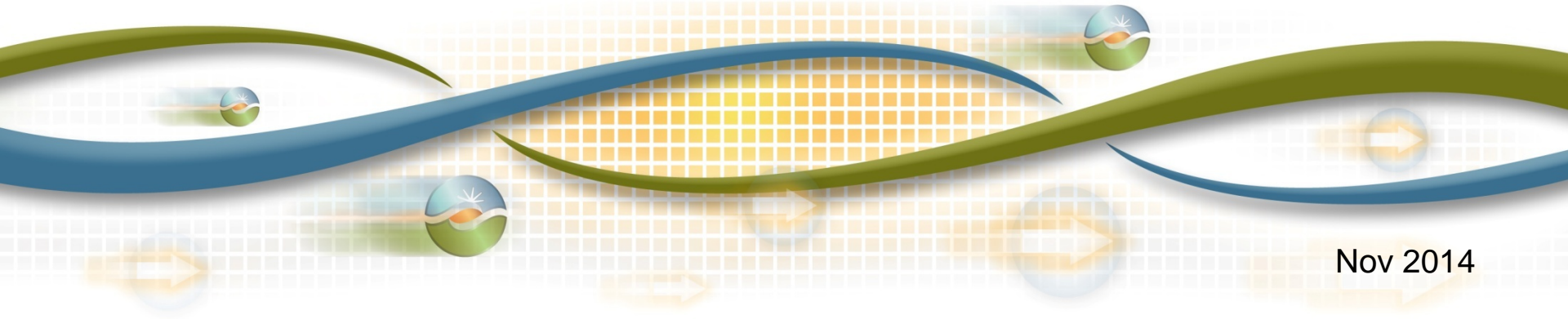


Interconnection Basics

Interconnection: the rules and processes that an energy resource provider must follow in order to connect its source into the electricity grid



The following slides will help you

- Understand what the ISO balancing authority is
- Understand what the ISO as a market facilitator is
- Understand what transmission is under ISO operational control versus what is under utility control
- Determine whether to interconnect using the ISO's interconnection process or a local utility's interconnection process for distributed energy resources
- Determine which interconnection option to pursue (if ISO interconnection is appropriate)
- Learn about additional processes necessary to sell power to the grid

The ISO is

- A balancing authority area
- A facilitator of a competitive wholesale power market
- A transmission grid operator

ISO Balancing Authority Area

A balancing authority is responsible for balancing supply and demand in the area under its control.

The ISO manages the flow of electricity across the high voltage, long-distance power lines within its balancing authority area, and matches supply with demand, maintaining frequency within limits and in real time.

Additionally, the ISO is responsible for procuring sufficient ancillary services to meet reliability requirements for unforeseen events.

Yellow on the map represents the California ISO balancing authority area. Non-yellow areas are not part of the ISO's balancing authority area.

The ISO does not operate the transmission nor interconnection facilities outside of its area.

