Advanced Metering Infrastructure (AMI) Program Update

'The Digital Foundation to Enhance the Customer Experience'

Public Utility Board
Study Session
January 9, 2019

Safety moment

Agenda

1. Introduction (5 minutes)
2. TPU Digital Engagement Strategy (10 minutes)
3. AMI Refresher (10 minutes)
4. AMI Program Update (10 minutes)
5. AMI Business Case Calibration (20 minutes)
6. Vendor Contract Proposals (20 minutes)
7. Customer Communications & Outreach Strategies (5 minutes)
8. Wrap Up (10 minutes)

Industry view – call to action

Sue Kelly, President of the American Public Power Association

"We can no longer stay in our comfort zone on our side of the meter – providing basic electric service and sending bills. We must diversify the menu, develop new rate designs to handle increased demands on our distribution grids, adapt to changing customer preferences, and prove we can be our customers' trusted energy advisors."

Digital transformation

Digital transformation is the application of modern technology to processes, products, and assets to improve efficiency, enhance customer value, manage risk, and uncover new revenue opportunities.

Digital Natives

amazon

UBER

NETFLIX

Digital Adapters

Digital Deniers

BLOCKBUSTER

Kodak

Sears

Our business drivers

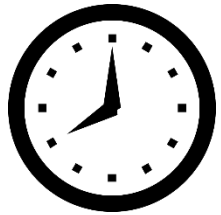
Ever-increasing customer expectations

Advanced metering infrastructure

An evolving workforce

Digital vision for customers

Value my time



Value my money

TPU Customers

Value me

Value my preferences

Digital vision for employees

Collaboration

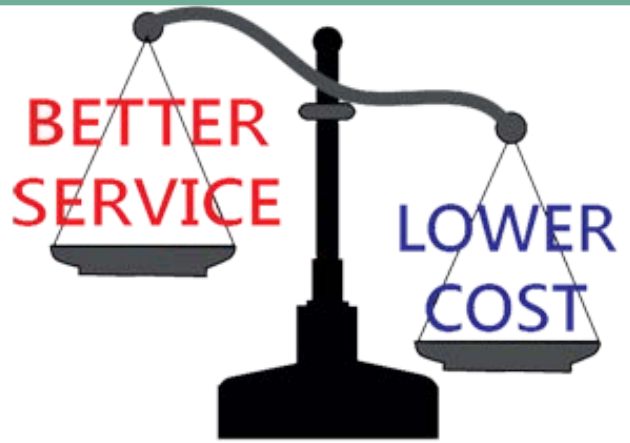
Communications

TPU Employees

Culture

Safety

A single TPU brand experience



TPU Customers

Social

Mobile/SMS

Email

IVR

Click to Chat

Web

Deliver a consistent TPU customer experience that accounts for our overlapping customer base, service offerings, and choice of channels our customers prefer to use.

Improving the customer experience thru digital service offerings

Today as a TPU customer…		*Tomorrow, enabled by digital utility offerings…*
I am only able to use a few channels to interact with TPU	Omni-channel personalization	I can interact with TPU via my preferred channel and learn about utility services that I find valuable
I have a hard time finding and accessing the resources I need to address my issues	Customer empowerment	I can easily locate the answers to my questions and resolve issues myself
I have to contact TPU every time I have a problem or issue	Proactive communications	TPU will proactively inform me of an issue or outage on my preferred communications channel
I get different information from different sources from TPU depending on which channel I use	Consistency & simplification	I get the same information no matter how I contact TPU and know what to expect at every interaction

