Home Upgrade
Energy Upgrade California®

2016 HOME UPGRADE

PARTICIPANT HANDBOOK

FOR PACIFIC GAS AND ELECTRIC COMPANY AND
SOUTHERN CALIFORNIA GAS COMPANY TERRITORY

Build It Green

Version 3.1, May 2, 2016

Welcome, Program participants!

Welcome to Energy Upgrade California® Home Upgrade, an innovative new program that advances energy efficiency and resource conservation through upgrades of thousands of existing buildings throughout the state.

As a Home Upgrade Program participant, you are a critical part of this program. It's your expertise that allows Customers to make their properties more energy efficient and helps the State reach its greenhouse gas reduction goals.

Home Upgrade will also help you—by providing ways to market new services to existing Customers generate leads to new clients and grow your business in a sustainable, energy-efficient marketplace.

This handbook provides you with information about the program, guidelines on becoming a Program participant, and the processes you need to follow to perform energy efficiency upgrades. The handbook serves as a supplement to the training and other in-person workshops that will be offered. Think of it as a roadmap for a sustained relationship with Energy Upgrade California!

THIS PROGRAM **PARTICIPANT HANDBOOK** IS A WORKING DOCUMENT. BUILD IT GREEN RESERVES THE RIGHT TO UPDATE, CHANGE AND/OR REVISE THE DOCUMENT TO CLARIFY PROGRAM RULES AND REQUIREMENTS AT ANY TIME DURING THE TERM OF THE PROGRAM. THE CURRENT VERSION WILL BE AVAILABLE ON THE BUILD IT GREEN **PROGRAM PORTAL** WEBSITE AT: WWW.HOMEUPGRADE.ORG

This Program is funded by California utility Customers and administered by Pacific Gas and Electric Company (PG&E) and Southern California Gas Company (SoCalGas®) under the auspices of the California Public Utilities Commission.

Page

TABLE OF CONTENTS

Page

1 ABOUT THE PROGRAM

Home Upgrade is a comprehensive, *whole house* approach to home improvement. Based upon building science principles, the Program emphasizes an integrated approach to energy efficiency, starting with an assessment of current systems to identify effective solutions that will improve comfort and energy performance.

Home Upgrade has three key components:

1. Establish measures that support the *whole house* approach to energy efficiency
2. Offer rebates, incentives and financing options to reduce the upfront cost of energy efficiency projects and drive property owners to participation
3. Provide workforce training for building professionals that perform energy upgrades

The Program is open to both home owners and renters, with permission from their landlords.[1] Single family detached homes, including manufactured homes, as well as two-four unit buildings can participate. Participating contractors must complete all (or subcontract) the upgrade work and hold the prime contract/scope of work with the Customer. Subcontractors working for Participating contractors must meet Program eligibility requirements (background check, licensing, insurance, etc.) and perform work within the limitations set forth by all applicable code and licensing rules and requirements.

Special Notes: PG&E Electric Customers who use propane to fuel items within their home (stove, water or space heating) are now eligible for rebates for (only) Electric savings through the Home Upgrade pathways. Mobile homes on a chassis and axle constructed under HUD codes do not qualify.

1.1 Home Upgrade Program Overview

Energy Upgrade California® Home Upgrade offers property owners a choice of two Home Upgrade pathways, Home Upgrade (formerly Basic Package) and Advanced Home Upgrade (formerly Advanced Package).

- The Home Upgrade pathway focuses on the 'low hanging fruit' of energy efficiency and requires installation of at least one base measure and two additional measures for a minimum total of three. The Home Upgrade pathway offers Customers and Program participants an easy entry point to home energy efficiency while leaving open the opportunity for additional comprehensive upgrades in the future. Home Upgrade pathway incentives are not available for 2-4 unit buildings. Home Upgrade projects in PG&E and SoCalGas® service territories are administered in all counties served by PG&E and SoCalGas®, *except* within the nine Bay Area counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma), where those

[1] For simplicity, this document refers to "Customers", which is meant to include landlords when the home is not owner-occupied.

projects are administered by the San Francisco Bay Area Regional Energy Network (BayREN).

- The Advanced Home Upgrade pathway provides a customized solution for each property owner, starting with a *whole house* energy assessment to evaluate current systems and identify opportunities for improvements. All eligible 2-4 unit buildings must use Advanced Home Upgrade. Advanced Home Upgrade projects in PG&E and SoCalGas® service territories are administered by PG&E and SoCalGas® in all counties served by PG&E and SoCalGas®. Advanced Home Upgrade projects in the nine Bay Area counties are administered by PG&E.

Property owners can choose to add additional, enhanced options to both Home Upgrade pathways such as Green Building measures, water efficiency and renewable energy. These enhanced options may not eligible for PG&E incentives but could be eligible for rebates from local governments or tax credits.

Please also note that both Home Upgrade pathways require "test-in" (before installation or repair) and "test-out" (after installation or repair) Combustion Appliance Safety (CAS) testing. Advanced Home Upgrade also requires "test-in" and "test-out" building leakage and duct leakage testing, while Home Upgrade projects require building leakage and/or duct leakage testing, depending on the Base Measures selected. You can learn more about each Home Upgrade program pathway in Section 2 of this handbook.

1.2 Rebates and Incentives

The Home Upgrade Program provides opportunities for Customers to reduce the cost of their upgrades through incentives and rebates offered by utilities and local governments.

- The **PG&E and SoCalGas® Home Upgrade Program** provides up to $6,500 to Customers who complete either Home Upgrade ($1,500–$3,000) or Advanced Home Upgrade ($1,000–$6,500) projects.[2]
- **Local government rebates** vary by city and county, but may offer substantial incentives above and beyond the PG&E and SoCalGas® rebate program. Program participants can find information on local rebates and eligibility requirements at www.EnergyUpgradeCA.org .

In order to be qualify for rebate, the total project cost for eligible energy efficiency upgrade measures must exceed the rebate amount (i.e., there must be a net cost for the work, greater than $0). Additional information about the rebates and incentives can be found in Section 2 of this handbook.

1.3 Program Participant Training

Energy Upgrade California® Home Upgrade provides training for building professionals seeking to offer energy upgrades as Program participants.

This Program may require substantial training and investment to succeed. If your company is already committed to offering your clients comprehensive energy efficiency improvement

[2] In reality, there is no cap on the advanced program. Incentives are based on Therm and kWh savings – the more the savings, the more the incentive. However, contractors are not allowed to advertise higher dollar amounts (to prevent 'run-away' incentive claims).

services based on "house-as-a-system" building science and best practices, this Program can augment your current services. If you or your company is considering pursuing HVAC, insulation or home performance work, then becoming a Home Upgrade program participant can provide a solid foundation to make this transition.

In designing this Program, Build It Green has attempted to streamline paperwork. Where the Program imposes extra requirements that are outside the scope of a Program participant's normal business practices, the focus has been to achieve at least one of the following goals:

1. Safeguard Customer health and safety
2. Maximize Customer benefits in the form of lower utility bills, and improved comfort and indoor air quality
3. Implement best practices and avoid missed opportunities for cost-effective energy savings
4. Demonstrate that claimed energy savings are achieved

As a Program participant, we hope you will join us in committing to achieve these worthwhile outcomes for your customers and your business.

1.4 Program Funding and Oversight

Energy Upgrade California® Home Upgrade is a program of the California Public Utilities Commission in collaboration with the California Energy Commission, California counties, cities, nonprofit organizations, and the state's investor-owned utilities. Funding comes from utilities' ratepayers under the auspices of the California Public Utilities Commission in addition to incremental funding from the U.S. Department of Energy.

PG&E and SoCalGas® has engaged a diverse team with extensive Program design and implementation credentials to help administer the Program. The team consists of Build It Green, Electric & Gas Industries Association (EGIA), and PG&E and SoCalGas®. Team member roles are allocated as follows:

Table 1. Team Roles

Partner	Roles
Build It Green	▪ Serve as prime contractor to PG&E and SoCalGas® ▪ Assist PG&E and SoCalGas® with Program implementation ▪ Lead Program participant outreach/training ▪ Develop and maintain job tracking system ▪ Conduct technical reviews of job applications ▪ Conduct administrative reviews of job applications ▪ Process rebates and submit applications to PG&E ▪ Report on rebate processing and details to PG&E and SoCalGas® ▪ Lead quality assurance, field verification and mentoring efforts ▪ Coordinate with local government and industry stakeholders
EGIA	▪ Conduct administrative reviews of enrollment applications ▪ Support Program participant outreach
PG&E and SoCalGas®	▪ Fund program in PG&E and SoCalGas® territory and provide incentive payments ▪ Lead Program design and requirements ▪ Lead customer marketing and communication efforts ▪ Support BayREN and local government coordination ▪ Supply reporting requirements

NOTES

2 HOME UPGRADE PATHWAYS

2.1 The Home Upgrade Rebate Pathway

The Home Upgrade pathway is intended to serve Customers who are unable or not yet ready to invest in a broader set of upgrade measures. It also opens the Program to contractors who will gain experience and training to later qualify to offer the Advanced Home Upgrade pathway. The Home Upgrade pathway requires selection of at least one base measure and at least two additional efficiency measures. Improvements must meet or exceed all applicable Title 24 Standards ***and*** Program technical specifications.

Table 2. Home Upgrade Measures

Category	Measure	Technical Specifications	Points	PG&E Fuel Requirements
Base Measures	**Duct Sealing**	Seal to ≤ 10% for existing systems	**25**	Gas and/or Electric
	Duct Replacement	Seal to ≤ 6% for replacement ducts	**65**	Gas and/or Electric
	Whole Building Air Sealing	≥ 15% leakage reduction from vintage table ACHn (all building vintages)	**25**	Gas and/or Electric
	Whole Building Air Sealing	≥ 30% leakage reduction from vintage table ACHn (for homes built before 1993 only)	**45**	Gas and/or Electric
	Attic Insulation & Air Sealing	Insulation ≥ R-30 (≥ R-38 in climate zones 1, 11-13, 16)	**55**	Gas and/or Electric
	Attic Insulation & Air Sealing	Insulation ≥ R-44 (all climate zones)	**65**	Gas and/or Electric
Base Measure Kickers	**2nd Base Measure**	--Discontinued--	**N/A**	**N/A**
	3rd Base Measure	--Discontinued--	**N/A**	**N/A**
Flex Measures	**Wall Insulation**	Insulate ≥ R-13	**50**	Gas and/or Electric
	Floor Insulation	Insulate ≥ R-19	**55**	Gas and/or Electric
	Duct Insulation	Insulate ≥ R-8	**40**	Gas and/or Electric

Flex Measures	**Windows**	0.32 U,0.25 SHGC	**70**	Gas and/or Electric
	Gas Central Furnace	≥ 92% AFUE	**60**	Gas
	Gas Central Furnace	≥ 95% AFUE	**70**	Gas
	Gas Wall Heater	≥ 70% AFUE	**40**	Gas
	Air Conditioner	Split HVAC: ≥ 15 SEER/12.8 EER; Packaged HVAC: ≥ 15 SEER/12.9 EER	**75**	Electric
	Gas Storage Water Heater	EF ≥ 0.67	**35**	Gas
	Gas Storage Water Heater	EF ≥ 0. 70	**45**	Gas
	Gas On-Demand Water Heater	EF ≥ 0.82	**90**	Gas
	Electric Storage Water Heater	EF ≥ 2.00	**40**	Electric

Bonus points in the form of 'Base Measure Kickers' are no longer available .

If a home has previously had any one of the available measures installed in the last six (6) years, then it is ***not*** eligible for the Home Upgrade rebate with that measure(s) selected as part of the rebate package. However, another measure not previously rebated may be substituted to form a different package for rebate application. All rebate applications must have a minimum of three measures selected in order to be eligible for rebate submission. Additionally, all Home Upgrade projects require installation or verification of the existence of at least one CO Alarm or Detector (see Section 6.1 for specific requirement details).

Rebates and Incentives

Home Upgrade offers a flexible, points-based incentive, beginning at a minimum threshold of $1,500 for combined measures totaling at least 150 points, continuing to increase by $100 per every additional 10 points, up to a maximum of $3,000 for 300 points or more. Table 3 (below) describes the rebate levels:

Table 3. Home Upgrade Rebate Tiers

Rebate Tier	Amount
Home Upgrade	
150-155 Points	$1,500

160-165 Points	$1,600
170-175 Points	$1,700
180-185 Points	$1,800
190-195 Points	$1,900
200-205 Points	$2,000
210-215 Points	$2,100
220-225 Points	$2,200
230-235 Points	$2,300
240-245 Points	$2,400
250-255 Points	$2,500
260-265 Points	$2,600
270-275 Points	$2,700
280-285 Points	$2,800
290-295 Points	$2,900
300+ Points	$3,000

Customers who receive both gas and electric service from PG&E are eligible for the all of the Home Upgrade measures listed above. Customers who receive either gas or electric service from another utility are eligible for a rebate, depending on which energy services they receive from PG&E, as long as PG&E supplies the type of fuel used by any equipment selected as part of the combined measures contributing to the incentive amount. However, upgrades of existing equipment must be for more efficient versions of the same type of equipment (i.e., less-efficient Gas Central Furnace to more-efficient Gas Central Furnace, etc.). Fuel-switching is not eligible for rebate in Home Upgrade. Additionally, customers must have existing air-conditioning if they only have PG&E electric service or an existing natural gas furnace if they only have PG&E gas service, regardless of whether the equipment is selected as a measure as part of a Home Upgrade application.

