Residential Home Upgrades in California

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Home Upgrade
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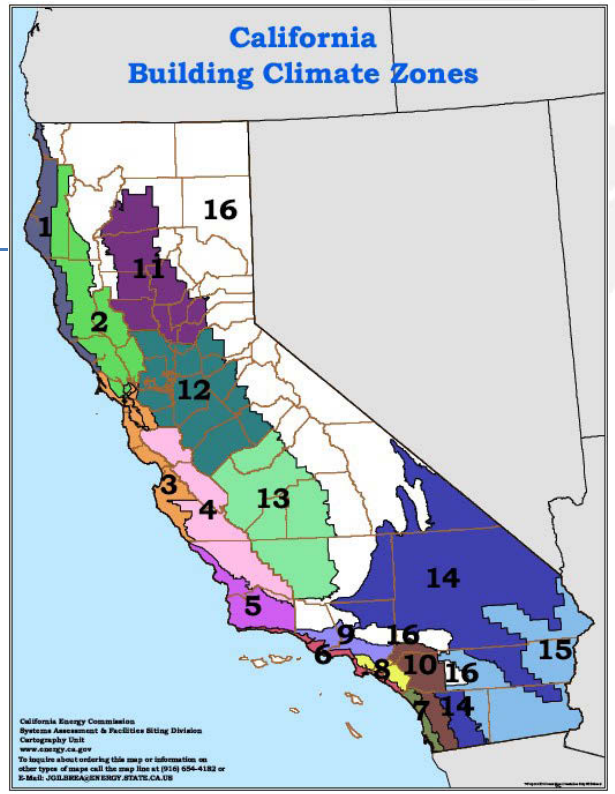
Presentation Outline



- Introduction
- Home Upgrade Program Issues, Process & Solutions
- Home Upgrade Program Accelerator Metrics & Results
- Timeline
- Goals

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Introduction

is a non-profit green building standards development, training and program implementation services organization.

Introduction

Build It Green® is implementer for the Home Upgrade program, under the statewide Energy Upgrade California 'programs umbrella', in the Pacific Gas and Electric (PG&E) service territory, as well as the service territory that PG&E shares with the Southern California Gas Company (SoCal Gas).

Introduction

The Home Upgrade Program (HUP) participation consists of:

- **150 Participating Contractors**
- **3,000 – 5,000 Upgrade Project Rebates Issued Annually**
- **2 Program pathways**
  - Home Upgrade pathway is prescriptive measures based
  - Advanced Home Upgrade pathway requires energy modeling (Pre- and Post-Installation)

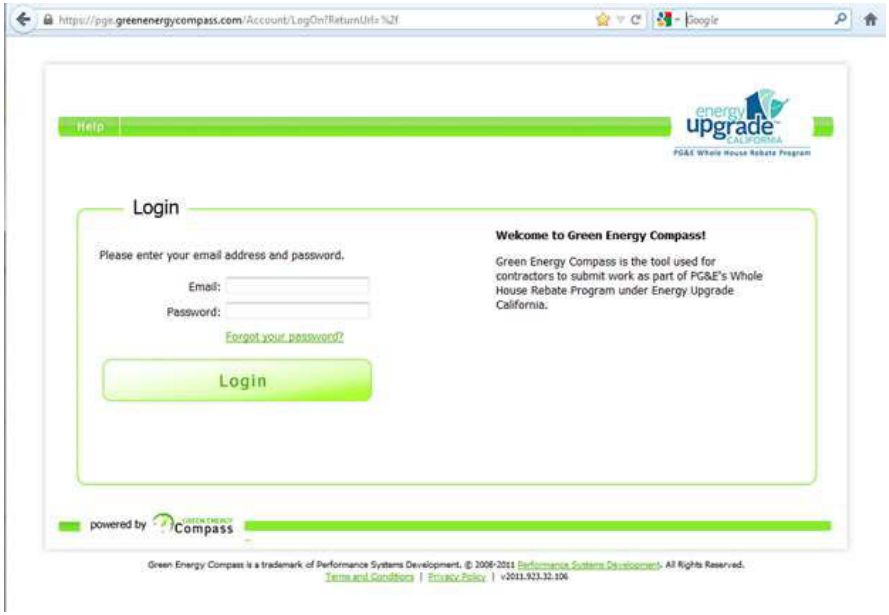
Home Upgrade Program Issues

- Program is **complicated** and requires ongoing training and mentoring
- Initially, the Advanced program had **only one approved energy modeling software tool**
- Program requires a significant amount of **time-consuming data collection and document submission**
- Rebate application **process** is lengthy and (initially) **unnecessarily complex**
- Job-submission **staff turnover can cause delays** during 'learning-curve'
- Modeled energy **savings** is **not as accurate as desired**

Home Upgrade Program Issues

Biggest initial pain-point:

- Rebate application process is lengthy and (initially) unnecessarily complex



Focus on:

Information Systems

(i.e., the thing we had the most control of)

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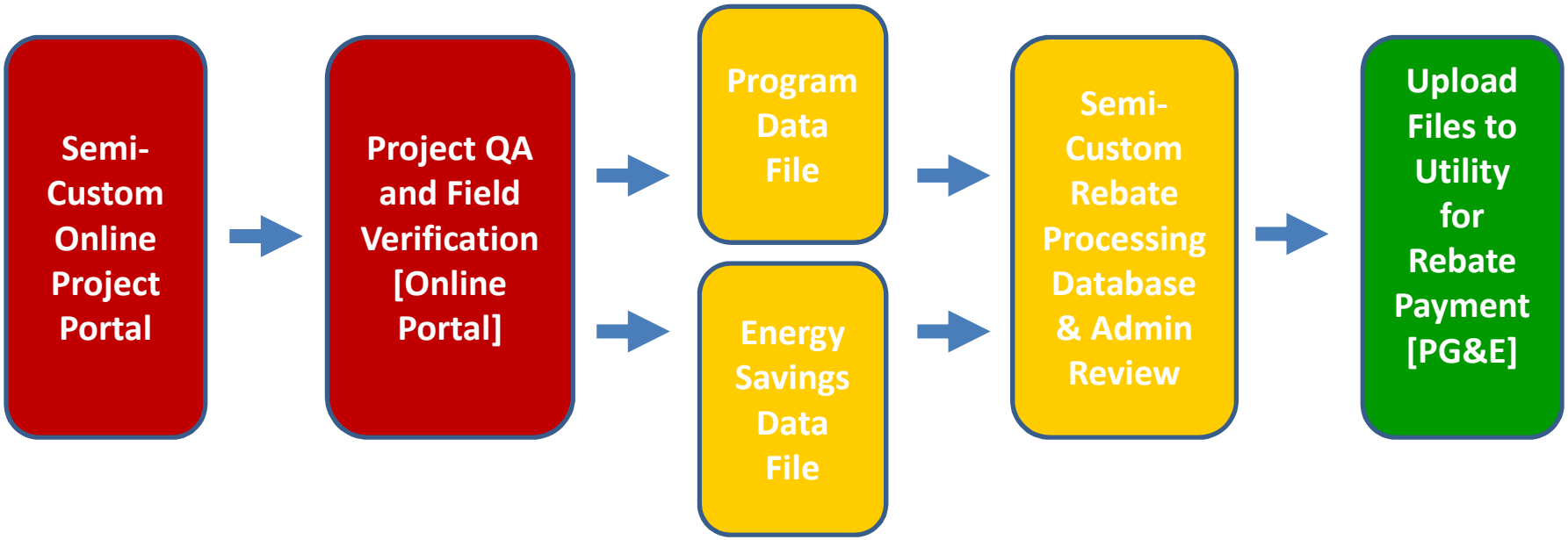
Home Upgrade Program Process