Digital Business Transformation Initiatives

Equitable Access for All Customers

mytpu.org redesign

Enhanced customer portal

Customer analytics use cases

Enhanced customer outage notifications

Digital signage at TPU campus

Tacoma Economic & Workforce Development

Workforce Connect

Workforce analytics use cases

CRM for commercial/industrial customers

Office 365 & Microsoft Teams

Smart City use cases

Protect & Steward the Environment

ESRI GIS modernization

Natural resources analytics

Asset management analytics use cases

Enhanced load forecasting

Enhanced customer load profiling

Resilience & Reliability

Advanced metering infrastructure

Security & network operations center

Cybersecurity program refinements

Energy Imbalance Market

Distribution automation

TPU Digital Business Roadmap

Key: Equity | Economic & Workforce | Environment | Resilience

**Many of these initiatives span multiple strategic themes*

Higher

Value

Lower

- Advanced metering infrastructure program delivery
- Distribution automation
- mytpu.org redesign
- Enhanced customer portal with preference center and self-service features
- Real-time connectivity modeling
- Natural resources analytics
- ESRI GIS modernization
- Enhanced load forecasting
- Workforce Connect
- Refine cybersecurity program
- Asset management analytics use cases
- Customer analytics use cases
- Enhanced customer load profiling
- Wide area network modernization
- Workforce analytics use cases
- Security & network operations center(s)
- Land mobile radio digital upgrades
- Smart city use cases
- New TPU employee intranet
- Outage communications customer portal
- CRM for commercial & industrial customers
- Deploy digital signage at TPU
- Enhanced social listening
- Office 365 & Microsoft Teams
- CRM web portal for joint pole usage

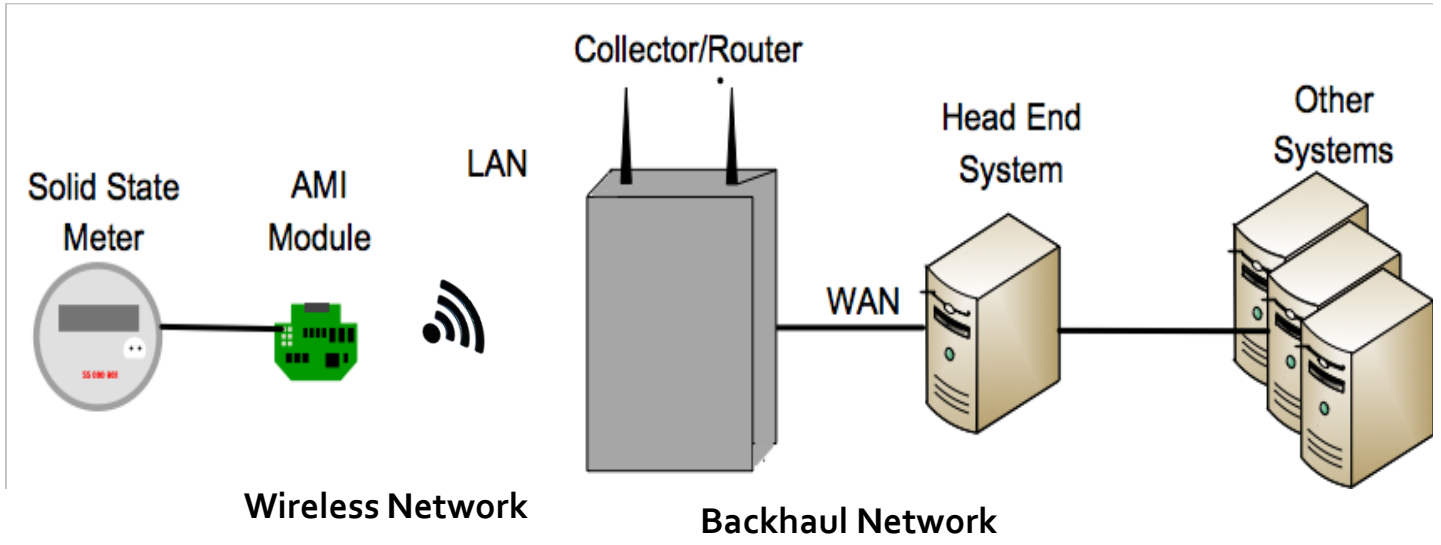
2019 – 2020 Biennium | **2021 – 2022 Biennium** | **2023 and beyond…**

TACOMA PUBLIC UTILITIES

AMI Review

Advanced metering infrastructure

- Composite technology of meters, communications networks, and software systems that automated the collection of meter data and provides a two-way connection between customers and the utility
- Considered a mature technology based on industry standards
- Deployment costs have come down with improved security & reliability
- Over 70% of US electric meters have been upgraded to advanced meters and continues to grow
- A recent water utility survey has revealed that three quarters of US providers are planning to make AMI-based smart water investments in the next 24 months.



