Achieving Full Demand Participation in the New England Electricity Market

FERC Technical Conference
National Action Plan on Demand Response, Docket No. AD09-10-000

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ISO new england

FERC's National Action Plan on Demand Response

- The ISO supports the objectives of the National Action Plan ("NAP"), which are to:
  - Identify requirements for technical assistance to the States
  - Develop a broad-based, national communications program
  - Develop tools and other materials to support the development of demand response
- The ISO also supports the important role that demand response plays in FERC's 2009-2014 Strategic Plan
- We suggest that the NAP place greater urgency on building the infrastructure required for demand response

Are the three sets of possible strategies and activities described in the Discussion Draft appropriate and effective?

- While we support NAP objectives, the document does not address the process by which key policy issues would be resolved. Establishing clear policy objectives would facilitate development of the communications program, tools and other materials.
  - Define the benefits of demand response and metrics for measuring them
  - Establish the appropriate roles for state and Federal regulators, RTOs, distribution utilities, load-serving entities, and demand response providers in implementing policies that capture the value of demand response
  - Determine acceptable approaches to promote demand response among customers (e.g., retail pricing designs, programs implemented by the RTO, and/or modifications to wholesale market design)
  - Establish appropriate methods and levels of compensation to customers engaged in demand response
  - Determine the appropriate parties to whom the cost of achieving cost-effective demand response ought to be allocated

Are the three sets of possible strategies and activities described in the Discussion Draft appropriate and effective? (cont.)

- In addition:
  - Technical Assistance to States: Expert consultants and "champions" of DR should be available to provide support where needed
  - National Communications Program: Communications should allow for continuous feedback from potential customers
  - Tools and Materials to Support Demand Response: Establish policy on estimating and quantifying costs and benefits of demand response

- A significant barrier is a lack of AMI/Smart Grid Infrastructure. The NAP needs to address this more directly

Should any of the possible activities described in the Discussion Draft not be part of the National Action Plan? Should any activities not listed be added to the National Action Plan?

- Activities in the NAP need to be put into appropriate sequencing:
  - Demand response policy must be developed first
  - Infrastructure and dynamic pricing need to be supported at the same time in order to create effective price-responsive demand
  - Communications plan must be properly sequenced starting with a plan to reach key policymakers and implementers. Mass market campaigns should be conducted only after a commitment to improve infrastructure and pricing
- The Department of Energy ("DOE"), with its expertise and resources, should be an early partner and ally

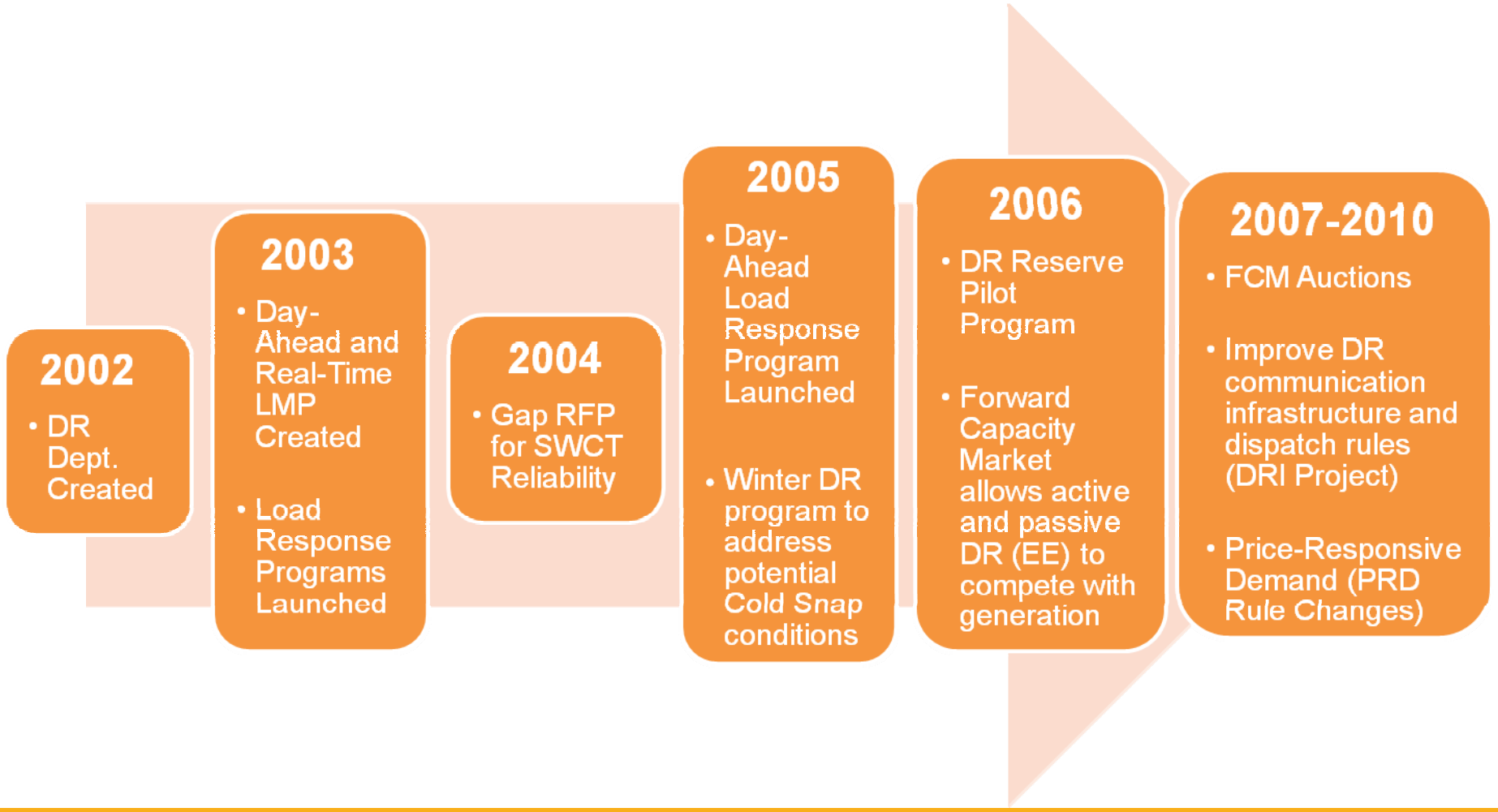
Is the possible strategy of using a coalition to carry out the objectives discussed in Part 1 consistent with EISA?

