



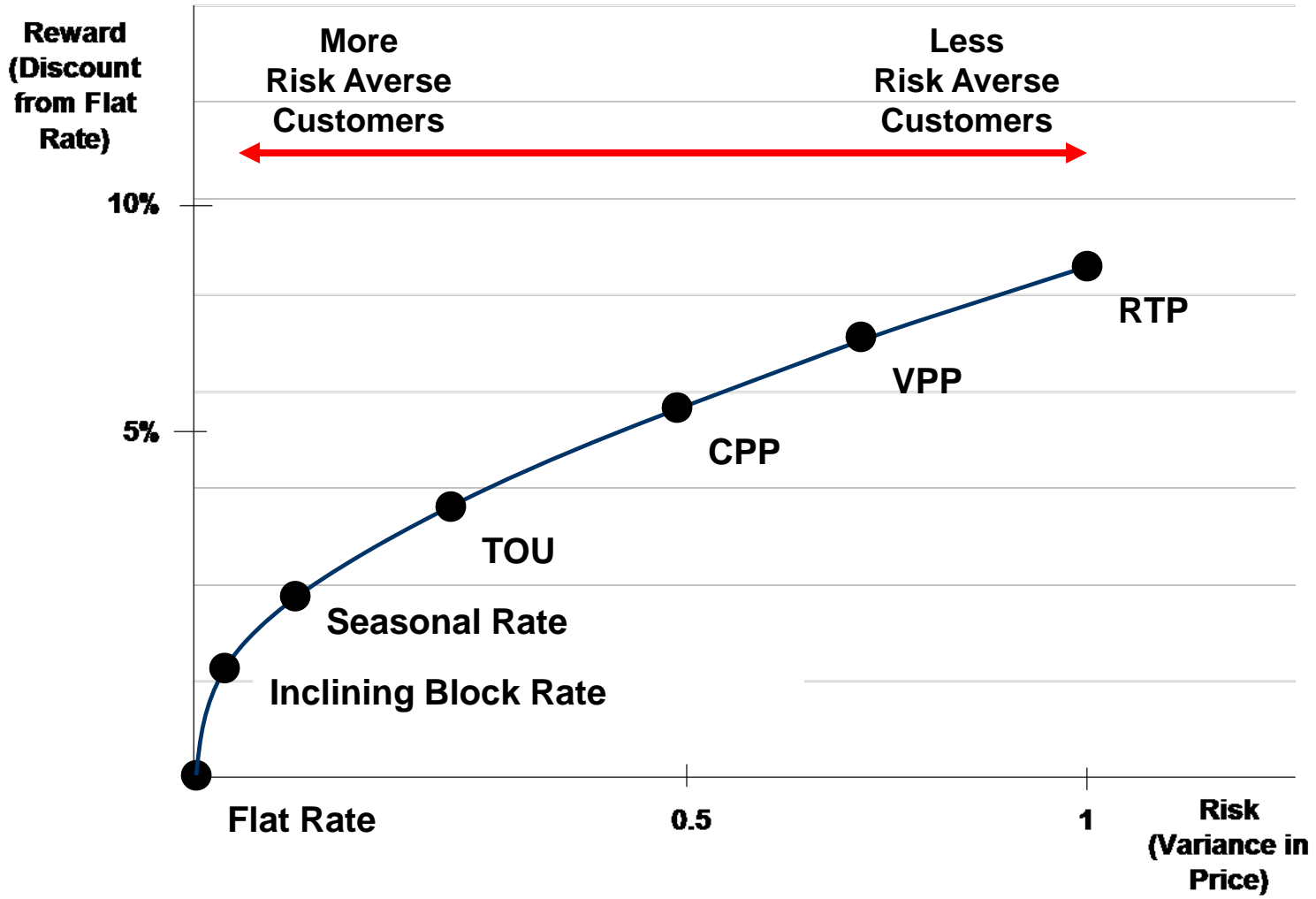
Telecommunications • Litigation • Finance • Environment • Energy