AMI Overview – selected vendors

Power &
Water Meters

AMI Base Station(s)

SENSUS

AMI headend system

SAP

Customer Information System

UTEGRATION

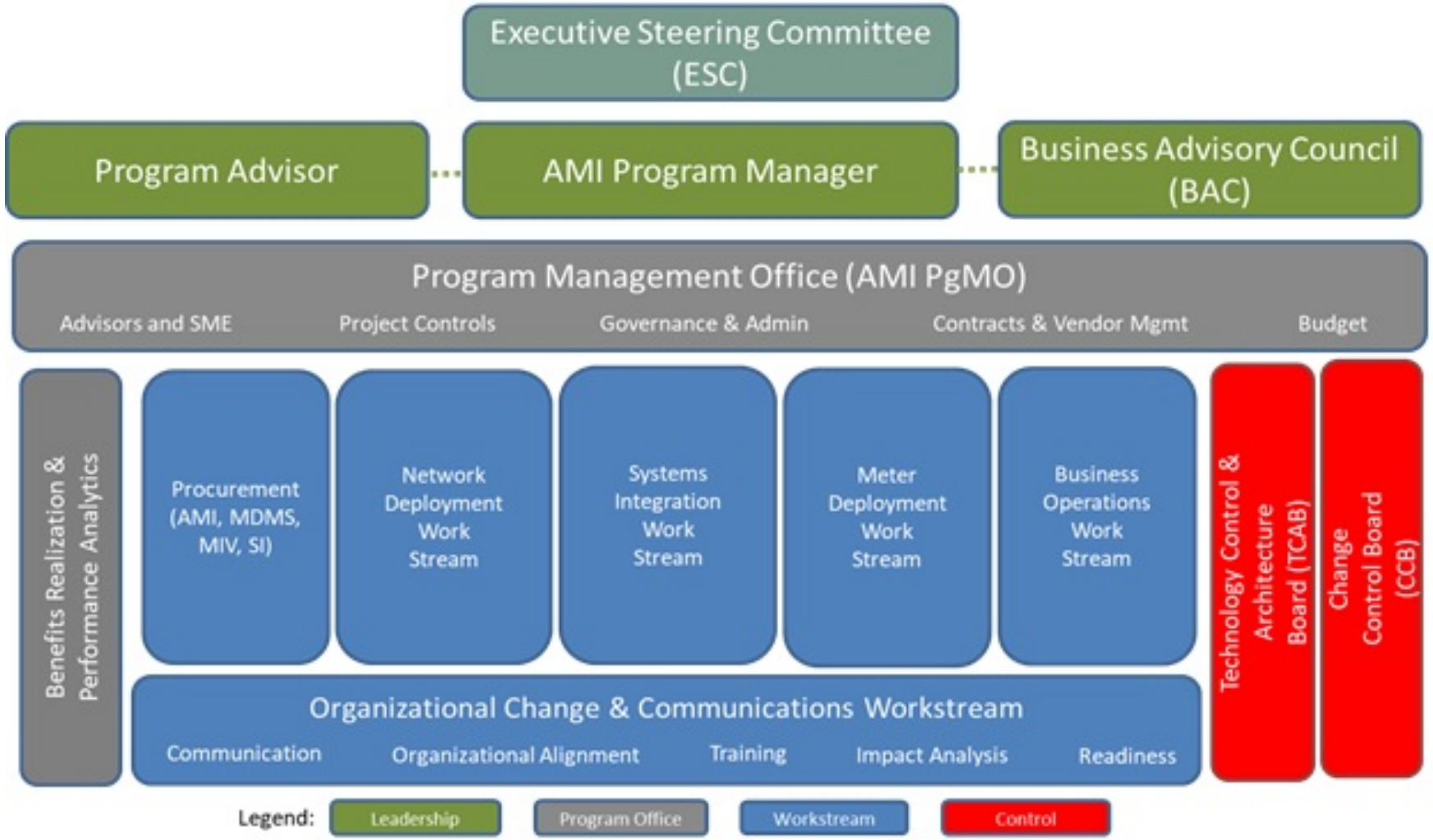
OMNETRIC
A Siemens Company

Meter Data Mgmt. System

Status of AMI in the PNW

	Seattle City Light	Snohomish PUD	Puget Sound Energy	Clark Public Utilities
AMI/Metering Capabilities	RF mesh AMI from Landis+Gyr in deployment	AMI Business Case Approved	Next Generation AMI Deployment underway. RF mesh AMI from Landis+Gyr	AMR Completely installed. Drive by AMR from Itron
	Portland General Electric	**SMUD**	**Peninsula Light**	**Avista**
AMI/Metering Capabilities	AMI Completed in 2010 RF star AMI from Sensus	AMI Completed in 2013 RF mesh AMI from Silver Spring Networks	AMR Completely installed. Power line carrier AMR from Aclara	RF mesh AMI from Itron
	Lakewood Water District	**Woodinville Water District**	**Glendale Water & Power**	**City of Anaheim Water & Power**
AMI/Metering Capabilities	AMI Completed in 2015 RF Star AMI from Sensus.	AMI Completed in 2014. RF star AMI from Sensus.	AMI Completed in 2010. RF mesh AMI from Itron.	AMI Completed in 2010. RF mesh AMI from L+G.

AMI governance structure



2018 Accomplishments

Tier 1 and Tier 2 Business Processes	• 20 sessions January through February • 18 three hour sessions from September through November
