California ISO

RESOURCE INTERCONNECTION FAIR

Interconnection Application Options and Process

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Topics

- Interconnection Resource Team
- ISO Tariff and Business Practice Manuals (BPM)
- Application Options, Requirements, and Timelines
- Generator Downsizing Process
- Project Withdrawals
- Electronic Submission of Interconnection Requests (RIMS)

Interconnection Overview

Jason Foster, Sr. Interconnection Specialist

Interconnection Resources – We're here to support you!

- Interconnection Customer's point of contact throughout application and study process
- Facilitates communications between all parties
- Conducts project scoping and study results meetings
- Ensures documentation and project information is up to date in the Resource Interconnection Management System
- General questions, IRInfo@caiso.com

California ISO Tariff

The California ISO operates under the terms and conditions of its FERC-approved tariff:

- Section 25 addresses interconnection of generating units

In addition, appendices of the tariff address generator interconnection processes:

- **Appendix DD**
  - Generator Interconnection Deliverability Allocation Procedures (commonly known as the GIDAP).
- **Appendix EE**
  - Large Generator Interconnection Agreement for interconnection requests processed under Tariff Appendix DD.
- **Appendix FF**
  - Small Generator Interconnection Agreement for interconnection requests processed under Tariff Appendix DD.

California ISO Tariff-cont.

- The CAISO tariff may be modified, amended, or supplemented as needed, subject to the approval of FERC
- Each section or appendix of the CAISO tariff is maintained and updated separately in accordance with FERC orders
- The CAISO tariff governs in case of any inconsistency or ambiguity with, business practice manuals, operating procedures, or interconnection agreements

Business Practice Manuals

ISO Business Practice Manuals (BPMs) provide detailed guidelines, procedures, and examples.

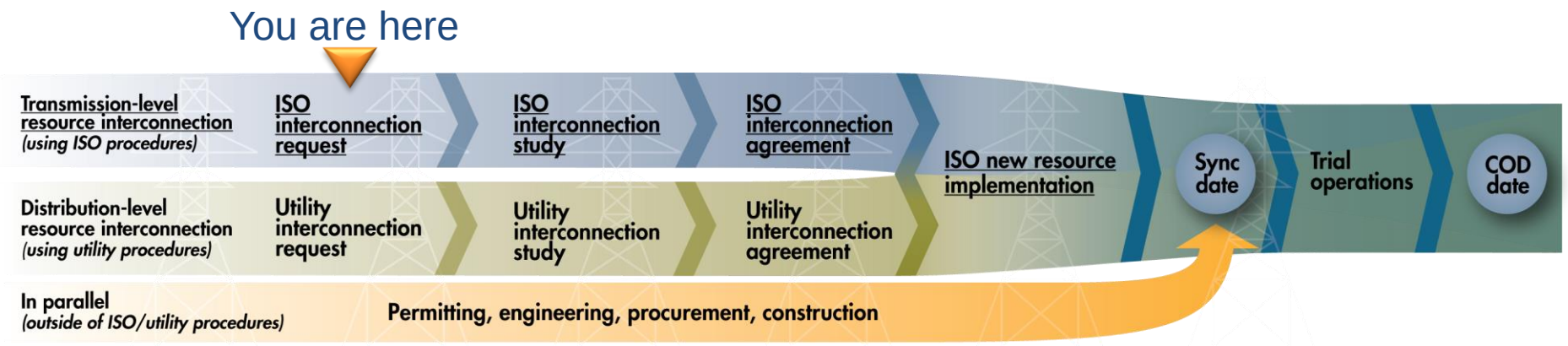
<u>Interconnection Resources Team References Three BPMs</u>

- BPM for Generator Interconnection Deliverability Allocation Procedures (GIDAP)
  - Current, effective with Cluster 5 and forward

- BPM for Generator Interconnection Procedures (GIP)
  - Applicable only to existing Cluster 4 and earlier projects

