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# Dynamic Pricing Comes To Michigan— Consumers Energy's Experiment

**Ahmad Faruqui, Ph.D.  
Sanem Sergici, Ph.D.  
Lamine Akaba, M.Sc.**

**Peak Load Management Alliance  
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# Consumers Energy's ran a dynamic pricing pilot called the Personal Power Plan (PPP) last summer

## It ran from July-September 2010

- ◆ Six event days were called during the pilot (treatment) period
- ◆ The pre-treatment period covered May and June 2010

**Around 600 customers were placed on dynamic pricing or informational treatments**

## The pilot also had two distinct control groups

- ◆ One group was uninformed of the pilot (GCON) ~ 230 customers
- ◆ The other was informed of the pilot (RCON) ~ 90 customers

# The allocation of customers is shown below

Treatment Group						
	RCPP	RCPP_ TECH	RCPR	RPIO	RPIO_ TECH	TOTAL
Pre-Treatment	122	98	152	155	74	601
Treatment	122	98	152	155	74	601

Control Group		
	GCON	RCON
Pre-Treatment	229	106
Treatment	228	92

**Note:** The counts are restricted to the active customers as of September 1, 2010.

# PPP tested the impact of dynamic prices and information in conjunction with an enabling technology

**Two different dynamic pricing structures**

**Critical peak pricing treatment (RCPP)**

**Critical peak rebate treatment (RCPR)**

**Role of information in changing the usage behavior of the customers**

**Informational treatment (RPIO)**

**Effectiveness of an intelligent communicating thermostat (ICT) beyond prices or information alone**

**CPP and ICT treatment (RCPP\_TECH)**

**Informational and ICT treatment (RPIO\_TECH)**

# We evaluated the comparability of the treatment and control groups in the pre-treatment period

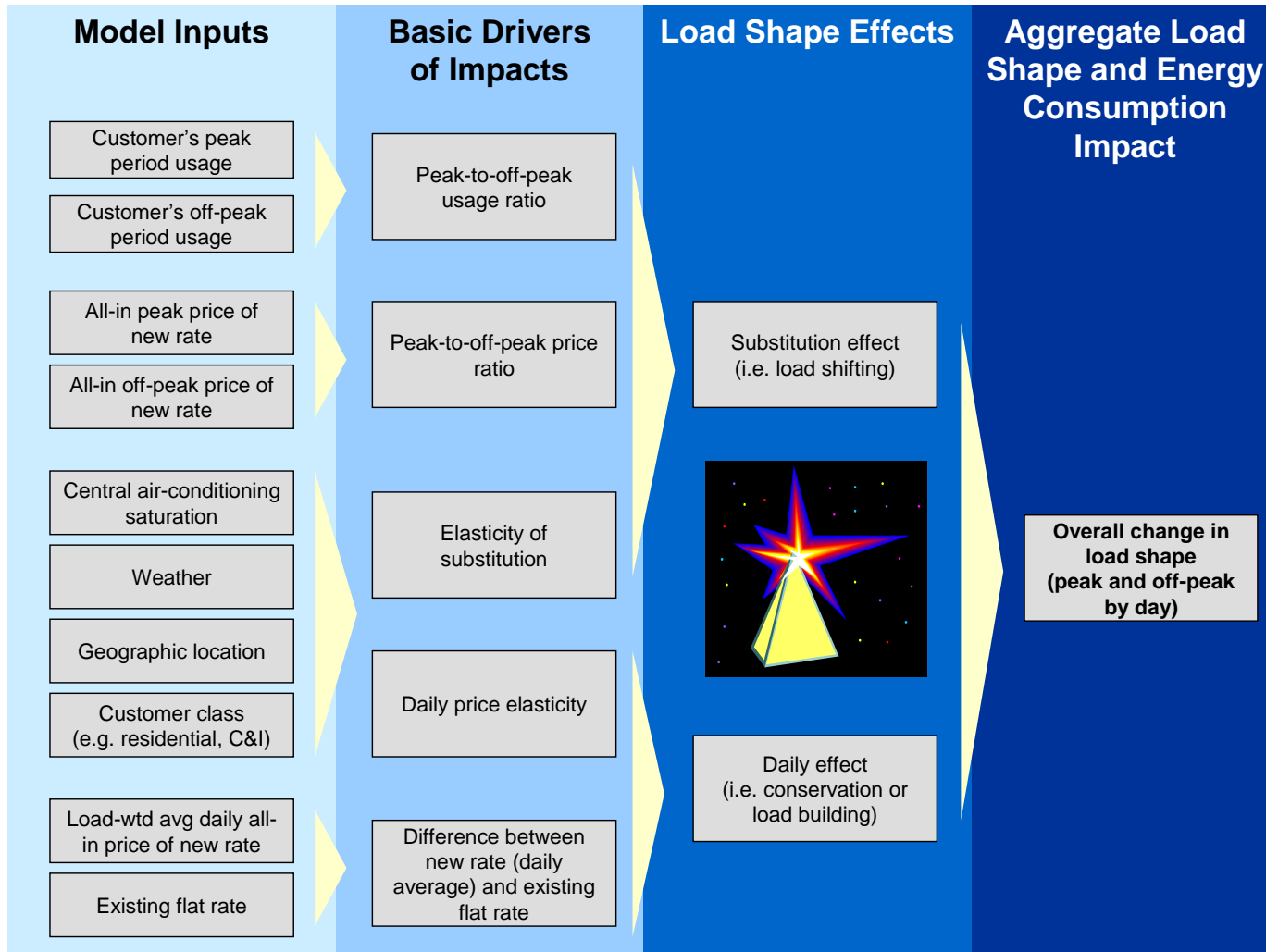
## The following comparisons were made

- ◆ Typical-day load profiles for each month
- ◆ Detailed summary statistics of the load data (by pricing period)
- ◆ Socio-demographic and appliance attributes based on the enrollment surveys

***Our analyses revealed that the treatment and control customers were largely comparable in the pre-treatment and treatment periods***

- ◆ Any remaining differences is accounted for the difference-in-differences terms in the estimated econometric models of customer demand

