

### Modeling Assumptions for interconnection studies

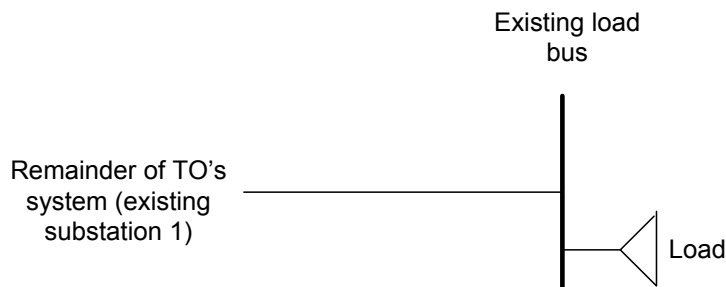
The following is a discussion surrounding the standard practices for the modification of cases used in the study of projects in the interconnection studies.

General:

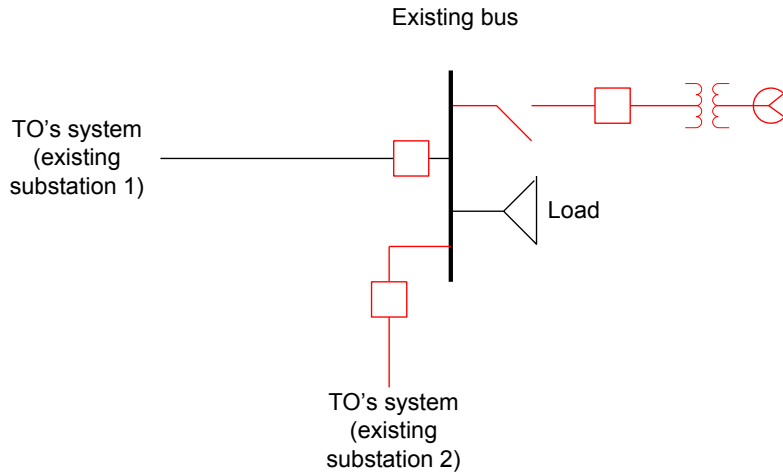
All studies are targeted to be completed on the base case which is 5 years in the future from the queue year. There are times in the process of studying the requests in the queue when the 5 year case is not available and the preceding year case is used. This is most prevalent when discussing the Feasibility Studies associated with new requests though delays in the case completion may require utilization of a 4 year case for some impact studies. When a case year is identified at the beginning of the System Impact Study of a queue, all subsequent re-tools for that queue are also performed and all results are provided on that same case which was used for the original System Impact Study.

- A. Another factor affecting the modeling associated with individual projects is the choice in location for a request. In the event that a project is connecting to a location on the system which provides for radial connection from a load serving bus, an additional connection may be established, and proposed to the customer, to be included in their study in order to provide additional certainty to the customer as to the deliverability of the facility they have proposed. See below for an example.

Existing configuration:



Proposed configuration: (New facilities noted in red)



When the new generation is connected, the loss of the line to existing substation 1 will result in the loss of all export capability. With the addition of the line to substation 2, the customer's generation is capable of exporting under N-1 conditions. This new configuration has the result of changing the flows in the local area as a result of the connection of substation 1 and 2 through the existing load bus. This configuration change is made in the model to also provide indications to the customer of their impacts on flows and may have the result of changing the impacts of the new generation under system normal conditions as well as other contingencies.

- B. Other factors affecting the case configuration relate to changes in the requirements associated with baseline reinforcements. When the base case is established and approved, the base line upgrades for an individual case are "locked in" for the queue studies. In subsequent years, the baseline upgrades may be delayed or even cancelled but the original base case is retained to determine the obligations associated with each new service request. Following the determination of the obligations for each new service request associated with the locked base case, PJM performs re-tools to determine what issues might result from the delay or removal of the base line projects which have been delayed or removed. Any new reinforcements identified to restore deliverability commensurate with the deliverability established in the original study would become the responsibility of the applicable transmission owner as base line upgrades. Depending on the violations identified there may be; (1) new reinforcements required in the baseline, (2) reestablishment of the original baseline project, (3) other potential solutions specific to each case which cannot be fully defined at this time. In all cases the solutions will be developed in order to create a system condition which will provide that the new service request would be deliverable, feasible, etc.
- C. Periodically the transmission owners may determine that there is a need for a change in the ratings associated with an element in the case being used for the study of a new service request. Dependent upon what the change is, the ratings changes are handled differently.
  - a. Ratings increases can be immediately entered in the case

- b. Ratings decreases can be modeled if there is no impact to new service requests under study for the entire base case year. Normally this is not accommodated as it is difficult to determine which requests may be impacted in the future.
  - c. Ratings decreases will not be modeled if there is impact to new service requests under study for the entire base case year.
- D. The introduction of retirements in the queue process provides a “queued event” which must also be accounted for in the construction of the case and the conduct of studies. When a retirement request is received, it is identified as an event as if it was the introduction of an additional new service request, though it is not assigned a queue position. This allows the proper modeling and treatment of the reinforcements. See below for treatment of the retired generator and the required reinforcements.

W1-001	request received on 2/1/2010
Generator Requesting Deactivation in 2015	request received on 2/2/2010
W1-002	request received on 2/3/2010

Note: W1 queue is being studied on the 2014 case as the 2015 case was not available at the time the System Impact Study commenced

During the study of the W1-001 project, the generator requesting deactivation is on in the case, allowing the generator to both aggravate overloads as well as back off overloads. For the study of the W1-002 project, as well as all projects subsequent to W1-002, the generator requesting deactivation is off in the case so that it will aggravate any overloads but not back off any overloads. The reinforcements for the retirement of the generator are modeled when the generator is turned off in order to ensure that any violations identified with the retired generator are not realized in the queue study. By modeling the reinforcements and turning the generator off, we do not allow the generator to back off any additional violations for projects which enter the queue after the announcement of the proposed retirement.

#### High level step by step process to build case

1. Obtain completed base case
2. Load all projects in queues prior to the queue under study along with finalized reinforcements (with topology change only) for prior queue projects
3. Turn on the queue projects with ISAs and an in-service date on or before the base case year under study. Also model associated reinforcements.
4. Load all projects in the queue under study
5. Determine if any retirement changes need to occur in the case under study based upon sequence described above. (Load retirement reinforcements and turn off generator at the appropriate point in the studies)

6. Load any configuration changes as necessary to address the issue discussed in A above prior to the study of the generator which requires the change. Retain the change in the case in all subsequent studies

Analysis is then performed with changes as required per 5 and 6 above. The reports are prepared and the required reinforcements are included based on the case construction listed above.

Following completion of the System Impact Study the customers will enter into either the Facilities Study or ISA stages. If the customer is entering directly into the ISA then a restudy would be quickly required in order to determine if the delay or removal of baseline upgrades requires new baseline upgrades. If a project is entering into the Facilities Study, PJM performs similar additional studies to identify new baseline upgrades.