



City of Palo Alto

(ID # 12285)

Utilities Advisory Commission Staff Report

Report Type: New Business**Meeting Date: 7/7/2021****Summary Title: Advanced Metering Infrastructure Project****Title: Staff Recommend That the Utilities Advisory Commission Recommend the City Council Approve the Use of the Electric Special Project Reserves in an amount Not-to-Exceed \$18.5M to Fund the Smart Grid Technology Installation Project (EL-11014) for Advanced Metering Infrastructure (AMI) Implementation-Related Expenditures****From: City Manager****Lead Department: Utilities**

Recommendation

Staff recommend that the Utilities Advisory Commission Recommend that City Council Approve the use of the Electric Special Project reserves to fund the Smart Grid Technology Installation Project (EL-11014) in an amount not to exceed \$18.5M, as follows:

1. Transfer up to \$7.6M from the Electric Special Project (ESP) reserves to the Smart Grid Technology Installation Project (EL-11014) for Electric Advanced Metering Infrastructure (AMI) and smart grid-related expenditures;
2. Transfer up to \$7M from the ESP reserves to the Smart Grid Technology Installation Project (EL-11014) for Water AMI and smart grid-related expenditures as an inter-fund loan with a repayment term of 5-years with prevailing interest, upon completion of the project; and
3. Transfer up to \$3.9M from the ESP reserves to the Smart Grid Technology Installation Project (EL-11014) for Gas AMI and smart grid-related expenditures as an inter-fund loan with a repayment term of 5-years with prevailing interest, upon completion of the project.

Executive Summary

In 2018, the Utilities Advisory Commission (UAC) and City Council approved the Smart Grid Assessment and Technology Implementation Plan and supported implementation of the Advanced Metering Infrastructure (AMI) project. AMI is a foundational technology that is becoming a standard in the utilities industry to implement smart grid systems designed to improve customer experience, strengthen system reliability, enable City of Palo Alto Utilities (CPAU) to operate more effectively, and enable the community to meet its environmental sustainability and resiliency goals.

To implement AMI, staff identified detailed business requirements and issued a request for proposal to

potential AMI systems and installation vendors. After evaluating 13 proposals, staff recommends Sensus USA Inc, for their AMI system and equipment installation services, and N. Harris Computer Corporation for their SmartWorks Meter Data Management Software (MDMS). Staff also recommends a contract amendment with E Source Companies to assist CPAU with project management, change management, system integration, support for testing and training, and field oversight throughout the project from 2021 through 2025. The combined initial (capital) costs of these three contracts are estimated at between \$16.5 and \$18.5 million, depending on the use of \$2M in contingency funds. An additional \$2 million in expenditures is projected over the 5 to 10-year term of the contracts for on-going annual software and hosting services, bringing the total contact amount to \$20.5 million over the life of the contracts.

The Electric Special Projects (ESP) reserve fund is in place to fund major one-time electric utility expenditures, including the AMI project. Hence staff recommend using up to \$7.6 million from ESP reserves to cover the electric share of the AMI project, and for the ESP lend up to \$10.9 million to cover the gas and water share of the project, with a plan to repay the loan with interest at the prevailing interest rate (currently 2.15%) within 5 years after project completion. The use of ESP for this project is within the ESP reserve guidelines approved by UAC and Council in 2015 ([Staff Report #5716](#)).

Background

In November 2018, the City Council approved the Utilities Smart Grid Assessment and Technology Implementation Plan ([Staff Report # 9780](#)). The assessment recommended the implementation of Advanced Metering Infrastructure (AMI) based smart grid systems for the benefit of electric, natural gas and water utility customers.

AMI is a foundational technology that is becoming a standard in the utilities industry and will improve customer experience while enabling CPAU to operate more effectively. An AMI-based smart grid system will empower customers to more efficiently utilize utility supplies, facilitate customer adoption of distributed energy resources (DER) such as solar photovoltaics, energy storage, and electric vehicles, and enable the timely detection of water leaks. AMI will also enable CPAU to optimize operations and improve reliability by reducing restoration time for outages. AMI will be a critical system to meet the community's greenhouse gas reductions goals by enabling time-of-use (TOU) electricity rates and to encourage the use of electrical appliances and charging EVs during periods of the day when electricity cost is low.

Given the large investment required to implement an AMI system, a cost-benefit analysis was undertaken in 2018 period to determine financial viability of AMI, assess staffing requirements, and consider technological dependencies, project risks, and CPAU's operational readiness. The analysis found that the overall net-present-value (NPV) of the investment over the 18- year life of the system was close to break-even, considering only the costs and benefits that can be quantified. This effectively means that there will be little or no impact on utility cost to customers over the 18-year life of the project. Upon including non-quantifiable benefits such as enhanced customer experience, improved system reliability, and better distribution asset utilization, the analysis suggests that this strategic

investment would be a net benefit to all utility customers, particularly for the electricity and water utility customers. The estimated capital cost related to the AMI system installation was approximately \$16 to \$19 million with an investment life of 18 years. The evaluation also analyzed the operational impact and found that the investment will require a few staffing changes to implement and maintain the AMI infrastructure to maximize the value of the investment. The annual operating cost of the AMI system is estimated to be \$1.9 million, which would be offset by \$3.3 million in benefits estimated to accrue from electricity and water use conservation, and current staffing related savings. The result is projected to be a net monetary benefit to of \$1.4 million per year on an ongoing basis.

The UAC and Council acceptance in 2018 of staff’s recommendation to invest \$16 to \$19 million in AMI technology was based on a financial and economic analysis undertaken by expert consultants and the experience gained by CPAU after implementing the *CustomerConnect* AMI pilot in 2013-18

Discussion

I. RFP Issuance, Vendors Selection, and Contract Negotiations to Implement AMI Project

Following Council’s acceptance of staff’s recommendation to invest in AMI technology in November 2018, staff retained consultants to assist with soliciting AMI systems vendor proposals. On March 31, 2020, a Request for Proposal (RFP) Number 177782 for ‘Equipment, Software, and Services for an Advanced Metering Infrastructure Project’ was issued. Staff received 13 proposals ranging from one to five components identified in the RFP: AMI network, water metering, gas metering, installation services, and meter data management system. The proposers were asked to submit a proposal on a single project component, multiple project components, or all five components. Proposers were also permitted to submit a joint proposal for one or more project components, to provide a proposal that best meets the City’s stated needs.

Component Number	Component Name	Component Description
1	AMI Field Area Network (“FAN”)	Equipment, software, and services capable of delivering billing and interval reads from customer meters, including networking infrastructure components and the installation thereof, AMI-integrated electric meters, water and gas endpoints/modules, and other ancillary equipment (batteries, water meter pit lids, etc.) necessary to attain functionality; additionally, integration services to tie the AMI headend to other business-critical systems
2	Water Metering	Water meters, registers, and lids
3	Gas Metering	Gas meters and indices
4	Installation Services	Installation services for electric meters, AMI endpoints/modules, and other ancillary metering equipment (water and gas meters, water meter registers, gas meter indices, lids, boxes, etc.) related to the AMI Project; additionally, procurement of ancillary equipment, such as water meter boxes, as-needed upon request
5	Meter Data Management System (“MDMS”)	Software and services for the long-term retention, validation, estimation, and editing of meter reads, as well as advanced analytic tools for the data; additionally, integration services to tie the MDMS to other business-critical systems

Staff and the consultant assembled a cross-functional AMI project team consisting of members from Administration, Customer Service, Engineering, IT, Operations and Resource Management. The team met for eight months reviewing each proposal, interviewing vendors, participating in vendor demonstrations and presentations, and conducting customer reference calls.

The proposals were evaluated based on the following criteria. It was also specified that the weights associated with the criteria would be different for the five components of the RFP.

1. Quality and completeness of Proposal
2. Quality, performance and effectiveness of the solution
3. Proposer's experience
4. Cost to the City
5. Proposer's financial condition and stability
6. Proposer's ability to perform the requirements within the time specified
7. Proposer's prior record of performance with City or other agencies
8. Proposer's ability to provide future maintenance, repairs, parts and/or services
9. Proposer's compliance with applicable laws, regulations, policies
10. Whether or not the Proposal is Turnkey; existence of synergies with existing City systems

The selected vendors have a proven history of AMI experience in the municipal sector with electric, gas, and water meters in California. The solutions and services they offered were the best fit for the City in the near term and for future business requirements.

II. AMI Technology

AMI system provided by Sensus USA Inc. was selected. This system consists of five elements:

1. A 900 MHz point-to-multipoint network over FCC licensed radio band.
 - o Five network poles will be erected at Hale Well Station, Peers Park Pump Station, Maybell Substation, Montebello Reservoir, and East Meadow Substation to receive wirelessly transmitted meter data from ~74,900 electric, gas and water meters.
 - o There will be a total of 10 collector radios, ranging from one to three collectors per site, powered at 8 Watts, and are expected to collect meter data continuously and transmit every fifteen minutes.
 - o Network and meter communication is secured via fiber backhaul and AES-256 encryption and the system meets all relevant NIST standards.
2. Approximately 27,100 Sensus residential/small commercial electric meters and ~2,900 Aclara kV2C commercial electric meters, both with Sensus radios, will replace all ~30,000 of the existing electric meters.
 - o The 2 Watt-powered radio embedded in a meter is expected to transmit data (15-minute energy consumption and voltage data) on a hourly basis, but ~0.1 second each time. The customer consumption information will be made available to customers the day-after, on a hourly interval basis for electricity consumption and daily intervals for water/gas consumption.

