

Program Evaluation for Missouri Gas Energy's Water Heater Program

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Executive Summary

The Missouri Public Service Commission required that Missouri Gas Energy (MGE) report key metrics regarding operations from High Efficiency Gas Water Heater Replacement Incentive Program (Water Heater Program) within 15 months of program initiation. MGE hired Johnson Consulting Group (JCG) to conduct a process and impact evaluation. This program was approved on August 7, 2007¹; the scope of this report covers program operations from August 2007 to October 31, 2008.

This report summarizes the results from program evaluation and addresses the following major issues:

1. Documents the energy savings from participating and non-participating customers who purchased qualifying water heaters.
2. Determines the specific energy savings for both tanked and tankless water heaters
3. Documents program results to date and
4. Identifies areas for improvement.

The scope of the program evaluation included conducting a review of the program documents and database; completing in-depth interviews with both staff, key stakeholders, and participating and non-participating plumbers; and completing customer surveys with both program participants and non-participants. The major findings and recommendations from this program evaluation are summarized next.

Major Findings

Energy Savings Impacts

MGE's Water Heater Program has led to significantly higher energy savings among program participants. The findings from the billing analysis revealed that the energy savings for *program participants* were significantly higher than for non-participants — between 18 and 20 percent of annual energy use. This represents 43 hundred (centum) cubic feet (ccf) of incremental annual savings for an efficient water heating system; there was no significant difference in savings for tankless systems compared to high efficiency tank systems. Gross annual energy savings for the program were estimated to be 23,349 ccf and savings net of free riders (i.e., those customers who would have bought the high efficiency option without the program incentive) were estimated to be 19,847 ccf. Savings over the expected fifteen year life of the equipment were estimated at 297,700 ccf. Overall, this program will lead to higher energy savings for participants who purchase either type of water heater system.

¹ Docket Filing GT-2008-005 Service Commission , Missouri Public Service Commission, Aug. 7, 2007, p. 3.

Program Participation

As of October 31, 2008, the program had received a total number of 543 applications. While there were more applications submitted for tanked water heaters, a strong majority of these applications were denied (58%). Most of these denials were because the customers did not purchase a qualifying tanked water heater. Therefore, program participation is actually higher among customers who purchase tankless water heater systems compared to those who purchased tanked systems. It is also important to note that once the staff provided additional guidance to customers, on the website and to the plumbers, regarding the program standards, the rate for program denials declined dramatically. But as the contractor interviews show, the participation rates still continue to be highest among those customers purchasing tankless water heaters.

E-1: Summary of Application Status in Program Database

# of Applications	Total Number in Database	% of Total	% Approved	% Denied
Tanked Water Heaters	311	57%	42%	58%
Tankless Water Heaters	231	43%	97%	3%
Total	542	100%	65%	35%

Program Operations

To date the program has only spent 18.4 percent of its total available dollars. The remaining funds in the program as of September 30 show a surplus of \$917,235. While MGE has plans to spend the funds for additional energy efficiency programs that is outside the scope of this evaluation. Rather, this finding suggests that there are funds available to increase both the rebate amounts for tanked water heater systems and also increase the advertising to plumbers.

The staff has taken a proactive approach to identify and resolve issues that may be causing confusion among customers or plumbers. The proposed program redesign in 2009 further suggests that the program staff is committed to continuing to reach out to water heater plumbers and home builders by providing rebates directly to plumbers rather than billing credits to customers and to emphasize the importance of “early replacement” to all customers and plumbers.

Water Heater System Characteristics

The program has been dominated by customers replacing their existing water heater systems with a tankless model. As the findings from both the database review and customer surveys showed, nearly all the installations were for existing systems, not new construction. Most installations were among single-family residences not landlords and of those tanked systems installed, most were for more than 40 gallons.

Among plumbers, a single participating contractor has accounted for nearly all of the tankless water heater installations. While the plumbers interviewed indicated they are satisfied with both MGE and also the program, they are still not convinced of the benefits of promoting more energy efficient tanked water heaters.

Awareness

The findings from the staff, contractor, and customer surveys all indicated that there is a relatively high awareness for the program among both participants and non- participants; most effective methods were advertising from the MGE bill inserts and the program website. Suggests does not need to increase customer advertising methods but rather focus on contractor messaging and support instead. Running bill inserts does seem to lead to increased participation, at least anecdotally as reported by program staff.

Plumbers

The findings from four plumbers indicated that while they are interested in participating in MGE's Water Heater Program, only one has had any real success. As confirmed in the program database, program participation is dominated by one contractor who specializes in tankless water heater systems. However, the other three plumbers anticipate that their program participation will increase in 2009, especially if the rebate for the tanked water heaters is increased.

The biggest challenge has been to attract plumbers who install tanked water heaters. These plumbers are still not convinced of the value of the energy savings for qualified equipment for the tanked systems. This lack of "contractor commitment" coupled with the lower rebate levels does help to explain why some plumbers are not generating "warm leads" into actual sales or installations.

One participating contractor has asked for the option of providing "instant/point of purchase rebates." However, MGE staff indicated that providing plumbers with this capability would not be difficult, and could actually increase participation among home builders and tanked water heater plumbers. Therefore, MGE should consider implementing this tactic in 2009.

The customer surveys corroborated the results from the database review, staff holder interviews, and contractor interviewers. Program participation is highest among those purchasing tankless water heater systems while non- participants are significantly more likely to purchase and install non-qualifying tanked water heater systems. Both the participants and non- participants were aware of the program mainly through information provided by MGE either through bill inserts or on the company website.

The participants reported high satisfaction levels with both MGE and their contractor; but overall both groups of respondents indicated that they were satisfied with MGE overall.

Free Ridership

Overall, program free ridership is estimated to be between 13 and 15 percent. However, the results from the customer surveys suggest that free ridership may actually be higher among those customers who purchase tankless water heaters. Moreover, since these respondents were also significantly more likely to have higher annual household incomes and higher education levels, these results suggest that the program is currently only successfully reaching one part of the water heating market.

Barriers to Participation

The biggest barrier to program participation was that non- participants opted to purchase less efficient tanked water heaters; however, there did not seem to be any barriers of participation to purchasing tankless water heaters. The staff, plumbers, and customers identified two critical barriers to program participation:

- Rebate levels are lower for tanked water heaters compared to tankless systems.
- Lack of qualifying tanked water heater equipment available in stock from either the local plumbing wholesalers or the local installers.

This has led to lower participation rates among those customers purchasing tanked water heater systems. Moreover, since customers are not purchasing the higher efficiency tanked water heater systems, the local plumbing wholesalers and plumbers are not inclined to keep it in inventory.

Recommendations

Based on the findings from this program evaluation, MGE should consider the following actions:

1. Increase program rebate levels for tanked water heaters

The plumbers and staff believe that the disparity between the \$40.00 bill credit for tanked water heater systems is not sufficient to offset the longer payback and higher upfront cost of these systems. Therefore, MGE should increase tanked water heater rebate to \$100.00. Given the surplus of the program budget, this increase should help to “move” the market more aggressively among tanked water heater systems, which comprise the majority of water heaters installed in MGE’s service territory.

2. Continue to promote the value of early replacement to home-owners and plumbers who specialized in tanked water heater systems.

Customers typically do not purchase new equipment for energy efficiency, but rather for other reasons, specifically equipment replacement, or to address health, comfort and safety concerns. This finding was corroborated in the customer surveys. This may help to explain the appeal of tankless water heater systems among MGE’s more affluent customers. It also

reinforces the need for MGE to promote the value of “early replacement” in advance of water heater system failure, which will allow the local plumbers to procure the qualifying equipment and also help to demonstrate to the plumbers the value of promoting this more efficient system.

3. Explore the possibility of offering plumbers “instant rebates” as a way to increase participation among tanked water heater installers and home builders.

Although this is not a critical need, it may help to increase participation among these two groups, by making the incentives accessible at the point-of-sale.

4. Launch the proposed program changes in 2009

MGE has developed plans to relaunch the program in 2009. This program launch should include a larger budget to increase both customer education and contractor outreach. The proposed marketing activities should also consider targeted direct mail to customers with tanked water heater systems. The program should emphasize the benefit of upgrading tanked water heater systems to more energy efficient models.

Overall, MGE has designed and implemented a good water heater replacement program. Program participation should increase, especially among tanked water heater customers, if the proposed recommendations are implemented.

1. Introduction

This report summarizes the findings from the program evaluation for Missouri Gas Energy's (MGE) High Efficiency Gas Water Heater Replacement Incentive Program (Water Heater Program). MGE hired Johnson Consulting Group (JCG), with the approval of the Collaborative, to conduct a process and impact evaluation for the program's first year of operation. This program was approved on August 7, 2007²; the scope of this report covers program operations from August 2007 to October 31, 2008.

1.1 Program Evaluation Overview

As part of the regulatory approval process, the Missouri Public Service Commission required that MGE report key metrics regarding program operations within 15 months of beginning program operations. These requirements are summarized in Table 1. This evaluation was also conducted to determine the effectiveness of the program delivery process, a billing analysis to estimate savings, and to identify recommendations for program improvement.

The *objectives of this program evaluation* are to:

1. Document the energy savings from both participating and non-participating customers who purchased qualifying water heaters.
2. Determine the specific energy savings for both tanked and tankless water heaters
3. Document program results to date and
4. Identify areas for improvement.

To achieve these objectives, JCG:

1. Conducted a brief program material review and kick off meeting to ensure we meet could the project objectives and timetable
2. Completed eight in-depth staff interviews to increase the overall understanding of program operations and identify market barriers.
3. Completed five interviews with both participating and non- participating water heater plumbers/dealers.
4. Completed a statistically valid impact evaluation based on billing records for both tankless and tank water heater customers
5. Completed a statistically valid survey of both participants and non-participants via a telephone survey.

² Docket Filing GT-2008-005 Service Commission , Missouri Public Service Commission, Aug. 7, 2007, p. 3.

Table 1: Program Evaluation Requirements for MGE's Natural Gas Program

Evaluation Objectives	Program Database Review	Document Review	Staff Interviews	Contractor Interviews	Customer Surveys	Billing Analysis
Program Characteristics						
Total number of incentive requests	√					
Total number of requests approved	√					
Water Heater Characteristics						
Water Tank Storage Capacity	√				√	
Energy Factor Rating	√				√	
Fuel Source of Water Heater that was Replaced	√				√	
Program Expenses						
Total dollar amount for bill credits		√	√			
Total administrative expenses		√	√			
Total promotion/ advertising expenses		√	√			
Complaint Resolution						
Total number of complaints	√		√			
Resolution of complaints	√		√			
Participant Characteristics						
Type of residence	√				√	
Age and size of water heater being replaced	√				√	
Reason for purchasing high efficiency hot water tank/system	√				√	
Factors Driving Program Participation						
Reasons for participation			√	√	√	
Barriers to participation			√	√	√	
Free Ridership			√	√	√	√
Areas for Program Improvement			√	√	√	
Estimated Savings from Program Operations					√	√

1.2 Program Background

The Water Heater Program is designed assist MGE customers with natural gas conservation efforts by encouraging them to replace current water heaters with high efficiency natural gas water heaters. The program is open to all current active MGE customers who purchase either a qualifying tanked or tankless water heater. Participating customers will receive a bill credit to offset the cost of this higher efficiency equipment.³

1.2.1 Program Incentives

As an incentive, each customer purchasing a qualifying system will be eligible to receive one of the following rebates issued in the form of a bill credit within eight weeks of satisfactory completion of the Incentive Request Form (Program Application).

- 1 \$40 bill credit for qualifying hot water tank purchase with Energy Factor (EF) of:
 ~ tank size of 39 gallons or less EF of 0.64 or greater
 ~ tank size of 40 gallons or more EF of 0.62 or greater
- 2 \$200 bill credit for qualifying tankless hot water system purchase (EF of 0.80 or greater)

To participate, customers must meet the following program requirements:

- Must be an **active** MGE customer with **residential use only** (i.e. no final bill or inactive accounts)
- No more than one incentive per account number
- Receipt must be provided with incentive request
- Receipt must be dated within 90 days of the incentive request
- The water heater system must be fired by natural gas

³ Docket Filing GT-2008-005 Service Commission , Missouri Public Service Commission, Aug. 7, 2007, p. 3.