The Brattle Group

SMART RATES

Ahmad Faruqui, Ph. D.
Principal

Smart rates come in a variety of forms



Inclining block rates, enabled by the smart grid, can promote energy efficiency

- A recent Hydro One survey found that 40 percent of U.S. utilities offer an inclining block rate in some form
 - ▶ Nearly all of these utilities have two or three tiers in the rate
- PG&E's rate has five tiers rising from 11.5 cents/kWh in the first tier to 41 cents/kWh in the fifth tier
- The effectiveness of these rates can be enhanced by in-home displays

A recent Brattle study found that these rates can lower energy use by 1% to 6% in the short run

TOU rates can promote permanent load shifting

Arizona

- Salt River Project and Arizona Public Service have the largest number of customers on TOU rates
- They offer multiple TOU options
 - ▶ Various peak-to-off-peak price ratios
 - ▶ Coupled with demand charge
- 40 percent of residential customers on TOU

Ontario, Canada

- All customers anticipated to be on TOU by 2010 (after full AMI deployment)

CPP rates can provide significant amounts of demand response

Gulf Power, Florida

- GoodCents Select Program
- CPP layered on a TOU rate
- Critical peak hours restricted to 1% of year
- Opt-in with \$5 monthly fee to participate
- 6,000 participants by 2003
- Has provided roughly 1 MW of demand reduction

PG&E, California

- CPP rate offered on opt-in basis to all residential and small C&I customers in Bakersfield
- 10,000 customers enrolled (7.5% participation)
- Average peak reduction was 16.6% in summer of 2008

Similar amounts of DR can be obtained through peak-time rebates (PTR)

Anaheim, California

- First test of PTR impacts
- They lined-up well when compared to CPP rate impacts from the California statewide pricing pilot

Hydro Ottawa, Ontario

- Compared PTR impacts to CPP and found them to be statistically equivalent

BG&E, Maryland

- Confirmed the equivalence of PTR to CPP with and without enabling technologies

RTP programs are being offered in Illinois and being tested in Washington, DC

Commonwealth Edison, Illinois

- Day-of notification
- Ran as a pilot for four years
- Full-scale program in January 2007

