Smart Grid @ RPU

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we pledge, we deliver
an enfinity energy partner

Burns & McDonnell

Burns & McDonnell
SINCE 1898

Issues for Tonight's Discussion

- Recap Smart Grid overview-RPU status
- Results of analysis
  - Recommendations
- Path forward

Open dialogue approach

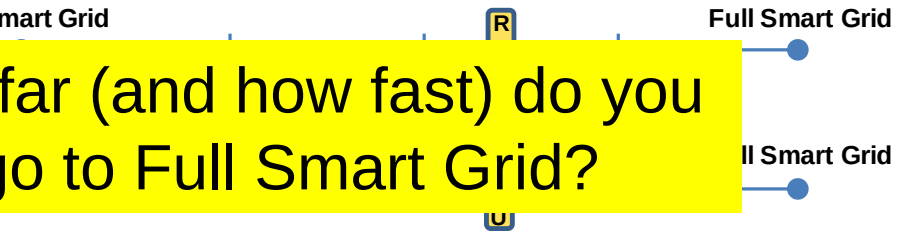
Ask questions as we go!

RPU already is on the Smart Grid path.

CUSTOMER SERVICE

CUSTOMER ACCESS TO INFORMATION & CHOICE

LOAD MANAGEMENT



DISTRIBU

ll Smart Grid

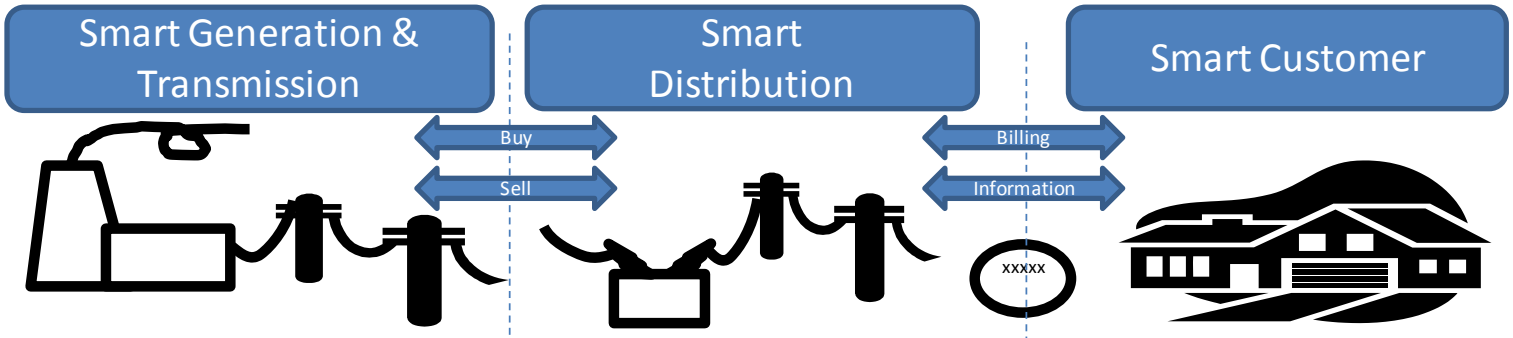
How far (and how fast) do you go to Full Smart Grid?