2. Document Review

The first step in this evaluation was to review all pertinent program documents and the records in the program database. These reviews also addressed the following evaluation objectives as noted in Table 2.

Table 2: Evaluation Objectives for the Document Review

Evaluation Objectives	Program Database Review	Document Review
Program Characteristics		
Total number of incentive requests	√	
Total number of requests approved	√	
Water Heater Characteristics		
Water Tank Storage Capacity	√	
Energy Factor Rating	√	
Fuel Source of Water Heater that was Replaced	√	
Program Expenses		
Total dollar amount for bill credits		√
Total administrative expenses		√
Total promotion/advertising expenses		√
Complaint Resolution		
Total number of complaints	√	
Resolution of complaints	√	
Participant Characteristics		
Type of residence	√	
Age and size of water heater being replaced	√	
Reason for purchasing high efficiency hot water tank/system	√	

2.1 Methodology

This review included examining the following documents supplied by staff:

- Tariff filing
- Contractor recruitment and training materials
- Customer marketing materials
- A copy of the current customer database used for program tracking
- Program application forms

2.2 Database Findings

MGE has developed a dedicated database called WHAM which tracks all critical program benchmarks including those specifically requested by the Missouri Public Service Commission such as questions determined to monitor self-reported free ridership,⁴ fuel switching and home ownership. This database also generates the internal documents necessary to notify the accounting department so that participating customers receive the proper billing credit.

All findings reported in this section are based on the database results as of October 31, 2008. However, not every program participant fully answered all the questions on the application form, so the summary tables included in the section also report the total number of customer responses captured in the database

The database review did identify a few (less than 10) errors in the application database. There were also four complaints reported in the database; three were regarding the energy factor rating and one was a clerical processing error. All four were resolved within 24 hours. Overall, the database is well organized and all critical benchmarks are tracked in an easy-to-understand format.

Program Expenses: Per the Commission Report and Order in GR-2006-0422, the Company has allocated the following dollars on an annual basis:

- \$705,000 for the High Efficiency Gas Water Heater Replacement Incentive Program, consisting of:
 - \$533,800 for rebates in the form of bill credits for qualified purchases;
 - \$100,000 for promotion and advertising expense; and
 - \$71,000 for administrative expenses associated with the program.

To date the program has only spent 18.4 percent of its total budget. These results were based on the information provided by MGE and have not been verified independently. The information in Table 3 reflects the quarterly data as of September 30, 2008. The ratepayer dollars collected exceeded the speed with which program ramp-up could fully utilize. The MGE Collaborative has developed a portfolio of programs to implement to spend the backlog of funds and future funds. While this activity is not included in this evaluation report, it is important that it be noted.

⁴ Free ridership is defined as determining the number of customers who would have purchased qualifying equipment in the absence of the program. The free ridership findings from this program evaluation are discussed in Chapters 2, 3, and 5.

Table 3: Summary of Program Expenses: Budgeted vs. Actual

Category	Collected from ratepayers	Spent to date	Remaining funds	% Funds Spent
Bill Credits	\$800,700	\$42,960	\$757,740	5.4%
Promotion/Advertising	\$150,000	\$90,122	\$59,878	60.1%
Education	\$67,50000	\$43,990	\$23,510	65.2%
Administrative Expenses	\$106,500	\$30,393	\$76,107	28.5%
Total	\$1,124,700	\$207,465	\$917,235	18.4%

Application Approvals: The program database had 542 records. As Table 4 shows, 65 percent of the applications were approved while 35 percent were denied. The denial rate was significantly higher among tanked water heater applications water heater applications were approved while 58 percent were denied mostly because the tanked water heaters had did not meet the required energy factor.

Table 4: Status of Program Applications in the WHAM Database

# of Applications	Total Number in Database	% of Total	Number Approved	Number Denied	% Approved	% Denied
Tanked Water Heaters	311	57%	128	183	42%	58%
Tankless Water Heaters	231	43%	225	6	97%	3%
Total	542	100%	353	189	65%	35%

As Table 5 shows, most of the denials of the program applications denials were because the customer purchased a non-qualifying water heater (82%). This was especially true for tanked water heater customers. A number of tanked applications were denied due to date of receipt, while only two tankless customer applications were denied because they had purchased the system prior to the program's initiation. As the findings in the staff and contractor interviews further show, the lack of readily available qualifying equipment, especially for tanked water heaters, has emerged as one of the largest barriers to program participation.

Table 5: Reasons for Denial of Water Heater Applications

Type	Receipt Too Old	Rating Factor Does Not qualify	Total # Denied	% of Total	% Receipts Too Old	% Rating Factor Does Not Qualify
Total	34	155	189	100%	18%	82%
Tanked	32	155	187	98%	21%	82%
Tankless	2	0	2	2%	100%	0%

MGE staff processes the water heater applications in a timely manner. Table 6 displays the average length of time it took for the approved applications to be processed according to the database records. Overall, the program applications are processed very quickly, usually within two days of receipt. The processing time ranged from one day to 25 days, which is well within the timeframe for application processing.

Table 6: Application Processing Time

Type	Total Number of Applications	Average Number of Days to Process Application	Shortest Processing Time (in days)	Longest Processing Time (in days)
Total	353	1.95	1.00	25.02
Tanked	128	1.29	1.00	25.02
Tankless	225	2.32	1.00	25.02

2.2.1 Water Heater Characteristics

The database also captured several key characteristics regarding the water heater systems installed through the program. As Table 7 shows, the installed tankless water heaters have a much higher average energy rating factor compared to the tanked water heaters.

Table 7: Characteristics of Approved Water Heaters

Characteristic	Tanked Water Heaters (n=110)	Tankless Water Heaters (n=195)
Average Energy Rating Factor	0.63	0.82
Average Size of Water Heater that was replaced	50.26	40.51

Most of the water heaters that were replaced, according to the program records, were six years or older. This was especially true among the tankless water heaters, as shown in Table 8.

Table 8: Reported Age of the Water Heater That Was Replaced

Age of Water Heater That Was Replaced	0-5 years	6-15 years	15 + years
Tanked	5	47	55
Tankless	17	131	48
Total	22	178	103

Table 9 shows that this program did not lead to fuel switching in that only 9 of the installed water heaters replaced electric water heaters as their fuel source and in all cases those were for tankless system installations.

Table 9: Fuel Source of Replaced Water Heater

Fuel Source of Replaced Water Heater	Total	Tanked	Tankless
Electric	9	0	9
Gas	319	116	203

2.2.1 Participant Characteristics

The program database also records answers to several questions asked of all program participants. These results are summarized next.

Figure 1 reports the ways that the participants first learned about the program. Based on the results from the database, most participants heard about the program from MGE's bill insert or website. This finding was consistent across both groups and is also consistent with the findings from the customer surveys in Chapter 5.

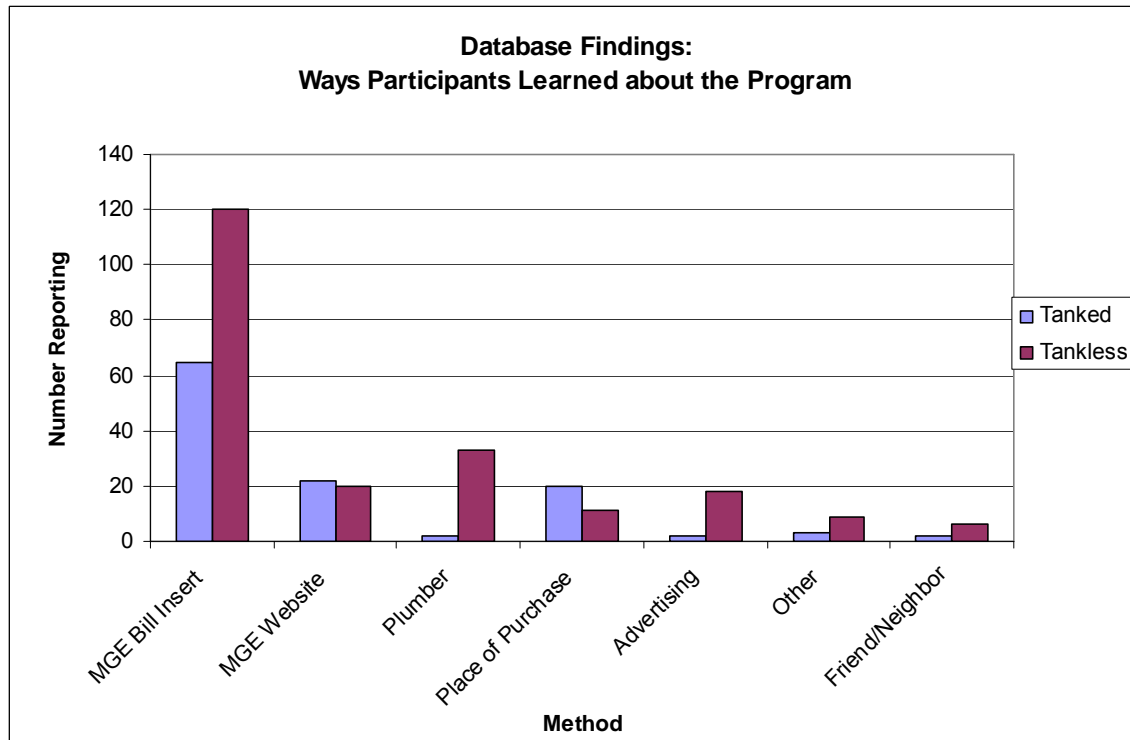


Figure 1: Ways Participants Learned about the Water Heater Program

The majority of the program participants are home owners, regardless of the water heater installed (see Table 9).

Table 9: Home Ownership Characteristics

	Home Owner	Landlord
Total	327	4
Tanked	112	2
Tankless	97	2

The application form also asks program participants two questions designed to measure free ridership. These responses indicate that most (63%) of the participants would have purchased a new water heater without an incentive. This is especially true for tanked water heater participants (83%) while the results were more evenly divided among tankless participants.

Table 10: Summary of Responses for Purchasing Without the Incentive

(WHEN) Would you have purchased a water heater at this time without the incentive	Total	Tanked	Tankless
Yes	210	98	112
No	122	19	103
Total	332	117	215

Table 11 shows that about 40 percent of the program participants said they would have purchased the efficient water heater on their own, without the incentive. The results also indicate that the tankless participants were less likely to purchase this type of water heater without the program incentive, suggesting that free ridership may be higher among tankless water heater participants. Free ridership will be examined more fully Chapter 5, the customer survey results.

Table 11: Summary of Responses for Purchasing a Less Efficient (Less Expensive) Water Heater without the Incentive

(WHAT) Would you purchase a less efficient water heater	Total	Tanked	Tankless
Yes	135	49	86
No	197	68	129
Total	332	117	215

2.3 Program Flow

The following flow chart illustrates the ways the program information is captured and tracked in the WHAM database.

