

## **APPENDIX B – SCOPE OF WORK**

### **1.0 GENERAL PROJECT DESCRIPTION**

This RFP is issued by the City of Riverside, through its Public Utilities Department, (RPU) to solicit proposals to engage the services of a Consultant to support implementation of a fixed network electric and water metering infrastructure to collect interval load data remotely, enhance and optimize operations, while reducing costs, provide customers with better data to make more informed decisions about energy and water usage, and position the utility for even greater business benefits down the road. The intent of the RFP is to award a Professional Services Agreement (Appendix A) to the qualified Consultant whose proposal, conforming to this RFP, is most advantageous to RPU. Failure to submit information in accordance with the RFP requirements may be cause for disqualification.

### **2.0 BACKGROUND**

Riverside Public Utilities (RPU) places very high priority on using current technology to continuously improve operational efficiency and customer service. In June, 2015, RPU published a Strategic Technology Plan (Appendix C), which outlines high-level business cases for implementing Automated Meter Reading (AMR), Advanced Metering Infrastructure (AMI), and AMR/AMI hybrid deployments. To develop the business cases in the Strategic Technology Plan, the consultant preparing the Technology Plan used statistics from detailed business cases conducted for similar clients, as well as utility industry reports, in order to understand and monetize benefits of technology project use cases. Although the total benefits were determined to be higher for the full AMI business case, the return on investment (ROI) was higher for the AMI/AMR hybrid case. Therefore, the Strategic Technology Plan recommends pursuing the AMR/AMI hybrid solution.

This project proposes implementing a phased upgrade to the metering infrastructure, installing fixed radio frequency (RF) network to collect interval data from all RPU customer water and electric meters. The phased approach will focus on implementing the fixed network for Commercial and Industrial (C&I) meters first, followed by residential electric and water meters. C&I implementation will be prioritized based on current usage, existing meters, and needs, such as customers participating in existing Distributed Generation programs, which require Power Resources and Electric System Planning to access to real-time data.

There are several current systems and integrations that will be included in the scope of this project, as they are impacted by implementation of a fixed network solution. The project will focus on minimizing impacts and disruptions to current systems and operations as much as possible

### **3.0 DESIRED BENEFITS**

Through this project, RPU anticipates the achievement of the following benefits:

#### **3.1 OPERATIONAL BENEFITS**

- Selecting/Designing Rate Tariffs
  - Provides greatest possible flexibility
  - Offers the ability to collect, analyze and process multiple demand and time-of-use (TOU) period readings
  - Allows for new rate designs with various TOU periods and demand charges using RPU data

- Provides the ability to estimate billing impacts of transitioning customers from current rates to rates with various TOU periods and/or demand charges (includes residential, commercial, and industrial)
  - Potential to implement critical peak pricing programs
- Cost-of-Service / Rate Design Studies
  - Provide opportunities to accurately stratify and assign utility costs and revenue to the correct customer and functional categories
  - Offers the ability to compare and contrast coincident versus non-coincident peaks by specific customer classes (CP vs. NCP calculations)
  - Provides opportunities to design rates to recover costs and eliminate subsidies as customers install distributed energy resources
- Programs and Rebates
  - Improves the potential for new time-based rates and demand response programs
  - Offers the ability to identify customers who are interested in, and/or benefit from, various types of programs and rebates
  - Provides reliable tracking and assessing effectiveness and true impact of programs
- System Planning
  - Provides the ability to calculate the demand on specific distribution transformers to prevent overload damage or inefficient operation
  - Allows opportunities to determine the customer makeup of a poorly performing area
  - Offers the ability to test the feasibility of distribution system changes, based on the number/type of customers affected
  - Validates the accuracy of existing distribution load models and load allocation methods
  - Enables access to customer and transformer data to enhance distribution model effectiveness
  - Validate instrument transformer accuracy
  - Provides information to determine impacts of Distributed Generation (DG) on distribution transformers, circuits, substations, and electric system
- Meter Reading
  - Increases accuracy of meter reads (reduction in missed reads, reduction in estimated reads)
  - Increases accessibility and safety
  - Enables collection data multiple times a day, rather than once a month
- Outage Management
  - Aids in identifying outages or system disturbances by meter, transformer and circuit

