memo

To: NEPOOL Markets Committee

From: Alex Rost, Director - Transmission Services

Date: March 5, 2025

Subject: Repowering in the ISO Interconnection Procedures and the Forward Capacity Market (FCM), and Considerations related to Capacity Auction Reforms (CAR)

As part of the Capacity Auction Reforms (CAR) discussions, there have been questions on how repowering will be considered as the region transitions from a forward/annual to a prompt/seasonal capacity market. This memo provides context on the term "repowering" and the process to repower with respect to current rules for both interconnection and the FCM. The memo also provides considerations for repowering when transitioning to a prompt/seasonal capacity market.

Any concepts discussed in this memo tied to current Tariff rules have been reviewed to ensure consistency. In the case of any discrepancy between this memo and the Tariff rules, the Tariff rules govern.

What is Repowering?

The term "repowering" is not a defined term in the Tariff. Instead, this term is used informally to describe a type of project that involves change to an existing Generating Facility. There can be differences in how the term repowering is used between the ISO Interconnection Procedures and the current FCM rules.

Meaning of Repowering in the ISO Interconnection Procedures

In the ISO Interconnection Procedures[1], the term "repowering" is used to describe an Interconnection Customer's (IC's) proposal to replace/change an existing Generating Facility with a new/changed version of the existing Generating Facility. For example, an existing 100 MW thermal unit may be replaced with a new 100 MW Battery Energy Storage System (BESS). Under the Interconnection Procedures, the IC's Interconnection Service associated with the

[1] For the purposes of this memo, Schedule 22 (Large Generator Interconnection Procedures) and Schedule 23 (Small Generator Interconnection Procedures) of Section II of the Tariff. References to rules will focus on Schedule 22, but similar rules can be found in Schedule 23.

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existing Generating Facility is used to support the interconnection of the new/changed version of the existing Generating Facility. The Interconnection Procedures do not use the term "repowering". Instead, the Interconnection Procedures use the term "modification" to cover any change, including changes considered to be repowerings.

For the purposes of this memo, an existing Generating Facility associated with a repowering project is referred to as the "original Generating Facility", and the changed version of the existing Generating Facility associated with a repowering project is referred to as the "new Generating Facility."

Meaning of Repowering in the Forward Capacity Market (FCM)

Under current FCM rules, the term "repowering" is used to describe investment made to the Generating Facilities associated with an Existing Generating Capacity Resource that, if large enough, result in the ability of the Generating Facilities associated with the Existing Generating Capacity Resource to participate in a Forward Capacity Auction (FCA) as a New Generating Capacity Resource. Specifically, Section III.13.1.1.1.2 of the Tariff, commonly known as the repowering provision, covers the following investments:

- Investment where the Generating Facilities' will see an increase in output above a MW threshold.
- Investment in the Generating Facilities' equipment that exceeds a monetary threshold, where such investment will:
    - Result in changes to the Generating Facilities' electrical characteristics (*e.g.*, powered by a new technology type or not in-kind changes to generators, turbines, voltage regulators, etc.), or
    - Not result in changes to the Generating Facilities' electrical characteristics (*e.g.*, addition of larger boilers or fuel tanks, conversion of primary fuel type, complete like-for-like replacement of equipment, or investment to comply with environmental regulations or permits).

In many cases, projects that qualify for use of the repowering provisions in the FCM are supported by corresponding processes in the Interconnection Procedures, since the projects may result in an electrically modified version of an existing Generating Facility (*e.g.*, replacement of a 100 MW thermal unit with a 100 MW BESS). This is not true in all cases, since some projects that qualify for use of the repowering provisions in the FCM will not result in an electrically modified version of an existing Generating Facility (*i.e.*, repowering provisions for projects that do not result in changes to a resource's electrical characteristics) (*e.g.*, updating the boiler of a thermal unit).

For the purposes of this memo, an original Existing Generating Capacity Resource associated with a New Capacity Show of Interest Form (SOI) submitted pursuant to the repowering provisions is referred to as the "original capacity resource", and a New Generating Capacity

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Resource[2] associated with an SOI submitted pursuant to the repowering provisions is referred to as the "new capacity resource."

What is the Repowering Process?

