MA Scarcity Pricing Proposal: 3rd Review

SPWG

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Monitoring Analytics

Shared Overall Goals

- **Incorporate operational requirements and practice in the dispatch models**
- **Send locational price signals consistent with system conditions**
- **Send price signals consistent with security constrained dispatch and operational decisions**
- **Improve system operation during times of system stress**

Shared Characteristics

- **Use of Operating Reserve Penalty Factor Curve to drive within hour dispatch and optimization**
  - **PJM proposing cumulative $850 penalty factors that adjust marginal bus LMP (max price $2,700) during reserve scarcity**
  - **MA proposes $1,000 penalty factors that drive dispatch, with defined LMP targets (max price $1,000) on marginal buses during reserve scarcity**
- **Emergency procedures (Voltage Reduction and Manual Load Dump) should not suppress price**

Issues for discussion

- **Operating Reserve Penalty Factor Curves**
  - **10 minutes reserve target(s)—Synchronized Reserve (S.R.) and/or Primary**
  - **Scarcity price targets ($1,000 vs. $2,700)**
  - **Location specific opportunity costs**
  - **Handling morning pickup/min gen events (duration element)**

Issues for discussion

- **Reserve measurement/Data Requirements**
  - **As part of final scarcity design need defined methodology for determining**
    - **Tier 1 S.R. available**
      - hour ahead
      - 5 minute basis
    - **Tier 2 S.R. available**
      - hour ahead
      - 5 minute basis
    - **Non Synchronized Reserve (part of Primary) available**
      - hour ahead
      - 5 minute basis
  - **Need resulting data prior to final design**

Issues for discussion

- **The RPM Revenue Offset**
  - **Marginal unit designation**
  - **Scarcity Component**

Issues for discussion

- **Structure of the Tier 2 Synchronized Reserve (S.R.) Market: Hour ahead scheduling vs. "full 5 minute optimization"**
  - **Cycling of assignment**
  - **Location specific opportunity costs**
  - **Participation of DR**
  - **Effects on generation participation and incentives**

- **The treatment of emergency measures vs. emergency resources**
  - **Emergency DR**
  - **Capacity Recalls**

Issues for discussion

- **Capacity recalls**
  - **As part of final scarcity design need written procedures on when and how to recall**
  - **As part of final scarcity design need documented methodology to determine the amount of recallable capacity**
  - **As part of final scarcity design need data based on methodology**

Issues for discussion

- **Definition of reserve regions**
  - **Match current?**
  - **Dominion vs. Mid Atlantic S.R.**

Concerns with PJM's Approach

- **Price Levels**
  - **Proposed price levels not necessary to attract resources or reliably operate the system**
  - **Scarcity price targets (up to $2700) inconsistent with DA vs. RT hedging and arbitrage**

- **System control**
  - **Largely eliminates hour ahead scheduling of Tier 2**
    - **Cycling within hour assignments**
    - **As proposed will reduce reserves and sources of reserves**
  - **Non-locational dispatch and price setting with emergency DR**

Concerns with PJM's Approach

- **Frequency of scarcity pricing events**
  - **Scarcity triggered during morning pick up?***
  - **False positives and resulting dispatch instructions***
  - **Treatment of emergency resources vs. actions**

***This is an issue that needs to be addressed under both proposals**

Proposed Scarcity Pricing Approach

- **Concept: Add in reserve constraints to the optimization model**
- **LMP is the incremental cost to serve incremental load at a location while controlling for *all* related constraints**
  - **Reserves are additional constraints to the optimization.**

- **LMP = Energy + Marginal Losses + Congestion + "Scarcity Adder"**
- **"Scarcity Adder" is an administrative contribution to marginal bus LMP(s) when short one or more reserve products**

Defining the Reserve Requirement "LMP Target"

