Demand Resource Contracting in New England

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ISO new england

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Outline

- ISO New England
- Demand Response Programs During Transition Period
- Demand Response in FCM
  - Demand Resource Types
  - Participating in FCA
  - Dispatching Demand Resources in FCM
  - Demand Resources In FCA #1 and FCA #2

About ISO New England

- Private, not-for-profit corporation created in 1997 to oversee New England's deregulated electric power system and bulk power grid
  - Independent of companies doing business in the market
  - Regulated by the Federal Energy Regulatory Commission (FERC)
- Approximately 400 employees headquartered in Holyoke, MA

History – Industry Timeline

1965 Northeast Blackout shuts down power to 30 million

1971 New England Power Pool (NEPOOL) created to establish a central dispatch system and enhance system reliability. Utilities and municipals own generation, transmission and distribution lines

1997 ISO New England created to manage the regional bulk power system and new wholesale markets, and ensure access to transmission lines

1999 ISO New England begins managing restructured regional wholesale power markets (“Interim Markets”)

2003 ISO implements Standard Market Design with locational pricing

2005 ISO begins operation as Regional Transmission Organization

New England's Electric Power Grid

- 6.5 million customer meters
  - Population: 14 million
- 350+ generators
- 8,000+ miles of high voltage transmission lines
- 13 interconnections to three neighboring systems:
  - Maritimes, New York and Quebec
- 32,000 megawatts (MW) of installed generating capacity
- 300+ market participants
- Summer peaking system
  - Summer: 28,130 MW (8/2006)
  - Winter: 22,818 MW (1/2004)

What is Demand Response?

- Customers reducing their electricity consumption in response to either:
  - **high wholesale prices** or
  - **system reliability events**,
- Customers being **paid** for performance based on wholesale market prices.

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Why is Demand Response Important?

- **Reliability Benefits**
  - Resource available to help "keep the lights on" during extreme emergency conditions
  - 1 MW of Demand Response = 1 MW of Generation
- **Capacity Resources**
  - Rapid implementation and fast response
  - Can be used to satisfy a Capacity Obligation
- **Customer Benefits**
  - Improved load shape and capacity credits
  - Paid for performance

Real-Time Price Response

Who?	Individual or Group. Minimum 100 kW Reduction.
When?	Notified by ISO that wholesale prices are forecasted to exceed $0.10/kWh either the night before or morning of the event day.
How fast?	**Voluntary!** Customer decides when and for how long.
How much?	Greater of Real-Time Wholesale Price or Guaranteed Minimum of $0.10/kWh
How long?	Price response "window" open as early as 7AM and remains open until 6PM.
Metering?	**Hourly Meter** - Meter that records your usage every hour or Customized Monitoring and Verification plan

Real-Time Demand Response

Who?	Individual or Groups (Minimum 100 kW Reduction)
When?	Respond to ISO Control Room Request
How fast?	Within 30-Minutes or 2-Hours of ISO request.
How much?	**Energy Payment:** Greater of Real-Time Wholesale Price or Guaranteed Minimum \$0.50/kWh for 30-Minute Response and \$0.35/kWh for 2-Hour Response. **Capacity Payment:** Payment (\$/kW-Month) based on the Transition Payment Schedule
How long?	Minimum 2-Hour guaranteed interruption
Metering?	5-Minute Usage data sent to ISO NE via the Internet or Customized Monitoring and Verification plan

Day-Ahead Option

Who?	Option available to all Real-Time Price and Real-Time Demand Response participants starting June 1, 2005
When?	Customer submits a “bid” in the Day Ahead Market. Minimum bid established monthly. Maximum bid $1.00/kWh.
How fast?	If bid accepted, reduction is *scheduled* for the following day.
How much?	Paid the greater of Bid Price or Day-Ahead Clearing Price. Any load deviations (+/-) *purchased* from or *paid* at the Real-Time Price.
How long?	Based on customer’s accepted schedule
What else?	Reliability Participants Eligible for Installed Capacity (ICAP) credit
Metering?	Same as Real-Time Price and Real-Time Demand Programs

