



SMART REGULATORY APPROACH FOR SMART GRID INVESTMENTS

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SMART GRID: WHAT IS IT?

- New metering and communication system, .e.g, “smart” meters: demand response; pricing options
- T&D investments to “modernize” communications, sensors, grid design and operation: manage outages; energy storage; intermittent resources
- Customer side of the meter: In Home Devices

SMART GRID: JURISDICTION

- Federal policies are not mandatory; states have discretion about adopting any PURPA policies, including Smart Grid policies in the Energy Policy Acts of 2005 and 2007
- FERC regulates wholesale markets and supervises RTOs; required to establish “just and reasonable” rates
- States regulate utility distribution rates (and generation supply portfolios and rate design in states with and without restructuring); approve cost recovery; establish retail tariffs and prices for retail electricity service
- Smart Grid is primarily a matter for state regulation

SMART METERING

- Advanced or smart meters: Only achieves part of this vision
- Most utilities focus primarily on Advanced Metering systems and rarely propose Smart Grid plans or investment decisions
- Smart Meter proposals often claim to represent crucial part of future Smart Grid plans
- Unknown ratepayer costs for investment to obtain modernization of the Transmission and Distribution grids

Consumers Have Serious Questions about AMI

○ Costs:

- Rate impacts (AMI costs alone in CA over \$3 B; \$200-400/meter is typical)
- Technology obsolescence
- Increased costs to retire existing working meters

○ Benefits:

- Operational cost savings: meter reading; field operations; remote connect and disconnect
- Demand Response: implementation of dynamic pricing; direct load control
- Energy conservation or consumption reduction
- Part of implementation of Smart Grid for T&D operations: integrate renewables; enable Electric Vehicles

CONSUMER CONCERNS ABOUT COSTS

- Utilities often seek separate tracker to assure cost recovery outside of a base rate case: consumers bear full responsibility for actual costs as they occur
- Potential for higher bills for low use and low income customers
- New technologies: who bears risk of wrong choice? [VCRs vs. DVDs vs. DVRs]
- Smart Metering proposals may be only a down payment on unknown future Smart Grid investments, i.e., electric vehicle infrastructure

CONSUMER CONCERNS ABOUT BENEFITS

- Benefits are estimated over a 15-20 year period; degree of accuracy rarely calculated for all variables
- To document cost effectiveness, utilities sometimes seek demand response and supply side benefits that make up over 50% of costs and that require estimates of future wholesale prices of capacity and energy
- Demand Response benefits have yet to be proven in any full scale implementation of dynamic pricing: customer participation rates; persistence of results; impacts of wholesale market structure on value of DR and how to return this value to customers
- Can low use and low income/elderly customers see benefits or only costs?
- Who bears the risk that these estimates are wrong?

CONSUMER CONCERNS ABOUT BENEFITS

- Utilities seek to justify their smart metering approach without any analysis of alternative means to obtain DR results from residential customers: direct load control works and is less costly; do not need AMI for this technology
- Utilities typically do not include customer costs to actually bring the usage data into the home or connect to any appliance: in-home devices and new appliances are not cheap!
- Who is likely to purchase EV autos? Who bears the costs to upgrade T&D system to allow recharging and handle increased residential load?

REAL TIME PRICING: WHAT IS IT?

- Dynamic retail pricing varies the price of electricity as wholesale prices fluctuate over the course of the day; rely on “spot” or “day ahead” prices
- Theory: customers can shift usage or reduce usage according to their “sensitivity to price”
- Are these pricing options for residential customers the most cost effective way to reduce system peak load and reduce generation supply prices?
- Is this designed to allow customers to reduce their electricity bill? Or just shift usage to off-peak hours to avoid higher critical peak prices?

CONSUMER CONCERNS ABOUT DYNAMIC PRICING

- AMI is being used as a justification for demanding that residential customers move to TOU or dynamic pricing as “default”
- Consumers want and need stable and fixed prices for service essential to their health and well being
- TOU rates NOT popular for a reason
- Concern about bill impacts on some customer groups: low income; elderly; disabled. Pilot results show much lower elasticity of demand for low income but rarely studied directly in most pilots



SMART METERS: KEY IMPACTS ON LOW INCOME CUSTOMERS

- Costs of new systems run into billions for large utilities and will increase prices for all customers
- Remote disconnection for nonpayment—no more premise visits to obtain payment, declare medical emergency, or detect unsafe and dangerous conditions for very young, old, or infirm
- Prepayment metering easily the next step
- Encourages more reliance on volatile spot market prices based on wholesale markets
- Can low income customers really shift usage sufficiently to save on overall bill? What about elderly faced with paying 75 cents/kWh for air conditioning on hot summer days?