- **The LMP "target" during scarcity:**
  - **Purpose is to signal scarcity and attract resources**
  - **Purpose is to attract resources not committed via the capacity market**
  - **Setting the resulting energy price too high may result in a wealth transfer, rather than meaningful increase in resources availability**
  - **Determines the opportunity cost for reserves during scarcity**

Option 1: Primary Reserve Target

- **Primary Reserve Requirement is 150% of largest contingency:**
  - **Primary Reserves (150% of largest contingency in PJM)**
    - Sync, Non-Sync, DR (as Tier 2) can contribute
  - **Sync Reserve Requirement (100% of first contingency)**
    - Sync (including DR as Tier 2) can contribute
    - Max DR Contribution to Sync = 25%

Option 1: Primary Reserve Target

- **Theoretically, primary reserves (150% Requirement) can be met via sync reserves (including DR)**
- **Where Primary = Sync + DR + Non Sync**
  - **A minimum amount of Sync (Tier 1 and Tier 2) required (100% of largest contingency)**
  - **Current restriction on max DR contribution towards Sync target (100% Requirement) is 25% (can only be Tier 2)**
  - **Remainder of Primary Reserve target met via Non-sync quick start and excess Tier 1**

Option 1: “LMP Target”

- **One Target (component targets): primary reserves**

- **“LMP Target” if system runs short of reserves:**
  - **LMP at the marginal unit buses gets set equal to $1,000.**
  - **Resulting opportunity costs determined relative to LMP**
  - **Max opportunity price for reserves = $1,000**

Option 2: Primary Reserve and Sync Reserve

- **Two targets:**
  - **Primary Reserve Requirement is 150% of largest contingency:**
    - **Primary Reserves (150% of largest contingency in PJM)**
      - Sync, Non-Sync, DR (as Tier 2) can contribute
  - **Sync Reserve Requirement (100% of largest contingency)**
      - Sync (including DR as Tier 2) can contribute
      - Max DR Contribution to Sync = 25%

Option 2: “LMP Target(s)”

- **Two targets: Primary and Sync**
  - **Primary**
    - **“LMP Target”: LMP target, higher of Marginal Unit or $700 at marginal buses**
      - Resulting opportunity costs determined relative to LMP
      - Max opportunity price for Primary Reserves = $700
  - **Sync**
    - **“LMP Target”: LMP at the marginal unit buses gets set equal to $1,000.**
      - Resulting opportunity costs determined relative to LMP
      - Max Opportunity price for Sync Reserves = $1,000

“LMP Target” vs. “Penalty Factor”

Gen	MC	Max Gen	Max Reserves
A	$20	400	50
B	$60	400	50
C	Q+$100	400	50

Reserve Requirement = 100 MW

MA: LMP goes to $1000 when scarce, Max Price for Reserves = $1000

PJM: Penalty Factor = $850

MA: “LMP Target”

	"Market Prices" (Non RPM resouces price)							Dispatch					
Total Load/Energy	System Reserve	Energy Price (LMP)	Reserve Price	"Scarcity Adder"	MU	"Scarcity Adder"	MU	Energy A	Reserves A	Energy B	Reserves B	Energy C	Reserves C
400	100	$ 20	$ -		A		A	400	0	0	50	0	50
500	100	$ 60	$ -		B		B	400	0	100	50	0	50
700	100	$ 60	$ -		B		B	400	0	300	50	0	50
750	100	$ 60	$ -		B		B	400	0	350	50	0	50
800	100	$ 150	$ 90		C		C	400	0	350	50	50	50
850	100	$ 200	$ 140		C		C	400	0	350	50	100	50
900	100	$ 250	$ 190		C		C	400	0	350	50	150	50
950	100	$ 300	$ 240		C		C	400	0	350	50	200	50
1000	100	$ 350	$ 290		C		C	400	0	350	50	250	50
1050	100	$ 400	$ 340		C		C	400	0	350	50	300	50
1100	100	$ 450	$ 390		C		C	400	0	350	50	350	50
1110	90	$ 1,000	$ 940	$ 940	B	$ 550	C	400	0	360	40	350	50
1140	60	$ 1,000	$ 940	$ 940	B	$ 550	C	400	0	390	10	350	50
1170	30	$ 1,000	$ 530	$ 530	C	$ 530	C	400	0	400	0	370	30