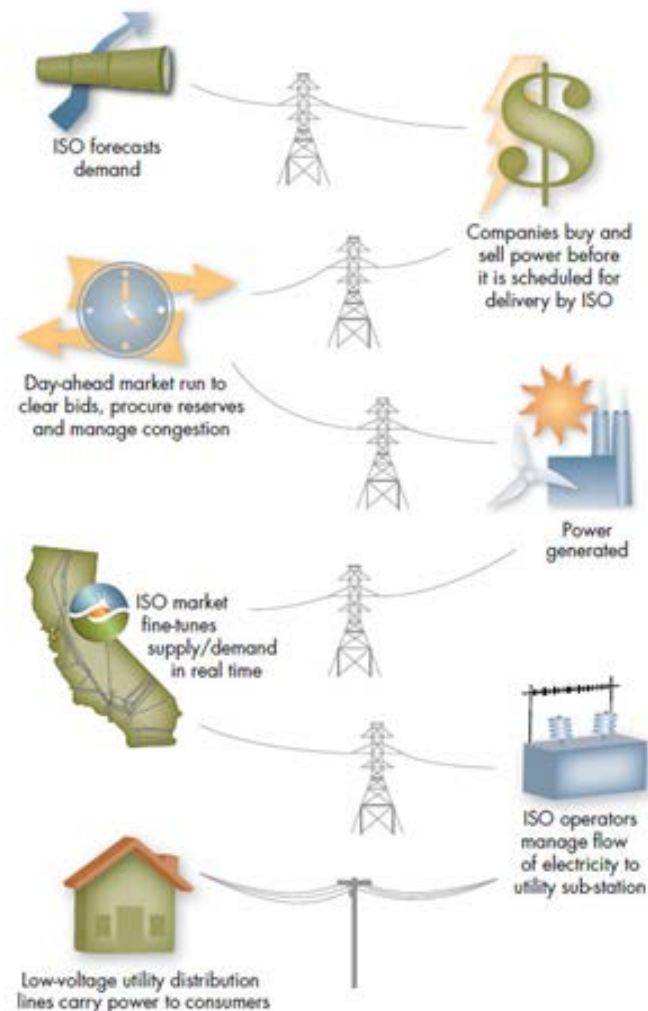


Facilitator of a Wholesale Electricity Market

The ISO opens access to the wholesale power market that is designed to diversify resources and lower prices

In the market, resources and customers bid or self schedule available supply or needed demand for energy products and services. The ISO is responsible for economically and efficiently clearing the available supply to meet the forecasted demand by using the available transmission and at the most reasonable cost.

The ISO administers an energy and ancillary services market, but does not participate or compete in it. The ISO also provides transparent information about the state of the system and prices.



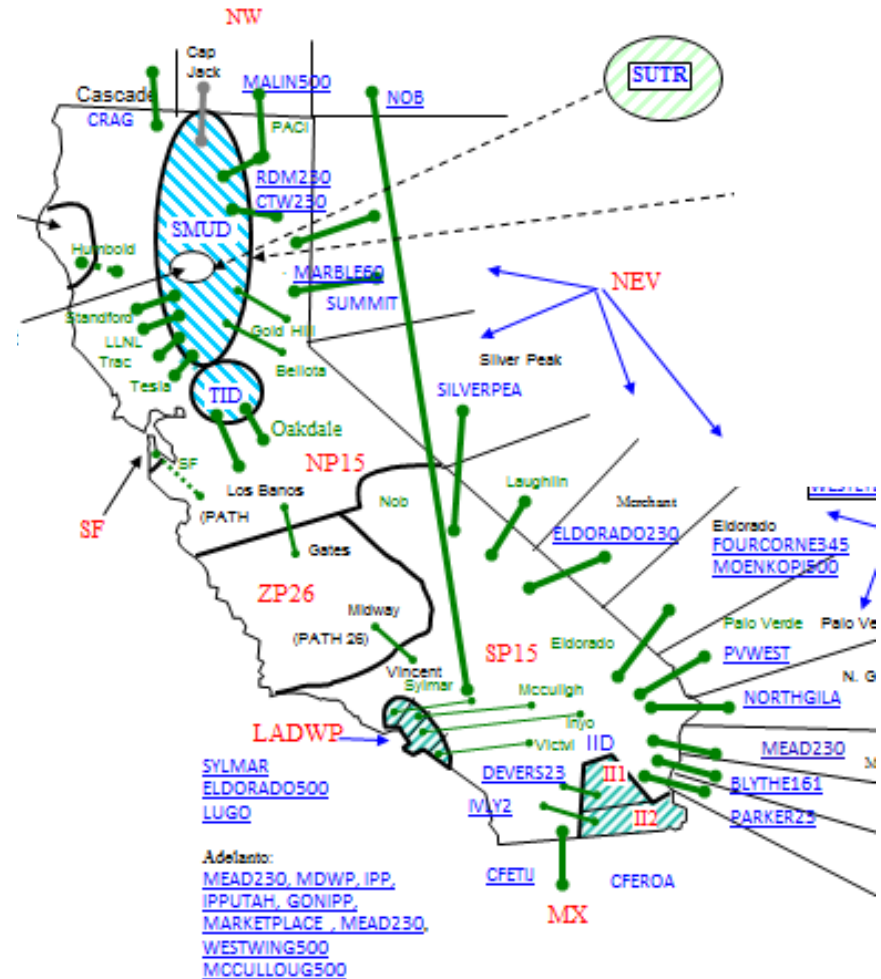
Transmission Grid Operator

The ISO operates the long distance, high voltage transmission lines that are within its balancing authority area, as well as those necessary for the ISO to fulfill its core reliability responsibilities. These lines make up 80 percent of California's power grid and encompass a small portion of Nevada.

