The Brattle Group

Demand Response
A Long View

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California Energy Commission
June 10, 2008

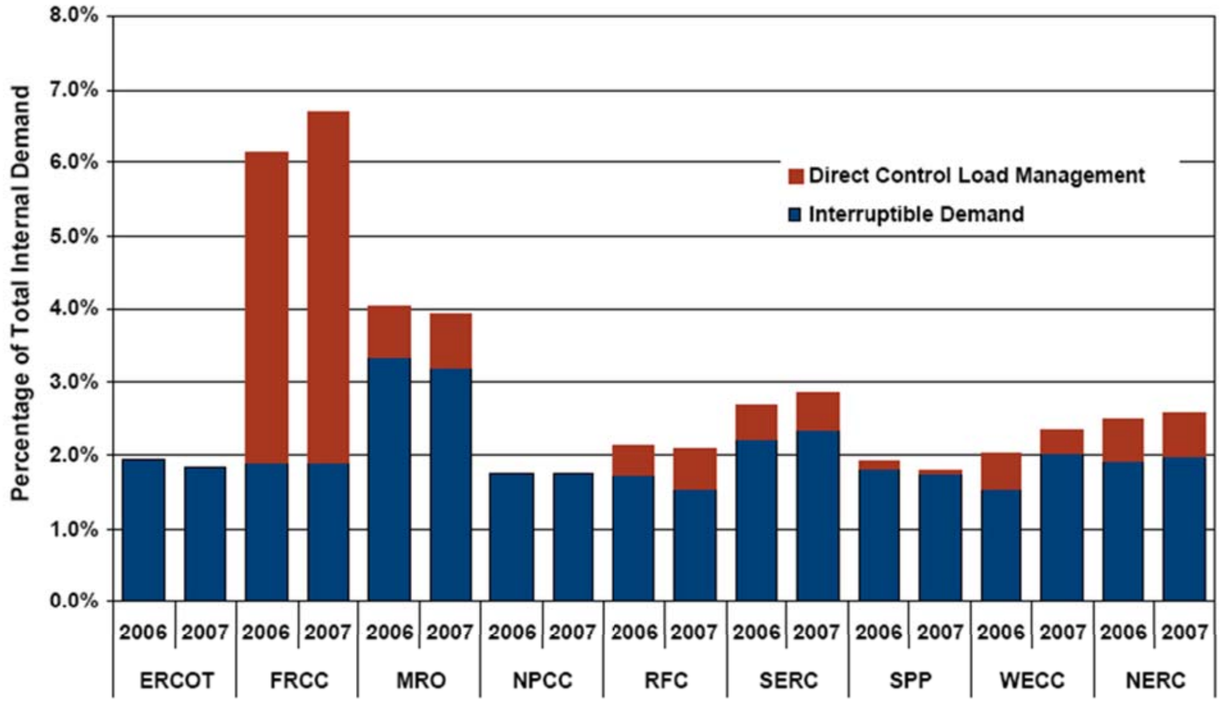
DOCKET
08-DR-1
DATE JUN 10 2008
RECD. JUL 25 2008

Today's demand response

- Only invoked when brownouts and blackouts are imminent
  - Driven by reliability triggers
- Based largely on yesterday's conditions
  - Aging technology (direct load control)
  - Aging rate designs (curtailable and interruptible rates)
- Customers are paid cash for lowering peak usage against an elusive baseline