PJM: “Penalty Factor”

	"Market Prices" (Non RPM resouces price)							Dispatch					
Energy	System Reserve	Energy Price (LMP)	Reserve Price	"Scarcity Adder"	MU	"Scarcity Adder"	MU	Energy A	Reserves A	Energy B	Reserves B	Energy C	Reserves C
400	100	$ 20	$ -		A		A	400	0	0	50	0	50
500	100	$ 60	$ -		B		B	400	0	100	50	0	50
700	100	$ 60	$ -		B		B	400	0	300	50	0	50
750	100	$ 60	$ -		B		B	400	0	350	50	0	50
800	100	$ 150	$ 90		C		C	400	0	350	50	50	50
850	100	$ 200	$ 140		C		C	400	0	350	50	100	50
900	100	$ 250	$ 190		C		C	400	0	350	50	150	50
950	100	$ 300	$ 240		C		C	400	0	350	50	200	50
1000	100	$ 350	$ 290		C		C	400	0	350	50	250	50
1050	100	$ 400	$ 340		C		C	400	0	350	50	300	50
1100	100	$ 450	$ 390		C		C	400	0	350	50	350	50
1110	90	$ 910	$ 850	$850	B	$460	C	400	0	360	40	350	50
1140	60	$ 910	$ 850	$850	B	$460	C	400	0	390	10	350	50
1170	30	$ 1,320	$ 850	$850	C	$850	C	400	0	400	0	370	30

LMP Target vs. Penalty Factor

- **Using the same reserve targets, the unit specific operational dispatch signals are identical**
  - **Using different targets will cause different potential outcomes**
- **Regardless of targets, both mechanisms would move PJM from manual within hour dispatch for reserves to automated within dispatch for reserves**
- ***Both* represent a *change* from current operations and to what will be considered to be "optimal" dispatch**

MA: “LMP Target”

Non-RPM Resource	
RPM C Effective LMP	RPM C Effective Reserve Price
$ 20	$ -
$ 60	$ -
$ 60	$ -
$ 60	$ -
$ 150	$ 90
$ 200	$ 140
$ 250	$ 190
$ 300	$ 240
$ 350	$ 290
$ 400	$ 340
$ 450	$ 350
$ 1,000	$ 940
$ 1,000	$ 940
$ 1,000	$ 530

PJM: “Penalty Factor”

Non-RPM Resource	
RPM C Effective LMP	RPM C Effective Reserve Price
$ 20	$ -
$ 60	$ -
$ 60	$ -
$ 60	$ -
$ 150	$ 90
$ 200	$ 140
$ 250	$ 190
$ 300	$ 240
$ 350	$ 290
$ 400	$ 340
$ 450	$ 350
$ 910	$ 850
$ 910	$ 850
$ 1,320	$ 850

Pricing Under Scarcity: $2,700 vs. $1,000

- **No evidence that the scarcity signal in the energy market need exceed $1,000 in order to maintain reliability**
- **Resources have responded below $1,000 in the past**
- **Last and “only” scarcity event reached $1,000 due to administrative process, not by the value of the most expensive *marginal* resource**

Pricing Under Scarcity: $2,700 vs. $1,000

- **Capping the market at $1,000**
  - **Makes it possible to arbitrage between DA and RT**
  - **Not possible at $2,700.**

- **Capping the market at $1,000**
  - **Allows participants to better manage risks in DA market**
  - **Price risk considerably higher at $2,700**
    - **Missed load prediction**
    - **Tripped unit**

Pricing Under Scarcity: $2,700 vs. $1,000

- **Capping the market at $1,000**
  - **Would set LMP consistently with current resource offer caps**
  - **Would ensure full resource stack is dispatched**