# We estimate demand response impacts using the CMS-PRISM model



# Econometric issues

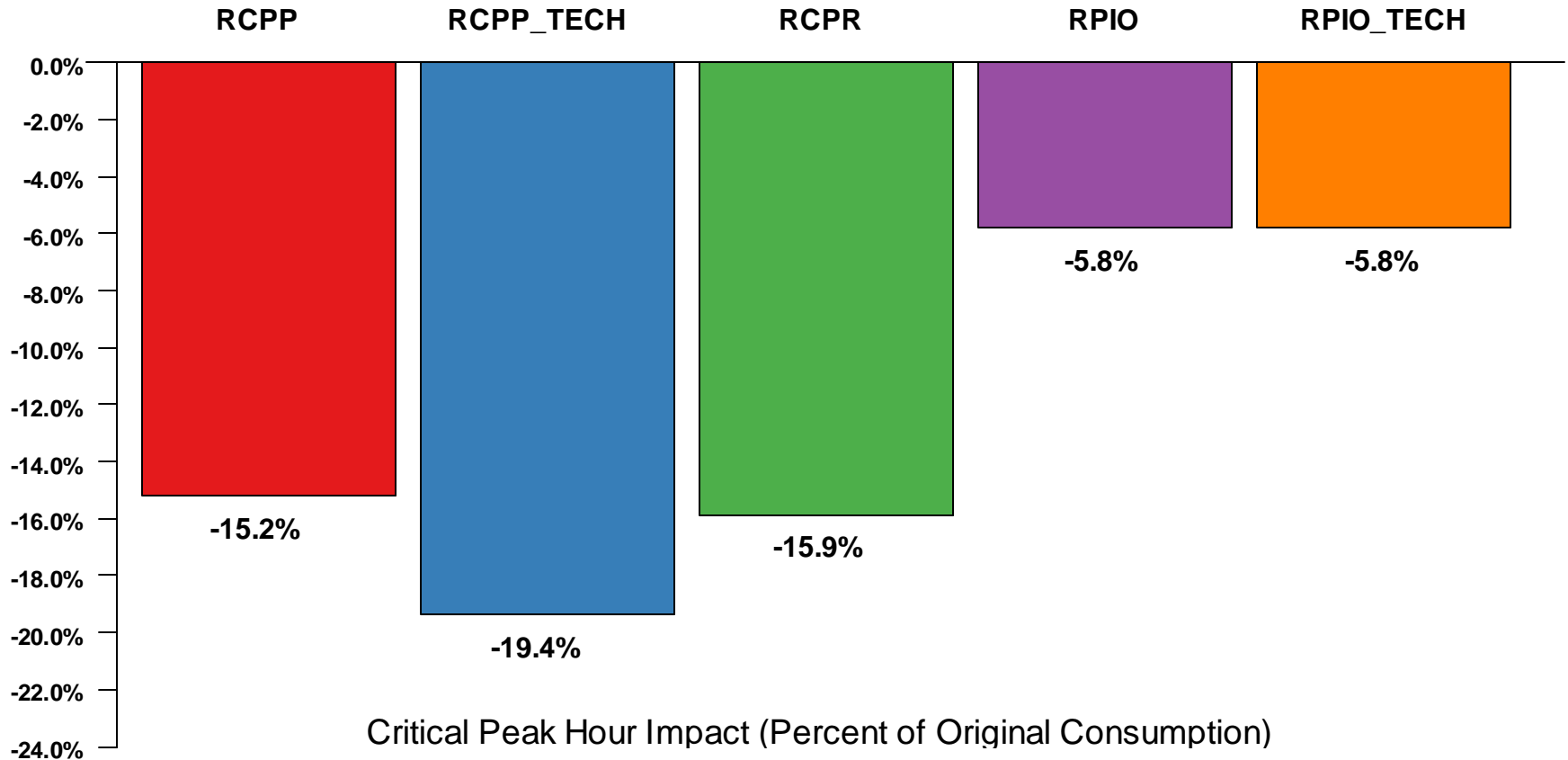
**In order to predict consumption under new rate designs, we estimate a constant elasticity of substitution (CES) demand system that consists of two equations:**

- ◆ *Substitution Equation* models changes in *load shape* caused by changing peak-to-off peak prices
- ◆ *Daily Equation* models changes in *average daily consumption* caused by changing average daily prices

