Rev 1

Resource Capacity Accreditation in the Forward Capacity Market

Seasonal Tie Benefits

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Resource Capacity Accreditation in the Forward Capacity Market	WMPP ID: 157

Proposed Effective Date: FCA 19

- The Resource Capacity Accreditation (RCA) project proposes improvements to ISO-NE's accreditation processes in the Forward Capacity Market (FCM) to further support a reliable, clean-energy transition by implementing methodologies that will more appropriately accredit resource contributions to resource adequacy as the resource mix transforms

- RCA provides an opportunity for continuous improvement of the Resource Adequacy Assessment (RAA) model that is used to calculate capacity requirements (demand side) and resources' reliability contribution (supply side)

- This presentation focuses on the assumptions for the evaluation of seasonal tie benefits

Proposed Effective Date: FCA 19

Outline of today's discussion:

- Seasonal tie benefits background and scope (slides 4 – 9)

- Two approaches for seasonal tie benefits evaluation

  - Approximation approach (slides 10 – 16)

  - Simulation approach (slides 17 – 22)

- ISO's determination and proposal (slides 23 – 25)

- Seasonal tie benefits assumptions for upcoming Impact Analysis, FCA 19, and FCA 20 and beyond (slides 26 – 29)

SEASONAL TIE BENEFITS BACKGROUND AND SCOPE

Tie benefits background

- Tie benefits values are parameters for various FCM processes
  - An input to RAA model for the ICR calculation
  - An input for determining the capacity transfer limit (CTL) for external interfaces
  - An input for establishing Hydro-Québec Interconnection Capability Credits (HQICCs)

Motivation for seasonal tie benefits evaluation

- Tie benefits are currently a set of annualized values representing the equivalent reliability contribution from each external interconnection in reducing New England's annual LOLE risk
  - Calculated through a probabilistic tie benefits study using simulation method
  - Since current ICR model focuses on the system risks during summer, such annual tie benefits values are essentially based on LOLE in the summer, representing the tie benefits available during the summer peak conditions

- As part of RCA, the ISO has proposed to incorporate risk modeling during the winter, thus it is important to review and develop seasonal tie benefits for the RAA model to account for situations where the loss of load could occur in both summer and winter

RCA seasonal tie benefits evaluation scope

- At February 2023 RC meeting, the ISO proposed to conduct an evaluation of seasonal tie benefits for FCA 19 to:
  - Evaluate the feasibility of calculating seasonal tie benefits using the current tie benefits calculation methodology
  - Identify the appropriate approach to develop seasonal tie benefits for the calculations of ICR and resources' MRI values under RCA

- As communicated in the ISO's October 22, 2022 memo to the Participants Committee, seasonal tie benefits evaluation for FCA 19 is not intended to:
  - Review of the current tie benefits calculation methodology
  - Review of the appropriateness of using tie benefits to meet the ICR
  - Beyond the scope for the FCA 19 RCA effort, a broader evaluation of tie benefits started at the October 2023 Power Supply Planning Committee (PSPC) meeting and will continue throughout 2024

Approaches for deriving seasonal tie benefits

- ISO proposed to evaluate two approaches using FCA 16 data assumptions, which was then the base for the original Impact Analysis
  - Approximation approach
    - Derive winter tie benefits from current tie benefits study results
    - Has been used for developing winter tie benefits assumptions for prior Impact Analysis and Future Grid Reliability Study
  - Simulation approach
    - Derive seasonal tie benefits through simulation by extending current tie benefits calculation methodology
    - Discussed at February 2023 RC meeting

Takeaways

- There is a need to develop seasonal tie benefits under RCA

- The ISO evaluated two approaches for deriving seasonal tie benefits in the FCA 19 RCA effort
  - Approximation approach
  - Simulation approach

- A broader evaluation of tie benefits is beyond the scope for the FCA 19 RCA effort and a separate review has begun at the PSPC and will continue throughout 2024

APPROXIMATION APPROACH

Interpretation of current tie benefits study results

- Current tie benefits are calculated as annualized values
  - Since New England system LOLE risks occur generally during the summer months, these annualized tie benefits represent the summer tie benefits from external areas
  - Quebec and Maritimes tend to be able to provide more tie benefits, mainly driven by the seasonal load diversity
    - Both areas are winter peaking systems and have surplus capacity during the summer that are available to assist the New England region when needed
    - Tie line transfer capability is typically the limiting factor

Interpretation of current tie benefits study results, cont.