- The use of coalitions is a good idea because:
  - Diverse perspectives, incentives, needs, and interests of the stakeholders need to be recognized
  - Broad constituencies need to be mobilized in order to educate and prepare customers for change
  - Maintaining credibility of the effort among many sectors will be important for it to be sustained over several years
- We suggest that existing regional organizations be leveraged for this effort
- A States-based focus is appropriate because the States have jurisdiction over AMI/Smart Grid infrastructure and retail rate structures. Such activities should be coordinated with ongoing NAESB and NIST efforts.

How can such a coalition best facilitate the implementation of the National Action Plan?

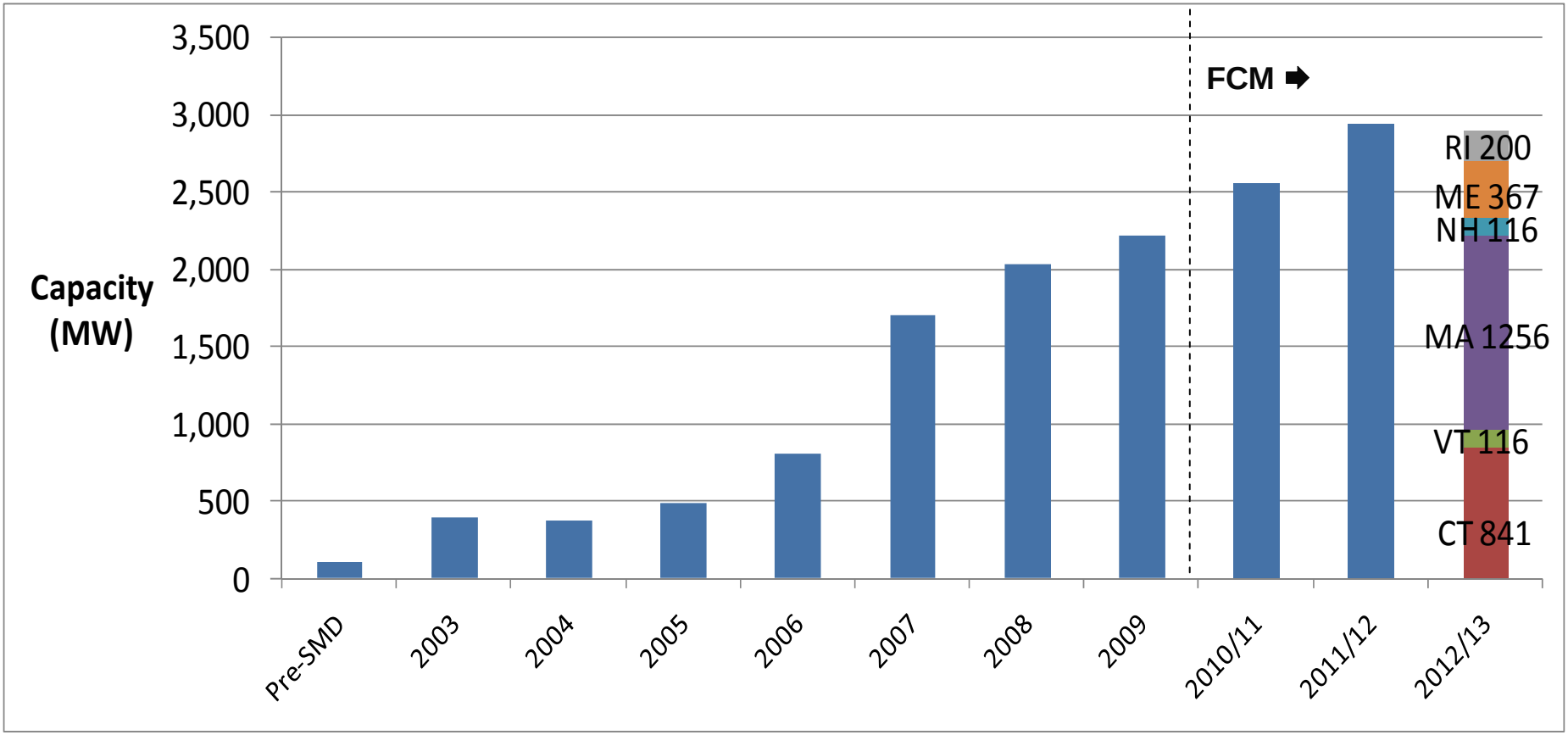
- Seek best practices in each region as a starting point
  - Include practices in pricing, auctions, advanced metering, communications, control and other relevant disciplines
  - Consult with existing coalitions, policymakers, and others who have run or are conducting demand response programs
- Clearly identify decision-makers and their authority to make decisions to move the process forward
  - Establish rotation of decision-making responsibilities among coalition members
- Ensure that breadth and variety of stakeholder interests are heard and are incorporated into implementation plans to the extent consistent with policy objectives
- Make sure that agreed-upon objectives are clearly-defined and measurable

ISO New England Efforts to Expand DR



Growth in Demand Resources in Region

Capacity Market Promotes Growth



Success Brings New Challenges

- DR now replacing generation as capacity
  - Growth rate exceeded expectations
    - Greater than 20-fold increase in less than 10 years
    - 500% increase in the last 5 years

- Large amount of DR creates operational challenges
  - Increasing dispatch frequency
    - More DR will be called upon for more hours, including off-peak months
  - Major ISO projects were initiated to address these challenges

