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Demand Response A Long View

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California Energy Commission

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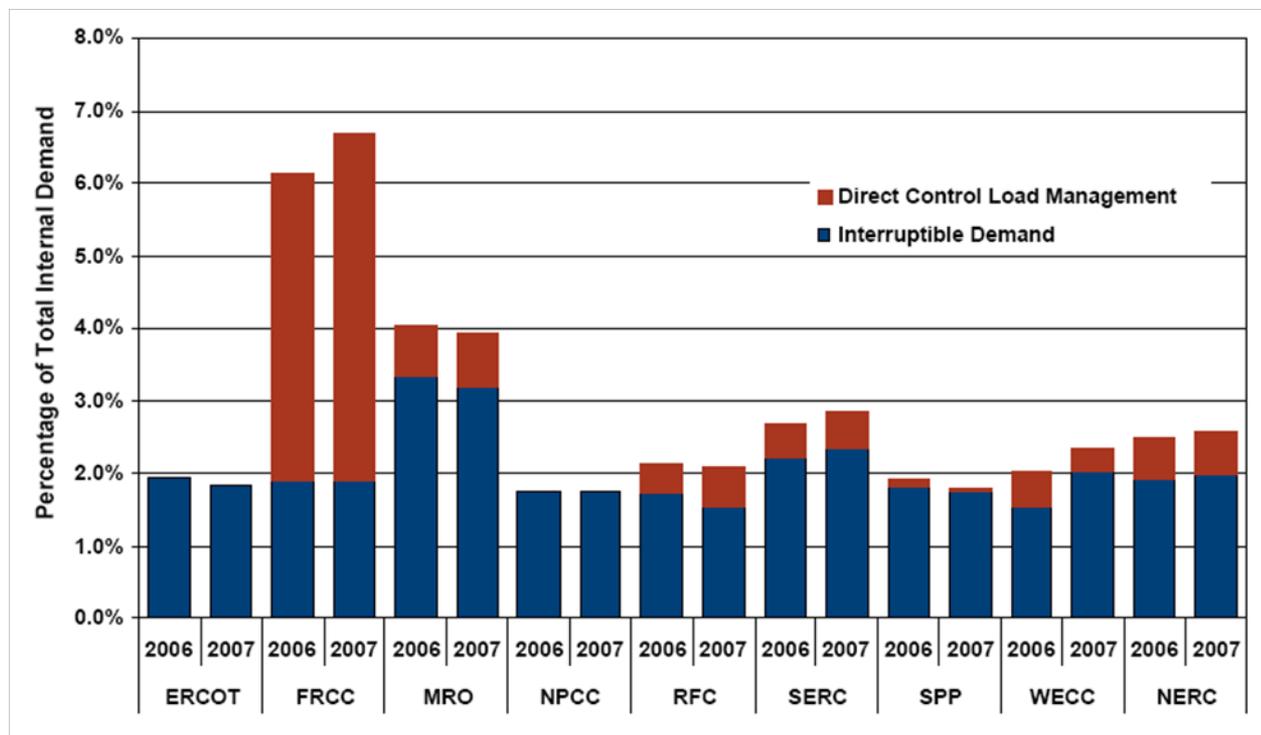
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Today's demand response

