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Utility Generation Interconnection Process in California

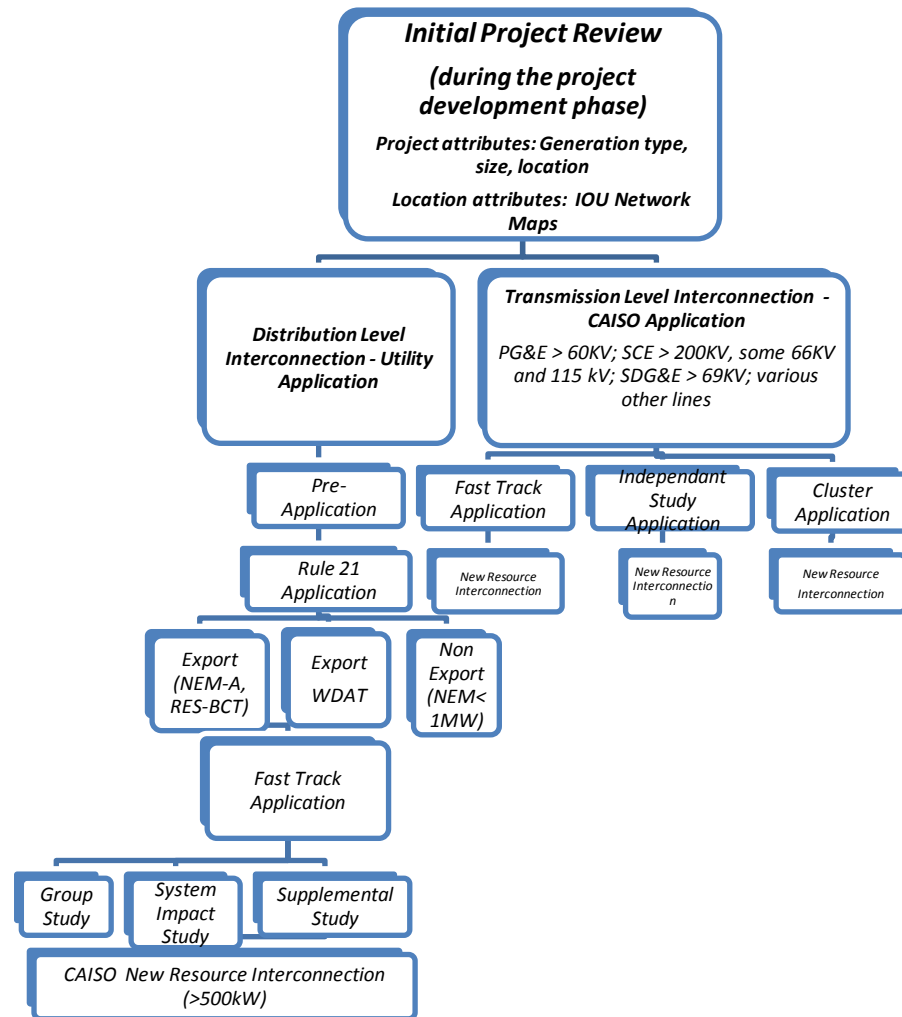
Interconnection Process Overview

Perhaps the most challenging portion of any renewable energy project greater than 0.5 megawatt with a single point of interconnection (POI) is determining the applicability, feasibility, scope, and cost of the grid interconnection. The terms and conditions of the current NEM tariff (for systems 1MW and less) place the scope and cost burden of the interconnection on the utility. However, for Rule 21 and WDAT interconnections the burden shifts to the customer/project developer (including systems > 1MW using the RES-BCT tariff). For this reason it is prudent to retain an expert consultant that has experience with renewable energy project development and these interconnection application processes.

The chart below depicts the division of distribution level and transmission level interconnection administrative processes.

1. Initial Project Review Initial project review with the customer: Provides details about the proposed generation source technology, characteristics, system size, system type, physical location, proposed tariff or sales agreement. If no project development has started, this information may not be available.

Key Information: location, project technology, generator, size, point of interconnection (POI) details (e.g., utility pole numbers).



