Expanding Capacity Eligibility

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ICAPWG/MIWG

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NEW YORK INDEPENDENT SYSTEM OPERATOR

Agenda

- Background
- Installed Capacity Supplier Payment Structure
- Peak Load Windows
- Counting MWs
- Capacity Value Study
- Performance-based Generators
- MST 5 Incremental Revisions
- Appendices

Background

Purpose of the DER Project

- **The objective of the complete DER design is to allow smaller resources into the NYISO markets including load reduction assets into the Energy Market**
- **In addition, the NYISO is proposing rules that value resources in the capacity market based on the reliability benefit that the resource provides to the system**
  - This proposal would allow resources with short durations that currently cannot participate in the Capacity Market to be eligible to provide Installed Capacity
  - These market rule changes will be implemented for Capability Year 2021

Purpose of Today's Discussion

- **Review modifications to NYISO's proposed design of the qualifications and participation requirements to allow comparable treatment of Installed Capacity Suppliers using resources with daily energy duration limitations and Installed Capacity Suppliers with resources that have no duration limitations based upon the reliability benefit of the resource**
  - Proposed design focuses on the capacity values for 2, 4, 6 and 8 hour duration limited resources, incremental penetration levels of duration limited resources, and periodic review of the Capacity Value Study
- **Review Market Services Tariff Section 5 for the incremental tariff changes made to incorporate Distributed Energy Resources and other market changes from the DER proposal**
  - Please note that the tariff language regarding the Capacity Values may be revised to incorporate ongoing discussions with stakeholders

Installed Capacity Supplier Payment Structure

Purpose of Today's Proposal

- **Evaluating the capacity value of resources with varying duration limitations is a shift from the approach currently used today**
  - Resources will now be valued based on the reliability value they provide to the system when considering the capacity market is set up to attract and retain sufficient resources to meet or exceed the resource adequacy Loss of Load Expectation criterion
  - Under this proposal payment is directly tied to the capacity value of the resource based upon its duration limitation in addition to the availability of the resource
- **Since the 10/9/2018 ICAPWG, NYISO staff conducted extensive stakeholder outreach to collect detailed feedback on the GE study and the proposed capacity market design**
- **NYISO is proposing to modify the capacity market design presented at the 1/22/2019 ICAPWG**
  - Modifications are a result of stakeholder feedback and focus on the capacity value of resources with duration limitations at incremental penetration levels below 1000 MW of capability and at and above 1000 MW of capability

ICAP Supplier Payment Structure

- **The NYISO proposed capacity values are based on the GE Capacity Value Study as well as the other studies that have been conducted**
  - The NYISO is proposing that the market signal should not incent investment of large quantities of 2 hour resources (i.e. no more than 50% of 4 hour resources)
  - Every year, the NYISO will post the MW tally of new resources with duration limitations to identify if we have hit the transition point
    - Once past the transition point (=> 1000 MW), the 'At and Above 1000 MW' numbers will be used until new values are established

	Incremental Penetration of resources with duration limitations	
Durations (hours)	Less than 1000 MW	At and Above 1000 MW
2	45%	37.5%
4	90%	75%
6	100%	90%
8	100%	100%

Peak Load Windows

Peak Load Windows

- **The modifications to the proposal now require two peak load windows**
  - A 6 hour Peak Load Window is applicable until the incremental penetration of resources with duration limitations reaches or exceeds 1000 MW
  - As previously stated, once this transition point has been reached (=> 1000 MW), the 8 hour Peak Load Window will be applicable until a new Peak Load Window is established

Peak Load Windows (cont.)

- The 6 hour window is applicable for incremental penetration of resources with duration limitations less than 1000 MW
  - Winter: HB 16 – 21
  - Summer: HB 13 – 18
- The 8 hour window is applicable for incremental penetration of resources with duration limitations equal to or greater than 1000 MW
  - Winter: HB 14 – 21
  - Summer: HB 12 – 19

Counting MWs

Counting MWs

- Every year, the NYISO will post the MW count of incremental Resources with Energy Duration Limitations so that all Market Participants are aware which set of capacity values will be used in the upcoming Capability Year
- The MW count will start for incremental penetration of duration limited resources above the existing MW as of January 1st, 2019
- The incremental MW count is:
  - CRIS of additional Resources with Duration Limitations above the existing fleet in service by July Gen Status – CRIS of Resources with Duration Limitations Retired by July Gen Status + Demand Response July MW (for SCR and DR MW) – Existing SCRs from July 2018 (1309.1 MW)

Counting MWs

- The incremental MW count will be posted by July 15th to provide time for resources to elect their durations by August 1st
- Once the MW penetration threshold has been met, the effective date of new capacity values should be May 1st of the following Capability Year
  - These values will continue to be effective notwithstanding the future MW count of incremental penetration of Resources with Energy Duration Limitations

Capacity Value Study

Capacity Value Study

- **The NYISO will revisit the Capacity Value Study in 2022-2023, with results from the future study implemented in 2025**
  - Going forward, the NYISO is proposing to revisit the Capacity Value Study every 4 years with a 205 filing
    - Results of the Capacity Value Study will be submitted with the 205 filing, including any potential changes to the durations, capacity values, and Peak Load Windows
    - The duration of the Peak Load Window (used for B/S/N obligation, derating factor calculation, etc.) will be tied to the lowest duration eligible for 100% capacity payment
  - This proposed timeline attempts to balance market certainty (and investment signals) with forecasting capacity values

Capacity Value Study (cont.)

