Interregional Transmission Coordination

A review of practices following FERC Order Nos. 890 and 1000

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Acronyms and Abbreviations

CAISO	California Independent System Operator
CEII	Critical Energy/Electric Infrastructure Information
CSP	Coordinated System Plan (MISO/PJM/SPP)
FERC	Federal Energy Regulatory Commission
FRCC	Florida Reliability Coordinating Council
GLDF	generation to load distribution factor
HVAC	High Voltage Alternating Current (line)
HVDC	High Voltage Direct Current (line)
IMEP	Interregional Market Efficiency Project (MISO/PJM)
IPSAC	Interregional Planning Stakeholder Advisory Committee (MISO/PJM/SPP)
ISO	Independent System Operator
ISO-NE	ISO New England
ITP	Integrated Transmission Plan (MISO/SPP)
JIPC	Joint ISO/RTO Planning Committee (ISO-NE/NYISO/PJM)
JOA	Joint Operating Agreement
JPC -	Joint Planning Committee (MISO/SPP)
JRPC	Joint RTO Planning Committee (MISO/PJM)
MEP	Market Efficiency Project (MISO/PJM)
MISO	Midcontinent System Operator
MTEP	MISO Transmission Expansion Plan
MVP	Multi-Value Project (MISO/PJM)
NCSP	Northeastern Coordinated System Plan (ISO-NE/NYISO/PJM)
NERC	North American Electric Reliability Corporation
NTTG	Northern Tier Transmission Group
NYISO	New York Independent System Operator
OATT	Open Access Transmission Tariff
PJM	PJM Interconnection, LLC
PUC	Public Utility Commission
RPR	Relevant Planning Region
RTEP	Regional Transmission Expansion Plan (PJM)
RTO	Regional Transmission Operator
SCRPT	South Carolina Regional Transmission Planning
SERTP	Southeastern Regional Transmission Planning
SPP	Southwest Power Pool
TMEP	Targeted Market Efficiency Project (MISO/PJM)
WECC	Formerly the Western Electricity Coordinating Council
WPR	Western Planning Region

Executive Summary

The regional transmission planning and interregional coordination requirements established by FERC through Order Nos. 890 and 1000 represent important tools that regions can wield to address regional transmission needs. Order No. 890 outlined general requirements for local as well as regional transmission planning practices and procedures. Order No. 1000 laid out specific requirements for (1) regional transmission planning; (2) consideration of transmission needs driven by public policy requirements; (3) non-incumbent transmission developer reforms; (4) interregional transmission coordination and cost allocation; and (5) cost allocation for transmission projects that have been selected in a regional transmission plan for purposes of cost allocation.

This report is the third in a series of reports on the regional transmission planning practices pursuant to FERC Order Nos. 890 and 1000.[1] The first two reports reviewed regional transmission planning practices and the selection of transmission projects within regions. This report describes interregional transmission coordination practices and activities among one or more regions, focusing on practices for selecting interregional transmission projects for purposes of interregional cost allocation.

With respect to interregional transmission coordination, Order No. 1000 directs that public-utility transmission providers in each pair of neighboring transmission planning regions within the Eastern and Western interconnections establish processes for identifying and jointly evaluating interregional transmission projects that may be more efficient or cost-effective solutions to regional needs. Order No. 1000 also requires that each public-utility transmission provider have a method or set of methods for allocating the costs of interregional transmission projects that are selected in both of the relevant regional transmission plans for purposes of cost allocation. The methods must be consistent with six principles FERC outlines for interregional cost allocation. Order No. 1000 does not preclude nor require neighboring regions to produce an interregional plan or to engage in interconnection-wide planning.

In response to Order No. 1000, the 12 transmission planning regions recognized by FERC have established compliant transmission coordination processes with one or more of their neighboring regions within the same interconnection. The majority of these processes involve pairs of neighboring regions. One process involves three neighboring regions: ISO-NE, NYISO, and PJM. Another involves all four regions that make up the Western Interconnection: CAISO, ColumbiaGrid, NTTG, and WestConnect.

[1] The two earlier reports are Eto (2016): https://emp.lbl.gov/publications/building-electric-transmission-0, and Eto and Gallo (2017): https://emp.lbl.gov/publications/regional-transmission-planning-review.

We find:

Interregional transmission projects must meet the same standards applied to regional transmission projects
Just as regional transmission projects must meet regional transmission needs more efficiently or cost-effectively than alternatives in order to be selected for regional cost allocation, so too must interregional transmission projects. In this regard, the only difference between an interregional transmission project and a regional transmission project is that an interregional transmission project must meet more than one region's regional transmission needs more efficiently or cost-effectively than alternatives within each region.

In other words, the criteria used to evaluate and select interregional transmission projects are the same criteria used to evaluate and select regional transmission projects for regional cost allocation. While the criteria remain the same, the consideration of interregional transmission projects by two or more regions, requires additional processes related to identification and then coordinated evaluation by the regions.

Interregional transmission coordination involves timely information exchanges among regions
Because two or more regions must each find that an interregional transmission project is more efficient or cost-effective than alternatives within their respective regions, selection of an interregional transmission project for interregional cost allocation requires that regions coordinate their planning processes with one another. Coordination activities take two forms: (1) information sharing, and (2) time alignment between or among regional transmission planning processes for purposes of considering an interregional transmission project.

Each pair or group of regions has adopted means for coordinating their evaluations of interregional transmission projects that might be selected for interregional cost allocation. A typical approach involves an annual joint meeting at which, among other topics, regional transmission planning activities are reviewed, and needs for coordination around one or more proposed interregional transmission projects are discussed. An outcome of these meetings is acknowledgment that two (or more) regions will consider an interregional transmission project and an understanding of how with this consideration will take place in relation to their individual regional planning cycles.

The allocation of costs among regions is based on benefits established by each region
When two or more neighboring regions in which an interregional transmission project is located each select that interregional transmission project for purposes of cost allocation, the costs are then allocated among the beneficiaries of the transmission project in accordance with FERC's principles for cost allocation: the costs of a selected interregional transmission project are allocated in a manner that is at least roughly commensurate with the project's estimated benefits in each of the regions. Specifically, costs are allocated among regions based on the proportion of total benefits that accrue to each region. Application of this principle directs that each region relies on its established means for determining regional benefits when allocating costs among regions. This is in explicit deference to each

region's approach for defining benefits that are appropriate for consideration by the region. It is recognized that transmission planning regions will differ in their approaches.

Next Steps

The prior two reports in this series emphasized that regional implementation of FERC Order Nos. 890 and 1000 is recent. In the non-ISO/RTO regions, compliant-specific procedures were, to a large extent, created for the first time. In ISO/RTO regions, although there might have been a foundation of regional planning practices, many significant changes have been required to establish compliant procedures. Both types of regions have continued to modify their practices as they and their stakeholders gain experience. In fact, envisioning a stable end-state for regional practices misses the point: we should expect that regional practices will evolve to accommodate the ever-changing environment within which regional transmission planning takes place.

Therefore, it is important to comprehensively and consistently monitor and track the evolution of regional practices. A common understanding of what, in fact, has taken place in the past is an essential foundation for justifying changes to improve future outcomes. Ongoing monitoring and tracking should foster understanding of the outcomes of regional practices as well as the regional processes from which those outcomes emerge.

At bottom, we should seek to understand how regional needs for transmission are being met and whether they are being met by means that are consistent with FERC's requirements for regional planning. A critical insight of our reviews has been acknowledgment that regional needs can and often will be met more cost effectively and efficiently by means that do not require or seek regional cost allocation (both transmission and non-transmission alternatives). Therefore, understanding how regional needs are met requires a holistic perspective that considers all transmission (and non-transmission) activities within a region, not just projects that are selected for purposes of regional or interregional cost allocation.

1. Introduction

The regional transmission planning and interregional coordination requirements established by the Federal Energy Regulatory Commission (FERC) through Order Nos. 890 and 1000 constitute important tools that transmission planning regions can wield to address regional transmission needs. Order No. 890[2] outlined general requirements for local as well as regional transmission planning practices and procedures. Order No. 1000[3] laid out specific requirements for: (1) regional transmission planning, (2) consideration of transmission needs driven by public policy requirements, (3) non-incumbent transmission development, (4) interregional transmission coordination, and (5) cost allocation for transmission projects that have been selected in a regional transmission plan for purposes of cost allocation. This report describes how the transmission planning regions are implementing the requirements related to interregional transmission coordination.

This report is the third in a series of reports on regional transmission planning practices carried out pursuant to the above FERC Orders, specifically on the practices for selecting transmission projects for regional cost allocation.[4] The first report described the governance structures and decision-making procedures of the 12 transmission planning regions that have been recognized through compliance with Order No. 1000. That report also summarized the regions' overall transmission planning processes and studies, including the sponsorship and competitive bidding approaches used to select projects for regional cost allocation. Finally, the first report reviewed then-recent (circa 2016) transmission planning outcomes, focusing on transmission projects selected for regional (or interregional) cost allocation.

The second report in the series expanded on the first report's introduction of the sponsorship and competitive bidding selection approaches by linking a region's general reliance on one of the two approaches to fundamental differences among the regions. Those differences stem from the scope of the regional transmission planning activities that the regions conduct. That report also extended the basic descriptions of how the transmission planning regions assess regional transmission needs that are driven by reliability, public policy requirements, and economic considerations, by explaining how these assessments are sequenced within each region's transmission planning processes. However, the second report did not discuss interregional transmission coordination.

This third report completes the series by focusing on the interregional transmission coordination aspect of the requirements of Order Nos. 890 and 1000.

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[2] See FERC (2007); FERC Order No. 890: https://www.ferc.gov/whats-new/comm-meet/2007/021507/E-1.pdf?csrt=7523442146500923501

[3] See FERC (2011); FERC Order No. 1000: https://www.ferc.gov/whats-new/comm-meet/2011/072111/E-6.pdf?csrt=7523442146500923501

[4] The two earlier reports are: Eto, Joseph H. (2016). *Building Electric Transmission Lines: A review of recent regional transmission plans*, at https://emp.lbl.gov/publications/building-electric-transmission-0; and Eto, Joseph H. and Giulia Gallo (2017). *Regional Transmission Planning: A Review of Practices Following FERC Order Nos. 890 and 1000*, at https://emp.lbl.gov/publications/regional-transmission-planning-review.

With regard to selecting transmission projects for regional cost allocation, FERC Order No. 1000 articulates three core requirements. First, regional transmission planning processes must consider and evaluate, on a non-discriminatory basis, possible transmission solutions (and non-transmission alternatives) to address regional transmission needs and must result in a regional transmission plan. Second, in order to select a transmission project for regional cost allocation, a region must find that a project is more efficient or cost-effective compared to alternatives to address regional transmission needs. Third, the region must have in place a method to allocate the costs of selected projects in a manner that is at least roughly commensurate with the project's benefits. At the same time, nothing in Order No. 1000 compels regions to select projects for regional cost allocation. Regions may conclude that they have regional needs for a transmission project *and* that the needs can be met by means that do not involve or require the selection of a transmission project in the regional transmission plan for purposes of cost allocation.

In addition to the core regional transmission planning requirements of Order No. 1000, it also requires that neighboring transmission planning regions engage in interregional transmission coordination. This report focuses on the processes for interregional transmission coordination, and is organized in three sections following this introduction.

In Section 2, we summarize findings from the two earlier reports that are essential for understanding how the regions conduct interregional transmission coordination activities. The findings distinguish among the types of entities that conduct regional transmission planning (and that are therefore also responsible for interregional transmission coordination), the two major approaches the regions follow in selecting projects for regional cost allocation, and the three types of projects that may be selected for regional cost allocation.

In Section 3, we provide an overview of the major organizing features or approaches for interregional transmission coordination that help to distinguish among different interregional practices.

In Sections 4 through 8, we illustrate these features and approaches with a series of case studies. Each case study describes a set of interregional transmission coordination practices that are followed by two or more regions in conjunction with one another. When available, we summarize the results or outcomes from a recent interregional transmission coordination activity that has been conducted.

In Section 9, we summarize our findings and outline information that we recommend be collected to monitor and track regional transmission planning and interregional transmission coordination activities and outcomes in order to assess the effectiveness of the requirements in Order Nos. 890 and 1000.

2. Regional Transmission Planning Practices Following FERC Order Nos. 890 and 1000

In this section, we summarize from our two earlier reports the findings that are essential for understanding how the regions conduct interregional transmission coordination activities. Our earlier findings were organized around three topics, which are also used to organize this section: (1) the types of entities that conduct regional transmission planning (and that are therefore also responsible for interregional transmission coordination), (2) the two major approaches these entities follow in selecting transmission projects for regional cost allocation, and (3) the three types of transmission projects that may be selected for regional cost allocation.

2.1 FERC recognizes twelve transmission planning regions

FERC recognizes 12 distinct groupings of public-utility transmission providers[5] that are responsible for implementing the regional transmission planning requirements of Order No. 1000 (see Table 2-1 and Figure 2-1).[6] For the purposes of this report, we refer to each grouping as either a "transmission planning region" or a "regional planning entity."

