BAWSCA and Valley Water AMI Implementation Survey

A White Paper on survey results and opportunities for collaboration on AMI projects among BAWSCA and Santa Clara Valley Water District agencies

Survey developed by ManageWater Consulting, Inc., in association with Don Schlenger and Associates, LLC.,

and

BAWSCA
Bay Area Water Supply & Conservation Agency

Valley Water

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1. Abstract

The Bay Area Water Supply and Conservation Agency (BAWSCA) has a long track record of assisting its agencies in advancing the use of technologies for water management. During recent preliminary discussions in the Water Resources Committee, member agencies discussed the desire for regional collaboration for implementing Advanced Metering Infrastructure (AMI**)** technology. Following these discussions, BAWSCA and its member agencies identified the need to develop baseline information about their existing metering infrastructure – its current status and management practices.

As a result, BAWSCA and Valley Water (Valley Waterformerly Santa Clara Valley Water District) decided to jointly work on obtaining information about their agencies' current and planned work with AMI technology. This technology enables two-way communication of meter data through user-interface platforms for water agency staff and customers. The most important feature of AMI technology is that it provides water utilities time-based information, including leak detection and water use analytics to manage water systems and communicate with customers.

ManageWater Consulting, Inc., in association with Don Schlenger and Associates, LLC., developed a comprehensive survey to find out from BAWSCA and Valley Water agencies about their current status of AMI implementation, their readiness to implement it, and interest in collaboration on regional projects.

The survey included 33 questions and multiple-choice responses that were expected to identify member agency interest and readiness to participate in regional AMI projects facilitated by BAWSCA and Valley Water. The survey requested information about each agency, the existing metering system, plans and level of interest to implement AMI, and specific project topics. BAWSCA used SurveyMonkey™ to distribute the survey and solicit responses. Twenty-nine BAWSCA and Valley Water agencies responded to the survey. A summary and analysis were presented by ManageWater Consulting, Inc., at BAWSCA's AMI workshop on March 27, 2019.

The responses reveal five main findings. For all agencies meter data is used by diverse groups and for many similar end-uses. AMI and Visual/Manual meter reading are most commonly used to obtain meter readings. Agencies use similar practices for meter maintenance, calibration, and replacement.

Responses to questions about meter management practices showed that agencies mainly manage meters in-house and that the main replacement practice for all meter size categories is to replace them when they break. Typically, meter data is not integrated with processes using it, and automating integration for commonly used routine data is desired by member agencies. Virtually all agencies recognize the important features and added value of AMI technology. Sixty-two percent of survey participants are interested in collaboration on AMI project planning and implementation.

Common themes and potential for collaboration were evident from the survey results. Opportunities and interest within and between agencies exists for coordinated procurement and potentially shared contracts. Agencies are very interested in pro-active notification to their customers about leaks and abnormally high water use. Eighty-one percent listed specific interest in non-revenue water reporting, followed by 71% identifying leak alerts, meter information and maintenance history, and automating routine in-house reports.

Standardizing criteria and thresholds to define water leaks for customer groups would provide consistency throughout BAWSCA and adjacent Valley Water geographic regions. Standardizing notifications that are common between member agencies would help customers understand them and respond, if needed.

Similarly, standardizing templates and automating routine in-house and compliance reports appears to be of common interest and achievable in the near term. Additionally, agencies indicated the need for education about AMI technology improvements with fast return on investments (ROI) to develop funding requests with cost benefit analysis.

Development of a BAWSCA/Valley Water led *'AMI-knowledge' ecosystem* with ongoing, periodic seminars/webinars to demonstrate agency case studies and presentations from vendors will strengthen member's long-term engagement and knowledge to make informed decisions about AMI.

Admittedly, some challenges and barriers may prevent agencies from seizing opportunities to work with others on AMI implementation. Significant challenges to deploying AMI include: lack of resources due to planned major upgrades or deployment of a new billing system (44%), lack of funding (31%), and uncertainty about the process or benefits to the agency (43%). To the latter point, 53% of the agencies identified "limited staff for collaborative projects" as the highest barrier.

Development of a systematic approach for a uniform policy, including templates/guidelines related to data privacy, opt-ins to participate in regional AMI projects, electronic contract information, and frequency of follow-up, will provide BAWSCA and Valley Water a strong framework for a long-term resilient, collaborative AMI implementation program.

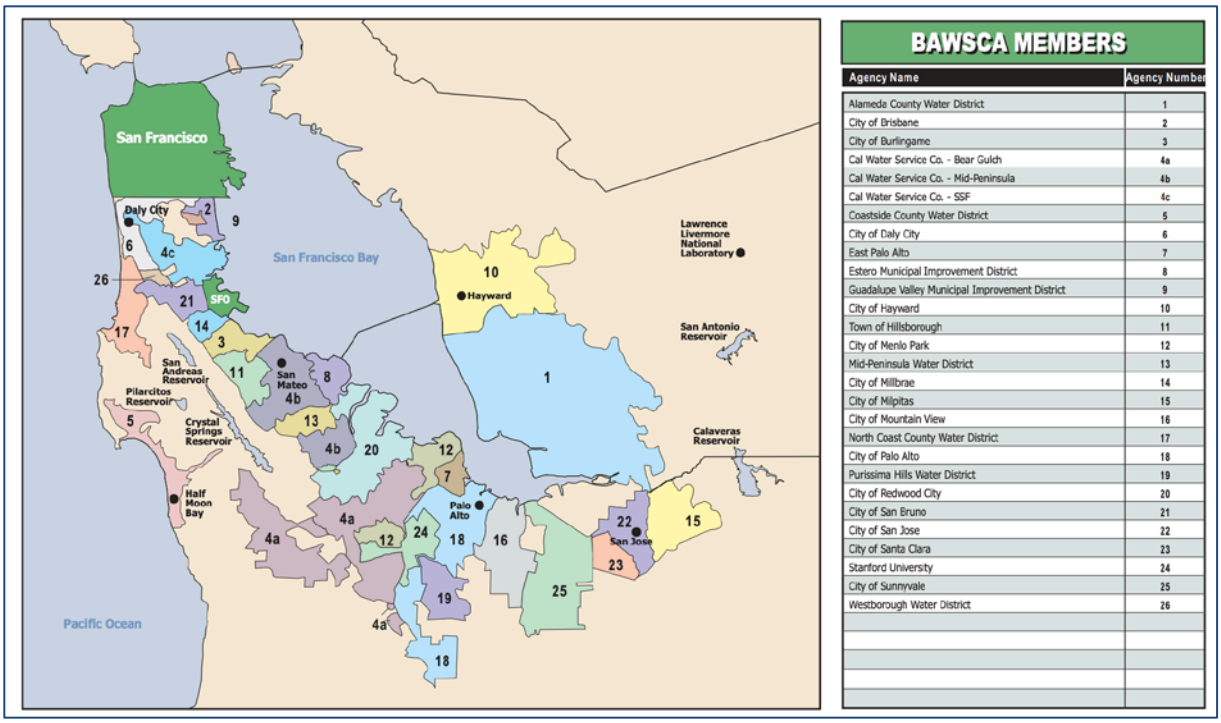
The first project will test the collaborative process and, if successful, will increase effectiveness and efficiency for the participants. One approach that can lead to success is to start with a small cooperative project of high common value. Such a project would demonstrate the potential of expanding the process to a larger scale.

2. Introduction

The Bay Area Water Supply and Conservation Agency (BAWSCA) and Valley Water (Valley Water, formerly Santa Clara Valley water District) are jointly working to obtain information about their agencies' current and planned work with Advanced Metering Infrastructure (AMI**).** BAWSCA's and Valley Water's goal is to assist agencies (Figures 1 and 2) with developing and implementing collaborative regional AMI projects. During preliminary discussions on the

potential for regional procurement between BAWSCA and its Water Resources Committee, BAWSCA identified the need to develop baseline information on metering infrastructure – the current status and management practices.

Figure 1. BAWSCA agencies and their location in the San Francisco Bay Area. Source: BAWSCA.