2. Interconnection Strategy Development and Determination of Process Type

Once the proposed POI location(s) is known, the IOU system network maps (PVRAM, DERIM, or SDG&E's Interconnection map) can provide some basic information to determine nearest lines, substations, and circuits (maps will provide the names of these infrastructure components, which can be used in preparing the pre-application form, see next step). The maps will also provide line/substation voltage, designation of transmission vs. distribution line/substation type, operating capacity (load) of the line/circuit, design capacity of the line/circuit, and if there are existing renewable energy systems present (interconnected on the line being viewed, in the area of the proposed POI). This information can determine if an Interconnection Request (IR) should be filed with the CAISO or one of the IOUs.

Key Information: Interconnection controlled by utilities or the ISO, and space available on utility distribution system.

3. Pre-Application Process

If the interconnection request is to be submitted to the local Utility, a pre-application form (\$300) should be prepared and submitted to the applicable Utility in advance of the IR. The Utility is required to respond to the "pre-app" within 10 business days with network data (information found on the network maps, plus additional data). This additional information can include:

- Total Capacity (in MWs) available on the line
 - Total Capacity (in MWs) of substation bus
- Approximate circuit distance between the proposed site and the substation
 - Relevant line section(s) peak line load estimate
- Number of protective devices and voltage regulating devices between the proposed POI site and the substation/area
 - Whether or not three-phase power is available at the site
 - Limiting conductor rating from proposed POI to distribution substation.

This information is very useful in evaluating the potential cost effectiveness of the proposed interconnection strategy (which is an important scope/cost component of the overall generation system/project cost estimate).

Once a decision is made in R11-09-011 there will be several enhancements to the Pre-Interconnection Request:

Primary Service Package (\$225), available within 10 business days:

Primary Service Package: Nominal Distribution circuit voltage and wiring configuration -

- i) Relevant line section(s) absolute minimum load, and minimum load during the 10 AM – 4 PM period (provided when SCADA data is available).
- ii) Existing upstream protection including:
 - (a) Device type (Fuse Breaker, Recloser)
 - (b) Device controller (device make/model ex: 50E/50T)
 - (c) Phase settings [IEEE Curve, Lever, Min Trip (A), Inst Trip(A)]
 - (d) Ground settings [IEEE Curve, Lever, Min Trip (A), Inst Trip(A)]
 - (e) Rated continuous current
 - (f) Short Circuit interrupting capability
 - (g) Confirm if the device is capable of bi-directional operation
- iii) Provide the Available Fault Current at the proposed point of interconnection including any existing distributed generation fault contribution.

Behind Meter Interconnection (\$800), available within 30 business days:

Behind The Meter Interconnection Package (Package does assume a physical verification based on field confirmation) -

- i) Relevant line section(s) absolute minimum load, and minimum load during the 10 AM – 4 PM period (provided when SCADA data is available)
- ii) Transformer data
 - (a) Existing service transformer kVA rating
 - (b) Primary Voltage and Secondary Voltage rating
- (c) Configuration on both Primary and Secondary Side (i.e., Delta, Wye, Grounded Wye, etc.)
- (d) Characteristic impedance (%Z)
- (e) Confirm if the transformer is serving only one customer or multiple customers¹⁰
- (f) Provide the Available Fault Current on both the Primary and Secondary Side
 - iii) Secondary Service Characteristics
 - (a) Conductor type (AL or CU) and size (AWG)
 - (b) Conductor insulation type
 - (c) Number of parallel runs
 - (d) Confirm if the existing secondary service is 3 wire or four wire.
 - iv) Primary Service Characteristics
 - (a) Conductor type (AL or CU) and size (AWG)
 - (b) Conductor insulation type
 - (c) Number of parallel runs
 - (d) Confirm if the existing primary service is three wire or four wire

Key Information: Interconnection availability, preliminary cost estimates.

4. Tariff or Sales Agreement

There are a multitude of tariff/sales options available in California, depending upon the characteristics of the generator, the location of the generator, and the POI, as the following table shows.

Almost all of the options are available to generation connected at the utility distribution level. Generation connected at the transmission level (generally: PG&E > 60KV; SCE > 200KV, some 66KV and 115 kV; SDG&E > 69KV; various other lines) has many more limitations - generally being unavailable for utility tariffs (NEM, RESBCT) and many utility purchase solicitations (e.g., REMAT).

