



CITY OF AUGUSTA CITY COUNCIL AGENDA REPORT

Meeting Date: January 17, 2022
 Department: Public Utilities – Electric Division & Water Division
 Submitted By: Tim Johnson, Public Utilities Director
 Prepared By: Tim Johnson, Public Utilities Director
 RE: **Assessment of Vision Metering AMI Pilot Project**

RECOMMENDATION

Receive and file a presentation on the AMI metering pilot project from Public Utilities Director Tim Johnson.

BACKGROUND

During the summer of 2020 it became clear the city faces several issues and opportunities that might best be addressed with a comprehensive approach. In 2019 the city adopted a plan to replace every water meter in its system with state-of-the-art digital meters. By early 2020 it became apparent the current water meter reading technology would also have to be replaced as both the hardware and software will no longer be supported as of 2023. At about the same time it also became evident the city needed to begin the process of replacing its electric meters.

Augusta is not alone in needing to replace water and electric meters and update its meter reading technology. Kansas Power, (KPP) staff have for some time been fielding questions from members about Advanced Metering Infrastructure (AMI) technology, its advantages over older technology, how it works and what it costs. In May 2020 KPP released a technical report providing comparison costs of AMI technology from four vendors for sixteen KPP member cities, including Augusta. A team of city staff from utility billing, electric and water researched the different technologies; met with three of the four vendors to learn more about the different types of AMI technology; attended a day long KPP technical meeting to again meet with those vendors and compare and contrast their products and services head-to-head; and then met with a fourth vendor the city has worked with in the past to discuss their products and services. Following these meetings staff concluded that AMI technology can benefit the city in a number of ways.

AMI is the term used to describe a communications infrastructure that includes smart meters, two-way communication networks, control center equipment and computer applications that enable the gathering and transfer of energy and water usage information in near real-time. AMI makes two-way communication with customers possible and is the backbone of what is called the smart grid.

Smart meters have the capacity to collect information about energy, water, and gas usage at various intervals and transmit that data through fixed communication networks to utility and billing staff, as well as receive information like pricing signals from the utility and convey it to consumers. As they develop smart city plans, local governments are considering connected solutions in a wide range of areas, including:

- **Utilities management:** Where it can help improve efficiency and avoid electric outages.
- **Lighting:** Where it can reduce energy costs and enhance safety while serving as a starting point for other connected services.
- **Urban mobility:** This includes real-time information about traffic and pedestrian volumes that can inform longer-term initiatives, including maintenance and economic development.
- **Parking:** Where solutions can increase revenue, reduce congestion, and open the door for public-private partnerships.
- **Safety and security:** Where real-time monitoring can support sophisticated predictive analytics, improved response times and interagency collaboration.
- **Waste management:** Where optimization can enhance customer service and reduce costs.
- **Environmental monitoring:** Which can help governments monitor and respond to both manmade challenges like pollution and natural disasters like flooding.
- **Emerging opportunities:** Including ways to improve the citizen experience through kiosks and other informational tools.

AMI Benefits

Operational benefits: AMI benefits the water system and electric grid by improving the accuracy of meter reads, identifying water leaks and energy theft, and increasing efficiency by improving responses to power outages, eliminating the need for on-site meter reading, and providing for remote disconnection of services.

Financial benefits: AMI brings financial gains to the water and electric utilities by reducing equipment and maintenance costs, enabling faster restoration of electric service during outages, providing for remote disconnection of services, and streamlining the billing process.

Customer benefits: AMI benefits water and electric customers by detecting meter failures early, accommodating faster service restoration, and improving the accuracy and flexibility of billing. Further, AMI allows for time-based rate options that can help customers save money and manage their water and energy consumption.

These benefits are presented in more detail below.

Benefits of Electric AMI

- Reduces high bill complaints by providing transparency and more accurate data

- Overloaded transformer notifications
- Ability to monitor system performance
- Timely, efficient, cost-effective data collection for billing
- Identity control and energy theft
- Platform for future efficiency and automation applications
- Reduces costs of truck rolls
- Reduces work-place injuries and workers compensation claims
- Load forecasting
- Easy to manage and install
- Helps with problems and troubleshooting
- Increased system reliability
- Remote disconnects – Less customer confrontations
- Prepaid metering options
- Remote meter reading
- Reduction of human error in billing readings
- Customers can make intelligent decisions regarding energy consumption
- Customer access to data and awareness of usage
- Enhanced outage detection and improved restoration

