The New Generation Interconnection Process and the Forward Capacity Market

Technical Session

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Purposes

• This technical session presentation was prepared in response to stakeholder/participant requests for discussion regarding the timing of impact studies and the interrelationship between the interconnections processes and the FCM

• This session will provide an overview of the current procedures governing the integration of the new generator interconnection process with the Forward Capacity Market (FCM)
  – Transparency and useful information for the market in understanding the application of the Overlapping Impact Test
  – Opportunity to obtain more meaningful information concerning the energy deliverability of new resources given the system topology
  – Coordination of the above with FCM qualification
Agenda

- History of interconnection process development in New England
- Current status of the interconnection study progress
- Further discussion of the FCM/Queue changes
- Overview of the generator interconnection process
- Development of overlapping interconnection upgrades
- Queue position timeout
- Qualification statistics
- The overlapping interconnection standard
- Case studies
BRIEF HISTORY OF INTERCONNECTION PROCESS DEVELOPMENTS IN NEW ENGLAND
Timeline of Interconnection Standard Development in New England

1998
• Minimum Interconnection Standard

2003/2004
• FERC Proforma LGIA/LGIP

2009
• FCM/Queue Reforms

2015
• Elective Transmission Upgrades
Minimum Interconnection Standard

- Minimum required upgrades, consistent with:
  - No degradation in transfer capability
  - Maximum one-for-one displacement of existing/proposed generation
  - All reliability standards must be met
  - ISO can still operate and maintain the system reliably

- Minimum Interconnection Standard
  - More stringent than “plug and play”
  - Does not ensure incremental capacity to serve load
  - Does ensure no degradation to load-serving capability of the system
  - Consistent with market and Tariff constructs for Network Resources
2008 FCM-Q Reforms: Summary of Objectives

• Improved coordination between the requirements of the Forward Capacity Market and the Generator Interconnection Process

• Addressed Intra-Zonal Deliverability in New England

• Addressed Interconnection Queue processing issues that had been observed across the industry and discussed at FERC
Elective Transmission Upgrades

• In April 2015, FERC approved the interconnection procedures for Elective Transmission Upgrades (ETUs)
  – New Schedule 25 in the ISO OATT that governs the interconnection of all forms of ETUs to the New England system
    • Closely modeled on, and integrated with, the generator interconnection procedures
  – Established interconnection service rights for certain ETU types
    • New controllable External ETUs
  – Enabled an Internal ETU to become directly associated with a specific Generating Facility seeking CNRIS
    • So that it can be studied together with the Generating Facility and thereby increase the Generating Facility’s ability to qualify for the FCM
  – Did not alter the existing Tariff structure
    • ETUs must function within the existing dispatch, market and tariff structures of the New England system
THE CURRENT STATUS OF THE INTERCONNECTION PROCESS THROUGHOUT NEW ENGLAND
Current Queue Status

- **At this time, with very specific exceptions, queue processing is up-to-date**

- With the exception of the North and Western Maine portion of the system (which has experienced a backlog of mostly wind interconnection requests), all of the generator interconnection requests made through 2014 have completed the system impact study phase and have moved to the Interconnection Agreement and commercialization phases.

- Note that the ISO has also identified other parts of the system that would face significant challenges to adding new generation:
  - Northern Vermont
  - Northern New Hampshire
Status of Queued Requests (December 1, 2015)

Active Interconnection Requests Without a Completed System Impact Study

<table>
<thead>
<tr>
<th>Year of Original Interconnection Request</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
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<tbody>
<tr>
<td>Wind Project In Maine</td>
<td>1</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Not a Wind Project In Maine</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Drivers of the Backlog in Maine

1. Characteristics of the Maine system

2. Requests far beyond the capability of the existing Maine system

3. Issues with Inverter Based Generators
Generator Interconnection Process Improvements
Phase 1 - Near Term Plans

• The ISO is currently working with stakeholders to make targeted changes to the interconnection process
  – Q3 2015 – Q1 2016