- 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

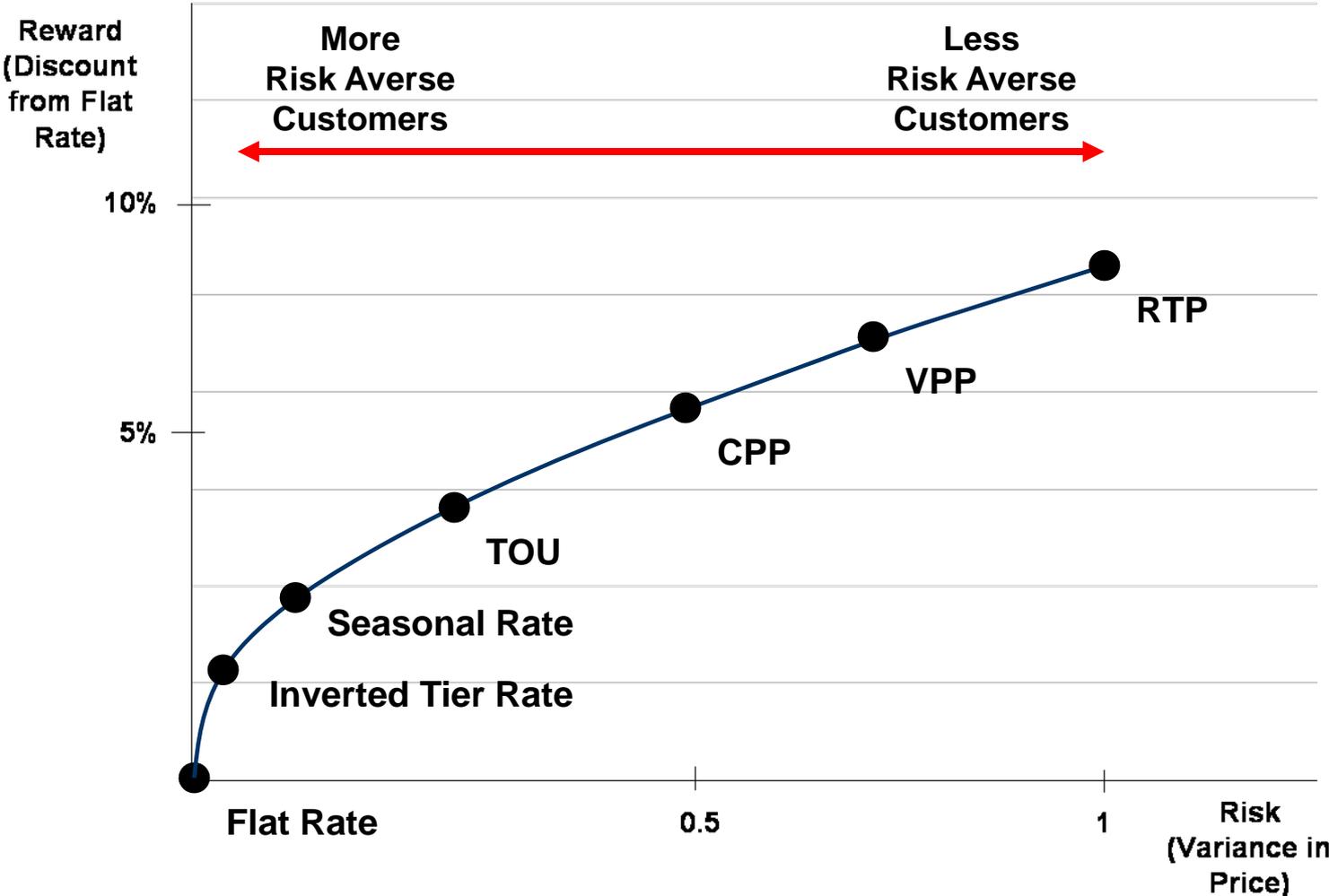


Source: 2007 NERC Summer Assessment, 2007 FERC Assessment of DR & Advanced Metering