**Using elasticities estimated by this system of two equations, we predict consumption by rate period**

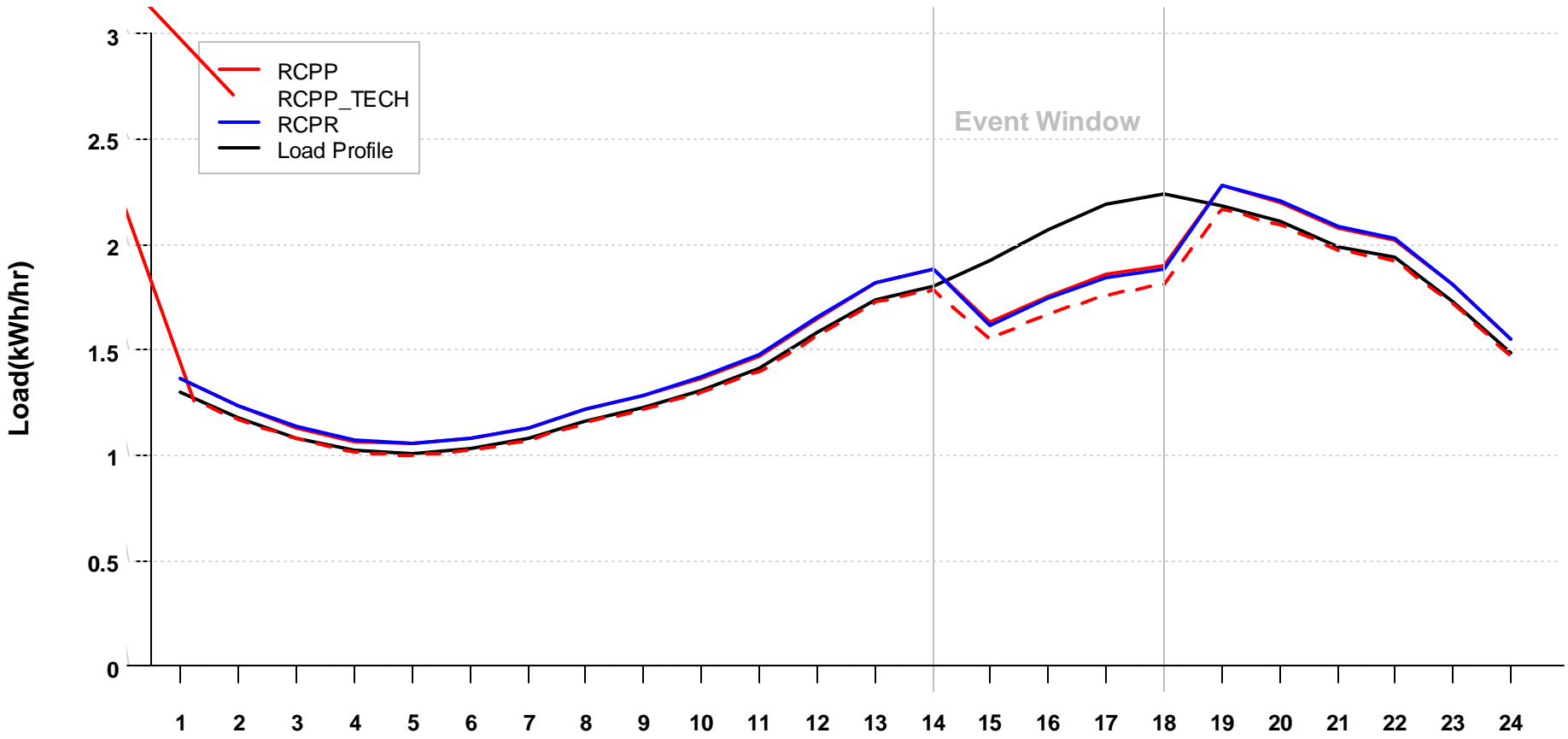
- ◆ The price differential between the mid-peak and off-peak periods is very small. For that reason, we combined the mid-peak and off-peak periods into one period