Three vendor selections	• Completed the AMI, MDM, and SI vendor selection processes • Requirements and RFP development • RFP review: proposal sessions, shortlist presentations, interviews, and scoring
Business Case Refresh	• Develop business case narrative expressing the purpose, cost and benefits of AMI • Reassessed and confirmed assumptions, costs, benefits, and calculations
Organization Change Mgmt. Plan	• Completed an organizational AMI alignment survey • Drafted a stakeholder engagement and communications plan • Developed internal and external messaging for talking points, web content, and responses to customers and community groups

Program schedule

2017 – 2018: Planning, Procurement, & Architecture

Q2 2017	Q3 2017– Q4 2017	Q1 2018 – Q3 2018
Program Charter & Governance Plan	Technical &, Business Process Architecture, Change Management Plan	Define requirements and RFPs for AMI, MDMS, and Meter Installation Vendor

2019-2020 : Systems Integration & AMI Network Deployment

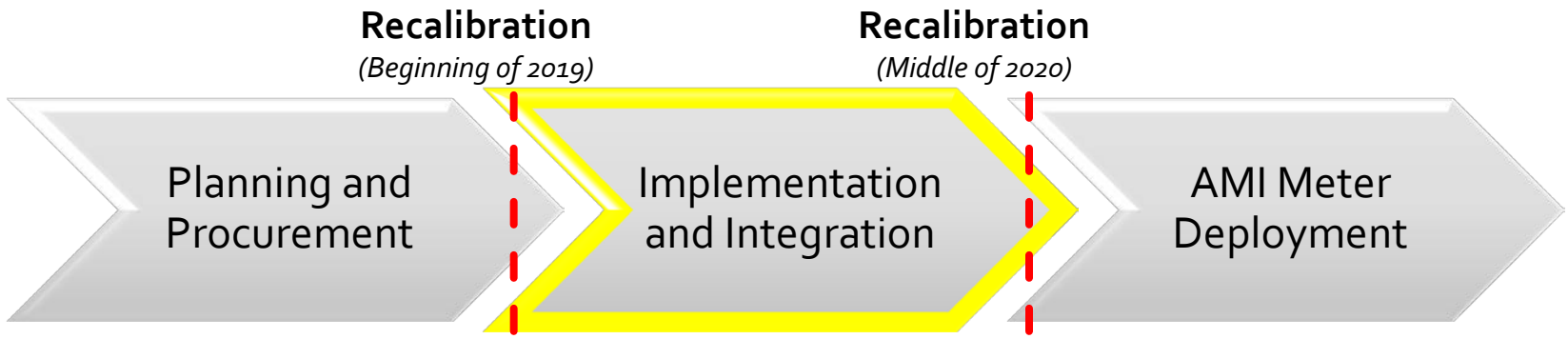
Q1 2019– Q4 2019	Q4 2018 - Q2 2020
MDMS Implementation & Systems Readiness	AMI Network Deployment

2020 – 2021: Mass Meter Deployment

Q2 2020	Q2 – Q4 2020	Q1 – Q4 2021
Complete AMI Network Deployment	Begin Meter Deployment (AMI Release 1)	Complete Meter Deployment (AMI Release 2)

