



Utility Approaches to AMI-Based Customer Engagement: Results from a Multi-Utility Survey

An Evaluation of Utility AMI Engagement Practices

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About the Alliance for Water Efficiency

The Alliance for Water Efficiency (AWE) is a nonprofit dedicated to the efficient and sustainable use of water across North America. Based in Chicago, AWE advocates for water efficient products and programs and provides information and assistance on water conservation efforts. AWE works with more than 500 member organizations, providing benefit to water utilities, business and industry, government agencies, environmental and energy advocates, universities, and consumers.

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Executive Summary

Background

Advanced Metering Infrastructure (AMI) is a powerful tool that enables water utilities to gain high-resolution insight into customer water use. AMI data can be used for a variety of conservation and non-conservation related activities to improve system operations, management processes, customer experience, and water use efficiency. As AMI deployment expands, utilities are leveraging AMI platforms and data to engage with customers.

In 2025 Alliance for Water Efficiency (AWE) conducted a nation-wide AMI Benchmarking Survey to assess the current deployment and utilization of AMI as a customer engagement tool. This report presents the findings of the 2025 survey. The survey was modeled after AWE's 2022 AMI Engagement Survey, published in "Smart Practices to Save Water: An Evaluation of AMI-Enabled Proactive Leak Notification Programs", and further revised. It was open for 1 month and shared across a variety of AWE and partner communication channels. The two surveys are not compared in this report. Thirty-four utilities completed the 2025 survey, providing insight into their AMI deployment and customer engagement practices.

Key Findings

Eleven key findings are summarized from the survey. These key findings are classified by subject.

Customer Contact Information: Most utilities with AMI leverage digital engagement. Maintaining updated customer contact information is a challenge, limiting the effectiveness of customer engagement efforts.

Customer Notifications: Proactive notifications have become a standard practice and opt-out notification models are the most successful method of connecting with customers at scale.

AMI Software and Hardware: AMI is deployed most widely for residential customer accounts and utilities are split between in-house and third-party management based on available resources.

Management and Operations: Water Conservation Departments are typically responsible for managing leak notifications and personnel time to manage these notifications varies widely.

Minimum Continuous Flow Notifications: Automated opt-out minimum continuous flow notifications are common. Portal systems are frequently used to track notifications, but some utilities still use separate databased and billing systems for tracking.

High Flow Notifications: Many utilities have high flow notifications, but these types of notifications are less common and standardized than minimum continuous flow notifications.

Water Savings: AMI data is used to track water savings from notification programs, and there are opportunities for more utilities to engage in this practice.

Customer Resources: Utilities provide educational content and resources to customers following leak alerts. These touchpoints can be key opportunities to connect with customers and highlight efficiency efforts.

Leak Programs and Bill Adjustments: Leak notification programs can increase positive customer interactions without causing a long-term increase in customer complaints. Bill adjustments are common, but most utilities have eligibility requirements and/or require evidence of leak repair.

Common Practices: AMI data is primarily used to troubleshoot high bill complaints and verify program savings for water efficiency purposes.

Challenges and Opportunities: Educating customers and maintaining current contact information are the biggest challenges related to leak and/or high use notification programs. Future plans to leverage AMI data focused on demand forecasting and targeting high/inefficient water users.

1. Introduction

Alliance for Water Efficiency (AWE) conducted an online survey in autumn of 2025 to evaluate the current deployment and utilization of advanced metering infrastructure (AMI) as a customer engagement tool. This report shares the findings from that survey.

1.1 Previous Research

In 2022 AWE conducted a multi-utility survey to collect information on AMI-enabled leak notification programs. The results of this survey are published in “Smart Practices to Save Water: An Evaluation of AMI-Enabled Proactive Leak Notification Programs”.¹ This survey had 102 participants across 21 U.S. states and Canadian provinces. Ninety percent of participants who took the 2022 survey had AMI partially or fully deployed. Participants were asked questions about AMI deployment, customer portal systems, leak notification programs, customer resources, and the use of AMI data to support programs and water savings. The most recent survey conducted in 2025 was structured based on the 2022 survey but conducted at a smaller scale.

1.2 Survey Goal

The goal of the 2025 AMI Engagement Benchmarking Survey (“survey”) was to evaluate the technology, level of engagement, and applied uses of AMI for water providers across North America. To achieve this goal, the survey included questions on AMI infrastructure, notifications, customer communications, management and policy decisions, and alternative uses of AMI. Survey questions closely aligned with questions asked in the AWE 2022 AMI Engagement survey.¹ Survey results show how often participating utilities reported using specific AMI practices, programs, and engagement strategies. By understanding what practices are most common across the industry, water practitioners have a practical way to evaluate their own AMI programs, communicate successes, and identify opportunities to expand AMI engagement by comparing and benchmarking with peers.

¹ Alliance for Water Efficiency. Smart Practices to Save Water: An Evaluation of AMI-enabled Proactive Leak Notification Programs. Chicago, IL: Alliance for Water Efficiency, 2023.

2. Survey Development and Dissemination

The 2025 AMI Engagement Benchmarking Survey was developed through a collaborative process and was distributed through AWE's communication channels.

2.1 Survey Development and Dissemination

2.1.1 Survey Development

The survey aimed to evaluate the technology, level of engagement, and applied uses of AMI for water providers across North America. The survey development, dissemination, and analyses were conducted with the support of San Antonio Water System (SAWS) and informed by a sub-group of members from AWE's Conservation and Advanced Metering Infrastructure (CAMI) Network. Questions were updated from the 2022 survey and new questions were added to advance understanding of how AMI is being used to engage with customers.

The final survey included 100 questions, with a mixture of multiple choice and free-response questions. Logic-linked questions led the participant through topics appropriate for their current stage of AMI deployment based on their previous responses. Survey questions were divided into the following eight sections:

1. AMI System Information
2. General Leak / High Usage Notification Programs
3. Minimum Continuous Flow Notifications
4. High Flow Notifications
5. Leak Alert Follow-Up
6. AMI Data and Water Savings
7. Leak, Bill, and Customer Adjustments
8. Reflections and Looking Ahead

A list of all survey questions is provided in Appendix A.

2.1.2 Survey Dissemination

The survey was open October 6 – November 19, 2025. AWE shared the survey across its water practitioner network through weekly membership emails, social media channels, and advertisement at the AWWA WaterSmart Innovations Conference in October 2025. The Survey was also shared through targeted outreach to AWE's CAMI Network and other identified stakeholders. SAWS supported survey dissemination by sharing it through targeted outreach as well.

3. Survey Results

Survey responses provide an overview of common and uncommon AMI engagement practices among North American utilities. Results are a tool to identify opportunities to expand AMI engagement and identify successes.

3.1 Structure of Survey Results

The survey results are designed to share common and uncommon AMI engagement practices. To demonstrate the frequency of a practice among the utility participants, responses to each survey question were calculated into percentage values based on the total number of responses to the question. In most circumstances, responses of “not applicable” or “I do not know” were excluded from this percentage calculation. Based on the percentage of responses, the practice was categorized on a scale of very uncommon to very common among the utilities that participated in the survey. Table 1 is a key that applies to all practice tables in the survey results.

Table 1. AMI Engagement Practice Key

Survey responses are calculated as a percent of the total number of responses and classified on a scale of very uncommon to very common.

<i>Classification</i>	<i>Percent of Responses</i>
<i>Very Uncommon</i>	<i>0 - 20%</i>
<i>Uncommon</i>	<i>21 - 40%</i>
<i>Average</i>	<i>41 - 60%</i>
<i>Common</i>	<i>61 - 80%</i>
<i>Very Common</i>	<i>81 - 100%</i>

3.2 Survey Participants

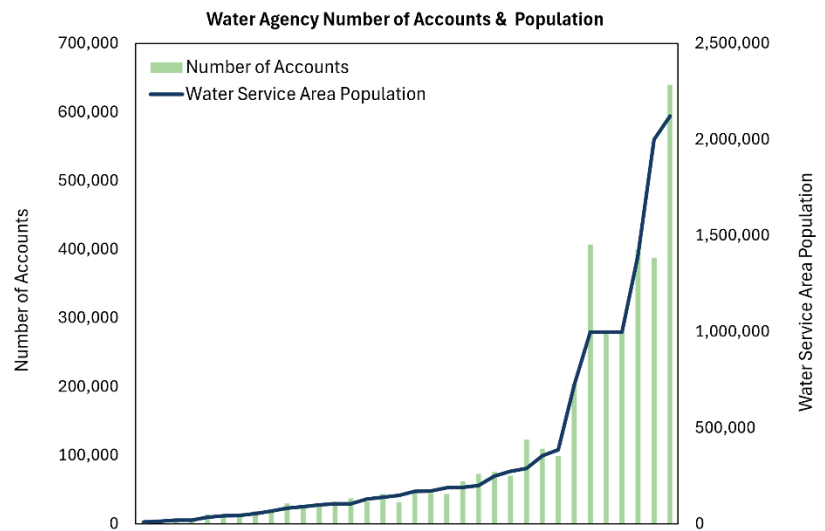
A total of 34 utilities² participated in the survey across the West, Northwest, Southwest, South, and Southeast regions (Table 2).³ The participating water utilities had water service area populations that ranged from 11,000 to greater than 250,000. The number of accounts for the water utilities ranged from 4,500 to over 600,000 (Figure 1). The key findings in this report are from the subset of utilities that took the survey. The findings represent a snapshot in time and demonstrate an opportunity to continue collecting data on AMI engagement to better inform common practices among utilities.