There are two basic types of regional planning entities: (1) those that are also an independent system operator (ISO) or regional transmission operator (RTO), which we refer to as the "ISO/RTO regions," and (2) those composed of transmission providers in the rest of the country, which we refer to as the "non-ISO/RTO regions."

Table 2-1. Regional planning entities described in this report

ISO/RTOs	Non-ISO/RTOs
California Independent System Operator (CAISO)	ColumbiaGrid
ISO New England (ISO-NE)	Florida Reliability Coordinating Council (FRCC)
Midcontinent Independent System Operator (MISO)	Northern Tier Transmission Group (NTTG)
New York Independent System Operator (NYISO)	South Carolina Regional Transmission Planning (SCRTP)
PJM Interconnection (PJM)	Southeastern Regional Transmission Planning (SERTP)
Southwest Power Pool (SPP)	WestConnect

[5] "Public utility transmission provider" is a formal designation and applies to entities that must file open access transmission tariffs with FERC.

[6] Order No. 1000 does not apply to Hawaii, Alaska, or the portion of Texas served by the Electric Reliability Council of Texas.

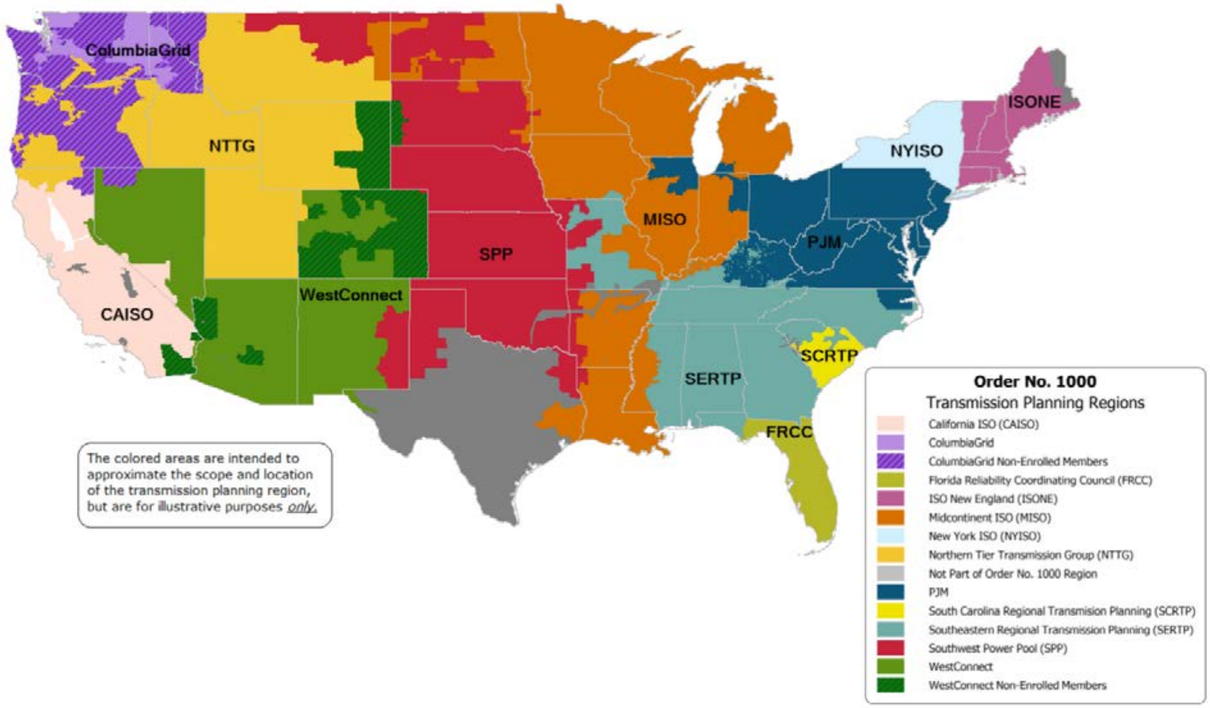

Figure 2-1. FERC Order No. 1000 Transmission Planning Regions

Source: FERC (2019): http://www.ferc.gov/industries/electric/indus-act/trans-plan.asp

Prior to Order Nos. 890 and 1000, the non-ISO/RTO regions engaged in bilateral or multi-lateral regional transmission planning activities (through regional electric reliability councils and otherwise), as needed. In contrast, the ISO/RTO regions routinely led formal region-wide transmission planning activities. The scope and approach taken to implement the requirements of Order No. 1000 directly reflect these past practices. The activities of the non-ISO/RTO regions are largely, if not solely, focused on conducting regional planning processes required to implement the two FERC Orders.[7]

The activities of the ISO/RTO regions are significantly broader at the regional level. They include operation of the regional bulk power system, operation of one or more centralized wholesale electricity markets, and a variety of transmission planning activities, such as generator interconnection, that do not involve or lead to selection of transmission projects for regional cost allocation.

2.2 The regional planning entities rely on either a sponsorship or competitive bidding approach to select projects for regional cost allocation

Although no two transmission planning regions use identical approaches to select transmission projects for regional cost allocation, the regions can be grouped into two general categories: those that utilize

[7] FRCC is an exception among the non-ISO/RTO planning regions. FRCC is also a North American Electric Reliability Corporation (NERC) regional entity. In February 2019, FRCC, NERC, and SERC Reliability Corporation (SERC) filed a joint petition with FERC (Docket No. RR19-4-000) to dissolve the FRCC regional entity. The petitioners propose to transfer the FRCC regional entity responsibilities to SERC after FRCC dissolves in August 2019. FERC approved the petition on April 30, 2019.

the project *sponsorship* approach and those that utilize the *competitive bidding* (at one time referred to as *competitive solicitation*) approach. [8,9]

With one exception,[10] the non-ISO/RTO regions use the project sponsorship approach to select transmission projects for regional cost allocation. In most of these regions, the participating utilities' individual transmission plans are first combined to form a baseline regional transmission plan.[11] The baseline regional transmission plan does not contain transmission projects whose costs are allocated to the entire region following the region's Order No. 1000 regional cost allocation method.

From the standpoint of the utilities within the region, this plan fully addresses the local transmission needs and solutions identified by each participating transmission provider in the region. From this perspective, the regional transmission planning process can be thought of as having been established primarily to provide an open, coordinated, and transparent means by which stakeholders are allowed to participate in regional transmission planning, and non-incumbent transmission developers (and other stakeholders) can have their proposed solutions vetted against those of the incumbents whose projects are already contained in the baseline regional transmission plan. From the standpoint of a developer proposing a transmission project and seeking to obtain regional cost allocation for that project, the baseline plan is "the plan to beat." Reliance on the project sponsorship approach is consistent with this perspective on the selection process for regional cost allocation.

In the ISO/RTO planning regions, the ISO/RTOs are responsible for a much broader scope of transmission planning (e.g., for all of the highest-voltage transmission lines within their respective regions) than is the case in the non-ISO/RTO planning regions**.** The local transmission plans of the transmission owners within the ISO/RTO footprint provide input to ISO/RTO planning, but the ISO/RTOs independently conduct significant additional transmission planning. Specifically, it is the responsibility of the ISO/RTO to formulate a regionally complete plan, including, when appropriate, selection of transmission projects for regional cost allocation.

Several ISO/RTOs explicitly provide opportunities for the "market" to first offer regional transmission solutions (including transmission, generation, or demand-response proposals) that will neither require nor seek regional cost allocation. If such solutions are forthcoming, there is no need to conduct an open competitive process to select transmission projects in the regional transmission plan for purposes of cost allocation because the regional transmission needs have already been addressed by solutions whose revenue requirements are met by other means, such as wholesale market mechanisms or bi-lateral contracting arrangements.

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[8] FERC uses the term "competitive bidding" instead of "competitive solicitation." See, for example, Further Supplemental Notice of Technical Conference, Competitive Transmission Development Technical Conference, Docket No. AD16-18-000, at 14 (June 20, 2016). Consistent with this practice, this report will also use the term "competitive bidding."
[9] Under the sponsorship approach, the competition generally involves both the selection of a proposed transmission solution as well as the developer for it. Under the competitive bidding approach, the competition generally involves only the selection of a developer for a pre-identified transmission solution. See *Further Supplemental Notice of Technical Conference, Competitive Transmission Development Technical Conference,* Docket No. AD16-18-000, at 14 (June 20, 2016).
[10] WestConnect is an exception; WestConnect uses a competitive bidding approach.
[11] ColumbiaGrid is an exception; it does not develop an initial baseline plan for the region.

In this setting, the formal process for selecting transmission projects for regulated rate recovery to meet regional transmission needs (and become eligible for regional cost allocation) can be thought of as a "backstop," that is pursued only after other means (which may not require or seek regional cost allocation) have been considered that might meet these needs. In other words, in these ISO/RTO regions, reliance on a sponsorship approach to select transmission projects in the regional transmission plan for purposes of cost allocation is an outcome of having first considered other avenues for ensuring that regional transmission needs are met. The sponsorship approach in these regions rewards developers (either non-incumbent or incumbent) for their creativity in proposing transmission projects that will meet regional transmission needs more efficiently or cost-effectively than the roll-up of the local transmission plans.

The competitive bidding approach differs from the sponsorship approach in the formal separation between the process for confirming that a regional transmission solution is more efficient or cost-effective than alternatives in meeting a regional transmission need and the process for selecting a developer for that solution. In the sponsorship approach, where the sponsor if known, a regional transmission solution and its developer are both selected in a single step. In the competitive bidding approach, a regional transmission solution is selected in a separate process that precedes the process in which a developer is selected.

2.3 Projects selected for regional cost allocation must meet regional reliability, public policy, or economic transmission needs

Having described the two selection approaches above, we next describe how transmission planning regions assess specific regional needs for transmission—*reliability requirements, public policy requirements,* and *economic considerations*—how they sequence these assessments, and how they apply the standard of "more efficient or cost-effective".

Transmission needs driven by reliability requirements have the longest history of being formally evaluated and are generally considered at the start of (and sometimes even prior to or outside of) a regional transmission planning cycle. Where and how reliability-driven transmission needs are addressed in relation to a regional transmission planning process depends on whether and to what extent the transmission planning region itself is responsible for complying with mandatory national, regional, and local reliability rules. Transmission planning regions that are not responsible for this compliance (the non-ISO/RTO regions) must first take into account the findings of the North American Electric Reliability Corporation (NERC)-registered entities that are responsible for compliance with applicable reliability planning standards. Transmission planning regions that are responsible for compliance (the ISO/RTO regions) must make findings that planned transmission projects adhere to NERC's rules, independent of findings they make regarding regional cost allocation for specific projects.

The "more efficient or cost-effective" standard generally focuses on whether the cost of a regional solution is lower than the costs of the alternatives for meeting the reliability rules. The alternatives could be either other proposed regional solutions or, more often, one or more local solutions required to comply with the reliability rules (e.g., solutions that, together, would involve more than one transmission owner's footprint within the region). Local solutions, in this example, are those that do not seek or require regional cost allocation.

Transmission needs driven by public policy respond to the requirements of local, state, or federal laws or regulations. This category of transmission needs was most recently added to the list of needs that public-utility transmission providers may address in selecting transmission projects for regional cost allocation. The assessment processes follow common steps in all regions. First, a region determines whether and what public policy requirements create needs for a regional transmission solution(s). Stakeholders, including states, within the region play an important role in identifying public policy requirements that might create these needs. In some ISO/RTO regions, there are formal arrangements with either a single state public utilities commission (PUC) (for single-state ISO/RTOs, such as CAISO and NYISO) or representatives of the states, such as the New England States Committee on Electricity (NESCOE) (for multi-state ISO/RTOs, such as ISO-NE, and PJM) to identify these needs. Proposals for solutions to these transmission needs are considered either separately from, or at the same time as, the identification of the needs.

As with reliability needs, the basic test is whether a regional transmission solution will meet public policy needs more efficiently or cost-effectively than alternatives. The alternatives may be either other regional solutions or local solutions that the regional transmission solution would displace/replace.

Transmission needs driven by economics are associated with reducing transmission losses, lowering congestion costs, or integrating more efficient new resources**.** There are two basic approaches for evaluating the economic benefits of projects; these approaches are generally aligned with a specific type of region.

1. In most non-ISO/RTO regions, the economic benefit of a regional transmission solution is determined by considering (among other benefits, such as changes in transmission losses) the costs of the local transmission projects that would be replaced (or "avoided") by a regional solution.
2. In all ISO/RTO (and some non-ISO/RTO) regions, the economic benefit of a regional transmission solution is determined by also considering regional changes in production costs (sometimes along with other generation-related impacts) that would result from construction and operation of a proposed solution. In some regions, benefits must be found to exceed costs by a specific threshold (e.g., greater than a 1.25 benefit-cost ratio).

These approaches translate (in spirit, and to varying degrees) into means by which the "more efficient or cost-effective" standard is subsequently and separately applied to evaluate regional solutions that might meet economic needs for transmission.