# Peak demand impacts across the PPP treatments

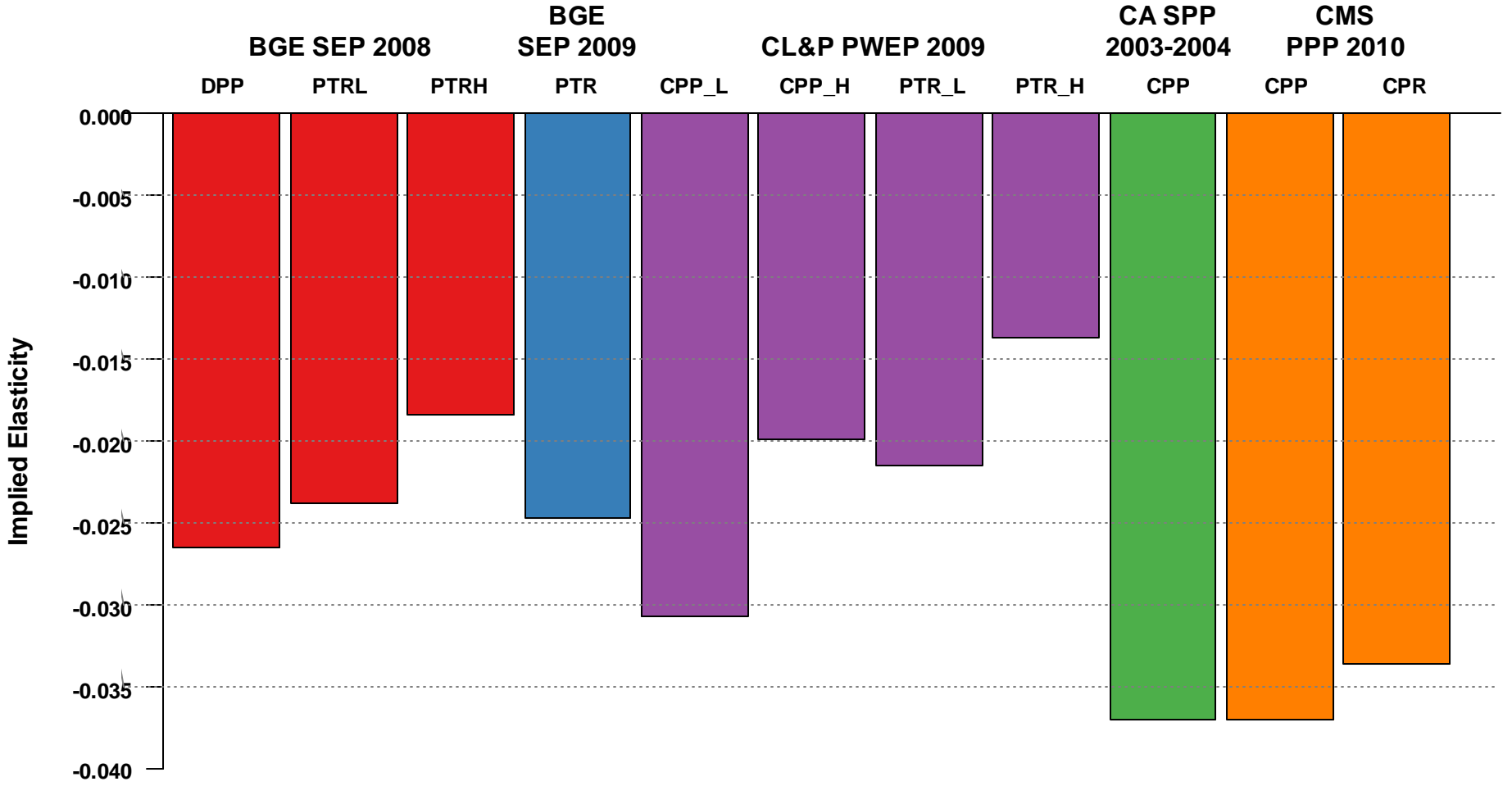


# Load profile on a proxy event day before and