² Seventeen utilities that responded to the survey were participants in the CAMI Network at the time of survey completion.

³ Organizations that approved acknowledgement as survey participants are listed in Appendix B.

Table 2. Water Utility Responses by State

Number of Survey Responses By U.S. State	
Arizona	2
California	7
Colorado	7
Florida	4
Georgia	4
Nevada	1
Texas	7
Utah	1
Washington	1

**Figure 1.** The approximate number of accounts and water service areas population for all survey utility participants.

3.3 Customer Contact Information

Key Findings

Participating utilities with AMI have largely built the infrastructure needed for digital customer engagement; however, few utilities have the systematic strategies in place to maintain accurate contact information, creating a gap between engagement capacity and effective outreach.

Ninety-four percent of survey participants reported having a customer portal to engage customers. Participants use a variety of portal brands, with a total of 20 brands reported and two utilities reporting in-house customer portals. The most common portal brand was VertexOne, formerly known as WaterSmart.

Participants were also asked about processes for updating customer contact information for their customers. Most survey participants (23) have not conducted a campaign to request that customers update their digital contact information. Of the 11 utilities (32%) that have conducted a campaign, three reported the campaign as overall successful, two reported the campaign as unsuccessful, and six reported the campaign success as neutral or unsure⁴. A minority of participating agencies (8) had a schedule to encourage customers

⁴ A campaign was determined overall successful if there was an increase in the percentage of customers enrolled in a program and/or updated their contact information. A campaign was determined overall unsuccessful if there was no increase in customers sharing contact information or the answer stated that it

to update their contact information. Schedules for customer contact update campaigns varied across these eight agencies. Four agencies scheduled revalidation campaigns on a sub-annual basis (monthly, quarterly, or non-event specific) and three agencies scheduled revalidation campaigns on a multi-year basis.⁵

Twenty-three participants provided information about connecting customer email addresses to accounts.⁶ Twenty-one participating utilities had more than 60% of residential customer emails on file. Twenty-five participants provided information about the number of phone numbers on account.⁷ Twenty-one of these participating agencies had greater than 60% of residential customer phone numbers on file. Table 3 provides a summary of agency customer contact practices.

Table 3. Customer Contact Engagement Practices

Classified on a scale of very common to very uncommon based on percent of survey responses.

<i>Customer facing portal</i>	
No	Very Uncommon
Yes, an in-house portal	Very Uncommon
Yes, commercially available software	Very Common
<i>Schedule to encourage customers to revalidate their contact information</i>	
Yes	Uncommon
No	Common
<i>Campaign to request that customers provide digital contact information</i>	
Yes	Uncommon
No	Common

3.4 Customer Notification

Key Findings

The use of proactive notifications is becoming standard practice among participating utilities with AMI. Utilities using opt-out models are more successful in reaching customers at scale, highlighting program design, not just technology, as a key driver of engagement.

Table 4 outlines responses regarding utility proactive leak and/or high use alert customer notifications. Twenty-six utilities (76%) proactively send leak and/or high usage alert

the program was unsuccessful. A campaign was determined unsure/no indication if it was too early to determine the success or the participant stated that the success of the campaign was unknown.

⁵ One participating utility responded ‘unknown’ to the question of customer contact revalidation schedule timeframe.

⁶ Ten participants replied “unknown” and one response could not be validated.

⁷ Eight participants replied “unknown” and one response could not be validated.

notifications beyond what is provided in a customer portal. For these utilities, it is most common to send a leak or high usage alert notification through the portal and an additional method. Of the sixteen utilities that send proactive notifications through both a customer portal and an alternative method, approximately 80% have an opt-out notification program.

Of the five utilities that only send proactive notification through a customer portal, 80% have an opt-out notification program, and of the six utilities that only send proactive notifications through alternative outreach methods, 66% have an opt-in notification program. It is more common for utilities to have opt-in proactive notifications when the notifications are only sent via an alternative method (i.e. not the portal).

For utilities that have opt-in proactive notification programs, the highest reported percent of residential customers that opted in was 30%. For utilities that have opt-out notification programs, the highest reported percent of residential customers that opted out was 17%. However, the opt out rate for most utilities with opt-out notification programs⁸ was between 1 – 2%. Five of the six utilities reporting that they were not currently sending proactive notifications noted that they were working to launch a proactive leak and/or high use notification program.

Table 4. Proactive Leak and/or High Use Customer Notifications

Classified on a scale of very common to very uncommon based on percent of survey responses.

<i>Proactive leak and/or high use notifications sent beyond notifications provided via customer portal</i>	
Yes	Common
No	Very Uncommon
Not applicable, all customers are not an AMI-integrated customer portal	Very Uncommon
<i>Methods of sending proactive leak and/or high use alerts</i>	
Through a customer portal and other outreach methods	Average
Only through other outreach methods	Uncommon
Only through a customer portal	Very Uncommon
<i>Proactive leak and/or high use alert notifications are opt-in or opt-out</i>	
Opt-out	Common
Opt-in	Uncommon
<i>Reasons utilities are not sending proactive notifications</i>	
Launching proactive notification program - no current program	Common
Insufficient Technology	Uncommon
No customer-facing portal	Uncommon
Not enough customers - no plan to implement a proactive notification program with full AMI deployment	Uncommon
Not enough customers - plan to implement a proactive notification program with full AMI deployment	Very Uncommon
Lack of support from leadership / decision-makers	Very Uncommon

⁸ This percentage only considers utilities that reported a residential customer percentage. Thirteen utilities with opt-out notification programs reported a percentage of residential customers that opted out.

Across all participating utilities that send proactive notifications, email is the most common communication method, followed by print mail, text, and voice/robocall. Most utilities use multiple communication methods. Utilities that use text messaging for notification alerts frequently require that customers opt in to texts (71%). For all notification types, customers typically must log in or register to a portal to view meaningful details about the leak and/or high usage. Table 5 shows the common general customer communication methods.

Table 5. Customer General Communication Methods

Classified on a scale of very common to very uncommon based on percent of survey responses.

<i>Communication methods used to send notifications</i>	
Email	Very Common
Print mail (postcard, letter, door hanger)	Common
Text	Common
Voice/robocall	Common
Utility staff call	Average
Portal notifications	Average
Field Visit	Very Uncommon
<i>Customers must opt in to receive text notification</i>	
Yes	Common
No	Uncommon
<i>Customers must login to a portal to see meaningful details about the leak information after they received a notification</i>	
Yes	Common
No	Uncommon

3.5 AMI Software & Hardware

Key Findings

AMI deployment has grown over the past decade, and most participating utilities have the widest AMI deployment among residential customers. Utilities are split between independent or third-party AMI systems management. There is opportunity for continued growth and development of AMI programs, but there is not a preferred way to manage AMI systems, which is likely dependent on utility resources.

Thirty-one agencies were fully or partially AMI deployed at the time of the survey.⁹ This amounted to 91% of survey participants reporting partial or full AMI deployment. Twenty-two agencies reported full AMI deployment, which was categorized as deployment across

⁹ The AMI-related questions were only asked to agencies with full or partial AMI deployment.

all or nearly all accounts,¹⁰ and 18 of these agencies began AMI deployment in 2016 or later. The earliest deployment year was 2007. For agencies reporting full AMI deployment,

- 95% of agencies had AMI deployed for +80% residential customer accounts;
- 38% of agencies had AMI deployed for +80% commercial, industrial, institutional (CII) customer accounts;
- 17% of agencies had AMI deployed for 1–29% designated irrigation meter (DIM) accounts.

Nine agencies reported partial AMI deployment. All utilities except for two initiated their AMI deployment in 2020 or later. For agencies reporting partial AMI deployment,

- 33% of agencies had AMI deployed for +80% residential customer accounts;
- 22% of agencies had AMI deployed for +50% CII customer accounts;
- 33% of agencies had AMI deployed for DIM accounts, ranging from 5 – 100%.

Table 6 summarizes AMI deployment across customer classes for utilities with full and partial AMI deployment.

Table 6. Utility AMI Deployment by Account Sector

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon. Thirty utilities have AMI deployed for residential and CII customers, and seven utilities have AMI deployed for designated irrigation meters (DIMs).

<i>Percent of AMI Residential Customers</i>	
0 - 29%	Very Uncommon
30 - 59%	Very Uncommon
60 - 89%	Very Uncommon
90 - 100%	Average
<i>Percent of AMI CII Customers</i>	
0 - 29%	Average
30 - 59%	Very Uncommon
60 - 89%	Very Uncommon
90 - 100%	Uncommon
<i>Percent of AMI Irrigation Customers (only 4 utilities)</i>	
0 - 29%	Very Common
30 - 59%	Very Uncommon
60 - 89%	Very Uncommon
90 - 100%	Very Uncommon

Utilities reported a range in AMI software types, with the most common software types of VertexOne, EyeOnWater, Aquahawk. In total, thirteen AMI software brands were reported.