RELIABILITY

ASSET MANAGEMENT

ENTERPRISE

RPU has "Areas of Control" in Smart Grid

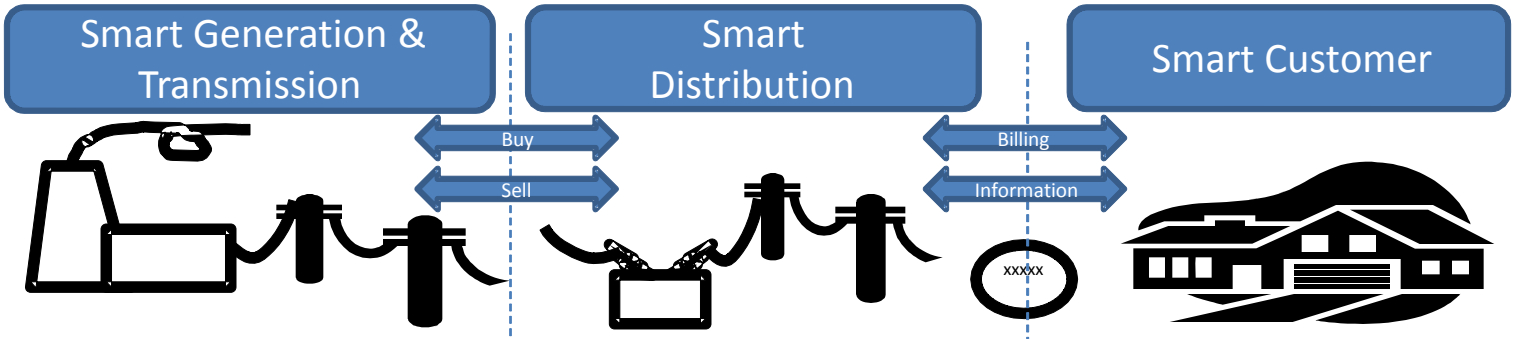


RPU involved in SG here through SMMPA/MISO initiatives.

RPU controls this space entirely:
-Remote feeder switching
-Remote monitoring of substation equipment
-Feeder power quality
-Fault identification
-Outage monitoring
-System Loading
-Remote connect/disconnect

RPU works with customers for acceptance "beyond the meter":
-Variable pricing
-hourly consumption/bill updates
-Load management at appliance level
-Distributed Generation/Micro Grids

"Areas of Control" have different Products and Technologies



Products and Technologies are Aimed at Utility industry
-Phasor Measure Units
-Control Center Energy Management Systems

Products and Technologies are Aimed at Utility industry
-Computer Relays
-Distribution Automation
-Outage Management Systems
-Asset Management
-Meter Data Management

Products and Technologies are Aimed at Utility
-Advanced Meters and assoc. comm.
And consumers-
-Home Area Networks
-In home displays
-Appliances
-Computer Applications

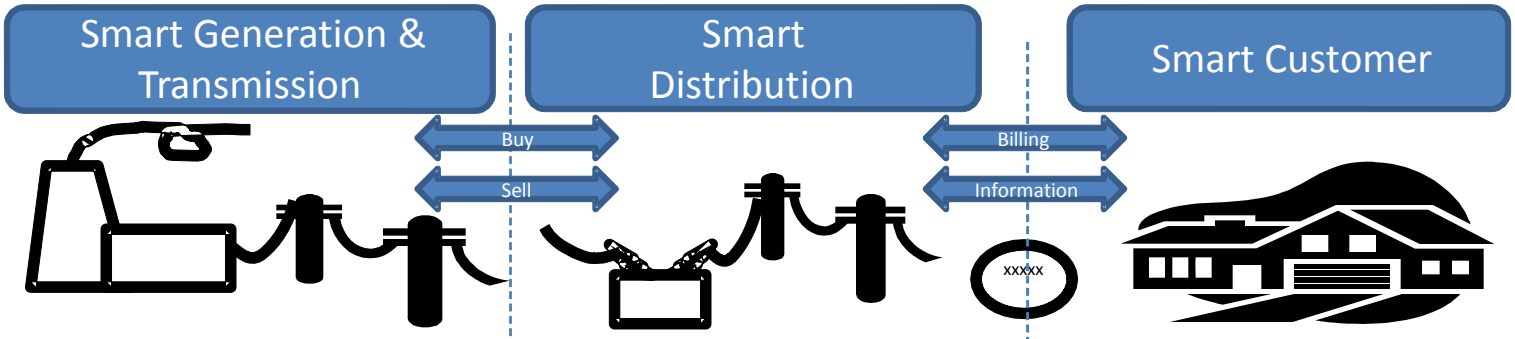
RPU has a Relatively Advanced System

Existing System	Status
Fiber optic communications	4 out of 10 substations connected
Advanced SCADA system	21 RTUs and 53 PLCs SEL 2030 Gateways at substations
Capacitor bank controls	8 advanced capacitor banks 50% of distribution capacitor banks with controllers
Transmission relays	100% fault locating end of 2010
Distribution Relays	100% fault locating end of 2011
Telvent Outage Management System	Advanced system with many more capabilities and connectivity than RPU is currently using

RPU's Reliability is Already High…

Measurement	RPU	Industry Ave.
Ave # of outages	0.49/customer/yr	1.10 /customer/yr
Duration of outage	33.59 minutes	90 minutes
Ave Restoration time	69.01 minutes	81.6 minutes