CALIFORNIA PILOT RESULTS: ANALYSIS BY TURN

- The pilot programs did not factor in the costs of the AMI and smart thermostats in analysis of bill impacts!
- DR response by residential customers is closely aligned with appliance usage, climate, and demographic (income) factors
- Almost 50% of residential customers have very low price elasticities (less than -0.10); half will make very little usage changes
- YET all must pay for program; TURN found that 60% of customers who use less than 6,000 kWh annually would have to shift more than half their peak load to see bill savings when costs of AMI taken into account
- TURN concluded that only a relatively small group of high usage residential customers can realistically shift sufficient peak load to find bill savings.
- Several consultants have used the California pilot program results to create a model that is used to predict the demand response results of smart metering proposals in other states, measuring residential customer “elasticity of demand.”

PREVIOUS EXPERIENCE WITH TOU FOR RESIDENTIAL CUSTOMERS

- PUGET SOUND ENERGY: Mandatory TOU prices for all residential customers abandoned in 2002 when analysis showed negative cost benefit and higher, not lower, customer bills
 - Customers with most adverse bill impacts: multi-family and mobile homes
- MAINE: Mandatory TOU prices for high use electricity customers made voluntary with onset of restructuring and widespread customer dissatisfaction in face of higher electricity prices
 - Elderly customers in newly built multi-unit condos and senior and low income housing complexes most adversely affected and without alternative options
- NEW YORK: Previous efforts to push for Time of Use pricing resulted in state law that prohibits such time-based pricing except as voluntary options.
- Many utilities offer Time of Use rate options to residential customers using interval meters; little customer interest
- RESTRUCTURING STATES: Most abandoned mandatory TOU and other rate design structures associated with generation supply management and assumed that the competitive market would provide such products.

CONSUMER CONCERNS ABOUT CONSUMER PROTECTIONS

- Utilities typically couple smart metering with the functionality of remote connection and disconnection of the meter; CA results document significant increase in volume of disconnections with AMI; elimination of premise visit increases risk of wrongful or disputed disconnection; health and safety risks
- These new meters may give rise to a host of degraded service options, e.g., prepayment (pay in advance and automatically disconnect when meter is not fed); service limiters
- New privacy concerns will become evident with the access to individual household usage information: Is anybody home? What appliances are being used? Who can access this data and for what purpose?

SMART GRID AND THE CUSTOMER SIDE OF THE METER: WHO IS IN CHARGE?

- Promoters of a “smarter” grid emphasize how customers can be “empowered”
- Dynamic pricing does not “empower” customers; it presents a Hobson’s Choice to many low use, low income, and elderly customers who must use electricity during peak hours for health and safety reasons (Chicago heat wave; over 700 deaths, mostly seniors living alone)
- A voluntary approach to dynamic pricing or relying on Peak Time Rebates is preferred approach; PTR has been successfully demonstrated to result in peak load reduction without TOU or CPP

SMART GRID AND ELECTRIC POWERED VEHICLES

- An EV will increase household load factor by 50% or more at peak hours (source: BG&E executive)
- Significant burden on utility transformers and distribution system
- What if off-peak usage gets more expensive due to demand?
- Questions:
 - Who pays: all customers or cost causers? Ratepayers or taxpayers?
 - Should this potential development be used to demand TOU rates for all?
 - Can plug in devices control time of energy flow?
 - In home or neighborhood plug in options?

T&D INVESTMENTS

- Smart Grid investments for T&D systems should be linked to delivery of customer benefits:
 - Establish a baseline that identifies current status of smart grid investments in T&D systems
 - Condition rate recovery to enforceable reliability objectives—reduce frequency and duration of outages; reduce customer outage costs
 - Target distribution investments where they are likely to have most significant results
 - Demonstrate ability to integrate intermittent resources and distributed resources

SMART GRID: REGULATORY RESPONSE

- KEY RECOMMENDATION: Let's be "smart" about "smart grid"
 - Utilities should link proposed investments to specific functionalities
 - What incremental investments are required? Who pays?
 - At what cost? Over what period of time?
 - What enforceable promises are made to deliver the benefits to end use customers?

WE NEED SMART REGULATORY POLICIES FOR SMART GRID

- Endorsement of utilities “wants” based on magic words or inchoate promises would not be “smart”
- Presumption should be for rate recovery that links costs and benefits: utilities must assume some of the risks that their estimates are wrong
- Base rate recovery preferred to separate trackers or surcharges
- Smart Grid and smart metering must not be used as a means to impose dramatic changes in retail rate design for residential customers
 - Dynamic and time-based price programs must remain optional on an “opt in” basis
 - Rewards in the form of credits for peak usage reduction should be the preferred approach