The state of play

NERC Estimate of Existing DR by Region

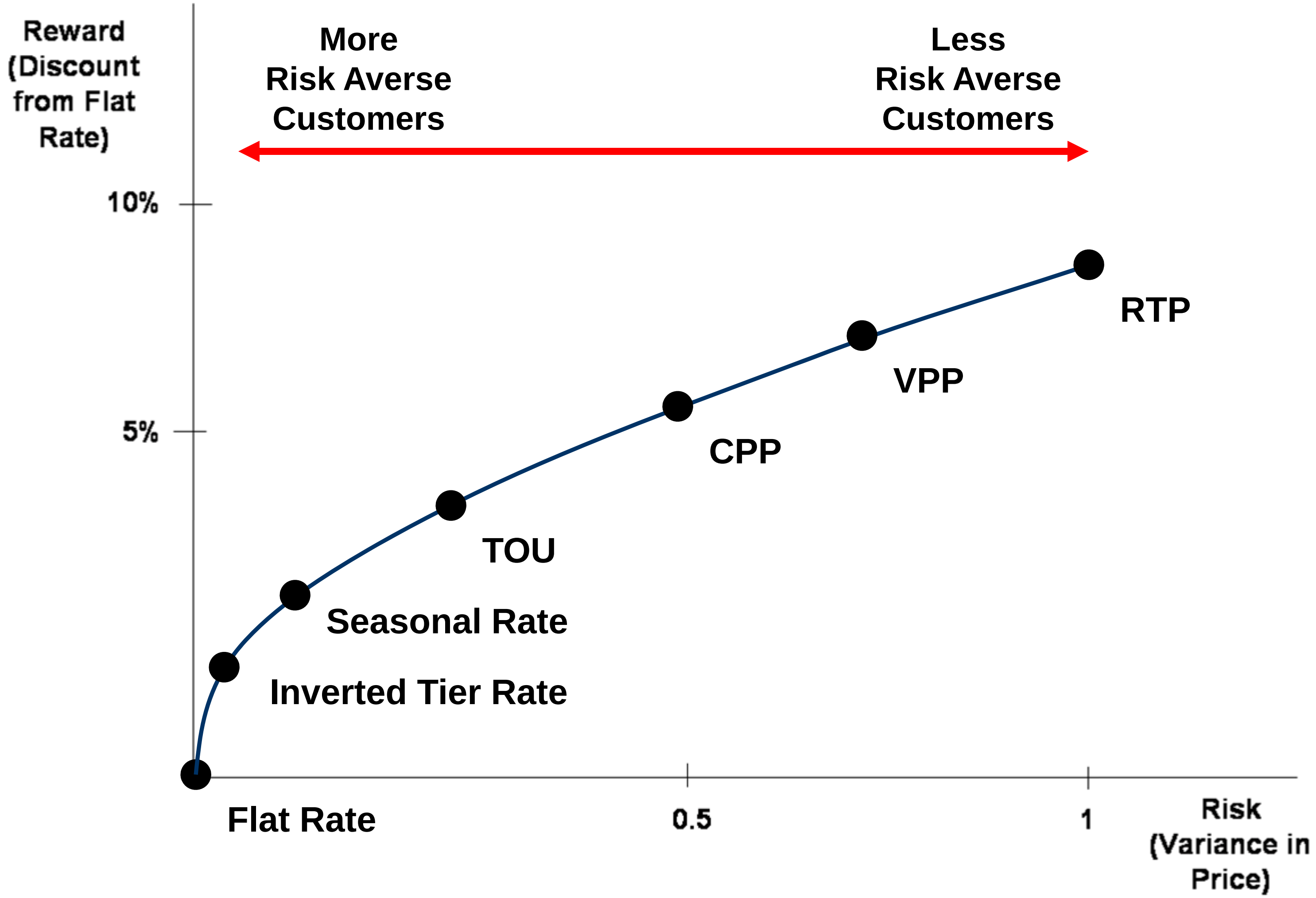


Source: 2007 NERC Summer Assessment, 2007 FERC Assessment of DR & Advanced Metering

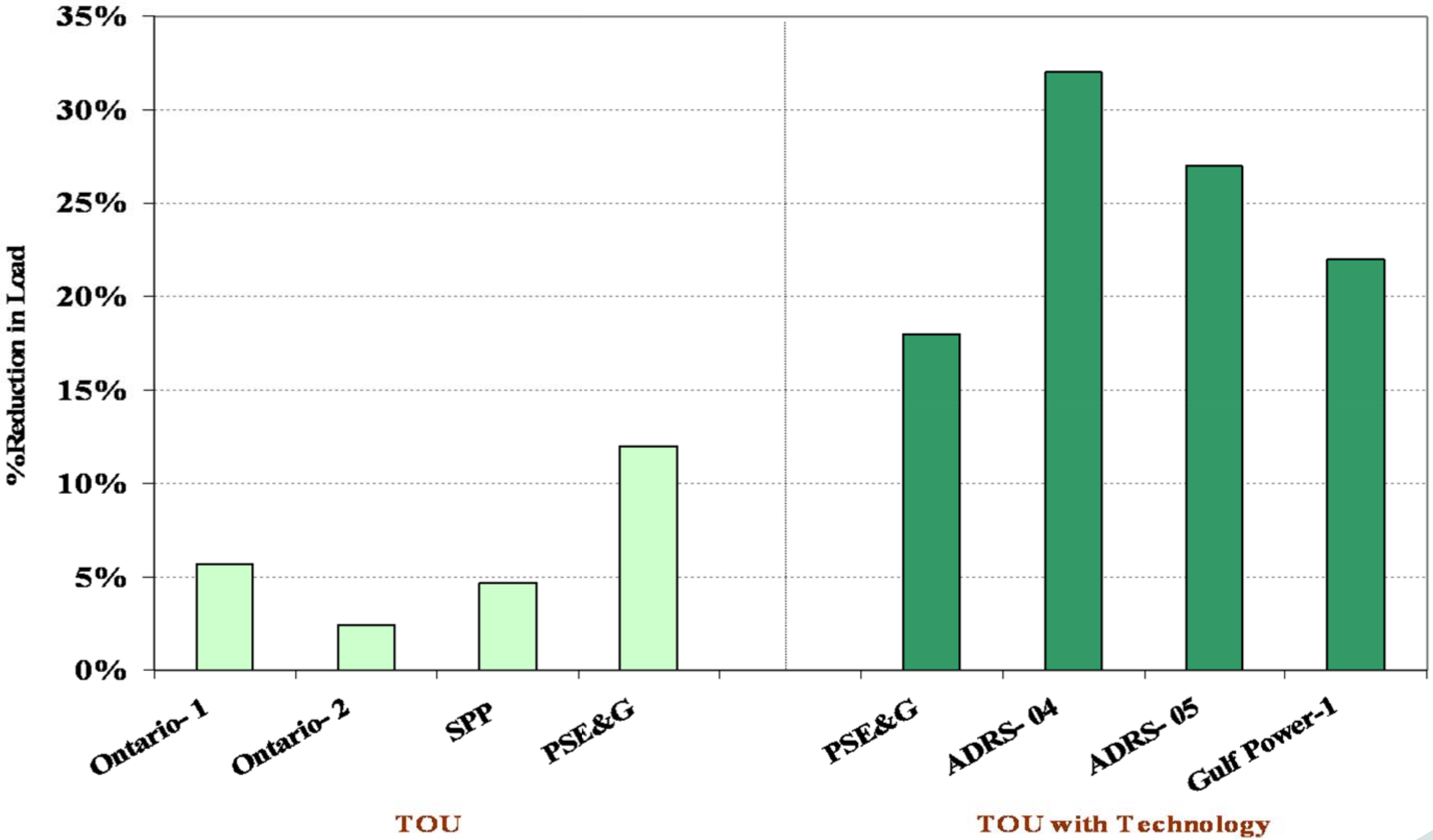
Tomorrow's demand response

- Will be price-driven
  - Default dynamic pricing
- Digital technologies will play a decisive role
  - AMI
  - Smart Grid
  - Programmable thermostats and EMS
- No longer an option but a condition of service