Customers may also be eligible for single measure rebates and incentives from PG&E, as long as the rebate is not for the same measure selected for contribution to a Home Upgrade project. For a list of available single-measure rebates and incentives visit www.pge.com/rebates.

Individual cities and counties may offer additional whole house rebates over and above the PG&E incentive. Program participants should check on the statewide website (www.EnergyUpgradeCA.org) or with local governments to see what rebates are available.

2.2 The Advanced Home Upgrade Rebate Pathway

Advanced Home Upgrade maximizes opportunities for long-term energy savings. It offers Customers a more customized path to home performance than the Home Upgrade pathway. Advanced Home Upgrade requires diagnostic 'test-in' and 'test-out' assessments consistent with *Building Performance Institute Standard Practice for Basic Analysis of Buildings* and *Whole House Combustion Appliance Safety Test Procedure For Pacific Gas and Electric Company (PG&E) Home Upgrade Program*.

The 'test-in' begins the process of defining a comprehensive work scope for each job (including discovery of whether a home has existing health or safety issues to inform that work scope). The 'test-out' is used to document that specified improvements have been properly sized and installed and that safety tests have been successfully completed. The Advanced Home Upgrade pathway also requires at least a 10% expected improvement in performance based on modeling a minimum of two measures and installation or verification of the existence of at least one CO Alarm or Detector (see Section 6.1 for specific requirement details). Additionally, Advanced Home Upgrade:

- Establishes a baseline for each job by using a 'test-in' and 'test-out' method compatible with the requirements of HERS II assessments and BPI
- Requires higher levels of contractor training and qualifications
- Uses California Energy Commission (CEC) or Home Upgrade approved building simulation software and methodology to model performance and estimate energy savings for each job
- Provides greater Customer rebates and incentives than are available under the Home Upgrade rebate pathway

While not strictly required, it is recommended that Advanced Home Upgrade work scopes include any Home Upgrade measure(s) that is not already installed. It is also recommended that measures meet or exceed any/all above-code standards (at a minimum, installed measures must be an improvement upon existing ***and*** meet current Title 24 requirements) specified in Table 4 (below).

Table 4. Typical Advanced Home Upgrade Measures

Measure Description	Program Standard
1. Wall insulation	R value ≥ 13, installed per CEC QII Standards.
2. Attic Insulation	R-38 or better, installed per CEC QII standards.
3. Floor insulation	R value ≥ 19, installed to full-joist thickness, per CEC QII Standards.
4. Envelope air sealing	0.35ACHn target, 0.5 ACHn minimum performance, achieved in accordance with BPI standards and ASHRAE 62.2
5. Infiltration reduction measures (air barriers)	Install to manufacturer's specifications. Must result in measureable air infiltration reduction.
6. Exterior Windows	ENERGY STAR® compliant, air leakage less than 0.3 CFM/ft, installed per manufacturer's instructions
7. Window film	Per manufacturer's installation guidelines. SHGC meets or exceed Energy Star requirements.
8. Heating and cooling equipment replacement	Central natural gas furnace: AFUE ≥ 94% Direct-vent natural gas heater: AFUE ≥ 80% Split AC SEER: ≥ 15, EER ≥ 12.8 Packaged AC: SEER ≥ 15, EER ≥ 12.9 Split heat pump: ≥ 15, EER ≥ 12.8, HSPF ≥ 8.7 Packaged heat pump: SEER ≥ 15, EER ≥ 12.9, HSPF ≥ 8.2 All systems properly sized according to ACCA Manuals J, D, and S with room-by-room air flows and register types identified.
9. Duct insulation	R-8 or greater.
10. Duct sealing	Reduce duct leakage to 10% or less of nominal or actual air flow of the heating or cooling system.
11. HVAC duct replacement/retrofit	Designed and sized per ACCA Manual D; ducts located in unconditioned spaces shall be buried in insulation or insulated to minimum R-8; duct leakage shall not exceed 6% of nominal or actual air flow; meet or exceed Title 24 requirements.
12. Refrigerant charge	Restore to stamped charge. Requires HVAC change-out and CF-3R submittal by certified HERS rater,
13. System air flow verification	Minimum 350 CFM/ton. Requires HVAC change-out and CF-3R submittal by certified HERS rater.
14. System fan wattage verification	Maximum 0.58 watts/CFM. Requires HVAC change-out and CF-3R submittal by certified HERS rater.
15. Radiant/hydronic heating	Per manufacturer's installation guidelines.
16. Lighting	Meet or exceed Title 24 "High-Efficacy" definition and ENERGY STAR standards (when applicable).
17. Domestic hot water	Exceed Title 24 requirements or ENERGY STAR standards when applicable (excludes solar water heating for this rebate Program).
18. Tankless water heater	Per manufacturer's installation guidelines.
19. Primary refrigerator replacement/installation	ENERGY STAR certified. Per manufacturer's installation guidelines.
20. Pool Pump	CEC-approved variable speed primary pump (model electric savings only). Installation by Certified Aquatic Equipment Installer (CAEI).

Measure Description	Program Standard
21. Cool roofs	Aged thermal emittance ≥ 0.75; Low slope: aged solar reflectance ≥ 0.55; Steep slope: aged solar reflectance ≥ 0.35.

Rebates and Incentives

Advanced Home Upgrade offers modeled energy savings-based incentives (subject to regulatory adjustment), beginning at a minimum threshold of $1,000 for 10% savings, continuing to increase by $500 per every additional 5% savings up to a maximum tier-based incentive of $4,500 for 45%+ savings. Additionally, customers may receive bonus 'Kicker' incentives for units of modeled energy savings (subject to regulatory adjustment) by PG&E 'fuel' type at $2.00 per Therm and $0.75 per kWh. Customers who receive both gas and/or electric service from PG&E and/or SoCalGas® are eligible for the following Advanced Home Upgrade rebates:

Table 5. Advanced Home Upgrade Rebate Tiers & Performance Bonus Kickers*

A. Savings/ Participation Level: % Reduction*	B. Savings percentage Incentive Amount		C. Energy Savings Incentive amounts $0.75/kWh and $2.00/therm*		D. Total Incentive D = (B+C) ≤ $6,500
10%	$1,000				
15%	$1,500				
20%	$2,000				
25%	$2,500	+	$0.75/kWh and $2.00/therm	=	Final Incentive amount (maximum $6,500)
30%	$3,000				
35%	$3,500				
40%	$4,000				
45%+	$4,500				

*Some upgrades may be eligible for a higher incentive for significant energy savings.

Customers who receive either gas or electric service from another utility are eligible for a pro-rated rebate, depending on which energy services they purchase from PG&E and/or SoCalGas®. However, upgrades of existing equipment claimed for modeled savings must be for more efficient versions of equipment using the same type fuel. Fuel-switching is not eligible for rebate in Advanced Home Upgrade, regardless of whether the project is for a home that is attached (2-4 Unit) or detached.

Additional rebates and incentives may be available from your local government, water district, or municipal utility. PG&E and SoCalGas® currently offer individual measure rebates for some measures that fit within an Advanced Home Upgrade work scope. However, Customers

are *not* eligible for additional PG&E and SoCalGas® rebates and incentives for individual products that are included in the Advanced Home Upgrade scope of work (i.e., double-dipping). For a list of available single-measure rebates and incentives visit **www.pge.com/rebates** and/or **www.socalgas.com/for-your-home/rebates**.

NOTES

3 BECOMING A PROGRAM PARTICIPANT

3.1 Eligibility/Credential Requirements

Home Upgrade includes two pathways for Program participation. In the Program, you and/or your company must meet the minimum credential requirements as described below.

3.1.1 Participating Contractor Requirements

Contractors may qualify to offer Customers only Home Upgrade improvements or both Home Upgrade and Advanced Home Upgrade improvements. To enroll in the Program, your company must execute the Contractor (or Rater) Participation Agreement, including all supporting documentation, and meet the minimum credential requirements in Table 6 (below):

Table 6. Contractor Credentials

Rebate Pathway	Minimum Credential Requirements
Home Upgrade	All of the following: • CSLB issued B license (General Contractor) or a C license (Specialty Contractor) of various installation work types (e.g., C-2 Insulation, C-20 HVAC, etc.) • Company leadership and crew leads complete Home Upgrade Core Training • Company leadership attends a Program Participation Workshop • Execute the Contractor Participation Agreement, including all supporting documentation • HERS II Whole House Rater or BPI-certified professional or properly trained staff employed by BPI-accredited company conducts project diagnostic assessment test-in, test-out • BPI-certified professional or properly trained staff employed by BPI-accredited company performs Combustion Appliance Safety testing for contractor (CAS testing individual, whether employees or subcontractor/consultants, must have completed Home Upgrade Advanced Technical Training)

Advanced Home Upgrade	All of the Home Upgrade requirements specified above, plus: • Must be CSLB issued B license (General Contractor) • At least one certified BPI-certified professional on staff at each business location • BPI-certified professional(s) performing CAS testing must have completed Home Upgrade Advanced Technical Training (both employees or subcontractor/consultants) • Home Upgrade Core Training recommended but not required

3.1.2 Participating Rater Requirements

Raters, upon enrollment approval, qualify to offer Customers both Home Upgrade and Advanced Home Upgrade assessments. To enroll in the Program, you must meet these minimum credential requirements:

- HERS II Whole House Rater certification
- BPI-Building Analyst certification
- Participation Workshop attendance
- Completion of Home Upgrade Advanced Technical Training
- Home Upgrade Core Technical Training recommended but not required

In addition to these credential requirements, Raters must also comply with the following Program requirements:

- Execute the Rater Participation Agreement, including all supporting documentation
- Participating Rater must perform diagnostic assessment test-in, test-out and combustion appliance tests

3.2 Participation Workshop

Before enrolling in the Program, you and/or your company's leadership must attend a Participation Workshop to gain an overview of Program requirements and rules, the application process, rebate and incentive levels, quality assurance and field verification requirements, and job data reporting for rebate authorization.

Workshop attendance is a condition for enrolling in the Program, as is registering for a Home Upgrade Core Training and/or Advanced Technical Training. Please visit www.HomeUpgrade.org for a calendar of upcoming workshop and training events.

3.3 Application Process

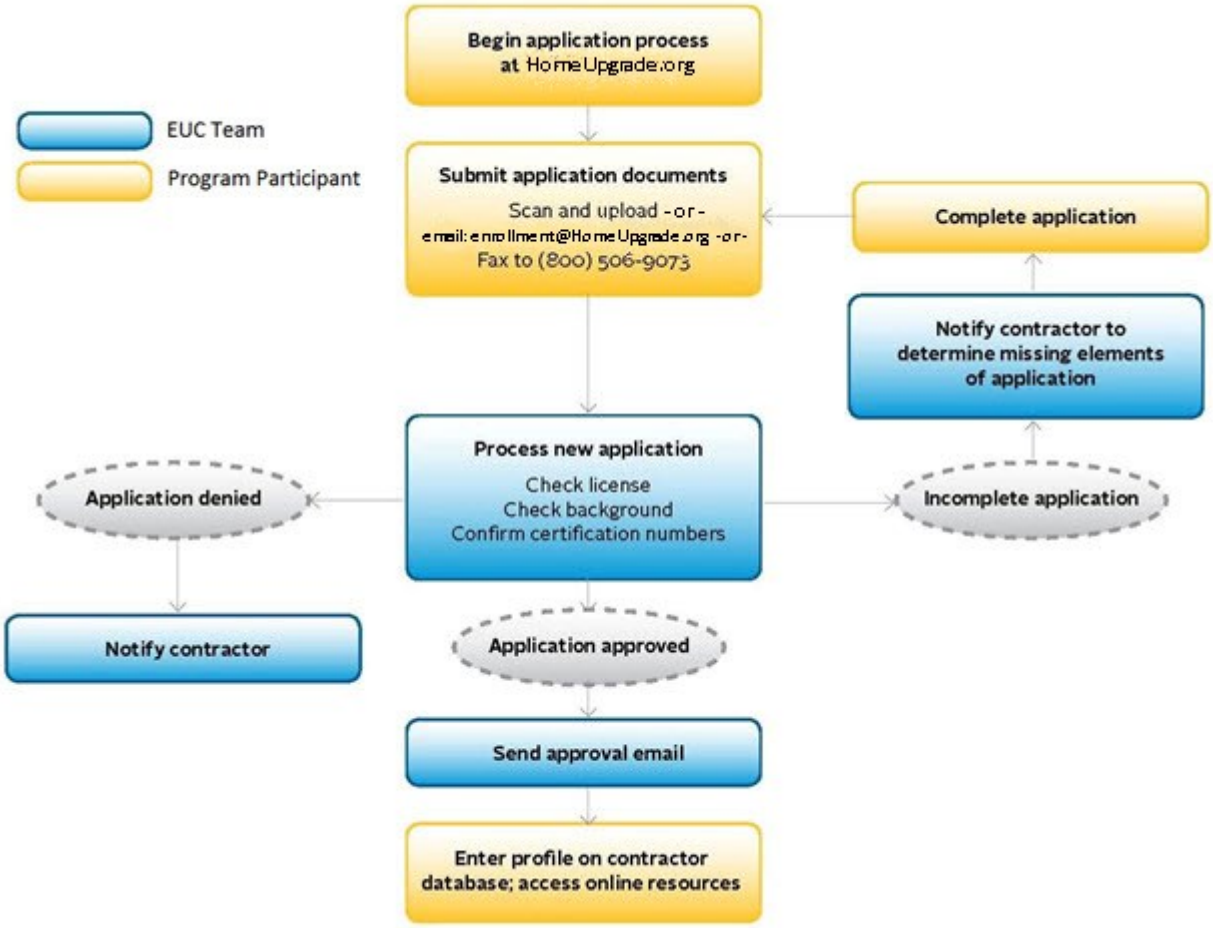
Program participants can access the enrollment site through the Build It Green portal at www.HomeUpgrade.org by selecting "Ready To Start: Enroll As A Contractor" button or "Ready To Start: Enroll As A Rater" button from the 'Enrollment Requirements' web page, or by selecting "Enroll Now>" in the 'Enroll Today' box from any page.