Repowering Process in the ISO Interconnection Procedures

The general steps for a repowering project in the ISO Interconnection Procedures are:

1. The IC submits the proposed project for the new Generating Facility to the ISO.
2. The ISO reviews the proposed project for the new Generating Facility to determine if it results in a Material Modification[3] to the original Generating Facility. If the proposed project for the new Generating Facility results in a Material Modification to the original Generating Facility, go to step 3. If the proposed project for the new Generating Facility does not result in a Material Modification to the original Generating Facility, then no further process steps (*i.e.*, the subsequent steps listed below) are required.[4]
3. The IC submits an Interconnection Request (IR) for the proposed project for the new Generating Facility,[5] and the ISO performs the necessary Interconnection Studies for the new Generating Facility.
4. The ISO, IC and Interconnecting Transmission Owner (ITO) execute a new Interconnection Agreement (IA)[6,] for the new Generating Facility. Concurrent with the effective date of the new IA for the new Generating Facility, the ISO and/or ITO terminate the IA for the original Generating Facility. The appendices of the new IA describing the facilities and milestones will memorialize the timing of the replacement of the original Generating Facility with the new Generating Facility and amount of Interconnection Service assumed by the new Generating Facility from the original Generating Facility.

[2] Initially, this Generating Capacity Resource will be a New Generating Capacity Resource, but may become an Existing Generating Capacity Resource if the New Generating Capacity Resource clears in an FCA.

[3] See the definition of Material Modification in Section 4.4 in Schedule 22 of Section II of the Tariff. Material Modifications can also occur for reasons that are not related to a repowering project.

[4] An IR or a new IA is not be required if the proposed project does not result in a Material Modification, but the existing IA for the original Generating Facility is amended to reflect changes, if required.

[5] A new IR is required for a Material Modification, in addition to other circumstances such as an increase to the energy or capacity capability of an existing Generating Facility or a change in existing Interconnection Service. See the definition for Interconnection Request in Schedule 22 of Section II of the Tariff.

[6] A new IA is always needed for a new IR submitted as a result of a Material Modification.

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5. The new Generating Facility is built and commences Commercial Operation[7] under the new IA. The original Generating Facility ceases Commercial Operation.

These steps are illustrated below in Figure 1.

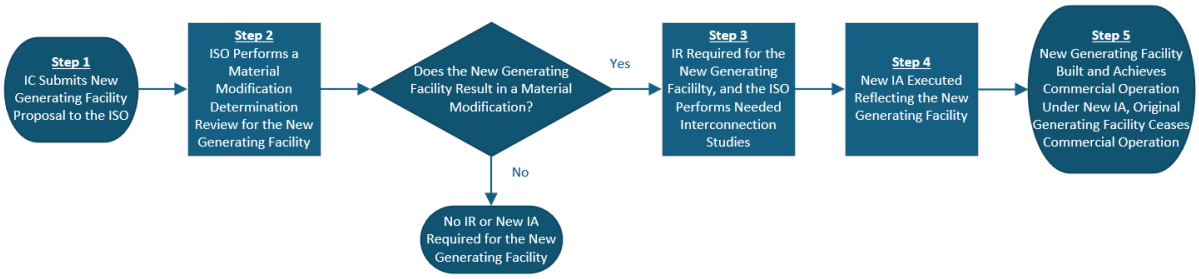

Figure 1: General repowering steps in the ISO Interconnection Procedures.

Repowering Process in the FCM Under Current Rules

The general steps for a repowering project in the FCM under current rules are:

1. The Project Sponsor submits an SOI for the proposed project for the related FCA, creating the new capacity resource which is a New Generating Capacity Resource.
2. The ISO performs a qualification review for the new capacity resource. This includes confirmation that the related project meets the applicable megawatt or investment threshold, and review of the project's critical path schedule to ensure the project will be on-line in time for the related Capacity Commitment Period (CCP). If the new capacity resource qualifies for the FCA, go to step 3. If the new capacity resource does not qualify for the FCA, the new capacity resource does not proceed to any further steps.
3. The new capacity resource participates in the FCA. If the new capacity resource obtains a Capacity Supply Obligation (CSO), go to step 4. If the new capacity resource does not obtain a CSO, then the new capacity resource does not proceed to any further steps.

[7] See the definition of Commercial Operation in Schedule 22 of Section II of the Tariff.

