SCR and EDRP: How to Better Manage Load Reduction Resources in Real-Time

Presented by:

Neenan Associates

And

LECG

Current PRL Program Provisions

1. Emergency Demand Response Program (EDRP)
   - Voluntary load reduction
   - Minimum 2 Hours notice
   - Guaranteed Minimum Payment level
   - Minimum 4 Hour payment window
2. Special Case Resource (SCR) Program
   - Mandatory load reduction
   - 24 Hour Advisory notice/2 Hour Dispatch notice
   - Up-front Capacity Payment & Energy Payment (EDRP Participants only)
   - Minimum 4 Hour payment window

Growth of Programs from 2001 to 2002

Superzone	EDRP Participant Cnt 2001	EDRP Participant Cnt 2002	EDRP Subscribed MWs 2001	EDRP Subscribed MWs 2002	SCR Participant Cnt 2001	SCR Participant Cnt 2002	SCR Subscribed MWs 2001	SCR Subscribed MWs 2002
Western NY	115	265	462	866	41	98	N/A	457
Capital	28	43	97	91	1	12	N/A	87
Hudson River	45	54	38	46	6	14	N/A	11
NYC	68	99	83	146	13	42	N/A	63
Long Island	38	925	25	181	11	39	N/A	19
Total	**294**	**1386**	**705**	**1330**	**72**	**205**	**N/A**	**637**
Joint EDRP/ICAP	***11***	***156***	***11***	***500***	***11***	***156***	***N/A***	***565***

Western NY = Zones A, B, C, D, and E

Capital = Zone F

Hudson River = Zones G, H, and I

NYC = Zone J

Long Island = Zone K

Issues with Current Programs

1. Limitations on Dispatch
   - SCR and EDRP always called jointly
   - Explicit provision for partial dispatch is at the zonal level
2. Payments
   - SCR participants receive an up-front payment
   - EDRP participants receive an energy payment
   - Joint SCR and EDRP participants receive both a capacity payment and an energy payment
3. Price Setting
   - Real-Time LBMP may be depressed if too many SCR and EDRP resources are dispatched
   - SCR and EDRP resources can not now set LBMP

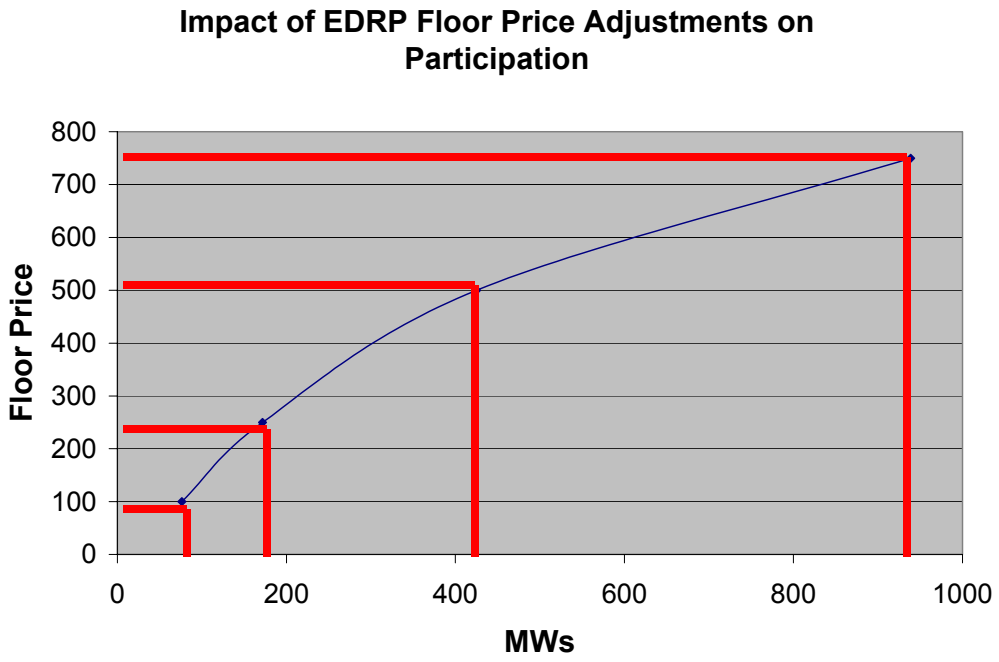
Proposed Alternative Program Designs to Address Issues