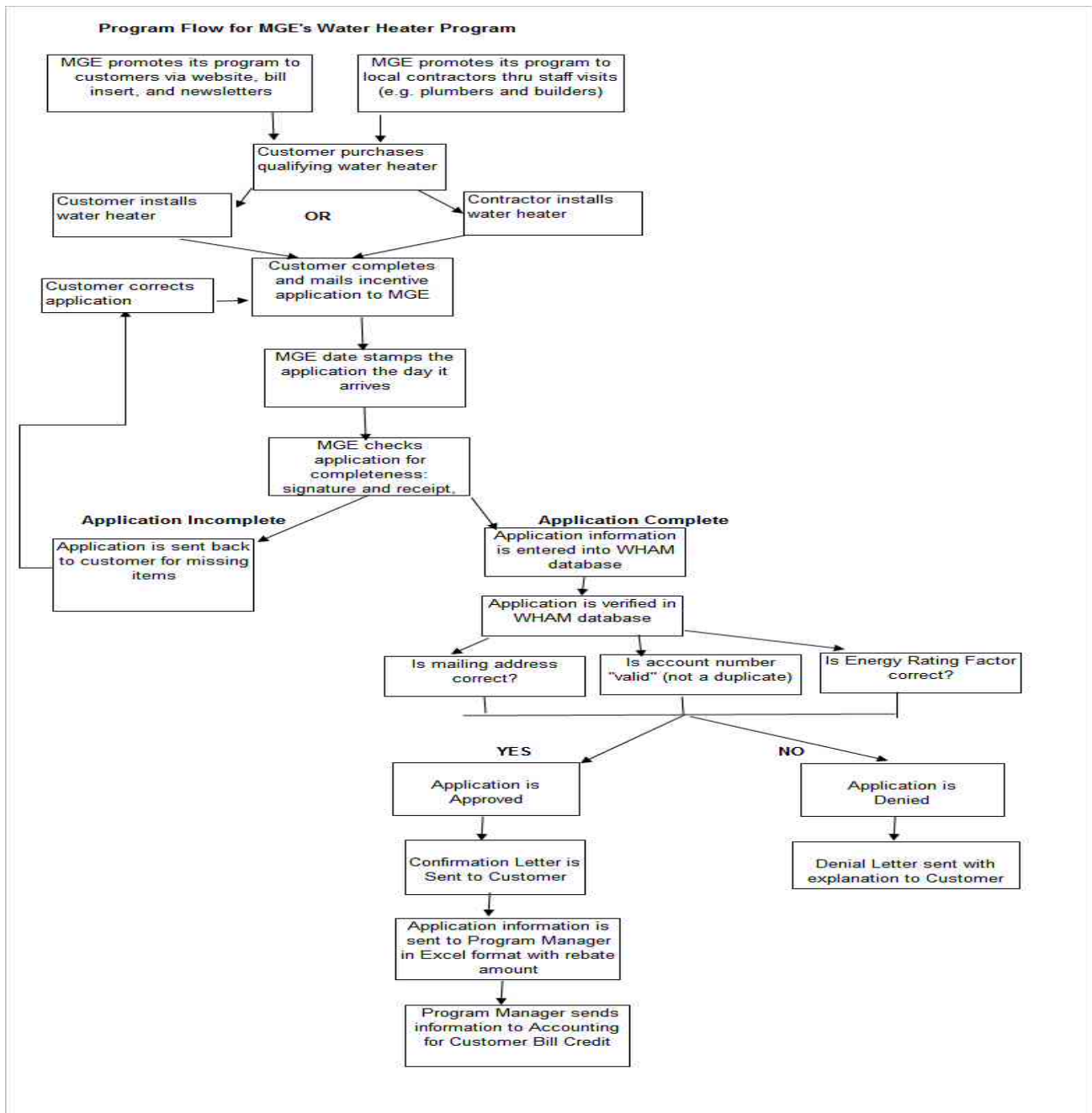


Figure 2: Water Heater Program Flow

Overall, this review from that the program database is well-designed and organized. The staff processes applications in a timely manner, and the records are well-organized. Going forward, MGE may want to capture the responses in numeric rather than text format, for example, coding the water heater system as tanked=1, tankless= rather than in text to facilitate ongoing tracking. The program records and database exceed the requirements established for compliance with the Missouri Public Service Commission.

While, there was a high level of application denials early in the program, this denial rate has declined considerably in the following months. According to the program records, most customers learned about this program through MGE, either in the bill insert or on the website. The program also did not lead to fuel switching. These findings are consistent with the results reported in the staff and customer interviews.

3. Staff Interviews

As part of a robust process evaluation, it is also necessary to interview the key players involved in program design and implementation. Table 12 summarizes the types of information gathered during these staff interviews.

Table 12: Evaluation Objectives for the Staff Interviews

Evaluation Objectives	Staff Interviews
Program Expenses	
Total dollar amount for bill credits	√
Total administrative expenses	√
Total promotion/advertising expenses	√
Complaint Resolution	
Total number of complaints	√
Resolution of complaints	√
Participant Characteristics	
Type of residence	√
Age and size of water heater being replaced	√
Reason for purchasing high efficiency hot water tank/system	√
Additional Information Collected from Program Evaluation	√
Factors Driving Program Participation	
Reasons for participation	√
Barriers to participation	√
Free Ridership	√
Areas for Program Improvement	√

3.1 Methodology

JCG conducted in-depth interviews with seven members of the MGE team who were instrumental in Water Heater Program design, deployment, and on-going administration. These interviews included six MGE staff members and one outside consultant. These interviews were completed in October 2008 and all respondents were promised confidentiality. Therefore, there will be no attribution to any direct quotations cited in this report.

3.2 Summary of Staff Interview Findings

3.2.1 Respondent Background

The respondents interviewed included those staff directly responsible for program design, administration, contractor outreach, and program tracking. Four of the staff members interviewed have been involved with the program since its initial design and deployment; two have become active in the program as it has expanded its outreach. The outside consultant became involved with the program in the summer of 2008, primarily to guide MGE's activities as the Water Heater Program for 2009.

3.2.2 Program Background

According to these interviews, MGE had limited experience in implementing energy efficiency or rebate programs. However, as the program was underway, Company had a relatively fast learning curve.

“By January 2008, all of the Collaborative members were disappointed in the lack of participation and wanted to increase the number of rebates processed.”

Initially, the program targeted existing residential home owners which also included reaching out to landlords of multiple-family housing. However, the MGE staff reported that they did not have specific goals other than the broad based objective to “increase energy efficiency.”

“...There were no set targets or goals for this program. There were no set targets or goals. The impression was that the program was broad based and it was aimed at increasing energy efficiency. This was really a brand new initiative and MGE had never done anything like this before... the first goal is general education and knowledge and then showing incremental improvement.”

3.2.3 Program Implementation

MGE's Water Heater Program was launched in August 2007. However, the program results have been lower than expected due to a number of factors. The MGE staff is optimistic that eventually the program will achieve a much higher level of participation , especially as more customers and plumbers become more aware and tax incentives return in 2009.

“Participation has been slower than we anticipated; In terms of real savings think we are not seeing it yet.”

“The numbers of applications seem to increase after a bill insert about the program but generally the program averages about 15 applications a week during the busier times.”

“Regarding participation, I am not sure that the customers fully understand the program. We had a slower start in terms of actual number of requests and we also had a relatively high rejection rate initially which has been declining as program continues... But we did a better job of educating the customers and the plumbers on the program requirements, so think there is better awareness. But it takes time to gain momentum...”

“No body is really building much these days... only had 3 participants.”

3.2.4 Free Ridership

The MGE staff does not believe that free ridership is a factor in this program, given the stringent program requirements and the difficulty of obtaining tanked water heaters that meet the program’s energy efficiency requirements.

“No. There are very specific EF criteria for the water heater program and that is a much higher efficiency level that what is currently readily available... so the plumbers and/or customers really have to ask for it...one of the biggest complaints (from plumbers) is that they can’t find qualifying equipment.”

“The program’s focus is on high efficiency equipment and the tanked water heaters are harder to find than the tankless...”

3.2.5 Program Tracking and Administration

As noted previously, The Water Heater Program developed a specialized program tracking and administrative database, which facilitates the tracking and reporting, processes for the staff.

The program database (WHAM) does a lot of error checking...it checks for duplicate account numbers, verifies the efficiency rating, and looks it up the account number if need be. The database also does validation of the account and then prints out either acceptance or rejection letters. It also sends out an email file with the critical program benchmarks.”

Rebate applications are processed internally by an administrative staff member. The application processing is documented in the program flow diagram (see Section 2.3). The applications are processed in batches at least once a week. Overall, the staff seem pleased with the capabilities and flexibility of this in-house database system.

“What we have now works great and we can issue a bill credit to the customer. The application is running solid and have 543 applications processed to date.”

This program database was also specifically designed to be able to make specific queries, so it “would meet regulators’ requests.”

3.2.6 Contractor Assessment

Initially, this program targeted plumbers in MGE’s service territory. To date, one contractor, specializing in tankless water heater installations, accounts for the majority of program applications. The staff reports that there has been little interest among other local plumbers, especially those specializing in tanked water heater installations. This finding is consistent with the results from the contractor interviews as well.

“We have a handful of plumbers only about 6 out of the possible 500 are participating – “The plumbers feel very good about (the program), but there are a very small number of plumbers on board.”

Plumbers are thrilled with it and think this is a good business.

Another challenge was to convince the local plumbers that this program would actually benefit customers.

“There was a resistance- because (the qualifying equipment) is more expensive...but that mindset is changing among the installers.”

“The Collaborative didn’t like the low redemption rates so MGE hired a marketing consultant to gather better market information. To that end, MGE had a focus group with plumbers and Kansas City remodelers –folks who were on the ‘front lines’ of the water heating industry... The biggest take-away from the focus group was that tanked water heater efficiency of .62 was actually unavailable for most plumbers and not at the supply houses. As a result, plumbers didn’t push to get higher efficiency water heaters to their customers because the plumbers didn’t see any significant benefit between that efficiency level and what is currently available.

“(We) haven’t convinced plumbers that the tankless water heaters were a ‘good’ product in the metro area ... out of 300 plumbers, they may be only 2 experienced plumbers that install tankless...”

“One plumber said that whenever he got a call from a customer about the tankless, he talked them into something else. Plumbers didn’t understand the energy factor...”

“Plumbers didn’t know about the energy savings difference and the value of insulated blanket...”

In December 2007, the collaborative agreed to no longer exclude new home construction/builders from the program., MGE started reaching out to new home builders a few months ago. However, this has met with limited success.

“We started the builder focus about 6 months ago... We want to tap into the new construction/green movement. That is a hot topic area and the electric company is doing some rebates with ENERGY STAR so wanted to do that too...but the program wasn’t designed for the new construction market as it was limited to a bill credit option.”

“There has been some resistance to program (from) the builders. We reach out to builders through the local home builders association and the president of the association helps spread the word... We are also involved with the build green council and we have targeted builders that are active in the conservation market...energy efficiency building. The spec homes aren’t energy efficient so we are targeting the custom market.”

“Since it began... we just got approval to expand it to new construction... and they did allow MGE to roll it out using a phased approach. The focus was on the largest market- the existing residential customers first—and now moving on to new construction.”

“We expanded the program to reach out to builders and developers and have a new sales contact...but this is not going over really well. The housing market is the number one concern and the opportunities in the new housing market is constrained with 2007-2008 building down turn.”

3.2.7 Customer Assessment

The staff reports that the customers have been very pleased with this program. This is consistent with the results from the customer surveys (see Chapter 4). Despite providing information to customers regarding program qualifying criteria in the bill insert and on the website, there was still some initial customer confusion. This was because the term “energy rating factor” was unfamiliar to customers and that information is only identifiable on the water heater box. This resulted in a high disqualification rate in the initial months for customers who purchased tanked water heaters.

This confusion was resolved when the staff took two actions. First, the staff posted a picture of where to find the energy factor rating on the box on the website and application form. Also, the staff provided the energy factor rating information in a look-up searchable database that links to a clearinghouse for water heater information (GAMA). This tool identifies if a specific water heater meets program specifications. The addition of this software tool has significantly reduced the number of disqualified applications due to energy factor ratings.

“We also found out that some people would be willing to purchase energy efficiency water heaters but they are not getting the rebate or are not turning it in...there was some confusion over the energy factor and that information is only on the box. Which is typically thrown out...so identifying and verifying the energy factor rating was a challenge.”

“So far have had only 4 complaints...we want to build on this program and expand on it...”

When the program was first launched, there was some initial confusion regarding the qualifying criteria for the energy efficiency ratings. This was especially true for customers who purchased tanked water heaters. As a consequence, there was a very high disqualification rate among customers. However, this has declined over time as both customers and local plumbers became more aware of the program requirements.

“We promote the program through the website and there is a challenge for customers to verify that the energy factor for the water heater meets the program criteria...so we built some software tools to help look ups for energy efficiency ratings.”