4. The new capacity resource achieves FCM Commercial Operation[8], and the original capacity resource is permanently de-listed.[9]

These steps are illustrated below in Figure 2.

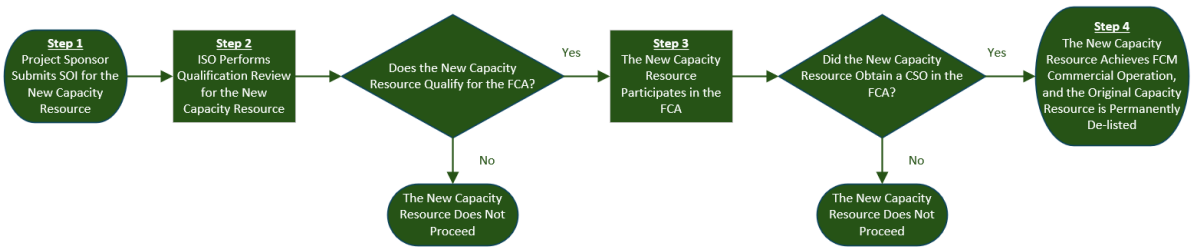

Figure 2: General repowering steps in the FCM.

Links Between the ISO Interconnection Procedures' and FCM's Repowering Processes

Links between the repowering processes in the ISO Interconnection Procedures and the FCM exist when a repowering project for a new Generating Facility requires an IR (*i.e.*, the change is electrically material, as described above) and seeks to hold Capacity Network Resource Interconnection Service upon its completion. Specifically, under these circumstances there are the following links between the ISO Interconnection Procedures and the FCM:

- An IR is required for the new Generating Facility under the Interconnection Procedures (if the change is electrically material), and a valid IR is required to support an SOI for the new capacity resource in the FCA qualification process (if the change is electrically material).
- A new IA is required for the new Generating Facility under the Interconnection Procedures which reflects its characteristics and the Capacity Network Resource Capability (CNRC) that will be associated with it, where this CNRC is dependent on the amount of CSO obtained by the new capacity resource in the FCA.
- Coordination of the Commercial Operation date of the new Generating Facility, the FCM Commercial Operation date of the new capacity resource, the assumption of Capacity

[8] See Section III.13.3.8 of the Tariff.

[9] The new capacity resource is expected to achieve FCM Commercial Operation at the beginning of the CCP associated with the FCA where the new capacity resource first cleared. There are provisions associated with the case where the new capacity resource is delayed beyond this target CCP, which may result in the original capacity resource meeting CSO obligations until the new resource achieves FCM Commercial Operation (see Section III.13.1.1.1.2 and Section III.13.3.4(a)(iii) of the Tariff).

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Network Resource Interconnection Service (CNRIS)/CNRC by the new Generating Facility[10], the date on which the original Generating Facility ceases Commercial Operation, and the permanent de-list of the original capacity resource.

Figure 3 illustrates these links with purple connectors.

