PG&E Energy Water Conservation Plan - Final Report

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1. EXECUTIVE SUMMARY

Documentation of the PG&E Energy Water Conservation Plan was performed by Richard Heath & Associates, Inc. on behalf of the Pacific Gas and Electric Company (PG&E). The report includes the following:

- Background Data Collection
- Framework for Working with Water Agencies
- Co-Funded Program Test
- Test Results
- Coordination Program

The Energy Water Conservation Plan was initiated in response to the California Public Utilities Commission (CPUC) (R.) 13-12-011[i] , which encouraged the development of a partnership framework to co-fund programs that reduce energy consumption by the water sector. The partnership was developed between investor-owned utilities (IOU) in the energy sector and privately-owned water utilities regulated by the CPUC and public water agencies.

The Energy Water Conservation Plan was intended to provide a pathway for PG&E's Energy Savings Assistance (ESA) Program to incorporate a co-leveraged energy water conservation program as a systemwide enhancement to reduce water and energy consumption.

The ESA Program provides no-cost weatherization services to low-income households who meet the California Alternate Rates for Energy (CARE) income guidelines. Services provided include attic insulation, energy-efficient refrigerators, energy-efficient furnaces, weatherstripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs which reduce air infiltration[ii].

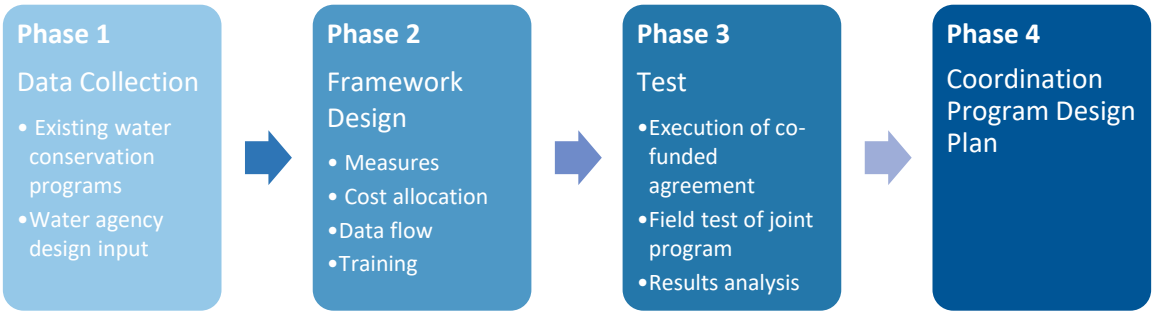
1.1 Energy Water Conservation Plan Approach

The Energy Water Conservation Plan initiated in January 2015 with the following intention:

- Developing new ideas for improving and expanding water conservation services within the ESA Program
- Creating an approach to sharing costs for the following:
    - Incremental energy-water savings measures
    - Water conservation education and collateral
    - Residential water conservation audit
    - Data collection, aggregation and reporting
    - Contractor training
- Mitigating barriers to successful collaboration between PG&E and water agencies
- Providing a blueprint for a systemwide collaboration between PG&E and water agencies

A phased approach, depicted below, was adopted for the Energy Water Conservation Plan:

Figure 1: Energy Water Conservation Plan Phased Approach



Phase 1: Data Collection

Existing water agency conservation efforts were cataloged, and interviews were conducted with water agencies and water collaboratives on key issues in joint program design.

Phase 2: Framework Design

A framework for collaborative programs was developed that included a standard menu of incremental water conservation measures and service options deliverable concurrently with ESA Program services, PG&E and water agency cost sharing methodology, data architecture and training plan.

Phase 3: Test

Two water agencies offered to co-funded test programs (Test), and agreements were developed. The program was executed in three markets, and the Test results were analyzed to determine if any program design enhancements were necessary.

Phase 4: Coordination Program Design Plan

Conclusions drawn from Test outcomes were used to adjust the program framework and create a plan for ongoing coordination of programs with water agencies.

1.2 Key Findings

Lessons learned in the development of the Energy Water Conservation Plan include the following:

- Water agencies are enthusiastic about working collaboratively to maximize water conservation efforts, as the ESA Program provides a cost-effective way for water agencies to deliver conservation services
- Establishing a select set of water conservation measures that ESA Program contractors can readily implement reduces program complexity
- Utilizing a menu-based approach to collaborative services allows water agencies to tailor programs for their customers that meet regulatory and managerial/oversight board objectives
- PG&E successfully developed relationships with two of the largest water agencies in their territory and implemented co-funded Tests that provided incremental measures and services to 1,394 ESA customers, saving over 4.6 million gallons of water and 8,028 kWh per year

2. BACKGROUND

The ESA Program is PG&E's largest residential direct installation energy efficiency program. In 2014, the year prior to the launch of the Energy Water Conservation Plan, the ESA Program served over 120,000 households, providing qualified customers with energy-saving improvements at no charge. The ESA Program includes measures such as faucet aerators, shower heads and thermostatic shower valves, that save energy due to the reduced consumption of hot water.

Historically, there has not been a mechanism to claim embedded energy savings from cold water conservation. As such, the ESA Program does not install measures that conserve hot water when PG&E does not provide the energy to heat the water, as in the case of a home with a propane water heater. The ESA program also does not include cold water conservation measures, such as high-efficiency toilets or toilet flappers.

Ongoing water challenges in California have increased the emphasis on collaborative solutions to water conservation. CPUC guidance on water/energy nexus at the start of the Energy Water Conservation Plan included the following:

- R.09-11-014 and May 2012 guidance decision(D.12-08-044) that directed IOUs to expand energy-water efficiency programs[iii]
- D. 07-12-050 which authorized energy-water studies and directed IOUs to run pilot projects[iv]
- The CPUC Code 739.8 excerpt (c) that states the CPUC "shall consider and may implement programs to assist low-income ratepayers in order to provide appropriate incentives and capabilities to achieve water conservation goals"[v]
- R. W-4976 that adopted drought procedures for water conservation rationing[vi]
- R.13-12-011 policies to promote a partnership framework between energy and water utilities to promote energy-water nexus programs[vii]

By incorporating incremental water conservation services and measures co-funded by water agencies into the ESA Program, additional water savings could be achieved with limited incremental expense. There are over 700 water retailers within PG&E's service territory and more than 35 water wholesalers. Combined, these water agencies have a variety of residential water conservation initiatives including rebate offers with varying rebate criteria and amounts, giveaways, direct installation programs and audit services.

The Energy Water Conservation Plan was initiated to develop a strategic plan for the integration of existing water conservation program offerings with the ESA Program offerings. The overall goal was to develop a framework for collaboration that would overcome perceived barriers for leveraged programs, such as waiting on the CPUC directives for the energy-water nexus, the sheer number of water agencies in PG&E's territory and various regulations regarding service for low-income customers.