Business Case Calibration

AMI business case calibration



- *As AMI transitions from procurement to implementation TPU must recalibrate the AMI business case to accurately reflect known program costs and realized benefits.*

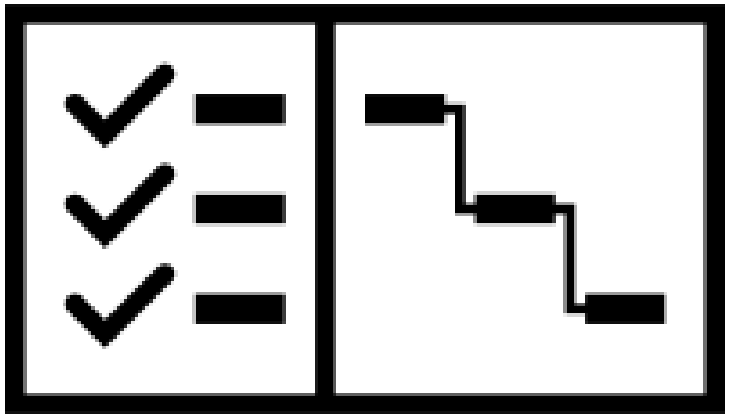
- *The next comprehensive AMI Business Case calibration will occur in the mid-2020 timeframe as the program transitions from implementation to deployment.*

Business case assumptions

Updated program costs	• AMI meters and network • Meter data mgmt. system • System integration • Program support
Refined benefits analysis	• Inclusion of monthly billing • Inclusion of carbon reduction
Updated asset replacement methodology	• Revised water meter replacement strategy based on updated meter replacement vs. retrofit costs. • Updated installation costs associated based on recent field survey analysis.

AMI business case scope

- ✓Installation of approximately 180,000 electric meters and 110,000 water meters
- ✓Installation of the AMI network
- ✓Implementation of a meter data management system
- ✓AMI to SAP integration
- ✓Transition to monthly billing
- ✓Deployment of a customer usage portal
- ✓All applications and functionality associated with Phase 1 and 2 of the AMI roadmap



New AMI customer benefits

Value my time

- Improved outage and system restoration times
- Advanced water leak detection capabilities
- Remote turn-on/turn-off
- Advanced self-service capabilities

Value my money

- Automated billing
- Monthly billing
- Prepayment options
- Selectable bill date
- Detailed usage information

TPU Customers

Value me

- Lower cost of service model
- Reduction of manual processes
- Paperless billing capabilities
- Demand response capabilities

Value my preferences

- Near Real-time usage information
- Alerts and notifications
- Billing and payment notifications
- Conservation options
- Multi-channel capabilities

AMI Customer Benefits Roadmap

Updated January 3, 2019

Customer Benefits Key

Reliability & Resiliency | Billing & Payment | Convenience

Phase 1: Delivered Functionality

To be completed by end of 2021

1. Basic meter to bill
2. Basic meter data reporting
3. Monthly billing
4. Customer meter options policy
5. Support for existing manual prepay process

1. Enhanced customer portal
2. Consumption data available via new portal

1. Remote meter reading
2. Remote disconnect/reconnect
3. Automated service order creation

Phase 2: Delivered Functionality

To be rolled out between 2021 and 2023

1. Enhanced prepay functionality (via customer portal)

1. Enhanced outage notifications
2. Abnormal consumption notifications
3. Emergency water leak notifications

1. Asset analytics use cases
2. Engineering analysis & systems planning use cases
3. Enhanced voltage monitoring
4. Revenue protection

Enabled Functionality

Features enabled by AMI not in program scope
To be prioritized after 2023

1. New real-time rate models
2. Support for multi-service prepay (water, sewer, trash)
3. Choose your own bill date

1. Enhanced SAP contact center tools via CIC upgrade
2. Enhanced demand & load forecasting
3. Enhanced grid & outage mgmt. operations
4. Distribution automation
5. Smart City integration

2020 | **2021** | **2022** | **2023** | **2024 and beyond…**

Measurable AMI benefits

- For Tacoma Water & Tacoma Power
- Benefits are based on industry benchmarks
- Labor-meter reading benefit assumes the transition to monthly billing