Demand Response Reserves Pilot

Who?	Up to 50 MW of smaller resources (< 5 MW) in the 30-Minute Real-Time Demand Response Program or Behind the Meter Generation
What?	Determine if demand response can provide a “functionally equivalent” operating reserves product
How often?	Dispatched approximately 20 times (each season)
How much?	Availability payment based on the Forward Reserve Clearing Price
How long?	Seasonal pilot program (Winter Period starts 10/1/09)
Metering?	5 minute real-time metering through IBCS OS May beta test new CFE connected RTU dispatch

Acronyms

- Commitment Period or Delivery Period
  - June 1 through May 31
- FCA – Forward Capacity Auction
  - Conducted approximately 3 years in advance of the delivery period
  - Declining clock auction
- FCA #1 – 1st FCA held in February 2008
  - Commitment Period: June 1, 2010 through May 31, 2011
- FCA #2 – 2nd FCA held in December 2008
  - Commitment Period: June 1, 2011 through May 31, 2012
- FCM – Forward Capacity Market
- ICR – Installed Capacity Requirement
  - Total amount of capacity purchased in FCA

Forward Capacity Market (FCM) – Objectives

- Procure enough capacity to meet New England’s forecasted demand and reserve requirements three years in the future
- Provide a long-term (up to 5 year) commitment to resources to encourage investment
- Select a portfolio of Supply and Demand Resources through a competitive ***Forward Capacity Auction (FCA)*** process that uses a reverse clock auction
- The selected resources are paid the market-clearing price

Eligible Resources

- Supply Resources
  - Traditional Generation (Oil, Coal, Natural Gas, etc.)
  - Intermittent Generation (Wind, Solar, etc.)
  - Renewable Generation
- Demand Resources
  - Energy Efficiency
  - Load Management
  - Distributed Generation

Forward Capacity Market

- Many different types of Demand Resources can participate in the FCM
  - Ranging from Distributed Generation installed at a single facility to large scale Energy Efficiency programs serving hundreds or thousands of retail customers
  - The Market Rules define Demand Resources ***by the way in which they reduce load***, not by technology

Demand Resources in FCM

- Measures that result in verifiable reductions in end-use consumption of electricity
- Passive Demand Resources (Passive DR)
  - Save energy (MWh) during peak hours
  - Are *not* dispatchable
  - Include On-Peak and Seasonal Peak
- Active Demand Resources (Active DR)
  - Are designed to reduce peak loads (MW)
  - Can reduce load based on real-time system conditions or ISO instructions
  - Include Real-Time Demand Response (RTDR) and Real-Time Emergency Generation (RTEG)

Demand Resources Under FCM

- Demand Resources
  - Continue to increase under the Forward Capacity Markets
  - Are competing with other Capacity Resources to maintain reliability on the bulk power system
- The current reliability programs expire under the Forward Capacity Market beginning with the June 1, 2010 delivery period

Demand Resource Types

1. On-Peak - Passive
2. Seasonal Peak - Passive
3. Real-Time Demand Response - Active
4. Real-Time Emergency Generation - Active