• Goal is to reduce time to complete interconnection studies, particularly for inverter-based generators in weak areas of the system, such as Northern and Western Maine
  – The objective of these proposals is to make generator projects more “study-ready”
    • Based on experienced gained studying projects in the New England queue
    • Based on observations of best practices in other areas
    • Leveraging the capabilities of generation technology

• Also seek to address curtailment and performance issues in system operations for inverter-based generators and to meet modeling and performance requirements being introduced by new NERC standards
  – Recent FERC NOPR regarding reactive capability for wind generators
Generator Interconnection Process Improvements
Phase 2 - Longer Term Considerations

• Interconnection issues in the identified remote areas of the system are not caused by, nor can they be addressed by, queue process changes
  – The existing transmission system was built to serve minimal system load and is at its limit
    • As noted above, studies since 2009 have shown the need for significant transmission system expansion
    • Even if small incremental amounts of wind can be added, it is clear that the existing system cannot support hundreds or thousands of proposed MWs
  – If individual projects are not able or willing to make the scale of system upgrade investments now required; key issue becomes infrastructure

• How to address the infrastructure issues?
  – Additional wind integration analysis to identify the overall upgrades required to interconnect the levels of MW that are proposed?
    • Such an approach is essentially a clustering study and only appears to be a way forward if coupled with cost allocation to queue projects to share costs
    • Interconnection cost allocation alternatives?
Other Recent Queue Observations

• Upturn in proposals in Southern New England
  – Many timed with FCM Show of Interest window
  – Many new proposals in Southeast New England (SEMA/RI)
  – Mostly gas-fired (primary fuel)
  – Studies proceeding well overall

• Activity with solar project applications

• Activity with storage applications

• Recent newly proposed Elective Transmission Upgrades
FURTHER DISCUSSION OF THE FCM/QUEUE CHANGES

Regulatory Background
FCM/Queue Stakeholder Process

• The ISO, NECPUC (New England Conference of Public Utilities Commissioners), and New England Power Pool (NEPOOL) agreed to engage in a stakeholder process to look for ways to improve the coordination between the requirements of the FCM qualification and the generator interconnection process.

• The resulting FCM/Queue Filing addressed three different Tariff compliance requirements regarding the interconnection process for Generating Facilities in New England:
  – Order 2003 Compliance to implement an intra-zonal deliverability standard
  – The reliance on interconnection queue position to determine qualification for the FCM
    • Concerns about “queue blocking”
  – FERC review of interconnection process management efficiencies
Order 2003 Compliance

• In Order 2003, FERC promulgated the pro-forma Large Generator Interconnection Procedure (LGIP)
  – Order 2006 covered Small Generator Interconnection Procedure (SGIP)

• ISO-NE submitted the initial compliance filing in January 2004

• In its November 8, 2004 Order, FERC addressed the use of the “Minimum Interconnection Standard” (MIS) for generator interconnections
  – The MIS does not test the deliverability of generation to load
Order 2003 Compliance (cont.)

• FERC stated that it may not be just and reasonable
  – “For a generator in one location to sell its capacity as a capacity resource to, and receive capacity payments from, a load in another location if the generator's output is not deliverable to the load that buys the capacity”

• First driving issue of FCM/Queue reforms: FERC required the ISO to file a mechanism that will ensure generators meet an intra-zonal deliverability test in order to qualify as a capacity resource
Reliance on Interconnection Queue During FCM Qualification

• The overlapping impacts analysis in the FCM design relied on the interconnection queue order as a tie-breaking mechanism for the qualification of New Generating Capacity Resources in instances of limited overlapping impact interconnection space.

• Stakeholders expressed concern that disqualifying new generation from the FCM based on queue position was “not ideal”
  – Least-cost resources may not be selected in FCM
  – Queue blocking
  – Resources not selected in the FCM risk incurring costs that may not be recouped, regardless of queue position

• Second driving issue of FCM/Queue reforms: There were concerns regarding the reliance on Interconnection Queue position during FCM Qualification.
FERC Interconnection Processes Efficiencies Review

• FERC held a technical conference regarding Interconnection Process efficiencies on December 11, 2007
  – Docket No. AD08-02-000