Benefit	Amount
Labor-Meter Reading	$56.72M
Labor-Call Center	$5.04M
Meter Replacement	$8.42M
Asset Management	$4.82M
Carbon Reduction	$2.69M
Reduced Write-offs	$2.51M
Reduced Energy Losses	$2.46M
Avoided Truck Rolls	$2.55M
Leak Forgiveness	$0.10M
Reduced Outage Duration-SAIDI	$0.01M
Total NPV of Quantifiable Benefits	**$85.61M**

This is a conservative benefit analysis that does not incorporate significant customer "soft" benefits associated usage information, self-service applications and system and account notifications

Program deployment cost

- AMI Costs are based on the following:
  - Contracted vendor pricing
  - Transition to monthly billing
  - Updated asset replacement strategy
- Costs include additional TPU staffing and contractors

Program Element	Cost
Electric Meter Deployment	$30.7M
Water Meter Deployment	$11.8M
AMI Communications Network Deployment	$1.7M
Systems Integration and Meter Data Management Implementation	$7.7M
Planning, Procurement, and Program Management Support	$7.1M
Subtotal	**$70.0M**
Contingency	$10.7M
Total Deployment Cost with Contingency	**$80.7M**

	2017-18	2019-20	2021-22
Biennium Costs	$1.54M	$21.9M	$46.6M

Note: Biennium costs exclude contingency

Financial summary

- AMI Return on Investment:
  - W/ Contingency = $(649,967)
  - W/o Contingency = $10,080,705
- AMI Costs are based on the following:
  - Contracted vendor pricing
  - Transition to monthly billing
  - Updated asset replacement strategy
- Costs include additional TPU staffing and contractors

Description	Amount
Capital Expenses (NPV)	$61.4M
O&M Expenses (NPV)	$14.2M
Electric Benefits	$58.7M
Water Benefits	$23.9M
Carbon Reduction Benefits	$3.0M
NPV w/o Contingency	**$10.1M**
Contingency	$10.7M
NPV w/ Contingency	**$-0.65M**

Solution Providers

Selected AMI vendors & contracts

- Sensus *(AMI meter and network provider)*
  - Hardware Statement of Work
- Omnetric *(Meter Data Management System)*
  - Implementation Statement of Work
- Utegration *(System Integrator)*
  - Implementation Statement of work
- Z2 Solutions *(Program Advisor)*
  - Contract Amendment

Vendor components

Advanced Meter Infrastructure (AMI)

- AMI power and water meter supplier
- Meter communication network infrastructure
- Head-end System (HES) system to manage the RF network and collect data from the meters

Meter Data Management System (MDMS)

- System of record for all meter data
- Collects and converts raw meter data into meaningful information of other systems
- Collects, processes, sends billing determinants
- Synchronizes with CIS (Customer Information System) and maintains synchronization of AMI
- Collects and analyzes meter events and alarms

System Integrator (SI)

- Configure and build the system integrations between the AMI HES, MDMS and SAP
- Orchestrates Blue Print workshops to capture SAP business and configuration workshops
- Coordinates and manages integration testing and user acceptance testing
- Coordinate go live and post go live support

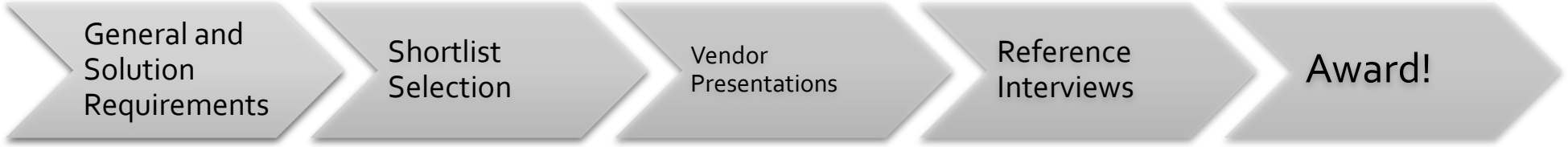
Meter Installation Vendor (MIV) - TBD

- Manages the warehousing and installation of the AMI meters
- Delivers installation data to TPU's systems
- Provides customer service for installation appointments and claims

Vendor selection approach

- Engaged consultant to facilitate our vendor selection process
- The selection panels were comprised of key SME's across TPU and City IT
- Vendors were equally evaluated via competitive RFP process