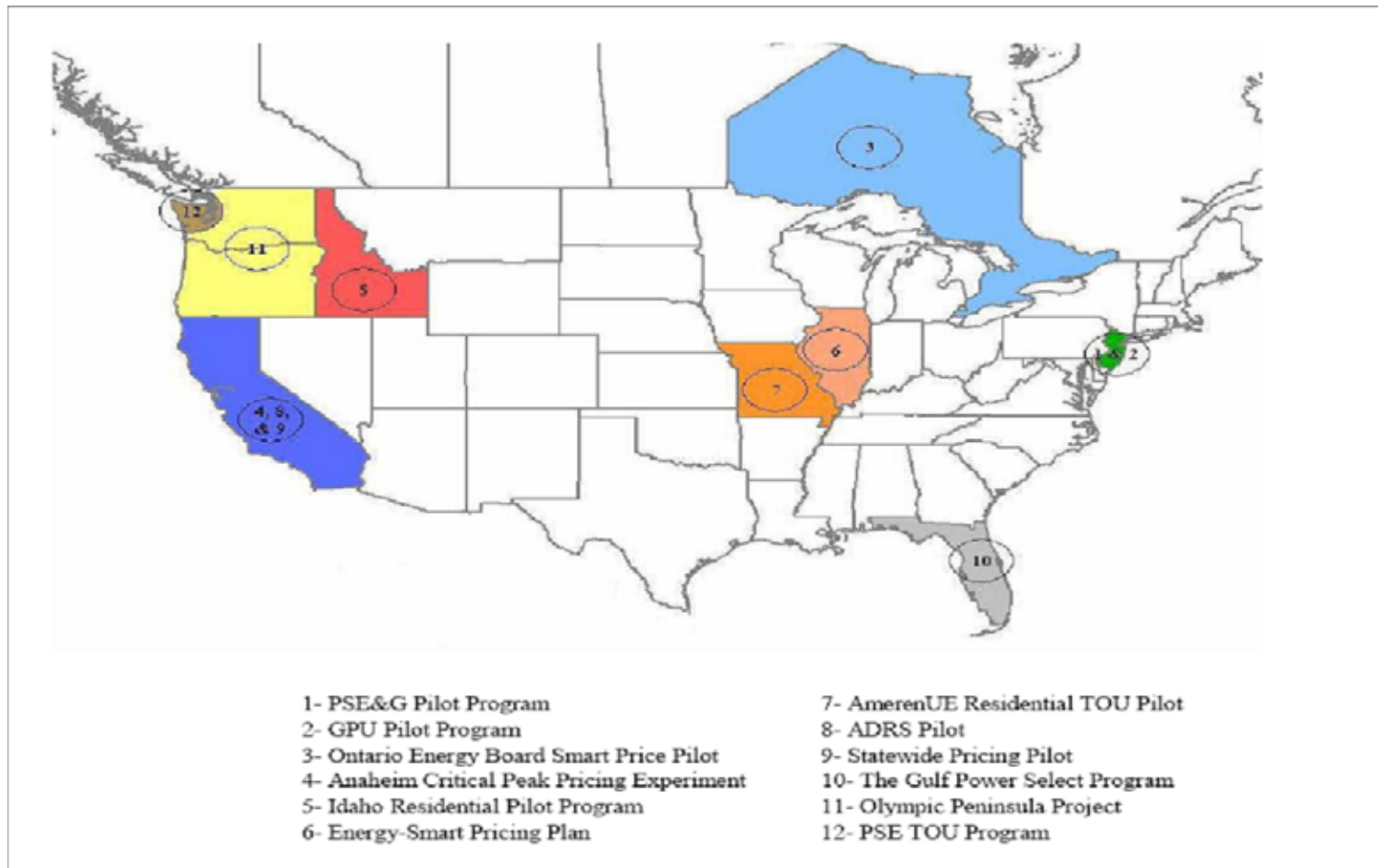
Ameren Illinois Utilities

- Day-ahead notification
- Full-scale program