- New York tends to provide less tie benefits
  - There are minimal tie benefits from load diversity
    - New England and New York loads are closely correlated during the summer
    - Both systems would tend to experience tight supply conditions at the same time
  - Therefore, tie benefits are mainly the result of resource random outages and diversity
    - New York is able to assist New England when New England experiences large amounts of simultaneous forced outages while New York does not, and vice versa
    - There may be slight diversity in the output of variable resources due to geographical differences
  - Tie line transfer capability is not the limiting factor

Expectation of tie benefits during the winter

- As compared to the summer, tie benefits from Quebec and Maritimes are expected to decrease during the winter when seasonal load diversity diminishes
  - They would not have the surplus capacity in the winter as they have during the summer
  - Tie benefits during the winter would then mainly come from resource random outages and diversity

- Tie benefits from New York during the winter are expected to result from resource random outages and diversity, just as they are in the summer
  - New York's winter load is expected to be similarly correlated to New England's as during the summer

Approximation of winter tie benefits using summer tie benefits results

- It is the expectation that during the winter, tie benefits from all external areas would be mainly attributed to resource random outages and resource diversity

- Simulated tie benefits from New York during the summer is representative of the amount of tie benefits obtainable from an external area as a result of resource random outages and resource diversity between the two systems

- New York's simulated summer tie benefits results can be used to approximate tie benefits from all external areas during the winter
  - New York's winter tie benefits ≈ New York's simulated summer tie benefits
  - Quebec's winter tie benefits ≈ New York's simulated summer tie benefits
    - Quebec system is slightly larger than New York, and it's reasonable to assume Quebec to be able to provide an amount of tie benefits similar to New York
    - Total Quebec winter tie benefits will be allocated to Phase II and Highgate proportionally to their summer tie benefits
  - Maritimes' winter tie benefits ≈ x% of New York's simulated summer tie benefits
    - A discount factor is applied to reflect a relatively smaller size of Maritimes' system

Example of approximation approach

- For the original Impact Analysis and the 2021 Economic Study (FGRS), approximation approach was used for developing seasonal tie benefits
  - New York's winter tie benefits ≈ New York's simulated summer tie benefits
  - Quebec's winter tie benefits   ≈ New York's simulated summer tie benefits
  - Maritimes' winter tie benefits ≈ *25%* of New York's simulated summer tie benefits

- Using FCA 16 tie benefits study as an example

	New York AC Ties	Quebec Ties			Maritimes Ties	Total
		Total	Phase II	Highgate		
FCA 16 tie benefits study results (MW)	287	1,065	923	142	478	1,830
Approximated seasonal tie benefits (MW)	287 (S) 287 (W)	1,065 (S) 287 (W)	923 (S) 249 (W)	142 (S) 38 (W)	478 (S) 72 (W)	1,830 (S) 646 (W)

Takeaways

- As compared to the summer, the tie benefits from Quebec and Maritimes during the winter are expected to reduce as the seasonal load diversity diminishes

- It is the expectation that during the winter, tie benefits from all external areas would be mainly attributed to resource random outages and resource diversity

- Simulated tie benefits from New York during the summer is representative of the amount of tie benefits obtainable from an external area as a result of resource random outages and resource diversity between the two systems

- New York's summer tie benefits results can be used to approximate the tie benefits from all external areas during the winter

SIMULATION APPROACH

Overall methodology

- As discussed [at February 2023 RC meeting](#), simulation approach utilizes the existing tie benefits calculation methodology