- **The NYISO is proposing to revisit the Capacity Value Study every 4 years**
  - Periodic reevaluation is required to ensure that the capacity value of resources more accurately reflects the actual system changes over time and sends the right investment signals to the developers
  - The Capacity Value Study will be reoccurring starting two years before the Demand Curve Reset process begins (every 4 years) (*e.g.*, 2022, 2026, etc.)
- **Any recommendations that require tariff changes will proceed through the stakeholder process pursuant to Article 19 of the ISO Agreement**

Performance-based Generators

Performance-based Generators

- **Performance-based generators (Wind, Solar, RoR Hydro) will continue to be Installed Capacity Suppliers if qualified**
  - The NYISO is no longer proposing to change the performance measurement windows for Intermittent Power Resources as part of this market design effort
    - The performance measurement for Intermittent Power Resources will be considered as part of the Tailored Availability Metric effort to allow for additional review and analysis considering that they are a separable category from duration limited resources
  - The NYISO is no longer proposing to increase the performance measurement windows for RoR Hydro resources
    - Measurement window will remain the top 20 NYCA-wide load hours over the previous five like-Capability Periods (total of 100 hours)

MST 5
Incremental Revisions

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Incremental Revisions – MST 5

- Sections
  - 5.7
  - 5.12.1.14
  - 5.12.6.2
  - 5.12.14
  - 5.12.14.2
- Incremental revisions are highlighted in yellow in the version of MST 5 that was posted with today's materials

MST 5.7

- **This section discusses the Requirements for Entities not located within the NYCA**
  - Changed the wording from “would participate” to “seeking to participate”

MST 5.12.1.14

- **This section discusses the Installed Capacity Supplier Qualification Requirements**
  - The second sentence in this section now reads "An Installed Capacity Supplier can elect any Energy Duration Limitation that it can demonstrate pursuant to section 5.12.1.2"

MST 5.12.6.2

- **This section discusses the UCAP calculations for different resource types**
  - No longer includes revision to the Limited Control Run-of-River Hydro derating factor calculation as proposed at 2/15 ICAPWG

MST 5.12.14

- **This section is new to the tariff**
  - Revisions have been made to clarify that the Energy Duration Limitations and corresponding Duration Adjustment Factors are dependent on incremental penetration levels of Resources with Energy Duration Limitations
    - The revisions specify how the incremental MWs will be counted in regards to the penetration levels of Resources with Energy Duration Limitations
  - Additional revisions were made to include the 6 hour Peak Load Windows for the Summer and Winter Capability Periods, as applicable for up to 1000 MW incremental penetration of resources with duration limitations

MST 5.12.14.2

- **This section is new to the tariff**
  - Revisions have been made in regards to the schedule for the periodic review of the Capacity Value Study
  - Revisions have been made to clarify that the outcome of the study will recommend values for the Energy Duration Limitations and associated Duration Adjustment Factors, and Peak Load Windows
    - This change has been made to sections 5.12.14.2.3, 5.12.14.2.5, 5.12.14.2.7, 5.12.14.2.8, and 5.12.14.2.9

Next steps

Next Steps

- Return to upcoming ICAPWG to continue discussions and present incremental tariff edits
- Presentation from Operations at upcoming ICAPWG

Feedback/Questions?

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Appendix

Winter Peak Load Windows

- **The proposed 6 hour Winter Peak Load Window is HB 16 – 21**
  - This window is applicable for less than 1000 MW penetration of resources with duration limitations
- **The proposed 8 hour Winter Peak Load Window is HB 14 – 21**
  - This window is applicable equal to or greater than 1000 MW penetration of resources with duration limitations

Winter Peak Load Windows

8-hour window

Capability Year	Peak Day		Peak Periods					
	Date	Peak MWh	Cold Snap Period	Total Days	1-9 PM	2-10 PM	3-11 PM	4-12 PM
2012-2013	1/24/2013	2-10 PM	1/17-1/25/2013	9	4	4	1	0
2013-2014	1/7/2014	1-9 PM	1/22-2/28/2014	38	13	22	3	0
2014-2015	1/7/2015	2-10 PM	1/1-2/28/2015	59	17	26	16	0
2015-2016	1/19/2016	1-9 PM	1/15-1/19 & 2/12-2/15/2016	9	4	4	1	0
2016-2017	12/15/2016	2-10 PM	None	0	0	0	0	0
2017-2018	1/5/2018	2-10 PM	12/26-1/7/2018	13	1	12	0	0
Frequency:	**1-9 PM**	**2**	**Cold Snap Freq:**	**128**	**39**	**68**	**21**	**0**
	2-10 PM	**4**	*%*		*30.5%*	*53.1%*	*16.4%*	*0.0%*

6-hour window

Capability Year	Peak Day		Peak Periods							
	Date	Peak MWh	Cold Snap Period	Total Days	1-7 PM	2-8 PM	3-9 PM	4-10 PM	5-11 PM	6-12 PM
2012-2013	1/24/2013	4-10 PM	1/17-1/25/2013	9	0	0	4	5	0	0
2013-2014	1/7/2014	4-10 PM	1/22-2/28/2014	38	0	1	9	26	2	0
2014-2015	1/7/2015	4-10 PM	1/1-2/28/2015	59	0	1	28	29	1	0
2015-2016	1/19/2016	3-9 PM	1/15-1/19 & 2/12-2/15/2016	9	0	1	3	4	1	0
2016-2017	12/15/2016	4-10 PM	None	0	0	0	0	0	0	0
2017-2018	1/5/2018	4-10 PM	12/26-1/7/2018	13	0	0	1	12	0	0
Frequency:	**3-9 PM**	**1**	**Cold Snap Freq:**	**128**	**0**	**3**	**45**	**76**	**4**	**0**
	4-10 PM	**5**	*%*		*0.0%*	*2.3%*	*35.2%*	*59.4%*	*3.1%*	*0.0%*

- **Additional analysis has been conducted by the NYISO for the Winter Peak Load Window**
  - This analysis looked at the peak winter day and Cold Snap Periods for the past 6 Winter Capability Periods

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Summer Peak Load Windows

- **The proposed 6 hour Summer Peak Load Window is HB 13 – 18**
  - This window is applicable for less than 1000 MW penetration of resources with duration limitations
- **The proposed 8 hour Summer Peak Load Window is HB 12 – 19**
  - This window is applicable equal to or greater than 1000 MW penetration of resources with duration limitations