Pepco

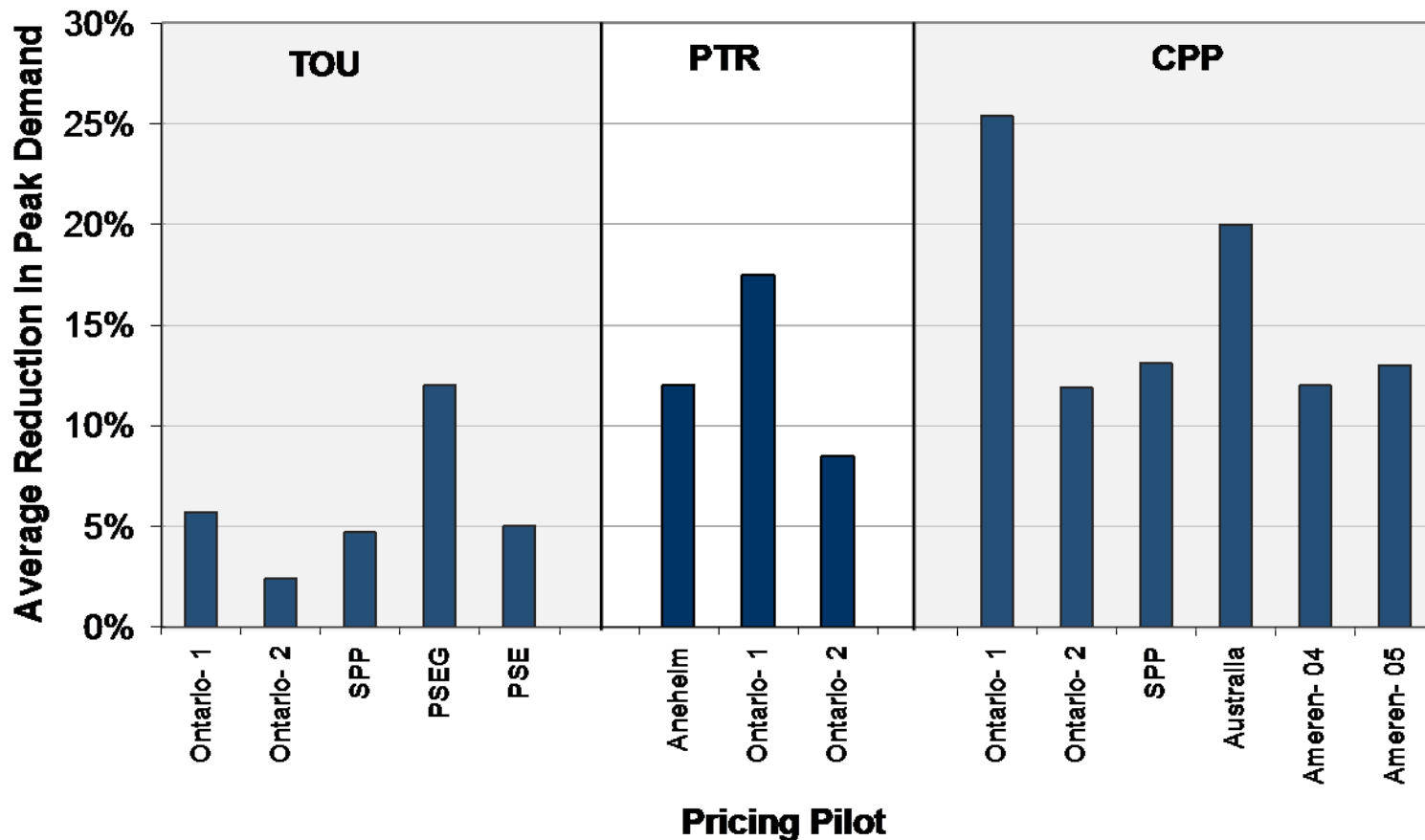
- Experimental program involving CPP, PTR and RTP

