, I'm afraid they're gonna come out and they're gonna find everything that you know, like the job I did on the toilet years ago and they're gonna make me tear out my bathroom."*

5.2.4 Relationship between Permits and Workforce Quality

A number of stakeholders mention that there is not necessarily a direct relationship between permits and workforce quality. The California State License Board[41] cites the advantages of using a licensed contractor and pulling a permit are:

- Increased risk of poor or incomplete installations
- Foregoing an independent 3rd party inspection of work
- Potential for fines and penalties
- Potential liability for worker(s) injured on your property
- Decreased efficiency

> **Stakeholder Interviews**
>
> *"No, it's checking the box. It all depends on the inspector and the project and level of complexity…the permitting world right now and the inspection world has come down to how many permits you can sign off in a day and that translates into their revenue. It is a problem of inspectors rushing through and finalizing these without the level of care or knowledge in the quality of work. …Maybe they need to hire more people that are knowledgeable."*

However, while many stakeholders found these advantages to be theoretically true, many indicated that in the field there is likely little difference between workforce quality of permitted and unpermitted systems. DNV GL also found evidence that pulling permits may not translate to higher work quality in their recent HVAC Permit and Code Compliance Market Assessment. Results of their HVAC residential study suggested that:

- Enforcement of requirements varied among local building departments.
- Despite HERS inspections, many HVAC projects fail to meet the Title 24 energy efficiency requirements.
- Similar levels of efficiency for equipment at permitted and non-permitted sites in a representative statewide sample suggesting that under current market and enforcement condition permitting does not lead to increased energy efficiency of HVAC change-outs.

5.2.5 PA Role in Compliance

Most of the stakeholders interviewed believe that it is not the PA's sole responsibility to enforce permit compliance. They believe permit enforcement is the responsibility of the CSLB and the building departments.

[41] California State License Board. (No Date). HVAC Ambassador Program Fact Sheets. Retrieved November 11, 2017, from http://www.cslb.ca.gov/Resources/GuidesAndPublications/HVAC_AmbassadorPacket_Consumer.pdf

However, most stakeholders believe the PAs should play a role in supporting compliance. Currently programs often require a signature from either the customer or contractor, certifying that the contractor has adhered to applicable federal, state and local laws including permit requirements.

> **Stakeholder Interviews**
>
> *"I think there's some validity in the claim that there are existing institutions out there responsible for that permit closure process. However, abdicating all responsibility when the IOU's are benefitting from repair money for certain projects I don't think is valid."*

Most stakeholders believe the PAs have an ethical responsibility to uphold the law and ensure quality work, especially given the fact that PAs benefit from ratepayer dollars. One stakeholder thought that PAs should notify building departments if they suspect a violation as they are in the best position to identify red flags. Many stakeholders liked the concept that rebates should not be paid until permit closure, although one stakeholder indicated that this could translate into a significant lag time in a major retrofit. Typically in a major retrofit, a general contractor would pull a single permit that covers the entire job--such as electrical, mechanical, etc. These permits are mixed permits that include efficiency and non-efficiency items. This is done to save money and because a mixed permit typically is a more streamlined approach to managing the permitting aspects of a large project. However, if it is a residential retrofit and the homeowner is just swapping out the furnace, there is less chance of a meaningful delay as it is a simpler permit.

A few stakeholders expressed surprise that PAs were not more motivated to drive compliance based on the fact that codes and standards drive a significant portion of PA energy savings. They explained that the codes and standards savings calculations include a compliance rate multiplier.

> **Stakeholder Interviews**
>
> *"I feel like it is always about striking the right balance and so there's 100% quality assurance, you know we can do 100% inspections, but there is a certain degree of at what point of the incremental level of effort worth the incremental increase in quality or whatever it might be. I think we have tried to strike the right balance between what amount of risk we are comfortable with versus the additional extra effort it would take to eliminate that risk. And so when we think about things like How much is this actually going to help versus the additional administrative work that is going to require both from our end as well as our program implementers and then the customers who have to fill out these forms or have someone come out and inspect again. So there is all these elements that impact how easy it is for our customer to participate and for us to administer the program that we try to take into account when we are trying to figure out what is that right balance."*

From the PA perspective, stakeholders talked about their role in designing programs and striking a balance between program administrative costs, contractor burden, and customer satisfaction when managing program risk. PA stakeholders also consistently reported that enforcing or policing work or labor standards was not in their purview; however, they did see a role for the PA in educating customers and contractors about such requirements. PA stakeholders did speak about requiring anyone who receives a rebate to sign off saying that they complied with all applicable permits and laws. They noted however that PAs do not actually go and look up licenses and permits, but they do ask those receiving a rebate to self-certify that they are following the law. The PA stakeholders also brought up that there is a distinction between permit closure and permit sign-off for finalization. It is possible for a permit to be closed but never actually signed off; whereas a final permit is where there is a final inspection and the job was approved. It was unclear if these practices are consistent across programs, but a number of stakeholders we spoke to thought that rebate recipients should sign an affidavit signifying that they have met all elements of the responsible contractor policy at the time it is operationalized. They thought for larger projects that PAs should maintain a list of contractors that have been pre-determined to meet requirements and require customers to either

choose a contractor from that pool or have their chosen contractor submit documentation substantiating they meet the requirements.

5.2.6 Strategies for Improving the Compliance Rate

There were a number of strategies uncovered in our secondary data review, stakeholder interviews, and our initiative review to improve compliance rates. These include: (1) compliance process optimization; (2) training and technical support programs; (3) stretch code programs; (4) limited self-verification permit programs; and specifically for HVAC, (5) sales tracking and (6) technology innovation.

- **Compliance Process Optimization.** Streamlining the compliance process is of interest to many stakeholders and is supported by our secondary data review and our initiative review. Strategies identified for streamlining the process include: simplified forms and a standardized online statewide permitting system. Our research found that the benefits of an optimized compliance process are time and resource savings for contractors and homeowners; increased code compliance due to more efficient and understandable processes; and more effective and efficient building department enforcement. Strategy 1-1 for improving code compliance in the Strategic Plan is to "Develop streamlined local government HVAC permitting systems, including online HVAC replacement permitting" by 2020. The Strategic Plan also calls for the investigation of tools, software programs, "incentives", and policies to simplify and streamline the permit process.

  Literature Review

  "The extreme diversity of permitting systems and requirements is chaotic and unmanageable for the average contractor or home owner." – WHPA Online Permitting Feasibility Memo

  Our initiative review found that National Grid in both Massachusetts and Rhode Island have had success in simplifying documentation as part of their code support and enhancement initiatives. The WHPA Compliance Committee established the Online Permitting Working Group in 2016 to study the feasibility of implementing a statewide online permitting system for HVAC changeouts. The Working Group concluded in November 2017 after much study and two surveys mentioned earlier—one with building department representatives and one with contractors--that an online permitting system targeted for HVAC alterations is feasible and will improve compliance rates in California. They note that this system would need to be carefully designed and implemented and upfront costs still remains an issue.

- **Training and Technical Support Programs**. Training is often viewed as a key element to increasing energy code compliance, especially given the national trend of increasing code complexity and rigor. The Code Support and Enhancement Initiatives in Massachusetts and Rhode Island have found that coupling training through multiple modes with technical support is an effective way to increase understanding of energy codes; and thus increase compliance. Interviews with program implementers underscored the fact that it is important to meet the audience "where they are at." It is essential to tailor trainings to the audience and to gauge audience understanding and skills at the beginning of each training. For training to be successful, training must not only increase participants knowledge about codes but also foster

behavior change. Joel Rogers of Compliance Wave[42] identified integrating behavior-change principles into compliance training not only changes behavior in the near term, but also changes attitudes about compliance that impact behaviors in the long run. Including repitition in the form of technical project specific support in the Code Support and Enhancement Initiatives is one example of increasing information retention and behavior change.

- **Stretch Code Programs.** A number of stakeholders mentioned the Stretch Code program in Massachusetts as an innovative approach to increasing code compliance. The Strategic Plan mentions adopting voluntary "reach" code tiers for residential and commercial sectors. They also mention developing reach codes for Zero Net Energy (ZNE) buildings and the need for investigating the balance between mandatory, prescriptive, and beyond-code reach standards to achieve more effective codes, greater compliance rates, and more innovation in the marketplace. The state of Massachusetts has found their stretch code program successful in increasing building energy efficiency. This program, implemented in July 2009, has successfully enrolled 59% of Massachusetts' 351 municipalities in the program as of September 2017 (Figure 5-5). The stretch code represents on average a 20% greater building efficient requirement than the base code.
- **Limited Self-Verification Permit Program.** One stakeholder suggested the need for a limited self-verification permit program where properly trained, certified, and verified contractors could self-verify meeting specific requirements. A key benefit of this type of program is decreasing cost to contractors, building departments, and homeowners. In addition, it would eliminate the need for homeowners to wait at home for an inspector to arrive at their house, a key barrier to compliance.
- **HVAC Sales Tracking.** While a very polarizing issue in the HVAC community, a few stakeholders did mention that one strategy to increase HVAC code compliance is through tracking HVAC equipment from the point of sale through installation. The Strategic Plan mentions "tracking the installation of all new and replacement equipment to ensure they are installed in compliance with all applicable state energy codes." California's Existing Building Energy Efficiency Action Plan – 2016 update under Strategy 1.5 Building Efficiency Standards Development and Compliance identifies Sub-strategy 1.5.8 that states "If indicated as a critical resource for compliance improvement, establish HVAC equipment serial number tracking database". The CEC released RFP-16-403 entitled "Technical and Cost Proposal to Provide HVAC Equipment Installation Compliance Tracking System Business Needs and Functional Requirements for the California Energy Commission" on February 15, 2017; however the RFP was cancelled on March 21, 2017, three days before the RFP was due without explanation. The challenge of such a system is that some stakeholders believe it would be overly burdensome, costly, and could actually have a negative impact on compliance rates. Others argue that sales tracking is one of the best potential solutions to ensure the equipment sold in California is installed with the requisite permits. While this solution continues to be discussed, little progress seems to have been made on determining its efficacy or moving toward implementation.
- **HVAC Technology Innovation.** One stakeholder believes that we will have more sophisticated technology in the near future—a few years away--that will greatly help with compliance and enforcement. These smart tools will be able to automatically assess and communicate system performance—in effect diagnosing system issues. This data can create accountability of the contractor with homeowners, building owners, PA program managers/implementers, building department officials, inspectors, etc. These smart tools are

[42] Rogers, Joel. (March 2016). *5 Simple Strategies for More Engaging Compliance Training*. Retrieved November 11, 2017, from http://www.compliancewave.com/blog/5-simple-strategies-for-more-engaging-compliance-training

getting easier to read and the data is becoming easier to interpret. This stakeholder strongly believes that these tools will provide a necessary data-driven feedback loop that can guard against contractors who do not have a customer's best interest in mind as well as help enforce compliance with PA program standards and building code requirements.

Figure 5-5. Initiative Review: Massachusetts Stretch Code

MASSACHUSETTS STRETCH CODE (780 CMR APPENDIX 115.AA)

BACKGROUND

Massachusetts was the first state to adopt an above-code appendix to the "base" building energy code, which it adopted in July 2009. As of September 2017, two hundred and seven (207) municipalities out of 351 have adopted the Board of Building Regulations and Standards Stretch Code. The code:

- Emphasizes energy performance, as opposed to prescriptive requirements
- Results in cost-effective construction that is more energy efficient that that built to the "base" energy code
- Requires HERS ratings for all newly built homes

COST-BENEFIT CASE STUDIES OF HOMES THAT USE STRETCH CODE

Completed by: Independent building energy consulting hired by DOER, August 2017

- All cases show that homeowners see a positive cash flow from day 1 from purchasing a 2015 stretch code home vs. a 2015 base code compliant home.

MASSACHUSETTS ELECTRIC AND GAS PROGRAM ADMINISTRATORS: STRETCH CODE MARKET EFFECTS STUDY

Completed by: NMR Group and Cadmus, March 2017

- The stretch code had on average a 20% greater building efficiency requirement than the code based on 2009 IECC and used a performance path for compliance.
- Adoption by the six communities studied and most communities across the state would likely have been harder in the absence of the PA-sponsored program elements.

Key factors to code adoption

- Desire for environmentally responsibility
- Green Community designation, which provides access to state funding
- Presentations and training
- Availability of residential new construction incentives offered by Program Administrators
  - Partial compensation for increased construction cost
  - PA-sponsored programs increased base of HERS raters

Key barriers to code adoption

- Increased construction costs
- Concerns about additional builder training
- Misinformation on code requirements
- Resistance to increased regulations

5.3 Wages and Employee Benefits

Wages and employee benefits was another potential element that stakeholders mentioned in relation to the responsible contractor policy. One view that came out of stakeholder interviews is that there is a perceived direct link between paying livable wages and providing benefits and attracting and retaining a skilled workforce. We heard that contractors who are willing to pay a living wage and/or provide health benefits are also the contractors who are willing to invest in training their employees since retaining their workers is less of an issue.

> **Stakeholder Interviews**
>
> *"Studies have shown a direct link between contractors that pay low wages and provide no benefits and the use of an unskilled workforce. Moreover, contractors that are unwilling to pay their workers decent wages or supply even basic benefits are unlikely to invest time and money in training.."*

Other stakeholders focus on the flipside of the argument that wages do not necessarily correlate with quality. The PAs expect that contractors participating in their programs are already following all laws associated with wages. They fear that establishing higher wage and benefit requirements beyond what is required by law will result in increased program costs without increasing energy savings. Another stakeholder commented that wages and benefits will not move the needle on quality, instead you need to inspire a culture change of contractors who care about doing quality work because they are professional or because they care about energy efficiency. Another stakeholder commented that there are all kinds of approaches to offering "healthy" compensation packages. For example, some contractors allow their employees to keep company vehicles after hours so they don't have to purchase a personal vehicle, while other employers purchase lunch for their employees every day.