3. DATA COLLECTION

3.1 Inventory of Existing Water Conservation Measures and Services

In the first phase of the Energy Water Conservation Plan, the existing water conservation programs were cataloged. Information about water conservation giveaways, rebates and direct installation services was collected from 250 of the largest water agencies within PG&E's service area (Attachment 1). Data was collected between May and June 2015. Many of the available measures were promoted on the water agencies' web sites, but some information was harder to find and required a call to the water agency. Fewer than five percent of water agencies were identified as providing direct installation of any water conservation measures. There was substantial variation in the types of measures and services offered. The information was compiled into a master list of water conservation measures listed below:

Table 1: Water Conservation Measures Master List

Measure Type	Giveaway	Rebate	Direct Installation
Interior Measures			
Home-Survey Kit	X		
Aerator	X		
Shower Timer	X		
Showerhead*	X		X
Leak Dye Tablets	X		
Toilet Displacement Device	X		
Toilet Flapper Valve	X		
Toilet Fill Valve	X		
Low-flow Toilets*		X	X
High-efficiency Clothes Washer		X	
High-efficiency Dishwasher		X	
Hot Water Recirculating System		X	
Water Pressure Regulator			X
Exterior Measures			
Hose Nozzle	X		
Outdoor Hose Timer	X		
Sprinkler Nozzles	X		
Soil Moisture Sensor	X		
Rain Gauge	X		
Mulch	X		
Smart Irrigation Timer		X	
Turf Removal		X	
Rain Barrel		X	
Pool Cover		X	
Greywater System		X	

* Measures were available as giveaways from some water agencies and for direct installation by some agencies.

On-site interior and/or exterior water audits were also offered by 18 percent of water agencies. These audits were frequently combined with giveaways. Some include direct installation services of simple measures, such as faucet aerators.

3.2 Water Agency and Industry Association Interviews

Eleven of the 250 water agencies and six water conservation industry associations listed below were interviewed to solicit feedback on a framework for building collaborative programs that would leverage existing conservation efforts in both the water and energy areas.

Table 2: Water Agencies and Conservation Industry Associations

Water Agencies
1. Bay Area Water Supply Conservation Agency
2. California American Water
3. California Water Service Company
4. City of Fresno
5. City of Napa
6. Contra Costa Water District
7. East Bay Municipal Utilities District
8. San Jose Water
9. Santa Clara Valley Water District
10. Solano County Water Agency
11. Zone 7 Water Agency
Associations
1. Association of California Water Agencies
2. California Department of Water Resources
3. California Urban Water Conservation Council
4. California Water Association
5. Pacific Conservation Institute
6. U.S. Green Building Council of Northern California

Three water agencies were enthusiastic about a potential collaborative partnership and wanted to know more about how the program would operate, pricing and how soon they could get started. Seven expressed some interest but did not want to be one of the first to start. One was not at all interested, citing adequacy of existing programs for their lack of interest.

These interviews help to clarify the need for a flexible program structure to meet the unique interest and needs of each water agency. Customer data privacy issues also were identified as a challenge to collaboration.

4. FRAMEWORK DESIGN

Based on the information gathered, a framework for collaboration was designed. Key components of the design included the measure selection, co-funding agreement, data flow and training.

The following basic assumptions were central to the design:

- **Customers must qualify for ESA Program services**: Customers must be eligible for ESA Program services to receive incremental water conservation measures and services
- **Customers must qualify for water agency services**: Customers must be eligible for incremental water conservation measures and services based on criteria established by water agencies
- **ESA Program contractors will perform the work:** All services to be delivered in the program will be completed by ESA Program contractors
- **PG&E Installation Standards will be used:** PG&E will define the requirements for all approved measures and diagnostic protocols
- **Energy Water Program Administrator:** PG&E will contract with a third party for the administration of the energy water program. The program administrator will recruit and execute program services contracts with the water agencies and ESA Program contractors

4.1 Measures

A menu approach was chosen to allow water agencies flexibility in measure and service selection while limiting the complexity of implementation within the ESA Program. The master list of water conservation measures shown in Table 1: Water Conservation Measures and existing water agency residential conservation services were analyzed to determine which were feasible to be implemented within ESA. This analysis also included a review of any specialty licenses needed to do the following:

- Perform the services (water conservation education, assessment and audits)
- Provide the installation of each water conservation measure
- Identify installation barriers and criteria
- Identify any special skills and certifications required

A basic list of options was selected and included in Table 3 below.

Table 3: Measures, Giveaways and Services

Measures	Giveaways	Services
Toilet Flapper	Hose Nozzle	Interior Water Use Assessment
Low-flow Toilet	Shower Timer	Exterior Water Use Assessment
High-efficiency Dishwasher Hot Water Recirculating Pump	Water Efficiency Collateral	Meter Leak Check
Aerator*		Water Conservation Education
Showerhead*		Referral to Water Agency Service
Thermostatic Shower Valve*		
Thermostatic Tub Spout*		
High-efficiency Clothes Washer*		

*when ESA cannot install (as, for example, when PG&E does not provide the water-heating fuel)

Services were defined as follows:

- **Interior Water Use Assessment:** Assessment conducted by walking through the home with the customer, visually inspecting every room and providing water and energy conservation education based on opportunities observed. Existing equipment and fixtures assessed for leaks, including testing each toilet utilizing dye tablets, and identifying upgrade opportunities
- **Exterior Water Use Assessment**: Assessment conducted by visually inspecting all hose bibs and water features (pools, evaporative coolers, fountains) to verify that 1) there are no indications of leaks and 2) no water features are currently performing a fill cycle that would interfere with meter check. Water waste, such as standing water, wet spots or green patches in non-irrigated areas, are identified and recorded
- **Meter Leak Check**: Check water meter for indication of water use when no water is running inside or outside of the home. If a leak is indicated, leak isolation is attempted by turning off property water valve. Information regarding any potential leak is communicated to the homeowner and water agency
- **Water Conservation Education:** Provide education on three topics from Water Conservation Tip Sheet relevant to specific conditions observed in the home
- **Referral to Water Agency Service:** Referral to water agency programs based on conditions observed, such leak assistance, landscape audit or rebates, and ratepayer assistance

4.2 Cost Allocation

The following is the basic cost allocation structure for PG&E's contributions toward hot water conservation measures and for water agencies' contributions toward cold water conservation measures and services:

Table 4: Cost Allocation

	% Allocation	
Item Allocated	**PG&E**	**Water Agency**
Toilet Flapper Low-flow Toilet High-efficiency Dishwasher Hot Water Recirculating Pump		100%
Aerator Showerhead Thermostatic Shower Valve Thermostatic Tub Spout High-Efficiency Clothes Washer	100% if PG&E heats water	100% if PG&E does not heat water
Giveaways (hose nozzle, shower timer)		100%
Interior Water Use Assessment	50%	50%
Exterior Water Use Assessment		100%
Meter Leak Check		100%
Water Conservation Education	50%	50%
Water Agency Set-up and Contractor Training		100%
Energy Water Program Administration	100%	

At the time of the co-funding agreement development, a parallel effort was underway to explore whether energy savings could be realized through water conservation measures[viii]. R.13-12-011 authorized a series of pilot programs to further investigate Water-energy nexus opportunities. In the future, the outcome of these efforts may allow a pathway for energy utilities to co-fund cold water conservation efforts.