3.2.8 Areas for Program Improvement

MGE and its marketing research consultant have also identified additional ways to improve this program. These modifications were based on feedback from contractor focus groups which were held in May 2008. These focus groups provided MGE with guidance for making program modifications as well as providing a better understanding of the “lay of the land” in terms of understanding the industry and the local plumbers. The proposed program modifications include the following:

- Developing an option that allows direct payments to the contractor (i.e., the builder or plumber) rather than as a billing credit to the customer account.

“The challenge is to incorporate the builder incentive component into the program because the builder wants the incentive, but it is designed to be a bill credit to the customer... the builders usually group all the offers and collect the rebates directly and this isn’t possible in this program yet...”

- Encouraging local plumbing wholesalers to stock a sufficient inventory of qualifying tanked water heaters.

“We are trying to encourage plumbing wholesalers to stock qualifying tanked system... are getting more people involved that weren’t previously.”

“Many plumbers don’t have financial resources to warehouse the inventory and (the standard efficient) tanked water heaters are more available. There are also liability issues with utility storing them...”

- Educating manufacturers of our efforts to create demand for energy efficiency water heaters in this market, so they are more willing to stock qualifying equipment.

“We want to move the market and the availability of qualifying tanked water heaters is a challenge...”

“...we have been in conversations with Rheem to talk about making the product more accessible at the higher efficiency rating.”

- Expanding participation in the program by promoting the benefits of “early replacement among local plumbers and customers..

This approach will help to reduce one of the biggest barriers to water heater replacements. In general, these appliances are an “emergency” replacement decision. By focusing the marketing materials on encouraging customers to change out these appliances before they fail, (i.e., focus on early replacement) that will help “set the stage” for customers opting for a more efficient water heater, rather than replacing their current equipment with the standard efficiency option.

“We need to focus educational messages on the value of early replacement... don’t wait until the water heater is on its ‘last legs’... need to educate the plumbers too. So we’ve develop a strategy for messaging to the plumbers in the program redesign.”

“Water heaters are the most forgotten appliance but do offer good energy savings. Focus is on behavior changes – it is the third largest energy end use.”

“And want to recruit preferred plumbers for the installations... and want to get more aggressive in creating partnerships with the plumbers.”

- Considering the implications of increasing the current rebate levels for tanked water heaters from \$40 to \$100 per system installed.

“There are a lot of barriers in the tanked water heater market- especially regarding the rebate amount...I don’t think it is adequate... it is not high enough... need to create the rebate level to at least \$100.”

“Don’t see a silver bullet to convince plumbers (to participate) and they couldn’t rationalize the higher cost (for the energy efficient water heaters)... Do think the rebate for tanked water heaters should be increased.”

3.2.9 Proposed Program Changes

MGE is also considering implementing additional changes to help streamline the program by implementing the following modifications to the program, subject to the approval from the Collaborative.

- Have the plumbers or builders complete the customer rebate form and submit it directly to MGE for processing.

“We wanted to target plumbers in the know—and have them trained on how to fill out the customer rebate... and then turn it in for the customer.”

“... We want to make it easy for the plumbers to fill out the form and also found a third-party implementer to pay the plumbers for the installation. The plumber needs to get cash back not a bill credit... and that is the number one priority with a third-party.”

“For the program relaunch, we are trying to develop an ‘instant’ rebate customer payment ... the purpose of redesign is to put a greater emphasis on contractor promotion.

- Develop marketing materials that emphasize the benefits of the energy efficient water heaters for both tanked and tankless water heater systems.

“Given the flat rate structure, the utility wanted to help people become more energy efficient and we recommended a plan to really help them break through in this market. The biggest piece was an advertising component that included TV/radio as a way to put some pressure on plumbers to promote the rebate.

3.2.10 Overall Program Expectations

Despite these challenges, all the respondents believe that MGE’s water heater program will become much more successful, especially after the modified tariff is approved and implemented in early 2009. The staff believes that the program is going to succeed in the long run, especially given the increasing pressure on rising water and energy costs. But as one staff member said, “Building markets takes time.”

“I also think that there will be increased interest when the water rates go up (the water rates are going to quadruple), when the new ENERGY STAR ratings come out and when the tax credits take effect.”

3.3 Conclusion from Staff Interviews

The staff interviews confirmed the findings from the program database and also provided additional insight into program operations. Overall, the staff has taken a proactive approach to identify and resolve issues that may be causing confusion among customers. Staff is committed to continuing to reach out to water heater plumbers and home builders by providing rebates directly to plumbers rather than limiting program to billing credits to customers only and to emphasize the importance of “early replacements to all customers and plumbers.

4. Plumbers Interviews

Another critical part of this program evaluation was to speak with both participating and non participating plumbers about MGE's water heater program. Table 13 summarizes the evaluation objectives for these interviews.

Table 13: Evaluation Objectives for the Contractor Interviews

Evaluation Objectives	Contractor Interviews
Factors Driving Program Participation	
Reasons for participation	√
Barriers to participation	√
Free Ridership	√
Areas for Program Improvement	√

4.1. Methodology

As part of this evaluation, JCG was to complete up to six interviews with local plumbers, specifically plumbers working in MGE's service territory. Using a recent list supplied by MGE, JCG contacted both participating and non participating local plumbers. All of these plumbers had been invited to participate in the contractor focus groups held in May 2008, so all were aware of this program.

Table 14: List of Plumbers

	Participating	Non-Participating
Total Number	5	6
Total Attempted	5	6
Number Completed	2	2

4.2.1 Participation Status

As of December 8, 2008 JCG was able to complete four interviews with local plumbers currently listed as preferred vendors with signed vendor contracts for this program; two "non-participants" and two participants, one of whom is the most active program participant to date. However, only two of these plumbers have installed any water heaters as a result of the program, so they were classified as "participants" while the other two plumbers are better viewed as "interested" in participating in the program in the near future.

"I didn't know the program was up and running yet. will participate if MGE sends me the information."

4.2.2 Program Awareness

All four plumbers were aware of the program and all had participated in the focus group held in the spring. These plumbers also believed that program awareness was also pretty high among customers as well.

"MGE creates a lot of awareness among the customers and most customers know about it. I would say about 75% of our customers learned about the program from MGE."

4.2.3 Program Satisfaction

The participating plumbers were asked to rate their overall satisfaction with the program on a scale of "1" to "5" with a "1" meaning "Not at all Satisfied" and "5" means "Very Satisfied." The two participating plumbers reported satisfaction scores of 4 or 5. Overall, the participating plumbers seemed pleased with the program. This was especially true for the most active contractor in the program.

"Program is just great and makes the product much more available to the general public."

"MGE has been phenomenal... I like the program and the rebate."

However, the results to date have been mixed. One contractor, who specializes in tankless installations, has been very successful with the program, reporting more than 50 installations. However, he is the exception; since the other participating contractor reported less than ten installations for the program.

"Yes, but didn't really know what to expect. The customers want to get the tankless system."

"Had a lot of calls, but no takers. don't know why."

4.2.4 Free Ridership

None of these plumbers believe that free ridership is an issue for this program given that the rebated water heaters have a much higher efficiency rating requirement than the current water heaters in stock. These findings are consistent with the results from both the staff interviews (Chapter 2) and the Customer Surveys (4).

"Don't think free ridership is an issue because the energy efficiency ratings are higher in the program than what is currently available."

“The efficient tanked water heaters are not in stock. I will stock them if they sell but don't want to right now because of the carrying costs.”

4.2.5 Barriers to Program Participation

All four plumbers interviewed expressed interest in participating in the program. However, three identified barriers to program participation which they think are affecting customers' interest in participating. These barriers are the:

- Lower rebate for tanked water heater systems
- Lack of availability of the tanked energy efficient water heaters in the local market and
- Customers' hesitancy to make a purchase “for early replacement.”

All three plumbers who installed tanked water heaters believed that the rebate was too low for this system, and it did not adequately cover the price differential.

“Think that we were not getting very many serious people because the price difference is too high...”

“We haven't had any sales yet. We have had some customers who were serious lookers but when they see the cost difference, they want to stay with a lower cost water heater.”

“We do both types of installations- tanked and tankless. we do get a lot of tire kickers but the cost is double for the water heaters in the program and that is part of the problem. To install a tankless system costs about \$2,700; to install a 40-gal natural gas system costs about \$725 (standard system) and much higher for the higher energy efficient systems.. the \$40 rebate doesn't make much of a difference.”

Lack of the equipment availability is another barrier to participation, especially for those customers who want to install a tanked water heater.

“I think it is difficult to get the tanked water heater stocked locally and that will continue to be a problem until the ‘low end’ water heaters are eliminated...”

Two plumbers also believe that the customers are just not interested in purchasing a water heater unless it is necessary. However, one contractor believes that sales may increase in 2009, when the new energy tax credits take effect.

“I found out that most people want to wait until after the first of the year, when the tax credits come back into effect before buying a water heater...All the folks know about the rebates but want to wait until after the first of the year to make a purchase.”

4.2.6 Areas for Program Improvement

Overall, these plumbers are very pleased with the program. However, the plumbers did have several suggestions for program improvement:

- Increase the bill credit/rebate for tanked water heaters to at least \$100
- Provide a mechanism for plumbers to collect the rebates directly from MGE rather than having the customer receive a bill credit
- Promote the program using radio advertising to supplement the bill inserts

Three plumbers believe that the rebate needs to be increased for the tanked water heaters, given the price differential. All seem to think that a rebate of \$100 would be more effective than the current bill credit of \$40.00.

“Think that (MDG) needs to go to a higher rebate amount of at least \$100.”

The most active contractor would like to be able to offer customers and “instant” rebate at the point of sale as a way to increase sales.

“The one change would be to provide plumbers the rebate at the point of sale.. some of these purchases are not necessarily planned and would help to cost-justify the purchase if the rebate were ‘instant.’”

Overall, the plumbers think that MGE does an excellent job of promoting the program, which is consistent with the findings from the Customer Surveys as well. However, one contractor recommended expanding the promotion to local radio stations as well.

“I think that the advertising on the radio and the bill inserts are the way to go.. those methods work the best..”

4.2. Summary of Contractor Interviews

The findings from four plumbers indicated that while they are interested in participating in MGE’s Water Heater Program, only one has had any real success. As confirmed in the program database, program participation is dominated by one contractor who specializes in tankless water heater systems. However, the other three plumbers anticipate that their program participation will increase in 2009, especially if the rebate for the tanked water heaters is increased.

5. Customer Surveys

This program evaluation also included conducting customer surveys with both program participants and non participants. As Table 15 shows, the customer surveys were instrumental in measuring the program's overall effectiveness as well as identifying barriers to program participation and areas for program improvement. They also provided information regarding program free ridership.

Table 15: Evaluation Objectives for the Customer Surveys

Evaluation Objectives	Customer Surveys
Participant Characteristics	
Type of residence	√
Age and size of water heater being replaced	√
Reason for purchasing high efficiency hot water tank/system	√
Factors Driving Program Participation	
Reasons for participation	√
Barriers to participation	√
Free Ridership	√
Areas for Program Improvement	√
Estimated Savings from Program Operations	√

Several questions in the customer survey allowed for multiple responses, and therefore the responses will not add up to 100%. All multiple response questions are designated with an asterisk in the table's heading.

5.1 Methodology

JCG contracted with Ward Research to complete a statistically valid number of customer surveys among both participating and non participating customers.

Table 16: Number of Completed Customer Surveys- Recommend vs. Actual

Group	Recommended Minimum # of Completed Interviews	Actual # of Completed Interviews
Program Participants	41	53
Program Non-Participants	41	48
Total	82	101

Ward Research completed a total of 101 customer surveys of both program participants and non participants, which exceeded the survey requirements for a statistically valid customer survey at the 90%/10% level. All statistically significant findings from these surveys are displayed in **bold** and underlined. The sample was fairly evenly divided between tank and tankless customers.

For the purposes of this survey, non-participants were defined as those customers who purchased a water heater but did not receive a rebate. Several non-participants had recently completed a water heater system purchase, and therefore their applications were in process during the time of this customer survey. Unless a customer's application has been approved by MGE, the customer was defined as a non-participant.