- Improves the ability to overlay outage information with Geographic Information System (GIS) data
- Provides troubleshooting information to determine if the problem is customer or utility based
- Customer
  - Provides information about how and when customers use energy with access to interval data
  - Enables the ability to adjust consumption patterns to reduce bills
  - Provides information to analyze and dissect time dependent load patterns for specific customers
  - Offers improved access to data for Customer Service to respond to high bill calls
  - Increases reliability and reduces outage durations
  - Reduces estimated meter reads and billing disputes surrounding estimated bills
  - Enables advanced water leak detection and notification
  - Provides potential to receive notifications when reaching or exceeding set budget and usage thresholds
- Environment
  - Increases conservation and reduced energy and water use by providing usage trend information
  - Reduces of Greenhouse-Gas emissions
  - Increase water conservation from advanced leak detection and notification

### **3.2 FINANCIAL BENEFITS**

- Reduction in Operating Costs
  - Reduction in labor costs for manually reading meters
  - Reduced truck rolls
    - Increased data to more efficiently dispatch crews to location of outage
    - Increased data to remotely research out-of-power trouble calls and high-bill complaints
    - Reduction in daily meter reading (1/3 reduction if continuing to read water only)
  - Reduced outage identification and restoration time
  - Elimination of communication costs for current interval metering (such as phone modem)
- Improved revenue assurance
  - Improved meter data accuracy
  - Increased theft detection capabilities
  - Improved water leak and loss identification
  - Improved rate tariffs

## 4.0 CURRENT STATE

### 4.1 ELECTRIC METERS

There are currently approximately 112,000 electric meters, including 100,000 residential and 12,000 commercial and industrial meters. Since 2008, RPU has replaced a majority of the electric residential meters, and some of the C&I meters, with Itron C1-SR digital meters that are read remotely from a hand-held device. The meters are capable of remote reading with implementation of the Itron Choice Connect network backhaul and a head-end system. The current meter breakdown is shown in Table 1.

**TABLE 1. CURRENT ELECTRIC METER INVENTORY**

Type	Meter	Current Count
Electric - Residential	Itron C1-SR Remote Read	99,478
Electric – C & I	Itron CD-SR Remote Read (Flat rate and demand)	2,995
Electric – C & I	GE KV (majority), ABB, Landis & Gyr, Sangamo, Schlumberger, Westinghouse Manual Read (Flat rate and demand)	8,583
Electric – C & I	GE KV-2C Probe (Time-of-Use)	533

### 4.2 WATER METERS

There are currently approximately 66,000 water meters of which 60,000 are residential and 6,000 are commercial and industrial. Approximately 40,000 of the meters are less than 10 years old, 15,000 are between 10 and 20 years old, and 5,000 are over 20 years old. There are a variety of water meter makes/models currently installed, but as part of an ongoing replacement program, approximately 4,000 residential water meters are replaced annually. The replacements are currently Zenner Performance Multi-Jet Magnetic Drive meters. The current standard for larger C&I customers is Master Meter Octave Ultrasonic meters.

All water meters are in pits, vaults, or below ground, except for the above ground fire service tattletale meters and some production meters. The meters do not currently include encoded registers necessary for remote readings, nor do they have “RF-friendly” composite pit lids.

### 4.3 METER READING SOFTWARE

RPU utilizes Itron’s MV-RS, PC-based meter reading software solution for data collection and route management. It is compatible with Itron handheld devices, mobile collection systems, optical probes and touch probes. MV-RS is interfaced with the enQuesta Customer Information System (CIS) and sends billing determinants to CIS through a batch process file (download/upload). This system, along with current hand-held devices, will no longer be supported by Itron as of October 2021.

#### **4.4 METER DATA TRANSLATION SYSTEM**

RPU currently utilizes Itron's MV-90xi Multi-Vendor Data Translation System (MV-90) workstation version to collect interval load data for several large commercial customers. MV-90 is considered to be a "Meter Data Management (MDM) lite" system that performs data validation, editing, reporting, graphic generation, totalization, and historical database functions. The system stores data in 15-minute intervals providing the ability to perform data analysis on peak usage within any selected time period.