¹⁰ Full AMI deployment is a subjective measurement that was reported by the utility. Agencies that reported full AMI deployment also reported a range in deployment across residential, CII and DIM accounts.

Table 7 shows common water utility use of AMI software and hardware. It is very common for utilities to have a customer facing portal that provides access to AMI consumption data, and there is approximately a 50:50 split on whether an AMI system is managed independently or by a service provider. Approximately 45% of utilities with reported full AMI deployment manage their AMI systems independently, and about 66% of utilities with partial AMI deployment manage their AMI systems independently.

Regardless of management style, participating utilities reported their AMI system sub-hourly reads. However, there was no common frequency at which data is transmitted into Head-End Systems (HES) and/or Meter Data Management Systems (MDMS). Table 7 shows multi-hourly reads and/or transmission on a sub-daily scale.

Just under half (42%) of the participating utilities with full or partial AMI deployment use another sensor or device along with their AMI system. The most common use of another device and/or sensor is for pressure monitoring (39%) followed by remote shut off (26%). One utility reported that they were in a pilot phase for these types of additional devices and/or sensors, and two utilities reported that they were in a testing phase.

Table 7. AMI Software and Hardware Related Practices and Utilization

Frequency of practice or utilization of hardware is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

<i>In-house or commercially available AMI software</i>	
Commercially available	Very Common
In-house	Very Uncommon
<i>Customer facing portal provides access to AMI consumption data</i>	
Yes	Very Common
No, the customer portal is not integrated with AMI data	Very Uncommon
No customer facing portal	Very Uncommon
<i>AMI system managed independently or by service provider</i>	
Service provider	Average
Independently	Average
<i>AMI communication technology</i>	
Radio frequency	Average
Cellular	Uncommon
<i>Highest frequency of AMI reads</i>	
Hourly	Common
Sub-hourly	Uncommon
Multi-hourly	Very Uncommon
<i>Frequency of data transmitted into HES and/or MDMS</i>	
Hourly	Uncommon
Multi-hourly	Uncommon
Daily	Uncommon
<i>Use of devices along with AMI system</i>	
Pressure monitoring	Uncommon
Remote shut off	Uncommon

Water quality monitoring
 Other sensors, equipment, and field monitoring devices
 None

*Very Uncommon**Very Uncommon**Average*

3.6 Management & Operations

Key Findings

Customer engagement through leak notifications is commonly the responsibility of a Water Conservation Department and can require major personnel resources, although the personnel time commitment to manage leak notifications varies widely among participating utilities.

Management and operations decisions shape AMI engagement policy. Participants reported on management and operations of AMI systems in relation to flow measurement and leak notification programs. Table 8 includes common management and operations practices. Most utilities send minimum continuous and high flow notifications. These notifications are predominantly sent in English, and water conservation departments are the most common department to oversee flow notifications (40% of utilities), followed by billing departments (22% of utilities). Personnel time ranged from 0 full time employee equivalents (FTE) (i.e. fully automated) to greater than 1.5 FTE. Personnel time is dependent on a variety of factors which include stage of deployment, technological resources, system settings, and more. The number of FTEs did not correlate with the number of accounts in a utility's service area, but the utilities with the largest service areas did report FTEs at or below 0.25, indicating automation is key component in notification management and operations for these large organizations.

Table 8. Management and Operations

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon

<i>Utility is measuring minimum continuous flow to identify leaks</i>	
Yes	Very Common
No	Very Uncommon
<i>Utility sends high flow notifications</i>	
Yes	Common
No	Uncommon
<i>Notifications sent in languages other than English</i>	
No	Very Common
Yes	Very Uncommon
<i>Department that oversees the utility leak alert process</i>	
Water Conservation	Average
Billing	Uncommon
Analytics	Very Uncommon
Customer Service	Very Uncommon
Water Dept/Public Works	Very Uncommon
<i>Personnel time required to manage notification processes</i>	
Fully automated	Very Uncommon
0.01 - 0.25 FTE	Average
0.25 - 0.5 FTE	Very Uncommon
0.51 - 0.75 FTE	Very Uncommon
0.76 - 1 FTE	Uncommon
1.1 - 1.5 FTE	Very Uncommon
>1.5 FTE	Very Uncommon

3.7 Minimum Continuous Flow Notifications

Key Findings

Automated opt-out continuous low flow notifications are a common practice for participating utilities with AMI deployment, and most of these utilities can adjust the flow threshold for customers. Portal systems are most commonly used to track notifications, but separate databases and billing information systems are also common methods of tracking, indicating an opportunity to streamline operations for some utilities.

Twenty-eight survey participants send minimum continuous flow notifications. All 28 participants reported they either use or are planning to use automatic processes to send these notifications. Minimum continuous flow thresholds were provided for single-family residential accounts, small multi-family (2 – 4 units) residential accounts, large multi-family (+4 units) residential accounts, CII accounts, and DIM accounts. Figure 2 displays the range in minimum continuous flow thresholds of utilities.

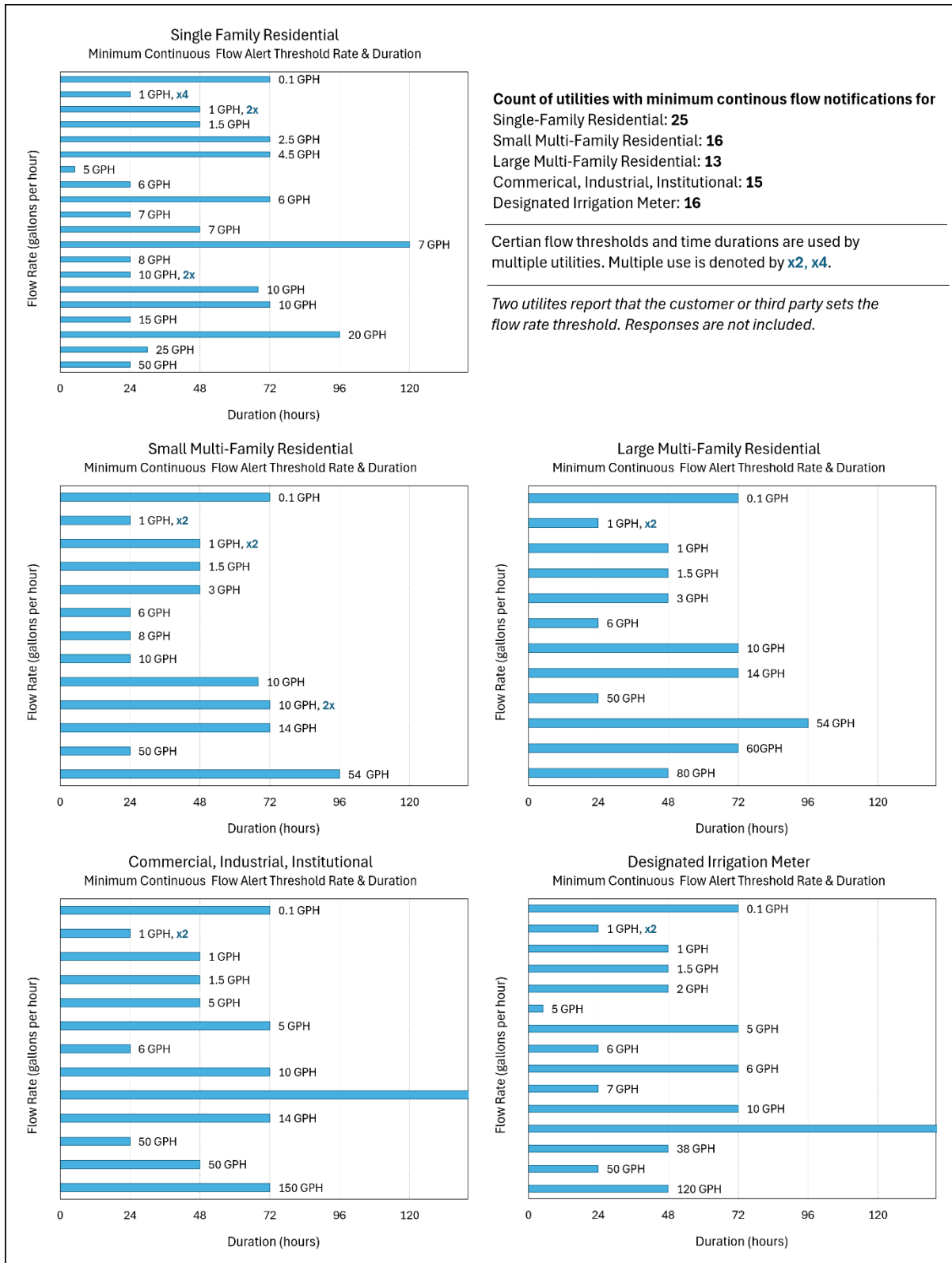


Figure 2. Minimum continuous flow rate thresholds and durations for five account types.

