



THE CITY OF SAN DIEGO  
**REPORT TO THE CITY COUNCIL**

DATE ISSUED: March 13, 2012 REPORT NO: 12-032

ATTENTION: Natural Resource and Culture Committee  
Agenda of March 21, 2012

SUBJECT: Update on the Implementation of an Advanced Metering Infrastructure System

REQUESTED ACTION:

THIS IS AN INFORMATION ITEM ONLY. NO ACTION IS REQUIRED ON THE PART OF THE COMMITTEE.

SUMMARY:

The Public Utilities Department (Department) has reviewed the use of Advanced Metering Infrastructure (AMI) technology to identify opportunities to enhance its water meter reading, customer service, billing and water conservation capabilities. AMI technology generally provides utilities with remote meter reading capabilities which allow it to be more responsive to customer needs, increase revenues and minimize operating costs, and improve safety for employees and the public.

An assessment conducted by the Department regarding the potential use of AMI highlighted the following key factors leading to significant improvement:

1. The concentration of meters within monthly reading routes will enable the deployment of AMI at a reasonable cost and provide the maximum benefits for the dollars invested.
2. Improved customer service and confidence will result from increased detail and timeliness of consumption data, quicker resolution of bill disputes and a reduction in the number of estimated meter reads.
3. Increased revenues will result from the installation of new, more accurate meters by City staff which will take place in conjunction with the AMI installation process.
4. Automating meter reading for the highest-cost/risk and hardest-to-read meters, such as meters located in underground vaults, will reduce meter reading costs and improve employee safety.

Background

AMI technology allows water meters to be read electronically rather than through direct visual inspection by field staff. The meters transmit customer consumption and time-of-use data to the Department via radio or cellular frequency. Time-of-use data can be used to manage and analyze customer consumption patterns. Additionally, AMI data identifies and alerts staff and customers

of unusual consumption patterns which could indicate leaks on a customer's property and or meter tampering. This information supports water conservation efforts and benefits customers who would be financially harmed by water loss on the private side of the meter.

AMI systems include multiple options for electronically capturing meter data. The first method requires meter readers to walk near the meter and collect reads using a hand-held device. The second method is a mobile system where a computer in a vehicle collects reads as the vehicle is driven near the meters. The third method is a fixed network system where the meters send information to a central computer through a system-wide network similar to a cellular phone network.

In addition to capturing the meter read at the beginning and end of a billing period, which is necessary to calculate customer consumption for billing purposes, AMI systems also capture and provide many regular intermittent reads throughout the billing period. This interval meter data provides a much more granular and detailed view of a customer's consumption pattern and will allow the Department to help customers who typically use large amounts of water to conserve and use the resource more efficiently. For instance, in a fixed network system, customers will have near real-time access to their current and historical usage information providing timely feedback on usage trends and conservation results. A fixed network system will be able to provide timely notification to customers of deviations from their normal usage profile which may be caused by water leaks. While some AMI benefits are more directly realized by large commercial users, all rate payers benefit as the water system becomes more efficient and larger users take advantage of these new tools to reduce overall water consumption. The Department's initiative to replace/refurbish large meters in conjunction with the AMI installations will recover additional under-registration revenue to the benefit of all customers.

It is important to note that cyclical drought conditions have continued to challenge the region. As water conservation increasingly becomes more important, AMI technology will allow the Department to provide tools to empower its customers to make better decisions about their water use. AMI is proving to be an effective tool around the world for educating consumers about their water consumption and the impact such conservation would have in reducing expenses.

Supported by SAIC, a nationally recognized expert in AMI technology, the Department assessed the potential use of AMI within its business operations. A review of meter reading requirements, customer service, bill payment and investigation activities was performed. In addition, meter maintenance operations were also assessed to fully evaluate the degree to which AMI technology could support and provide efficiencies.

As a result, the Department determined that either: 1) a fixed network or 2) a mobile system that can migrate to a fixed network without equipment replacement or other significant costs, will best meet customers' needs.

The five (5) main components of such a system are:

1. Meter Interface Unit (MIU) – Device attached to the meter that collects and transmits meter reading data in digital format.
2. Meter Data Collection Unit (MDCU) – Strategically placed units that collect interval meter read data from multiple meters for transmission to the Control Computer.

3. Control Computer – System computer, which manages a database of meter readings, user-profile patterns, such as tamper and leak detection, and other meter related information. These first three components are also known as the “head end system.”
4. Head End System Software – Software designed to operate interfaces with various other network servers and systems, monitor the performance of the head end system and provide graphical displays of general consumption patterns and individual account water use.
5. Meter Data Management System (MDMS) - Hardware and software required to allow SAP to utilize interval read data. The MDM is the “raw data” depository for interval read data. The MDM also adds analytical capabilities and reporting used to detect leaks, unauthorized use and other customer use profile analytics.

### Project Scope

The planned AMI implementation will include approximately 10,000 of the total meter population of roughly 275,000. This will comprise all monthly read meters, including all meters 3 inches and above, and one bi-monthly read route. Large meters that are past their useful life will be replaced with newer meters fitted with AMI compatible registers. Once implemented, AMI will be used for all subsequent new meter installations, including bi-monthly read meters. With the components of the fixed network or mobile system in place, the Department can continue adding new devices in a steady cost effective manner.