after demand response

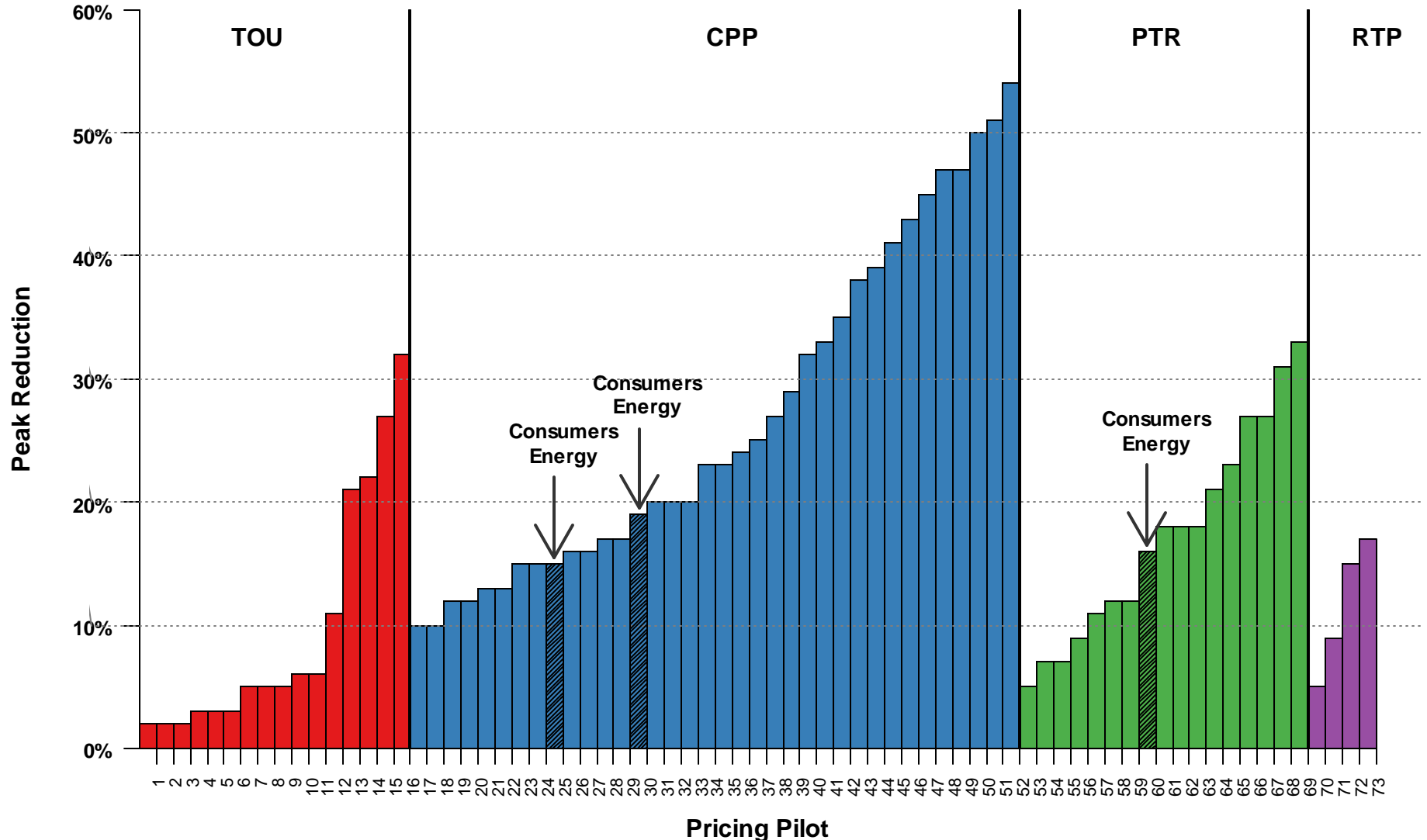
### Load Profile on a Proxy Event Day Before and After Demand Response