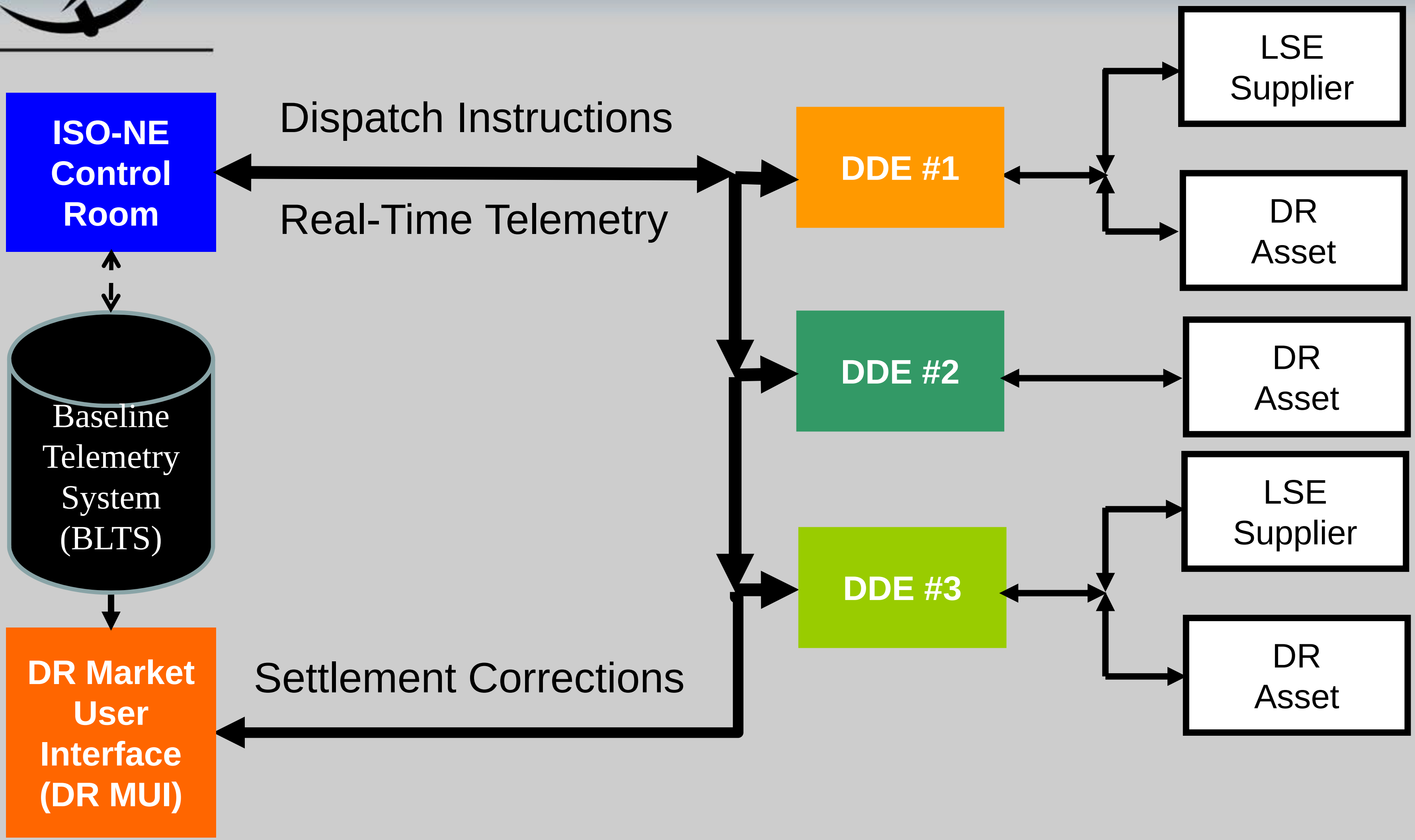
New Dispatch Rules

- The ISO will work with the Providers to establish Demand Designated Entities (DDEs) for dispatch just like generators
  - This will be the only entity that the ISO System Operators will deal with during an actual dispatch
- The ISO will dispatch DR Resources where and when needed and only in the amount needed
  - Avoids unnecessary activations of DR customers Assets
  - Limits customer fatigue
  - ISO forecasts "would have begun to allow the depletion of 30 Minute Reserves" the day before the Operating Day
  - ISO has "begun to allow the depletion of 30 Minute Reserves" during the Operating Day

What is the ISO Trying to Accomplish with OP #4 and Demand Response?

