

BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking on the Commission's Proposed Policies and Programs Governing Post-2003 Low-Income Assistance Programs.	R.04-01-006
And Related Matters	A.05-06-005 A.05-06-009 A.05-06-012 A.05-06-013

**PETITION OF PACIFIC GAS AND ELECTRIC COMPANY  
TO MODIFY DECISION D.05-12-026 TO ESTABLISH A TANKLESS WATER  
HEATER PILOT PROGRAM AS PART OF PACIFIC GAS AND ELECTRIC  
COMPANY'S 2006 LOW INCOME ENERGY EFFICIENCY PROGRAM**

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**I. INTRODUCTION**

Pursuant to Rule 47 of the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), Pacific Gas and Electric Company ("PG&E") hereby petitions the Commission for an order modifying Decision D05-12-026 in the above referenced proceeding. By this Petition, PG&E requests permission to conduct a Tankless Water Heater Pilot Project with the California State Department of Community Services and Development (CSD) and the Community Action Agency of San Mateo County, Inc. (CAASMC), a community based organization (CBO) performing weatherization for low income clients. PG&E proposes that D. 05-12-026 be modified to permit implementation of the Tankless Water Heater Pilot Project as part of PG&E's Program Year (PY) 2006 Low Income Energy Efficiency (LIEE) programs. In this pilot program, PG&E would work with CSD and CAASMC to assess Tankless Water Heaters as a prospective low income program measure. The proposed Tankless Water Heater pilot project would be included as part of PG&E's Program Year (PY) 2006 Low Income Energy Efficiency (LIEE) Program. The scope of work and budget for the proposed pilot project are attached in Attachment 1.

## **II. BACKGROUND**

During December, 2005 CSD and CAASMC approached PG&E with a request for PG&E to partner with them to help fund a pilot project to assess Tankless Water Heaters<sup>1/</sup> as a potential new measure of interest to low income customers in the State's LIHEAP program. On December 16, 2005, the Commission issued D.05-12-026 which adopted the utilities PY2006 LIEE programs and budgets. The Tankless Water Heater Pilot Project was not submitted as part of PG&E's Application seeking approval of its PY 2006 LIEE programs and budget (A.05-06-005) because the pilot proposal was not presented to PG&E by CSD and CAASMC until after PG&E's Application for its PY2006 LIEE programs was filed with the Commission. However, since the contemplated Tankless Water Heater measure could provide an additional energy conservation measure for the utilities' LIEE programs, PG&E is interested to include the pilot project as part of its PY2006 LIEE program. The attached scope of work describes the pilot project and budget commitment. (See Attachment 1). PG&E requests authorization to proceed to work with CSD and CAASMC on this pilot project. PG&E currently has sufficient LIEE funding available to proceed with this pilot project, and will include the pilot project in its request for a PY2006 LIEE program budget augmentation, due on April 14, 2006 in compliance with D.05-12-026, OP.12.

## **III. DISCUSSION OF TANKLESS WATER HEATER PILOT**

PG&E proposes to include the Tankless Water Heaters (a.k.a. instantaneous or demand water heaters) Pilot as part of its PY 2006 LIEE program because of the potential for saving energy via three means: 1) the elimination of storage tank heat loss, 2) the ability to only heat water as needed, and 3) the elimination of a pilot light system. Current product literature

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<sup>1/</sup> Tankless water heaters heat water directly without the use of a storage tank; therefore, they avoid the standby heat losses associated with storage water heaters. When a hot water tap is turned on, cold water travels through a pipe into the unit and activates the gas burner or an electric element heats which then heats the water. As a result, tankless water heaters deliver a constant supply of hot water. They also attach to a wall and are not free-standing; therefore they are less prone to movement in case of an earthquake.

estimates that savings of up to 20% may be expected from the use of pilotless, tankless water heaters. Such energy savings could result in significant savings for a low-income household.

The proposed pilot project would allow: 1) the thorough assessment of twenty homes to identify real world field barriers associated with the installation of tankless water heaters, including the acquisition of before and after usage data via installing water flow and energy metering devices ; 2) five tankless water heater units to be installed and monitored in weatherization qualified single family homes during 2006; and 3) a side-by-side usage study between an older 40-gallon tank and a tankless water heater in a controlled laboratory environment to determine energy, water, and gas savings.