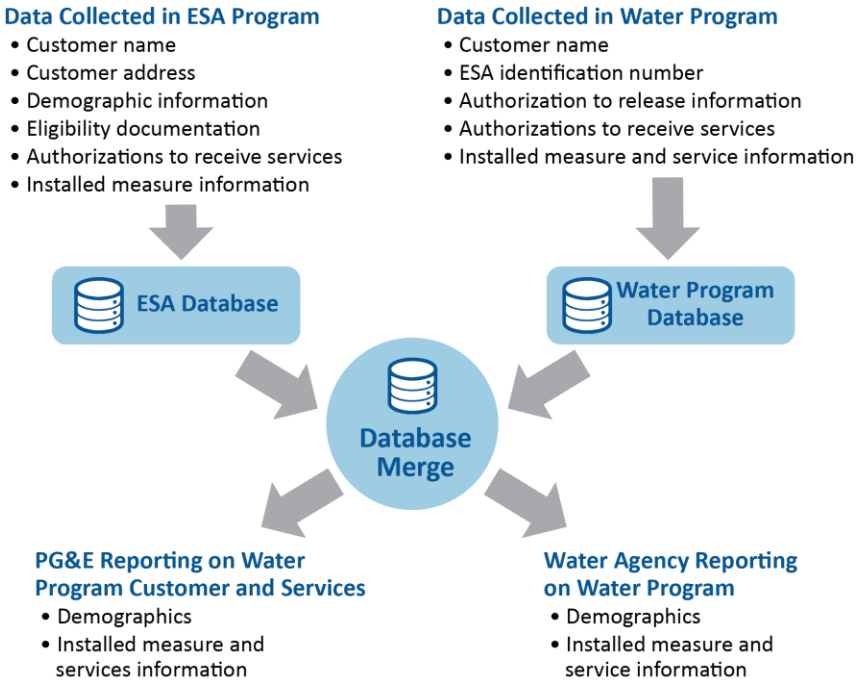
The Energy Water Program Administrator, contracted by PG&E, will negotiate and execute co-funding agreements with individual water agencies, as well as contracts for service delivery by ESA Program contractors. The Energy Water Program Administrator will oversee the execution of the contracts, including ESA Program contractor training on the delivery of incremental measures and services, quality assurance, program invoicing and reporting.

4.3 Data Flow

The ESA Program has an established process for collecting program data, including customer address, demographic information, program eligibility documentation, authorizations to provide services and installed measure information. It would be optimal to incorporate tracking for water measures and services into the ESA Program database, but the complexity necessitates a two-phased approach:

- **Phase I: Parallel Data Collection** The ESA Program will use its existing data collection process, and a separate and parallel process will be used to collect and store incremental water conservation measures and services data. It will also collect and store customer information and release authorizations so that PG&E and the water agency may receive shared reporting on the measures and services delivered to the property owner. Data from the two separate systems will be merged so that PG&E and water agencies can receive consolidated information about services delivered.

Figure 2: Data Flow



- **Phase II: Integrated Data Collection** Long term, it is recommended that PG&E incorporate fields for collaborative program delivery with water agencies in the ESA Program database. This will decrease duplicate data entry and overall program administration costs.

4.4 Training

Just as the water agency can customize their co-funded program by selecting the components from the Measure and Services Menu, the contractor training approach is designed to be tailored to their individual program. When an agency selects the measures, giveaways and services, the training for their specific program will be created.

ESA Program contractors providing services on behalf of a water agency will include the following topics, at a minimum:

- Specifics of the water agency's program
- Customer qualification process
- Measure installation, giveaway protocols and service delivery
- Data collection, reporting and invoicing

Training location may vary based on the number of contractor staff to be trained and complexity of measure installation training.

5. TEST

While conducting water agency interviews, three water agencies expressed a strong interest in testing a co-leveraged energy water conservation program in their service area. Field testing the framework described was determined to be a beneficial opportunity for assessment and adjustment prior to finalization of the systemwide plan.

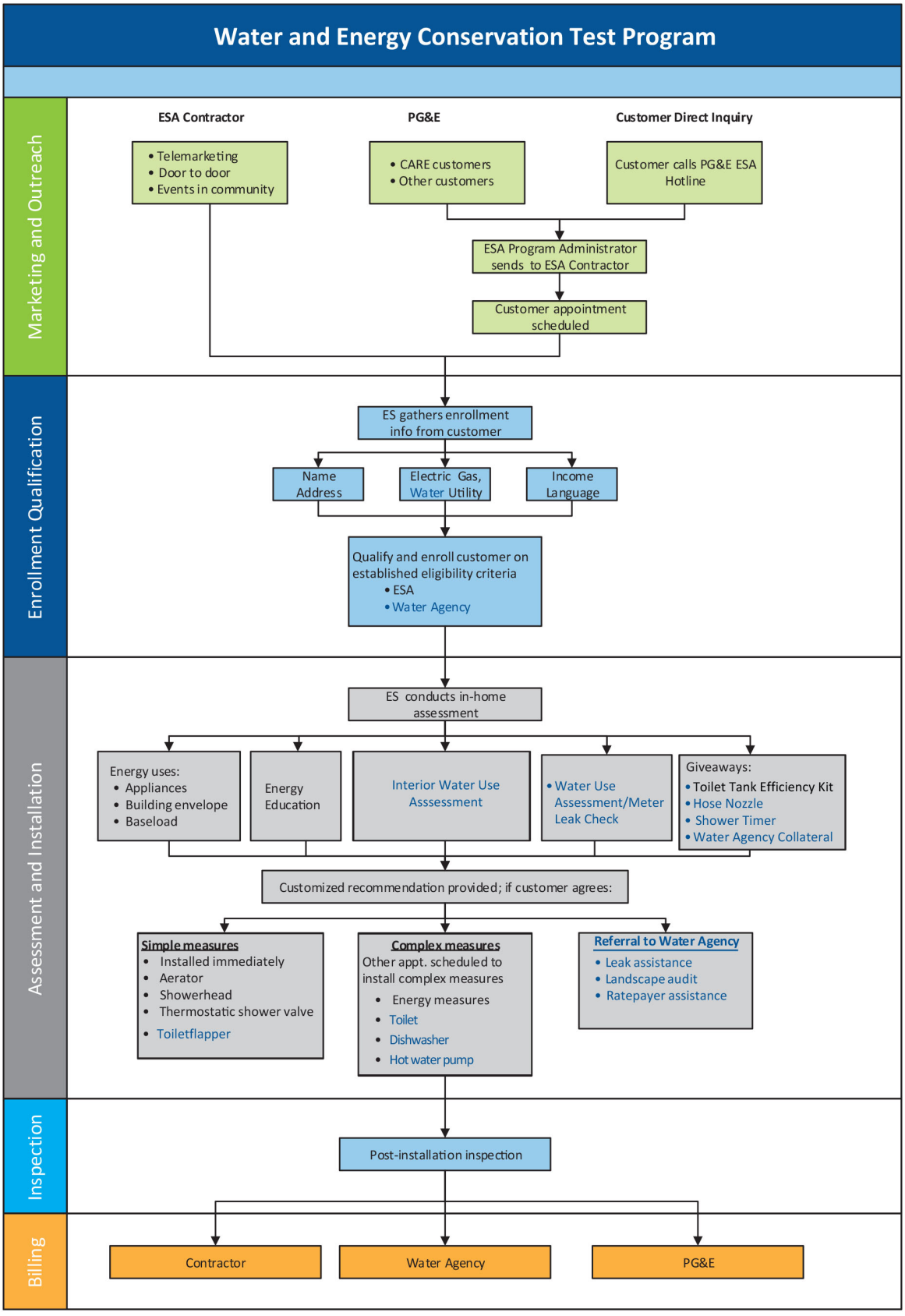
Proposals for Test programs were submitted to three water agencies. One water agency was unable to proceed with a Test program due to a prevailing wage conflict. Contractors providing services to the ESA Program are exempt from prevailing wage requirements, but the water agency's policy required adherence to these requirements. Two water agencies elected to proceed with a Test program.