Utilities operate the remaining transmission lines and lower voltage distribution lines that are also within the ISO balancing authority area.

If a project is located within the [ISO balancing authority area](#), it will interconnect to one of the following: an ISO-controlled high voltage transmission line, a utility-controlled distribution line, or one of the remaining transmission lines controlled by the utility, whichever is appropriate.

* blue shaded areas on map are not ISO controlled grid



Interconnection and Selling Power to the Grid

- Interconnection refers to the technical aspects and equipment required to connect generators or other resources (such as energy storage devices) to the transmission system. An interconnection is required before participation in the wholesale market can be achieved. Once a resource is in the interconnection queue, the interconnection study process can take two years or more to complete.
- After a resource has completed the study phases of the interconnection process (or after completing the process of registering a Demand Response resource and requesting a customer resource ID), contracts must be signed, the resource must be modeled in the ISO's market systems, and metering and telemetry equipment will need to be installed before participation in the wholesale power market is allowed. In order to participate in the wholesale power market, these steps must be completed whether the resource interconnects using the ISO's transmission interconnection process or using a utility's distribution interconnection process. These additional steps (contracts, modeling, metering, etc.) take a minimum of 6 months to complete.

How and Where to Begin

- The first step is to determine whether to interconnect using the ISO's interconnection process (transmission interconnection) or using a local utility's interconnection process (distribution interconnection).
- Distributed Energy Resources that desire to participate in the ISO market have unique requirements. Specific information is available in subsequent slides and on the "Utility Interconnection Options" slides later in this presentation
- Demand Response participants will need to follow a separate process that is specific to DR. Follow this [link](#) for more information.
- The next slide describes which facilities are under ISO control and subject to the ISO Tariff and interconnection requirements.
- To confirm which interconnection process is appropriate, check with the [utility](#) that serves the territory where the project is located.

Some Participating Transmission Owners (PTOs) offer access to a tool to help you map the nearest point of interconnection to your a project using the physical address or location of the project. Registration for each is required: [Pacific Gas and Electric](#) [Southern California Edison](#) [San Diego Gas and Electric](#)

ISO Transmission Interconnection?

If the desired interconnection voltage level is listed below, an interconnection request should be filed **with the ISO** (not the utility):

Pacific Gas & Electric service area: transmission lines 60 kV and higher*

Southern California Edison service area: several 66 kV and 115kV lines and all transmission lines 220 kV and 500 kV*

San Diego Gas & Electric service area: transmission lines 69 kV and higher*

Municipal utility service areas: some lines owned by the municipal utilities but outside of the cities' boundaries

Valley Electric Association service area: transmission lines 138 kV and higher*

Other transmission lines: Trans-Elect NTD Path 15, Startrans, Trans Bay Cable, Western Area, Power Administration-Path 15, and several lines outside the ISO Balancing Authority which have been turned over to ISO for operational control

* Lines that are necessary for the ISO to fulfill its reliability responsibilities

Continued on next slide..

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Utility Distribution Interconnection?

If the desired interconnection voltage level is not listed on the previous slide, an interconnection request must be filed **with the utility** that serves the territory where the project is located.

Distributed energy resources will find the utility distribution level interconnection process most applicable.

For more information about interconnection to a utility controlled facility, please consult the utility, or find information on the utility's website by searching the keyword "interconnection". (You may also click [here](#) and follow the link to the utility.)

Please note: regardless of whether the resource interconnects using the ISO's transmission interconnection process or a utility's distribution interconnection process, additional steps must be completed with the ISO in order to participate in the wholesale power market.

ISO Interconnection Options

The ISO has three interconnection options for resources interconnecting to the high voltage ISO controlled transmission system:

1. *Cluster Study Process*
2. *Independent Study Process*
3. *Fast Track Process*

*Demand Response participants will need to follow a separate [process](#) that is specific to DR.

Please note: regardless of whether the resource interconnects using the ISO's transmission interconnection process or a utility's distribution interconnection process, additional steps must be completed with the ISO in order to participate in the wholesale power market.

Option 1: Cluster Study Process

- The interconnection request window is open once per year: April 1 – April 30.
- All projects in a cluster are assigned a queue position number and have equal standing within the cluster.
- Interconnection studies must be performed for each project. The study process begins in late July and takes approximately two years to complete.
- The project submits a completed Interconnection Request, study deposit, evidence of site exclusivity (or deposit in lieu of), and technical data.