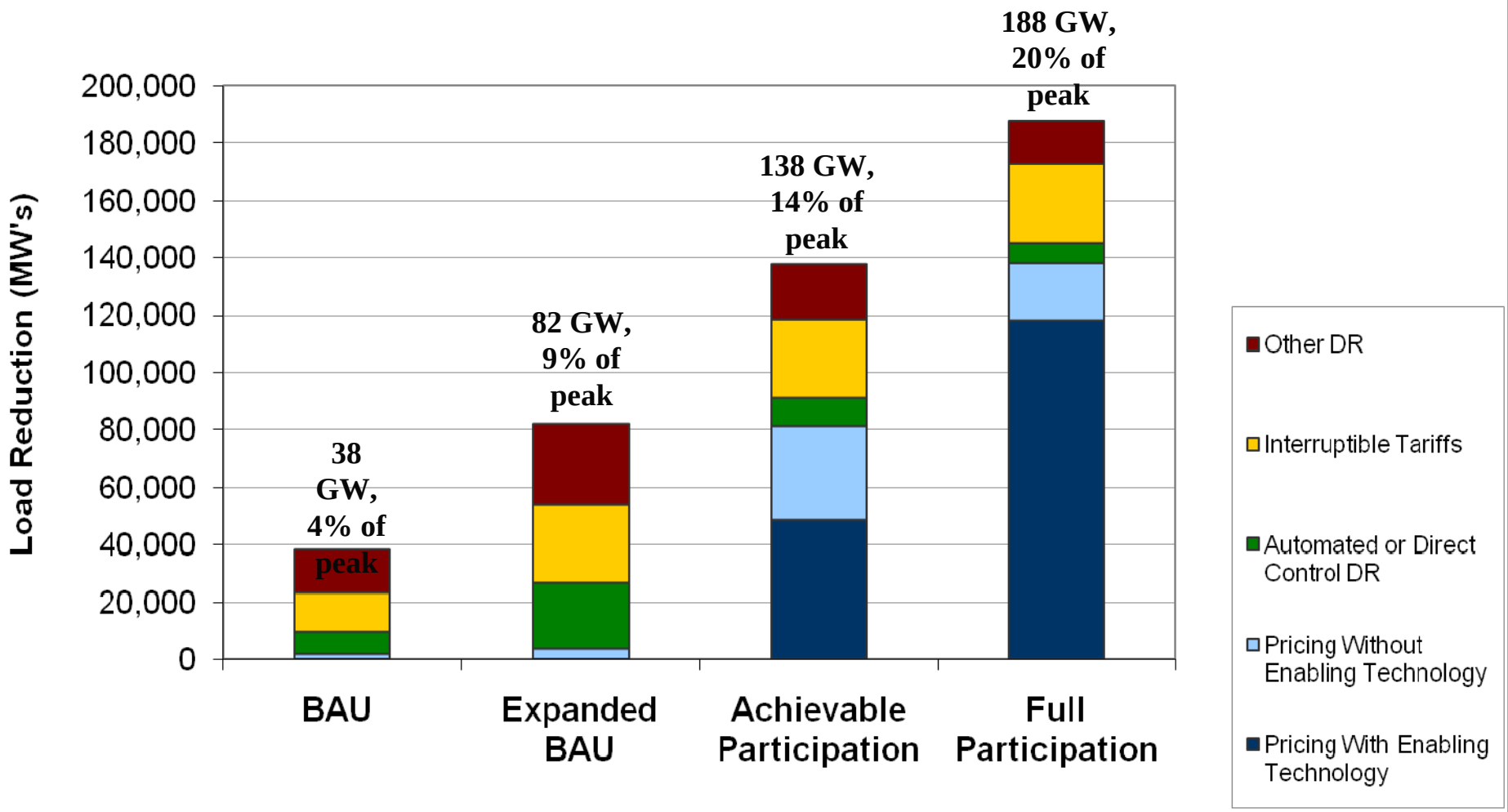
The Strategic Plan of the Federal Energy Regulatory Commission

- FERC's 2009-2014 Strategic Plan emphasizes DR
  - Competitive pressure to reduce wholesale electric prices
  - Increase awareness of energy usage
  - Provide for more efficient operation of markets
  - Mitigate market power
  - Enhance reliability
  - Support the renewable energy and distributed generation
- Develop a "National Action Plan on Demand Response" that will
  - Identify requirements for technical assistance
  - Develop a national communications program
  - Develop tools and other materials to support the development of demand response

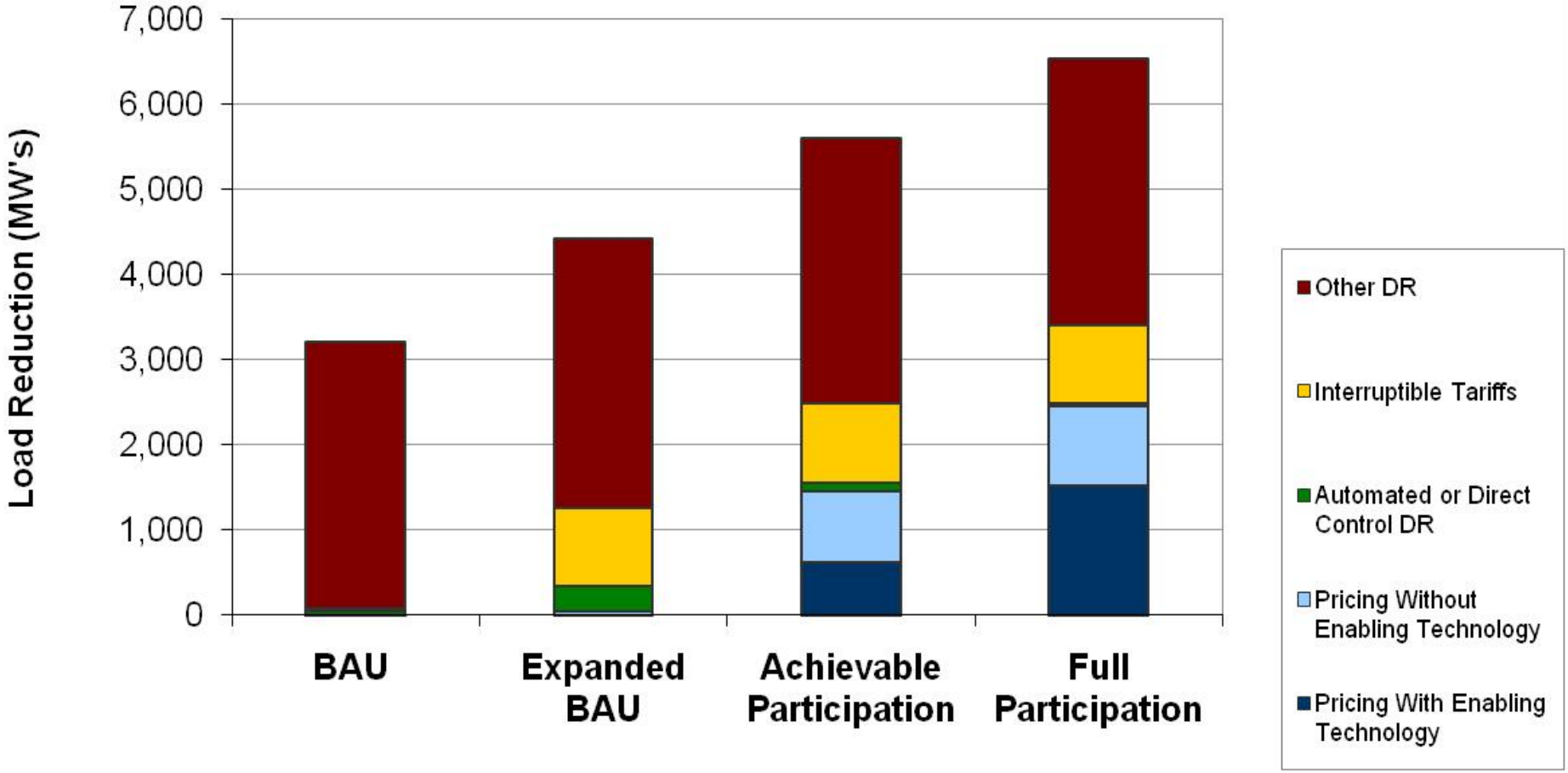
The Strategic Plan of the Federal Energy Regulatory Commission (cont.)