3. Interregional Transmission Coordination Practices

This section describes the major organizing features of, or approaches to, interregional transmission coordination, which are reflected in different regional practices. We first summarize the interregional transmission coordination requirements in FERC Order Nos. 890 and 1000. Then, we review the basic principle followed by regions for selecting interregional transmission projects for regional cost allocation. Next, we describe how regions coordinate their planning processes to enable parallel consideration and selection of interregional transmission projects for regional cost allocation. We then discuss how costs are allocated between (or among) regions for selected projects. We conclude by introducing the five case studies of interregional transmission coordination practices that are presented in Sections 4 through 8 of this report.

3.1 Interregional transmission coordination requirements in FERC Order Nos. 890 and 1000

FERC Order No. 890 directed transmission providers to follow nine transmission planning principles.[12] One of the principles addresses regional participation. It requires that transmission providers coordinate with interconnected systems to (1) share system plans to ensure that these plans are simultaneously feasible and otherwise use consistent assumptions and date, and (2) identify system enhancements that could relieve significant and recurring transmission congestion or integrate new resources. The information-sharing directed by this principle plays a foundational role in both regional transmission planning and interregional coordination of regional activities when considering potential interregional transmission projects.

FERC Order No. 1000 established new requirements for regional transmission planning.[13] With respect to interregional transmission coordination, Order No. 1000 requires each public utility transmission provider to establish procedures with each of its neighboring transmission planning regions for the purpose of: (1) coordinating and sharing the results of their respective regional transmission plans to identify possible interregional transmission projects that could address regional transmission needs more efficiently or cost-effectively than separate regional transmission projects; and (2) jointly evaluating those interregional transmission projects that the pair of neighboring transmission planning regions identify, including those proposed by transmission developers and stakeholders.[14] FERC defines

[12] The nine planning principles are: (1) coordination, (2) openness, (3) transparency, (4) information exchange, (5) comparability, (6) dispute resolution, (7) regional participation, (8) economic planning studies, and (9) cost allocation for new projects.

[13] The new requirements are: (1) Public utility transmission providers must participate in a regional transmission planning process that satisfies Order No. 890 principles and produces a regional transmission plan; (2) Local and regional transmission planning processes must consider transmission needs driven by public-policy requirements established by local, state, or federal laws or regulations; (3) Public-utility transmission providers in each pair of neighboring transmission planning regions within each interconnection must coordinate to determine whether more efficient or cost-effective transmission solutions are available within each pair of neighboring regions; (4) Each transmission planning region must produce a regional transmission plan reflecting solutions that meet the region's needs more efficiently or cost-effectively; and (5) Stakeholders and any interested party must have a meaningful opportunity to participate in identifying and evaluating potential solutions to regional transmission needs.

[14] Order No 1000-A, 139 FERC ¶ 61,132 at P 493 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 396). FERC clarified that "the requirement to coordinate with neighboring regions applies to public utility transmission providers within a region as a group, not to each individual public utility transmission provider acting on its own. For example, within an RTO or ISO, the RTO or ISO would develop an interregional cost allocation method or methods with its

an interregional transmission project as “one that is located in two or more transmission planning regions.”[15]

FERC also requires each public utility transmission provider to describe the methods by which it will identify and evaluate interregional transmission projects and to include a description of the type of transmission studies that will be conducted to evaluate conditions on neighboring systems for the purpose of determining whether interregional transmission projects are more efficient or cost-effective than regional transmission projects.[16] Consistent with the requirement that public utility transmission providers must describe the methods by which they will identify and evaluate interregional transmission project, FERC states that “each public utility transmission provider must explain in its OATT how stakeholders and transmission developers can propose interregional transmission facilities for the public utility transmission providers in neighboring transmission planning regions to evaluate jointly.”[17]

Order No. 1000 also requires that each public-utility transmission provider in a transmission planning region have, together with the public utility transmission providers in its own transmission planning region and a neighboring transmission planning region, a common method or set of methods, for allocating the costs of interregional transmission projects among the beneficiaries of those transmission projects in the transmission planning regions in which the transmission facility is located. To be eligible for interregional cost allocation, an interregional transmission project must be selected in the relevant regional transmission plan for purposes of cost allocation. The interregional cost allocation methods must be consistent with six principles for interregional cost allocation.[18]

While FERC requires public utility transmission providers to establish further procedures with each of its neighboring transmission planning regions to coordinate and share the results of their respective regional transmission plans to identify possible interregional transmission projects that could address regional transmission needs more efficiently or cost-effectively than separate regional transmission projects, FERC neither requires nor precludes public utility transmission providers from conducting interregional transmission planning. [19]

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neighboring regions on behalf of its public utility transmission owning members.” Order No. 1000-A, 139 FERC ¶ 61,132 at P 630 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 584).

[15] Order No 1000-A, 139 FERC ¶ 61,132 at P 494 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 482 n.374).

[16] Order No. 1000-A, 139 FERC ¶ 61,132 at P 493 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 398).

[17] Order No. 1000-A, 139 FERC ¶ 61,132 at P 522.

[18] The six interregional cost allocation principles are: (1) Costs must be allocated in a manner that is “roughly commensurate” with estimated benefits; (2) Those who do not benefit from transmission do not have to pay for it; (3) Benefit-to-cost thresholds must not exclude projects with significant net benefits; (4) No costs are allocated outside a region unless the other region agrees; (5) Cost allocation methods and identification of beneficiaries must be transparent; and (6) Different allocation methods could apply to different types of transmission projects.

[19] See e.g., Order No. 1000, FERC Stat. & Regs. ¶ 31,323 at P 399 (clarifying that “the interregional transmission coordination requirements that [the Commission] adopt[s] do not require formation of interregional transmission planning entities or creation of a distinct interregional transmission planning process to produce an interregional transmission plan” and, “[t]o the extent that public utility transmission providers wish to participate in processes that lead to the development of interregional transmission plans, they may do so and, as relevant, rely on such processes to comply with the requirements of this Final Rule.”). FERC also requires that “the developer of an interregional transmission project to first propose its transmission project in the regional transmission planning processes of each of the neighboring regions in which the transmission facility is proposed to be located.” *Id.* P 436.

In response to Order No. 1000, the 12 transmission planning regions recognized by FERC established transmission coordination processes with one or more of their neighboring regions within their respective interconnections. The majority of these processes involve pairs of neighboring regions. One process involves three neighboring regions: ISO-NE, NYISO, and PJM. Another involves all four regions that make up the Western Interconnection: CAISO, ColumbiaGrid, NTTG, and WestConnect.

3.2 Interregional transmission projects must meet regional transmission needs more efficiently or cost-effectively than alternatives

Just as regional transmission projects must meet regional transmission needs more efficiently or cost-effectively than alternatives in order to be selected for regional cost allocation, so too must interregional transmission projects. In this regard, the only difference between an interregional transmission project and a regional transmission project is that an interregional transmission project must meet more than one region's regional transmission needs more efficiently or cost-effectively than the alternatives within each region. If an interregional transmission project meets regional transmission needs more efficiently or cost-effectively in only one region, it can be selected for regional cost allocation in only that region (and therefore would also cease to be an interregional transmission project). The selection of a project by one region has no direct bearing or influence on the selection of the same project by another region.

In all regions, the criteria used to select interregional transmission projects follow the same principles as those used to select regional transmission projects for regional cost allocation. From this perspective, the portion of an interregional solution that is physically within (or is considered for the purposes of regional planning to be a part of) a single region is evaluated following the same methods and standards applied to regional alternatives that might be under consideration by that region. Nevertheless, interregional transmission coordination involves a comparison of regional plans and projects that is distinct from the regional transmission plan analysis.

3.3 Regions must coordinate their planning processes to select interregional transmission projects for regional cost allocation

Because two or more transmission planning regions must find that an interregional transmission project is more efficient or cost effective than alternatives within their respective regions, selection of an interregional transmission project for regional cost allocation requires that regions coordinate their planning processes with one another. Coordination takes two forms: (1) information sharing and (2) time alignment between or among individual regional transmission planning processes.

As noted in Section 3.1, FERC Order No. 890 directs regular sharing of transmission planning and related information among regions. Shared information supports both regional transmission planning and interregional transmission coordination. Formal information sharing generally takes place at least annually between or among regions.

Regular information exchanges among regions are also supported by ongoing, interconnection-wide, transmission-related planning activities. In the Western Interconnection, the Western Electricity Coordinating Council (WECC) Reliability Assessment Committee is responsible for developing interconnection-wide reliability assessments and planning models and serves as an interconnection-wide Anchor Data Set for use in power flow and production-cost modeling.[20] In the Eastern Interconnection, the Eastern Interconnection Reliability Assessment Group's Multiregional Modeling Working Group is responsible for developing interconnection-wide reliability planning models.[21] In addition, the Eastern Interconnection Planning Collaborative (EIPC), a coalition of 20 major Transmission Planning Coordinators, collaborates on Eastern Interconnection-wide planning activities.[22]

Generally speaking, these interconnection-wide planning activities provide a base of common planning information that is consistent across all of the regions within an interconnection. Typically, individual regions will then build upon or add to this base with updated or more detailed information for their specific regions. They also exchange updated or more detailed information with one another as mentioned previously, subject to and consistent with their rules and procedures for the handling of Critical Energy/Electric Infrastructure Information (CEII) and other confidential information, and subject to the authorities granted to them by their members.

As noted in Section 3.2, interregional transmission projects are considered within established regional planning processes that have been created to select transmission projects for regional cost allocation. Selecting interregional transmission projects for regional cost allocation requires that every region affected by a project select the relevant portion of that project for regional cost allocation through their respective regional transmission planning processes.

Each of the regions has established regular planning cycles in which they consider regional transmission needs, and, when appropriate, select transmission projects for regional cost allocation. The planning cycles vary in duration from one to three years, and in some cases the cycles overlap with one another. They generally start at or just before the beginning of a calendar year, but some multi-year processes start in even years while others start in odd years. In addition, some regions have multiple planning cycles that overlap and run in parallel with one another.

Despite these varying practices, each pair or group of regions has adopted means for coordinating their evaluations of interregional transmission projects that might be selected for regional cost allocation. A typical approach involves an annual joint meeting at which regional transmission planning activities are reviewed, and needs for coordination around any proposed interregional transmission projects are discussed. An outcome of these meetings is acknowledgment that two (or more) regions will consider an interregional transmission project and an agreement on how this consideration will take place in relation to each entity's regional planning cycles.

[20] See https://www.wecc.org/RAC/Pages/Default.aspx
[21] See https://www.rfirst.org/ProgramAreas/RAPA/ERAG
[22] See https://www.eipconline.com/

3.4 The costs of interregional transmission projects are allocated to regions in proportion to the benefits they provide to each region

When two (or more) regions each select an interregional transmission project for regional cost allocation, they then allocate the costs of the project between (or among) themselves. The allocation reflects six interregional transmission cost allocation principles, including that costs of selected projects be allocated in a manner that is at least roughly commensurate with the project's benefits.

Order No. 1000 directed interregional transmission pairs to establish an ex-ante method or methods for allocating the costs of interregional transmission projects to each region. Most pairs have chosen the avoided cost method of allocating interregional project costs between regions.

The avoided cost method of allocating interregional project costs between regions involves determining the costs of the transmission projects within each region that are "avoided" (or replaced) by the interregional transmission project. These avoided costs represent the benefit that each region receives from the interregional project. The costs avoided by each region when divided by the sum of the costs avoided by all regions represents the proportion of the costs of the interregional project that are allocated to each region.

Generally speaking, the portion of the total cost of an interregional transmission project that is allocated to each region is then allocated within each region, using the same ex-ante regional allocation method adopted by that region.

3.5 Five interregional transmission coordination processes illustrate the range of approaches currently in practice

The following five sections of this report each present a case study of an interregional transmission coordination process. The five examples together illustrate the range of approaches that are currently in practice.

To highlight both similarities and differences among the approaches, each case study follows a common structure. We first introduce the regional planning entities involved and describe the overall process they follow for interregional transmission coordination. We then describe the processes they follow for selecting interregional transmission projects for regional cost allocation as well as for allocating costs among regions. We conclude by summarizing, when available, results or outcomes from a recent interregional transmission coordination activity that they have conducted.

The first case study describes interregional coordination between MISO and SERTP. MISO is an ISO/RTO planning region, and SERTP is a non-ISO/RTO planning region (see Section 2 for a discussion of the differences between these two types of transmission planning regions). SERTP was established largely to comply with FERC Order Nos. 890 and 1000. Therefore, this case study is generally representative of the flow and procedures followed by SERTP when coordinating with other non-ISO/RTO regions (SCRTP and FRCC), as well as with the ISO/RTO PJM.