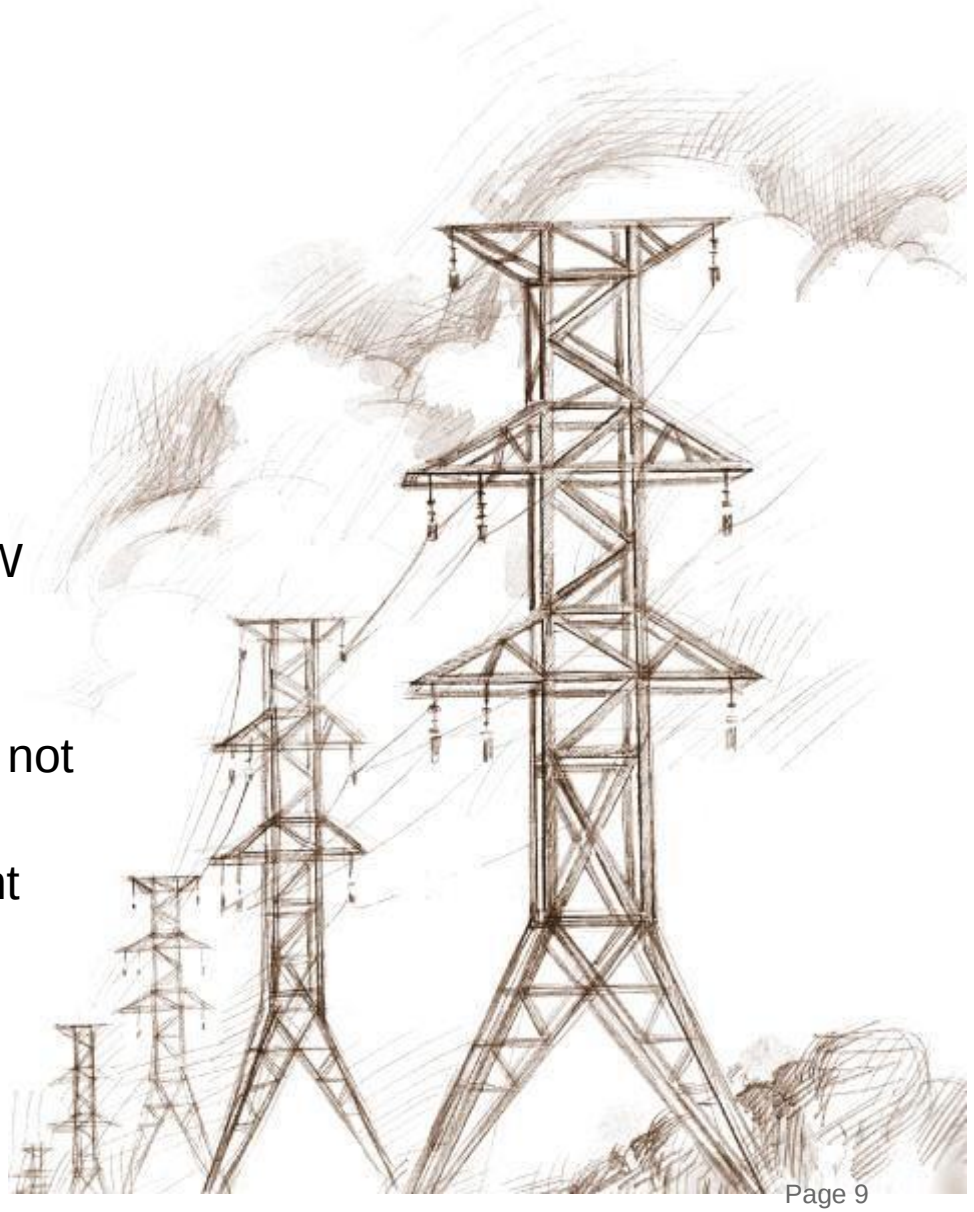
- BPM for Distributed Generation for Deliverability (DGD)

Interconnection Process Map



Application Options

- Pre-Application
  - Small project; 20 MW or less
- Cluster study
  - Small project; 20 MW or less
  - Large project; more than 20 MW
- Independent Study Process
  - When the cluster process does not accommodate desired COD
  - Must be electrically independent
- Fast Track Process
  - 5 MW or less



Pre-Applications

- Opportunity for Interconnection Customers with a proposed Small Generating Facility to receive a report of readily available data

- Requirements
  - $300 Non-Refundable Fee
  - Pre-Application Request Form

- Report includes (as applicable):
  - Electrical configuration of the substation
  - Existing aggregate generation capacity for substation or circuit
  - Existing or known constraints for a proposed Point of Interconnection (POI)
  - Available capacity on substation or circuit likely to serve the proposed POI