Summer Peak Load Windows

8-Hour Window

Capability Year	Peak Day		Peak Periods						
	Date	Peak MWh	Heat Wave Period	Total Days	11-7 PM	12-8 PM	1-9 PM	2-10 PM	TSA
2013-2014	7/19/2013	11-7 PM	7/14-7/20	7	3	3	0	1	
2014-2015	9/2/2014	12-8 PM	None	0	0	0	0	0	
2015-2016	7/29/2015	12-8 PM	7/20-7/29	10	3	6	1	0	
2016-2017	8/11/2016	12-8 PM	7/5-7/7 7/25 8/11-8/12	6	3	2	0	1	7/7, 7/25, 8/12 (all 11-7 max load)
2017-2018	7/19/2017	12-8 PM	6/11-6/13 7/19	4	0	2	1	1	
2018-2019	8/29/2018	11-7 PM	6/30-7/5 8/6 8/28-8/29 9/2-9/6	14	5	3	4	2	7/3, 7/4, 9/6 (all 11-7 max load)
Frequency:	**11-7 PM**	**2**	**Heat Wave Freq:**	**41**	**14**	**16**	**6**	**5**	
	12-8 PM	**4**	*%*		*34.1%*	*39.0%*	*14.6%*	*12.2%*	

6-hour window

Capability Year	Peak Day		Peak Periods								
	Date	Peak MWh	Heat Wave Period	Total Days	11-5PM	12-6PM	1-7PM	2-8PM	3-9PM	4-10PM	TSA
2013-2014	7/19/2013	12-6 PM	7/14-7/20	7	0	3	3	1	0	0	
2014-2015	9/2/2014	12-6 PM	None	0	0	0	0	0	0	0	
2015-2016	7/29/2015	1-7 PM	7/20-7/29	10	0	0	9	1	0	0	
2016-2017	8/11/2016	1-7 PM	7/5-7/7 7/25 8/11-8/12	6	0	3	2	1	0	0	7/7, 7/25, 8/12 (Earlier max loads
2017-2018	7/19/2017	2-8 PM	6/11-6/13 7/19	4	0	0	1	2	0	1	
2018-2019	8/29/2018	12-6 PM	6/30-7/5 8/6 8/28-8/29 9/2-9/6	14	0	5	5	3	1	0	7/3, 7/4, 9/6 (earlier max load)
Frequency:	**12-6 PM**	**3**	**Heat Wave Freq:**	**41**	**0**	**11**	**20**	**8**	**1**	**1**	
	1-7 PM	**2**	*%*		*0.0%*	*26.8%*	*48.8%*	*19.5%*	*2.4%*	*2.4%*	
	2-8 PM	**1**									

- **Additional analysis has been conducted by the NYISO for the Summer Peak Load Window**
  - This analysis looked at the peak summer day and Heat Wave Periods for the past 6 Summer Capability Periods
    - Note: the NYISO activated a Thunderstorm Alert (TSA) for 6 out of the 11 peak periods that fell between 11-7 PM (HB11–HB18). This leads to lower load later in the day as the storm passes through and cools ambient air temperatures, reducing AC load across the state

LOLE Analysis

- **The NYISO conducted an analysis to determine which hours of the day have the highest probability of experiencing a Loss of Load Event**
  - The analysis used data from the GE Capacity Value Study for the Summer Capability Period
    - Both the Base Case and High Wind High Solar cases were analyzed

LOLE Analysis – 8 hour PLW

Base Case	
Hour of Day	Expected Number of Occurrences
10	0.3023
11	0.1274
12	2.1612
13	9.2498
14	31.5375
15	79.9591
16	142.1838
17	179.3231
18	179.1465
19	97.2627
20	28.1731
21	7.1231
22	1.7977
23	1.6282
24	0.0606

High Wind High Solar	
Hour of Day	Expected Number of Occurences
10	0.0606
11	0.0668
12	1.4690
13	6.3876
14	24.4235
15	63.9293
16	121.9317
17	174.2329
18	200.0180
19	125.0373
20	44.4244
21	17.6167
22	4.7127
23	1.8926
24	0.1212

- Please note that the 'Hour of Day', as presented in the GE Capacity Value Study, includes hours 1-24, whereas the NYISO's proposal has been listing hours as 0-23
  - For example, the analysis shows that for the Base Case hours 13-20 have the highest probability of a LOLE. This is the same window (HB 12-19) as proposed by the NYISO
- This analysis confirms the 8 hour Summer Peak Load window that the NYISO is proposing (based on Base Case values)

LOLE Analysis – 6 hour PLW

Base Case	
Hour of Day	Expected Number of Occurrences
10	0.3023
11	0.1274
12	2.1612
13	9.2498
14	31.5375
15	79.9591
16	142.1838
17	179.3231
18	179.1465
19	97.2627
20	28.1731
21	7.1231
22	1.7977
23	1.6282
24	0.0606

High Wind High Solar	
Hour of Day	Expected Number of Occurrences
10	0.0606
11	0.0668
12	1.4690
13	6.3876
14	24.4235
15	63.9293
16	121.9317
17	174.2329
18	200.0180
19	125.0373
20	44.4244
21	17.6167
22	4.7127
23	1.8926
24	0.1212

- Please note that the 'Hour of Day', as presented in the GE Capacity Value Study, includes hours 1-24, whereas the NYISO's proposal has been listing hours as 0-23
  - For example, the analysis shows that for the Base Case hours 14-19 have the highest probability of a LOLE. This is the same window (HB 13-18 as proposed by the NYISO
- This analysis confirms the 6 hour Summer Peak Load window that the NYISO is proposing (based on Base Case values)

Appendix II

The following slides were presented at the 1/22/19 ICAPWG

SCR Program

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System Operations Analysis using SCRs

- The NYISO conducted an analysis using actual enrollment and event data to determine the expected duration of SCR calls at different penetration levels (1200 and 2000 MW)
- The NYISO conducted additional analysis to determine the appropriate length of time of SCR calls as to not introduce a double peak throughout the day at different levels of resource penetration
- The analysis uses the reconstituted load profiles for Zones J and NYCA for four SCR calls over the last few years
  - More details on following slide

SCR Analysis (cont.)