	QF	REMAT	RESBCT	Public Agency Solicitations	IOU Utility Solicitations
Interconnection Level	Transmission or Distribution	Distribution	Distribution	Transmission or Distribution	Transmission or Distribution
Summary	Variable price sale of exported energy	Fixed price contract for exported energy	Generation rate energy component allocated to benefiting accounts energy rates	Generation rate decided as part of response to RFP	Utility solicitations for various products
Criteria	QF certification by FERC	Renewable generator, < 3MW, connected to distribution system	Government agency, renewable generator, <5MW	Have to meet utility RPS requirements	<u>Varies as to size and criteria</u> RAM: 3-20MW, RPS: >0.5MW, Renewable RFP: > 20MW, RA: 1 MW, PRP RFO: <100MW
Penalties	none	if produce less kWh than contracted	if produce more electricity than benefiting accounts can absorb	if deviate from generation proposed in RFP response	depends upon solicitation
Program availability	Unlimited	utility specific cap	utility specific cap	varies	varies
Comments	Energy prices determined by gas prices	Current hydro/wind price 8.923 cents/kWh, have 18 months to come on line	Have to allocate generating energy to individual benefiting accounts	Price depends upon proposal winning bid.	Price depends upon proposal winning bid
Interconnection	Rule 21 export or WDAT or SGIA	Rule 21 export	Rule 21 NEM (modified)	Rule 21 export or WDAT or SGIA	Rule 21 export or WDAT or SGIA

Interconnection Timeline	4-5 months	7-9 months	4-5 months	4-5 months	varies
New ISO Meter and Telemetry >500kW	Yes	Yes	No	Yes	Yes
New Scheduling Obligations	Yes	Yes	No	Yes	Yes
Reporting Requirements	CEC and WREGIS	CEC and WREGIS	CEC and WREGIS	CEC and WREGIS	CEC and WREGIS
Price Determined by	Ngas prices and annual capacity prices	Contract	Tariff	Proposal	Proposal
Application	anytime	bi-monthly	anytime	in response to RFP	in response to RFP
Price changes	Monthly with gas prices	Fixed for duration of contract	With tariff energy rate changes	Depends upon proposal	Depends upon proposal
Escalation Rates	With gas prices	0	Tariff Changes - Energy component only	Depends upon proposal	Depends upon proposal
RECs	transferred to utility	transferred to utility	owned by applicant	transferred to utility	transferred to utility
Analysis	Forecast of future gas prices	Amount of exported energy	Exported energy value vs. benefiting account energy value	Depends upon proposal	Depends upon proposal

Generation Sales Options Characteristics Summary

Key Information: Tariff or sales agreement to pursue and how to pursue it.