Utilities do not send thresholds to all groups; all utilities send residential single-family thresholds. All values reported in gallons per hour (gph)

Seventy-one percent of participating utilities can adjust minimum continuous flow thresholds, and most utilities are also capable of adjusting thresholds by customer class and for individual customers. Two participants noted that their utility relies on platform thresholds or customer set thresholds for minimum continuous flow notifications. To keep track of the notifications that are sent to customers, utilities most commonly reported using their customer portal systems (54%), followed by a separate spreadsheet or database (36%). Others (29%) rely on customer billing information systems for notification tracking.

Table 9 shows the practice frequency of opt-in versus opt-out minimum continuous flow notifications. Opt-out notifications are most commonly used by utilities across all customer categories, including single-family residential (75%), multi-family residential (64%), and CII accounts (68%).

Table 9. Minimum Continuous Flow Notifications Opt-In or Opt-Out

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

<i>Single-family residential</i>	
Opt-In	Uncommon
Opt-Out	Common
<i>Small & large multi-family residential</i>	
Opt-In	Uncommon
Opt-Out	Common
<i>Commercial, institutional, industrial (CII)</i>	
Opt-In	Uncommon
Opt-Out	Common

3.8 High Flow Notifications

Key Findings

Opt-out spike notifications are the most common type of high flow notifications, where threshold setting processes differ across customer groups. Compared to minimum continuous flow notifications, fewer utilities send high flow notifications. There is less consistency in high flow notification processes among participating utilities, suggesting an opportunity to increase customer engagement through this type of notification.

Twenty-one of the utilities that participated in the survey (62%) send high flow notifications.¹¹ Participants reported on four high flow notification types—spike thresholds, bill alerts, vacation alerts and custom alerts—which are detailed in Table 10.

¹¹ Questions pertaining to high flow notifications were only asked to utilities that send high flow notifications.

Table 10. Type of High Flow Notification Alerts

Spike Threshold
High use over the course of a day or days compared to a static threshold
High use over the course of a day or days compared to an average use (specific to customer and may change)
High use over the course of hours (<24) compared to a static threshold
High use over the course of hours (< 24) compared to an average use (specific to account and may change)
Bill Alert
Water use in a billing period is trending to be higher than average use (account specific)
Vacation Alert
Non-zero use during a specified duration of time
Custom
Notifications based on a customer's chosen volume of water over a specific duration of time

Additional alert types reported by participants include VertexOne high flow notifications, zero use notifications, irrigation alerts, and unplanned use. Table 11 provides practice frequency of high flow alert notifications. A majority of utilities (76%) with high flow alerts had at least one type of opt-out spike notification. Five utilities (24%) had only opt-in high flow spike notification options. Approximately 62% of utilities had bill alerts, which were split between opt-in and opt-out notification styles. For utilities that have high flow vacation alerts (62%), notifications were predominantly opt-in. Due to the nature of custom notifications, these high flow notifications were predominantly opt-in as well.

Table 11. High Flow Alert Notification Opt-In and Opt-Out

Frequency of practice is classified based on the percent of survey responses and is reported on a scale of very common to very uncommon.

<i>Spike - High use over the course of a day or days compared to a static threshold</i>	
Opt-In	Uncommon
Opt-Out	Common
No notification	Very Uncommon
<i>Spike - High use over the course of a day(s) compared to an average use (specific to customer/may change over time)</i>	
Opt-In	Uncommon
Opt-Out	Average
No notification	Very Uncommon
<i>Spike - High use over the course of a number of hours (<24) compared to a static threshold</i>	
Opt-In	Very Uncommon
Opt-Out	Average
No notification	Uncommon
<i>Spike - High use for a number of hours (<24) compared to an average use (specific to account/may change over time)</i>	
Opt-In	Uncommon
Opt-Out	Uncommon
No notification	Average

<i>Bill Alert - Water use in billing period is trending to be higher than average use</i>	
Opt-In	Uncommon
Opt-Out	Uncommon
No notification	Uncommon
<i>Vacation Alert – non-zero use during a specified period of time</i>	
Opt-In	Average
Opt-Out	Very Uncommon
No notification	Uncommon
<i>Custom - Notification based on customer's chosen volume of water in a day or other period of time</i>	
Opt-In	Average
Opt-Out	Very Uncommon
No notification	Uncommon

Survey participants were asked to describe their high flow notifications threshold for single-family residential, small multi-family residential, large multi-family residential, and CII accounts. Common themes are presented in Table 12.

Table 12. High Flow Notification Threshold Topics

<i>Single-family residential</i>	
Customers can set high flow threshold.	
Spike notifications are opt-out.	
Different thresholds are set for different meter types and sizes.	
High flow reports are run and addressed daily.	
Non-burst high flow notifications are opt-in.	
Efforts to minimize false positives include repeat high flow readings over specified time and threshold values.	
Information is manually vetted.	
Utilize software automated alert.	
<i>Small multi-family residential</i>	
Customers can set high flow threshold	
Different thresholds are set for different meter types and sizes	
High flow reports are run and addressed daily.	
Software automated alert.	
<i>Large multi-family residential</i>	
Customers can set high flow threshold.	
Different thresholds are set for different meter types and sizes.	
High flow report run and addressed daily.	
Utilize software automated alert.	
<i>Commercial, Institutional, Industrial (CII)</i>	
Customers can set high flow threshold.	
Different thresholds are set for different meter types and sizes.	
High flow report run and addressed daily.	

3.9 Water Savings

Key Findings

About half of the participating utilities with AMI leverage data to estimate water savings from notification programs, which is most commonly done by tracking customer usages patterns and trends. For many utilities, water savings estimates are an untapped use of AMI data that can be leveraged to inform and the effectiveness of notification programs.

Participants were asked how their utility leverages AMI to track and calculate water savings. Twenty-nine utilities responded to this question. About half of these utilities (14) estimate water savings from notification programs. Beyond notification programs, these utilities have used water savings measurements to informed conservation programs, the introduction and/or expansion of leak alert programs, water loss adjustments, demand calculations, and bill pay assistance programs. Table 13 shows the types of analyses informed by AMI data.

Table 13. AMI Data to Calculate Water Savings

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

<i>Water savings estimates from notification programs</i>	
Yes	Average
No	Average
<i>Incorporation of AMI data with water usage analyses</i>	
Customer Usage (patterns & trends)	Average
Analysis of Leaks	Uncommon
Analysis of customer attributes, eligibility & outreach	Very Uncommon
Irrigation Water Use & Customer Compliance	Uncommon
Conservation Customer Compliance	Very Uncommon
Water Loss	Very Uncommon
Audits	Very Uncommon
Billing	Very Uncommon
Per Capita Usage	Very Uncommon

3.10 Customer Resources

Key Findings

Most participating utilities, with and without AMI, are proactive at providing tools and resources to customers who have received a leak alert. Educational content is the most common resource, and it is frequently delivered in a digital format. Post leak alert resources are a key engagement opportunity with customers, and many utilities take advantage of this communication to highlight programs and resources.

All survey participants (34) were asked about customer resources that are shared for leaks, high usage, and corresponding high bills. Twenty-nine utilities, 26 of which have AMI, provide tools and resources for customers when they receive a leak alert, including digital resources, physical resources, and access to staff expertise. In addition to educational resources offered by utilities post leak alert, all utilities provide educational information about leaks through digital platforms for their customers. Other leak-related resources include leak kits, repair services, and finances assistance / programs. Beyond these programs, utilities also provide a series of financial or repair assistance programs that are specifically designed to support low-income customers. Table 14 details the types of programs and resources provided by utilities.

Most utilities (25) also provide subsidized leak inspection or audits on/inside a customer's property. In many situations, these audits are conducted under specific circumstances and may be conducted in person or over the phone. Some utilities have other stipulations to receive a free post-leak audit, such as income qualifications. However, most audits are at no cost to the customer. Irrigation audits and inspections are common as well (Table 14).

Table 14. Customer Resources to Support Leaks and High Water Usage

Frequency of practice is classified based on the percent of survey responses and is reported on a scale of very common to very uncommon.

<i>Utility provides tools or resources to customers who receive a leak alert to help them find and address leaks</i>	
Webpage (directions, guides, videos)	Common
Email	Very Uncommon
Portal (directions, guides, videos)	Uncommon
Personal Communication	Very Uncommon
Physical Resources	Uncommon
Field Staff Audit or Investigation	Very Uncommon
Phone Call	Very Uncommon
Newsletter	Very Uncommon
None	Very Uncommon
<i>Utility provides additional financial or repair assistance for low-income customers</i>	
Customer Assistance Program (CAP) - Bill Pay	Very Uncommon
Plumbing Assistance Program	Very Uncommon
Leak Forgiveness / Reimbursement	Very Uncommon
Leak Detection	Very Uncommon
Water Line Assistance Program	Very Uncommon
Toilet Rebates	Very Uncommon
No	Average
<i>Leak - related resources</i>	
Educational information about leaks on web, social media, and/or other communications channels	Very Common
Leak kits	Average
Leak repair services	Uncommon
Leak repair insurance program	Very Uncommon
On-bill financing to pay for cost to repair leaks (customer pays for repairs through additional charge on utility bill)	Very Uncommon

Low-cost loan program to pay for the cost to repair leaks	Very Uncommon
<i>Utility provides free or subsidized leak inspections at a customer's property</i>	
Yes	Average
Sometimes	Uncommon
No	Uncommon

3.11 Leak Programs & Bill Adjustments

Key Findings

Leak notification programs do not result in a long-term higher volume of customer queries and complaints among the participating utilities. Leak notification programs can improve customer engagement with the utility through more customer conversations. Most participating utilities provide leak adjustments to customer bills. Adjustment stipulations vary, with the most common being eligibility restrictions and evidence of leak repair completion. Typically, customer action must be taken to resolve the problem before a bill adjustment is made.