Table 1: Actual SCR calls

	Date of SCR call	8.12.2016	7.2.2018	8.28.2018	8.29.2018
NYCA	Average Load Reduction	1216 MW			
	Time of Actual Duration	HB 13-17			
	Actual Duration	5			
Zone J	Average Load Reduction	371 MW	394 MW	461 MW	421 MW
	Time of Actual Duration	HB 13-17	HB 12-16	HB 12-17	HB 12-17
	Actual Duration	5	5	6	6

Table 2: Expected duration of SCR calls

	Date of SCR call	8.12.2016		7.2.2018		8.28.2018		8.29.2018	
NYCA	Resource Penetration	1200 MW	2000 MW	1200 MW	2000 MW	1200 MW	2000 MW	1200 MW	2000 MW
	Time of Expected Duration	HB 13-17	HB 12-17	HB 12-17	HB 11-18	HB 13-18	HB 12-19	HB 12-17	HB 11-18
	Expected Duration	5	6	6	8	6	8	6	8
Zone J	Resource Penetration	384	640	384	640	384	640	384	640
	Time of Expected Duration	HB 13-17	HB 12-17	HB 13-17	HB 12-17	HB 13-17	HB 12-17	HB 12-17	HB 12-17
	Expected Duration	5	6	5	6	5	6	6	6

The values for Zone J were determined as the proportion of (actual SCR ICAP in Zone J/ actual SCR ICAP NYCA) * penetration levels (i.e. 1200 or 2000 MW)

SCR Program

- **The NYISO team conducted extensive outreach to the SCR providers and collected input on SCR program**
  - Majority of the SCR providers communicated that their resources cannot support longer than the current 4 hour obligation
  - Majority of the SCR providers also communicated that their resources cannot support shorter notification times
- **The SCR program will remain at a 4 hour duration requirement for participation in the Capacity Market**
  - SCRs will only be eligible to participate as Capacity Suppliers with duration limitations of 4 hours
  - SCRs will receive the payment percent that is applicable to resources that have duration limitations of 4 hours
  - All other SCR program rules, including the current notification times and testing requirements, will remain the same

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Capacity Suppliers

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Capacity Suppliers – Qualifications

- **A resource must not have any hourly limitations to qualify as a Capacity Supplier**
  - Satisfaction of all registration requirements, including an effective Interconnection Agreement with the Connecting Transmission Owner (or with the Connecting Transmission Owner and the NYISO, if the resource is subject to the NYISO's interconnection procedures) that allows wholesale market participation
  - Have a minimum injection capability of 1 MW for all resources

Capacity Suppliers– Qualifications (cont.)

- **What is necessary for a resource to be eligible to be a Capacity Supplier?**
  - Must provide a DMNC test, as applicable to the resource type
    - More details on following slide
  - ICAP for a resource will be based on CRIS and DMNC
    - CRIS is only applicable to Injection capability of resources (not Withdrawal or Load Reduction portion)
    - ICAP = min(CRIS, DMNC of injection)

Capacity Suppliers – DMNC

- **DMNC tests will continue to be determined by the technology type of the resource**
  - Traditional resources (nuclear, fuel-based)
    - Will keep the existing 1 or 4 hour maximum capability test, as applicable to technology type
- **More details on following slide**

Capacity Suppliers – DMNC (cont.)

- DMNC tests for Nameplate resources (e.g., Intermittent Power Resources) will not change
- No other changes will be made to DMNC testing requirements
  - e.g. testing windows, data submission, audit, temperature correction, etc.
  - Operational data can be submitted in place of DMNC test

Capacity Suppliers – Bid/Schedule/Notify

- **Bid/Schedule/Notify obligations for traditional resources will not change for Capacity Suppliers**
  - 24 hour Bid/Schedule/Notify requirement will remain in effect

Capacity Suppliers – Bid/Schedule/Notify (cont.)

- **The NYISO is not proposing any changes to the Bid/Schedule/Notify obligations for performance-based resources**
  - Intermittents (Wind, Solar) have no current obligation to Bid/Schedule/Notify
  - RoR will maintain the 24 hour Bid/Schedule/Notify requirement

Capacity Suppliers – Other Obligations

- **Other rules and obligations for resources that have sold capacity:**
  - Continue to provide 2 year forward outage information
  - Respond to a NYISO SRE
  - Subject to penalties/shortfall charges, e.g. for over sale of capacity, failure to Bid/Schedule/Notify

Capacity Suppliers – Derating Factors

- **UCAP is calculated as ICAP times quantity 1 minus the derating factor**
  - UCAP = ICAP * (1 – derating factor)
- **Derating factor**
  - The derating factor for availability-based Capacity Suppliers will be calculated using GADS data
    - The GADS EFORd calculation will continue to be used for traditional resources
  - The derating factor for performance-based Capacity Suppliers (Wind, Solar, RoR Hydro) will be calculated based on the resource's performance during peak hours
    - The peak hours will expand from 4 hours to 8 hours to match the Peak Load Window used for Capacity Suppliers with duration limitations bidding requirements (see slides later in presentation)

Capacity Suppliers – Derating Factors (cont.)

- **The derating factor calculation for availability-based, GADS/EFORd, resources will remain unchanged**
  - Resources include nuclear, conventional combustion generators large hydro generation, Control Area System Resources (HQ), and UDRs/EDRs
  - Derating factors are calculated based on actual outages over an 18-month rolling average when the resource is scheduled for dispatch

Capacity Suppliers – Other Rules

- Performance-based generators (Wind, Solar, RoR Hydro) will continue to be Capacity Suppliers if qualified
- Mitigation rules will not change for existing Capacity Suppliers with this current proposal

DER

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DER – Qualifications

- **DER that do not have any hourly limitations can qualify as a Capacity Supplier**
  - DER with hourly limitations can qualify as Capacity Suppliers with duration limitations
  - Satisfaction of all registration requirements, including an effective Interconnection Agreement with the Connecting Transmission Owner (or with the Connecting Transmission Owner and the NYISO, if the resource is subject to the NYISO's interconnection procedures) that allows wholesale market participation
  - Have a the minimum injection capability of 0.1 MW
    - Minimum MW threshold could be met by aggregating with other resources at the same transmission node

DER – Qualifications (cont.)

- **Resources using the DER Participation Model must be electrically located within the NYCA to be a Capacity Supplier**
  - The NYISO has the ability to schedule internal DER whenever they are needed, but not does have the same visibility and/or ability over external DER (including knowing what the DER is comprised of)
  - Load curtailment resources are not able to deliver power to the NYCA so they do not provide a capacity benefit
  - The NYISO cannot depend on external DER to provide capacity when needed
    - Example – the NYISO needs a 4 hour resource starting in HB 16 but the External Control Area scheduled the resource from HB 12-15, the resource would not be available to the NYISO for HB 16

DER – Qualifications (cont.)