The second case study is of the four regional planning entities that make up the Western Interconnection: CAISO, ColumbiaGrid, NTTG, and WestConnect. CAISO is an ISO/RTO planning region, and the other three are non-ISO/RTO planning regions. Although some pre-date FERC Order Nos. 890 and 1000, the three non-ISO/RTO planning regions are, for the purposes of this discussion, similar to SERTP (and SCRTP and FRCC) in that they are currently organized largely to support compliance with FERC's Orders. As a result, this case study shares some similarities with the first case study. A primary difference between this and the first case study has to do with the need to identify which regions must coordinate their respective regional transmission planning processes in order to select a proposed interregional transmission project.

The third, fourth, and fifth case studies all involve two or more ISO/RTO regions in the Eastern Interconnection (MISO and SPP; MISO and PJM; and ISO-NE, NYISO, and PJM). As discussed in Section 2, these ISO/RTO regions each have more involved planning processes for selecting transmission projects that meet regional economic needs. These processes are unique to each region and can include production-cost modeling and evaluations of multiple scenarios. As a result, the details of the coordination processes involved in selecting interregional transmission projects that meet more than one region's economic needs are specific to the two or more regions that may be involved. The fifth case study, like the second case study, also involves establishing which regions must coordinate with one another.

4. Case Study: Southeastern Regional Transmission Planning and Midcontinent Independent System Operator

SERTP and MISO began formal interregional transmission coordination pursuant to FERC's final compliance orders for Order No. 1000, which have an effective date of January 2015.

Interregional transmission coordination between SERTP and MISO consists primarily of model and data exchanges, and, when appropriate, parallel evaluations of projects that might be selected by both regions for regional cost allocation. These parallel processes each take place within the regions, after their regional transmission planning processes. A project must be found to be more efficient or cost-effective than regional alternatives in order to be selected for regional cost allocation.

The costs of projects that are located within both regions and that are selected for regional cost allocation by both regions are allocated to each region based on the relative share of benefits provided to each region. The benefits are the sum of the costs of the regional transmission projects that are avoided by the interregional transmission project.

At the time this case study was prepared (March 2019), no interregional transmission projects had been identified for selection for regional cost allocation by SERTP and MISO.

4.1 Overview of interregional transmission coordination activities

In support of interregional transmission coordination, SERTP and MISO provide each other with data and information on their current regional transmission plans, related power-flow models, and data used in these models. This information exchange takes place when the information becomes available within each region's planning process, typically during the first quarter of each calendar year.

If SERTP and MISO find that a project submitted to both regions satisfies all requirements to be considered for possible selection for regional cost allocation, coordinated evaluation of the proposed project typically starts during the third quarter of the calendar year. The evaluation follows each entity's regional planning procedures.

The transmission owners within the SERTP footprint also share updates on current interregional planning activities. Stakeholders within SERTP have opportunities to provide feedback and input on projects that are being evaluated as well as on the analyses of these projects. This takes place during the Annual Transmission Planning Summit and the Assumptions Input Meetings that are held by SERTP during the fourth quarter of each planning year. Transmission owners/providers within SERTP also post to the regional planning website a list of all current interregional planning projects proposed for consideration for selection for interregional cost allocation in both SERTP and MISO. Similarly, MISO, through its Planning Advisory Committee, shares regular updates with stakeholders and receives feedback on its interregional planning efforts, including those with SERTP.

4.2 Selection of interregional transmission projects for regional cost allocation

The process through which the two regions consider interregional transmission projects that might be selected by both for regional cost allocation consists of three steps: (1) identification and qualification of potential interregional transmission projects, (2) parallel evaluation of projects, and (3) inclusion in each region's regional transmission plan.

Identification and qualification of potential interregional transmission projects. In the first phase of interregional transmission coordination, SERTP and MISO review their respective regional transmission plans and needs to determine whether there are interregional transmission projects that could address those needs and that might be more efficient or cost-effective than ones identified in the regional transmission processes. Stakeholders and transmission developers may also propose such projects in this phase.

Transmission projects proposed for selection for regional cost allocation by both regions must meet the following requirements:

1. The project must be located in both regions to which costs would be allocated;
2. The project must interconnect to existing or proposed transmission projects in both regions;
3. The project must meet the project eligibility criteria of both regions; and
4. The project must have a combined benefit-cost ratio of 1.25 or higher to both the SERTP and MISO regions.

On a case-by-case basis, SERTP and MISO may also consider a potential interregional transmission project that does not satisfy all of the criteria specified above but that:

1. meets the threshold criteria for selection for regional cost allocation in only one of the two regions, and
2. would be interconnected to existing or planned transmission projects in both regions.

Transmission projects proposed for selection for regional cost allocation must also satisfy all qualifying criteria of each regional transmission process (e.g., the timeframes for submittals for cost allocation). If a project is proposed by a transmission developer, the transmission developer must also satisfy each region's qualification criteria.

Finally, proposed interregional transmission projects must have a combined benefit-cost ratio of 1.25 or greater to both the SERTP and MISO regions. The benefit-cost ratio is calculated by summing together the present values of costs of the projects that would be avoided (or displaced) by the interregional transmission project in each region ("the benefit") and then dividing this sum by the present value of the proposed interregional transmission project ("the cost").

Parallel evaluation of interregional transmission projects. Qualified potential interregional transmission projects must be submitted to both the MISO and SERTP regional transmission processes for evaluation. These evaluations follow each region's regional transmission practices. As needed, the regions also exchange status updates regarding the process and the projects that have been or are currently being proposed (e.g., project benefits, timelines for future assessments of projects).

*Inclusion in each region's regional transmission plan***.** Projects that meet each region's criteria for selection for interregional cost allocation are included in each region's respective regional transmission plan. A region can also remove a project from its regional plan, if the developer fails to meet developmental milestones.

4.3 Interregional cost allocation

The cost of an interregional transmission project selected for regional cost allocation in the regional transmission plans of SERTP and MISO are allocated between the two regions as follows:

Each region is allocated a portion of the interregional transmission project's costs in proportion to the benefits the project provides to each region. The total benefits are, as stated earlier, the sum of the present values of the costs of the transmission projects that are avoided in each region by the interregional transmission project. The proportion of these benefits to each region is used to allocate the cost of the project to each region.

For example, assume that regional transmission project A, which is located in region A, and regional transmission project B, which is located in region B, can be displaced by interregional transmission project C. The present value of the cost of project A is PV-A, the present value of the cost of project B is PV-B, and the present value of the cost of project C is PV-C.

The allocation of the PV-C between the two regions is as follows:

Cost allocation to region A = PV-C * [PV-A / (PV-A + PV-B)]

Cost allocation to region B = PV-C * [PV-B / (PV-A + PV-B)]

Calculation of these elements follows the procedures of each region's regional planning process, and aspects of the calculation may be updated during the course of each regional planning process. Therefore, the final calculation of benefits by each region individually may lead to different values compared to those used in a preliminary calculation of benefits.

4.4 Recent interregional transmission coordination outcome

At the time that this case study was prepared (March 2019), no interregional transmission projects had been proposed for selection for regional cost allocation by SERTP and MISO.

5. Case Study: California Independent System Operator/ ColumbiaGrid/Northern Tier Transmission Group/WestConnect

The four transmission planning regions in the Western Interconnection—CAISO, ColumbiaGrid, NTTG, and WestConnect (or their predecessors)—have participated in interregional transmission coordination activities since the early 2000s. Collectively, they refer to themselves as the Western Planning Regions (WPRs). This case study focuses on the formal interregional transmission coordination activities that the WPRs conduct pursuant to FERC's final compliance orders for each entity for Order No. 1000. These final orders have effective dates of January 2015 for ColumbiaGrid, and October 2015 for CAISO, NTTG, and WestConnect.

Interregional transmission coordination activities focus on selecting transmission projects for regional cost allocation. Initially, the regions meet to exchange information and discuss proposed interregional transmission projects. Affected regions (those that would interconnect electrically to a proposed project) evaluate the proposed project within their existing regional transmission planning processes. If more than one affected region finds that an interregional transmission project is more efficient or cost-effective than alternatives, and the project is selected for purposes of regional cost allocation, the affected regions determine the portion of total project costs that will be allocated to each region. The portion allocated to each region is based on the proportion of total benefits to each region.

CAISO, ColumbiaGrid, NTTG, and WestConnect completed their first coordination cycle in compliance with FERC's final orders in 2017. At the time this case study was prepared (March 2019), the regions were in their second cycle, which began in January 2018. Six potential interregional transmission projects were considered in this second cycle, but none was found to meet the threshold for consideration as an interregional project in more than one region that interconnects electrically with the proposed interregional project, referred to as Relevant Planning Regions (RPRs).

5.1 Overview of interregional transmission coordination

The WPRs do not produce a joint plan separate from their individual regional transmission plans. Instead, the WPRs share information on proposed interregional transmission projects (for example, projected costs) and study assumptions and methodologies used in each region's individual planning process to evaluate the projects. There are differences in the timing of the regions' planning processes;[23] these differences are factored into the interregional transmission coordination process.

[23] As described in the appendices of Eto and Gallo (2017), CAISO conducts annual regional transmission planning studies focused largely on identifying transmission solutions that can address reliability, public policy, and economic needs within the ISO's footprint. ColumbiaGrid conducts annual regional transmission planning studies focused on identifying potential transmission problems and solutions that address reliability, public policy, and economic needs resulting in the development of a Biennial Transmission Expansion Plan. Every two years, NTTG reviews the status of the collective transmission needs of all transmission owners that participate in its activities to investigate whether these needs can more cost-effectively be met at a regional or interregional scale than at a local level. WestConnect follows a biannual planning cycle for selecting transmission projects for regional cost allocation.

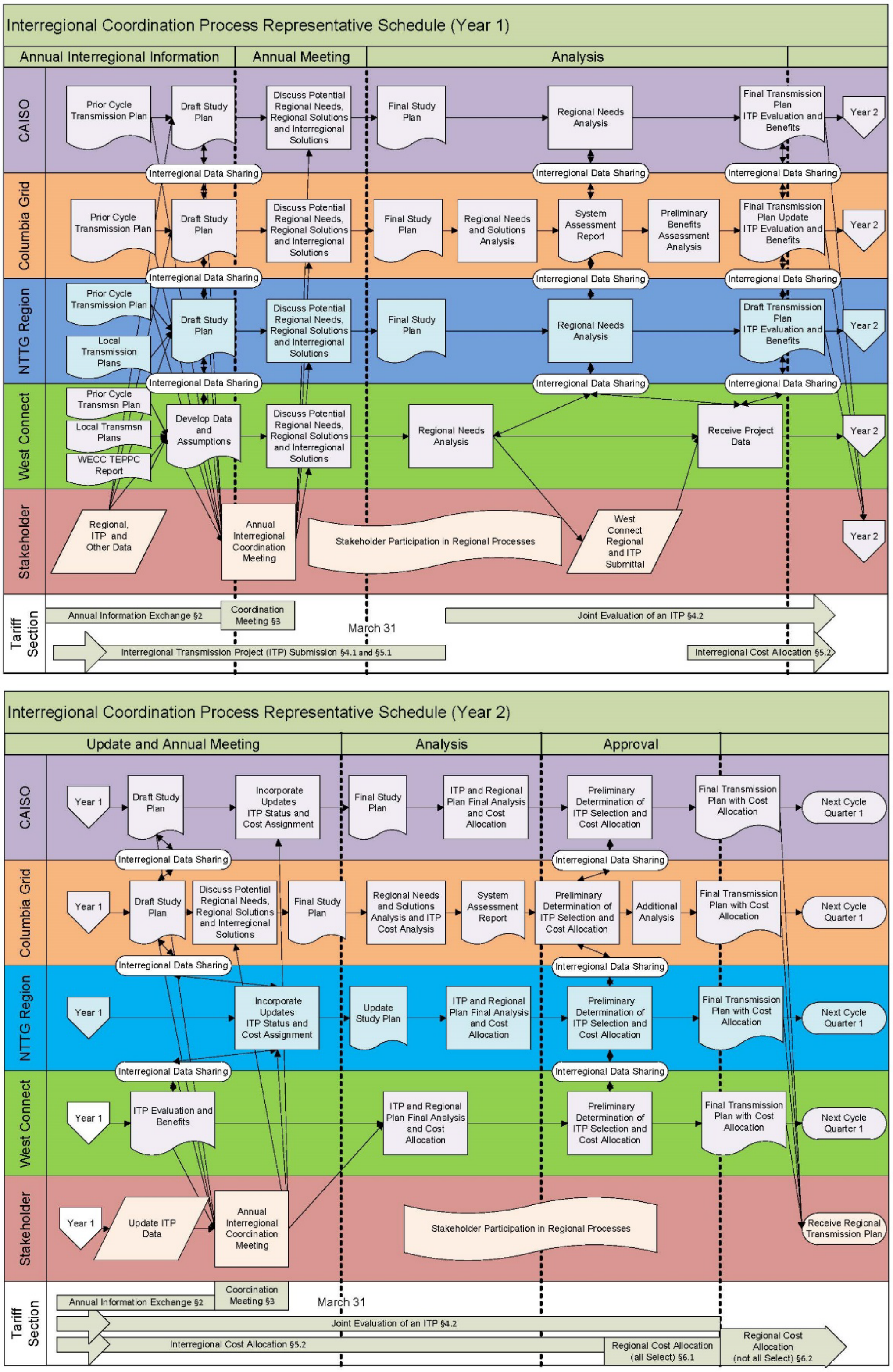

Figure 5-1. Representative schedule for the WPRs' interregional coordination process

Source: CAISO, Northern Tier Transmission Group (NTTG), and West Connect (2013): https://www.caiso.com/Documents/May10_2013TariffAmendment-Order1000Phase2%20InterregionalER13-1470-000.pdf

The interregional transmission coordination process spans two years, during which time the entities share results and updates on their independent analyses of potential interregional transmission projects and, if appropriate, cost-allocation activities. Figure 5-1 shows the sequence of activities led by each of the regions, including routine information exchanges that are independent of consideration of interregional transmission projects and interactions with stakeholders. The interregional projects are limited to the set of projects proposed during the submission period for interregional transmission projects. The arrows in the figure represent the flow of information to and from each transmission planning region or stakeholder involved in the interregional transmission coordination processes.

