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The Path to Power: Connecting Large Loads

Technical Appendix: Regional Large Load Interconnection Processes

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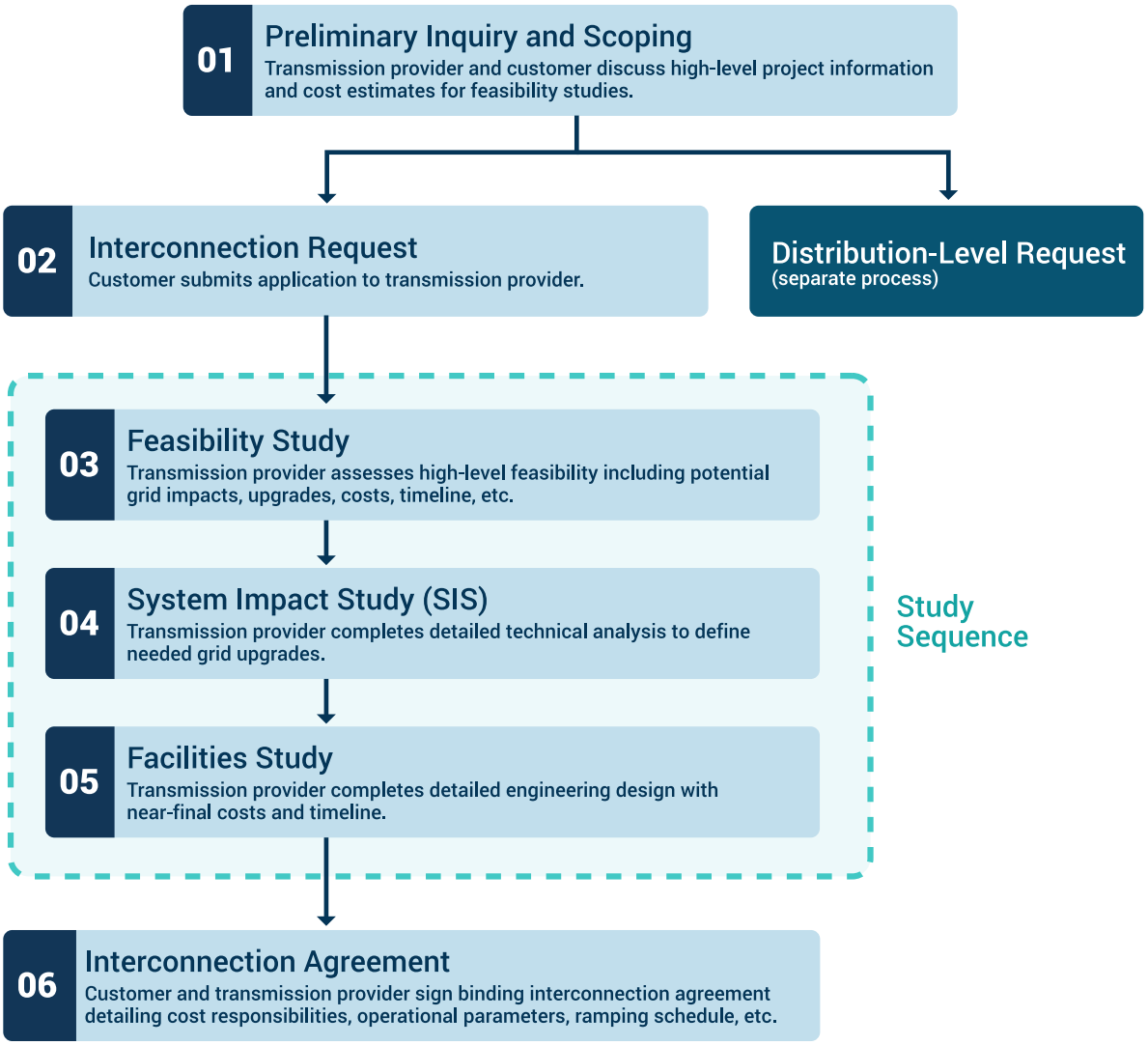
Appendix: Regional Large Load Interconnection Processes

This *Appendix* provides additional detail on regional variations in large load interconnection processes across the United States. As described in the main body of the report, before connecting a large load to the transmission system, grid operators evaluate the impact that the new load will have on the system and determine (1) whether existing transmission lines, substations, and related infrastructure can accommodate the additional demand without compromising system reliability or integrity, and (2) whether upgrades or new infrastructure are necessary. Assuming the customer is willing to pay their portion of identified costs, the relevant utilities then make the needed upgrades so that the large load can energize and draw power from the grid.