> **Stakeholder Interviews**
>
> *"I think it would be a huge mistake. I think the problem is the IOUs would end up facing is are you going to get the participation?"*

5.3.1 Relationship between Prevailing Wage and Workforce Quality

We did not find recent quantitative data linking wages to a skilled workforce in the building construction industry. The most recent study we encountered was from 1995. "Prevailing Wage Laws in Construction: The Costs of Repeal to Wisconsin", summarizes the effect of appealing prevailing wage laws in nine states in the 1980s.[43] According to this study, the repeal of wage laws at the time led to reduced levels of skill and workmanship. In addition, the wage repeal in Utah in the 1980s led to the deterioration of the apprenticeship program, resulting in a shortage of skilled workers. We also found more recent examples of wages being linked to a skilled workforce related to the highway construction industry. The Government Accountability Office reviewed several studies conducted by the National Alliance for Fair Contracting and the Construction Labor Research Council between 1995 and 2004 which concluded that a prevailing wage requirement has a positive effect on attracting highly skilled highway construction workers which resulted in enhanced productivity. Similarly, studies conducted by the Federal Highway Administration in 2000 and 2004 found that

[43] Belma, Dale and Voos, Paula. (October 1995). Prevailing Wage Law in Construction: The Costs of Repeal to Wisconsin.The Institute for Wisconsin's Future. Retrieved December 29, 2017, from https://pdfs.semanticscholar.org/98fd/ce7c72e8d3559e4f5c4111a65c147b2ccccd.pdf.

a prevailing wage requirement for contractors working on highway projects promoted more training for labor and more qualified contractors.[44]

5.3.2 Relationship between Prevailing Wage and Work Quality

We searched for data to take the claim one step further, that paying competitive wages and providing benefits results in increased work quality. A study completed in 2004 by the Kentucky Legislative Research Commission concluded that prevailing wage laws appear to be an inefficient tool for achieving additional quality in the construction market. This is because the law results in wage payments above what the private market pays for the same level of quality.[45] Seemingly related to this finding, focus group participants commented that a wage requirement is leverage for better quality work if there is a sufficient pool of available quality workers if current employees are underperforming. These contractors noted that the industry in California is currently experiencing a shortage of workers with many workers coming in from out of state.

Best Practice Review: Clean Energy Works Oregon

"I think there was a correlation. I didn't have the time to like analyze that data scientifically, but I definitely saw that where a lot of the companies that ended up struggling or were kind of the problem children around the QC stuff, you know the quality control we had, also were the ones who really struggled in their workforce."

While the Community Power Works and Clean Energy Works Oregon programs do not have data that directly ties wage and benefit requirements to work quality, anecdotally, both programs found that companies that struggled to meet the programs quality control requirements or went out of business entirely, were the ones who also struggled to meet the requirements of the High Roads Agreement.

5.3.3 Effect on Contractors

HVAC contractors and lighting contractors in the focus groups believe that a wage requirement could potentially have a positive effect on work quality, but a neutral to negative effect on their business profitability depending on the details. Like other stakeholders we interviewed, contractors find that higher pay results in attracting and retaining employees who view the job as a career and are happier employees who do better work. At the same time, contractors emphasize that they would need to see a benefit from paying their workers more than they currently do to make it worth participating in PA programs.

Contractor Focus Groups

"I guess it's rare to see someone get paid a lot of money and do a really crappy job. How does he get that money, you know what I mean? You usually get fired if that happens, you cost too much to the company."

[44] US Government Accountability Office. (December 2008). Federal Requirements for Highways May Influence Funding Decisions and Create Challenges, but Benefits and Costs are Not Tracked. Retrieved November 1, 2017, from http://www.gao.gov/assets/290/284235.pdf

[45] Clark, Mike. (Fall 2005). The Effects of Prevailing Wage Laws: A Comparison of Individual Workers' Wages Earned on and off Prevailing Wage Construction Projects. Journal of Labor Research 26(4), 725-737. Retrieved May 10, 2017, from Business Source Complete, EBSCOhost.

As part of the High-Roads agreements for Seattle's Community Power Works and Clean Energy Works Oregon, participating contractors were required to comply with wage and insurance requirements. According to the Clean Energy Works Oregon Final Technical Report, contractors found that investing in their crews resulted in better quality work, less turnover and more stability for their business. The report credits these benefits in part to the program's focus on encouraging family-supporting wages, full time employment and training opportunities.[46] Seattle's Community Power Works program's High-Roads Agreement require participating contractors to pay weatherization workers one of three tiers of wage rates based on the employee's level of experience (Table 5-3). They also required contractors to offer fringe benefits to workers if they did not provide medical benefits. In addition, participating contractors had to pay the prevailing wage rates to electricians, and plumbers. Interviews with program staff revealed that while contractors initially were resistant to the wage requirements, the requirements did not present a large enough barrier to prevent participation, and ultimately contractors complied because they wanted to participate in the programs. The program achieved 100% wage compliance among its 26 participating contractors.[47]

Table 5-3. Seattle Community Power Works High-Roads Agreement: Wages and Benefits

Category	Level	Wage	Fringe[a]	Total	Prevailing Wage
Weatherization Workers	Entry (Year 1)	$15.50	$2.50	$18.00	
	Mid (Year 2)	$18.50		$21.00	
	Advanced (Year 3+)	$21.50		$24.00	
Electrician	Journey Rate	$30.44	n/a	$30.44	✓
Plumber		$34.69		$34.69	✓
HVAC (Where there is furnace swap out)		$30.44		$30.44	

[a] Fringe benefits were required when the employer does not provide medical benefits. If employee refused benefits, employer not required to pay fringe.

Focus group contractors noted that any wage requirement should take into consideration that Union contractors do not have a choice about what they can pay workers. Clean Energy Works Oregon's High Roads Agreement required wage rates that reflected the prevailing wages of the region. According to the Clean Energy Works Oregon Final Technical Report, this allowed contractors to remain competitive to market rates and to ensure alignment with current industry and union wage standards. Participating contractors are required to pay workers one of two tiers of rates based on job category and region. The base rates do not include fringe benefits.[48] The program achieved 100% compliance among 56 program contractors.

[46] Portland Bureau of Planning and Sustainability. (December 2013). Clean Energy Works Oregon: Final Technical Report. Retrieved October 11, 2017, from https://www.osti.gov/scitech/servlets/purl/1117211

[47] City of Seattle. (2014). Seattle Power Works: Final Report and Conclusions. Retrieved October 9, 2017, from https://www.osti.gov/scitech/servlets/purl/1172056

[42] Portland Bureau of Planning and Sustainability. (December 2013). Clean Energy Works Oregon: Final Technical Report. Retrieved October 11, 2017, from https://www.osti.gov/scitech/servlets/purl/1117211

Table 5-4. Clean Energy Works Oregon High-Roads Agreement: Wages and Benefits

Job Category	Job Category Description	Rural	Metro
Basic	Basic weatherization work, including minor repairs, batt insulation, blown insulation, weather stripping, air sealing, caulking, minor and incidental structural repairs, duct sealing and roofing.	180% of state minimum wage	
Specialized	Any program work that is not Basic, including without limitation, replacement of doors and windows and carpentry work; the maintenance, repair or replacement of furnaces, ducting or other HVAC equipment; replacement of water heaters and other plumbing fixtures; and all electrical work.	200% of state minimum wage	250% of state minimum wage

A few of the stakeholders we interviewed pointed out that wage and benefit requirements would create additional administrative logistics for the contractor which they may not be able to absorb without hiring additional administrative staff. Stakeholders caution that the benefit to participating will need to outweigh the additional cost to the contractor. This scenario was observed in the Seattle Community Power Works program, although program staff report that requirements did not hinder program participation in their market. The program staff we interviewed reported that while it was not a requirement to do so, nearly all participating contractors hired administrative help to comply with program requirements beyond their usual business practices.

Best Practice Review: Community Power Works Staff

"We had monthly contractor meetings. And these women would show up and they'd be like hi I'm the new admin at this company and we were like oh hey great nice to meet you. Like people just couldn't handle the paperwork or the sales calls or anything like that and they hired – there was a lot of administrative assistants around hired."

Staff from both Seattle's Community Power Works program and Clean Energy Works Oregon point to collaboration with a stakeholder advisory committee, which included contractors and labor unions, as a key factor in striking a balance on wage and other requirements between effectiveness in achieving goals and limiting burden on contractors. Relationship building that resulted from including contractors in the advisory committee and monthly contractor meetings throughout the duration of the pilot, helped contractors feel like they had a voice in the process which led to an environment of trust and mutual expectation. Program staff acknowledge that contractors and stakeholders are always going to push back on additional requirements, so working collaboratively, finding solutions, and providing support to comply with requirements is also crucial.

Best Practice Review: Community Power Works Staff

"We brought in at least three contractors to have a seat at the table so that labor and some of the training providers could start to understand. Like really understand what small contractors were going through and the risks that they were taking with bringing on new hires and that was a good move that was a really good move."

5.3.4 Cost Effectiveness of Prevailing Wage

Over the past 20 years both sides of the debate have developed a rich set of literature discussing whether increasing wages result in increasing cost. While it is out of scope to conduct a comprehensive examination

of this literature, we present a few studies highlighting both sides of the argument to give the reader a flavor for the discussion.

First let's look at the "pro side" of higher contractor requirements. One body of research examines costs (and other construction outcomes, like safety, training investments, wages, benefits, etc.) in states with and without prevailing wage laws as well as in states that eliminated prevailing wage laws. This research contends that there is a preponderance of evidence that shows that prevailing wages do not raise construction costs. This is in alignment with the DVC Needs Assessment, which reports that research in the construction industry that compares public works projects executed with and without prevailing wages show similar overall costs, as employers are able to compensate for higher wages through the use of more highly skilled workers.[49] The DVC report also states that the perceived trade-off between ensuring high quality energy efficiency work and providing that work at a price consumers are willing to pay is a trade-off that has "not been well-documented or studied."[50]

Literature Review

"Research by independent, academic economists indicate that New York's prevailing wage law is a uniquely valuable component of state policy that simultaneously uplifts residents and communities while imposing minimal, if any, cost on taxpayers." – Economic Policy Institute New York's Prevailing Wage Law: A Cost-Benefit Analysis.

In, New York's Prevailing Wage Law: A Cost-Benefit Analysis, published on November 1, 2017 by the Economic Policy Institute, Ormiston et al.[51] discusses the fact that New York state government is one of the construction industry's largest customers in New York and thus significantly influences local construction markets. This puts them in an interesting position---balancing the need to minimize taxpayer costs against the responsibility of ensuring fair wages, benefits and safe working conditions of workers. This report concludes that prevailing wage law offers policymakers the opportunity to meet both responsibilities.

Smart Cities Prevail, a leading construction industry research and education organization published a report in 2017, The Value of Linking Good Construction Jobs to California's Housing Reforms, which included an examination of the costs associated with construction labor.[52] According to this paper, the California residential building industry requires 13% more workers today to produce the same output today as it did in 2007, two decades ago. Meanwhile, construction employment is currently at the same level it was in 2000 and unemployment rates are also relatively low. This means that the California could face a challenge in finding and retaining enough skilled workers to meet its growing housing need. Despite this, the industry is characterized by declining wage, health and retirement benefits, skills training, and productivity.

[49] Mahalie, N. (2008). Prevailing Wages and Government Contracting Costs. A Review of the Research. EPU Briefing Paper #215. Retrieved November 11, 2017, from: http://www.epi.org/publication/bp215/

[50] Donald Vial Center On Employment In The Green Economy Institute for Research on Labor and Employment University of California, Berkeley. (March 2011). California Workforce Education & Training Needs Assessment. Retrieved January 27, 2017, from http://laborcenter.berkeley.edu/pdf/2011/WET_Part1.pdf.

[51] Economic Policy Institute. (November 2017). New York's Prevailing Wage Law: A Cost-Benefit Analysis. Retrieved November 11, 2017, from http://www.epi.org/publication/new-yorks-prevailing-wage-law-a-cost-benefit-analysis/

[52] Smart Cities Prevail. (2017). The Value of Linking Good Construction Jobs to California's Housing Reforms. Retrieved November 2017, from https://www.smartcitiesprevail.org/wp-content/uploads/sites/24/2017/03/SCP_HousingReport.0314.pdf

The paper proposes that wage standard requirements would be a cost-effective approach to increase the supply of skilled workers needed to address California's housing supply challenges. The study concludes that the California residential construction industry has room to absorb wage increases based on the following:

- **Construction labor makes up only 15% of total project costs.** The study looked at the State of California's 2014 Affordable Housing Cost Study (AHCS) and Economic Census data specific to California's construction industry to identify the cost structure of California multi-family housing development. The study concluded that construction wages and benefits makes up 15% of total project costs and are therefore far from the determining factor in overall housing costs.
- **Prevailing wage is not a statistically significant driver of cost variation (4%) in the development of affordable housing.** The study analyzed AHCS data to identify the most important drivers of cost variation in affordable housing. It found prevailing wage to have an impact of approximately 4%, which was deemed not to be statistically significant. It found that location, the business cycle, and project type and scale were the most important drivers, accounting for 85% of variation.
- **Regulatory programs and requirements do not significantly influence housing costs.** State government housing officials commissioned a study which examined whether specific regulatory requirements created significantly higher costs in the development of market rate housing. They found that none of the regulatory factors studied had a significant influence on housing costs. Specifically, the study looked at the influences of the following regulatory programs and requirements:
    - California's Redevelopment Area program and accompanying regulations;
    - Federal and/or state mandates that projects deemed to be public works require payment of "prevailing wages" to construction workers; and
    - California Environmental Quality Act (CEQA) review and mitigation; and tax credit regulations that connect higher project application scoring to various project and/or site amenities.