The WPRs' interregional transmission coordination process entails the following phases:

1. *Annual interregional information exchange phase.* During the information exchange phase, the transmission planning regions and their stakeholders share information on their most recent regional transmission plans.
2. *Annual interregional coordination meeting.* The interregional coordination meeting takes place annually during the first quarter of the calendar year. At the meeting, regional committees, stakeholders, and staff review the previous year's planning information and models, discuss potential interregional transmission projects, and provide updates on the status of interregional transmission projects currently under evaluation.
3. *Coordinated but independent interregional transmission project evaluation.* Once two or more regions determine that an interregional proposal has been submitted appropriately to each and would directly interconnect within each of their footprints, they jointly define regional reference cases with common ITP assumptions for their respective independent assessments of the proposal. The regional reference case often derives from the current WECC anchor data set[24] and is reviewed by all of the impacted regions to make sure that it includes the latest loads, resources, and transmission topologies.
4. *Regional analysis and selection.* As discussed further below, the individual transmission planning regions independently evaluate interregional transmission proposals following each entity's regional transmission planning practices. The regional selection process hinges on a determination by the individual region that an interregional project will address a regional transmission need more efficiently or cost-effectively than alternatives within the region. The selection takes place entirely within and as a part of each individual entity's regional transmission planning process. Accordingly, each region's consideration of an interregional transmission project is based on the region-specific criteria that it has established for determining the efficiency or cost-effectiveness of a project compared to alternatives. Selection of a proposal as an interregional transmission project does not necessarily mean selection for regional cost allocation. Regional cost allocation must be requested by the project proponent.

[24] See https://www.wecc.org/SystemStabilityPlanning/Pages/AnchorDataSet.aspx.

5.2 Selection of interregional transmission projects for interregional cost allocation

Because each of the individual WPRs follows slightly different regional planning schedules, each region has also established its own individual but concurrent proposal window (i.e., all of the individual windows follow the same time schedule) during which qualified stakeholders submit interregional transmission projects for consideration. The submission period ends on March 31 of each even-numbered year. However, project proponents are encouraged to submit prior to this date so that there can be time to prepare for an initial discussion of their projects at the annual interregional coordination meeting (which takes place during the first quarter of each calendar year).

In its submittal to each transmission planning region, the proponent of an interregional transmission project must identify all of the regions to which it has submitted its project for consideration, as well as the region(s) for which it seeks regional cost allocation. Each RPR must confirm that the project will directly connect electrically within their regions.

Each RPR independently determines the costs and benefits of a proposed interregional transmission project within its footprint following the same procedures it applies to proposed regional projects. In this instance, the purpose is to determine whether the interregional project could meet the region's need more efficiently or cost-effectively, by eliminating or deferring the need for a regional transmission project. If an RPR determines that a proposed interregional transmission project will not meet its regional needs more efficiently or cost-effectively than a regional or other transmission project, then the region does not continue to participate in the interregional transmission planning coordination process as an RPR.

An interregional transmission project submittal is effectively selected when at least two RPRs select the interregional transmission project through their respective independent regional transmission planning processes. Note that selection may or may not include regional cost allocation (i.e., regional cost allocation must be requested by the proponent). If two or more RPRs select the interregional transmission project for regional cost allocation (i.e., regional cost allocation has been requested), the interregional analysis of cost allocation continues. This process might not be completed within the bounds of the existing two-year interregional coordination cycle and therefore may extend into the subsequent cycle.

5.3 Interregional cost allocation

When an RPR determines that an interregional transmission project is more efficient or cost-effective than regional alternatives, and the project proponent has requested regional cost allocation, the RPRs determine the dollar value of the project's benefits to their individual regions. They then determine their pro-rata share of the project costs by multiplying the total project costs by the region's share of the total benefits as identified by all transmission planning regions. As noted, each region defines these benefits by following criteria that have been established independently by and for each region. Figure 5-2 shows an example of the formula used to determine a pro-rata share of a project's cost.

Example of a Pro Rata Cost Assignment

An Interregional Transmission Project estimated to cost \$45 million is submitted for consideration for Interregional Cost Allocation in the regional transmission planning processes of the three of the Western Interconnection's four regions in which the Applicants are located.

- One region determines that the project does not meet any need within that region, and is permitted to disengage from the joint evaluation process under Section 4.2 of the Common Language.
- Two regions select the project in their regional transmission plans and determine that the project satisfies one or more regional needs and creates benefits[103] for the region, as follows:
  - Region X determines that the project would create \$35 million in benefits for its region.
  - Region Y determines that the project would create \$42 million in benefits for its region.
- Under the Common Language, the *pro rata* assignment would result in:
  - An assignment of project costs to Region X of \$20 million
    - \$35 million divided by \$77 million equals a 45% share of project benefits
    - 45% of the project's \$45 million estimated total cost equals \$20 million
  - An assignment of project costs to Region Y of \$25 million
    - \$42 million divided by \$77 million equals a 55% share of project benefits
    - 55% of the project's \$45 million estimated total cost equals \$25 million
- Given the use of a *pro rata* assignment method, both Region X and Region Y experience benefits greater than its assigned share of costs:
  - Region X: \$20 million in assigned costs versus \$35 million in quantified benefits
  - Region Y: \$25 million in assigned costs versus \$42 million in quantified benefits

Figure 5-2. Example of a pro-rata cost assignment

Source: CAISO, Northern Tier Transmission Group (NTTG), and West Connect (2013): https://www.caiso.com/Documents/May10_2013TariffAmendment-Order1000Phase2%20InterregionalER13-1470-000.pdf

5.4 Recent Interregional Transmission Coordination Outcomes

The WPRs' 2018-2019 interregional transmission coordination process submission was completed on March 31, 2018. Six interregional transmission projects were submitted to CAISO, NTTG, and WestConnect (the three RPRs for one or more of these six projects) for consideration. Of the six projects submitted, four had been submitted previously during the 2016-2017 interregional transmission coordination cycle and were resubmitted during the 2018-2019 cycle. Table 5-1 lists the six projects that were submitted.

At the time this case study was prepared (March 2019), CAISO and WestConnect had determined that none of the submitted projects would be selected in their regional plans. Therefore, CAISO and WestConnect are no longer considered RPRs for these projects, and these projects are in effect no longer a part of the interregional transmission coordination process. NTTG's independent assessment of the projects will continue through the remainder of its regional process, which will conclude at the end of 2019.

Table 5-1. Interregional transmission project submittals to the Western Interconnection's 2018-2019 coordination process

Proposed Project/ Submitted By	Description	RPR	Cost allocation requested	Project Cost ($)	Planned In-Service Date
Project: TransWest Express AC and DC Project *Submitted by:* TransWest Express LLC	A proposed 730-mile, phased 1,500/3,000 MW, ±600kV, bi-directional, two- terminal, high-voltage direct current (HVDC) transmission system with terminals in south-central Wyoming and southeastern Nevada	CAISO, NTTG, WestConnect	CAISO, WestConnect	~ $4.11 Billion (2018$)	2022
Project: TransWest Express DC Project *Submitted by:* TransWest Express LLC	A proposed project to build a 3,000MW line and 1,500MW of terminal capacity with a later, parallel, addition of 1,500MW of terminal equipment to provide capacity between the California and Rocky Mountain regions	CAISO, NTTG, WestConnect	CAISO, WestConnect	~ $2.11 Billion (2018$) for initial 1,500MW phase; $0.87B for additional 3,000MW	2022
Project: Southwest Intertie Project (SWIP) North *Submitted by:* Great Basin Transmission LLC	A proposed 275-mile 500kV single-circuit AC line connecting the Midpoint 500kV substation to the Robinson Summit 500kV substation, with an expected bi-directional WECC-approved path rating of approximately 2,000MW	CAISO, NTTG, WestConnect	CAISO will pay for the cost of the project if approved	Redacted	2022
Project: Cross-Tie Transmission Line Project *Submitted by:* TransCanyon LLC	A 213-mile 500kV HVAC transmission project that would be constructed between central Utah and east-central Nevada, with an expected rating of approximately 1,500MW	NTTG and WestConnect	CAISO, NTTG, WestConnect	$667.0 Million (2015$)	Q4 2024
Project: HVDC Conversion Project Submitted by: San Diego Gas and Electric	Proposed conversion of a portion of the 500kV Southwest Powerlink to a multi-terminal, multi-polar HVDC system with terminals at North Gila (500kV), Imperial Valley (500kV), and Miguel Substations (230kV)	CAISO and WestConnect	Not requested	$700-$900 Million	2022
Project: North Gila-Imperial Valley #2 *Submitted by:* Southwest Transmission Partners LLC/ITC Grid Development LLC	A proposed 500-kV HVAC transmission project that would be constructed between southwest Arizona and southern California	CAISO, WestConnect	CAISO, WestConnect	$291 Million (2018$)	Q4 2022

See the section on 2018-19 Interregional Transmission Project Submittals on WestConnect (2019): http://regplanning.westconnect.com/interregional_coordination.htm

The remaining project proposals remain under study by the RPRs, per the evaluation timeline shown in Figure 5-3.

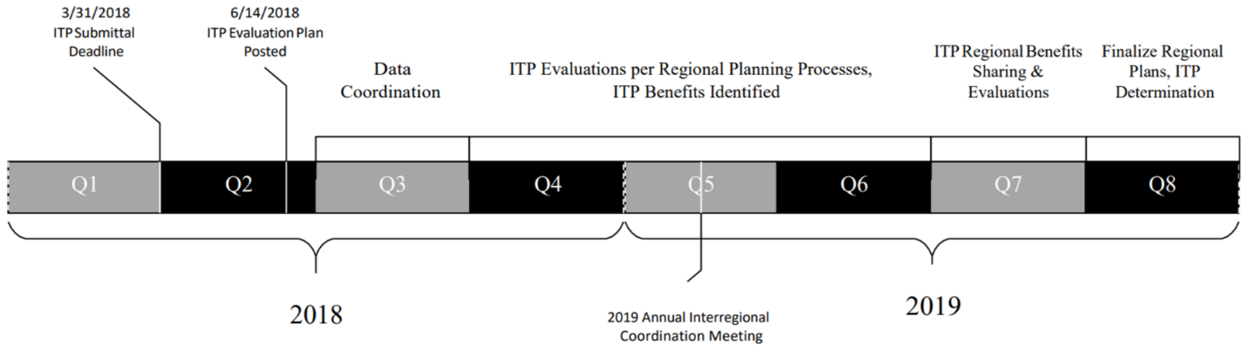

Figure 5-3. WPRs' interregional transmission project evaluation timeline

Source: ColumbiaGrid, CAISO, NTTG, and West Connect (2018): https://www.caiso.com/Documents/Cross-tie_Project_Interregional_Transmission_Project_Evaluation_Plan.pdf

6. Case Study: Midcontinent Independent System Operator and Southwest Power Pool

MISO and SPP have conducted joint interregional planning activities since 2004. This case study focuses on the formal interregional transmission coordination process that they now conduct jointly pursuant to FERC's final compliance orders for Order No. 1000, which have an effective date of March 30, 2014

MISO's and SPP's interregional transmission coordination process focuses on preparation of a Coordinated System Plan (CSP) study, which can be initiated annually. The principal purpose of the CSP study is to identify mutually beneficial transmission enhancements and report on processes and decisions regarding interregional transmission projects selected for interregional cost allocation.

Interregional transmission projects are evaluated independently by both MISO and SPP within each region's respective regional planning process. MISO and SPP have recently modified the CSP process (starting in 2019) to include joint evaluations of projects. The costs of projects that are selected by both regions for interregional cost allocation are apportioned to each region based on the relative share of the net present value of total benefits calculated for each respective region.

At the time this case study was prepared (March 2019), no interregional transmission projects had been selected for regional cost allocation by both MISO and SPP.