While the core elements of this process are broadly consistent, implementation varies by region. This appendix first summarizes the general framework, followed by descriptions of the processes used in PJM Interconnection (PJM), Southwest Power Pool (SPP), Midcontinent Independent System Operator (MISO), New York Independent System Operator (NYISO), Electric Reliability Council of Texas (ERCOT), Bonneville Power Administration (BPA), and for a non–RTO transmission provider in the Western United States.

General Framework

For simplicity, we use "transmission provider" in the general framework to refer collectively to the transmission owner and the RTO, and "customer" to refer to the large load customer and the local utility. In the region-specific sections that follow, we instead use the applicable region-specific terminology for these entities. The graphic below summarizes the six conceptual steps in the load interconnection process.



Step 1 — Preliminary Inquiry and Scoping: In the first step, the customer submits a formal request to connect a new load to the transmission provider, specifying the proposed location, size in megawatts, voltage level, and desired in-service date. The transmission provider then conducts preliminary scoping to assess the feasibility of the project and whether it can be served by the distribution grid. Typically, large loads over 20 MW connect at the transmission level to avoid inefficiencies or overloading distribution system capabilities.

Step 2 — Interconnection Request: If the project exceeds distribution system capabilities, the customer submits an interconnection request to the transmission provider. Some transmission providers require the customer to pay a study fee and/or provide more detailed project information.

Study sequence (Step 3 through step 5): At this stage, the request enters a series of three increasingly detailed studies conducted by the transmission provider to determine the needed transmission upgrades and costs.

One can think of the successive studies as similar to how one designs a new home.

- **First**, the feasibility study provides a rough cost and timeline for upgrades, just as a home developer conducts an analysis based on similar homes and approximate square footage.
- **Second**, the system impact study refines the initial estimate by designing more engineering details and their associated cost and timelines. In the home development process, this would be details such as the number of bathrooms, office space, and kitchen layout.
- **Finally**, the facilities study produces the technical blueprints that allow the builder to create a detailed project plan, purchase parts, and begin construction.

With each step of the process, the transmission provider delivers more detail and often requires additional customer financial commitment.

Step 3 — Feasibility Study: The feasibility study evaluates project viability using sound engineering judgment without performing a full interconnection or system impact analysis. After completing this study, the transmission provider gives the customer preliminary cost estimates and expected timelines. If the customer decides to proceed to the next phase, they pay additional study fees.

Step 4 — System Impact Study (SIS): The SIS includes a detailed technical analysis of how the new load will affect the broader transmission system including:

- Identifying the specific upgrades required
- Assigning preliminary cost responsibility
- Defining both customer interconnection facilities and network upgrades (described in more detail below)

The SIS is the most critical step in the process because it determines what must be built and who is responsible for it.

Step 5 — Facilities Study: Based on the SIS, the Facilities Study creates a full engineering plan that:

