
Smart Grid Investment Grant Consumer Behavior Studies: *Background and Current Efforts*

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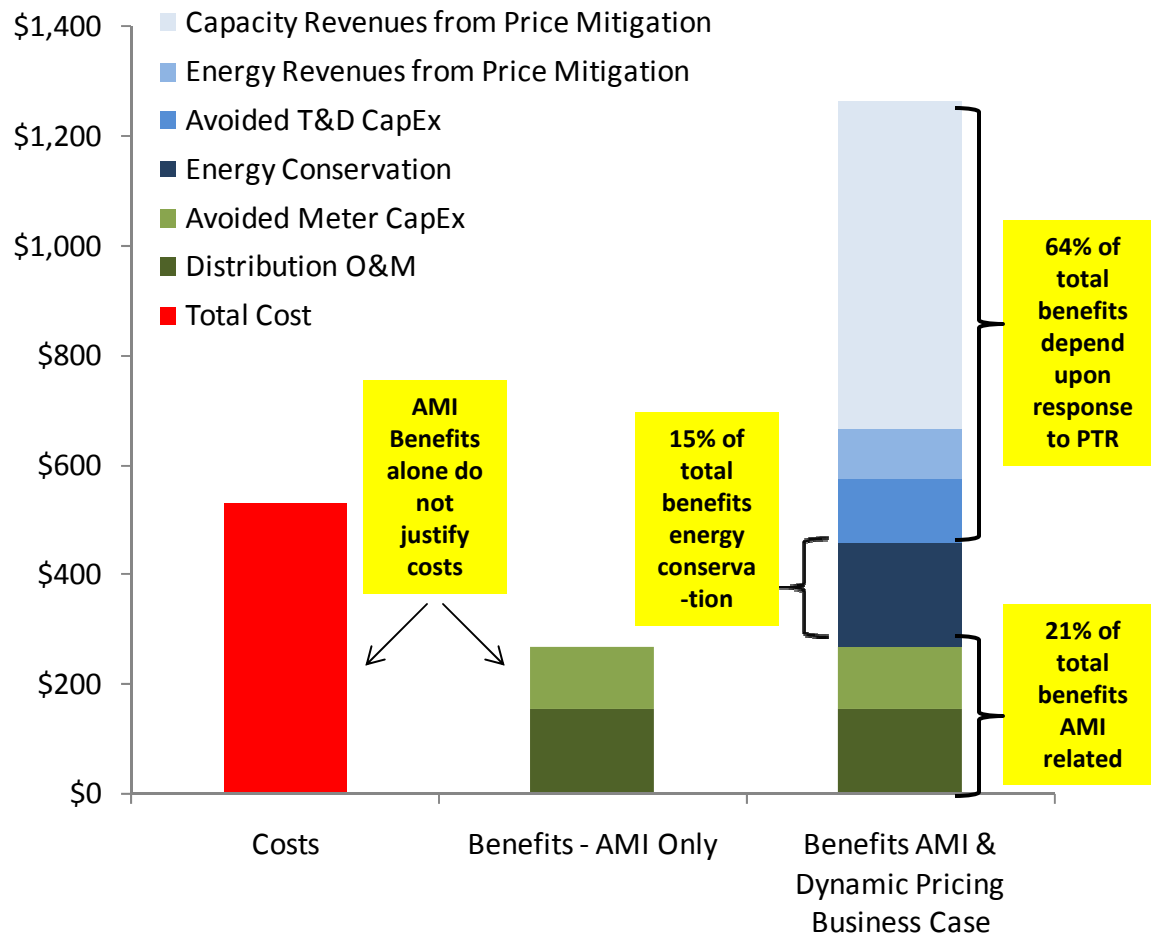
Background on Utility Industry:

Metering and Rates

- In 1884, intense debate raged among economists about the merits of pricing electricity differentially based on time (coincident peak demand vs. TOU)
 - Arguments against TOU pricing included high initial metering costs and frequent resetting of meter
- Debate evolved beyond theoretical assertions of economic efficiency to practical considerations of consumer behavior
 - Several experiments in the 70's and 80's illustrated how residential customers would respond to TOU rate designs
 - Up until about ~10 years ago, cost was still the over-riding reason only the largest C&I customers received anything other than bulk usage meters



Key Role for Demand Response in Making AMI Investments Cost Effective



- AMI includes the necessary metering to provide a more comprehensive suite of DR opportunities to mass market customers
- Many AMI business cases are NOT cost effective from O&M benefits alone but require additional benefits from DR
- But these benefits hinge upon assumptions concerning customer participation and response to DR opportunities

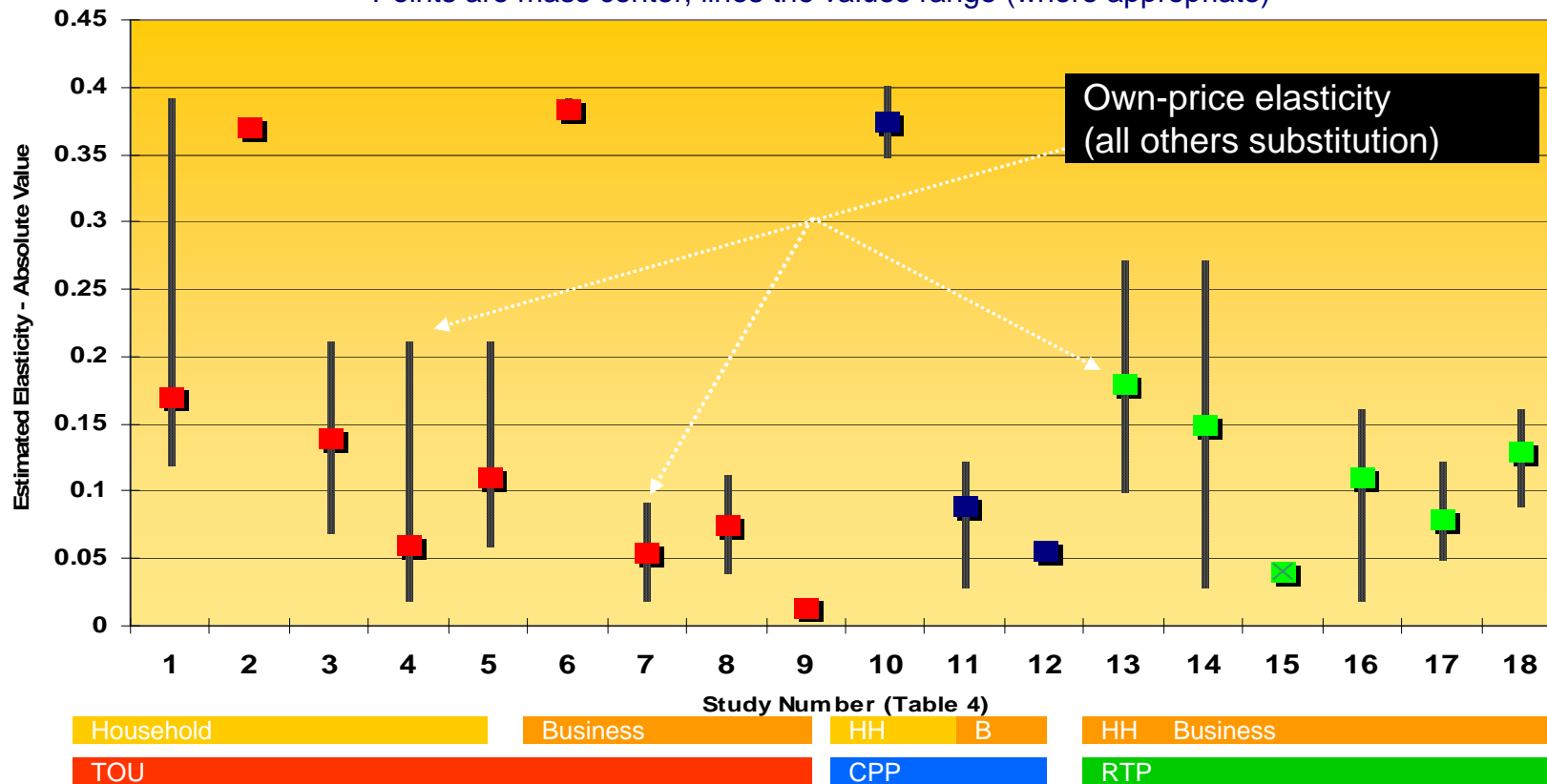
Source: Rick Hornby Direct Testimony MDPSC Case 9208: Exhibit JRH-4