• FERC provided guidance on variations that could potentially be justified under “independent entity variation standard”
  – Increase requirements for getting and keeping a queue position
  – Consider alternative approaches to prioritizing queue processing comparable to first-come, first-served approach (e.g., first-ready, first-served)

• Third driving issue of FCM/Queue reforms: the need for Interconnection Procedure reform to increase process efficiencies
FCM/Queue Filing: Key Elements

• Established two types of Interconnection Service
  – Capacity Network Resource Interconnection Service (CNRIS)
  – Network Resource Interconnection Service (NRIS)

• Incorporated the overlapping impacts analysis in the form of a CNR Group Study as the intra-zonal deliverability standard and other FCM-related milestones for CNRIS

• Replaced the “first-come, first-served” approach with a combination of a “first-come, first-served” and “first-cleared, first-served” approach for CNRIS
FCM/Queue Filing: Key Elements (cont.)

• Increased the milestones and deposits in the LGIP

• Created an option for a preliminary, non-binding analysis of overlapping impacts under the existing Interconnection Feasibility and System Impact Studies (SIS’s)

• A valid Interconnection Request for CNR Interconnection Service required before submitting a Show of Interest (SOI) form to the FCM
FCM/Queue Filing: Key Elements (cont.)

• Established a Conditional Qualified New Generating Capacity Resource treatment for resources with lower Queue Positions in instances of limited overlapping impact interconnection space

• Established a Long-Lead Facility construct for inclusion of such resources in CNR Group Studies prior to the applicable Forward Capacity Auction (FCA)

• Established a restudy for determining final upgrade responsibility for CNRIS subsequent to each FCA
FCM/Queue Filing

• The October 31, 2008 FCM/Queue Filing was approved by FERC on January 30, 2009
  – ER09-237, 126 FERC ¶ 61,080
Interconnection Process – Basic Flow

- Feasibility Study
- System Impact Study
- Facilities Study
- Interconnection Agreement Development
- Construction

Interconnection Request

Scoping Meeting

Commercial Operations
Capacity Interconnections

• CNR Interconnection Service is available for Interconnection Customers that wish to provide capacity to New England at their established CNR Capability
  – CNR Interconnection Service follows from demonstrated ability and commitment to meet the Capacity Capability Interconnection Standard
Timeline: FCA vs Interconnection Queue Process

- **FCM Qualification Reviews (9 months)***
- **Auction Prep FERC Review (4 months)**
- **Project applies to FCA<sub>n</sub>**
- **QDN Notification**
- **FCA<sub>n</sub> ~ 3 Years**
- **If project clears in FCA<sub>n</sub> it undergoes post FCA restudy to determine final upgrade responsibility**

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### Feasibility Study
- **System Impact Study**
- **Facilities Study**
- **Interconnection Agreement Development**
- **Construction**

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**Optional) Preliminary Non-Binding Analysis***

*aaka Preliminary Non-Binding Overlapping Impact Study (PP5-6, Section 8)*

**For FCA #11, this time frame may change as part of timeline change proposals associated with the Retirement Reforms project.*
Capacity Interconnections – Milestones

• Capacity Interconnections have to meet the following requirements (milestones)
  – Pursuit of the completed Interconnection Process for NR Interconnection Service
  – Participate in FCM Qualification
    • Show of Interest
    • New Capacity Qualification Package
  – Post FCM Financial Assurance (FA)
  – Clear in the FCA within a certain period of time
    • Or obtain a Capacity Supply Obligation through an Annual Reconfiguration Auction or Annual Bilateral Transaction
  – Participate in Post-FCA restudy
Capacity Network Resource Capability

• Defines the CNR Interconnection Service rights that must be maintained for the generator

• Defines whether an Interconnection Request is required for a proposed increase in CNR Capability in accordance with the LGIP/SGIP

• Defines whether an initial interconnection analysis is required under FCM qualification for a proposed increase in output from an Existing Generating Capacity Resource
Capacity Network Resource Capability (cont.)