2011-2014



Home Upgrade Program Issues

Process advantages for 'Semi-Custom' portal/database solutions:

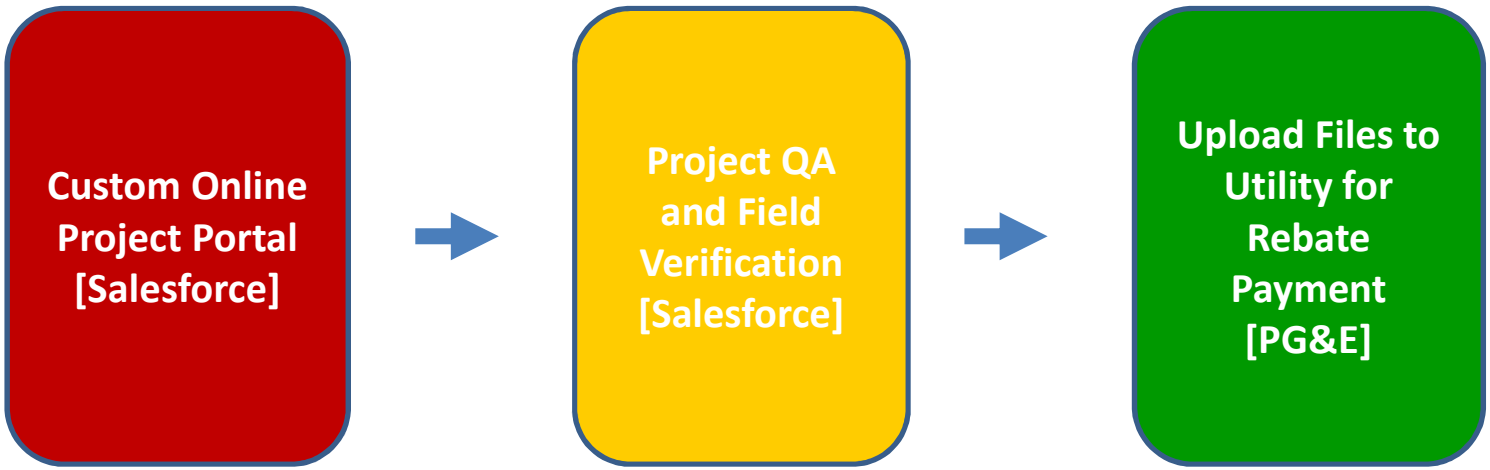
- Off-the-shelf solution to launch Program

Process drawbacks for 'Semi-Custom' portal/database solutions:

- Difficult to update features without significant impacts on users
- Difficult to track application documentation updates (good notes required!)
- Design included significant amount of manual aggregation of data in order to move to next step in process
- Reporting capabilities were not as flexible as needed
- More steps = More potential for data errors in transfer

Home Upgrade Program Process

2015-Current



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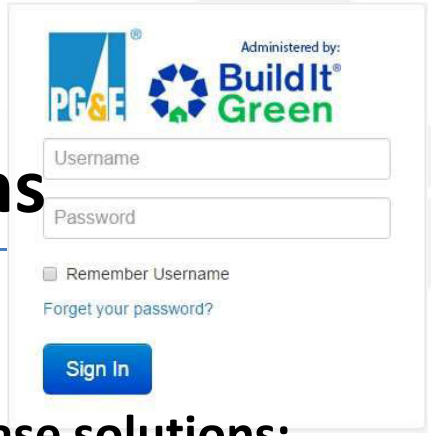
Home Upgrade Program Issues & Solutions



Process advantages for fully 'Custom' integrated portal/database solutions:

- Regular, flexible feature updates built on stable, standardized platform (Salesforce) minimize impacts on users and increases efficiency
- Iterative application documentation tracking (good notes still recommended!)
- Automated data aggregation speeds move to next step in process significantly
- Reporting capabilities are as flexible as needed (design for standardization of data where possible)
- Fewer steps = Limited potential for data errors in transfer

Process drawbacks for fully 'Custom' portal/database solutions:

- Initial Cost

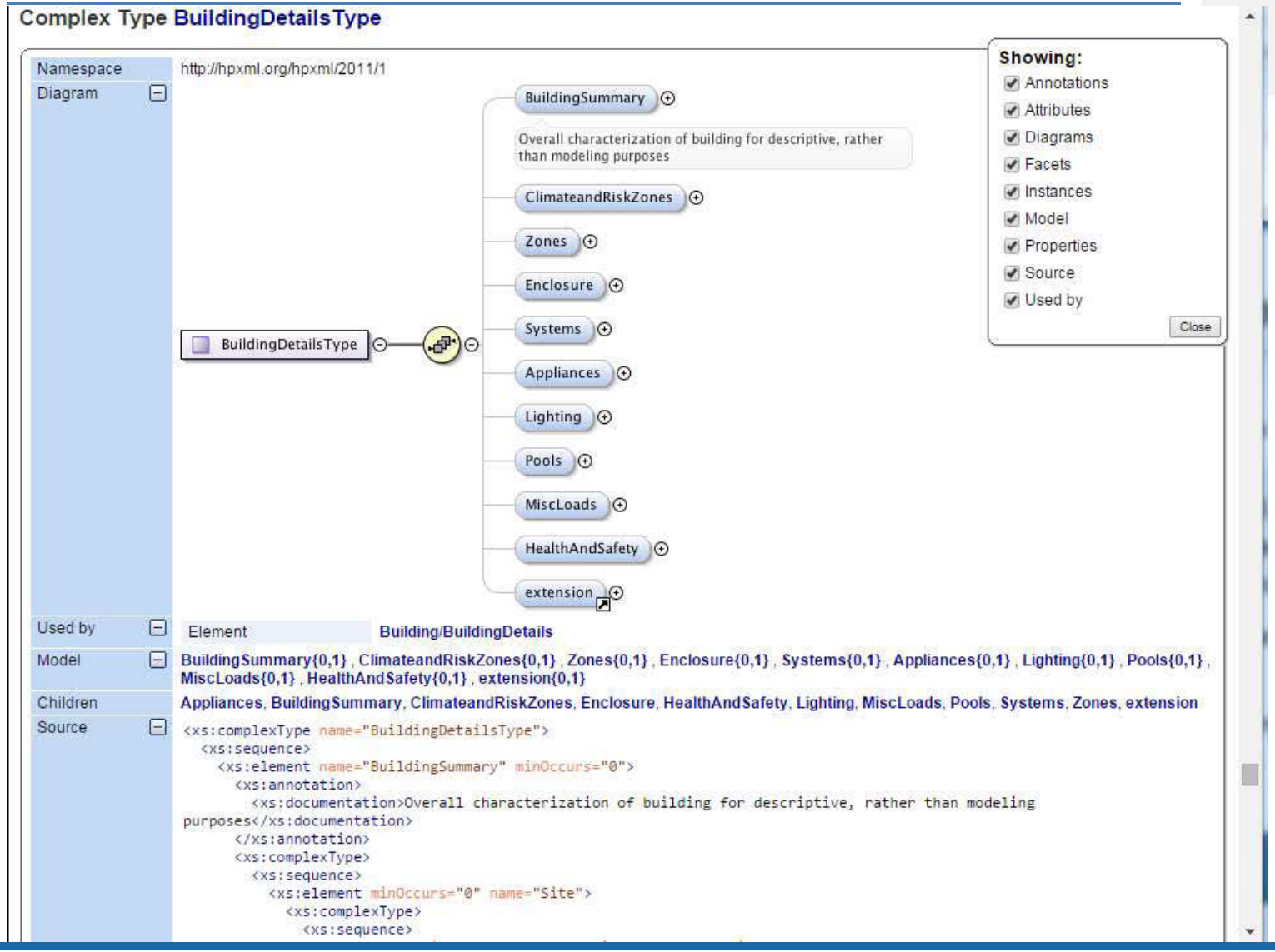
Home Upgrade Program Solutions

Addressing other Pain-Points:

- **Reduce unnecessary and/or manual data entry and documentation**
  - Parse data and 'auto-populate' from transparent, standardized energy modeling output (HPXML)
  - Online, dynamic, database-integrated 'test-measurements' form to minimize manual data transfer and user-error
  - Choice of 'less-detailed' software options

These solutions can increase efficiency and save time/money, but might they help reduce staff turnover as well?

HPXML Standard/Structure Maintained by DOE (NREL)



HPXML Structure Based on BPI & DOE Standards

Building Performance Institute, Inc.
BPI Standards

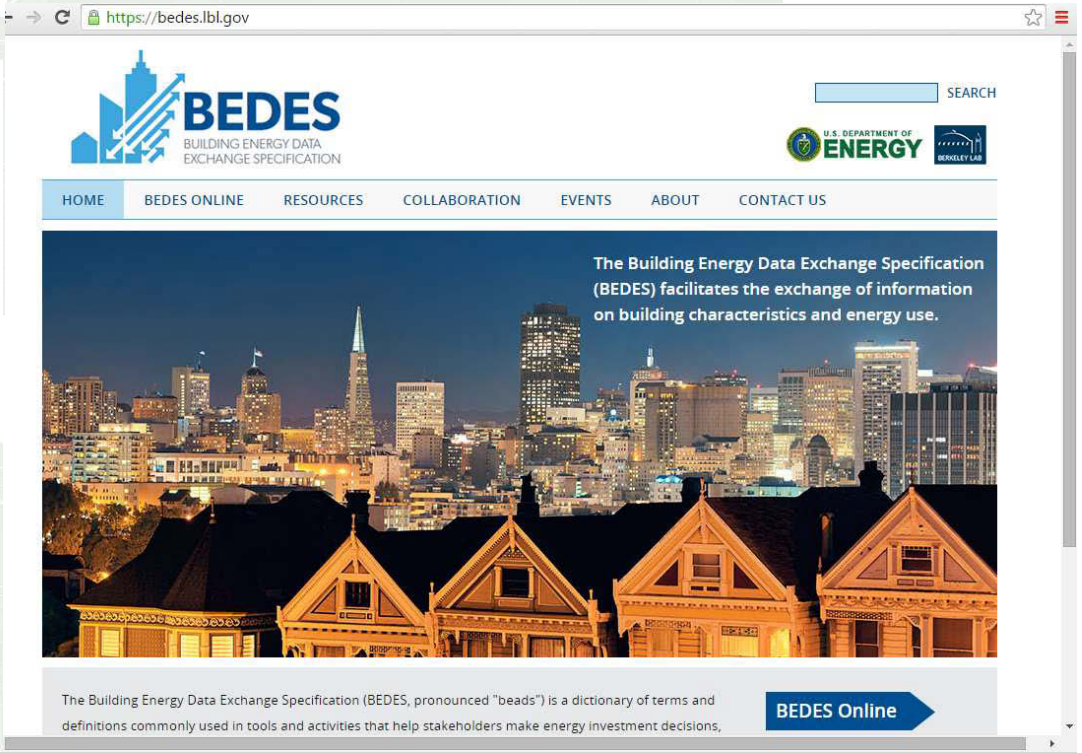
ANSI/BPI-2400-S-2012
Standard Practice for Standardized Qualification of Whole-House Energy Savings Predictions by Calibration to Energy Use History