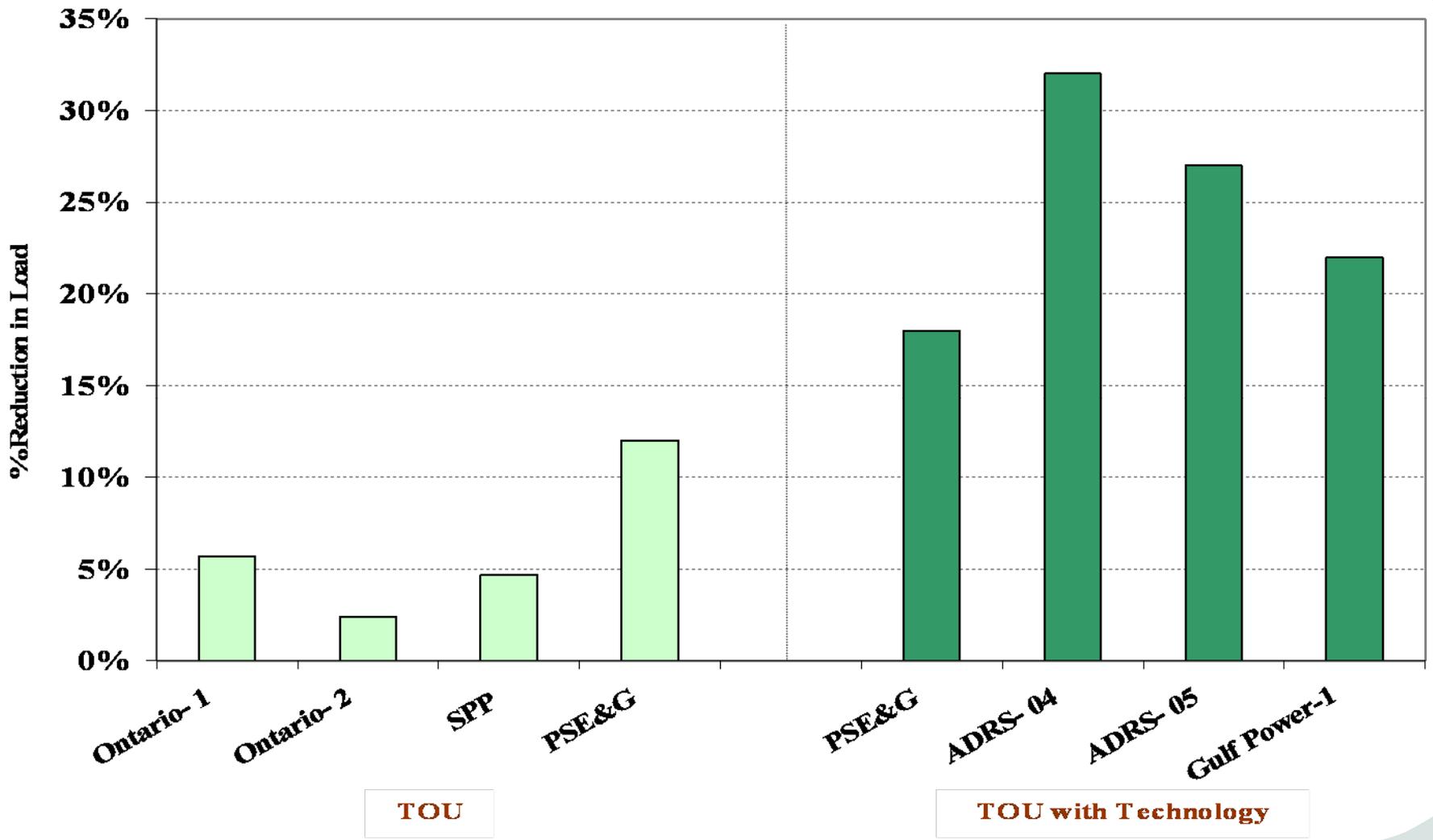
Tomorrow's demand response

- 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

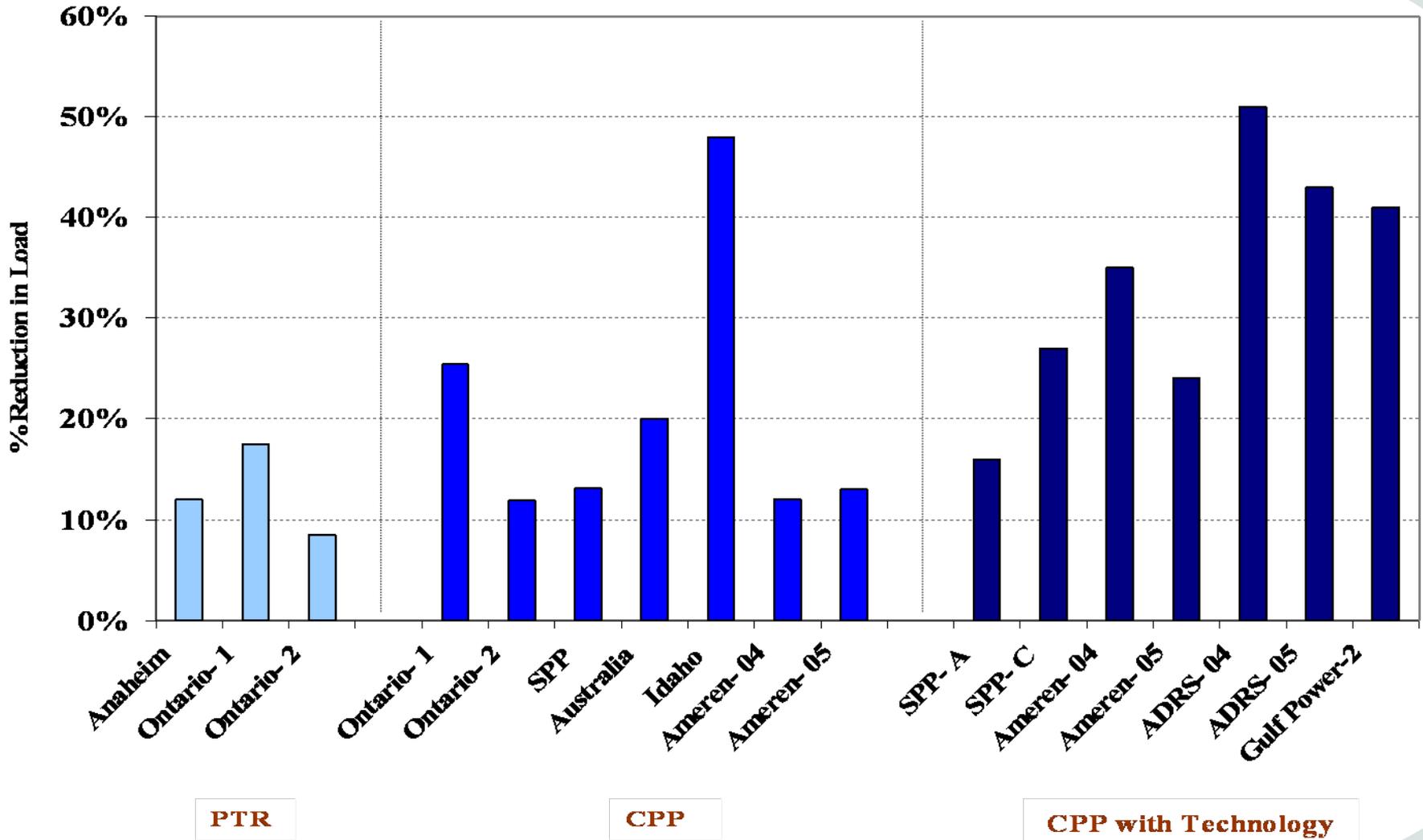
The shape of prices to come



Customers respond to static time-of-use rates



They respond even more to dynamic pricing



PTR

CPP

CPP with Technology

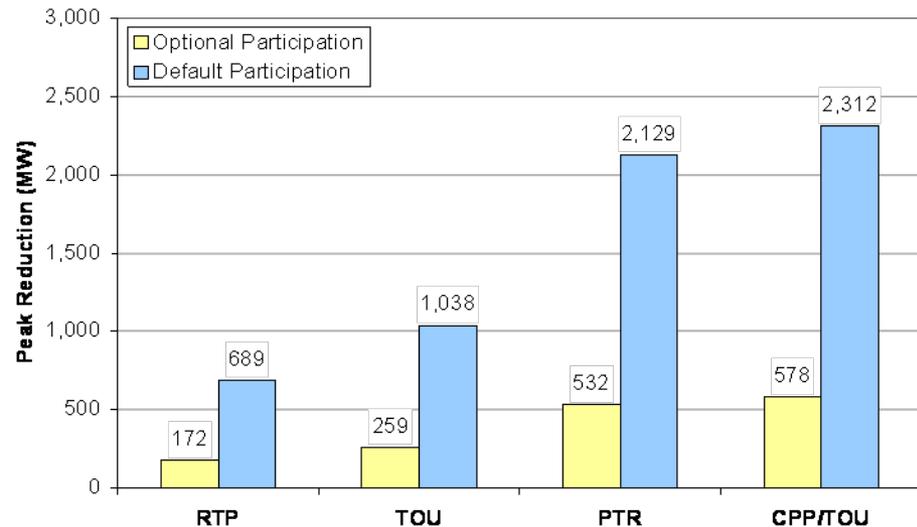