6.1 Overview of interregional transmission coordination activities

MISO's and SPP's interregional transmission coordination processes are conducted through two committees:

1. The Joint Planning Committee (JPC) is composed of representatives from each RTO. The JPC is the decision-making body for interregional transmission coordination and is responsible for all aspects of the process.
2. The Interregional Planning Stakeholder Advisory Committee (IPSAC) is open to all stakeholders and provides guidance and feedback on the interregional transmission coordination led by the JPC.

The focus of these committees' activities is preparation of the CSP study. The CSP study reviews transmission issues (i.e., regional transmission needs driven by reliability, economics, and/or public policy requirements) and determines whether there are recommended interregional transmission solutions that would address such needs. After recommended projects are identified, MISO and SPP must then consider and select recommended projects in their respective regional transmission planning process. Thus, preparation of the CSP study embodies all steps involved in the selection of interregional transmission projects for interregional cost allocation.

6.2 Selection of interregional transmission projects for interregional cost allocation

The process for developing the CSP study consists of four steps (see Figure 6-1):

1. Annual review of transmission issues and determination of the need for a CSP study
2. Coordination of regional models for the CSP study and development of the draft CSP report that includes recommendations for interregional projects (and associated cost allocation)
3. Parallel evaluation of interregional project proposals in MISO's and SPP's regional transmission planning processes
4. Allocation of project costs between the two regions if selected by both regional transmission planning processes for purpose of cost allocation

Annual review of transmission issues. In this first phase, MISO, SPP, and their stakeholders meet annually through the IPSAC to review transmission issues identified by either MISO, SPP, or a third party. The goal of the review is to determine whether there is a need for a CSP study. The review focuses primarily on issues that have been identified at or near the "seams" between MISO and SPP. Based on the review, the IPSAC makes a recommendation to the JPC regarding the need to initiate a new CSP study. JPC then has 45 days to vote on whether to prepare a new CSP study.

Coordination of regional models and preparation of draft CSP. MISO and SPP share modeling data annually, independent of whether any CSP study is undertaken, to facilitate each region's respective model-building process. The JPC then facilitates the review and coordination of the appropriate regional models to be used during preparation of a CSP study if one is undertaken.

In addition to coordinating regarding their modeling data, the regions share information on regional needs that might be addressed by interregional projects. These needs have been previously identified, separately by each region using its regional criteria. That is, SPP relies on the criteria it already uses for its Integrated Transmission Plan (ITP), and MISO relies on the criteria it already uses for the MISO Transmission Expansion Plan (MTEP). The needs that are identified are posted on each entity's website.

At this point, MISO, SPP, or a third party can propose interregional solutions to address transmission issues identified in the CSP study. The proposed solutions are evaluated by the JPC in consultation with IPSAC.[25] JPC develops a draft CSP, which identifies any recommended interregional projects, which then go through the parallel evaluation.

Parallel evaluation of interregional project proposals in the regional transmission planning processes. MISO and SPP evaluate proposed interregional transmission solutions, generally speaking, just as they evaluate proposed regional solutions, applying the same evaluation methods and criteria used in their regional processes. The objective is to determine the more efficient or cost-effective solution to an identified regional need. After each region has completed its evaluation, the results are presented to the IPSAC.

[25] See MISO and SPP (2017a), Article 9, Section 9.3.3.4.

An interregional transmission project determined to be the more efficient or cost-effective solution to an identified regional need must be approved through the respective approval processes associated with each entity's regional plan (i.e., by the boards of MISO and SPP).

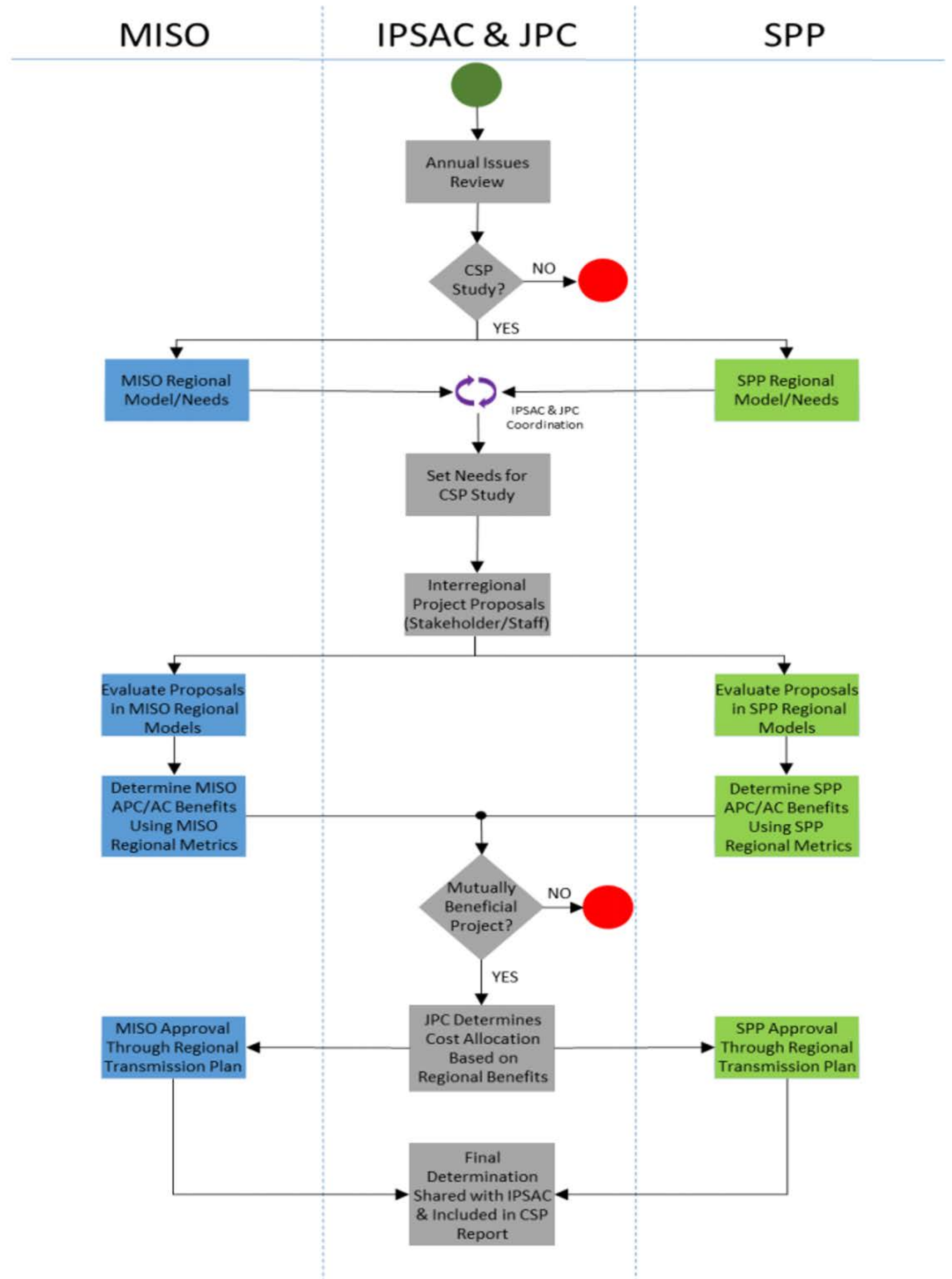

Figure 6-1. Sequence of activities involved in preparation of the Coordinated System Plan

Source: SPP and MISO (2019): https://cdn.misoenergy.org/20190131%20MISO%20SPP%20IPSAC%20Item%2003%20CSP%20Detailed%20Process%20Overview313550.pdf

6.3 Interregional cost allocation

The costs of interregional transmission projects that are selected for interregional cost allocation are apportioned between the two regions based on the share of the combined benefits that the project provides to each region. As noted, these benefits are determined separately for each region, following each region's evaluation criteria.

MISO Cost = Total project cost * (MISO Benefit)/(MISO Benefit + SPP Benefit)
SPP Cost = Total project cost * (SPP Benefit)/(MISO Benefit + SPP Benefit)

MISO Benefit = Net present value (NPV) of MISO's benefits as calculated in MISO's MTEP process
SPP Benefit = NPV of SPP's benefits as calculated in SPP's ITP process

6.4 Recent interregional transmission coordination outcome

The most recent final interregional coordination outcome was the result of an older interregional planning protocol to which modifications have since been proposed to take effect in 2019. In 2016, MISO and SPP initiated a two-year CSP study to consider interregional projects that might be selected for interregional cost allocation. The CSP study identified seven regional transmission needs; these needs had been identified previously in MISO's 2016 MTEP and in SPP's 2017 ITP 10-year assessment.

This approach of targeting regional transmission needs identified first through each region's regional planning processes was pursued in response to stakeholder feedback, with the goal of making the joint study process more efficient by leveraging regional study work that had already been completed.

Next, MISO and SPP staff and stakeholders proposed interregional transmission solutions to address the regional needs. Following the then-current interregional planning protocol, the JPC then used a common model to jointly evaluate the solutions. The principal metric that emerged from the common model was adjusted production cost, which was used to evaluate the proposed solutions.

As a result of this evaluation, the JPC identified one solution—the Loop One Split Rock to Lawrence 115kV circuit into Sioux Falls project—as a potential interregional transmission project. That is, they found that this project would benefit both MISO and SPP and provide adjusted production-cost benefits that exceeded the cost of the project over the initial 20 years of the project's expected life.

Based on these findings, and following endorsement by the IPSAC, the project was reviewed within each of the two entities' regional transmission planning processes (MTEP and ITP). MISO did not find the project to be more efficient or cost-effective compared to regional alternatives and therefore did not recommend the project for further consideration. Specifically, the MISO regional process found that although the project might be beneficial, there were two alternatives to the project that provided equal or greater benefits at a much lower cost. SPP found that the project was beneficial to the region. However, because MISO did not recommend further consideration of the project, SPP did not select the project in its regional transmission plan for purposes of cost allocation.

7. Case Study: Midcontinent Independent System Operator and PJM Interconnection

MISO and PJM have conducted joint planning since 2003. This case study focuses on the formal interregional transmission coordination activities that are conducted jointly pursuant to FERC's final compliance orders for Order No. 1000, which have an effective date of January 2014.

Notably, FERC accepted a modification of the MISO/PJM interregional transmission coordination processes which stipulates that, beginning in 2017, potential Interregional Economic Projects (IEPs) are individually evaluated independently by MISO and PJM within and as a part of each region's planning process. Prior to this modification, these projects were evaluated through a joint evaluation process.[26]

The costs of interregional transmission projects that are more efficient or cost-effective solutions than regional alternatives are allocated to each region based on the relative share of benefits provided to each region.

At the time this case study was prepared (March 2019), seven Targeted Market Efficiency Projects (TMEPs) had been approved by both the MISO and PJM boards. Five TMEPs were approved in 2017, and two were approved in 2018. Currently, MISO and PJM are evaluating a number of other potential interregional transmission projects.

7.1 Overview of interregional transmission coordination activities

MISO and PJM's interregional transmission coordination process is conducted by two subcommittees:

1. The Joint RTO Planning Committee (JRPC) is composed of representatives from each RTO. JRPC is the decision-making body for all coordinated interregional transmission activities and is responsible for all aspects of that process.
2. The Interregional Planning Stakeholder Advisory Committee (IPSAC) is open to all stakeholders and provides guidance and feedback on the interregional activities led by JRPC.

Annually, beginning in the fourth quarter of each calendar year and continuing through the first quarter of the following calendar year, the two RTOs evaluate the transmission issues identified in each of the RTOs' regional planning processes, including issues from each respective RTO's market operations.

JRPC leads this annual review of transmission issues, considering together the transmission issues and upgrade needs that the two entities have identified. The results of each RTO's individual analysis are discussed jointly during IPSAC meetings.

[26] See MISO and PJM (2018a), Section 9.3 on Coordinated System Planning.

FERC's order in Docket No. EL13-88 (NIPSCO Complaint)[27] accepting MISO's and PJM's compliance filings replaced MISO and PJM's prior interregional joint economic analysis and cost allocation process with a regional economic study process. Specifically, the NIPSCO complaint order directed deletion of the requirement that an interregional economic transmission project meet a joint 1.25-to-1 benefit-to-cost ratio, i.e., the "triple hurdle." Joint models are still used for the longer two-year CSP studies.

MISO and PJM assess potential interregional economic projects in parallel. Each RTO evaluates the projects following the same analysis steps that are applied to economic projects being considered as wholly within the individual RTO's region. The RTOs report the outcomes of their evaluations as part of their regional plans.

This effort includes interregional and regional evaluation phases (see Figure 7-1) and can lead to the development of a two-year Interregional Market Efficiency Project (IMEP) study. The IMEP study progresses in parallel through the PJM and MISO regional processes, with each RTO developing its own regional economic model and identifying issues for which upgrades are being solicited. Proposals submitted for consideration within the IMEP study process must address at least one regional issue within each region and be submitted to both regional processes.