- **Seasonal** tie benefits will be calculated as the equivalent **seasonal** capacity that reconciles the **seasonal** LOLE difference of the New England system with and without the external interconnections
    - Model New England system and neighboring areas it has direct interconnection with
    - Bring each area **annual** LOLE to 0.1 days/year simultaneously while interconnected with each other, and observe **seasonal** LOLE components
        - When an area has a **seasonal** LOLE target, both **annual** and **seasonal** LOLE targets will be achieved in this step
    - Disconnect New England system from neighboring areas, both New England **annual** and **seasonal** LOLE will increase as a result of losing the assistance from other areas
    - Identify the amount of **seasonal** capacity when added to New England system will return its **seasonal** LOLE to the **seasonal** targets or the **seasonal** components when the **annual** LOLE is at 0.1 respectively
    - This amount of **seasonal** capacity is the **seasonal** total tie benefits for New England
    - Similar process is used to identify the **seasonal** tie benefits contribution from different interconnections by disconnecting the interconnection(s) under study

Challenges with simulating winter tie benefits for New York

- Under the simulation approach, tie benefits are calculated by comparing the LOLE difference of the New England system between two cases – with and without external tie(s). This requires that each control area properly captures their respective seasonal risks in the simulation model

- Not all neighboring areas have incorporated the winter risk in their reliability model
  - Both Quebec and Maritimes have winter focused models since they both are winter peaking systems
  - New England is working toward incorporating winter risk modeling as part of modeling enhancements under RCA
  - New York's reliability model provided to the NPCC still focuses on summer risk only
    - While NYISO is also working on the winter risk modeling as part of its capacity market reform, it indicated it is unlikely to be able to provide a winter focused model in the near future for our purpose
    - Tie benefits calculated using current New York model would not properly reflect New York's ability to provide assistance to its neighbors during the winter

Scenarios for simulating Quebec and Maritimes winter tie benefits

- Quebec and Maritimes winter tie benefits are simulated under three scenarios where New England winter LOLE risk is at different levels
  - 0.01 days/winter – low winter risk (10% of annual risk)
  - 0.05 days/winter – moderate winter risk (50% of annual risk)
  - 0.10 days/winter – high winter risk (100% of annual risk)

- There is abundant surplus during the winter in the current summer-focused New York model, which, if used directly, would result in unrealistic amount of assistance to New England not only through its direct interconnection with New England, but also by wheeling through Quebec and Maritimes to New England, which may also result in overstating the tie benefits from Quebec and Maritimes

- In order to properly simulate the tie benefits from Quebec and Maritimes, capacity is removed from New York to arrive at the same winter risk level as New England to eliminate the impact of the New York surplus that can be wheeled through Quebec and Maritimes and create an equal leaning condition for both systems during the winter

Comparison of Quebec and Maritimes winter tie benefits results of two approaches

- Simulated Quebec and Maritimes winter tie benefits increase slightly as the risk levels of New England and New York increase

- Average simulated winter tie benefits of Quebec is similar to the result from approximation approach
  - Supports approximation approach that Quebec winter tie benefits can be approximated using New York summer tie benefits

- Average simulated winter tie benefits of Maritimes is twice as high as the result from the approximation approach
  - Suggests Maritimes winter tie benefits can be approximated as 50% of New York's summer tie benefits
  - The tie benefits contribution is not necessarily proportional to the system size

Winter risk level for New York and New England	Quebec winter tie benefits		Maritimes winter tie benefits	
	Simulation approach	Approximation approach	Simulation approach	Approximation approach
Low risk − 0.01 days/winter	238		123	
Moderate risk − 0.05 days/winter	245	278	137	72
High risk − 0.10 days/winter	304		160	
Average	262		140	

Takeaways

- Current tie benefits calculation methodology can be used to simulate seasonal tie benefits to obtain sensible results when all areas have proper models to capture the system risks for both summer and winter
  - Lack of winter risk model for the New York system does not allow the application of the current tie benefits calculation methodology to obtain sensible winter tie benefits from New York

- Quebec and Maritimes' winter tie benefits can be calculated using the simulation approach by removing New York surplus during the winter. The results are relatively insensitive to the winter risk level of New England