The enrollment portal will walk you through the application process. You will be able to save and exit the system then re-enter with login and password to complete enrollment as needed. You have three options for submitting application documents:

1. Scan and upload to the enrollment portal.
2. Scan and email to enrollment@homeupgrade.org
3. Print and fax to (800) 506-9073

An overview of the application and screening process is shown in Figure 1 below.

Figure 1. Enrollment Application and Screening Process



The Build It Green team will review your submittals and determine whether you have met the application requirements. You will receive an email of approval, denial, or request for additional information or clarification. Once you are enrolled in the Program, you will be added to an email distribution list for announcements about

training opportunities, Program updates, and related information. Your contact information will also be forwarded to the administrators of the statewide website (www.EnergyUpgradeCA.org), who will assist you in getting listed in the Program Participant Directory.

3.4 Home Upgrade Core Training

This course provides essential training for Program participants who wish to offer Energy Upgrade California rebates (incentives) to their clients who receive PG&E and/or SoCalGas® electric and/or gas service. This training is a required course if you do not already have a BPI-certified professional on staff and it is strongly recommended even if you do.

In this course, you will learn the fundamentals of building science and gain practical experience installing the core measures in the Home Upgrade Program, including;

- How to find air leaks in the building shell and properly seal them
- How to insulate the attic plane
- Basic blower door and duct testing procedures
- Essential combustion appliance safety testing practices and appropriate action to take when tests reveal potential problems

Course time is evenly split between the classroom and the demonstration house at PG&E's Energy Training Center in Stockton, as well as other potential training facilities throughout PG&E and SoCalGas® service territories. A training schedule is available on the Events calendar at www.HomeUpgrade.org.

3.5 Home Upgrade Advanced Technical Training

This training is required for all BPI-certified professionals (or properly supervised BPI Accredited/BPI Gold Star company staff) who wish to submit combustion appliance safety test results to the Program. The course focuses on supplementary combustion appliance safety protocols that complement those specified by BPI. It also provides information on Program required duct testing techniques, which are not always covered by all types of BPI-certified professional training. See the Build It Green website (www.HomeUpgrade.org) for the Advanced Home Upgrade technical training calendar.

3.6 Building Performance Institute (BPI)

The Building Performance Institute, Inc. (BPI) is a national standards development and credentialing organization for residential energy efficiency upgrade work. BPI offers professional certification examinations on the assessment and upgrade of residential buildings—both single-family and multifamily. The organization also provides accreditation to contracting companies committed to whole house home performance, and quality assurance programs that ensure this work adheres to BPI's nationwide technical standards. As an independent, not-for-profit organization, BPI brings together leading building science experts from across North America to develop standards using a consensus-based methodology.

Through a separate division, BPI maintains relations with a national network of affiliate training organizations who provide independent training for BPI professional certifications.

3.6.1 BPI Certification

Curricula offered by training affiliates cover every aspect of whole-home performance evaluation and execution, for every style and age of home, in every climate zone of the United States. The house-as-a-system approach teaches students about the relationships between different components within the home, how to identify problems at the root cause and provide solutions that improve energy efficiency while providing important safety functions such as mold prevention, indoor air quality, carbon monoxide testing, and combustion appliance safety checks. BPI professional certifications that qualify for enrollment requirements in the Program include:

- Building Analyst
- Envelope Professional
- Manufactured Housing
- Heating
- Air Conditioning and Heat Pump

Additionally, BPI offers supplemental business-model focused Home Energy Professional (HEP) certifications, developed with the support of National Renewable Energy Laboratory (NREL) with the following designations:

- Energy Auditor
- Retrofit Installer
- Crew Leader
- Quality Control Inspector

A BPI professional certification (that includes a combustion appliance safety field examination as a requirement for certificate issuance) is required for conducting combustion appliance safety testing. Please refer to www.BPI.org for more detailed information.

3.6.2 BPI Accreditation

BPI accreditation (a.k.a., BPI Gold Star) provides a business engaged in building performance work with a competitive advantage by ensuring that it has appropriately certified staff and quality management systems in place to delivery consistent, high quality services. BPI accreditation is voluntary and requires a true commitment to approach each project from a building performance perspective. A BPI-accredited company is committed to educating Customers on a whole-house, comprehensive approach even when a comprehensive package of services may not have initially been requested.

BPI accreditation helps ensure the accredited company has the tools and techniques necessary to impress upon the Customer the value and importance of their offerings,

while still allowing the flexibility to perform a limited scope of work if that is preferred and circumstantially appropriate. The intent of accreditation is to distinguish a business from its competition. Companies new to BPI accreditation are afforded a twenty-four (24) month period of skills development in their accreditation in order to meet all accreditation requirements.

A company employing a BPI-certified professional, and at least one specialty certification, can become accredited by BPI. Accredited companies participate in BPI's independent, third-party quality assurance program. They may also choose to hire non-accredited companies (while still responsible for quality assurance on the entire project) so long as all building performance work at a given project has on-site supervision by a BPI certified professional with the appropriate certification designation for the work being done. Please refer to the www.BPI.org website for more specific information.

3.7 Participation Agreement

Program participants in PG&E and SoCalGas® service territories must execute a Participation Agreement with Build It Green, which includes agreeing to:

1. Perform and report a minimum of four (4) completed jobs in each 12 month cycle of the Program period.
2. Assure that all work is performed in a safe and professional manner, including but not limited to full adherence to the Program's Combustion Appliance Safety Protocols.
3. Abide by the quality assurance procedures including job submission reporting and sampling protocols.
4. Train internal staff to field Customer inquiries about Energy Upgrade California and the Program.
5. Provide excellent customer service to any Customer requesting home improvement services.
6. Require all employees to present company identification and/or professional credentials upon the start of work each day in a Customer's home.
7. Contractor shall comply with contractor licensing requirements, applicable building codes, and all applicable federal, state, and local laws, rules, and regulations, and obtain all required building permits (unless done so by homeowner or their appointed agent). Raters shall comply with HERS II and BPI certification requirements as well as all applicable federal, state, and local laws, rules, and regulations.
8. 'Represent and Warrant' to Build It Green that Program participant's leadership (President, CEO, etc.), subcontractors, consultants and staff have no prior conviction of specified crimes as well as no lawsuits or liens filed against the Program participant or its leadership within the previous seven (7) years. Program participants must have a 'time of-hire' and annual background check policy in place to verify this.
9. Abide by the Program terms, including but not limited to, third party policies, procedures, regulations, licenses as well as standards in any co-marketing collateral Program participant may produce.
10. Immediately report to Build It Green, or its representatives, all Customer conflicts that are not resolved to Customer's full satisfaction.

Additional application requirements and associated verification protocols are summarized in Table 7 (below).

Table 7. Participant Screening and Verification Requirements

Requirements	Verification
1. Applicant Contact Information	Name, title, company, address, phone, fax, email, Home Upgrade and/or Advanced Home Upgrade
2. Participation Agreement	Authorized signature, including 'Represent and Warrant' affidavit that none of Program participant's employees with access to Customer homes has been convicted within the last 7 years of any of the following misdemeanors or felonies: arson, assault, battery, burglary, driving under the influence (3 yrs.), domestic violence, larceny, manslaughter, murder, theft (including identity theft), and any crimes against children
3. Insurance and Bonding Requirements	Insurance certificates for [1] general commercial liability, [2] auto liability, [3] workers compensation and [4] bonding. Liability Insurance must name "Build It Green" , "SoCalGas®", and "PG&E" as additional insured s' and [1], [2] and [3] above require a 'waiver of subrogation' endorsement favoring BIG, PG&E, and SoCalGas®.
4. License and/or Certification Information	**For contractors:** License number(s), classification(s), and expiration date(s). For Home Upgrade, B or C licenses; for Advanced Home Upgrade, B license (minimum) and a BPI certified professional on staff. License status and compliance with CSLB contractor bond requirements will be verified online and checked yearly for compliance. **For raters:** HERS II and BPI certification numbers and expiration dates (BPI Accreditation/Gold Star for 'Rater Company')
5. Evidence of being in business for 2 years (contractors only)	Screen shot of 2-year history for relevant CSLB license (i.e., installing the equipment, products, or materials indicated on Program participant's license or of equivalent experience) or if not available, financial info for past 2 years. **-- OR --** Documentation that the business has BPI accreditation or two years of similar work experience and two professional references
6. Evidence of certifications	Copies of certification identification cards for all BPI-certified employees and HERS II raters
7. List of sales personnel and CSLB Home Improvement Salesman	**For contractors:** Provide list verified on the CSLB website **For raters:** Provide list of sales personnel
8. Background checks	'Represent and Warrant' no prior felony conviction as well as no lawsuits or liens filed against Program participant, its leadership, or sales and field staff within the previous 7 years. Program participants conduct background checks 'at-hire' and yearly on all employees with job duties in/at customer homes
9. Attendance at Participation Workshop	Owner/Principal and/or primary job submission staff must attend (verified by workshop webinar attendance rosters)

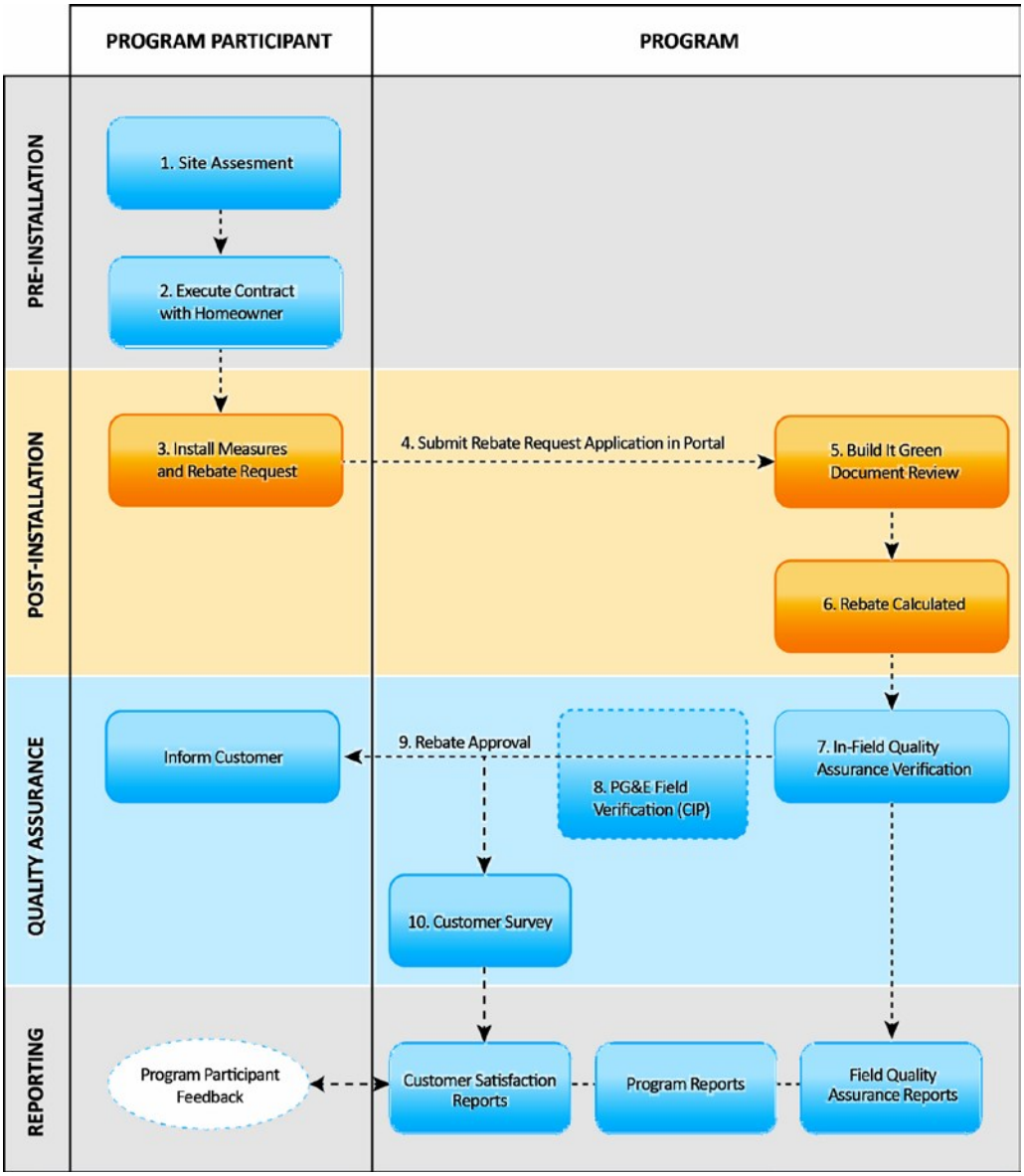
10. Attendance at Home Upgrade Core Training	Required for Home Upgrade contractors only if no BPI certified professional on staff
11. Attendance at Home Upgrade Advanced Technical Training	Required for all BPI-certified professionals performing combustion appliance safety tests on Program jobs