5.1 Test Program Workflow

A workflow was developed for the Test, outlining the key activities occurring at each stage. Below is a summary:

- **Marketing and Outreach**: Performed as-usual in the ESA Program
- **Enrollment and Qualification**: Customers first enrolled in the ESA Program, then enrolled in the water agency program, with water utility information captured
- **Assessment and Installation**: Interior water use assessment conducted by an ESA Program Energy Specialist (ES) in parallel with ESA Program assessment; exterior water use assessment and meter leak check completed; energy and water education provided; giveaways distributed; simple energy and water measures installed; complex measures installed on a separate visit
- **Inspection**: Water measure inspections conducted in parallel with ESA Program inspections
- **Billing:** Water agency invoiced for their portion of the measure and services costs, PG&E invoiced for their share, and program contractors paid for services delivered

Figure 3: Water and Energy Conservation Test Program



5.2 Test Program Agreements with Water Agencies

In Fall 2015, **California American Water** was the first water agency to enter into a Test agreement. California American Water agreed to provide the following water conservation services and measures to 2,000 of their customers in the Sacramento, Monterey, Salinas and Santa Rosa areas by June 2016:

- Interior Water Use Assessments
- Exterior Water Use Assessments
- Meter Leak Checks
- Water Conservation Education
- Toilet Flappers
- Low-flow Toilets
- ESA Water Measures (Aerator, Showerhead, Thermostatic Shower Valve) when ESA could not
- Hose Nozzles
- Shower Timers

The agreement end date was extended to December 2017, to fully serve all customers.

Solano County Water Agency entered into a Test agreement in 2016, and agreed to provide the following services and measures to 750 customers in Solano County by December 2016:

- Interior Water Use Assessments
- Water Conservation Education
- Hose Nozzles
- ESA Water Measures (Aerator, Showerhead, Thermostatic Shower Valve) when ESA could not

The agreement was extended, and then renewed through December 2017, to fully serve all customers.

5.3 Test Launch

Once Test agreements were executed with each water agency, customized data collection forms were created. California American Water's data collection sheet is included in Attachment 3 and Solano County Water Agency's data collection sheet is in Attachment 4. Water Conservation Tip Sheets, customized with each water agency's logo, were also created.

One ESA Program contractor in each geographic region was approached to participate in the Test.

Contractor	Region Served in Pilot	License(s)	Sector
Residential Weatherization, Inc. (RWI)	Sacramento	B, C-2, C20, C36	Residential
Staples & Associates, Inc. (Staples)	Monterey / Salinas	B, C10, C20, C36	Residential
Community Housing Opportunities Corporation (CHOC)	Solano County	B	Residential

Differing background check policies necessitated some of the contractor staff complete an additional background check. All ESA Program contractor staff must pass a criminal background check. While this background check was sufficient for Solano County Water Agency, a more comprehensive background check and drug test was required by California American Water.

Contractor staff were trained at each contractor's headquarters. Field staff training included the following:

- An overview of the energy water conservation program goals
- Water agency's program specifics
- Customer qualification process
- Data collection process
- Requirement for execution of liability release and authorization
- Water Conservation Tip Sheet objective, tip review and customized tip training
- Assessment service explanation and training
- Measure installation instruction
- Giveaway protocols

Administration staff training included the following:

- Reporting
- Invoicing

The Test services to ESA customers in the Sacramento area began in January 2016. Test services in the Monterey/Salinas area and in Solano County began December 2016.

The Water Conservation Test concluded in December 2017.

5.4 Test Program Observations

The overall framework design worked well in the Test:

- The measure menu approach allowed water agencies to tailor their program to match their priorities
- The allocation of costs between PG&E and the water agencies was agreeable to the water agencies
- The parallel data collection approach enabled the Test program to launch quickly
- Contractor training was completed with minimal disruption

The measures, giveaways and services were not all equally embraced:

- Water agencies did not have any interest in supporting the costs of installing high-efficiency dishwashers or hot water recirculating pumps
- Toilet flappers proved to be a challenging measure for ESA Program contractors, due to the complexity of carrying a sufficient number of toilet flapper models to fit most toilets, as well as the variances in installation times

Other observations included the following:

- Variances in water agency background check policies resulted in ESA Program contractor staff undergoing separate screenings, resulting in minor delays during program start-up but ultimately with minimal difficulty
- Adding water agency customer qualification processes to the ESA Program was challenging. ESA Program contractors received a qualified customer list from one of the water agencies and had to check each ESA customer to verify eligibility for Test program services. This process was cumbersome and was not always completed successfully by ESA contractor staff, resulting in either the home not being served or services provided that could not be reimbursed
- In smaller water agency service areas, some water agency customer service areas did not coincide with ESA Program contractor targeting approach, limiting the potential for coordinated service delivery
- Multifamily properties were frequently not sub-metered and tenants of those properties were ineligible for ratepayer-funded services, so they could not receive Test services
- Parallel data collection was tedious for ESA Program contractor staff and due to the lack of error detection logic in the process, data integrity was an issue

5.5 Low-income Water-Energy Program Forum

A second round of water agency feedback was conducted once the Test was underway. The PG&E Low-income Water-Energy Program Forum was held on March 21, 2016. Seven water agencies participated in the forum.

The objectives of the forum were to develop a shared understanding of water and energy conservation collaboration opportunities and challenges, and to identify best practices in program design for future collaborations. Topics discussed included the following:

- Review of regulatory requirements and guidance on collaboration between water and energy utilities
- Discussion of water and energy utility objectives in the water-energy arena
- Experiences with energy efficiency and conservation programs
- Unique needs of low-income communities
- Overarching strategies to guide future collaborations and key design aspects
- Cost-sharing methodologies

Overall, there was a substantial interest among water agencies to participate in collaborative programs. Water agencies expressed a desire to stretch their relatively limited water conservation budgets by leveraging the outreach work done by the ESA Program. Water service and measure priorities differ among water agencies, further highlighting the need for a flexible approach that allows water agencies to select the options deemed most valuable to them.

Key issues to be considered in the design of a collaborative approach included the following:

- **Prevailing Wage:** Municipal utilities require that the work done for them conform to prevailing wage requirements; ESA Program contractors are not required to pay prevailing wage rates

- **Contractor Training:** Having substantial experience with water conservation services and measures, the water agencies were interested in reviewing existing ESA Program water measure training and vetting the development of any new trainings
- **Data Sharing**: Water agencies require information about measures and services that they funded and were delivered to their customers but were also interested in receiving information on ESA Program water conservation measures and services delivered to their customers
- **Master Meters in Multifamily Properties**: The vast majority of multifamily properties are not sub-metered and therefore tenants are not eligible for ratepayer-funded services
- **Warranty Issues:** Water agencies require a clear understanding of how issues will be corrected during the measure warranty period
- **Water Agency Time Investment:** Water agencies have staff that are constrained; any collaborative program would have to require minimal staff time