"Areas of Control" have different Products and Technologies



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New Products &Technologies Blur Smart Grid Utility/Customer Line

Ultimate Smart Grid Customer Level Functionality

1) Real-time Information on Usage and Cost
2) Automated Control of Appliances
3) Customer Empowerment to affect consumption

CUSTOMER	CUSTOMER/UTILITY INTERFACE	UTILITY
Smart Appliances	Home Energy Displays	Smart Meters/AMI	Direct Load Control	Demand Response	Distribution Automation	Enterprise Data Systems (MDMS)

RPU has Installed an Automatic Meter Reading System…

Smart Meter Capabilities	Current Meter Capability?	Add on Capability?
Customer Features		
Interval reads (hour or less)	Some Locations	Yes
Remote on-demand reads	No	Yes
Real-time information to the home (ZigBee)	No	No
On Line ePortal for customers	No	Yes
Distribution Features		
Power outage notification	No	Yes
Power quality monitoring	No	No
Remote connect/disconnect	No	Yes

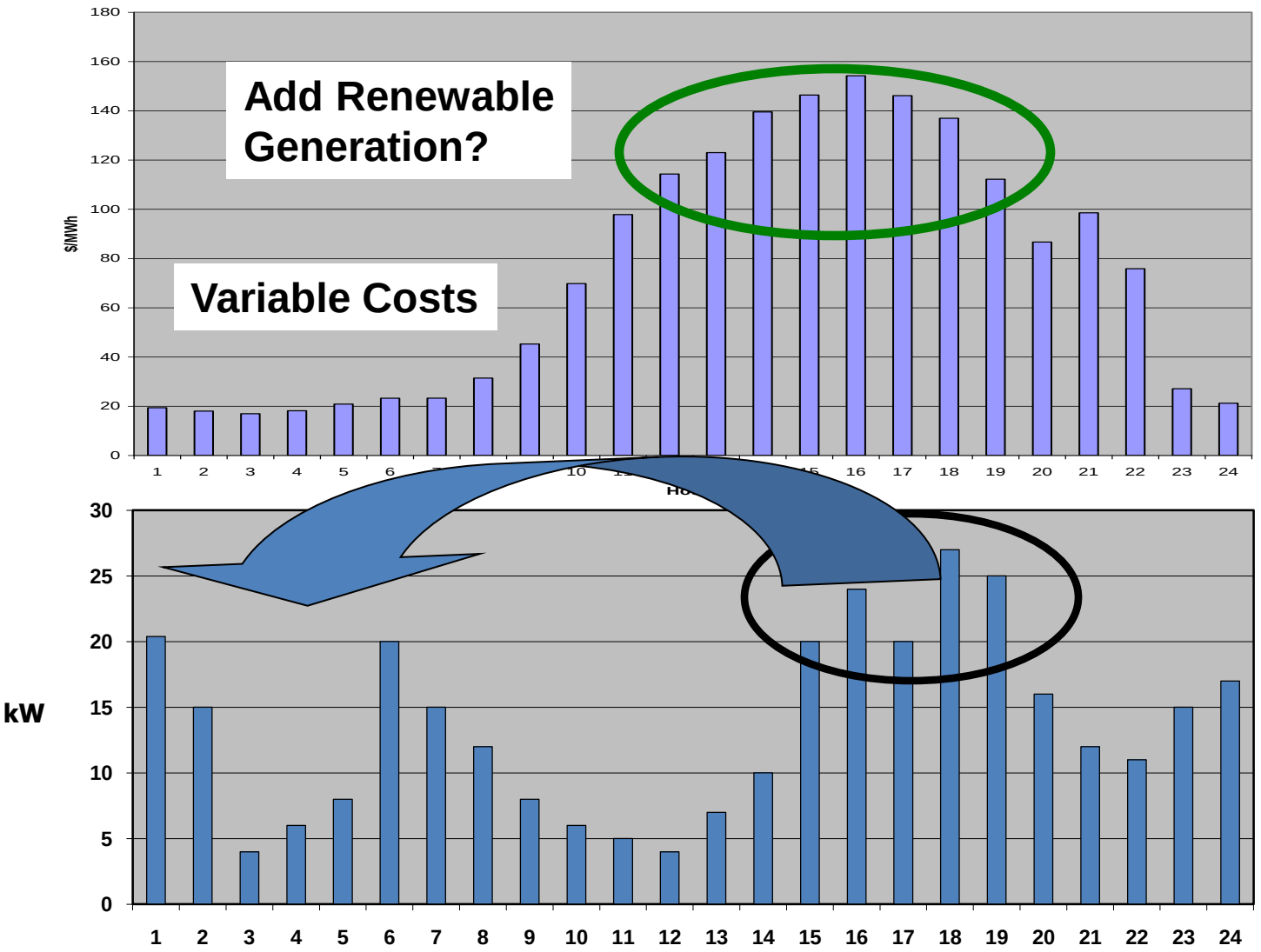
Smart Meter Capabilities require two way communication system between RPU and meter.