- On an optional basis the electric meters can have an embedded Zigbee radio, which when turned on by CPAU at customer's request, will be able to communicate meter reading data within the home via a in-home-display (IHD) or wi-fi enabled gateway to a customer selected IHD/gateway service provider.
 - Some electric meters will also have a remote disconnect switch. This feature could be used to turn off or limit the current flow to a delinquent customer. This feature will lower CPAU operating costs of travelling to customer site for customer turn-off or move outs.
 - Replacement of the electric meter will result in a momentary outage for the customer. Customers will be notified in advance of the electric meter replacement.
3. Approximately 20,798 water meters will be retrofitted with Sensus water meter end-point radios.
- Water meter radios are powered by batteries that are warranted for 15-20 years and transmit to the collector at 2 Watts, 6 times a day, with transmission lasting ~ 0.1 seconds each time.
 - Approximately 9,000 water meters are older than 20 years and are due for replacement with CPAU's preferred Badger meters. To achieve operational efficiencies and economies related to installation, these older water meters will be replaced when AMI radios are installed at those locations. CPAU will directly purchase the Badger water meters from the manufacturer and provide them to Sensus for installation along with Sensus water end-point radio.
 - Since the water meters will be procured by CPAU, outside the Sensus contract and are not directly related to the AMI project, these costs are not included in this report nor included as part of the AMI capital budget. Instead, these water meter replacements will be charged against the Water Meter Replacement CIP (WS-80015). Due to staffing constraints in previous years, CPAU has accumulated a large backlog of aged water meters in need of replacement. Water meter box lids will also be replaced or retrofitted to accommodate a mushroom shaped radio antenna that is mounted flush with the lid to provide a clear path for communication.
4. Approximately 24,208 of existing gas meters will be retrofitted with Sensus gas meter end-point radios.
- Gas meter radios are powered by batteries that are warranted for 20 years and transmit to the collector at 2 Watts, 6 times a day, with transmission lasting ~ 0.2 seconds each time.
 - The dials of the existing gas meters will be removed and be retrofitted with dials which can be connected to the gas meter radio/antennas.
5. A cloud-based meter Head End System (HES) will store all the data collected and transmitted by the meters. Sensus will be providing hosted HES solution for an initial 10 year period, extendable up to 20 years.
- Data centers hosting the HES are located in the U.S and communication is secured through a VPN connection. Data is encrypted at rest including backups. All datacenters comply with SOC2 for physical security. No Personally Identifiable Information (PII) will be stored in the system.
 - Sensus maintains a set of security policies that are aligned with industry standards and has been certified by GE under the Achilles Practices Certification (APC) and Achilles Communication Certification (ACC) programs.
 - Sensus is in the process of obtaining ISO 27001 certification and expects to be certified by the

end of CY 2021.

Illustrations of these five AMI system components from Sensus are provided in Attachment A.

The total capital cost associated with procuring this system is estimated at \$10.4 to \$11.7 million, with an additional \$90,000/year for hosting and software services.

III. Installation Services

Customer metering equipment installation services would also be provided by Sensus USA, under a subcontract with Utility Partners of America (UPA). UPA is one of the leaders in providing large-scale meter installation services. UPA served as the installation contractor for other municipal utilities in California such as Sacramento Municipal Utility District, Eastern Municipal Water District, the City of Long Beach Energy Services and the City of Santa Rosa. The Work Order Management System (WOMS) to aid the management and quality control will be based on Enight+ software.

- Enight+ software services are hosted by Rackspace, which is SOC 1, SOC 2, SOC 3, and ISO 27001 certified; and the data is stored with AES-256 bit encryption.
- Enight+ as an organization is in the process of being SOC2 certified by early 2022.

Installation services include replacement of electric meters, retrofitting existing water meters with AMI radios, replacing water meter box/lids, replacement of aging water meters, retrofitting existing gas meters with AMI radios, removal and disposal of old equipment in accordance with City's disposal and recycling policies.

Installation of electric meters will cause a momentary outage for the customer. Installing water and gas radio end-point will not cause service disruptions for the customer. Replacement of aging water meters will cause a 30 to 45-minute service disruption. Timely notices, including knocking on the doors, would be provided to customers during the mass installation phase of the project, anticipated to occur in the 2023-24 period.

New electric meters will be tested on a sample basis. Due to the volume of meter replacement and associated logistics, meters removed will not be tested. If customers perceive their meter to be inaccurate, tests will be performed on the new meters.

The installation services by UPA are expected to begin in mid-2023 and projected to cost \$4.3 to \$4.7 million. Illustrations of the installation services that will be provided by UPA are provided in Attachment B.

III. Meter Data Management System (MDMS)

The MDM software system will be provided by SmartWorks (a division of N. Harris Computer Corporation) based in Ontario, Canada. They are the industry's leading MDM provider for medium size utilities like CPAU. The system would include the following application and security features:

- Validate, edit and estimate (VEE) metering information received from the Sensus HES and store information as the system of meter reading records.

- Process and provide required information to produce customer bills in the SAP CIS system; feed hourly/daily consumption information to the SEW customer portal (MyCPAU) for viewing by the customer.
- Provide information for various system analytics tasks such as outage notification, transformer loading analysis, voltage analysis, conservation voltage program, etc.
- The software and hosting services are provided on servers operated by IBM. The hosted software meets industry security standards:
 - AES-256 encryption, FIPS (140-2), FISMA and California SB1386 compliant.
 - In the process of obtaining SOC2 certification by early 2022.
 - No Personally Identifiable Information (PII) will be stored in the system.

The MDMS will act as the system of record for all meter readings and customer consumption, integrating with various other system and feeding billing, customer service, and engineering operations. It will offer dashboards, visualizations, and analytics to view individual meters or aggregated meters. The MDMS also provides analysis tools for water leak detection, outage map, and transformer health. Under phase 1, the City will receive water leak detection and outage maps. The transformer module for identification and resolution of overloaded and underloaded transformers within the system will also be implemented. Additional features such as conservation voltage reduction program are expected to be implemented in phase 2 of the AMI project in the 2026 period.

An illustration of the MDM system is provided in Attachment C.

The total capital cost associated with procuring and configuring/integrating this system is estimated at \$0.7 to \$0.8 million, with an additional \$270,000 per year for hosting and software services.

V. Project Management and Organizational Change Management Consulting Services

Staff recommend to continue utilizing the services of E Source (previously UtiliWorks Consulting) to assist CPAU staff in managing this large specialized project. With their wide-ranging and in-depth AMI experience, E Source had previously assisted CPAU with analyzing the cost-benefits of the AMI investment and also assisted in soliciting vendor proposals, evaluation, and during the vendor contract negotiations.

E Source has a proven history of working with CPAU in developing a strategic technology roadmap, completing the AMI business case and cost-benefit analysis, and supporting procurement of advanced metering infrastructure (AMI) and meter data management (MDM) solutions.

E Source services under the agreement will include project management, organizational change management, system integration, testing and training support, and field services oversight. The expenditure under this contract is projected to be \$1.1 to \$1.3 million.

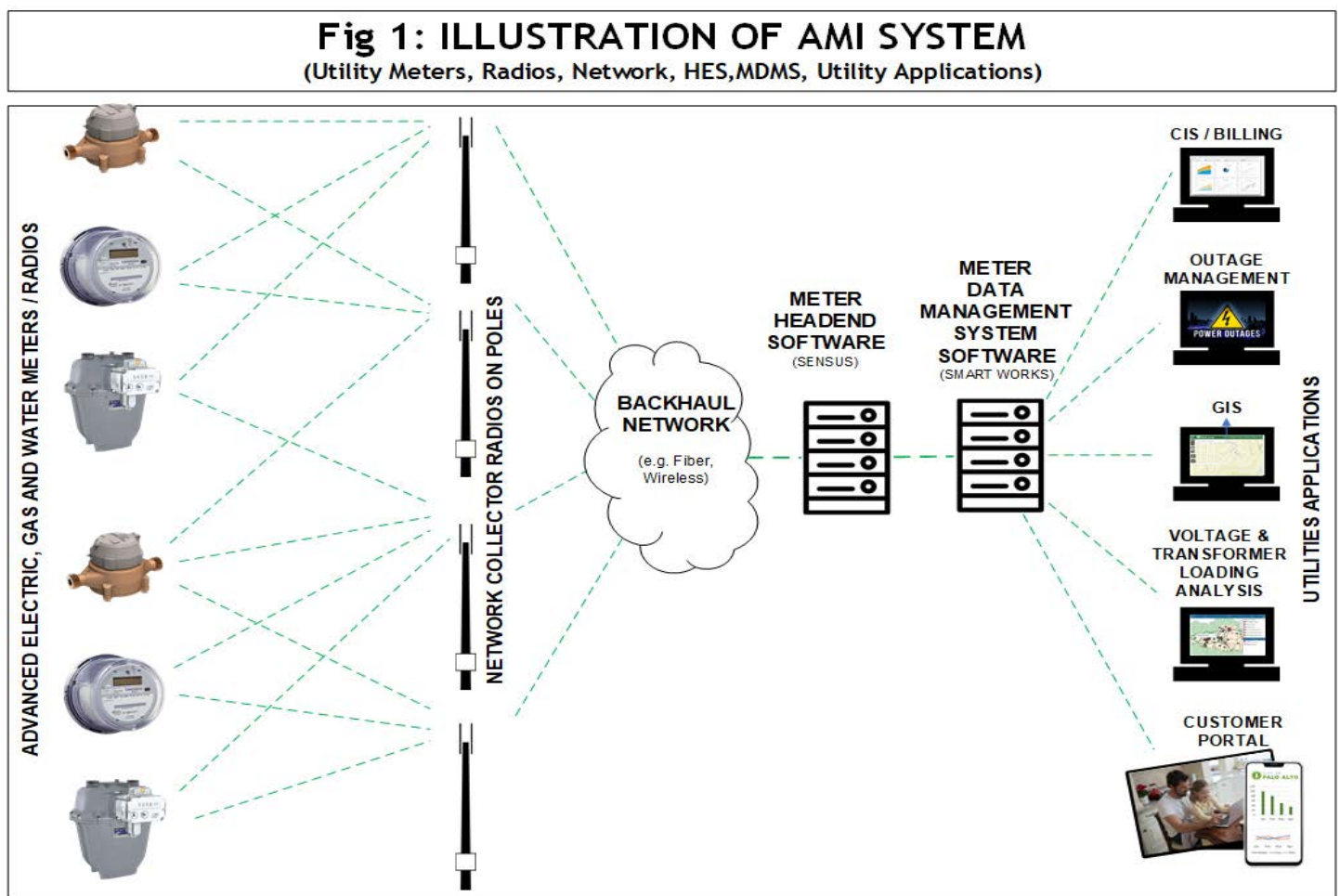
VI. System Integration Services with Existing CPAU Technology Systems

In addition to equipment and services procured through these three contracts (four services), additional resources will also be needed to implement this project:

- Augmenting SAP Consultants services to integrate MDMS with the CIS/Billing system.
- Augmenting consulting services with SEW, the MyCPAU customer account management portal provider to integrate AMI data into the portal.
- Re-assigning existing staff to new roles to implement and maintain AMI systems.
- Hire temporary staff to back-fill for existing staff who will be assigned to the AMI project during implementation phase.