The AMI system Request for Proposal will also solicit proposals for optional leak detection devices for the water system. In some utilities with non-revenue water losses higher than San Diego, the installation of leak sensors has led to a measurable reduction in non-revenue water. The Department will evaluate the cost against the potential savings associated with early detection of system leaks.

Public Utilities has a pilot with IBM to test its analytical capabilities in identifying system leaks by evaluating historical water use and new data from a small number of temporary mobile AMI devices. The study is limited to a single pressure zone and is primarily focused on bi-monthly customers. The IBM pilot will be concluded prior to the AMI project. The lessons learned can be leveraged to maximize the data analysis for the approximately 10,000 monthly accounts, including all large meters.

### FISCAL CONSIDERATIONS:

This project is scheduled to be completed within 2 years, with an estimated total capitalized project cost of \$4,857,688. While this is a capitalized project, the funding will not come from CIP funds. The Department intends to use the City’s Master Lease Agreement financing option. The table below illustrates anticipated lease payment funding requirements beginning FY 2014 for a seven year term. The estimated amount to be financed includes an additional contingency of approximately 4.5%. The Master Lease Financing will be presented to the Budget and Finance Committee on April 11, 2012. Presentation to full Council is projected the second or third week in May, 2012.

Amount to be Financed	Annual Lease Payments				Total Payments
	FY 2014	FY 2015-19	FY 2020	FY 2021	
\$5,076,688	\$689,256	\$822,614	\$678,022	\$133,358	\$5,613,704

For the operating expenses there are sufficient funds in the FY 2013 budget to meet anticipated needs. The FY 2014 operating expenses will be determined and requested in the normal budget process. Once fully implemented, the projected cost of running the system for the first 10 years is \$46,700 annually. After that time, costs will go up as warranties on MIU replacement begin to prorate.

Cost Avoidance/Savings

Costs as described above total approximately \$4.86 million for the project deployment. Comparing costs against conservative projected savings results in a net present value of \$7.1 million. Projected savings include:

- Automation/efficiencies in Meter Reading and Customer Service.
- Improved consumption accuracy through the installation of new meters: Older meters typically result in marginal under-registration of water consumption.
- Unauthorized use, prevention and detection.
- Early detection of failing meters after implementation.

Note: A mobile system will gather the same data as a fixed network system, but this data is not available in real time.

The Department’s Business Case Evaluation, based on conservative projections, shows a net present value of \$7.1 million. The investment payback period is 5.1 years and includes savings from meter replacement and early detection of underperforming meters. Public Utilities also examined the business case for the proposed project without counting the savings from meter replacement or even early detection of failing meters. Under that analysis, the net present value of the project was \$5.3 million with a payback period of approximately 7.0 years. When the same analysis was applied to a full system deployment, the Department was unable to generate a positive net present value. This was due to the high initial cost projection of approximately \$82 million and a negative net present value of approximately \$10 million. The of expansion to bi-monthly meters, which currently have lower meter reading costs, did not balance out against such a large investment. In addition, the larger project would require additional AMI hardware and software purchases.

The approach proposed allows AMI technology to be applied on a smaller scale. In doing so, only a small portion of customers will be impacted by any implementation challenges associated with the project. Changes to policies and procedures can be more easily developed and tested. If and when AMI technology has proved its value, the City will be able to make an informed decision, using its own actual data, about a wider application of the system. At the completion of the project proposed, City staff could continue adding AMI meters to the system for age replacement, new construction and other relevant scenarios.

The City's Purchasing and Contracting Department, and City Attorney's Office have recommended the Department use a "Goods and Service" contract with a construction management element for AMI procurement, as this is the most appropriate form of contract for the AMI project. This contracting form will provide the most efficient process to get the best system at the lowest cost.

PREVIOUS COUNCIL and/or COMMITTEE ACTION:

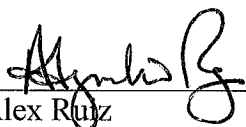
Previous Council Action R.W. Beck – City Council approval 1<sup>st</sup> reading (June 22, 2010) second reading (July 19, 2010), NTP (August 23, 2010) O-19974  
IROC - Information Item (July 21, 2010); and Vote in Support (September 20, 2010)  
IROC - Vote in Support (February 21, 2012)

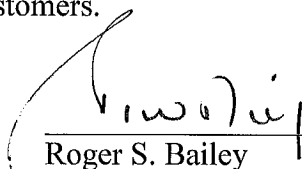
COMMUNITY PARTICIPATION AND PUBLIC OUTREACH EFFORTS:

Public outreach will be a component of the project and will extend through implementation. To achieve this, the Department will educate and explain the benefits and features of AMI to interested parties with focus on the customers who will be receiving the new technology.

KEY STAKEHOLDERS AND PROJECTED IMPACTS:

All City of San Diego residents will be positively impacted as larger users will have the ability to monitor their use thus enabling them to reduce water consumption. Concurrently, the Department's initiative to refurbish large meters in conjunction with the AMI installations will recover unbilled revenues to the benefit of all customers.

  
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