

ISO New England's Forward Capacity Market (FCM) & Interconnection Processes for New Generation

May 6, 2009

Training Objectives



- Discuss regulatory background to the revisions to the generator Interconnection Procedures
- Describe the changes made to the Interconnection Procedures
- Describe the integration of the Forward Capacity Market (FCM) rules into the Interconnection Procedures to offer two levels of Interconnection Service
- Describe new features in Interconnection Procedures and FCM rules such as
 - Preliminary Non-Binding Analysis, Conditional Qualification and Long-Lead Facility treatment

What is Covered in this Training?

- This training focuses on the Interconnection Procedures and FCM qualification for New Generating Capacity Resources
- The training does not cover
 - Energy Market or Ancillary Service Market issues for Generating Resources
 - FCM treatment of Existing Generating Capacity Resources
 - FCM treatment of Imports over existing import tie-lines
 - FCM treatment of Demand Resources
 - These items are addressed in separate training offered by the ISO

Disclaimer

- The information in this presentation is based on the current Tariff as of May 6, 2009
- The ISO New England Market, Transmission & Services Tariff (“The Tariff”) is the governing document for the Interconnection Process and FCM, not this presentation
- All assumptions and examples in this presentation are for illustrative purposes only
- The Tariff is subject to change

Section I: Regulatory Background

Cheryl Ruell, Project Manager
System Planning

FCM/Queue Filing

- The October 31, 2008 FCM/Queue Filing was approved by FERC on January 30, 2009
 - ER09-237, 126 FERC ¶ 61,080
- The 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
 - FERC review of interconnection process management efficiencies
- These issues are discussed further on the next slides

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
- Issue: 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
- Issue: There were concerns regarding the reliance on Interconnection Queue position during FCM Qualification

Reliance on Interconnection Queue During FCM Qualification (cont.)

- 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
 - May create inefficient use of scarce interconnection resources
 - Resources not selected in the FCM risk incurring costs that may not be recouped, regardless of queue position
- As part of FERC acceptance of initial FCM rules, a Stakeholder Process and Compliance filing was required by October 2008

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)
- Issue: the need and options for Interconnection Procedure reform to increase process efficiencies

FCM/Q 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 FCM/Queue Filing resulted from this stakeholder process
- Materials discussed as part of this stakeholder process may be found at [Home > Committees > Committees & Working Groups > Other Committees > FCM Generator Interconnection Process Stakeholder Group](#)

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

All of these items will be discussed later in this training

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 is now required before submitting a Show of Interest (SOI) form to the FCM

All of these items will be discussed later in this training

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

All of these items will be discussed later in this training

Interconnection Roadmap

Interconnected
Network Generator



Interconnection Process

Capacity
Resource
Interconnection
Process

Forward
Capacity Market
Participation

Interconnected
Capacity Generator



Where Can I Find the Tariff Rules Relating to Interconnection and the FCM?

- The LGIP is contained in Schedule 22 of Section II of the ISO Tariff
 - The LGIP applies to Interconnection Requests for Generating Facilities greater than 20 MW
 - [Home > Regulatory > Transmission, Markets, & Services Tariff > Section II - Open Access Transmission Tariff > Schedule 22 - Standard Large Generator Interconnection Procedures](#)

Where Can I Find the Tariff Rules Relating to Interconnection and the FCM? (cont.)

- The SGIP is contained in Schedule 23 of Section II of the ISO Tariff
 - The SGIP applies to Interconnection Requests for Generating Facilities less than or equal to 20 MW
 - [Home > Regulatory > Transmission, Markets, & Services Tariff > Section II - Open Access Transmission Tariff > Schedule 23 - Standard Small Generator Interconnection Procedures](#)
- The FCM Rules are contained in Section 13 of Section III of the ISO Tariff
 - [Home > Regulatory > Transmission, Markets, & Services Tariff > Section III - Market Rule 1](#)

Section I Review

- In this section we identified
 - The Tariff provisions governing generator interconnections and FCM participation
 - The regulatory background and stakeholder process resulting in the FCM/Queue Filing
 - The key elements of the FCM/Queue Filing
- Next Section
 - We will review the Interconnection Procedures, identifying the requirements for NRIS and CNRIS and highlighting the new elements implemented as a result of the FCM/Queue Filing

Section II: Generator Interconnection Process

Kevin Mankouski, Project Manager
System Planning

Training Objectives of This Section



- Review the applicability of the Tariff Interconnection Procedures
- Describe the steps in the Interconnection Process
- Highlight the changes to the process introduced by the FCM/Queue filing

Aspects of Interconnecting a Generator

- Interconnection Process* – leads to Interconnection Agreement and Service
- Market Process – leads to Market Participant Service Agreement on generator's participation in the Markets for the sale of energy, capacity* and/or ancillary services
- I.3.9. Approval Process – leads to permission to operate when interconnected within the New England control area

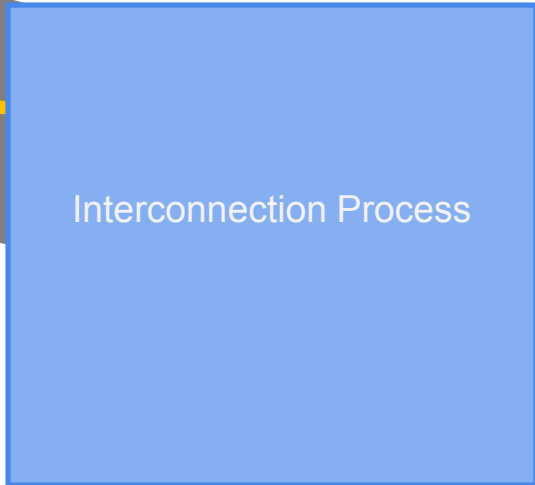
**focus of this training*



Interconnection Roadmap

Focus On: Interconnection Process

Interconnected
Network Generator



Interconnection
Process

Capacity Market
Participation

Interconnected
Capacity Generator



An Interconnection Request is a Request to:

- Interconnect a new Generating Facility
- Increase the capability of an existing Generating Facility that is interconnected with the Administered Transmission System
- Make a Material Modification to the design or operating characteristics of an existing unit
- Commence participation in the New England Markets
- Change from NRIS to CNRIS

An Interconnection Request is NOT:

- A retail customer interconnecting a new Generating Facility that will produce electric energy to be consumed only on the retail customer's site
- A request to interconnect a new Generating Facility to a distribution facility that is not subject to the Tariff because the Generating Facility will not be used to make wholesale sales of electricity in interstate commerce
- A request to interconnect a Qualifying Facility (QF) where the QF's owner's intent is to sell 100% of the QF's output to its interconnected electric utility

ISO-NE Interconnection Procedures

- Interconnection Procedures are contained in Schedule 22 (LGIP and Large Generator Interconnection Agreement (LGIA)) and Schedule 23 (SGIP and Small Generator Interconnection Agreement (SGIA))
- Interconnection Procedures apply to Interconnection Requests (defined below) to the Administered Transmission System (Pool Transmission Facilities (PTF), Non-PTF and Tariff distribution facilities)
- Interconnection Procedures establish the interconnection process, with defined deadlines and studies, resulting in a pro-forma Interconnection Agreement governing the Interconnection Service

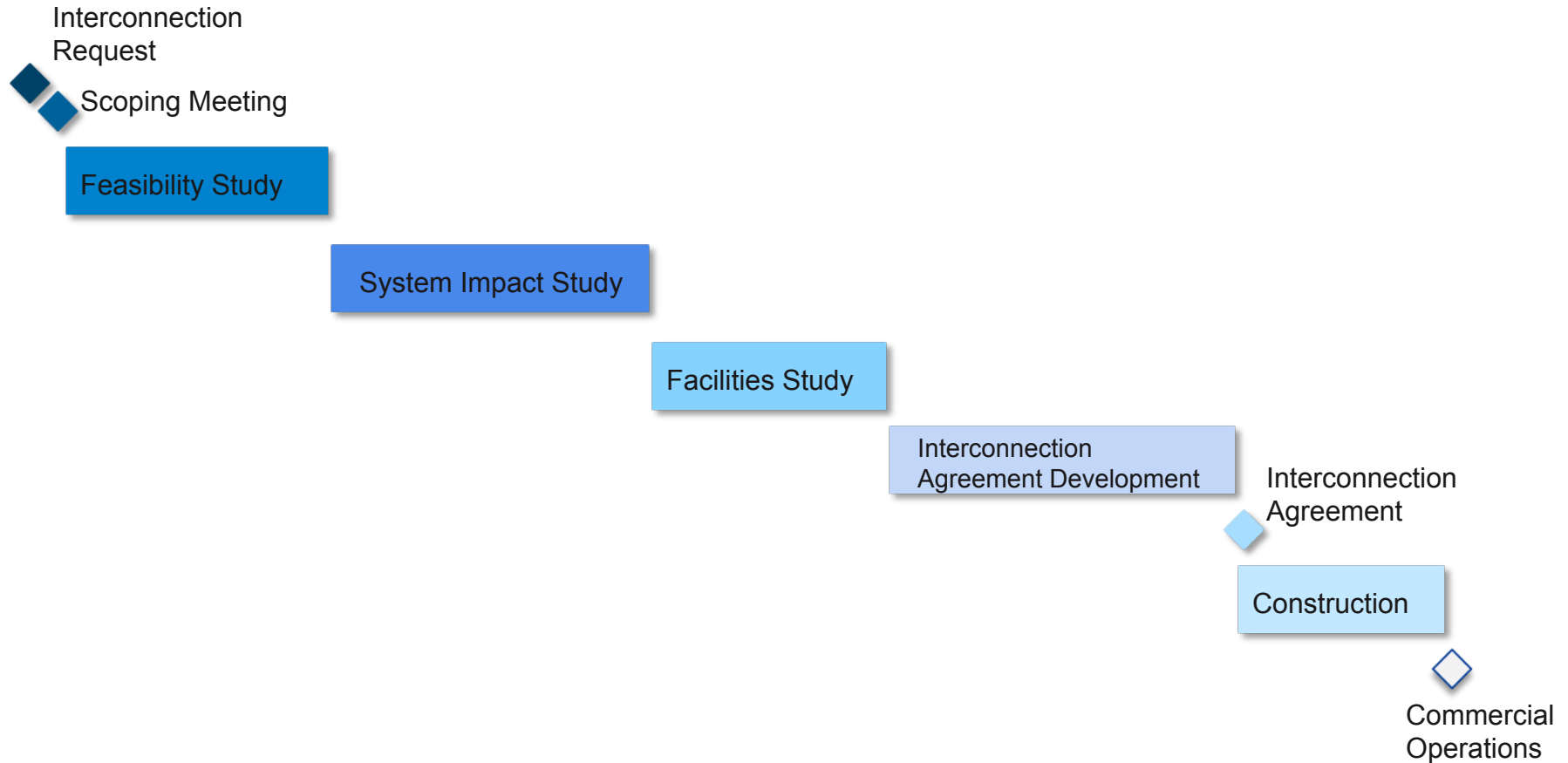
ISO-NE Interconnection Procedures (cont.)

- Interconnection Procedures now offer two types of Interconnection Service, which replaced the former NRIS under the MIS
 - NRIS under Network Capability Interconnection Standard (NCIS)
 - CNRIS under Capacity Capability Interconnection Standard (CCIS)
- In this section of the training, we will be walking through the interconnection process for NRIS
 - This can be thought of as the process for basic interconnection
- The additional steps to achieving CNRIS will be covered later in the training

Generator Interconnection Process Topics

- Review and Process Interconnection Request
- Scoping Meeting
- Feasibility Study
- System Impact Study
- Engineering & Procurement Agreement
- Facilities Study
- Optional Interconnection Study
- Restudy
- Interconnection Agreement

Interconnection Process – Basic Flow



LGIP – Milestone/Financial Requirements

- To increase the likelihood that interconnection projects that have received and are maintaining a Queue Position and are consuming significant study efforts are viable and that they continue to demonstrate willingness to proceed to completion, the LGIP requires:
 - Higher deposits at various stages of the interconnection process, which can be offset by demonstration of project progress on activities outside of the interconnection process
- New LGIP milestone and financial requirements apply to:
 - The next stage of the process for generators currently pending in the Interconnection Queue, commencing February 1, 2009
 - All Interconnection Requests submitted on or after February 1, 2009

LGIP – Milestone/Financial Requirements (cont.)

	Previous Schedule 22 Requirements	New Schedule 22 Requirements
Interconnection Request (IR)	<ul style="list-style-type: none"> • \$10,000 refundable deposit due with IR <ul style="list-style-type: none"> ○ Balance applicable to Feasibility Study or System Impact Study deposit 	<ul style="list-style-type: none"> • A completed Capacity IR is required by the Show of Interest deadline for those resources seeking to be considered in the qualification analysis for the given FCA • \$50,000 non-refundable study deposit due with IR <ul style="list-style-type: none"> ○ Unspent portions of this deposit are refundable if the project withdraws within 10 business days of the Scoping Meeting or if an IA is executed ○ Balance applicable to studies
Interconnection Request	<ul style="list-style-type: none"> • Additional \$10,000 refundable deposit or demonstration of Site Control within a cure period 	<ul style="list-style-type: none"> • Site Control required with a Capacity IR
Feasibility Study Agreement	<ul style="list-style-type: none"> • Additional deposit of the greater-of \$10,000 or estimated monthly study cost due with Feasibility Study Agreement 	<ul style="list-style-type: none"> • Deposit of 100% of estimated study cost balance due with Feasibility Study Agreement. Upon completion or termination of the Feasibility Study, funds remaining beyond the initial \$50,000 deposit (above) are refundable or may be applied to the System Impact Study Agreement Deposit.