We Don't Currently Know Enough about Customer Response or Acceptance

Electricity Price Elasticity Estimates - Range and Mass Central Points (Absolute Values) for 15 Studies

Points are mass center, lines the values range (where appropriate)



Source: Neenan, B., Eom, J. January 2008, p. 27.



To Facilitate Modernizing the Grid, Stakeholders Need More/Better Information



- What **financial risks** should customers be expected to **manage** and which ones should they be **protected from**
- What are the **short-term and long-term goals** to be achieved
- What **education and marketing efforts** are most effective to elicit the desired participation and response levels
- **More accurate short- and long-term response estimates** in order to address uncertainty
- Which customers are the most/least receptive to **joining and remaining** on these time-based rates

Smart Grid Investment Grant Funding Opportunity Announcement

- By funding well designed, properly implemented, and rigorously evaluated experiments, DOE has the **potential** to provide more definitive answers to policymakers responsible for modernizing electricity infrastructure
- DOE Smart Grid Investment Grant (SGIG) FOA was released in June 2009 and was expected to contribute to serving this need
- FOA, among other things, stated ideal approach for conducting consumer behavior studies that would be funded
 - Focus on dynamic pricing tariffs that come closest to aligning customer incentives with true costs of electricity (i.e., RTP, CPP)
 - Random assignment of dynamic pricing at the customer level
 - Requirement to deliver highly granular customer-level consumption and demographic data for subsequent DOE cross-project analysis

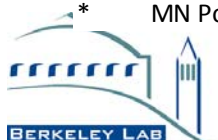


SGIG Consumer Behavior Studies: Overview of Committed and Approved Study Designs

	Sierra Pacific	Nevada Power	OG&E	MMLD	CVPS	VEC	MN Power*	CEIC	SMUD	DECo	Lake land	Total
Rate Treatments												
TOU	●	●							●		●	3
CPP	●	●	●	●	●		●		●	●		8
CPR					●			●				2
VPP			●			●						2
Non-Rate Treatments												
Education	●	●								●		3
Cust. Service						●						1
IHD	●	●	●		●	●	●	●	●	●		9
PCT	●	●	●					●		●		5
DLC								●				1
Features												
Bill Protection	●	●	●	●							●	4
Experimental Design												
Opt In	●	●	●	●	●	●	●		●	●	●	9
Opt Out								●	●	●	●	3
Within									●			1
Number of Participants												
	9,509	6,853	3,196	500	3,735	6,440	4,025	5,000	97,480	5,400	3,000	145,138

●—● Sierra Pacific and Nevada Power are testing the effect of a technology package, including an IHD and a PCT

* MN Power is also testing the difference between hourly energy feedback and daily energy feedback



SGIG Consumer Behavior Studies:

Study Population Statistics

- **Total of ~145,000 customers are expected to “participate” as treatment or control customers (as of now)**
 - **Plan to collect key demographic information on all treatment and control customers (ideally), subject to survey response rates**
 - **Assuming 3 years worth of hourly interval usage meter data (1 year pre-treatment and 2 years post-treatment); this represents 3.9 billion data observations**
- **To put our SGIG analysis and evaluation effort into perspective:**
 - **ComEd’s CAP study included ~8,500 participants and ran for 12 months (June 2010 - May 2011)**
 - **CA Statewide Pricing Pilot included ~2,500 participants and ran for 18 months (July 2002 – December 2003)**