Building Performance Institute, Inc.
BPI Standard

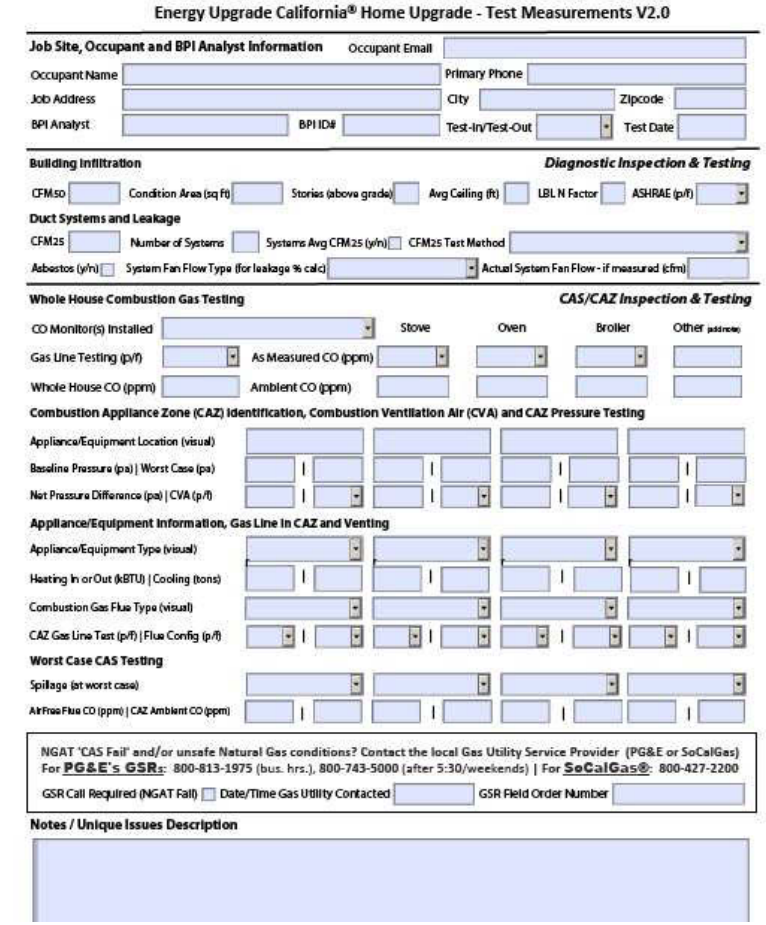
BPI-2100-S-2013
Standard for Home Performance-Related Data Transfer v2.1.0

Building Performance Institute, Inc.
BPI Standard

BPI-2200-S-2013
Standard for Home Performance-Related Data Collection v2.1.0



Test Measurements Form



Energy Upgrade California® Home Upgrade - Test Measurements V2.0

Job Site, Occupant and BPI Analyst Information Occupant Email

Occupant Name | Primary Phone

Job Address | City | Zipcode

BPI Analyst | BPI ID# | Test-In/Test-Out | Test Date

Building Infiltration — ***Diagnostic Inspection & Testing***

CFM50 | Condition Area (sq ft) | Stories (above grade) | Avg Ceiling (ft) | LBL N Factor | ASHRAE (p/f)

Duct Systems and Leakage

CFM25 | Number of Systems | Systems Avg CFM25 (y/n) | CFM25 Test Method

Asbestos (y/n) | System Fan Flow Type (for leakage % calc) | Actual System Fan Flow - if measured (cfm)

Whole House Combustion Gas Testing — ***CAS/CAZ Inspection & Testing***

CO Monitor(s) Installed | Stove | Oven | Broiler | Other (address)

Gas Line Testing (p/f) | As Measured CO (ppm)

Whole House CO (ppm) | Ambient CO (ppm)

Combustion Appliance Zone (CAZ) Identification, Combustion Ventilation Air (CVA) and CAZ Pressure Testing

Appliance/Equipment Location (visual)

Baseline Pressure (pa) | Worst Case (pa)

Net Pressure Difference (pa) | CVA (p/f)

Appliance/Equipment Information, Gas Line in CAZ and Venting

Appliance/Equipment Type (visual)

Heating In or Out (kBTU) | Cooling (tons)

Combustion Gas Flue Type (visual)

CAZ Gas Line Test (p/f) | Flue Config (p/f)

Worst Case CAS Testing

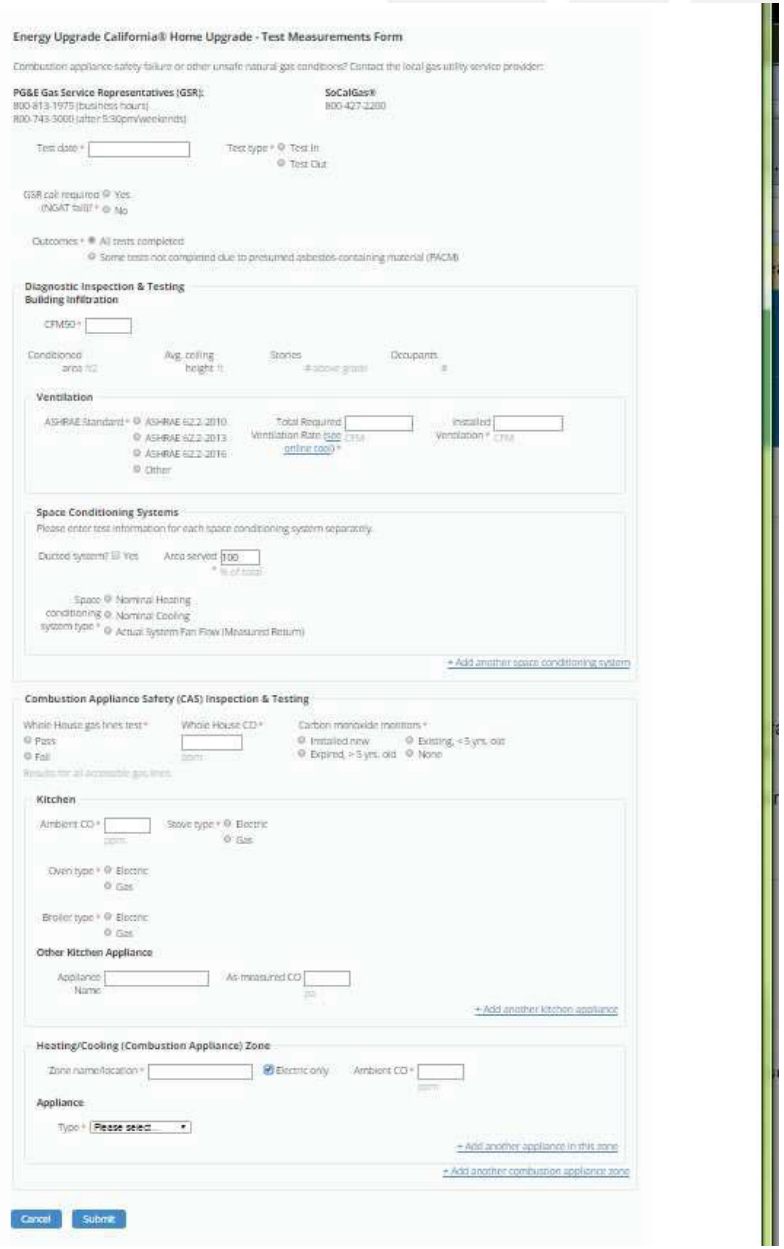
Spillage (at worst case)