LGIP – Milestone/Financial Requirements (cont.)

	Previous Schedule 22 Requirements	New Schedule 22 Requirements
<p>System Impact Study Agreement (SISA)</p>	<ul style="list-style-type: none"> • Deposit of the lower-of estimated study cost or \$50,000 	<p>Developer to elect one of the following three choices to be made available under the Tariff:</p> <p>Greater of 100% of study costs or \$250,000 refundable study deposit due with SISA</p> <p><i>OR</i></p> <p>Refundable deposit of the lower-of estimated study cost or \$50,000 <i>AND</i> copies of major permit applications (including state siting for generator, generator lead, fuel lateral and air/water permit if applicable)</p> <p><i>OR</i></p> <p>Refundable deposit of the lower-of estimated study cost or \$50,000 <i>AND</i> demonstration of “at-risk” project expenditures in at least the amount of increased deposit requirement described in choice 1 above. These expenditures must be project specific and must include proof of non-refundable payment.</p>

LGIP – Milestone/Financial Requirements (cont.)

	Previous Schedule 22 Requirements	New Schedule 22 Requirements
<p>Facilities Study Agreement</p>	<ul style="list-style-type: none"> Deposit of the greater-of \$100,000 or estimated monthly study cost due with Facilities Study Agreement 	<p>Developer to elect one of the following three choices to be made available under the Tariff:</p> <p>Deposit of the greater-of 25% of study costs or \$250,000 refundable study deposit due with Facilities Study Agreement</p> <p>OR</p> <p>Refundable deposit of the greater-of \$100,000 or estimated monthly study cost due with Facility Study Agreement <i>AND</i></p> <p>Copies of major permit applications (including state siting for generator, generator lead, fuel lateral and air/water permit if applicable)</p> <p>OR</p> <p>Refundable deposit of the greater-of \$100,000 or estimated monthly study cost due with Facility Study Agreement <i>AND</i></p> <p>Demonstration of “at-risk” project expenditures in at least the amount of increased deposit requirement described in choice 1 above</p>

LGIP – Milestone/Financial Requirements (cont.)

	Previous Schedule 22 Requirements	New Schedule 22 Requirements
<p>Interconnection Agreement</p>	<ul style="list-style-type: none"> Commit to upgrade expenditure schedule 	<p>Developer to elect one of the following two choices to be made available under the Tariff:</p> <p>Commit to upgrade expenditure schedule <i>AND</i> provide copies of major permit approvals (including state siting for generator, generator lead, fuel lateral and air/water permit if applicable)</p> <p><i>OR</i></p> <p>Refundable deposit of 20% of the Interconnecting TO and Generator Interconnection Related Upgrades as estimated in the Interconnection Studies or E&P Agreement, due at IA execution</p> <ul style="list-style-type: none"> If TO expenditure schedule calls for an initial payment of greater than 20% of the total upgrade costs, then payment of the scheduled initial payment Commit to remaining upgrade expenditure schedule Include milestones for the completion of major permit approvals (including state siting for generator, generator lead, fuel lateral and air/water permit if applicable) in the IA Include milestones to align IA with fulfillment of terms outlined in the FCM, including potential termination of IA if capacity obligation not satisfied in accordance with MR1 FCM criteria

SGIP Financial Requirements

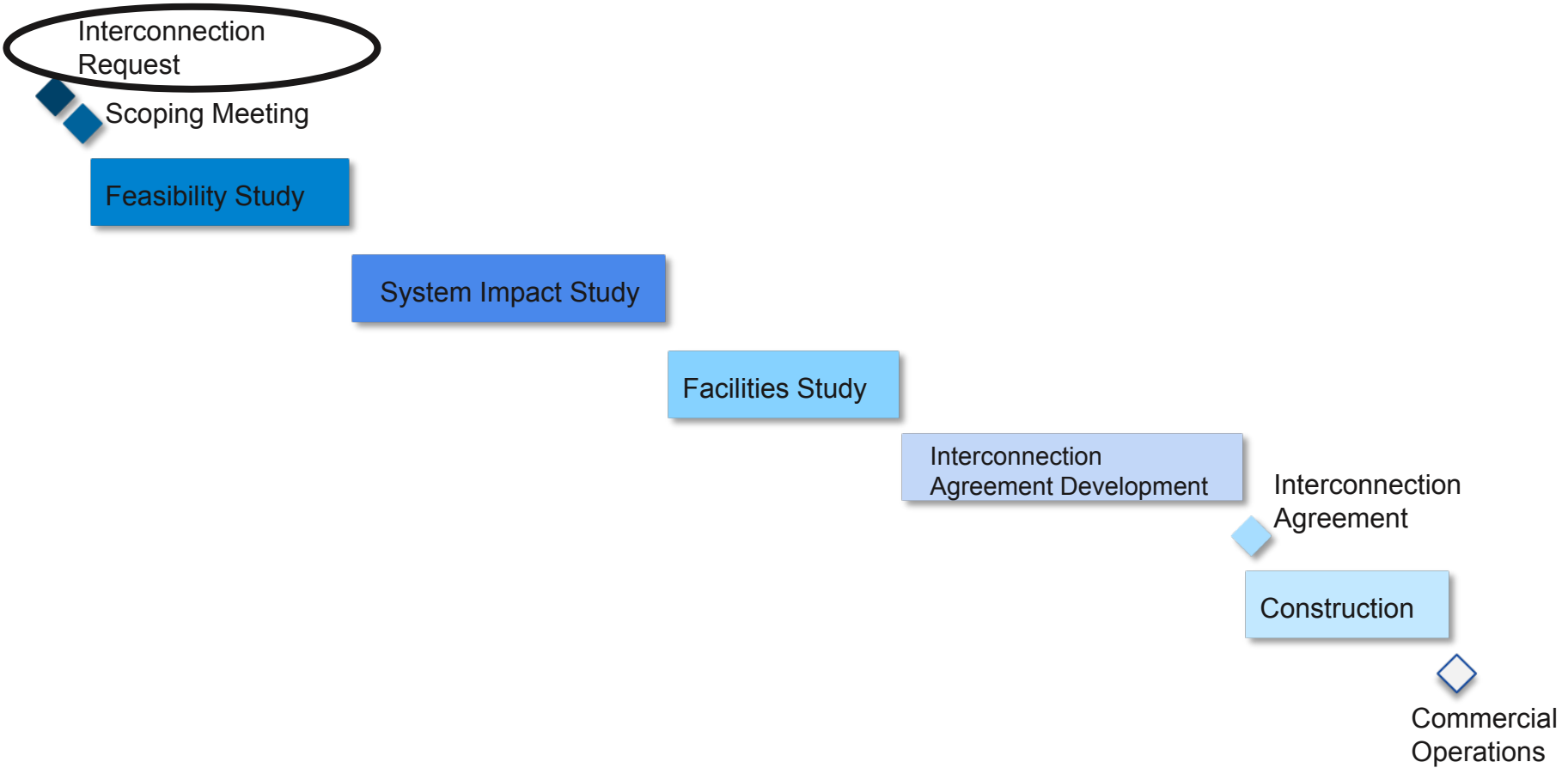
- SGIP deposit structure was unchanged by the FCM/Queue filing
- Small Generating Facility Deposit
 - \$1,000 study process deposit
 - For greater than 2 MW and
 - For 2 MW or less submitted under the study process
 - \$500 non-refundable processing fee for 2 MW or less submitted under Fast Track Process*
- Inverter-based facility no larger than 10 kW processing fee
 - \$100 non-refundable processing fee

* *Fast Track Process is for certified technologies for Small Generating Facilities that are 2 MW or less. Presently there are no certified technologies in the ISO-NE process.*

SGIP Financial Requirements (cont.)

- Feasibility Study: Customer provides deposit of 50% of study cost and pays balance upon completion of study
- System Impact Study: Customer provides deposit of 100% of a distribution study and 50% of a transmission study cost and pays the balance upon completion of study
- Facility Study: Customer provides deposit equal to the study cost

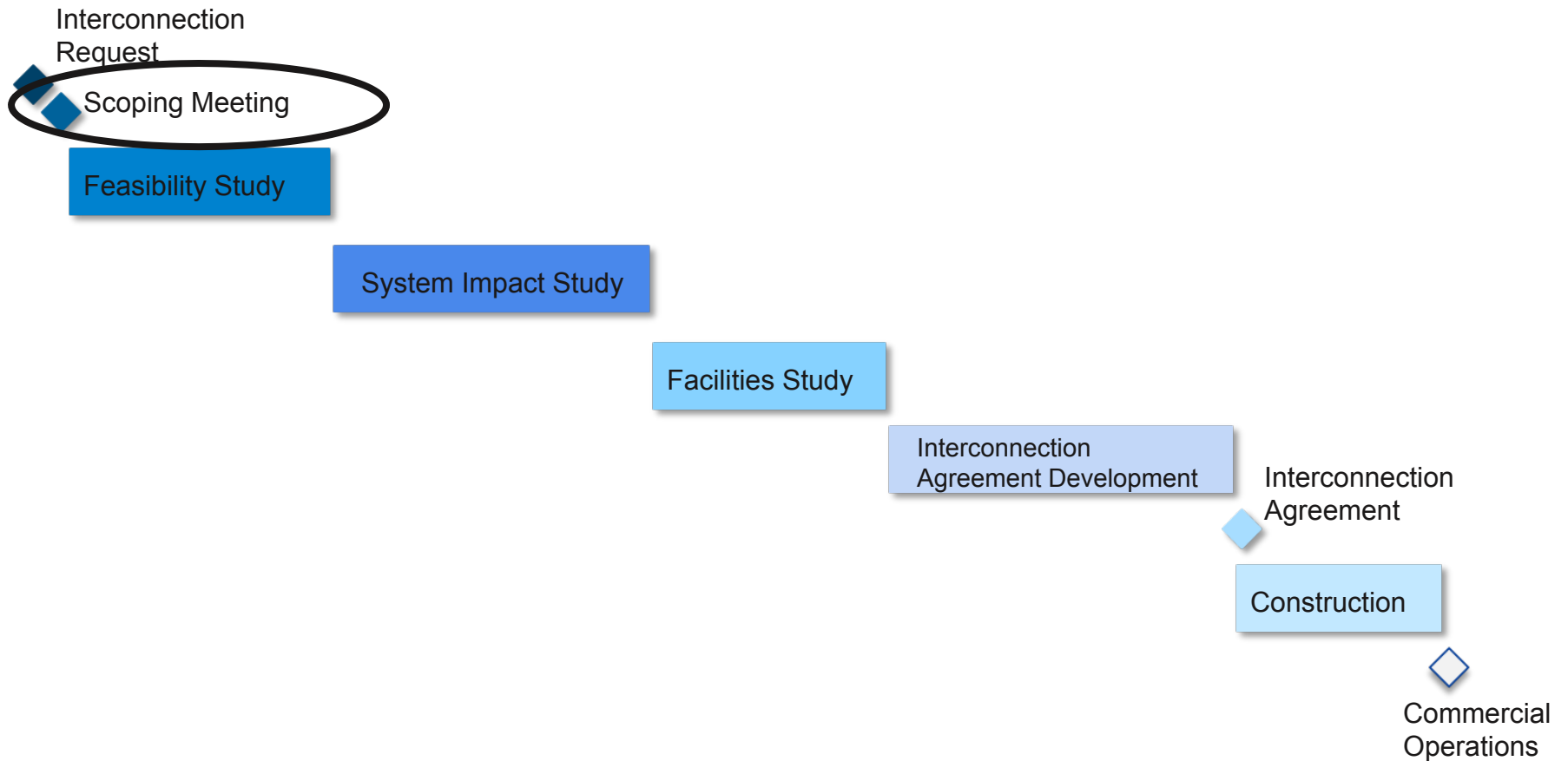
Interconnection Process – Basic Flow



Interconnection Request Requirements

- Interconnection Customer must submit a valid Interconnection Request, providing all required information, such as:
 - Generating Facility capacity
 - Initial Synchronization, In-Service and Commercial Operation Dates
 - Site Control
 - Deposit or Processing Fee
- Detailed technical data must be provided with Small Generator Interconnection Request
- Detailed technical data may be provided with executed Study Agreement under LGIP