The cost of these additional resources is estimated at between \$1.0 and 1.5 million.

An overview of the AMI and MDM systems selected and their communications and interfaces with CPAU’s existing technology systems are illustrated in Figure 1.



VI. Components of Project Cost & Projected Budgets

A description of the of the three contracts (for four services) that will be taken to the Council for consideration and approval in August 2021 is provided in the table below .

Table 1: Description of AMI Systems Hardware, Installation, Software and Consulting Services

Contracting Entity	Sensus USA, Inc.	Sensus USA, Inc. & Subcontractor (Utility Partner of America)	N. Harris Computer Corporation	E Source	Total
Contract Description					
Type of Service	AMI equipment, software and hosting services, integration services, and professional services	Meter, radio, and lid installation services	MDMS software through Smart Works, integration services, and professional services	Consulting services related to project management, change management, system integration and field services	
Contracting Term	10 years (additional two, 5-year renewal option)	N/A (subcontractor to Sensus)	5 years (additional 5-year renewal option)	4 years (additional 2-year renewal option)	
Costs					
Implementation Cost	\$ 10.4	\$ 4.3	\$ 0.7	\$ 1.1	\$ 16.5
Contingency	\$ 1.4	\$ 0.4	\$ 0.1	\$ 0.2	\$ 2.0
Total Implementation Cost	\$ 11.7	\$ 4.7	\$ 0.8	\$ 1.3	\$ 18.5
Annual Recurring Cost	\$ 0.1	\$ -	\$ 0.3	\$ -	\$ 0.4
Total NTE Amount for Contract Term(s)	\$ 12.7	\$ 4.7	\$ 1.9	\$ 1.3	\$ 20.5

The total value of the approval sought from Council is \$20.5 million, of which \$16.5 million is related to initial implementation, with the remaining funds accounting for annual recurring costs for the duration of the contracts (\$2.0 million) and contingency funds (\$2.0 million). Of the initial implementation cost, \$12.4 million could be directly attributable to one of the three utility services, while \$4.1 million are indirect and cannot be directly attributable to any given utility service. Ongoing total software/hosting charges are estimated at \$360,000 per year.

Through negotiations with vendors, a savings of \$345,000 was realized on vendor professional services for implementation, as well as an additional \$300,000 (over 5 years) on the annual recurring cost for MDMS, as compared with the initial proposals submitted.

VII. Project Funding & Allocation of Costs to the Electric, Water and Gas Funds

The total implementation cost of the project is estimated at between \$17.5 and \$20.0 million (including CPAU internal costs related to integration with existing systems), as outlined in the table below. This is above the \$16.7 million costs estimated by staff in 2018.

Table 2: Estimated Total Contract Cost of AMI Systems Implementation (M\$)

Cost Category	Cost (Low)	Cost (High)	2018 Estimate
Sensus – Equipment and Software	\$ 10.4	\$ 11.7	\$ 10.8

Sensus – UPA Installation Services	\$ 4.3	\$ 4.7	\$ 3.0
Smart Works – MDMS	\$ 0.7	\$ 0.8	\$ 0.7
E Source – PM Services	\$ 1.1	\$ 1.3	\$ 1.2
Subtotal	\$ 16.5	\$ 18.5	\$ 15.6
Integration Services – SAP, SEW, Backfill, etc.	\$ 1.0	\$ 1.5	\$ 1.1
Total	\$ 17.5	\$ 20.0	\$ 16.7

Installation costs increased substantially over the 2018 estimate for two primary reasons: the current contract estimate now includes the installation cost to replace ~8,000 aging water meters, compared with previous estimates that included water register and endpoint retrofits only. Additionally, labor rates are dependent on determinations from California Department of Industrial Relations (DIR), which have increased since the time of the estimate in 2017-18 period.

The Electric Special Projects (ESP) reserve will be used to fund the electric portion of the AMI investment. As a result, there will be no rate impact to the electric ratepayers. The gas and water funds will cover direct cost associated with their own equipment and installation costs. Project costs that cannot be directly allocated to one of the three utilities (indirect costs, such as project management services, installation service mobilization cost, warehouse rental, etc. totaling \$4.1 million) are proposed to be allocated based on the ratio of each of the three utility annual revenues during FY 2020. This results in an apportionment ratio for indirect project cost of 65% (electric), 18.5% (water) and 16.5% (gas). With these allocations, the total baseline capital cost of the vendor contracts of \$16.5 million (without contingency funds) is estimated to be allocated as follows: \$6.4 million (electric), \$6.4 million (water) and \$3.6 million (gas). The allocation of cost, including contingency, are as follows: \$7.6 million (electric), \$7 million (water) and \$3.9 million (gas).

To reduce the short term cashflow impacts on the gas or water funds it is also proposed that the ESP reserve initially cover water and natural gas utility funding needs related to the AMI project, with a repayment plan to the ESP reserve at prevailing interest rate (currently 2.15%) over a 5-year period upon project completion. The proposed AMI capital improvement project (CIP) budget from ESP reserve and repayment schedule from the water and gas funds are illustrated in Table 3. The table below illustrates the expenses of \$18.5 million during the 2021-24 period and repayment in the 2025-2029 period.

Table 3: Illustration of Baseline AMI Funding Needs: ESP Funding and Repayment by Gas and Water Funds (M\$)

	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
ESP Funding of Expenses & Repayment	\$ 0.0	\$ 3.7	\$ 4.8	\$ 9.9	\$ (2.1)	\$ (2.2)	\$ (2.2)	\$ (2.2)	\$ (2.2)	\$ 7.6
Gas Fund Repayment					\$ 0.8	\$ 0.8	\$ 0.8	\$ 0.8	\$ 0.8	\$ 3.9
Water Fund Repayment					\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.4	\$ 7.0
Total										\$ 18.5

Costs that are to be repaid to the ESP Reserve by the gas and water funds have been straight-line amortized across a five-year period after implementation is completed.

VI. Overall Project Organizational Structure

The project will be implemented under the direction of the Strategic Business Manager and the AMI Project Core Team headed by the AMI Project Manager. Nine AMI implementation workgroups, with assigned leads, will be formed to implement workstream associated with the project. These groups will be working collaboratively with the AMI core team and the relevant external vendors throughout the project. See Attachment D for project implementation organizational structure.

Next Steps:

Upon UAC consideration and approval of the use of ESP reserve to fund this AMI/Smart Grid project, staff expects to take a resolution to Council for formal approval for the use of up to \$18.5 million ESP reserve funds, and the approval of the three contracts.

Timeline

UAC and Council Approval	July and September 2021
Notice to Proceed Issued to Vendors	September 2021 – April 2022
Installation of AMI network, initial meters	Jan 2022 – June 2023
Availability of AMI System to Limited Number of Customers	Soft Launch mid 2023
Mass Deployment of Meters	June 2023 – December 2024
AMI Implementation Project Completion (Phase I)	CY Q1 2025
Phase II: Begin Initiatives to Optimize AMI Investment (e.g., conservation voltage reduction program)	CY Q3 2025

Resource Impact

In addition to the projected initial capital cost of \$16.5 million to \$18.5 million, the on-going annual

operating cost for the AMI and MDMS vendor systems is estimated at \$0.36 million/year for software licensing and SaaS support. Most of the capital costs have been included the current and projected CIP budgets, but these may need some adjustments based on project cashflow needs over the next 3 years.

New permanent roles of AMI Manager (Utilities Supervisor), AMI Systems Technician (Business Analyst) and MDMS Data Analyst (Business Analyst) are also anticipated to be created, from existing vacant positions, to implement, support and manage AMI related systems. These new roles are anticipated to be filled during the project implementation phase and the roles will take on the operation, maintenance, and enhancement roles post Phase I implementation. Furthermore, best efforts will be made to train and potentially reassign seven meter-reading staff to new roles since the meter reader position will be impacted after the implementation of this technology project.

Policy Implications (If Applicable)

The recommendation conforms with the 2018 Utilities Strategic Plan (USP) that has identified implementation of AMI system as a key strategy under USP Priority #2 to “Invest in and utilize technology to enhance customer experience and maximize operational efficiency.”

A number of policies to implement and operate an AMI system must be considered and approved as the project implementation progresses. Such policies and procedures and related Utilities Rules and Regulations will include: ways to accommodate customers who elect to opt out of advanced meters at their homes, a backup customer billing process in the event AMI meters cannot be read remotely due to a cyber-attack or a communication network interruption, etc.

