Synchronized Reserve Performance Evaluation

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Synchronized Reserve Deployment Task Force

- Current methodology will not work
  - Resources are no longer asked to increase as fast as they can during the event (10 minutes or longer)
  - Not all units will be expected to provide full Synch Reserve assignment
    - Some units will not be dispatched up
      - And could even be dispatched down
  - Resources will be asked to follow basepoints during Synch Reserve events
    - Basepoints may change during the event as operators approve new SCED cases
    - New cases may be approved before resources can achieve basepoints

- ## What do we evaluate resource performance against?

  - Lesser of Synch Reserve Assignment or summation of 1 minute pro-rated Basepoints over course of event

- ## How do we handle changes to basepoints based on SCED approvals before event ends?

  - Prorate basepoints over length of event

- ## Do we evaluate performance for events less than 10 minutes?

  - Status Quo: Response = Expectation if event < 10 Minutes

- ## For events lasting more than 10 minutes, do we evaluate performance for 10 minutes or until the event ends?

  - Until event ends but performance > than 10 minutes evaluated against expected response for pro-rated Basepoints

- How do we evaluate resources that are also providing regulation?

  – Status Quo – Subtract regulation assignment from response

- How do we measure DR Response?

  – Status Quo

- How is Event End determined?

  – Expected response will go to end of event

  – Unit performance will be measured at 10 minute point (+/- 1 min) and for each minute > 10 minutes against expected response from pro-rated Basepoints

Example 1 – Current Performance Method

Ramp rate = 2 MW/Min   Eco Min = 50 MW   Eco Max = 200 MW   Synch Reserve Assignment = 20 MW

		Event Start - IRD Case Approved				SCED Case with unit loss approved					Ten Minutes (Next SCED Case approved)				Event End	
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit Output (MW)	100	102	104	106	108	110	110	112	112	114	114	108	106	104	103
Unit Basepoint	103	110	110	110	110	115	115	115	115	115	105	105	105	105	105
Expected Response		2	2	2	2	2	2	2	2	2	2	0	0	0	-

Expected Response = 20 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 114 – 100 = 14 MW

Performance = Average (10 Min Response + >10 Min Response) – Reserve Assignment=
Average (14,14,14,14,14,14,14,14,14,14,8,6,4) - 20 MW = -7.85 MW

Example 2 – Unit Over-response

Ramp rate = 2 MW/Min   Eco Min = 50 MW   Eco Max = 200 MW   Synch Reserve Assignment = 20 MW

	Event Start - IRD Case Approved					SCED Case with unit loss approved				Ten Minutes (Next SCED Case approved)				Event End	
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit Output (MW)	100	102	104	106	108	110	110	112	112	114	114	108	106	104	103
Unit Basepoint	103	110	110	110	110	115	115	115	115	115	105	105	105	105	105
Expected Response		1	1	1	1	1.1	1.1	1.1	1.1	1.1	-0.45	-0.45	-0.45	-0.45	-

Expected Response = Lesser of: Reserve Assignment OR Summation(Basepoint at each minute – Starting unit MW (+/- 1 min))/10 = Lesser of 20 OR (110-100)/10 + (110-100)/10 + (110-100)/10 + (110-100)/10 + (115-104)/10 + (115-104)/10 + (115-104)/10 + (115-104)/10 + (115-104)/10 + (105-109.5)/10 + (105-109.5)/10 + (105-109.5)/10 + (105-109.5)/10 = 7.7 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 114 – 100 = 14 MW

Performance = Average (10 Min Response + >10 Min Response) – Expected Response = Average (14,14,14,14,14,14,14,14,14,14,8,6,4) – 7.7 MW = +4.45 MW

Example 3 – Unit Under-response

Ramp rate = 2 MW/Min   Eco Min = 50 MW   Eco Max = 200 MW   Synch Reserve Assignment = 20 MW

		Event Start - IRD Case Approved								SCED Case with unit loss approved	Ten Minutes			Event End	
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit Output (MW)	100	102	104	106	108	110	110	110	110	110	110	111	110	110	112
Unit Basepoint	103	123	123	123	123	123	123	123	123	120	120	120	120	120	120
Expected Response		2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	0.16	0.16	0.16	0.16	0.16	-

Expected Response = Lesser of: Reserve Assignment OR Summation(Basepoint at each minute – Starting unit MW (+/- 1 min))/10 = Lesser of 20 OR (123-100)/10 + (123-100)/10 + (123-100)/10 + (123-100)/10 + (123-100)/10 + (123-100)/10 + (123-100)/10 + (123-100)/10 + (120-118.4)/10 + (120-118.4)/10 + (120-118.4)/10 + (120-118.4)/10 + (120-118.4)/10= 19.2 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 111 – 100 = 11 MW