- Establish rules that enhance competition by allowing non-discriminatory market access to all supply-side and demand-side energy resources
  - Further barriers to participation by demand resources in organized wholesale electric markets will be identified and eliminated
  - Best practices for demand response products and procedures will be explored and, as appropriate, implemented in organized wholesale electric markets.

FERC National DR Potential Assessment



FERC National DR Potential Assessment



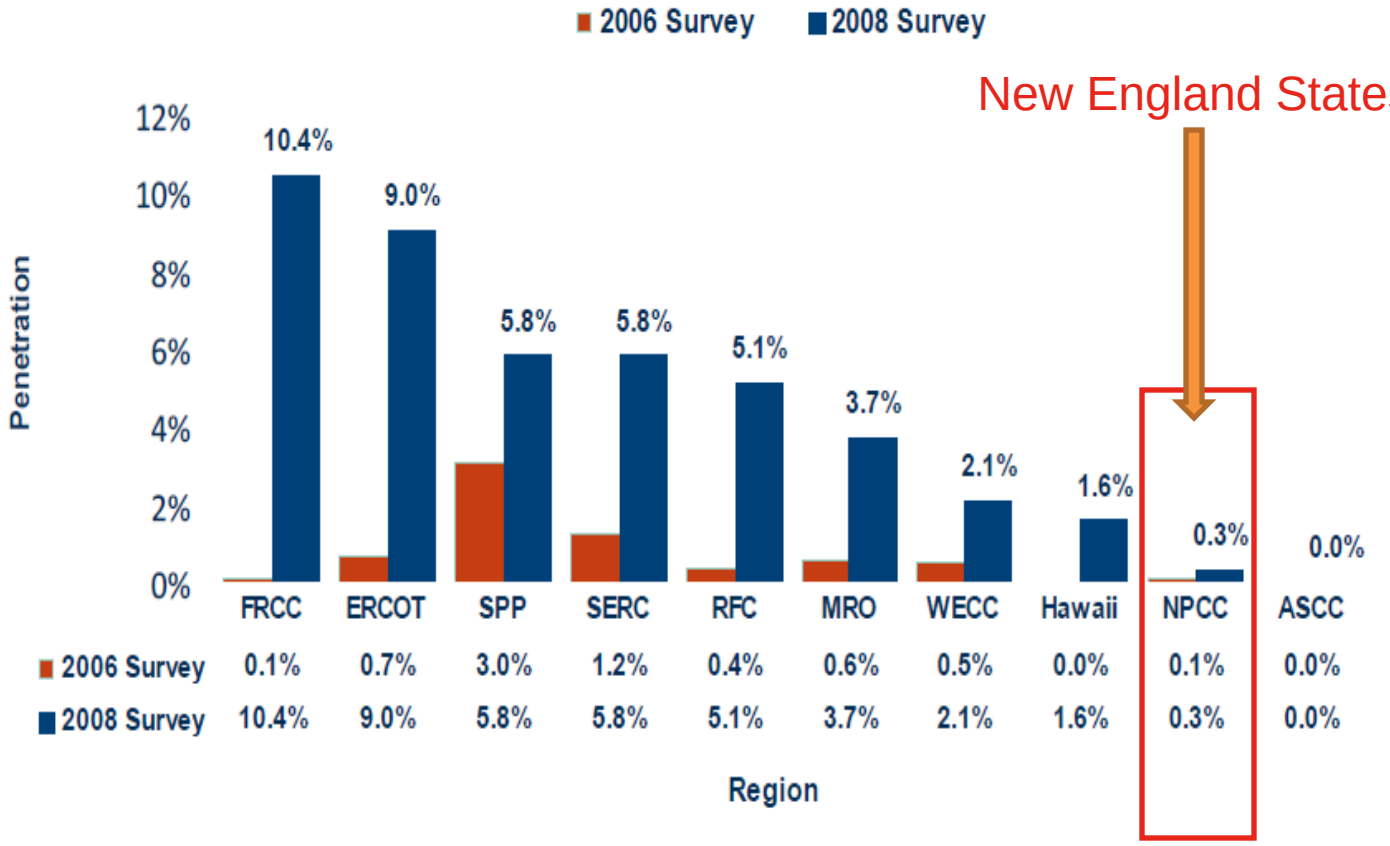
PRD Can Further Improve Energy Market

- While ISO/RTO programs capture much of the demand response potential, much of the remaining potential is in price-responsive demand
- What is “Price-Responsive Demand?”
  - Consumers change consumption in real time, in response to changes in wholesale power prices
    - Use *more* energy when prices are low and *less* when prices are high
- What are the benefits?
  - Improves capacity utilization of New England system
  - Helps consumers manage energy needs efficiently
  - Reduces LMP when prices are highest

Main Barriers to Price Responsive Demand in New England

- Future growth of demand response in New England is dependent upon price-responsive demand
- However, most consumers in New England are still charged uniform retail rates
  - Consumers cannot benefit from changing their consumption levels in response to changing real-time wholesale energy prices
- Further, New England lacks advanced metering infrastructure ("AMI") and tools to assist customers to respond to prices
  - Limits the ability of suppliers to offer dynamic retail rates because customers cannot be billed for their specific real-time demand profiles
  - Limits the ability to consumers to evaluate dynamic retail offers

