Forward Capacity Auction 13 Transmission Transfer Capabilities & Capacity Zone Development

Planning Advisory Committee

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Topics

- Review of interface transfer capabilities
- Proposed Capacity Zone construct for the thirteenth Forward Capacity Auction (FCA-13, Capacity Commitment Period (CCP) 2022-2023)

FCA-13 – Capacity Zone Development: Steps So Far

- The Forward Capacity Auction 13 (FCA-13) Capacity Zone Development Preview was presented at the November 2017 Planning Advisory Committee (PAC) meeting
- 2018 Forward Capacity Market Transmission Certifications were presented at the January 2018 Reliability Committee
  - There is no change to the interface transfer capabilities as a result of the new certifications for FCA-13

REVIEW OF INTERFACE TRANSFER CAPABILITIES

Internal Interfaces

FCA-13 Internal Interface Transfer Capability

Single-Value, Summer Peak,[a] Non-Firm, Transmission Interface Limits for Use in Subarea Transportation Models										
Interface	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Orrington South Export	1325	1325	1325	1325	1325	1325	1325	1325	1325	1325
Surowiec South	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Maine-New Hampshire	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Northern New England-Scobie + 394	3100	3450[b]	3450	3450	3450	3450	3450	3450	3450	3450
North-South	2100	2725[b]	2725	2725	2725	2725	2725	2725	2725	2725
East-West	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
West-East	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Boston Import (N-1)	4850	5700[b]	5700	5700	5700	5700	5700	5700	5700	5700
Boston Import (N-1-1)	4175	4600[b]	4600	4600	4600	4600	4600	4600	4600	4600
SEMA/RI Export	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400
SEMA/RI Import (N-1)	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
SEMA/RI Import (N-1-1)	720	720	720	720	720	720	720	720	720	720
Southeast New England Import (N-1)	-	5700[b]	5700	5700	5700	5700	5700	5700	5700	5700
Southeast New England Import (N-1-1)	-	4600[b]	4600	4600	4600	4600	4600	4600	4600	4600
Connecticut Import (N-1)	2950	2950	3400[c]	3400	3400	3400	3400	3400	3400	3400
Connecticut Import (N-1-1)	1750	1750	2200[c]	2200	2200	2200	2200	2200	2200	2200
SW Connecticut Import (N-1)	2500	2500	2500	2800[d]	2800	2800	2800	2800	2800	2800
SW Connecticut Import (N-1-1)	1750	1750	1750	1900[d]	1900	1900	1900	1900	1900	1900

Notes are discussed on the following pages

FCA-13 Internal Interface Transfer Capability (Notes)

a) Limits are for the summer period, except where noted to be winter
   - The limits may not include possible simultaneous impacts, and should not be considered as “firm”
   - For the years within the FCM horizon (CCP 2022-23 and sooner), only accepted certified transmission projects are included when identifying transfer limits
   - For the years beyond the FCM horizon (CCP 2023-24 and later), proposed plan approved transmission upgrades are included according to their expected in-service dates

b) Increase associated with the Greater Boston Upgrades

c) Increase associated with the Greater Hartford/Central Connecticut Upgrades

d) Increase associated with the Southwest Connecticut Upgrades

EXTERNAL INTERFACES

FCA-13 External Interface Import Capability

Single-Value, Summer Peak,[1] Non-Firm, Transmission Interface Limits for Use in Subarea Transportation Models

Interface	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Brunswick-New England (energy import capability)[2]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
New Brunswick-New England (capacity import capability)	700	700	700	700	700	700	700	700	700	700
HQ-New England (Highgate) (energy import capability)[3]	217	217	217	217	217	217	217	217	217	217
HQ-New England (Highgate) (capacity import capability)	200	200	200	200	200	200	200	200	200	200
HQ-New England (Phase II) (energy import capability)[4]	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
HQ-New England (Phase II) (capacity import capability)	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
Cross-Sound Cable (CSC) (energy import capability)[5]	330	330	330	330	330	330	330	330	330	330
Cross-Sound Cable (CSC) (capacity import capability)	0	0	0	0	0	0	0	0	0	0
New York-New England (energy transfer capability)[6]	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
New York-New England (capacity transfer capability)	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400

Notes are discussed on the following pages

External Interface Import Capability (Notes)