Interconnection Process – Basic Flow



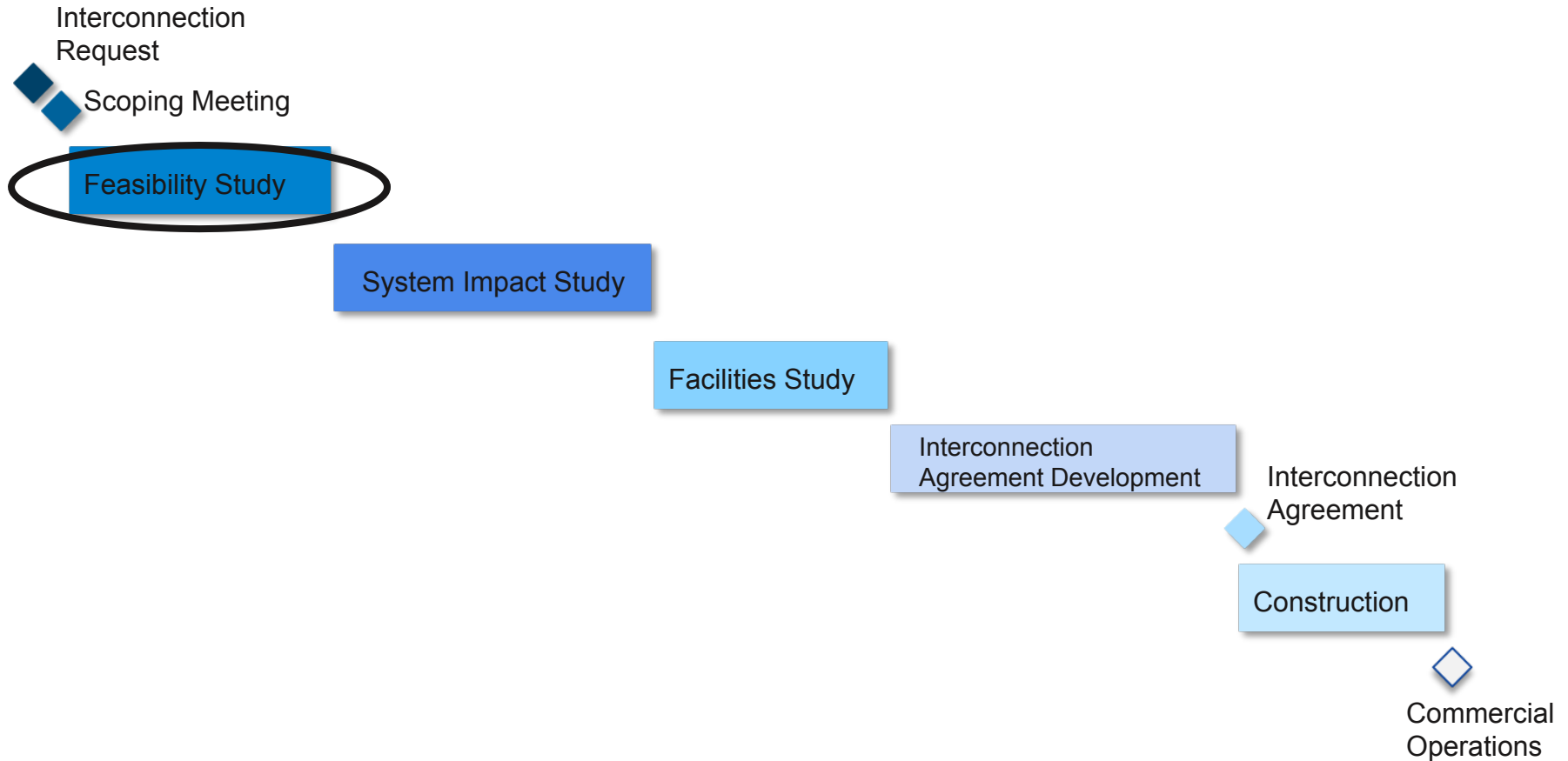
Scoping Meeting

- Attended by representatives of ISO-NE, Interconnection Customer, Interconnecting Transmission Owner, and Affected Parties, as identified by ISO-NE
- Held within 30 days of valid LGIP Interconnection Request; within 10 days of valid SGIP Interconnection Request
- Meetings have standard agendas

Scoping Meeting Action Items

- Interconnection Customer elects to proceed with Feasibility Study or SIS
- ISO-NE, together with Transmission Owner and Affected Parties, determines conduct and performance of study components
- ISO-NE, together with Transmission Owner and Affected Parties, estimates study cost and timeline
- ISO-NE creates three-party study agreement
- Interconnection Customer returns completed, executed study agreements within 30 days under LGIP or 15 days under SGIP

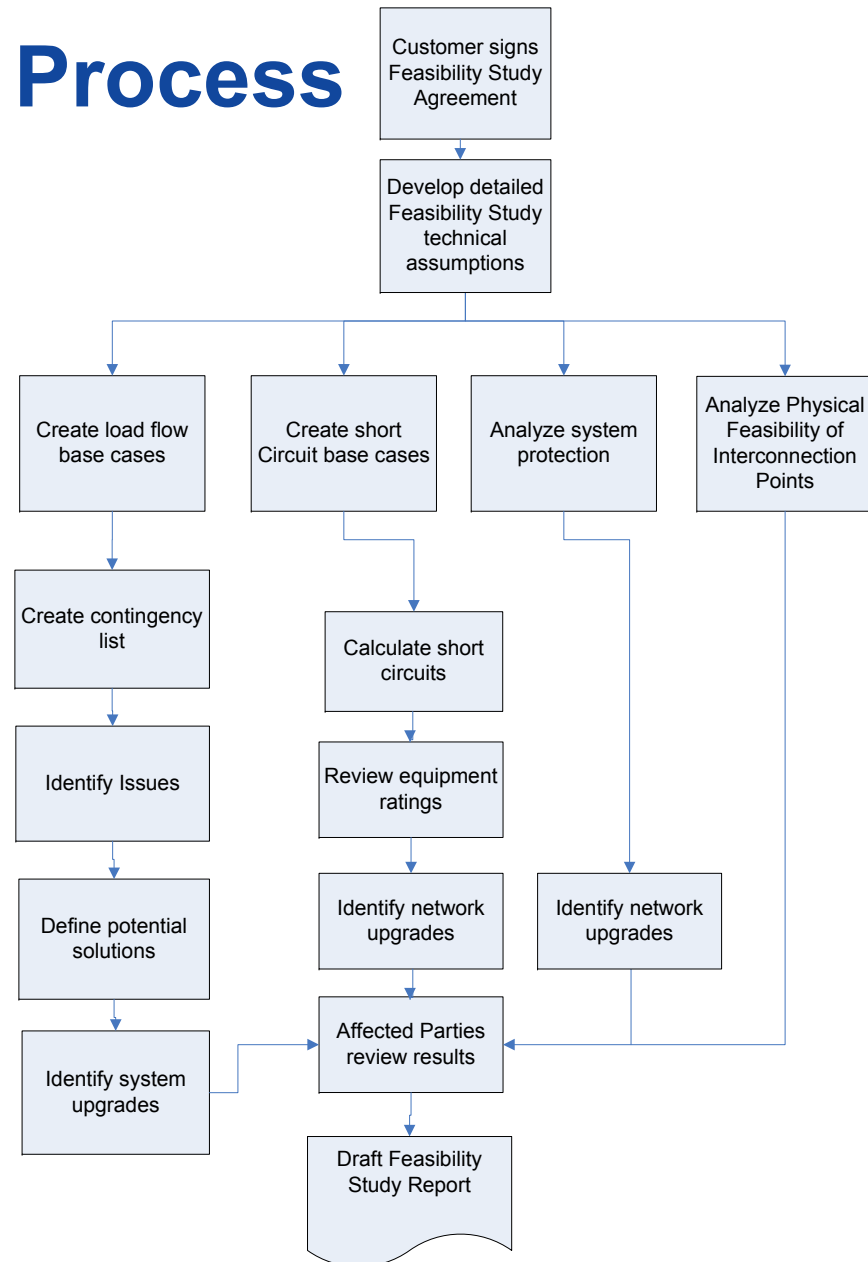
Interconnection Process – Basic Flow



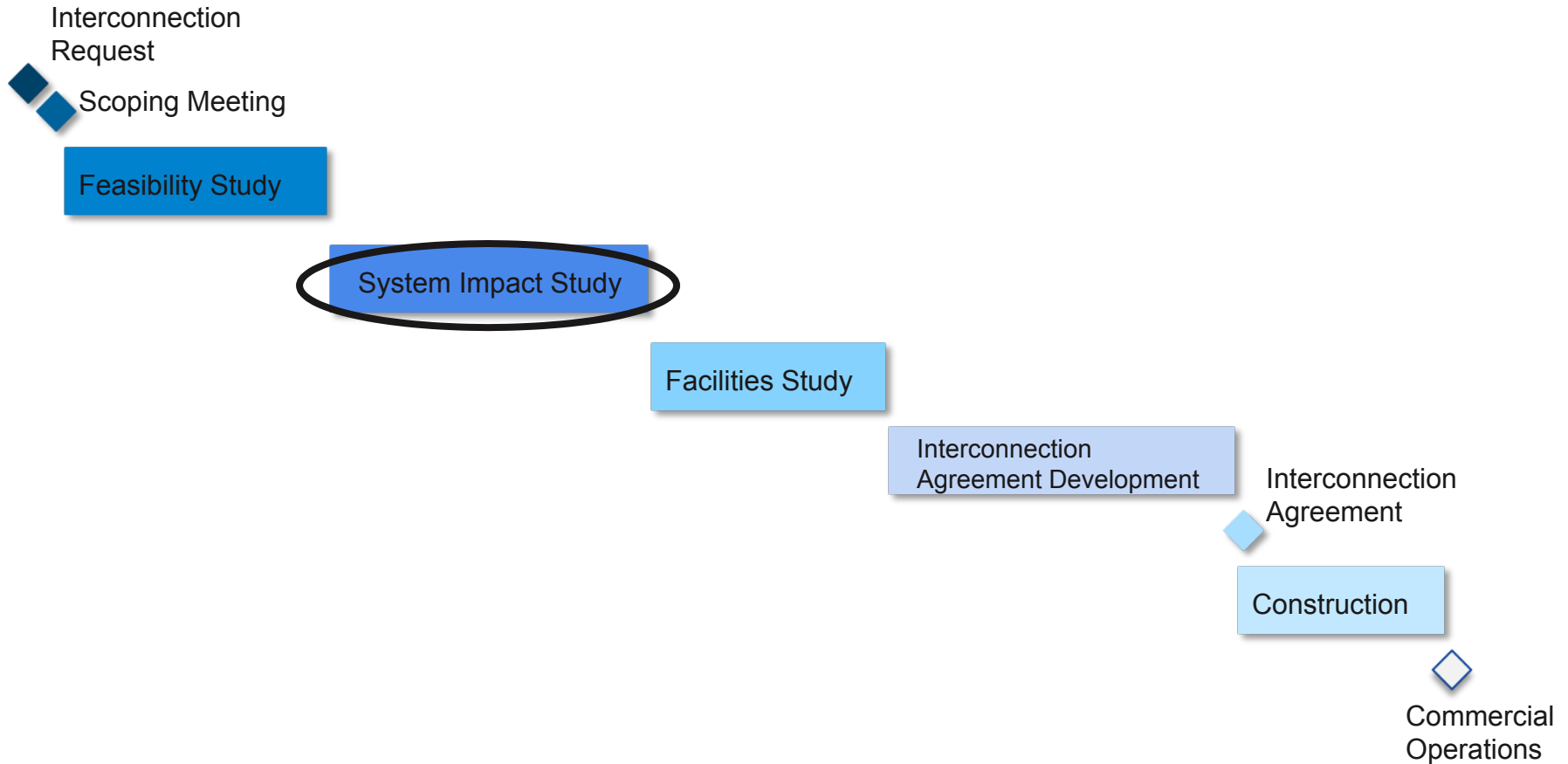
What is the Feasibility Study Process?

- Study analysis consists of preliminary
 - Power flow, including thermal analysis and voltage analysis, short circuit analysis, protection system assessment
- Determine physical feasibility of interconnection
- Develop good faith estimates of interconnection costs, system upgrades and construction time for interconnection facilities and upgrades
- Prepare study report for Interconnection Customer review
- Hold study results meeting within 10 days of issuance of draft report to the Interconnection Customer

Feasibility Study Process (cont.)



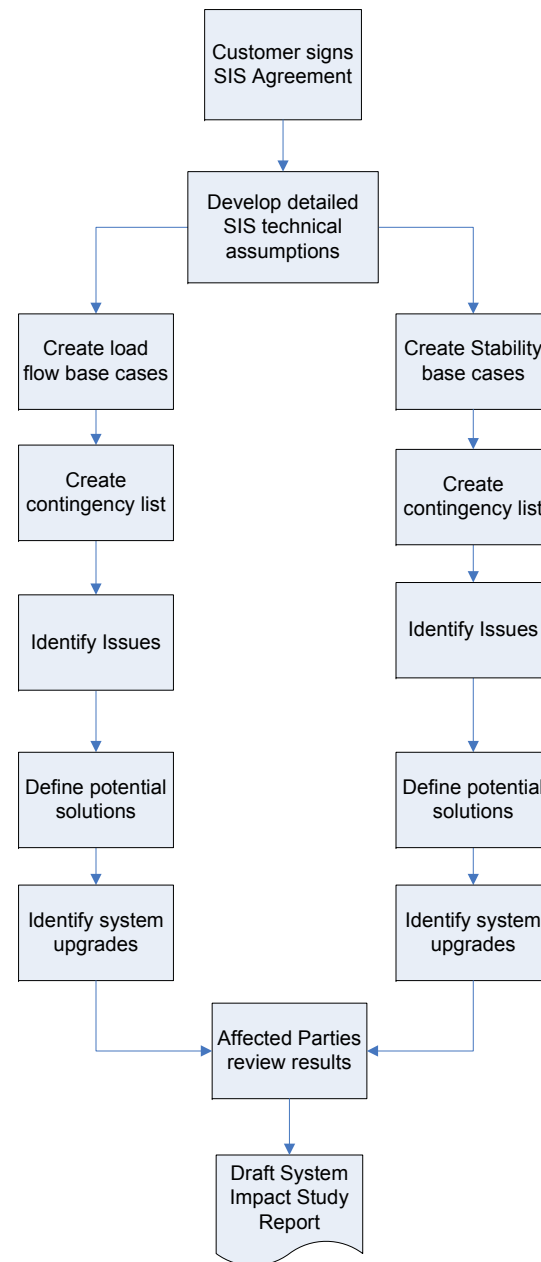
Interconnection Process – Basic Flow



What is the System Impact Study Process?