6. TEST RESULTS

6.1 Homes Served in Test

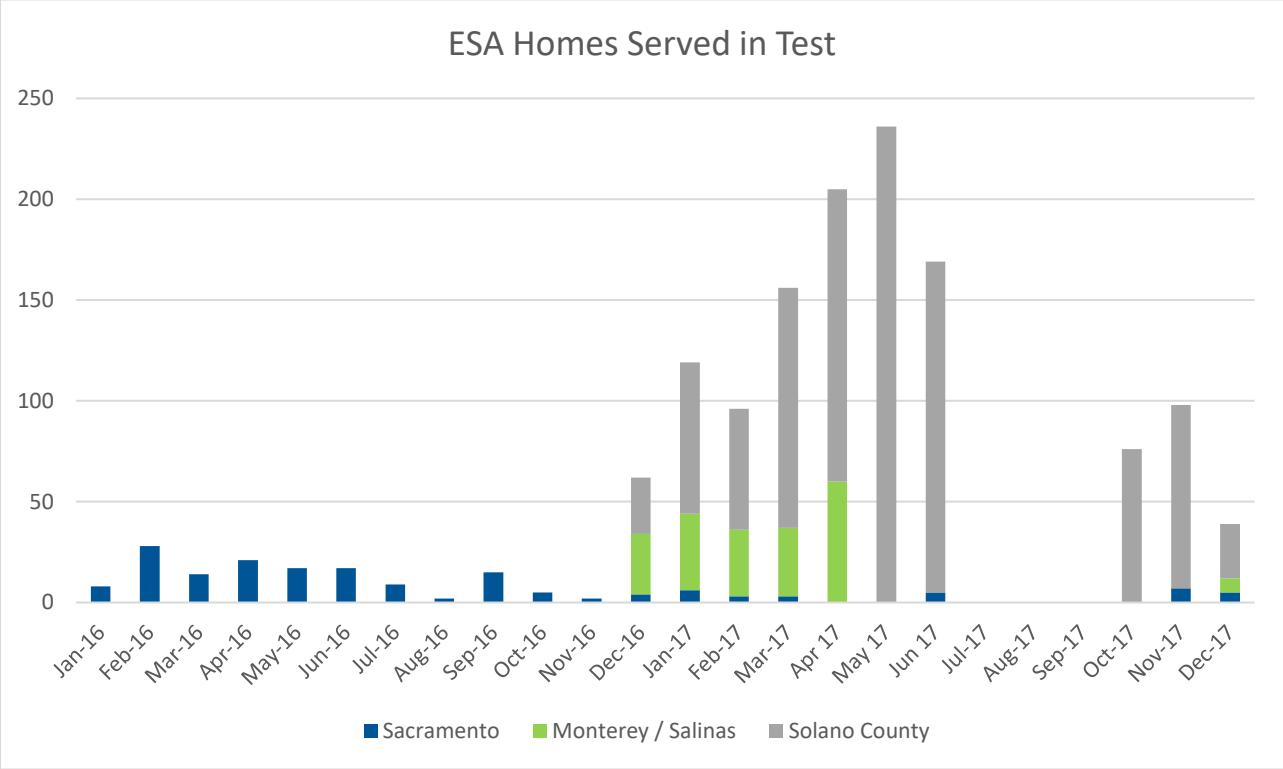
Table 5 below includes a summary of the homes served during the Test period and by Test region. The Test program services were only delivered in the Sacramento region for most of 2016. The program launched in the Monterey/Salinas region and Solano County in November 2016, driving a substantial increase in program production in the first half of 2017. The small number of homes served between July and September was due to the uncertainty related to the ESA Program contract extension.

The highest month for homes served in the Sacramento region was in February 2016. This was due to a big push by contractor RWI to start aggressively implementing the program. As the Test progressed, a gradual decline in homes served in this region was observed. This was due, in part, to a decreasing number of customers eligible for the ESA Program but not yet served.

In the Monterey/Salinas region, contractor Staples had strong, steady production from December 2016 to April 2017 and exhausted all Test funds allocated in five months.

In Solano County, contractor CHOC had steady growth from December 2016 to May of 2017, with a slight decline on June 2017, as they completed their existing contract. Once a new contract was in place through the end of 2017, CHOC demonstrated their strongest production.

Table 5: ESA Homes Served in Test



6.2 Measures Installed

Shown in Table 6 below is a summary of all services performed and measures installed as part of the Test program for all three participating regions. This illustrates all homes in the Test received the co-funded Basic Indoor Assessment and Water Conservation Education. Additional services and measures installed were part of the scope of services for California American Water customers in Sacramento and Monterey/Salinas.

Table 6: Services Performed and Measures Installed

	Number of Services and Measures Installed by Region			
Services & Measures Installed	Sacramento	Monterey / Salinas	Solano County	Total Installed
Services				
Basic Indoor Assessment	171	202	1021	1394
Water Conservation Education	171	202	1021	1394
Basic Outdoor Assessment and Meter Check and Leak Isolation	171	202		373
Cold-Water Measures Installed				
Shower Timer	314	217		531
Hose Nozzle	154	53		207
Toilet Flapper	37	7		44
Toilet	86	95		181
Hot Water Measures Installed (only when not feasible for ESA)				
Faucet Aerators	19	104		123
Low-flow Showerheads	8	93		101
Thermostatic Shower Valve	8	82		90

Cold-Water Measures Installed

As part of the Basic Indoor Assessment, toilet leak tests were completed by placing a dye tablet in the toilet tank. Of the 373 homes served in the Sacramento and in the Monterey/Salinas territories there were 213 toilet leaks detected. These leaks were remedied through either the installation of new toilet flappers or, if the toilets qualified, the installation of new high-efficiency toilets. You can find the number of individual measures installed by looking at the charts below.