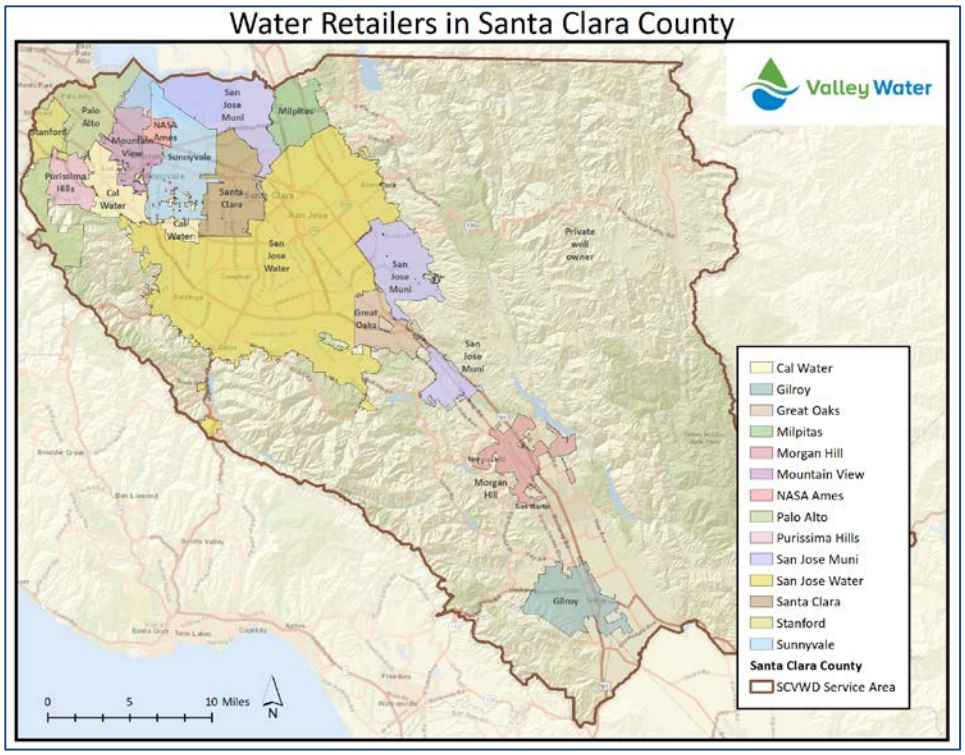


BAWSCA MEMBERS

Agency Name	Agency Number
Alameda County Water District	1
City of Brisbane	2
City of Burlingame	3
Cal Water Service Co. - Bear Gulch	4a
Cal Water Service Co. - Mid-Peninsula	4b
Cal Water Service Co. - SSF	4c
Coastside County Water District	5
City of Daly City	6
East Palo Alto	7
Estero Municipal Improvement District	8
Guadalupe Valley Municipal Improvement District	9
City of Hayward	10
Town of Hillsborough	11
City of Menlo Park	12
Mid-Peninsula Water District	13
City of Millbrae	14
City of Milpitas	15
City of Mountain View	16
North Coast County Water District	17
City of Palo Alto	18
Purissima Hills Water District	19
City of Redwood City	20
City of San Bruno	21
City of San Jose	22
City of Santa Clara	23
Stanford University	24
City of Sunnyvale	25
Westborough Water District	26

BAWSCA will use the baseline information to identify tangible ideas for opportunities to collaborate on AMI and related projects.

Figure 2. Valley Water Agencies and their location in the San Francisco Bay Area. Source: Valley Water.



To support BAWSCA and Valley Water's efforts, ManageWater Consulting, Inc., in association with Don Schlenger and Associates, LLC., developed a comprehensive survey and analyzed its responses. The survey gauged agencies' present and near-future involvement in AMI and interest in regional collaboration.

This white paper discusses the four elements of the AMI survey development and analysis:

- Methodology – process, tools, and survey design
- Parameters – information needed to support BAWSCA's/Valley Water's goal
- Survey results – key findings
- Collaboration potential – needs and interests.

Background

This project builds on the BAWSCA's leadership in working with its agencies to advance the use of technology for managing water resources.

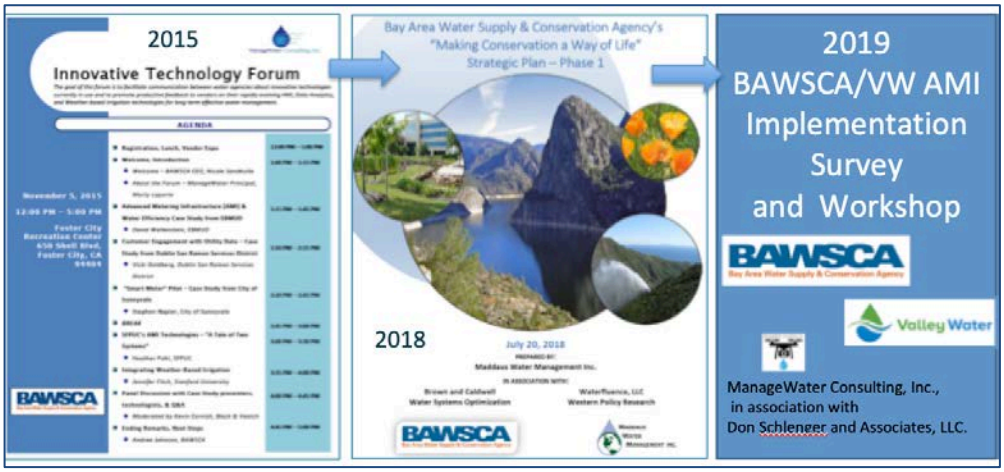
In the fall of 2015, BAWSCA worked with ManageWater Consulting, Inc., (MW) to organize the first Innovative Technology Forum for BAWSCA agencies. This Forum focused on AMI technology. Case studies were presented by San Francisco Bay Area agencies implementing AMI. (1)

In fall of 2018, BAWSCA spearheaded: "Making Conservation a Way of Life" Strategic Plan – Phase 1, prepared by Maddaus Water Management Inc., in association with Brown and Caldwell, Water Systems Optimization, Waterfluence, LLC., and Western Policy Research. (2) In BAWSCA's Strategic Plan, AMI technology was discussed as an important element to

meeting California's mandate and implementing Executive Order B-37-16: "Making Conservation a Way of Life". (3)

BAWSCA's Strategic Plan also discussed "Planning for Success: Actions to Achieve Urban Water Use Objectives". It specifies that BAWSCA "Organize an AMI symposium to enable information exchange, including case studies, implementation strategies, and data analysis techniques, like the Innovative Technology Forum sponsored by BAWSCA that took place in San Mateo in 2015."

Figure 3. BAWSCA AMI initiatives – Leadership to advance the use of AMI technology.



Advanced Metering Infrastructure – Benefits and challenges

AMI is an integrated metering system that includes smart meters, communications networks, and data management systems. AMI enables two-way communication of meter data through user-interface platforms for water agency staff and customers. This technology provides nearly real-time data about water use. AMI enables many advanced functions that are not possible with manual or Automated Meter Reading (AMR) systems. The most important feature of AMI technology is that it provides water utilities time-based information, including leak detection and water use analytics to manage water systems and communicate with customers. Examples of AMI components are shown in the schematics from two commonly deployed AMI systems: Rockwell/Sensus, Inc., and Badger Meter, Inc.

Figure 4. Four major AMI components. Source: Rockwell/Sensus, Inc.

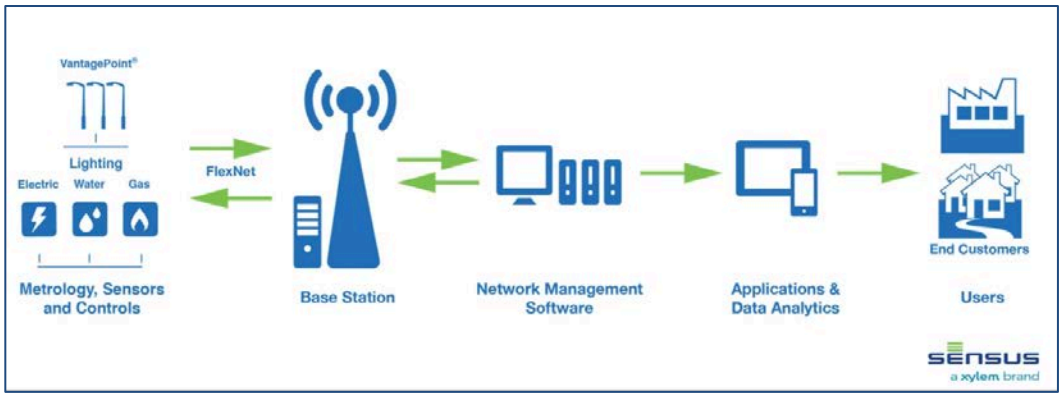
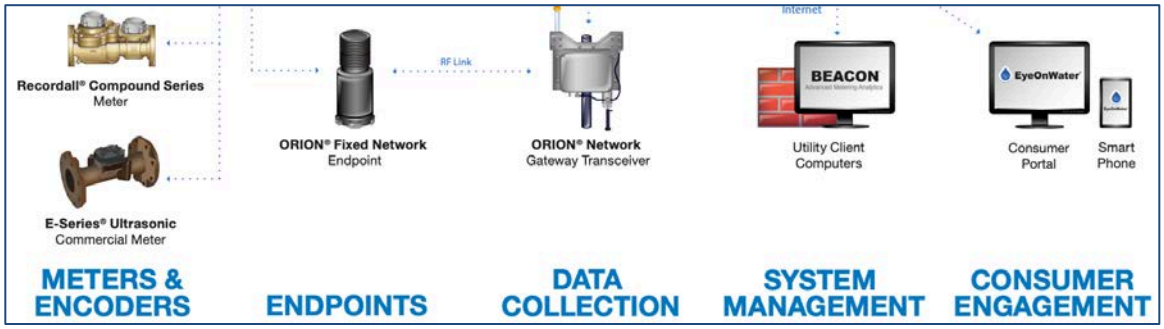


Figure 5. Four major AMI components. Source: Badger Meter, Inc.