All participants (34) were asked to share information about their leak programs and bill adjustments. Twenty-two utilities shared information about the effect of notification programs on the frequency of customer high bill queries and complaints to the utility. Multiple participants noted that the notification program increased the number of conversations with customers. Others commented that after an initial increase in customer queries the number of queries stabilized, the notification program increased water savings, and there was no change in the number of leak adjustments resulting from the notification program. While detailed answers varied, only six utilities noted that their utility saw an increase greater than 10% in customer high bill queries and complaints. Table 15 displays the frequency of customer queries in response to the introduction of a leak notification program.

Thirty utilities reported that they provide courtesy leak adjustment to bills. The most common circumstances required for customers to receive a leak adjustment were

- Evidence of leak repair;
- Customer eligibility based on number of previous applications;
- Time frame of leak report and/or adjustment request.

Sixteen utilities require that the leak is repaired prior to a courtesy leak adjustment to the customer's bill. The same number of utilities have eligibility restrictions, where customers may only be eligible a specified number of times. Eight utilities require that the leak be reported within a specified period. The frequency of these requirements is shown in Table 15.

Table 15. Utility Leak Adjustments

Frequency of practice is classified based on the percent of survey responses and is reported on a scale of very common to very uncommon.

<i>Notification program impacted the number of customer high bill queries or complaints</i>	
Significant reduction (>20%)	Very Uncommon
Small reduction (10 - 20%)	Uncommon
No change (+/- 10%)	Uncommon
Increase (>10%)	Uncommon
<i>Policy for courtesy leak adjustments</i>	
Yes	Average
Yes, under certain circumstances	Average
No	Very Uncommon
<i>Leak adjustment circumstances</i>	
Eligibility for adjustment	Average
Repair must be complete prior to adjustment	Average
Timeframe for adjustment request	Uncommon
Adjustment is leak volume dependent	Uncommon
Specific leaks are eligible	Very Uncommon
Price of excess water use is adjusted	Very Uncommon
Account must have minimum period of consumption record	Very Uncommon
Late payment or bill credit limit	Very Uncommon
Sewer payment reduced	Very Uncommon

3.12 Common Practices

Key Findings

AMI data is most commonly used to support water efficiency and conservation efforts, but there is a wide range of uses for both efficiency and non-efficiency efforts. Almost all participating utilities with AMI use the data for troubleshooting high bill complaints, and many utilities use AMI to verify water savings from programs.

Utilities are using AMI for purposes both related and unrelated to water efficiency and conservation; however, it is more common for utilities to use AMI data for water efficiency and conservation purposes. The most common use of AMI data is for troubleshooting and high bill complaints (79% of utilities), followed by verification of savings from programs (65% of utilities),¹² and bill adjustments for leaks (56% of utilities). While AMI data was not commonly used for purposes unrelated to water efficiency and conservation, billing purposes were the most common use indicated outside of water efficiency and conservation (24% of utilities). Table 16 shows AMI application for various water efficiency and non-efficiency related efforts.

¹² Note this verification of water savings from programs references all programs, while Table 13 water report water savings estimates from notification programs.

Table 16. Current and future uses of AMI

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

<i>Ways utilities are currently using AMI for water conservation or efficiency related purposes</i>	
General troubleshooting for high bill complaints	Common
Verification of savings from programs	Common
Bill adjustments for leaks	Average
Targeting high/inefficient users for programs	Average
Meter accuracy or functionality	Average
Irrigation system audits	Uncommon
Water use restriction monitoring and/or enforcement (e.g. time and day restrictions)	Uncommon
Commercial, industrial, institutional (CII) indoor audits	Uncommon
Demand forecasting	Uncommon
Distribution system analysis/leak identification	Uncommon
Irrigation water use calculations/benchmarking	Uncommon
Residential indoor water use calculations/benchmarking	Uncommon
Commercial, industrial, institutional (CII) water use benchmarking	Uncommon
Meter sizing	Uncommon
Peak demand analysis	Uncommon
Pressure management	Uncommon
Identification of irrigation during rain events	Very Uncommon
Multi-family residential indoor audits	Very Uncommon
Verification of savings to determine rebate amount/approve rebate	Very Uncommon
Water budgets –informational	Very Uncommon
New or re-development impact fees	Very Uncommon
Operations and maintenance planning	Very Uncommon
Water budgets – rates assessment	Very Uncommon
Transition to monthly or other frequency of billing	Very Uncommon
Other departments utilize the data	Very Uncommon
AMI Not in use	Very Uncommon
<i>Ways utilities are currently using AMI for purposes other than water conservation or efficiency</i>	
Billing	Uncommon
Customer engagement / service	Very Uncommon
Meter & water usage check	Very Uncommon
Infrastructure management	Very Uncommon
Leak identification	Very Uncommon
Wastewater	Very Uncommon
Operations and management	Very Uncommon
Other	Very Uncommon
Pressure monitoring	Very Uncommon
Troubleshooting	Very Uncommon
Regulatory compliance	Very Uncommon
Utility Department	Very Uncommon
Parks Department	Very Uncommon
Legal Team	Very Uncommon
Marketing Team	Very Uncommon
None or Not Applicable	Uncommon

3.13 Challenges and Opportunities

Key Findings

Customer education and maintaining customer contact information are the most common leak and/or high use notification program challenges among participating utilities. Utilities may benefit from reevaluating available education resources and considering a customer contact information campaign. In the future, participating utilities seek to use AMI to continue verifying water savings from programs, conduct demand forecasting, and target high/inefficient users. These findings highlight common uses of AMI data can be expected in the near future.

Participants were asked about challenges they face with their customer leak and/or high use notification programs. The most common challenges are provided in Table 17. Other challenges not listed are engaging senior customers with technology, technology and software limitations, and data management and use. Overall, the greatest challenge that utilities face is educating customers (62% of utilities), followed by maintaining customer contact information (53% of utilities).

Table 17. Leak and/or High Use Notification Program Challenges

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

Challenges related to leak and/or high use notification programs

Educating customers	Common
Maintaining current contact information for customers	Average
Developing appropriate criteria for large residential and CII customers	Average
Low portal sign-up	Average
Insufficient staff for follow-up, inspections and/or audits	Average
Multiple customers on a single meter	Uncommon
Challenges related to availability or cost of professionals (e.g. plumbers or irrigation professionals) to support customers in finding and/or addressing leaks	Very Uncommon
No separate irrigation meters	Very Uncommon
Training customer service representatives	Very Uncommon
Meter reading precision	Very Uncommon
No customer facing portal	Very Uncommon
No leak and/or high use notification program	Very Uncommon
Data management and use	Very Uncommon
No notification program	Very Uncommon

Participants were also asked how they plan to use AMI and what they want to learn more about related to AMI for water conservation and efficiency purposes. Table 18 shows common areas of planned use and interest. The top areas of planned use and interest are verification of savings from programs, demand forecasting, and targeting high/inefficient

users. Between 44 and 53% of participants noted that these are the topics that they want to learn more about.

Table 18. AMI, Water Conservation & Water Efficiency Topics of Interest

Frequency of practice is classified based on the percentage of survey responses and is reported on a scale of very common to very uncommon.

<i>Ways utilities plan to use AMI and topics of interest related to AMI, water conservation & water efficiency</i>	
Verification of savings from programs	<i>Average</i>
<i>Demand forecasting</i>	<i>Average</i>
Targeting high/inefficient users for programs	<i>Average</i>
Commercial, industrial, institutional (CII) water use benchmarking	<i>Uncommon</i>
Distribution system analysis/leak identification	<i>Uncommon</i>
Peak demand analysis	<i>Uncommon</i>
Pressure management	<i>Uncommon</i>
Residential indoor water use calculations/benchmarking	<i>Uncommon</i>
Water budgets –informational	<i>Uncommon</i>
Irrigation system audits	<i>Uncommon</i>
Irrigation water use calculations/benchmarking	<i>Uncommon</i>
Water use restriction monitoring and/or enforcement (e.g. time of day and/or day of week restrictions)	<i>Uncommon</i>
General troubleshooting for high bill complaints	<i>Uncommon</i>
Identification of irrigation during rain events	<i>Uncommon</i>
Bill adjustments for leaks	<i>Uncommon</i>
Meter accuracy or functionality	<i>Uncommon</i>
Operations and maintenance planning	<i>Uncommon</i>
Water budgets – rates assessment	<i>Uncommon</i>
Verification of savings to determine rebate amount/approve rebate	<i>Uncommon</i>
Meter sizing	<i>Very Uncommon</i>
Multi-family residential indoor audits	<i>Very Uncommon</i>
Transition to monthly or other frequency of billing	<i>Very Uncommon</i>
CII indoor audits	<i>Very Uncommon</i>
New or re-development impact fees	<i>Very Uncommon</i>
No AMI	<i>Very Uncommon</i>

4. Summary

This report provides insight into the processes, practices, and decisions made by utilities to harness AMI as a customer engagement tool. Through peer comparison, utilities can evaluate opportunities and celebrate successes in AMI deployment and data application. The results from this survey demonstrate

- There is not a consistently common way to manage AMI;
- AMI deployment is most widespread among residential customer accounts;
- Opt-out notifications are the most common notification type;
- Minimum low flow communications are more common than high flow notifications;
- Notification programs are frequently managed by Water Conservation Departments;
- Post-leak educational resources are the most common form of engagement;
- Most educational resources are digitally based;
- Most frequent uses of AMI are troubleshooting high bill complaints, and verifying program water savings;
- Key challenges are educating customers and maintaining up-to-date contact information;
- Most common future plans to leverage AMI are for verifying program water savings, demand forecasting, and targeting high/inefficient users.