- **What is necessary for a DER to be eligible to be a Capacity Supplier?**
  - Must provide a DMNC test
    - More details on following slide
  - ICAP for a resource will be based on CRIS and DMNC
    - CRIS is only applicable to Injection capability of resources (not Withdrawal or Load Reduction portion)
    - For resources using the Dispatchable DER Model:
      - ICAP = min(CRIS, DMNC of injection)+DMNC of load reduction

DER – DMNC

- **DMNC tests for DER**
  - Each Capability Period – 8 hour test at maximum output
  - The NYISO has determined that it is essential for DER to demonstrate its full duration at registration to accurately capture what the resource is capable of providing for its chosen duration
    - Since DER can change on a monthly basis, the NYISO believes it is necessary to test the full duration of the DER each Capability Period to ensure that the DER can continue to meet its duration requirement

DER – Bid/Schedule/Notify

- Bid/Schedule/Notify obligations for Dispatchable DER will be for all 24 hours of the DAM for the ICAP Equivalent of UCAP sold

DER – Other Obligations

- **Other rules and obligations for DER that have sold capacity:**
  - Continue to provide 2 year forward outage information
  - Respond to a NYISO SRE
  - Subject to penalties/shortfall charges, e.g. for over sale of capacity, failure to Bid/Schedule/Notify

DER – Derating Factors

- **UCAP is calculated as ICAP times quantity 1 minus the derating factor**
  - UCAP = ICAP * (1 – derating factor)
- **Derating factor**
  - The derating factor for DER will be calculated using the UOL availability calculation
    - Derating factor = 1 – (Time-Weighted UOL/Time-Weighted ICAP)
      - Based on the availability of the average of 6, 12-month blocks
    - For more details on the UOL Calculation, see Appendix

DER – Other Rules

- **Supply Side Mitigation**
  - Pivotal Supplier must offer – resources using the Dispatchable DER Model are subject to the Pivotal Supplier must offer rule
    - The load reduction portion of the DER must be offered, unless the NYISO has determined that the mitigated UCAP has been attributed to its host load
      - This is conceptually similar to the BTM-NG rule as described in MST 23.4.5.4.1(b)
  - Physical Withholding – resources using the Dispatchable DER Model are subject to the Physical Withholding rules relating to the audit of removals of capacity from Mitigated Capacity Zones
- **Buyer Side Mitigation**
  - The NYISO is not proposing any changes to the existing Buyer Side Mitigation rules, applicable to both Capacity and Capacity Suppliers with duration limitations

Capacity Suppliers with duration limitations

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Capacity Suppliers with duration limitations

- **The NYISO is proposing to allow shorter duration resources to qualify as Capacity Suppliers with duration limitations**
  - Capacity Suppliers with duration limitations can be 2, 4, 6, or 8 hour resources
  - Resources will be allowed to aggregate to meet a certain duration requirement
  - Payments to Capacity Suppliers with duration limitations will depend on the resource's duration

Capacity Suppliers with duration limitations – Qualifications

- **Qualifications for a Capacity Suppliers with duration limitations**
  - Satisfaction of all registration requirements, including an effective Interconnection Agreement with the Connecting Transmission Owner (or with the Connecting Transmission Owner and the NYISO, if the resource is subject to the NYISO's interconnection procedures) that allows wholesale market participation
  - Resources must be electrically located within the NYCA
    - The NYISO has the ability to schedule internal resources (even with duration limitations) whenever they are needed, but not does have the same visibility and/or ability over external resources
    - As such, the NYISO cannot depend on external resources with duration limitations to provide capacity when needed
      - Example – the NYISO needs a 4 hour resource starting in HB 16 but the External Control Area scheduled resource from HB 12-15, the resource would not be available to the NYISO for HB 16

Capacity Suppliers with duration limitations – Qualifications (cont.)

- **Qualifications for a Capacity Suppliers with duration limitations**
  - Have a minimum injection capability of 1 MW for all resources, excluding ESR and Dispatchable DER where the minimum injection capability is 0.1 MW
  - Performance-based generators (Wind, Solar, RoR Hydro) will not be eligible for a duration limitation
  - Resources with energy limitations can derate and/or time stack their capacity to reach any duration (more details on Aggregations and Time Stacking later in the presentation)

Capacity Suppliers – DMNC

- **DMNC tests will be determined by the technology type of the resource**
  - Traditional resources (nuclear, fuel-based)
    - Will keep the existing 1 or 4 hour maximum capability test, as applicable to technology type
  - Storage
    - Full duration test at registration
      - This one-time test is required to validate that the resource can perform for the duration
    - Each Capability Period – paper audit with certifications (i.e. information on degradation) with duration test at maximum output (1 hour test for electrochemical storage, 4 hour test for other storage)

Capacity Suppliers – DMNC (cont.)

- **DMNC tests will be determined by the technology type of the resource**
  - DER
    - Each Capability Period – full duration test at maximum output.
      - Since the DER can have frequent changes (e.g., load of the customer changes, participate through time stacking, or change their enrollments on a monthly basis) DER will be required to do a full-duration test each Capability Period to demonstrate that the resource can perform for the duration
  - ELR
    - Full duration test at registration
      - This one-time test is required to validate that the resource can perform for the duration
    - Must provide information supporting its ELR status each Capability Year
    - Each Capability Period – paper audit (i.e. information regarding ELR status) with duration test based on technology type (e.g. Pumped Storage is 4 hour test)
- **Duration limited resources must perform their DMNC test during the Peak Load Window**

Capacity Suppliers with duration limitations – Peak Load Window

- **Capacity Suppliers with duration limitations are not expected to be available 24/7 but must be available during a predefined 8 hour Peak Load Window**
  - The Peak Load Window for Winter and Summer Capability Periods are different
    - Summer: 12-8PM (HB12 through HB19); Winter 2-10PM (HB14 through HB21)
      - Note that Winter Peak Load Window has changed since 10/9/2018 ICAPWG, see following slide for more detail
    - The Peak Load Windows are not tied to a resource type or duration limit
- **Peak Load Window was determined using data provided by GE's Capacity Value Study along with operator and control room input**
  - As part of their analysis, GE provided dispatch schedules (MW by hour) for resources with varying energy limitations
  - 2-, 4-, 6-, 8- and 10-hour duration dispatches were used in this analysis