The system was implemented in 1992 to collect interval load data for billing of large commercial customers metered at the 12KV substation level. Since 2002, the system has also been collecting interval load data for commercial customers who are participating in an existing Automated Meter Reading Program.

The system currently retrieves interval data by means of telephone interrogation. Specific TOU meters have a recorder installed that have the capability to store interval load data. The system interrogates the modem meter to retrieve the stored interval data and then uploads the data into the system. It also has the capability to retrieve data by means of hand-held readers, which do not require telephone line installation.

#### **4.5 CUSTOMER INFORMATION SYSTEM**

In February of 2015, RPU implemented a new Customer Information System (CIS) system by Systems & Software, Inc. (S&S), called enQuesta. It is a utility billing and customer service solution that delivers customer information features, billing, meter management, revenue management, customer Web self-service, electronic bill presentment, field services management, and reporting.

This is the most important system for the new AMI/AMR system to integrate with as it contains the billing and customer information necessary for meter-to-cash. It is extremely important to minimize disruption to CIS as it impacts the revenue generation stream for the utility and other city services. EnQuesta currently interfaces with MVRs, the city-wide cashing system, i-Novah, field services mobile application, PragmaCAD, and multiple other systems through point-to-point and Oracle Fusion.

#### **4.6 OPERATIONS DATA MANAGEMENT SYSTEM**

RPU is in the process of implementing OSIsoft's Pi Operations Data Management System (ODMS) that will serve as a "data hub" to integrate data from multiple systems that are currently siloed. It provides the ability to store, view and analyze distributed data sources from electric, water and generations systems as one consolidated dataset, while maintaining data integrity and providing analytic and reporting tools.

There are many uses for the Pi system to manage and analyze operational meter data, including asset management, load forecasting, operations and billing support, revenue protection and curtailment programs.

#### **4.7 COMMUNICATIONS NETWORK**

The existing communications networks in the City of Riverside, includes microwave, fiber optic, cellular, and radio networks. RPU facilities (substations, operation centers, offices, etc.), along with city facilities (fire and police, city hall, etc.) are connected via fiber optic network.

##### **4.7.1 Random Phase Multiple Access**

RPU recently installed Ingenu's Random Phase Multiple Access (RPMA) wireless network with 9 access points for machine communications in the City of Riverside. RPMA utilizes 2.4 GHz unlicensed and universal band, which offers 80 MHz of bandwidth, allowing for flexibility to locate frequency with less traffic. The RPMA network offers next-generation, nationwide wireless technology for the Internet of Things and Smart Cities. RPMA provides high capacity, scalability, strong signal strength, and industry leading coverage per access point. The Ingenu network will provide 100% coverage for electric meters, and would need to be propagated for water meters.

RPU is currently utilizing this network for Grid Sensor Distribution Automation devices, but the network also supports AMI/AMR with GE's C&I meters, transformer monitoring, LED streetlights, parking, air quality monitoring, waste management, storm water monitoring, and other smart city applications. Ingenu works with partners to create RPMA enabled hardware that runs on the network. Solution providers are now developing around RMPA, and some of the current partners today include Trilliant, LED Roadway Lighting, Compal, GE and Meterling.

#### **4.8 OUTAGE MANAGEMENT SYSTEM**

RPU does not currently have an outage management system (OMS) in place. Selection, procurement and implementation of an outage management system is planned for 2018 at the earliest.

#### **4.9 GEOGRAPHIC INFORMATION SYSTEM**

RPU currently uses Esri's Workstation Arc/Info Coverages and ArcGIS SDE platforms in parallel for mapping water and electric distribution systems. CIS premise data is related to a GIS address feature via a geo-coding process. GIS address locations are mapped based on the city's Cadastral dataset standards and generally fall inside the parcel polygon that is being provided water and/or electric service. There currently is no database relationship between CIS meter data and GIS service point locations in the water and electric network datasets. RPU currently relies on printed maps for information during outage events. In the future, RPU will use Schneider Electric's ArcFM extension to extend Esri's ArcGIS software and provide water and electric network tracing functionality for responding to water shutdown and electric outage events.