NOTES

4 JOBS DATA REPORTING AND ENERGY SAVINGS MODELING

Home Upgrade pathway requires only one job submission event, after completion of the work (including all work scope installations, Test-In and Test-Out CAS and diagnostic assessments, as well as any CAS related repairs that may be uncovered). The purpose of the job application is to (a) confirm Customer eligibility, (b) confirm that the proposed work scope meets rebate eligibility requirements, and (c) document pre- and post- improvement conditions, including Combustion Appliance Safety test results. You will submit job applications (rebate requests) on behalf of your customers. The general process is illustrated in Figure 2 (below).

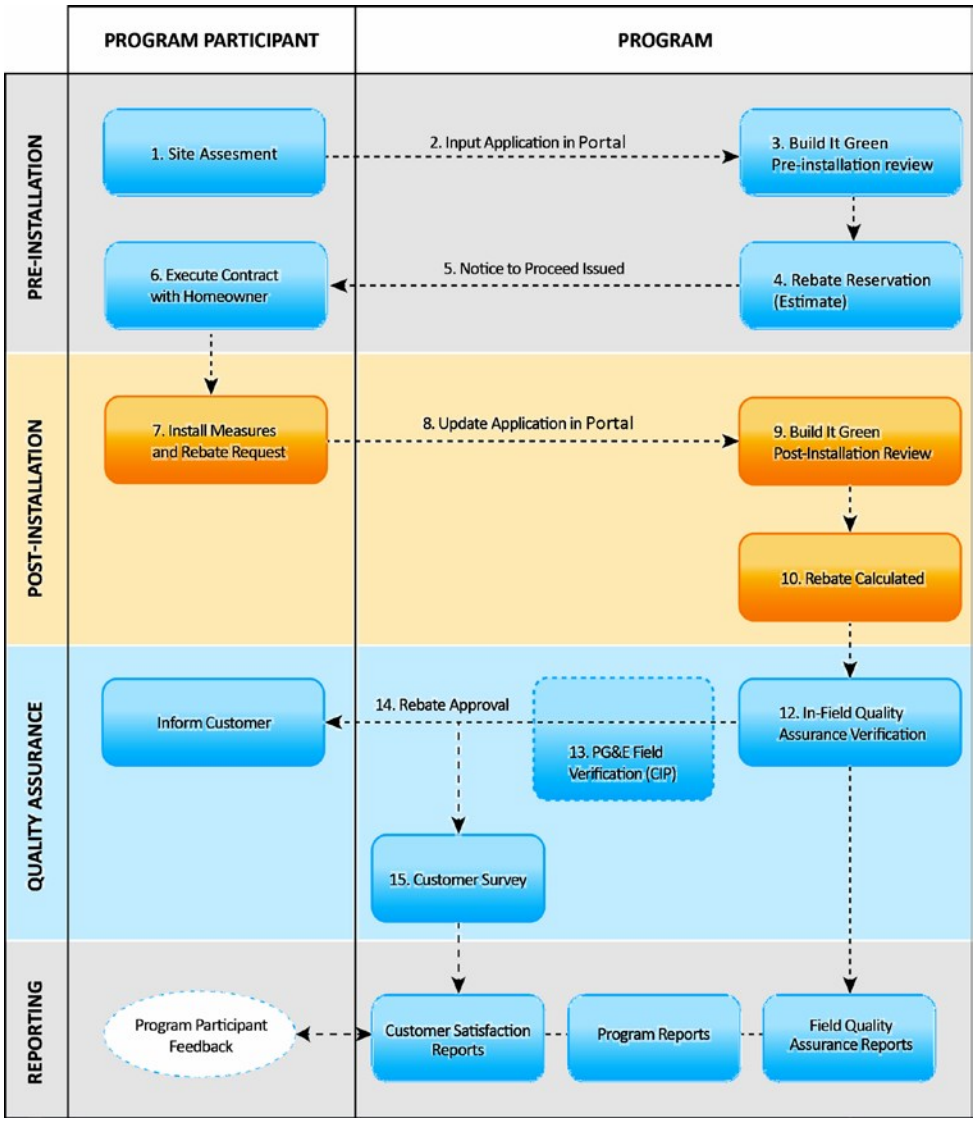
Figure 2. Home Upgrade Job Flow Process



The **Advanced Home Upgrade** pathway requires two sets of submittals for each job: (1) a "Pre-Installation" *job application* prior to starting work; and (2) a "Post-Installation" *rebate request* after job close out. The purpose of the *job application* is to (a) confirm Customer eligibility, (b) confirm that the proposed work scope meets rebate eligibility requirements, and (c) document pre-installation conditions, including Combustion Appliance Safety test results. The purpose of the *rebate request* is to document post-improvement conditions, including final Combustion Appliance Safety test results, and confirm that the upgrades meet rebate eligibility requirements.

You will submit job applications and rebate requests on behalf of your customers. The general process is illustrated in Figure 3.

Figure 3. Advanced Home Upgrade Job Flow Process



4.1 Site Assessment

To start a job, complete a site assessment of your prospective client's home, including Combustion Appliance Safety (CAS) test, and develop a proposed scope of work in line with the "house as a system" approach. Be sure to identify any repairs needed to fix combustion appliance safety issues and include those in your proposal to your client. Keep in mind that PG&E and SoCalGas® require that *all* combustion appliance safety issues to be fixed to qualify for the rebate. Please refer to the Program's *Whole House Combustion Appliance Safety Test Procedure* resource on the Program portal Document Library for specific requirements (**Please Note**: PG&E Electric Customers with Propane appliances are eligible, but have a specific guidance document, also available on the Program portal Document Library; **Please Note**: Program participants shall also use the *SoCalGas Inspection Guidelines* document for CAS test procedures in SoCalGas® service territory).

If you are proposing a Home Upgrade job, then make sure the agreed-upon work scope is consistent with the eligibility requirements specified in Table 2 on page 5.

If you are proposing an Advanced Home Upgrade job, then model the energy savings for the accepted work scope using CEC-approved software (modeled savings must exceed 10%). Your client may elect to execute a contract at this time or may prefer to wait for confirmation that the proposed work scope would qualify for a Program rebate.

Special Note: PG&E issues rebate checks to the PG&E account holders. If your client is *not* also the PG&E and/or SoCalGas® account holder (e.g., client is the landlord, account holder is the tenant), then the account holder may sign a *Customer Release (Tenant-Landlord)* form to pass the rebate on to your client. The account holder also has the option to pass the rebate to contractor by signing a *Customer Incentive Payment Assignment (CIPA)* form. Both forms are available for download on the Program portal Document Library. All contract-signing customers must be informed of Post-Installation Approved rebate amount by the participating contractor, regardless of whether they are receiving the rebate or not.

Please explain to your client that Build It Green, PG&E and/or SoCalGas® *may* request access to inspect the job after it is completed. For more information on Quality Assurance and Field Verification refer to Section 5.

4.2 Submit Job Application

For Home Upgrade and Advanced Home Upgrade projects, you will submit rebate applications online through the online Job Submission Portal. You can access the job submittal web page via the Program Portal at www.HomeUpgrade.org. Please consult the *Home Upgrade Job Submission Instructions* or *Advanced Home Upgrade Job Submission Instructions* resources, depending on the Program pathway you select for your project, on the Program Portal Document Library. **For Home Upgrade jobs, skip ahead to Section 4.6 'Execute Contract and Make Improvements'.**

Your submittal will include (but is not limited to) the following components:

- Job information, including energy model files for Advanced Home Upgrade jobs
- Proposal/scope of work, on contractor letterhead with cost and job address
- CAS test results (at test-in and test-out) for each unit in the subject building
- Account holder/property owner information
- Utility service (meter IDs) information
- Utility bill release form(s)

For more detailed job submittal resources visit the Program portal Document Library.

4.3 Pre-Installation Technical Review

Your job application goes through two levels of review: technical and administrative. For the technical review, the Build It Green team reviews the job information, proposal/scope of work, and CAS test-in results to confirm that:

- Proposed job is for a PG&E and/or SoCalGas® customer(s) in a single-family home or two-four unit building
- Proposal/scope of work is consistent with Program requirements
- Proposal/scope of work addresses any deficiencies identified in the CAS test-in results

Test-in results must be submitted within 120 days from test-in assessment. If you have not submitted your test-in results within 120 days, you will have to perform the test-in again in order to submit your results.

For Home Upgrade jobs, scope must include one base measure and at least three measures (total), with the points for all measures totaling a minimum of 100 points (see Table 2 on page 5 for the list of required Home Upgrade measures). For Advanced Home Upgrade jobs, energy model inputs must match the proposed work scope and outputs must show a minimum 10% expected energy savings.

Any proposed job for a modular or factory-built home must have been transported and assembled on site in conformance with state and local building codes. In addition, these modular homes must be greater than 320 square feet in size, not have a State of California Community Services Department sticker indicating status as a licensed mobile home, and be assembled on site rather than transferred to the site on its own chassis. Mobile homes on a chassis and axle constructed under HUD codes do not qualify.

Single-family attached homes (2-4 Units) are eligible to participate in Advanced Home Upgrade (only), but are subject to special CAS testing requirements. Single family attached homes include townhomes, condominiums, and apartments up to four units. To participate, these projects must meet the following criteria:

- All property owners must agree to participate, along with all occupants of units that are subject to improvement.

- Each unit that is subject to improvement must be submitted as a separate application (including all electric buildings).
- The entire building *must* be tested for combustion appliance safety, including every unit, whether or not it is subject to energy upgrade (this testing can confirm which units, if any, are *all electric*). All CAS failures in all units *must* be corrected.
- Upon job completion (for units that are **not** *all electric*), all combustion appliances must either be located outside the building envelope, power vented, or sealed combustion.

Special Notice: 2-4 Unit (Single-family attached) jobs are subject to pre- and post-installation field verification/observation. Build It Green reserves the right to observe pre- and post-installation CAS tests. Please notify Build It Green at least 10 business days in advance of scheduled tests. Advance notice maybe provided via email to fieldqc@homeupgrade.org. BPI-certified professionals require on-site observation of test-in and test-out events on that individual's *initial* 2-4 Unit job (by Build It Green staff) in order to qualify for any/all independent assessment of future 2-4 Unit jobs.

Build It Green will follow up via email to alert you that additional information is needed to complete the technical review. Application anomalies may trigger field verification to confirm accuracy of submittals. For more information on Quality Assurance and Field Verification refer to Section 5.

4.4 Pre-Installation Administrative Review

In addition to the technical review, the Build It Green team reviews submittals to confirm Customer eligibility, summarized as follows:

- CAS test was performed by a qualified BPI-certified professional or appropriately trained and supervised employee of a BPI-accredited company
- Contact information is complete for the Customer and either (a) the PG&E and/or SoCalGas® Customer of Record matches the Customer name on the job application (i.e., the property owner); or (b) the property owner has provided written authorization to direct the rebate payment to the Customer of Record
- Home receives natural gas and/or electric service from PG&E and/or SoCalGas®
- A complete and signed copy of the Safety and Quality Acknowledgement form is provided

The Build It Green team may follow up with you via email for any additional information needed to complete the administrative review. Denied applications will be communicated to you by email. Inquiries about denied applications should be directed to jobs@homeupgrade.org or to 510-590-3360 x606.