AMI components:

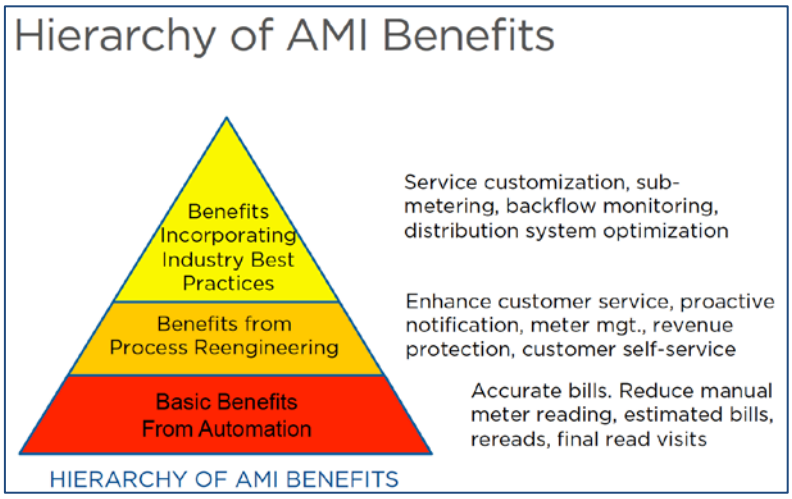
- Meters
- Data Transmitters, MIUs (eg., Base station, encoders, endpoints)
- Network infrastructure (eg., Data collection units, network, and network management software, Beacon system management)
- Communications (hardware, software: eg., Applications, data analytics, 'eye-on-water') integration with existing systems that rely on meter data (e.g., billing, water efficiency, engineering, operations, other).

These components collect, transfer, and manage the data for different end users – utility staff and customers – through user-interface software. Different types and formats of meter data are available for different end uses and end-users. The utilization of AMI data varies depending on the utility's requirements, preferences, integration with other data management systems, and type of user-interface software. The lack of standardization of AMI metering data formats for routine reports is a challenge for utilities, but also presents opportunities for collaboration. The opportunities are discussed in more detail in Sections 4 – Survey Results and 5 – Collaboration Potential.

Beyond the basic benefits of AMI – automated near-real time meter reading for billing and availability of continuous temporal data for analysis – additional levels of benefits are achievable to add value for making timely and data-based decisions.

As Figure 6 illustrates, higher benefit levels can be derived from AMI: from process re-engineering and incorporating 'Best Practices' that help improve management of water.

Figure 6. The hierarchy of AMI benefits. Source, copyright: Don Schlenger and Associates, LLC.



Specific benefits from AMI include:

Automation

- ✓ *Meter reading, re-reads* – near real-time meter data, reduced time for manual reads
- ✓ *Move-in/move-out* – remote disconnects, final reads
- ✓ *Theft identification* – near-real-time theft/tamper alerts
- ✓ *Billing/Finance* – faster meter data availability, reduced time for billing exceptions

Improved, pro-active customer service

- ✓ *Customer inquiries, pro-active notification portal* – tools to assist customers with timely alerts, improved understanding of consumption, use trends, high use, water efficiency information

Integration into water system management

- ✓ *Meter service orders* – troubleshoot remotely, track service orders and maintenance history
- ✓ *Water loss detection, use trends tracking* – improved accounting/reduction of water loss and non-revenue water
- ✓ *Meter accuracy, asset management* – improved tracking of meter age, accuracy, replacement of aging, inaccurate meters
- ✓ *Capital planning* – Improved use of data for hydraulic models and distribution system plans/designs

Integration with geospatial data

- ✓ *Geographic information systems* – improve identification of data trends and analytics in the context of spatial relationships
- ✓ *Visual spatial tracking and presentations* – integrate water system information using map layers to clearly illustrate areas of interest, projects, or related topics, such as areas of significant leaks, meters by age and size, test dates for meters of a particular size, problems with Pressure Reducing Valves (PRVs), and more.

In spite of the many benefits of AMI, utilities do not utilize all of the capabilities of their AMI systems and the technology is primarily used for simple meter reading and/or billing. Key reasons why the technology is underutilized stem from the need to dedicate staff time and resources to set up integration of the AMI systems, work with the vendors, and test the integrations. Also, inadequate training by vendors and lack of specific requirements in contracts for on-going training about AMI capabilities lead to lower utilization of AMI.

However, the underutilization of AMI also presents opportunities. These will be discussed in Section 5.

3. Methodology

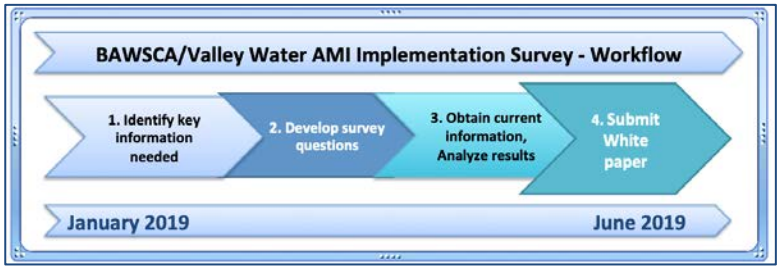
For some time, BAWSCA and Valley Water have been working with their member agencies to accelerate engagement with AMI technology.

Both agencies determined that a survey is the best tool to obtain baseline information from their member agencies about their plans for near-term AMI implementation. BAWSCA led the project and Valley Water joined in the effort, expecting that the baseline data will enable informed and meaningful discussions about projects for potential regional collaboration.

To meet the project goals, four main tasks and deliverables were developed:

1. Identification of key information that BAWSCA and Valley Water will need to determine potential areas for regional collaboration on AMI projects.
2. Development of survey questions to identify specific information about the current status of metering infrastructure and its management among BAWSCA and Valley Water agencies. The questions were intended to reveal areas of common interest and if the agencies would consider collaborating on AMI and related projects.
3. Review and analysis of survey responses and agency data. MW presented the results at BAWSCA's AMI workshop on March 27, 2019.
4. Documentation of the results from the survey in a White Paper.

Figure 7. Workflow for BAWSCA and Valley Water survey on AMI implementation.



Survey Structure and Format

The survey included 33 questions and the format facilitated grouping of responses to identify common interest areas.

The survey sections were mostly composed of multiple-choice questions with 'best-fit' answers. Space was provided for additional information for agencies to briefly elaborate, if they chose to do so. We requested that one representative respond to the survey, even if they obtained information from other agency staff. BAWSCA used Survey Monkey™ to

incorporate the questions and sent out the survey on February 5th to obtain responses from 31 BAWSCA and Valley Water members. We anticipated that the BAWSCA and Valley Water member agencies are at different stages in their AMI metering programs and some would not benefit from collaborating on AMI projects.

Based on review of BAWSCA's Strategic Plan, knowledge about BAWSCA and Valley Water agencies, and expertise with AMI, we identified four main sections for the survey:

- Agency profile – Agency-specific information
- Existing metering and data management systems
- Agencies with AMI – Planned, implemented
- Potential areas for collaboration, including level of interest.

The multiple-choice responses targeted identification of specific metering systems, the technology in use, its management, and extent of data integration. We recommended testing the survey questions on a small sample of agencies to verify and, if needed, improve the survey clarity for best results, responsiveness and quality.

Of the 29 agencies that responded, we received four duplicate responses in Survey Monkey™, so for some figures and tables the data have been adjusted manually, resulting in minor percentage changes.

4. Parameters

Section 1, included questions about the agency, point of contact, agency departments and interactions between groups involved in or connected to metering and data management. Questions in this section were about the current structure – both working groups and systems – its level of complexity, and other internal agency components that will be needed to support AMI implementation.