Selection process



AMI meter & network vendor

Power &
Water Meters

SENSUS

AMI Base Station(s)

AMI head-end system

- *Power & Water Meter Supplier*
- *Meter Communication Network Infrastructure*
- *Head-end System (HES) data collector*
- *Sandbox Deployment*

SAP

Customer Information System

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UTEGRATION

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OMNETRIC
A Siemens Company

Meter Data Mgmt. System

Sensus

- ✓ Best water meter support
- ✓ Best network and communications
- ✓ Solid electric support
- ✓ Strong network coverage
- ✓ Robust distribution automation capability
- ✓ Strong project team/methodology
- ✓ Lowest price

Sensus contract

Contract Component	Description	Price	Target PUB Meeting
Master Service Agreement (MSA)	General Terms and Conditions	NA	NA
Sandbox Statement of Work	Implementation of a test/non production environment	$185,000	TBD
Hardware Statement of Work	Meter and network infrastructure	$33,000,000	**1/23**
Implementation Statement of Work	Professional services for implementing the AMI system	$642,500	**1/23**
Software as a Service (Saas) Statement of Work	Network and system management	$1,326,000	**1/23**
Spectrum SOW	Network licensing agreement	NA	NA
	Total Contract Value	**$35,153,500**	

Meter Data Management System

Power &
Water Meters

AMI Base Station(s)

SENSUS

AMI head-end system

SAP

Customer Information System

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Meter Data
Management System

- *System of record for meter data*
- *Collects and converts raw meter data into meaningful information of other systems*
- *Collects, processes, sends billing determinants*
- *Collects and analyzes meter events and alarms.*
- *Synchronizes with SAP and maintains synchronization of AMI*

Omnetric

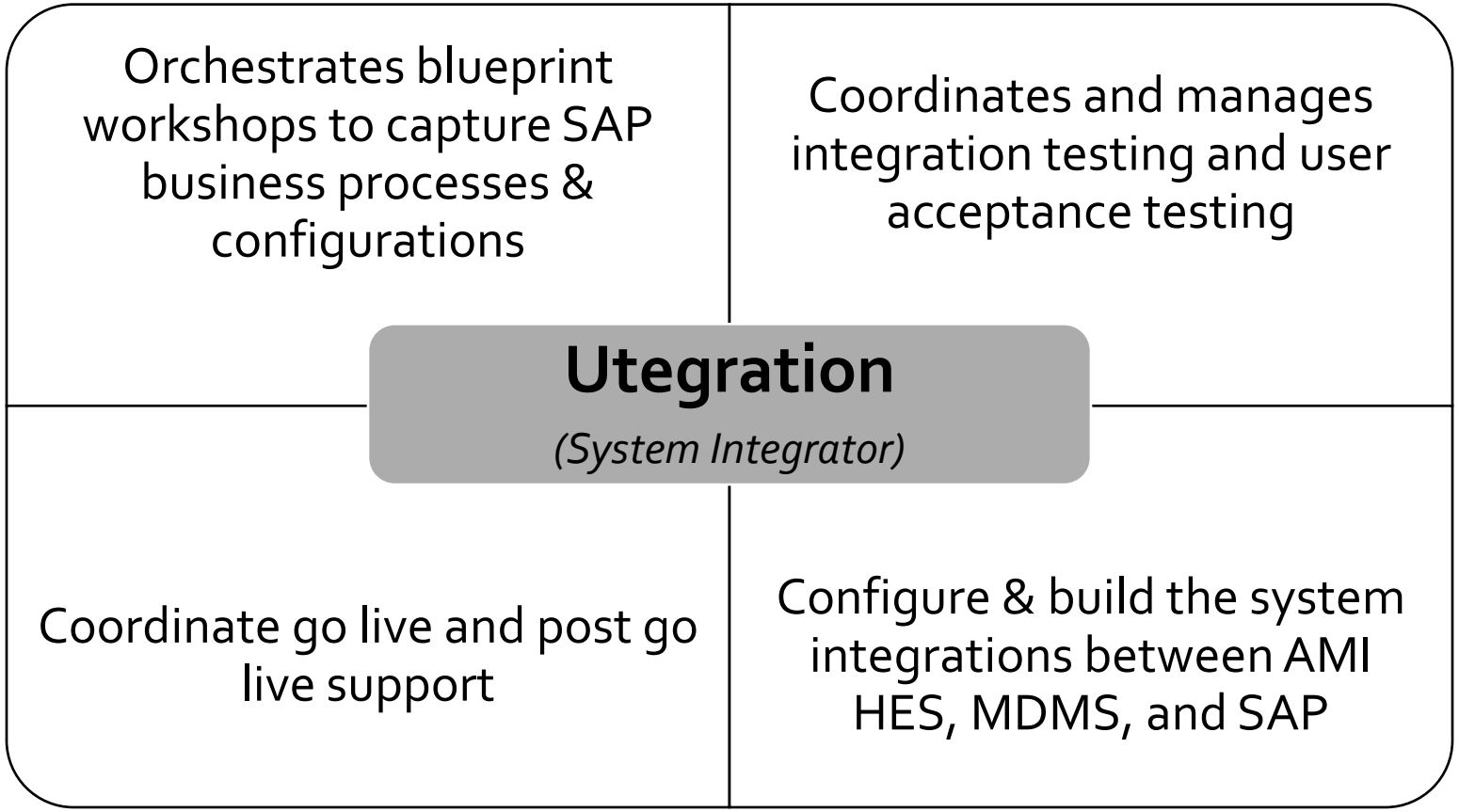
- ✓ Solid methodology
- ✓ Robust security and support
- ✓ Best-in-class system architecture
- ✓ Best functionality
- ✓ Experienced project team
- ✓ Excellent references
- ✓ Lowest price