All these smart rates have proven themselves through experimentation



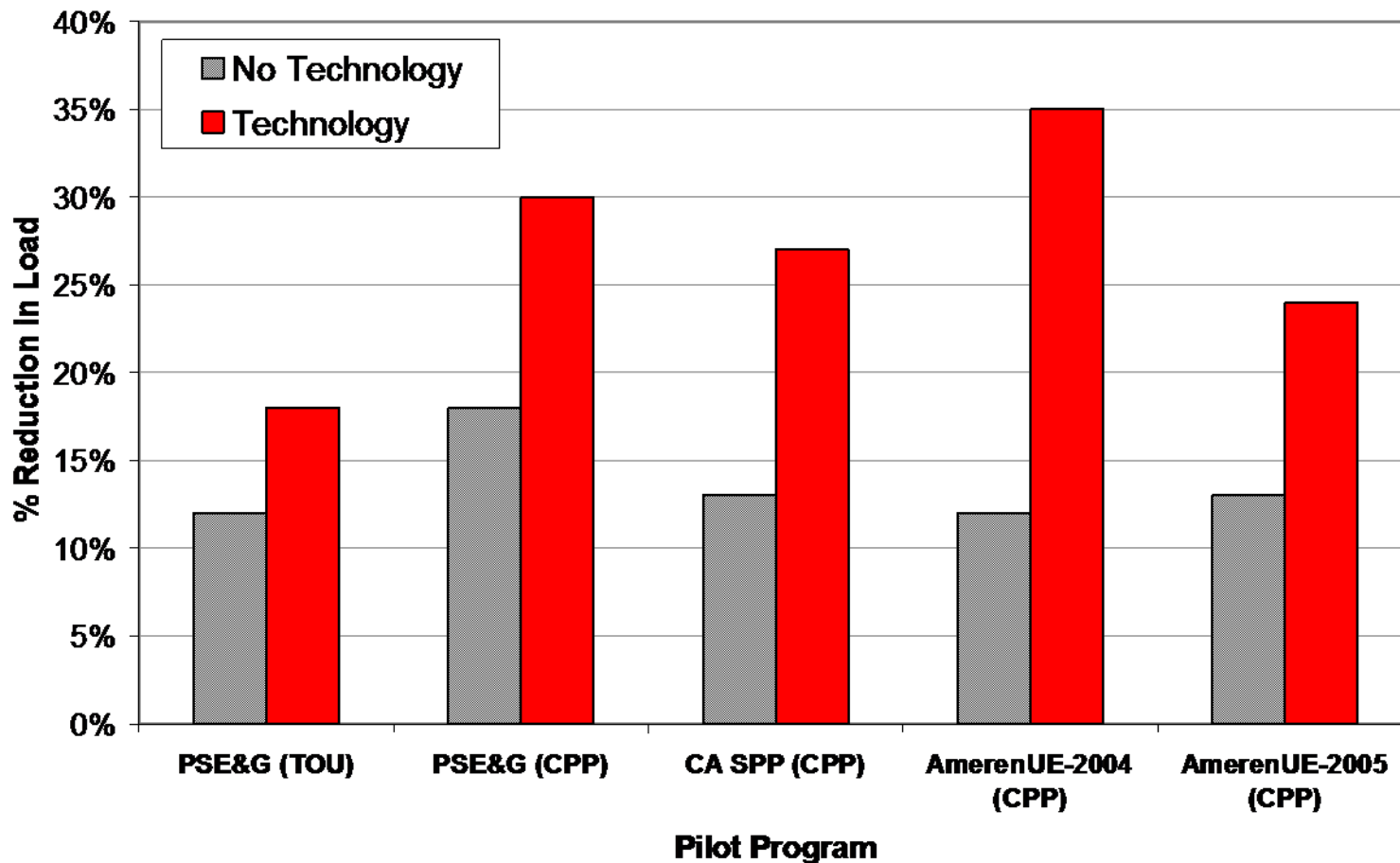
Customers respond to dynamic pricing even without enabling technology