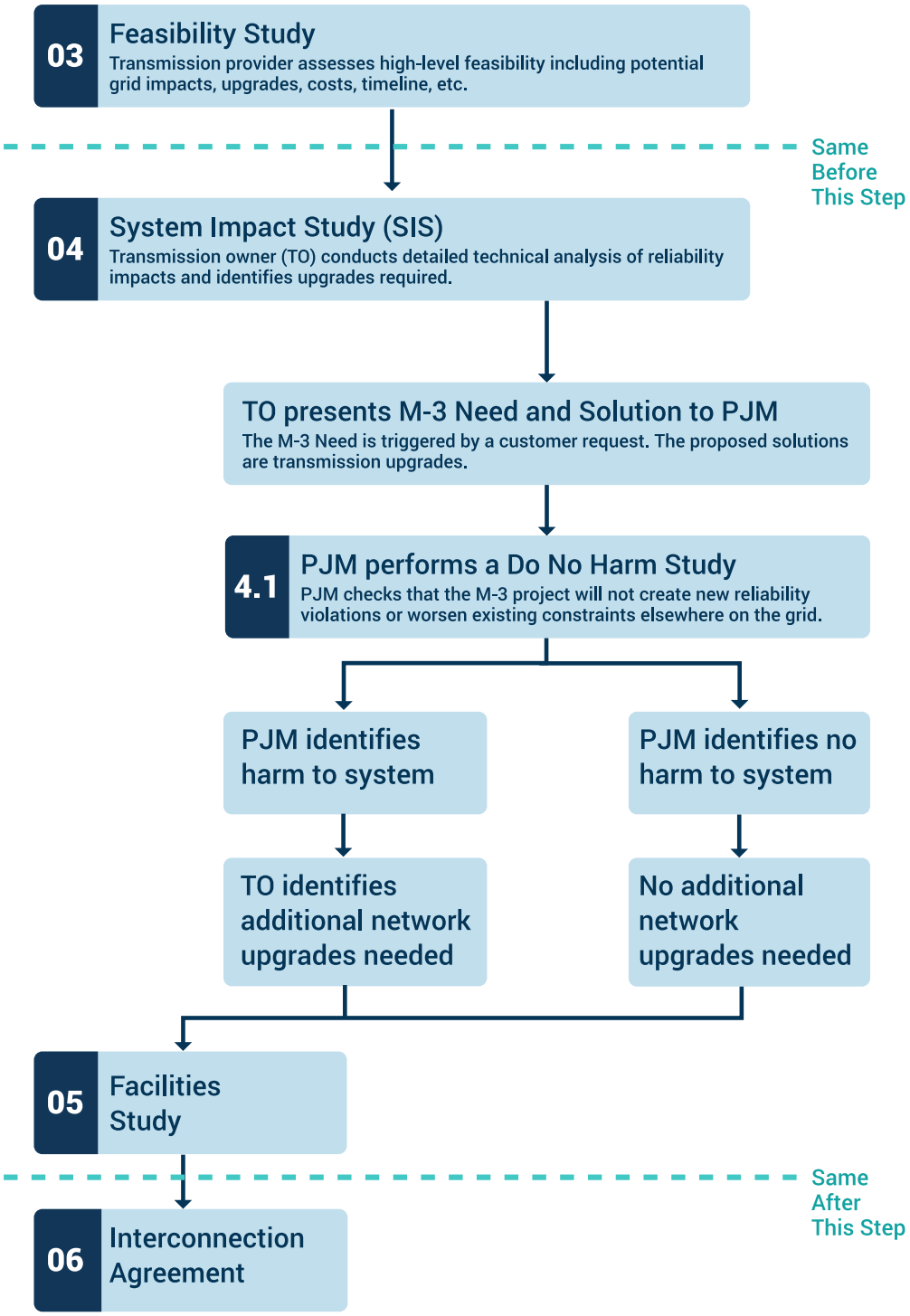
- Designs the required upgrades with construction-level detail
- Develops detailed equipment specifications
- Provides more precise cost estimates and schedules

The Facilities Study provides the technical design necessary for construction.

Step 6 — Interconnection Agreement: Once the studies are complete, the customer must decide whether to proceed by executing an interconnection agreement and, in many cases, posting significant financial security and/or deposits. This agreement establishes the technical requirements, construction responsibilities, and cost obligations for both the utility and the customer.