Capacity Suppliers with duration limitations – Bid/Schedule/Notify

- **Capacity Suppliers with duration limitations are required to Bid/Schedule/Notify during the Peak Load Window**
  - ESRs with duration limitations must B/S/N in the DAM for the entirety of Peak Load Window as ISO-Managed
  - DER and ELRs with duration limitations must B/S/N in the DAM for the number of hours that correspond to their duration requirement
  - For ESRs, DER, and ELRs:
    - These hours must be consecutive and within the Peak Load Window
    - NYISO Operations has the right to move the resource's DAM schedule as well as specify the exact hours that resources should bid into on an as needed basis
      - Operations can specify the bidding window up to 4 hours (1 am) before the close of the DAM
        - » This proposed timeline is consistent with the existing DARU timeline
      - Hours do not have to be within the Peak Load Window
      - Responding to hours outside of the Peak Load Window would be on a best effort basis and will not impact the derating factors

Capacity Suppliers with duration limitations – Derating Factor

- **The ICAP to UCAP translation will not change**
  - UCAP = ICAP * (1 - derating factor)
- **Availability-based derating factors will be derived from GADS or the UOL calculation, as applicable to the resource type**
  - The derating factor for traditional resources will continue to be based on the GADS/EFORd methodology
  - The derating factor calculation for resources using the UOL availability calculation (ESRs and DER) will be based on the resource type
    - More detail on the following slide
    - Activity that occurs outside of the required bidding obligation will not affect the derating factor (including failed starts and outages)

Derating Factor – ESRs

- **The derating factor calculation for ESRs that are duration limited is measured over the entire Bid/Schedule/Notify window**
  - ESRs will be measured in real time over the entire Peak Load Window

Derating Factor – DER

- **The derating factor calculation for DER that are duration limited is measured over the hours that the resources is expected to be available for**
  - The resource is expected to be able to operate for the number of hours that correspond to its duration requirement (i.e. 2, 4, 6 or 8)
  - The window that measures the availability of the resource will be adjusted based on the DER's DAM schedule

Capacity Suppliers with duration limitations – ICAP

- **ICAP will still apply to all resources as current practice, but the payment for all resources will be based on an Adjusted ICAP**
  - ICAP = min(CRIS, DMNC)
    - ICAP value used consistent with current practices (i.e. Bid/Schedule/Notify, etc.)
  - Adjusted ICAP = min(CRIS, DMNC) * Duration Adjustment Factor
    - Applies to all Capacity Suppliers where the payment corresponds to the Duration Adjustment Factor for that duration
    - The derating factor is applied to the Adjusted ICAP for the system wide ICAP to UCAP translation
  - UCAP for market = Adjusted ICAP * (1 – derating factor)
- **See Appendix for examples of ICAP payment calculations**

Capacity Suppliers with duration limitations – Other Obligations

- **Other rules and obligations for Capacity Suppliers with duration limitations that have sold capacity:**
  - Continue to provide 2 year forward outage information
  - Additional rules for Energy Storage Resources:
    - Provide Energy Level Telemetry to the NYISO

Capacity Suppliers with duration limitations – Other Obligations (cont.)

- **SRE Obligations**
  - Capacity Suppliers with duration limitations must bid during the Peak Load Window for the number of hours corresponding to the duration of the resource, where the NYISO can move the resource's schedule
- **Penalties for failure to Bid/Schedule/Notify**
  - Capacity Suppliers with duration limitations will only be evaluated for Bid/Schedule/Notify Obligation during the Peak Load Window, so the penalty would only be calculated during that window for the appropriate number of hours
    - e.g. a 4 hour Capacity Supplier would be evaluated over the appropriate 4 hour bidding window

Aggregations

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Aggregations – Qualifications

- **DER that are mapped to the same Transmission Node can aggregate to increase their capacity**
  - Each individual DER must be <= 20 MW and separately registered with the NYISO
  - Each DER must be electrically located within the NYCA
  - The minimum size of an Aggregation is 0.1 MW
    - DER <0.1 MW will need to aggregate in order to participate in the NYISO wholesale market
  - Aggregated DER will be managed by a single responsible party and be assigned one PTID. The NYISO will only view aggregated DER as a single resource
    - Aggregations will all be coordinated through the Aggregator, independent of the participation model that the Aggregation is using

Aggregations – Qualifications (cont.)

- **DER that are mapped to the same Transmission Node can aggregate to increase their capacity**
  - Homogenous Aggregations of DER will participate using that resource type's participation model
  - Heterogeneous Aggregations will participate using the DER Participation model
  - Time-stacked Aggregations are discussed later in presentation

Aggregations – DMNC

- **The NYISO will require the DER to perform a DMNC test once every Capability Period for the Aggregation as a whole**
  - Aggregations that obtain a DER new to the market must provide a new DMNC test for the Aggregation as a whole if the Aggregation wants to sell that DER in the Capacity Market
  - The aggregator will provide a resource-specific breakdown of the Aggregation's DMNC
  - An Aggregation can only change its duration at the beginning of the Capability Year
    - The Aggregation must notify the NYISO of this change prior to August 1st of the year preceding the Capability Year
  - Operating data can be submitted in lieu of a DMNC test

Aggregations – DMNC (cont.)

- **DER do not need to perform a new DMNC test again within the same Capability Period if:**
  - The capacity of the Aggregation does not increase
  - The aggregator obtains an existing DER that already performed DMNC (but new to the Aggregation)
  - The aggregator does not intend to sell the increased capacity
  - A DER leaves an Aggregation
    - If a DER leaves an Aggregation and does not join a new Aggregation, it can either participate on its own (if it is >= 0.1 MW) or leave the NYISO markets
      - A DER that leaves the NYISO markets can return at a later date if it meets all of the appropriate qualifications
      - A DER is considered to be a new DER after it has been out of the NYISO markets for 18 months

Aggregations – Bid/Schedule/Notify

- **Bid/Schedule/Notify obligations for a DER will be based on the characteristics of the Aggregation**
  - Homogenous aggregations will have the same obligation as that resource type
    - i.e. an Aggregation of Energy Storage Resources will Bid/Schedule/Notify as ISO-Managed Energy Level in the DAM
    - Exception is that an Aggregation of Load Curtailment resources will participate as part of the Dispatchable DER Model
  - Heterogeneous Aggregations will use the Dispatchable DER Model's Bid/Schedule/Notify obligation