AirFree Flue CO (ppm) | CAZ Ambient CO (ppm)

NGAT 'CAS Fail' and/or unsafe Natural Gas conditions? Contact the local Gas Utility Service Provider (PG&E or SoCalGas)
For **PG&E's GSRs**: 800-813-1975 (bus. hrs.), 800-743-5000 (after 5:30/weekends) | For **SoCalGas®**: 800-427-2200

GSR Call Required (NGAT Fail) | Date/Time Gas Utility Contacted | GSR Field Order Number

Notes / Unique Issues Description



Energy Upgrade California® Home Upgrade - Test Measurements Form

Combustion appliance safety failure or other unsafe natural gas conditions? Contact the local gas utility service provider:

PG&E Gas Service Representatives (GSR):
800-813-1975 (business hours)
800-743-5000 (after 5:30pm/weekends)

SoCalGas®
800-427-2200

Test date * | Test type * Test In / Test Out

GSR call required (NGAT fail)? * Yes / No

Outcomes * All tests completed / Some tests not completed due to presumed asbestos-containing material (PACM)

Diagnostic Inspection & Testing
Building Infiltration

CFM50 *

Conditioned area ft2 | Avg. ceiling height ft | Stories # above grade | Occupants #

Ventilation

ASHRAE Standard * ASHRAE 62.2-2010 / ASHRAE 62.2-2013 / ASHRAE 62.2-2016 / Other

Total Required Ventilation Rate (see online calc) * CFM | Installed Ventilation * CFM

Space Conditioning Systems

Please enter test information for each space conditioning system separately.

Ducted system? Yes | Area served 100 % of total

Space conditioning system type * Nominal Heating / Nominal Cooling / Actual System Fan Flow (Measured Return)

+ Add another space conditioning system

Combustion Appliance Safety (CAS) Inspection & Testing

Whole House gas lines test * Pass / Fail

Results for all accessible gas lines

Whole House CO * ppm

Carbon monoxide monitors * Installed new / Existing, < 5 yrs. old / Expired, > 5 yrs. old / None