Imagining the future in California

- 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

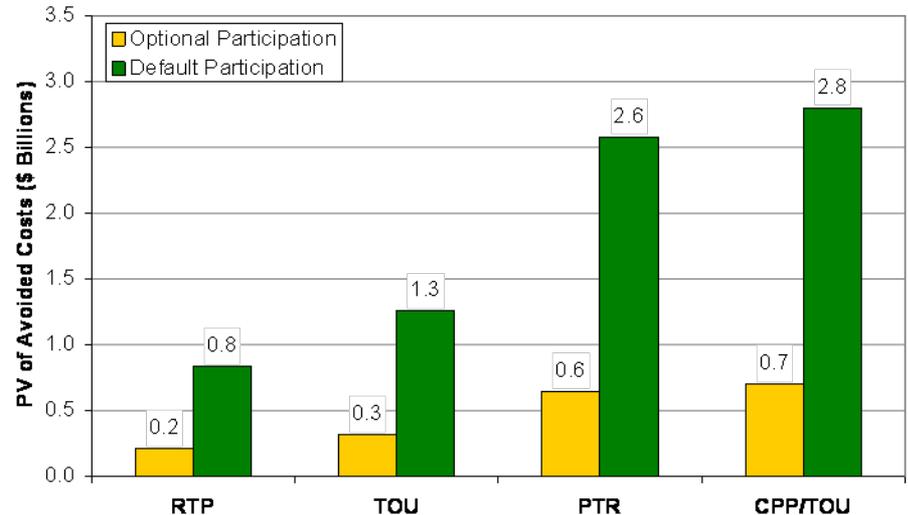
Residential class impacts

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

Residential Peak Reductions in First Year



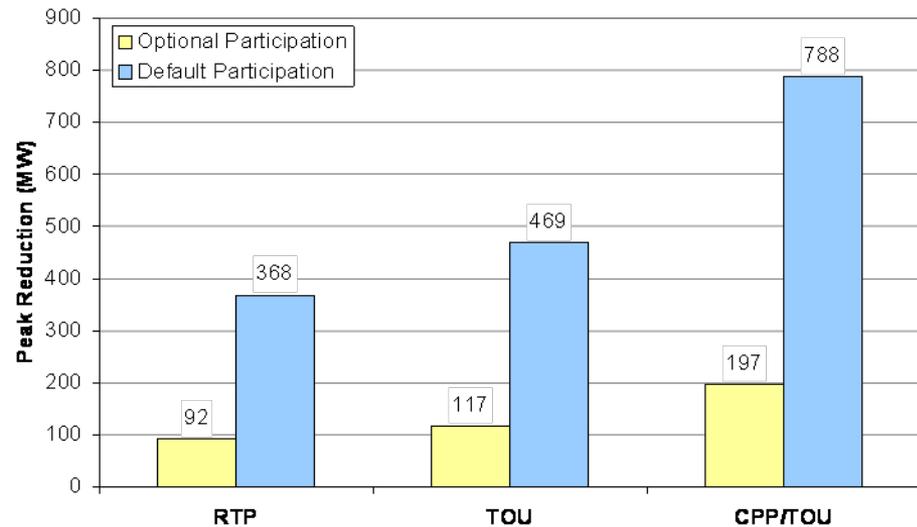
Present Value of Avoided Costs (Residential)