Application Options Summary

Study Process	Application Window	Site Exclusivity (SE)	Study Deposits
Cluster	April 1-15	Deposit or Documents ≤20 MW = $100K >20 MW = $250K	$150k
Independent Study Process (ISP)	Anytime	SE Must be demonstrated	$150k
Fast Track (FT)	Anytime	SE Must be demonstrated	$500 processing fee

Interconnection Timeline Summary

Cluster 13 – Two+ years

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
Apr 2020	~June 2020	Jul - Dec 2020	Jan 2021	Mar 2021	May – Nov 2021	Dec 2021	Mar 2022	May 2022	Aug 2022

Independent Study Process (ISP) – Eight months without deliverability

ISP Application	Electrical Independence	Scoping Meeting	Systems Impact and Facilities Study	Results Meeting	1st Posting	Reassessment Result
Anytime	30 CD from ISP eligibility	Set date within 5 BD of Electrical Independence	<= 120 CD of Study Agreement	<= 20 BD of Study Results	<= 120 CD of Study Results	Aug Annually

Fast Track (FT) – 10 weeks or more

FT Application	Initial Review (Screens)	Customer Options Meeting	Supplemental Review
Anytime	15 BD from FT Eligibility	10 BD from Determination of Upgrades / Additional Studies Needed	10 BD from Receipt of Review Deposit

Site Exclusivity

- Requirement for interconnection service
  - Initially, interconnection customers may provide a deposit
    - $100k/small and $250k/large
- For private land, Site Exclusivity is:
  - (a) Ownership of, a leasehold interest in, or a right to develop property upon which the Generating Facility will be located consisting of a minimum of 50% of the acreage reasonably necessary to accommodate the Generating Facility; or
  - (b) an option to purchase or acquire a leasehold interest in property upon which the Generating Facility will be located consisting of a minimum of 50% of the acreage reasonably necessary to accommodate the Generating Facility.
- For public land, please consult Appendix A of the CAISO tariff ("Site Exclusivity") and 5.1.3 of the BPM for GIDAP

Site Exclusivity-cont.

- Common problems with documentation:
  - The demonstration of Site Exclusivity, at a minimum, must be through the Commercial Operation Date
    - Most commonly an issue for leases or options to lease
  - The name of the interconnection customer and the name of the lease/option/grant holder do not match
    - Must provide an assignment agreement, certified organizational chart, or other documentation to evince that the interconnection customer (as listed on the interconnection request) holds the property interest
  - The rights to the land must include the right to develop the proposed project.
    - Not just the right to occupy for the purposes of environmental or other assessments.

Project Naming Requirement

NERC COM-002 Requirement

Stricter requirements for project name selection

- Duplicated or Unacceptable Project Names will:
  - Cause issues on the Operations Floor
  - Not be accepted into RIMS
  - Require changes after the IR submission
- Valid and acceptable project names will:
  - Provide clear and concise communications
  - Provide smoother transition for each stage of the study/project
  - Result in less required project name changes

Tools

- Section 5.2 of GIDAP BPM, Selecting a Project Name
- Prohibited Project Name List (link)

Cluster Study, Application Process

- **Application Window open April 1st – April 15th**
  - FERC Approval in March 2018

3

- **Complete Interconnection Request Package**
  - Submit IR more than 5 BDs early for opportunity to cure incomplete package
  - ISO has 5 BDs to deem IR Package Complete
    - Day-for-day extension for ISO delays
  - All IR Package elements must be received by April 15. Packages not deemed complete WILL NOT be studied in Cluster 13.
  - **Funds preferred via Fed Wire**; checks are accepted

Cluster Study, Application Process

Complete Interconnection Request Package must include:

(i) An Interconnection Study Deposit of $150,000

(ii) A completed application in the form of Appendix 1, Word doc

a. Including Attachment A, Excel doc

b. Study agreement, authorized signatory, & state of incorporation for IC

(iii) Demonstration of Site Exclusivity or posting of a SE Deposit

(iv) A load flow model

(v) A dynamic data file

(vi) A reactive power capability document

(vii) A site drawing

(viii) A single-line diagram

(ix) A flat run plot and a bump test plot from the positive sequence transient stability simulation application

(x) A plot showing the requested MW at the Point of Interconnection from the positive sequence load flow application