Figure 4: Toilets Installed

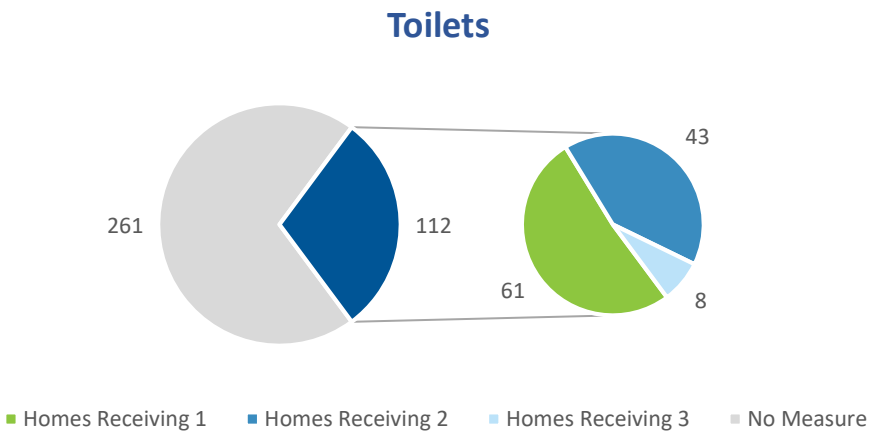


Figure 5: Toilet Flappers Installed

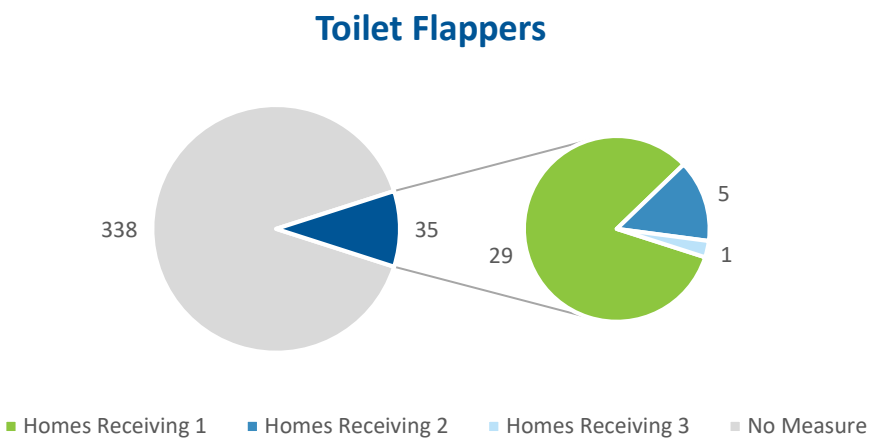


Figure 6: Hose Nozzles Installed

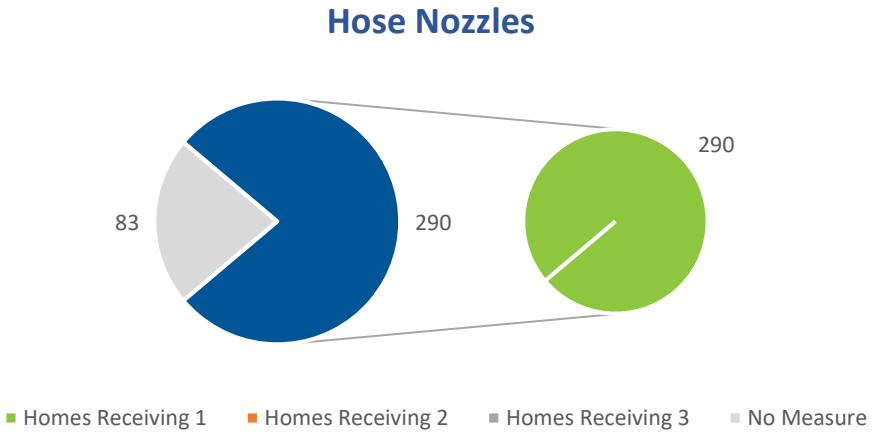
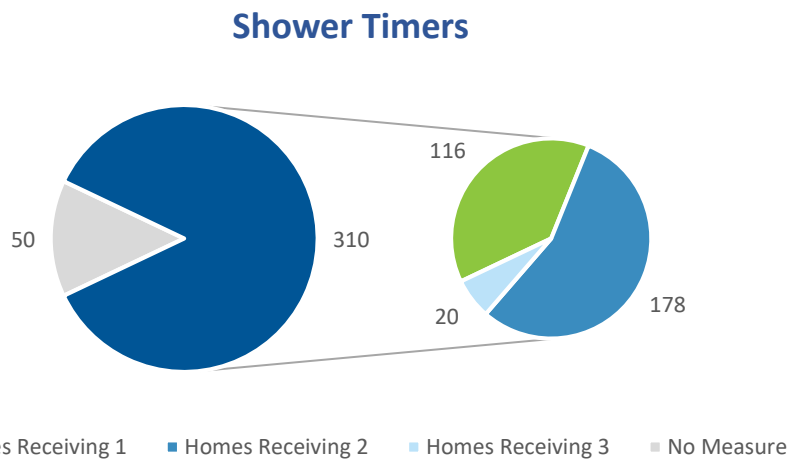


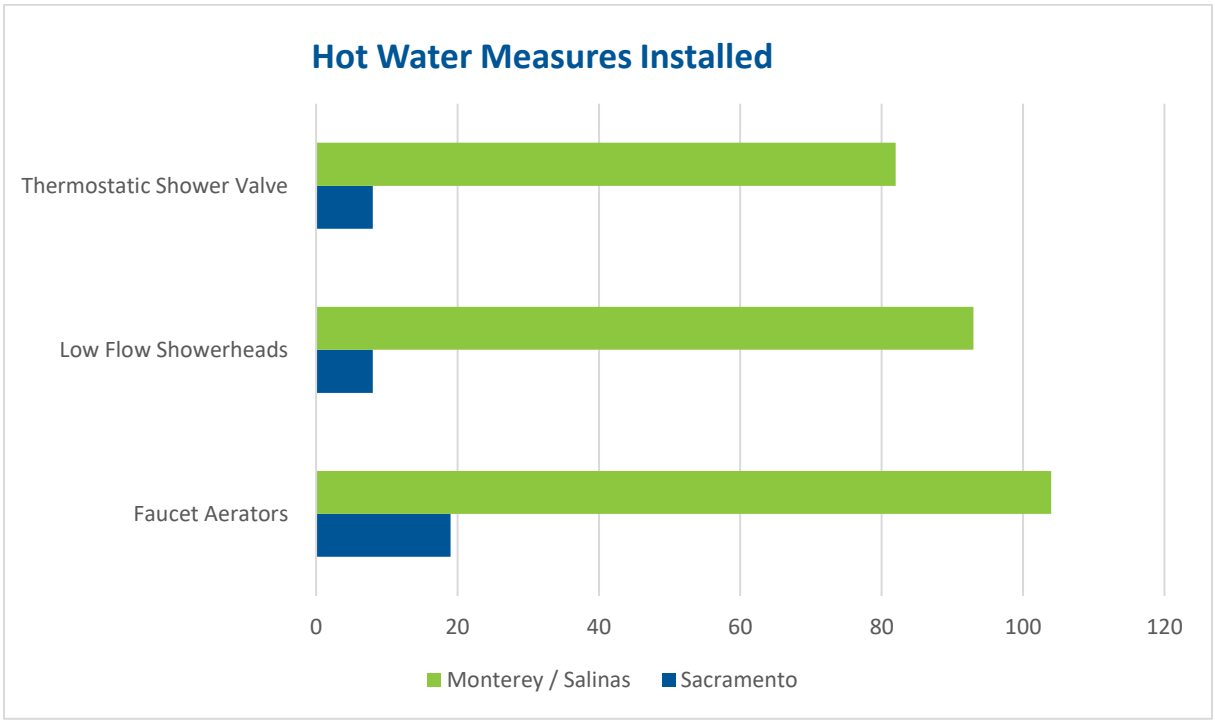
Figure 7: Shower Timers Installed



Hot Water Measures (when not feasible for ESA)

Both California American Water and Solano County Water Agency agreed to fund the hot water measures when PG&E could not. No customers in Solano County were identified during the Test as requiring this alternative funding. The number of hot water measures installed is shown in Figure 8 below.

Figure 8: Hot Water Measures Installed (when not feasible for ESA)



Installed Measure Rate

For planning and budgeting purposes, measure installation rates were estimated at the start of the tests with California American Water. The actual measure installation data was evaluated to identify if a differentiation existed between the projected measures installed rate and the actual rate/percentage of measures installed.

The estimated rate measure was correct 90% of the time, although some measures that were installed at a rate that was largely different than what was estimated. Measure installation rate differences can be attributed to the following factors:

- Toilet flappers were only minimally used in Monterey/Salinas due to the complexity of carrying a sufficient number of flapper models to address variety of toilets installed
- In the Sacramento area, fewer households than projected had non-PG&E provided water heating fuel
- In the Salinas area, many of the households served were in rural areas that used propane for their heating source. Hot water measures were not funded by ESA in these homes

Table 7 : Measure Installation Frequency

Measure Installed	Sacramento			Monterey / Salinas	
	Number of Measures Installed per Home	Estimated	Actual	Percent of Time Installed	Actual
Cold Water Measures					
Low-flow Toilet	1	10%	18.2%	10%	10.5%
	2	5%	13.2%	5%	9.2%
	3	0%	3.1%	0%	1.3%
Toilet Flapper	1	30%	15.7%	30%	1.7%
	2	0%	3.1%	0%	0%
	3	0%	0.6%	0%	0%
Hose Nozzle	1	100%	90.6%	100%	55%
	2	0%	0.0%	0%	0%
	3	0%	0.0%	0%	0%
Shower Timer	1	100%	16.4%	100%	37.8%
	2	50%	69.2%	50%	24.4%
	3	0%	8.8%	0%	2.5%
Hot Water Measures (when ESA can't pay)					
Faucet Aerator	1	0%	1.3%	0%	13.4%
	2	10%	1.3%	10%	12.2%
	3	0%	2.5%	0%	6.7%
Showerhead	1	20%	2.5%	20%	19.7%
	2	10%	1.3%	10%	11.8%

	3	0%	0.0%	0%	1.3%
Thermostatic Shower Valve	1	10%	2.5%	10%	15.1%
	2	0%	1.3%	0%	10.1%
	3	0%	0.0%	0%	0.4%

6.3 Cold Water Energy Savings in the Test

The CPUC[ix] defines embedded energy in water as the amount of energy that is used to collect, convey, treat, and distribute a unit of water to end users, and the amount of energy that is used to collect and transport used water for treatment prior to safe discharge of the effluent in accordance with regulatory rules.