As Table 17 shows, program *non-participants* were significantly more likely to have tanked water heaters while *program participants* were significantly more likely to have tankless water heaters. This finding suggests that there is a good market for water heater replacements; however, customers prefer to install standard efficient tanked systems compared to more energy efficient program-qualifying models

Table 17: Customer Survey Characteristics

Water Heater Type	Total	Participant	Non-Participant	Participant % of Total	Non-Participant % of Total
Tank	53	18	<u>35</u>	34%	66%
Tankless	48	<u>34</u>	14	71%	29%
Total	101	52	49	51%	49%

Table 18 shows that among those respondents with tanked water heaters, the majority are likely to be 40 gallons or larger.

Table 18: Size of Water Heaters Among Survey Respondents

System Size	Total	Participant	Non-Participant	Participant % of Total	Non-Participant % of Total
39 Gal or less	6	0	6	0%	100%
40 Gal or More	44	<u>18</u>	26	41%	59%
Don't Know	3	0	3	0%	100%
Total	53	18	35	34%	66%

Nearly all the survey respondents purchased these water heaters to replace an existing system (see Table 19).

Table 19: Size of Water Heaters Among Survey Respondents

	Participant	Non Participant
New	6%	2%
Existing	94%	98%

5.2 Summary of Customer Surveys

5.2.1 Awareness

The customer survey asked both participants and non participants how they first became aware of the program and the results are shown in Table 20. Consistent with the findings from the program database, most customers learned about this program from the MGE's bill inserts or mailings. These findings were nearly identical for both participants and non participants. Figure 3 displays these findings for the program participants by water heater system type. These findings were consistent with the results from the program database in Chapter 2.

Table 20: Ways Respondents First Learned of MGE's Water Heater Program

How did you first become aware of the program?	Total (n=101)	% of Total	% of Participant (n=52)	% of Non- Participant (n=49)
Gas Company Mailing	52	51%	46%	57%
Saw information on the gas website	15	15%	23%	6%
Don't Know	12	12%	2%	22%
Other	9	9%	12%	6%
Heard about it from a friend/colleague	7	7%	10%	4%
From Plumber	6	6%	8%	4%

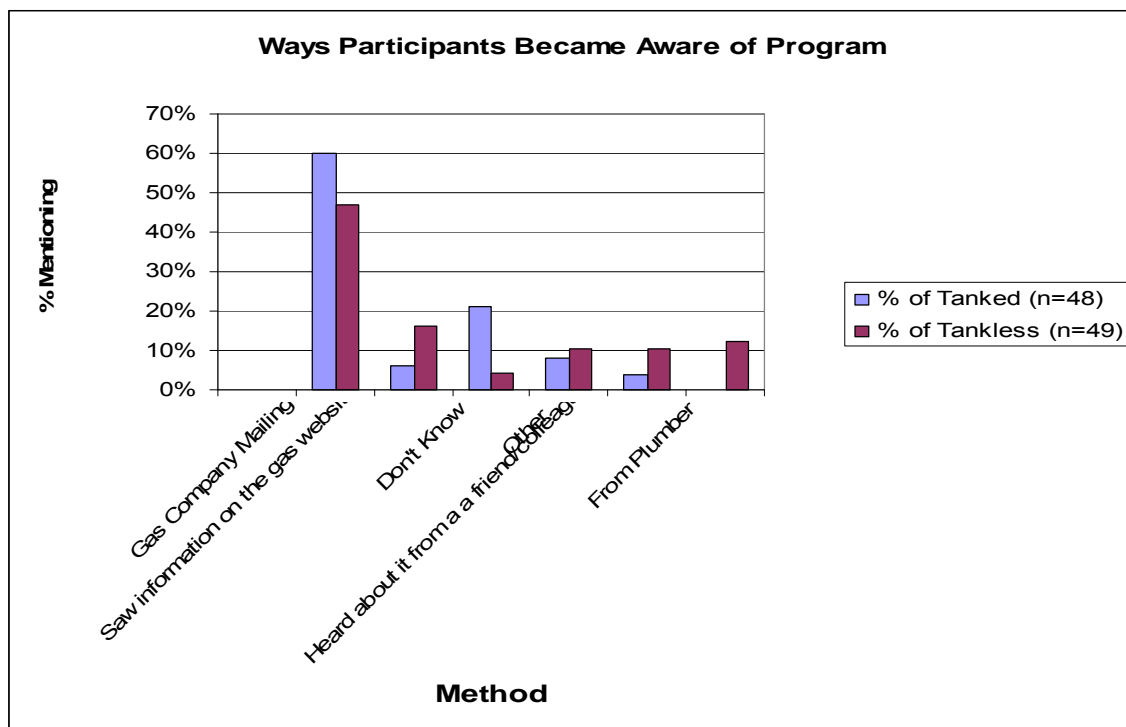


Figure 3: Ways Participants Became Aware of the Program

As Table 21 shows, most respondents did not recall learning about the program from any other method.

Table 21: Other Ways Respondents Learned of MGE's Water Heater Program*

	Total (n=92)*	% of Total	% of Participant (n=53)*	% of Non-Participant (n=39)*
Gas Company Mailing	3	3%	6%	0%
Saw information on the gas website	7	8%	11%	3%
Don't Know	68	74%	68%	82%
Other	8	9%	9%	8%
Heard about it from a friend/colleague	2	2%	2%	3%
From Plumber	4	4%	4%	5%

*multiple response question

5.3.2 Customer Participation

The program participants provided their reasons for deciding to participate in this program. Figure 4 summarizes these responses for both the tanked and tankless water heater participants. As this figure shows, most tanked water heater participants needed to

purchase a new water heater, while most tankless participants wanted to save money by purchasing a tankless system. It is interesting to note that energy efficiency or conservation was not much of a factor in determining participation for either group.

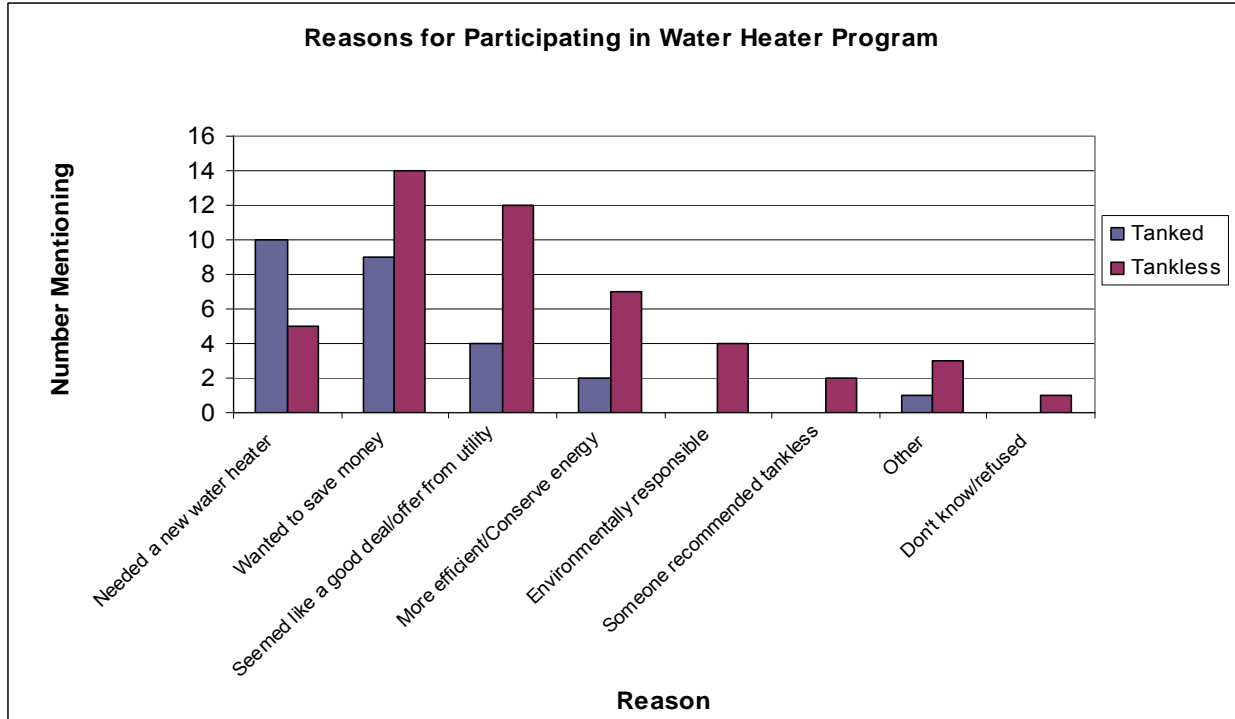


Figure 4: Reasons for Program Participation

The biggest barrier to not participating in the program was not purchasing a qualifying water heater, as show in Table 22.

Table 22: Reasons for Non Participating in MGE's Program

Why Did You Decide Not to Participate	Total	% of Total	% of Tanked (n=32)	% of Tankless (n=9)
Didn't buy a qualifying water heater	25	61%	75%	11%
Didn't know about the program until after I purchased it	5	12%	0%	56%
Other	5	12%	6%	33%
Don't Know	6	15%	19%	0%

Several non participants indicated that they were still waiting for notification from MGE about their application and those results are summarized in Table 23.

Table 23: Current Status of Non Participants

Non Participant- Current Status	Total	% of Total
Completed Application in Processing by MGE	4	29%
My application isn't completed yet.	2	14%
My application was approved	4	29%
Other	2	14%
Don't Know	2	14%
Total	14	100%

5.3.3 Plumber Assessment

The program participants were also asked to assess the plumber who installed the water heater. Nearly all the participants (90%) said they would recommend this contractor to someone else, suggesting a very high satisfaction level with the participating program plumbers. Table 24 shows that most of the program respondents believed that their plumber did a “good job” (31%) and was professional (10%).

Table 24: Reasons for Recommending this Plumber*

Why Recommend a Plumber	Total (n=126)*	% of Total	% of Participant (n=66)*	% of Non- Participant (n=59)*
Does a good job	39	31%	32%	31%
Professional/Good Service	12	10%	8%	2%
On schedule/arrived on time	8	6%	8%	3%
Explained everything	8	6%	8%	2%
We worked with them before	7	6%	6%	14%
It works/ no problems	6	5%	6%	7%
Price was reasonable/ didn't overcharge	6	5%	5%	3%
Other	6	5%	5%	3%
Followed up when we had problems	5	4%	5%	2%
Fast/Quick/Efficient	5	4%	5%	8%
Courteous/Polite	5	4%	5%	3%
Has lots of experience	5	4%	3%	3%
Don't Know	4	3%	3%	0%
Cleaned up afterwards	4	3%	3%	3%
Honest/Straightforward	4	3%	2%	5%
He's a friend/neighbor	2	2%	0%	10%

*Multiple Response Question

5.3.4 Free Ridership Findings

The program participants were also asked a series of questions designed to determine the likelihood of purchasing this type of energy efficient water heater without this program. As the following two tables indicate, free ridership rates for this program are fairly low, with only eight respondents indicating they did not have considering purchasing this water heater earlier. The majority (65%) did not consider making this purchase earlier (see Table 25).

Table 25: Did You Consider Purchasing Earlier

Did you consider purchasing earlier?	Total	% of Total (n=52)	% of Tanked (n=18)	% of Tankless (n=34)
Yes	8	15%	6%	21%
No	44	85%	94%	79%
Total	52	100%	100%	100%

All but one of the respondents indicated that they did not have the money available to make this purchase earlier.

Only 15 respondents reported that they were “Very Likely” to have made this purchase without the bill credit, of these eight were tanked water heater participants and seven had tankless systems. On average, the likelihood of purchasing this water heater without a bill credit was low, with an average rating of 3.56, as shown in Table 26.

Table 26: Likelihood of Purchasing Without a Bill Credit

How Likely Purchase on Your Own Without the Bill Credit	Total	Tanked	Tankless
Average Ratings	3.56	3.72	3.47

The findings suggest a free ridership rate of 13 percent for tanked water heater participants and 15 percent for tankless systems, for an overall program estimate of 14 percent.