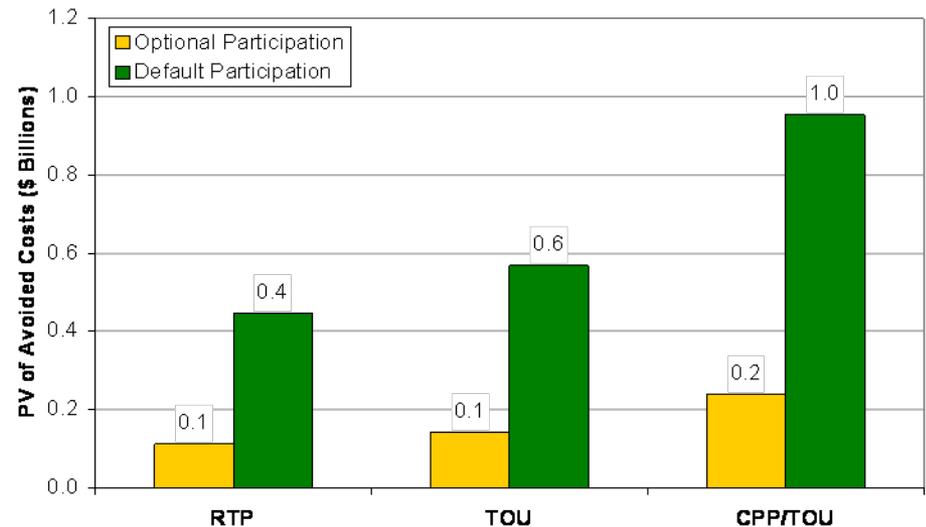
Medium C&I class impacts

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

Medium C&I Peak Reductions in First Year



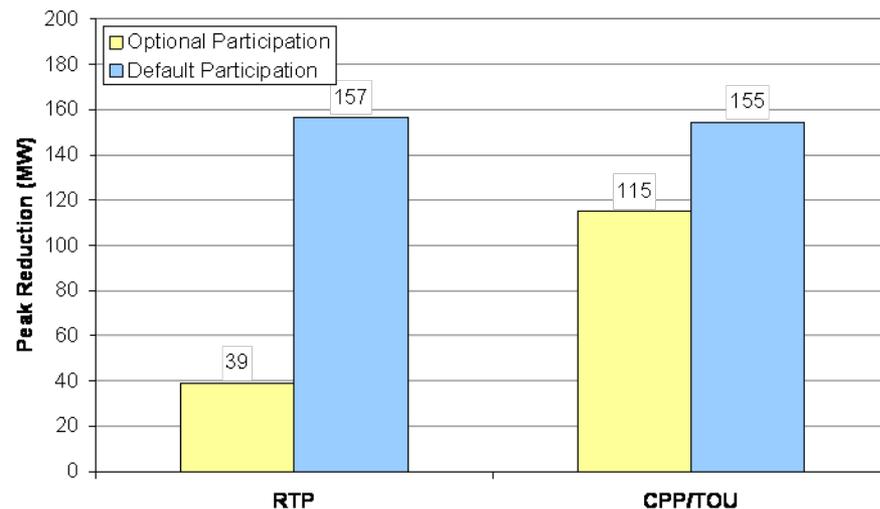
Present Value of Avoided Costs (Medium C&I)



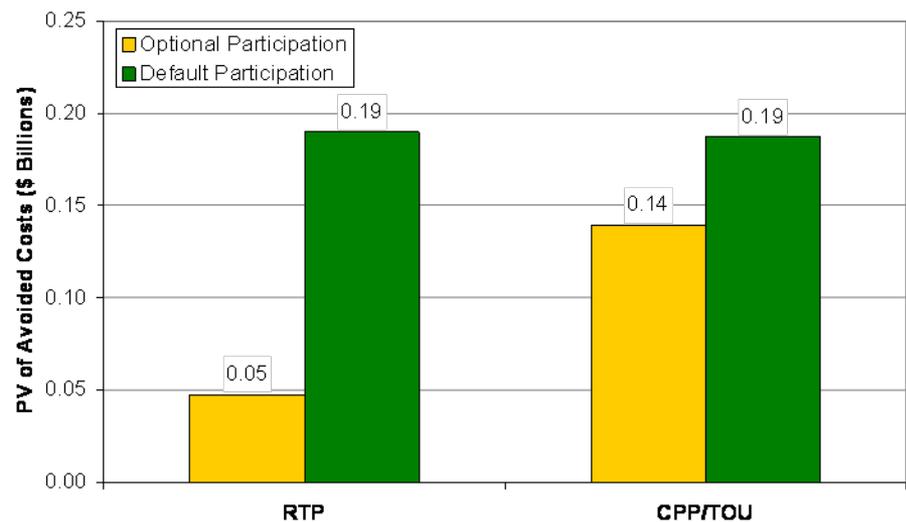
Large commercial class impacts

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

Large Commercial Peak Reductions in First Year



Present Value of Avoided Costs (Large Commercial)