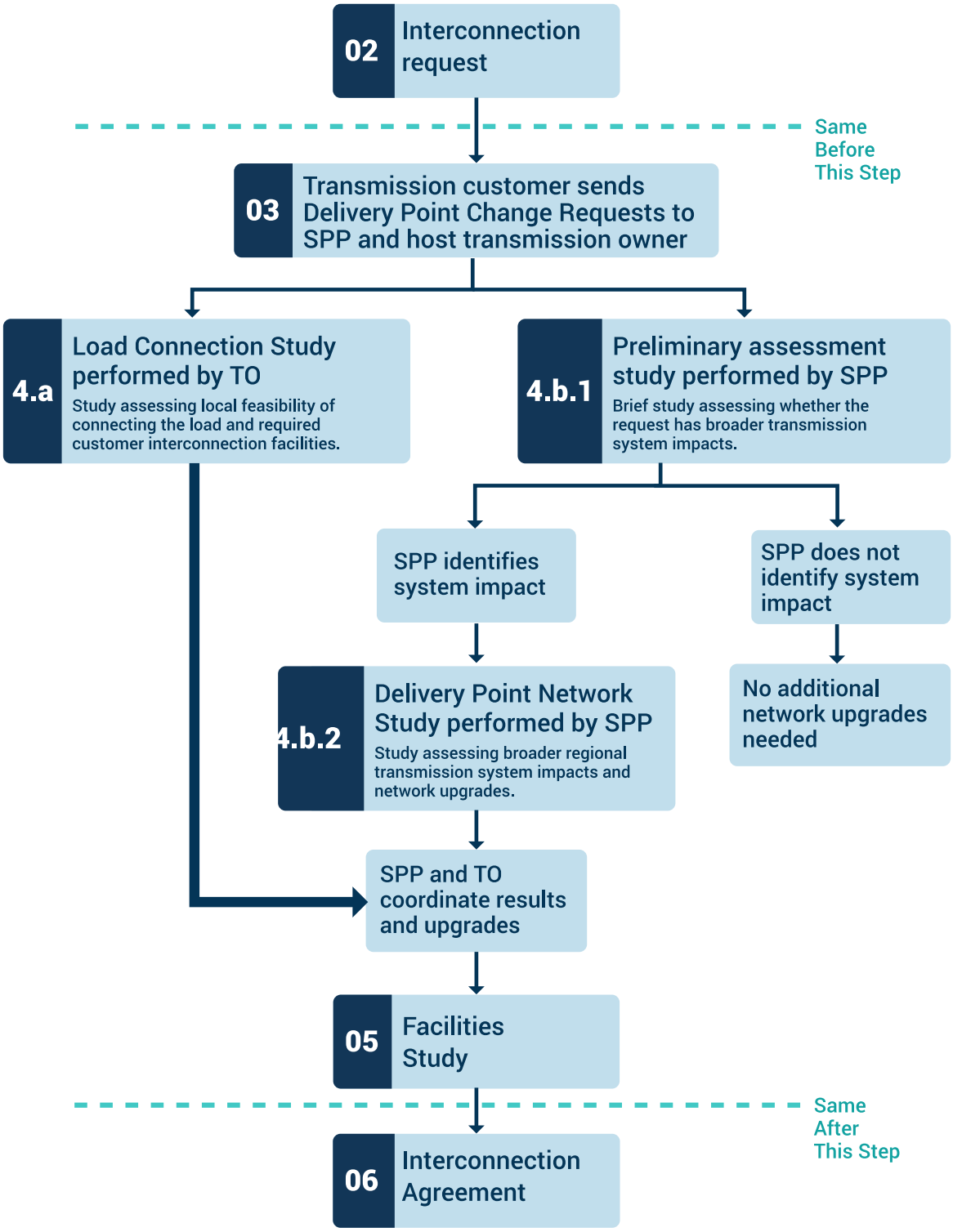
Construction and energization: After the interconnection agreement is executed, the project moves into detailed engineering, permitting, and construction. The utility coordinates construction of the required upgrades, while the customer develops its on-site electrical infrastructure. Final testing and commissioning occur before the load is energized. As with all construction, actual timelines depend on the scale of required improvements, regulatory approvals, supply chain constraints, and coordination with broader generation, transmission, and distribution planning. The full large load interconnection process can take anywhere from several months to several years from initial request to full energization, making it one of the most significant schedule and cost determinants in large load project development.