• For Existing Generating Capacity Resources, was determined based on the hierarchy - IA, I.3.9 or historical capability

• For New Generating Capacity Resource, is obtained by completing all of the associated interconnection milestones, including obtaining a Capacity Supply Obligation in the FCM

• Is captured in the Interconnection Agreement for New Generating Capacity Resources

• Is recorded in the annual forecast report of Capacity, Energy, Loads and Transmission (the “CELT”)
KEY STEPS IN THE QUALIFICATION PROCESS
Key Steps in Qualification Process

1. SOI form submission*
2. QPCRD submission
3. Initial interconnection analyses
4. New qualification package submission
5. New qualification package review
6. QDN issuance
7. Market participant deadline
8. FCM deposit submission

QPCRD = Qualification Process Cost Reimbursement Deposit
QDN = Qualification Determination Notification

*Generation and Elective Transmission Upgrades must also have submitted a valid Interconnection Request
Key Steps in Qualification Process

**Step 1 – SOI Form Submission**

- **SOI form:**
  - Submitted by all interested project sponsors seeking qualification
  - Applicable to all eligible resource types
  - Contains all necessary project information including the proposed MWs, interconnection point, and other necessary attachments
  - Submitted using the Forward Capacity Tracking System (FCTS)

- **SOI form is required for generation resources in addition to a valid Interconnection Request submitted as defined in Schedules 22, 23, and 25 of the Tariff (LGIP/SGIP/ETU Interconnection Procedures)**
Key Steps in Qualification Process

*Step 2 – QPCRD Submission*

• Qualification Process Cost Reimbursement deposit is:
  – Submitted by all project sponsors who have submitted an SOI
  – Mechanism to recover costs incurred during the qualification process
  – Dependent on the type and size of the project

• ISO sends invoice for payments a few weeks after the SOI submission window
  – Payment is due in accordance with the ISO New England Billing Policy
Key Steps in the Qualification Process

*Step 3 – FCM Initial Interconnection Analyses*

- Performed by the ISO to identify the effect of the new project on the New England transmission system
- Applicable to all generation resources and ETUs:
  - Direct connect review (including site control review/verification)
  - Network Capability Interconnection Standard (NCIS) test
  - Overlapping Interconnection Impact Analysis

*Note: Analysis also applies to demand resources (DRCR and RTEG)*
Key Steps in Qualification Process

**Step 4 – New Qualification Package Submission**

New Capacity Qualification Package:

- Required for projects to continue in the qualification process
- Submitted by the project sponsors
- Contains:
  - Detailed information on the Critical Path Schedule (CPS) of the project
  - Intermittent data (for intermittent resources)
  - Cost workbook (for Offer Review Trigger Price challenge)
  - Election selections
  - Additional required information based on project type
- Submitted using the Forward Capacity Tracking System (FCTS)
Key Steps in Qualification Process

Step 5 – New Qualification Package Review

• Qualification package review for *generation resources*:
  – **CPS Review**: to ensure that the project can achieve commercial operation by the CCP start date
  – **Intermittent Review**: to determine the reduced claimed capability for intermittent resources
  – **Threshold Review**: to determine the costs associated with upgrades to existing resources

• Qualification package review for *import resources*:
  – **CPS Review**: to ensure that a non-commercial import project can achieve commercial operation by the CCP start date
  – **Documentation Review**: to determine ownership of the external resource and determine their capacity capability
Key Steps in Qualification Process

***Step 5 – New Qualification Package review, cont.***

- Qualification package review for **demand resources**:
  - **CPS Review**: to ensure the project can achieve commercial operation by CCP start date
  - **Source of Funding**: to determine the project’s financial capability
  - **Measurement and Verification (M&V) Plan**: to ensure compliance with ISO’s requirements

For all resource types, there is opportunity for ISO consultation with the project sponsor throughout the qualification process.
Key Steps in Qualification Process

**Step 6 – QDN Issuance**

- **Qualification determination notification (QDN):**
  - Published to each project sponsor via the FCTS
  - Indicates whether the project has been qualified (accepted) or denied from participating in the FCA
  - Based on reviews and analyses performed between Steps 3-5

- **Two separate QDNs will be issued:**
  - System Planning QDN
  - Internal Market Monitor QDN
What is Planning Procedure 10?