- If Feasibility Study waived, analysis performed as first step of SIS
 - SIS includes short circuit, stability, power flow, including thermal and voltage, analyses
 - Determination of Bulk Power System (BPS) status
 - *Note: under SGIP, separate distribution studies may be warranted*
- Prepare study report for Interconnection Customer review
- Hold study results meeting within 10 days of draft report provided to Interconnection Customer under LGIP

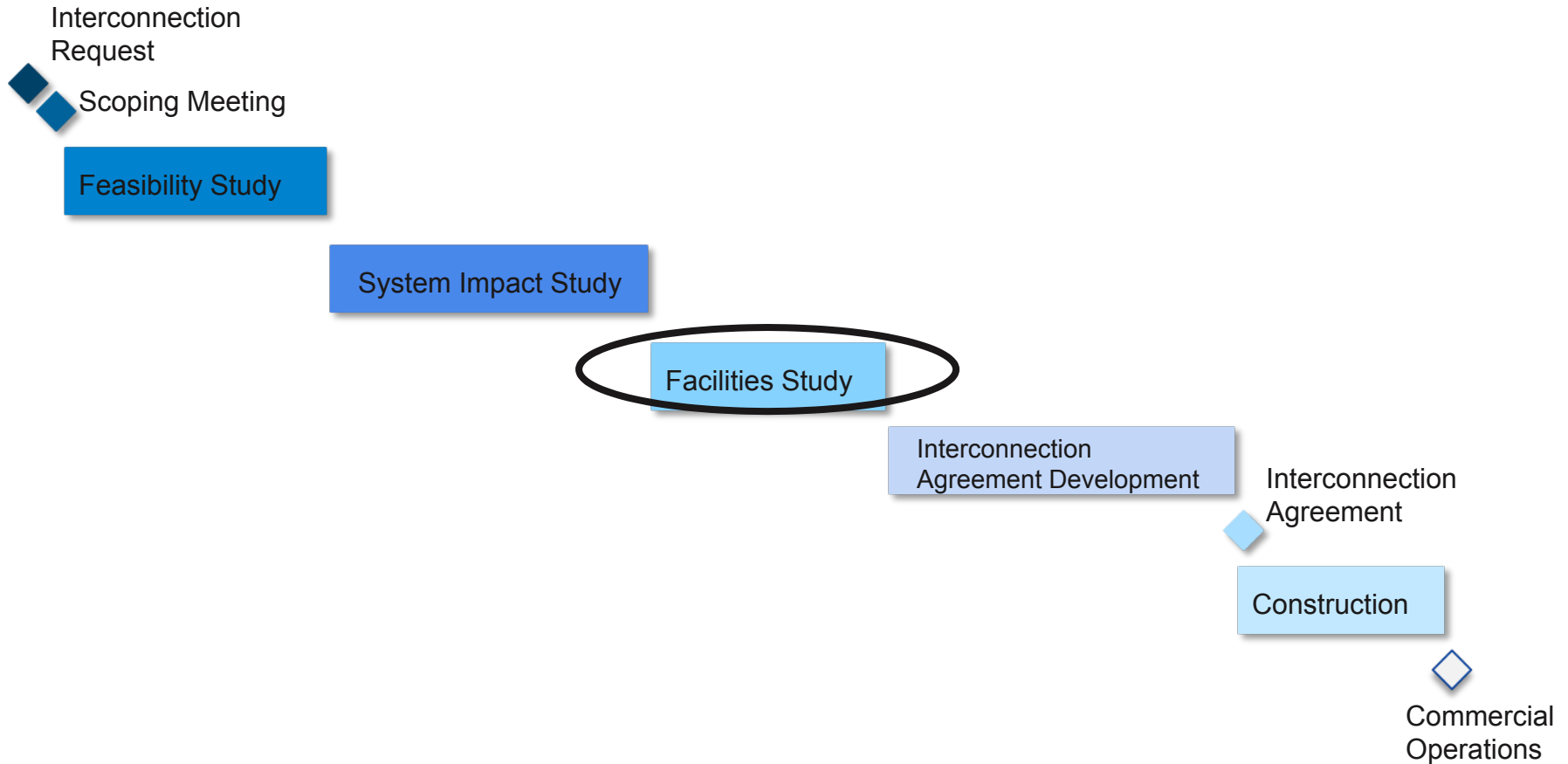
System Impact Study Process (cont.)



New Feature – Preliminary Non-Binding Analysis of Overlapping Impacts

- Under a preliminary non-binding analysis, a developer can specify which earlier queued generation to model in the feasibility study and/or the SIS
 - This would allow the generator to attempt to approximate the eventual outcome of the overlapping impact analysis
- Developers specify which earlier queued generation and which transmission upgrades to include in the network model for the preliminary analysis
- *Note that final upgrade responsibilities for Capacity Network Resources are determined in the FCM Group Study and post-FCA restudy*

Interconnection Process – Basic Flow



What is the Facilities Study Process?

- The Facilities Study specifies and estimates the cost of the equipment, engineering, procurement, and construction work needed to implement the conclusion of the SIS
- Facilities Study may be waived
- If waived, Interconnecting Transmission Owner approval of engineering of Interconnection Facilities becomes a milestone in the Interconnection Agreement

Facilities Study Process (cont.)

- Study report is available to authorized parties when presented to Interconnection Customer
- Study results meeting must be held within 10 days of draft report being provided to Interconnection Customer for Large Generator

Optional Study

- Interconnection customer can request a sensitivity analysis, excluding interconnection requests, earlier in the queue
- Request for optional study must be made within five (5) business days of SIS results meeting
- Scope of optional study similar to scope of SIS

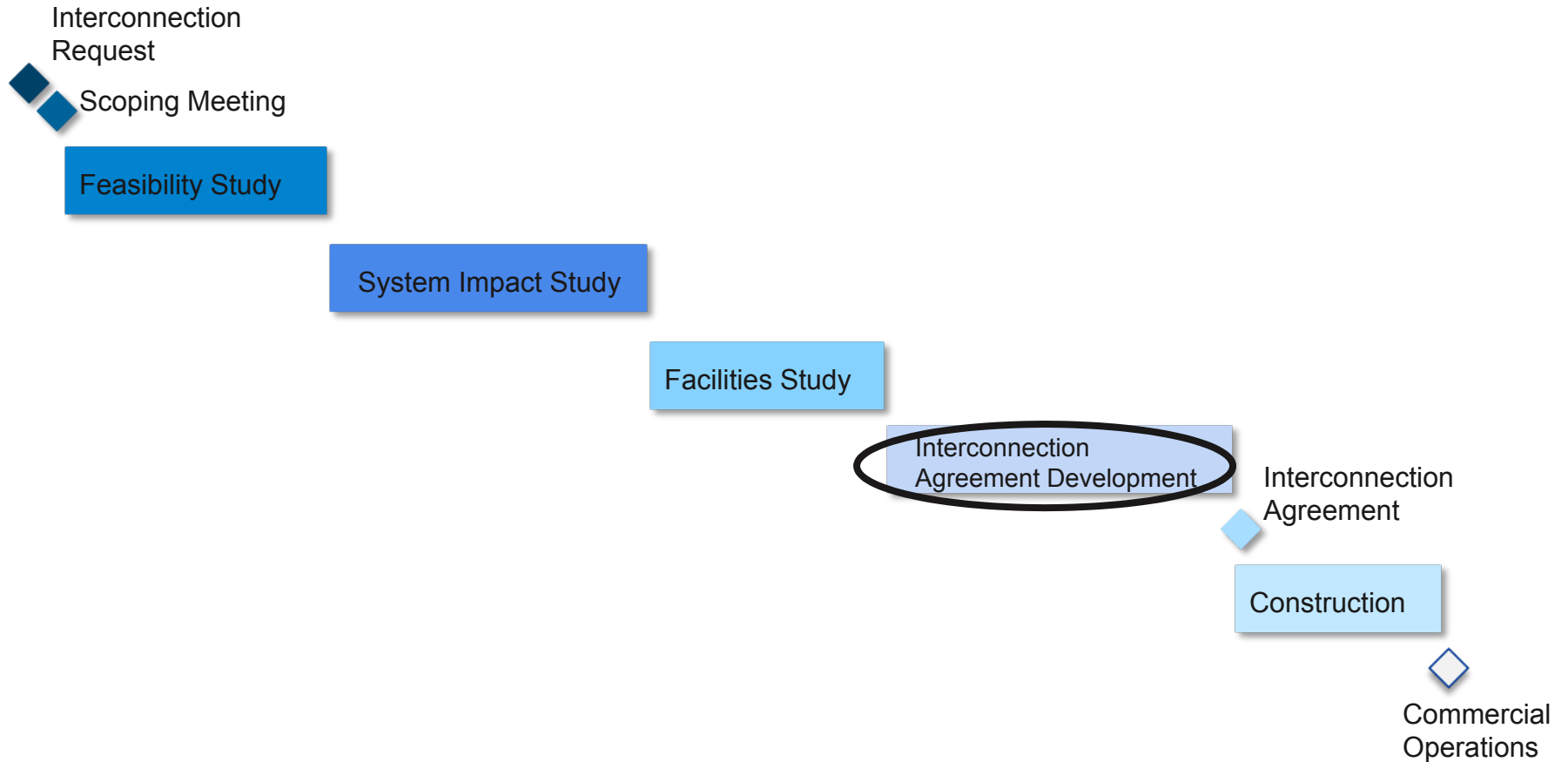
Restudy

- A restudy of a feasibility study or SIS may be required for:
 1. An earlier queued project dropping out of the queue
 2. Modification of an earlier queued project
 3. Re-designation of the point of interconnection
 4. Re-assessment of upgrade responsibilities of a generating facility after it receives a capacity supply obligation
- A restudy of a facilities study may be required for items 1, 2, and 4 above

Engineering & Procurement Agreement

- Interconnection Customer, who is interconnecting a Large Generating Facility, may request an Engineering & Procurement (E&P) Agreement to accelerate its project
- The E&P Agreement is a two-party agreement between the Interconnection Customer and the Transmission Owner
- Deposit of 100% of study costs required

Interconnection Process – Basic Flow



Interconnection Agreement

- The Interconnection Procedures contain a pro-forma LGIA and SGIA to be revised solely in the case of unique characteristics of the interconnection project
 - LGIA – Appendix 6 to Schedule 22
 - SGIA – Exhibit 1 to Schedule 23

Interconnection Agreement (cont.)

- Provides terms and conditions on:
 - Scope and Limitations of Agreement
 - Inspection, Testing, Authorization, and Right of Access
 - Effective Date, Term, Termination, and Disconnection
 - Cost Responsibility for Interconnection Facilities and Distribution Upgrades
 - Cost Responsibility for Network Upgrades
 - Billing, Payment, Milestones, and Financial Security
 - Assignment, Liability, Indemnity, Force Majeure, Consequential Damages, and Default
 - Confidentiality
 - Disputes & Taxes
 - Notices

Interconnection Agreement (cont.)

- Includes detailed descriptions of:
 - The generating facilities
 - The interconnection facilities
 - Type and amount of Interconnection Service
 - Milestones to achieve commercial operation

ISO-NE Interconnection Queue

- The ISO-NE Interconnection Queue is available on spreadsheet form on the ISO-NE website, with a link on OASIS, at [Home > Generation & Resources > New or Modified Interconnections > Interconnection Status](#)
- The Queue contains:
 - A sheet for active projects connecting to the Administered Transmission System
 - A sheet for active projects connecting to distribution systems in the ISO-NE area or nearby transmission systems
 - A sheet for projects that are commercial
 - A sheet for projects that are withdrawn

I.3.9 Approval Process

- Peer review process to ensure generator or transmission project has no significant adverse impact on reliability
- Transmission and Stability Task Forces review studies and make recommendations to Reliability Committee (RC)
- RC makes recommendation to ISO-NE
- Upon completion of all studies and identification of necessary upgrades, ISO-NE issues letter stating project has no adverse impact

I.3.9 Approval Process (cont.)