Cluster Study, Application Process

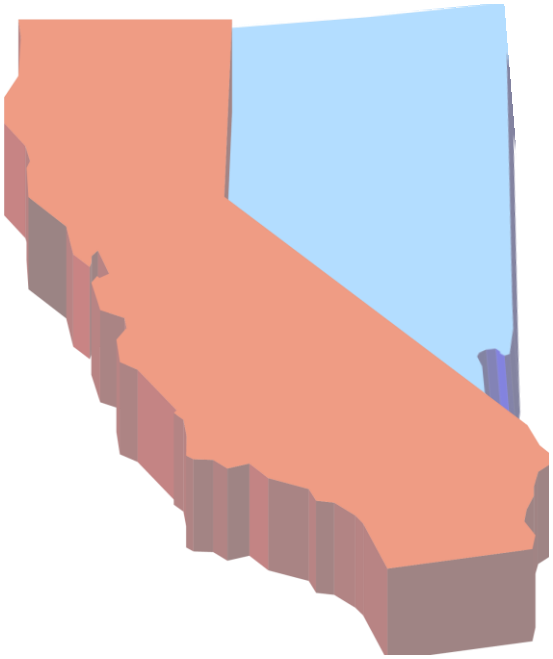
- Validation & Deficiencies Cure of Interconnection Request (IR)
  - ISO has 10 business days to determine IR validity (initial review)
  - ISO has 5 BDs to respond IR validity (subsequent Reviews)
    - Day-for-day extension for ISO delays until May 31
  - ICs do not have response timeline requirements
- June 30th cut-off to cure all deficiencies
  - Plus any extensions due to ISO delay
  - Cure deficiencies in required timeframe to be included in cluster study
- Once all applications are validated:
  - Queue numbers assigned
  - Queue report is available in RIMS

Questions?

Cluster, Independent Study, and Fast Track Process Overview

Phelim Tavares, Sr. Interconnection Specialist

Cluster Study Process



- Interconnection Requests (IR) submitted April 1st – April 15th each year are studied together
- Study costs shared between projects assigned to same study group
- Two cost components:
  - Network Upgrade costs assigned to projects on pro rata basis, if shared
  - Interconnection Facilities costs are project specific, not shared

Cluster - Customer Meetings & Studies

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
Apr 2020	~June 2020	Jul - Dec 2020	Jan 2021	Mar 2021	May – Nov 2021	Dec 2021	Mar 2022	May 2022	Aug 2022

- Approximately 2 years for above timeline with deliverability

	Scoping Meeting	Phase I Study *	Phase I Results Meeting *	Phase II Study *	Phase II Results Meeting *
Purpose	In-Service / COD P.O.I. Transmission system	NU & IF Costs & Timeline Study Report	Study Results Cost Responsibility for Upgrades	Updated NU & IF Costs & Timeline Study Report	Updated Study Results Cost Responsibility for upgrades
Timing	No later than June 30	Begins July 1 170 CD to Complete	Within 30 CD of Phase I Study Report	Begins May 1 205 CD to Complete	Within 30 CD of Phase II Study Report

*Planned dates shown. Also applicable to ISP projects with deliverability studied with the cluster.

Cluster – IC Cost Responsibility

- Generally, IC's maximum set by lower of Phase I and Phase II Network Upgrades (NU) costs
- No maximum for Interconnection Facilities (IF) costs
- May be impacted by:
  - Appendix B allowed changes
    - Reduced MWs
    - Deliverability decisions
  - Reassessment study impacts
- Updated cost responsibility definitions will be covered in the second presentation that covers the study results

Cluster - Modifications Between Phase I and II

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
Apr 2020	~June 2020	Jul - Dec 2020	Jan 2021	Mar 2021	May – Nov 2021	Dec 2021	Mar 2022	May 2022	Aug 2022

- Appendix B (to GISPA study agreement) due 10 business days after Phase I results meeting:
  - Confirms deliverability status & option A/B, project milestone dates, and other data provided in the IR
  - Identifies allowable modifications:
    - Decrease in MW output
    - Modify technical parameters of technology
    - Modify the interconnection configuration
    - Point of Interconnection (POI) Change

Cluster - Interconnection Financial Security

- Posted to PTO as security for project costs
  - Network Upgrades
  - Interconnection Facilities

- Posting formulas
  - Initial – 15% of upgrades with qualifiers
  - Second – 30% of upgrades with qualifiers
  - Qualifiers include:
    - project size (initial posting only)
    - Minimums
    - Maximums