#### **4.10 WORK AND ASSET MANAGEMENT SYSTEM**

The City of Riverside uses an Oracle enterprise system called Utilities Work and Asset Management (UWAM) for all of its work management, asset management, purchasing, inventory, and timekeeping activities. While some meter inventory is maintained, customer and customer meter data are not carried over to this system currently.

#### **4.11 CUSTOMER ENGAGEMENT TOOLS**

##### **4.11.1 Itron MV-90xi**

Approximately nine of RPU's commercial customers have opted into the MV-90 billing program including University of California at Riverside (UCR), Ralphs, Goodrich, Riverside Community Hospital and Bourns. Data is extracted on a monthly basis and bills are created manually. The benefit to these customers is

that the bill is produced on the same day each month and reports are available upon request. Interval load data collected has also been utilized by Utilities Finance and Power Resources for rate structure analysis.

#### **4.11.2 Automated Energy – Load Profiler**

Approximately 20 of RPU's industrial customers have opted to utilize Automated Energy's Load Profiler to gain a better understanding of usage to minimize energy costs and maximize efficiency by pinpointing opportunities to eliminate wasted energy. The web-based application (link available through Green Riverside) collects, records and displays usage data in 15 minute intervals, including kWh and temperatures. It displays usage, demand data and costs, data comparisons by date, facility, shift and sub-meter, and can generate reports, rate comparisons, and calculations. The customer can also specify parameters for alerts, such as high-usage and spend over budget.

Automated energy calls and queries the data from the meters, or the pulse outputs from the meters in the data loggers that are installed. RPU currently pays the monitoring fee of \$25/ month for the load profiler customers, or \$30-35/ month for the service if it is a cell-enabled data logger. The customer pays the monthly fee for the phone line.

#### **4.11.3 AMR Meter Opt-Out**

RPU does not currently have a formal AMR meter opt-out program. Over the last several years, Field Services has been installing the Itron C1-SR "AMR" meters. At time of installation, approximately 180-200 customers requested that they keep their previous meter and therefore the C1-SR meter was not installed. There is no formal tracking, paperwork, rates, or process currently associated with this program

### **5.0 SCOPE OF WORK**

The purpose of this RFP is to engage a Consultant in developing an implementation plan for the deployment of fixed network for remote reading of water and electric meters. The plan should include a phased approach, considering AMI metering and infrastructure for electric C&I and water meters, while maximizing the use of current technology investments, including existing residential electric AMR meters, as well as establishing a roadmap to transition to full AMI.

RPU's Operational Technology Office (OTO) has outlined a proposed project plan with options for fixed networks that maximize current investments. The project plan includes:

1. Planning, implementation and integration of one or more fixed RF network(s) with communication back-haul(s) and head-end system(s),
2. Installation of remaining residential electric meters,
3. Selection and installation and/or retrofitting of water meters,
4. Selection and installation of C&I meters,
5. Selection, procurement and installation of a Meter Data Management System (MDMS),
6. Field trials,
7. Integration of existing and future systems such as CIS, GIS and ODMS, and ,

8. All related equipment, hardware and software.

RPU's proposed list of major tasks is provided below, however, Consultants are encouraged to use their expertise to propose modifications to the tasks where the Consultant believes a different approach would better serve RPU.