- Maintain Operating Reserves at a system-wide level to remain within established criteria to allow recovery from contingencies
- Maintain Transmission Constraints/Interface Limits to avoid instability, uncontrolled separation and cascading overloads both pre and post contingency
- On a normal day-in and day-out basis we do this with generation, transmission, and scheduled transactions with our neighbors

Dispatch and Meter Data Communication



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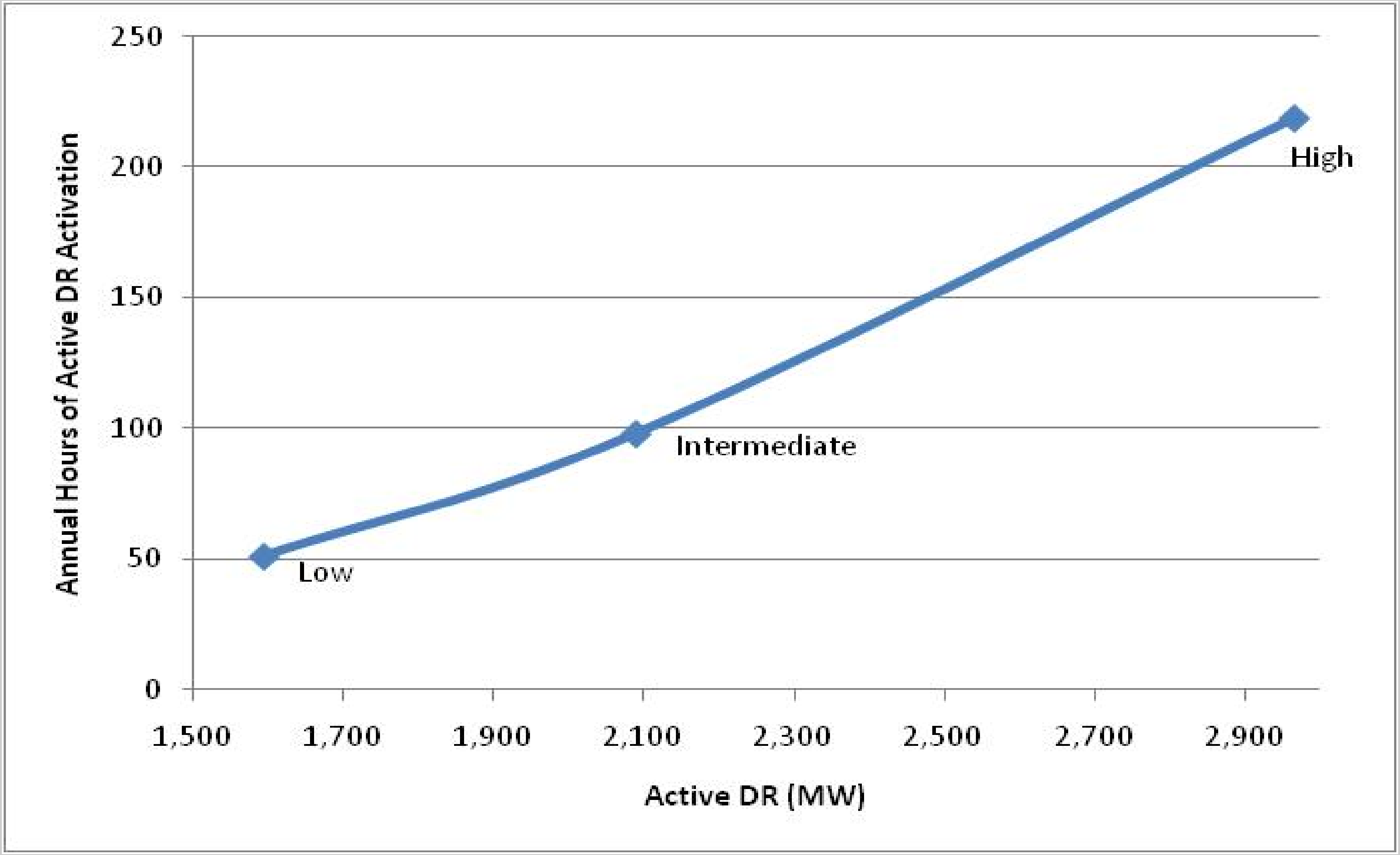
Real-Time Demand Response Resources