Cluster - Interconnection Financial Security

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
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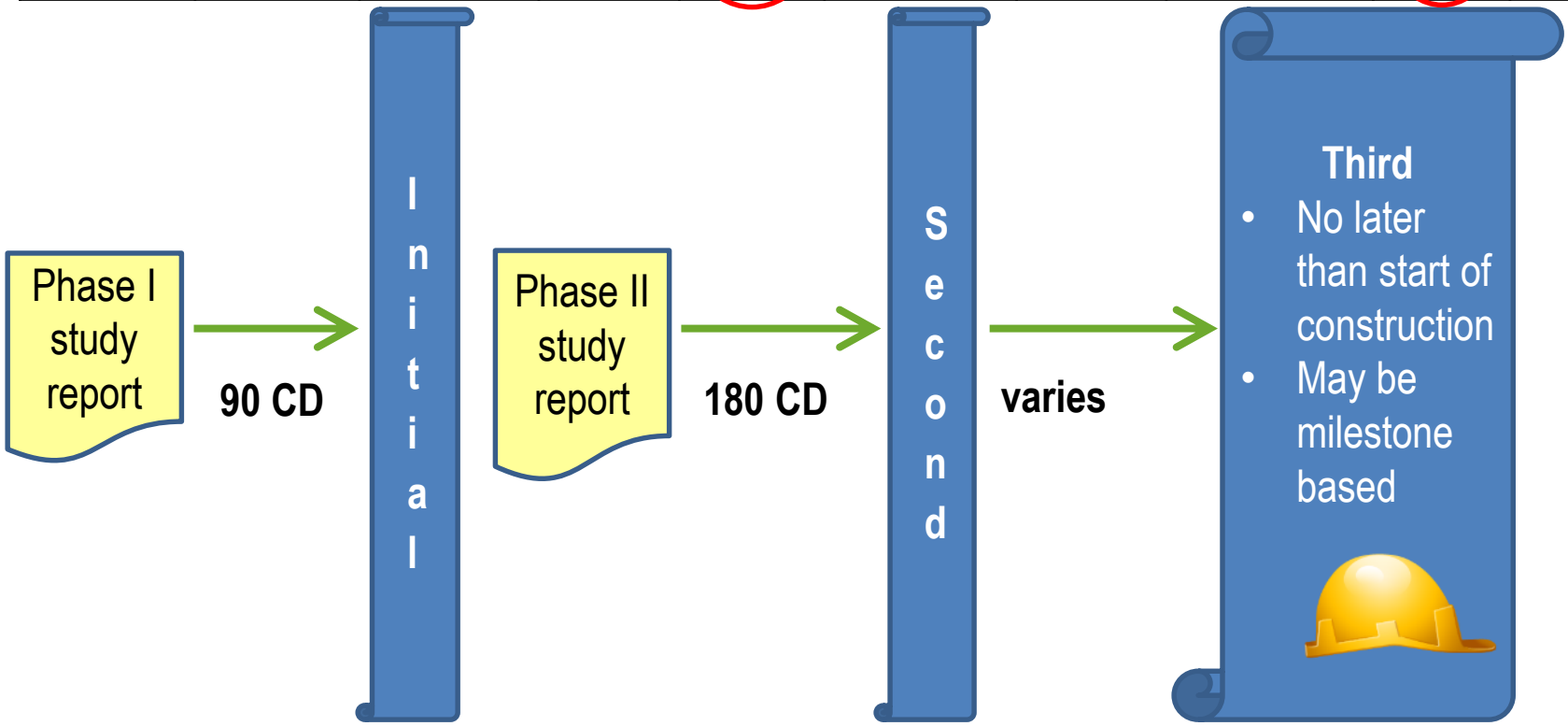


Independent Study Process Application

- Can submit an Interconnection Request anytime, however it is advantageous to submit the applications anytime between November and March
- Eligibility:
  - Demonstrate cluster process cannot accommodate desired Commercial Operation Date, and provide evidence of the following:
    - Financial resources
    - Permitting and regulatory approval
    - Purchase order for gen equipment
    - Point of Interconnection
    - Reliability Network Upgrades
  - Site Exclusivity via documentation only
  - Electrical Independence
  - Deliverability Assessment included as part of next Cluster study