4.5 Pre-Installation Approval (Notice to Proceed)

Once all application requirements have been met, a reservation is formed and the Build It Green team will send you an email with a Pre-Installation Approval (formerly Notice to Proceed). Advanced Home Upgrades may be started before Pre-Installation Approval (not applicable for Home Upgrade jobs) is issued if you are confident that the job qualifies for the Program. Prior to installing measures, the Program participant must perform a comprehensive test-in, including combustion safety testing, to document the pre-existing conditions. Take pictures to document uncommon or unique situations.

The Pre-Installation Approval reserves rebate funds for your proposed scope of work for up to 45 days. After that period, rebate availability is subject to change without notice. If you choose to perform work without the Pre-Installation Approval, you accept full liability that the rebate funds have not been reserved and that your Customer may not be eligible. Regardless of receipt of Pre-Installation Approval, it is your responsibility to manage expectations with your customer that the estimated rebate amount is only an estimate. Changes to overall work scope and differences in performance-based measures (air-sealing & duct-sealing) results from proposal to installation can change estimated and/or actual rebate amounts.

4.6 Execute Contract and Make Improvements

Typically, once the Notice to Proceed is issued (not relevant for Home Upgrade projects as they are submitted post-contract execution and installation), contractors execute a contract with the client and make energy improvements (installation and/or repairs) per the agreed-upon work scope. **Please note that a CAS test is required prior to leaving the job site *any* time measures are installed that affect the infiltration or pressurization of the home.** If we do not hear back from you within a couple weeks, we may follow up periodically to learn how the job is progressing.

As part of job completion (test-out), make sure a BPI-certified professional or BPI-accredited company employee repeats the full combustion appliance safety testing procedures for all units in the subject building, even if not participating in the program, to make sure that no health and safety issues were introduced during the course of improving the home.

Special Note: The Customer may not waive repair of any combustion safety deficiencies identified during the course of upgrading the home. It is therefore essential that you identify any deficiencies at the test-in stage and incorporate any required repairs into your scope of work. This also applies to Home Upgrade jobs.

Please keep us posted on the expected job test-out date. If you are new to the Program, your job test-out may be a good opportunity to receive some free field mentoring from Build It Green. Advance scheduling is required. For more information on Quality Assurance and Field Verification refer to Section 5.

4.7 Job Reporting and Rebate Request

All rebate requests (post-installation applications for Home Upgrade and Advanced Home Upgrade) must be submitted to the online Portal within 60 calendar days from the job completion date.

For **Home Upgrade** pathway, after job completion, submit a rebate request (post-installation) and enter job information/data into the Home Upgrade online portal. A complete submittal includes detailed job description and installed measure information. Test-in and test-out CAS and applicable diagnostic test results, client-signed CAS test acknowledgement form and applicable permits should be uploaded to the Home Upgrade online portal (accessible from www.HomeUpgrade.org).

For **Advanced Home Upgrade** pathway, after job completion, submit a rebate request (post-installation/test-out) and enter job data into the online Portal, much as you did for the pre-installation application. A complete submittal includes cost and job description, building vintage, detailed installed measure technical information, and estimates of modeled site energy savings. Test-out CAS results and client-signed CAS test acknowledgement form, building model files, applicable permits and client-signed contract should be uploaded to the online Portal (also accessible from www.HomeUpgrade.org).

4.8 Post-Installation Technical Review

Build It Green reviews the job information, client-signed contract/scope of work (for Advanced Home Upgrade), and CAS test-out results to confirm that:

- Contractual work scope is consistent with Program requirements and technical specifications
- CAS test-out results *pass* (i.e., no outstanding corrective actions required)

For Advanced Home Upgrade jobs, energy model inputs must match the contractual work scope and outputs must show minimum 10% expected energy savings. The Build It Green team may follow up with you via email for any additional information needed to complete the administrative review. Denied applications will be communicated to you by email. Inquiries about denied applications should be directed to jobs@HomeUpgrade.org or to 510-590-3360 x606. Application anomalies may trigger field verification to confirm accuracy of submittals. For more information on Quality Assurance and Field Verification refer to Section 5.

Special Note: In order to prevent potential double-dipping of PG&E and/or SoCalGas® incentives, all Customer invoices must state the following:

> Customers cannot receive more than one rebate for the same product, equipment or energy efficiency measure from more than one California investor-owned utility or third party energy-efficiency program offering rebates, financing or other rebates funded with CPUC Public Goods Charge funds. In addition, products discounted by PG&E and/or SoCalGas® at the point of sale are not eligible for additional rebates.

4.9 Post-Installation Administrative Review

In addition to the technical review, the Build It Green team reviews submittals to confirm rebate eligibility, receipt of a Safety and Quality Acknowledgement (SQA) form, and that the client-signed contract/scope of work meets rebate eligibility requirements, summarized as follows:

- Total job cost is provided (Advanced Home Upgrade only)
- CAS test was performed by a qualified BPI-certified professional or appropriately trained and supervised employee of a BPI-accredited company
- Contact information is complete for the Customer and either (a) the PG&E and/or SoCalGas® Customer of Record matches the Customer name on the job application (i.e., the property owner); or (b) the property owner has provided written authorization to direct the rebate payment to the Customer of Record
- Home receives natural gas and/or electric service from PG&E and/or SoCalGas®

The Build It Green team may follow up with you via email and/or phone for any additional information needed to complete the administrative review. Denied applications will be communicated to you by email. Inquiries about denied applications should be directed to jobs@builditgreenutility.org or to 510-590-3360 x606.

4.10 Rebate (Incentive) Calculation

For **Home Upgrade** jobs, the rebate (incentive) amount is calculated based on the cumulative total of points-associated measures. Rebates for Home Upgrade jobs are available for Customers who receive gas or electric service from a source other than PG&E and/or SoCalGas®, but the fuel source for equipment-based measures (e.g., furnace, A/C, hot water heater, etc.) must be provided by PG&E in order to be eligible.

For **Advanced Home Upgrade** jobs, the rebate (incentive) amount is calculated based on software-modeled site energy savings. Rebates for Advanced Home Upgrade jobs are pro-rated for Customers who receive gas or electric service from a source other than PG&E and/or SoCalGas®.

4.11 Safety and Quality Acknowledgement Form

Program participants must have the Customer sign a Safety and Quality Acknowledgement (SQA) form to confirm that a combustion appliance safety test was completed at test-out. Job applications will not be approved for rebate until the form has been received by Build It Green. The individual signing the SQA form must 18 years of age or older and have been present for the CAS testing, and must either be the PG&E and/or SoCalGas® account holder or a signatory on the job contract or own, rent or reside in the tested home.

Special Note: Make a point of educating the Customer about combustion appliance safety and explaining your test-out results. If the Customer reports that no test was done, then Build It Green may need to visit the home to test for combustion safety and may invoice you for the visit.

4.12 Rebate (Incentive) Approval

Once all rebate (incentive) requirements have been met and the combustion appliance safety test(s) has been confirmed (i.e., everything is ”passing”), then the Build It Green team will notify you by email that the job information will be uploaded to PG&E for final verification and check processing. As previously noted, PG&E / SoCalGas® account holder can choose to pass on the rebate to contractor or contractor’s ‘client’ (e.g., client is the landlord, account holder is the tenant), by signing a Customer Incentive Payment Assignment (CIPA) form or Customer Release form (respectively). All contract-signing customers must be informed of Post-Installation Approved rebate amount by the participating contractor, regardless of whether they are receiving the rebate or not.

4.13 Customer Survey

The Build It Green team will send Customers an email invitation to complete a web-based Customer survey, as described in Section 5. Please supply Customer email contact information with job and document submission.

4.14 Quality Assurance and Quality Control (Field Verification)

To support quality assurance efforts, quality control will be performed on a sampled selection of jobs that will receive a field verification visit from the Build It Green team, as described in Section 5. Jobs may also be selected for field verification by PG&E’s Central Inspection Program (CIP) team or the California Public Utilities Commission (CPUC) Program evaluator. Health or safety (especially combustion appliance safety) issues identified during these inspections can prevent final rebate processing until such issue(s) have been corrected at either homeowner and/or contractor expense. You and your clients will be able to contact a Program representative for questions via phone at 510-590-3360 x606 or via email at jobs@homeupgrade.org.

NOTES

5 QUALITY ASSURANCE AND QUALITY CONTROL

Home Upgrade Program Quality Assurance (QA) and Quality Control (QC) enables Build It Green to evaluate the quality of work performed and the effectiveness of training of Program participants. An added function is to provide feedback to Program participants, which may also contribute to quality improvements.

Every Program participant is required to comply with the Quality Assurance and Quality Control components of the Home Upgrade Program, which includes random field verifications and Customer surveys. Additionally, Program participants will have the option to receive up to five (5) free field-mentoring sessions.

5.1 Approach

Quality Assurance and Quality Control is essential to the Program and reflects the Build It Green team's commitment to maintaining high standards for Customer protection, project quality, building performance, and verifiable results. Consistent standards will be applied to build Customer confidence in the Program. The QC requirements are designed to include protocols for third-party field verifications of randomly sampled completed jobs, Customer surveys, Program participant feedback, and corrective measures.

To ensure credibility, cross-functionality, and marketability, the QC requirements are designed to be fully compliant and/or aligned with the quality assurance protocols from existing building performance Programs and standards such as:

- Building Performance Institute (BPI)
- California Home Energy Rating System (HERS I and II)
- Home Performance with Energy Star (HPwES)

5.2 Desktop Review of Submissions (Quality Assurance)

As described in Sections 4.3, 4.7 and 4.8, all jobs will be subject to desktop reviews by QA staff: For **Home Upgrade,** jobs are only subject to review at one stage (post-installation). For **Advanced Home Upgrade**, jobs are subject to two review stages (the pre-installation 'job reporting'/application stage and at the post-installation 'rebate request' stage).

The Home Upgrade job application includes selection of prescribed, points-based measures (including at least one Base Measures and three total Measures) to form the rebate request, test-in/out CAS and applicable diagnostic test results, and a Safety and Quality Acknowledgement (SQA) form, as well as reference information for any applicable building permit(s).

The Advanced Home Upgrade job application includes the energy model, scope of work (client-signed version for post-installation), test-in/out CAS and applicable diagnostic test results, and a Safety and Quality Acknowledgement (SQA) form, as well as reference information for any applicable building permit(s). The intent of the desktop review is to evaluate the validity of data submittals. The scope of work will be manually compared to the modeling results to confirm consistency. The CAS results will be reviewed and

compared to the scope of work (or measures selected for Home Upgrade) to ensure all required CAS and diagnostic testing was performed and that any indicated remediation is/was included in the scope of work. The following are some scenarios that would trigger the pre-installation job application being returned for revision:

- The data values are out of range of expected values, based on the home's vintage and scope of work
- Proposed scope of work is inconsistent with modeling assumptions
- Repairs required to address CAS test failures are not included in scope of work

Similarly, the following are common scenarios that would trigger return of the post-installation rebate request for revision:

- Contractual scope of work is inconsistent with modeling assumptions (Advanced Home Upgrade only)
- Energy modeling results do not show a minimum of 10% energy savings (Advanced Home Upgrade only)
- Measures selected are inconsistent with Test Measurements (CAS) form information
- CAS test results show failures

5.3 Field Verification of Selected Jobs (Quality Control)

Field verifications, or Field Quality Control (FQC), focus on evaluating your ability to perform a project diagnostic assessment (including Combustion Appliance Safety testing), develop a scope of work of eligible improvements, and/or properly install and test the improvements selected by the Customer. There are five events that can trigger field verification for a particular job:

1. Random sampling (as described in the following subsection 5.3.1) is the primary manner in which field verifications are scheduled
2. Desktop review of a project application or rebate request identifies anomalies
3. Customer survey identifies a job performance issue (pending Customer and Program participant interviews) or lack of combustion appliance safety testing
4. Customer complaint warrants further investigation
5. Participating Contactor has outstanding corrective actions from previous jobs

5.3.1 Job Selection / Sampling Protocol

Field verifications are performed on completed jobs to obtain a representative sample of your company's work. Table 8 (below) details the sampling rates for field verification by tier.

Table 8. Field Verification Sampling Tiers

Sampling Rates for Program participants	
Tier 1	Field verification on three of the first five jobs (3 of 5) completed by a Program participant.
Tier 2	After the first five jobs are completed and Tier 1 is satisfactorily passed, at least four of the next twenty jobs (4 of 20) may receive field verification.
Tier 3	After completion of first 25 jobs; • Up to 15% rate for Program participants without BPI-BA on staff (1 in 7) • Up to 5% rate for Program participants with BPI-BA on staff (1 in 20); • Up to 2% rate for BPI-accredited Program participants with PG&E/ SoCalGas® approval (1 in 50)

Raters and contractors working together on the same project will both be evaluated during field verifications. Each new Program participant will have three of the first five jobs verified, including the first job submittal. After three satisfactory job verifications, a 20% field verification rate for the next 20 jobs is undertaken (i.e., four verifications out of twenty jobs reported). After successfully completing Tiers 1 and 2, field verifications are selected randomly from the Program participant's subsequent jobs in order to obtain an unbiased sample of the work.