Benefits of Water AMI

- Meters are more accessible
- More efficient use of time
- Water leaks detected sooner
- Reduces costs of truck rolls
- Compare metered consumption and treated water produced to determine daily water loss
- Reduction of human error in billing readings
- Customers can make intelligent decisions regarding water consumption
- Customer access to data and awareness of usage
- Improved customer service
- Helps locate theft of services
- Water use histories available
- Educational tool
- Able to identify non-working meters quicker

Having met with several vendors and KPP, staff recommended the city council conduct a test or pilot program with the lowest cost vendor (Vision Metering). Vision has been selling electric AMI technology for several years and has a solid reputation in the electric metering business; however, it is just entering the water AMI market. While attracted by the price of the Vision Metering system and the company's reputation in the electric meter industry, staff were reluctant to recommend the system to the city council without field testing their technology. When staff shared our reluctance to commit to their system given its lack of a track record, the company offered the city a six-month trial period of the system before making a final decision. Several factors, including COVID and some design and manufacturing bottlenecks at Vision delayed implementation of the test program until April 2021.

ASSESSMENT

The Vision Metering pilot project was concluded in October, and staff have the following to report.

1. The system uses the same radio frequency as the city's water SCADA system, causing interference with both systems and reducing AMI performance to an unacceptable level.
2. Utility billing interface is adequate, but not sophisticated.
3. Customer service is severely lacking: Vision gave the city no insight into possible radio transmission conflicts; nor did they perform a propagation study until late in the pilot project, the city was left to figure the system out on its own.
4. The system did not perform adequately after the gateways were located as directed per the propagation study. Placing gateways as directed by the propagation study improved performance, but did not meet Vision's estimated metrics, nor staff's expectations.
5. The electric meters perform satisfactorily.
6. The water meter AMI units do not have sufficient range.
7. Vision Metering is located in South Carolina and has no support staff west of the Mississippi River.

The observations listed above led staff to recommend the city NOT adopt the Vision Metering AMI system at this time.

About five months into the Vision Metering test period, staff reached out to a regional vendor who offered to conduct a test of their system in Augusta. This vendor was one of the four originally vetted by KPP but was more expensive than the Vision system and not considered until their system proved inadequate. The city has done a great deal of business in the past with this vendor (Core & Main), which is also supplying the city's new water meters. Core & Main quickly brought a mobile gateway truck to Augusta, placed it adjacent to one of the city's SCADA towers to determine if the city's SCADA system would have any effect on their system, and allowed city staff to install several water and electric meters in the most challenging locations possible throughout the city.

The Core & Main AMI test lasted just less than three months (12 weeks), and staff have the following to report.

1. The system communicated with every meter instantly and consistently, and at a completely acceptable level.
2. The system does not operate on the city's SCADA system radio frequency; the system operates on a Core & Main proprietary frequency, which prevents interference or signal degradation of either system.
3. The utility billing and customer software and interface are more intuitive to use and provide more information to the user (staff & customers).
4. Customer service is robust and responsive.
5. The electric meters perform satisfactorily.
6. The water meter AMI units perform satisfactorily.
7. Core & Main has a local office with support staff.
8. The initial test location at Power Plant #2 performed satisfactorily, but Core & Main also provided a propagation study that indicated the optimum locations for their gateways are State Street Water Tower and Arnold Water Tower. Since the city already has internet access at Golf Tower Core & Main was asked to determine the viability of relocating the State Street Tower gateway to Golf Tower. Their conclusion was that Golf Tower will perform as well as State Street Tower.

ANALYSIS

The Vision Metering solution is the low-cost system, but does not address the city's needs for consistent, reliable meter reads for either the electric or the water utility. Further, its utility billing and customer service interface are not as user friendly as the other system tested. Finally, Vision is reactionary rather than proactive in its customer service, and the service it does provide must come from South Carolina and is limited to 1-2 support staff.

The Core & Main system exceeded staff's expectations during its two month-long test. Both the electric and the water meters collected and transmitted information as promised by the Core & Main representative. The scale of the Core & Main test is smaller (6 electric; 6 water meters), but the meters were placed in the most problematic locations identified in the Vision Metering test and their performance has exceeded staff's expectations. The system does not operate on the same frequency the city's SCADA systems use. Further, a single 80' tall antenna located at Power Plant #2 is communicating satisfactorily with every meter, regardless of location. Core & Main conducted a propagation study identifying State Street Tower and Arnold Tower as the optimal locations for the system's antennas. Since the city already has internet access at Golf Tower, Core & Main was asked to determine the viability of moving the State Street Tower gateway to Golf Tower. Their conclusion was that locating a gateway at Golf Tower will not have a detrimental

effect on the system's performance. Core & Main's utility billing and customer interface is more mature, intuitive and customer friendly than that of Vision Metering. Finally, Core & Main has several locations within a two-hour drive of Augusta and has a history of providing the city prompt customer support.