On the flip side of the coin, those who oppose contractor requirements such as prevailing wage argue that government construction costs are inflated by prevailing wage laws, that project effectiveness is decreased due to union rules, and that such laws effectively serve as a taxpayer subsidy. They also contend that elected officials have an incentive to weigh political concerns, due to the Union's strong voting blocs, against cost-effectiveness. A report published on April 24, 2017 by the Empire Center for Public Policy, Inc. found in *Prevailing Waste: New York's Costly Public Works Pay Mandate* that New York's prevailing wage law inflates state and local government total construction costs by 13% to 25% depending on the region. The study also found that the wage mandated by the law

Literature Review

"The prevailing wage mandate inflates total public construction costs by at least 13 to 25 percent depending on the region, without including the productivity-eroding impact of work rules. This translates into billions more in borrowing and higher debt service expense and, ultimately higher taxes." – Empire Center Prevailing Waste: New York's Costly Public Works Pay Mandate.

includes expensive union fringe benefits, which can approach or exceed the cost of hourly pay.[53]

5.3.5 Relationship between Health Insurance and Workforce Quality

A study by Jaewhan Kim and Peter Philips published in 2010, *Health Insurance and Worker Retention in the Construction Industry*, looked at the impact of health insurance and worker retention in the construction industry. This study used the 1996 panel (spanning April 1996 to March 2000) and the 2001 panel (February 2001 to January 2004) of the *Survey of Income and Program Participation (SIPP)* to study the firm and industry labor turnover of individual union and nonunion construction workers focusing on whether or not they received health insurance from their employer.[54] The sample focused on blue collar construction workers who were full time employees receiving a wage and the study uses a shared frailty survival model of analysis. The study concludes that health insurance increases the probability of worker retention within the construction industry among union and non-union workers and encourages the accumulation of human capital, including skilled workers.

Clean Energy Works Oregon's High Roads Agreement required employers to provide one of four tiers of employer-subsidized health coverage for all employees (Table 5-5). The program expected compliance with the requirement to improve over time. The program achieved 81% compliance with its healthcare requirement as of 2013.[55]

Table 5-5. Clean Energy Works Oregon High-Roads Agreement: Health Insurance Benefits

Component	Option 1	Option 2	Option 3	Option 4
% Premium Employer Paid	At least 50%	At least 60%	At least 75%	At least 100%
Deductible	$500 or less	$1,500 or less	$2,000 or less	$3,000 or less
Max Out-of-pocket	Not to exceed $6,000			

While the Seattle's Community Power Works program did not require contractors to offer health insurance to their workers, contractors received additional points during the application process for providing health, dental and/or vision insurance to employees; or health insurance for workers' families. Ultimately, 65% of the 26 program contractors offered these benefits to their workers.

[53] McMahon, E.J. and Gardner, Kent. (April 2017). Prevailing Waste: New York's Costly Public Works Pay Mandate. Retrieved November 11, 2017, from https://www.empirecenter.org/publications/prevailing-waste/

[54] Kim, Jaewhan, and Peter Philips. (March 2010). Health Insurance and Worker Retention in the Construction Industry. Journal of Labor Research, 31 (1), 20-38. Retrieved May 10, 2017, from Business Source Complete, EBSCOhost.

[55] Portland Bureau of Planning and Sustainability. (December 2013). Clean Energy Works Oregon: Final Technical Report. Retrieved October 11, 2017, from https://www.osti.gov/scitech/servlets/purl/1117211

5.4 Diversity

As with other program elements, we did not provide definitions or specify what a diversity requirement might entail. In some cases, stakeholders discussed requirements that could encourage or lead to increased diversity, in other cases they interpreted a diversity requirement more literally as requiring diversity. A few stakeholders feel that at least some level of requirement that encourages workforce diversity should be part of a responsible contractor policy. They feel that it is appropriate to set a high standard for diversity, particularly when rate-payer dollars are involved. The rest either did not comment on whether a diversity requirement was important or were strongly opposed to such a requirement. Those who oppose, argue that while they generally want to support access and reach to disadvantaged workers, a diversity requirement does not align with the primary goals of energy savings programs, which are to contribute to the state energy goals.[56]

California's Strategic Plan, the DVC Needs Assessment and California Governor Jerry. Brown as well as SB-350 all document the need to support disadvantaged communities.

- The Strategic Plan includes a goal of ensuring "minority, low income and disadvantaged communities fully participate in training and education programs at all levels of the Demand Side Management (DSM) and energy efficiency industry."
- The DVC Needs Assessment suggests that the "large public investment in the energy efficiency and related sectors presents a potentially viable opportunity to build pathways out of poverty for individuals who have been historically disadvantaged in the labor market, particularly because of the relatively high percentage of energy efficiency jobs that do not require a college degree." The DVC recommends in their Needs Assessment that policymakers, funders and practitioners, collaborate with community colleges and apprenticeships in providing pathways for students from disadvantaged communities;" and "adopt as a goal for the Energy Training Centers the inclusion of low-income, minority and disadvantaged workers and job seekers."
- Governor Jerry Brown in his inaugural address on January 5, 2015 stated "California has made bold commitments to sustain our environment, help the neediest and build for the future …[We] must dedicate ourselves to making what we have done work."[57]
- SB-350 also takes steps to ensure California's clean energy future includes a strong focus on equity to ensure benefits are realized by all Californian's, especially those in vulnerable communities.

5.4.1 Relationship between Diversity and Work Quality

The literature is vast on the relationship between diversity and work quality. There are many studies that discuss the idea that workplace diversity is thought to increase organizational effectiveness, allowing the organization to draw from a larger poll of talent, increase its capacity to innovate and make better decisions, allow it to access to a wider customer base, and better satisfy customer needs.[58] Other literature suggests

[56] Note that we did not provide definitions for the terms diversity or disadvantaged communities to in-depth interview participants or focus group participants. As such, we use the terms interchangeably to reflect the terminology used by stakeholders and focus group participants.
[57] Brown, E. (January 5, 2015). Inaugural Address. Retrieved November 2017 from https://www.gov.ca.gov/news.php?id=18828
[58] Cox T. and Blake, S (1991). Managing Cultural Diversity: Implications for Organizational Competitiveness. The Executive, 5, 45-56.

that when diversity doesn't work, it can result in lower revenues due to missed business opportunities.[59] For every study that describes a positive effect of diversity on outcomes such a performance or innovation, there is at least one study suggesting the effect is in the opposite direction.[60]

We did hear anecdotal support during the initiative review interviews regarding the connection between diversity and work quality. While the Community Power Works and Clean Energy Works Oregon programs do not have data that directly tie diversity requirements to work quality, based on interviews with program staff, both programs found that companies that struggled to meet the programs quality control requirements or went out of business entirely, also struggled to meet the requirements of the High Roads Agreement.

5.4.2 Effect on Contractors

Focus group contractors do not see how encouraging diversity would lead to better quality work. They fear not being able to find people who meet diversity requirements with the required skills, which could potentially have a negative effect on quality. They also feel that it would be unfair to give jobs to individuals just because they meet certain diversity requirements. Ultimately, they say that a diversity requirement would prevent them from participating in a PA sponsored energy efficiency program because they want complete control over who they hire.

Contractor Focus Groups

"It's tough, because I can't call the union and say hey what are the next three people on the list? Are any of them good? And I go well, I'd really like to get a diverse person. Whatever that means. They are way at the bottom of the list, but they're no good, they're always out of work, and they're always late, you know what I mean? Do I, do I take them anyway?"

Clean Energy Works Oregon initially faced pushback from contractors who were required to support the program's diversity goals, one of which was related to hiring women. To help contractors find qualified candidates and meet the requirements, the program teamed with the Oregon Tradeswomen Association--a pre-apprenticeship program that trains women in weatherization work. Contractors were able to source qualified workers through Oregon Tradeswomen. Program staff believe that if contractors had not faced the hiring requirements, they never would have thought to hire women. Once forced to do so, they found that it was beneficial to have diversity on their staff and that women were good for their business. Anecdotally, contractors found women, who often found themselves selling to other women, had a sales advantage in selling home upgrades. In addition, women could get into smaller spaces, and they had better attention to detail which enhanced the quality of the work performed.

Stakeholders who support a diversity requirement, as well as staff from the programs reviewed as part of the initiative review, suggest supporting contractors by providing a source of qualified workers who meet diversity requirements is key to helping them meet diversity goals. The stakeholders we spoke with at one equity organization emphasized the importance of workforce development programs as a key component in developing talent pools, increasing job access, and helping contractors meet diversity goals. This equity organization is a green training and employment, and residential efficiency organization. The organization operates green energy training pre-apprenticeship programs which provides low-income students with pre-apprenticeship certification that's recognized by the national Building Trades. In addition to OSHA certification

[59] Richard, O., Barnett, T., Dwyer, S., and Chadwick, K. (2004). Cultural Diversity in Management, Firm Performance and Moderating Role of Entrepreneurial Orientation Dimensions. Academy of Management Journal, 47.
[60] Guillaume, Y., Dawson, J., Woods, S., Sacramento, C., and West, M. (2013). Getting Diversity at Work to Work: What we know and what we still don't know. Journal of Occupational and Organizational Psychology, 86.

and first aid/CPR certification, students are trained on professional development, basic hands-on construction and energy efficiency skills. Graduates also receive case management and job placement support. This organization provides support to employers as well, helping to identify quality candidates, pre-screening resumes, providing retention support to help new hires be successful, and connecting them to hiring incentives to help offset initial hiring costs.

Program staff involved in the development of Clean Energy Works Oregon share this organization's view, and stress the importance of collaborating with contractors and with training centers to align a pipeline of qualified candidates with contractor needs. Initially, the Clean Energy Works Oregon program trained more laborers than the contractors needed, resulting in a surplus of laborers who ended up leaving the construction industry to find jobs elsewhere. The program learned to align the pipeline of workers with the contractors needs at a given time. Similarly, apprenticeship programs work to achieve a balance in the supply and demand of trained workers as well in effort to avoid training more people than there are jobs. Each year, apprenticeship programs only enroll as many students as are needed to meet the projected demand for labor.

5.4.3 Diversity Requirements: Approaches from High Roads Agreements

Some stakeholders who support a diversity requirement suggest limiting such requirements to apply only to larger scale projects. For example, projects costing $100,000 or more. Requirements could ensure hiring practices include opportunities for workers from disadvantaged communities and could provide support to help contractors hit targeted hiring goals.

High Roads agreements, like those used in Clean Energy Works Oregon and Seattle Community Power Works, prioritize diversity during the contracting process. Rather than making it a requirement, programs encourage it by granting vendors additional points for certain high roads characteristics during the contracting process. In the Clean Energy Works Oregon program, the higher a contractor applicant scored on high roads objectives, the more retrofit project leads were allocated to that firm. Contractors can receive additional points during the application process for employing a diverse workforce, being a historically underrepresented business, or contracting with a historically underrepresented business. Table 5-6 summarizes the diversity characteristics incentivized through the programs.

Table 5-6. Diversity Requirements in Clean Energy Works Oregon High-Roads Agreements

Characteristic	Community Power Works	Clean Energy Works Oregon
Additional Points in the Application Process		
Ownership	• Being a local, small, minority owned, women-owned, veteran-owned, employee-owned cooperative, and/or a nonprofit corporation or social enterprise.	
Hiring History	• Demonstrating a history of employing targeted workers, especially targeted workers (low-income, veterans and current members of the National Guard, Reservists, other individuals with barriers to employment) drawn from community based job training programs.	• Have a successful track record in hiring and retaining historically underrepresented or economically disadvantaged people and demonstrates efforts to provide employment opportunities to individuals who are seeking self-sufficient career pathways in weatherization and construction.
Subcontractor Relationships	• Demonstrating substantial subcontracting relationships with minority- or women-owned businesses that will be utilized in work performed under the program.	• Have a well-described plan for establishing sub-contracting relationships with businesses owned by historically disadvantaged or underrepresented people who have been in business for a minimum of 6 months.

6. Policy Considerations

Our research identified many factors that should be considered when operationalizing the responsible contractor policy in relation to the PA energy savings programs. These include impacts on cost-effectiveness, program design, contractor capacity and type, project scale, administrative challenges, and workforce data collection.

6.1 Cost-Effectiveness

California's established "loading order" calls for first pursuing all cost-effective efficiency resources, then using cost-effective renewable resources, and only after that using conventional energy sources to meet new load. A key concept in this loading order is cost-effectiveness. The foundation for all cost-effectiveness analysis for all demand-side resources in California is based on the Standard Practices Manual.[61] This Manual describes four tests used to assess the costs and benefits of demand-side resource programs from different stakeholder perspectives, including participants and non-participants. These tests are the Total Resource Cost (TRC), Program Administrator Cost (PAC), Ratepayer Impact Measure (RIM), and Participant Cost Test (PCT). These tests in general attempt to quantify program costs such as administration, incentives, equipment, etc. and program benefits such as avoided costs, bill reductions, and tax credits.[62]

Some stakeholders are very concerned about the impact of a responsible contractor policy on energy efficiency program cost-effectiveness. These concerns revolve around increased training and administrative costs as well as a responsible contractor policy limiting the contractor pool resulting in higher project costs without higher saving benefits.

Stakeholder Interviews

"The ultimate goal of programs is to defer investments in generation and distribution by getting the most energy savings for the least cost. Energy Efficiency must be cost-competitive with other procurement resources to ensure its sustainability [The utility] is concerned that requiring additional standards from a contractor will increase program costs without any "claimable" savings or direct benefits to offset them, thereby jeopardizing EE offerings altogether."