Stakeholder Engagement

The need for an AMI system has been discussed with the UAC and Council since 2013, including the implementation of a pilot AMI system in the 2013-2018.

As part of the 2018 Utilities Strategic Plan development, staff actively engaged with internal and external stakeholders to identify priorities to be carried out by staff over the next three to five years. AMI was a recurring theme and identified as a strategic initiative under the “Technology” priority to increase system reliability, enhance customer experience, improve response time and meet the community’s sustainability goals.

Upon UAC approval and prior to Council consideration and approval staff recommendations to proceed with implementing the AMI project, staff will undertake a concerted effort to communicate the many facets of this project, including: customer and organization benefits and costs, project timeline and what can customers and employees expect during different stages of the project, how will this project impact individual staff members, staff training needs, etc. Appropriate channels will be used to effectively communicate and engage with stakeholders.

An AMI project webpage will be set up to inform the residents and businesses about the project and its benefits to the community. As project progresses and mass meter deployment begins in mid-2023,

additional meter installation related communications will also be undertaken with the community.

Environmental Review

The UAC recommendation to Council of approval of the AMI project, including associated vendor contracts and funding sources, does not meet the definition of a project under CEQA Guidelines section 15378(b)(5) as an administrative activity of government; therefore, the California Environmental Quality Act (CEQA) review is not required at this stage.

Attachments:

- Attachment A: Illustrative Pictures of AMI Components from Senus
- Attachment B: Illustrative Pictures from Installation Contractor UPA
- Attachment C: Illustrative Pictures of MDMS Software Features from SmartWorks
- Attachment D: AMI Project Implementation Organizational Structure
- Attachment E: AMI Presentation

ATTACHMENT A

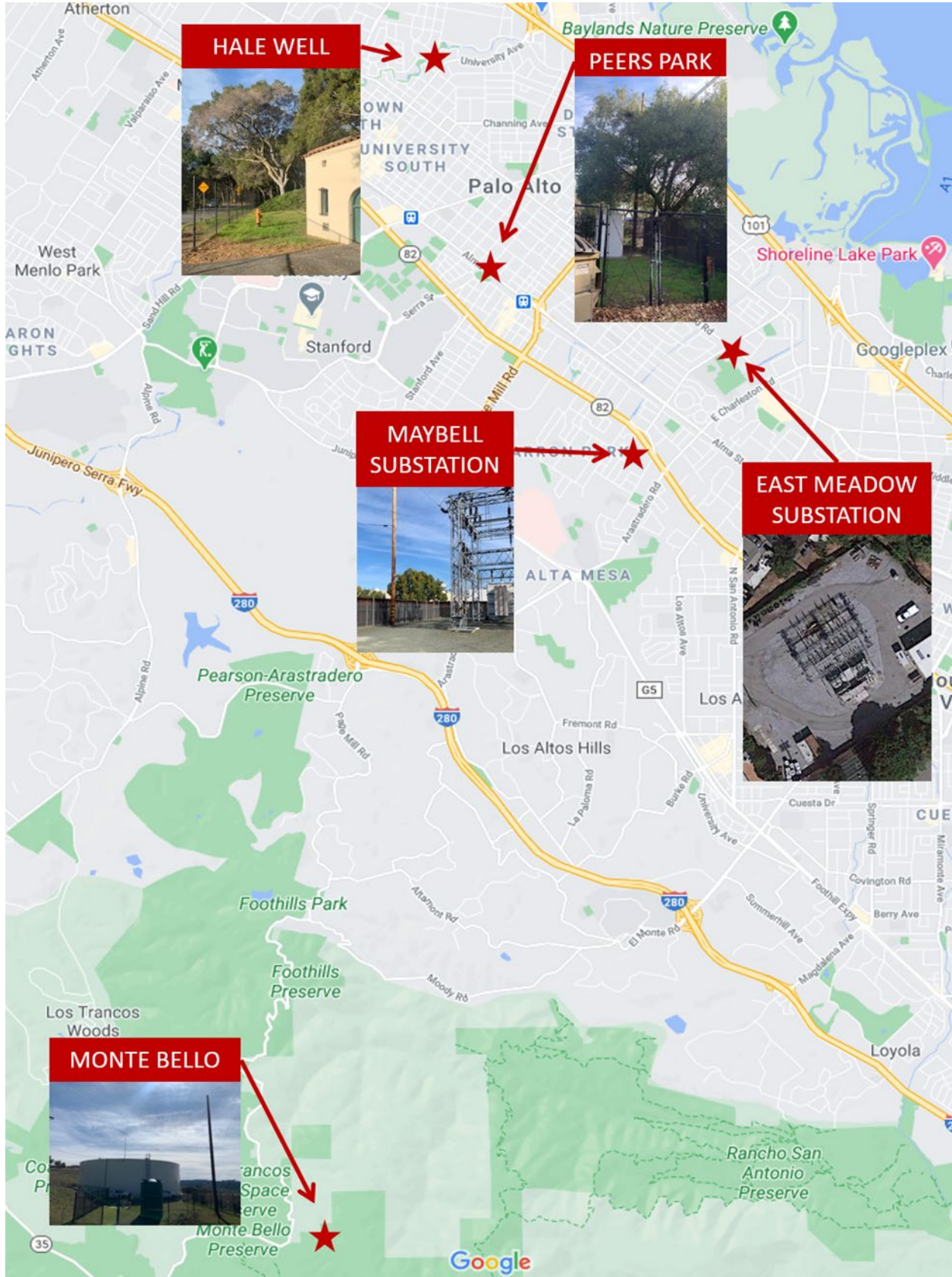
Illustrative Pictures of the AMI Sensus Components



Sample pictures of M400 Base Station Equipment (10 such boxes will be installed at 5 locations in Palo Alto). The equipment will be mounted at eye-level on a 40 to 50 foot pole that will have an antenna mounted.



The Five Base Station Locations Planned




Maybell Substation Rendering



METER COMPONENTS

ELECTRIC


- *Replace approximately 30,326 Electric Meters*



The image shows two smart electric meters. On the left is a Stratus IQ meter, which is a circular, light-colored device with a digital display and a small antenna. On the right is an Aclara meter, also circular, with a digital display and a small antenna. Both meters have technical specifications and identification numbers printed on their faces.

GAS

- *Retrofit approximately 24,208 Gas Meters with SmartPoints*



The image displays five different models of smart gas meters. From left to right: a small, grey, cylindrical meter; a larger, grey, rectangular meter with a circular dial; a grey, rectangular meter with a circular dial and a small antenna; a green, rectangular meter with a circular dial and a small antenna; and a large, grey, rectangular meter with a digital display and a small antenna. Each meter is shown from a different perspective, highlighting its design and features.

WATER

- *Replace approximately 8,369 Water Meters*
- *Retrofit approximately 12,429 Water Meters with SmartPoints*



The image shows three types of water meters. On the left is a traditional, brown, cylindrical water meter with a grey top cover. In the middle is a modern, grey, cylindrical water meter with a digital display and a small antenna. On the right is a smart water meter housed in a protective, rectangular, grey enclosure with a circular access point on top. The enclosure is shown in a photograph of a field, indicating its outdoor use.

ATTACHMENT B

Illustrative Pictures from Installation Contractor UPA– Subcontractor to Sensus



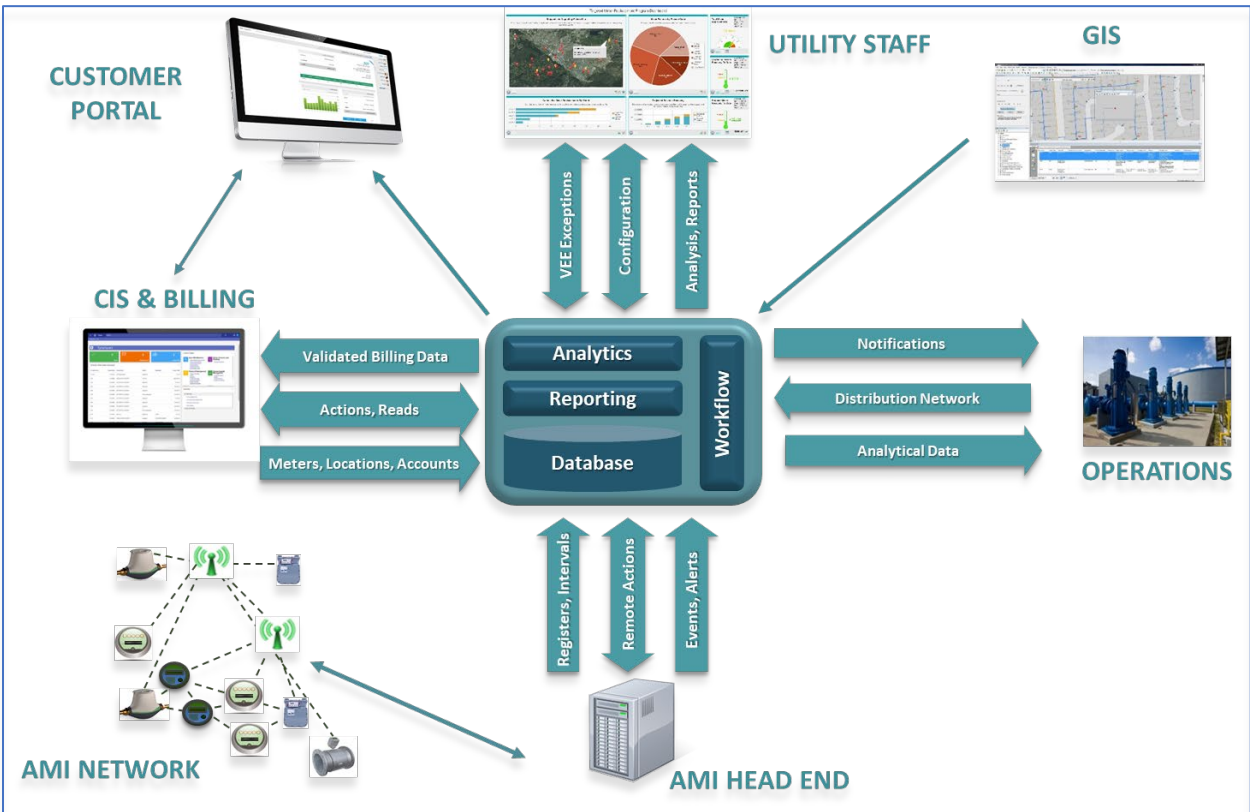
Beginning in mid-2023, mass replacement of electric meters is planned, along with retrofitting existing water and gas meters with AMI radios. Approximately 40% of aging water meters will also be replaced simultaneously. Advanced noticing, including knocking on the doors, would be provided to customers during the mass installation phase.