Costs

Table 1 below illustrates *KPP's initial cost estimates* for the four vendors they evaluated. Hometown Connections was not evaluated by city staff because of their high costs, relative to the other three providers.

Table 1 – Initial Cost Estimates (2020)

Vision Metering Project Costs	Vision Metering Annual Costs	Core & Main Project Costs	Core & Main Annual Costs	Landis + Gyr Project Costs	Landis + Gyr Annual Costs	Hometown Connections Project Costs	Hometown Connections Annual Costs
822,190	9,576	1,568,300	21,500	1,502,631	14,364	1,880,022	90,315
5-year Cost Estimate							
860,494		1,669,405		1,560,087		2,241,282	

Vision Metering. After reviewing the KPP information, staff reached out to the three lowest-cost providers to develop the more refined cost estimates illustrated in **Table 2**. This table provides a more accurate comparison of the initial costs, as well as estimated costs over a period of five years. A quick look at each estimate shows why staff recommended investing the time and effort to test the Vision Metering alternative. The final estimated total project cost for the Vision Metering AMI system (not including the new water meters) was **\$911,459**. The estimated five-year total cost, including four additional years of software, hosting, and warranty is **\$950,161**.

Core & Main. Core & Main, who is the vendor and service provider for all of the city's Sensus iPERL water meters, submitted a detailed proposal for their AMI system (not including water meters) of **\$1,215,205**. The proposal includes all software and hosting fees for the first year. The five-year total cost estimate is **\$1,352,593**. This covers software, hosting fees, analytics, warranty, and a customer portal that allows rate payers to see and manage consumption and payment information and receive text alerts.

Landis + Gyr. The third vendor included in KPP's initial cost estimate was Landis + Gyr (LG). The LG system uses a different communications platform known as a mesh system. This approach has individual meters transmitting data to other electric and water meters before the data is transmitted to the collectors. The final estimated total cost for the Landis + Gyr AMI system (not including the new water meters) is **\$1,590,300**. The five-year total cost estimate is **\$1,663,500**. This covers software, hosting fees, analytics, and warranty. Given the large difference in cost, along with the satisfactory performance of the Core & Main system, staff have not requested a demonstration of the Landis + Gyr technology at this time.

Table 2 – Revised Cost Estimates (2021)

	Vision Metering	Core & Main (Sensus Meters)	Landis + Gyr
Electric Meters (3-gas Vision)	540,360	616,825	924,000
Water Meter Antenna	339,623	436,600	499,500
Communication Equipment	21,800	95,000	148,500
Software, Hosting, Warranty	9,676	66,780	18,300
Total Estimated Project Cost	911,459	1,215,205	1,590,300
Water Cost Allocation (KDHE Loan)	371,099	598,380	666,300
Electric Costs Allocation (KPP Financing?)	540,360	616,825	924,000
4 Years Software, Hosting, Warranty	38,702	137,388	73,200
Estimated 5-year Cost	950,161	1,352,593	1,663,500

FISCAL IMPACT

Water AMI (\$598,380). Augusta has purchased the remainder of the Sensus iPERL water meters needed to bring the entire system up to date. Funding for the meters was provided through a KDHE revolving loan awarded to the City in February 2021. That loan totals \$1,221,000, the proceeds of which have been thus far allocated as follows:

\$265,400	State Street Water Tower rehabilitation
\$295,000	Sensus iPERL water meters (1,600 ¾” meters; 500 1” meters)
\$ 64,700	Schwab Eaton Engineering Services (water tower)
\$ 15,000	<u>Administrative costs of loan</u>
\$640,100	
\$580,900	Current KDHE Balance Remaining
\$161,780	Communication Equipment, Software, Hosting, Warranty
<u>\$436,600</u>	<u>Water Cost Allocation (AMI Project Cost)</u>
\$598,380	Total Water AMI Cost
\$580,900	KDHE Balance
- \$598,380	<u>Total Water AMI Cost</u>
\$ 17,480	TBD

Electric AMI (\$616,825). Funding possibilities.

1. KPP ECA
2. Electric 40-61 transfer (former transfer to Electric Bond P & I currently slated for distribution system and power plant campus improvements)

Annual Costs. Electric has historically covered the costs of meter reading for both utilities. Implementation of AMI may provide decision-makers the opportunity to consider adding a technology fee to cover the annual costs of the customer portal and perhaps other services, such as online credit card payments.

1. Electric Administration 40-61
2. Water Administration 30-51