Section 2 included questions specific to the existing metering system. Questions asked about hardware components, sizes, meter-reading system, i.e., how meter data are collected - manual, AMR, AMI, or combination of various methods. Also, information was requested about meter reading frequency for billing and if meters are surveyed, so geo-location of meters and associated equipment is available. AMI installation with data integration via maps, such as ESRI ArcGIS, (meter geo-location, not just the address) is increasingly being used by water utilities. For example, mapping software is used to connect metering, maintenance, leak, and other data that can be represented spatially to guide decisions.

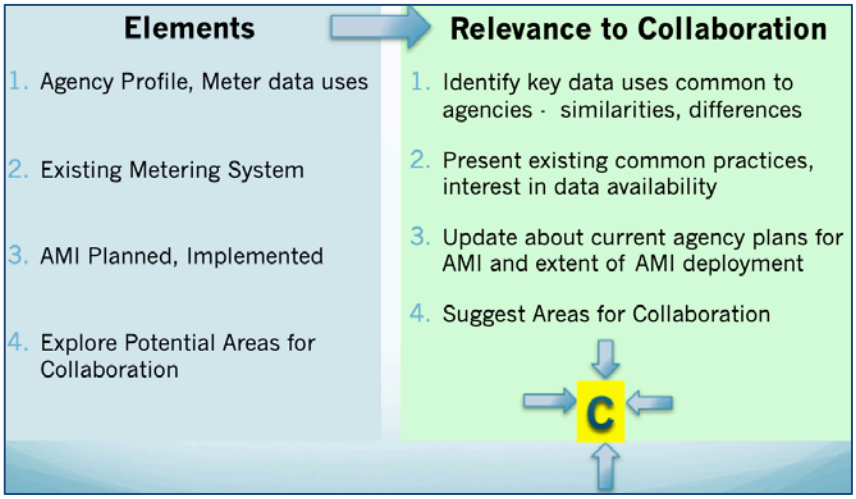
Questions also requested information about the existing Data Management Systems (DMS) related to metering. The questions asked about the extent of automation and integration for: processes and software used to collect and transfer metering data for billing, customer communications, customer and sector water use trends, non-revenue water and leak management, water demand management, consumption forecasts, and regulatory and other reports. Information was requested to gauge the extent of data integration and manual work to detect potential 'pain points' and drivers for AMI data solutions.

Questions about sources and extent of AMI knowledge, planning, and funding were included. Agencies were asked to identify the internal groups who are part of planning for, or already working on AMI. Agencies with AMI were asked about the type of AMI system, implementation status, and current uses, as well as those planned in the next 24 months. Agencies were also asked about the AMI features they would each benefit from, to identify areas of common interests.

Section 3 questions were specific to agencies having or planning to implement AMI, including pilot projects in the next 24 months. This section requested information about the planned components of AMI, including: meters, data transmitters, network infrastructure, data component communication, and User Interface (UI) software.

Section 4 focused on member agency interest in collaboration. Agencies were asked to identify their level of interest (on a scale of 0 – no interest, to 5 – highly interested) and identify specific project topics. The survey elements and relevance to collaboration are shown in Figure 8.

Figure 8. Survey Elements and Relevance to collaboration.



The best outcome from the survey responses will provide BAWSCA and Valley Water a clear and representative view of member agencies' AMI plans, needs, and their ability and readiness to collaborate on AMI projects.

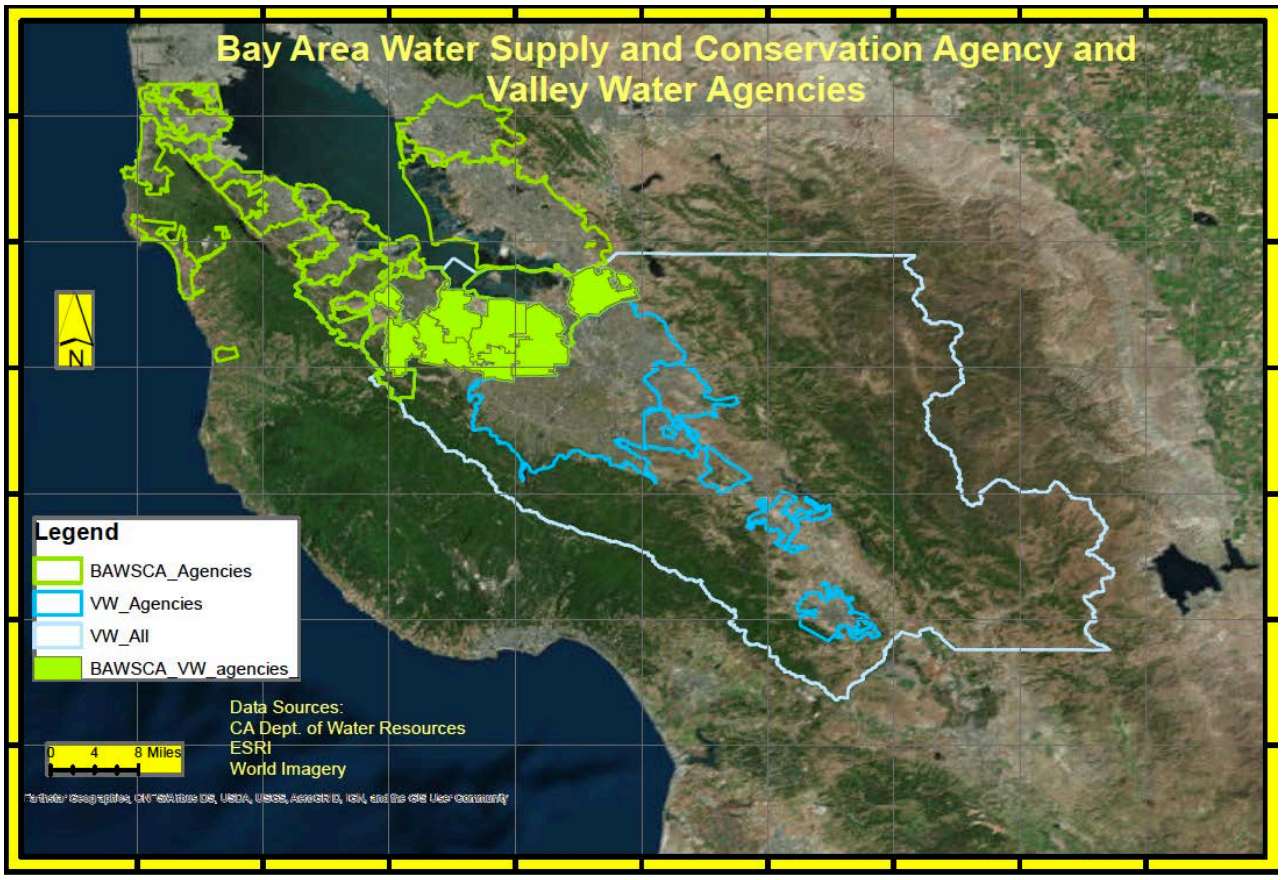
5. Survey Results

Obtaining survey responses and analyzing agency information

In anticipation of agency representatives needing to obtain information from multiple internal sources, more than two weeks were provided to complete the survey. To facilitate understanding, clarity, and answer agency questions, on February 11, BAWSCA organized a WebEx video conference call, in which MW reviewed the survey questions and multiple-choice responses.

The surveys were sent to 25 BAWSCA agencies. Of these, nine agencies are both BAWSCA and Valley Water members. Six additional Valley Water (only) member agencies received the survey. The agencies and their affiliations to BAWSCA and Valley Water are shown in Figure 9 and agency names, memberships, and metering attributes are shown in more detail in Table 1.

Figure 9. Map showing member agencies and their affiliation to BAWSCA, BAWSCA and Valley Water, and Valley Water only agencies. See Table 1 for agency affiliations and names. Map Source: ManageWater, Inc.



We received responses from 29 BAWSCA and Valley Water agencies (Attachments 1 and 2). A summary of the information and its analysis was presented at BAWSCA's AMI workshop on March 27, 2019. The responses will guide BAWSCA's and Valley Water's decisions about the efficacy and options for regional collaboration on AMI projects.

Key findings

This section summarizes five main findings from the 29 survey responses.

- Finding 1. In all agencies, meter data is used by diverse groups and end-uses. Agencies maintain many common, routine processes and products.
- Finding 2. AMI and Visual/Manual meter reading are most common, Rockwell/Sensus and Badger meter brands dominate, and agencies use similar practices for meter maintenance, calibration, and replacement.
- Finding 3. Typically, meter data is not integrated (except for billing) with processes using it and automating integration (rather than manually transferring) for commonly used routine data is desired by agencies.
- Finding 4. Virtually all agencies recognize the important features and added value of AMI technology.