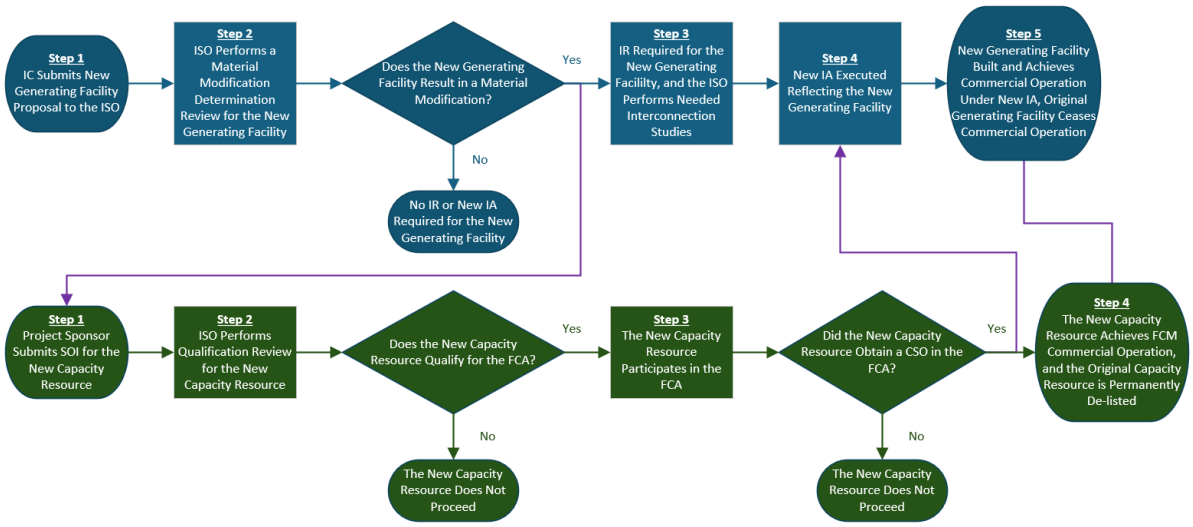

Figure 3: Links between the ISO Interconnection Procedures' and FCM's general repowering processes.

As an example, assume that:

- Facility A (*i.e.*, the original Generating Facility):
  - Is an existing 100 MW thermal unit that has:
    - Network Resource Interconnection Service (NRIS) for 100 MW of Network Resource Capability (NRC).
    - CNRIS for 100 MW of CNRC.
  - Is represented in the FCM by Existing Generating Capacity Resource "Generating Capacity Resource X" (*i.e.*, the original capacity resource).
- Facility B (*i.e.*, the new Generating Facility) is a proposed 100 MW BESS seeking to replace Facility A by using the same POI as Facility A, and seeking to assume Facility A's NRIS/NRC and CNRIS/CNRC.

[10] Network Resource Interconnection Service/Network Resource Capability is also assumed by the new Generating Facility.

To accomplish this:

- In the ISO Interconnection Procedures:
  - Facility B establishes a new IR since replacing an original Generating Facility with a new Generating Facility that uses a different technology would be a Material Modification.[11]
  - The ISO performs the required Interconnection Studies.
  - A new IA that represents Facility B is executed. The new IA is coordinated with the IA for Facility A to reflect the timing and amount of Interconnection Service that Facility B will assume from Facility A. The IA for Facility A is terminated when the new IA representing Facility B is effective.
- In the FCM space:
  - An SOI is submitted for Facility B for the FCA qualification process associated with CCP Z, creating a New Generating Capacity Resource "Generating Capacity Resource X"[12] (*i.e.*, the new capacity resource).
  - The new capacity resource qualifies for the FCA associated with CCP Z, and clears 100 MW in the FCA for CCP Z.[13] This results in the original capacity resource becoming permanently de-listed at the start of CCP Z.[14]
- At the start of CCP Z, Facility B is built and achieves Commercial Operation, and the new resource achieves FCM Commercial Operation. At this point, Facility B is operating under the new IA, and Facility A ceases Commercial Operation.

Additional Considerations Related to Repowering

How Interconnection Service is Assumed by the New Generating Facility from the Original Generating Facility

To operate, the new Generating Facility requires an IA that reflects its characteristics, and the type and amount of Interconnection Service assigned to it. The type and amount of Interconnection Service documented in the original Generating Facility's IA is translated to account for the type and amount of Interconnection Service assumed by the new Generating Facility. The original Generating Facility must cease Commercial Operation by the time the new Generating Facility achieves Commercial Operation, which means the IA will reflect that the

[11] See the definition of Material Modification in Schedule 22 of Section II of the Tariff, and Appendix E of Planning Procedure 5-6.

[12] The Forward Capacity Tracking System (FCTS) uses the same resource ID for the original and new capacity resources.

[13] Once the New Generating Capacity Resource for Generating Capacity Resource X clears in the FCA for CCP5, it becomes an Existing Generating Capacity Resource for subsequent FCAs.

[14] See Section III.13.2.3.2(e) of the Tariff.

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new Generating Facility will assume Interconnection Service upon entering Commercial Operation, whereupon the original Generating Facility will cease to have Interconnection Service. Note that the timing for the new Generating Resource to assume CNRC (and hence all Interconnection Service required for Commercial Operation) is set as the start of the CCP associated with the FCA in which the new capacity resource first obtained a CSO.[15]