Issues for discussion

- **Structure of the Tier 2 Market: Hour ahead scheduling vs. “full 5 minute optimization”**
  - **Cycling of unit assignments**
  - **Location specific opportunity costs**
  - **Participation of DR**
  - **Effects on generation participation and incentives**

Concerns with PJM's Approach

- System control issues with PJM's proposal
  - PJM proposes to largely eliminate hour ahead scheduling of Tier 2 Synchronized Reserve (S.R.)
  - PJM proposal, as presented, will reduce reserves and sources of reserves
    - Cycling within hour assignments
    - Participation of DR
    - Affects on generation participation and incentives
  - May affect frequency of events

Sync Reserve Optimization: PJM Proposal

- **PJM proposes to effectively eliminate hour ahead Tier 2 S.R. Market**
  - **Hour ahead assignment based on unit limitations (need to start, etc) on within hour assignment**
- **PJM's objective is to maximize the resources being optimized within the 5 minute dispatch**
- **PJM argues 5 minute optimization will improve overall efficiency and improve transparency of system conditions**

Sync Reserve Optimization: PJM proposal

- **Efficiency and Reliability improvement via "full" 5 minute optimization depends on a number of unproven assumptions:**
  - **PJM assumes there are issues w/ current method**
  - **Resources will be capable of changing status between reserves and energy on a 5 minute basis**
  - **Resources will be willing to follow dispatch on a 5 minute basis**
  - **"Cycling" of assignment for a 10 minute product makes sense on a 5 minute basis**
  - **PJM presumes *required* "cycling" will not occur**
  - **There will be the same amount of reserve capacity available under 5 minute optimization as under hour ahead scheduling mechanism**

Synchronized Reserve Optimization: MA concerns with PJM proposal

- **Concerns about "full" 5 minute optimization (and elimination of hour ahead Tier 2 S.R. market):**
  - **No reason to believe 5 minute "cycling" of Tier 2 S.R. assignments will not occur (constraints and multiple marginal units)**
    - **Could reduce available S.R. reserves "offers"**
    - **How does DR track S.R. status?**
    - **Preventing cycling cannot be consistent with 5 minute optimization**
      - Restricting cycling will reduce "optimization"
      - Taking assignments as given from interval to interval

Synchronized Reserve Optimization: MA concerns with PJM proposal

- **Concerns about "full" 5 minute optimization (and elimination of hour ahead tier 2 market):**
  - **Fewer reserves could be made available if hour ahead scheduling is lost:**
    - **DR may need hour ahead notification to participate**
      - Significant source of Tier 2 S.R. under current structure
    - **Generation may have less reserves available on "5 minute" basis**
      - 10 minute ramp vs. 5 minute assignment
      - May have more available from predetermined set points (from hour ahead assignment)
      - Incentives under hourly integrated prices
      - Questionable transparency improvement with hourly integrated prices

Cycling within hour assignments

Area A Generation			
Gen	MC	Max Gen	Reserves
B	$60	850	50
C	Q + $100	400	50
Area B Generation			
Gen	MC	Max Gen	Reserves
D	$600	100	50