Kitchen

Ambient CO * ppm | Stove type * Electric / Gas

Oven type * Electric / Gas

Broiler type * Electric / Gas

Other Kitchen Appliance

Appliance Name | As-measured CO ppm

+ Add another kitchen appliance

Heating/Cooling (Combustion Appliance) Zone

Zone name/location * | Electric only | Ambient CO * ppm

Appliance

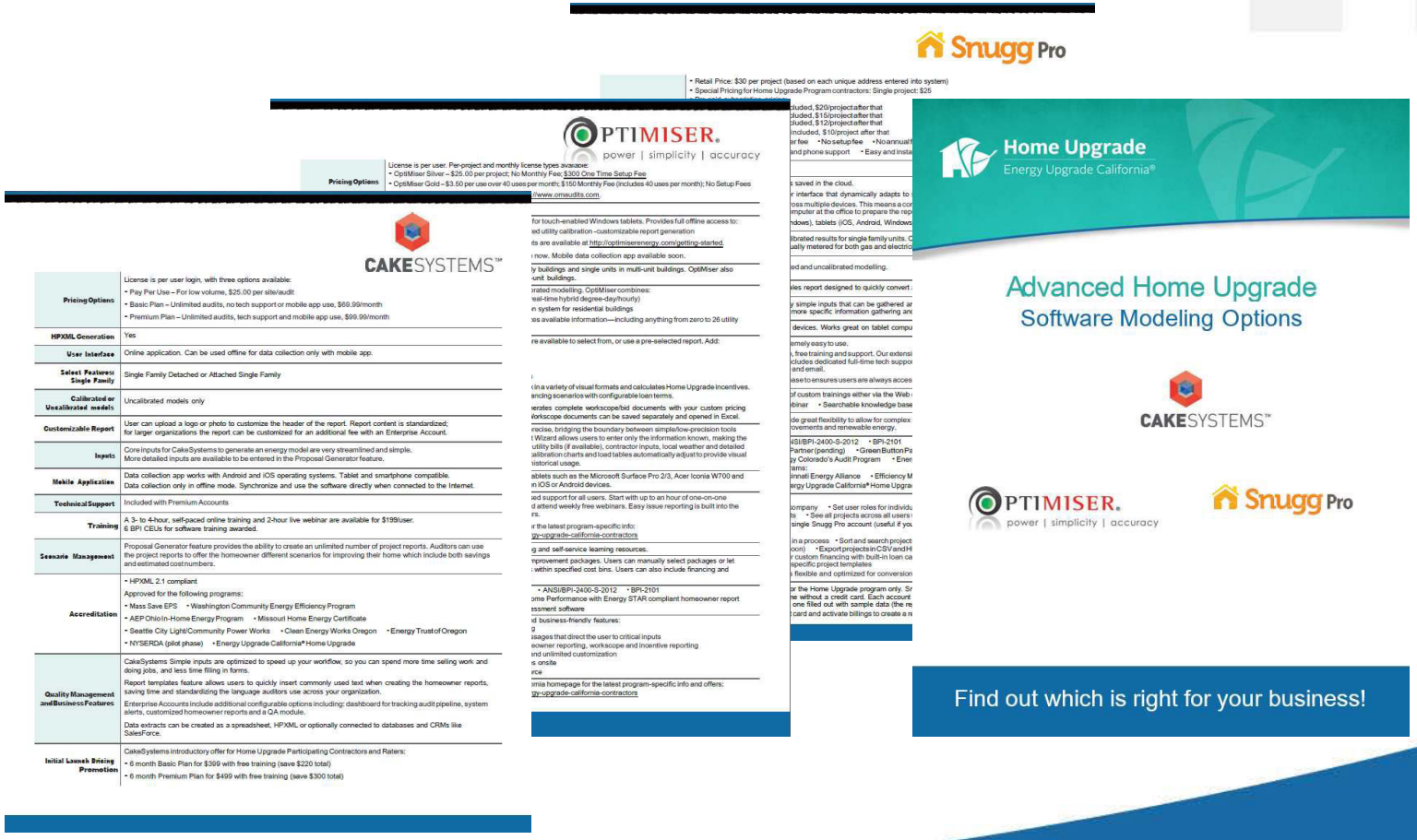
Type * Please select

+ Add another appliance in this zone

+ Add another combustion appliance zone

Cancel | Submit

At-a-Glance Software Comparison Guide



Snugg Pro

- Retail Price: $30 per project (based on each unique address entered into system)
- Special Pricing for Home Upgrade Program contractors: Single project: $25

OPTIMISER.
power | simplicity | accuracy

Pricing Options

License is per user. Per-project and monthly license types available:
- OptiMiser Silver – $25.00 per project; No Monthly Fee; $300 One Time Setup Fee
- OptiMiser Gold – $3.50 per use over 40 uses per month; $150 Monthly Fee (includes 40 uses per month); No Setup Fees

www.omeudits.com.

CAKESYSTEMS™

Pricing Options	License is per user login, with three options available: • Pay Per Use – For low volume, $25.00 per site/audit • Basic Plan – Unlimited audits, no tech support or mobile app use, $69.99/month • Premium Plan – Unlimited audits, tech support and mobile app use, $99.99/month
HPXML Generation	Yes
User Interface	Online application. Can be used offline for data collection only with mobile app.
Select Features: Single Family	Single Family Detached or Attached Single Family
Calibrated or Uncalibrated models	Uncalibrated models only
Customizable Report	User can upload a logo or photo to customize the header of the report. Report content is standardized; for larger organizations the report can be customized for an additional fee with an Enterprise Account.
Inputs	Core inputs for CakeSystems to generate an energy model are very streamlined and simple. More detailed inputs are available to be entered in the Proposal Generator feature.
Mobile Application	Data collection app works with Android and iOS operating systems. Tablet and smartphone compatible. Data collection only in offline mode. Synchronize and use the software directly when connected to the Internet.
Technical Support	Included with Premium Accounts
Training	A 3- to 4-hour, self-paced online training and 2-hour live webinar are available for $199/user. 6 BPI CEUs for software training awarded.
Scenario Management	Proposal Generator feature provides the ability to create an unlimited number of project reports. Auditors can use the project reports to offer the homeowner different scenarios for improving their home which include both savings and estimated cost numbers.
Accreditation	• HPXML 2.1 compliant Approved for the following programs: • Mass Save EPS • Washington Community Energy Efficiency Program • AEP Ohio In-Home Energy Program • Missouri Home Energy Certificate • Seattle City Light/Community Power Works • Clean Energy Works Oregon • Energy Trust of Oregon • NYSERDA (pilot phase) • Energy Upgrade California® Home Upgrade
Quality Management and Business Features	CakeSystems Simple inputs are optimized to speed up your workflow, so you can spend more time selling work and doing jobs, and less time filling in forms. Report templates feature allows users to quickly insert commonly used text when creating the homeowner reports, saving time and standardizing the language auditors use across your organization. Enterprise Accounts include additional configurable options including: dashboard for tracking audit pipeline, system alerts, customized homeowner reports and a QA module. Data extracts can be created as a spreadsheet, HPXML or optionally connected to databases and CRMs like SalesForce.
Initial Launch Pricing Promotion	CakeSystems introductory offer for Home Upgrade Participating Contractors and Raters: • 6 month Basic Plan for $399 with free training (save $220 total) • 6 month Premium Plan for $499 with free training (save $300 total)

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Advanced Home Upgrade Software Modeling Options

CAKESYSTEMS™

OPTIMISER.
power | simplicity | accuracy

Snugg Pro

Find out which is right for your business!

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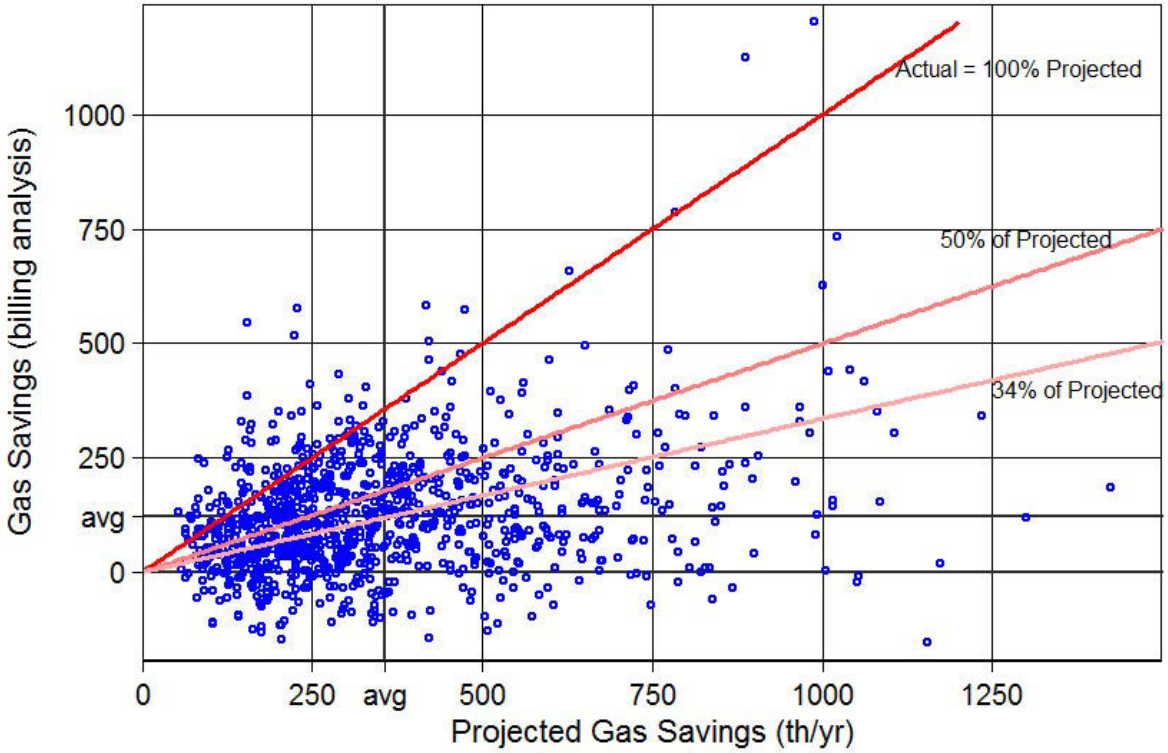
Home Upgrade Program Solutions