Interconnection Study Considerations for Repowering Projects

All projects subject to the ISO Interconnection Procedures that require an IR (including repowering projects) are placed in the ISO interconnection queue and are subject to the Interconnection Study rules described in those procedures. Since repowering projects result in the replacement of an original Generating Facility with a new Generating Facility at the same POI, to respect the existing Interconnection Service that is eventually assumed by the new Generating Facility from the original Generating Facility, thermal studies examining net MW injections may not be required for the new Generating Facility if its net MW injection at the POI is less than or equal to the net MW injection at the POI from the original Generating Facility. The ISO would still need to perform all other required study analyses for a repowering project (*e.g.*, steady state voltage, short circuit, stability, electromagnetic transient, *etc*.), including thermal studies for any requested Interconnection Service that exceeds the Interconnection Service associated with the original Generating Facility.[16]

Facilities Associated with a Valid IR for a Repowering Project are Not Automatically Retired After Non-Operation for Three Calendar Years

Section III.13.2.5.2.5.3(d) of the Tariff states that Generating Facilities that do not operate commercially for a period of three calendar years are deemed retired by the ISO, which results in the loss of all Interconnection Service associated with the Generating Facilities, unless the IC submits a valid IR for a repowering project before the three calendar year period is complete, and while such IRs remain valid.

Repowering vs. Surplus Interconnection Service

Under the ISO Interconnection Procedures, repowering projects result in the IC's replacement of its original Generating Facility with a new Generating Facility. In the end, Interconnection Service is held by the IC's new Generating Facility at the POI (*i.e.*, the Interconnection Service is not shared with a separate Generating Facility).

Surplus Interconnection Service allows an IC to utilize its Unused Capability at its Generating Facility to support the addition of another, but separate, Generating Facility behind the same

[15] The Tariff allows for these events to take place before or after the start of the CCP associated with the FCA in which the new capacity resource first obtained a CSO if the Generating Facilities achieve Commercial Operation before or after this date.

[16] Any amount of net MW injection from the new Generating Facility that is greater than the original Generating Facility's net MW injection at the POI is incrementally studied. In addition, BESS charging may need to be considered if the requested level of charging is not covered by the Interconnection Service associated with the original Generating Facility.

POI. The surplus Generating Facility may be owned by the IC, the IC's affiliate, or an unaffiliated third party. Under Surplus Interconnection Service, the existing Generating Facility continues Commercial Operation (*i.e.*, it is not replaced) and retains its Interconnection Service when the surplus Generating Facility achieves Commercial Operation capped at the Unused Capability.

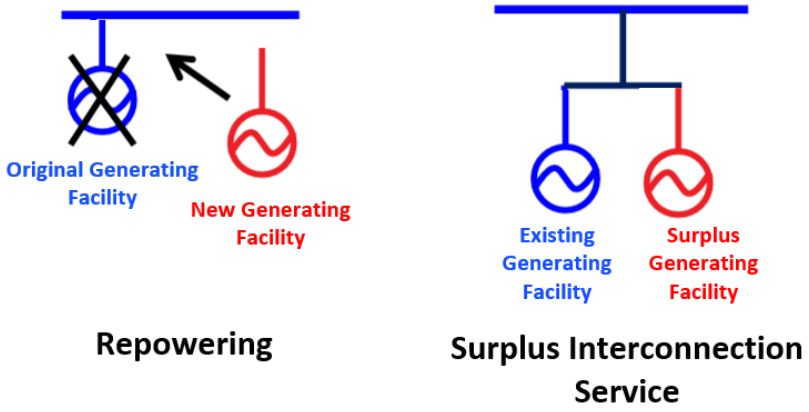

Figure 4: Repowering vs. Surplus Interconnection Service.

Repowering vs. Deactivation

Deactivation (*i.e.*, retirement or permanent de-list) results in loss of the existing Generating Facility's Interconnection Service up to the retired or permanently de-listed amount. In other words, there is no new Generating Facility that assumes the deactivating Generating Facility's Interconnection Service after the deactivating Generating Facility loses it Interconnection Service.

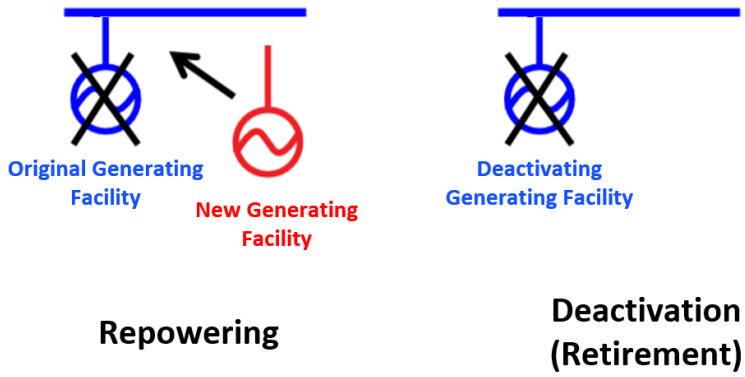

Figure 5: Repowering vs. deactivation.