Findings from this report are a starting point to grow community knowledge. Utilities can identify opportunities for improvement and celebrate successes by learning about practices, challenges and opportunities among peer utilities.

Appendix A.

AMI Engagement Benchmarking Survey questions.

A.1 Survey Questions Overview

Appendix A includes all AMI Engagement Benchmarking Survey questions. Select questions are not included in the results summary, however they are listed in the survey questions. Many questions in this survey are logic-linked to answers from a previous question. The purpose of this design was to lead the participant through the survey that was appropriate for their utility's level of AMI deployment. Questions with open-ended responses were categorized as either short answer or long answer questions. The answers to these types of questions were synthesized by topic and presented in the survey results.

A.2 AMI Engagement Benchmarking Survey

1. Contact Name (*short answer*)
2. Contact Title (*short answer*)
3. Contact email address (*short answer*)
4. Organization Name (*short answer*)
5. State or Province (*short answer*)
6. What is the approximate population (number of people) in your water service area? (*short answer*)
7. What is the approximate number of accounts in your water service area? (*short answer*)
8. Do you have a customer-facing portal? (system with customer-specific utility information accessed by web, mobile, or separate app). (*multiple choice*)
 - a. Yes
 - b. No
9. **Logic Linked Question (Q#8 – a)** Please enter the brand of your portal software, if known: (*short answer*)
10. What is the percentage of customers with an email address on account?
 - a. Residential Customers (*short answer*)
 - b. Total Number of Customers (*short answer*)
11. Of the residential customers with an email address on account, what is the

- a. Open rate of emails sent *(short answer)*
 - b. Click rate of emails sent *(short answer)*
 - c. Not applicable, we do not send emails
12. What is the percentage of customers with a phone number on account?
- a. Residential Customers *(short answer)*
 - b. Total Number of Customers *(short answer)*
13. Is there a schedule to encourage customers to revalidate their information?
(multiple choice)
- a. Yes
 - b. No
14. **Logic Linked Question (Q#13 – a)** What is the time frame for the revalidation schedule? (e.g. 1 year, 5 years, 10 years)? *(short answer)*
15. What is the percentage of customers for which you have both email addresses and phone numbers?
- a. Residential Customers *(short answer)*
 - b. Total Number of Customers *(short answer)*
16. Have you done a campaign to request that customers provide digital contact information? *(multiple choice)*
- a. Yes
 - b. No
17. **Logic Linked Question (Q#16 – a)** Please provide details on the success of the campaign. Details may include but are not limited to information about the percentage of contact information increase during the campaign or the number of additional contacts collected during the campaign. *(long answer)*

Advanced Metering Infrastructure (AMI) System Information

18. Do you have Advanced Metering Infrastructure (AMI)? *(multiple choice)*
- a. Yes - All accounts (or nearly all)
 - b. Yes - Only a portion of accounts
 - c. No - Not yet, plan within the next 5 years to implement AMI
 - d. No – Not yet, plan in more than 5 years to implement AMI
 - e. No - Do not have active plans to implement AMI
19. **Logic Linked Question (Q#18 – a, b)** Please provide the approximate percentage of AMI customers by customer class (e.g. 75% residential, 15% commercial, 10% industrial, etc.) *(short answer)*

20. **Logic Linked Question (Q#18 – a, b)** What type of AMI communication technology do you have?
- a. Radio frequency
 - b. Cellular
 - c. Hybrid
 - d. Other (please specify) *(short answer)*
21. **Logic Linked Question (Q#18 – a, b)** What year did your organization first deploy AMI? *(short answer)*
22. **Logic Linked Question (Q#18 a, b)** Approximately how many accounts are currently on the AMI system? Please provide a numeric value. *(short answer)*
23. **Logic Linked Question (Q#18 – a, b)** What is the highest frequency of reads? *(multiple choice)*
- a. 15 minutes
 - b. 30 minutes
 - c. Hourly
 - d. Daily
 - e. Other___*(short answer)*
24. **Logic Linked Question (Q#18 – a, b)** What is the highest frequency of data transmitted into Head-End System (HES) and/or Meter Data Management System (MDMS)? *(multiple choice)*
- a. Hourly
 - b. Daily
 - c. Weekly
 - d. Bi-Weekly (every 2 weeks)
 - e. Monthly
 - f. Other___*(short answer)*
25. **Logic Linked Question (Q#18 – a, b)** Do you have a customer-facing portal that provides access to AMI consumption data? *(multiple choice)*
- a. Yes, it was developed in-house
 - b. Yes, we use commercially available software
 - c. No, the customer-facing portal is not integrated with AMI data
 - d. No, we do not have a customer-facing portal
26. **Logic Linked Question (Q#25 – a, b)** Please enter the AMI portal software brand even if it is the same as your organization's overall customer portal (e.g. the

main portal is only for billing). *(short answer)*

27. **Logic Linked Question (Q#18 – a, b)** Does your utility manage its AMI system independently or with assistance from a service provider? *(multiple choice)*
- a. Independently
 - b. Service Provider
 - c. I'm not sure
28. **Logic Linked Question (Q#18 – a, b)** Do you use the following third-party devices along with your AMI system? Check all that apply. *(multiple choice)*
- a. Remote shut-off
 - b. Pressure monitoring
 - c. Water quality monitoring
 - d. Other ____ *(short answer)*

General Customer Leak / High Usage Notification Programs

29. Does your organization proactively send any notifications (email, text, voice, etc.) **beyond what is provided through a customer portal** regarding high use or leaks? Proactive means before the bill is delivered. *(multiple choice)*
- a. Yes
 - b. No
 - c. Not applicable - All customers are on an AMI-integrated customer-facing portal system
30. Does your organization proactively send any notifications (email, text, voice, etc.) **through a customer portal** regarding high use or leaks? Proactive means before the bill is delivered. *(multiple choice)*
- a. Yes - Only through the portal
 - b. Yes - Through portal **and** other outreach methods/systems
 - c. Yes - Only through other outreach methods/systems separate from portal
 - d. No - We provide notifications when delivering the bill.
 - e. No - We don't have a high-use or leak notification program
31. **Logic Linked Question (Q#30 – d, e)** If you do not proactively contact customers, why not? Please select all that apply. *(multiple choice)*
- a. Too expensive;
 - b. Insufficient support technology;
 - c. Insufficient personnel;
 - d. No customer-facing portal;

- e. Lack of support from leadership/decision-makers;
 - f. We don't do it yet but are working to launch a proactive leak and/or high use notification program;
 - g. Not enough customers on AMI, no specific plans to implement a proactive leak and high use notification program;
 - h. Not enough customers on AMI, but we plan to implement a proactive leak and high use notification program once we are fully AMI deployed;
 - i. Other (please specify) (short answer)
32. **Logic Linked Question (Q#30 – a, b, c)** Does your organization have an Opt-in or Opt-out model for leak alerts? If Opt-in, it means the customer must set up an account or take some other action to enroll in the system. If Opt-out, then all customers are automatically eligible/enrolled and will be notified if their usage triggers the thresholds. *(multiple choice)*
- a. Opt-in
 - b. Opt-out
33. **Logic Linked Question (Q#32 – a)** What percentage of residential customers have “opted in” for leak alerts? *(short answer)*
34. **Logic Linked Question (Q#32 – b)** What percentage of residential customers have “opted out” of leak alerts? *(short answer)*
35. **Logic Linked Question (Q#30 – a,b,c)** What communication method do you use to send notifications? Please select all that apply. *(multiple choice)*
- a. Email;
 - b. Text;
 - c. Voice/robocall;
 - d. Call by utility employee;
 - e. Portal notification;
 - f. Print mail (postcard, letter, door hanger);
 - g. Other ____ *(short answer)*
36. **Logic Linked Question (Q#35 – b)** Do customers have to opt in to receive texts? *(multiple choice)*
- a. Yes
 - b. No
37. **Logic Linked Question (Q#30 – a,b,c)** Do customers have to login/register to see meaningful details about the leak information after they receive a notification? *(multiple choice)*
- a. Yes
 - b. No

38. **Logic Linked Question (Q#30 – a,b,c)** Which department oversees the leak alerting process for your utility? (*short answer*)

AMI-Enabled Leak / High Usage Notification Programs

The following questions apply only to customer notification programs enabled by AMI. If your organization has only some elements of its notification program powered by AMI data, **please only consider those elements in responding to these questions.**

This section references two types of notifications: A) **minimum continuous** flow notifications, which are considered leak notifications, and B) **high flow notifications**, which would include all other notifications, including spike, burst, high use, billing related, or other customized notifications.