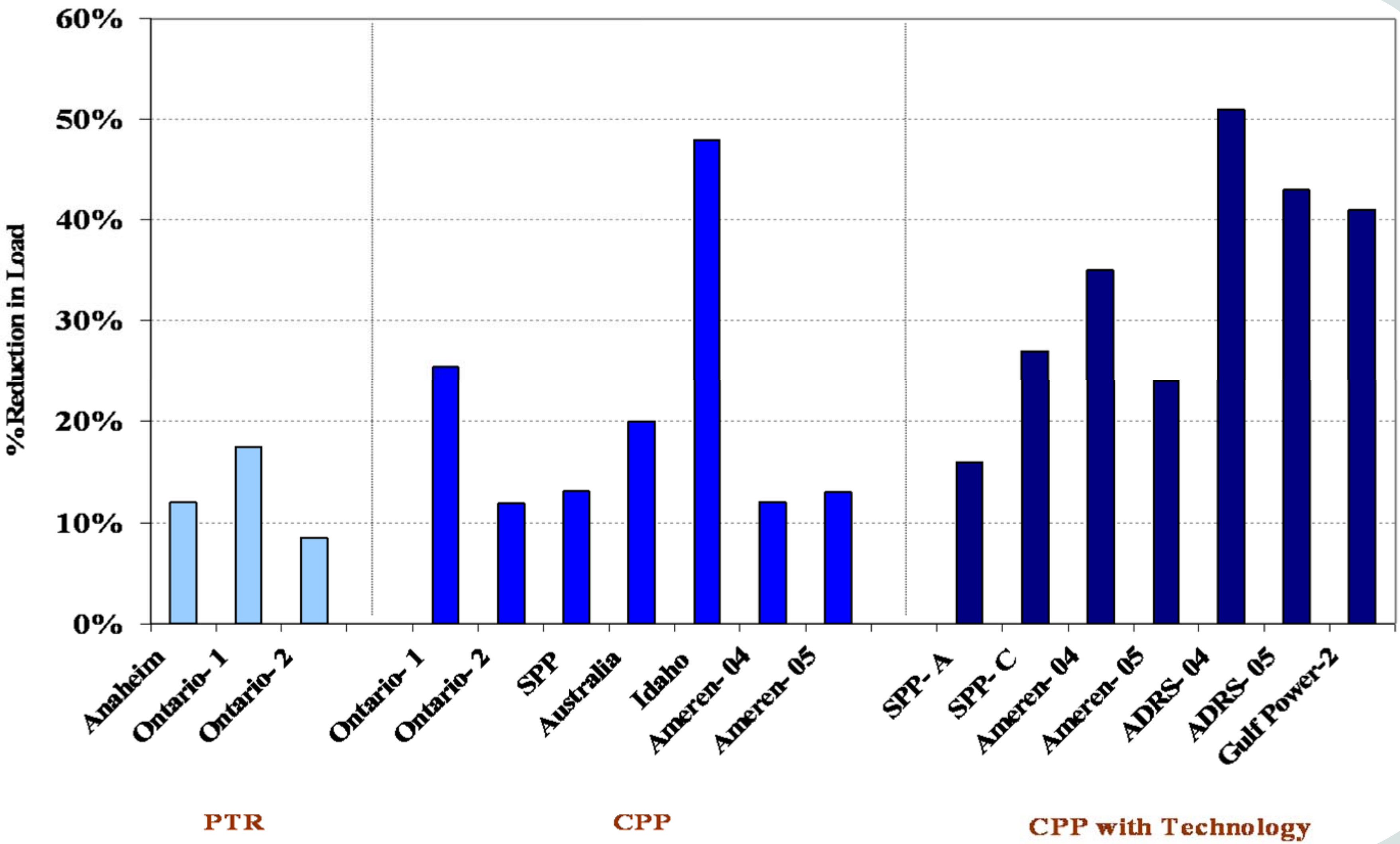
The shape of prices to come



Customers respond to static time-of-use rates



They respond even more to dynamic pricing

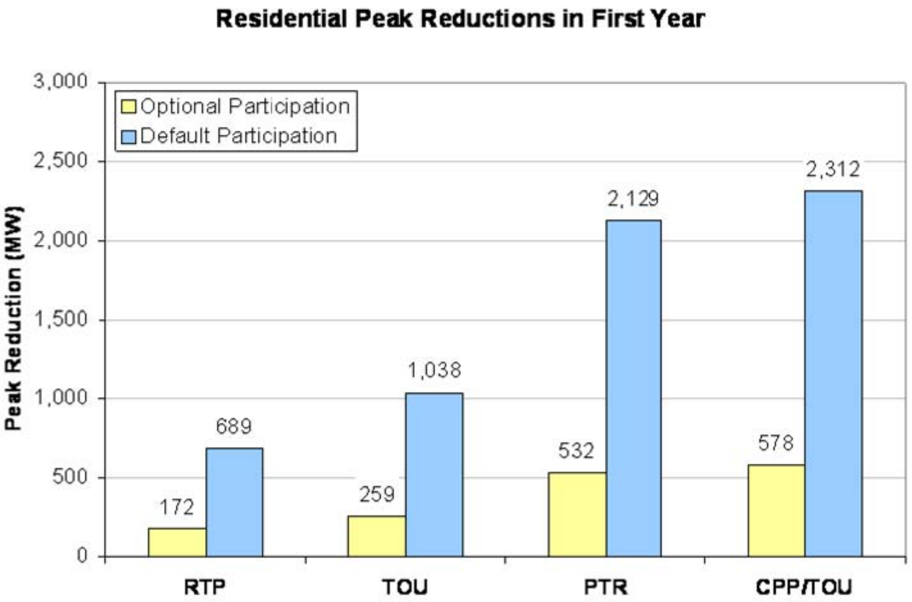


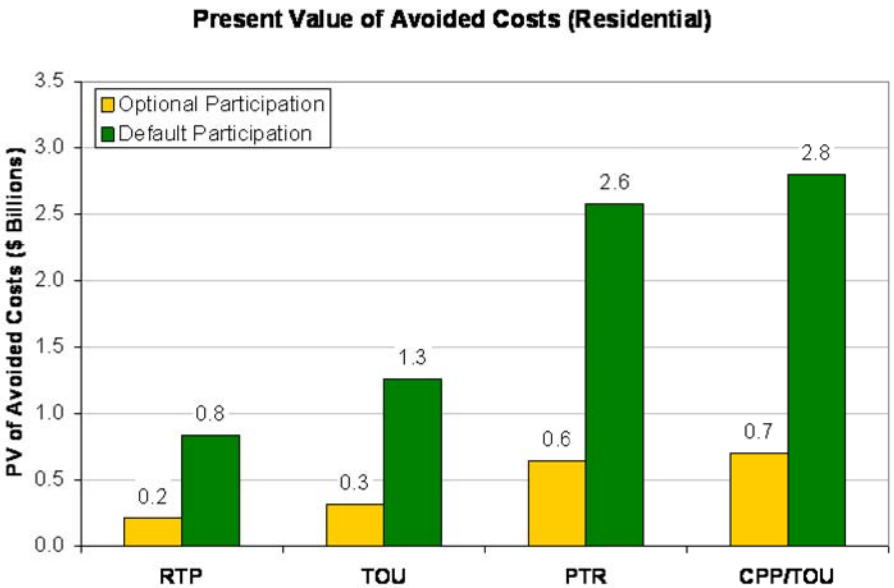
Imagining the future in California

- The Demand Response Research Center has funded a project on advanced rate designs