SGIG Consumer Behavior Studies:

Overview of Research Topics

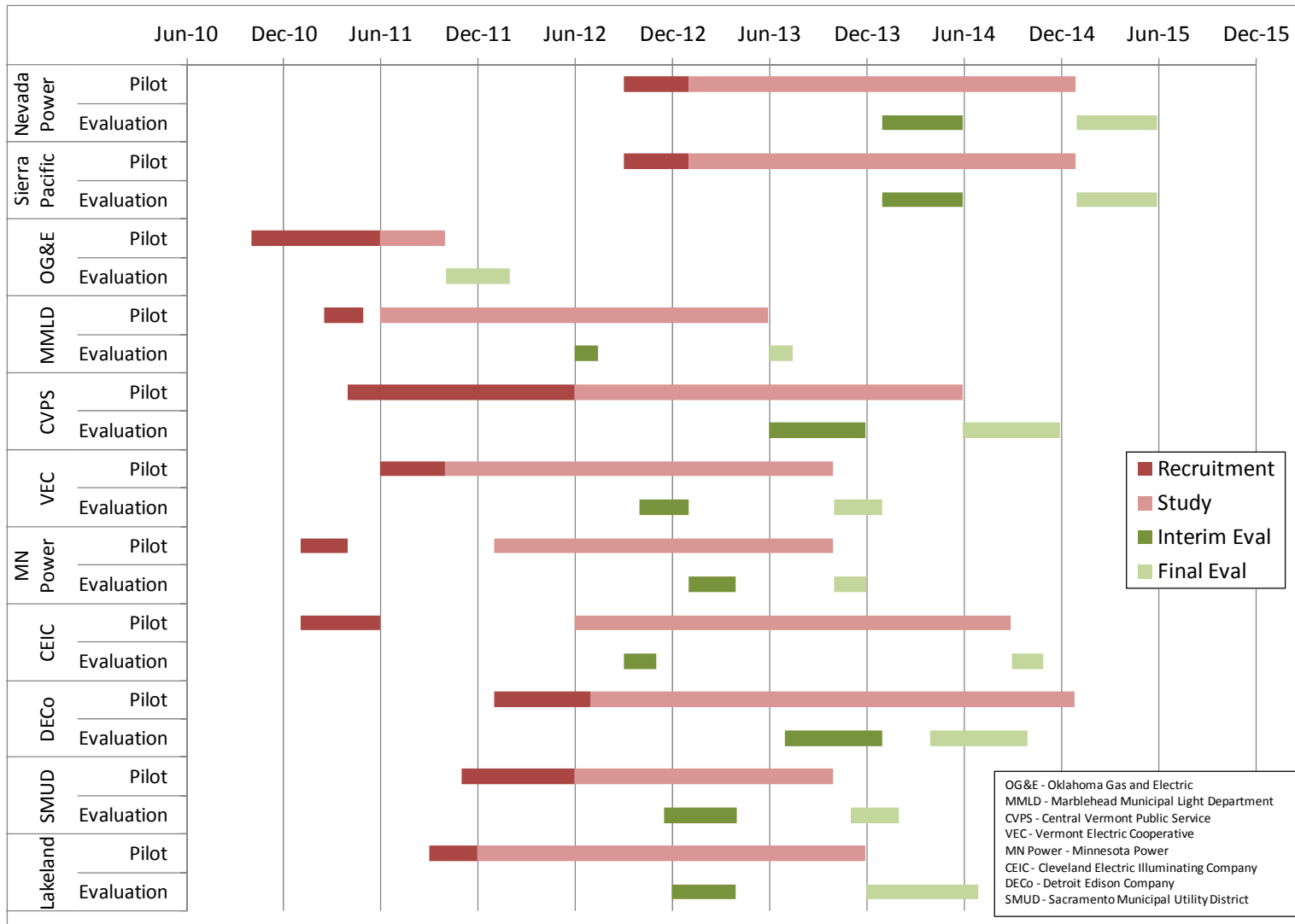
- Given the diversity of studies being undertaken as part of the SGIG program, we have a unique opportunity to evaluate issues in several topical areas:

Research Topical Areas

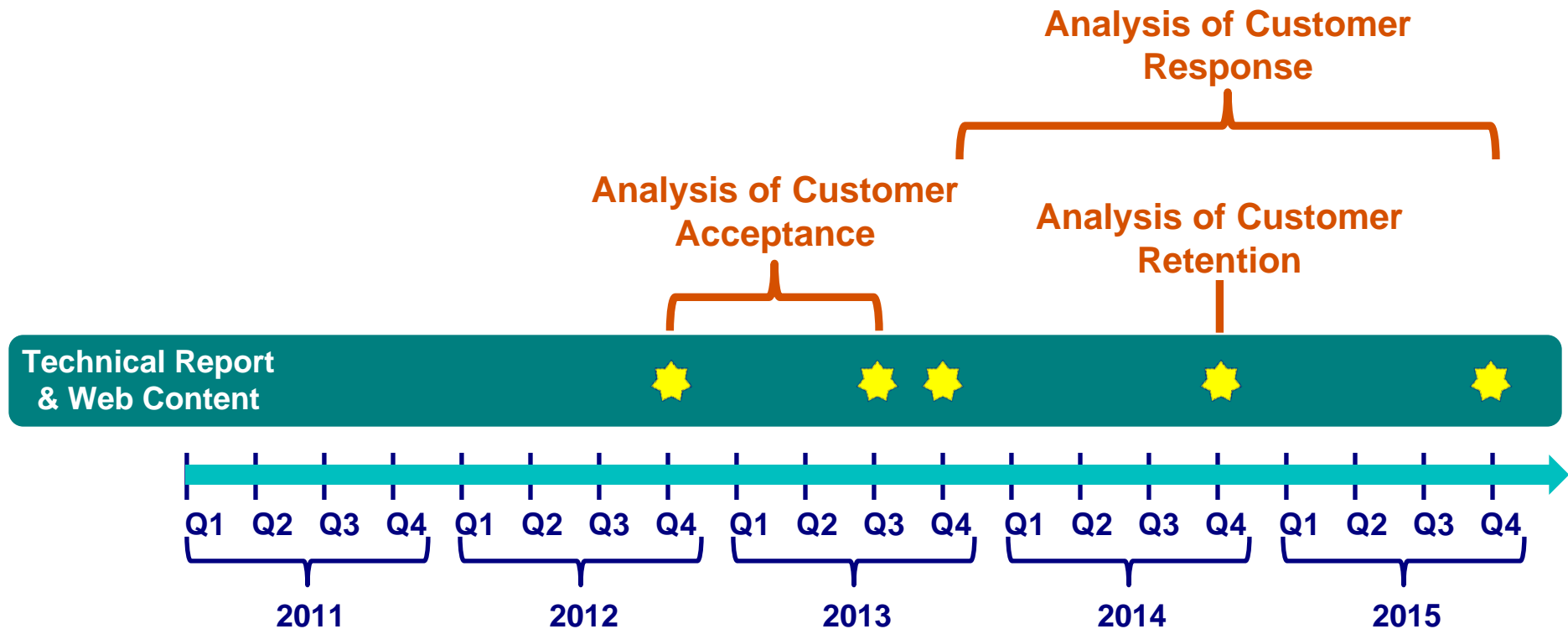
1. **Customer Acceptance:** What motivates customers to accept time-based rate programs?
2. **Customer Retention:** What motivates customers to remain on time-based rate programs?
3. **Customer Response:** Will customers respond, and if so by how much will they respond, to time-based rate programs?
4. **Role of enabling technology and information/education:** Will customers respond, and if so by how much will they respond, to control and/or information technology and/or education alone?



SGIG Consumer Behavior Studies: Current Study Schedules



SGIG Consumer Behavior Studies: *Proposed Schedule of Deliverables*



Questions/Comments