1. Payments
   - Lower minimum payment guarantee (e.g. $250/MW)
2. Dispatch
   - Pro-rated (based on subscription)
   - Round-robin
   - Bid-based (lowest to highest)
   - Notice period (shortest to longest)
3. Price Setting
   - Use Hybrid Pricing methodology so EDRP and/or SCR resources can set price when these resources are needed

Proposed Alternative Payment Methodology

Reduce minimum energy payment level to $250/MW

- Based on Stated Choice analysis in 2001 PRL Evaluation, the number of participants in EDRP is reduced as minimum energy payment level decreases
- If minimum energy payment level is increased, participation rates increase
- These rates of change in participation are **not** proportional to the change in the payment level



Proposed Alternative Dispatch Protocols

1. Pro-rated
   - All participants are requested to curtail an identical proportion of their subscribed load reduction capability
   - Payment is only provided for this number of MWs

   Problem: Indivisibility of some curtailment actions
2. Round-robin
   - First dispatch randomly draws from participant population
   - Subsequent dispatches remove all previously called participants until all participants have been called

   Problem: Inefficient use of resources

Proposed Alternative Dispatch Protocols (2)

3. Bid-based

- Participants submit a strike price at which they would curtail for 4-hours, using one of the following methods:
  - Each participant provides a unique strike price
  - Participants choose from a series of pre-determined strike prices
  - Participants submit unique strike prices and then NYISO creates blocks after-the-fact
- All bids are compiled into an aggregate bid curve
- Bid curve determines which are dispatched based upon need

Problem: Conformity to SCD and gaming

Proposed Alternative Dispatch Protocols (3)

4. Notice-period
   - All participants provide the minimum notice period they require prior to a curtailment event
   - Operators assess how much is needed and when to determine which participants to dispatch

Problem: Participants with shortest notice are most valuable but may be called less often

Proposed Ability for EDRP and/or SCR Resources to Set LBMP

- By design, EDRP and SCR resources must be activated for at least 4 hours even if they are only needed in a fraction of that time
- This attribute makes them similar to peaking units that bid a minimum run time
- Suggests using existing Hybrid Pricing method:
  - When these resources are needed and dispatched, they can set LBMP
  - If they are not needed but are still dispatched to run, the resources are placed at the bottom of the bid stack

Neenan/LECG Proposed Program Designs

- Near Term
  - Participation opportunities remain the same
  - Refined dispatch rules allow for the "right" amount of these resources to be called
  - Adjust payments accordingly
  - Allow EDRP to set LBMP
- Longer Term
  - SCR participants bid into the Day-Ahead Market
  - Real-Time Price Following and Operating Reserve Demand Response programs reduce the need for an Emergency program

Near-Term Neenan/LECG Proposed Program Designs

- SCR
  - Always call first
  - 24 Hour advisory notice and 2 Hour dispatch notice
  - Pro-rated dispatch, if required
  - Requirement to meet Capacity obligation based upon "Capacity" CBL or else penalties are assessed
  - Provide an energy payment at Real-Time LBMP based upon "Energy" CBL (Recent historical average usage)
  - Do not allow SCR resources to set Real-Time LBMP

Capacity CBL and Energy CBL

- Capacity CBL
  - Represents equivalent peak capacity contributions of an end-use customer
  - Methodology: Average peak demand in last year's 4 summer months
- Energy CBL
  - Represents the expected energy consumption of an end-use customer during an event
  - Methodology: Average highest 5 of last 10 days energy usage with some modifications for circumstances

Near-Term Neenan/LECG Proposed Program Designs (2)