Addressing other Pain-Points:

- **Increase energy-modeling accuracy for better Program energy savings and satisfaction**
  - Launch mechanism for comparison of energy-modeled predictive savings results with pre- and post-installation customer bill data (CalTRACK)
  - Provide realization-rate feedback to energy modeling software vendors to improve tools
  - Provide realization-rate feedback to contractors to target areas that need improvement with more specific training and mentoring (potentially introduce ‘contractor scores’)

Is the Program Delivering Savings?

Actual (billing analysis) vs. Projected Gas Savings



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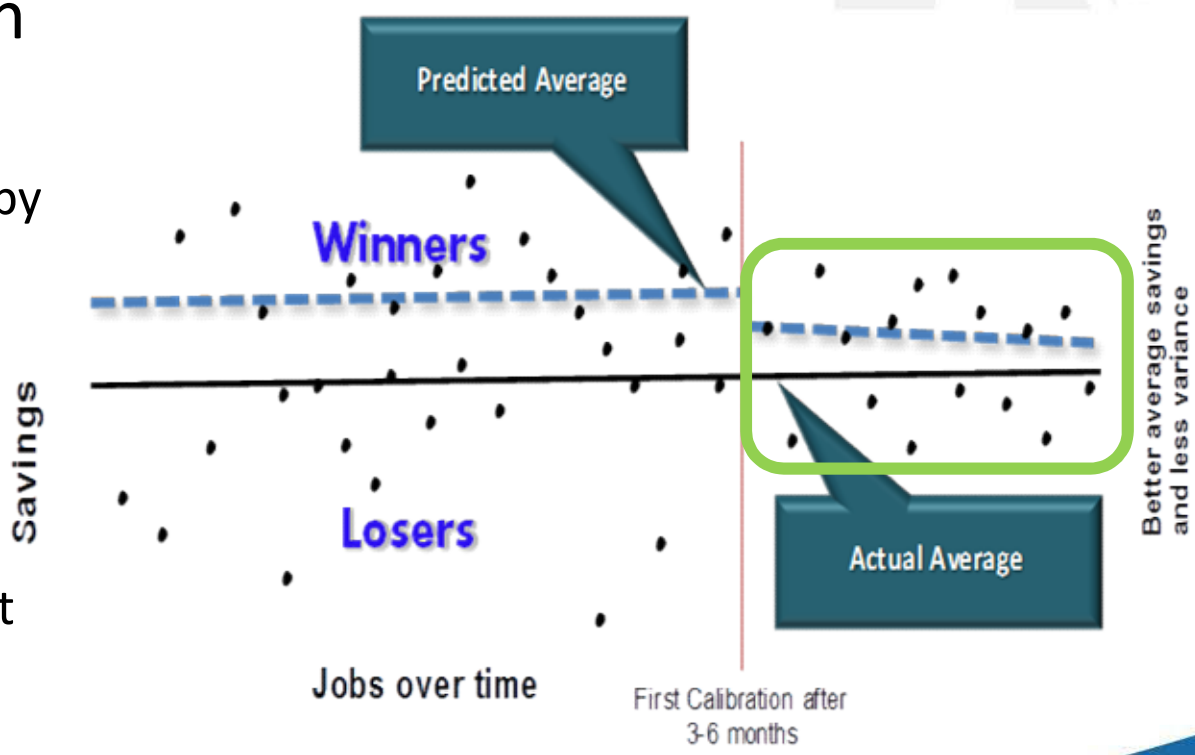
CalTRACK: Delivery of Predicted Savings

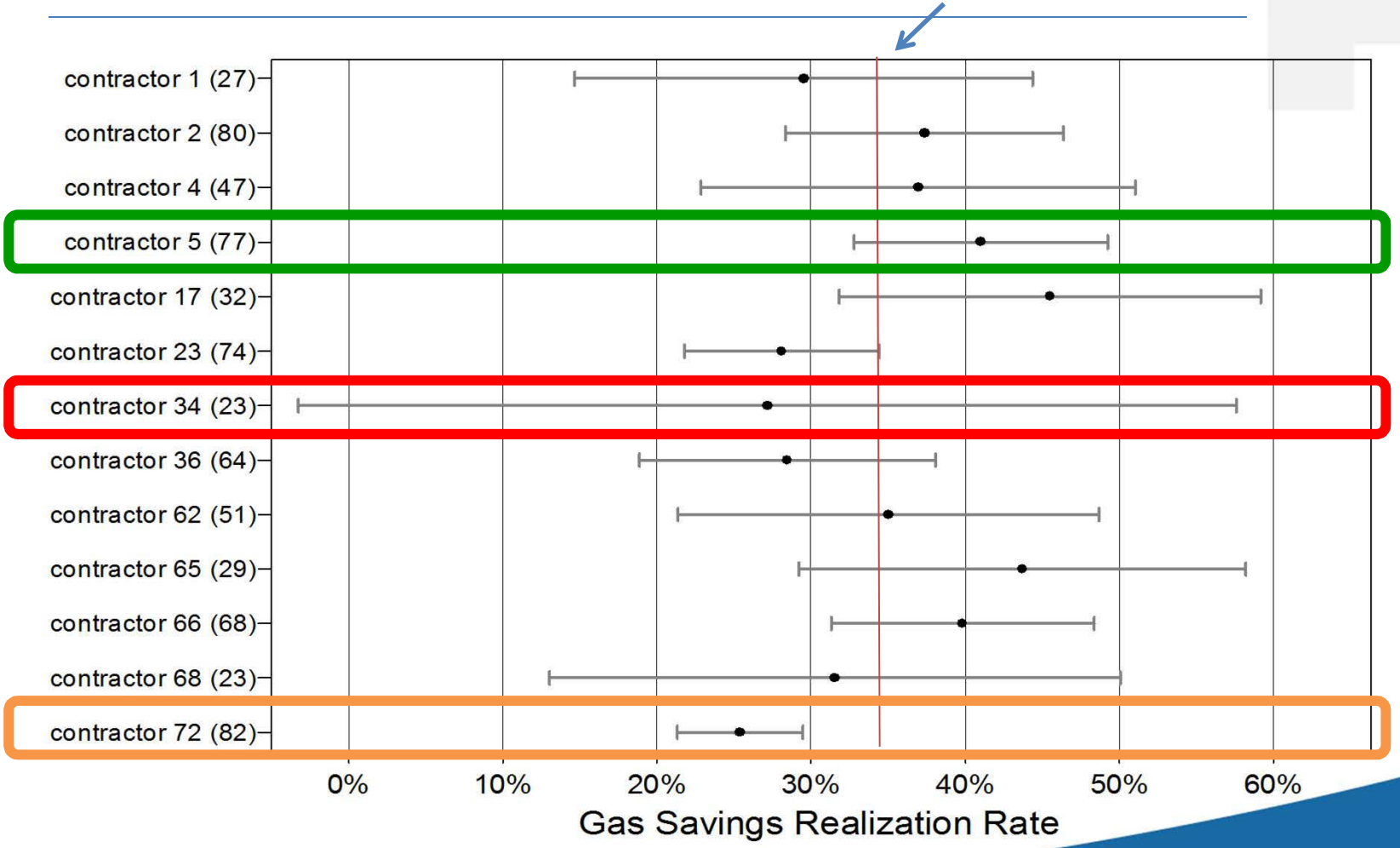
California Data-Driven Tracking and Analysis