#### **TASK 1 – PROJECT PLAN REVIEW**

- a) Consultant shall review the options outlined in the proposed project plan, assess RPU's current capital investments, systems, architecture, and asset utilization outlined in the project plan, and make recommendations that maximize current investments wherever possible.
- b) Consultant shall review options outlined in the project plan and make recommendations for a fixed network(s) to support electric and water meters, validating benefits, configuration, reliability, long-term growth potential, and cost compared to alternative options.
- c) Consultant shall review proposed communications methods to ensure reliability, throughput, functionality and cyber and physical security.
- d) Consultant shall confirm existing water meter inventory and develop a plan to replace or retrofit meters based on age and condition.
- e) Consultant shall review options for commercial meters and make recommendations for installation of new meters that are supported by selected fixed network(s) and offer the appropriate level of functionality at the best cost.
- f) Consultant shall base recommendations for solutions on past project experience, industry best practices, lessons learned from implementations at other utilities, and subject matter expertise.
- g) Consultant shall interview executive management and key stakeholders to validate short-term and long-term goals and objectives, review the benefits outlined in the project management plan, and validate the benefits to be attained with the selected solution(s).
- h) Consultant shall validate use cases and costs and benefits of the solution, including equipment life-cycle, functionality, operating and maintenance costs, revenue assurance, operational savings, revenue and cash flow impacts, return on investment, and ability to integrate with current and future systems.

#### **TASK 2 – SYSTEM IMPLEMENTATION PLAN**

- a) Consultant shall develop the project management plan into a System Implementation Plan, which will be the tactical plan for the overall project design and release.
- b) Plan should be developed using a phased "crawl, walk, run, sprint" approach, which gradually builds up system capabilities. Each phase and layer shall be planned so the resulting system is scalable, continues to function well when the number of meters or data increases; reliable, able to continue to function normally with the loss of nodes or elements; adaptable, able to take on new or unforeseen tasks by means of a flexible design; and extensible, able to be expanded or capabilities added in the future.
- c) Phases shall include sequential numbering and descriptions that organize project activities and priorities.



### **TASK 3 – IMPLEMENTATION SERVICES**

#### **a) System Architecture**

- i. Consultant shall prepare a network diagram that visually depicts the system architecture and data flows of the recommended solution(s) and the interconnections with current and future systems.
- ii. Consultant shall assess impacts to the corporate network and make recommendations to minimize impacts, or install additional hardware as necessary.
- iii. Consultant shall develop a system diagram composed of layers, that when placed on top of one another, show the build-out of the system and associated integrations and data flows.

#### **b) System Engineering**

- i. Consultant shall identify and document technical and non-technical requirements for all aspects of the project, including meter requirements and configuration in CIS; material, equipment and construction specifications and Standards related to the fixed communications network, related systems and software; communication backhaul; head-end system; data collection and devices; MDMS; data collection, transfer, validation, editing, usage, governance, short and long-term storage, analysis and presentment (Customer Service, Utilities Dispatch, and customer); reports and dashboards; integrations with existing and future systems; real-time system monitoring, including status of all fixed communication nodes and elements, and traffic volume with the ability for operator or control system to reconfigure system to adjust for the loss of up to N nodes or elements; impacts and changes to billing, rates, and programs and services; and all related software and hardware.
- ii. Consultant shall synthesize RPU requirements with the industry lessons learned models from successful implementations.
- iii. Consultant shall develop and manage a detailed requirements spreadsheet, tracking requirements through design process, and confirming the final solution meets all specified requirements.
- iv. Consultant shall be responsible for overseeing the testing process, including creating test cases and environments, conducting testing, validating test results, and continual verification of the system through gradual build-up and deployment.
- v. Consultant shall recommend the scope/size and support a field trial prior to full-scale deployment to verify the ability of one or more vendor systems to achieve benefits identified by the business case and to meet functional and performance requirements from the statement of work.

#### **c) Fixed Network Implementation**

- i. Consultant shall document requirements, create an RFP, support review and selection of vendor, and support Project Manager on all aspects of the fixed network implementation.