5.3.2 Field Verification Process

You are expected to let the Customer know a Program representative may be calling to arrange a verification visit. At that time, you should also provide the Customer with the one-page *The Field Verification Visit: What Homeowners Can Expect* document (available on the Document Library) that summarizes the Program, briefly explains why we verify jobs and how to prepare for the visit by removing any obstacles from where work was performed for easy access by the FQC verifier. Typical FQC visits will be scheduled after you have closed out the job and submitted a rebate request (Post-installation job submittal). The Customer will be notified of the field verification visit after submitting the rebate request. You may be requested to provide any additional job information such as proposals/recommendations, photos, permits or Customer agreements. The purpose is to allow the FQC verifier to gain an entire picture of the job completed and evaluate how the test-in information was presented to the Customer and if a comprehensive list of recommendations was given.

Your rebate request (Post-installation job submittal) for sampled jobs will be held until field verification is complete. Additionally, if PG&E / SoCalGas® (CIP) field verification results trigger corrective action requirements, then the rebate request and payment approval *will* be held up as long as the identified issues remain uncorrected. Participants have seven calendar days to correct health and safety failures. Participants must immediately notify customers of hazards found during FQC or CIP inspections. Corrections must be completed and proof of correction photos emailed to fieldqc@homeupgrade.org within seven (7) calendar days. Failure to complete corrections and submit photos may result in disciplinary action. If repeated or severe

corrective actions are required, you may be subject to disciplinary action and/or a fee-based field verification requirement.

5.3.3 Field Verification and Mentoring Upon Test Out

The FQC verifier may witness your test-out procedures as a substitute for verifying the job independently. This can accommodate the homeowner by avoiding duplicative tests. Upon your request, up to five field verifications may be scheduled to coincide with your job test-out. These field verifications may double as mentoring visits. You will have an opportunity to correct any deficiencies identified through the field mentoring before a final pass/fail determination is made. Passing FQC scores and/or corrective action in these cases will be required before the application can be approved and/or rebate can be issued.

5.3.4 Field Verification Visit

The FQC verifier will complete an introductory discussion with the Customer and then begin the visual and diagnostic inspection. The FQC verifier may ask the Customer for a short tour of the home to point out where improvements were made and to visually verify installed scope of work.

FQC verifiers are requested to take digital photos and notes to capture elements of the job that were both done well and poorly. Pictures and notes will be used to provide feedback and document any deficiencies needing correction.

For Home Upgrade jobs, the FQC verifier will:

1. Conduct visual survey
2. Review measures claimed and assess that each is *new* or *existing* in the home.
3. Compare installation of each measure against Program installation standards
4. Replicate blower door and duct tests and validate reported test-out results
5. Replicate CAS tests and validate reported test-out results
6. Report obvious missed opportunities for improving home performance that were not reflected in the test-in findings and recommendations. This information is to be used for qualitative evaluation.
7. Prepare a FQC Report and offer suggestions and feedback for the Program participant

For Advanced Home Upgrade jobs, the FQC verifier will perform all of the actions listed above, plus:

8. Review CEC-approved software model inputs and compare to observed conditions
9. Replicate any additional diagnostic performance tests and validate reported test-out results

FQC verifiers are instructed to have the Customer contact you directly for the verification results. The FQC verifier will not discuss any details of the inspection with the Customer unless a health and safety issue is identified.

An example of this rule is when replication of the combustion appliance safety testing reveals a problem that requires a call to either a PG&E Gas Service Representative (GSR) dispatcher or SoCalGas® Customer Service Representative or other immediate response, in accordance with *NGAT Action Guidelines*. The FQC verifier will immediately disclose any such health and safety findings that require Customer action or consent.

5.3.5 Field Verification Score

Field verification scores are based on a scale of 0 or 1 within Fail, Discrepancy (identified) and Pass categories. The field verification scoring methodology is substantially based on BPI Technical Standards, but also incorporates PG&E-specific Natural Gas Appliance Testing (NGAT) requirements from Advanced Technical Training. Table 9 (below) details the types of field verification score.

Table 9. Field Verification Scoring Summary

Score	Finding
Fail	
Fail 0 (F0)	Contractor has left the home in an unsafe condition that threatens occupants' health and safety and requires immediate corrective action (per BPI and NGAT). Verifier has notified the homeowner of the unsafe conditions and has called PG&E or SoCalGas® to assess the situation. Follow-up is required for all CAS failures and corrective action is mandatory.
Fail 1 (F1)	CAS test results did not meet Program standards and/or triggered a "stop work" action based on BPI and/or NGAT requirements. Verifier has notified the homeowner of the unsafe conditions and has called PG&E or SoCalGas® to assess the situation. Follow-up is required for all CAS failures and corrective action is mandatory.
Discrepancy	
Discrepancy 0 (D0)	The contracted scope of work does not meet home performance standards and/or Program requirements. Corrective action is strongly recommended and may be required. Areas of technical performance need improvement.
Discrepancy 1 (D1)	Significant discrepancies in modeling or testing data submitted in the post installation application.
Pass	
Pass 0 (P0)	Contractor's performance meets most technical standards and program requirements but some areas of technical performance need improvement.
Pass 1 (P1)	Exceptional work completed.

Each category contains descriptions of findings that provide the basis for the score assigned. It is important to note that it is possible to receive more than one Fail and/or Discrepancy score. For example, if the Domestic Hot Water (DHW) heater failed spillage testing under Worst Case Depressurization (WCD) and knee-walls were left uninsulated, then that job would receive a Fail 1 and a Discrepancy 0. This scoring structure allows Build It Green to identify common issues and target additional mentoring and training opportunities accordingly. Overall, verification reports that include Discrepancy scores can still Pass, but those with Fail scores will not (until corrective action has been completed). In the example above, the overall score would be the lowest mark received ('Fail 1').

For additional detail on Field Verification scoring, please review the Field Scoring Worksheet on the Document Library or contact Build It Green at fieldqc@homeupgrade.org or 510-590-3360 x607.

5.4 Program Participant Feedback, Corrective & Disciplinary Actions

When enforcing corrections to Program participant performance deficiencies, the Build It Green FQC team will begin by providing positive and constructive feedback, while maintaining a zero-tolerance policy for fraud. This section lists feedback and enforcement mechanisms that will be used.

5.4.1 Field Mentoring

The purpose of mentoring and feedback is to ensure new Program participants are using a whole house approach, following BPI and Program standards, properly implementing CAS testing protocols, and providing quality home performance services to PG&E and SoCalGas® Customers. As discussed in Section 5.3.3 (above), you may schedule up to five field verification visits to coincide with your job test-outs so that they can double as field mentoring sessions. You are strongly encouraged to bring multiple personnel to participate in the mentoring session.

Any mentoring you may request, out of the five free mentoring sessions allotted (provided that allocated Program funding have not been exhausted), is not required to coincide with test-out assessments. To schedule field mentoring (anytime), first identify an available home, and then contact Build It Green (phone: 510-590-3360 x607 or email: fieldqc@homeupgrade.org) to negotiate the earliest possible schedule that meets your needs and the availability of mentors.

5.4.2 Field Verification Failures and Disciplinary Actions

Field verification failure(s) will trigger corrective action(s) to the job. Build It Green will communicate required corrective actions, timing, and documentation protocols required of the Program participant to show successful resolution (typically, proof of correction photos emailed to fieldqc@homeupgrade.org). Participants must immediately notify customers of hazards found during FQC or Central Inspection Program (CIP) inspections.

Failure to resolve corrective action requirements in seven (7) calendar days may result in disciplinary action -- increased sampling rates or potential suspension. If suspended, every subsequent rebate request can trigger a fee-based field verification requirement (100% sampling rate) and withholding of rebate payment approvals until field verification produces a passing result.

Once corrective action is complete and all issues for that job are resolved, verification sampling rate restarts at Tier 1 (3 of 5 jobs) and continues to Tier 2 (4 of the next 20 jobs). Based on a Program participant's pattern of failed field verifications, there are three levels of failure that can trigger increasingly stringent disciplinary actions.

1. **Disciplinary Action: Low.** Restarts a Program participant's sampling rate at Tier 1. FQC functions may become fee-based until the Program participant reaches Tier 3.
2. **Disciplinary Action: Medium.** Restarts a Program participant's sampling rate at Tier 1 plus mandatory fee-based mentoring. FQC functions become fee-based until the Program participant reaches Tier 3.
3. **Disciplinary Action: High.** One year suspension from Program, named removed from Program participant Directory. Re-entry into the Program would require the Program participant to retake all training prerequisites and begin at Tier 1 for Quality Assurance.

FQC field verifications can become fee-based when conducted in response to:

1. Desktop review of a project application or rebate request identifies anomalies
2. Customer survey identifies a job performance issue (pending Customer and Program participant interviews) or lack of combustion appliance safety testing
3. Customer complaint warrants further investigation
4. Outstanding disciplinary actions from previous jobs
5. Job sampling rate is Tier 1 or Tier 2 because of disciplinary action in response to prior field verification failure

Fee-based field verification will be charged at a rate of $500 per FQC visit plus travel costs. Delinquency in remitting verification fees will be cause for suspension.

5.5 Avoiding Conflict of Interest

Build It Green strives to deliver Quality Assurance that is objective and fair. FQC provides an opportunity to give feedback on home performance upgrades and enables you to continually improve the quality of your work. FQC verifiers **shall** adhere to the following Code of Ethics:

1. Avoid conflicts of interest or activities that compromise, or appear to compromise, professional independence, objectivity, or integrity of work including, but not limited to:

- Work on any property in which the FQC verifier or FQC verifier's company has any financial interest in the ownership or transfer of the property, either as a lender or equity investor.
- Work on any property in which the FQC verifier or FQC verifier's company has any financial or familial ties with the builder, general contractor, rater, subcontractors, architect, or owner.
- Offer or deliver any compensation, inducement or reward to the owner of the sampled property, the broker, or agent, for the referral of any business to the FQC verifier or FQC verifier's company.
- Accept compensation, directly or indirectly from product or service supplier for recommending those businesses to Program participants or Customers.

2. Act in good faith toward each Program participant and Customer.
3. Perform services and express opinions based on honest conviction and only within their areas of education, training, or experience.
4. Be objective in reporting and not knowingly understate or overstate the significance of reported findings.
5. Not disclose to third parties other than the Build It Green team any personal or Confidential Information about the project, client, seller, tenant, or others involved in the project without the approval of the individual(s) affected.
6. Not disclose FQC results to anyone other than the Build It Green team and the Program participant or the Program participant's agent without the approval of the Program participant unless required to do so based on health and safety issues.
7. Avoid activities that harm the public, discredit themselves, or reduce public confidence in the profession or in Home Upgrade.
8. Maintain professional relationships with Program participants, colleagues and others associated with the Quality Control activities without regard to race, color, national origin, gender, religion, age, sexual orientation, or disability.
9. Abide by the Program rules and guidelines in the use of the Program logo and other Program materials.
10. Respond professionally to Program participant, Customer or Build It Green concerns and complaints about a FQC results.
11. Report substantial and willful violations of this Code to Build It Green.

NOTES

6 HEALTH AND SAFETY

All Program participants and verifiers must abide by BPI Health and Safety standards and have all the necessary personal safety equipment required by all applicable federal, state and local laws, including, but not limited to, the "Occupational Safety and Health Standards" implemented by the U.S. Department of Labor (OSHA) and the California Division of Occupational Safety and Health (Cal-OSHA). Required safety equipment includes, but is not limited to:

- Fitted respirators with canister filters
- Dust masks
- Gloves
- Protective clothing
- Safety glasses
- Hard hats, as required
- Personal CO detector

For more information, visit Cal-OSHA at www.dir.ca.gov/title8/1529.html or OSHA at www.osha.gov/dsg/annotated-pels/tablez-1.html.

6.1 Combustion Appliance Safety

Combustion appliance safety is a core Program concern. The Program aims to assist Customers in improving the energy performance of their home while following the admonition “first, do no harm.” The Program has adopted core CAS protocols from BPI. In addition, PG&E and SoCalGas® have developed protocols that supplement the BPI standards, known as the *Natural Gas Appliance Test (NGAT) Action Guidelines*. Please also see the most current version of the *Whole House Combustion Appliance Safety Test Procedure* and the *SoCalGas Inspection Guidelines* for complete protocol specifications for PG&E and SoCalGas® (available in the Program Portal’s Document Library).

As required for compliance with CA SB-183 (also known as the “Carbon Monoxide Poisoning Prevention Act”), as of July 1, 2011, all Program Single-Family Dwelling projects, regardless of necessity for building permit, must include permanent installation of at least one CO alarm/detector meeting UL-2034 (for alarms) or UL-2075 (for detectors), installed according to manufacturer's instructions in all dwelling units intended for human occupancy. Existing CO alarms/detectors less than five years old and meeting Program requirements are allowed. As of January 1, 2013, all 2-4 Unit Dwelling projects are also required to comply.