1. Limits are for the summer period
   - The limits may not include possible simultaneous impacts, and should not be considered as “firm” (the bases for these limits are subject to more detailed review in the future)
2. The electrical limit of the New Brunswick-New England (NB-NE) Tie is 1,000 MW
   - When adjusted for the ability to deliver capacity to the greater New England Control area, the NB-NE transfer capability is 700 MW
     - This is because of downstream constraints; in particular Orrington South
3. The capability for the Highgate facility is listed at the New England AC side of the Highgate terminal

External Interface Import Capability, continued …

4. The Hydro-Quebec Phase II interconnection is a DC tie with equipment ratings of 2,000 MW. Due to the need to protect for the loss of this line at full import level in the PJM and NY Control Areas' systems, ISO-NE has assumed its transfer capability for capacity and reliability calculation purposes to be 1,400 MW
   - This assumption is based on the results of loss-of-source analyses conducted by PJM and NY
5. Import capability on the Cross Sound Cable is dependent on the level of local generation
6. New York interface limits
   - These are without CSC and with the Northport Norwalk Cable at 0 MW flow
   - Simultaneously importing into NE and SWCT or CT can lower the NY-NE capability (very rough decrease = 200 MW)

PROPOSED POTENTIAL ZONAL CONSTRUCT FOR FCA-13

Proposed Potential Zonal Construct for FCA-13

- For FCA-12, the following were evaluated using the Capacity Zone modeling objective criteria triggers in Section III.12.4 of the Tariff
  - Potential export-constrained zone
    - Northern New England ("NNE" - Vermont, New Hampshire & Maine)
  - Potential import constrained zones
    - Southern New England ("SENE" - Northeast Massachusetts/Boston & Southeast Massachusetts/Rhode Island)
    - Connecticut
- The potential Capacity Zone construct for FCA-13 will be different from the proposed construct in FCA-12
  - In addition to the above considerations, the Maine Load Zone will also be evaluated as a potential export-constrained Capacity Zone
    - There has been a significant backlog of requests in the ISO New England Interconnection Queue in Maine
    - The November 1, 2017 FERC approval of the ISO's Clustering Proposal will enable the queue to move forward in Maine
      - This will mean that more resources in Maine may be able to qualify for the FCA