#### **d) Meter Implementation**

- i. Consultant shall support review and selection of meters, and support the Project Manager on all aspects of the electric and water meter implementation related to the project.
- e. Community/Customer Engagement
  - i. Consultant shall coordinate with RPU's Marketing group to develop a customer communications and engagement program to educate the community about the project.
  - ii. Consultant shall determine regulatory requirements that apply to RPU and develop plans to implement programs, such as opt-out, green button, and others as pertinent.
  - iii. Consultant shall identify new and changes to existing programs and service, such as conservation, demand response, and others as pertinent that are available with the implementation of the fixed network(s).
- f. Organizational Transition
  - i. Consultant shall outline an approach for organizational transition and change management, including business process changes, buy-in from key staff and stakeholders, on-going education and training, and identifying and minimizing impacts to current state.
  - ii. Consultant shall outline a detailed operations plan to include staff, organizational structure, future state policies, procedures, and processes.
  - iii. Consultant shall make recommendations to bring on new staff during the project to begin training and knowledge transfer process prior to implementation.
  - iv. Consultant shall support the change management process to facilitate the realization of identified benefits, manage the transition and ensure organizational acceptance of new system, that the utility is positioned for long-term success, and that employees can remain productive during implementation.
- g. Security
  - i. Consultant shall identify security requirements to address physical security, preventing unauthorized access to facilities or equipment, and for all aspects of the project, including vendor security.
  - ii. Consultant shall identify security requirements to address cyber security, protecting and securing the communications network and other related systems, for all aspects of the project, including data transmittal and storage and vendor security.
  - iii. Consultant shall identify system reliability requirements, ensuring normal operations continue normally for the loss of N nodes or system elements.
  - iv. Security requirements should encompass and reflect the recommendations and good practices contained in the National Institute of Standards and Technology (NIST), Internal or Interagency Reports 7628, ***Guidelines for a Smart Grid Cyber Security***, and the NIST ***Cyber Security Framework***.

#### **TASK 4 – INTEGRATION SERVICES**

Consultant will manage integration of the fixed network, head-end system, and Meter Data Management System with new and existing systems.

- a. Integration Framework

- i. Consultant shall establish an enterprise vision for a secure integration framework that is extensible, scalable, and ensures accurate exchange of information between different systems such that the integration appears seamless and information residing in any one system can be leveraged by other systems, thus optimizing business processes.
- b. Meter Data Management System
  - i. Consultant shall document requirements, create an RFP, support review and selection of vendor, and manage implementation of a Meter Data Management System that is compatible with the fixed network(s) and the CIS.
  - ii. If multiple fixed networks are selected, consultant shall determine how the data will converge in the MDMS and how the data will flow to CIS, ODMS, and other systems.
- c. Interface with Customer Information System
  - i. Consultant shall document a detailed plan, test cases, testing process and all items necessary for retiring legacy systems, MVRs and MV-90, implementing a new MDMS, and interfacing with the CIS.
  - ii. The plan should include billing data, rates, meter configurations and streamlined process, with no impacts to billing.
- d. Other Interfaces (as identified)
  - i. Consultant shall manage interfaces and integration with other systems, including but not limited to GIS, ODMS, and Work Management System.

## **TASK 5 – PROJECT MANAGEMENT SERVICES**

Consultant shall support project management of the metering infrastructure upgrade project, including but not limited to the following:

- a. Consultant will be required to conduct on-site meetings with stakeholders, subject matter experts and Executive Management as needed to collect information required to successfully complete the project.
- b. Consultant shall support communications and support the creation of presentations for the Operational Technology/Information Technology Steering Committee, Board of Public Utilities, and Executive Management as requested.
- c. Consultant shall support the tracking of action items, project activities, and assignments.
- d. Consultant shall participate in a weekly project team meeting and other meetings as needed.
- e. The Consultant will be required to be available for a once weekly conference call, and others as needed throughout the project.
- f. Consultant will work closely with RPU's designated Project Manager to ensure that the project is successfully completed on-time and within the proposed budget.
- g. Consultant shall identify and outline risks and track in a formal risk matrix/register with contingency and/or mitigation plans.
- h. Consultant shall develop, track and update a detailed project schedule in MS Project.
- i. Consultant shall develop, track and update a detailed project budget and keep Project Manager informed of status.

## **6.0 PROJECT DELIVERABLES**

- 6.1 System Implementation Plan, including costs
- 6.2 Network Diagram
- 6.3 Technical and Non-Technical Requirements
- 6.4 Test Plans and Results
- 6.5 Community / Customer Engagement Plan
- 6.6 Organizational Transition Plan
- 6.7 Current and Future State Process Diagrams
- 6.8 Security/Reliability Requirements for components, systems, data handling and storage, and vendors
- 6.9 Request for Proposal (MDMS)
- 6.10 MS Project Schedule
- 6.11 Monthly status/budget report