- **Training costs.** Some stakeholders indicated that if education and training are program-specific and are considered program costs, these costs will impact cost-effectiveness calculations, but if they are transferred to the non-resource WE&T program this will not be an issue. Other stakeholders explained that while moving training costs to the WE&T program might mean that *program* cost effectiveness is not impacted, the overall *portfolio* cost-effectiveness will be impacted since non-resource program costs are included in the portfolio cost effectiveness calculation.
- **Administrative costs.** Stakeholders were also concerned about the responsible contractor policy resulting in higher administrative costs. Examples provided for this concern included new costs related to the potential tracking and verification of responsible contractor elements, such as verifying contractor licenses

[61] California Public Utilities Commission. (October 2001). California Standard Practice Manual – Economic Analysis of Demand-Side Programs and Projects. Retrieved October 2001 from http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/CPUC_STANDARD_PRACTICE_MANUAL.pdf

[62] Depending on the cost-effectiveness test utilized, what costs and benefits are included and how they are calculated differ.

or the closing of permits; increased costs to recruit contractors; and increased costs related to renegotiation of contracts. One PA spoke about how code requirements alone are driving many program implementers to other states where programs that are less costly to run and they can make more money.

- **Project costs.** Another concern stakeholders expressed was that additional standards for contractors could limit the pool of contractors who are interested in participating in energy efficiency programs, ultimately increasing project costs for the customer, which could make the project cost-prohibitive. In addition, increased contractor business costs such as added employee recruitment costs or increased paperwork could be passed on to the PA or the customer depending on the program.

Other stakeholders disagree with these concerns. They believe that contractors who do not comply with requirements now are driving energy savings down by improperly installing energy efficiency measures. As one stakeholder points out, the majority of current utility cost-effectiveness calculations do not take into account lost energy savings from poor installation outcomes. Generally, these stakeholders believe that there might be a short-term increase in administration costs without the accompanying benefit of increased energy savings. However, in the long-term, increased energy savings through quality will balance out the increase in administrative costs. A few stakeholders also believe that including responsible contractor benefits in non-energy benefit calculations will also balance out any increase in program costs. However, the CPUC does not currently accept non-energy benefits in its cost-effectiveness framework.

Stakeholder Interviews

"Responsible Contractor policies will help reduce illusory paper savings and increase the true cost-effectiveness outcomes of EE programs."

Over the past 20 years, both sides of the debate have contributed to a rich set of literature on examining whether increasing worker wages have resulted in increasing cost. We discuss this literature in section 5.3.4 cost-effectiveness of Prevailing Wage.

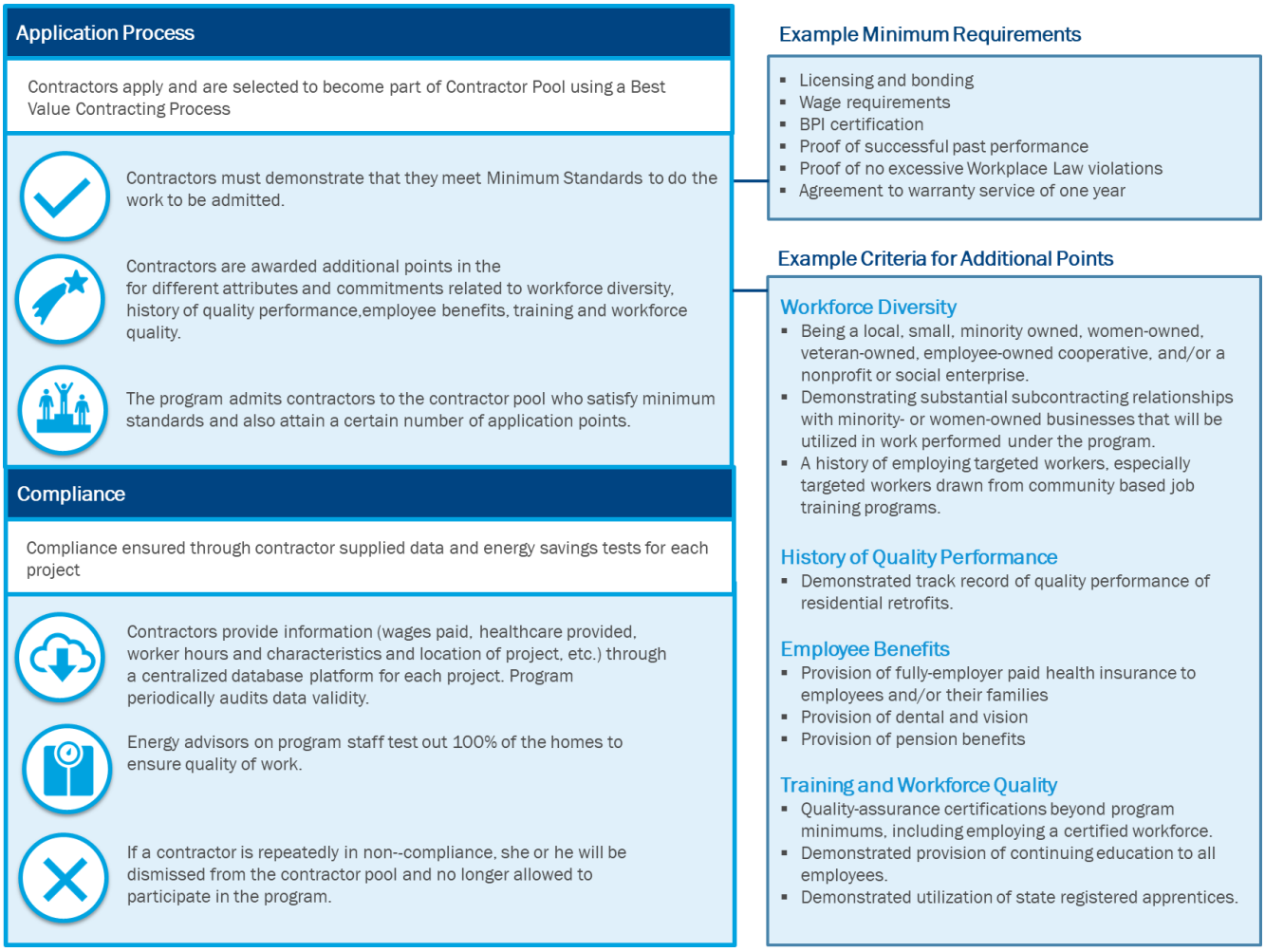
6.2 Variance by Program Design

Numerous stakeholders discussed concerns around how a responsible contractor policy would be applied to programs where the PA does not have a direct contracting relationship with the contractor. For example, how would a requirement work for programs in which customers can do the work themselves or hire who they want to hire to complete the work. These types of programs operate under the general open marketplace where customers can do the work themselves or hire who they want. The customer chooses to enter contractual relationship with the contractor or not. Program requirements state that all work must comply with federal, state and local laws and the customer has to comply with the terms and conditions specific to that program. Some stakeholders also brought up concerns regarding upstream and midstream programs and enforcing a responsible contractor policy. However, if we look at the responsible contractor language in SB-350; these programs seemingly would not be considered "installation or maintenance, or both installation and maintenance" programs.

The Clean Energy Works Oregon and Seattle Community Power Works programs found that there are some desired standards and community benefits that cannot be achieved simply by applying universal criteria to all contractors participating in the project. Both programs approached this challenge by assembling an applicable mix of contractors in an overall pool of approved contractors who could perform work for the program using a Best Value Contracting Process. This process uses a two-step qualification process for entry into a contractor pool, paired with ongoing compliance checks and performance evaluation. They first screen contractors for minimum requirements designed to indicate the contractor's ability to do quality work. As shown in Figure 6-1, minimum requirements were related to licensing and bonding, wages, basic certification levels, proof of past performance and warranty agreement. Contractors who met those requirements were then awarded additional

"High Roads" points for various criteria related to workforce diversity, employee benefits, training and workforce quality which indicated their support for various program goals. The Oregon program allowed anyone who met the minimum requirements to perform work for the program, but supplied leads only to contractors who attained a certain threshold of "High Roads" points. The Seattle Community Power Works program required contractors to achieve 50 points out of 100 "High Roads" points in addition to meeting the minimum requirements in order to be admitted to the program contractor pool. Once admitted into the contractor pool, contractors must agree to adhere to program standards on all work performed for the program, provide compliance data and undergo work quality checks for each project. Figure 6-1 summarizes the high roads, application process for the Clean Energy Works Oregon and Seattle Community Power Works programs.

Figure 6-1. Initiative Review: Best Value Contracting Process



It should be noted that the Clean Energy Works Oregon program, in its initial form, provided significant incentives to move homeowners toward an energy efficiency upgrade, paid contractors for performing test-in audits and for selling the home energy retrofit, and provided loan origination fees and loan loss reserves to lenders. According to the 2013 Clean Energy Works Oregon Program Final Technical Report, in attempt to achieve long term stability, the Clean Energy Works Oregon Program faced the challenge of moving program design away from the aforementioned free services, to asking contractors, lenders and homeowners to pay

for services. We were unable to find metrics showing how the High Roads agreement performed under these changes.

6.3 Contractor Capacity and Type

Some stakeholders feel that one of the potential unintended consequences of imposing more contractor requirements is that such requirements may give a competitive advantage to larger firms who have the resources to adopt additional requirements and remain competitive and profitable. For example, if the new policy requires the contractor to gather additional complex data, a small firm may not have the resources or infrastructure to support what may be significant increases in administrative costs. This may give the competitive advantage to larger firms who can absorb the additional administrative cost and still compete. This could lead to some firms not being able to participate in programs or compete in the market. The capacity and scale of contracting firms affects their ability to comply with requirements and this needs to be carefully considered with any new program requirement.

In addition, some stakeholder feel that a responsible contractor policy needs to allow room for exceptions. It may not make sense to apply requirements to all types of contractors. For example, a PA recently implemented a requirement in which contractors in its Trade Professional Alliance were required to provide proof of a CSLB license in order to receive an incentive check. This requirement presented a problem in one instance where a vendor was proposing software that would lead to energy savings. The policy prevented the PA from providing the incentive check to this vendor because the vendor did not hold a contracting license because software vendors are not eligible for CSLB licenses.

One PA cautions against allowing for exceptions. They feel that a policy won't be effective if it relies on exceptions. Instead it should clearly indicate which kind of programs it applies to, i.e. programs that involve installation or maintenance, or both installation and maintenance, by building contractor.

6.4 Project Scale

While the legislation mandates the implementation of a policy for use across all ratepayer funded programs, some stakeholders feel that contractor standards should vary based on the size or complexity of projects. They feel that the policy should consider using thresholds at which different criteria take effect. For example, larger and more complicated commercial and industrial projects should have more stringent requirements than small residential projects. Similarly, enforcement strategies should also vary based on the scale of the project. For example, for larger projects, it might make sense to require customers to hire contractors from a pre-approved list of contractors. For smaller projects, stakeholder feel that it may be sufficient to have the contractor submit a form with a contractor affidavit.

One PA identifies that a responsible contractor policy may vary by the nature of the program or measure being installed. This PA believes that it may not be necessary to have a contractor install an LED lightbulb in a residence to be subject to the same policy as one installing large scale HVAC equipment in a business. There may not be a one-size-fits all type of policy and may depend on the size of the risk to ratepayer investments, safety, and consumer protection.

Another PA believes a responsible contractor policy should address the perception issue that smaller projects can do whatever they want while larger projects are subject to greater scrutiny.

6.5 Administrative Challenges

The American Recovery and Reinvestment Act of 2009 (ARRA) included an amendment that required each loan recipient to ensure that all contractors would be paid a fair wage (prevailing rates) as determined in the Davis-Bacon Act. States and grant recipients participating in the DOE's Weatherization Assistance Program faced challenges when trying to execute the ARRA mandated wage requirement. A lack of established wage rates and lack of knowledge among administrative staff surrounding implementation of the clause resulted in a delay in fund distribution and execution of weatherization work.[63]

Similarly, the Seattle Community Power Works program and Clean Energy Works Oregon, both learned that developing and implementing High Roads Policies is a complicated process with many moving pieces. Setting up all of the pieces and getting them to work together requires time. If the requirements, logistics, and mechanisms for tracking and enforcing the requirements are not clearly defined prior to the deployment of the policy, contractors who are trying to comply will be confused and frustrated.

Best Practice Review: Clean Energy Works Oregon

"We were literally building the ship as we sailed it. So I think that our contractors felt that in some ways. I think it is good to do this research ahead of time and try not to reinvent the wheel and try to build – like we if we had had the database built right away, if we had all these things in place it may have been that much easier on our contractors to know what they were supposed to be doing."

6.6 Collection of Workforce Data

As part of the administrative challenges, a responsible contractor policy will likely prompt the need for a collection of workforce data. Both the Clean Energy Works Oregon and Seattle's Community Power Works programs used a self-report method of data collection through a custom-built database application tool as well as a limited audit of each contractor followed by an audit of a contractor selected at random to ensure the quality of data provided. The Seattle program also checked wage rates monthly. Contractors found the self-report process to be easy after an initial training for contractors and the use of populated drop-down fields. Providing sensitive race/ethnicity data was a slight concern for some contractors in the Oregon program. In-depth interviews with program staff revealed that the program responded with sensitivity by not pushing back if the information was refused.

In 2015, Opinion Dynamics published a qualitative study intended to explore the purpose, needs, and options for collecting workforce condition data from programs that are not in a contracting relationship with contractors.[64] This study was partially in response to Decision 12-11-015, in which the CPUC directed the PAs to collect similar workforce condition data for all of their energy efficiency programs. "In the meantime while a more comprehensive approach is being designed, the PAs should emulate, for their energy efficiency programs, the data collection protocols with respect to workforce initiatives recently adopted by the Commission for the low-income programs in D.12-08-044. This will assist us in evaluating new proposals for

[63] US Department of Energy Office of Inspector General Office of Audit Services. (February 2010). Progress in Implementing the Department of Energy's Weatherization Assistance Program Under the American Recovery and Reinvestment Act. Retrieved January 27, 2017, from https://energy.gov/sites/prod/files/igprod/documents/OAS-RA-10-04.pdf.