Reserve Requirement = 100 MW

Cycling within hour assignment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
											Energy area A								Energy Area B					Unit D		
Row	Total Greater System Demand	Greater System Demand (Area A)	Transmission from A to B	Local Demand for area B	Net Demand for area B	Reserves	Area A LMP	Reserve Area Price	MU Area A	MU Area B	B Energy	B Reserves	MC	"Local" Opportunity Cost	C Energy	C Reserves	MC	"Local" Opportunity Cost	Area B LMP	D Energy	D Reserves	MC	"Local" Opportunity Cost	Margin on energy	Margin on Reserves	Row
1	450	400	50	50	0	150	$ 60	0	B	B	450	50	$ 60		0	50	$ -		$ 60	0	50	$ -				1
2	550	500	50	50	0	150	$ 60	0	B	B	550	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				2
3	750	700	50	50	0	150	$ 60	0	B	B	750	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				3
4	800	750	50	50	0	150	$ 60	0	B	B	800	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				4
5	850	800	50	50	0	100	$ 60	0	B	B	850	0	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				5
6	950	850	50	100	50	100	$ 150	$ 90	C	D	850	0	$ 60	$ 90	50	50	$150.00	$ -	$ 600	50	50	$ 600	$-	$ -		6
7	1020	900	50	120	70	100	$ 220	$ 160	C	D	830	20	$ 60	$ 160	120	50	$220.00	$ -	$ 600	70	30	$ 600	$-	$ -		7
8	1080	950	50	130	80	100	$ 250	$ 190	C	D	820	30	$ 60	$ 190	150	50	$250.00	$ -	$ 600	80	20	$ 600	$-	$ -		8
9	1130	1000	50	130	80	100	$ 330	$ 270	C	D	820	30	$ 60	$ 270	230	50	$330.00	$ -	$ 600	80	20	$ 600	$-	$ -		9
10	1190	1050	50	140	90	100	$ 390	$ 330	C	D	810	40	$ 60	$ 330	290	50	$390.00	$ -	$ 600	90	10	$ 600	$-	$ -		10
11	1240	1100	50	140	90	100	$ 440	$ 380	C	D	810	40	$ 60	$ 380	340	50	$440.00	$ -	$ 600	90	10	$ 600	$-	$ -		11
12	1250	1110	50	140	90	100	$ 450	$ 390	C	D	810	40	$ 60	$ 390	350	50	$450.00	$ -	$ 600	90	10	$ 600	$-	$ -		12
13	1270	1130	50	140	90	80	$ 910	$ 850	B	D	830	20	$ 60	$ 850	350	50	$450.00	$ 460.00	$1,450	90	10	$ 600	$850	$ 850	$ 850	13
14	1290	1150	50	140	90	60	$ 910	$ 850	B	D	850	0	$ 60	$ 850	350	50	$450.00	$ 460.00	$1,450	90	10	$ 600	$850	$ 850	$ 850	14
15	1320	1180	50	140	90	30	$1,330	$ 850	C	D	850	0	$ 60	$1,270	380	20	$480.00	$ 850.00	$1,450	90	10	$ 600	$850	$ 850	$ 850	15