PJM Interconnection



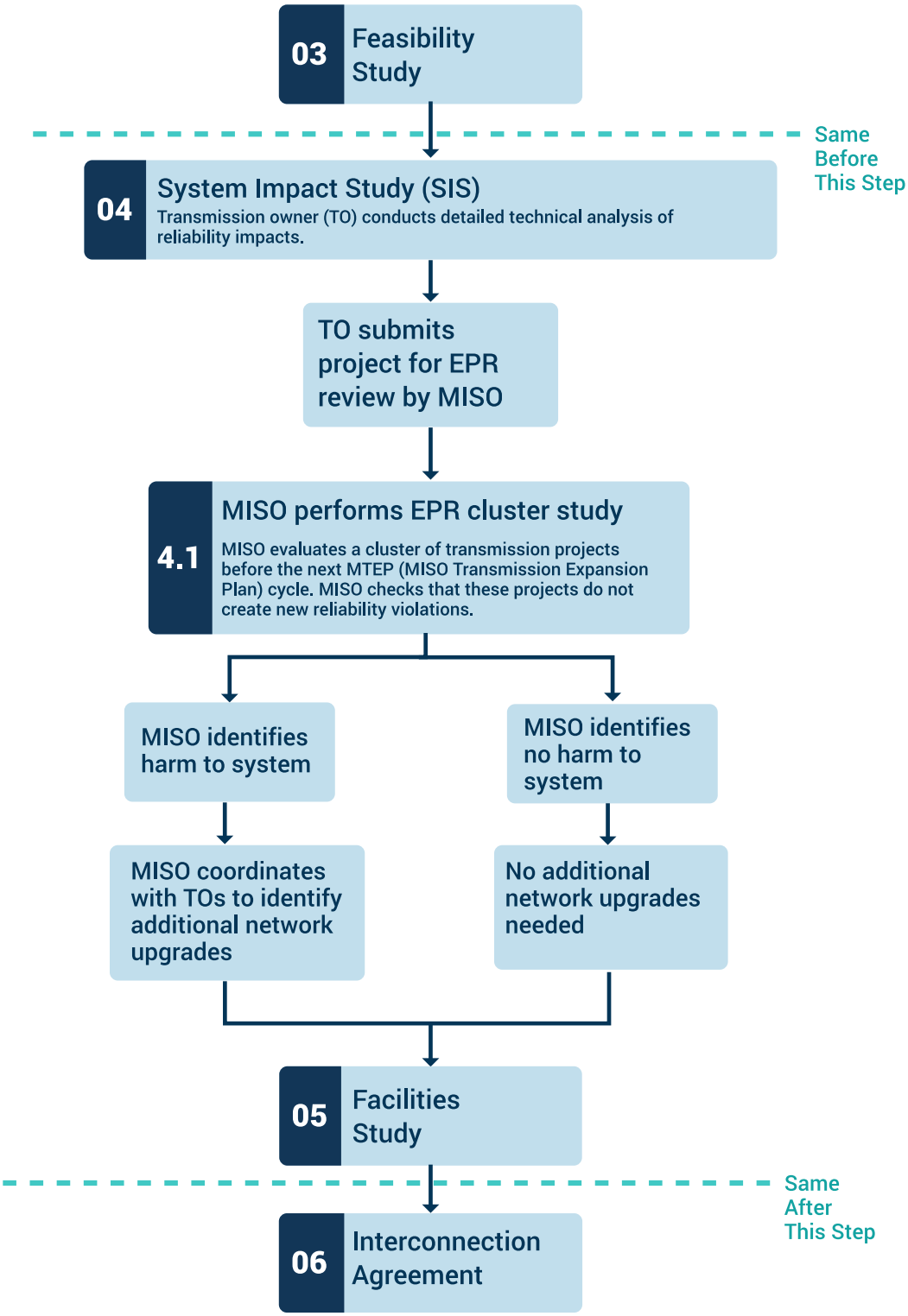
Details on the PJM study process are based on discussions with transmission provider staff.

Southwest Power Pool (SPP)



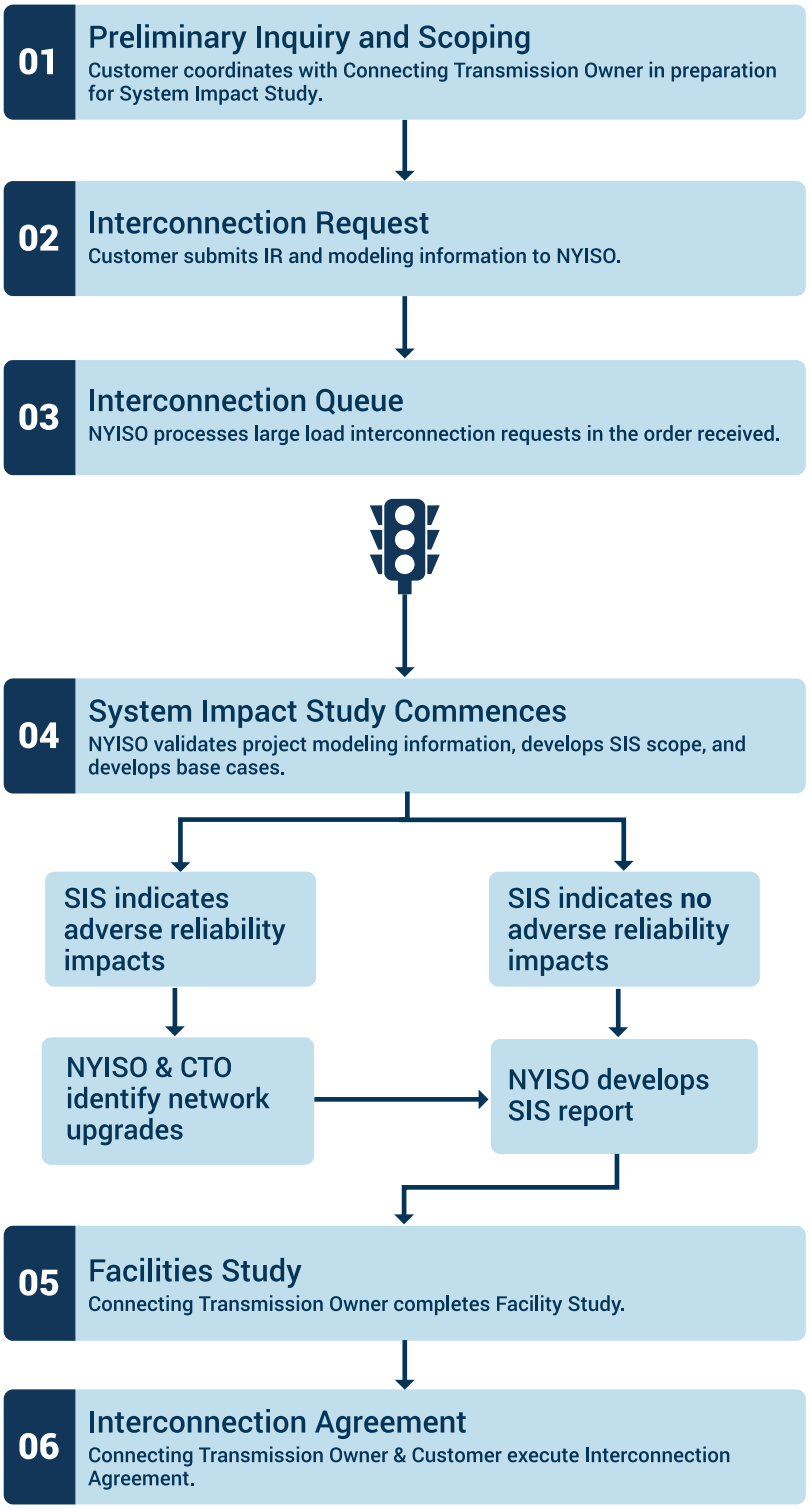
Details on the SPP study process are based on [the Attachment AQ process flowchart.]