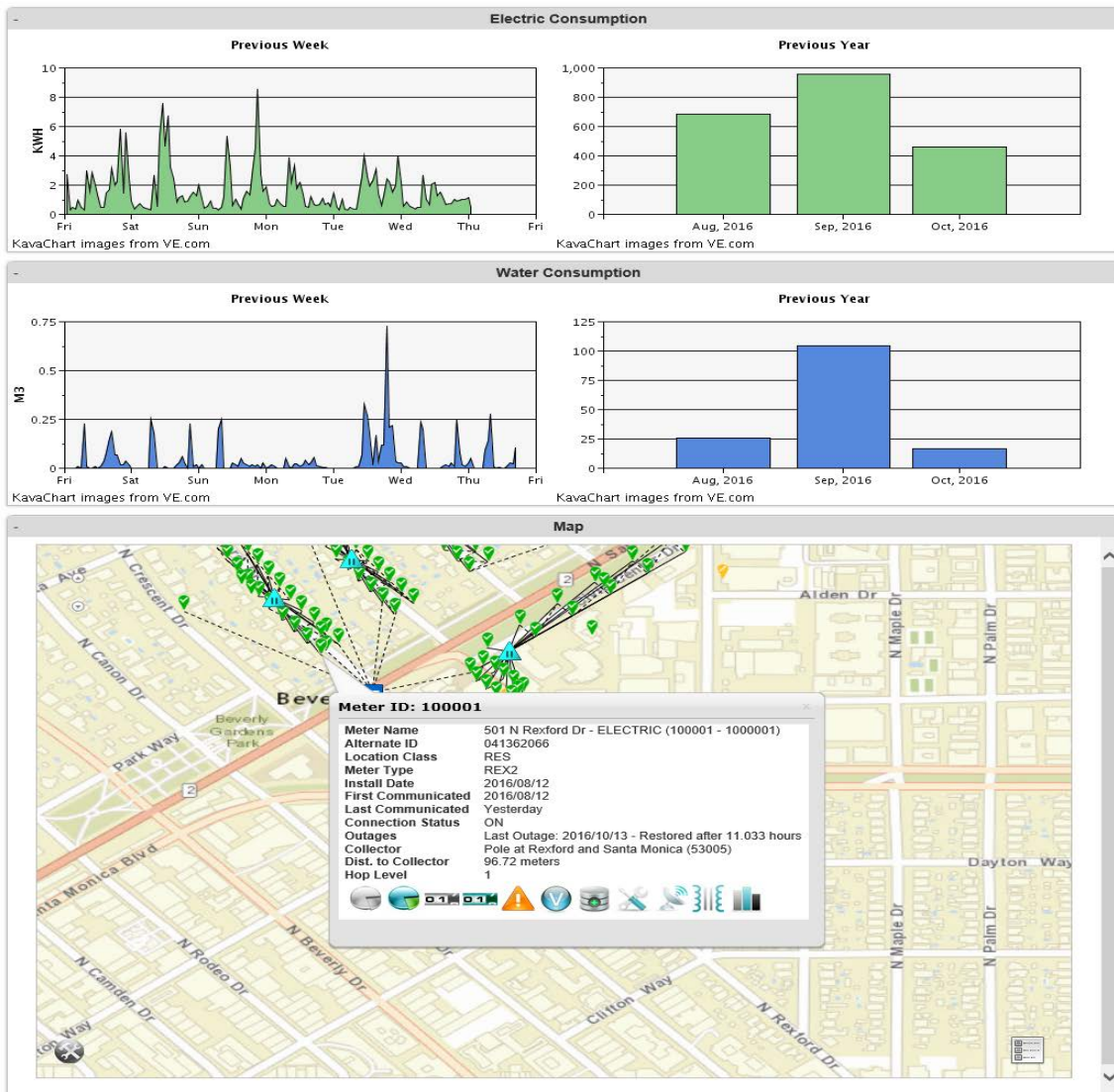
Attachment C: Illustrative Pictures of MDMS Software Features from SmartWorks

The MDMS will act as the system of record for all meter readings and customer consumption data. MDMS will be integrated with various other existing systems: customer billing, customer service call center, outage reporting, rates analysis, and analysis to aid engineering/operations decision making.

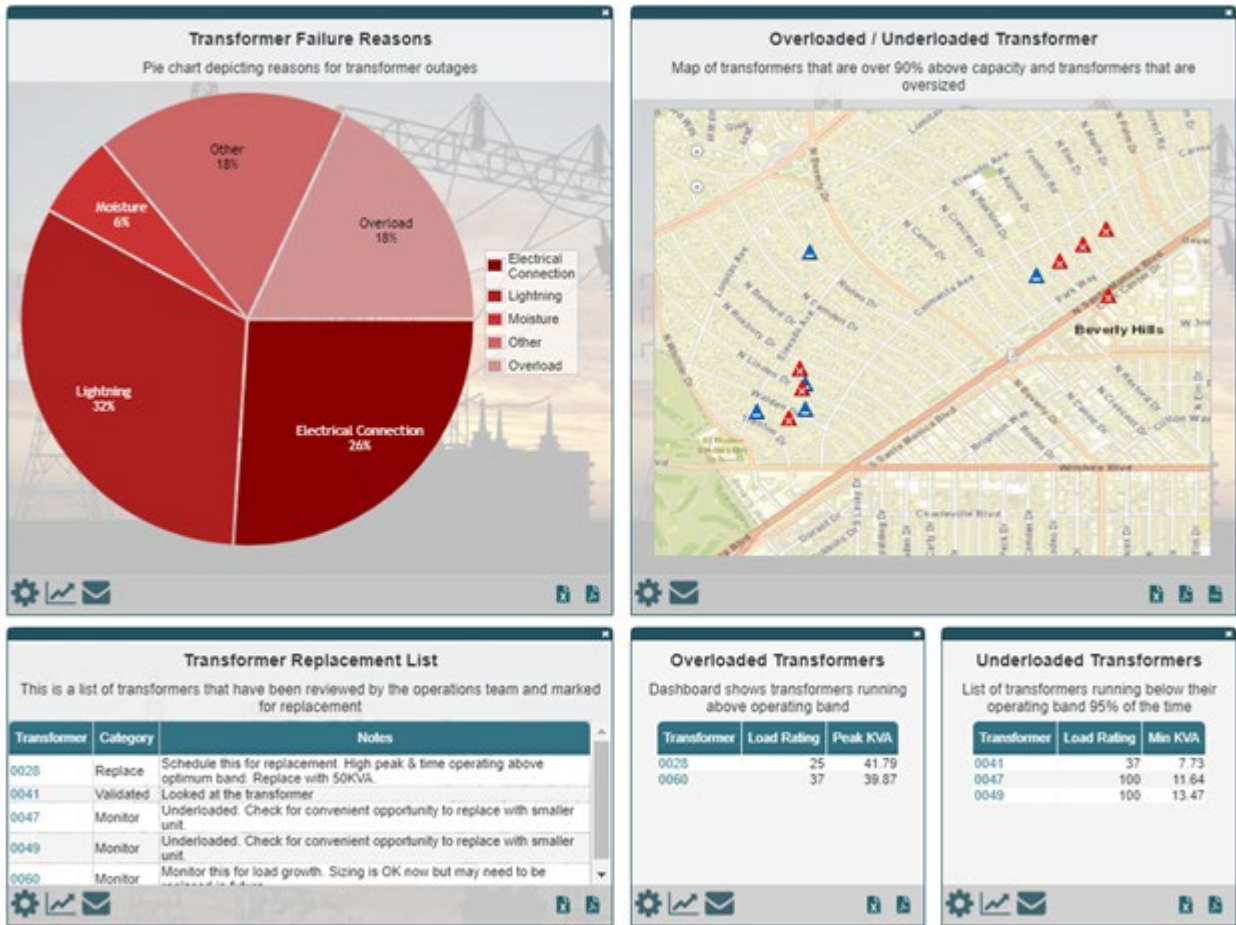
The system will provide hourly/daily customer consumption data to the customer via MyCPAU portal, for customers to view their consumption the day after, to make informed and timely decisions about their consumption of utility services.



