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ON DEMAND, TANKLESS WATER HEATER PROGRAM

BACKGROUND

KeySpan Energy Delivery has initiated a Tankless Water Heater Rebate Program in coordination with the regional gas utility collaborative, GasNetworks. GasNetworks includes natural gas utilities from Massachusetts, New Hampshire and Maine¹ whose mission is to work with governmental agencies and affiliates to promote energy efficient technologies, create common energy efficiency programs, educate consumers and promote contractor training and awareness of ever-changing, natural gas technologies. GasNetworks jointly administers market transformation programs for high efficiency heating and water heating equipment, including programmable thermostats and ENERGY STAR windows and trade ally trainings.

KeySpan and GasNetworks previously administered a water heater rebate program until 2004, that included stand alone water heaters with an Energy Factor of 0.61 or greater as well as indirect water heaters in applications installed with an ENERGY STAR hot water boiler. When the minimum efficiency standards changed to 0.59 EF from 0.54 EF² in 2004, the stand alone water heater rebate was no longer cost effective and the group began to evaluate potential savings of the on demand, tankless water heaters as an energy saving alternative to stand alone heaters for their residential and small commercial customers.

TECHNOLOGY

Tankless water heaters are very common in Japan and Europe, although they hold less than 1% market share of water heaters in the United States. Tankless water heaters use a burner and a heat exchanger to heat water as it flows through the coils. When there is a call for hot water, cold water enters the heat exchanger, the flow triggers the heating elements, and energy is used to heat the hot water that is needed. When the hot water tap is turned off, the unit shuts down.

Most models with an Energy Factor of 0.82 and electronic ignition supply at least 5 gallons per minute (gpm) with a 65°F rise in water temperature. A common shower head requires a flow rate of 2.5 gpm. Some models offer modulating valves, which allow the tankless water heater to supply hot water to small loads, from 0.6 gpm using 15,000 BTUs to 6 gpm using 180,000 BTUs. Most tankless water heaters need to be direct vented and can be wall hung.

¹ Berkshire Gas, Bay State Gas, KeySpan Energy Delivery, New England Gas, Northern Utilities, NStar Gas and Unitil

² Energy factor is an efficiency ratio of the energy supplied in heated water divided by the energy input to the water heater.

Capacity varies among models, however, the larger models that can handle a flow rate of 13 gpm, requires gas service of up to 380,000BTUs.

PROGRAM SPECIFICS

As the leading natural gas provider for greater Boston, Cape Cod and southern New Hampshire, KeySpan Energy Delivery New England has 800,000 residential heating customers. From 2002 to 2004 the high efficiency water heater rebate program consistently had over 1500 participants annually, at least half of the participation came from stand alone water heater purchases. In 2004, when KeySpan eliminated the stand alone program, just over 700 rebates were fulfilled for indirect water heaters.

KeySpan found tremendous opportunity for energy savings in the residential market as well as the small commercial market, with on-demand, tankless water heaters. KeySpan serves a large number of multi family homes and condos in the greater Boston area as well as a number of seasonal homes on Cape Cod. Additionally, southern New Hampshire has tremendous new construction activity where many opportunities exist to install high efficiency equipment.

KeySpan launched the tankless water heater program in March 2005 and GasNetworks followed suit in May 2005. The program folded into the high efficiency water heater program which still includes indirect water heaters attached to an ENERGY STAR rated hot water boiler. KeySpan set goals for the program year with participation totaling 750; 300 tankless rebates and 450 indirect rebates.

The tankless water heater rebate is \$300, as is the rebate for the indirect water heater. The total budget for the water heater program is now \$310,000 for both Massachusetts and New Hampshire territories. This includes administration costs, marketing and education materials, evaluation and research. Trade ally training expenses are not included in the water heater budget, although training is a very large component to the program.

Historically, KeySpan's water heater program has always been successful. KeySpan is on target to meet the goal of 300 tankless water heaters and 450 indirect water heaters by the end of the program year in April 2006.

IMPLEMENTATION

KeySpan launched the on demand water heater program in March 2005. The program was first announced to the contractor community. KeySpan has a number of affiliated heating contractors and plumbers (Value Plus Installers) who were informed of the new program by both site visits through KeySpan trade ally representatives as well as direct mail.

Feedback from the contractor community was initially very negative towards the new technology. Many contractors made reference to a tankless model that was introduced 20 years ago as an energy saving option for residential use, but did not have much success. In addition, the new water heaters that qualify for the KeySpan rebate need to be direct vented, which the contractor community was not comfortable in doing, and contributed to a higher installation cost.

To address the concerns and apprehension of the contractor community, as well as the potential installation errors, KeySpan set up a series of product trainings with several manufacturers of tankless water heaters. KeySpan initially partnered with Bosch to hold a training for contractors to launch the new program. Bosch focused specifically on the installation, sizing, piping and service of the 635 ES model, the only Bosch model that meets KeySpan and GasNetworks minimum energy factor requirements.