- Finding 5. Sixty-two percent of survey participants are interested in collaboration. Based on the responses untapped opportunities exist for regional projects.

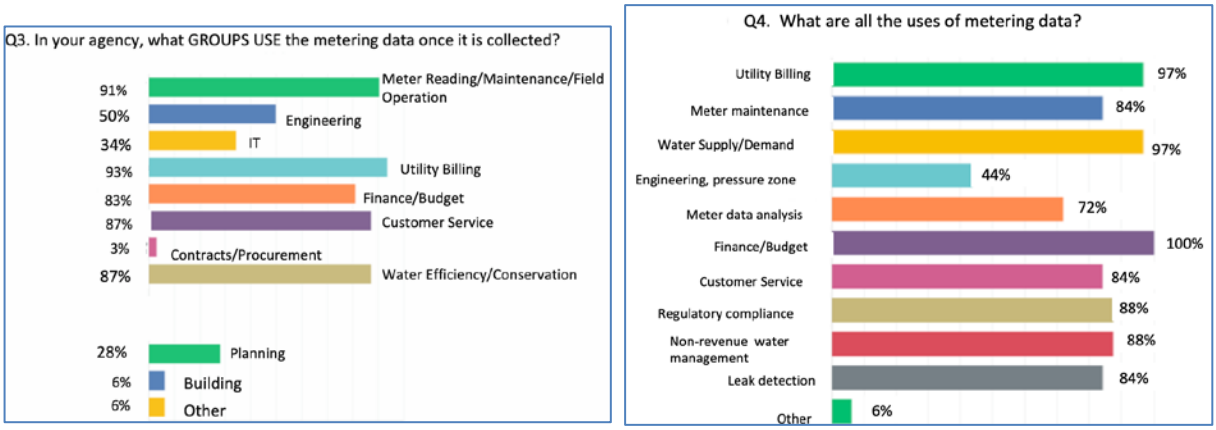
In the discussion below, information from survey responses is summarized and grouped, as needed, to illustrate common themes, synergies, and potential for coordinated projects.

Finding 1. Meter data is used by diverse groups and end-uses in all agencies.

The responses validated that meter data is the information 'backbone' for multiple groups and end-uses for BAWSCA and Valley Water agencies. The responses showed that various other member agency groups use the metering data, beyond the groups doing Meter Reading, Maintenance, Field Operations, and Billing. Respondents stated that meter data is commonly used by Water Efficiency/Conservation and Customer Service (87%), Finance/Budget (83%), and engineering (50%).

Not surprisingly, a variety of end-uses were identified by the agencies, beyond utility billing, finance/budget. Meter data is most commonly used for water supply/demand (97%), regulatory compliance and non-revenue water management (88%), and customer service (84%) and leak detection (84%).

Figure 10. Responses illustrate the diverse groups and varied use of meter data within agencies.



It is apparent from the responses that meter data is fundamental for many users and uses. Enabling access to timely, reliable, and accurate meter data provides many core benefits for utility operations.

Finding 2. AMI and Visual/Manual meter reading are most common, Rockwell/Sensus and Badger meter brands dominate, and agencies use similar practices for meter maintenance, calibration, and replacement.

The responses revealed that AMI is the predominant (>38%) meter-reading method for BAWSCA and Valley Water agencies. Manual/visual meter reading is the next most common method (34%), followed by 14% using touchpad, and 14% mobile AMR. AMI is used by 7

BAWSCA, 2 BAWSCA/Valley Water, and 2 Valley Water agencies. Rockwell/Sensus and Badger are the most common brands used by BAWSCA/Valley Water agencies, with 55% and 45%, respectively.

Table 1. Survey Findings – BAWSCA, Valley Water, and BAWSCA and Valley Water agencies, their dominant meter brands in use, and meter-reading methods. The data have been updated manually to correct for four agencies submitting duplicate responses in Survey Monkey™.

Agency	BAWSCA	Valley Water	AMI >50%	Manual/ Visual >50%	Touch - pad >50%	Mobile AMR >50%	Dominant meter brands in use
Gilroy			X				Rockwell/ Sensus
Menlo Park				X			Rockwell/Sensus Badger Neptune
Purissima Hills			X				Badger
Mid-Peninsula Water District			X				Rockwell/ Sensus
Cal Water, Bear Gulch				X			Neptune Badger Hersey/Mueller
Redwood City			X				Rockwell/ Sensus
San Jose Muni						X	Badger
Milpitas				X			Badger
Alameda				X			Elster/Amco Neptune Badger
Brisbane/GVMID						X	Neptune Badger
Burlingame						X	Rockwell/ Sensus
Daly City					X		Rockwell/ Sensus
Hillsborough			X				Rockwell/ Sensus
Mountain View				X			Badger
Palo Alto				X			Badger
Santa Clara				X			Rockwell/Sensus Badger
Santa Clara Co.				X			
Sunnyvale						X	Neptune Badger Hersey/Mueller
Coastside Water CWD			X				Rockwell/ Sensus
Millbrae					X		Rockwell/ Sensus
Stanford			X				Badger Hersey/Mueller
Westborough					X		Rockwell/ Sensus
Estero MID			X				Rockwell/Sensus Neptune
Hayward			X				Badger
San Jose Water				X			Rockwell/Sensus Badger Neptune
Great Oaks				X			Badger
Morgan Hill			X				Rockwell/ Sensus
San Bruno			X				Rockwell/ Sensus
North Coast County Water District					X		Rockwell/ Sensus
East Palo Alto							
NASA Ames							

X	BAWSCA agencies
X	Valley Water agencies
X	Both BAWSCA and Valley Water agencies
	Did not respond to survey

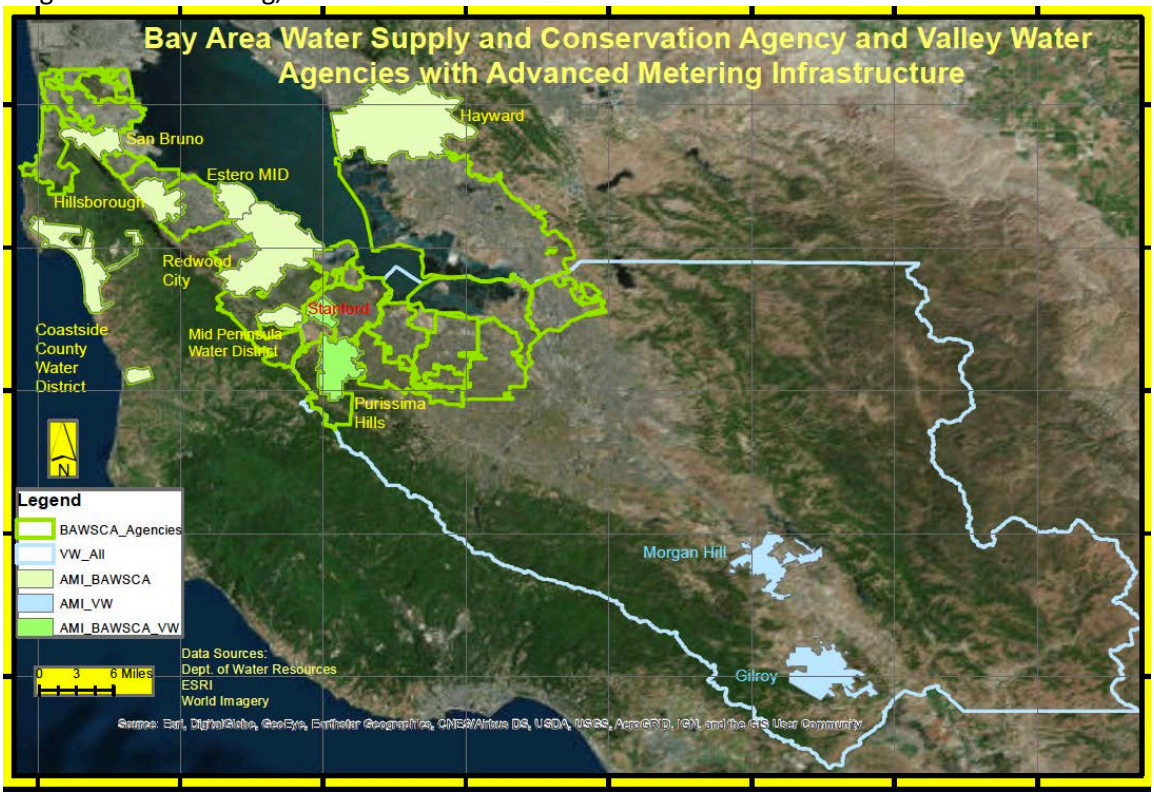
By the numbers: of the 29 agencies that responded, 11 have implemented AMI, 10 read meters manually, four use touchpads, and four use mobile AMR.