- We have developed illustrative dynamic rate designs that show the range of possibilities by sector across a range of deployment scenarios

Residential class impacts

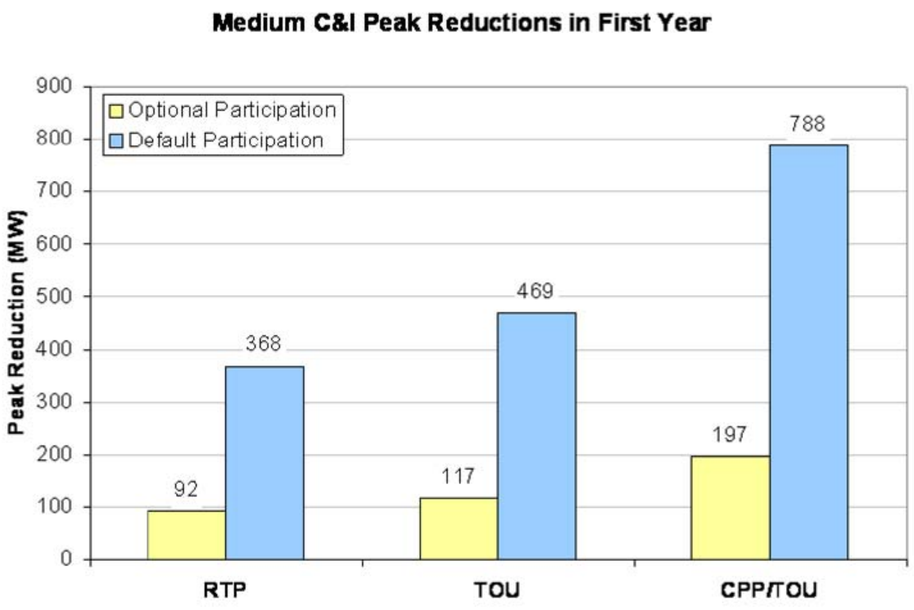
- Annual peak reductions range from 170 MW to 2,300 MW
- This translates into $ 0.2 - 2.8 billion in avoided costs