- The ISO will send Dispatch Instructions to DDE
- DDE will determine which Real-Time Demand Response Resources to interrupt
  - RTDR must curtail electrical usage within 30 minutes of receiving a Dispatch Instruction; and
  - Continue curtailing usage until receiving a Dispatch Instruction to restore electrical usage
- Designed for dispatchable measures with no binding air quality permitting restrictions on their use

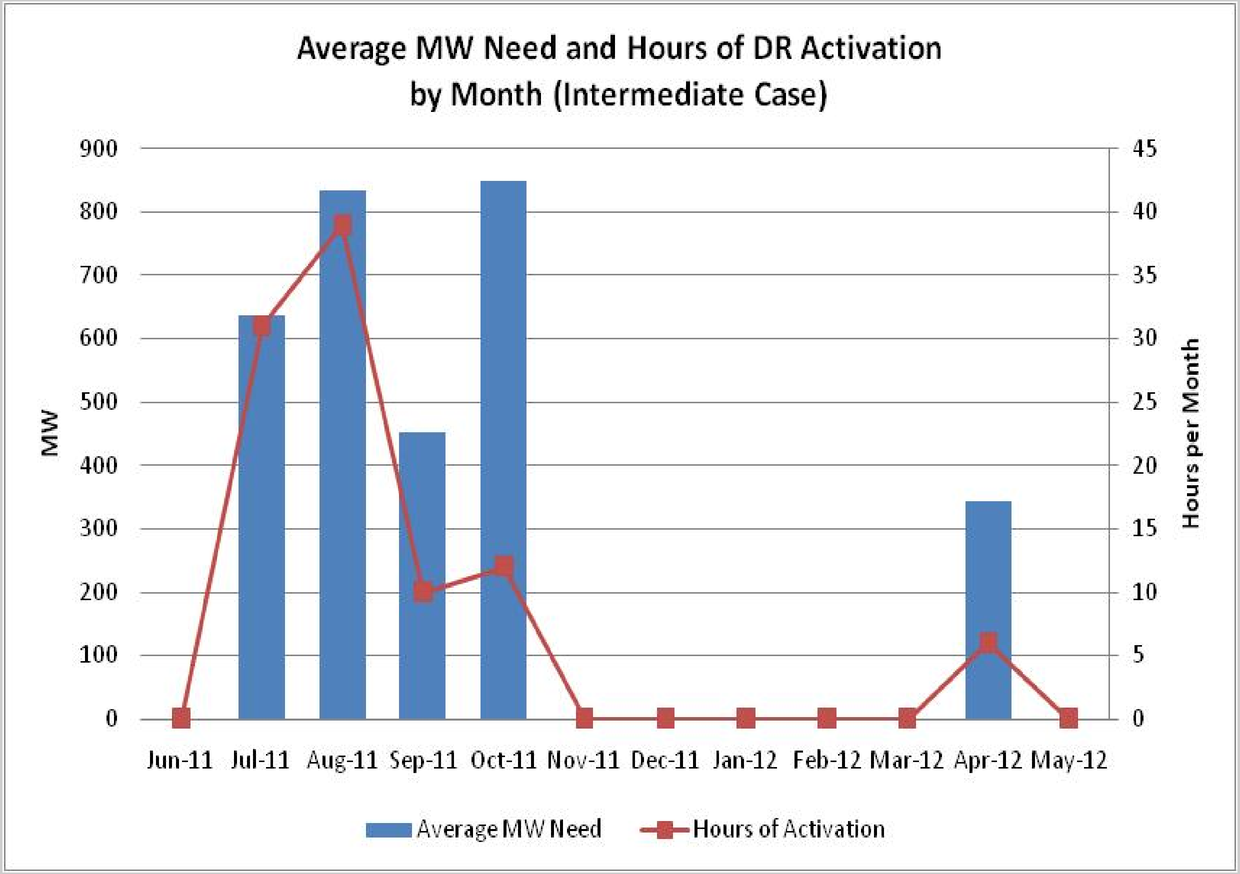
Operable Capacity Analysis – Observation #1