5.3.5 Program Satisfaction

The program participants were also asked to report their satisfaction with both the program itself and the various program components on a five-point scale. The scale ranged from “1” which meant “Not at all Satisfied” to “5” which meant “Very Satisfied.” As Figure 5 shows, both participant groups reported relatively high satisfaction ratings across all program components. However, the tankless water heater participants reported significantly higher satisfaction ratings for both the amount of the bill credit receive and the application processing time, compared to the tanked water heater participants.

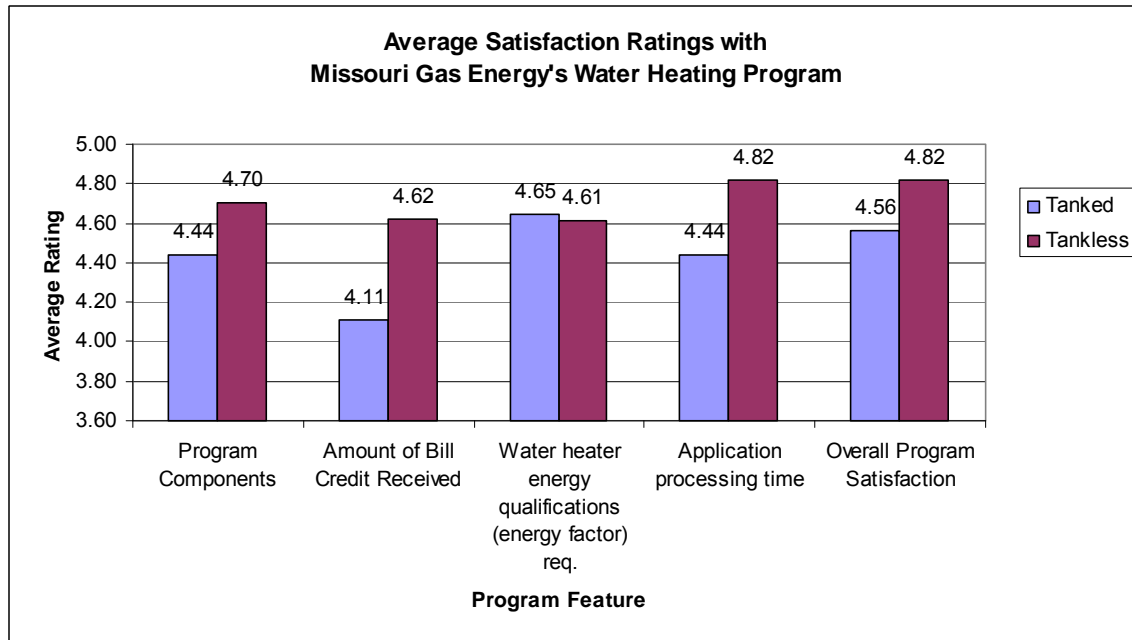


Figure 5: Average Satisfaction Ratings for MGE's Water Heater Program by Participant Type

All respondents were also asked to rate their overall satisfaction with MGE, using the same five-point scale. As Figure 6 shows, the participants reported significantly higher satisfaction scores compared to non participants (average ratings of 4.49 vs. 4.12). Of note, the tankless water heater participants also reported significantly higher satisfaction ratings compared to the tanked water heater participants (average ratings of 4.53 vs. 4.12). Satisfaction rating were also much higher among those who used a plumber to install their system compared to those who installed the system themselves (average rating of 4.46 vs. 3.75).

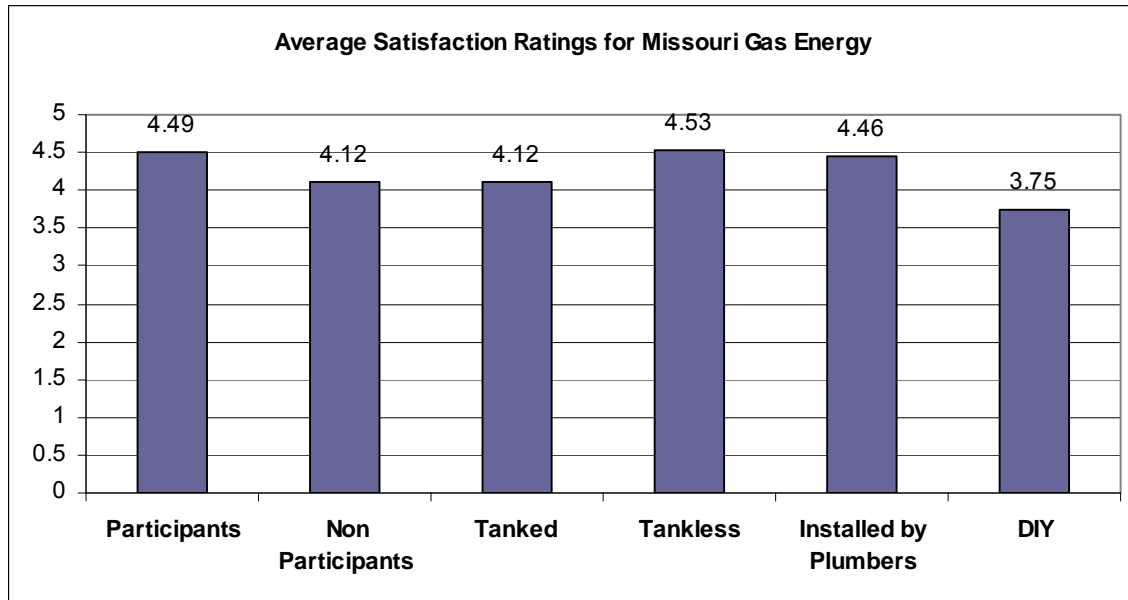


Figure 6: Average Satisfaction Ratings for Missouri Gas Energy

All of the program participants said they would recommend this program to others. The major reasons for recommending this program as shown in Table 27 were the rebate (48%), energy conservation/energy efficiency (14%) and they are satisfied with the water heater (17%). These findings are consistent for both groups of participants which is illustrated in Figure 7.

Table 27: Reasons for Recommending the Program to Others*

Reasons for Recommending the Program	Total	% of Total
Save Money/Rebate	25	40%
Energy Conservation/Energy efficiency	7	11%
Helps to pay the water heater bill	3	5%
A good program	6	10%
Happy/satisfied with my water heater	9	14%
Already recommended the program	3	5%
Other	10	16%
Total	63	100%

*multiple response question

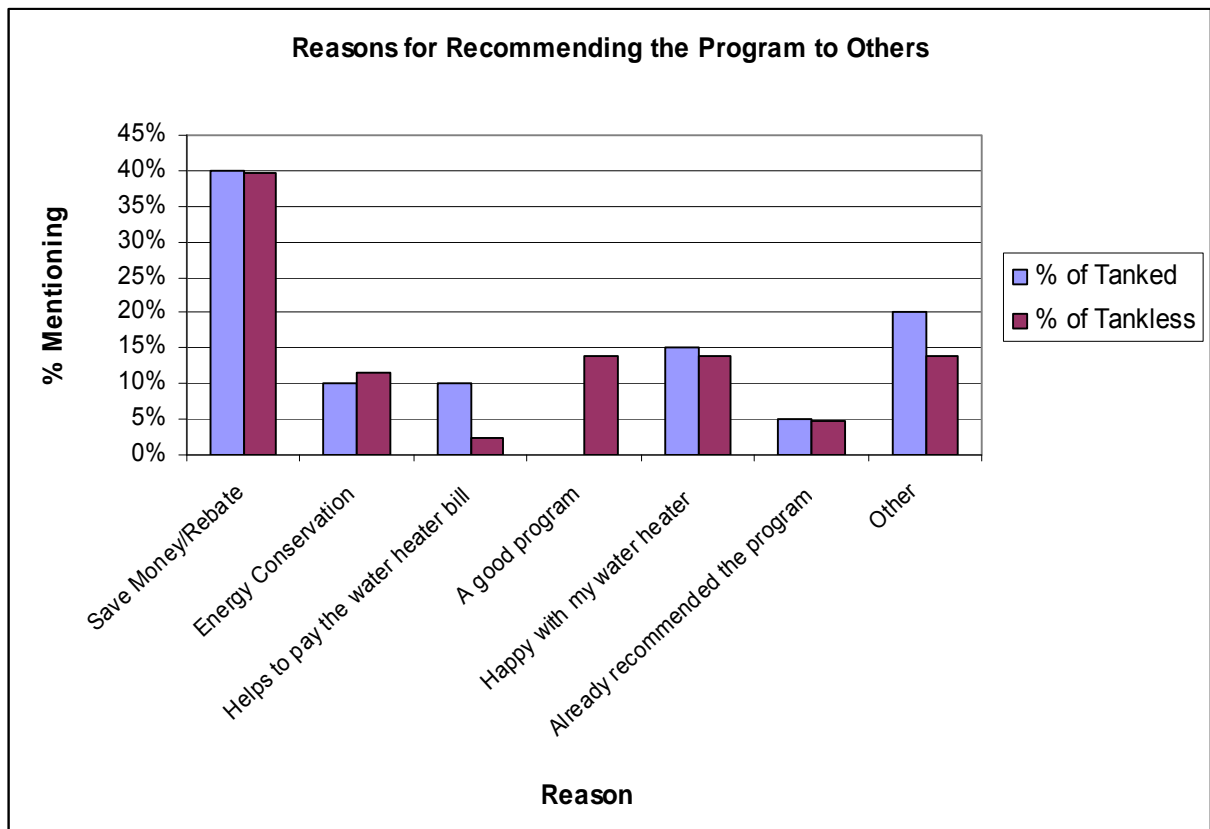


Figure 7: Reasons for Recommending the Program to Others by Water System Type

5.3.6 Areas for Program Improvement

The participants also provided suggestions on the ways in which this program could be improved. However, one-third (33%) believe the program is fine as is while 17% suggested advertising the program more and 19% suggested increasing the amount of the bill credit/rebate. Another 17% did not offer any suggestions (see Table 28).

Table 28: Ways the Program Could Be Improved*

Suggestion	Total (n=53)	% of Total	% of Tanked (n=18)	% of Tankless (n=34)
Fine as is	17	33%	28%	35%
Give a bigger rebate	10	19%	28%	14%
Advertise it more	9	17%	6%	24%
Provide more details	3	6%	6%	6%
Other	5	10%	17%	6%
Don't Know	9	17%	17%	18%

*multiple response question

5.3.7 Customer Demographics

The customer survey also captured some demographic information about these respondents. Where appropriate these demographic differences have been noted in this analysis. The findings are summarized in this section.

Home Ownership Characteristics: Nearly all of the customer survey respondents (99%) owned their homes; all of the non participants and all but one of the participants were home owners. All of the tankless water heater system customers were home owners as well. All but one respondent lived in a single family home, while one customer lived in a condominium and one lived in another type of residence.

Household Occupancy: Most respondents (45%) reported living in a two-person household. Of note, participants were statistically more likely to have slightly more household occupants (2.60 average number of people) compared to non participants (2.04 average number of people). Of note, those households with incomes of \$75,000 or more reported significantly higher number of household occupants (3.17 average number of people) compared to those households with incomes less than \$75,000 annually (1.38 average number for households with incomes of less than \$30,000 annually; 2.05 average number of people for those with household incomes between \$30,000 to \$75,000 annually (see Table 29).

Table 29: Number of Household Residents

Number of People in the Home	Total (n=101)	% of Total	% of Participants (n=52)	% of Non-Participants (n=49)
1	19	19%	12%	27%
2	46	46%	40%	51%
3	16	16%	25%	6%
4	11	11%	15%	6%
5+	4	4%	4%	4%
Refused	5	5%	4%	6%
Average Number	2.33		2.60	2.04

The majority of all respondents (89%) reported that the number of household residents has stayed the same for the past year.