- EDRP
  - Called after all SCR resources have been dispatched and as needed
  - 1 Hour dispatch notice
  - Strike price based dispatch
    - Bids are submitted by participants for a 6-Month season with monthly adjustment opportunities
    - Minimum bid threshold commensurate with DADRP
    - Maximum bid threshold commensurate with market cap
  - Participants are paid the higher of Real-Time LBMP or their submitted bid

Near-Term Neenan/LECG Proposed Program Designs (3)

- EDRP cont.
  - Verified performance for payment based on "Energy" CBL (Recent historical average usage)
  - NYISO includes dispatched blocks into SCD based on expected performance
  - Dispatched EDRP resources are incorporated into SCD via the Hybrid-Pricing method thereby allowing these resources to set Real-Time LBMP in hours when needed to re-establish reserve margins
  - Load in SCD is increased based on expected performance to counterbalance generation needs

Near-Term Neenan/LECG Proposed Program Designs (4)

Day-Ahead Demand Response Program (DADRP)

- If the DADRP participant is also in SCR and the scheduled curtailment is coincident with an SCR event:
  - SCR reduction must be met based on Capacity CBL
  - Scheduled DADRP reduction must be met in Real-Time based on Energy CBL
  - Payment for energy is provided Day-Ahead, not in Real-Time
- If the DADRP participant is also in EDRP and the scheduled curtailment is coincident with an EDRP event:
  - Scheduled DADRP reduction must be met in Real-Time based on Energy CBL
  - Any additional reduction is paid at the EDRP payment rate

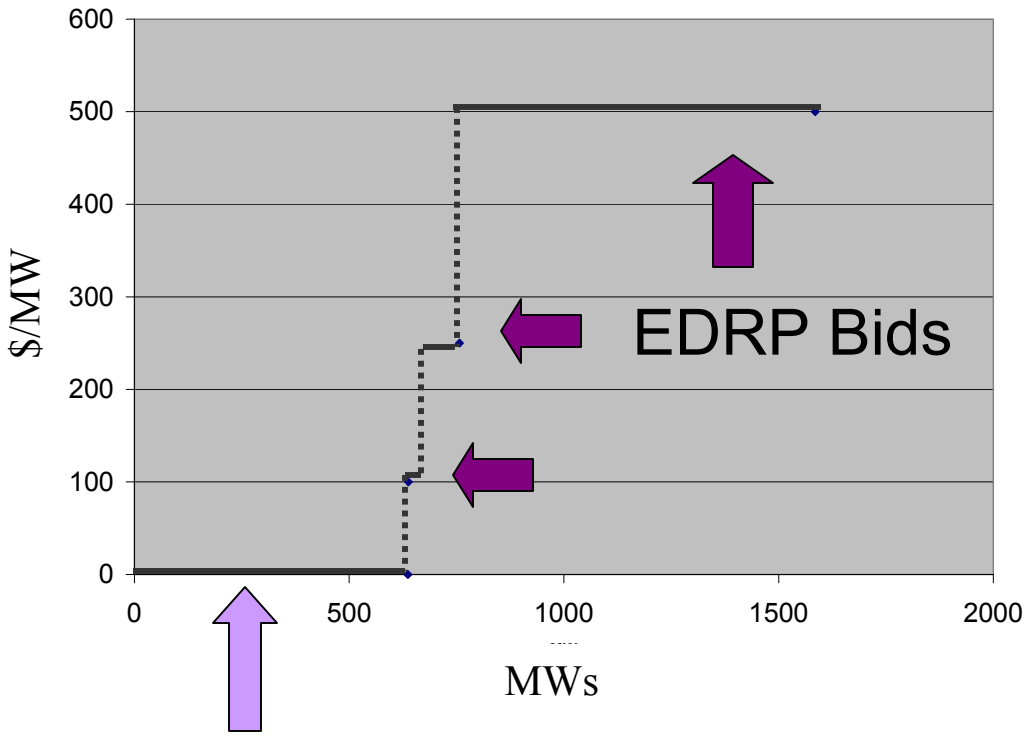
Simulation of Near-Term Proposed Program Design