• Planning Procedure 10 (Planning Procedure to Support the Forward Capacity Market – PP-10) provides procedures for the following
  – Base Case & Network Topology
  – Standard for Initial Interconnection Analysis
  – Standard for Overlapping Review
  – Procedures for determining if upgrades can be completed in time for the Commitment Period
CNR Group Study

• New Generation is analyzed for Overlapping Interconnection Impacts, in Interconnection Queue order, during FCA qualification

• For the FCA, where qualification transmission upgrades (QTUs) can be completed in time for the start of the Capacity Commitment Period, the generator will be qualified and the generator will be responsible for the QTUs
  – If qualification is restricted due to overlapping impacts, the threshold is when the QTU cannot be completed in time for the start of the Capacity Commitment Period
  – If applicable, the resource may be partially qualified to participate in the FCA up to the amount that the resource can operate without fixing the observed violations
Conditional Qualified Capacity Resources

• A lower-queued resource (Conditional Resource) with the same overlapping impacts as a higher-queued resource (Primary Resource) may “conditionally qualify” for the FCA along with the Primary Resource
  – Limited to a single Primary and a single Conditional
    • Limited by complications of potential combinations of network impact scenarios
  – Both resources can offer their capacity in FCA
  – The Conditional and Primary resources are mutually exclusive
    • If the Primary Resource does not post FA, then the Conditional Resource would no longer be Conditional and could proceed (as if it were Primary)
    • If the Primary Resource withdraws from the FCA, then the Conditional Resource may clear
Conditional Qualified Capacity Resources (cont.)

• Result is increased competition within the auction
  – More resources can qualify for the FCA where overlapping impacts exist
  – Basic premise of FCM is that the Capacity Clearing Price is set by competitive new entry
  – New capacity resources need to be free from entry barriers
  – Interconnection Queue will be a smaller barrier to entry
  – A Primary Resource cannot block a Conditional Resource by qualifying for a FCA and withdrawing at the Start Price, or by failing to submit FA
CNR Restudy

• After each FCA, the New Generating Capacity Resources that cleared in the FCA will undergo a restudy of the relevant interconnection study to memorialize the final upgrade responsibilities for each cleared resource

• The results of the CNR restudy will be captured in the appropriate sections of the generator’s interconnection study
LONG-LEAD FACILITY TREATMENT
Long-Lead Facility Treatment

- Power plants with development life-cycles that are longer than the time between the FCA and the beginning of the Capacity Commitment Period will be allowed advance opportunity to study and “secure” transmission plans/obligations sufficient for FCM participation through the LGIP process.

- Long-Lead Facility Treatment can be elected along with the original Interconnection Request (IR) or after the IR.

- Projects smaller than 100 MW are subject to ISO review before achieving Long-Lead Facility Treatment.
Long-Lead Facility Treatment (cont.)

- The resource would initially present a CPS in the same format as a resource seeking qualification for an FCA
- The resource will be included in each FCA’s group study after the completion of its SIS
- Until the resource clears in an FCA, the resource will provide FA in the form of an annual interconnection deposit
Long-Lead Facility Treatment (cont.)

• If the resource withdraws from the Interconnection Queue then
  – A percentage of its submitted Long-Lead Facility Interconnection Deposit is forfeited
    • If the resource withdraws after its second scheduled FCA then 10% of its deposit is forfeited
    • For each subsequently scheduled FCA, the resource forfeits an incremental 5% deposit
QUEUE POSITION TIMEOUT
Queue Position Timeout

• Queue position timeout rules **were not** created or changed as a part of the FCM/Queue reforms

• Timeout rules are long standing features of the interconnection procedures
Pro forma Perspective on Timeout Rules

• In Order 2003, when constructing the pro forma timeout provisions, FERC sought to balance:
  – Varying lead times associated with different generation development types, and,
  – Delays that can be experienced in generation development
  – Need to maintain some limits on the extent of uncertainty introduced to the overall transmission planning process
• Once a generator interconnection is approved and remains in the queue, the transmission planning process will reflect the generator in base cases
  – Even if the generator is not immediately moving forward to construction
Complimentary *Pro forma* Timeout Provisions