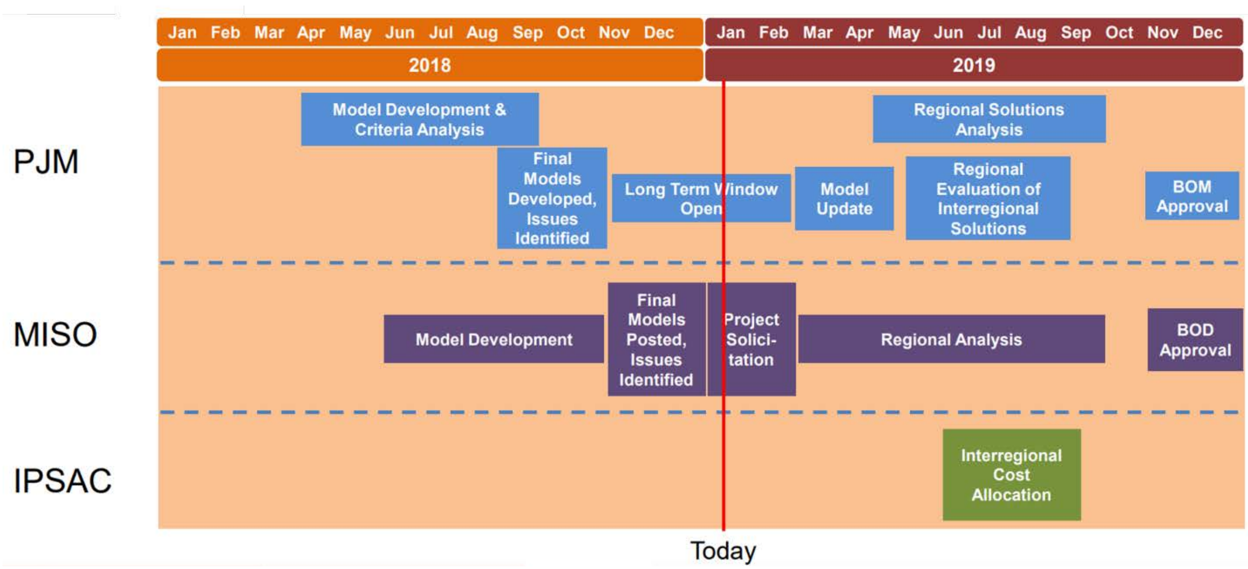

Figure 7-1. Diagram of PJM-MISO IMEP study estimated timeline

Source: MISO and PJM (2019): https://cdn.misoenergy.org/20190108%20MISO-PJM%20IPSAC%20Presentation310730.pdf

JRPC relies on the outcomes of each RTO's evaluations to recommend selection of projects for interregional cost allocation. As part of this process, JRPC also allocates costs to each RTO based on the procedures described below. The proposed cost allocations are reviewed with IPSAC and stakeholders and posted on the websites of the two RTOs. IPSAC solicits stakeholder input, which is taken into consideration by JRPC when deciding which projects to recommend for inclusion in the regional plans.

27 See https://www.ferc.gov/whats-new/comm-meet/2017/011917/E-19.pdf

Final approval of a project is made by the PJM and MISO boards.

The results of JRPC's coordination activities are included in IPSAC materials, posted on the websites of the RTOs, and detailed in the annual regional plan documents. These details include the steps that the two RTOs have taken to share information on current transmission projects and issues as well as evaluations of potential future transmission projects.

7.2 Selection of interregional transmission projects for regional cost allocation

Generally, a project is defined as interregional if it is physically located in both the MISO region and the PJM region. It may also be defined as interregional if it is physically located wholly in one transmission planning region but MISO and PJM jointly agree that it would provide benefits to the other transmission planning region or both transmission planning regions.

There are subcategories of interregional transmission projects, as follows:

Cross-Border Baseline Reliability Projects, which must:

- meet applicable reliability criteria and
- be defined as baseline reliability projects under the MISO or PJM tariffs.

Interregional Reliability Projects, which must:

- be selected in both the MISO and PJM regional planning processes and be eligible for each region's cost allocation process and
- displace one or more reliability projects in PJM and/or MISO, as defined in their respective tariffs, and more efficiently or cost-effectively meet applicable reliability criteria than the displaced reliability project.

Interregional Market Efficiency Projects (IMEPs), which must:

- be evaluated as part of the CSP process
- qualify as an economic transmission enhancement or expansion under the terms of the PJM Regional Transmission Expansion Plan (RTEP) and qualify as a Market Efficiency Project (MEP) or a Multi-Value Project (MVP) that meets multi-value project criterion 2 or criterion 3 under the terms of Attachment FF of the MISO Open Access Transmission Tariff (OATT)
- address one or more constraints for which at least one dispatchable generator in the adjacent market has a generation shift-to-load factor of 5% or greater with respect to serving load in that adjacent market, as determined using the CSP power-flow model.[28]

Interregional Public Policy Projects, which must:

- be selected both in the MISO and PJM regional planning processes and be eligible for each

[28] At the time this case study was prepared (March 2019), MISO and PJM intended to file joint operating agreement changes at FERC to remove the 5% generation-to-load distribution factor (GLDF) criterion for interregional market efficiency projects.

region's cost allocation process

- displace one or more regional projects addressing public policy in MISO or one or more public policy projects in PJM, as defined in each respective tariff, and meet the applicable public policy criteria more efficiently or cost-effectively than the displaced regional project(s).

Targeted Market Efficiency Projects, which must:

- be evaluated as part of a CSP or joint study process as described in Section 9.3.7.2(c) of the MISO-PJM Joint Operating Agreement (JOA) and [be] demonstrably expected to substantially relieve identified historical market efficiency congestion issues (specifically congestion that is on an identified market-to-market flow gate).[29]

The criteria for all of the types of interregional transmission projects listed above, excluding TMEPs and IMEPs, are the same as those applied by the individual RTOs in their regional transmission planning processes for the same types of projects. The only "pure" type of interregional transmission project that does not exist in either RTO's regional transmission planning process is the TMEP, which is only considered in the joint interregional transmission coordination process. The criteria for evaluating the benefits that can be achieved by a TMEP are historical market-to-market congestion analyses. Both MISO and PJM perform forward-looking congestion analyses when evaluating regional economic projects.

MISO's regional review process uses models and assumptions developed as part of its regional planning process and applies criteria to evaluate the viability of an interregional economic project. These criteria include screening to determine which cost allocation zones within MISO's footprint benefit from the economic project and to determine whether a benefit-cost ratio that considers the net present value of 20 years of benefits and costs is greater than 1.25. Economic projects are tested for robustness using scenarios.

PJM's regional review process for market efficiency projects uses regional models and assumptions developed as part of PJM's RTEP. This process identifies transmission solutions that reduce projected congestion and uses security-constrained production-cost simulation tools that project future congestion, including the identified binding constraints that will lead to this congestion. An economic efficiency test compares the present worth of 15 years of projected benefits to the revenue requirements of the transmission solution. PJM's market efficiency benefit-cost criterion is identical to MISO's—1.25 or greater.

[29] Note that on February 28, 2019, MISO filed proposed tariff revisions under Docket No. ER19-1156-000. In its proposed tariff revisions, MISO proposes a new cost allocation project category: the Interregional Economic Project (IEP). This new cost allocation category will include any project that: (i) qualifies as an Interregional Market Efficiency Project (IMEP) under Article IX of the MISO-PJM JOA and also qualifies as a Market Efficiency Project (MEP) but does not qualify as a Multi-Value Project (MVP) under Attachment FF, or (ii) qualifies as an Interregional Project primarily addressing economic issues under Article IX of the MISO-SPP JOA; and (iii) meets the criteria for inclusion in the MISO Transmission Expansion Plan (MTEP) as a MEP or a Local Economic Project (LEP), as applicable based on voltage level, but does not include projects that qualify as Multi-Value Projects. This filing is pending and at the time this report was finalized in June 2019, FERC had not yet issued an order on the proposed tariff revisions. These proposed tariff revisions would also be applicable to MISO-SPP interregional transmission planning.

7.3 Interregional cost allocation

Interregional cost allocation is based on each entity's share of regionally defined benefits. These benefits are calculated by each region independently following its own practices for assessing the benefits of regional transmission projects. These practices and their application for interregional cost allocation are described in Table 7-1.

Table 7-1. Joint interregional transmission projects defined by MISO and PJM, with associated cost-allocation methodologies and criteria

Project Type	Description	Project Requirements	PJM-MISO Allocation
Targeted Market Efficiency Project (TMEP)	Alleviates historical market-to-market (M2M) congestion in both RTOs	≤ $20 million; in service by 3rd summer peak after approval	Ratio of each RTO's day-ahead and excess congestion fund congestion, offset by historical M2M payments
Interregional Market Efficiency Project (IMEP)	Reduces market congestion in both RTOs	Qualifies as a Market Efficiency Project (MEP) or Multi-Value Project (MVP) in MISO and economic transmission enhancement or expansion in PJM; generation-to-load distribution factor (GLDF) of 5% or greater in each RTO[30]	MISO: 100% APC[31] PJM: Double 345kV+: 50% APC, 50% net load payments (NLP); 100kV – Single 345kV: 100% NLP
Interregional Reliability Project (IRP)	Displaces reliability projects in both RTOs and more efficiently or cost-effectively addresses reliability criteria than displaced projects	Qualifies as Base Reliability Project (BRP) or MVP in MISO and/or BRP in PJM	Ratio of avoided project costs in each RTO
Cross-Border Baseline Reliability Project (CBBRP)	Needed to efficiently meet reliability criteria	Qualifies as BRP in MISO or PJM	Transfer distribution factors (DFAX) of RTO generation to respective RTO load
Interregional Public Policy Project (IPPP)	Displaces public policy projects in both RTOs and more efficiently or cost-effectively addresses public policy criteria than displaced projects	Qualifies as MVP in MISO or economic or reliability project in PJM	Ratio of avoided project costs in each RTO

[30] See Footnote 28 regarding potential changes to the GLDF criterion.
[31] MISO has filed regional benefit metric changes to add avoided reliability project benefits and reduced MISO-SPP JOA settlement charge benefits to the adjusted production cost benefits of MEPs.

7.4 Recent interregional transmission coordination outcomes

At the time this case study was prepared (March 2019), seven TMEPs had been selected for interregional cost allocation by both MISO and PJM. Five TMEPs were approved in 2017, and two TMEPs were approved in 2018.

In 2016, MISO and PJM started a two-year CSP study to identify potential IMEPs. The first year, 2016, focused on identifying issues, and the second year focused on soliciting and evaluating projects (MISO MTEP 16, 2016).

On January 16, 2017, MISO published a description of regional issues and asked stakeholders to propose interregional transmission projects that might address these regional issues. Proposals were due at the end of February 2017. This solicitation window was concurrent with PJM's regional project proposal window. The two RTOs then individually evaluated interregional project proposals that were submitted.

MISO and PJM received eight interregional transmission project proposals in response to the 2017 solicitation. Three projects were upgrades, and five were greenfield proposals. Notably, half of the projects were sub-345kV that qualify as MISO market efficiency projects based on FERC's EL13-88 ruling.

Of these projects, the Thayer–Morrison 138kV transmission line proposal had the potential to be recommended as an interregional market efficiency project. The project addressed congestion on the Goodland–Reynolds 138-kV and Paxton–Gifford 138kV transmission lines that serve both RTOs' regions. This project showed benefits in excess of cost and met the benefit-cost criteria in each RTO.

MISO performed a no-harm reliability test on the Thayer–Morrison project. No reliability issues were identified. Because no PJM generator had a 5% or above generator-to-load distribution factor (GLDF), the project did not meet all criteria to become an IMEP.

8. Case Study: ISO New England/New York Independent System Operator/PJM Interconnection

ISO New England (ISO-NE); New York Independent System Operator (NYISO); and PJM Interconnection (PJM) have prepared interregional planning studies jointly since 2004. This case study focuses on the formal interregional transmission coordination process that they conduct pursuant to FERC's final compliance orders for Order No. 1000. The amended Northeast protocol became effective July 10, 2013. The individual files by ISO-NE, NYISO, and PJM became effective January 1, 2015.

ISO-NE, NYISO, and PJM's interregional transmission coordination process includes the joint preparation of a Northeastern Coordinated System Plan (NCSP). The NCSP describes interregional transmission projects that can meet the needs of more than one region more efficiently or cost-effectively than separate regional solutions, pursuant to an annual review and coordinated interregional studies conducted by the Joint ISO/RTO Planning Committee (JIPC).

Potential interregional transmission projects are formally evaluated by each affected region (i.e., each region with regional needs that would be addressed by the interregional transmission project) independently in its regional transmission process. To be eligible for regional cost allocation, each affected region must find that the interregional transmission project would meet a regional need more efficiently or cost-effectively than a regional transmission project.

The costs of projects that are selected by more than one region for regional cost allocation are allocated to each region based on the relative share of benefits provided to that region. The benefits are the sum of costs of the regional projects that are avoided by the interregional project.