Current methodologies have only been able to account for direct energy savings, therefore eliminating the ability for cold water measures to be included in the energy IOU program offering. However, with CPUC approval of the water-energy nexus workpaper and Water Energy Cost Effectiveness Calculator, these embedded energy savings can now be calculated.

All energy savings for measures included in this report are calculated using the CPUC Water Energy Calculator documented in the Workpaper. A direct link to this online Nexus Calculator is: http://www.cpuc.ca.gov/nexus_calculator/.

Shown in Table 8 below is the annual water and energy savings for all measures installed during the test. The water savings as well as the energy savings calculations were based upon research and through use of the Water Energy Cost Effectiveness Calculator version 1.05. The calculations are an average across all hydrologic regions in PG&E's territory. The Total Water Savings for the test was approximately 4.66 million gallons per year and the Total Embedded Energy Savings throughout the life of the Test was 8,028 kilowatt hours (kWh.)

Table 8: Annual Energy and Water Savings from All Measures Installed in Test

		Annual Water and Energy Savings per Measure		Annual Water and Energy Savings from All Measures Installed in Test	
Measure	**Total Quantity Installed in Test**	**Water Savings* (gallons/year)**	**Average Annual Embedded IOU Electric Energy* (kWh)**	**Total Water Savings (gallons/year)**	**Total Energy Savings (kWh)**
Low-flow Toilet	112	13,870	18.04	1,553,440	2,020
Toilet Flapper	35	26,463	59.56	926,205	2,085
Shower Timer	310	3,241	7.29	1,004,710	2,260
Hose Nozzles	290	2,700	2.72	783,000	789
Faucet Aerator	123	548	1.23	67,404	151
Low-flow Showerhead	101	2,008	4.52	202,808	457

Thermostatic Shower Valves	90	1,314	2.96	118,260	266
Total Water & Embedded Energy Savings				4,655,827	8,028

**RHA calculated using WEN calculator and a calculated average across all Hydrologic Regions.*

6.4 Demographics

The demographic data collected during the Test program was reviewed with special emphasis placed on the number of owner-occupied ESA homes served versus rental homes occupied by ESA-qualified renters. Additionally, the housing type was documented. Housing types served in the Test program included single-family homes, multi-family homes and duplexes comprising two to four homes.

Figure 9: Owner vs. Renter

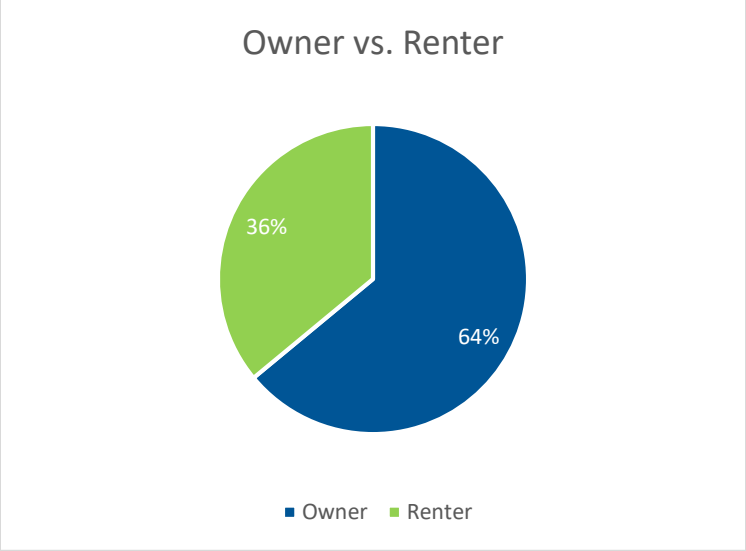
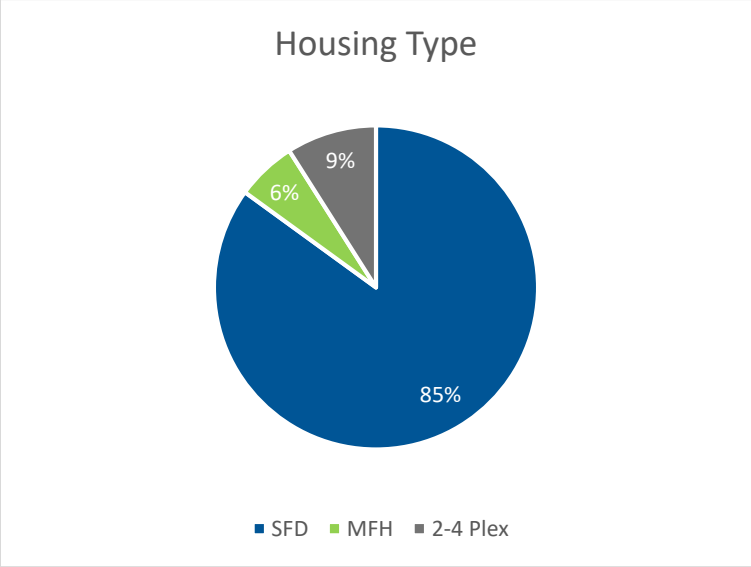


Figure 10: Housing Type



6.5 Budget

In Table 9 below, the breakdown of funds spent on measures and services throughout the Test is reflected along with the total number of homes. The differences in the funds spent varies by region due to the number of water agency funded cold-water measures installed. In Solano County, there were many more homes served, but only the co-funded services of the internal and external assessments and water education tips was done in these homes. More funds were spent by the water agency in the Sacramento and Monterey/Salinas regions due to the additional installation of toilets, toilet flappers, shower timers and hose nozzles in these areas along with the assessments.

Table 9: Expenditures for Measures and Services and Homes Served by Region

Region	PG&E Expenditures	Water Agency Expenditures	Homes Served
Sacramento	$5,358.97	$37,523.80	171
Monterey/Salinas	$5,403.70	$38,859.24	202
Solano County	$23,993.00	$28,592.85	1021
Totals:	$34,755.67	$104,975.89	1394

7. COORDINATION PROGRAM DESIGN PLAN

Knowledge gathered through the testing of the collaboration framework, combined with new guidance from the CPUC, resulted in minor adjustments. The resulting Coordination Program Design included adjustments to the measure mix, costs allocation model and data flow.

7.1 Updated Regulatory Guidance

CPUC (D) 16-11-022 [x] reinforced the directive for PG&E, Southern California Edison (SCE), Southern California Gas (SoCalGas) and San Diego Gas and Electric (SDG&E) to set up coordination programs with water agencies. The CPUC also directed water agencies to distribute "Toilet Tank Efficiency Kits" and provide water conservation education as part of the ESA Program. These directives changed the cost allocation of these portions of the collaborative program.

7.2 Measures

The menu approach proved successful in providing water agencies with flexibility in measure and service selection while limiting the complexity of implementation within the ESA Program. After receiving feedback from water agencies and reviewing key findings from the Test, the following changes were made to the measure list:

- Toilet flappers removed, due to inventory and installation challenges
- Dual-flush converters added, which change a standard 3.5 gallons per flush (gpf) toilet to one that will use 1.05 gpf for liquids and 3.5 gpf flush for solids
- High-efficiency dishwashers and hot water recirculating pumps were removed due to lack of interest
- Interior assessment replaced with toilet dye tab test, as the ESA Program currently provides most of what was covered in the previous interior assessment
- Water displacement bag and fill diverter installation added, as these are now provided for free in the Toilet Tank Efficiency Kits, but customers may need assistance installing them

Table 10: Coordination Program Measures, Giveaways and Services

Measures	Giveaways	Services
Dual-flush Converter Low-flow Toilet Aerator* Showerhead* Thermostatic Shower Valve* Thermostatic Tub Spout* High-efficiency Clothes Washer*	Hose Nozzle Shower Timer Water Agency Collateral	Toilet Dye Tab Test Water Displacement Bag and Fill Diverter Installation Exterior Water Use Assessment Meter Leak Check Referral to Water Agency Service

*When ESA cannot install

7.3 Cost Allocation

The cost allocation structure used in the Test was proven successful. With adjustments for changes in the measures and services, the model for the Coordination Program is shown in Table 11.