Performance = Average (10 Min Response + >10 Min Response) – Expected Response = Average (11,11,11,11,11,11,11,11,11,11,11,10,10) – 19.2 MW = -8.35 MW

Example 4 – SCED Approved After 10 Minute

Ramp rate = 2 MW/Min   Eco Min = 50 MW   Eco Max = 200 MW   Synch Reserve Assignment = 20 MW

	Event Start - IRD Case Approved									Ten Minutes			SCED Case with unit loss approved	Event End	
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit Output (MW)	100	102	104	106	108	110	112	114	116	118	120	122	120	120	120
Unit Basepoint	105	125	125	125	125	125	125	125	125	125	125	125	120	120	120
Expected Response		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0	-0.5	-0.5	-

Expected Response = Lesser of: Reserve Assignment OR Summation(Basepoint at each minute – Starting unit MW (+/- 1 min))/10 = Lesser of 20 OR (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (120-125)/10 + (120-125)/10= 24 MW capped at Synch Res Assignment = 20 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 122 – 100 = 22 MW

Performance = Average (10 Min Response + >10 Min Response) – Expected Response = Average (22,22,22,22,22,22,22,22,22,22,22,20,20) – 20 MW = 1.69 MW

Example 5 – Event Ends Prior to 10 Min

Ramp rate = 2 MW/Min   Eco Min = 50 MW   Eco Max = 200 MW   Synch Reserve Assignment = 20 MW

		Event Start - IRD Case Approved					SCED Case with unit loss approved		Event End		Ten Minutes				
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	-13	14
Unit Output (MW)	100	104	104	106	108	110	112	114	116	116	114	112	110	110	110
Unit Basepoint	105	125	125	125	125	125	110	110	110	110	110	110	110	110	110
Expected Response		2.5	2.5	2.5	2.5	2.5	-0.25	-0.25	-0.25	-	-	-	-	-	.-

Expected Response = Lesser of: Reserve Assignment OR Summation(Basepoint at each minute – Starting unit MW (+/- 1 min))/10 = Lesser of 20 OR (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (125-100)/10 + (110-112.5)/10 + (110-112.5)/10 + (110-112.5)/10 = 11.75 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 116 – 100 = 16 MW

For Event less than 10 min; Unit is credited Lesser of Reserve Assignment or Summation of Basepoint = 11.75 MW

Example 6 – Synch Condenser

Ramp rate = 5 MW/Min   Eco Min = 30 MW   Eco Max = 50 MW   Synch Reserve Assignment = 20 MW

	Event Start - IRD Case Approved				SCED Case with unit loss approved				Ten Minutes (Next SCED Case approved)				Event End	
Minute	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit Output (MW)	0	0	0	0	0	0	0	5	10	15	20	25	30	35	40
Unit Basepoint	0	30	30	30	30	50	50	50	50	50	50	50	50	50	50
Expected Response		3	3	3	.3	3.8	3.8	3.8	3.8	3.8	1.9	1.9	1.9	1.9	-

Expected Response = Lesser of: Reserve Assignment OR Summation(Basepoint at each minute – Starting unit MW (+/- 1 min))/10 = Lesser of 20 OR (30-0)/10 + (30-0)/10 + (30-0)/10 + (30-0)/10 + (50-12)/10 + (50-12)/10 + (50-12)/10 + (50-12)/10 + (50-12)/10 + (50-31)/10 + (50-31)/10 + (50-31)/10 + (50-31)/10 = 38.6 MW capped at Synch Res Assignment = 20 MW

10 Minute Response = Highest Output achieved over 10 minutes (+/- 1 min) – Lowest Unit Output (+/- 1 min) = 25 – 0 = 25 MW

Performance = Average (10 Min Response + >10 Min Response) – Expected Response = Average (25,25,25,25,25,25,25,25,25,25,25,30,35) – 20 MW = +6.15 MW

- A unit's response can be converted from MW to MWh by multiplying the MW calculated by the length (minutes) of the event divided by 60 minutes.

- Examples:

  - From event lasting 5 minutes:

    o Calculated MW response = 3 MW

    o (3) x (5 / 60) = 0.25 MWh response

o Conversely, MWh can be converted to MW by multiplying the MWh by 60 minutes divided by the length (minutes) of the event.