Aggregations – Derating Factor

- **The method for calculating the derating factor for a DER will be based on the characteristics of the DER by treating the DER as a single resource**
  - The derating factor for homogenous Aggregations will be calculated using the method pertaining to that resource type
    - i.e. an Aggregation of all Solar resources (using the Solar Participation Model) will use the derating factor calculation for Solar resources
  - The derating factor for heterogeneous Aggregations will be calculated using the method for the Dispatchable DER Model
- **Derating factors for DER will be measured on the availability or performance of the Aggregation as a whole, as appropriate for that participation model**
  - The NYISO will not have visibility into the availability of the individual DER that comprise an Aggregation (excluding GADS)

Aggregations – Swapping Aggregations

- **Resources that switch Aggregations but remain within the same participation model can switch on a monthly basis**
  - Existing resources will carry their previous DMNC with them
- **Resources that switch between participation models must do so at the beginning of the Capability Year**
  - Existing resources will carry their previous DMNC with them
  - Resources must notify the NYISO of this change prior to August 1st of the year preceding the Capability Year
- **Resources that switch from a retail load modifier to NYISO wholesale market participation must do so at the beginning of the Capability Year**
  - Resources must notify the NYISO of this change prior to August 1st of the year preceding the Capability Year

Aggregations- Swapping Aggregations (cont.)

- **Resources that switch from NYISO wholesale market participation to a retail load modifier**
  - If notified prior to August 1st of the year preceding the Capability Year, then the resource's transition to a retail load modifier will be reflected in the requirements for the Transmission District
  - If not notified prior to August 1st of the year preceding the Capability Year, then the resource's transition to a retail load modifier will not be reflected in the Transmission District Requirements
- **Resources with load reduction at the time of NYCA and Locality Peak will be added back to the actual metered load for determining ICAP Requirements**
  - Similar to the add-back done currently for SCR load reductions
- **New resources entering the market into an existing Aggregation will affect the Aggregation's derating factor going forward**
  - The derating factor for the months prior to the resource entering the market will be based on the NYISO class average of that resource type
- **For resources that swap Aggregations, the resource derating factor will be determined based on the participation models that the resource is moving to/from**
  - Homogeneous Aggregations have derating factors that are resource-type specific, whereas heterogeneous Aggregations are all Aggregations that use the UOL calculation

Time Stacking

Time Stacking - Qualifications

- **Time Stacking - the ability to stack/sequentially align DER to meet minimum duration requirements for capacity payments**
  - Individual DER must be separately registered and must be able to run for a minimum of 1 hour per day to participate in time stacking
    - Individual DER will only be allowed to participate in hour increments and be truncated down to the hour duration before time stacking
  - A time stacked DER will be rated for the amount of power it can sustain over the run time requirement
    - This can be the Capacity Supplier requirement or any Capacity Supplier with duration limitations requirement
  - DER participating in the homogeneous intermittent model cannot time stack
- **Individual DER can time stack to meet the 8 hour duration requirement, and/or can aggregate to increase their capacity if all individual DER are <= 20 MW**
  - The size requirement is only applicable to the injection portion of DER

Time Stacking – DMNC

- **The NYISO will require the time-stacked Aggregation to perform a DMNC test once every Capability Period**
  - The DER will be required to test these DER sequentially during the DMNC window to demonstrate that the DER can be distributed throughout the window
    - Prior to time stacking, each DER will have met all of the qualifications of a Capacity Supplier, excluding the duration requirement
    - The DER are stacked based on their ICAP
  - DMNC of the Aggregation is the minimum sustained output over the duration period
    - Time-stacked Aggregations will only be allowed to switch durations at the beginning of a Capability Year, and consequently perform a new DMNC test
  - Aggregations that obtain a DER new to the market must provide a new DMNC test for the Aggregation as a whole if the Aggregation wants to sell that DER in the Capacity Market

Time Stacking – DMNC (cont.)

- **The NYISO will require the time-stacked Aggregation to perform a DMNC test once every Capability Period**
  - The aggregator will provide a resource-specific breakdown of the time-stacked Aggregation's DMNC
  - Operating data can be submitted in lieu of a DMNC test
- **Aggregators do not need to perform a new DMNC within the same Capability Period if:**
  - The capacity of the Aggregation does not increase
  - The aggregator does not intend to use the new capacity
  - A DER leaves an Aggregation
  - If the duration of a time-stacked Aggregation decreases

MST 5
Incremental Revisions

The following slides were presented at the 2/15/19 ICAPWG

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Incremental Revisions – MST 5

- Sections:
  - 5.2
  - 5.3.3
  - 5.7
  - 5.12.1
  - 5.12.7
  - 5.12.11.5
  - 5.12.13
  - 5.12.14

Revisions Throughout MST 5

- **Revisions were made in the following sections of MST 5 to clean up the existing language:**
  - Capitalized “I” on “Installed Capacity” in Section 5.2
  - Changed “these” to “the” in Section 5.3.3

MST 5.7

- **This section discusses the Requirements for Entities not located within the NYCA**
  - Excludes resources using the DER Participation Model, Aggregations, Intermittent Power Resources, Limited Control Run of River Hydro Resources, and Resources with Energy Duration Limitations located in External Control Areas from participation in the NYISO Capacity Market

MST 5.12.1

- **This section discusses the Installed Capacity Supplier Qualification Requirements**
  - Removed “or DER” since Resource is inclusive
  - Removed “and Special Case Resources” as Responsible Interface Parties already appeared in the existing tariff language

MST 5.12.1 (cont.)