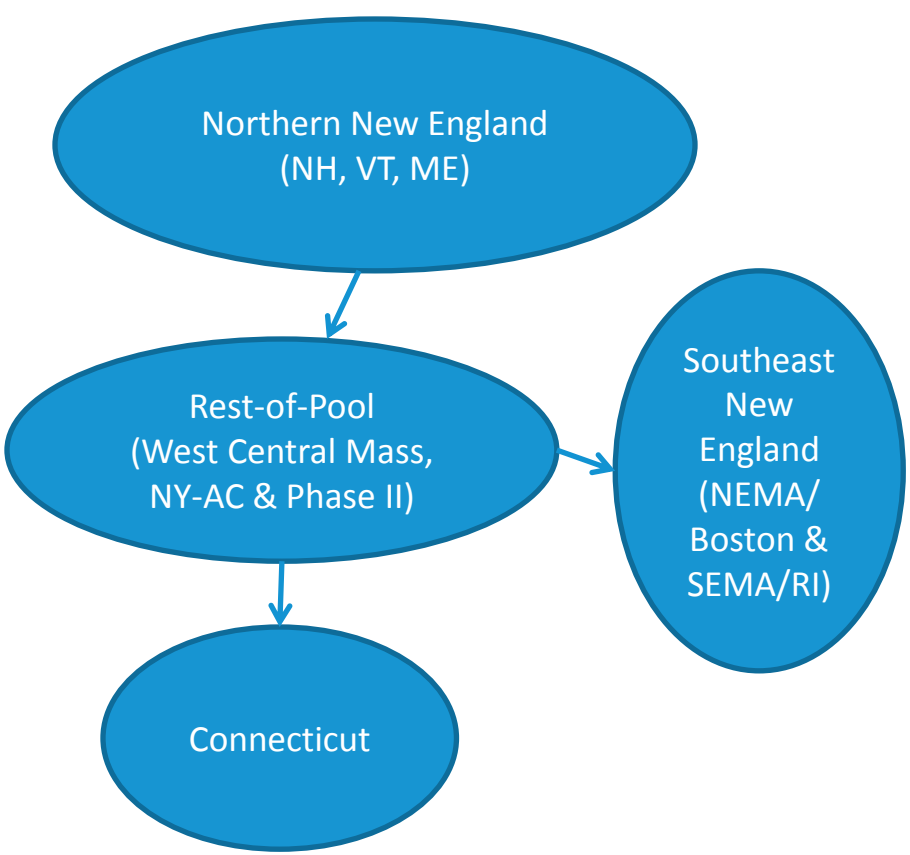
Northern New England

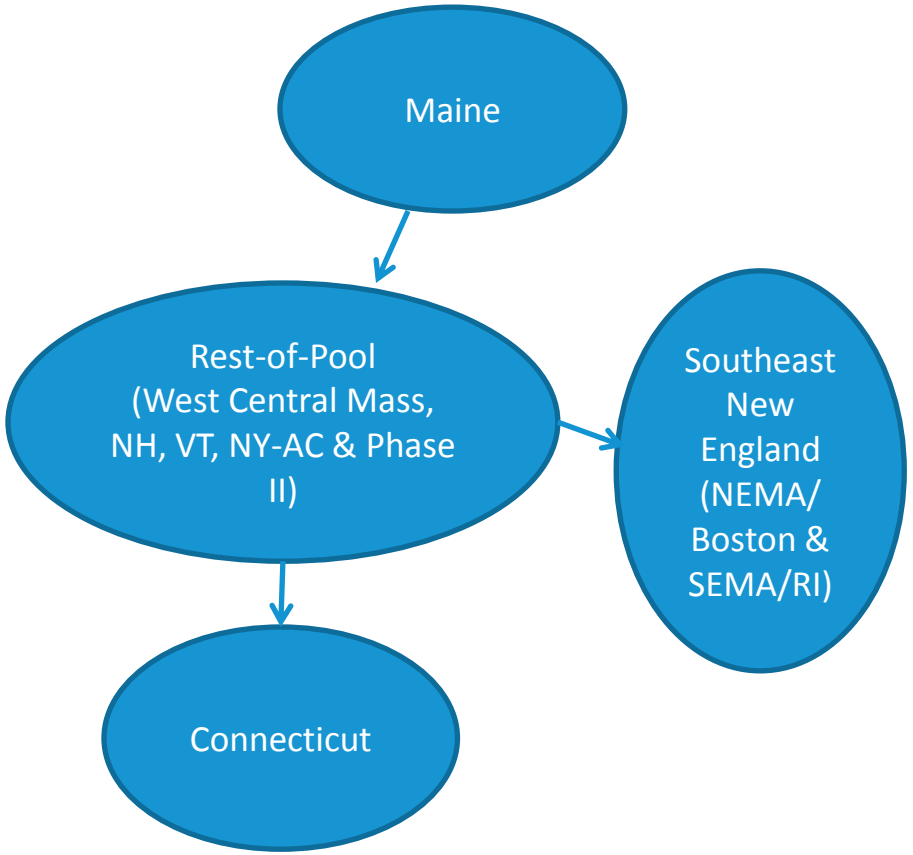
- Northern New England (NNE) will also be evaluated as a potential export-constrained Capacity Zone – there are two possible eventual outcomes for this part of the system for FCA-13
  1. NNE could be modeled as an export-constrained Capacity Zone that includes Maine, New Hampshire and Vermont
     - Without Maine modeled as a separate export-constrained Capacity Zone
  2. Maine could be modeled as an export-constrained Capacity Zone with New Hampshire and Vermont incorporated into the Rest-of-Pool zone

Potential Capacity Zone Boundary Interface Transfer Capabilities

FCA-12 Transfer Capabilities (MW)		FCA-13 Transfer Capabilities (MW)	
SENE Import N-1	5,700	SENE Import N-1	5,700
SENE Import N-1-1	4,600	SENE Import N-1-1	4,600
Connecticut Import N-1	3,400	Connecticut Import N-1	3,400
Connecticut Import N-1-1	2,200	Connecticut Import N-1-1	2,200
North-South (NNE Boundary) N-1	2,725	North-South (NNE Boundary) N-1	2,725
		Maine-New Hampshire (Maine Boundary)	1,900