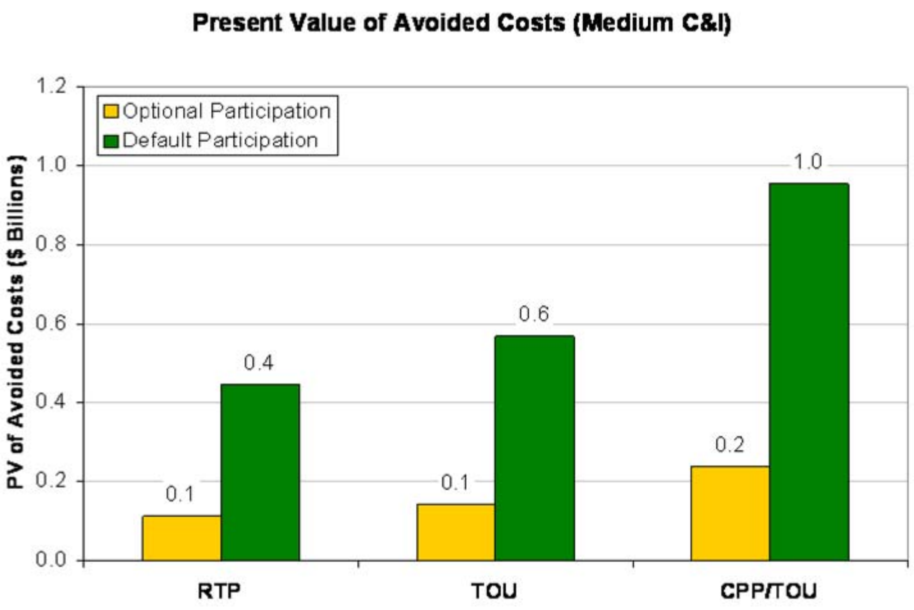




Medium C&I class impacts

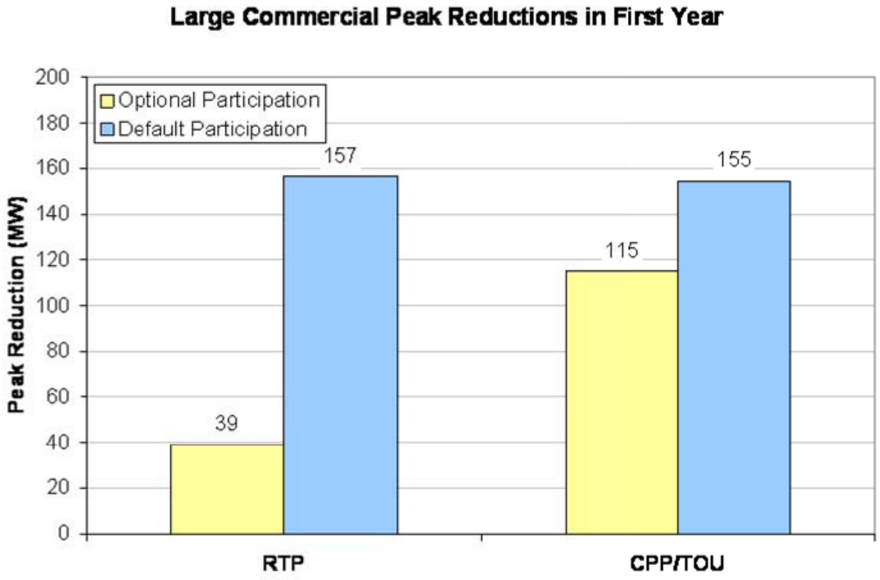
- Annual peak reductions range from 90 MW to 790 MW
- This translates into $ 0.1 - 1.0 billion in avoided costs

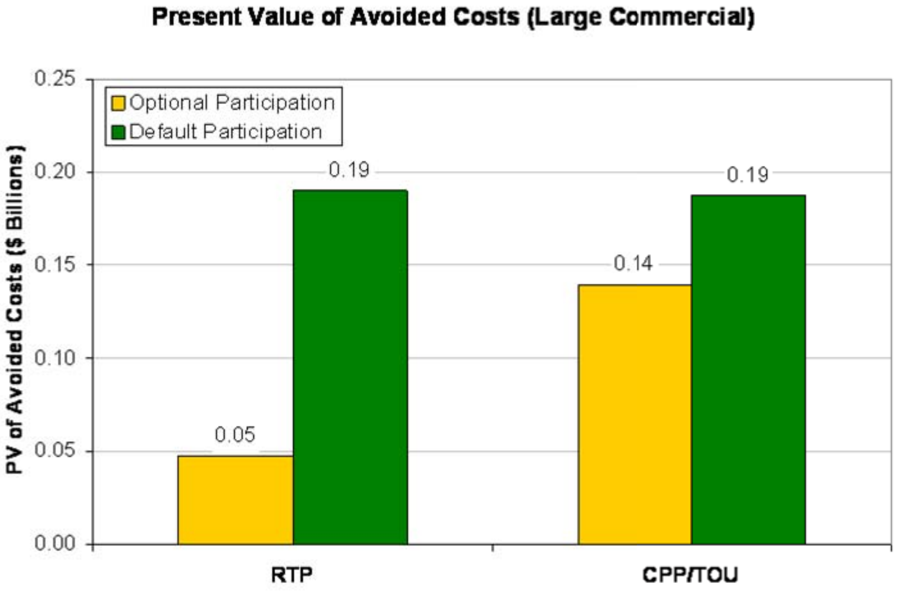




Large commercial class impacts

- Annual peak reductions range from 40 MW to 160 MW
- This translates into $ 50 - 200 million in avoided costs