1. (In the Interconnection Request) The expected In-Service Date shall be no more than the process window for the regional expansion planning period...not to exceed seven years from the date the Interconnection Request is received by the Transmission Provider
   – Up to 10 years lead-time can be requested, if required by the development timeline

2. Extensions of less than three (3) cumulative years in the Commercial Operation Date of the Large Generating Facility to which the Interconnection Request relates are not material and should be handled through construction sequencing
FCM Participation

- FCM participation timeout is merely a reflection of the underlying queue timeout provisions

![Diagram showing timeline of FCM participation and CCP in-service dates]

- Show of Interest: ~1 year
- FCA$_x$: 3 years, 4 months
- CCP$_x$: 7 years, 4 months
- CCP$_{x+1}$
- CCP$_{x+2}$
- An in-service date for CCP$_{x+3}$ is more than 7 years after the date of the Interconnection Request.
Commercial Operation Date Extensions

• There are provisions to accommodate Commercial Operation Date extensions

• However, these are not designed for developer to have things both ways
  – Generator that is qualifying for FCAs is convincing the ISO that they will be in-service in time for the Capacity Commitment Period
  – The same generator would not be able to say that Commercial Operation Date extension is required because of project delays
Managing Timeout

• Several generators have successfully managed the timeout of their original queue position by entering and proceeding with a new queue position for CNR Interconnection Service
  – Generators have successfully cleared in the Forward Capacity Auction with their second (or even third queue position)

• This approach:
  – Maintains the manageability of the overall planning process
  – Is consistent with the Pro Forma approach
  – Is appropriate in the context of the queue blocking concerns
QUALIFICATION STATISTICS
Forward Capacity Auction Qualification

- FCA #1: Qualified
- FCA #2: Qualified
- FCA #3: Qualified
- FCA #4: Qualified
- FCA #5: Qualified
- FCA #6: Qualified
- FCA #7: Qualified
- FCA #8: Qualified
- FCA #9: Qualified

- Generation Denied for Overlap
- Generation Denied for Overlap & NCIS
- Generation Denied for Overlap & Direct Connect
- Qualified Generation
- Generation Denied North of Orrington
Observations on Qualifications Statistics

• The majority of generating resources have been able to qualify for the FCA (sometimes with upgrades)

• The ISO has not observed a need to change the overlapping impact standard or the conditional qualified design at this time

• Conditional Qualified treatment for overlapping interconnection impacts has never been invoked
  – All resources either passed overlapping impacts (sometimes with upgrades) or all area resources failed to qualify (North of Orrington)
The Overlapping Interconnection Impact Standard

Planning Advisory Committee

Technical Session

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Background

- Originated from the March 2006 Settlement Agreement:

  “While a full and completed System Impact Study (SIS) is not a requirement to participate in the FCA, at a minimum, initial interconnection analysis is required. The ISO and the Reliability Committee shall work out specifics with respect to the performance of such initial interconnection analysis and selection criteria (including auction details) for multiple projects when only a subset of such projects can be selected in the FCA due to overlapping interconnections impacts”.

*Settlement Agreement II.B.3.c*
Background *cont’d*

• In March 2007, Planning Procedure 10 – Planning Procedure to Support the Forward Capacity Market (PP-10) was created
  – Section 5.7* documented the analysis of overlapping interconnection impacts (for New Generating Capacity Resources)
  – New qualified capacity must be incrementally useful: it must provide an additional capacity benefit
  – Original design included:
    • Load Zone deliverability standard
    • 3% Distribution Factors (DFAX) standard

*The Analysis of Overlapping Interconnection Impacts is now in PP-10, Section 5.8*
Background cont’d

- Section 5.7* was further modified in July 2009 to reflect FCM/Queue changes
  - Reference to a resource’s Capacity Network Resource Capability (CNRC)
  - Establishment of a “re-study” for final upgrade responsibility subsequent to each FCA
  - Potential for conditional qualification

- Section 5.7* was further modified in February 2010 to add an overlapping interconnection impacts analysis for Demand Resources

- Section 5.8 (formerly Section 5.7) was further modified in May 2015 to reflect ETUs