The purpose of this project is to determine whether tankless water heaters are a viable energy conservation measure for addition to the LIEE and CSD packages of energy efficiency measures being offered to qualifying low-income households. The project will address: 1) home assessment and domestic water distribution system selection barriers; and 2) installation barriers and potential pitfalls. Even though the major emphasis will be assessment, selection and installation barriers, actual energy and water usage data will be collected and utilized in assessing associated energy and water savings. The primary focus of the pilot project, however, is not cost effectiveness (savings derived from the use of tankless water heaters) because the California Energy Commission (CEC) and Lawrence Berkeley National Laboratory (LBNL) are also addressing the energy savings and cost-effectiveness issues. This pilot project complements the CEC and LBNL efforts because it focuses on barriers unique to low-income customers, such as system type and location, structural problems, and delayed maintenance. These issues will not be addressed by the CEC and LBNL assessment. To ensure the optimal use of the tankless water heater data, information derived from this pilot project will be shared with other tankless water heater researchers.

The pilot program is designed to run over a 15 month timeline, and target CAASMC weatherization qualified participants living in single-family homes (installing tankless heaters in five single family homes). The total program budget is less than \$62,000 (see attachment 1 for program cost breakout). PG&E anticipates that the immediate costs for this program can be incorporated into PG&E's existing LIEE funding. Any updated cost information related to this pilot will be included in PG&E's request for a PY2006 LIEE program budget augmentation, due on April 14.

**IV. CONCLUSION**

For the reasons set forth above, Pacific Gas and Electric Company respectfully requests authority to implement the proposed Tankless Water Heater Pilot Project, in association with CSD and CAASMC, as part of PG&E's PY 2006 LIEE program.

Respectfully submitted,

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March 6, 2006

CERTIFICATE OF SERVICE BY ELECTRONIC MAIL OR U.S. MAIL

I, the undersigned, state that I am a citizen of the United States and am employed in the City and County of San Francisco; that I am over the age of eighteen (18) years and not a party to the within cause; and that my business address is Pacific Gas and Electric Company, Law Department B30A, 77 Beale Street, San Francisco, CA 94105.

I am readily familiar with the business practice of Pacific Gas and Electric Company for collection and processing of correspondence for mailing with the United States Postal Service. In the ordinary course of business, correspondence is deposited with the United States Postal Service the same day it is submitted for mailing.

On the 6th day of March 2006, I served a true copy of:

**PETITION OF PACIFIC GAS AND ELECTRIC COMPANY  
TO MODIFY DECISION D.05-12-026 TO ESTABLISH A TANKLESS WATER  
HEATER PILOT PROGRAM AS PART OF PACIFIC GAS AND ELECTRIC  
COMPANY'S 2006 LOW INCOME ENERGY EFFICIENCY PROGRAM**

By Electronic Mail – serving the enclosed via e-mail transmission to each of the parties listed on the official service list for R.04-01-006 et al. with an e-mail address.

By U.S. Mail – by placing the enclosed for collection and mailing, in the course of ordinary business practice, with other correspondence of Pacific Gas and Electric Company, enclosed in a sealed envelope, with postage fully prepaid, addressed to all parties on the official service list for R.04-01-006 et al. without an e-mail address.

I certify and declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on this 6th day of March 2006 at San Francisco, California.

/s/

\_\_\_\_\_  
PATRICIA KOKASON

# **A PUBLIC – PRIVATE PARTNERSHIP DESIGNED TO EVALUATE THE FEASIBILITY OF TANKLESS WATER HEATERS FOR LOW-INCOME CUSTOMERS**

## **1. SCOPE OF PROJECT**

### **1.1 Description**

The California State Department of Community Services and Development (CSD) and the Community Action Agency of San Mateo County, Inc. (CAASMC), a community based organization (CBO) performing weatherization for low-income clients, request the participation of PG&E in a public-private partnership to evaluate the applicability of tankless water heaters for use in the LIEE and CSD low-income weatherization programs via a pilot project. Tankless water heaters (a.k.a. instantaneous or demand water heaters) are being considered because of their potential for saving energy via three means: 1) the elimination of storage tank heat loss, 2) the ability to only heat water as needed, and 3) the elimination of a pilot light system. Current product literature indicates that savings estimates of up to 20% may be expected from the use of pilotless, tankless water heaters, which could result in be a significant savings amount for a low-income household.

The proposed pilot project would allow: 1) the thorough assessment of twenty homes; 2) five tankless water heater units to be installed and monitored in weatherization qualified single family homes during 2006; and 3) a side-by-side usage study in a controlled laboratory environment.