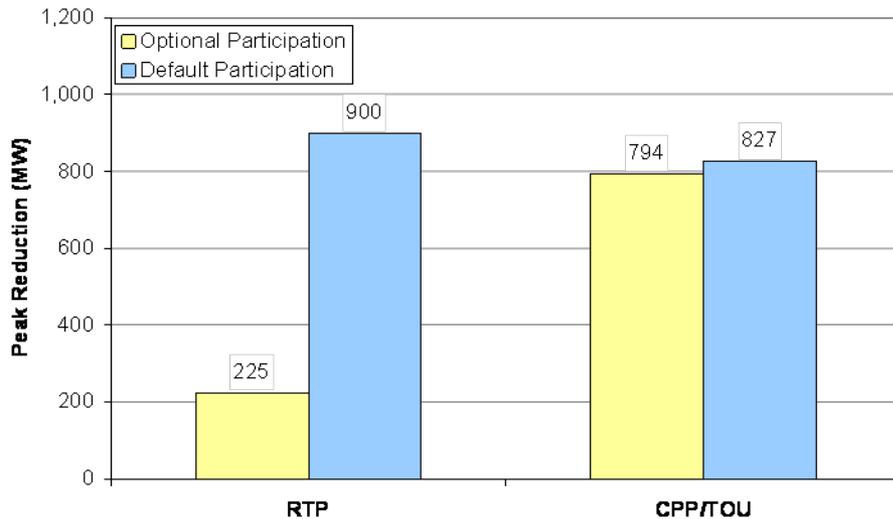


Note: In calculating the CPP/TOU impacts, “high” elasticities are used for the optional participation scenario and “low” elasticities are used for the default participation scenario

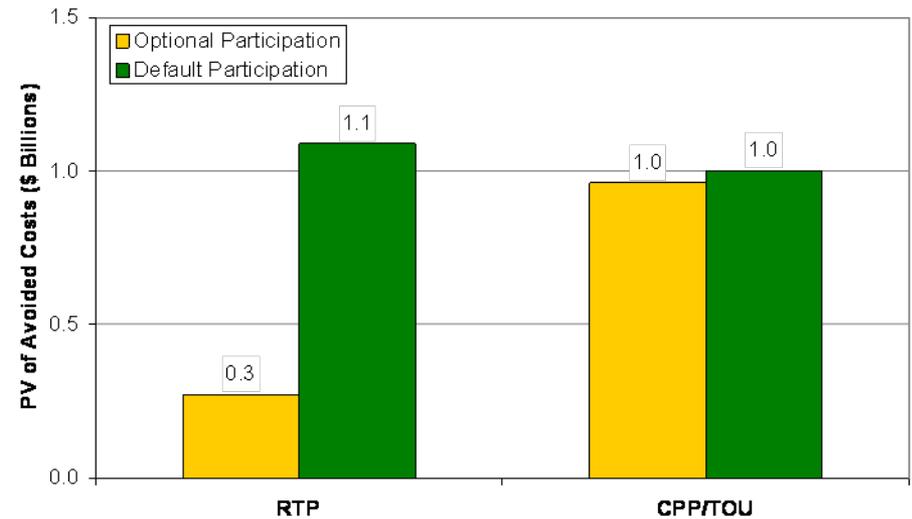
Large industrial class impacts

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

Large Industrial Peak Reductions in First Year



Present Value of Avoided Costs (Large Industrial)