- Generator or Transmission Owner makes a Proposed Plan Application (PPA) after SIS is complete
- Generating Facilities 5 MW or less only required to notify ISO-NE and the RC
- I.3.9 approval letters can be found at the following Web site: [Home > Transmission Proposed Plan & TCA > ISO-NE Application Approvals > ISO-NE I.3.9 Proposed Plan Application Approval Letters](#)

Section II Review

- In this section we
 - Reviewed the applicability of the Tariff Interconnection Procedures
 - Described the steps in the Interconnection Process
 - Highlighted the changes to the process introduced by the FCM/Queue filing
- Next
 - We will review the FCM Processes for New Generation, identifying the elements that have changed under the FCM/Queue filing

Section III: Generator Interconnection Process – Capacity Network Resources

Al McBride, Project Manager
System Planning

Training Objectives of This Section

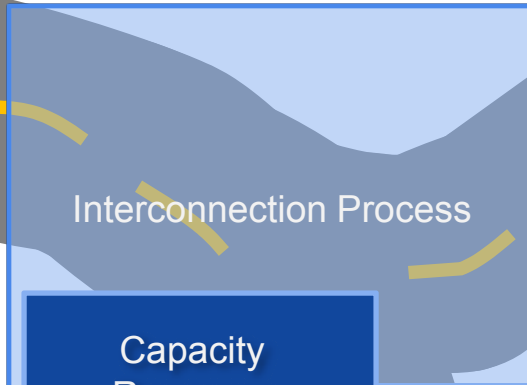


- Review the additional milestones for Capacity Network Resource Interconnection Service resulting from the FCM/Queue filing
- Review the FCM Qualification Process for New Generating Capacity Resources
- Describe the changes to the process introduced by the FCM/Queue filing

Interconnection Roadmap

*Focus On: Capacity Network Resource
Interconnection Process*

**Interconnected
Network Generator**



**Interconnected
Capacity Generator**



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 must meet the Capacity Capability Interconnection Standard

Capacity Interconnections – Milestones

- Capacity Interconnections will have to meet the following requirements (milestones)
 - Pursuit of completed Interconnection Process for CNR Interconnection Service
 - Participate in FCM Qualification
 - Show of Interest
 - New Capacity Qualification Package
 - Post FCM Financial Assurance (FA)
 - Clear in the FCA
 - 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 identified using historical documented 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
- Will be recorded in the in the annual forecast report of Capacity, Energy, Loads and Transmission (the “CELT”)

FCM Qualification: One of the Milestones for CNR Interconnection Service

Interconnection Roadmap

Focus On: FCM Qualification Process

**Interconnected
Network Generator**



Interconnection Process

Capacity
Resource
Interconnection
Process

Forward
Capacity Market
Participation

**Interconnected
Capacity Generator**



FCM Market Rules

- The rules governing FCM Qualification are contained in Section III.13 of the ISO Tariff
 - Section III of the Tariff is also known as Market Rule 1

FCM New Resource Qualification

- Per Section III of the Tariff, two major information submittals are required for qualification of New Capacity Resources for the FCM
 1. Show of Interest Form
 - Contains sufficient information to perform preliminary analysis of the effect of the proposal on the New England system
 - *Note: a valid Interconnection Request for CNR Interconnection Service is now required before submitting an SOI form*
 2. New Capacity Qualification Package
 - Contains sufficient information to assess the viability of the project
 - Critical Path Schedule (CPS)
 - Will include attachments as necessary

ISO Qualification Process Overview

- As required under Section III.13 of the Tariff
 1. Receive and review application materials
 - Show of Interest form
 - New Capacity Qualification Package
 2. Meet with Project Sponsors
 3. Conduct the qualification reviews
 - Described on the following slides
 4. Consult with Project Sponsors on any findings or questions
 5. Consult with Transmission Owners on any findings or questions
 6. Issue Qualification Determination Notifications (QDN's)

What is Planning Procedure 10?

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

Qualification Reviews – New Generation

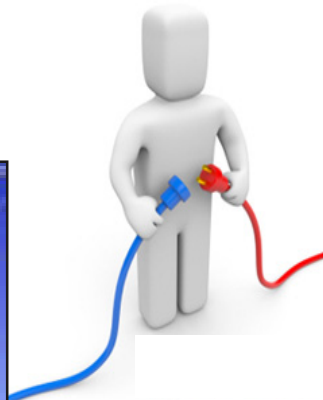
- The following qualification reviews are conducted:
 - Show of Interest Review
 - Site Control Review
 - Direct Connect Review
 - Network Capability Interconnection Standard Review
 - Overlapping Interconnection Impact Review
 - Short Circuit Review
 - Critical Path Schedule Review
 - Intermittent Resource (Wind) Effective Capacity Review
- The review standard is can any identified issues be remedied in time for the Commitment Period?

Show of Interest and Site Control

- SOI forms are reviewed to ensure:
 - Completeness
 - Conformance of proposal with Market Rules
 - Consistency with S/LGIP Interconnection Request
- Site Control is reviewed to ensure:
 - Demonstration of control of the generating site in accordance with the Market Rule
 - *Note that Site Control is also required with the CNR Interconnection Request*

Direct Connect

- Ability to connect the resource to the point of common coupling (Interconnection Point)
- Focus is on cases of longer distances
 - Uncertainty of actual Interconnection Point
 - Right-of-way issues
 - Land ownership issues
 - Terrain/Obstacles
 - Permittability



What is Initial Interconnection Analysis?

- Part of FCM Qualification
 - Assess the ability to interconnect by the start of the Capacity Commitment Period
 - Thermal Power Flow Analysis
 - Short Circuit Analysis
- Uses LGIP result whenever available
- For the FCM, if qualification is restricted due to Initial Interconnection Analysis, the threshold is
 - Where the upgrade(s) cannot be completed in time for the Commitment period
 - Where upgrades can be completed in time, the generator will be qualified and the generator will be responsible for the upgrades

Initial Interconnection Analysis: Network Capability Interconnection Standard Review

- Test to ensure that the New Generating resource does not cause overloads that cannot be fixed in time for the Capacity Commitment Period
 - Allows re-dispatch of existing resources to relieve overloads
- Uses L/SGIP result, whenever available
 - Otherwise uses PP-10

Initial Interconnection Analysis: Capacity Capability Interconnection Standard Review

- Test to ensure that the New Generating resource does not cause overloads that cannot be fixed in time for the Capacity Commitment Period AND is deliverable within the Load Zone
 - Re-dispatch of existing resources is restricted
- Uses PP-10 methodology

CNR Group Study

- New Generation is analyzed for Overlapping Interconnection Impacts, in Interconnection Queue order, during FCA qualification
- For the FCA, if qualification is restricted due to overlapping impacts, the threshold is
 - Where the upgrade(s) cannot be completed in time for the Commitment period
 - Where upgrades can be completed in time, the generator will be qualified and the generator will be responsible for the upgrades
 - 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

- New option for Generating 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
 - 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

Critical Path Schedule Review

- CPS reviewed to perform the following
 - Evaluation of whether a project's CPS contains all required milestones or not
 - Evaluation of whether CPS milestones meet required definitional requirements or not
 - Evaluation of whether proposed milestone sequences and / or durations create obvious schedule inconsistencies or not
 - Evaluation of whether milestone durations are flawed or not

Intermittent Resource Review

- Intermittent Resource information reviewed to verify the following:
 - That the raw wind speed data provided is reasonable and suitable for the purposes of estimating wind turbine electrical output at the given location
 - That the equipment characteristics (e.g., mechanical efficiency) are reasonable for the purposes of estimating wind turbine electrical output
 - That the calculations of wind turbine electrical output are conducted in an appropriate manner
 - That the overall calculation of effective capacity is reasonable

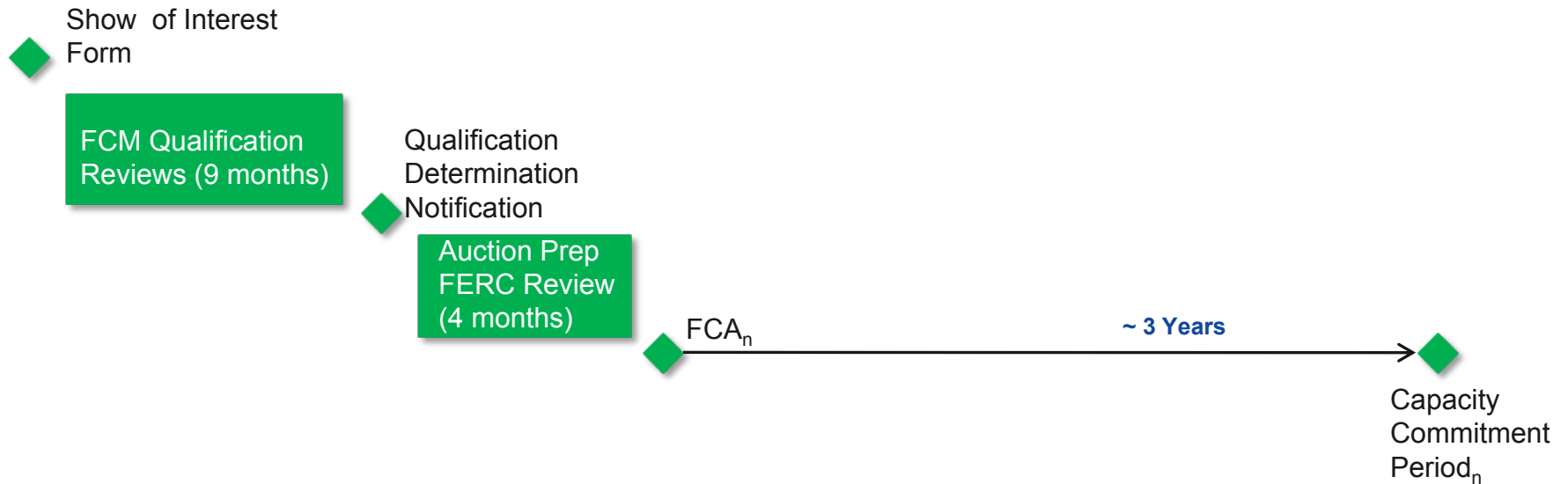
Qualification Determination Notification

- Notifications sent to Projects Sponsors at the end of the FCA qualification process
- Notifications identify
 - Qualified Summer and Winter Capacity
 - Listing of issues (overloads, etc.) that must be addressed to meet the Capacity Capability Interconnection Standard in time for the Capacity Commitment Period
 - Whether or not the Resource is Conditionally qualified for the FCA