Midcontinent Independent System Operator (MISO)



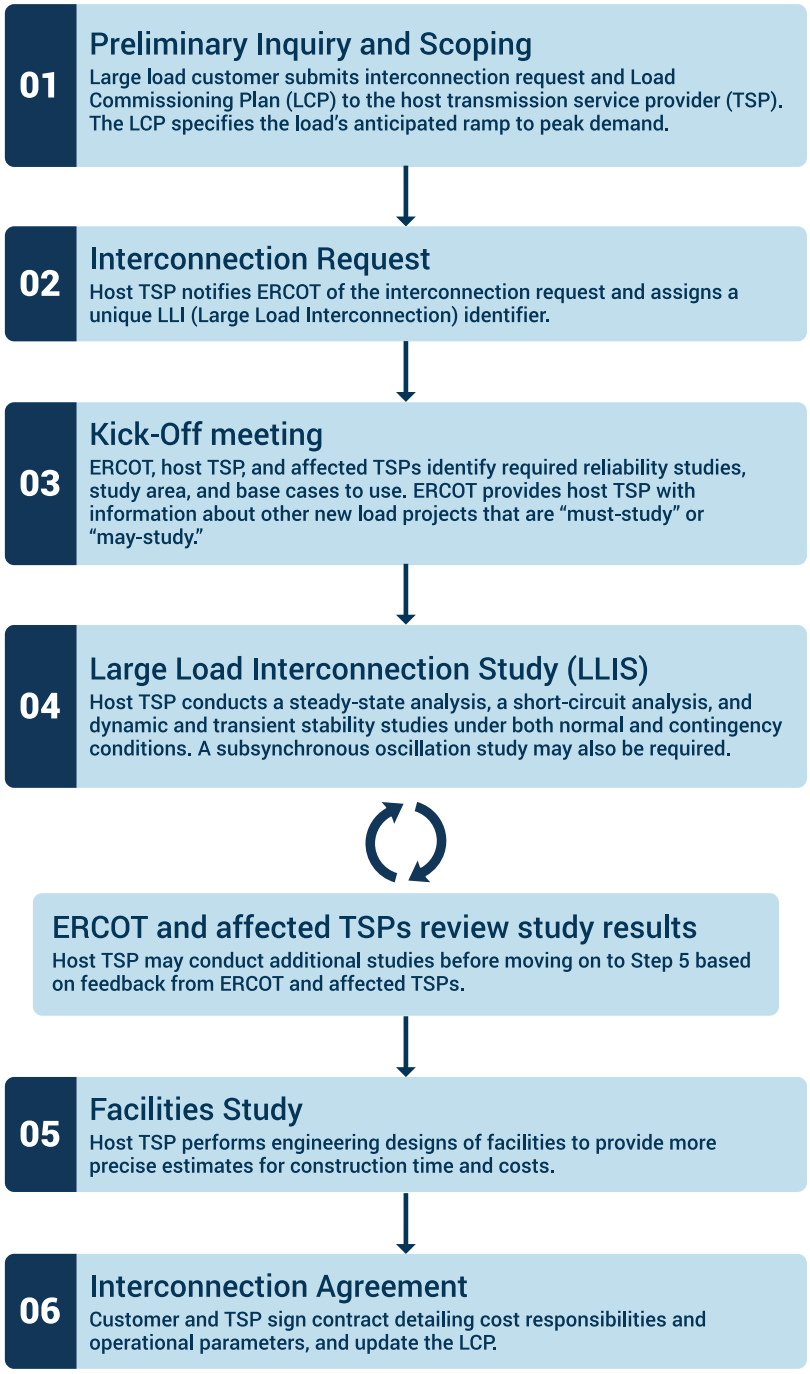
Details on the MISO study process are based on Expedited Project Review documentation.