For more information, visit the California State Fire Marshal website at: www.fire.ca.gov or for specific CO device information, osfm.fire.ca.gov/strucfireengineer/strucfireengineer_bml.php

6.2 Hazardous Materials Encountered by Energy Upgrade Projects

There are several hazardous materials that Program participants may encounter during energy upgrade projects. Training and certification in the identification, removal, disposal, abatement and remediation of hazardous materials is outside of the scope of the Program. If any hazardous materials are encountered during the course of a project, only those Program participants that have the necessary training and required certification(s) may remove, dispose, abate and/or remediate hazardous materials discovered on a job site. Program participants shall be solely responsible for the identification, removal, disposal, abatement and/or remediation of hazardous materials encountered on a job site. Neither Build It Green nor PG&E nor SoCalGas® shall have any liability arising out of, resulting from or regarding a Program participant's detection, identification, inspection, removal, disposal, abatement, and/or remediation of hazardous materials.

The following section identifies the more common hazardous materials and the appropriate ways to handle and dispose of the materials.

6.2.1 Asbestos

Until the 1970s, many types of building products and insulation materials used in homes contained asbestos. In older houses (prior to 1981), it's important to be aware of common products that might have contained asbestos in the past, and conditions which may release fibers, including (but not limited to):

- **Steam pipes, boilers/chillers/tanks, and HVAC/furnace ducts** insulated (even on the inside) with an asbestos blanket, mudded joints mixed with asbestos, gray corrugated asbestos paper (or "Air Cell"), cardboard ribbed asbestos paper with foil insulation, pre-formed sections of calcium/magnesium silicate mixed with asbestos or asbestos paper tape and/or wrap. These materials may release asbestos fibers if damaged, repaired, removed improperly, or otherwise disturbed.
- **Resilient floor tiles** (vinyl asbestos, asphalt, and rubber), **vinyl sheet flooring** (backing)**, and adhesives** used for installing floor tile. Sanding tiles can release fibers as can scraping or sanding the backing of sheet flooring during removal.
- **Cement sheet, millboard, and paper** used as insulation around furnaces and wood burning stoves. Repairing or removing appliances may release asbestos fibers. So may cutting, tearing, sanding, drilling, or sawing insulation.
- **Door gaskets** in furnaces, wood stoves, and coal stoves. Worn seals can release asbestos fibers during use.
- **Soundproofing or decorative material** (e.g., popcorn ceilings) sprayed on walls and ceilings. Loose, crumbly, or water-damaged material may release fibers, as will sanding, drilling, or scraping the material.

- **Patching, surface-texture and joint compounds** for walls and ceilings, and **textured paints.** Sanding, scraping, or drilling these surfaces may release asbestos.
- **Asbestos cement roofing, shingles, exhaust flues, and siding**. These products are not likely to release asbestos fibers unless sawed, drilled, or cut.

How to handle

DO NOT disturb asbestos. Material in good condition will not release asbestos fibers. The danger is when asbestos becomes friable and fibers are released into the air.

A qualified professional should take samples for analysis due to an increased health risk if fibers are released. Sampling can be hazardous if done incorrectly. Taking samples yourself is not recommended.

Only asbestos abatement professionals who have completed training that meets EPA and Cal-OSHA guidelines are certified to remove asbestos. Removal of boilers, chillers, tanks or furnaces attached to pipe or ducts (with attached/adhered asbestos-containing material) without removing the pipe or ducts could constitute Class III asbestos work under OSHA regulations.

For more information on asbestos, visit www.epa.gov/asbestos and www.dir.ca.gov/dosh/asbestos.html.

6.2.2 Lead Based Paint

Most homes built before 1960 contain heavily leaded paint. Some homes built as recently as 1978 may also contain lead paint. Lead based paint can be found on window frames, interior and exterior walls and other older painted surfaces. Common renovation activities like sanding, cutting, and demolition can create hazardous lead dust and chips by disturbing lead-based paint, which can be harmful to adults and children.

To protect against this risk, on April 22, 2008, the EPA issued the lead renovation, repair and painting rule requiring the use of lead-safe practices and other actions aimed at preventing lead poisoning. Under the rule, beginning April 22, 2010, contractors performing renovation, repair and painting projects that disturb lead-based paint in homes, child care facilities, and schools built before 1978 must be certified by the EPA and use certified renovators who are trained by EPA-approved training providers to follow lead-safe work practices.

How to handle

Harmful exposures to lead can be created when lead-based paint is improperly removed from surfaces by dry scraping, sanding, or open-flame burning. Only an EPA-certified contractor can perform work on materials with lead based paint. Visit the following EPA website to learn more about training and certification, cfpub.epa.gov/flpp/searchrrp_training.htm.

6.2.3 Mercury

Mercury is a naturally occurring element that is found in air, water and soil. It exists in several forms: elemental or metallic mercury, inorganic mercury compounds, and organic mercury compounds. Exposures to mercury can affect the human nervous system and harm the brain, heart, kidneys, lungs, and immune system.

Since the late 1980's, there has been a decreasing trend in mercury emissions and use from manufacturing sources in the United States. However, during an upgrade project, you may encounter fluorescent lights and thermostats that contain mercury.

How to handle

Fluorescent lighting: Compact fluorescent bulbs and fluorescent tubes contain small amounts of mercury (no mercury is released unless bulb is broken). It is illegal to dispose tubes and bulbs in the landfill, they must be recycled by certified recycler.

Locate a recycler at www.calrecycle.ca.gov/Electronics/Collection/RecyclerSearch.aspx. Care should be taken when storing and transporting tubes. Never vacuum up the breakage from a broken tube or bulb; this will only disperse the mercury throughout the area from the vacuum exhaust. Wipe up debris with a wet paper towel and place in an airtight container and bring to a hazardous waste facility or a certified recycler.

Thermostats: Mercury thermostats are unlikely to break or leak mercury while in use, but they need to be properly disposed of when being replaced. If a mercury thermostat is being replaced, the old thermostat needs to be disposed of by taking it to a state or local household hazardous waste collection center for recycling.

California's Mercury Thermostat Collection and Recycling Act of 2008 (California Health and Safety Code section 25214.8.20) established Extended Producer Responsibility for manufacturers who sold mercury-added thermostats in California. Manufacturers are required to operate collection and recycling programs for out-of-service mercury-added thermostats that become waste. Thermostat manufacturers now provide collection bins for out-of-service mercury-added thermostats at certain heating, ventilation, and air-conditioning (HVAC) wholesaler locations. There is no cost to dispose of out-of-service mercury-added thermostats at one of the participating HVAC wholesaler collection locations.

Program participants can find an HVAC wholesaler collection location near them by visiting www.thermostat-recycle.org.

Additional information on the Mercury Thermostat Collection and Recycling Act, and on contractor's requirements under the law, can be found on the Department's Web site at www.dtsc.ca.gov/thermostats.

6.2.4 Spray Foam

Spray polyurethane foam (SPF) insulation is known to resist heat transfer extremely well, and it offers a highly effective solution in reducing unwanted air infiltration through cracks, seams, and joints. SPF insulation is a spray-applied cellular plastic that forms a continuous barrier on walls, around corners and on all contoured surfaces. SPF

insulation applied by professionals is generally described as a high pressure foam or a low pressure foam and is available as "open-cell" or "closed-cell" foam.

Two liquids combine during a chemical reaction to form spray polyurethane foam. The two liquids come in different drums or containers, and professionals generally refer to one container as the "A" side and the other container as the "B" side. The "A" side of a spray polyurethane system is commonly comprised of methylene diphenyl di-isocyanate (MDI) and polymeric methylene diphenyl di-isocyanate (pMDI). The "B" side is typically a blend of polyols, catalysts, blowing agent, flame retardant, and surfactant. The polyols are part of the chemical reaction to make foam. The remaining ingredients in the "B" side serve different purposes to help control the creation of the foam bubbles (the "cells") in an optimal way, and of course to provide a flame retardant in the finished foam product.

How to handle[3]

Preparation

Make sure the raw chemical ingredients are handled and stored properly at all times before use to avoid chemical exposure.

Read the manufacturer's label and material safety data sheet (MSDS). Follow the directions to achieve consistent curing conditions and times. Be prepared to carefully manage temperature and other area conditions while the SPF dries or cures. Unpredictable or uncontrolled curing rates can increase the risks of exposure. Make sure workers understand ahead of time how to safely handle chemicals, understand the dangers of exposure, and have the appropriate protective equipment on hand.

Spraying, streaming, or beading application process

Avoid exposure to vapor, mist, particulates and dust. Make sure workers wear protective equipment (gloves, respirators, etc.) and chemical-resistant clothing at all times.
Ventilate the work area

Isolate the work site and clean up thoroughly, to prevent isocyanates and other chemical vapors from spreading to other rooms or floors. Clean before allowing other unprotected workers or building occupants back into the area. *Trimming of foam*

Avoid exposure to dust and particles that may contain isocyanates. Make sure workers wear personal protective equipment while cutting and scraping foam.

Clean up after preparation, application, and trimming.

Clean the work site thoroughly to avoid exposing other workers and building occupants to dust and particles that may contain isocyanates.

Remove protective clothing and handle with care to avoid exposing yourself and others to toxic chemicals.

Long term exposure concerns

[3] From http://www.epa.gov/dfeprojects/spf/spf_basic_information.html#avoid

After spray foam is applied and cured, it is considered to be relatively inert; however, there are several situations where the cured foam may pose additional potential risks. (Note: "curing" of SPF means that the chemicals in the product are reacting to produce polyurethane foam; manufacturers estimate 23-72 hours for the foam to fully cure for the two-component high pressure "professional" SPF system, and 6 to 12 hours to cure for one component foam, typically available in 12 oz. to 24 oz. cans.)

Maintenance workers, including plumbers and electricians, should not heat or grind spray foam. Spray foam can potentially generate toxic emissions under these circumstances.

Building renovations, demolition, or building disassembly done years later can disturb spray foam insulation. Performing hot work on or near polyurethane foam may lead to potential exposures to isocyanates and other toxic emissions.

6.2.5 Polychlorinated Biphenyls (PCBs)[4]

PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include:

- Transformers and capacitors
- Other electrical equipment including voltage regulators, switches, re-closers, bushings, fluorescent light ballasts, and electromagnets
- Old electrical devices or appliances containing PCB capacitors
- Thermal insulation material including fiberglass, felt, foam, and cork
- Adhesives and tapes
- Oil-based paint
- Plastics (including cable insulation)
- Floor finish

For guidance on handling PCBs, see:
www.epa.gov/waste/hazard/tsd/pcbs/pubs/caulk/guide/guide-sect4c.htm

[4] From http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/about.htm

6.2.6 Knob and Tube Wiring

Homes from the first half of the twentieth century or older may contain knob and tube wiring if their electrical system has not been updated. This poses a potential fire hazard as the cloth insulation may fray, leaving the wire exposed.

Do not install insulation where live knob and tube wiring is present unless wiring has been surveyed by a C-10 electrical contractor and certified to be acceptable for encapsulation. Whenever possible, upgrade wiring to current standards before insulating.

6.2.7 Other Hazardous Materials

Under current California state law, aerosol cans, batteries, paint, stains, thinners, and solvents are considered hazardous and cannot be placed in the trash or recycled using curbside recycling Programs. They must be recycled by a specialty recycler. You can locate specialty recycler at www.dtsc.ca.gov/HazardousWaste/index.cfm for statewide resources or www.stopwaste.org/docs/buildersguide-05.pdf page 21 for Alameda County recycling resources.

NOTES

7 ADDITIONAL RESOURCES

7.1 Required and Recommended Equipment

This section includes a list of equipment (or equivalents) for home upgrade diagnostics that all Program participants should have available. Continued participation in the Program is dependent on having all the equipment needed for proper home diagnosis. It is difficult to conduct a comprehensive, reliable and accurate home diagnosis without these items.

Good sources for equipment purchase include the Energy Conservatory (www.energyconservatory.com) and Inspector Tools (www.inspectortools.com).

Required diagnostic/testing equipment:

- Blower Door and Duct Blaster (Tester) Manometer(s) - digital pressure and flow gauge
- Residential Combustion Analyzer or comparable CO sensing device
- Combustible Gas Leak Detector (UL 913, tick rate/tone change indicator and LEL percentage display)
- Approved bubble solution
- Diagnostic smoke or hand mirror
- Personal CO monitor
- Duct mask/blue painters' tape
- Digital camera
- Small flashlight
- Ambient thermometer

Recommended diagnostic/testing equipment:

- Ladders (step and telescoping)
- Digital psychrometer
- Flow hood
- Contact moisture meter
- Exhaust fan flow meter
- Pressure pan(s)
- Flow plate
- Thermal imaging (Infrared) and/or Duct cameras

7.2 Best Practices in an Energy Upgrade

The value of an energy upgrade project can be enhanced by including green measures that provide additional benefits, such as enhanced indoor air quality, water efficiency,

resource conservation, and possible environmental advantages based on the home's location.

Indoor Air Quality: In addition to combustion safety concerns, air tight homes may have a number of potential hazards as a result of existing building materials that may emit toxic particles. It is recommended that Program participants consider incorporating low toxicity/VOC materials and mechanical ventilation into upgrade projects to mitigate potential toxicity of existing building materials.