5. Interconnection Request (IR) Process

Utility Rule 21 Application

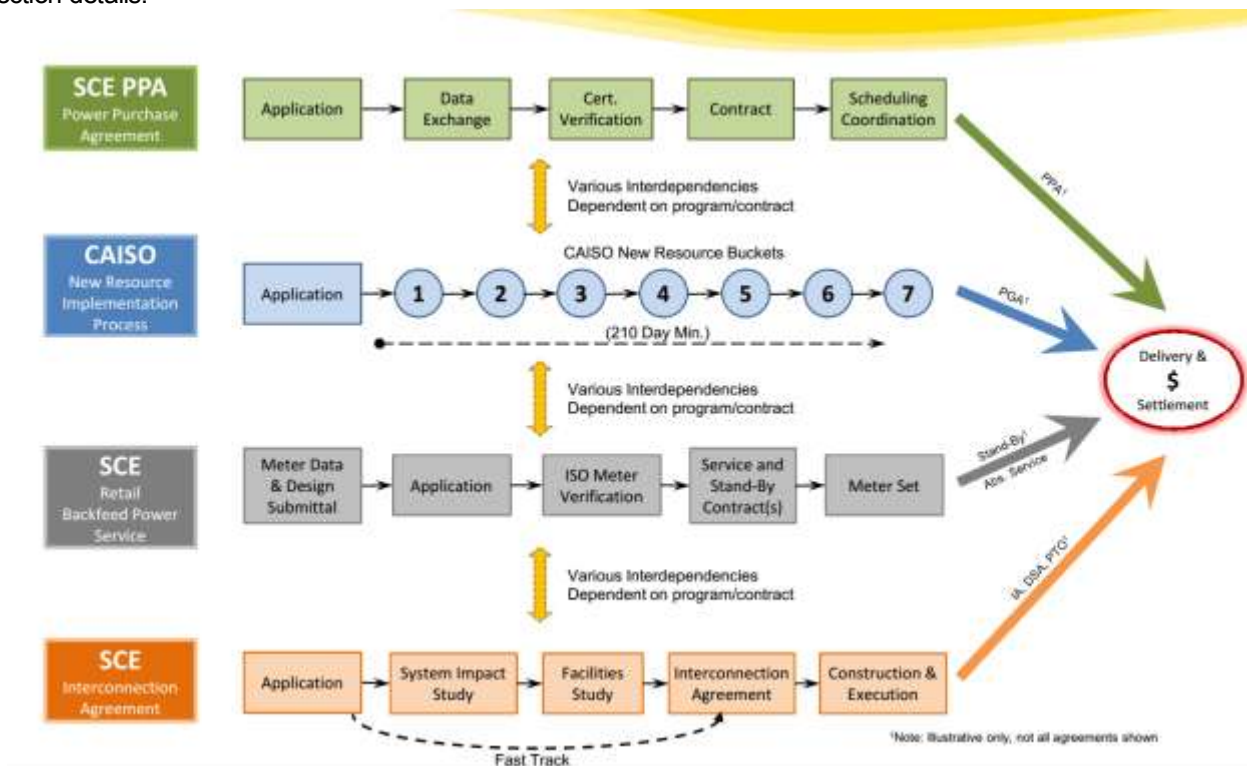
If the initial assessment shows the interconnection strategy to be cost effective (as defined by the overall project budget), the IR will be prepared and submitted to the applicable utility (requires: site drawings, Single Line Diagrams, Evidence of Site Exclusivity, POI data, Generator system info, Transformer data, Load Flow Dynamics program results). The different types of IRs are described below. It is important to note that the interconnection application process must be managed carefully to allow coordination with several different processes. For example, as the SCE interconnection application flow diagram below shows, the interconnection application must sync with PPA (Power Purchase Agreement) negotiations, ISO NRI (New Resource Implementation), and any other local utility requirements (like back-feed power service or standby power needs).

The IR process options include:

Fast Track: Projects need to be “eligible” for the Fast Track process before initial review and Supplemental review are performed. Fast Track eligibility is determined based on the generator type, size, voltage of the line, proposed location of POI. If the project passes initial review in the screening process, and supplemental review screens, the project can proceed through the application process without having to go through the independent study process. Only projects connecting via an inverter will pass fast track.

Independent Study: A request for interconnection under the Independent Study Process can be made at any time during the year. The Independent Study Process consists of a Detailed Study Process, i.e.: System Impact Study followed by the Facilities Study (if necessary), and can take six to nine months to complete.