New York Independent System Operator (NYISO)



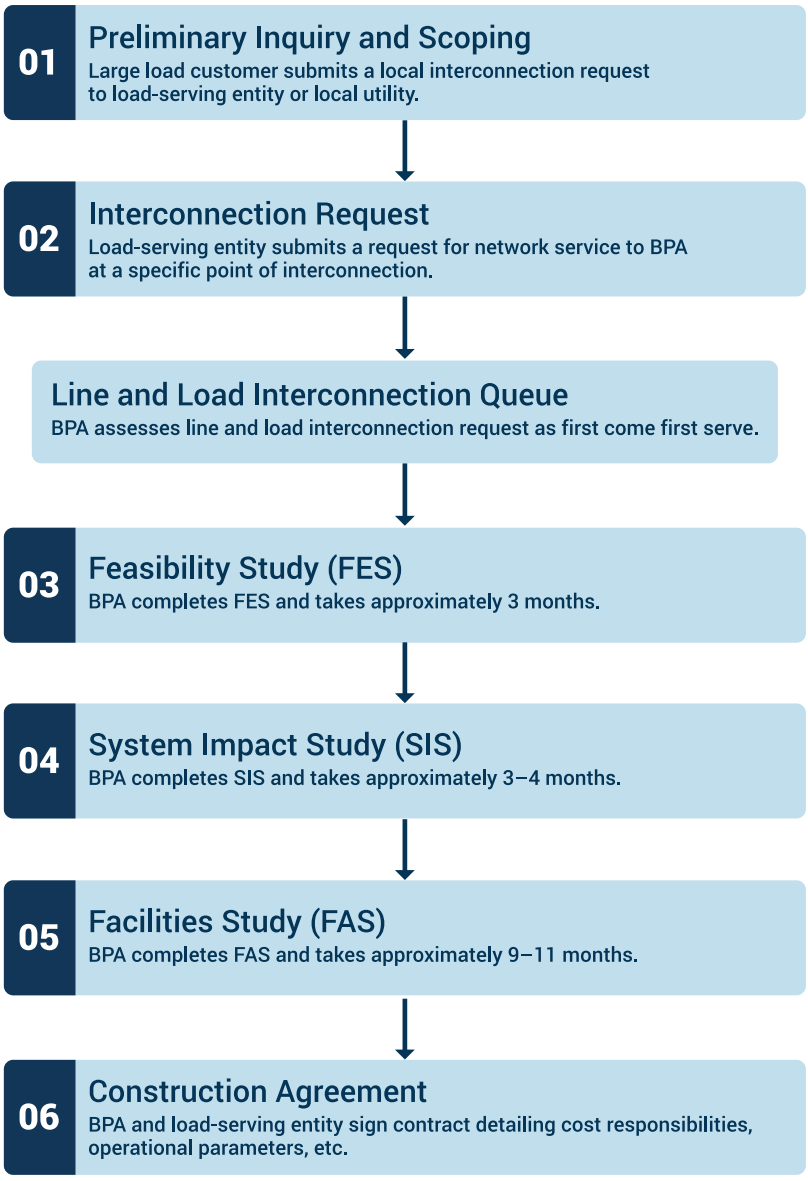
Details on the NYISO study process are based on a NYISO technical bulletin.

