

# Smart Meter Costs & Benefits

## *PA PUC Functional Requirements*

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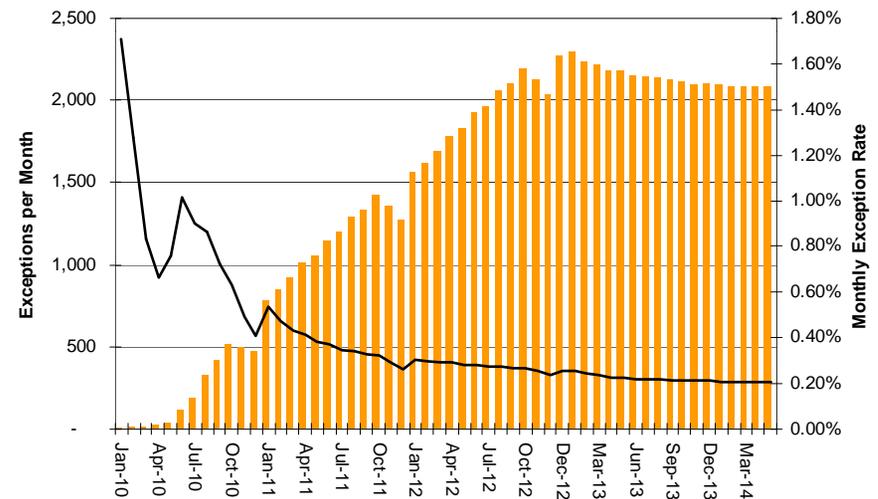
Chaired CPUC Business Case Subcommittee, R.02-06-001



## Costs & Benefits Overview

- Key costs and drivers
  - Meters
    - Design and manufacture
  - Communications network equipment
    - Geographic coverage
  - Software: MDMS, billing, CIS
    - Thick vs. thin MDMS; rates supported
    - IT operations: exception handling
  - Installation and integration
    - Hardware: saturation vs. one-by-one deployment
    - Software: custom development vs. COTS
  - Program management

AMI Exceptions per Month



## Costs & Benefits Overview

### Key benefits and drivers

#### Utility operations

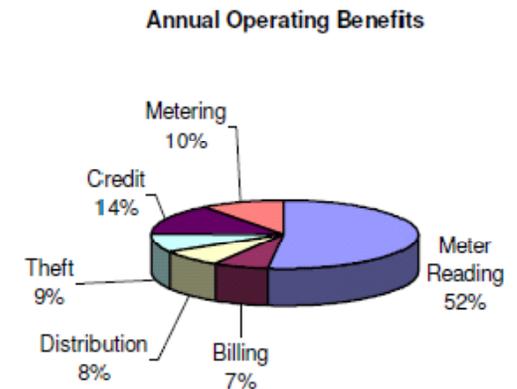
- Field labor for meter reading and move in/out
- Disconnect for high turnover areas
- Call center
- Billing related

#### T & D capital

- Peak demand reduction (note: eventually PHEV charging)