Potential Capacity Zone Constructs for FCA-13





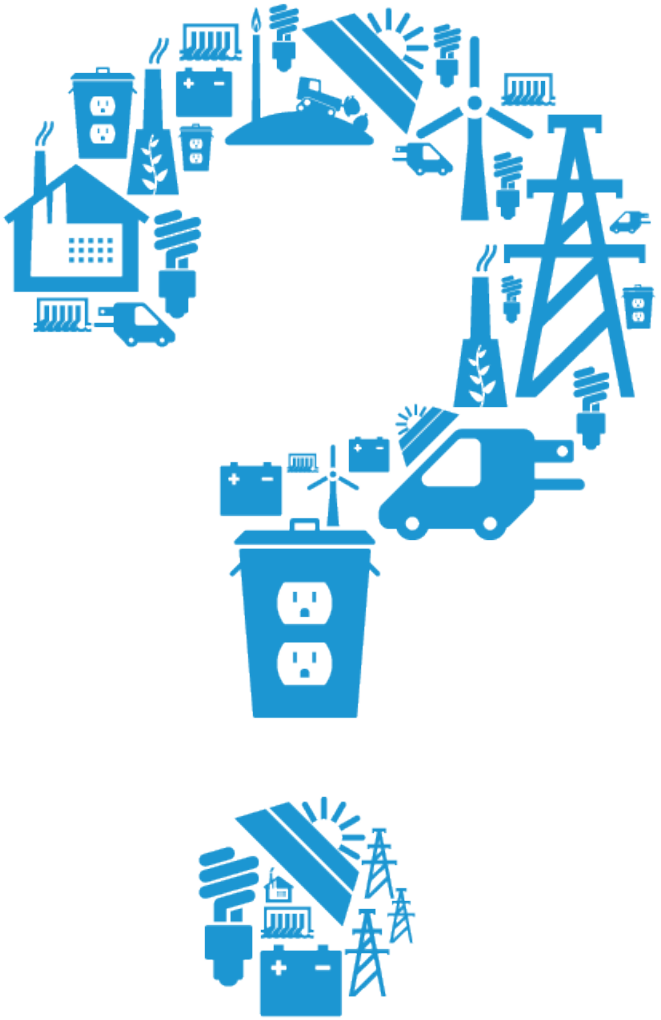
Note that zones are modeled in the FCA only if the objective criteria in Market Rule 1, Section 12 is triggered

Next Steps

- The potential Capacity Zone boundaries will be tested using the Step 2* objective criteria trigger calculations
  - Scheduled for the May 2018 Power Supply Planning Committee
- Zones that trigger the objective criteria will be modeled in the FCA and associated reconfiguration auctions
- The FCA will determine whether any of the modeled zones bind in the auction and experience price-separation