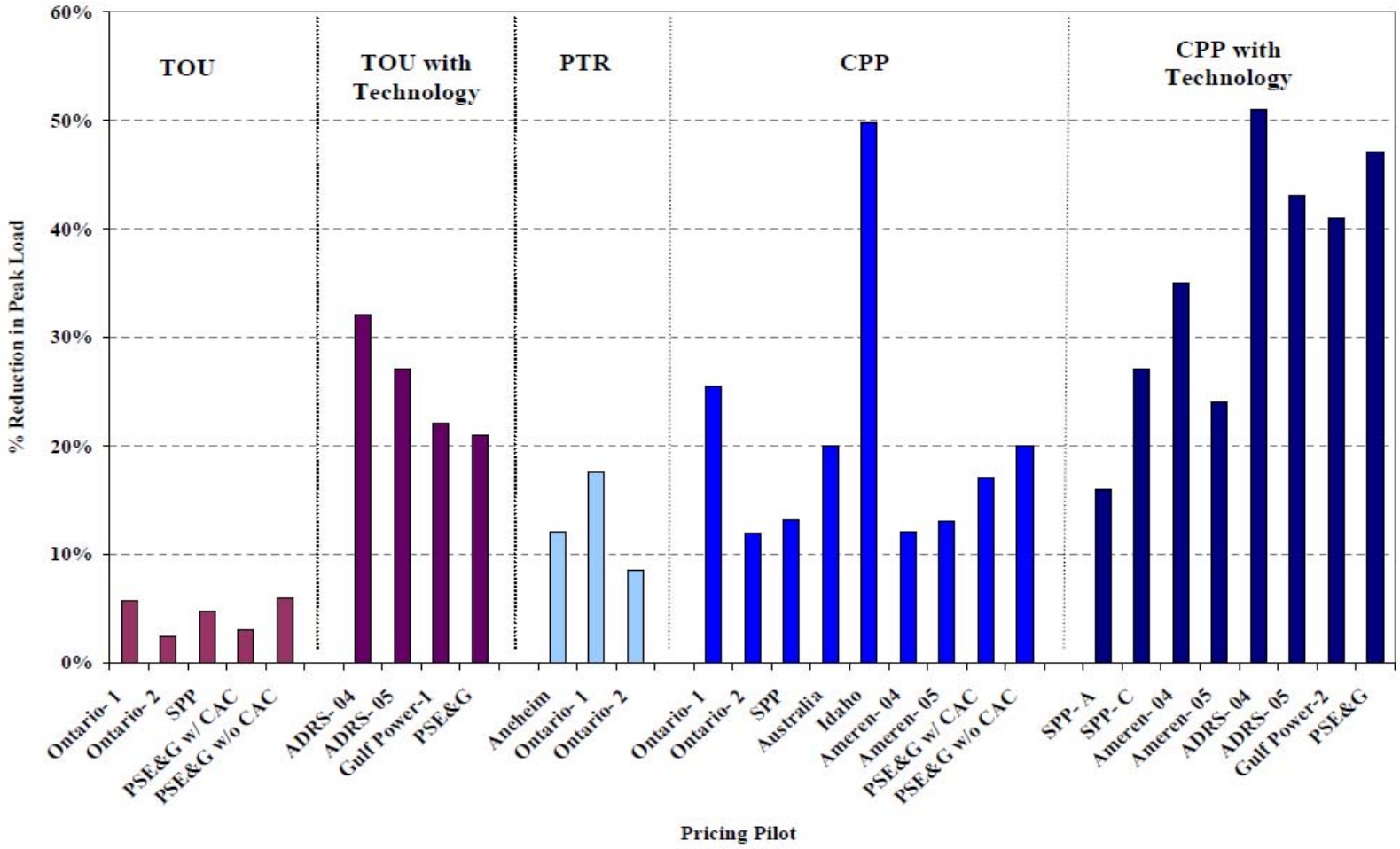
AMI Penetration by Region as of 2008



Source: 2006 FERC Survey and 2008 FERC Survey

*From Graph II-3, “FERC 2008 Assessment of Demand Response and Advanced Metering.” Includes US data only.

Background: Estimated Demand Response Impact by Pilot Program



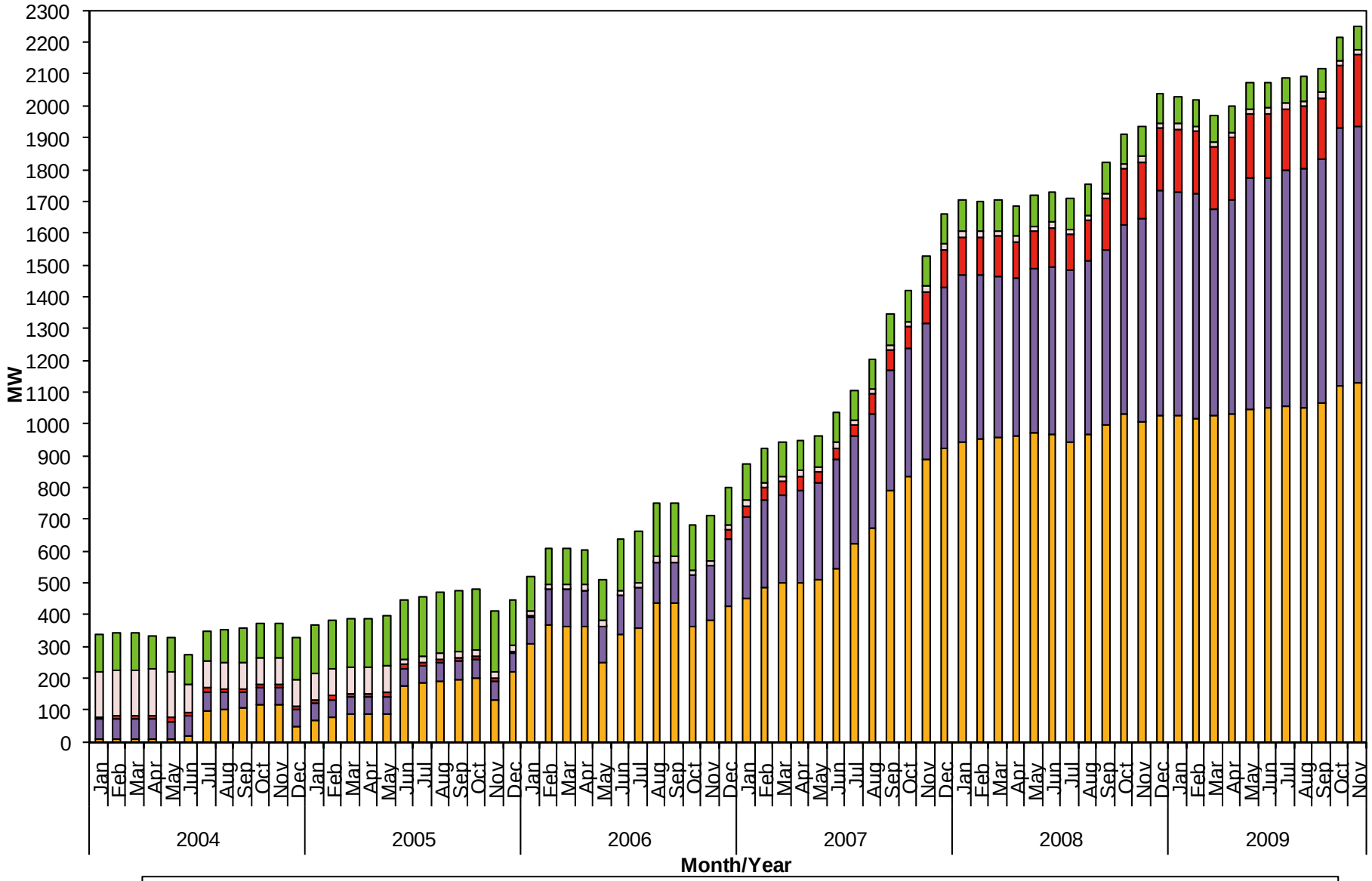
TOU = Time Of Use PTR = Peak Time Rebate CPP = Critical Peak Pricing CAC = Central Air Conditioning

Ahmad Faruqui and Sanem Sergici, "The Power of Experimentation," Discussion Paper, The Brattle Group, May 11, 2008, Slide 6.