OMNETRIC
A Siemens Company

Omnetric contract

Contract Component	Description	Price	Target PUB Meeting
Professional Service Agreement	General Terms and Conditions	NA	NA
Sandbox Statement of Work	Implementation of test/non-production environment	$90,482	**1/23**
Implementation Statement of Work	Implementation and integration of the MDMS	$1,168,452	**1/23**
Software License	MDMS Licenses	$50,000	TBD
	Total Contract Value	**$1,308,934**	

Systems Integrator



Utegration

- ✓ Strongest team
- ✓ Excellent reference checks
- ✓ Proven project methodology
- ✓ Significant municipal and combination utility experience
- ✓ Best minimum requirements score
- ✓ Good overall compliance requirements
- ✓ Strong SAP knowledge
- ✓ Local presence

Utegration contract

Contract Component	Description	Price	Target PUB Meeting
Master Service Agreement	General Terms and Conditions	NA	NA
Implementation Statement of Work	Integration services	$3,885,804	**1/23**
	Total Contract Value	**$3,885,804**	

Z2 Solutions & sub Excergy contract amendment

Scope of additional services:

- Meter and network deployment management support
- Stakeholder engagement and OCM services
- Systems integration advising services
- Program management support

Contract amendment request: $800,000

AMI contract proposal summary

Sensus (AMI Vendor)

- Hardware Statement of Work: $33,000,000

Omnetric (MDMS Vendor)

- Implementation Statement of Work: $1,308,934

Utegration (System Integrator)

- Implementation Statement of Work: $3,885,804

Z2 Solutions (Program Advisor)

- Contract Amendment: $800,000

Updated resolution – special project of limited duration

- Transition from procurement to implementation phase
- Staffing needs for temporary and special project positions
- Tonight's session for approval

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Customer Communications & Outreach Planning

Communications & outreach strategies

- Provide ongoing messaging updates to leadership, employees and customer-facing materials
- Highlight customer benefits and value
- Coordinate messaging timelines with project phases
- Use all available marketing channels as well as community and stakeholder relationships for outreach, similar to our rates process

Communications & outreach timeline

- 2018
  - Developed message map and confirmed customer benefits
  - Updated web content and FAQs
  - Provided talking points to leadership and outreach staff
  - Responded to customer and community group questions

- 2019/2020
  - Q1: Finalize 2019-2020 biennium Communications & Outreach Plan
  - Q2: Early communications of project timelines
  - Q3: Deployment communications to test group
  - Q4-Q1: Deployment communications to larger community

Summary

- How AMI provides the digital foundation to enhance the customer experience
- Refresher on AMI technology
- Reviewed calibrated business case
- Provided an overview of selected solution providers
- Preparation for contract approvals during upcoming PUB meetings

Questions