*See Appendix: Methodology for Modeling Capacity Zones in FCM

Questions



APPENDIX

Methodology for Modeling Capacity Zones in FCM

Developing Zonal Boundaries for the FCM

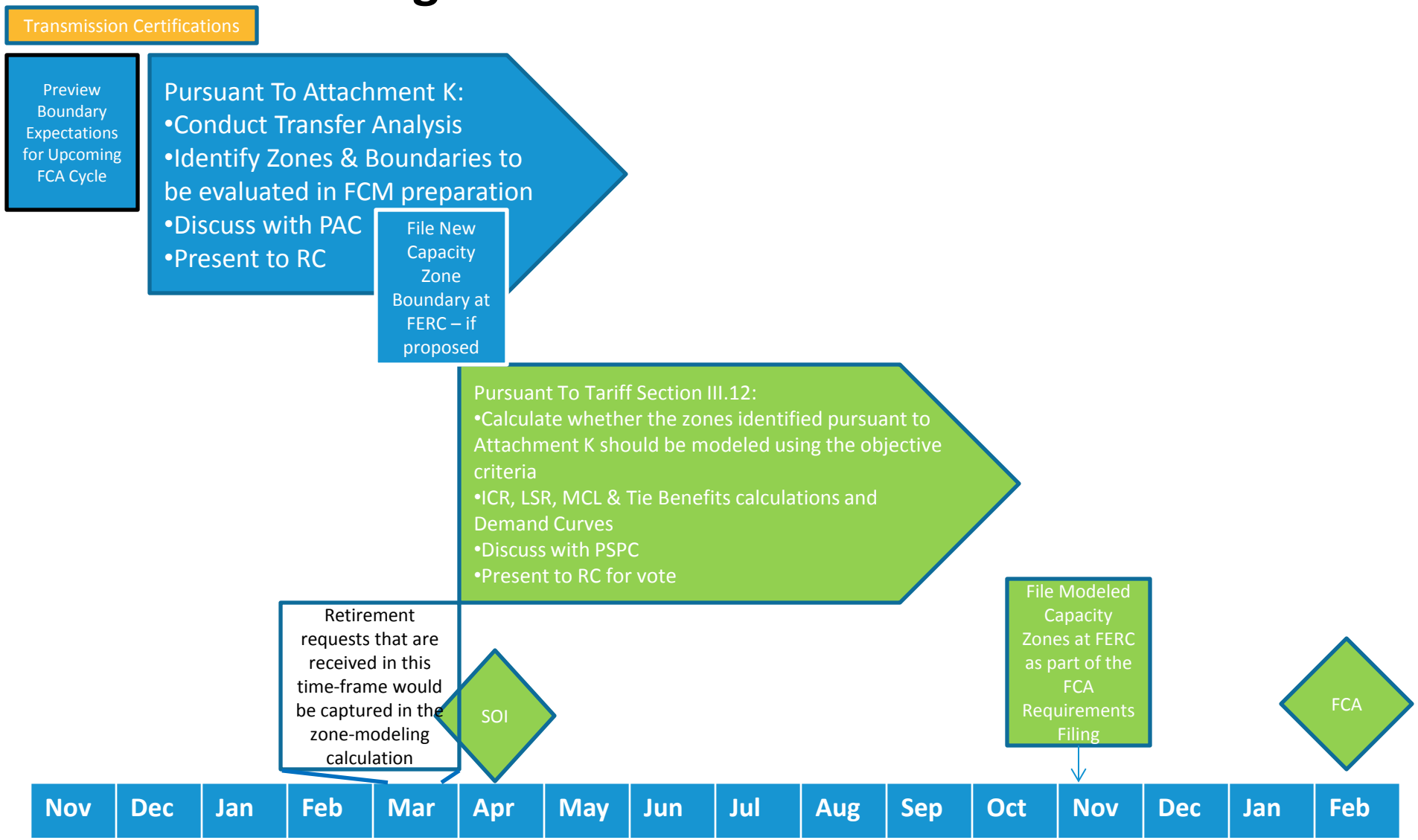
- Included in Attachment K of the Open Access Transmission Tariff:
  - Annual Assessment of Transmission Transfer Capability
    - Each year, the ISO shall issue the results of the annual assessment of transmission transfer capability, conducted pursuant to applicable NERC, NPCC and ISO New England standards and criteria and the identification of potential future transmission system weaknesses and limiting facilities that could impact the transmission system's ability to reliably transfer energy in the planning horizon.
    - Each annual assessment will identify those portions of the New England system, along with the associated interface boundaries, that should be considered in the assessment of Capacity Zones to be modeled in the Forward Capacity Market pursuant to ISO Tariff Section III.12.

Zone Formation: A Two Step Process

Step ONE	Step TWO
Identify the potential zonal boundaries and associated transfer limits to be tested for modeling in the FCM	Use objective criteria* to conduct the test determining whether or not the zone meets the trigger to be modeled for the Capacity Commitment Period
	Import-constrained zone Trigger to model the zone is based on the quantity of surplus resources in the zone above the zonal requirement Export-constrained zone: Trigger to model the zone is based on the quantity of existing and proposed new resources compared with the maximum capacity capability in the zone Zones that are neither import- or export-constrained are collapsed into the rest-of-pool zone

*Objective criteria are contained in Section III.12.4 of the ISO Tariff

Zonal Modeling Timeline



External Import Capability Determinations For Use in FCM (Tariff Section III.12.9.2.4)

- The import capability of all external interconnections with New England will be determined using studies of system conditions expected during the Capacity Commitment Period:
  - Forecast 90/10 peak load
  - Existing Generating Capacity Resources at their CNR Capability
  - Existing Demand Resources reflecting their Capacity Supply Obligation
  - Stressed Transfers
- The system will be modeled in a manner that reflects the design of the interconnection
  - If an interconnection and its supporting system upgrades were designed to provide incremental capacity into the New England Control Area, simulations will assume imports up to the level that the interconnection was designed to support
  - If the interconnection was not designed to be comparably integrated, simulations will determine the amount of power that can be delivered into New England over the interconnection

Background

- In November 2015, in preparation for the Capacity Zone formation process for FCA-11, the PAC engaged in comprehensive discussion of the zone formation process and the expected direction of zone preparations for FCA-11
  - Historical Development — link to presentation
  - Current Process — link to presentation
  - Review of Determinations for FCA 10 — link to presentation
  - New England Power System in 2020 — link to presentation
- In November 2017, the PAC discussed a preview of the Capacity Zone Determinations for FCA-13