*The Analysis of Overlapping Interconnection Impacts is now in PP-10, Section 5.8
FCM Initial Interconnection Analyses

• Described in Section 5 of PP-10

• Assess the ability to interconnect a resource subject to the Network Capability Interconnection Standard (NCIS)
  – Thermal Power Flow Analysis
  – Short Circuit Analysis
  – Large/Small Generator Interconnection Procedure results are used whenever available

• Assess the ability of a resource to provide incremental capacity in accordance with the overlapping interconnection impacts standard
  – Thermal Power Flow Analysis
Network Capability Interconnection Standard

- The transmission line between Substation 1 & Substation 2 (Line 1-2) becomes overloaded when Gen A is added
- Generators that add to the loading of Line 1-2 are called Harmer Generators
- Generators that reduce the loading of Line 1-2 are called Helper Generators

Potential Overload From 1 to 2

“Helper” Generation

“Harmer” Generation

New Study Generator Gen A
**Network Capability Interconnection Standard cont’d**

- Under the NCIS, other Harmer Generation can be re-dispatched down to relieve the overload on Line 1-2.
- Combined the new generator & re-dispatch must not degrade transfer or import capability.
- However, under this test, the new generator may not be incrementally useful capacity.
Overlapping Interconnection Impacts Standard

- Under the overlapping interconnection impacts standard, the re-dispatch of Harmer Generation to relieve the constraint so that the new generator is incrementally useful is not allowed.
Overlapping Interconnection Impacts Analysis

*Distribution Factor Re-dispatch Restriction*

- Distribution Factors (DFAX) are a measure of the responsiveness of electrical loadings on elements such as transmission lines or transformers due to a change in output from a given generator.

- Generators with a positive DFAX are referred to as “Harmer” generation because increasing the output of these generators results in more flow on the limiting element for a given contingency.

- The re-dispatch of “Harmer” generation is limited under the overlapping interconnection impacts test.

- Harmer generation with DFAX ≥ 3% on a constrained element is not to be re-dispatched to relieve the constraint.

- Existing generation that has not permanently de-listed or retired in a previous FCA is modeled at up-to its CNRC.
Overlapping Interconnection Impacts Analysis

*Transfer Level Stress and Interface Impacts*

- Transfer levels from external control areas are modeled to reflect various conditions ranging from 0 MW transfer up-to the associated interface import capability.
- Internal transfer levels are modeled to reflect various conditions ranging from 0 MW transfer up-to the internal interface associated transfer capability.
- Generation under study has to be incrementally useful within the Load Zone (up to the maximum export capability of that zone).
- Generation under study is not required to upgrade interface transfer capability between Load Zones.
Overlapping Interconnection Impacts Analysis

Other Test Conditions

- Test is performed at 100% of the 90/10 summer peak load
- Existing Demand Resources are included in the base case
- All single element contingencies and multiple element contingencies as described in Planning Procedure No. 3 (PP-3), Section 3.1. are tested
- The post contingency system is analyzed, if appropriate, to confirm that the system can be brought to a state that is prepared for the occurrence of a subsequent contingency in the time required by, and using the actions allowed in, the applicable ISO New England Planning Procedures and Operating Procedures
Overlapping Interconnection Impacts Analysis

*Outcome Scenarios*

- Where multiple New Generating Resources cannot be selected because they overlap with each other
  - Interconnection Queue order is used to choose between the overlapping generators
  - For example, if the generator under study was the fifth in the Interconnection Queue, the generators that have a higher Interconnection Queue position that are seeking qualification for the FCA will be included within the analysis
  - Conditional qualification provisions exist in instances where two or more resources are seeking to be qualified but only one can qualify
    - Resource with the lower queue position is accepted for participation in the FCA as a Conditional Qualified New Generating Capacity Resource
    - Resource with the lower queue may clear the FCA if the resource with the higher queue position “withdraws”
Overlapping Interconnection Impacts Analysis