Non-Technology Enabled Impacts of Pricing Pilots



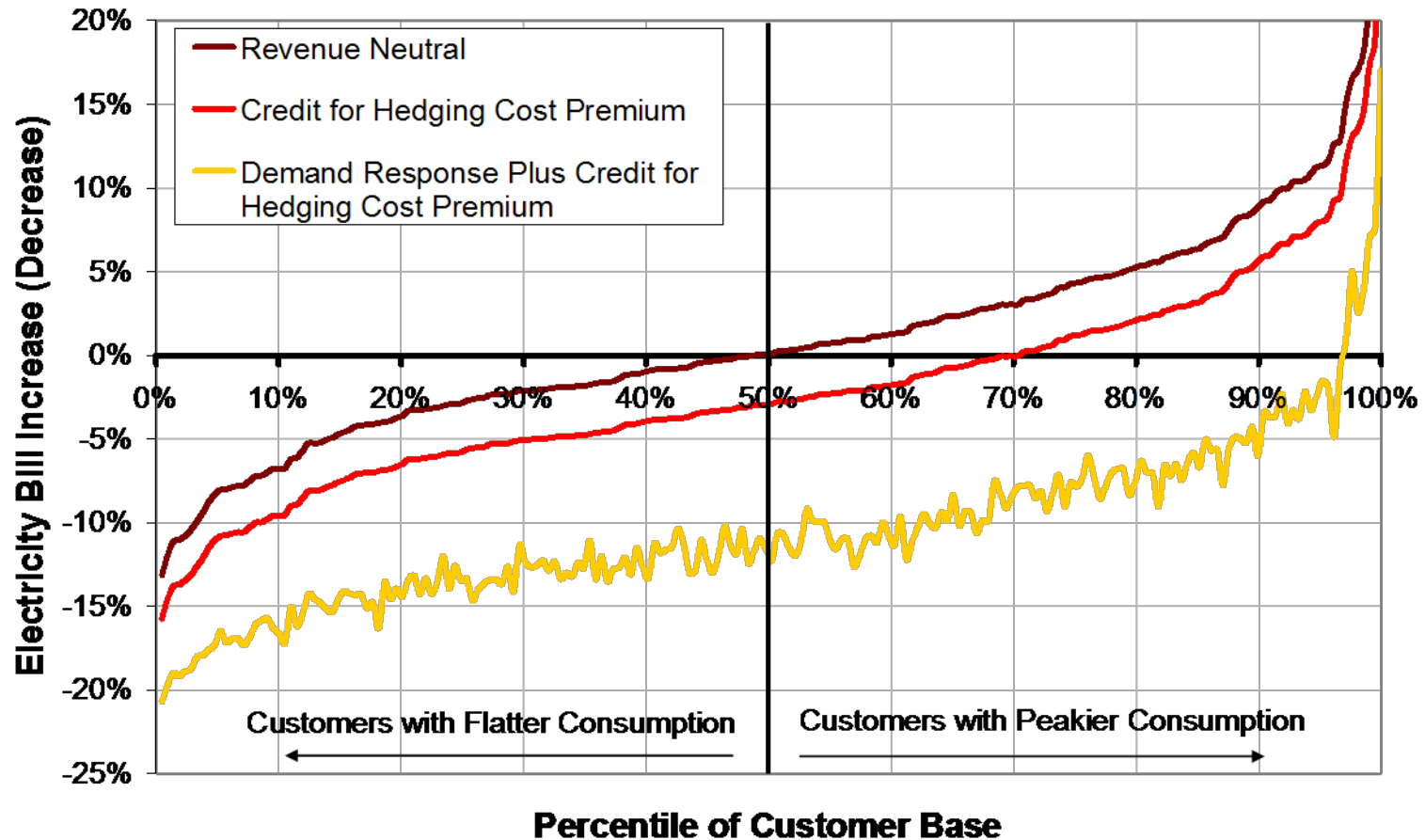
Enabling technologies facilitate even greater demand response

Role of Technology on Pilot Program Impacts



Smart rates can reduce bills in the near-term for most customers

Distribution of Bill Impacts



They can provide additional benefits over the long term

1. Economic Efficiency

- *Energy Efficiency*: Conveys dynamic cost of providing electricity, provides incentive for energy conservation
- *Demand Response*: Provides reliable and significant reduction in peak demand with short notification

2. Simplicity

- *Clear Communication*: Actionable, easy to understand
- *Ease in implementation*: For both utilities and customers

3. Equity

- Strikes balance between eliminating subsidies and providing predictable, affordable bills

4. Choice

- Empowers customers to make tradeoffs: cost vs. convenience, cost vs. service, cost vs. risk

How the smart rates fared at a rate design workshop

| | | Economic Efficiency | | Simplicity | | Equity | Choice |
|---------------------|--------|---------------------|-----------------|---------------------|------------------------|--------|--------|
| | | Energy Efficiency | Demand Response | Clear Communication | Ease in Implementation | | |
| New (Dynamic) Rates | Blocks | ++ | -- | 0 | + | - | + |
| | TOU | + | -- | 0 | 0 | + | + |
| | CPP | + | + | - | - | + | ++ |
| | PTR | + | + | -- | -- | ++ | + |
| | VPP | ++ | ++ | -- | - | + | ++ |
| | RTP | ++ | ++ | - | - | - | ++ |

| Scoring Options | |
|-----------------|-----------|
| ++ | Very good |
| + | Good |
| 0 | Average |
| - | Poor |
| -- | Very Poor |