As the quantity of Active DR increases, the dispatch frequency increases

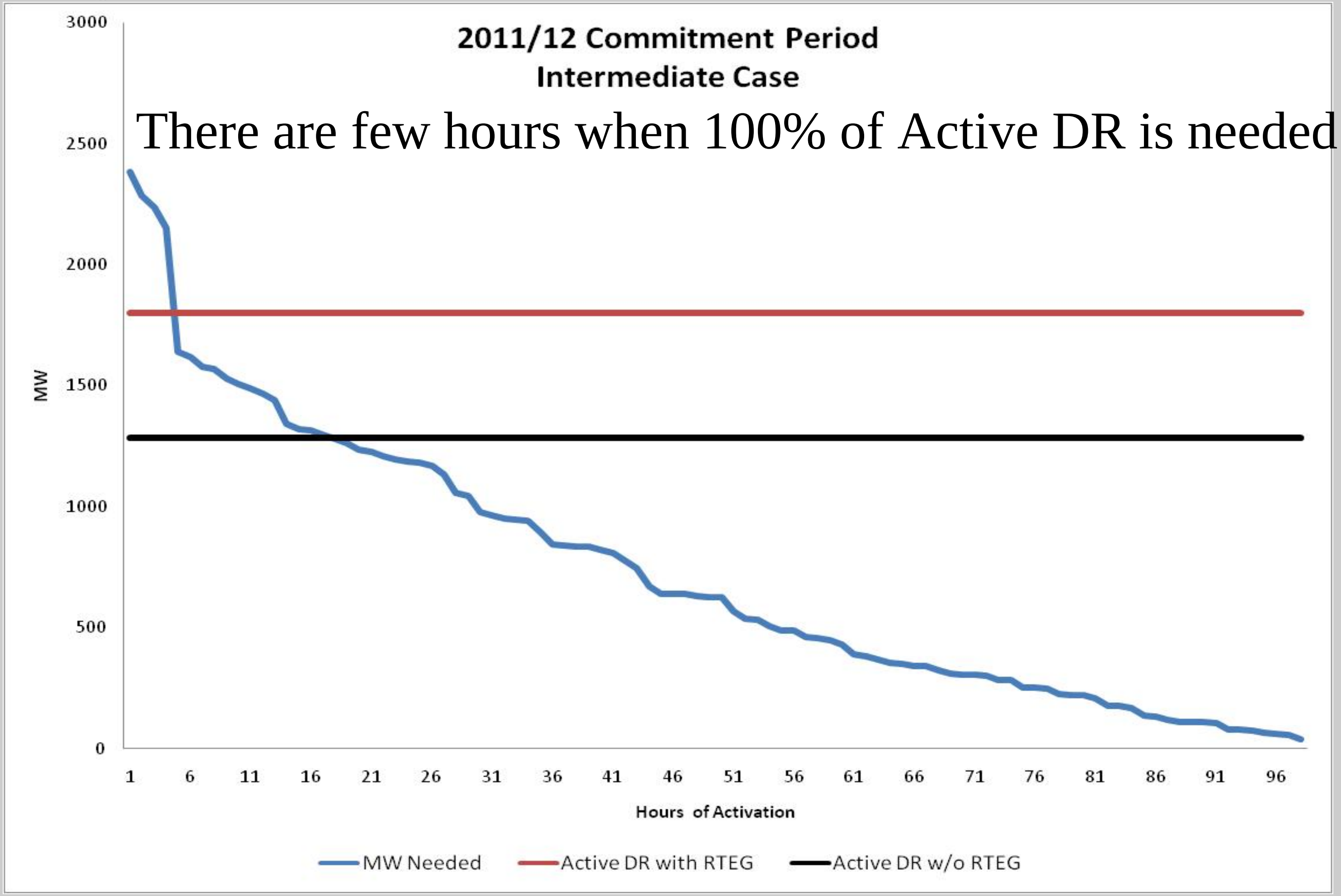


Operable Capacity Analysis – Observation #2

- Active DR will be needed during shoulder months
- Increasing amounts of DR displace generation
- DR needed when generators are unavailable