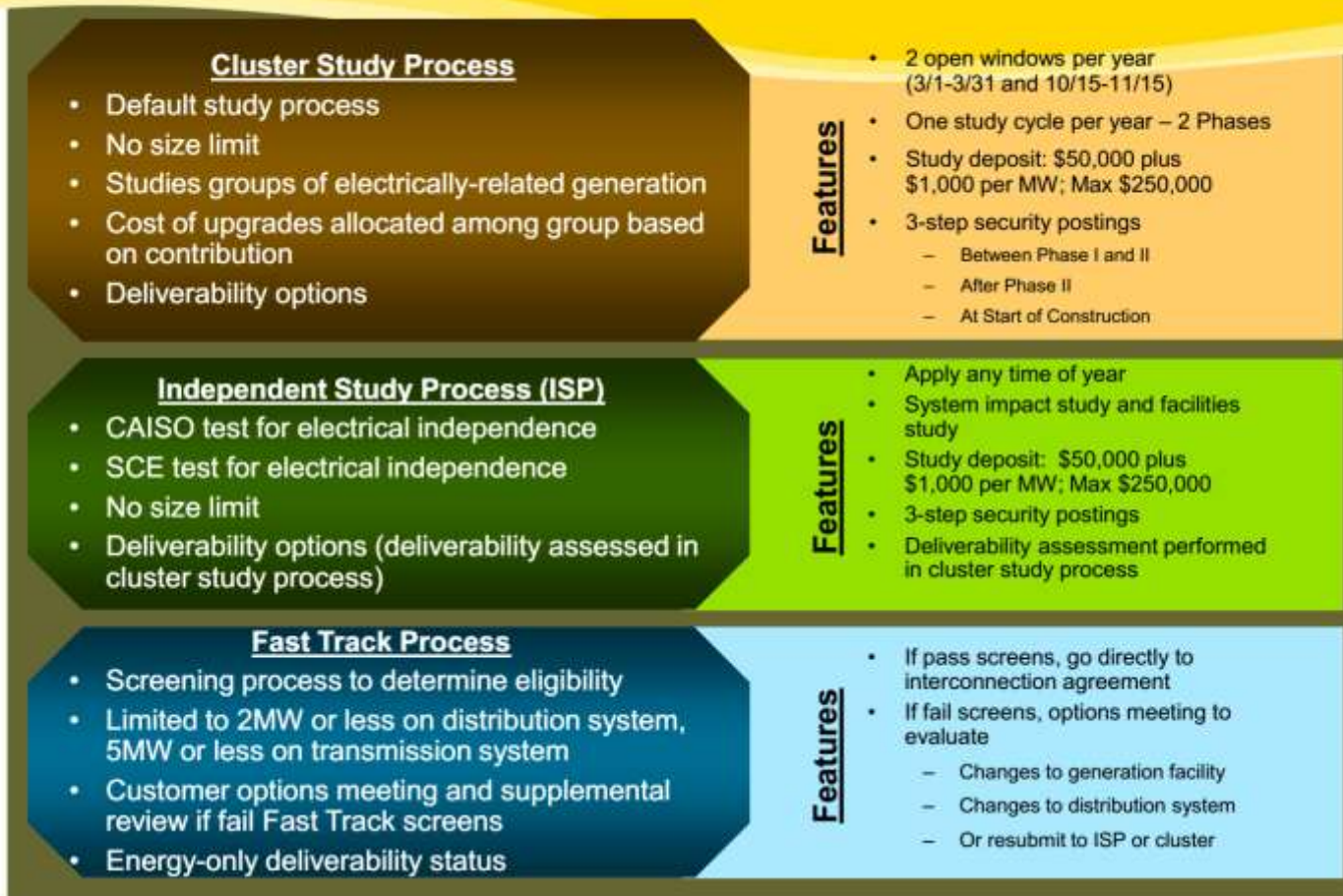
Distribution Group Study and Cluster Study: In the Distribution Group Study (Rule 21, distribution level) and Cluster Study (CAISO transmission level) process, projects are grouped by geographical and system areas to be studied together as a group: Utility network upgrades required to support the group are identified and the cost of the upgrades are then allocated to projects in that clustered group. The Cluster Study Process consists of a Phase I Interconnection Study and a Phase II Interconnection Study. A request for interconnection under the Distribution Group Study can be submitted at specific 6 month study periods in Sept and March. Cluster Study Process can only be submitted during a Cluster Application Window. For each calendar year, a Cluster Application Window is open from April 1 and to April 30 of that year. Please see following section for CAISO interconnection details.



Utility Wholesale Distribution Access Tariff (WDAT OR WDT)

The Utility Wholesale Interconnection is regulated by FERC (Federal Energy Regulatory Commission). The Utility WDAT uses one of three interconnection processes: Fast Track, Independent Study, or Cluster. The characteristics of these three interconnection applications is shown below.

Interconnection Study Process Tracks



Fast Track: Projects need to be “eligible” for the Fast Track process before initial review and supplemental review are performed. Fast Track eligibility is determined based on the generator type, generator size, voltage of the line, and location of the Point of Interconnection. Eligibility to request a Fast Track review means that the project can be evaluated under the initial review and the supplemental review screens.

Independent Study: A request for interconnection under the Independent Study Process can be made at any time during the year. The Independent Study Process consists of an Interconnection System Impact Study and an Interconnection Facilities Study.