Table 11: Coordination Program Cost Allocation

	% Allocation	
Item Allocated	**PG&E**	**Water Agency**
Dual-flush Converter Low-flow Toilet		100%
Aerator Showerhead Thermostatic Shower Valve Thermostatic Tub Spout High-efficiency Clothes Washer	100% if PG&E heats water	100% if PG&E does not heat water
Giveaways (Hose Nozzle, Shower Timer)		100%
Toilet Dye Tab Test		100%
Water Displacement Bag and Fill Diverter Installation		100%
Exterior Water Use Assessment		100%
Meter Leak Check		100%
Water Conservation Education	100%	
Referral to Water Agency for Rebate Program or Other Service		100%
Water Agency Set-Up and Contractor Training		100%
Energy Water Program Administration	100%	

7.4 Data Flow

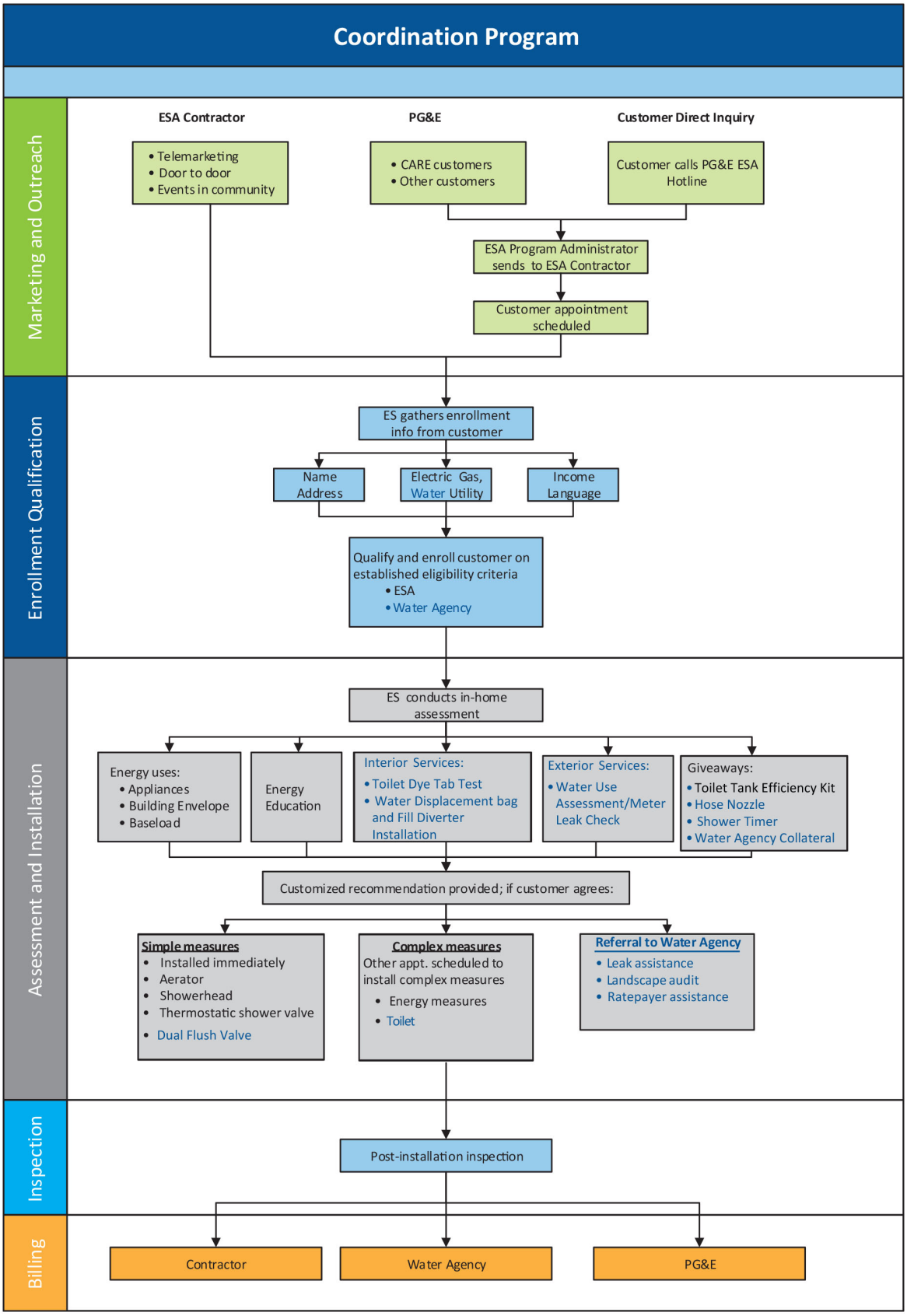
A stand-alone database was used to track information on the measures installed in the Test. While this approach was appropriate for a test, it is not optimal for an enterprisewide program due to the added complexity and cost.

For the Coordination Program, it is recommended that PG&E leverage the ESA Program database (Energy Insight) to track measure information.

7.5 Workflow

The workflow used in the Test proved successful for the delivery of incremental water conservation services within the ESA Program model. Minor adjustments were made to the to the workflow to reflect changes in the measures, giveaways and services.

Figure 11: Coordination Program Workflow



8. ATTACHMENTS

Table 12: Attachments

8.1 Attachment #1: Inventory of Existing PG&E Territory Water Agency Conservation Measures and Services	
8.2 Attachment #2: Water Conservation Tip Sheet	
8.3 Attachment #3: California American Water Energy Water Conservation Program Form	
8.4 Attachment #4 Solano County Water Agency Energy Water Conservation Program Form	

9. REFERENCES

[i] California Public Utilities Commission Rulemaking 13-12-011 http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M084/K481/84481715.PDF

[ii] Energy Savings Assistance Program http://www.cpuc.ca.gov/esap/

[iii] R0911014 Rulemaking to ExaminePost-2008 Energy Efficiency Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues

[iv] D0712050 Approving Pilot Water Conservation Programs Within the Energy Utilities' Energy Efficiency Programs

[v] California Public Utilities Code 739.8 Article 2. (c)

[vi] CPUC Resolution W-4976

[vii] R1312011 Order Instituting Rulemaking into Policies to Promote a Partnership Framework between Energy Investor Owned Utilities and the Water Sector to Promote Water-Energy Nexus Programs

[viii] http://www.cpuc.ca.gov/nexus_calculator/

[ix] Embedded energy in Water Studies Study3: End-Use Water Demand Profiles http://www.energy.ca.gov/appliances/2013rulemaking/documents/responses/Water_Appliances_12-AAER-2C/California_IOU_Response_to_CEC_Invitation_to_Participate-Lavatory_Faucets_and_Faucet_Accessories_REFERENCES/CPUC_2011a_Embedded_Energy_in_Water_Studies-Study_3.PDF

[x] California Public Utilities Commission Rulemaking 16-11-022 http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M169/K760/169760972.PDF