- Summer 2001 EDRP and SCR events were simulated
- Summer 2002 EDRP and SCR participants were used in the simulation
- Participants were simulated as being in only one program, not both. Those who currently subscribed to both EDRP and SCR were assigned to the SCR program only.
- 4 Dispatch Cases Simulated
  - All SCR
  - All SCR and EDRP who bid $100
  - All SCR and EDRP who bid $250
  - All SCR and EDRP who bid $500
- EDRP bid curve derived from 2001 PRL Evaluation stated preference analysis and arc elasticity calculations

Simulation of Near-Term Proposed Program Design (2)

- EDRP performance by 2001 Joint EDRP and SCR participants provided a derating factor to calculate 2002 energy contributions of all SCR participants vis-à-vis UCAP levels
- EDRP performance by 2001 EDRP only participants provided a derating factor to calculate 2002 energy contributions of all EDRP participants vis-à-vis subscription levels
- Used 2001 estimated price flexibilities to simulate Base LBMP by adding all 2001 load reductions (e.g. Voltage reduction, EDRP, ICAP, etc.) back into actual RT load
- Use dispatch cases to observe effect on Base LBMP
- Simulated effect on Base LBMP when EDRP can set LBMP and when EDRP can not set LBMP

Simulated SCR and EDRP Supply Curve (Subscription based)



- EDRP bid curve reflects changes in participation (estimated from 2001 Stated Preference analysis) and performance (estimated from 2001 arc elasticity calculations)
- Simulated supply curve illustrates problem with pre-determined strike price points as operators are unable to easily dispatch reasonable blocks

Simulated Effects on LBMP for Proposed Near-Term Program Designs

Superzone	Base LBMP	SCR Only	EDRP Can Set LBMP: SCR & EDRP @ $100	EDRP Can Set LBMP: SCR & EDRP @ $250	EDRP Can Set LBMP: SCR & EDRP @ $500	EDRP Can Not Set LBMP: SCR & EDRP @ $100	EDRP Can Not Set LBMP: SCR & EDRP @ $250	EDRP Can Not Set LBMP: SCR & EDRP @ $500
Capital	$ 368	$315	$ 321	$ 374	$ 555	$ 315	$ 311	$ 289
NYC	$ 354	$338	$ 338	$ 384	$ 550	$ 338	$ 336	$ 322
LI	$ 366	$360	$ 360	$ 370	$ 539	$ 360	$ 359	$ 348
Western NY	$ 273	$225	$ 233	$ 331	$ 540	$ 225	$ 221	$ 191
Hudson River	$ 311	$305	$ 305	$ 356	$ 539	$ 305	$ 304	$ 296

EDRP Can Set LBMP

- Calling Only SCR results in between 2% and 17% decrease in Real-Time LBMP
- Calling SCR & EDRP @ $250 increases price by as much as 21%
- Calling SCR & EDRP @ $500 results in a 50% to 100% increase in Real-Time LBMP

EDRP Can Not Set LBMP

- Due to the limited number of MWs bid in @ $100 or $250, the impact on prices is small
- Calling SCR & EDRP @ $500 results in a 5% to 30% reduction in Real-Time LBMP

Rationale for Proposed Near-Term Program Changes

- Proposed program changes underscore unique characteristics of SCR and EDRP resources and allow market to recognize differences in resources
- Separate dispatch of SCR and EDRP is logical first step at partial dispatch
- Pro-rated dispatch only way to "fine-tune" SCR dispatch further
- Bid curve dispatch of EDRP necessary if these resources are to set real-time LBMP
- Simulations show that this strategy does help minimize the downward pressure on real-time LBMP

Other Issues for Future Consideration

- Justification for two different CBLs
- Operators need an automated system to easily and quickly dispatch resources as well as provide updated performance calculations to more accurately dispatch only what is needed
- Is it in the long-term interest of the market for EDRP to set real-time LBMP?
- Market Monitoring will need to check for the possibility of strategic bidding and/or gaming

Recommendations

- Support Proposal to BIC
- Refine dispatch and other provisions with Market Members within 3 months of renewal
- Use Proposed Program Designs as framework for discussions with Market Members