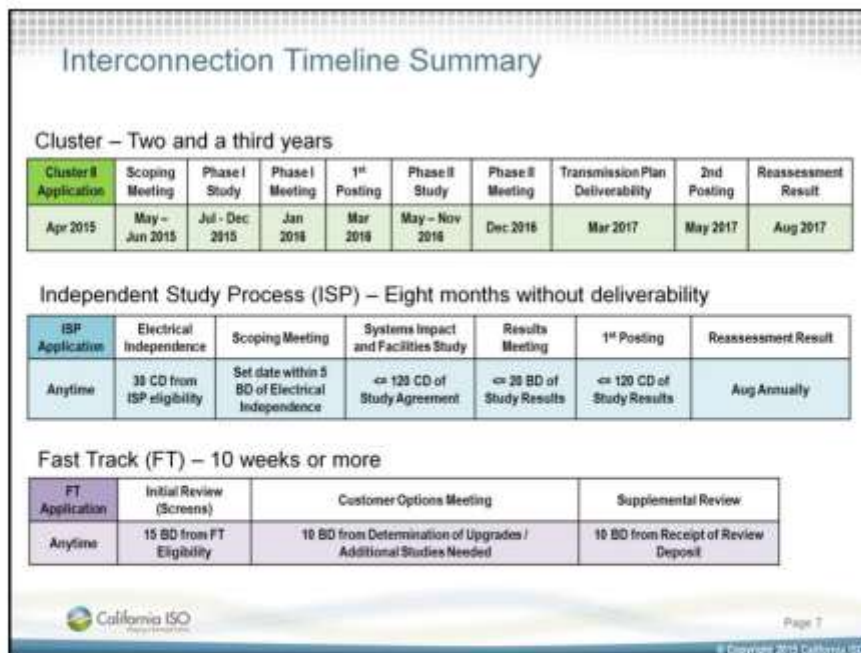
Cluster Study: In the Cluster Study Process, projects are grouped by geographical and system areas to be studied together (as a cluster). Upgrades are identified for the clustered group, and the cost of the upgrades is allocated to projects in that clustered group (in accordance with the guidelines of the GIP). The Cluster Study Process consists of a Phase I Interconnection Study and a Phase II Interconnection Study. A request for interconnection under the Cluster Study Process can only be submitted during a Cluster Application Window. For each calendar year, a Cluster Application Window is open from April 1 and to April 30 of that year.

California ISO Application

A schematic of the CAISO interconnection process is shown below. Depending upon the characteristics of the generation, type and size of generator and the line the generator is connecting to; the CAISO has three interconnection paths: Fast track,



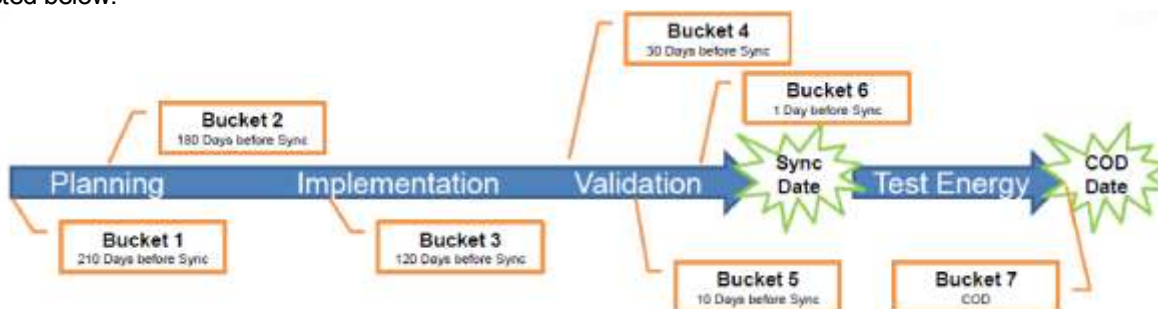
Independent Study, or Cluster. Each has different costs, different timelines, and different responsibilities. A summary of the different CAISO interconnection processes is provided below.



Estimated schedule. Does not include Generator Interconnection Agreement, construction and New Resource Interconnection (NRI) process (full network model, metering and telemetry, etc.) which is 6/7 months or more.

CAISO New Resource Interconnection (NRI)

Upon completion of a successful interconnection application, the generator must enter the ISO New Resource Interconnection process if it is greater than 500KW interconnected to the utility distribution system, or if it is connected to the transmission system. NRI uses a "bucket system" for deliverables and has strict timelines for deliverables. The bucket timelines and deliverables are depicted below.