## 1.2 Background

Tankless water heaters heat water directly without the use of a storage tank; therefore, they avoid the standby heat losses associated with storage water heaters. When a hot water tap is turned on, cold water travels through a pipe into the unit and activates the gas burner or an electric element which then heats the water. As a result, tankless water heaters deliver a constant supply of hot water. They also attach to a wall and are not free-standing; therefore they are less prone to movement in case of an earthquake.

Typically, tankless water heaters provide hot water at a rate of 2 – 5 gallons per minute, while gas-fired heaters produce higher flow rates than electric models. Although the gas-fired tankless water heaters tend to have higher flow rates than the electric models, they can waste energy if they have a constantly burning pilot light. For this pilot project, models will be installed that have an intermittent ignition device (IID) instead of a standing pilot light.

For homes that use 41 gallons or less of hot water daily, tankless water heaters can be 20% – 30% more energy efficient than conventional storage tank water heaters. They can be 8% – 14% more energy efficient for homes that use a lot of hot water - around 86 gallons per day. An even greater energy savings of 27% – 50% can be achieved if tankless water heaters are installed at each hot water outlet.

Energy efficiency values for gas storage water heaters range from 60 to 65%, and use an average of 200 therms per year. Electric storage water heaters 93

to 95% efficient and use an estimated 4,725 kWh/year. Tankless gas water heaters range from 68 – 82% efficient, about 20% more efficient than storage gas water heaters saving 40 therms or more a year.

Theoretically, a 20% savings in natural gas used to heat water in a typical household (250 therms/year) would result in an annual savings of 50 therms or approximately \$50.00 per year. If natural gas prices increase as expected this winter, that savings could amount to \$75.00 - \$90.00 or more a year.

This savings would become even more significant when considering the life of the measure. Tankless water heaters are estimated to last 10 – 20 years or more with the current level of technology.

### **1.3 Purpose**

The purpose of this project is to determine whether tankless water heaters are a viable energy conservation measure for addition to the LIEE and CSD packages of energy efficiency measures being offered to qualifying low-income households. The project will address: 1) home assessment and domestic water distribution system selection barriers; and 2) installation barriers and potential pitfalls. Even though the major emphasis will be assessment, selection and installation barriers, actual energy and water usage data will be collected and utilized in assessing associated energy and water savings. Less effort is being placed on cost effectiveness (savings derived from the use of tankless water heaters) since the California Energy Commission (CEC) and Lawrence Berkeley National Laboratory (LBNL) are

also addressing the savings issue; however, the void in their effort is those barriers unique to low-income customers, such as system type and location, structural problems, and delayed maintenance, all of which will be investigated in this project. Information derived from this project will be shared with, and gathered from, other tankless water heater researchers.

#### **1.4 Action Plan**

CAASMC is proposing a field component and a laboratory component for its tankless water heater pilot. The field component will allow CAASMC to identify real world field barriers associated with the installation of tankless water heaters. It will also include the acquisition of before and after usage data via installing water flow and energy metering devices.

As with all weatherization measures included in both the LIEE and CSD weatherization programs, weatherization standards and policies and procedures are an integral part of the management tools. The major components of both these documents are the assessment and measure feasibility criteria. An assessment tool will be developed to identify real world field barriers and measure feasibility criteria. This field information will be collected during the pilot study via a twenty home survey and included in the final report. It will also be used in developing measure-specific standards and Policies and Procedures if the measure is incorporated into the weatherization programs.

In addition to the field data, a side-by-side laboratory study will be conducted for an older 40-gallon water heater and a tankless water heater. A side-by-side computer controlled test/study will be designed and implemented under laboratory conditions that enable CASSMC to determine the following:

- Energy usage of a 40 gallon gas water heater
- Water saved by reducing the warm up time
- Gas saved by the elimination of a pilot
- Gas/electricity saved by reducing tank loss

To ascertain the information/data needed to produce answers, CASSMC will:

1. Install two side-by-side units.
  - One (1) 40 gallon tank unit
  - One (1) tankless and pilotless unit
2. Equip both installations with: 1) gas and water meters; and 2) electric controlled water valves. Valves will be installed a distance away from the water heater to be representative of most pipe runs in low-income homes.
3. Design a data acquisition and control system that simulates water usage of a four-member family by opening valves and allowing water to run for a period similar to what would occur in a typical family operation.
4. Operate the side-by-side units for a thirty-day test period.
5. Data will be downloaded from the data acquisition system, compiled into a database, and analyzed to determine the amount of energy and water savings derived from the installation of a tankless unit.