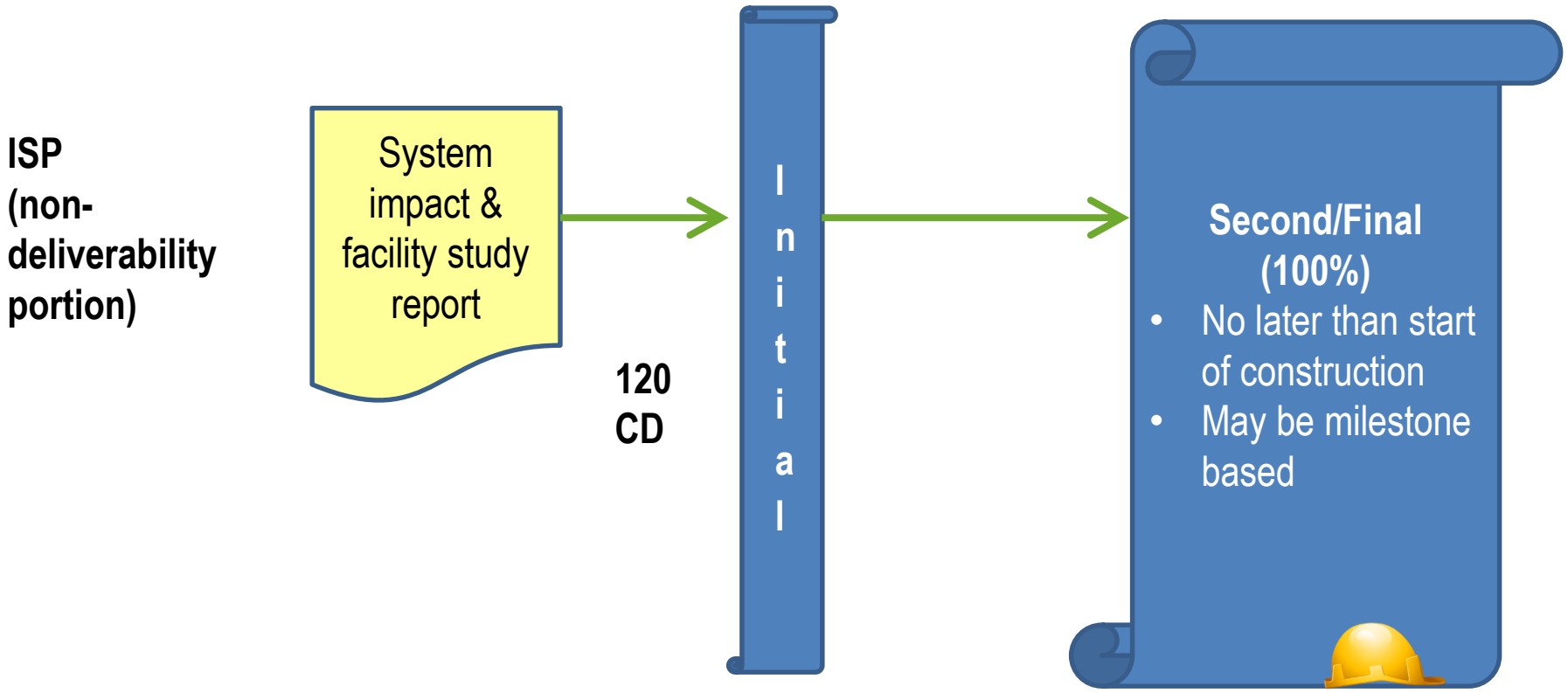
Independent Study Process - Customer Meetings & Studies

ISP Application	Electrical Independence	Scoping Meeting	Systems Impact and Facilities Study	Results Meeting	1st Posting	Reassessment Result
Anytime	30 CD from ISP eligibility	30 CD of Electrical Independence	<= 120 CD of Study Agreement	<= 20 BD of Study Results	<= 120 CD of Study Results	Aug Annually

- Approximately 8 months for above timeline through Results Meeting

	Scoping Meeting	System Impact and Facilities Study	Results Meeting
Purpose	Facility Loadings Instability, Short Circuit, Voltage, & Reliability Issues Prior System Studies	Short Circuit, Stability, & Power Flow Analysis IF & RNU Costs and Timeline Study Report Needed Studies	Study Results Cost Responsibility for Upgrades
Timing (Deliverability not included)	Scheduled within 5 BD of Notification of Electrical Independence	Completed within 120 CD after Execution of Study Agreement.	20 BD after System Impact and Facilities Study Report Provided to IC