At the time this case study was prepared (March 2019), no transmission needs had been identified that would be more efficiently or cost-effectively addressed by an interregional transmission project, using the planning process that resulted from FERC Order No. 1000. As a result, no interregional transmission projects have been selected by more than one region for interregional cost allocation.

8.1 Overview of Interregional Transmission Coordination Activities

Interregional transmission coordination activities are conducted under the auspices of the JIPC. In addition, the Interregional Planning Stakeholder Advisory Committee (IPSAC) provides an open stakeholder forum for discussion of interregional planning issues.

The JIPC is composed of staff from the three ISO/RTOs, and coordinates all interregional planning activities including guiding periodic interregional planning assessments and planning studies. The JIPC meets frequently to review and coordinate planning activities and establishes working groups to conduct specific planning or modeling as part of its interregional activities.

The JIPC reviews each of the ISO/RTOs' regional needs. This forms the basis for investigating the potential for interregional transmission solutions that could serve public policy, market efficiency, or reliability needs of at least two of the regions, more efficiently or cost-effectively than regional solutions.

The IPSAC is an open stakeholder group. It includes representatives of the three regional planning entities' planning advisory committees as well as representatives from transmission owners, market participants, governmental (state and regional) agencies, and any other party interested in the activities carried out by the regions. The IPSAC reviews—and provides input and suggestions to—the JIPC's coordinated system planning activities.

The IPSAC meets at least twice annually but can meet more frequently if warranted; it provides input before the coordinated study process begins, at least once during the study's execution (mid-term review and comment), and after the draft study has been finalized but prior to the finalizing of the results. During IPSAC meetings, which are part of the annual issue review process described below, the parties review potential interregional transmission issues identified by each regional planning entity or by stakeholders.

The regions typically conduct their interregional transmission coordination activities under the following schedule, annually, except as noted below:

Q3 and Q4:

- Hold IPSAC meeting
- Update the status of coordinated studies for the interconnection queue and long-term firm transmission service requests
- Identify system needs determined by the respective ISO/RTOs' regional planning processes
- Present the status of efforts to identify new solutions
- Discuss scope for NCSP (biennially in odd years)
- Request IPSAC input on potential interregional transmission projects and transmission needs
- Discuss work plan for following year, and solicit stakeholder input

Q1:

- Post responses to IPSAC questions/comments on respective ISO/RTO websites
  - Provide notification of postings, provide links
- JIPC prepares draft NCSP (biennially in even years)
- Post draft NCSP (biennially in even years)
  - Seek IPSAC comments

Q2:

- Finalize and post NCSP (biennially in even years)
- Hold IPSAC meeting
- Provide updates on regional planning processes and interregional coordination activities

- Discuss regional planning needs and potential solutions pursuant to stakeholder comments provided to the ISO/RTOs through their regional processes and discussions held at previous IPSAC meetings
- Provide updates to interconnection queues and long-term firm transmission service requests; highlight projects with potential for interregional impacts

Interregional transmission coordination activities typically include IPSAC discussions of newly defined interregional transmission network requests, generator interconnection requests in each region's queue, and long-term firm transmission requests that potentially affect neighboring regions. For example, a generator or transmission network service in Region A can affect Region B, and vice versa. Therefore, both regions need to evaluate the system's performance within their respective footprints and to allocate costs. The individual regions do not have to merge their interconnection queues at any time during this process but do coordinate their activities, such as the calculation of available transfer capability associated with long term, firm, point-to-point transmission service that may be requested.

These discussions also include regional transmission needs and the status of projects that could affect neighboring regions, keeping the IPSAC informed of potential opportunities for developing interregional projects.

While the activities of the JIPC and IPSAC are conducted on an annual cycle, the results of their activities are reviewed and summarized biennially in the NCSP. The NCSP reflects ongoing system changes such as load-growth projections, generation retirements, and new generation activation requests. It also discusses and incorporates information from the most recent individual regional transmission plans of the three regions. The plan describes transmission projects identified by the regions to resolve seams issues and potential interregional transmission projects identified per FERC Order No. 1000 requirements.

8.2 Selection of interregional transmission projects for interregional cost allocation

The interregional transmission coordination process can be divided into three phases:

1. *JIPC review of respective system needs and solution studies.* The JIPC review must take place annually but typically occurs at least monthly or whenever the committee receives a specific request from any entity. The JIPC reviews regional needs and the solutions identified in each region's regional transmission planning study and, with the IPSAC's input, assesses the potential for an interregional transmission project to meet regional needs (or the needs of more than one region) more efficiently or cost-effectively than separate regional transmission projects.
2. *Analysis and consideration of interregional transmission projects*. Analysis of whether the interregional transmission project meets the regional need or needs of more than one region more efficiently or cost-effectively than separate regional transmission projects is triggered if, in response to the JIPC's review, or otherwise, an interregional transmission project is proposed in more than one regional transmission planning process. The JIPC coordinates technical

planning studies including scopes of work, data assumptions, draft results, and final results. Technical studies may include assessments of power flow, production cost, short-circuit, and stability of projects affecting more than one region. The JIPC solicits feedback at IPSAC meetings where stakeholders learn of draft scopes of work, assumptions, draft results, and the status of studies.

3. *Regional consideration of interregional transmission projects.* Independent of the analysis conducted by the JIPC, the affected regions must independently consider, within their regional planning processes, any interregional project that could meet its regional public policy, economic, and/or reliability need for more than one region. Interregional projects must be proposed through each applicable regions' OATT transmission planning process, which includes provisions for competitive transmission solution solicitations. The three regional processes differ somewhat from each other in both their timing and sequencing. See Table 8-1.

Table 8-1. Timing of regional planning activities with interregional planning requirements

Key Activity that Affects Interregional Planning	ISO/RTO		
	NYISO	PJM	ISO-NE
Reliability needs	Continuously; summarized in a report every even year	Continuously identified and reported to stakeholders throughout the year; summarized in an annual report	Continuously; summarized in a report the fourth quarter of every odd year
Reliability solutions	Continuously; summarized in a report every odd year	Potential solutions identified, evaluated, and selected throughout the year in a transparent process with stakeholders	Continuously; summarized three times per year in a project list; summarized in a report every odd year
Economic needs	Continuously; summarized in a report every odd year	Identified midyear of year one of two-year cycle and reviewed with stakeholders Q3 and Q4	Continuously
Economic solutions	Continuously; summarized in a report for each proposed project	Potential solutions identified November 1 of year one of the two-year cycle through February of second year; solutions evaluated and selected in the second year	Continuously; summarized three times per year in a project list; summarized in a report every odd year
Public policy needs	As regional needs are identified	As regional needs are identified	As regional needs are identified
Public policy solutions	Following identification of a public policy transmission need	Following identification of a public policy transmission need	At least once every three years (last evaluated 2017)

Source: ISO-NE, NYISO, and PJM (2018): https://www.iso-ne.com/static-assets/documents/2018/05/2017_ncsp_final_043018.pdf

8.3 Interregional Cost Allocation

Consistent with the 2015 protocol, the OATT for each of the three regions states that costs of interregional transmission projects will be allocated as follows unless the entities mutually agree to another approach:

- To be eligible for interregional cost allocation, an interregional transmission project must be selected in the regional transmission plan for purposes of cost allocation in each of the transmission planning regions in which the project is proposed to be physically located. Costs are allocated in accordance with the joint operating agreements between NYISO and PJM and the respective tariffs of NYISO and ISO-NE.
- The cost share allocated to a region is determined by the ratio of the present value of the estimated costs of that region's displaced regional transmission project to the total of the present value of the estimated costs of the displaced regional transmission projects in all regions that have selected the interregional project in their regional transmission plans.
- No cost shall be allocated to a region that has not selected the interregional transmission project in its regional transmission plan.
- If a portion of an interregional project is included in the regional transmission plans of two entities, but one entity does not have a regional need or corresponding displaced regional transmission project, then all costs of the interregional project are allocated to the other region that has a regional need or displaced regional project. However, the region that does not have a regional need or displaced regional project can voluntarily agree, with the consent of the other affected entities, to an alternative cost allocation method (which must be filed with and accepted by FERC).
- The portion of the costs of an interregional project that are allocated to a region are to be allocated to that region's transmission customers pursuant to the regional cost allocation method provided in that region's FERC-filed documents and agreements.

8.4 Recent interregional transmission coordination outcomes

The three Northeastern regional transmission planning entities completed five NCSP studies between 2009 and 2018. The 2017 NCSP (NCSP17), released in 2018, is the most recent joint plan and shows full compliance with the Amended and Restated Northeastern Protocol, including interregional planning requirements of FERC Order No. 1000. NCSP17 did not identify any need for new interregional transmission projects for cost allocation that would be more efficient or cost-effective in meeting the transmission system needs of more than one region than proposed regional system improvements included in the entities' respective regional transmission plans. To date, no interregional transmission projects have been considered or selected for regional cost allocation by ISO-NE, NYISO, or PJM.

9. Next Steps

This section outlines the information that we recommend be collected to monitor and track regional transmission planning and interregional transmission coordination activities for purposes of assessing the effectiveness of FERC Order Nos. 890 and 1000.

This report is the third in a series of reports on the regional transmission planning practices pursuant to FERC Order Nos. 890 and 1000.[32] The first two reports reviewed regional transmission planning practices and the selection of transmission projects within regions. This report describes interregional transmission coordination practices and activities among one or more regions, focusing on practices for selecting interregional transmission projects for purposes of interregional cost allocation.

The prior two reports in this series emphasized that regional implementation of FERC Order Nos. 890 and 1000 is recent. In the non-ISO/RTO regions, compliant-specific procedures were, to a large extent, created for the first time. In ISO/RTO regions, although there might have been a foundation of regional planning practices, many significant changes have been required to establish compliant procedures. Both types of regions have continued to modify their practices as they and their stakeholders gain experience. In fact, envisioning a stable end-state for regional practices misses the point: we should expect that regional practices will evolve to accommodate the ever-changing environment within which regional transmission planning takes place.

Therefore, it is important to comprehensively and consistently monitor and track the evolution of regional practices. A common understanding of what, in fact, has taken place in the past is an essential foundation for justifying changes to improve future outcomes. Ongoing monitoring and tracking should foster understanding of the outcomes of regional practices as well as the regional processes from which those outcomes emerge.

In our second report, we noted that existing national data sources were not designed to follow or record information on the outcomes of the regional transmission planning activities directed by FERC's Orders. We recommended that, over time, national data sources should consider collecting this information because a national approach is the most expedient means for gathering comprehensive, consistent data.[33] We also noted that FERC had begun to publish regular reports on aspects of regional transmission planning activities. We recommended that FERC continue to publish and expand these reports. Our recommendations regarding these activities remain unchanged.

At bottom, FERC should seek to understand how regional needs for transmission are being met and whether they are being met by means that are consistent with FERC's requirements for regional

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[32] The two earlier reports are Eto (2016): https://emp.lbl.gov/publications/building-electric-transmission-0, and Eto and Gallo (2017): https://emp.lbl.gov/publications/regional-transmission-planning-review.

[33] These activities should only proceed when the value of the information gathered exceeds the costs of gathering it, compared to alternative means. In addition, protections may be required in order to ensure appropriate treatment of CEII and proprietary and financially or competitively sensitive information.

planning. A critical insight of our reviews has been acknowledgment that regional needs can and often will be met more cost effectively and efficiently by means that do not require or seek regional cost allocation (both transmission and non-transmission alternatives). Therefore, understanding how regional needs are met requires a holistic perspective that considers all transmission (and non-transmission) activities within a region, not just projects that are selected for purposes of regional or interregional cost allocation.

A holistic perspective is needed in all regions. It is needed in non-ISO/RTO regions where a majority of the transmission planning within the region takes place outside of the formal regional planning processes that have been established through FERC's Orders. It is also needed in the ISO/RTO regions when transmission projects within the region are not considered entirely within these formal processes, yet may affect the outcomes of these processes.

The breadth of this perspective should be consistent with the scope of FERC Orders, which is, in part, to establish means by which regional needs are met cost-effectively or efficiently. Hence, if projects developed within a region, yet outside of the formal regional planning process directed by FERC's Orders, are found subsequently to meet regional needs more cost-effectively or efficiently than alternatives seeking regional cost allocation, then some level of understanding regarding is warranted how these projects were planned. In particular, it may be appropriate to better understand the planning processes through which these projects emerge and to what extent they do or do not follow the planning principles in FERC's Orders.

This is not a recommendation that all transmission planning within a region should be subject to FERC's Orders. Nor is it a suggestion that existing regional transmission planning entities are not fulfilling the requirements of FERC's Orders. Rather, it is a recommendation to better understand how transmission planning practices within a region co-exist and interact with FERC's planning principles. Without this broad understanding, it will be difficult to evaluate whether or how regional transmission planning practices subject to FERC's Orders might or should evolve because they are to varying degrees dependent upon or influenced by planning practices that are not subject to these Orders. Ultimately, it is the responsibility of the planning entities within the region, their stakeholders, and FERC to decide on how both sets of practices will evolve.

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