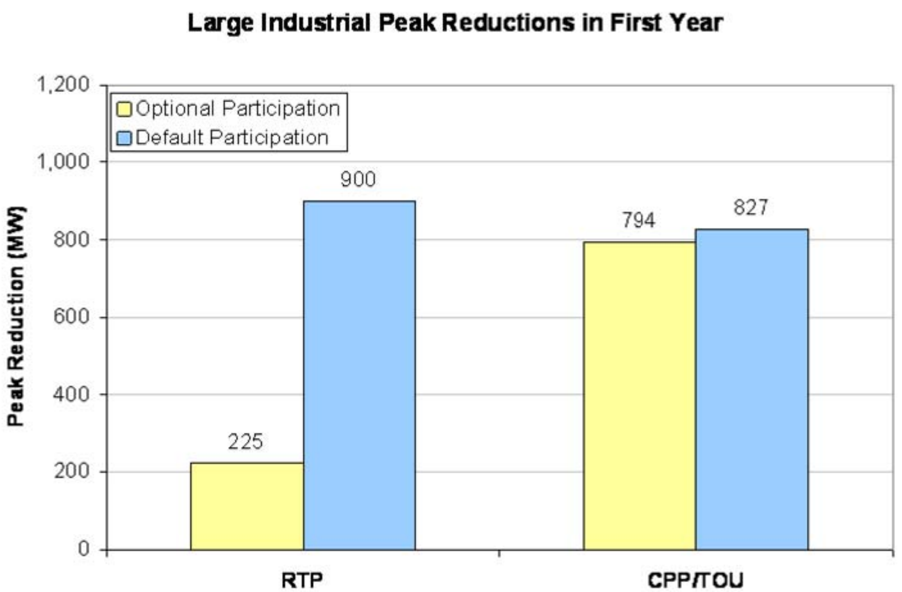


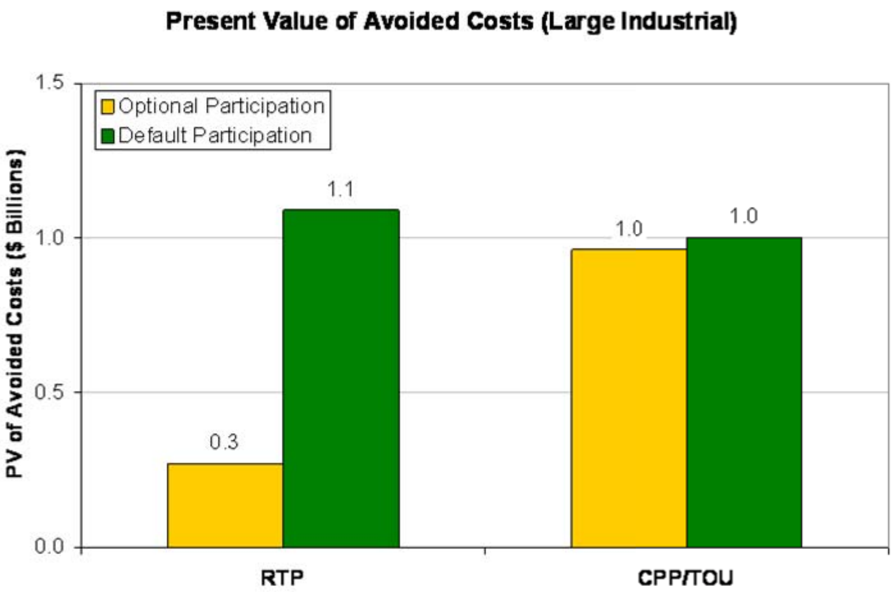


Note: In calculating the CPP/TOU impacts, “high” elasticities are used for the optional participation scenario and “low” elasticities are used for the default participation scenario

Large industrial class impacts

- Annual peak reductions range from 230 MW to 900 MW
- This translates into between $ 0.3 - 1.1 billion in avoided costs