Independent Study Process-Interconnection Financial Security



- Deliverability Studies follow the Cluster Timeline

Independent Study Process- Interconnection Financial Security

- Posted to PTO as security for assigned project costs
- Network Upgrades and Interconnection Facilities costs
  - No ADNUs
  - Large (>20 MW) vs. small (<= 20 MW) formulas
- Cost Responsibility is established in the System Impact and Facilities study for Energy Only
- Deliverability portion is set forth in Phase I and Phase II study

Fast Track Study Process Application

- No larger than 5 MW with Energy Only status
- Submit Interconnection Request at any time
  - $500 non-refundable processing fee
- Eligibility
  - Site Exclusivity via documentation only
  - Must pass all screens

- Customer Meetings, if required
  - Customer Options
  - Supplemental Review

Fast Track Timelines and Meetings

FT Application	Initial Review (Screens)	Customer Options Meeting	Supplemental Review
Anytime	15 BD from FT Eligibility	10 BD from Determination of Upgrades/Additional Studies Needed	10 BD from Receipt of Review Deposit

- Approximately 10 weeks or more for above timeline

	Customer Options Meeting (if needed)	**Supplemental Review** (if needed)
Purpose	If IR cannot be approved with minimal costs, or a supplemental study, or other additional studies	Determines whether the facility can continue to qualify for interconnection under the FT process
Timing	Scheduled within 10 BD of determination that IR cannot be approved without modifications at minimal cost.	IC will agree to a review within 15 BD of the offer.

Fast Track-Cost Responsibility

- Financial Security is usually not required unless costs are identified in the supplemental review.

- Costs identified in the Customer Options Meeting or Supplemental Review.
  - Facility modifications
  - Modifications to the Participating TO's electric system

Questions?

Transmission Plan Deliverability Allocation and Other Study Processes

Matt Chambers, Sr. Interconnection Specialist

Resource Adequacy & Deliverability

- Resource Adequacy (RA) is a CPUC program designed to:
  - Provide sufficient resources to the ISO to ensure safe and reliable operation of the grid in real time
  - Incentivize appropriate siting and construction of new resources to meet future reliability needs
- Deliverability is a resource attribute designated by ISO
  - Required for participation in the RA Program
  - Not to be confused with firm transmission service
  - Deliverability status does not guarantee that a project will avoid curtailment due to transmission congestion

Deliverability Statuses

- Full Capacity Deliverability Status (FCDS)
  - Allows a resource to provide RA Capacity to meet a Load Serving Entity's RA requirement
  - Net Qualifying Capacity payments settled bilaterally
- Energy Only Deliverability Status
  - Not eligible to provide RA Capacity
- Partial Capacity Deliverability Status
  - Only a fraction of generating facility capacity is Deliverable

Note:

- Operationally, no difference between Deliverability statuses
- The dispatch of energy is based on economics; not Deliverability Status

TP Deliverability Allocation Process: Affidavits

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
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- Projects requesting FCDS must submit affidavit to be eligible for Deliverability allocation. Applies to:
  - Cluster, ISP, and PTO WDAT studied by ISO for Deliverability in current cluster
  - Parked projects
  - Energy Only projects seeking Deliverability from existing and approved transmission facilities
- Market Notice will specify due date (typically due early December)
- Projects must, at a minimum, select an allocation group and attest to current financing, permitting and land acquisition statuses
- Allocation groups will establish priority if insufficient Deliverability

TP Deliverability Allocation Group Descriptions

Allocation Group	Deliverability Status	Commercial Status (PPA or shortlisting must require Deliverability)	Can Build DNUs for Allocation?	Allocation Rank
1	Current Cluster Phase 2 Study / Parked	(i) Executed or reg-approved PPA; OR (ii) LSE serving its own load	Yes	Allocated 1st
2	Current Cluster Phase 2 Study / Parked	(i) Shortlisted in a RFO/RFP; OR (ii) Negotiating a PPA	Yes	Allocated 2nd
3	Current Cluster Phase 2 Study	Proceeding without a PPA	Yes	Allocated 3rd

- Group 1: Must provide copy of executed PPA
- Group 2: Confirmation of shortlisting and terms on RFO/RFP required; or Terms of PPA and counterparty confirmation required
- Group 3: Projects proceeding to construction even if unable to secure PPA
  - Must accept allocation or WITHDRAW
  - Project will be converted Energy-Only if unable to comply with strict rules designed to limit time in Queue