Outcome Scenarios cont’d

• If qualification is restricted due to overlapping interconnection impacts, the threshold is when the QTUs cannot be completed in time for the Capacity Commitment Period
  – Where QTUs can be completed in time, the resource will be qualified
    • QTUs may be sponsored by the Transmission Owner(s) (if they are reliability upgrades)
    • QTUs may be sponsored by the Project Sponsor (if they are generator interconnection upgrades)
  – If applicable, the resource may be partially qualified up to the amount it can operate without fixing the observed violations
Overload of Line S1S2

a) There is 200 MW of existing CNRC at S1, but only 150 MW of it can run before the S1S2 line would be overloaded.

b) Potential outcomes of the Overlapping Impact Analysis of new resource Gen A are:

1. If the QTUs cannot be done by the start of the Capacity Commitment Period, new resource Gen A cannot qualify.
2. If the QTUs can be done by the start of the Capacity Commitment Period, then qualify new resource Gen A at 200 MW:
   - The resource is required to perform upgrades by the start of the Capacity Commitment Period
   - Or, the resource is qualified because the TO is performing the upgrades.
Example - 2

Overload of Line S1S2
a) There is 300 MW of generation at S1 (including 100 MW of existing CNRC), but only 200 MW can run without upgrading the S1S2 line

b) Potential outcomes of the Overlapping Impact Analysis of new resource Gen A are

1. If the QTUs cannot be done by the start of the Capacity Commitment Period, qualify Gen A at 100 MW (provided that Gen A’s Minimum Economic Limit is ≤ 100 MW)

2. If the QTUs can be done by the start of the Capacity Commitment Period, then qualify Gen A at 200 MW
   • The resource is required to perform upgrades by the start of the Capacity Commitment Period
   • Or, the resource is qualified because the TO is performing the upgrades
Example - 3

Overload of Line S1S2

a) There is 300 MW of generation at S1 (including 100 MW of existing CNRC), but only 200 MW can run without upgrading the S1S2 line. New resource Gen A has Interconnection QP 799 and new resource Gen B has Interconnection QP 800.

b) Potential outcomes of the Overlapping Impact Analysis of new resource Gen B are

1. If QTUs cannot be done by the start of the Capacity Commitment Period, conditionally qualify Gen B at 100 MW
   1. If new resource Gen A does not take on an obligation in the FCA, new resource Gen B could take on an obligation in the FCA
   2. If QTUs can be done by the start of the Capacity Commitment Period, qualify Gen B at 100 MW
CASE STUDIES

*CPV Towantic – FCA-9*

*Wallingford Energy Center – FCA-9*
CPV Towantic – 725 MW
Highlighted lines represent overloads found during the NCIS and Overlapping Impact Assessment.

CPV Towantic – 725 MW
Review of Transmission Upgrades

• The Reliability Committee recommended approval of the Proposed Plan Applications for CPV Towantic and the interconnection upgrades for CPV Towantic at the July 2014 Meeting
  
  http://www.iso-ne.com/committees/reliability/reliability-committee/?eventId=122549

• The Reliability Committee recommended approval of the overlapping impact upgrades for CPV Towantic at the August 2015 Meeting
  
  http://www.iso-ne.com/committees/reliability/reliability-committee/?eventId=122549&eventId=126025&load.more=1

• All of the above upgrades are now included on the RSP Project List
Wallingford 6&7 – 90 MW
Wallingford 6&7 – 90 MW

Highlighted lines represent overloads found during the NCIS and Overlapping Impact Assessment.
Review of Transmission Upgrades

• The Reliability Committee recommended approval of the Proposed Plan Applications for Wallingford Energy Center and the interconnection upgrades for Wallingford Energy Center at the July 2015 Meeting

http://www.iso-ne.com/committees/reliability/reliability-committee/?eventId=122549&eventId=125615&load.more=1

• The Reliability Committee will consider recommending approval of the overlapping impact upgrades for Wallingford Energy Center at the December 2015 Meeting

• All of the above upgrades will be included on the RSP Project List
Summary/Closing Remarks

• The FCM/Queue changes have successfully integrated the Interconnection Process with the Forward Capacity Market

• The majority of new generating resources have been able to qualify for the FCA (sometimes with upgrades)

• The ISO has not observed a need to change the overlapping impact standard or the conditional qualified design at this time

• The ISO will continue to monitor the implementation of these processes in the future
Questions