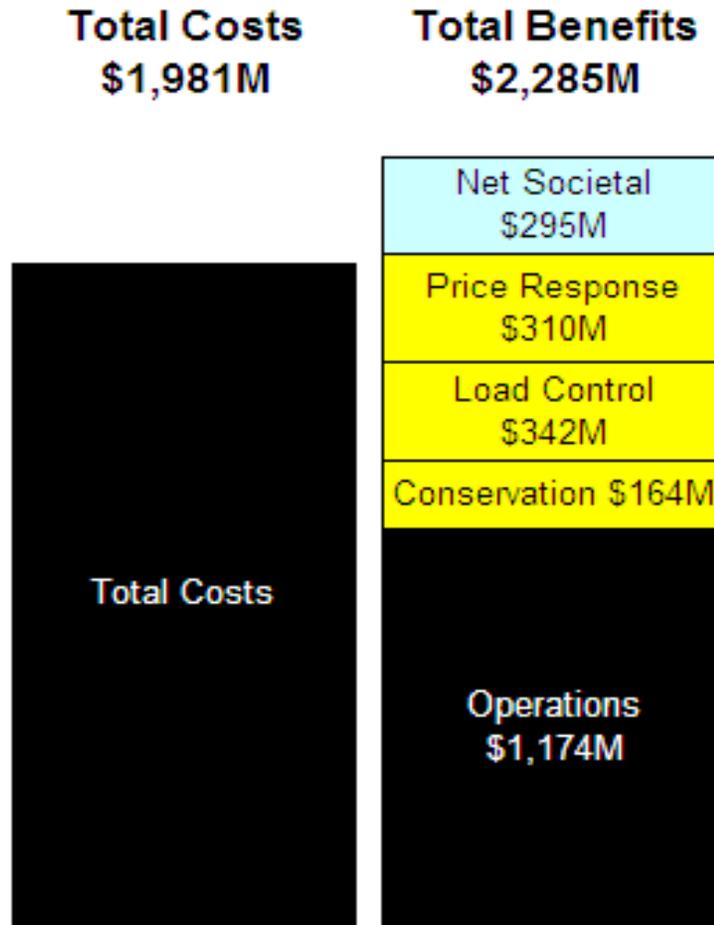
#### Societal

- Conservation by consumers via information feedback
- Energy efficiency by consumers via engagement
- Conservation in the distribution network
- Peak demand reduction



# Example: Southern California Edison

'07 PVRR (\$Ms)



Costs	
Phase II Pre-Deployment	
Acquisition of Meters & Comm Network	
Installation of Meters & Comm Network	
Back Office Systems	
Customer Tariffs, Programs & Services	
Customer Service Operations	
Overall Program Management	
Contingency	
Post-Deployment	
<b>Total Costs</b>	

Benefits	
Meter Services	
Billing Operations	
Call Center	
Transmission & Distribution Operations	
Demand Response - Price Response	
Demand Response - Load Control	
Conservation Effect	
Other	
<b>Total Benefits</b>	

(\$ Millions)		Nominal	'07 PVRR
		\$	
	(45)		
	(726)		
	(285)		
	(251)		
	(117)		
	(82)		
	(45)		
	(130)		
	(1,582)		
<b>Total Costs</b>		<b>\$ (3,263)</b>	<b>\$ (1,981)</b>
		\$	
	3,909		
	187		
	96		
	92		
	1,044		
	1,242		
	828		
	39		
<b>Total Benefits</b>		<b>\$ 7,437</b>	<b>\$ 1,990</b>
<b>Net Benefits Excluding Societal</b>		<b>\$ 4,174</b>	<b>\$ 9</b>
<b>Societal Benefits</b>			295
<b>Net PVRR</b>			<b>\$ 304</b>



## PA Functional Requirements

- Remote connect/disconnect and 802.15.4 HAN interface
  - Hardware cost of \$100 per meter device with the features vs. \$52 per meter device without them
  - Software (MDMS) needs capability to handle; marginal effect on total IT costs
- Ability to provide 15 minute interval data
  - A standard feature
  - Increases IT hardware costs for processing and storage by 400% compared to hourly, from about \$0.03 per meter-year to about \$0.13 per meter year
- On-board, non-proprietary meter data storage
  - Marginal added hardware cost
  - Design and time-to-market costs may be significant for vendors
- Ability to upgrade minimum capabilities over time
  - For hardware it depends; the key is to enable upgrades to occur in systems or devices outside the meter
  - For software, cost can be huge if flexibility is not planned up front; one utility is spending \$80 million



## PA Functional Requirements

- Additional requirements with similar results
  - Ability to monitor and report voltage
  - Ability to remotely reprogram the meter
  - Ability to communicate outages and restorations
  - Ability to support net metering
- Cost impacts
  - Each is essentially a standard meter feature with no added cost
  - Each requires software to use and benefit from the data, as well as integrating to the utility IT systems
  - The more complex the meter is in terms of data storage, processing, and configurability, the higher the software and operating costs to manage the complexity
    - Example: billing from register vs. interval data
  - The more that existing IT systems are affected or customized, the higher the software costs



## Summary

### ● Benefits

- Types: utility operations and societal, including difficult to quantify customer service and reliability improvements

### ● Costs

- Meters and installations straightforward
- Communications network a bit more complex
- IT costs subject to tremendous variability
  - Three strategies to minimize IT costs
    - Minimize effects on existing IT applications; avoid customizing
    - Maximize flexibility
    - Understand business processes to reduce exceptions and automate exception handling