- **This section discusses the Installed Capacity Supplier Qualification Requirements**
  - Section 5.12.1.14
    - Revisions have been made to better explain the duration election process for Resources with Energy Duration Limitations

MST 5.12.7

- **This section discusses the Availability Requirements for ICAP Suppliers**
  - Revisions to include Bid, Schedule, Notify requirements in the Day-Ahead Market for Installed Capacity Suppliers with an Energy Duration Limitation
  - Inclusion of the Peak Load Window for the Summer and Winter Capability Periods
  - Inclusion of NYISO ability to specify a different window, with hours outside the Peak Load Window
    - No longer includes language that B/S/N will be on a best effort basis
  - Capacity Suppliers with duration limitations must have combination of bidding, scheduling, or notify up to the total ICAP Equivalent of the UCAP sold in the Day-Ahead Market for a minimum of the number of hours corresponding to the resource's duration limitation, unless the resource is an ESR, which must bid, schedule, or notify for all 8 hours of the peak load window. Failure to meet this obligation will result in a penalty
    - Bidding is providing energy bids
    - Scheduling is scheduling a bilateral transaction in the Day-Ahead Market
    - Notify is notifying the NYISO that the resource is unavailable for some/all of its capacity

MST 5.12.11.5

- **This section is new to the tariff and discusses Capacity Suppliers with duration limitations**
  - This section includes provisions for DAM and real-time scheduling applicable to Capacity Suppliers with duration limitations

MST 5.12.13

- **This section is new to the tariff**
  - This section describes requirements for Aggregations that are Installed Capacity Suppliers
    - This section specifically describes the rules for Resources that swap between Aggregations and rules for Time-Stacking Resources in an Aggregation

MST 5.12.14

- **This section is new to the tariff and discusses the Energy Duration Limitations and Adjustment Factors for Installed Capacity Suppliers**
  - This section pertains to the Energy Duration Limitations and Adjustment Factors for Installed Capacity Suppliers
    - The Energy Duration Limitations (hours) and Duration Adjustment Factors (%) applicable to Capacity Suppliers with an Energy Duration Limitation are included in this section
    - Revisions have been made to address the reason for the periodic review of the Capacity Value Study

MST 5.12.14 (cont.)

- **This section is new to the tariff and discusses the Energy Duration Limitations and Adjustment Factors for Installed Capacity Suppliers**
  - Additional revisions have been made to Section 5.12.14 to state that Resources with a limited run-time must elect an Energy Duration Limitation

MST 5.1 – 5.11

Originally presented at 2/6 ICAPWG presentation

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Updates – MST 5.1 – 5.11

- Sections:
  - 5.1
  - 5.8
  - 5.10
  - 5.11.4

Revisions Throughout MST 5

- **Revisions were made throughout MST 5 to clean up the existing language to accommodate DER and Aggregations:**
  - 'Resource' replaced the word 'Generator' in many instances in the following sections:
    - 5.9.2.3, 5.12.1, 5.12.3, 5.12.6.2.1, 5.12.8
  - 'Installed Capacity Supplier' replaced the words 'Qualified Resource' in the following sections:
    - 5.10, 5.11.4
  - 'Installed Capacity Supplier' replaced the words 'Generator' or 'generation' in the following sections:
    - 5.11.4, 5.12.3

MST 5.1

- **This section discusses the Control Area Services**
  - This section specifies that in addition to generating units, Installed Capacity Suppliers must coordinate outage schedules within the NYCA

MST 5.8

- **This section discusses the Communication and metering requirements for Control Area Services**
  - Revisions to allow units to aggregate at a single location for purposes of bidding

MST 5.10

- **This section discusses the NYCA Minimum Installed Capacity Requirement**
  - Revisions to the Minimum Unforced Capacity Requirement calculate to account for Resource's Adjusted ICAP value

MST 5.11.4

- **This section discusses the LSE Locational Minimum Installed Capacity Requirement**
  - Revisions to the LSE Locational Minimum Unforced Capacity Requirement calculate to account for Resource's Adjusted ICAP value

MST 5.12

Originally presented at 2/6 ICAPWG presentation

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Updates – MST 5.12

- Sections:
  - 5.12.1
    - 5.12.1.13
    - 5.12.1.14
    - 5.12.1.15
  - 5.12.5.1
  - 5.12.6.2
  - 5.12.8
  - 5.12.11
  - 5.12.12.2
  - 5.12.14

MST 5.12.1

- **This section discusses the Installed Capacity Supplier Qualification Requirements**
  - Revisions to explicitly include DER and Aggregations
  - Revisions to 5.12.1.13 which will not prohibit ESRs from only qualifying as 4 hour Capacity Suppliers

MST 5.12.1 (cont.)

- The following sections were added to include DER and Aggregations
  - Section 5.12.1.14
    - Requires ELRs, ESRs, and Aggregations (excluding Intermittents) to elect an Energy Duration Limitation
  - Section 5.12.1.15
    - Includes a minimum injection capability or minimum Demand Reduction of 0.1 MW for each Aggregation

MST 5.12.5.1

- **This section discusses Operating Data Reporting Requirements for ICAP Suppliers**
  - Revisions to explicitly include DER among the different resource types

MST 5.12.6.2

- **This section discusses the UCAP calculations for different resource types**
  - Revisions to include description of the amount of UCAP DER are authorized to supply
    - UCAP based on the individual availability of the DER in Real Time and calculated by the ISO
    - ISO shall calculate separate Summer and Winter Capability Period UCAP values for DER and update seasonally

MST 5.12.6.2 (cont.)

- **This section discusses the UCAP calculations for different resource types**
  - Revisions to include that a Resource's Unforced Capacity value will be the applicable Adjusted ICAP multiplied by the quantity 1 minus the Resource's derating factor

MST 5.12.8

- **This section discusses UCAP Sales for ICAP Suppliers**
  - Revisions to explicitly include DER and Aggregations

MST 5.12.11

- **This section discusses Responsible Interface Parties, Municipally-Owned Generation, Energy Limited Resources and Intermittent Power Resources**
  - Revisions to 5.12.11.1 for SCR obligations to state that SCRs will be compensated as a four hour resource
  - Revisions to 5.12.11.3 for the bidding obligation for ELRs

MST 5.12.12.2

- **This section describes the Sanctions for Failing to Comply with Bid, Schedule, Notify Requirements**
  - Revisions to include sanctions for Installed Capacity Suppliers that have an Energy Duration Limitation

MST 5.12.14

- **This section is new to the tariff**
  - 5.12.14.1
    - This section describes the Adjusted Installed Capacity applicable to Capacity Suppliers with an Energy Duration Limitation
  - 5.12.14.2
    - This section describes the process for the periodic review of the Capacity Value Study

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- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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