Cycling within hour assignment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
											Energy area A								Energy Area B					Unit D		
Row	Total Greater System Demand	Greater System Demand (Area A)	Transmission from A to B	Local Demand for area B	Net Demand for area B	Reserves	Area A LMP	Reserve Area Price	MU Area A	MU Area B	B Energy	B Reserves	MC	"Local" Opportunity Cost	C Energy	C Reserves	MC	"Local" Opportunity Cost	Area B LMP	D Energy	D Reserves	MC	"Local" Opportunity Cost	Margin on energy	Margin on Reserves	Row
1	450	400	50	50	0	150	$ 60	0	B	B	450	50	$ 60		0	50	$ -		$ 60	0	50	$ -				1
2	550	500	50	50	0	150	$ 60	0	B	B	550	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				2
3	750	700	50	50	0	150	$ 60	0	B	B	750	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				3
4	800	750	50	50	0	150	$ 60	0	B	B	800	50	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				4
5	850	800	50	50	0	100	$ 60	0	B	B	850	0	$ 60	$ -	0	50	$ -		$ 60	0	50	$ -				5
6	950	850	50	100	50	100	$ 150	$ 90	C	D	850	0	$ 60	$ 90	50	50	$150.00	$ -	$ 600	50	50	$ 600	$-	$ -	$ -	6
7	1020	900	50	120	70	100	$ 220	$ 160	C	D	830	20	$ 60	$ 160	120	50	$220.00	$ -	$ 600	70	30	$ 600	$-	$ -	$ -	7
8	1080	950	50	130	80	100	$ 250	$ 190	C	D	820	30	$ 60	$ 190	150	50	$250.00	$ -	$ 600	80	20	$ 600	$-	$ -	$ -	8
9	1130	1000	50	130	80	100	$ 330	$ 270	C	D	820	30	$ 60	$ 270	230	50	$330.00	$ -	$ 600	80	20	$ 600	$-	$ -	$ -	9
10	1190	1050	50	140	90	100	$ 390	$ 330	C	D	810	40	$ 60	$ 330	290	50	$390.00	$ -	$ 600	90	10	$ 600	$-	$ -	$ -	10
11	1240	1100	50	140	90	100	$ 440	$ 380	C	D	810	40	$ 60	$ 380	340	50	$440.00	$ -	$ 600	90	10	$ 600	$-	$ -	$ -	11
12	1250	1110	50	140	90	100	$ 450	$ 390	C	D	810	40	$ 60	$ 390	350	50	$450.00	$ -	$ 600	90	10	$ 600	$-	$ -	$ -	12
13	1270	1130	50	140	90	80	$1,000	$ 940	B	D	830	20	$ 60	$ 940	350	50	$450.00	$ 550.00	$ 1,000	90	10	$ 600	$400	$ 400	$ 400	13
14	1290	1150	50	140	90	60	$1,000	$ 550	B	D	850	0	$ 60	$ 940	350	50	$450.00	$ 550.00	$ 1,000	90	10	$ 600	$400	$ 400	$ 400	14
15	1320	1180	50	140	90	30	$1,000	$ 520	C	D	850	0	$ 60	$ 940	380	20	$480.00	$ 520.00	$ 1,000	90	10	$ 600	$400	$ 400	$ 400	15

MA S.R. Proposal: Enhance Current Market Structure

- **MA proposes that PJM keep hour ahead Tier 2 Sync Market, market definitions and associated assignments**
  - **Tier 2 S.R. hour ahead assignments should be based on expectations of next hour system conditions and prices**
  - **Hour ahead Tier 2 S.R. assignments should continue to be taken as a "given" going into within hour optimization**
  - **As today, within hour adjustments (additions) to Tier 2 S.R. made in real time**
    - **Enhance within hour adjustments (additions) via use of reserves modeled as a constraint**

MA Synchronized Reserve Proposal: Advantages

- Consistent with current market structures
  - "Known" methodology and still improves within hour dispatch
  - Better at dealing with resource limitations that may otherwise limit reserve availability
  - More consistent with reserve requirements (90 minutes to rebuild)
- Will avoid issues of 5 minute "cycling"
  - Should provide for and encourage availability of more reserve resources
    - Allows continued participation by less flexible units
    - Allows continued participation by DR
  - May allow a means to properly recognize scarcity and avoid false positives (morning ramp)

Single opportunity cost for reserves?

- **Within hour reserves need to be valued, but not a "market"**
- **Within hour reserves is a "residual" product priced relative the actual market: Energy**
- **Cannot define the cost of reserves without referencing the energy price**
  - **Reserve cost is the opportunity cost of producing reserves instead of energy**
  - **Opportunity cost is bus dependent**
  - **Full transparency from LMP at the bus**

Single opportunity cost for reserves?

- **Using a single reserve cost within the hour can provide perverse incentives where LMP varies within the reserve area**
  - **Multiple marginal units**
  - **Multiple opportunity costs under price separation**
  - **Location specific determination of opportunity cost needed to maintain system control**

Frequency Issue: Morning Pickup and Scarcity

- There needs to be a way for the mechanism(s) to differentiate between the morning pickup situation and a scarcity event.
  - Supply stack is not “exhausted”
- Objective should be to develop a tool that internalizes the decision making process used by operations
- Morning pick up is normal. Not an emergency event.
- Repeated morning pick “emergencies” would indicate faulty mechanism and/or scheduling problem

Frequency Issue: Morning Pickup and Scarcity

- During the morning pickup
  - Reserves are used
  - But temporary situation
    - So long as reserves can be restored in 90 minutes
  - No emergency actions are taken or required.