[64] Opinion Dynamics. (December 2015). PY2013-2014 California Statewide Workforce Education and Training Program Workforce Conditions Data Investigation. Retrieved February 14, 2017, from CALMAC database (CPU0133.01).

energy-efficiency program workforce efforts, based on a more robust set of data in the future."[65] This study noted that the wording in the Decision caused some confusion amongst the PAs as to whether this entire data requirement should apply to all energy efficiency programs.

The study was qualitative in nature and summarized all information known to date on this topic. The study documented the following additional insights into if and how the PAs can begin to collect workforce condition data:

- Electronic payroll tracking is the most valid and reliable method to acquire the demographic and wage information requested. But this investment may be costly if data are not extracted on a regular basis. Contractor resistance to the time commitment related to accessing payroll records could be a drawback to using electronic payroll tracking.
- If a program does warrant an investigation into the demographics of supporting contractors, such as ethnicity or disadvantaged status, then the learnings from this study indicate that the data collection needs to carefully extract information from each employee within a contracting firm and the purpose of the data collection needs to be clearly communicated to contractors.
- Interviews with 15 contractors who participate in the California Home Upgrade Program (8 interviews) or Non-Residential Lighting Program (7 interviews) in December 2014 revealed that there are many challenges with collecting workforce condition data from contractors who are not in a contracting relationship with programs. Challenges are summarized in Table 6-1, below.

[65] Decision 12-11-015 (November 2012). Retrieved November 11, 2017,from https://docs.google.com/document/d/11ZLXEZwQLGIBor9wzVenBZPzzjFkQ0jnA9D82I7nkgw/edit.

Table 6-1. Challenges in Collecting Workforce Condition Data from Contractors

Consideration	Wage Data	Demographic Data
Data sources	• Workforce wages are available in secondary sources, but participating contractors are not easily identified in existing wage databases.	• CPUC's Supplier Clearinghouse: This clearinghouse verifies business eligibility and enters it into a database sent monthly to participating utilities. The database is searchable by minority-owned business (MBE), women-owned business (WBE), white women/minority men-owned business (WMBE), disabled veteran-owned business (DVBE), and SIC code (http://www.suppliernetwork.net/public_search.php)
Issues with contractor willingness to provide information	• Most CA Home Upgrade Program contractors would be able to provide reliable wage data for the workers they employ directly. • Some consider wage levels to be sensitive information. It would be critical to demonstrate the security of data submission and that no competitive disadvantages could result from submitting the information.	• Contractors noted that they are reluctant to collect and share demographic information that they consider private.
The cost of collection	• Workload and time commitment related to accessing payroll records. It would be critical to limit the number of times this data needs to be submitted.	
Validity and reliability concerns with most data collection methods.	• The following contractors may have more difficulty providing wage data for workers: ○ Use sub-contractors for installation work ○ Use piece-rate pay ○ Hire employees on a job-by-job basis This may particularly be of concern for lighting contractors. • How should bonuses be handled?	• No formal records: None of the interviewed contractors recorded workforce demographic information or provided the information to other parties. • Self-reported data from contractors will likely be based on anecdotal evidence.

7. Key Findings

This study covered a wide-range of topics and provided key findings related to the current state of contractor policies, what elements could be considered for inclusion in the policy, and the opportunities and challenges related to these potential elements. We outline the major report findings in the next sections.

7.1.1 Current State of Contractor Policies

CSLB Requirements

- By law, all businesses or individuals who construct or alter any building, highway, road, parking facility railroad, excavation, or other structure in California must be licensed by the CSLB if the total cost (labor and materials) of one or more contracts on the project is $500 or more. Each license requires a "qualifying individual" who must undergo a background check and meet experience and exam requirements. In addition, the licensee must submit documentation to prove they meet insurance and bond requirements.
- CSLB licenses are separated into three classifications – Class A (General Engineering Contractor), Class B (General Building Contractor) and Class C (Specialty Contractor). Within the Class C license classification, there are 42 Class C licenses for work that requires specialized skills. Contractors who hold a Class B license have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor could bid on a job that included HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but could not bid on a project that was exclusively HVAC installation or exclusively lighting work unless they held specialty licenses for those trades.
- C10 contractors must ensure that electricians working under them hold an electrical certification card issued by the Department of Industrial Relations' Division of Apprenticeship Standards (DAS). Technicians and laborers working under other C-Class contractors do not require certification specific to their trade.
- Contracting without a license could result in jail time or a fine. The CSLB has a Statewide Investigative Fraud Team that conducts stings and sweeps on a regular basis focusing on the underground economy, which is estimated annually to be between $60 and $140 billion.

Program Eligibility Requirements

- In the state of California, 94 PA energy efficiency programs currently involve a contractor that performs retrofit installation and/or maintenance work on existing buildings. Lighting and HVAC equipment are the most common equipment types included in these programs – with 51% of programs involving one equipment type, the other, or both.[66] Consequently, C10 Electrical (General) and C20 Warm-Air HVAC are the most common license classifications held by contractors completing work for PA programs. This study looks at 83 of these programs in which contractors holding the most common CSLB licenses are performing the installation and/or maintenance work. We excluded the remaining 11 programs which

[66] Note that this study only looked at whether or not contractors perform maintenance and/or installation related to a given equipment type, and did not look at the degree of focus a program places on that equipment type or the amount of projects, or savings related to that equipment type.

indicated a contractor is involved in retrofit installation and/or maintenance work on existing buildings, but did not specify a license type in response to our data request.

- Nearly all of the 83 programs explicitly require, stated in in writing, that the contractor comply with all federal, state, and local laws including CSLB licensure laws. Approximately half of the 83 programs have contractor requirements addressing permitting, insurance, warranties on work performed, and professional conduct. About a third of these programs have requirements related to past experience and less than a quarter of these programs require a background check. Contractor participation requirements tend to deviate based on whether or not contractors are required to be pre-approved and sign a participation agreement or other contract with the PA or implementation contractor. Programs in which contractors are required to be pre-approved—as opposed to programs in which customers are free to select any contractor--tend to have more stringent requirements than those that do not require pre-approval.
- When compliance with federal, state and local laws, and permitting are specified, programs often require a signature from either the customer or contractor, certifying that the contractor is a licensed contractor and has adhered to applicable federal, state and local laws including permit requirements.
- Nearly two-thirds of the 83 programs require an installation contractor to be pre-authorized to perform work for the program. Under this scenario a PA or third-party implementer typically reviews the contractor's qualifications and requires the contractor to sign a participation agreement or other contract with the program administrator or third-party implementer.

7.1.2 Policy Elements

Our research revealed four key elements, identified through an analysis of in-depth interviews with stakeholders, for consideration in operationalizing the Responsible Contractor Policy. Listed from most frequently mentioned to least frequently mentioned, these are: training and credentialing, code compliance and enforcement, wages and employee benefits, and workforce diversity. In this subsection, we summarize our findings by each element. Other elements were mentioned such as licensure requirements, bonding, safety, and OSHA Compliance, but outside of mentioning these elements little substantive discussion occurred. Seemingly most stakeholders appear to think these four elements have already been largely addressed in the marketplace.

Training and Credentialing

- Stakeholders expressed two high-level viewpoints related to the effect training has on quality. On one hand, some stakeholders are of the opinion that contractors who support their employees in continuing their education tend to be the ones who strive to provide the best possible service to their customer, including quality work. On the other hand, some stakeholders believe training and credentials on their own do not necessarily ensure quality work. For example, one stakeholder pointed out that you can have someone who is highly credentialed who may still cut corners or someone who is un-credentialed who does the job correctly.
- Consistency in job definitions, skill requirements, and training standards were challenges brought up repeatedly. Concerns center on defining how jobs are defined and what key knowledge, skills, and abilities (KSA's) are needed to perform a particular task. Who defines these KSA's? How do we ensure KSA's are kept current with quickly changing technology? How do you keep knowledge and content up-to-date when faced with contractors who are providing on-the-job training and instructors who are teaching courses for equipment that was not around when they were certified? How do you ensure that training includes skill sets that are relevant to energy efficiency when energy efficiency is not necessarily a focus of credentialing

organizations? Since projects and jobs vary, how can we ensure proposed KSAs can be consistent across skills and job categories?

- Stakeholders generally agree that certification needs to demonstrate both retained knowledge and application of skills. Stakeholders acknowledge the barrier that performance-based certifications are costly.
- The Guidelines for Home Energy Professionals Project provides an example of how the U.S. Department of Energy (DOE), along with the home energy upgrade industry approached the challenge of aligning work quality expectations with quality training and quality workers. The project developed resources which define quality work, quality training, and quality workers to support the quality driven home energy upgrade industry. This collaborative project conducted job task analyses, defined standard work specifications that address minimum acceptable outcomes, developed accredited training programs, and created Home Energy Professional certifications. These guidelines are currently utilized by the DOE's Weatherization Assistance Program (WAP). Staff involved in the development and implementation of these guidelines shared key lessons learned. These lessons include:
    - **Stakeholder Input**: It is important to engage stakeholders, especially the stakeholders that will likely resist the potential outcomes of the project.
    - **Incentives:** To properly incent quality work, contractor and technician time must be valued appropriately when designing program processes.
    - **Streamline Paperwork**: Data collection and transfer between contractors and programs should be as seamless as possible.
    - **Business Model:** Businesses need to internalize how quality work in the energy efficiency industry can increase revenue potential.
    - **Defining Success:** Stakeholders in programs (e.g. implementers, program staff, contractors, evaluators, etc.) need to all share a common definition of what success means.
- Stakeholders discussed the need for different types and levels of training. These options are needed to accommodate varying equipment types, equipment standards across regions and climate zones, experience levels, and career aspirations.
- Stakeholders identified that workers need both 1) requisite specialized task level skill expectations and 2) broad training that allows workers to take a holistic view of the systems they work with-- enabling them to make situational, systems-based decisions.
- Our research uncovered a gap in technician state level credentialing for all licensing categories except C10 electricians. In the other categories, the contractor must be licensed, but the technicians working under them do not. Some stakeholders contend that this gap may not support a workforce sufficiently trained to do quality work.
- Our research also uncovered a gap in the Class B General Building Contractor license. A Class B General Building Contractor is defined by the CSLB as "a contractor whose principal contracting business is in connection with any structure built, being built, or to be built, for the support, shelter, and enclosure of persons, animals, chattels, or movable property of any kind, requiring in its construction the use of at least

two unrelated building trades or crafts, or to do or superintend the whole or any part thereof."[67] Contractors who hold a Class B license have a background in framing and may only bid on jobs with two or more unrelated building trades, neither which can be framing. For example, a Class B contractor can bid on a job that includes HVAC and lighting work without holding specialty licenses (C20-HVAC or C10-Electrical) for those trades, but cannot bid on a project that was exclusively an HVAC installation or exclusively lighting work unless they hold specialty licenses for those trades. According to interviews with CSLB staff, the theory behind the requirement is that Class B contractors' principal business is related to remodels and/or new construction work, therefore they should at least know how to frame for structural safety reasons. The requirement that they bid on jobs with at least two unrelated building trades prevents them from marketing themselves as experts in a specialty trade. It is expected, although not required, that they will likely subcontract with a contractor holding the appropriate specialty license to complete the part of the job with which they do not hold the specialty license. Some stakeholders believe that requiring contractors with a Class B license to also have the applicable specialty licenses for the corresponding specialty work they, or their technicians are completing, rather than subcontracting out; would support increased work quality in the field.

- Multiple stakeholders identified contractor values--including valuing energy efficiency, meeting customer's needs, and striving to do 'the right thing'--as key drivers to quality work. Program administrators noted that contractors who are engaged in the customer experience, who have a keen sense of how to keep and retain customers, who are thoughtful about the customer's property, and who are quick to resolve complaints if they arise, tend to be contractors who they view as 'high performers'. As such, stakeholders believe that training and credentialing need to address both technical skills as well as soft skills.
- Contractors identified barriers to training their employees if such a requirement was included in the Responsible Contractor Policy, including cost, time, and fear of retaining employees after investing in them.

Code Compliance and Enforcement

- Compliance with pulling requisite building permits in the large commercial sector is perceived to be occurring for most jobs. However, permit compliance in the small commercial and residential sectors is perceived to be very low and a significant issue.
- There is a vast amount of data indicating that compliance with permitting requirements is an appreciable concern in the HVAC industry.[68] HVAC residential permit rates lie between 10% and 38%--far from the state's goal of meeting 90% permit compliance by 2020.
- Contractors drive the decision to pull a permit in the small commercial and residential sectors.
- There is a market disincentive to pull permits due to several market conditions. Four reasons for not pulling permits were uncovered including: 1) lack of understanding of complex energy codes, 2) permit cost and perceived return on investment, 3) local government budget limitations and process standardization, and 4) fear of inspectors uncovering other code violations not related to the current project.
- A culture seemingly has developed where the HVAC industry views enforcement as nothing more than a "slap on the wrist" in California. There is a very real concern among contractors and their representatives

[67] Business & Professions Code - Division 3, Chapter 9; Contractors, Article 4, Classifications. Retrieved November 2, 2017, from: http://www.cslb.ca.gov/About_Us/Library/Licensing_Classifications/B_-_General_Building_Contractor.aspx
[68] See studies cited in section 5.2.1.

that if compliance enforcement is not improved, legitimate contractors may be forced to go underground potentially leading to an increase in unrealized energy savings. Most stakeholders indicated that an effective enforcement mechanism needs to be a top priority to increase compliance rates and in turn, realize additional energy savings. However, past research suggests that under current market and enforcement conditions, permitting does not lead to increased work quality.