Electric Reliability Council of Texas (ERCOT)



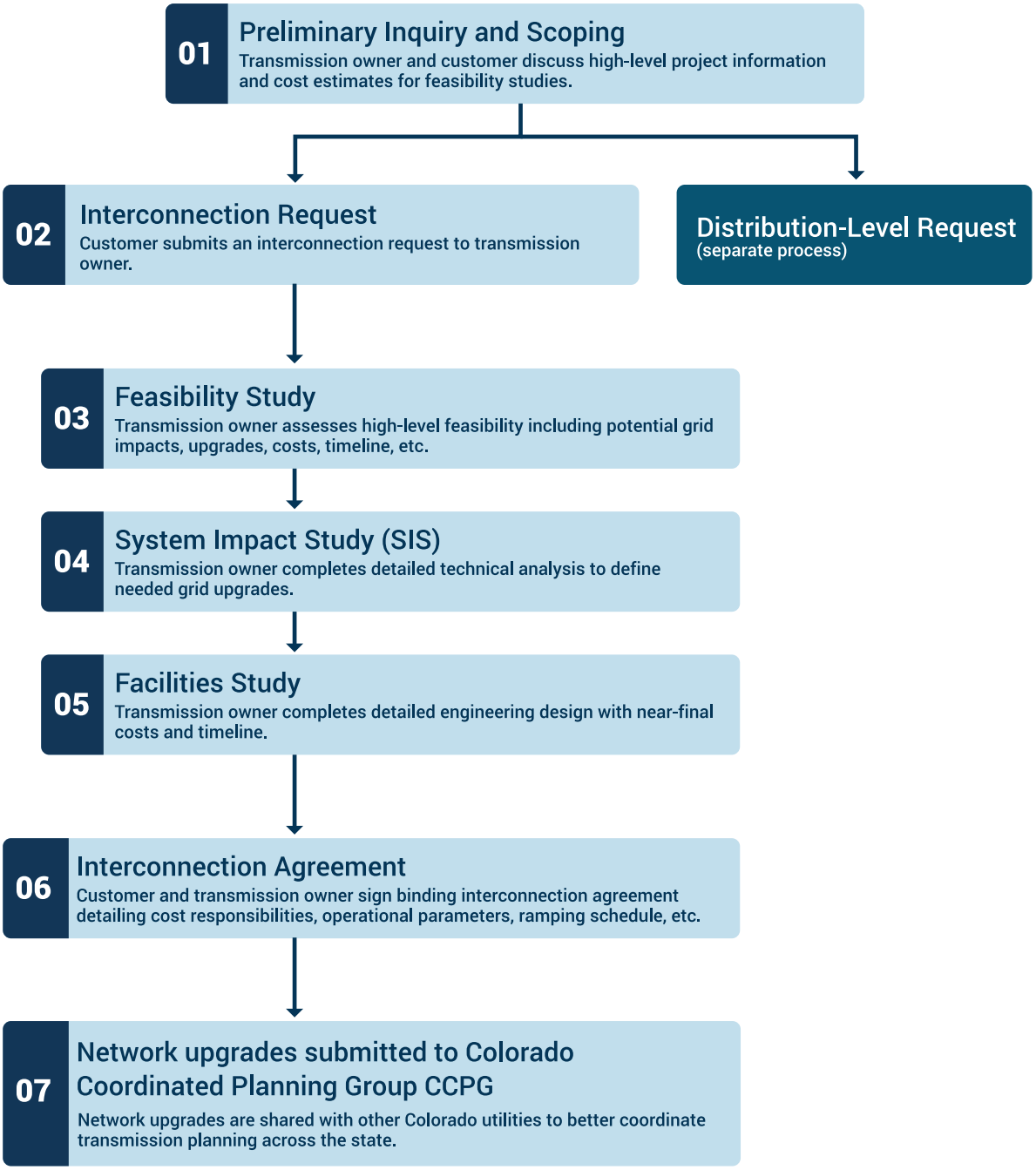
Details on the ERCOT study process are based on section 9 of the ERCOT planning guide.

Bonneville Power Administration (BPA)



Details on the BPA study process are based on *the Line and Load Interconnection* section of the business practices document.

Non–RTO transmission provider in the Western United States



Details on a non–RTO transmission provider in the Western United States study process are based on Public Service Company of Colorado's *Interconnection Guidelines for Transmission Interconnected Customer Loads.*