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Note that in the FCM, the repowering provisions are not tied to resource deactivation since use of these repowering provisions does not require submission of a Retirement or Permanent De-List Bid. Resource deactivation through submission of a Retirement or Permanent De-List Bid results in the loss of the corresponding level of the applicable Interconnection Service. This contrasts with the FCM repowering provisions, which can facilitate the assumption of CNRIS/CNRC from an original Generating Facility associated with the original capacity resource by a new Generating Facility associated with a new capacity resource.[17]

Impacts of Order No. 2023

The ISO's compliance filing with Order No. 2023 proposed to remove from the Interconnection Procedures the FCM-related actions and milestones to achieve CNRIS. Under the proposed new rules, which are presently pending at FERC, this will enable all projects subject to the ISO Interconnection Procedures (including repowering projects) to achieve CNRIS for the requested amount of CNRC solely by completing the requirements in the ISO interconnection process, implementing any required transmission upgrades, and achieving Commercial Operation. This outcome severs the link between the ISO Interconnection Procedures' and FCM repowering processes, as shown in Figure 6. Assuming the current FCM rules, the requirement for an SOI to be supported by a valid IR remains. Coordination of the new capacity resource achieving FCM Commercial Operation and the new Generating Facility achieving Commercial Operation (as well as the original capacity resource becoming permanently de-listed and the original Generating Facility ceasing Commercial Operation) will still be required since the timing of these events is tied to the beginning of the CCP for which the new capacity resource first cleared as a New Generating Capacity Resource and obtained a CSO.

[17] A Generating Capacity Resource that has deactivated through clearing a Retirement or Permanent De-List Bid may seek to return to the FCM by meeting the investment thresholds described in Section III.13.1.1.1.2 of the Tariff, but the associated Generating Facility would not re-assume any previously held Interconnection Service lost as a result of clearing a Retirement or Permanent De-List Bid. Such a reactivation would need to be supported by an IR for the appropriate type and amount of Interconnection Service.

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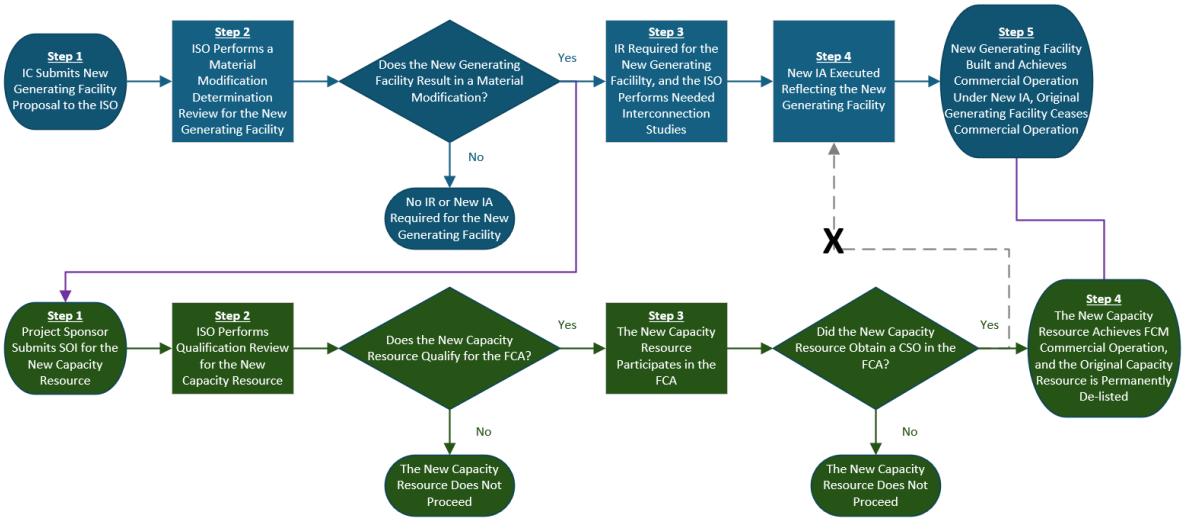

Figure 6: Impacts of Order No. 2023 on the links between the ISO Interconnection Procedures' and FCM's repowering processes.