Household Income: While many respondents refused to answer this question (44%), those who did respond reported household incomes of \$75,000 or more. Of particular interest is that the 23% of participants reported significantly higher annual incomes above \$100,000 compared to non participants in the same income range (2%). Moreover, tankless participants were significantly more likely to have household incomes of \$100,000 or more compared to tanked water heater participants (23% vs. 4%) (see Table 30).

Table 30: Reported Annual Household Income

Annual Household Income	Total (n=101)	% of Total	% of Participants (n=52)	% of Non-Participants (n=49)
Less than \$30,00	14	14%	7%	20%
\$30,000 to \$75,000	20	20%	15%	24%
\$75,000 or more	23	23%	33%	12%
Refused	44	44%	44%	42%

Highest Education Level: Most of the respondents had completed college (34%) or higher with 18 percent reporting graduate degrees. Of note, the non participants were significantly more likely to have completed high school only (27%) compared to the participants (10%) and the tanked water heater participants were significantly more likely to be high school graduates (26%) compared to the tankless water heater respondents (6%) (see Table 31).

Table 31: Highest Education Level Completed

Highest Education Level Completed	Total (n=101)	% of Total	% of Participants (n=52)	% of Non-Participants (n=49)
Some High School/High School Graduate	18	17%	10%	<u>27%</u>
Some College/Vocational School	25	23%	23%	27%
College	34	34%	39%	29%
Graduate	18	18%	23%	12%
Refused	6	6%	6%	6%

5.3 Summary Findings from Customer Surveys

The customer surveys corroborated the results from the database review, staff interviews, and plumber interviewers. Program participation is highest among those purchasing to tankless water heater systems while non participants are significantly more likely to purchase and install non-qualifying tanked water heater systems. Both the participants and non participants were aware of the program mainly through information provided by MGE either through bill inserts or on the company website.

The participants reported high satisfaction levels with both MGE and their plumber; but overall both groups of respondents indicated that they were satisfied with MGE overall.

The biggest barriers to program participation was that non participants opted to purchase less efficient tanked water heaters; however, there did not seem to be any barriers of participation to purchasing tankless water heaters.

These results, coupled with the free ridership estimates of 13 to 15 percent, suggest that program free ridership is highest among those participants who purchased tankless water heater systems. Moreover, since these respondents were also significantly more likely to have higher annual household incomes and higher education levels, these results suggest that the program is currently only successfully reaching one part of the water heating market.

6. Impact Evaluation of Efficient Water Heaters

This section describes the purpose of the impact evaluation, the method used, and the results of the analysis.

6.1 Purpose

The purpose of the impact evaluation was to estimate gross energy savings from both high efficiency tanks (efficiency factor greater than 0.62) and tankless water heaters.

6.2 Method

The method used was to select a statistically valid sample of participants and non-participants from the MGE database of results to conduct a billing analysis of energy savings. The sample of non-participants was selected from those customers who applied to the program but were not eligible to receive a rebate, usually because of the efficiency rating of the water heater.

Sample Selection: The MGE database of 543 records was cleaned by removing customers with a fuel source of electricity, those with no account number, those who installed a new water heating system before 2006 and those which installed a new system in August 2008. Random samples were selected from each of the participant and non-participant populations and added monthly consumption data for January 2006 through October 2008 (provided by MGE) for each of the selected sample. The sample was then cleaned by removing any non-participants with tankless water heater, customers who had no billing record before the installation of the equipment, and customers with incomplete billing data. Table 32 shows the expected and actual breakdown of the population and sample sizes for participants and non-participants.

Table 32: Population and Sample Sizes for the Billing Analysis

Group	Planned		Actual	
	Population Size	Sample at 90%-10%	Population Size	Sample at 90%-10%
Participants	190	51	345	54
Non-participants	120	44	183	62
Total	310	95	528	116

Adjust for Weather: Monthly heating degree days for Missouri (see Appendix A) were used to adjust gas usage for heating requirements since the data were for single-family homes only. Savings were estimated by comparing the average annual use for 2008

compared to average annual use for 2006, i.e. before the water heating system was installed in participant premises. Both reductions in volume (ccf) and percentage reduction were calculated.

Summer Gas Use: The use for the summer months (June through August) was analyzed to determine the impact on water heating use. As water heating is the largest end use of natural gas after heating, the summer usage was considered a good proxy for water heating load. All but one of the participants had a new water heater by summer 2008; one participant installed the water heater before summer 2007 so usage was compared to 2006. As for annual reductions, comparisons were made on volume reduced (ccf) and percentage reduced.

6.3 Summary of Impact Evaluation Findings

This section provides the results of the analysis and recommended gross savings.

Participants vs. Non-Participants: Statistical tests (t-tests for independent samples) were applied to compare results for participants and non-participants. Results were similar for volume and percentage reduction so the analysis presented is for percent gas reduced.

Energy use for participants was significantly reduced compared to non-participants for both summer and annual estimates. As shown in Table 33, gas use in the summer was reduced by an average of 18% which is significantly ($p < 0.003$) more than for non-participants. Results for annual reduction were consistent—20% reduction at a significance level of $p < 0.01$.

Table 33: Billing Analysis Results Comparing Participants and Non Participants

Group	Efficiency Factor	Summer Reduction			Annual Reduction		
		n	%	ccf	n	%	ccf adj
Non-Participant	< 0.60	54	1	0.4	53	5	0.1
Participant	> 0.62	61	18	4.0	61	20	0.4
		90%/10%, $p < 0.01$			90%/10%, $p < 0.01$		

Tankless vs. High Efficiency Tanks: Analysis of results for participants with tankless water systems compared to those with high efficiency water heaters found no significant difference between the two types of systems. There were slightly more people in the households with tankless systems—13 of the sample of tankless participants (about half) had at least 3 people in the household compared to 8 of the HE tank participants (30%). Also participants with higher efficiency tanks had slightly older existing equipment. However, none of these differences were significant. Table 34 below compares results for the participants for the two types of efficient water heating systems.

Table 34: Billing Analysis Results Comparing Tanked and Tankless Systems

Equipment	Efficiency Factor	n	Summer Reduction %	Annual Reduction %	Average # in Household	% Old Equipment > 15 years
HE Tank	0.62 - 0.80	30	20	21	2.4	60
Tankless	> 0.80	32	16	20	2.6	35
TOTAL		62	18	20	2.5	42

6.4 Summary of Results

This section provides the results of the analysis and recommended gross savings. The program was successful in significantly decreasing energy use for participants by 18 to 20 percent. This is in line with result from a study done in 2004⁵ that showed savings of 17 per cent for high efficiency water heaters (EF > 0.62).

6.4.1 Participants vs. Non-Participants:

Statistical tests (t-tests for independent samples) were applied to compare results for participants and non-participants. *Energy use for participants was significantly reduced compared to non-participants for both summer and annual estimates.*

As shown in Figures 8 and 9 and Table 35, gas use in the summer was reduced by an average of 18% which is significantly ($p < 0.003$) more than for non-participants. Results for annual reduction were consistent—20% reduction at a significance level of $p < 0.01$. In terms of energy savings, the results for summer savings (where energy is mainly used for water heating) show that average customer monthly use was reduced by 4 ccf compared to a reduction of 0.4 ccf for non-participants. Since all of the non-participants installed new water heating systems, the 0.4 ccf likely represents the impact of a new water heating system which needs to be accounted for in estimating incremental savings from installing a higher efficiency unit.

⁵ Evaluation Measurement and Verification Report for the Upstream High Efficiency Gas Water Heater Program #119-02, Prepared for ADM Associates, Inc., October 19, 2004

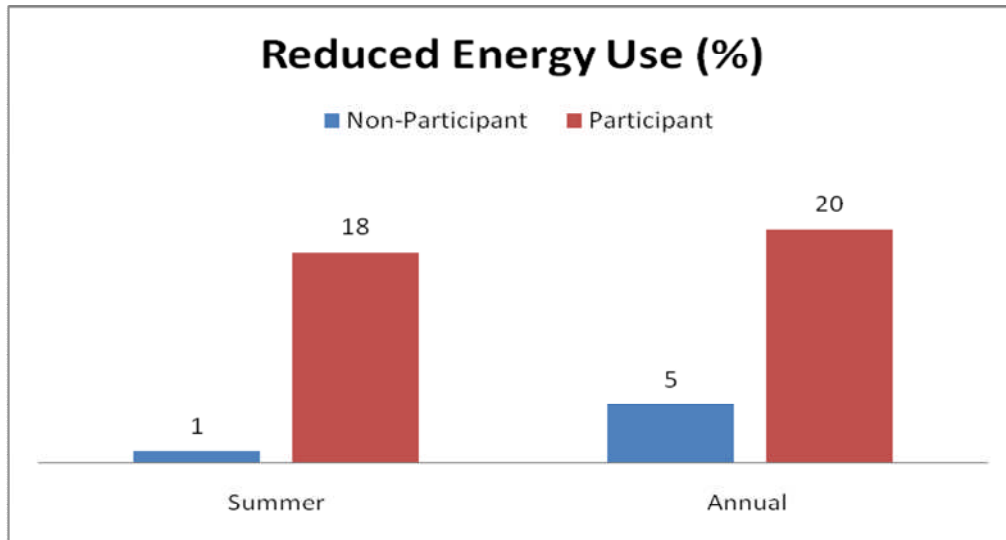


Figure 8: Comparison of Percent of Energy Savings for Participants and Non-Participants

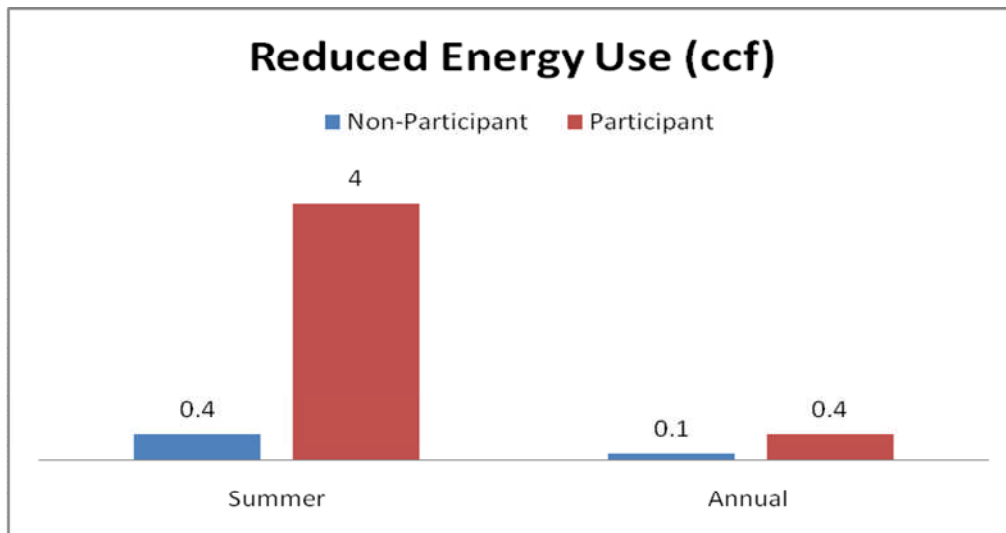


Figure 9 :Comparison of Energy Reduced by Participants and Non-Participants

Table 35: Billing Analysis Results Comparing Participants and Non Participants

Group	Energy Factor	Summer Reduction			Annual Reduction		
		Sample Size	%	ccf	Sample Size	%	ccf adj
Non-Participant	< 0.60	54	1	0.4	53	5	0.1
Participant	> 0.62	61	18	4.0	61	20	0.4
		90%/10%, p < 0.01			90%/10%, p < 0.01		

6.4.2 Tankless vs. High Efficiency Tanks:

Statistical analysis of results for participants with tankless water systems compared to those with high efficiency water heaters found *no significant difference between the two types of systems*.

In fact, savings were slightly higher for participants who installed high efficiency tanked water heaters than for those who installed tankless systems. As shown in Table 32, there were slightly more people in the households with tankless systems—13 of the sample of tankless participants (about half) had at least 3 people in the household compared to 8 of the HE tank participants (30%). Also participants with higher efficiency tanks had slightly older existing equipment. However, none of these differences were significant.