Two Approaches Essentially Same for Customer, not RPU…

- Data shared with 3rd parties
- Internet Security
- More difficult for RPU to get interval usage
- More devices for same functions as Smart Meter
- Customer controlled, can be supported now by RPU
- Communications via internet
- Not as prone to tech obsolescence with "all eggs in one basket"
- No straightforward approach to sharing data across RPU
- FYI, No billing quality information

- Data controlled by customer and RPU
- RPU Security responsibility
- Easy to get interval data
- Use of AMR requires "add ons"
- RPU controlled so customer must coordinate with RPU
- RPU communications
- Meter technology by vendor
- Replacement with Smart Meters could be done over time, targeted points
- Easier approach to sharing data across RPU
- Provides billing data

Dynamic Pricing-The Goal
(continued)



Variable costs will affect usage…

So, There are a number of options, considerations and approaches to Smart Grid

How do we get any focus on these issues?

Customer Space
-Time varying rates
-Real time usage
-Smart Building Controls
-Ancillary services

RPU Space
-Remote connect/disc
-Power quality info
-Outage information
-Real time usage
-Ancillary services

Key issue of Smart Grid for RPU is about use of Advanced Meter Infrastructure

Time of use rate issue is major factor in deployment of AMI

-Mandatory

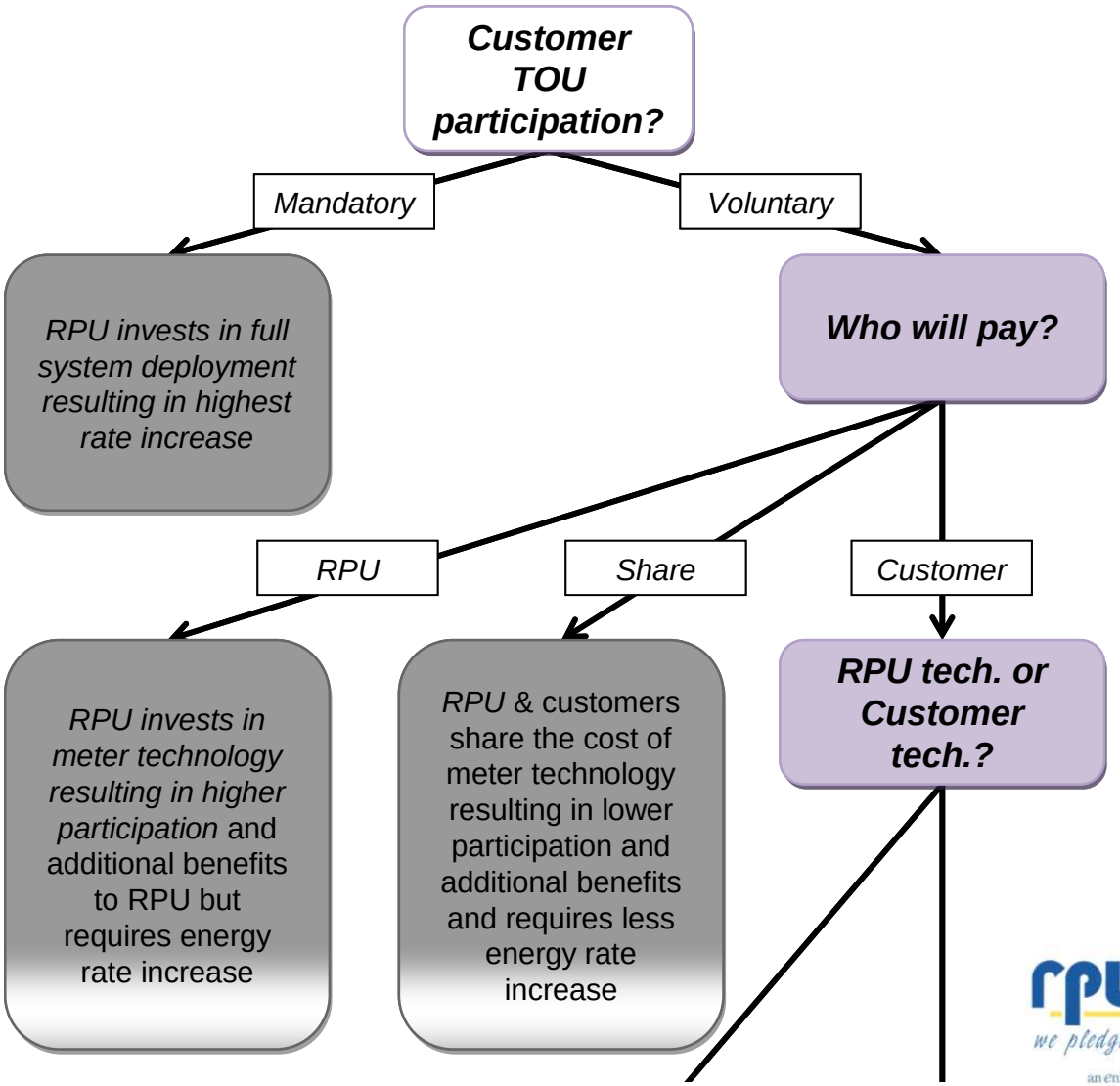
One fundamental question: Does RPU move to Mandatory Time of Use rates for all customers?