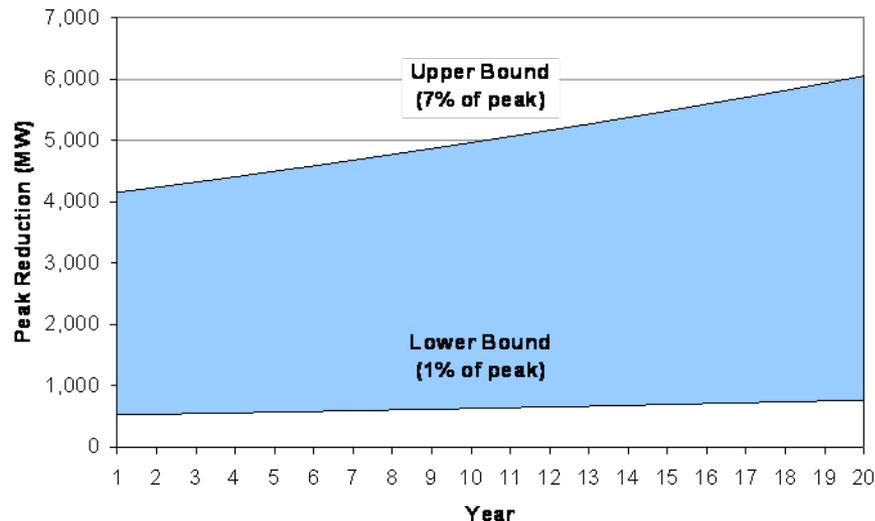


Note: In calculating the CPP/TOU impacts, “high” elasticities are used for the optional participation scenario and “low” elasticities are used for the default participation scenario