- The simulated Quebec winter tie benefits result supports that Quebec winter tie benefits can be approximated using New York summer tie benefits

- The simulated Maritimes winter tie benefits result suggests that Maritimes winter tie benefits can be approximated as 50% of New York's simulated summer tie benefits

ISO'S DETERMINATION AND PROPOSAL

ISO's determination

- Under RCA, there is a need to develop appropriate tie benefits for both summer and winter

- It is not feasible in the near-term to adopt the simulation approach to develop seasonal tie benefits assumptions due to the lack of winter risk modeling for the New York system

- In the short-term for the RCA effort, the ISO recommends to adopt the approximation approach to develop winter tie benefits
  - Comparison of the winter tie benefits from Quebec and Maritimes using these two approaches suggested that the approximation approach could result in a close approximation of the winter tie benefits using the simulation approach
  - Implementation of the approximation approach is straight forward and does not require additional simulation efforts

- Once all the external areas have proper models to capture both summer and winter risks, the ISO will re-evaluate these approaches, and determine which approach (or other alternative) is more appropriate in conjunction with the outcome of the broader tie benefits stakeholder discussions at the PSPC

ISO's proposal – using approximation approach to develop seasonal tie benefits for RCA

- Simulate the summer tie benefits for each external interface using the existing tie benefits calculation methodology
  - External areas' annual LOLE is at 0.1 days/ year while both New York's and New England's summer LOLE is at 0.1 days/year

- The winter tie benefits for each external interface will be approximated using New York's simulated summer tie benefits
  - New York's winter tie benefits = New York's simulated summer tie benefits
  - Quebec's winter tie benefits = New York's simulated summer tie benefits
    - Total Quebec winter tie benefits will be allocated to Phase II and Highgate proportionally to their simulated summer tie benefits
  - Maritimes' winter tie benefits = 50% of New York's simulated summer tie benefits

SEASONAL TIE BENEFITS ASSUMPTIONS FOR UPCOMING IMPACT ANALYSIS, FCA 19, AND FCA 20 AND BEYOND

Seasonal tie benefits assumptions for Impact Analysis

- The upcoming Impact Analysis for supporting the RCA design uses FCA 18 resource mix

- Seasonal tie benefits assumptions will be developed using the proposed approximation approach based on FCA 18 tie benefits study results, as summarized in the table below

	New York AC Ties	Quebec Ties			Maritimes Ties	Total
		Total	Phase II	Highgate		
FCA 18 tie benefits study results (MW)	396	1,177	1,041	136	544	2,115
Approximated seasonal tie benefits (MW)	**396 (S)** **396 (W)**	**1,177 (S)** **396 (W)**	**1,041 (S)** **350 (W)**	**136 (S)** **46 (W)**	**544 (S)** **198 (W)**	**2,115 (S)** **990 (W)**

Seasonal tie benefits assumptions for FCA 19

- Under the currently proposed RCA design
  - The RAA cases for the **seasonal risk assessment** and the **resource accreditation** will use completed FCA 18 tie benefits study results due to timing of the qualification period in Q1 2025
  - The RAA case for **Installed Capacity Requirements** calculation will use tie benefits assumptions from the FCA 19 tie benefits study with modeling updates conducted in the summer of 2025

- Therefore, the seasonal tie benefits assumptions for the FCA 19 seasonal risk assessment and resource accreditation will be developed using the proposed approximation approach based on FCA 18 tie benefits study results, as summarized in the table below

	New York AC Ties	Quebec Ties			Maritimes Ties	Total
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FCA 18 tie benefits study results (MW)	396	1,177	1,041	136	544	2,115
Approximated seasonal tie benefits (MW)	396 (S) 396 (W)	1,177 (S) 396 (W)	1,041 (S) 350 (W)	136 (S) 46 (W)	544 (S) 198 (W)	2,115 (S) 990 (W)

Seasonal tie benefits development for FCA 20 and beyond

- For FCA 20 and beyond
  - Application and timing of seasonal tie benefits will be further evaluated and discussed in conjunction with the ISO's ongoing discussions of future capacity market designs

Questions