- Most of the stakeholders interviewed believe that it is not the PA's sole responsibility to enforce permit compliance. They believe permit enforcement is the responsibility of the CSLB and the building departments. However, most stakeholders believe the PA should play a role in supporting compliance. PA stakeholders consistently reported that enforcing or policing work or labor standards was not in their purview; however, they did see a role for the PA in educating customers and contractors about such requirements.
- Our research identified six strategies for improving the compliance rate. These include: (1) streamlining compliance processes; (2) training and technical support programs; (3) stretch code programs; (4) limited self-verification permit programs; and specifically for HVAC, (5) sales tracking and (6) technology innovation. (See section 5.2.6 for full details)
- Massachusetts adopted an above-code appendix to the "base" building energy code for buildings in July of 2009. As of September 2017, two hundred and seven (207) municipalities out of 351 have adopted the Board of Building Regulations and Standards Stretch Code. The Stretch code achieves on average a 20% greater building efficiency than base code. The top two reasons for municipalities adopting the stretch code are the desire to be environmentally responsible, and the Green Community Designation which provides access to state funding.
- Overseen by National Grid, the Massachusetts Code Compliance Support Initiative & Rhode Island Code Compliance Enhancement Initiative are similar programs which are designed to close the gaps between critical energy code requirements and project requirements. These programs include three elements: training, technical assistance and documentation. According to interviews with program staff and the implementer, these programs have been successful. They identified the following as lessons learned:
    - **Key is to simplify.** Simplifying the process, documentation, and training ensures that codes are not daunting. Pocket guides and simplified application forms have been successful.
    - **Meeting audience where they are.** Tailor training content to specific audiences. Gauge audience background knowledge and understanding.
    - **Target training on installation quality**. Focus training not just on the basics but emphasize quality of installations to increase realization of energy savings.

Wages and Benefits

- Some stakeholders perceive there is a direct link between paying livable wages and providing benefits and attracting and retaining a skilled workforce. Contractors who are willing to pay a living wage and/or provide health benefits are also the contractors who are willing to invest in training their employees since retaining their workers is less of an issue. On the other hand, some stakeholders point out that wages do not necessarily correlate with quality.
- Contractors have found that higher pay results in attracting and retaining employees who view the job as a career and are happier employees who do better work. They believed that a wage requirement could potentially have a positive effect on work quality, but a neutral to negative effect on their business' profitability.

- Stakeholders cautioned that the benefit to participating in a PA program would need to outweigh the additional cost to the contractor associated with a wage requirement. The Seattle Community Power Works and Clean Energy Works Oregon programs provide examples of how two residential programs have addressed the challenge of incorporating wage and benefit requirements into program policy.[69] It should be noted that both programs have contracting relationships, called High Roads Agreements, with the contractors performing the work. A High Roads Agreement (HRA) is a multi-stakeholder agreement that lays out specific goals related to the quality and accessibility of economic opportunities; strategies for supporting these goals in the contractor selection process; and requirements that contractors and other stakeholders must agree to adhere to in order to support the goals throughout their involvement in the program. Contractors are admitted into a pool of approved contractors; and agree to adhere to requirements set out in the High Roads Agreements, including wage and insurance standards. Interviews with program staff revealed that while contractors initially were resistant to the wage requirements, ultimately contractors complied because they wanted to participate in the programs. According to the Clean Energy Works Oregon Final Technical Report, contractors found that investing in their crews resulted in better quality work, less turnover, and more stability for their business. Staff from both programs point to collaboration with a stakeholder advisory committee, which included contractors and labor unions, as a key factor in striking a balance between effectiveness in achieving goals and limiting contractor burden.
- Stakeholders who are against a wage requirement fear that establishing higher wage and benefit requirements beyond what is required by law will result in increased program costs without increasing energy savings. Our literature review revealed a rich history debating whether increasing wages results in increased project costs.[70]

Diversity

- As with other program elements, we did not provide definitions or specify what a diversity requirement might entail. In some cases, stakeholders discussed requirements that could encourage or lead to increased diversity, in other cases they interpreted a diversity requirement more literally as requiring diversity. A few stakeholders feel that at least some level of requirement that encourages workforce diversity should be part of a responsible contractor policy. They feel that it is appropriate to set a high standard for diversity, particularly when public rate-payer dollars are involved. The rest either did not comment on whether a diversity requirement was important or were strongly opposed to such a requirement. Those who oppose, argue that while they generally want to support access and reach to disadvantaged workers, a diversity requirement does not align with the primary goals of energy saving programs, which are to contribute to the state energy goals.
- Contractors do not see how encouraging diversity would lead to better quality work. They fear not being able to find people who meet diversity requirements with the required skills, which could potentially have a negative effect on quality. They also feel that it would be unfair to give jobs to individuals just because they meet certain diversity requirements. Ultimately, they say that a diversity requirement would prevent them from participating in a PA-sponsored energy efficiency program as they want complete control over who they hire.

[69] Clean Energy Works Oregon is a residential energy efficiency program offering financing and rebates for energy efficiency upgrades. The Seattle Community Power Works program offers financing and rebates for residential weatherization upgrades.
[70] See studies cited in section 5.3.4.

- Some stakeholders suggest limiting diversity requirements to larger scale projects, such as projects with a budget of $100,000 or more.
- Clean Energy Works Oregon provides an example of how programs have addressed the challenge of incorporating diversity requirements into program policy. As mentioned earlier, the program has contracting relationships, High Roads Agreements, with contractors performing work. Contractors are admitted into a pool of approved contractors; and agree to adhere to requirements set out in the High Road Agreements, including hiring standards that support the program's diversity goals throughout their involvement with the program. In addition, the program prioritizes diversity in the contracting process. This program uses a Best Value Contracting Process to assemble its contractor pool. This process uses a two-step qualification process, first screening contractors for minimum requirements, and then awarding additional "High Roads" points for various criteria that support High Roads agreement objectives, including supporting a diverse workforce, being a historically underrepresented business, or contracting with a historically underrepresented business. The higher a contractor applicant scored on high roads objectives, the more PA-acquired leads were allocated to that firm. The program also requires participating contractors to adhere to hiring standards that support the program's diversity goals throughout their involvement with the program. While the program initially faced pushback from contractors related to the hiring standards, the program overcame this barrier by providing a source for qualified workers who met the diversity requirements. In interviews, program staff stress the importance of collaborating with contractors and with training centers to align a pipeline of qualified candidates with contractor needs.

7.1.3 Policy Considerations

- Our research identified many factors that should be considered when operationalizing the responsible contractor policy in relation to the PA energy savings programs. These include impacts on program cost-effectiveness, program design, contractor capacity and type, project scale, administrative challenges, and workforce data collection.
- Some stakeholders are very concerned about the impact of a responsible contractor policy on energy efficiency program cost-effectiveness. These concerns revolve around increased training and administrative costs as well as a responsible contractor policy limiting the contractor pool resulting in higher project costs without higher energy saving benefits.
- Other stakeholders disagree with these cost-effectiveness concerns, stating that contractors who do not comply with requirements now are driving energy savings down by improperly installing energy efficiency measures, thus impacting cost-effectiveness calculations. A few stakeholders suggested that including responsible contractor benefits in non-energy benefit calculations would balance out any increase in program costs. However, the CPUC does not currently accept non-energy benefits in its cost-effectiveness framework.
- Numerous stakeholders discussed concerns around how a responsible contractor policy would be applied to programs where the PA has a direct contracting relationship with the contractor versus those that do not. This is a large factor that must be weighed heavily in any responsible contractor policy. About a third of programs are currently in an indirect contracting relationship with contractors where customers are allowed to hire the contractor of their choice as long as they meet the program requirements, which most often require only a valid CSLB license. PAs or third-party program implementers are directly hiring and overseeing the work of contractors when they enter into a direct contracting relationship with the contractors, e.g. CA's Energy Savings Assistance Program, and in that relationship the PAs have much more control over who does the work and how it is done.

- Some stakeholders feel that one of the potential unintended consequences of imposing more contractor requirements is that such requirements may give a competitive advantage to larger firms who have the resources to adopt additional requirements and remain competitive and profitable.
- Some stakeholders believe that contractor standards should vary based on the scale of projects; using thresholds at which different criteria take effect. For example, larger and more complicated commercial and industrial projects should have more stringent requirements than small residential projects. Similarly, enforcement strategies should vary based on the scale of the project. For example, for larger projects, it might make sense to require customers to hire contractors from a pre-approved list. For smaller projects, it may be sufficient to have the contractor submit a form with a contractor affidavit.
- The Seattle Community Power Works program and Clean Energy Works Oregon, both learned that developing and implementing High Roads Agreements is a complicated process with many moving pieces. These administrative challenges require time to implement.

Appendix A. Secondary Source List

Specific Documents included in our literature review are shown in the table below.

Table A-1. List of Secondary Sources

No.	Citation
1	California Public Utilities Commission. (January 2011 Update). California Long Term Energy Efficiency Strategic Plan. Retrieved January 27, 2017, from http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf
2	Pacific Gas & Electric. 2018-20125 PG&E Energy Efficiency Business Plan. January 17, 2017. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_cbeb1d9e14cf4575845e8d5cd6bce57f.pdf
3	Navigant Consulting. (April 2016). AB 802 Technical Analysis Potential Savings Analysis. Retrieved November 11, 2017, from http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M159/K986/159986262.PDF
4	Southern California Edison. (February 2017) Southern California Edison Company's Amended Energy Efficiency Rolling Portfolio Business Plan for 208-2025. Retrieved November 11, 2017, from https://docs.wixstatic.com/ugd/0c9650_9bf95393f6e9424db1686bdf67bdf13c.pdf
5	San Diego Gas & Electric. (January 2017). SDG&E Energy Efficiency Business Plan, "Building a Better Energy Efficiency Future, 2018-2025. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_52c02da4469c4213b0974b412b3f85ad.pdf
6	Southern California Gas Company. (January 2017). Energy Efficiency Plan. Retrieved November 11, 2017 from https://docs.wixstatic.com/ugd/0c9650_a9135c638d974c04ac7e99449d310d56.pdf
7	Bay Area Regional Energy Network. (January 2017). BayREN Energy Efficiency Business Plan 2018-2015. Retrieved November 11, 2017 from, https://docs.wixstatic.com/ugd/0c9650_5cc67ae2072945eeae78111e36b74d36.pdf
8	Marin Clean Energy. (January 2017). Energy Efficiency Business Plan. Retrieved November 11, 2017, from https://www.mcecleanenergy.org/wp-content/uploads/2017/01/EE-BusinessPlan2017_20160105_filing.pdf
9	Southern California Edison. (January 2017). SoCalREN Energy Efficiency Rolling Portfolio Business Plan, 2018-2015. Retrieved November 11, 2017, from https://docs.wixstatic.com/ugd/0c9650_c3d9a5b446704389bdff9cd0db785dc7.pdf
10	California State License Board. (No Date). Report Unlicensed Activity. Retrieved November 11, 2017, from http://www.cslb.ca.gov/Consumers/Report_Unlicensed_Activity/.
11	Donald Vial Center On Employment In The Green Economy Institute for Research on Labor and Employment University of California, Berkeley. (May 2014). Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities. Retrieved January 27, 2017, from http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf.
12	Donald Vial Center On Employment In The Green Economy Institute for Research on Labor and Employment University of California, Berkeley. (March 2011). California Workforce Education & Training Needs Assessment. Retrieved January 27, 2017, from http://laborcenter.berkeley.edu/pdf/2011/WET_Part1.pdf.
13	US Department of Energy Office of Inspector General Office of Audit Services. (February 2010). Progress in Implementing the Department of Energy's Weatherization Assistance Program Under the American Recovery and Reinvestment Act. Retrieved January 27, 2017, from https://energy.gov/sites/prod/files/igprod/documents/OAS-RA-10-04.pdf.
13	US Government Accountability Office. (February 2010). Recovery Act Officials' Views Vary on Impacts of Davis Bacon Act Prevailing Wage Provision. Retrieved January 27, 2017, from http://www.gao.gov/new.items/d10421.pdf.