Buckets 1 and 2 – Full Network Model Preparation. Required submittals include: Remote Intelligence Gateway (RIG) and Metering Submittals, Interconnection Agreement, Communication Block Diagram, Three Line Drawings, A Single Line Drawings, Remote Intelligent Gateway Details Form, Topographical Map, Generator Dynamic Model File, Generator Positive Sequence Load Flow Data, Network Application Information, and the RIG Initial Spreadsheet.

Bucket 3 – Regulatory Contracts, Model Testing, and Forecast Preparation. Generator Resource Data Template Initial Spreadsheet, Meter Configuration Worksheet, Site Information Form for Solar Resources, Regulatory Contracts Information Request Sheet(s), and the Schedule 1 Template.

Bucket 4 – Market Preparation. Scheduling Coordinator (SC) Selection and Acceptance Letters, Generator Resource Data Template Final Spreadsheet, Participating Intermittent Resource Program Letter of Intent, California Energy Commission (CEC) – Pre-certification, Control and Protection Documentation, 24/7 Contact Information form, Device Certificate Request Form for

RIGs, RIG and/or Metering Pretesting Email Notification, RIG and Meter ISO Testing Scheduled, CPS Subscribers Agreement for Remote Intelligent Gateways (RIGs), Energy Control Network Connectivity (ECN) Security Requirements and Agreement.

Bucket 5 – Trial Operations Approval. RIG Resource Site Narrative Document, Interconnection Approval Letter from Participating Transmission Owner (PTO), Interconnection Customer Synchronization Request Email, Test Energy Schedule.

Bucket 6 – Trial Operations. CAISO Internal Approval Process for Synchronization, 24 Hour Notice for Initial Sync, Contacting the ISO Real-Time Desk, Meter Certification Documents Must Be Accepted Before Commercial Operations, Metering Calculation Worksheet, CAISO Metering Certification form, Metering Calculation to Point Of Receipt Document, and Site Verification Data Sheet.

Bucket 7 – Commercial Operation. Commercial Operational Date Declaration, Metering and Telemetry Certificate of Compliance, Participating Transmission Owner (PTO) Final Approval Letter, Interconnection Customer COD or COM Notification, Generator Interconnection Agreement Exhibit E Letter, Distribution Connected COD Letter, Metering and Telemetry Certificate of Compliance, Participating Transmission Owner (PTO) Final Approval Letter, Metering and Telemetry Certificate of Compliance, Participating Transmission Owner (PTO) Final Approval Letter, Full Build-out of the Resource Completion form, Partial COM with Concurrent Trial Operation, Interconnection Customer COD Notification, Generator Interconnection Agreement Exhibit E Letter, Distribution Connected COD Letter, Interconnection Customer Commercial Operation for Markets Process & Notification, Commercial Operation for Markets (COM) Letter.

Other Regulatory Permits/Approvals Needed

There are a host of various regulatory agencies from which permits and reporting are required. The most relevant ones for water agency renewable generation projects are described in the following table.

Regulatory Agency	Acronym	Permit/Approval Required
Federal Energy Regulatory Commission	FERC	Qualifying Facility (QF); if small hydro then need a Small Hydro License or Exemption
Energy Information Agency	EIA	Generator Registration
Western Regional Energy Generating Information System	WREGIS	Qualified Reporting Entity (QRE) Generating Unit ID, annual QRE reporting
California Independent System Operator	CAISO	Full Network Model (FNM) registration, New Resource Integration (NRI), Metering, Interconnection, Generating Resource Assessment, System Assessment
California Energy Commission	CEC	Renewable Portfolio Standard (RPS) Certification, Generating Plant ID
Utilities	PG&E, SCE, SDG&E, etc.	Interconnection (if distribution level), Power Purchase Agreement (PPA) if selling to utility, tariff agreements if using electricity on site
Scheduling Coordinator	SC	SC agreement required for ISO
Environmental Documents	California Environmental Quality Act (CEQA)	CEQA document; if small hydro may need U.S. Army Corps of Engineers 404 permit and California Department of Fish

		and Wildlife 1602 permit
State Water Resources Control Board	SWRCB	If small hydro need Nonconsumptive Water Use Right, 401 permit