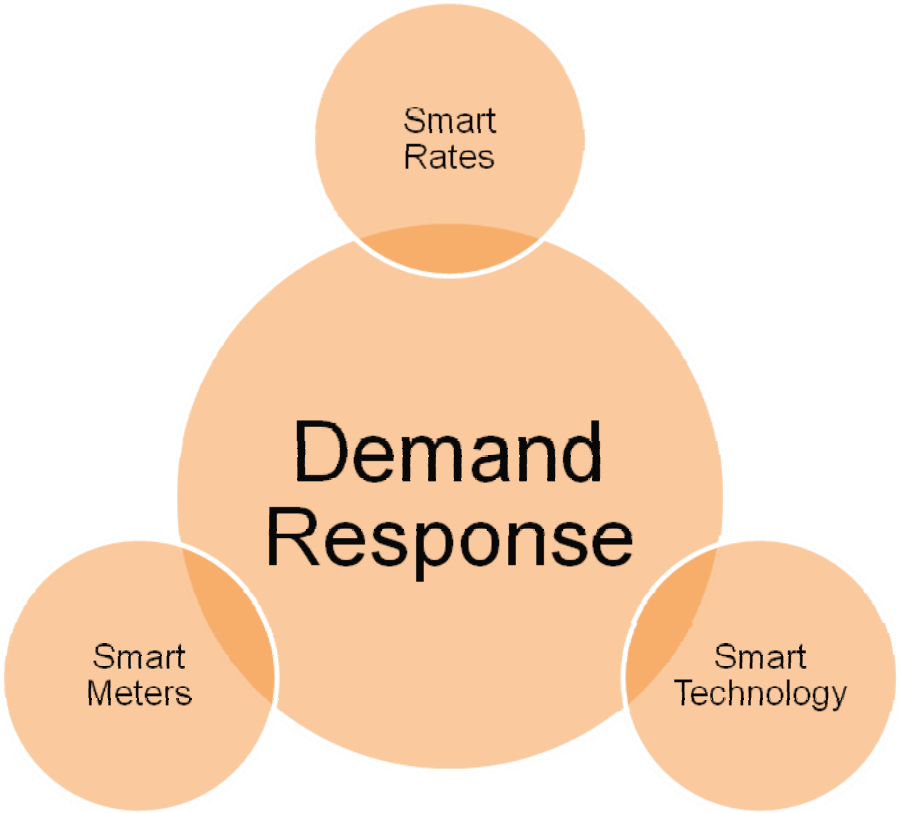
Demand Response Depends on Retail Rates, AMI, and Smart Grid Tools

- Demand response capability will likely ***not*** grow simply from the development of new demand response programs nor from paying more for each MWh of load reduction
- Providing additional incentive payments for MWh load reductions alone may:
  - Result in inefficient market outcomes where consumers may be incentivized to use more expensive resources in place of less expensive resources to meet their energy needs
  - Not increase demand response capability as demand response providers will likely use existing demand resources to participate in new programs and markets
- ***Expanded investment in AMI and Smart Grid technologies and state policies promoting dynamic rate designs will be key in achieving full demand participation in electricity markets***

Load Response Program Enrollment 1/2004 – 11/2009



To achieve greater levels of demand response the National Action Plan must develop a strategy that addresses barriers to dynamic retail rates, AMI, and tools to enable customer response to prices



Examples of Recent Federal Support for AMI and Smart Grid

- Congress encouraged rate-base capitalization of smart-grid investments (Sec. 1307, Energy Independence and Security Act of 2007)
- Congress changed depreciation life for smart meters and smart grid technologies from 20 years to 10 years (Emergency Economic Stabilization Act of 2008)
- Smart Grid Investment Grants funded from the American Recovery and Reinvestment Act of 2009
  - These will increase penetration of AMI in New England

Smart Grid Investment Grants in New England—Recovery Act 2009

Recovery Act Selections for Smart Grid Investment Grant Awards--By State

State	Awardee Name	Brief Description	Total Project Value including Cost Share
Connecticut	Connecticut Municipal Electric Energy Cooperative	13,000 Smart Meters	$ 18,376,100.00
Massachusetts	Honeywell International	Automated peak pricing response, 700 C&I customers	$ 22,768,726.00
Massachusetts	NSTAR Electric Company	Implement "self-healing" functions on grid.	$ 16,953,600.00
Massachusetts	ISO-New England	30 Synchrophasors, improve response time, reduce congestion.	$ 8,518,771.00
Massachusetts	Marblehead Municipal Light Dept	10,000 smart meters, pilot program for RTP	$ 2,692,350.00
Massachusetts	Vineyard Energy Project	Deploy smart grid technologies, including demand response program	$ 1,574,500.00
Maine	Central Maine Power Company	650,000 smart meters	$ 195,900,000.00
New Hampshire	New Hampshire Electric Cooperative	Advanced metering for 75,000 members and telecom	$ 35,144,946.00
Vermont	Vermont Transco, LLC	Deploy an additional 280,000 meters	$ 137,857,302.00
New England Totals:	Estimated Additional Smart Meters:	1,027,000	$ 439,786,295.00
	Estimated Total Smart Meters :	1,058,334	
	Total # of Electric Meters (2008):	7,078,215	

Present

0.3%

Estimated AMI Penetration

Future

15%

AMI Penetration = (# Smart Meters) / (Total # Electric Meters)

Achieving PRD in New England

- ISO New England has proposed two complementary approaches
  - **Supply-side**
    - Market participants to offer load reductions into the wholesale energy markets as though such offers were an offer to supply energy
  - **Demand-side**
    - Voluntary wholesale energy/capacity product at hourly real-time price – energy and capacity makes up about 96% of a typical C&I customer's wholesale power cost
    - NEPOOL support is tenuous
- Customers with advanced meters and access to dynamic prices can benefit from these approaches

Complex Issues and Differing Opinions

- **Payment for load reductions:** should payments for reductions in demand recognize avoided energy costs (savings participants receive by reducing energy use)?
- **Cost allocation:** treating DR like generation in the energy market creates a market imbalance in which supply > demand. How should these additional supply costs be recovered?
- **Baseline:** demand reductions are measured relative to a baseline. Baselines estimate usage that did not happen. Baseline accuracy and potential gaming are of concern.
- **Demand-side approaches:** approaches being considered include pricing capacity on a real-time basis. How should capacity be priced/allocated to wholesale customers? Should this be left to the states and the retail markets to address?