## **1.5 Timeline**

The pilot is scheduled to run for a 15-month period (January 1, 2006 through March 31, 2007). The data collection period of the study will be conducted over a nine month period after the physical installation of the tankless water heaters.

## **2. TARGET POPULATION**

The target population will be CAASMC weatherization qualified participants living in single-family homes.

## **3. CLIENT EDUCATION AND SETTING**

Each household will receive education about the benefits of tankless water heaters and will receive training that will teach them how to operate and maintain the unit, and how to assess problems. These units require minimal maintenance (replacement of batteries in the spark igniter) which will be shown to the occupants. The homeowner will receive all manufacturers' pamphlets and information included in the packaging of the tankless water heater.

## **4. INSTALLATION PARAMETERS**

The tankless water heaters will be installed according to the manufacturer's instructions and local building codes. Since no LIEE or CSD Weatherization Standards currently exist for tankless water heaters, CAASMC and the third-party consultant will closely monitor the installation process to identify items to be

included in future standards, should this item be included in the package of measures to be installed through LIEE or CSD programs.

## **5. QUALITY CONTROL**

CAASMC will contract with a third-party consultant to provide the quality control for the installation. The consultant will produce a tankless water heater installation check-list; provide training to CAASMC's weatherization crews on how to install the devices, and inspect each installation to ensure proper installation. CAASMC will contact participants on a monthly basis to assess customer satisfaction and to make any necessary temperature adjustments on the tankless water heaters.

## **6. DATA COLLECTION METHODOLOGY**

CAASMC will collect demographic information for participants during the intake process. All materials and labor costs associated with the installation of the water heaters will be recorded and tracked to determine actual cost of installation.

CAASMC will contract with a third-party consultant to monitor the installed devices. The consultant will monitor water and gas usage for a period of time to ascertain the energy savings potential of the product and also conduct a customer satisfaction survey to determine if the product meets the household's expectations for delivery of hot water as needed.

## **7. PERFORMANCE GOALS**

7.1 Install five (5) tankless water heaters in single family dwelling

7.2 Monitor and evaluate customer satisfaction and product effectiveness on a monthly basis

7.3 Complete feasibility study on effectiveness of tankless water heaters

## **8. CSD REPORTING REQUIREMENTS**

CAASMC will provide accurate and timely fiscal reports to CSD on a monthly basis and program reports on a quarterly basis.

## **9. LEVERAGING OPPORTUNITIES**

CAASMC will leverage funds with LIHEAP, DOE, PVEA weatherization programs and with the PG&E leveraging contract.

## **10. REINFORCEMENT AND/OR FOLLOW-UP ACTIVITIES**

Customers shall be contacted monthly after the installation of tankless water heater to determine customer satisfaction and product effectiveness.

## 11. BUDGET ITEMS

The following budget is based upon leveraging of this pilot program with additional funding from the California Department of Community Services and Development (CSD). The following is a summary of all tasks and associated costs for the share related to PG&E only.

1. Develop Water Distribution System Requirements..... \$ 2,400.00
  - A. Existing standards
  - B. Existing pipe size layout (gas and water)
  - C. Condition of system
2. Develop Assessment Tool with the following components: ..... \$ 4,160.00
  - A. Home assessment
  - B. Family demographics
  - C. Water usage pattern
  - D. Water distribution system
    - Type
    - Size
    - Condition
3. Income-qualify a pool of low-income families (Outreach) ..... \$ NO COST
  - Four or more occupants
  - Single-family home
4. Assess 20 homes utilizing the Assessment Tool ..... \$ 6,995.00
5. Select 5 homes to receive units + Installation..... \$ 3,000.00
6. Develop Monitoring Protocol..... \$ 3,315.00
  - A. Monitoring equipment
  - B. Data acquisition system
  - C. Data download protocol
7. Develop Installation Criteria for Crews..... \$ 4,190.00
  - A. Monitoring equipment
  - B. Water heaters
  - C. Customer training
8. Conduct Training..... \$ NO COST

9. Develop Side-by-Side Study .....	\$ <u>13,898.00</u>
A. Develop study plan	
B. Select equipment	
C. Purchase equipment	
D. Develop control software	
E. Install system	
10. Data Collection Monitoring.....	\$ <u>11,060.00</u>
A. Download data daily (5 days)	
B. Download data weekly (5 weeks)	
11. Develop Data Acquisition and Format for Assessment Data .....	\$ <u>3,060.00</u>
12. Final Report .....	\$ <u>9,500.00</u>
	TOTAL BUDGET: \$ <u>61,578.00</u>