Notification thresholds have been broken out into the most common groupings, but we know every organization may be slightly different. We recognize that your organization may have different thresholds for all of these categories.

Minimum Continuous Flow

39. What is the unit of measurement for your minimum continuous flow notification thresholds? (*multiple choice*)
- a. Gallons per hour
 - b. Cubic feet per hour
 - c. Liters per hour
 - d. Other (please specify) (*short answer*)
 - e. We are not currently sending minimum continuous flow notifications

Logic Linked Questions (#39 – a, b, c, d) Single-family residential minimum continuous flow alert thresholds (only enter digits and decimals, no commas please). If you are not currently sending notifications to this customer group, please enter “0”.

40. Flow Rate (in gallons, cubic feet, or liters per hour): (*short answer*)

41. Must be occurring for at least this number of hours: (*short answer*)

Logic Linked Questions (#39 – a, b, c, d) Small multi-family (2-4 units) residential minimum continuous flow alert thresholds (only enter digits and decimals, no commas please). If you are not currently sending notifications to this customer group, please enter “0”.

42. Flow Rate (in gallons, cubic feet, or liters per hour): (*short answer*)

43. Must be occurring for at least this number of hours: (*short answer*)

Logic Linked Questions (#39 – a, b, c, d) Large multi-family (>4 units) residential minimum continuous flow alert thresholds (only enter digits and decimals, no

commas please). If you are not currently sending notifications to this customer group, please enter “0”.

44. Flow Rate (in gallons, cubic feet, or liters per hour): *(short answer)*

45. Must be occurring for at least this number of hours: *(short answer)*

Logic Linked Questions (#39 – a, b, c, d) Commercial, Institutional, and/or Industrial (CII) minimum continuous flow alert thresholds (only enter digits and decimals, no commas please). If you are not currently sending notifications to this customer group, please enter “0”.

46. Flow Rate (in gallons, cubic feet, or liters per hour): *(short answer)*

47. Must be occurring for at least this number of hours: *(short answer)*

Logic Linked Questions (#39 – a, b, c, d) Dedicated Irrigation or Commercial Irrigation meters minimum continuous flow alert thresholds (only enter digits and decimals, no commas please). If you are not currently sending notification to this customer group please enter “0”.

48. Flow Rate (in gallons, cubic feet, or liters per hour): *(short answer)*

49. Must be occurring for at least this number of hours: *(short answer)*

50. **Logic Linked Question (#39– a, b, c, d)** If you have a distinct category or approach for minimum continuous flow alert notifications that is different from above, please describe and include thresholds. If none, write “none”. *(long answer)*

51. **Logic Linked Question (#39 – a, b, c, d)** Does your AMI system, process, or algorithm automatically **detect and/or send** minimum continuous flow notifications **all days** of the week, including weekends? Please select all that apply. *(multiple choice)*

- a. Yes – Data from all days of the week used to identify "leaks" identified but notifications sent only on certain days (e.g. only weekdays);
- b. Yes – Data from all days of the week used to identify “leaks,” and notifications sent all days of week;
- c. No – Data from certain days used to identify “leaks,” and notifications sent only on certain days;
- d. I'm not sure

52. **Logic Linked Question (#39 – a, b, c, d)** Can minimum continuous flow thresholds be adjusted? Please select all that apply.

- a. Yes - for different customer classes;
- b. Yes - for individual customers;
- c. Yes – seasonally;

- d. No;
- e. Other ____ *(short answer)*

Logic Linked Questions (#39 – a, b, c, d) Is the minimum continuous flow (leak notification) system opt-in or opt-out? If opt-in, it means the customer must set up an account or take some other action to enroll in the system. If opt-out, then all customers are automatically eligible/enrolled and will be notified if their usage triggers the thresholds.

- 53. Single-family Residential *(drop down – Opt-in, Opt-out)*
- 54. Small Multi-family Residential (2-4 units) *(drop down – Opt-in, Opt-out)*
- 55. Large Multi-family Residential (>4) *(drop down – Opt-in, Opt-out)*
- 56. Commercial, Institutional, Industrial (CII) *(drop down – Opt-in, Opt-out)*
- 57. Other *(short answer)*
- 58. **Logic Linked Question (#39 – a, b, c, d)** Do you send any of your minimum continuous flow notifications in a language other than English? *(multiple choice)*
 - a. Yes
 - b. No
 - c. I'm not sure
 - d. If known, please list the other languages: *(long response)*
- 59. **Logic Linked Question (#39 – a, b, c, d)** Approximately how many minimum continuous flow notifications were sent in the last year? Please enter the approximate number of minimum continuous flow notifications with whole number, no commas. If you are unsure, please write “unknown”. *(short answer)*
- 60. **Logic Linked Question (#39 – a, b, c, d)** How do you keep track of sent minimum continuous flow leak notifications? Please select all that apply. *(multiple choice)*
 - a. Customer portal system;
 - b. Customer billing or information system;
 - c. Separate spreadsheet or database;
 - d. Other ____ *(short answer)*
- 61. **Logic Linked Question (#39 – a, b, c, d)** If known, approximately how much personnel time is required to manage the notification process(es)? Please enter the approximate number of full-time equivalents (FTEs). If you are unsure, please write “unknown”. *(long answer)*

High Flow Notification

- 62. Does your utility send high flow notifications? *(multiple choice)*

- a. Yes
- b. No

Logic Linked Questions (#62 – a) What type of high flow notifications do you offer? Please select all that apply, indicating if you offer it and if a customer must take action to opt into that type of notification. Choose opt-out if customers are eligible to receive notification without doing anything.

- 63. Spike - High use over the course of a day or days compared to a static threshold
(drop down, opt-in, opt-out, no notification)
- 64. Spike - High use over the course of a day or days compared to an average use (specific to customer/may change over time)
(drop down, opt-in, opt-out, no notification)
- 65. Spike - High use over the course of a number of hours (<24) compared to a static threshold
(drop down, opt-in, opt-out, no notification)
- 66. Spike - High use over the course of a number of hours (<24) compared to an average use (specific to account/may change over time)
(drop down, opt-in, opt-out, no notification)
- 67. Bill Alert - Water use in billing period is trending to be higher than average use
(drop down, opt-in, opt-out, no notification)
- 68. Vacation Alert – non-zero use during a specified period of time
(drop down, opt-in, opt-out, no notification)
- 69. Custom - Notification based on customer's chosen volume of water in a day or other period of time
(drop down, opt-in, opt-out, no notification)
- 70. Other type of high use notification (please specify) (short answer)
- 71. **Logic Linked Question (#62 – a)** Describe your single-family residential high flow thresholds, if any. For example, "Alert sent after use in 1 day is at least 1.5x the customer's daily average". If none, write "none". (long answer)
- 72. **Logic Linked Question (#62 – a)** Describe your large multi-family (>4 units) residential high flow thresholds, if any. If none, write "none". (long answer)
- 73. **Logic Linked Question (#62 – a)** Describe your small multi-family (2-4 units) residential high flow thresholds, if any. If none, write "none". (long answer)

74. **Logic Linked Question (#62 – a)** Describe your Commercial, Institutional, and/or Industrial (CII) high flow thresholds, if any. If none, write “none”. *(long answer)*
75. **Logic Linked Question (#62 – a)** Please provide any additional information about your high flow notifications that is relevant to share. If none, write “none”. *(long answer)*
76. **Logic Linked Question (#62 – a)** If known, approximately how many high flow notifications were sent in the last year? Please enter the approximate number of high flow notifications with a whole number, no commas. If you are unsure, please write “unknown”. *(short answer)*

Leak Alert Follow-Ups

77. Do you provide tools or resources to customers who receive a leak alert to help them find and address leaks (e.g. webpage, personalized communication, videos, documents)? If yes, please describe. If there is a webpage, please provide the link. If none, write “none”. *(long answer)*
78. Do you provide any additional financial or repair assistance for low-income customers? If yes, please describe. *(long answer)*
79. Do you provide additional notifications if the leak continues past a set timeframe frame or if the leak exceeds a set threshold? If so, please provide the criteria (e.g. timeframe or volume threshold) used to prompt additional notifications. *(long answer)*

AMI Data & Water Savings Estimates

80. Has your utility used AMI data to conduct water usage analyses? If yes, how? *(long answer)*
81. Do you estimate water savings from your notification program(s)? *(multiple choice)*
- a. Yes
 - b. No
 - c. I'm not sure
82. **Logic Linked Question (#81 – a)** Please indicate which of the following activities estimated water savings have informed at your utility (Choose all that apply) *(multiple choice)*
- a. Conservation programs
 - b. Introduction or expansion of Leak Alert Program
 - c. Water loss adjustments
 - d. Low-Income Qualified or Bill Pay Assistance programs
 - e. Demand calculations

f. Other ____ (*short answer*)

Leak, Bill, and Customer Adjustments

This section asks about **utility issues or services related to leak and/or high use notification programs**. Even if you do not have AMI or a proactive notification program, some of these questions may still apply. Select "Not Applicable" as it relates to your organization.