Table 2. Summary table showing meter-reading methods by BAWSCA, Valley Water, and BAWSCA and Valley Water agencies. The data have been updated manually to correct for four agencies submitting duplicate responses in Survey Monkey™.

	AMI >50%	Manual/ Visual >50%	Touchpad >50%	Mobile AMR >50%	
TOTAL	11	10	4	4	29
BAWSCA	7	2	4	2	15
Valley Water	2	3	0	0	5
BAWSCA/Valley Water	2	5	0	2	9

The map below illustrates the location of BAWSCA, Valley Water, and BAWSCA and Valley Water agencies that have deployed AMI.

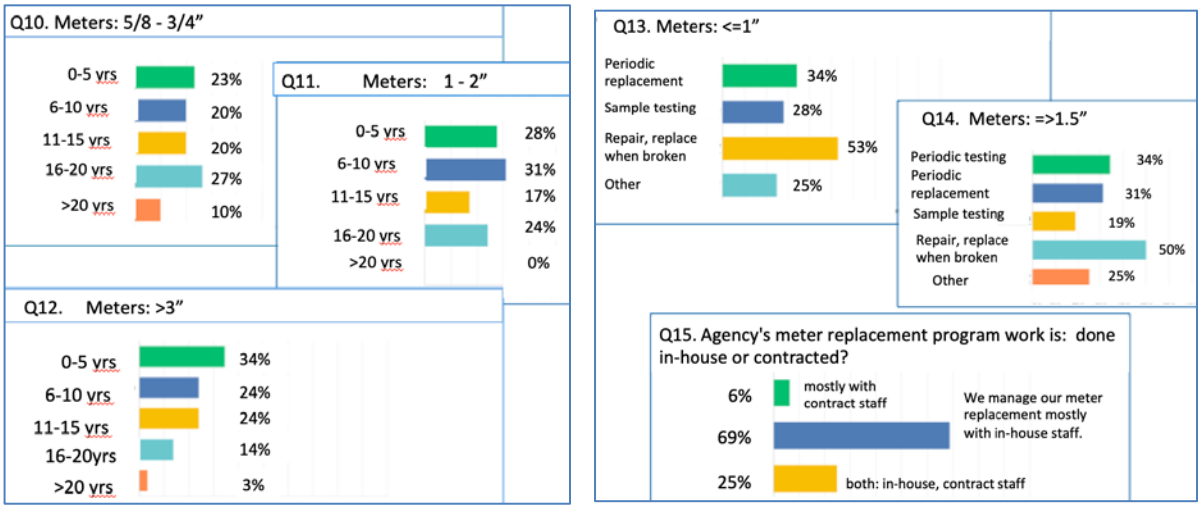
Figure 11. BAWSCA, Valley Water, and BWSCA/Valley Water agencies with AMI: Gilroy, Morgan Hill, Purissima Hills Water District, Stanford University, Mid-Peninsula Water District, Coastside County Water District, Redwood City, Estero MID, Hillsborough, San Bruno, and Hayward. Map source: ManageWater Consulting, Inc.



Responses to questions about meter age for three different size categories: 5/8”-3/4”, 1-2”, and >3”, revealed that depending on size, 23% to 34% are 0 to 5 years old, 20% to 31% are 6 to 10 years old, 17% to 24% are 11 to 15 years old, 14% to 27% are 16 to 20 years old, while 3% to 10% are more than 20 years old. Only 3% of meters that are more than 3 inches are older than 20 years and all 1 to 2 inch meters were reported to be less than 20 years old.

Responses to questions about meter management practices showed that agencies mainly manage meters in-house (69%) and that the main replacement practice for all meter size categories is to replace them when they break.

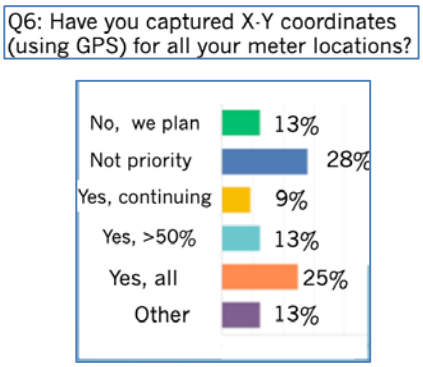
Figure 12. Meter age by meter size and meter management practices.



Geolocation of meters and associated assets is necessary for spatial analyses of patterns, such as clusters of underperforming meters, or tracking meter maintenance and performance histories.

Thirty-eight percent of agency responses stated that they have completed surveying 50 -100% of their meter infrastructure. However, 22% are continuing or planning to do so, while 28% state it is not a priority.

Figure 13. Status of GPS location surveys for meters.



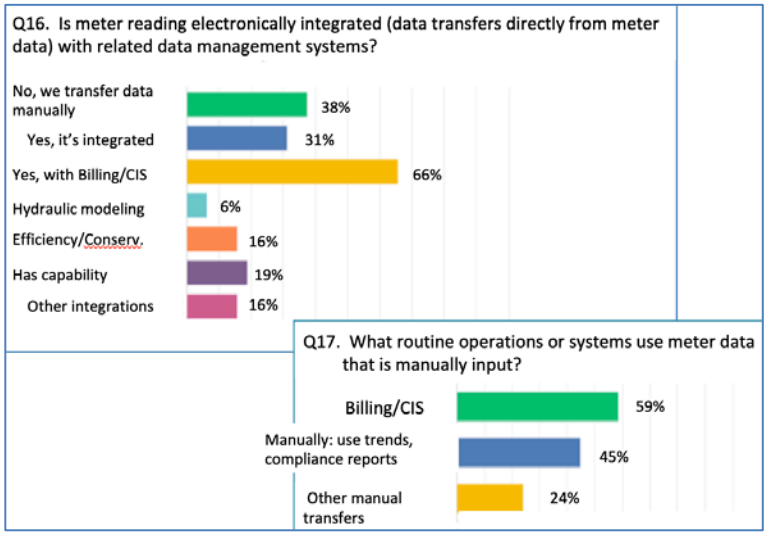
Standardizing meter inspection criteria could lead to earlier meter replacement and revenue recovery. Standardizing RFP elements for meter and asset surveys could reduce costs and increase efficiency for agencies.

Finding 3. Meter data is not typically integrated (except for billing) with processes using it and automating integration of frequently used data (rather than manually transferring) is desired by agencies.

Responses to survey questions asking about automated vs. manual transfer of meter data for routine uses, show that although 66% of the respondents integrate and automate data transfer with Billing/CIS, 59% state that data is manually input.

Additionally, 45% of the responses state that meter data is input manually for water use trend analyses and compliance reports. Twenty-four percent of responses also indicated that meter data is manually input for other routine uses. The responses suggest that agencies have automated transfer of some data electronically, but much continues to be transferred manually.

Figure 14. Meter data integration – automated vs. manual.



Anticipating the need for automating and standardizing meter data transfer, we asked agencies to identify standardized data management systems they would find helpful. Eighty-one percent listed non-revenue water reporting, followed by 71% identifying: leak alerts, meter information and maintenance history, and automating routine in-house reports.

Figure 15. Standardizing and automating meter data management for alerts and reports.

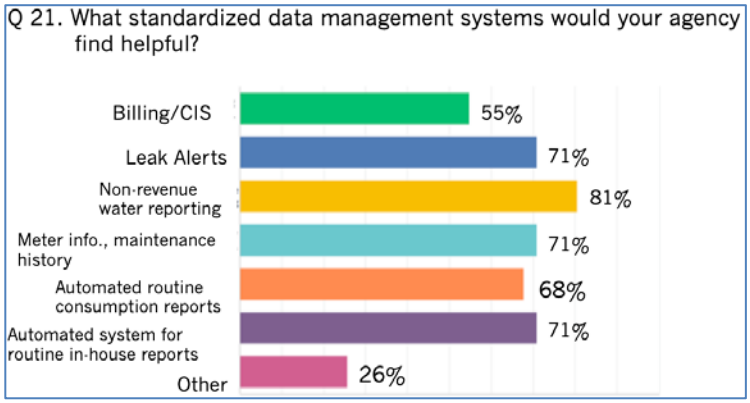


Table 3 lists 10 examples of routine data reports available when using AMI. Automating meter data transfer for frequent and common needs would take advantage of the existing features of the AMI technology, save time, and provide the needed information faster for end users.

Table 3. Common data reports available when using AMI, include identification of the following.