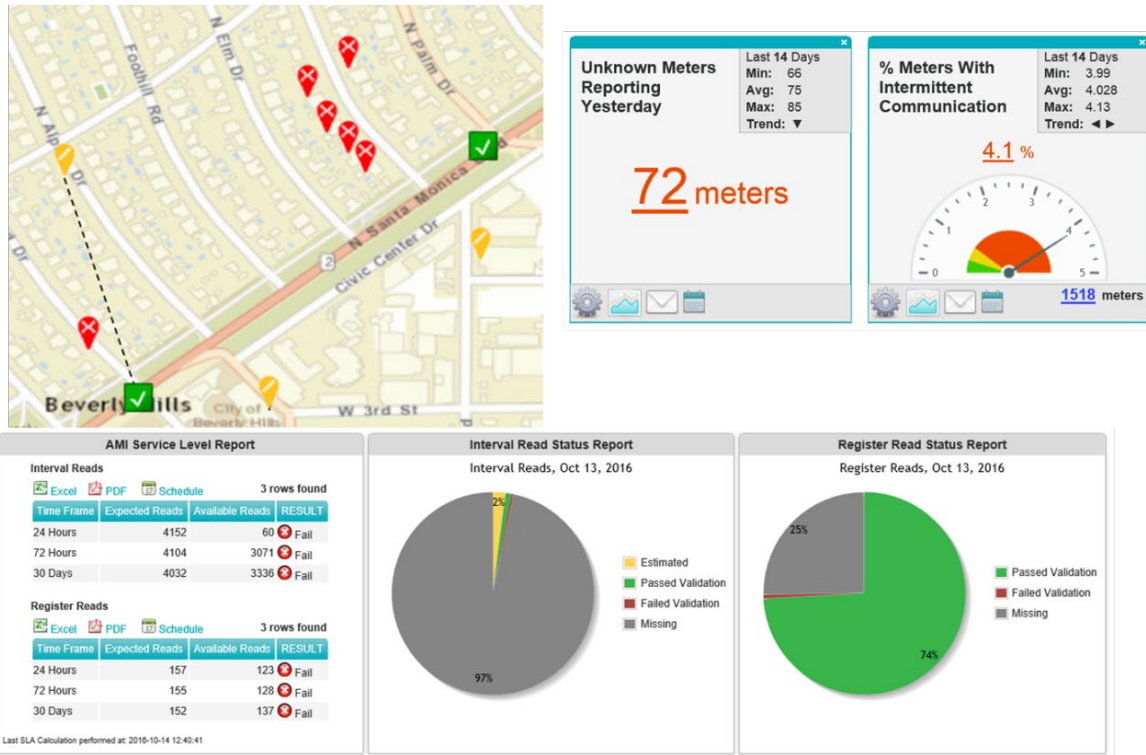
The MDMS will offer dashboards, visualizations, and analytics to view individual meters or aggregated meters to aid CPAU Operations.



The transformer analysis tools will support identification and resolution of overloaded and underloaded transformers within the system to optimally upgrade transformers.



Acting as a secondary monitoring tool (after the AMI HES), the MDMS will also provide health assurance and performance checking on the AMI network.



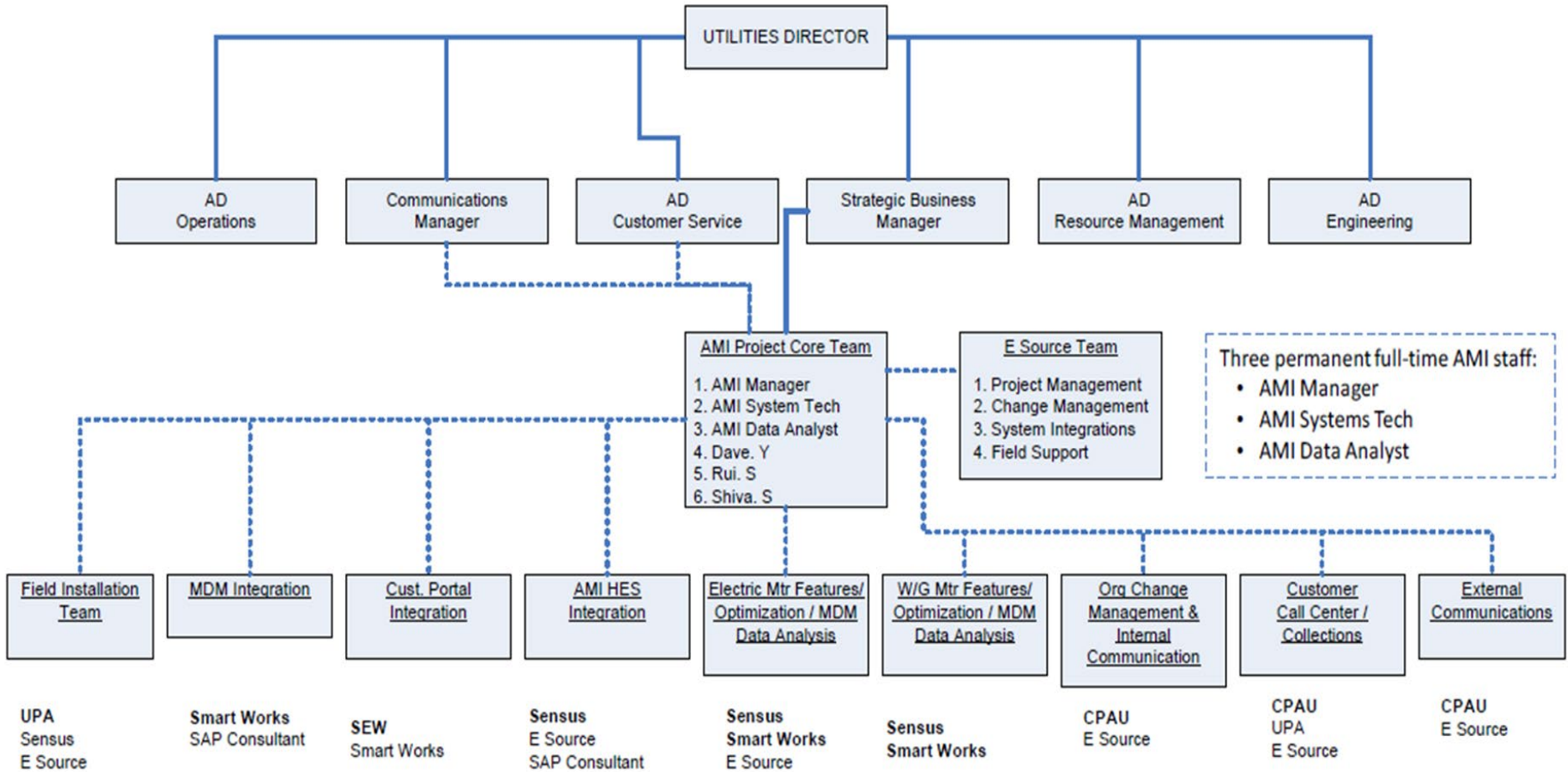
Water leak detection and notification feature of the MDMS will provide analysis of continuous consumption or sudden spikes in usage.



Excel PDF KML Schedule View Markers Marker Filters Add Markers 3 rows found

Meter ID	Meter Name	Commodity Type	Event Type	First Occurrence	Last Occurrence	Total Occurrences
<input type="checkbox"/> W18000090	8380 Civic Center Dr - WATER (0180000000-1000000)	W	Leak	2018/02/12	2018/02/25	14
<input type="checkbox"/> W28000001	Residential Water Meter (028000001)	W	Leak	2018/02/21	2018/02/24	4
<input type="checkbox"/> W28000003	W28000003	W	Leak	2018/02/21	2018/02/24	4

Attachment D: AMI Project Implementation Organizational Structure





Approval of Funding from Electric Special Projects Reserve for the Advanced Metering Infrastructure (AMI) & Smart Grid Project

Utilities Advisory Commission

July 07, 2021

Discussion Outline

- ✓ Project Background
- ✓ Vendor Proposal Summary
- ✓ AMI Systems Selected
- ✓ Illustration AMI System Elements
- ✓ AMI Project Implementation Timeline
- ✓ Project Team and Organization Structure
- ✓ Resource Needs and Funding
- ✓ Request today
- ✓ Next Steps

ELECTRIC

- Replace approximately 30,326 Electric Meters



GAS

- Retrofit approximately 24,208 Gas Meters with SmartPoints



WATER

- Replace approximately 8,369 Water Meters
- Retrofit approximately 12,429 Water Meters with SmartPoints



AMI Project Background

- ✓ Based on economic analysis of AMI investment, Council defers AMI based smart grid projects; approves small scale pilot projects – October 2012
- ✓ AMI pilot project, *CustomerConnect*, implemented in 300 homes; additional smart grid pilot projects undertaken – 2013-17
- ✓ Based on pilot projects results and updated economic analysis, Council approves AMI investment plan, capital costs estimated at \$16 to \$19 million – November 2018
- ✓ Staff retain AMI consultants, develop detailed AMI business requirements/specification, and issues RFP – March 2020
- ✓ After detailed review and analysis of 13 proposals, winning proposals chosen; in the process of finalizing scopes of work and contracting term for 3 vendors – today
- ✓ Seeking UAC approval to fund AMI Project with Electric Special Projects (ESP) reserve - today