Next Steps in New England

- Stakeholder process ongoing
- ISO plans to file the design basis document with FERC in December
- Market rule development to commence early next year
- Market rule filing planned for Summer of 2010

Conclusions Regarding the National Action Plan

- The ISO supports the objectives of the NAP as a means toward increasing demand participation in wholesale markets
- Increasing demand response capability in the region will depend upon an increase in dynamic retail pricing, which requires increased AMI and load control technology
- Paying more for load reductions or creating new programs doesn't necessarily translate into increased demand resource capability
- New infrastructure will enable new resources to participate, rather than simply having existing resources participate in new programs
- A States-based focus is appropriate because the States have primary jurisdiction over AMI/Smart Grid infrastructure and retail rate structures. Such activities should be coordinated with ongoing NAESB and NIST efforts
  - Early involvement of DOE resources to advance this effort would be helpful

Technical Appendix

Remaining Barriers to AMI*

- The AMI industry is still maturing
  - Standard functions in meters may still not include important capabilities
    - E.g., remote firmware upgrade, storage of metering data
  - Still needs greater integration with Home Area Networks (HAN)
- Lack of Interoperability standards
  - i.e., seamless data sharing, integrated functionality between digital systems and networks
- Including accurate estimates of demand response value in AMI cost-benefit calculations
- Fear of implementing technology that becomes obsolete too quickly

*Taken primarily from FERC's 2008 Assessment of Demand Response and Advanced Metering

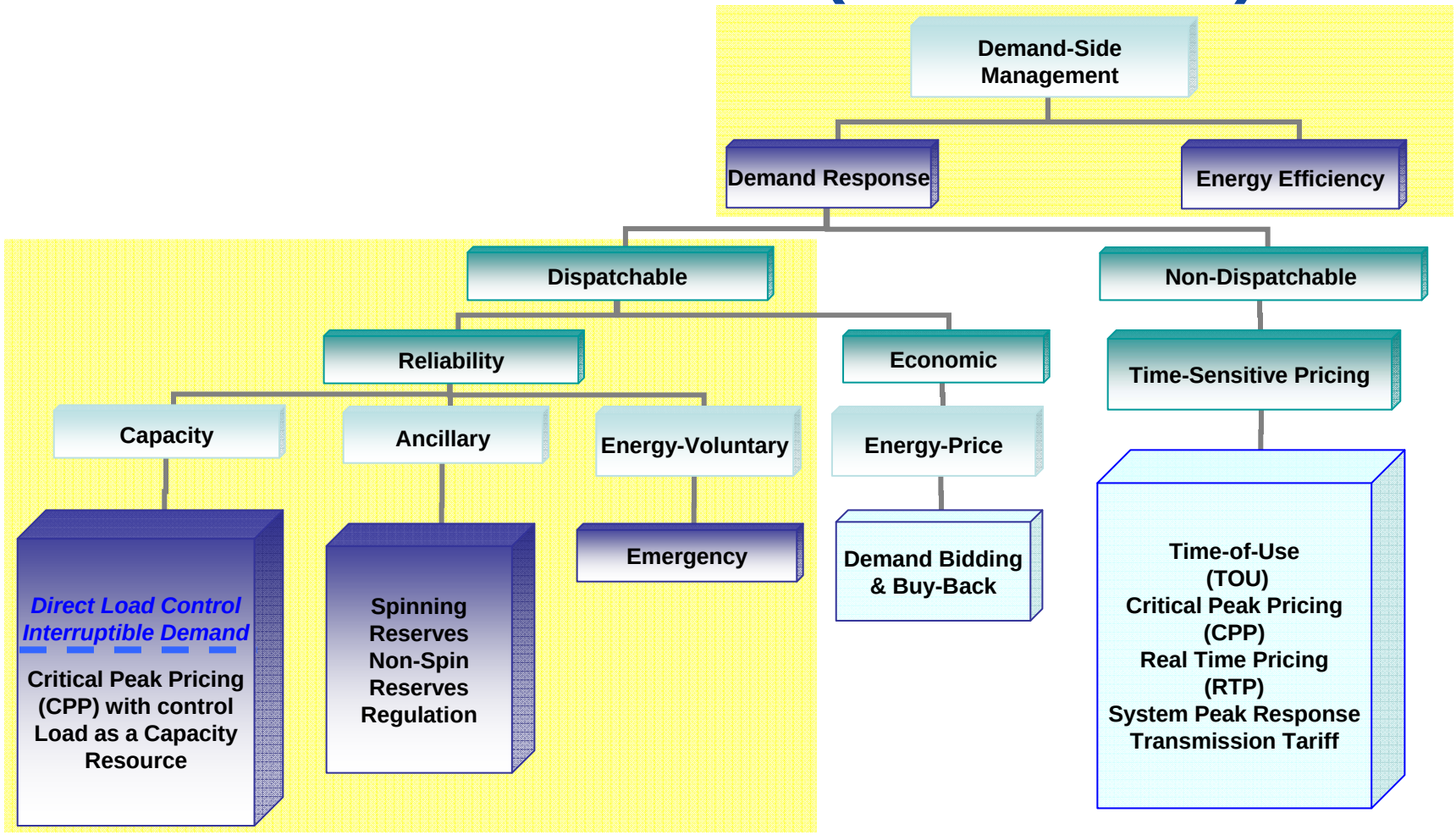
NAESB Business Practices for Measurement and Verification of Wholesale Electricity Demand Response

- April 11, 2007 – DSM/EE Subcommittee begins effort
- March 16, 2009 – NAESB Adopts Wholesale Demand Response Measurement and Verification Standards
- April 16 , 2009 – Begin effort for by DSM/EE Group 3 Phase II Wholesale Demand Response Additional Technical standards
- April 17, 2009 – NAESB files results of March 16, 2009 adoption of Wholesale Demand Response Measurement and Verification Standards, under Docket RM-05-017
- September 22, 2009 – FERC NOPR published in Federal Register