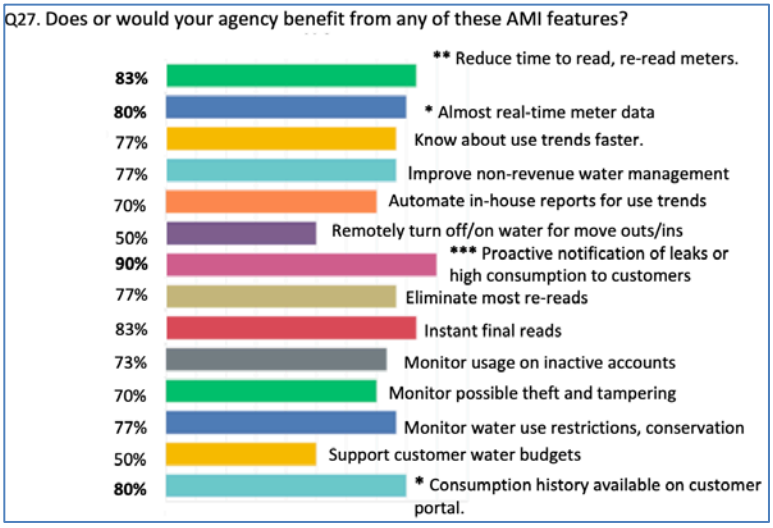
1. Low flow leaks. 2. Continuous high consumption events. 3. Consumption profiles and trends: by season, weekday, and rate class; customer type, and/or any user-specified collection of meters. 4. Usage on "inactive" accounts and automatically generate alerts and notifications. 5. Potential underperforming meters. Any meter with little or no change in registration (zero or low consumption) for a configurable number of days. 6. Analysis for water theft, use after shut off, and reverse flow. 7. Intermittent backflow situations. 8. Accounts where usage violates temporary restrictions. 9. Combining consumption from two registers of a compound meter, including handling the scaling of different registers. 10. Consumption trends (histograms) to help right size meters.

Enabling access to timely, reliable, and accurate meter data provides many core benefits for utility operations.

Finding 4. Virtually all agencies recognize the significant features and added value of AMI technology.

The survey results illustrate a clear understanding by BAWSCA and Valley Water agencies of AMI technology's benefits. For BAWSCA and Valley Water agencies, the four most important AMI features are indicated by asterisks below in Figure 16. Based on responses, "Pro-active notification of leaks or high consumption" is the most important (90%).

Figure 16. Responses rate beneficial features of AMI highly (50% – 90%).

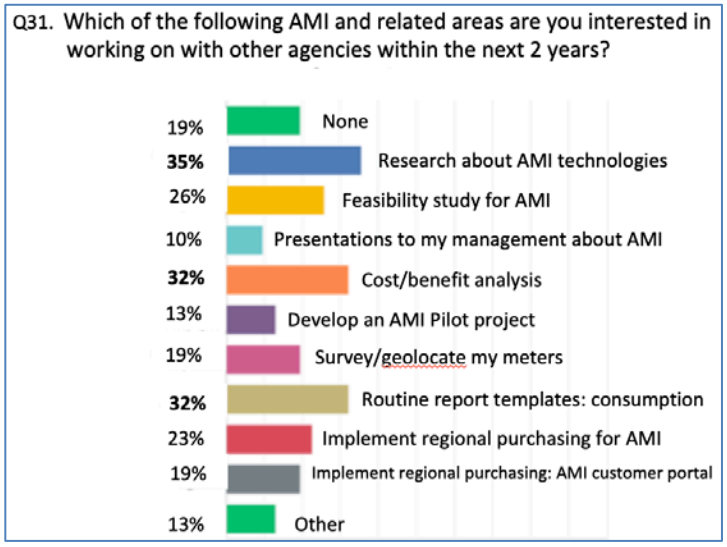


Helping water agencies advance AMI implementation will enable access to valuable tools for timely information about their infrastructure, water use, and for pro-active communications with their customers.

Finding 5. Sixty-two percent of survey participants are interested in collaboration and untapped opportunities exist for regional projects.

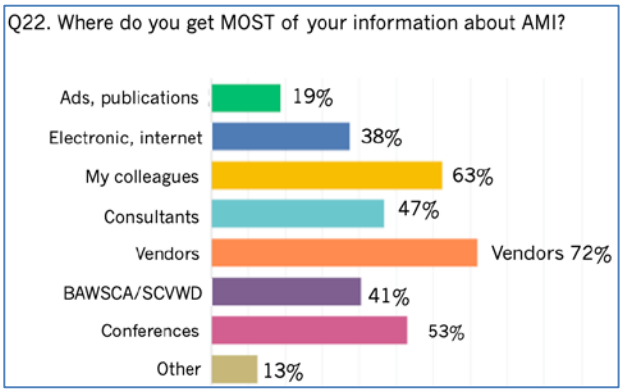
Agencies were asked to select AMI or related projects that they may be interested in working on with other agencies. The highest interest (35%) is in research about AMI technologies, followed by cost-benefit analysis and development of routine report templates for consumption (both 32%).

Figure 17. Responses identify areas of interest for coordinated projects in the next two years.



Agencies identified vendors (72%) and colleagues (63%) as the main sources for AMI information.

Figure 18. Survey Findings – Sources for AMI information.



Helping water agencies advance the AMI knowledge ecosystem will enable broader access to timely information about AMI technology advances.

6. Collaboration Potential

Based on the findings discussed above, opportunities exist for collaboration on AMI and related projects. When asked to rate interest – 0 (not at all) to 5 (highly interested) – in participating in coordinated projects, 62% (18 out of 29 responses, based on manual adjustment due to 4 duplicate responses in Survey Monkey™) of agencies showed interest higher than 3 (Figure 19).

Figure 19. Responses showing agency level of interest in collaborating on AMI and related projects.

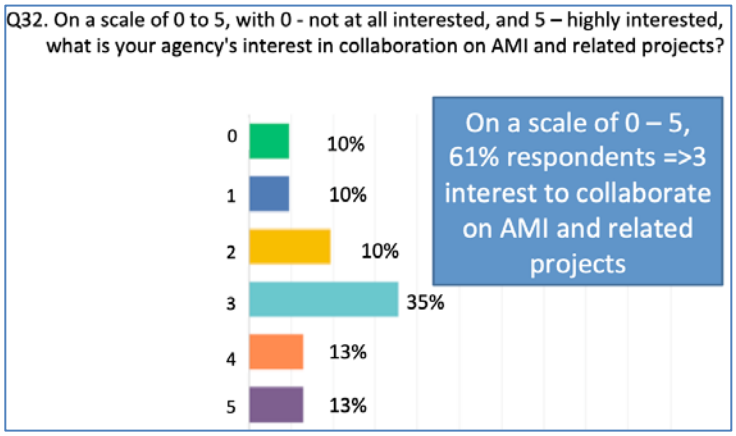
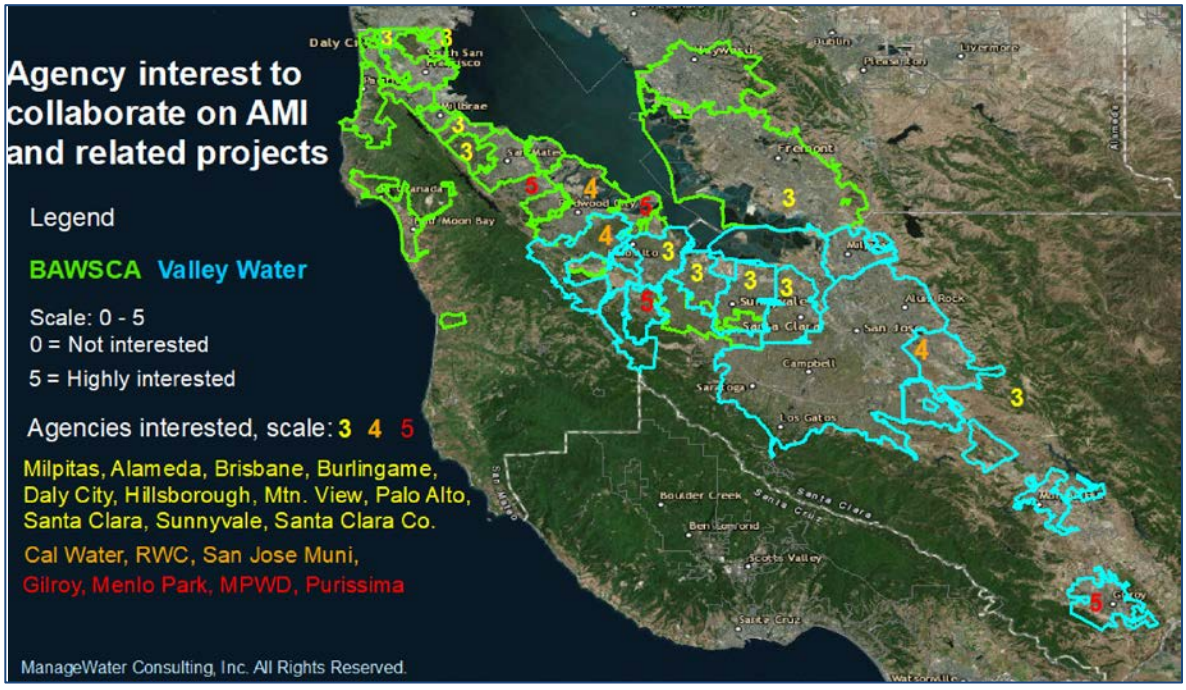


Figure 20. Map showing 18 BAWSCA and Valley Water agencies rating >3 interest in collaboration on AMI and related projects. Map source: ManageWater Consulting, Inc.