Table 36 and Figure 10 show the comparison of results for the participants for the two types of efficient water heating systems.

Table 36: Billing Analysis Results Comparing Tanked and Tankless Systems

Equipment	Efficiency Factor	Sample Size	Summer Reduction %	Annual Reduction %	Average # in Household	% Old Equipment > 15 years
HE Tank	0.62 - 0.80	30	20	21	2.4	60
Tankless	> 0.80	32	16	20	2.6	35
TOTAL		62	18	20	2.5	42

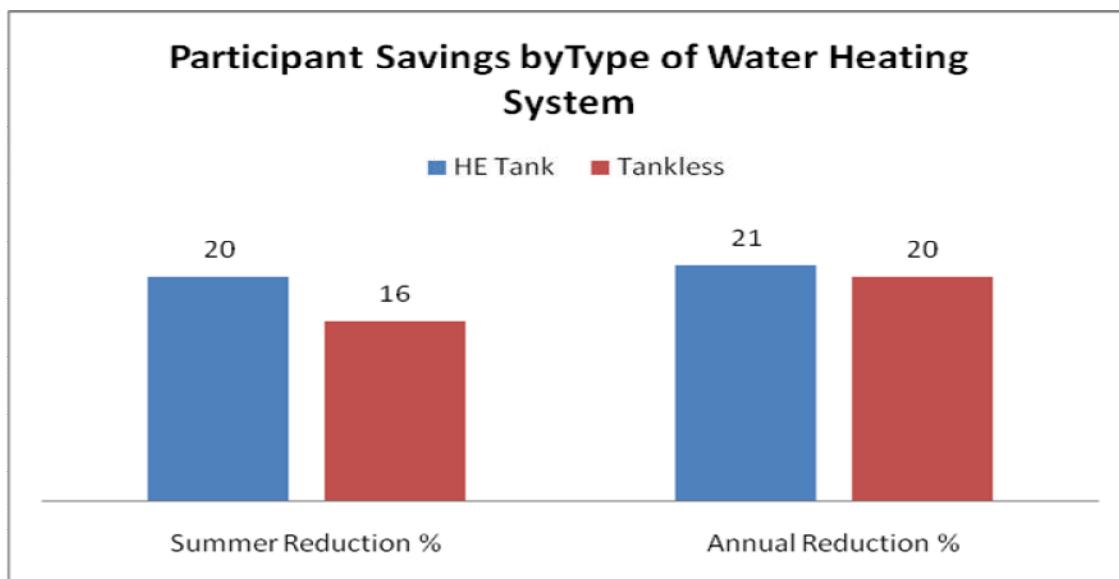


Figure 10: Comparing Participant Savings by Type of Water Heating System

6.4.3 Gross and Net Program Impact

The program was successful in achieving overall gross energy savings of 23,349 ccf and net savings of 19,847 ccf, excluding participants who would have installed the more efficient equipment without the program incentive. Lifetime savings were 297,700 ccf.

Annual Gross Savings:

Energy savings were based on results from the summer energy use analysis. Results were similar for both analyses and using the summer results provides a more conservative estimate of savings.

Energy saved by higher efficiency water heating systems is calculated as:

$$\begin{aligned}\text{Monthly Savings} &= \text{Summer Savings (Participants)} - \text{Summer Savings (Non-Participants)} \\ &= 4.0 - 0.4 = 3.6 \text{ ccf}\end{aligned}$$

$$\begin{aligned}\text{Annual Savings} &= \text{Monthly Savings} * 12 \text{ months} \\ &= 3.6 * 12 = 43 \text{ ccf}\end{aligned}$$

Total annual program savings are calculated as:

$$\begin{aligned}&= \text{Total Participants} * \text{Annual Savings} \\ &= 535 * 43 = 23,349 \text{ ccf} : \end{aligned}$$

Annual Net Savings:

Overall program free ridership was estimated to be between 13 and 15 percent in Section 5.2. The most conservative estimate of 15 percent was used to calculate net savings as shown below:

$$\begin{aligned}\text{Annual Net Savings} &= (1 - \text{Per cent of Free Riders}) * \text{Gross Savings} \\ &= (1 - 0.15) * 23,349 \text{ ccf} = 19,847 \text{ ccf}\end{aligned}$$

Lifetime Savings:

Since water heating equipment lasts for many years, lifetime savings can be calculated based on equipment life and estimated savings. MGE assumed equipment life of 15 years which is consistent with the average of Energy Star estimates of 20 years for tankless and 8-10 years for higher efficiency tanks.

$$\begin{aligned}\text{Lifetime Savings} &= \text{Life of Equipment} * \text{Net Annual Savings} \\ &= 15 * 19,847 \text{ ccf} = 297,700 \text{ ccf}\end{aligned}$$

7. Conclusions and Recommendations

7.1 Conclusions

Energy Savings Impacts

MGE's Water Heater Program has led to significantly higher energy savings among program participants. The findings from the billing analysis revealed that the energy savings for *program participants* were significantly higher than for non-participants—between 18 and 20 percent of annual energy use. This represents 43 hundred (centum) cubic feet (ccf) of incremental annual savings for an efficient water heating system; there was no significant difference in savings for tankless systems compared to high efficiency tank systems. Gross annual energy savings for the program were estimated to be 23,349 ccf and savings net of free riders (i.e., those customers who would have bought the high efficiency option without the program incentive) were estimated to be 19,847 ccf. Savings over the expected fifteen year life of the equipment were estimated at 297,700 ccf. Overall, this program will lead to higher energy savings for participants who purchase either type of water heater system.

Program Participation

As of October 31, 2008, the program had received a total number of 543 applications. While there were more applications submitted for tanked water heaters, a strong majority of these applications were denied (58%). Most of these denials were because the customers did not purchase a qualifying tanked water heater. Therefore, program participation is actually higher among customers who purchase tankless water heater systems compared to those who purchased tanked systems. It is also important to note that once the staff provided additional guidance to customers, on both website and to the plumbers, regarding the program standards, the rate for program denials declined dramatically. But as the contractor interviews show, the participation rates still continue to be highest among those customers purchasing tankless water heaters.

Program Operations

To date the program has only spent 19 percent of its total budget. The budget for incentives actually has a surplus of \$223,940. While MGE has plans to spend the funds for additional energy efficiency programs that is outside the scope of this evaluation. Rather, this finding suggests that there are funds available to increase both the rebate amounts for tanked water heater systems and also increase the advertising to plumbers.

Overall, MGE staff have done an excellent job in administering this program during its first year. The program has been operating effectively since program initiation. The program database is well-designed and organized. The staff processes applications in a

timely manner, and the records are well-organized. The program records and database exceed the requirements established for compliance with the Missouri Public Service Commission.

Overall, the staff has taken a proactive approach to identify and resolve issues that may be causing confusion among customers or plumbers. The proposed program redesign in 2009 further suggests that the program staff is committed to continuing to reach out to water heater plumbers and home builders by providing rebates directly to plumbers rather than billing credits to customers and to emphasize the importance of “early replacement” to all customers and plumbers.

Water Heater System Characteristics

The program has been dominated by customers replacing their existing water heater systems with a tankless model. As the findings from both the database review and customer surveys showed, nearly all the installations were for existing systems, not new construction. Most installations were among single-family residences not landlords and of those tanked systems installed, most were for more than 40 gallons.

Among plumbers, the one contractor has accounted for nearly all of the tankless water heater installations. While the plumbers indicated they are satisfied with both MGE and also the program, they are still not convinced of the benefits of promoting more energy efficient tanked water heaters.

Awareness

The findings from the staff, contractor, and customer surveys all indicated that there is a relatively high awareness for the program among both participants and non participants; most effective methods were advertising from the MGE bill inserts and the program website. Suggests does not need to increase customer advertising methods but rather focus on contractor messaging and support instead. Running bill inserts does seem to lead to increased participation, at least anecdotally as reported by program staff.

Plumbers

The findings from four plumbers indicated that while they are interested in participating in MGE’s Water Heater Program, only one has had any real success. As confirmed in the program database, program participation is dominated by one contractor who specializes in tankless water heater systems. However, the other three plumbers anticipate that their program participation will increase in 2009, especially if the rebate for the tanked water heaters is increased.

The biggest has been to attract plumbers who install tanked water heaters. These plumbers are still not convinced of the value of the energy savings for qualified equipment for the tanked systems. This lack of “contractor commitment” coupled with

the lower rebate levels helps to explain why some plumbers are not turning “warm leads” into actual sales or installations.

While one plumber has asked to provided the capabilities for “instant rebates” this is not yet an issue mentioned by any of the tanked water heater plumbers. However, MGE staff indicated that providing plumbers with this capability would not be difficult, and could actually increase participation among home builders and plumbers who install tanked water heaters. Therefore, MGE should consider implementing this tactic in 2009.

The customer surveys corroborated the results from the database review, staff holder interviews, and contractor interviewers. Program participation is highest among those purchasing to tankless water heater systems while non participants are significantly more likely to purchase and install non-qualifying tanked water heater systems. Both the participants and non- participants were aware of the program mainly through information provided by MGE either through bill inserts or on the company website.

The participants reported high satisfaction levels with both MGE and their contractor; but overall both groups of respondents indicated that they were satisfied with MGE overall.

Free Ridership

Overall, program free ridership is estimated to be between 13 and 15 percent. However, the results from the customer surveys suggest that free ridership may actually be higher among those customers who purchase tankless water heaters. These results suggest that program free ridership is highest among those participants who purchased tankless water heater systems. Moreover, since these respondents were also significantly more likely to have higher annual household incomes and higher education levels, these results suggest that the program is currently only successfully reaching one part of the water heating market.

Barriers to Participation

The biggest barriers to program participation was that non-participants opted to purchase less efficient tanked water heaters; however, there did not seem to be any barriers of participation to purchasing tankless water heaters. The staff, plumbers, and customers identified two critical barriers to program participation:

- Rebate levels are lower for tanked water heaters compared to tankless systems.
- Lack of qualifying tanked water heater equipment available in stock from either the local plumbing wholesalers or the local installers.

This has led to lower participation rates among those customers purchasing tanked water heater systems. Moreover, since customers are not purchasing the higher efficiency tanked water heater systems, the local plumbing wholesalers and plumbers are not inclined to keep it in inventory.

7.2 Recommendations

Based on the findings from this program evaluation, MGE should consider the following actions:

1. Increase program rebate levels for tanked water heaters

The plumbers and staff believe that the disparity between the \$40.00 bill credit for tanked water heater systems is not sufficient to offset the longer payback and higher upfront cost of these systems. Therefore, MGE should increase tanked water heater rebate to \$100.00. Given the surplus of the program budget, this increase should help to “move” the market more aggressively among tanked water heater systems, which comprise the majority of water heaters installed in MGE’s service territory.

2. Continue to promote the value of early replacement to home-owners and plumbers who specialized in tanked water heater systems.

Customers typically do not purchase new equipment for energy efficiency, but rather for other reasons, specifically health, comfort and safety. This finding was corroborated in the customer surveys. This may help to explain the appeal of tankless water heater systems among MGE’s more affluent customers. It also reinforces the need for MGE to promote the value of “early replacement” in advance of water heater system failure, which will allow the local plumbers to procure the qualifying equipment and also help to demonstrate to the plumbers the value of promoting this more efficient system.

3. Explore the possibility of offering plumbers “instant rebates” as a way to increase participation among tanked water heater installers and home builders.

Although this is not a critical need, it may help to increase participation among these two groups, by making the incentives accessible at the point-of-sale.

4. Launch the proposed program changes in 2009

MGE has developed plans to relaunch the program in 2009. This program launch should include a larger budget to increase both customer education and contractor outreach. The proposed marketing activities should also consider targeted direct mail to customers with tanked water heater systems. The program should emphasize the benefit of upgrading tanked water heater systems to more energy efficient models.

Overall, MGE has designed and implemented a good water heater replacement program. Program participation should increase, especially among tanked water heater customers, if the proposed recommendations are implemented.