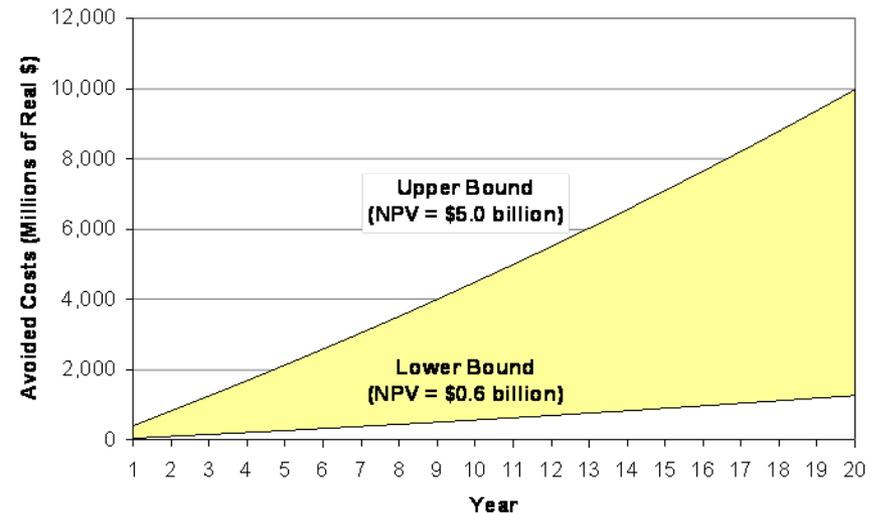
Benefits summary

- 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

Range of Annual Peak Reduction Forecasts

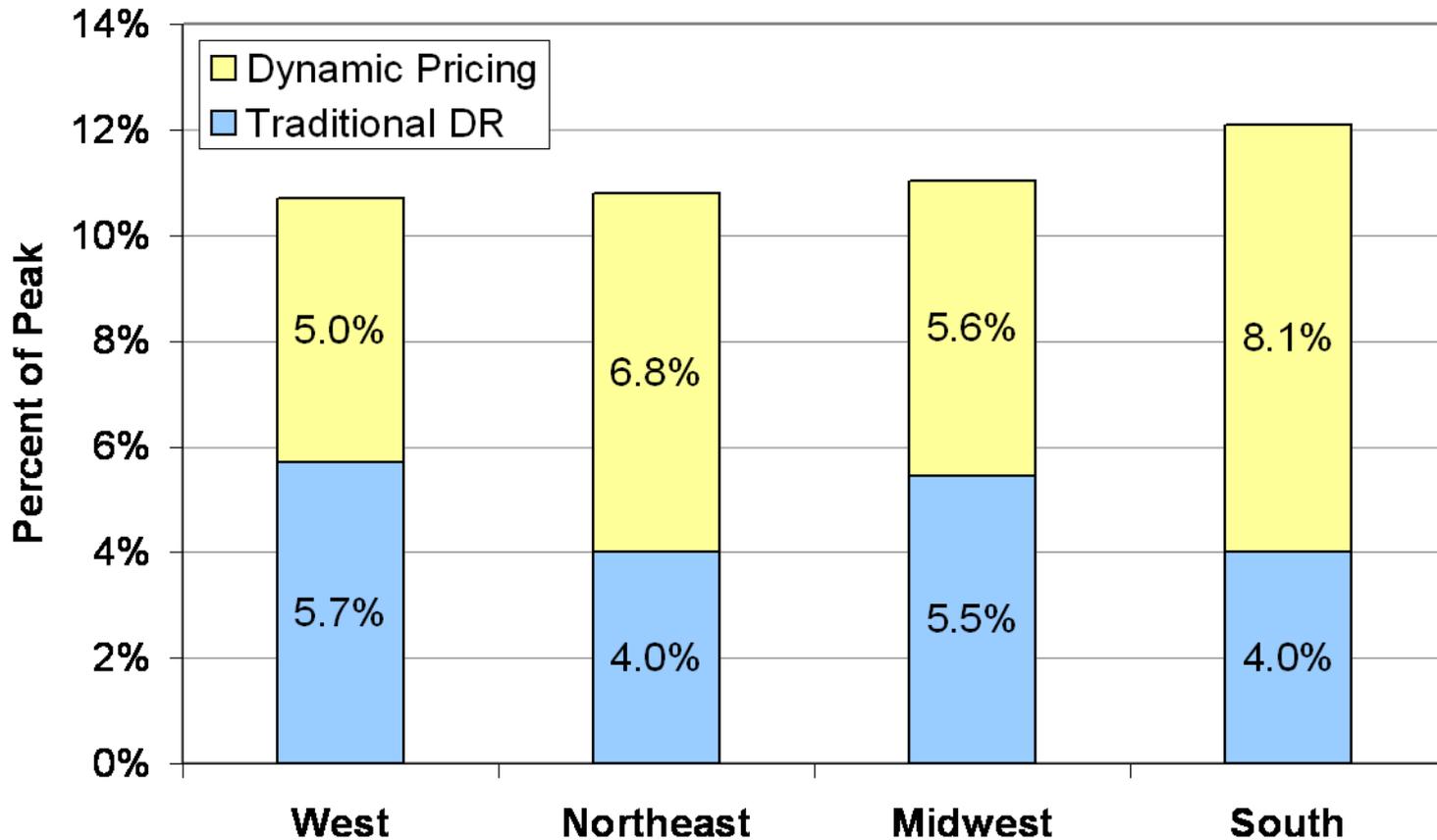


Range of Cumulative Avoided Cost Forecasts



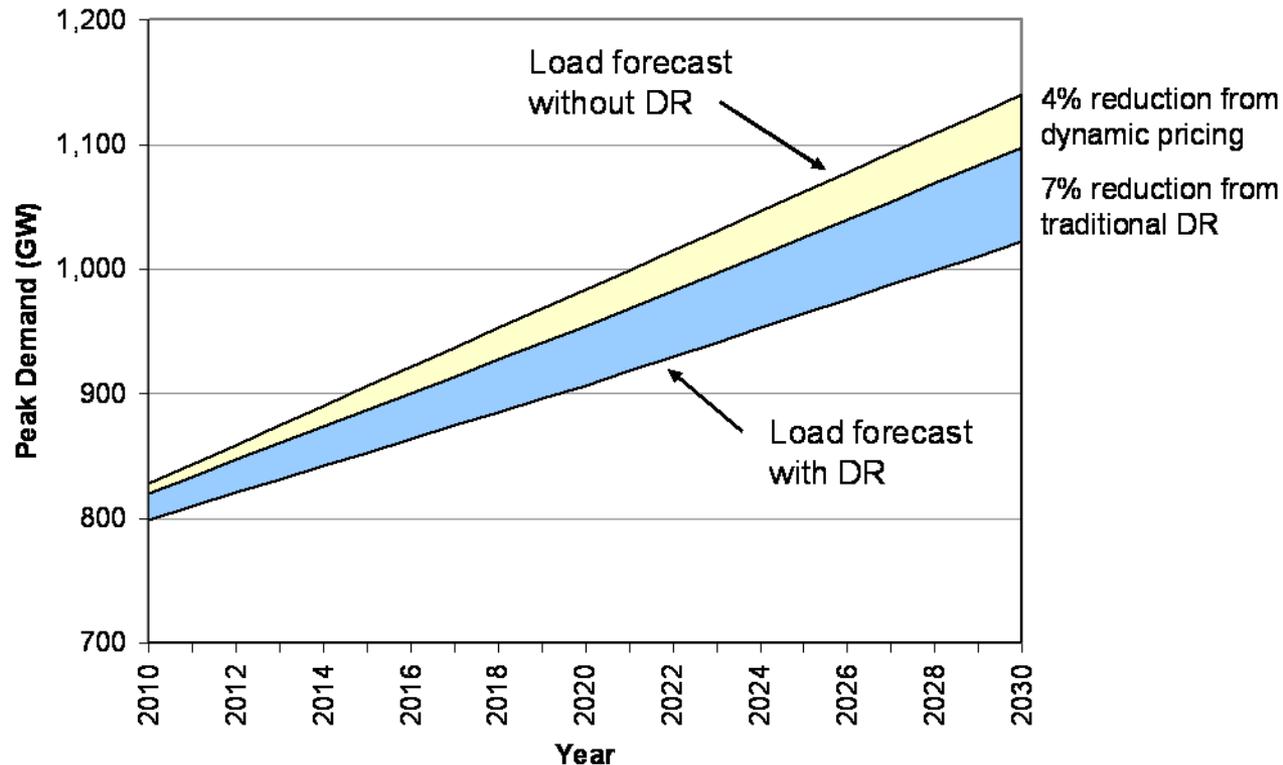
Similar assessments have been made for other regions

Regional DR Achievable Potential by 2030



Nationally, DR may offset 11% of peak demand

Forecast of U.S. Achievable Potential for DR



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**