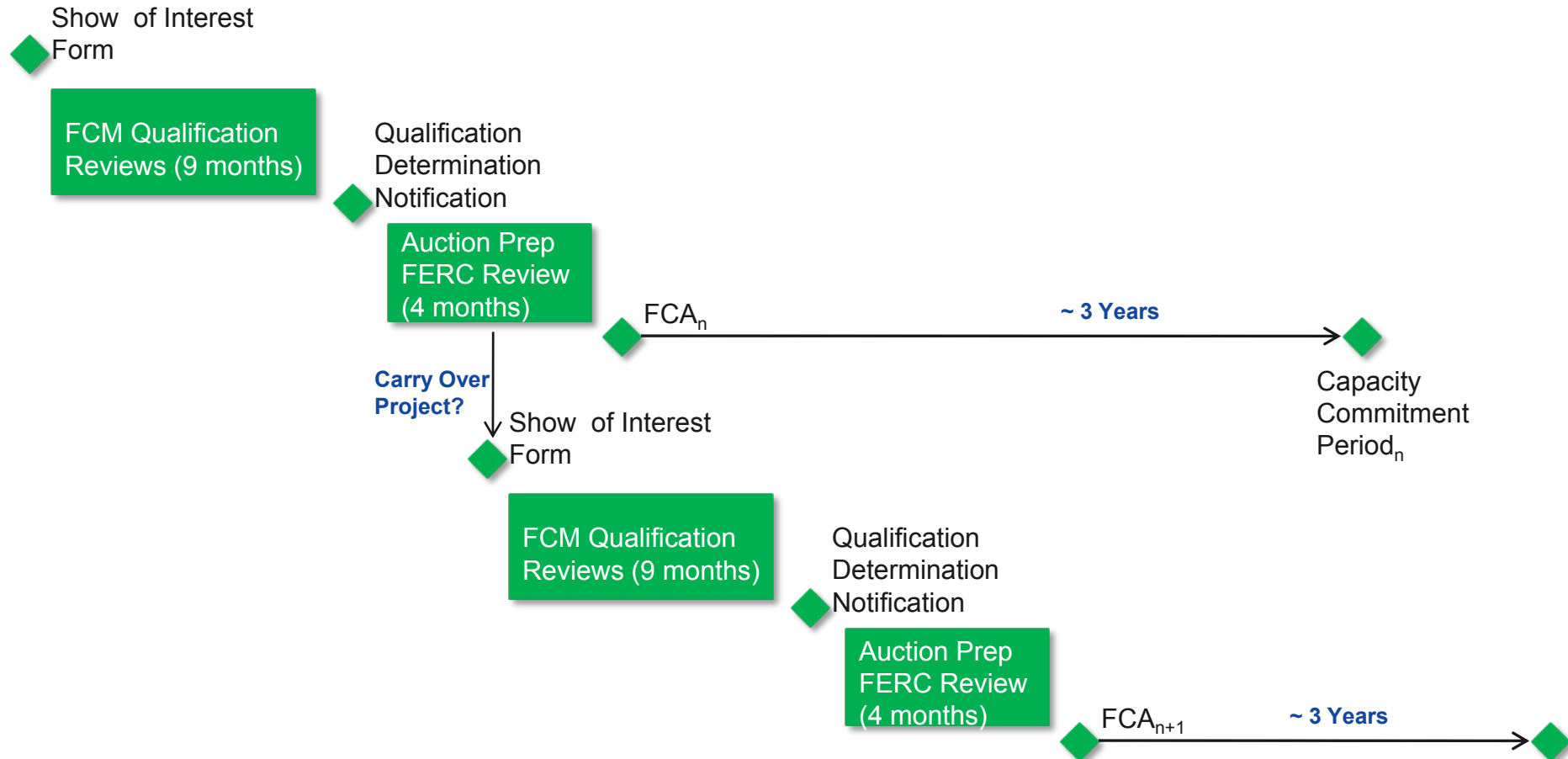
CNR Restudy

- 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

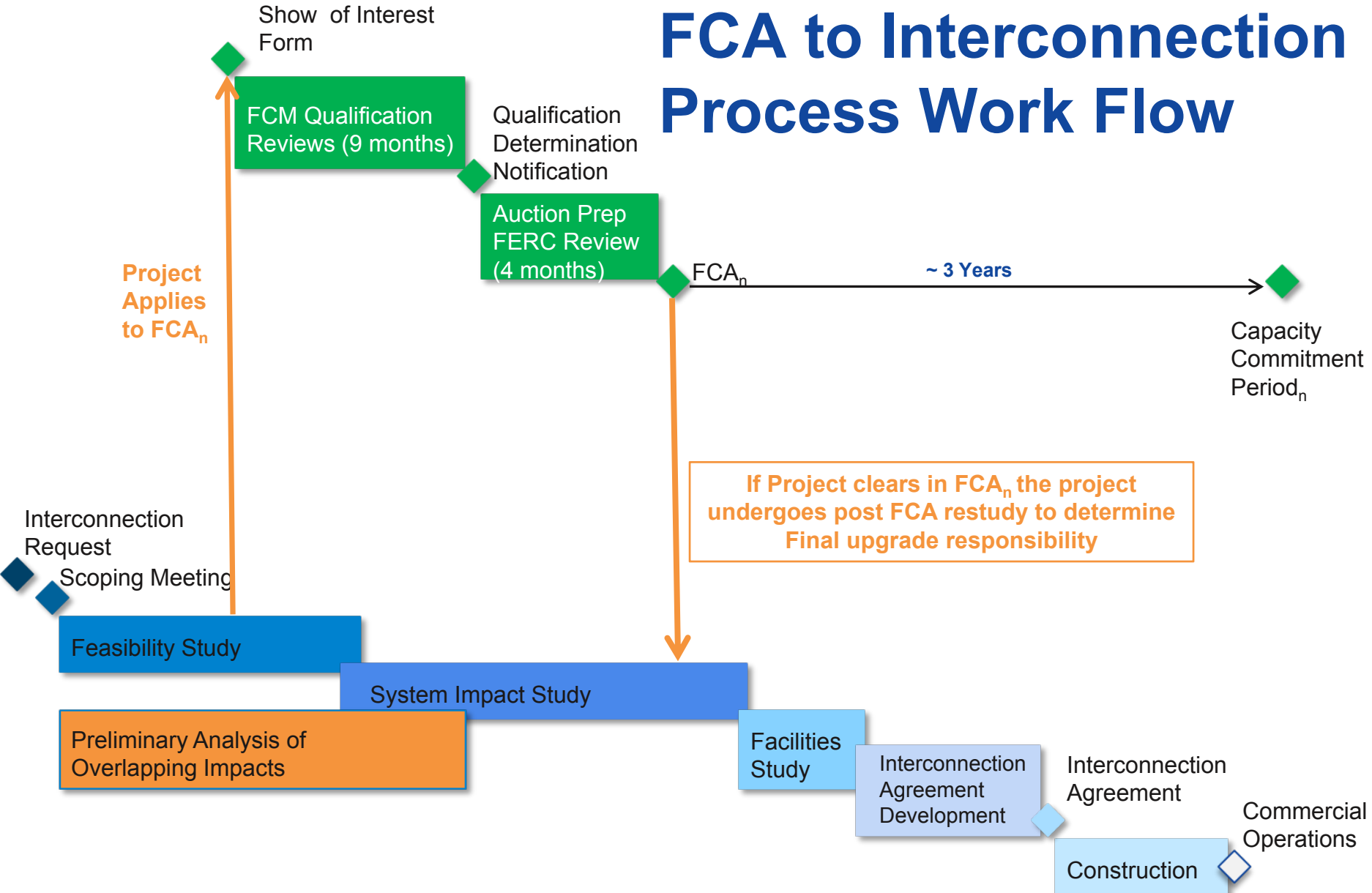
FCA Work Flow



FCA to FCA Work Flow



FCA to Interconnection Process Work Flow



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 in the amount of
 - $0.25 \times \text{CONE} \times [\text{Requested Net Summer Capacity}]$
 - e.g., 300 MW, CONE = \$6/kw-mo: Deposit = \$450,000/year

CONE = "Cost of New Entry" and changes based on the clearing price of previous FCAs

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



Transition to the Revised Interconnection Procedures

Transition

- To facilitate transition, the Interconnection Procedures provide that Resources that qualify as Existing Generating Capacity Resources in the fourth FCA will receive CNR status
- Interconnection Queue Positions assigned prior to February 1, 2009 will be maintained for purposes of a One-Time Election for resources that do not already qualify for CNR status and wish to be considered for CNRIS

Transition (cont.)

- Post February 1, 2009 Interconnection Requests will need to identify CNRIS or NRIS
- Pre-February 1, 2009 Interconnection Requests may make one-time election (before July 14, 2009) to be considered for CNRIS
- Long-Lead Facility Treatment may now be requested
- Forms and Contact Information can be found at [Home > Generation & Resources > New or Modified Interconnections](#)



Transition (cont.)

- In order to submit an SOI form for the 4th FCA (FCA 2013-2014), the Generating Resource must have an Interconnection Request for CNRIS
 - SOIs are due July 14th, 2009 for FCA 2013-2014
 - The one-time election secures a request for CNRIS at the current queue position
- Pre-February 1, 2009 Interconnection Requests that have not submitted the one-time election for CNRIS will need a new Queue Position (at the bottom of the queue) if they wish to submit an SOI in a future FCA

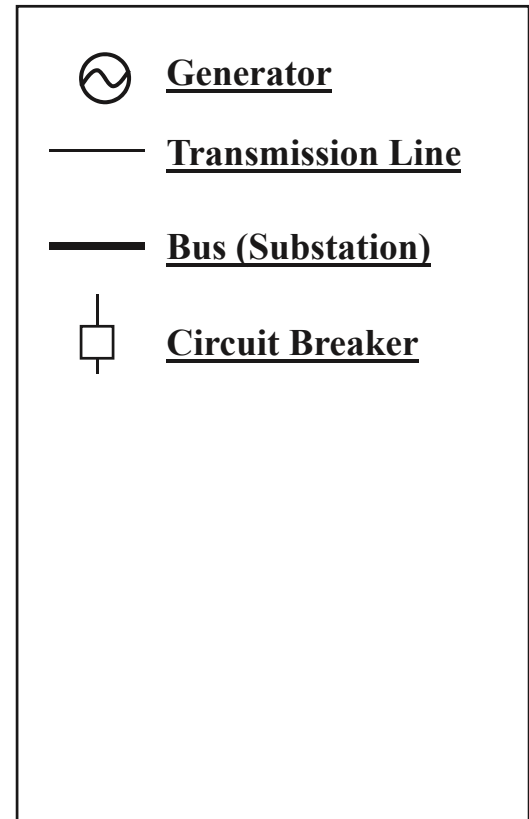
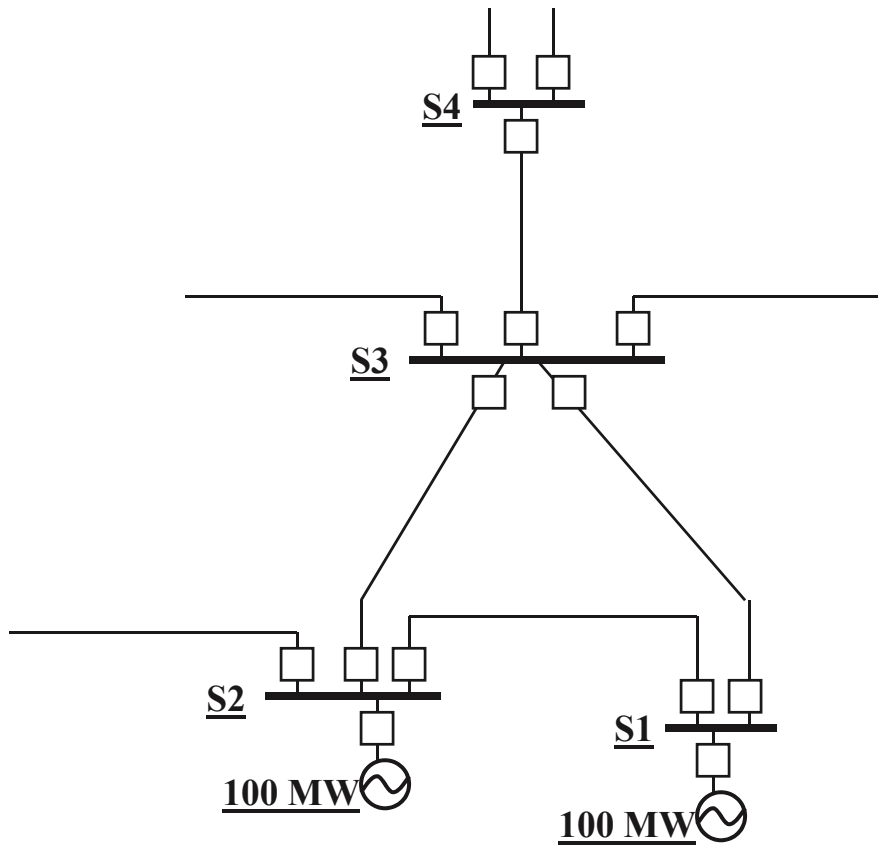
Section III Review

- In this section we
 - Described the additional steps and milestones for Generating Facilities pursuing CNRIS
 - Reviewed the FCM Qualification Process for New Generating Capacity Resources
 - Described the changes to the process introduced by the FCM/Queue filing
 - Described the Transition to the New procedures
- Next
 - We will walk through some illustrative examples of interconnection analysis

Section IV: Interconnection Analysis Scenarios

Al McBride, Project Manager
System Planning

Power System



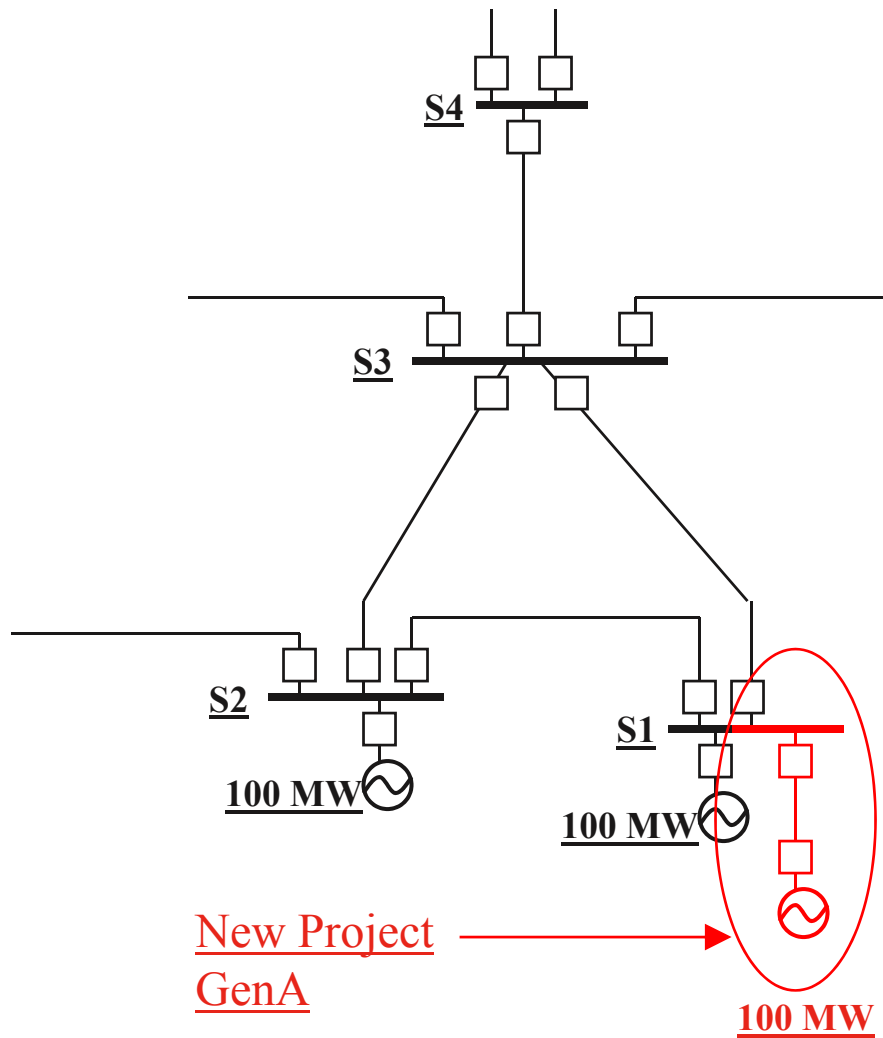
Interconnection Queue Projects

Queue Position	Interconnection Service Requested	MW	FCA Participation
A	CNRIS	100	Participating in FCA _n
B	NRIS	100	
C	CNRIS	100	Participating in FCA _n

Interconnection Process Review and FCM Qualification Review Illustrations

- The following slides illustrate steps in the Interconnection Process Review and FCM Qualification Process Reviews
- *Note that there are additional review such as stability and voltage review that are not discussed here*