83. How has your notification program impacted the number of high bill queries or complaints your organization receives? (*multiple choice*)

- a. Significant reduction (more than 20% reduction)
- b. Small reduction (10 – 20% reduction)
- c. No change (<10% change)
- d. Increase (more than 10% increase)
- e. Not Applicable

84. Do you have additional information to share about changes to high bill queries or complaints? If none, write "none". (*long answer*)

85. Does your organization provide free or subsidized leak inspections or audits at or inside a customer's property? (*multiple choice*)

- a. Yes
- b. Sometimes (provide additional information in Question #71)
- c. No
- d. I'm not sure

86. Do you have additional information about free or subsidized leak inspections or audits? If none, write "none". (*long answer*)

87. Does your organization have a policy for courtesy leak adjustments to bills? (*multiple choice*)

- a. Yes
- b. Yes - under certain circumstances
- c. No
- d. I'm not sure

88. Logic Linked Question (#87 – b) Please describe the circumstances in which your utility will conduct leak adjustments. (*short answer*)

89. Do you have additional information about your organization's courtesy leak adjustment policy for billing? If none, write "none.": (*long answer*)

90. How has your notification program impacted the number of courtesy billing

adjustments your organization manages per year? *(multiple choice)*

- a. Significant reduction (more than 20% reduction)
- b. Small reduction (10 – 20% reduction)
- c. No change (<10% change)
- d. Increase (more than 10% increase)
- e. Not Applicable

91. Do you have additional information about changes to billing adjustments? If none, write “none.”: *(long answer)*

92. Does your organization offer any of the following? Please select all that apply. *(multiple choice)*

- a. Educational information about leaks on the web, social media, and/or other communication channels;
- b. Leak kits;
- c. Leak repair services;
- d. Leak repair insurance program;
- e. On-bill financing to pay for cost to repair leaks (customer pays for repairs through additional charge on utility bill);
- f. Low-cost loan program to pay for the cost to repair leaks;
- g. I'm not sure

93. Do your organization's codes/regulations/policies specifically prohibit or address water waste from leaks? *(multiple choice)*

- a. Yes
- b. No
- c. I'm not sure

94. Does your organization complete an annual comprehensive system water loss audit (like the one outlined in the AWWA M36 manual)? *(multiple choice)*

- a. Yes
- b. No
- c. I'm not sure

95. Are any water conservation/efficiency personnel involved in the organization's water loss audit process? *(multiple choice)*

- a. Yes
- b. No
- c. I'm not sure

Reflecting and Looking Ahead

96. What are your biggest challenges related to your **current leak or high use notification program(s)**? Please select all that apply, or "Not Applicable".

(multiple choice)

- a. No customer-facing portal at this time;
- b. Low portal sign-up;
- c. Lack of meter reading precision;
- d. Multiple customers on a single meter;
- e. Insufficient staff for follow-up, inspections and/or audits;
- f. No separate irrigation meters;
- g. Educating customers;
- h. Training customer service representatives;
- i. Maintaining current contact information for customers;
- j. Developing appropriate criteria for large residential and CII customers;
- k. Challenges related to availability or cost of professionals (like plumbers or irrigation professionals) to support customers in finding and/or addressing leaks;
- l. Not Applicable - We do not have a notification program;
- m. Other ____ *(short answer)*

97. What other ways **are you currently using AMI data** for water conservation or efficiency related purposes? Please select all that apply, or "Not Applicable". *(multiple choice)*

- a. Bill adjustments for leaks;
- b. Commercial, industrial, institutional (CII) water use benchmarking;
- c. CII indoor audits;
- d. Demand forecasting;
- e. Distribution system analysis/leak identification;
- f. General troubleshooting for high bill complaints;
- g. Identification of irrigation during rain events;
- h. Irrigation system audits;
- i. Irrigation water use calculations/benchmarking;
- j. Meter accuracy or functionality;
- k. Meter sizing;
- l. Multi-family residential indoor audits;
- m. New or re-development impact fees;
- n. Operations and Maintenance (O&M) planning
- o. Peak demand analysis;
- p. Pressure management;
- q. Residential indoor water use calculations/benchmarking;
- r. Targeting high/inefficient users for programs;

- s. Transition to monthly or other frequency of billing;
- t. Verification of savings from programs;
- u. Verification of savings to determine rebate amount/approve rebate;
- v. Verification of savings from programs;
- w. Water use restriction monitoring and/or enforcement (e.g. time of day and/or day of week restrictions);
- x. Water budgets – informational;
- y. Water budgets – rates assessment;
- z. Not Applicable - We do not have AMI;
- aa. Other ____(*short answer*)

98. What other ways **do you plan to or would like to** use AMI for water conservation or efficiency purposes? (Select all that apply, or "None")
(*multiple choice*)

- a. Bill adjustments for leaks;
- b. Commercial, industrial, institutional (CII) water use benchmarking;
- c. CII indoor audits;
- d. Demand forecasting;
- e. Distribution system analysis/leak identification;
- f. General troubleshooting for high bill complaints;
- g. Identification of irrigation during rain events;
- h. Irrigation system audits;
- i. Irrigation water use calculations/benchmarking;
- j. Meter accuracy or functionality;
- k. Meter sizing;
- l. Multi-family residential indoor audits;
- m. New or re-development impact fees;
- n. Operations and Maintenance (O&M) planning
- o. Peak demand analysis;
- p. Pressure Management
- q. Residential indoor water use calculations/benchmarking;
- r. Targeting high/inefficient users for programs;
- s. Transition to monthly or other frequency of billing;
- t. Verification of savings from programs;
- u. Verification of savings to determine rebate amount/approve rebate;
- v. Verification of savings from programs;
- w. Water use restriction monitoring and/or enforcement (e.g. time of day and/or day of week restrictions);
- x. Water budgets – informational;
- y. Water budgets – rates;
- z. None;
- aa. Other ____(*short answer*)

99. What topics related to AMI for water conservation/efficiency purposes **would you**

like to learn more about? (Select all that apply, or "None") *(multiple choice)*

- a. Bill adjustments for leaks;
- b. Commercial, industrial, institutional (CII) indoor water use calculations/benchmarking;
- c. CII indoor audits;
- d. Demand forecasting;
- e. Distribution system analysis/leak identification;
- f. General troubleshooting for high bill complaints;
- g. Identification of irrigation during rain events;
- h. Irrigation system audits;
- i. Meter accuracy or functionality;
- j. Meter sizing;
- k. Multi-family residential indoor audits;
- l. New or re-development impact fees;
- m. Operations and Maintenance (O&M) planning
- n. Peak demand analysis;
- o. Pressure Management
- p. Residential indoor water use calculations/benchmarking;
- q. Targeting high/inefficient users for programs;
- r. Transition to monthly or other frequency of billing;
- s. Verification of savings from programs;
- t. Verification of savings to determine rebate amount/approve rebate;
- u. Water use restriction monitoring and/or enforcement (e.g. time of day and/or day of week restrictions);
- v. Water budgets – informational;
- w. Water budgets – rates;
- x. None;
- y. Other ____ *(short answer)*

100. How does your utility use an AMI system and data for objectives other than water conservation and efficiency purposes? *(long answer)*

101. No individual responses will be included in the study report or related materials and communications, and no individual responses will be included in the complimentary summary results shared with all survey respondents; however, we may choose to include a list or location map of utilities who submitted a response in a study report. Please indicate your preference for your organization to be listed as a study participant. *(multiple choice)*

- a. Yes, OK to list my organization as a survey participant.
- b. No, I prefer to not have my organization listed.

Appendix B.

AMI Engagement Benchmarking Survey Participants.

A total of 32 utility survey participants are listed of the 34 utilities that are represented in this survey.

B.1 Survey Utility Participants

Augusta Utilities, GA

Aurora Water, CO

Austin Water, TX

City of Buda, TX

City of Davis, CA

City of Garland Water Utilities, TX

City of Golden, CO

City of Kyle, TX

City of Loveland Utilities, CO

City of Mansfield, TX

City of Oceanside, CA

City of Ocoee, FL

City of Santa Barbara, CA

City of St. George, UT

City of Tempe, AZ

City of Thornton, CO

City of Westminster, CO

Coweta County Water & Sewerage Authority, GA

East Bay Municipal Utility District, CA

Forsyth County Water & Sewer, GA

Gwinnett County, GA

Highlands Ranch Water, CO

JEA, FL

Las Vegas Valley Water District, NV

Marin Water, CA

Montecito Water District, CA

Orlando Utilities Commission, FL

San Antonio Water System, TX

South Tahoe Public Utility District, CA

Tacoma Public Utilities, WA

Town of Prosper, TX

Town of Queen Creek, AZ