Operable Capacity Analysis – Observation #3



Operable Capacity Analysis – Observation #4

In Extreme Load Conditions, more Active DR will be called upon for more hours

Comparison of 50/50 and 90/10 Forecasts
August 2011 (Intermediate Case)

	50/50 Forecast	90/10 Forecast
# of Hours Load & Operating Reserve exceeds Available Generation	39	86
Corresponding # of Days in August	8	9
Maximum # of Consecutive Days in August	5	5
Average MW that Load and Operating Reserve exceeds Available Generation	835	2,843
Maximum MW that Load and Operating Reserve exceeds Available Generation	2,384	4,504

Participating in FCA

- Forward Capacity Auctions (FCAs) are held almost 3 years in advance of the delivery period
  - Presently the auctions are about 2.5 years in advance
  - Auctions are held about every 10 months until they are held about 3 years in advance
- The process to participate in a FCA has several step and specific deadlines
- Failure to meet one of the deadlines can result in a participant being disqualified for an FCA

Abbreviated Schedule for Demand Resources

FCA #	Show Of Interest	Existing Qualification	New Qualification Package	Qualification Determination Notification	Auction
1	2/28/2007	4/9/2007	6/15/2007	10/5/2007	2/4/2008
2	11/14/2007	2/29/2008	4/29/2008	8/1/2008	12/8/2008
3	9/16/2008	1/20/2009	2/17/2009	5/27/2009	10/5/2009

FCA #	FCM Delivery Period
1	6/2010 – 5/2011
2	6/2011 – 5/2012
3	6/2012 – 5/2013

Cleared Demand Resources (MW) versus Forecast Peak Load by Load Zone

FCA#1: 2010/11 Capacity Commitment Period

Load Zone	ON_PEAK	REAL_TIME	REAL_TIME_EG	SEASONAL_PEAK	Total	Percent DR	2010 Forecast Peak Load	Percent Peak Load
CT	83.6	288.0	342.1	134.0	847.6	33.2%	7,560	26.9%
Maine	26.1	210.5	36.6		273.2	10.7%	2,065	7.3%
NEMASSBOST	132.9	181.0	162.6	-	476.4	18.7%	5,660	20.1%
New Hampshire	43.8	30.5	44.2	-	118.5	4.6%	2,490	8.9%
Rhode Island	45.6	46.8	73.0	-	165.4	6.5%	1,870	6.6%
SEMASS	87.4	70.1	86.2	-	243.7	9.5%	3,670	13.0%
Vermont	57.7	23.6	20.3	-	101.6	4.0%	1,085	3.9%
WCMASS	77.1	128.5	109.8	11.7	327.1	12.8%	3,735	13.3%
Total	554.1	873.5	874.8	145.7	2553.6	**100.0%**	**28,135**	**100.0%**

FCA#2: 2011/12 Capacity Commitment Period

Load Zone	ON_PEAK	REAL_TIME	REAL_TIME_EG	SEASONAL_PEAK	Total	Percent DR	2011 Forecast Peak Load	Percent Peak Load
CT	122.1	285.6	268.8	247.8	951.9	32.4%	7,650	26.8%
Maine	26.5	190.4	31.6		293.9	10.0%	2,130	7.5%
NEMASSBOST	175.2	134.7	172.0		598.1	20.4%	5,730	20.0%
New Hampshire	57.4	34.8	13.2		106.0	3.6%	2,540	8.9%
Rhode Island	58.1	47.0	74.1	2.0	186.2	6.3%	1,900	6.6%
SEMASS	107.9	77.5	85.6	2.0	339.6	11.6%	3,720	13.0%
Vermont	68.9	26.0	7.8		102.7	3.5%	1,100	3.8%
WCMASS	92.5	118.9	105.5	17.5	358.3	12.2%	3,810	13.3%
Total	708.7	915.1	758.6	269.3	2936.6	**100.0%**	**28,580**	**100.0%**

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