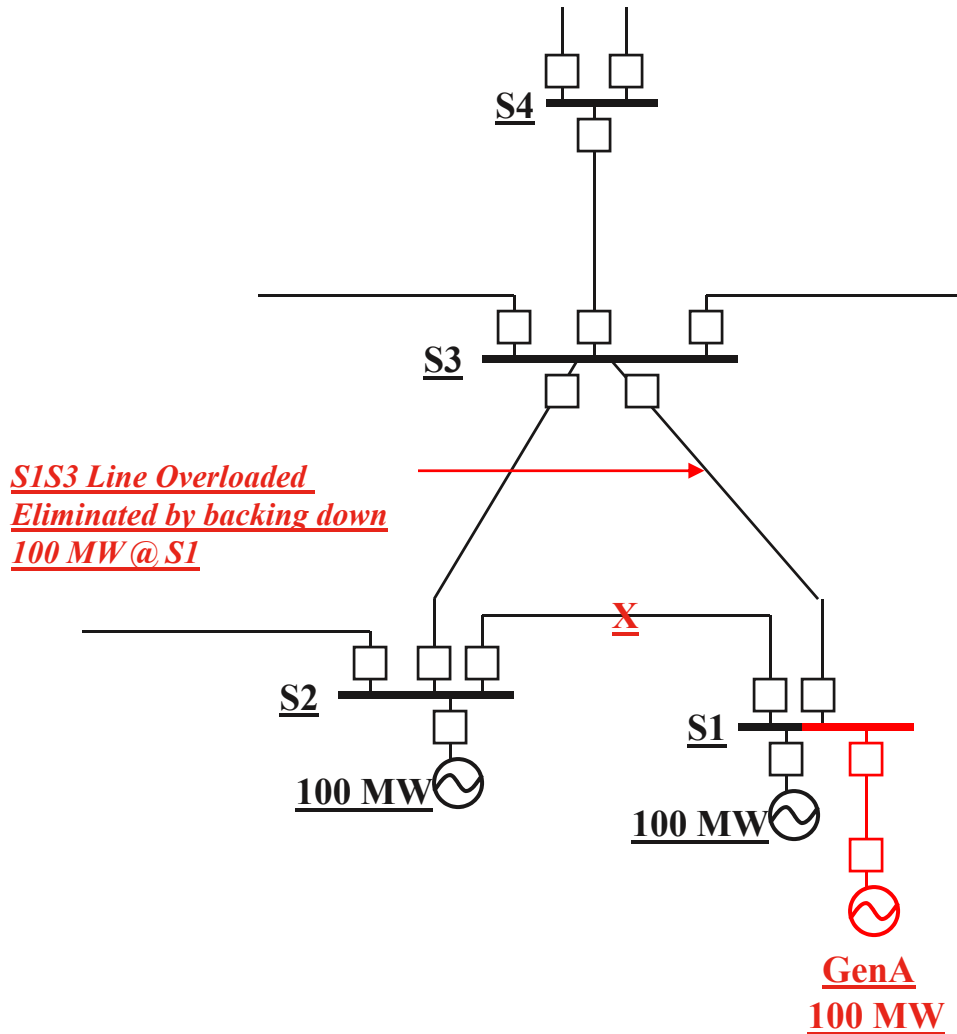
New Interconnection



Study Scope of Work for:
Analysis of the Interconnection
Facilities (Direct Connect)

- Can the substation accommodate the expansion (physical space)?
 - Can the bus-work be expanded?
 - Room for a new breaker?
 - Room for new line entry?
 - Is there new Right-of-Way for the line entering the substation?
 - Discussion with TO and substation visit required?
 - How long will this work take?
- ↑ **FCM Initial Interconnection Analysis Scope** ↑
- How much will upgrades cost?

Thermal (Power Flow Analysis)

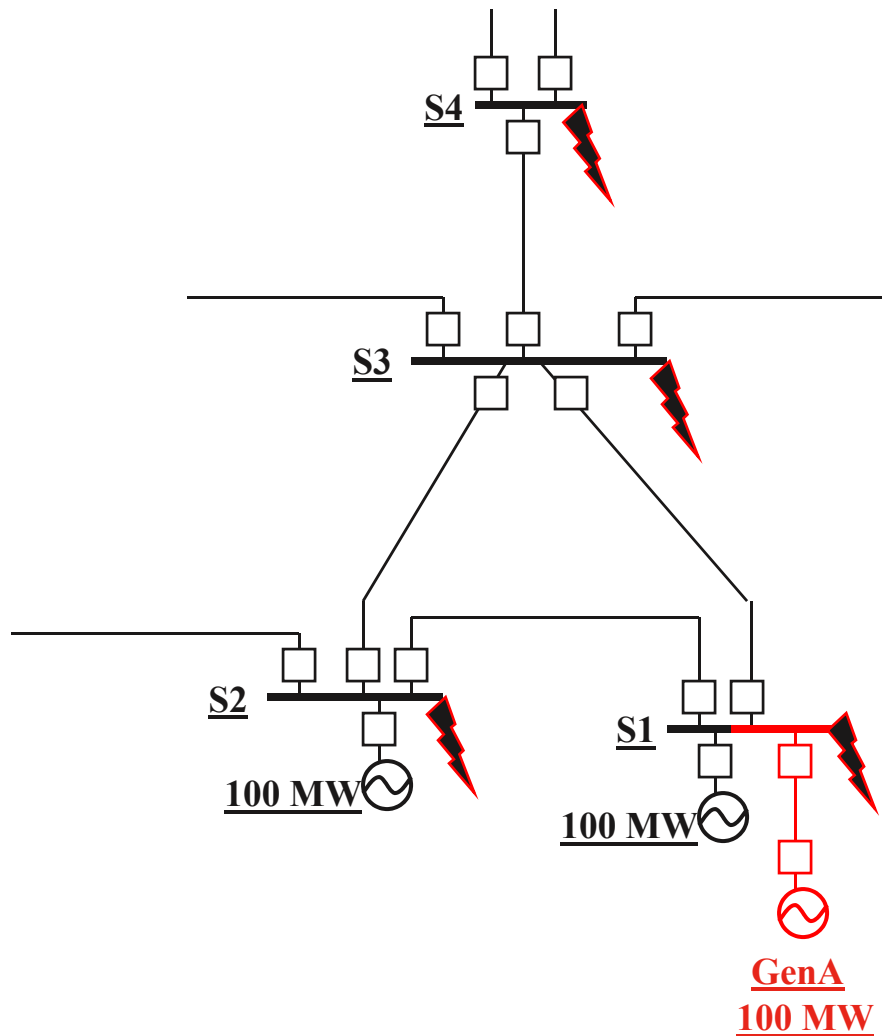


Scope of Work for: Thermal Power Flow Analysis **(Network Capability** **Interconnection Standard)**

- g) Test to see if any overload can be eliminated by backing down other (nearby) generation
Rule: Cannot back down more generation than is being added
Rule: Cannot “create” must-run
- h) Overloads that could not be eliminated by re-dispatch are assigned as Gen A responsible to fix
- i) Note that there is now 200 MW of generation at S1, but only 100 MW can run without upgrading S1S3 line (more on this later)

Short Circuit Analysis

Short Circuit Analysis



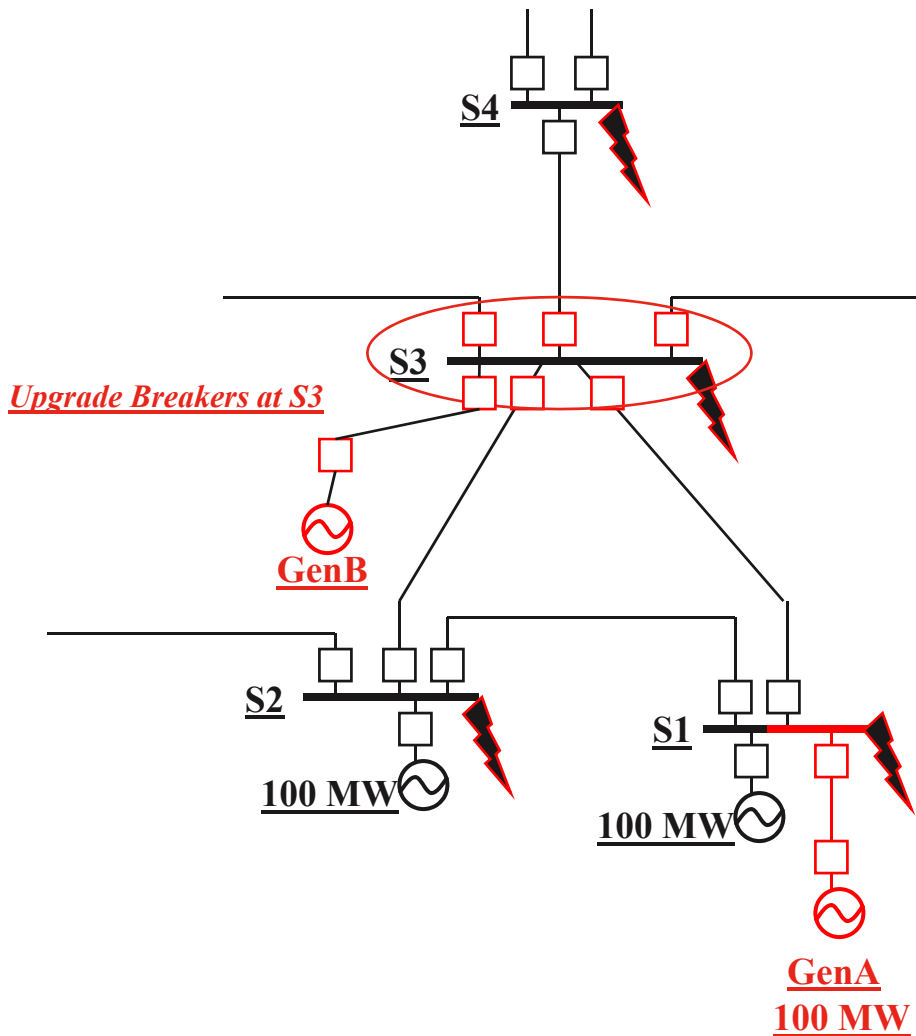
Scope of Work for: Short Circuit Analysis

- Build model for new project equipment into base case database
- Choose base case conditions for analysis (normally for short circuit analysis all generators are running)
- Run study to determine fault levels
- Identify over-dutied breakers
- Room for bigger breakers?
- Can the bus-work be expanded?
- Discussion with TO and substation visit required?
- How long will this work take?

↑ **Initial Interconnection Analysis Scope** ↑

- How much will upgrades cost?

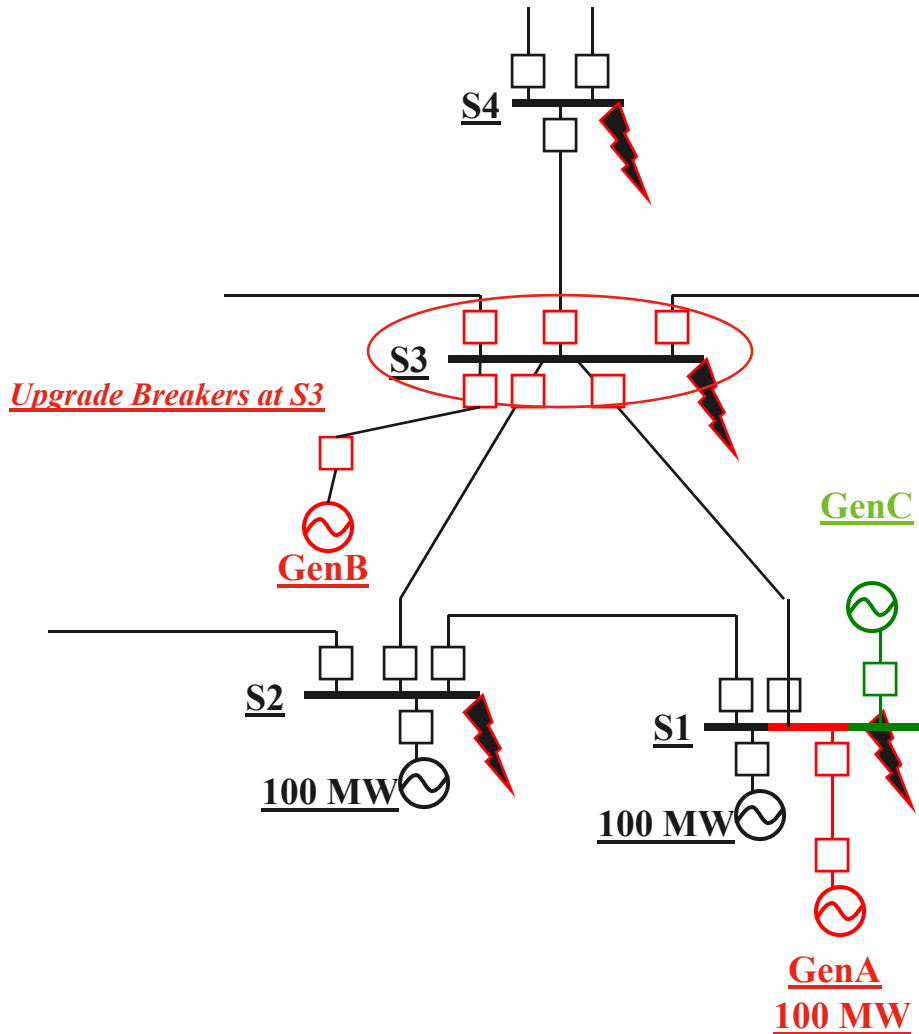
Short Circuit Analysis (cont.)



Scope of Work for: Short Circuit Analysis

- Gen B is studied after the addition of Gen A (normally for short circuit analysis all generators are running)
- In this case, upgrades were identified for the breakers at S3 for Gen B

Short Circuit Analysis (cont.)