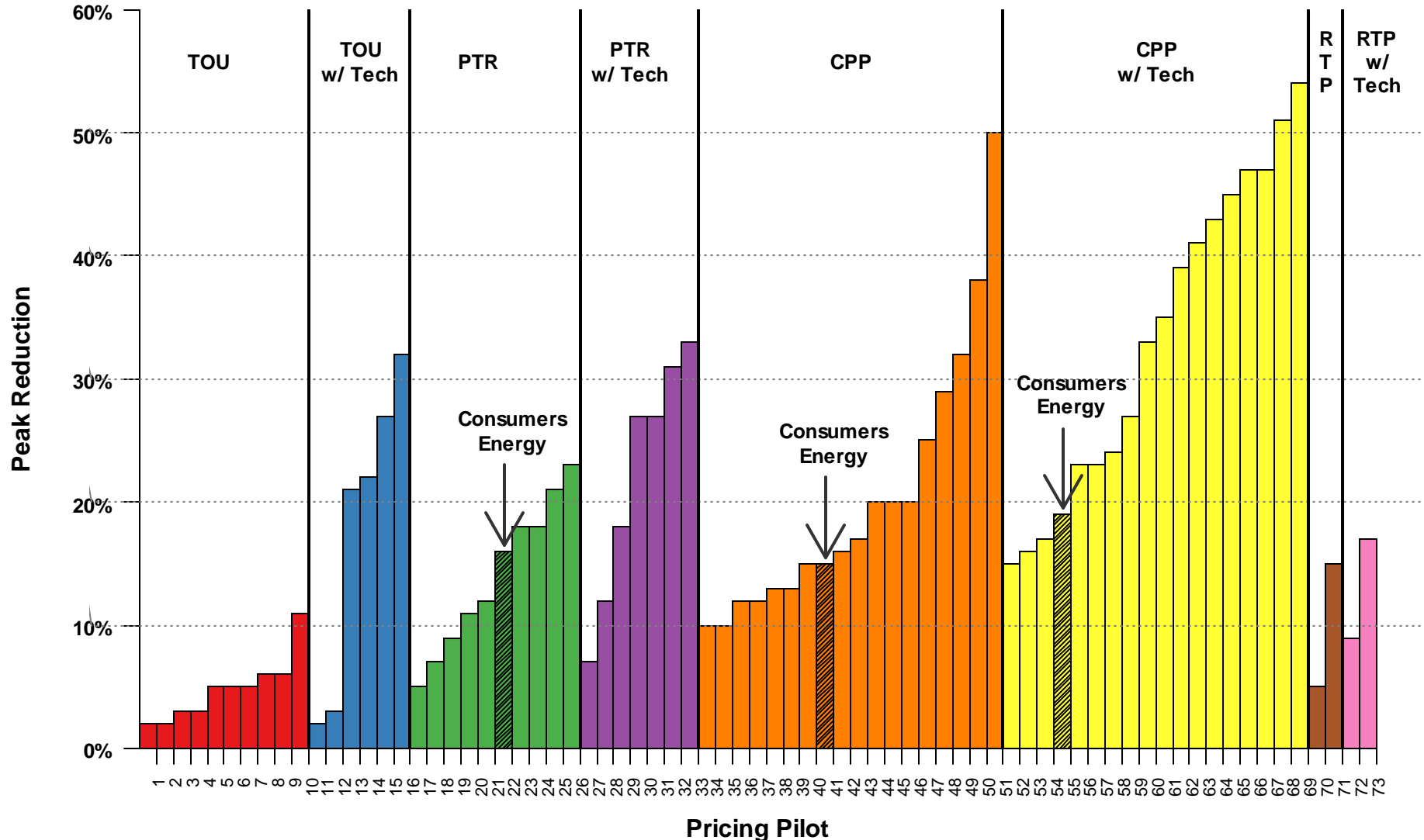
# Comparison of the PPP price elasticities with other pilots



# Comparison of the impacts across pilots- I



# Comparison of the impacts across pilots- II



# References

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# Biography

Ahmad Faruqui is an expert on the customer-facing aspects of the smart grid. He has performed cost-benefit analysis for electric utilities in two dozen states and testified before a dozen state and provincial commissions and legislative bodies. He has designed and evaluated some of the best known pilot programs involving dynamic pricing and in-home displays and his early experimental work is cited in Bonbright's canon.

He has assisted the Ontario Energy Board in evaluating the provincial deployment of time-of-use pricing and the Alberta Utilities Commission in responding to a ministerial inquiry into the smart grid. He is currently assisting the Saudi Arabian regulator in developing a Kingdom-wide plan for introducing demand response.

During the past two years, he has assisted the FERC in the development of the "National Action Plan on Demand Response" and in writing "A National Assessment of Demand Response Potential." He co-authored EPRI's national assessment of the potential for Energy Efficiency and EEL's report on quantifying the benefits of dynamic pricing. He has assessed the benefits of dynamic pricing for the New York Independent System Operator, worked on fostering economic Demand Response for the Midwest ISO and ISO New England, reviewed demand forecasts for the PJM Interconnection and assisted the California Energy Commission in developing load management standards. His report on "The Impact of Dynamic Pricing on Low Income Customers" was published last fall by the Institute for Electric Efficiency.

The author, co-author or editor of four books and more than 150 articles, papers and reports, he holds a doctoral degree in economics from the University of California at Davis.

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[ahmad.faruqui@brattle.com](mailto:ahmad.faruqui@brattle.com)

925-408-0149

353 Sacramento Street, Suite 1140

San Francisco, CA 94111