Vendor Proposal Summary – All Proposals

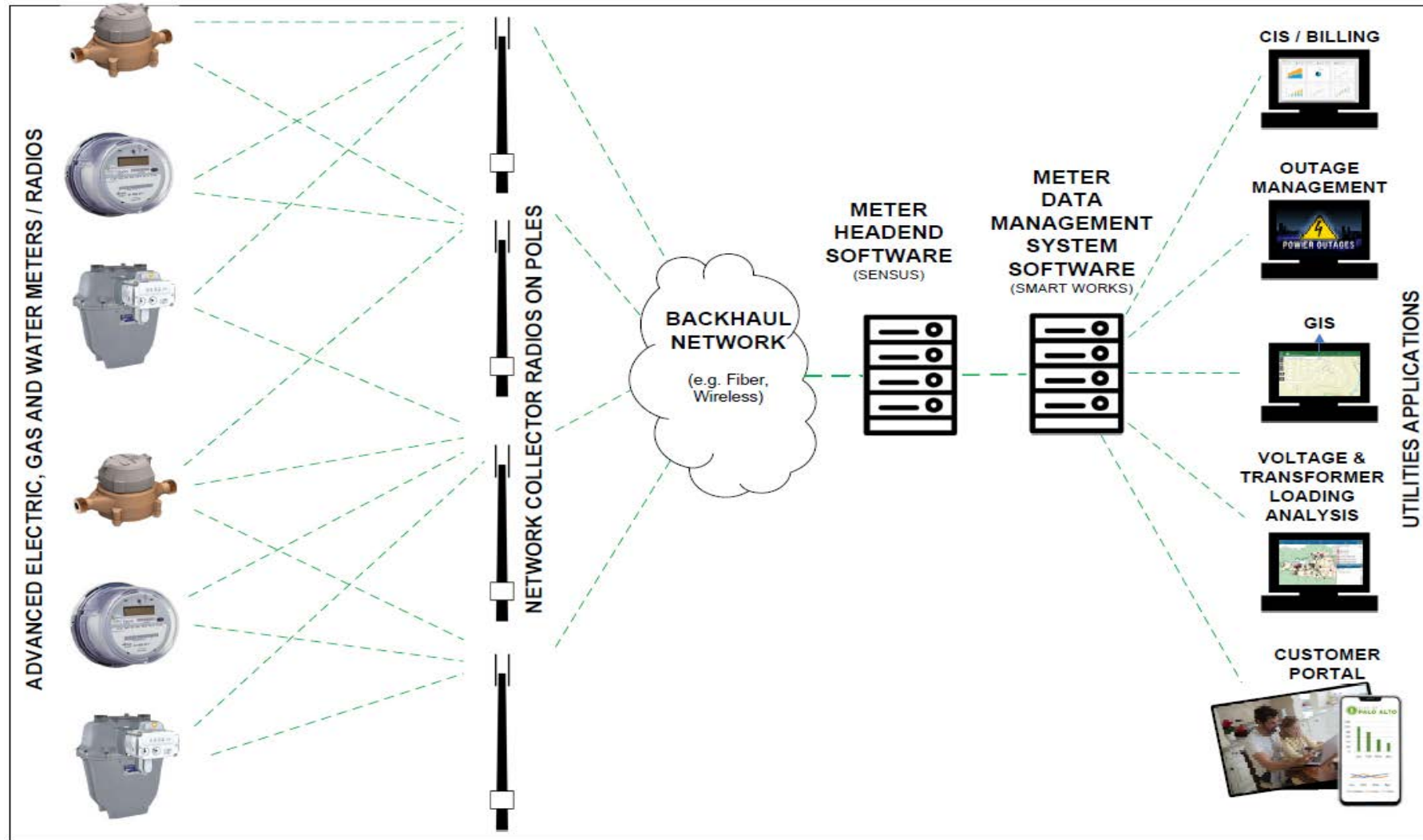
Proposer	AMI	Installation	Meter Data Management System (MDMS)
Aclara	✓	✓	✓
Anixter	✓	✓	✓
Hometown Connections	✓	✓	✓
Honeywell	✓	✓	✓
Landis+Gyr	✓	✓	
Sensus	✓	✓	✓
Tantalus	✓		
PMI		✓	
UPA		✓	
ACS			✓
SmartWorks			✓
Siemens			✓
Utilismart			✓

13 proposals received for 3 types of services, of which 5 were turnkey proposals

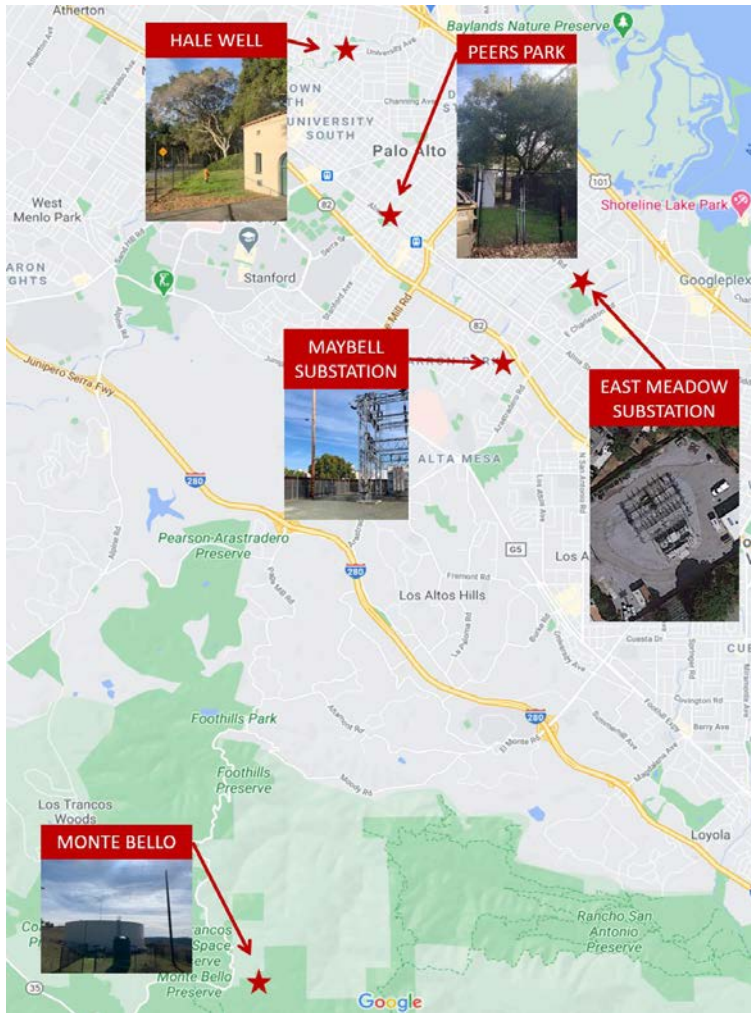
AMI Systems Selected: Recommended Contract Amount ~\$20.5M

Contracting Entity	Sensus USA, Inc.	Sensus USA, Inc. & Subcontractor (Utility Partner of America)	N. Harris Computer Corporation	E Source	Total
Contract Description					
Type of Service	AMI equipment, software and hosting services, integration services, and professional services	Meter, radio, and lid installation services	MDMS software through Smart Works, integration services, and professional services	Consulting services related to project management, change management, system integration and field services	
Contracting Term	10 years (additional two, 5-year renewal option)	N/A (subcontractor to Sensus)	5 years (additional 5-year renewal option)	4 years (additional 2-year renewal option)	
Costs					
Implementation Cost	\$ 10.4	\$ 4.3	\$ 0.7	\$ 1.1	\$ 16.5
Contingency	\$ 1.4	\$ 0.4	\$ 0.1	\$ 0.2	\$ 2.0
Total Implementation Cost	\$ 11.7	\$ 4.7	\$ 0.8	\$ 1.3	\$ 18.5
Annual Recurring Cost	\$ 0.1	\$ -	\$ 0.3	\$ -	\$ 0.4
Total NTE Amount for Contract Term(s)	\$ 12.7	\$ 4.7	\$ 1.9	\$ 1.3	\$ 20.5

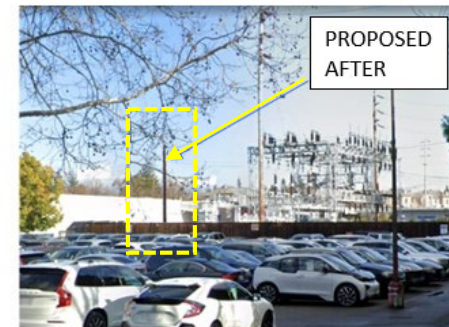
Illustration of AMI System Elements: Utility Meters, Radios, Network, Meter Headend Software, MDMS, Utility Applications



AMI Base Station Location & Communication with Meters

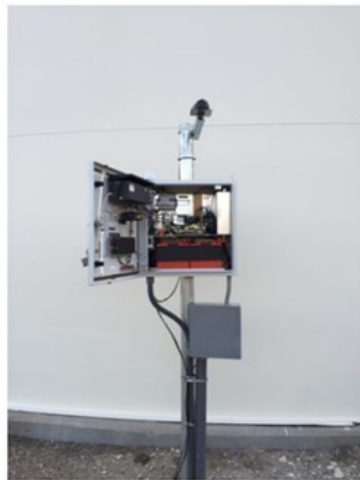


Maybell Substation Rendering



- Five Base Radio Stations at City Facilities Planned
- Base stations can will communicate with all 74,000 meters via 900 MHz FCC licensed radio band

AMI Components: Base Station, Electric Meters, G/W Meter Radio



ELECTRIC

- Replace approximately 30,326 Electric Meters



GAS

- Retrofit approximately 24,208 Gas Meters with SmartPoints



WATER

- Replace approximately 8,369 Water Meters
- Retrofit approximately 12,429 Water Meters with SmartPoints



AMI Benefits

- Reduction in Meter Reading Cost & Meter Reader Injuries
- Reduction Field Checks & Meter Connection Cost
- Improved Meter Reading Accuracy and Reduction High Bill Complaints
- Energy & Water Conservation
- Reduced Water Leaks
- Conservation through Voltage Reduction
- Improved Outage Response Time