For more details, please review the [Generator Interconnection and Deliverability Allocation Procedures](#)

Option 2 : Independent Study Process

- An applicant may apply at any time of the year but must demonstrate that the Cluster process will not accommodate the desired Commercial Operation Date (COD) and that the desired COD is achievable.
- The project must pass either a Flow Impact test or a Short Circuit Duty test to demonstrate that it is electrically independent of projects in the queue.
- The study timeline is approximately 240 calendar days for a project applying for Energy Only Status. Additional time will be required for Full Capacity status.
- If Full Capacity deliverability is requested for resource adequacy, the project will also be studied in the next available Cluster study window.
- The project submits a completed Interconnection Request, study deposit, evidence of site exclusivity, and technical data.

For more details, please review the [Generator Interconnection and Deliverability Allocation Procedures](#)

Option 3: Fast Track Process*

- Applicants may apply any time of the year.
- The project may be no larger than 5 MW.
- This option is for “energy only” deliverability.
- The project submits a completed Interconnection Request, study deposit, evidence of site exclusivity, and technical data.
- The project must reasonably anticipate that no transmission upgrades are necessary and it must pass six screens. If it fails the screens, the ISO and the Participating Transmission Owner (PTO) assess whether the facility may be interconnected safely, reliably, and consistent with power quality standards.
- A Fast Track project enters into the Small Generator Interconnection Agreement.

* The Fast Track process pertains solely to the ISO interconnection study process and does not provide for a faster path for network modeling, metering installation, telemetry installation, contract execution, mandatory training, nor other ISO processes and requirements.

For more details, please review the [Generator Interconnection and Deliverability Allocation Procedures](#)

Utility Interconnection Options

For resources interconnecting to the lower voltage utility controlled distribution system, you must follow the interconnection process of the utility that serves the territory where the project is located.

Types of interconnection agreements that allow a distribution level connected resource, including a Distributed Energy Resource (DER) to participate in the wholesale power market include:

1. Wholesale Distribution Access Tariff (WDAT)
2. Rule 21

To participate in the wholesale power market, resources must have a completed interconnection agreement and completed associated studies with the Utility Distribution Company (UDC). This includes Distributed Energy Resources.

Please note: regardless of whether the resource interconnects using the ISO's transmission interconnection process or a utility's distribution interconnection process, additional steps must be completed with the ISO in order to participate in the wholesale power market.

Utility Interconnection Options (cont.)

The utility determines whether Rule 21 or Wholesale Distribution Access Tariff (WDAT) applies. Please visit the Utility's web page for more information.

1. Rule 21:

“All generating facilities seeking interconnection with the distribution provider's transmission system shall apply to the CAISO for Interconnection and be subject to CAISO Tariff except for 1) Net Energy Metering (NEM) Generating Facilities and 2) Generating Facilities that do not export to the grid or sell any exports sent to the grid (Non-Export Generating Facilities). NEM Generating Facilities and Non-Export Generating Facilities subject to CPUC jurisdiction shall interconnect under Rule 21 regardless of whether they interconnect to a distribution provider's distribution or transmission system.”

2. WDAT:

“All exporting facilities not on a NEM shall apply for WDAT with the UDC.”

<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M028/K168/28168335.PDF>

Next Steps

- Projects requesting to interconnect to the ISO controlled grid can submit an [Interconnection Request](#) to initiate contact with the ISO.
- Projects requesting to interconnect to a distribution controlled facility should contact the appropriate utility for information about their interconnection options, and initiate an interconnection with that utility.
- All resources requesting participation in the wholesale power market must complete the requirements outlined in the [NRI Checklist](#).
- Demand Response participants will need to follow the [process](#) specific to DR

Regardless of whether the resource interconnects utilizing the ISO's transmission interconnection process or a utility's distribution interconnection process, [additional steps](#) must be completed with the ISO in order to participate in the wholesale power market.

Additional Resources

- Review the ISO participation [FAQs](#).
- Sign up for a “[Welcome to the ISO](#)” class to learn basic information about what the ISO does, and how its market works, and to learn about interconnecting resources to the ISO.
- An applicant should also review additional information on the wholesale power market, such as network modeling, metering installation, contract execution, etc. Completion of these requirements often takes more than 180 days. Start by reviewing the [checklist](#) of ISO requirements that are required in addition to interconnection.