-Voluntary

This question drives..

1. Whether to deploy technology across full system or for only customers who want TOU.
2. How readily RPU can leverage technology in customer space for Smart Grid Dist Automation objectives
3. How many rate structures RPU maintains
4. How to recover costs (ratebase or per adopter)

Decisions on TOU and Tech issues



Support in the voluntary approach

RPU promotes and installs meter technology that customers and RPU gain usage information from

RPU promotes and advises customers in the acquisition of technologies "behind the meter" that customers gain usage information from

Business Case developed using the following premises…

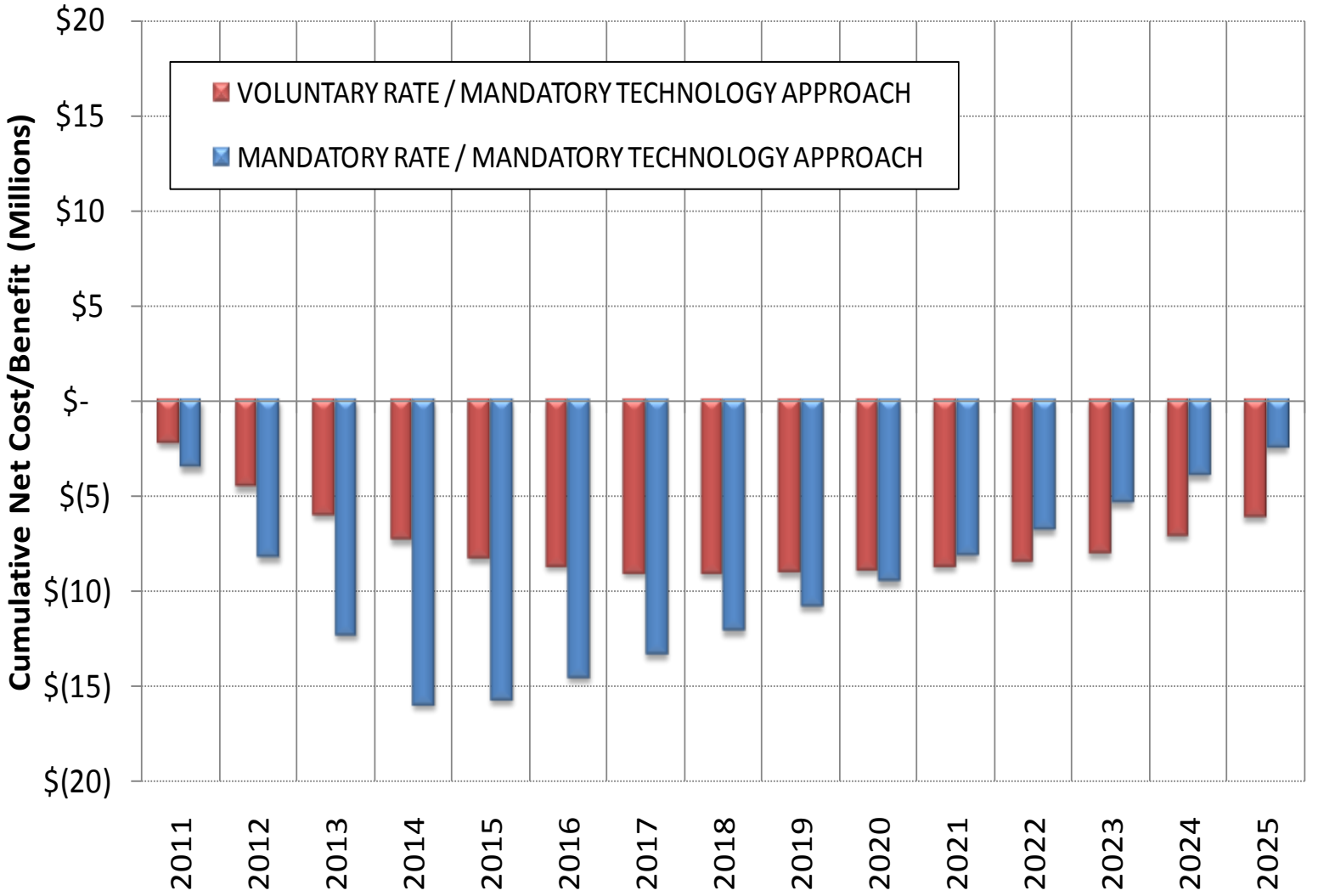
First: Due to advantages it brings, AMI would be deployed.
-RPU space
-Customer space
Mandatory use of AMI removes question of whether to use Internet or customer based approach

Second: RPU will determine approach to mandatory versus voluntary TOU rates.
-Business Plan reviewed both
-Main difference is pace of AMI deployment