NAESB M&V Standards Framework

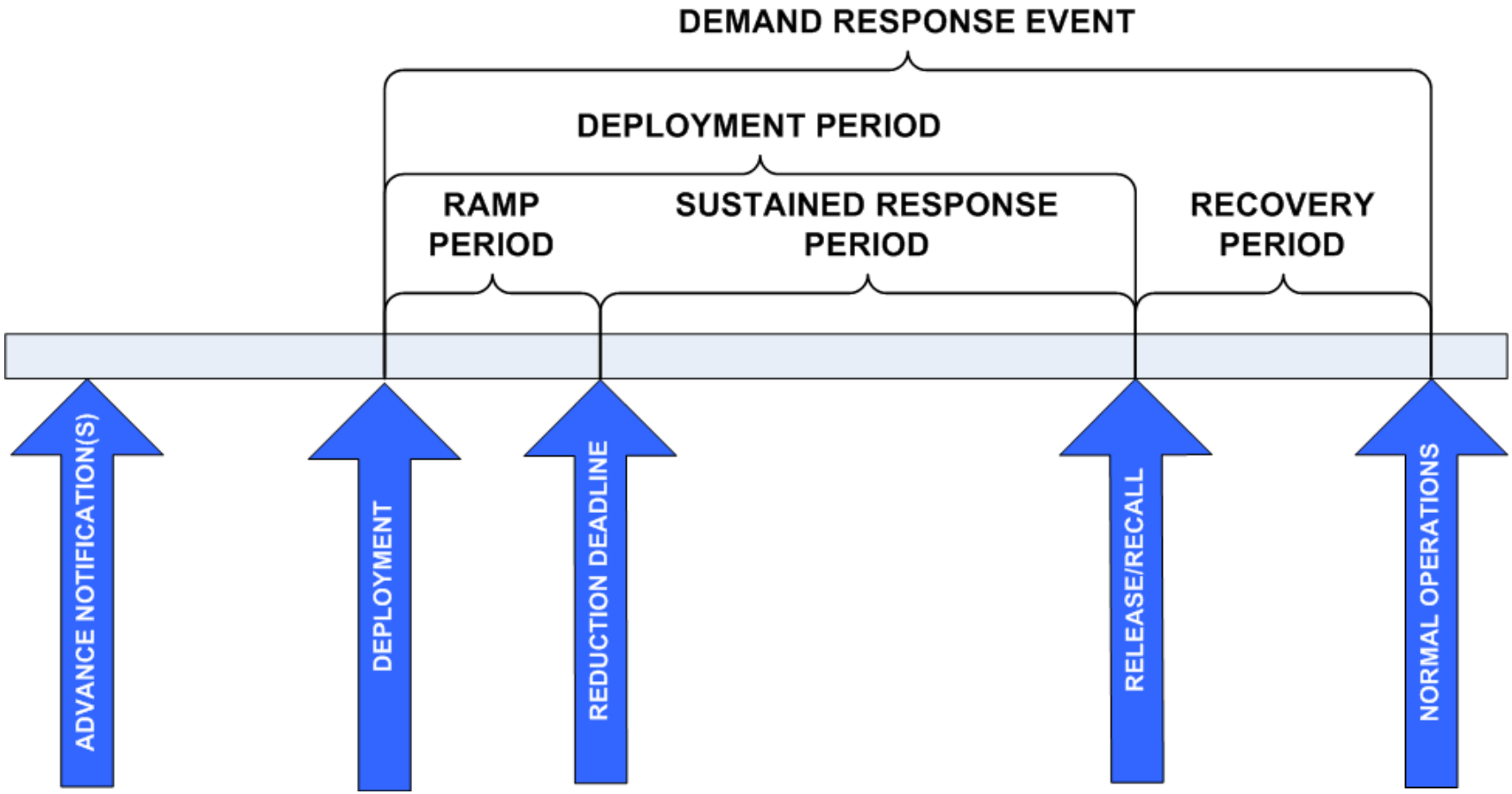
- Measurement and Verification (M&V) standards are intended to facilitate Demand Response in wholesale electricity markets by providing a common basis for the following
  - Transparency: accessible and understandable M&V requirements for Demand Response products
  - Accountability: criteria that will enable the System Operator to accurately measure performance of Demand Response resources
  - Consistency: standards applicable across wholesale electricity markets

Wholesale Demand Response Products and Services (NERC View)



NERC Areas of Interest

Demand Response Event Timing



DR Product Standards Overview

General

- Advance Notification
- Deployment Time
- Reduction Deadline
- Release/Recall
- Normal Operations
- Demand Resource Availability Measurement
- Aggregation
- Transparency of Requirements

Telemetry

- Telemetry Requirement
- Telemetry Accuracy
- Telemetry Reporting Interval
- Other Telemetry Measurements
- Communication Protocol
- Governor Control Equipment
- On-Site Generation Telemetry Requirement

After-the-Fact-Metering

- After-the-Fact Metering Requirement
- Meter Accuracy
- Details of Meter/Equipment Standards
- Meter Data Reporting Deadline
- Meter Data Reporting Interval
- Clock/Time Accuracy
- Validating, Editing & Estimating (VEE) Method
- On-Site Generation Meter Requirement

Performance Evaluation

- Rules for Performance Evaluation

Performance Evaluation Methodologies

A performance evaluation methodology is used to determine the Demand Reduction Value provided by a Demand Resource. The standards include descriptions of acceptable Baselines and alternative performance measurements.

- Maximum Base Load
- Meter Before / Meter After
- Baseline Type-I
- Baseline Type-II
- Metering Generator Output

Performance Evaluation Methodologies Standards Overview

Baseline Information	Event Information	Special Processing
• Baseline Window • Calculation Type • Sampling Precision and Accuracy • Exclusion Rules • Baseline Adjustments • Adjustment Window	• Use of Real-Time Telemetry • Use of After-the-Fact Metering • Performance Window • Measurement Type	• Highly-Variable Load Logic • On-Site Generation Requirements

Wholesale Demand Response
ISO/RTO Additional Technical Standards

- ISO/RTO completes North American Wholesale Electricity Demand Response Program Comparison a Matrix of Demand Response Characteristics April 2009
  - In support of FERC Order 719
  - In support of NAESB 2009 Work Plan item 5.a.
- 47 Products/Services
  - Details on 33 criteria for Product/Service Features including M&V standards
- 40 Performance Evaluation Methodologies
  - Details on 12 criteria for Performance Evaluation Methodologies
- Matrix available at ISO/RTO Council Web Site:

  www.iso-rto.org