Admittedly, some challenges and barriers may prevent agencies from seizing opportunities to work with others on AMI implementation. Significant challenges to deploying AMI include: lack of resources due to planned major upgrades or deployment of a new billing system (44%),

lack of funding (31%), and uncertainty about the process or benefits to the agency (43%). To the latter point, 53% of the agencies identified "limited staff for collaborative projects" as the highest barrier.

Figure 21. Agencies planning new billing or a significant system upgrade.

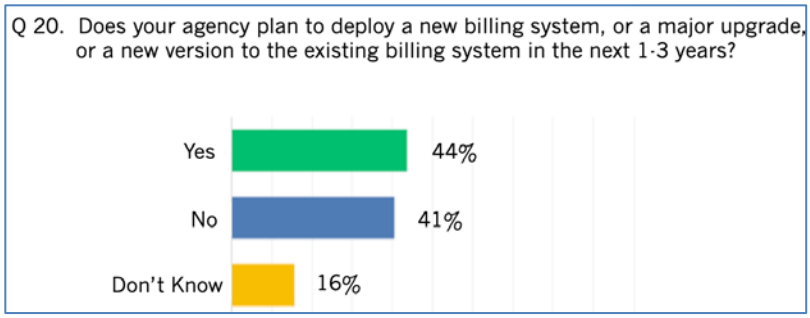
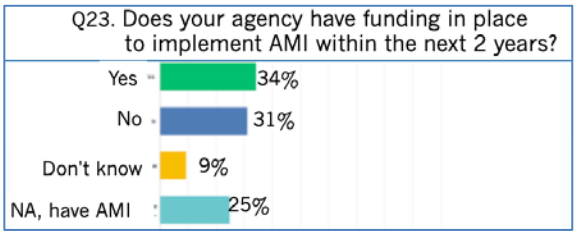
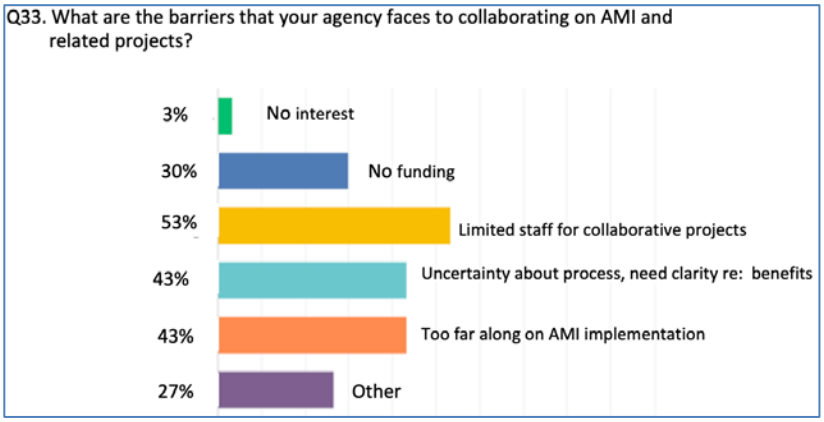


Figure 22. Availability of funding for AMI implementation.



These responses suggest that agencies view collaboration as an added, time-consuming project to their existing busy schedules, rather than saving time and effort.

Figure 23. Agency interest in collaboration and identified barriers.



Therefore, it will be important to structure the collaboration process effectively, so that increased efficiency is clear to participants.

7. Summary and Next Steps

Common themes and potential for collaboration were evident from the survey results. Opportunities and interest for collaboration within and between agencies exists. Depending on agency readiness and urgent needs for AMI, cost-effectiveness, and BAWSCA and Valley Water readiness to provide such services, collaborative teams could tackle a variety of common needs.

For instance, within agencies, groups working with field operations, finance, customers, reading meters, performing maintenance, engineering, and water efficiency share the need for timely information that is sourced from meter data. For routine uses, the information could be shared through templates for standardized reports.

Similarly, collaborative teams could be set up between agencies with the objective to streamline routine processes and reports, and identify 'Best Practices'. Where additional technical expertise is needed, agencies could form a working group, 'opt in', and hire consulting assistance, as needed.

A deeper dive into agency practices could identify the specific paths meter data goes through to reach its end uses. Two fundamental questions are:

1. How is meter data made available to those who need it?

2. Are there common steps in the extraction, delivery, and output processes that could be streamlined to increase effectiveness and efficiency ?

Agencies are very interested in pro-active notification to their customers about leaks and abnormally high water use. Standardizing criteria and thresholds to define water leaks for customer groups would provide consistency (between agencies) for such notifications throughout BAWSCA and Valley Water territories.

Similarly, standardizing templates and automating routine in-house and compliance reports appears to be of common interest and achievable in the near term. Additionally, agencies indicated the need for education about AMI technology improvements with fast return on investments (ROI) to develop funding requests with cost benefit analysis.

Collaboration opportunities – Some examples

In order to develop an 'AMI-knowledge' ecosystem, ground rules for the collaborative process will be needed. Development of a systematic approach for uniform policy, including templates or guidelines for data privacy, opt-ins to participate in regional AMI projects, electronic contract information, and frequency of follow-up will provide BAWSCA and Valley Water a strong and resilient framework for a long-term collaborative AMI implementation program. Some examples for near-term projects are listed below.

- Review existing meter data dissemination processes and identify opportunities for streamlining the process to increase timeliness and efficiency

- Develop a framework for uniform policies (on common member agency needs). For example, templates/guidelines regarding data privacy, opt-ins, need for electronic contact information, and frequency of follow-up with customers
- Develop a working group to identify common aspects for a universal RFP, using the generic AMI RFP developed by Don Schlenger and Associates, LLC., for the Alliance for Water Efficiency and California Water Efficiency Partnership. The result would be common elements in a template for AMI RFPs that could streamline agency processes and also send a strong signal to vendors about common needs from multiple agencies – presenting strength in purchasing numbers
- Standardize and automate reports helpful for multiple member agencies
- Develop templates for coordinated procurement and/or shared contracts
- Share RFPs for projects to survey (X,Y coordinates) meters and related assets. Having the metering infrastructure mapped with X-Y coordinates will enable integration with other meter data to develop a comprehensive history for water agencies. For instance, ability to use electronic maps to track the meter data, water use trends, and maintenance history
- Develop periodic webinars or training about AMI, meter data management, RFPs for AMI deployment, onboarding best practices, case studies, AMI technology improvements, and AMI BMPs
- Develop a practical documentation system for meter management practices
- Develop templates for routine, frequent in-house reports, for BAWSCA/Valley Water, or for agency compliance reporting
- Design proactive and consistent notification criteria and format to inform customers about leaks or high consumption. The notification format will need to factor in different profiles for different customer groups
- Seek grant-funding opportunities to phase in AMI implementation
- Develop BAWSCA/Valley Water pre-approved AMI products at pre-approved prices.

The basic elements that need to be established to proceed with cooperative AMI projects include:

- ✓ Facilitation for the collaborative process
- ✓ Ground rules to participate
- ✓ Identification of resources needed to proceed
- ✓ Selection of near-term project topics of interest and formation of project teams
- ✓ Identification of roles, responsibilities, and process framework
- ✓ Selection of near-term project(s) and Timeline(s) that are achievable

The first project will test the collaborative process and, if successful, will increase effectiveness and efficiency for the participants. We recommend starting with a small cooperative project of high common value to demonstrate the process and its potential to expand to a larger scale. Successful outcomes will translate to an AMI-knowledge ecosystem that will serve BAWSCA and Valley Water agencies for long-term and resilient water management.

8. Attachments

1. Survey Results – Agency responses

2. Survey Results – Summary - graphs summarizing agency responses

9. Selected References

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