- Upgrade projects tracked by software version used
- Savings predictions compared to weather normalized post retrofit billing data
- If inaccuracies identified at the software level, vendor can revise software or an adjustment factor can be applied to reconcile future model predictions



CalTRACK: Contractor Feedback

Avg. Gas Realization Rate (2010-2012 Data): 34%



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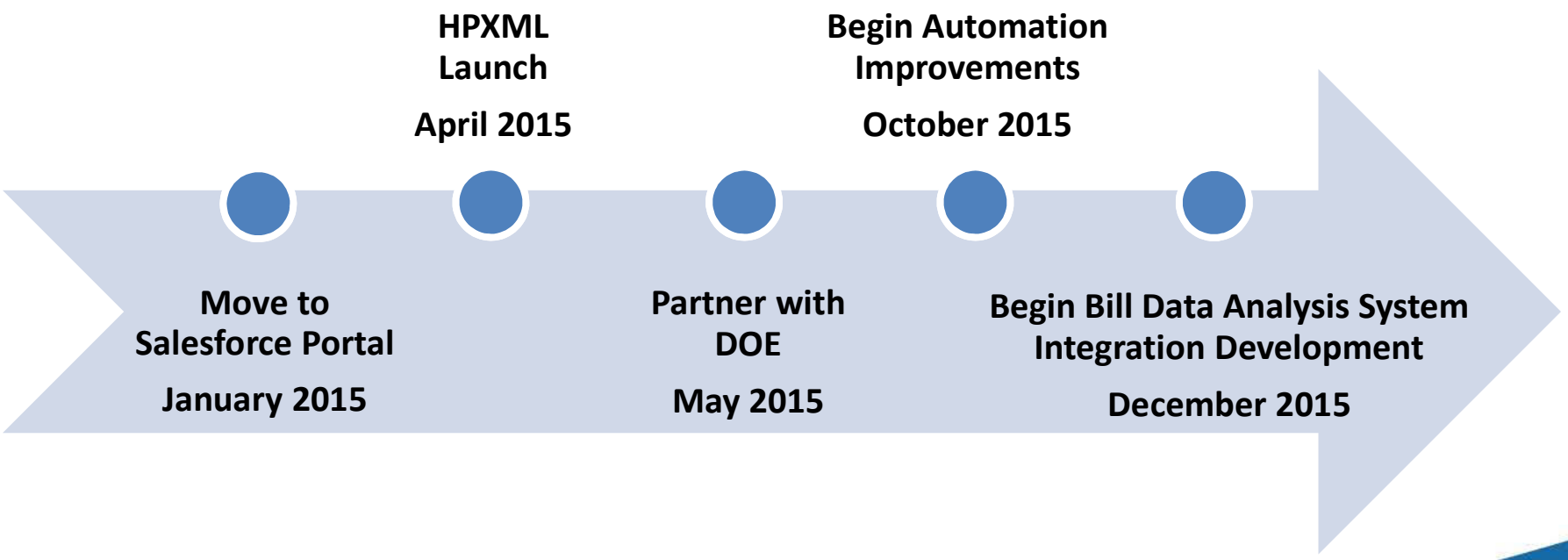
Home Upgrade Program Accelerator Metrics

1. Reduce administrative time to review rebate applications by 25% (per project)
2. Expand contractor choice of energy modeling software tools
3. Reduce the reporting burden on contractors by 25% (per project)
4. Improve contractors' satisfaction in the program by 20% (based on surveys)
5. Benchmark predictive accuracy of modeled energy savings and reduce average difference between predicted and actual savings by 10%

Home Upgrade Program Accelerator Results

1. Reduced administrative time to review rebate applications by 48%
2. Expanded contractor choice of energy modeling software tools to 3
3. Reduced the reporting burden on contractors by 27% in avg. application submission time and 20% in avg. energy modeling time
4. Improved contractors' satisfaction in the program by 28%
5. Benchmarking of predictive accuracy of modeled energy savings is **in progress**; reducing average difference between predicted and actual savings by 10% is next (upon completion of benchmarking)

HUP Improvements Timeline - 2015



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HUP Improvements Timeline - 2016

HPXML Required

February 2016

Begin Development on HPXML & HES to MLS Registry

April 2016

Initial Bill Data Access via Green Button (Share My Data)

June 2016

Initial Bill Data Analysis Delivery/Access via CalTRACK

September 2016

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Long-Term Goal: Market Transformation

Indirect benefits that HUP improvements can facilitate:

- Driving demand/quantifying value of energy efficiency work
  - ✓ Home Energy Score via HPXML
  - ✓ Bringing green building data to the MLS via HPXML
- Designing better, more cost-effective programs
  - ✓ Less risk (greater predictability) for investors
  - ✓ Better environment for private capital and industry investment
  - ✓ Standardized (HPXML) data sharing and comparative analysis between other states, organizations and industries

Questions and Comments

Contact:

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Thank You

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