14	National Governors Association Center for Best Practices. (November 2010). Enhancing State Clean Energy Workforce Training to Meet Demand. Retrieved January 31, 2017, from https://www.nga.org/files/live/sites/NGA/files/pdf/1011CLEANENERGYWORKFORCE.PDF.
15	Ernest Orlando Lawrence Berkeley National Laboratory. (March 2011). Interactions between Energy Efficiency Programs funded under the Recovery Act and Utility Customer-Funded Energy Efficiency Programs. Retrieved February 14, 2017, from https://emp.lbl.gov/sites/all/files/lbnl-4322e_0.pdf.
16	Smart Cities Prevail. (2017). The Value of Linking Good Construction Jobs to California's Housing Reforms. Retrieved November 2017, from https://www.smartcitiesprevail.org/wp-content/uploads/sites/24/2017/03/SCP_HousingReport.0314.pdf
17	Plympton, Patricia; Barbour, Ed; Boman, Sarah; Hensley, Rebecca; Pollock, Ed; Somers, Jennifer; Hoffmeyer, Dale; Phillips, Matthew; Ferington, Diane; Hanna, Jerome; Mosser, Mona; Jones, John; Dedolph, Carter. (August 2010). Retrofit Program Delivery Models for Home Performance with ENERGY STAR The Climate to Retrofit Is Now. Retrieved February 8, 2017, from https://aceee.org/files/proceedings/2010/data/papers/1964.pdf.
18	Cluett, Rachel; Amann, Jennifer. (March 2014). Residential Deep Energy Retrofits. Retrieved February 1, 2017, from ACEEE Research Report Database (A1401).
19	Research Into Action. (June 2015). Drivers of Success in the Better Buildings Neighborhood Program – Statistical Process Evaluation: Final Evaluation Volume 3. Retrieved February 3, 2017, from https://energy.gov/sites/prod/files/2015/08/f25/bbnp_volume_3_drivers_of_success_statistical_071715_0.pdf
20	Energy Market Innovations, Inc; Western Cooling Efficiency Center; Verified, Inc; Bettering Buildings, Inc. (September 2012). California HVAC Contractor & Technician Behavior Study. Retrieved February 10, 2017, from http://www.calmac.org/publications/CA_HVAC_Behavior_Study_FinalReport_2012Sept14_FINAL.pdf
21	Opinion Dynamics. (June 2016). PY2013-2014 California Statewide Workforce, Education and Training Program: Contractor Training Market Characterization. Retrieved February 14, 2017, from CALMAC database (CPU0134.01)
22	Opinion Dynamics. (December 2015). PY2013-2014 California Statewide Workforce Education and Training Program Workforce Conditions Data Investigation. Retrieved February 14, 2017, from CALMAC database (CPU0133.01).
23	National Renewable Energy Laboratory. (No Date). Standard Work Specifications for Home Energy Upgrades. Retrieved February 2017, from https://sws.nrel.gov/.
24	Kim, Jaewhan, and Peter Philips. (March 2010). Health Insurance and Worker Retention in the Construction Industry. Journal Of Labor Research, 31 (1), 20-38. Retrieved May 10, 2017, from Business Source Complete, EBSCOhost.
25	Clark, Mike. (Fall 2005). The Effects of Prevailing Wage Laws: A Comparison of Individual Workers' Wages Earned on and off Prevailing Wage Construction Projects. Journal of Labor Research 26(4), 725-737. Retrieved May 10, 2017, from Business Source Complete, EBSCOhost.
26	Swan, Eric; Metoyer, Jarred; Bos, Wim. (2008). Too Much Stick? Not Enough Carrot? Testing the Presumption of Non-Compliance. Retrieved October 12, 2017, from http://aceee.org/files/proceedings/2008/data/papers/1_612.pdf
27	Meres, Ryan; Sigmon, Jeremy; DeWein, Mike; Garrett, Ken; Brown, Jim. (2012). Successful Strategies for Improving Compliance with Building Energy Codes. Retrieved October 12, 2017, from https://aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf
28	City of Seattle. (2014). Seattle Power Works: Final Report and Conclusions. Retrieved October 9, 2017, from https://www.osti.gov/scitech/servlets/purl/1172056
29	City of Seattle. (June 2010). Community High-Road Agreement: for Seattle's Residential Retrofit Programs. Retrieved September 29, 2017, from http://clerk.seattle.gov/~public/meetingrecords/2010/regional20100720_3c.pdf
30	Portland Bureau of Planning and Sustainability. (December 2013). Clean Energy Works Oregon: Final Technical Report. Retrieved October 11, 2017, from https://www.osti.gov/scitech/servlets/purl/1117211

31	Clean Energy Works Oregon. (January 2012). High Road Standards and Benefits. Retrieved October 11, 2017, from https://enhabit.org/wp-content/uploads/2012/03/CEWO_HRS_1_12.pdf.
32	Green for All. (2012). High Road Agreements: A Best Practice Brief. Retrieved September 29, 2017, from https://www.greenforall.org/high_road_agreements_a_best_practice_brief_by_green_for_all
33	US Department of Energy. (March 2014). Guidelines for Home Energy Professionals Project (Brochure). Retrieved October 9, 2017, from https://www.nrel.gov/docs/fy14osti/61414.pdf
34	DNV GL. (September 2017). 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6). Retrieved November 6, 2017, from http://www.calmac.org/publications/HVAC%5FWO6%5FDRAFT%5FREPORT%5FAPPENDICES%5FVolumeII%5F22Sept2017%2E.pdf
35	DNV GL. (October, 2014). HVAC Permitting: A Study to Inform IOU HVAC Programs. Retrieved November 6, 2017, from CALMAC database (PGE0349.01).
36	Center for Sustainable Energy. (2014). HVAC Permit Compliance Survey Results. Retrieved November 6, 2017, from https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf
37	Proctor Engineering Group, Ltd. (October 2012). In Response To The Request For Comments On The Comprehensive Energy Efficiency Program For Existing Buildings (AB 758 Program) Scoping Report Docket No. 12-EBP-1. Retrieved November 6, 2017, from: http://www.energy.ca.gov/ab758/documents/2012-10-08-09_workshop/comments/Proctor_Engineering_Group%20Ltd_Comments_2012-10-29_TN-68241.pdf
38	California State License Board. (No Date). HVAC Ambassador Program Fact Sheets. Retrieved November 11, 2017, from http://www.cslb.ca.gov/Resources/GuidesAndPublications/HVAC_AmbassadorPacket_Consumer.pdf
39	Institute of Heating and Air Conditioning Industries. (2013). Supplementary comments on the AB 758 - Comprehensive Energy Efficiency Program for Existing Buildings: The View from a White Truck: A C-20 contractor perspective on Title 24 Compliance. Retrieved November 11, 2017, from http://www.energy.ca.gov/ab758/documents/2012-10-08-09_workshop/comments/The_Institute_of_Heating_and_Air_Conditioning_Industries_Additional_Comments_2013-07-19_TN-71687.pdf
40	Western HVAC Performance Alliance. (July 2017). Understanding the Residential HVAC Compliance Shortfall. Retrieved November 11, 2017, from http://www.performancealliance.org/Portals/4/Documents/Committees/Goal1/WHPA%20Compliance%20White%20Paper%20DRAFT2_7.12.17%20with%20Comments.pdf.
41	US Government Accountability Office. (December 2008). Federal Requirements for Highways May Influence Funding Decisions and Create Challenges, but Benefits and Costs are Not Tracked. Retrieved November 1, 2017, from http://www.gao.gov/assets/290/284235.pdf
42	Rogers, Joel. (March 2016). 5 Simple Strategies for More Engaging Compliance Training. Retrieved November 11, 2017, from http://www.compliancewave.com/blog/5-simple-strategies-for-more-engaging-compliance-training
43	Mahalie, N. (2008). Prevailing Wages and Government Contracting Costs. A Review of the Research. EPU Briefing Paper #215. Retrieved November 11, 2017, from http://www.epi.org/publication/bp215/
44	Economic Policy Institute. (November 2017). New York's Prevailing Wage Law: A Cost-Benefit Analysis. Retrieved November 11, 2017, from http://www.epi.org/publication/new-yorks-prevailing-wage-law-a-cost-benefit-analysis/
45	California Public Utilities Commission. (October 2001). California Standard Practice Manual – Economic Analysis of Demand-Side Programs and Projects. Retrieved October 2001 from http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/CPUC_STANDARD_PRACTICE_MANUAL.pdf
46	McMahon, E.J. and Gardner, Kent. (April 2017). Prevailing Waste: New York's Costly Public Works Pay Mandate. Retrieved November 11, 2017, from https://www.empirecenter.org/publications/prevailing-waste/

47	Decision 12-11-015 (November 2012). Retrieved November 11, 2017 from https://docs.google.com/document/d/11ZLXEZwQLGlBor9wzVenBZPzzjFkQ0jnA9D82l7nkgw/edit.
48	Brown, E. (January 5, 2015). Inaugural Address. Retrieved November 2017 from https://www.gov.ca.gov/news.php?id=18828
49	Cox T. and Blake, S (1991). Managing Cultural Diversity: Implications for Organizational Competitiveness. The Executive, 5, 45-56.
50	Richard, 0., Barnett, T., Dwyer, S., and Chadwick, K. (2004). Cultural Diversity in Management, Firm Performance and Moderating Role of Entrepreneurial Orientation Dimensions. Academy of Management Journal, 47.
51	Guillaume, Y., Dawson, J., Woods, S., Sacramento, C., and West, M. (2013). Getting Diversity at Work to Work: What we know and what we still don't know. Journal of Occupational and Organizational Psychology, 86.
52	Belma, Dale and Voos, Paula. (October 1995). Prevailing Wage Law in Construction: The Costs of Repeal to Wisconsin.The Institute for Wisconsin's Future. Retrieved December 29, 2017, from https://pdfs.semanticscholar.org/98fd/ce7c72e8d3559e4f5c4111a65c147b2ccccd.pdf.

Appendix B. In-Depth Interview Topics

Opinion Dynamics

Responsible Contractor Policy Study
In-Depth Interview Basic Guide

Introduction

Opinion Dynamics will conduct in-depth interviews with key stakeholders including the CEC, CPUC, CSLB, IOU WE&T staff, IOU policy teams, IOU program staff, other IOU staff, training providers, credentialing organizations, and contractor organizations. The purpose of these interviews is to understand what elements should be considered for inclusion in the Responsible Contractor Policy, how these elements might impact the market and program participation, the potential unintended consequences of the policy, who "owns" and enforces the policy, and the legal and contractual ramifications of such a policy. The Responsible Contractor language from SB-350 states:

> *[The] Commission shall adopt, implement, and enforce a responsible contractor policy for use across all ratepayer-funded energy efficiency programs that involve installation or maintenance, or both installation and maintenance, by building contractors to ensure that retrofits meet high-quality performance standards and reduce energy savings lost or foregone due to poor-quality workmanship.*

Background

On September 18, 2008, the California Public Utilities Commission (CPUC) drafted California's first Long-Term Energy Efficiency Strategic Plan (Strategic Plan). The Strategic Plan called for a Needs Assessment for WE&T in order to "more thoroughly define, initiate and drive long-term WE&T development and strategic planning" (pg. 75). In November 2009, the IOUs contracted with the Donald Vial Center for Labor in the Green Economy (DVC), to complete a Needs Assessment study. The study was completed in March 2011.

In D.12-11-015, *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets,* the IOUs were ordered to hire an expert entity to develop a comprehensive approach to WE&T, in accordance with the Strategic Plan Goals and the Needs Assessment study recommendations. Through a competitive solicitation process and with the help of a network of stakeholders, the IOUs issued a Request for Proposal for a consultant to develop that comprehensive approach. On May 30, 2013, the contract was awarded to DVC. On May 2, 2014, DVC finalized its recommendations in the document *Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities.* In this report, DVC recommended a Responsible Contractor Policy that states:

> *Recommendation 1.1 Adopt a responsible contractor policy for use across all resource programs where contractors work directly with the IOU or where a customer receives an incentive for equipment or service.*

> 1.1.1 Require and verify that all firms (and subcontractors) working on ratepayer subsidized projects meet pre-established, clearly defined minimum standards relating to contractor responsibility, including: all applicable licenses, bonding and insurance (including workers' compensation), wage and labor law compliance, no OSHA violations, and permitting that includes passing code inspections.

In D.14-10-046, *Decision Establishing Energy Efficiency Savings Goals and Approving 2015 Energy Efficiency Programs and Budgets,* the IOUs were directed to file a Tier 2 advice letter describing which of the Recommendations would be initiated in 2015.

On January 16, 2015, the IOUs hosted a Stakeholder Engagement Forum to review and solicit feedback on the IOUs' 2015 efforts regarding the Recommendations. As a result of that feedback, the IOUs modified and clarified their approach on a number of recommendations, including responsible contractor policies. The IOU modification stated:

> *Revised Recommendation 1.1 - Adopt a responsible contractor policy for use across all resource programs where contractors work directly with the IOU.*
>
> > 1.1.1 Require that all ratepayer-subsidized projects meet pre-established, clearly defined minimum standards relating to contractor responsibility, including: all applicable licenses, bonding and insurance (including workers' compensation), wage and labor law compliance, OSHA compliance, and permitting that includes passing code inspections.

The concept of a Responsible Contractor Policy was expanded in SB-350 to include contractor skills and performance related to retrofit installation and maintenance projects.

Questions

1. Some stakeholders believe that ratepayer funded programs should set the highest bar for Contractors to participate in retrofit installation and/ or maintenance energy efficiency programs including workforce quality, workforce diversity, safety, permit closure, insurance, wages and benefits, employer support, etc.

   What is your reaction to the idea that ratepayer funded programs should set the highest bar for participation?

3. We have studied the contractor eligibility requirements and standards that [Utility] mandates for participation in retrofit installation and maintenance programs. Across all energy efficiency utility program providers, more than half explicitly mention licensure requirements, compliance with Federal, State and Local Laws, and Permit Requirements (primarily HVAC programs). More than a third explicitly mention professional conduct, a pre-approval process, insurance, warranty on work performed, previous experience, and program training. Less than a third explicitly mention background checks.

   [ASK IOUs]

   How should these elements be considered relative to a responsible contractor policy? From your How are current program eligibility requirements currently verified? Who does this work? How is it done?

What type of data is collected? What type of resources does it take to do this work? How often are they checked?

How do these types of requirements impact contactor participation in programs? Are there particular types of requirements that are more impactful on participation than others?

How do these types of requirements impact end-user/customer participation in programs?

[Ask Everyone Else]

How should these elements be considered relative to a responsible contractor policy? From your perspective, what are the gaps that are not covered by current IOU requirements? What other requirements come to mind that should be considered by a responsible contractor policy? Who should be involved in implementing the responsible contractor policy? What role should each player play?

4. Thinking again about potential responsible contract policy elements of workforce quality, workforce diversity, safety, permit closure, insurance, wages and benefits, and employee support, are there other elements that should be included in the policy? Are there any elements that should definitely not be included in the policy?

   Are there other lines of business outside of EE that have such policies that could inform a responsible contractor policy?

5. When thinking about the implementation of a responsible contactor policy with some or all of the elements we discussed today, what other things come to mind that should be considered?