Impacts of a Prompt Capacity Market on FCM Repowering Concepts

The move to a prompt auction design results in capacity auctions taking place soon before their related capacity delivery periods. This means that new Generating Facilities seeking to participate in a prompt auction will need to be close to completion at the time they first seek qualification for a capacity auction. This is especially true if non-commercial capacity cannot participate in a capacity auction (*e.g.*, a prompt annual/seasonal auction or monthly reconfiguration auction). This design change results in the inability to support the FCM repowering provisions, since any projects otherwise triggering these FCM repowering provisions would need to be completed before the associated Generating Facilities can participate in a capacity auction. As a result, all mechanisms and steps needed for a new Generating Facility to assume the Interconnection Service (*i.e.*, NRIS/NRC and CNRIS/CNRC) held by an original Generating Facility will need to be completed under the ISO interconnection process before the new Generating Facility proceeds to a capacity auction. In other words, any commercial capacity (including commercial capacity associated with a repowering project) seeking to participate in a capacity auction will be required to have its CNRIS by the time it participates in a capacity auction.

Figure 7 shows how a prompt design and its resulting implications impacts the links between the ISO Interconnection Procedures' and FCM's repowering processes.

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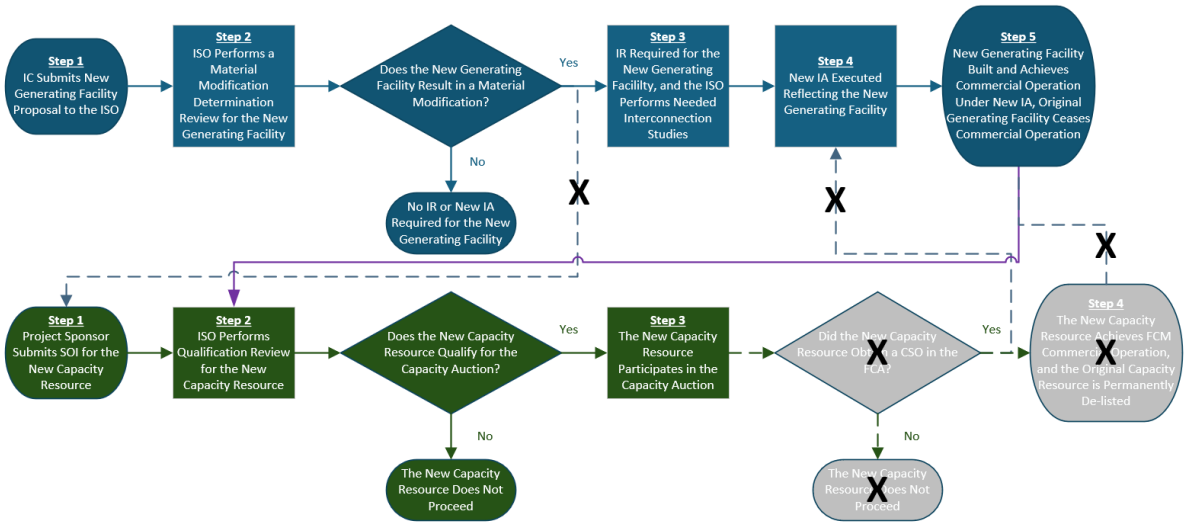

Figure 7: Impacts of a prompt capacity market design on the links between the ISO Interconnection Procedures' and FCM's repowering processes.

Final Thought on Repowering and Capacity Auction Reforms

The current FCM rules have ties to various processes and activities that may be impacted by Capacity Auction Reforms. Relatedly, stakeholders have expressed questions and interest on how concepts related to repowering will be impacted. At a fundamental level, ICs with repowering projects that seek to change/replace an original Generating Facility with a new Generating Facility, where the new Generating Facility assumes its needed Interconnection Service from the original Generating Facility, will maintain the ability to do so. As the design details associated with the capacity market reforms are set, the ISO will inform stakeholders on conforming changes related to repowering in New England.

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