Morning Pickup and Scarcity

- Mechanism needs to differentiate between a reserve draw down when it is not an issue and when it is an issue
- Operations knows that generation is on the way
  - Experience and DA schedules
  - Not an emergency
- Should look at ways to incorporate DA scheduling information to differentiate scarcity from non scarcity events
  - Look ahead capability

Accounting for Emergency Procedures

- **Goals in accounting for emergency procedures:**
  - **Recognize that emergency *procedures* will impact reserve position and without intervention may cause prices to fall inappropriately**
- **Approach should offset MW provided by administrative emergency procedures not priced in the PJM market:**
  - **Manual load dump**
  - **Voltage reduction**

Accounting for Emergency Resources

- **Goals in accounting for emergency resources:**
  - **Recognize that emergency *resources*, such as max emergency and emergency DR, are economic resources.**
- **During stated emergencies, approach would not offset qualifying MW provided by emergency resource MW priced in the PJM markets:**
  - **Emergency DR**
  - **Maximum emergency MW**
  - **Capacity recalls**
  - **Emergency purchases**

Accounting for Emergency Resources

- **Capacity recalls**
  - **Part of the definition of a capacity resource**
  - **As part of final scarcity design need written procedures on when and how to recall**
  - **As part of final scarcity design need documented methodology to determine the amount of recallable capacity**
  - **As part of final scarcity design need data based on methodology**

Accounting for Emergency Resources

- **Include emergency resource MW as energy:**
  - **Will help eliminate gaming opportunities created by allowing changing MW classifications (economic/emergency) during times of scarcity to affect market prices**
  - **Will properly recognize available qualifying market resources that are available for dispatch or have been deployed**
  - **Will avoid measurement error of calculating offsets for deployed (economic/emergency) resources**
  - **Will allow the optimization software to recognize and appropriately price changes in system conditions**

Issue: Dispatch of Emergency Demand Response Resources

- **Locational Dispatch of Emergency Demand Response (DR)**
  - **Identified issues:**
    - **Emergency DR Resources are deployed in bulk**
    - **1 hour and 2 hour notification times**
    - **Inadequate metering (data regarding the amount of DR available vs. already deployed)**
    - **Unknown location of the resource.**
      - Zone vs. Reserve Area?
      - Constrained side of a constraint?
  - **Need other options to call emergency DR in a more refined way to better maintain operational control**

PJM Proposal: Dispatch of Emergency Demand Response Resources

- **PJM proposals to date have focused on identifying resources by zone**
  - **Calling by price first**
  - **By groups of MW (% or totals)**
  - **Trying to find a way to have emergency DR set price**
  - **Working on ways to get better “real time” data**

MA Comments: Dispatch of Emergency Demand Response Resources

- **To improve reliability, the goal should be to improve the ability to dispatch resources on a locational basis**
  - **Metering (data regarding the amount of DR available vs. already deployed)**
  - **Need hourly data validation of dispatched/available MW**

MA Comments: Dispatch of Emergency Demand Response Resources

- **Absent telemetry and location, DR should not be able to set price**
- **Absent telemetry and location, allowing DR to set price will cause control issues under scarcity**
  - **Not consistent with locational pricing**
  - **Pricing not consistent with dispatch**
  - **Any change should be consistent with application to DR in all hours**
  - **Would need to develop mitigation rules for DR in energy market**

Marginal Unit Designation Issues

- **At issue:**
  - **High priced, inflexible units (or units that are ramp constrained during times of reserve constraint violation) have been dispatched and are needed**
  - **Inflexibility negates marginal status and confers it on lower cost flexible resources**

Marginal Unit Designation Issues

- **Use the logic that allows inflexible, but needed CTs to be marginal**
  - **Apply to all needed, inflexible otherwise marginal units**
  - **Logic needs to be applicable during scarcity event**