   What are the implications if programs do not have a direct relationship with the contractor?

   What are the potential implications of such a policy on cost effectiveness?

   How does such a policy impact business plan/ implementation plan development and execution?

6. Are you familiar with other states or organizations that already have responsible contractor policies in place or have tried to put responsible contractor policies in place? What elements did they include that were successful? What challenges did they face that we can learn from? (Probe: Legal considerations, implications of policy implementation)

Appendix C. Focus Group Discussion Guide

Opinion Dynamics

Responsible Contractor Policy Study
Focus Group Discussion Guide
October 19, 2017
Final

Focus Group Target: Two in-person focus groups: one with electric contractors who perform installation, retrofit, or maintenance work of lighting equipment and the second with HVAC contractors who perform installation, service and/or maintenance of HVAC equipment. As shown in the table below, we are recruiting 12 participants to seat 8 in each focus group.

Focus Group	Segment	Timing	Target Number of Participants
1	HVAC Contractors	6pm Thursday October 19th	12
2	Electric Contractors	8pm Thursday October 19th	12

Statement of Research Objectives

- Objective: Determine Elements that Should Be Considered for Inclusion in a Responsible Contractor Policy (Future State)
  - What elements should be considered for inclusion in a responsible contractor policy?
  - What is the role of industry-recognized credentials in a responsible contractor policy? How do we ensure these credentials have true utility and value and are quality measures of skill attainment?
  - Should bonding, insurance, worker's compensation, wage and labor law compliance, OSHA violations, and permitting compliance be included in the Responsible Contractor Policy?
  - What are the pros and cons of the Responsible Contractor Policy as it may apply to contractors, subcontractors, contractor laborers, technicians, etc.?
- Objective: Explore the Opportunities and Challenges to Implementing a Responsible Contractor Policy (Feasibility)
  - What are the potential impacts to contractor participation? Customer participation?

- How should the elements of the responsible contractor policy potentially be enforced? Who will potentially play the enforcement role(s)?

Focus Group Timing

- Opening/Introductions/Ground Rules = 10 minutes
- Topic 1 = 15 minutes
- Topic 2 = 10 minutes
- Topic 3 = 55 minutes

Opening/ Ground Rules

Time: Allotment: 5 Minutes

Hello and Welcome! Thank you all for coming this afternoon/evening. My name is ____ and I'm with Opinion Dynamics, an independent research firm that has been hired to conduct this group discussion. This group is being sponsored by the California Public Utilities Commission. You were invited here today to discuss your perspective related to the development and implementation of a Responsible Contractor Policy that has been mandated by Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015.

The first thing to keep in mind today is there are no right or wrong answers, just opinions. Your opinion is the most valuable thing you can contribute to this group. Please be honest in your opinions and feel free to share your point of view even if it differs from what others have said.

Second, everything you say here is confidential, which means that your names will not be associated with your comments. Many good ideas flow rather quickly in a focus group and I want to make sure I catch all the thoughts and ideas that surface in these dynamic discussions. Do I have everyone's permission to record this session? [Thanks.]

Third, in terms of our discussion today. Let's have only one person talk at a time. We want to make sure we hear everyone's full thoughts. Also, related to this, I need each of you to participate fully in the group today, although you don't have to respond to all questions. In addition, responding directly to each other's comments in encouraged, responses don't necessarily have to be directed to me. If the conversation drifts off a topic, I may jump in to get the discussion back on track or interrupt to move onto another topic due to timing, please don't take offense at this. I'm simply trying to cover all the issues in the 90 minutes we have together today.

Finally, let's review some quick logistics.

- The discussion will last approximately 90 minutes – get you out by 7:30/9:30.
- Location of bathrooms
- Please turn off cell phones and put them away.

Introductions

Time: Allotment: 5 Minutes

Great! Let's start by going around the room and having you tell us a little about yourself, including:

[FLIP CHART WITH INTRO QUESTIONS]

1. Your first name,
2 Your firm's primary focus,
3 How long you have been in the industry.

Topic 1: Perceptions of current IOU program requirements

Goal: To understand how current IOU program requirements are perceived, their role in current program participation decisions and in ensuring quality performance.

Time Allotment: 15 Minutes

Thank you for introducing yourselves. I would like to start tonight's discussion by talking a bit about your experience with the current energy efficiency and demand response programs offered by utilities in California.

Questions:

How many of you have participated in a utility sponsored energy efficiency or demand response program? [SHOW OF HANDS] Which programs have you participated in?

What information is most critical to your decision to participate or not?

Some utility programs require a contractor to have a signed contract with the utility showing that they meet certain eligibility requirements in order to participate in their program. In other programs, any contractor can work with a customer to complete energy efficiency projects that will be incentivized through the program, the contractor is not required to have a direct contract with the utility. Is there any difference in how you think about programs that require you to have a direct relationship with the utility compared to those that do not?

We have studied the contractor eligibility requirements and standards that utilities in California mandate for participation in retrofit installation and maintenance programs. Across all energy efficiency utility program providers, the vast majority explicitly mention licensure requirements and compliance with Federal, State and Local Laws. About half explicitly mention permit requirements (primarily HVAC programs), insurance, warranty on work performed, pre-approval process and professional conduct. About a third explicitly mention a, previous experience and program training. Less than a third explicitly mention background checks.

- How do these types of requirements impact your participation in programs? Are there particular types of requirements that are more impactful on your decision to participate than others? Are any of these requirements above or beyond your standard service provisions?
- What effect, if any, do you feel these types of requirements have on ensuring that retrofits meet high-quality performance/workmanship standards with respect to energy savings. What requirements are the most effective in this respect, which are the least effective. Why?

Topic 2: Initial Reaction to SB350 Language

Goal: Understand perceptions of the policy requirements and identify elements for consideration

Time Allotment: 10 minutes

Next, I would like to talk about the development and implementation of a Responsible Contractor Policy that is mandated in California's Senate Bill 350 (SB-350) Clean Energy and Pollution Reduction Act of 2015. For those of you who aren't familiar, SB-350 was signed into law in October of 2015 and establishes new clean energy, clean air and greenhouse gas reduction goals for 2030 and beyond. The portion of SB-350 that I would like to talk about states that the:

> *Commission shall adopt, implement, and enforce a responsible contractor policy for use across all ratepayer-funded energy efficiency programs that involve installation or maintenance, or both installation and maintenance, by building contractors to ensure that retrofits meet high-quality performance standards and reduce energy savings lost or foregone due to poor-quality workmanship.* [Hand out copy to each participant]

Questions:

- What is your initial reaction to this part of the policy?
- Where you aware of this policy before today? About the Responsible Contractor Language?
- Understanding that a policy has yet to be fully defined, but will be required. What characteristics should be used to predict a contractor's ability to deliver retrofits that meet high-quality performance standards, why? What should not be used, why not?

Topic 3: Elements for Consideration

Goal: Understand perceptions around what elements should be considered for inclusion in a responsible contractor policy. What are the pros and cons to each as they may apply to the contractor's business models, bottom-lines, hiring practices, perception of any differentiation around these topics they can use to sell their services and potential program participation.

Time Allotment: 55 Minutes

[Activity] – Perceptual Mapping

I would like to talk about six specific elements that could be considered for inclusion in the policy. I would like you to work as a group to discuss these elements, which I will reveal in a few minutes, with respect to their potential effectiveness in ensuring quality work and the potential benefits and drawbacks to your business and contractors like you.

Before we dive into this activity, let's look at an example from an unrelated topic. Let's compare five car companies – Toyota, Ford, General Motors, Hyundai and Volvo - relative to one another in terms of cost and quality. The grid behind me contains two spectrums. One spectrum runs vertically- with low quality on the left

and high quality on the right. The other spectrum runs horizontally – with high cost on the top and low cost on the bottom. Where would you place each car company on the continuum? [PLACE FIRST TWO AS AN EXAMPLE, THEN MOVE ON - Moderator does first one, providing reasoning. Asks group to do the second and to explain reasoning].

OK, so moving back to the topic of our discussion, I would like you to work together to place the following six elements that could be considered for inclusion in a responsible contractor policy, in terms of their potential effectiveness in ensuring quality work and the potential benefits and drawbacks to your business and contractors like you. The elements are:

- Permitting and permit closure requirements
- Training and credentialing requirements
- Licensing – who is required to be licensed in your field
- Safety
- Wages and benefits/employee support
- Diversity

As you see, the grid again has two spectrums. One running from least effective in ensuring quality work to most effective in ensuring work quality, and the other running from most drawbacks to most benefit to businesses and contractors like you to the most beneficial. As you decide where to place each element, I would like you to explain your reasoning behind your placement.

Question: Where would you place [ELEMENT] and why?

Probes:

- What do you see as the potential benefits and drawbacks as they pertain to:
    - Your hiring practices
    - Your bottom-line
    - Your customers
        - **Permitting:** Some people feel that holding all contractors to pulling permits and complying with permitting requirements would level the related to the costs associated with permit pulling. How would you react to this statement?
    - Your employees and technicians and sub-contractors
        - **Training and Credentialing:** What benefits and drawbacks do you see impact of investing in employees on business, cost, career paths, etc.
- How would this element influence your decision to participate or not to participate in a utility sponsored energy efficiency program?

[Repeat for each element]

Wrap Up

That brings us to the end of our session. I want to thank you for helping us today. On your way out, please visit the front desk where we will have a check for you as a show of appreciation for your time. Thanks again.

Appendix D. Public Comments

Opinion Dynamics received the public comments, embeded as PDFs below, for the draft Responsible Contractor Policy for EE Programs: Market Intelligence Study (Calmac Study ID: CPU0178) dated November 2017.


Council Comments.pdf


CEE Comments.pdf

Opinion Dynamics

Appendix E. Response to Public Comments

Memorandum

Responsible Contractor Policy for EE Programs: Market Intelligence Study Response to Public Comments

From: Opinion Dynamics
Date: January 8, 2018
Re: Response to Public Comments (CALMAC STUDY ID: CPU0178)

This memo summarizes Opinion Dynamics' responses to the public comments received in December 2017 for the draft Responsible Contractor Policy for EE Programs: Market Intelligence Study (Calmac Study ID: CPU0178) dated November 2017.

- **Summary of Comment 1:** The RCP study overview leads off with a prejudicial characterization of the SB350 responsible contractor mandate.

  Opinion Dynamics Response: Regarding the following overview statements: "As our society becomes increasingly complex, we are faced with more and more difficult policy challenges that are not easily solved. Contemporary policy problems are often characterized by ill-defined problems, solutions that cannot be proven correct before application, and little guarantee of the solution achieving the intended result. The Responsible Contractor Policy as mandated by Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015 (SB-350) is an example of one such contemporary policy issue." Our intent is to report summary information while remaining a neutral author, therefore we have removed the statement from the report.

- **Summary of Comment 2:** The RCP study inaccurately presents stakeholder viewpoints on the effect training has on quality as in conflict.

  Opinion Dynamics Response: We agree with this comment and have tried to clarify this by adding language to indicate that the two viewpoints are not necessarily in conflict.

- **Summary of Comment 3:** The RCP study improperly focuses on findings from a 2012 field study that the study itself found were not statistically significant

  Opinion Dynamics Response: We apppreciate the commenter's reminder that parts of the 2012 Energy Market Innovations' California HVAC Contractor and Technician Behavior Study on which we report on are not statistically significant. We do believe that it is important to mention this study as it does provide one documented case where training did not necessarily ensure work quality. We have removed the graphic and study recommendations in attempt to place less emphasis on the study.

- **Summary of Comment 4:** The cost-effectiveness discussion on pages 67-68 is incomplete. Significant cost-effectiveness factors have not been considered or addressed in this section. A meaningful

discussion of cost-effectiveness cannot take place without disclosing that current utility cost-effectiveness calculations for energy efficiency programs do not take into account lost energy savings from poor installation outcomes.

Opinion Dynamics Response: We do mention that some stakeholders believe that contractors who do not comply with requirements are driving energy savings down by improperly installing energy efficiency measures. We have also added language clarifying, based on your comment, that the majority of current utility cost-effectiveness calculations do not take into account lost energy savings from poor installation outcomes.

- **Summary of Comment 5:** Studies link wages and benefits to a skilled workforce in the building construction industry. On page 56, the RCP Study states that it "did not find quantitative data linking wages and benefits to a skilled workforce in the building construction industry." There are in fact several studies that make this finding.

  Opinion Dynamics Response: We added findings from the 1995 study you reference, "Prevailing Wage Law in Construction: The Costs of Repeal to Wisconsin," from The Institute for Wisconsin's Future to section 5.3.1. We also revised the language under 5.3.1 accordingly to specify that we did not find recent quantitative data linking wages to a skilled workforce. The commenter correctly points out that quantitative data does exist existence linking health insurance benefits and a skilled workforce. We had already referenced Kim & Philips' 2010 study, "Health Insurance and Worker Retention in the Construction Industry," in section 5.3.5.

- **Summary of Comment 6:** The section on workforce data collection challenges should include current workforce data practices in community workforce agreements throughout California and commercial software solutions

  Opinion Dynamics Response: As noted in the report, the findings presented in section 6.6 are summarized from a study Opinion Dynamics completed in 2015, "PY2013-2014 California Statewide Workforce Education and Training Program Workforce Conditions Data Investigation". We did not conduct an updated investigation into current collection systems that the IOUs use to track workforce data as it was not in scope for this study. Similarly, the stakeholders we spoke with did not discuss current systems.

For more information, please contact:

Dr. Ellen Steiner
Vice President

(720) 262-5857 tel
esteiner@opiniondynamics.com

Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451

San Francisco Bay

510 444 5050 tel
510 444 5222 fax

1 Kaiser Plaza, Suite 445
Oakland, CA 94612