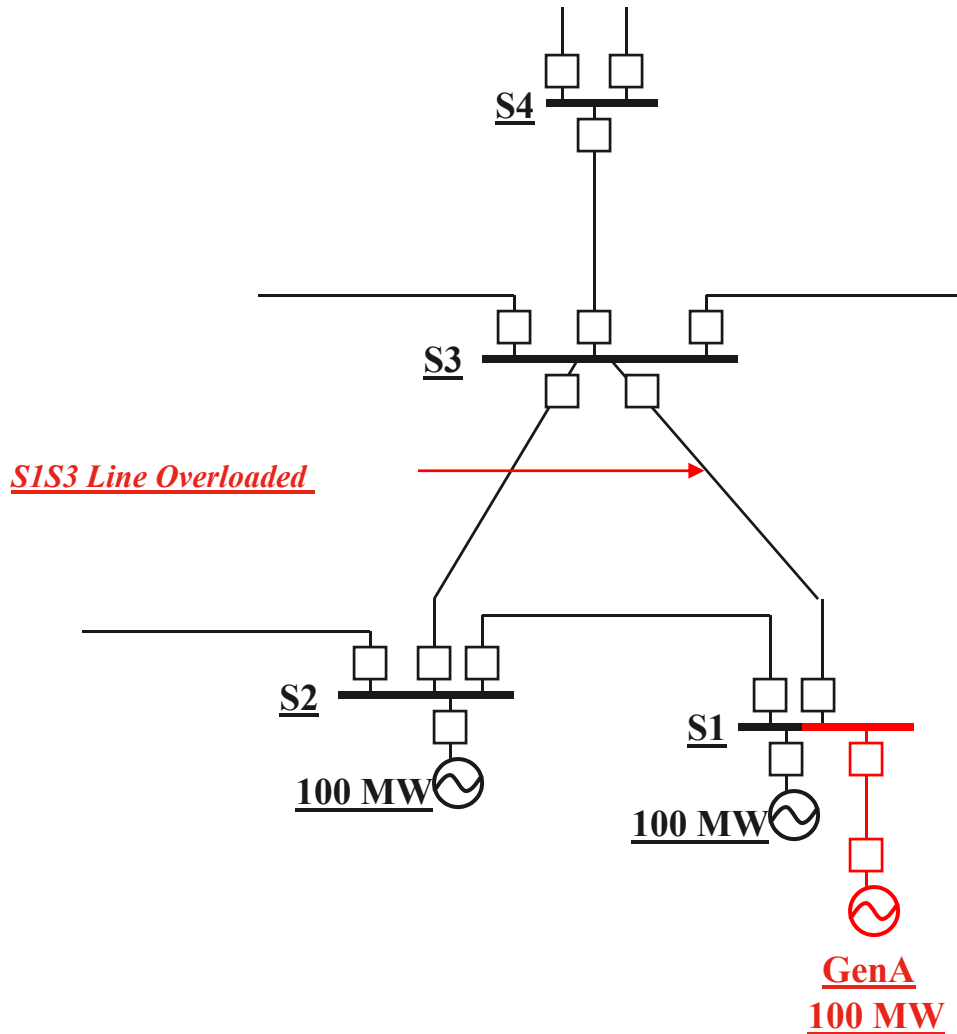


Scope of Work for: Short Circuit Analysis

- Gen C is studied next
- No additional upgrades were required for Gen C
- However, it is determined that the upgrades at S3 (for Gen B) will need to be in place

CNR Group Study

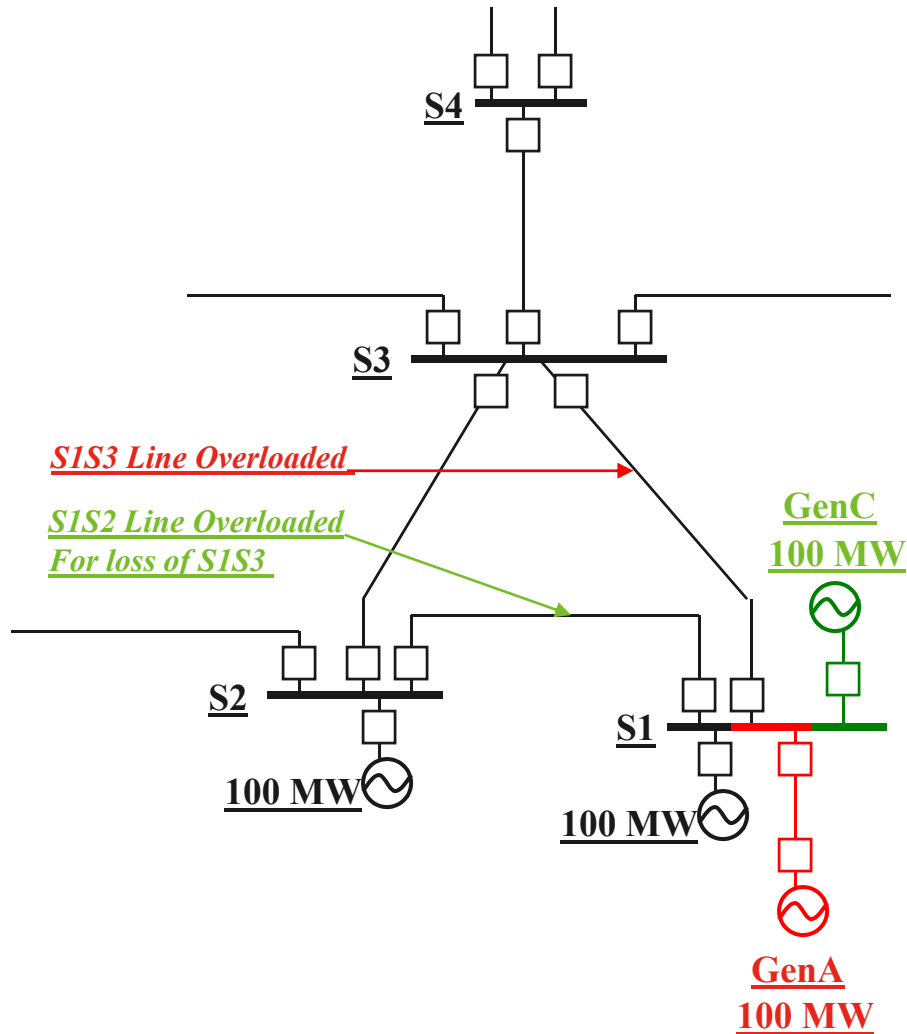
CNR Group Study



Overload of Line S1S3

- Overall approach is to add generators that have applied for the FCA by queue position until a violation that cannot be upgraded in time for the Commitment Period
- Note that for Gen A, there is now 200 MW of generation at S1, but only 100 MW can run without upgrading S1S3 line
- Alternatives for FCA are
 - Disqualify Gen A
 - If S1S3 can be upgraded in time, then qualify Gen A at 100 MW and Gen A must upgrade S1S3 if it clears in the FCA (let's assume this for the following examples)

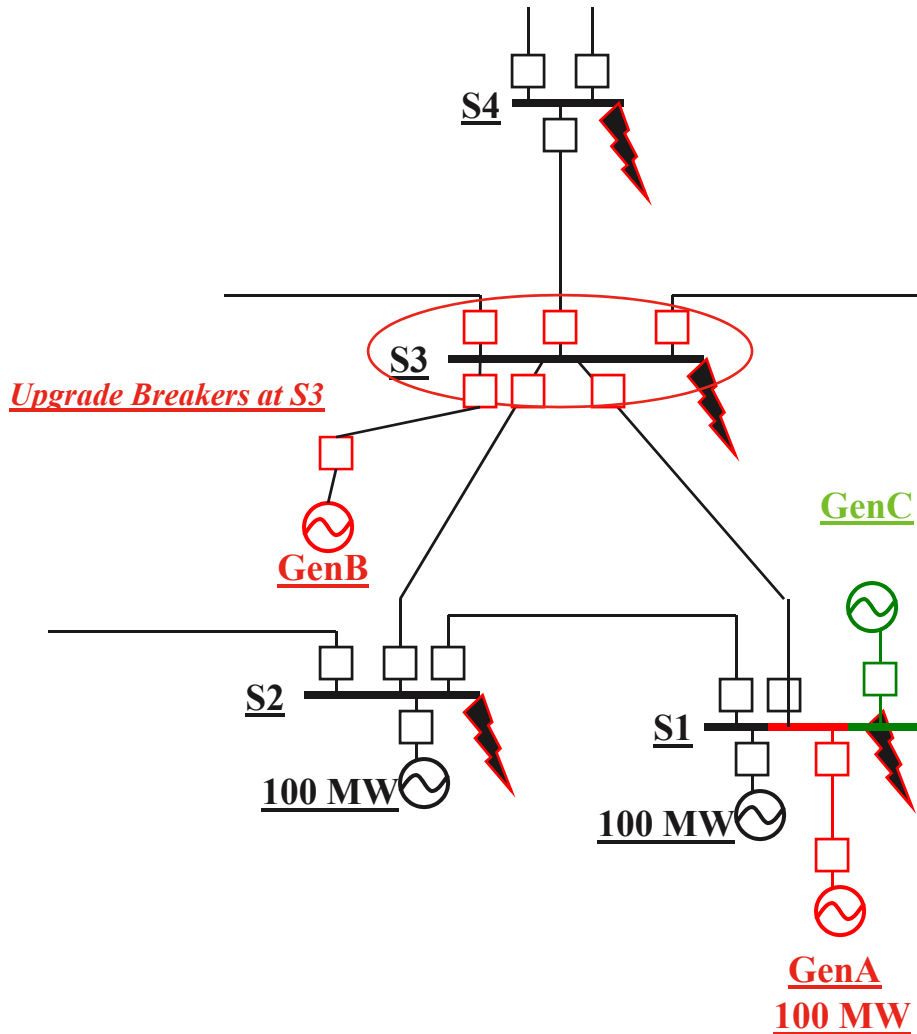
CNR Group Study (FCA_n)



Scope of Work for:
Later Queued Project – Gen C
has later queue position than
Gen A

- For Gen C, perform all of the analysis described for Gen A
- In this case, S1S2 cannot be upgraded in time
- Gen C can be Conditionally Qualified
- Gen C can clear in the FCA if Gen A withdraws from the FCA
- Whichever generator clears (Gen C or Gen A), it will have to upgrade S1S3

Short Circuit Analysis

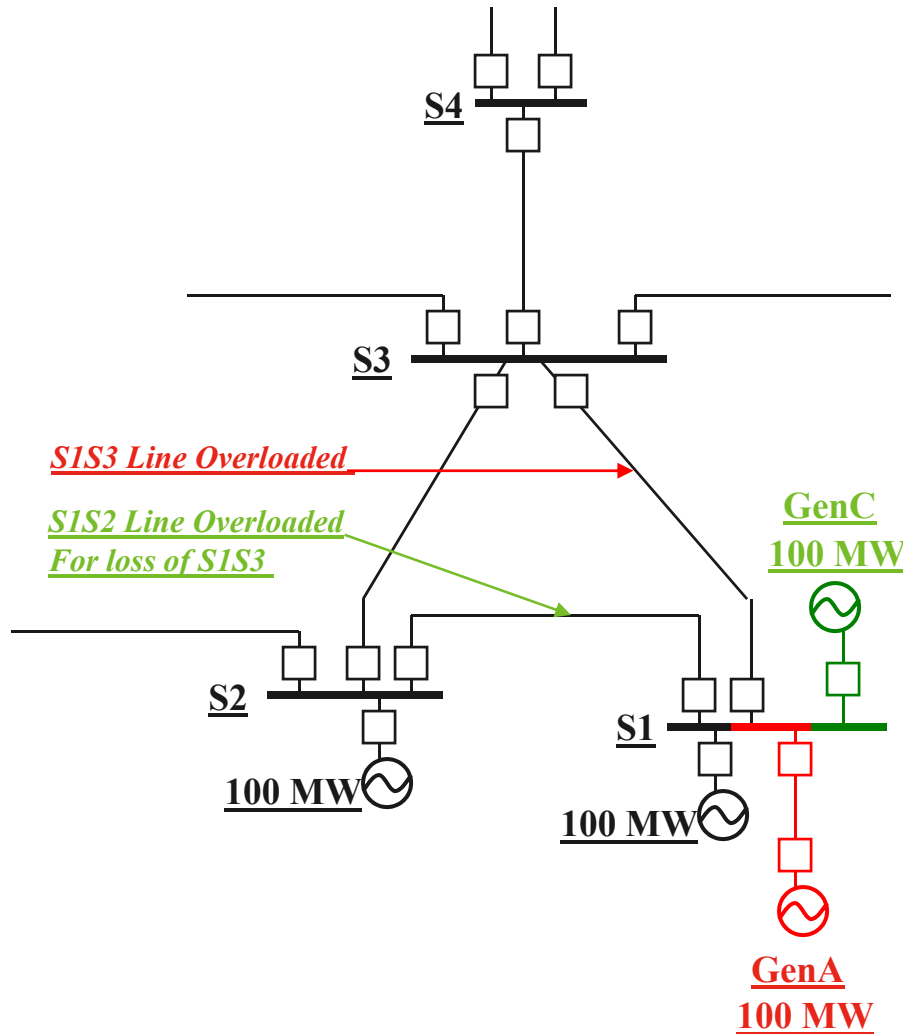


Short Circuit Analysis (LGIP Space)

- Gen C is later in the interconnection queue than Gen B
- The upgrades of breakers at S3 (which are Gen B's upgrades will have to be complete before Gen C can come online)
- Gen C may have to advance the upgrades of breakers at S3 under Construction Sequencing if it comes online before Gen B
- Gen C would not be qualified if the NCIS upgrades for Gen B could not be done in time
- If Gen B never builds, then Gen C could retain the responsibility for the breaker upgrades at S3

Post FCA Restudy

Post FCA Restudy



Scope of Work for: Post FCA Restudy

- Recall that only Gen A or Gen C could clear in the FCA_n
- If Gen A cleared fully, its final upgrade responsibility will be to upgrade S1S3
- If Gen C cleared, its final upgrade responsibility will be to upgrade S1S3 and to advance the upgrade of breakers at S3 if Gen C comes on line before Gen B
- Note that responsibility for NCIS upgrades is determined by Interconnection Queue position

Post FCA Restudy

- The Restudy will use the base case (updated as appropriate) that was used for the Group Study for the given FCA
- The results of the CNR restudy will be captured in the appropriate sections of the generator's interconnection study