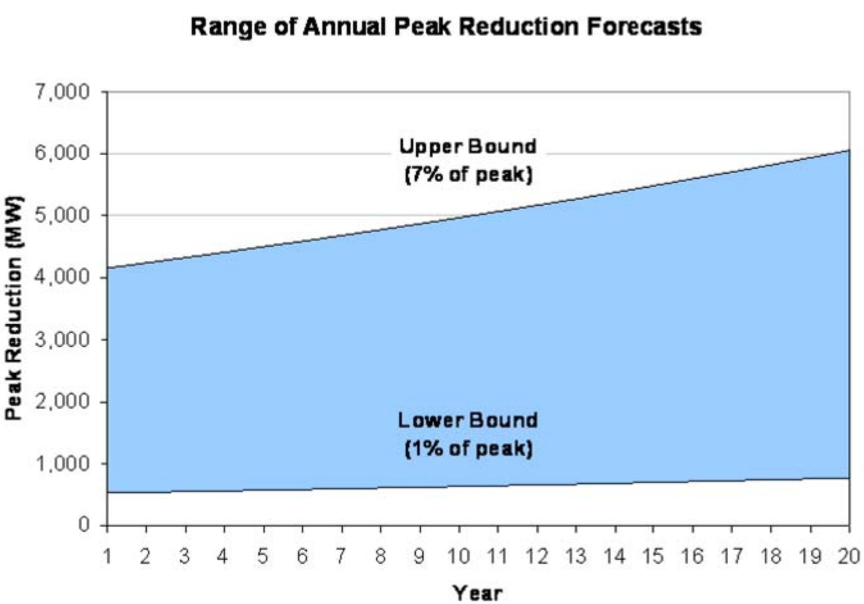


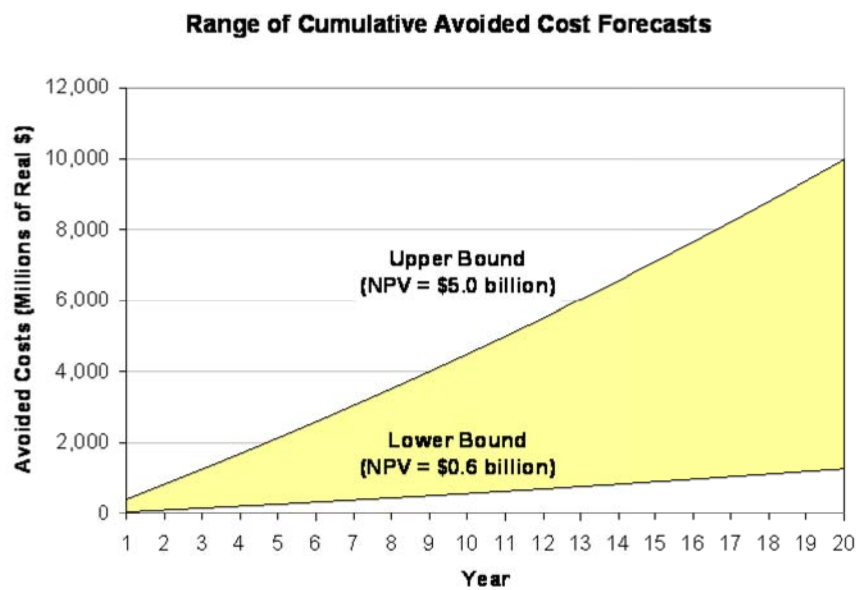


Note: In calculating the CPP/TOU impacts, “high” elasticities are used for the optional participation scenario and “low” elasticities are used for the default participation scenario

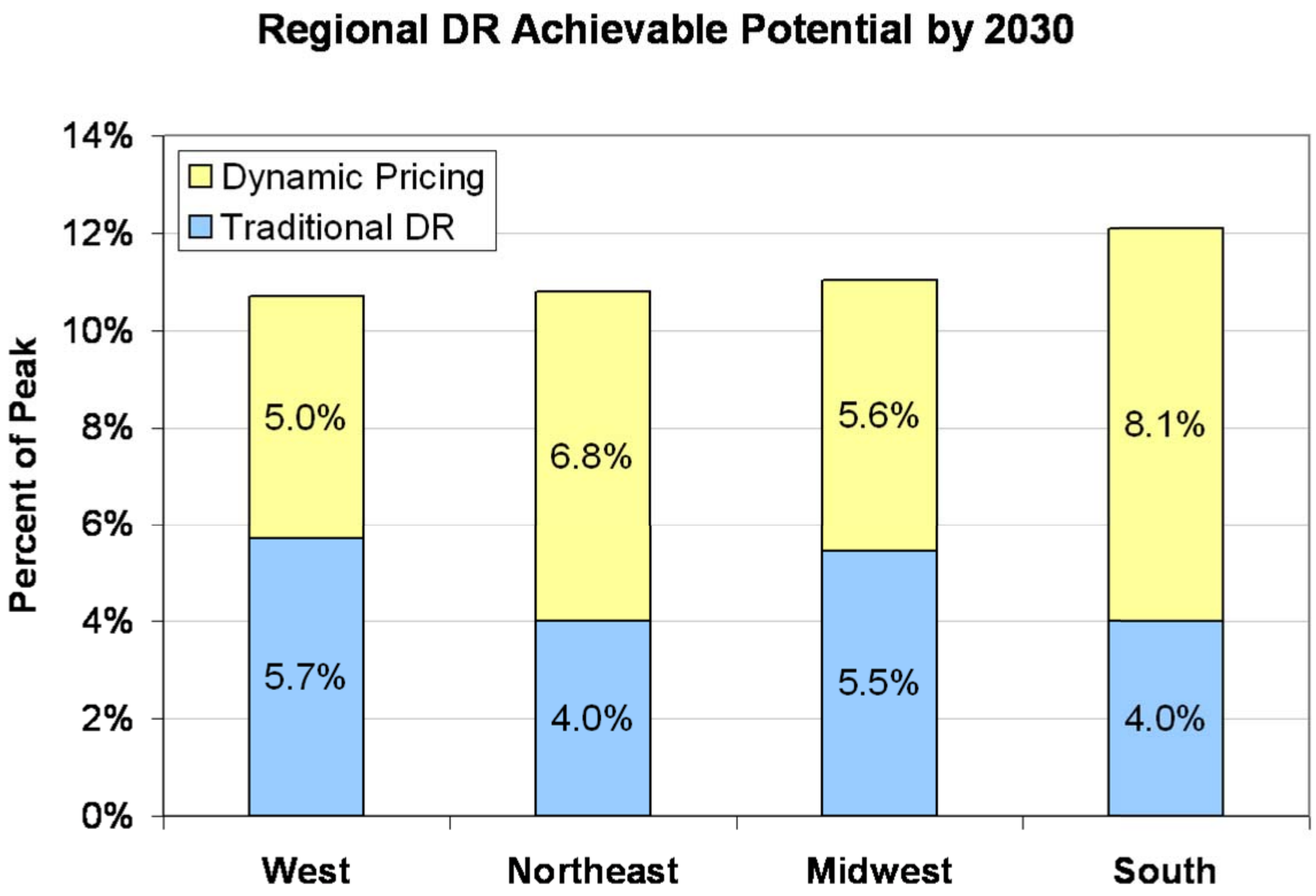
Benefits summary

- The largest impacts are produced by a **default CPP/TOU** for residential and medium C&I customers, and **default RTP** for large C&I customers
- The smallest impacts are produced by an **optional RTP** for all customers