For reference:

- California's Residential 01350 standard for testing building product emissions
- Related: 30-percent post-consumer recycled content in insulation products
- California Air Resources Board (CARB) composite wood products
- Greener Options for Fiberglass and Cellulose Insulation

Water Efficiency: This is connected to energy efficiency in several meaningful ways. •

Lower hot water consumption translates to lower energy and water bills

- Lower water consumption translates to reduced energy required to pump water for distribution and reduced energy and other inputs required at water treatment facilities.

Many municipal water districts offer rebates and incentives for water efficiency measures, which can be combined with an energy upgrade to offer greater levels of incentives and value to Customers.

Resource Conservation: This is another core element of green building that addresses these concerns that can contribute to a green label.

- Proper handling of household hazardous waste (lead, asbestos, mercury, etc.)
- Recycled content materials (e.g. post-consumer recycled insulation)
- Waste Management Plan – may be required for major upgrades and remodels

7.3 Additional Information and Training Opportunities

Table 10. Information Resources and Training Providers

Program Sponsor	
Build It Green www.HomeUpgrade.org info@HomeUpgrade.org	Participation Workshops Home Upgrade Core Training BPI + Home Upgrade Core Training Home Upgrade Advanced Technical Training

Additional BPI Affiliates	
Building Performance Center, Inc.	1301 Bidwell Street Folsom, CA 95630 Phone: 916.932.4208 www.theBPCinc.com
ConSol	7407 Tam O'Shanter Drive Stockton, CA 95210-3370 Phone: 800.526.6765 www.consol.ws
Consumnes River College	8401 Center Parkway Sacramento, CA 95823 Phone: 916.691.7353 Email: connalr@crc.losrios.edu www.crc.losrios.edu
Efficiency First California (formerly CBPCA)	1250 Addison Street, Suite 211-B Berkeley, CA 94702 Phone: 888.352.2722 www.efficiencyfirstca.org
Greener Dawn, Inc.	444 South Cedros Avenue, Suite 200 Solana Beach, CA 92075 Phone: 858.345.1390 Email: info@greenerdawn.com www.greenerdawn.com
Laney College	900 Fallon Street Oakland, CA 94607 Phone: 510.834.5740 www.laney.edu
OurEvolution Energy and Engineering	1385 Eighth Street, Suite E Arcata, CA 95521 Phone: 707.633.4210 www.ourevolution.com
Rising Sun Energy Center	1900 Addison Street, Suite 100 Berkeley, CA 94704 Phone:510.665.1501 www.risingsunenergy.org
Skyline College	3300 College Drive San Bruno, CA 94066 Phone: 650.738.4100 www.skylinecollege.edu
Sutech School of Vocational and Technical Training	3455 E. Olympic Blvd. Los Angeles, CA 90023 Phone: 323.262.3210 www.sutechschool.com

HERS Providers	
CalCERTS	31 Natoma Street, Suite 120 Folsom, CA 95630 Phone: 877.437.7787 www.calcerts.com
CHEERS (ConSol Home Energy Efficiency Rating Services)	5757 Pacific Avenue, Suite 220 Stockton, CA 95207 Phone: 800.424.3377 E-Mail: adminsupport@cheers.org www.cheers.org
Energy Analysis and Comfort Solutions, Inc.	PO Box 2233 Orangevale, CA 95662 Phone: 844.411.3227 E-Mail: info@eacsinc.com www.eacsinc.com
US Energy Raters Association	Phone: 888.931.1116 E-Mail: atrochez@usenergyraters.com www.usenergyraters.com
Energy Modeling Software	
Earth Advantage (CakeSystems)	623 SW Oak Street, Suite 300 Portland, OR 97205 Phone: 503.968.7160 Email: info@cakesystems.com www.cakesystems.com
EnergySoft (EnergyPro)	1025 5th Street, Suite A Novato, CA 94945 Phone: 415.897.6400 Email: support@energysoft.com www.energysoft.com
OptiMiser, LLC	4801 W. Yale Avenue Denver, CO 80219 Phone: 720.306.1742 optimiserenergy.com
Performance Systems Development (Treat)	124 Brindley Street Ithaca, NY 14850 Phone: 607.277.6240 psdconsulting.com/software/treat
Snugg Home, LLC (SnuggPro)	PO Box 82 Boulder, CO 80306 Phone: 720. 663.7836 Email: pro@snugghome.com www.snuggpro.com

Additional Resources	
Association for Energy Affordability, Inc. (AEA)	5900 Hollis Street, Suite R2 Emeryville, CA 94608 Phone: 510.431.1791 www.aeanyc.org
Build It Green	300 Frank H. Ogawa Plaza, Suite 620 Oakland, CA 94612 Phone: 510.590.3360 www.builditgreen.org
Cal-OSHA	455 Golden Gate Avenue San Francisco, CA 94102 Phone: 800.963.9424 Email: info@dir.ca.gov www.dir.ca.gov/dosh/dosh1.html
Energy Star®	US EPA - OAR ENERGY STAR Hotline (6202J) 1200 Pennsylvania Ave NW Washington, DC 20460 Phone: 888.782.7937 www.energystar.gov
National Association of the Remodeling Industry (NARI)	780 Lee Street Suite 200 Des Plaines, Illinois 60016 Phone: 800.611.6274 Email: info@nari.org www.nari.org or www.greenremodeling.org

NOTES

8 GLOSSARY OF TERMS

Advanced Home Upgrade (formerly Advanced Package) means a customized path to home performance that requires diagnostic "test-in" and "test-out" Whole House assessments consistent with Home Energy Rating System guidelines, Building Performance Institute, and the national Home Performance with ENERGY STAR Program. Compared to the Home Upgrade rebate pathway (formerly Basic Package), the Advanced Home Upgrade requires higher levels of Program participant training and qualifications; uses commercially available and properly-approved building simulation software and methodology to model site performance and estimate energy savings for each job; and provide higher Customer rebates and incentives than are available under the Home Upgrade pathway.

Aged Solar Reflectance (ASR): Refers to the roofing product's three-year solar reflectance rating.

Aged Thermal Emittance (ATE): Refers to the roofing product's three-year thermal emittance rating.

Assessment means visual evaluation, diagnostic performance and Combustion Appliance Safety test-in and/or test-out events, as well as energy software modeling and document submission, but specifically excludes installation or other work performed by Participating Contractors and/or subcontractors.

Association of Bay Area Governments (ABAG): The alliance of local governments comprised by the nine Bay Area counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma) the formed the San Francisco Bay Area Regional Energy Network (BayREN).

Building Performance Institute (BPI): The organization headquartered in Malta, New York that supports the development of a highly professional building performance industry through individual and organization credentialing and a rigorous quality assurance Program.

Build It Green (BIG): The nonprofit organization based in California, whose mission is to promote healthy, energy- and resource-efficient homes in California and which is incorporated under the legal name, 'Build It Green.'

California Whole-House Home Energy Rater (HERS Whole House Rater or 'HERS II' Rater) means a person who has been trained, tested, and certified by a HERS Provider to properly gather information on the energy consuming features of a home, perform diagnostic testing at the home, evaluate the validity of that information, simulate and perform analysis for a California Whole-House Home Energy Rating or a California Home Energy Audit using an Energy Commission-approved HERS rating software program to estimate the energy consumption of a home using the information gathered on site, and complete all of the cost-effectiveness evaluations described in the HERS Technical Manual.

Central Inspection Program (CIP): PG&E's internal group responsible for conducting inspection verification of Energy Efficiency Measures.

Combustion Appliance Safety (CAS): The concept (adopted by BPI, PG&E, and SoCalGas®, and others) that addresses safety policies, standards, protocols and procedures regarding the safe installation, maintenance, and removal of Combustion Appliances and the detection and repair of gas leaks and Carbon Monoxide spillage.

Confidential Information: Customer energy usage and billing data, together with all data or information that is marked "confidential" or verbally identified as "confidential" or "proprietary" by BIG, SoCalGas® and/or PG&E. Confidential Information shall not include information that Program participant can prove: (i) was in the public domain at the time of the disclosure; (ii) is subsequently made available to the general public without restriction and without any breach of the Agreement by said Program participant; or (c) was lawfully received by said Program participant from a third party who was not under any written confidentiality or non-disclosure obligations.

Corrective Action(s): Response action(s) required of Program participant(s) in order to correct performance and/or safety deficiencies, at a given Home Upgrade or Advanced Home Upgrade project, discovered by Field Quality Control (QC) verifier or CIP verifier/inspector.

CSLB: California State License Board

Customer: Any current PG&E electric and/or PG&E or SoCalGas® gas utility Customer and any individual that is eligible to be a gas or electric utility Customer of PG&E and/or SoCalGas® at any time during the Term.

Disciplinary Action(s): Action(s) taken by Build It Green in order to incentivize and/or enforce Program participant compliance with Program rules, requirements terms and/or conditions.

Energy Factor (EF): The measure of a water heater's efficiency. EF is based on recovery efficiency, standby losses and cycling losses. A higher EF indicates a more efficient water heater.

ENERGY STAR®: A joint Program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. ENERGY STAR is a registered trademark and use of the ENERGY STAR logo must meet strict guidelines.

Energy Upgrade California® (EUC) refers to a collaborative effort among California counties, cities, non-profit organizations, the state's investor-owned utilities (Pacific Gas and Electric Company, Southern California Edison, Southern California Gas Company, and San Diego Gas & Electric Company), and publicly owned utilities. The goals of this statewide effort are four-fold:

1. Help residential and commercial Customers and the building industry become knowledgeable about the many energy and water efficiency Programs and financing options that will be available during the next several years including the State Energy Programs, utility company Home Upgrade Programs, local rebates and incentives, appliance and renewable energy rebates and incentives, and energy financing Programs.

2. Provide a consistent and clear message regarding how Customers can choose the best energy-efficient measures and the right contractors and/or raters to provide those services.
3. Drive Customers and Program participants to a central resource that provides educational information that links all the state energy efficiency upgrade, and rebate and incentive Programs.
4. Educate the building trades and home improvement industry on jobs, training, and required certifications.

Energy Training Center: PG&E's Energy Training Center located in Stockton, California.

EPA means the U.S. Environmental Protection Agency, an agency of the federal government.

Home Energy Rating System (HERS) Program: California Energy Commission (CEC), as required by Public Resources Code Section 25942, established this statewide home energy rating program for residential dwellings. California HERS regulations also established the requirements for Field Verification and Diagnostic Testing services used to show compliance with the Title 24, Part 6; Building Energy Efficiency Standards, and established the basic framework for HERS Rater training, certification, and quality assurance. A recent update to HERS established a systematic process for the delivery of California Whole-House Home Energy Ratings to provide California homeowners and prospective home buyers with information about the energy efficiency of the homes they live in or are considering for purchase. The Ratings also provide an evaluation of the cost-effectiveness of options that can improve the energy efficiency in these homes.
Home Upgrade (formerly Basic Package) means the flexible, points-based selection of home energy efficiency measures intended to promote improvement based on at least one required base measure and at least two additional flex measures. This simple, menu-driven, flexible pathway is designed to encourage widespread Customer participation and provide rigorous quality assurance and quality control for elements completed within the deemed-savings based scope of work for the measures selected.

Home Upgrade Program (formerly the Whole House Rebate Program): The rebate Program whereby Customers receive incentives to conduct residential upgrades under the Home Upgrade and/or Advanced Home Upgrade rebate pathways. This is the PG&E Program under the statewide Energy Upgrade California brand.

Low slope: A low slope roof is a roof surface with a maximum slope of two inches "rise" for 12 inches "run" as defined in American Society for Testing and Materials Standard E 1918-97.

Natural Gas Appliance Testing (NGAT): A protocol for testing natural gas appliances in PG&E service territory. The NGAT Action Guidelines use this protocol for determining when a CAS testing individual can 'Make Safe' any CAS issues or needs to contact PG&E to send a Gas Service Representative (GSR) to further assess specific site issues.

Participating Contractor: A CSLB licensed contractor that has been approved for participation in the Program by successful processing of a PG&E and/or SoCalGas® Home Upgrade enrollment application.

Participating Rater: A Building Performance Institute (BPI) certified California Whole-House Home Energy (HERS II) Rater that has been approved for participation in the Program by successful processing of a PG&E and/or SoCalGas® Home Upgrade enrollment application.

R-Value: Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow. A greater R-value corresponds with a greater insulating effectiveness.

San Francisco Bay Area Regional Energy Network (BayREN): The program administrator, created by the Association of Bay Area Governments (ABAG), to manage funding and implementation of residential upgrades under the Home Upgrade Program (as well as other programs) within the nine Bay Area counties. This is one of the stakeholders under the statewide Energy Upgrade California brand.

Steep Slope: Steep slope roofs, or sloped roofs, are roof surfaces with a slope greater than two inches “rise” for 12 inches “run”.

Work: Goods and services supplied by Contractors and/or subcontractors to Customers.

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