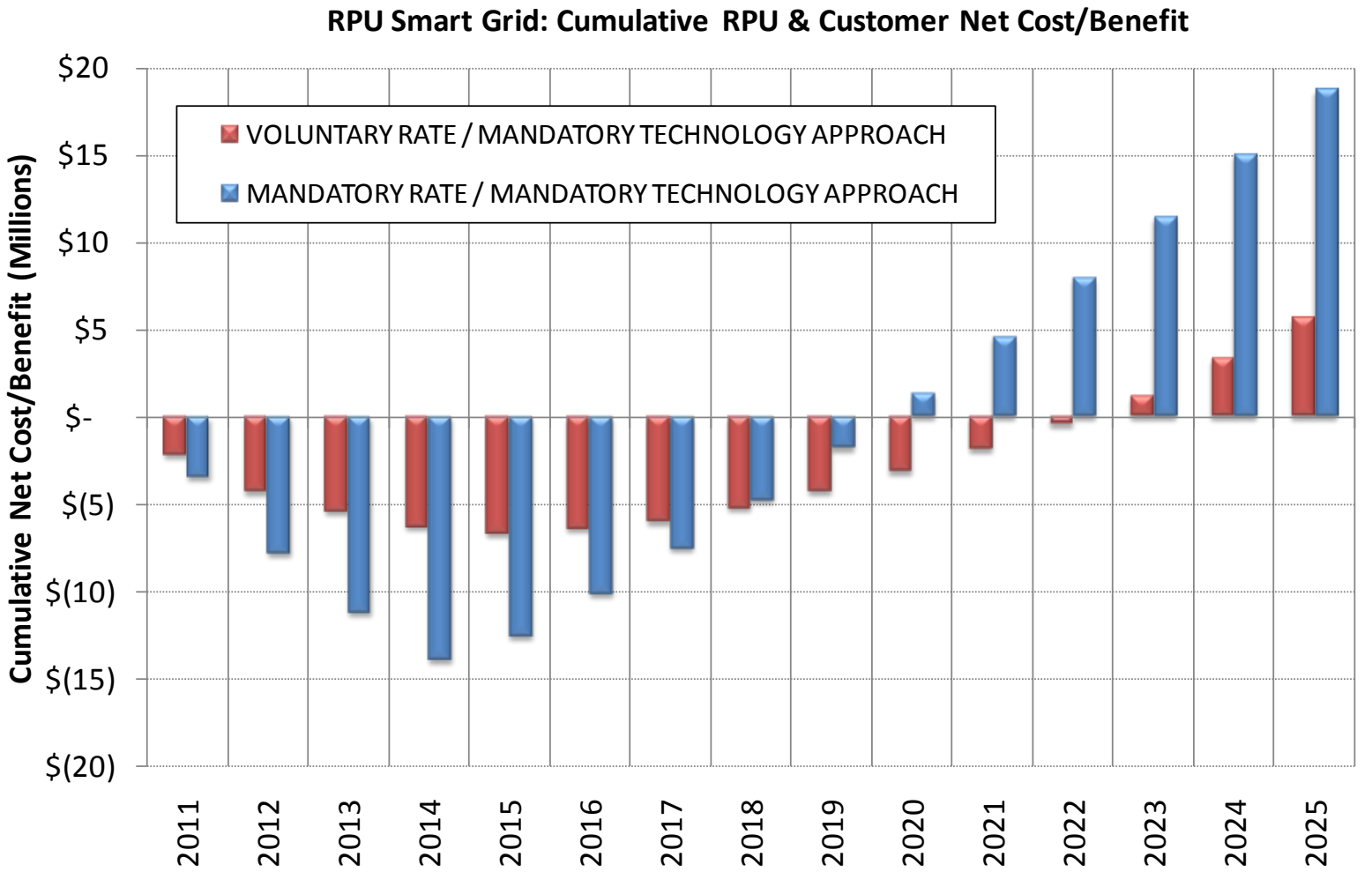
Business Case Includes:

- Discussion of Smart Grid
  - Different perspectives of Customer, RPU and Regulators
- GAP analysis of what infrastructure is currently in place and what is needed
- Discussion of mandatory versus voluntary approaches
- Benefit cost analysis
  - Spreadsheet tool that allows RPU to refine assumptions and rerun assessment
- Recommendations and Implementation Plan

RPU Direct Benefits



Total Community Benefits



Recommendations for RPU Smart Grid Future

- Due to advantages in cost and features, RPU should plan migration to an AMI platform.
  - New customers
  - AMR attrition
  - Statistical dispersion
  - TOU deployment
- In order to maximize customer benefits with Smart Grid, significant consumer education is needed.
  - First major activity.
  - What to do with usage information
  - What are impacts and how to use dynamic cost information
  - Manage fears of "intrusion" and personal information
  - Align expectations with realities of Smart Grid
- Upgrade SCADA and outage management system with regards to Smart Grid goals.
- Plan for increased amounts of data to be processed. Upgrade the CIS with eye towards this data coming and TOU rates being more widely deployed.

Possible Time Line

Year 1

- Customer dialog and education about Smart Grid
- RPU decision on mandatory versus voluntary TOU
- Identify and prioritize poorest performing distribution system areas
- Designs for communication system
- Designs for Back office systems upgrades
- Design customer programs (rates, ancillary services, DSM)

Year 2

- Continue consumer education, roll out of programs, devices
- Design TOU rates
- Initiate AMI deployment in strategic locations
- Initiate communication and computer systems upgrades
- Initiate distribution system upgrades at poorest areas

Year 3

- Begin offering TOU rates and other customer programs
- Tie meter data management system to customer and outage systems
- Continue distribution and meter system upgrades

Year 4+

- Evaluate, monitor and refine customer programs
- Continue distribution and meter system upgrades
- Evaluate, monitor, and refine internal RPU data sharing, organization, and processes

What do you think?

Where do we go from here?

Vision for Consideration

Prudently adopt Smart Grid technologies which provide customer value in reliability or service.