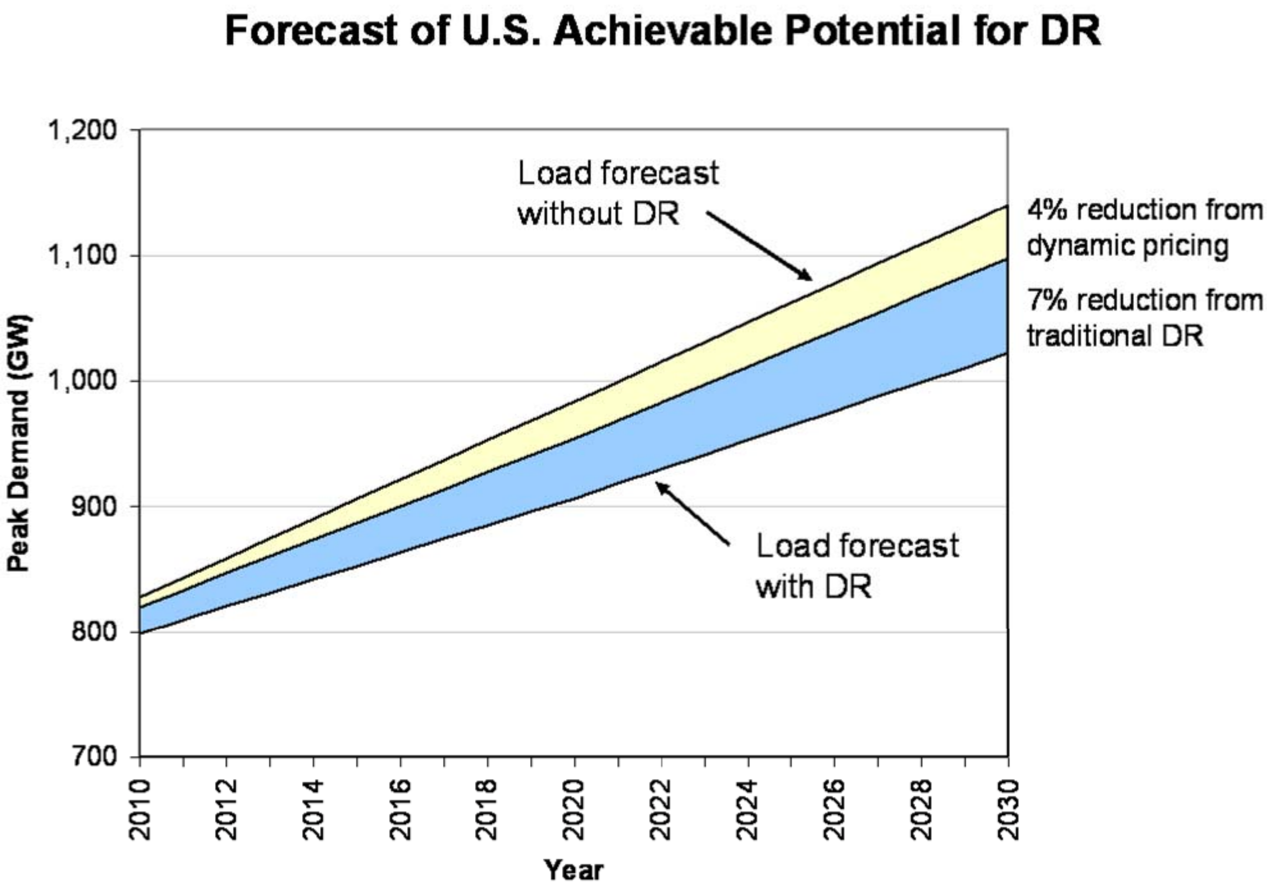




Similar assessments have been made for other regions



Nationally, DR may offset 11% of peak demand



Additional peak savings would be achieved through energy efficiency

EPRI, EEI. "Potential for Energy Efficiency in the U.S., 2008 – 2030." Preliminary results of Reference Case analysis of Demand Response achievable potential. April 2008.

So why is there so much resistance?

- To quote Arthur C. Clarke, any radical new idea will generate three reactions
    - ♦ "It is completely impossible"
    - ♦ "It's possible but not worth doing"
    - ♦ "I said it was a good idea all along"

Library

- **Ahmad Faruqui and Sanem Sergici, "The Power of Experimentation," Discussion Paper, The Brattle Group, May 11, 2008**
  (Downloadable from www.brattle.com/Publications/ReportsPresentations.asp)

- **Electric Power Research Institute and Edison Electric Institute. "Potential for Energy Efficiency in the U.S., 2008 – 2030." Preliminary results of Reference Case analysis of Demand Response achievable potential. April 2008.**

- **The Brattle Group, "Quantifying the benefits of dynamic pricing," Edison Electric Institute, January 2008** (Downloadable from www.eei.org/ami)

- **Plexus Research, Inc., "Deciding on Smart Meters," Edison Electric Institute, September 2006** (Downloadable from www.eei.org/ami)

- **Federal Energy Regulatory Commission, "Demand Response and Advanced Metering," Staff Report, August 2006**

- **Robert Earle and Ahmad Faruqui, "Toward a new paradigm for valuing demand response," The Electricity Journal, May 2006**

- **US Department of Energy, "Benefits of Demand Response in Electricity Markets," February 2006**

- **Join the AMI/Smart Grid list serve – send name and affiliation to** moldak@eei.org