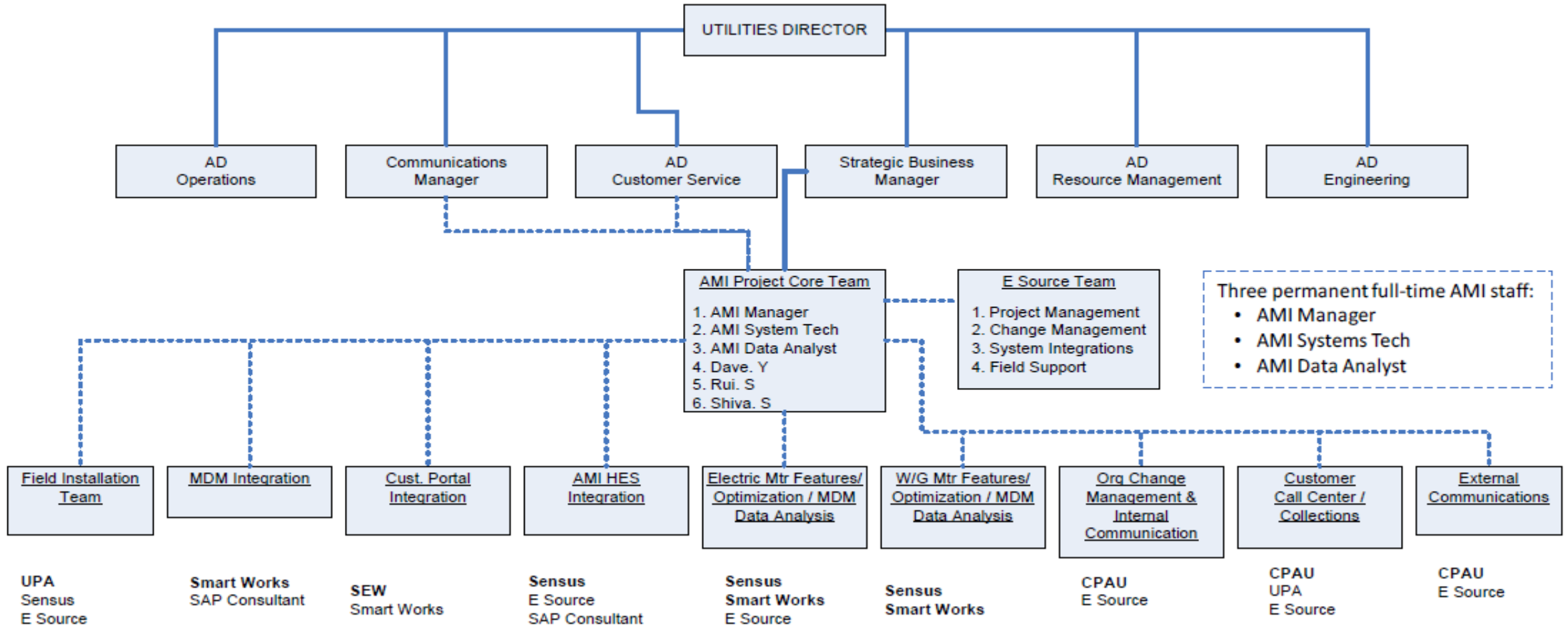
AMI Benefits

- Improved Customer Experience
- Maintain and Improve Reliability
- Gas Leak Detection
- Improved System Planning Capabilities
- Improved Asset Utilization
- Improved Water Resource Management
- Remote and timely Meter Reading
- Implementing advanced retail rates
- Unauthorized Use Detection
- Improved Safety/Reduced Workman's Compensation
- Compliance with Future Legislative Requirements

AMI Project Implementation Timeline

Project	Year 1 - 2021			Year 2 - 2022				Year 3 - 2023				Year 4 - 2024				Year 5 - 2025		Year 6+
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
Advanced Metering Infrastructure (AMI) & Meter Data Management System (MDMS) (\$16.5 to \$20.5)	Contract Negotiations, Approvals / Planning	UAC & Council Approval / Planning	Planning / Communication	Alpha Phase (6 months) AMI/MDMS (City Facilities & CPAU Employees ~ 100 meters)		Beta Phase AMI/MDMS (12 months) (Two Routes ~ 3,000 meters)				Full Deployment (18 months) (By Route ~ 71,000 meters)				Final Acceptance / System Stabilization		New EE and DR Programs Customer Time-of-Use Distribution System Optimization, CVR Impl. New OMS Integration		
				Integrate MDMS to CIS, GIS, MyCPAU, AMI Head End System (HES)														

AMI Project Implementation Team & Structure



Resource Needs & Funding

- ✓ Three Vendor Contract Cost for Council approval
 - Initial capital cost – \$16.5M (baseline); \$18.5M (with contingency funds)
 - On-going annual software and hosting costs, total over contact term \$2M
 - Total contract cost, not-to-exceed amount - \$20.5M

- ✓ Allocation of baseline contract cost of \$18.5M based on direct and shared costs
 - Electric (\$7.6M), Water (\$7.0M), Gas (\$3.9M)

- ✓ Funding from ESP Reserves - \$18.5M
 - Up to \$7.6 M for electric fund related cost
 - Loan funds to cover water and gas related expenditure for up to \$7M and \$3.9M respectively; with a repayment term of 5-years with prevailing interest, upon completion of the project.



Required Changes to Utilities Rules & Regulation

- Rules related to customer choosing to opt-out: duration, fees, etc.
- Exception to new electric meter testing during full AMI deployment
- Disposal of old meters without testing
- Estimated billing protocols in the event of a cyber attack
- Water leak notification related protocols

Request Today

Staff recommend that the UAC Recommend that City Council Approve the Use of the Electric Special Project Reserves to Fund the Smart Grid Technology Installation Project (EL-11014) for a Not to Exceed Amount of \$18.5M, and consisting of the following:

- Transfer up to a not to exceed amount of \$7.6M from the Electric Special Project (ESP) reserves to the Smart Grid Technology Installation Project (EL-11014) for Electric advanced metering infrastructure (AMI) and smart grid-related expenditures;
- Transfer up to a not to exceed amount of \$7.0M from the ESP reserves to the Smart Grid Technology Installation Project (EL-11014) for Water AMI and smart grid-related expenditures as an inter-fund loan with a repayment term of 5-years with prevailing interest, upon completion of the project; and
- Transfer up to a not to exceed amount of \$3.9M from the ESP reserves to the Smart Grid Technology Installation Project (EL-11014) for Gas AMI smart grid-related expenditures as an inter-fund loan with a repayment term of 5-years with prevailing interest, upon completion of the project.

Next Steps

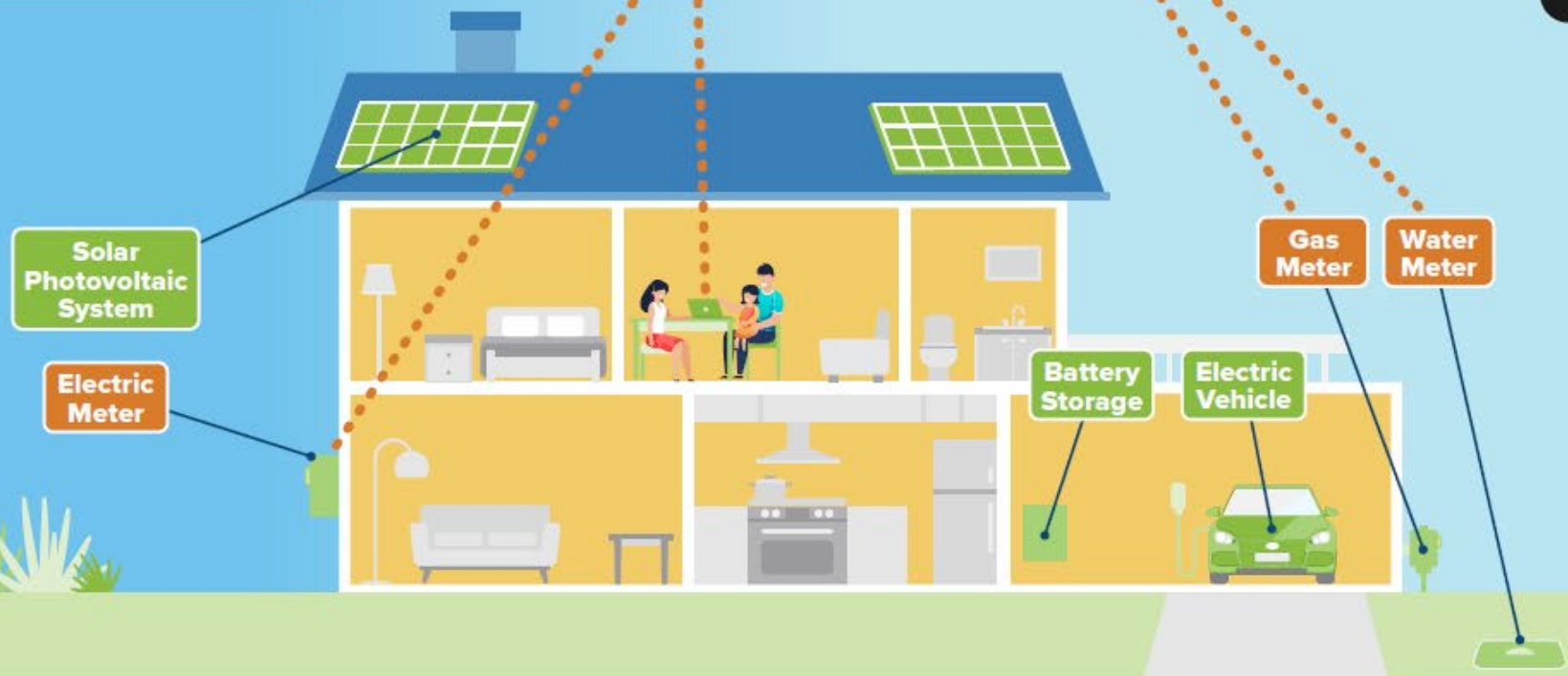
On August 30th, Seek City Council Approval of:

- UAC recommended ESP reserve transfers to fund the AMI/Smart Grid Project
- The contracts with Sensus, SmartWorks and E-Source

A Smart Home – Enabled by Advanced Utility Meters (AMI)

AMI based smart home will enable:

- Actionable hourly consumption info
- Optimal use of utility services
- Early detecton of water leaks
- Time-of-use electric rates
- Improved electric service reliability
- Faster outage response times
- Enhanced customer experience



Questions?

Feedback?