KeySpan was proactive in contacting manufacturer's representatives to ensure that accurate information was provided to contractors regarding gas piping. The gas piping required in the installation of the larger tankless units is often larger than the existing piping system. Some units require more than 4 inches of water column for sufficient gas supply to heat the water to the desired temperature. Improper gas piping is a leading cause of complaints regarding the tankless water heaters and could impede the use of the other gas appliances in the home.

In May 2005, GasNetworks launched the regional tankless water heater program for all gas utilities in Massachusetts and New Hampshire. Contractor trainings were then held throughout the state with major manufacturers, Rinnai and Noritz. Rinnai also conducted a training seminar at the GasNetworks annual heating conference in September.

MARKETING

KeySpan administers a number of residential and commercial energy efficiency programs, which are promoted as a package to leverage exposure and funding. In addition to the GasNetworks collaborative trade ally training, high efficiency heating, water heating, thermostat and windows programs, KeySpan administers programs in Weatherization measures, ENERGY STAR Homes, Low-Income and Home Energy Assessments. The tankless water heater program was rolled into this package as another energy saving option for homeowners and another energy efficient technology for contractors to offer to customers.

To introduce the program to residential customers, KeySpan created a bill insert for the 800,000 residential bills that went to KeySpan customers. The bill insert was a smaller version of the rebate application. The quarterly e-efficiency electronic newsletter that is distributed to over 7,500 customers, also announced the new program with some standard facts about the value of tankless heaters. In-home energy auditors were trained on the tankless technology as well, to enable them to make tankless recommendations when appropriate. The tankless water heater rebate was also included in all program literature, KeySpan and GasNetworks websites and marketing events such as home shows, home buying seminars and community fairs.

As both rebate programs are marketed on the web site and through general program materials, KeySpan and GasNetworks worked with manufacturers to educate contractors on the best applications for tankless water heaters, to prevent confusion over the efficiency value of both types of equipment. The rebate for both types of water heaters is the same amount, \$300.

The training sessions that both KeySpan and GasNetworks sponsored were a key component in marketing the program to the contractor community. As it was a process to get contractors to adopt the indirect water heater technology, the adopters of that technology were apprehensive to bring another option for water heating into their product offers to customers.

New England has a large share of hydronic heating customers and the indirect water heater is a good option for these customers. However, the tankless water heater is often a good choice for warm air customers. Additionally, new construction of condo units is more often direct vented warm air furnaces, where a tankless water heater could be easily incorporated into the plans. KeySpan's ENERGY STAR Homes program that KeySpan administers also promotes the use of tankless water heating technology and the rebate program is marketed to builders throughout the region.

ENERGY SAVINGS ANALYSIS

In the Northeast, tankless water heaters need to be able to provide at least a 65 degree temperature rise. The more common models provide a 3 gallon per minute (gpm) flow rate with a 65 to 70 degree rise, although larger models can handle a 5.5 gpm flow rate with a 65 degree temperature rise. A 5.5 gpm flow rate is more suitable for an application that requires hot water for two or more points of use at the same time.

KeySpan ran a number of situational analyses to determine the greatest benefit cost ratio for the program. Comparing a tankless unit with 0.82 EF and electronic ignition, with a 40 gallon tank with a 0.59 EF, energy savings can be up to 28%, based on the energy factor, according to ACEEE, 2004.

In the total resource cost analysis, we assumed several factors; a lifetime of 20 years, an energy factor of 0.82 and an incremental cost difference of \$500 between the tankless and the stand alone water heater with an EF of 0.59. Units with an EF of 0.82 have an electronic ignition which eliminates standby losses. The energy factor was the main determinant in the benefit cost ratio, however, KeySpan identified several other beneficial factors to the tankless units that were not utilized in the energy savings model. Other factors depend on application, for instance, in a home with whirlpool tubs where the hot water tank has been oversized for the occasions that the tub gets filled, savings can be greater, as there is no recovery time and minimal heat loss. KeySpan's BCR is based on the energy factor and assumes the same conditions and as a 40 gallon water heater.

Another consideration in the energy savings that we did not include in the benefit cost analysis is the modulating feature of many models. Many of the tankless units that are fully modulating also contribute to the energy savings where energy use directly corresponds to the demand for hot water.

Results/Achievements

Rebate information shows that the switch to tankless technology is still being initiated by the consumer and not the contractors or builders. This could be due to the advertising campaigns launched by manufacturers such as Bosch and Noritz. KeySpan and GasNetworks continue to work with the manufacturers to bring the product information to contractors. The percentage of rebates for indirect water heaters is still considerably higher than the tankless, however, customers are requesting more and more information on the tankless technology and 25% of the domestic hot water rebates offered this year were for tankless applications. KeySpan still sees more potential in the tankless market, however, this will require time.

KeySpan and GasNetworks anticipate maintaining the rebate program until April of 2007, at which time we will be re-evaluating the domestic hot water market and program changes will be considered at that time.