TP Deliverability Allocation Group Descriptions

Allocation Group	Deliverability Status	Commercial Status	Can Build DNUs for Allocation?	Allocation Rank
4	(i) Converted to Energy-Only; OR (ii) Energy-Only projects that achieved Commercial Operation Date	Executed or regulator-approved PPA requiring FCDS	No	Allocated 4th
5	(i) Converted to Energy-Only; OR (ii) Energy-Only projects that achieved Commercial Operation Date	Shortlisted in a RFO/RFP or Negotiating a PPA	No	Allocated 5th
6	Converted to Energy-Only	Commercial Operation Date achieved	No	Allocated 6th
7	Energy-Only	Commercial Operation Date achieved	No	Allocated 7th

- Must submit a seeking TP Deliverability affidavit and $60,000 study deposit as described in Market Notice

TP Deliverability Allocation Results

Cluster 13 Application	Scoping Meeting	Phase I Study	Phase I Meeting	1st Posting	Phase II Study	Phase II Meeting	Transmission Plan Deliverability	2nd Posting	Reassessment Result
Apr 2020	~June 2020	Jul - Dec 2020	Jan 2021	Mar 2021	May – Nov 2021	Dec 2021	Mar 2022	May 2022	Aug 2022

- Transmission Plan (TP) Deliverability allocation:
  - Determined from most recent Transmission Plan and eligible projects seeking Deliverability
  - Projects may be allocated 0% - 100% of requested amount
  - Deliverability allocation results released to all eligible projects requesting FCDS in mid-March
  - Within seven calendar days of results notice, IC must confirm how to proceed via customer options form (accept allocation, decline, park, etc.)

Distributed Generation (DG) Seeking Deliverability

- Annual Process
  - February - July
- Must apply to Utility Distribution Company (UDC)
- Eligibility
  - Wholesale Distribution Access Tariff or CPUC Rule 21
- Business Practice Manual on Distributed Generation for Deliverability

Annual Downsizing Opportunity

- Reduce existing project MW size for projects in the CAISO queue
  - Apply annually, Oct 15 – Nov 15
  - Separate downsizing request application
  - $60K study deposit
  - Meet the eligibility requirements:
    - Project must be in good standing
  - Included in the annual reassessment and downsizing results study

Reassessments

- Annual downsizing and reassessment study report:
  - Shows the impacts of downsized projects, results of TP Deliverability, and withdrawals in the CAISO queue
  - Any active project that has complete the Phase II study and is impacted and/or submitted a request through the Annual Downsizing will receive this report
  - Issued around late July each year

Questions?

Withdrawals, Refunds, and Recovery

Julie Balch, Interconnection Specialist

Withdrawals, Refunds, and Recovery

IC may withdraw at any time.

Email

or

Written Notice

ISO may withdraw an IR if the IC fails to adhere to certain requirements of the Tariff

Withdrawals, Refunds, and Recovery (Cont.)

Effects on study deposit

Scoping Meeting for Cluster and ISP projects

100% of Unused Portion

30 CD

Phase I for Cluster System Impact and Facilities Study for ISP Results Meeting

Difference between study deposit and greater of costs incurred or one-half of study deposit to a max of $75K

30 CD

No Refund

Withdrawals, Refunds and Recovery (Cont.)

Financial Security for **Interconnection Facilities**

- Release of entire posted amount, except any amounts necessary to pay for costs incurred or irrevocably committed.

Withdrawals Refunds and Recovery (Cont.)

Financial Security for **Network Upgrades** for Cluster and ISP projects

- On 2/19/19 FERC approved CAISO's proposed removal of all conditions for partial IFS recovery
- All projects qualify for recovery of 50% of IFS postings for NUs upon withdrawal
  - Less any irrevocably committed funds by PTO towards any NUs

Withdrawals Refunds and Recovery (Cont.)

Initial Posting **Second Posting** **Construction**

Formula for non-refundable portion: Lesser of IFS (plus any other provided security plus any separately provided capital):

less all costs and expenses incurred or irrevocably committed,

OR

minus the lesser of 50% of posted value **or** $10K/MW ($20K/MW after second posting)

Withdrawals Refunds and Recovery (Cont.)

Withdrawal between the initial posting and the deadline for the second posting for a cluster project

Example 1:

Project size: 100 MW

Interconnection Financial Security (IFS) posted for Network Upgrades (NUs): $20M

50% of posted amount or $10K/MW, whichever is less is calculated:

50% of $20M = $10M

$10K x 100 MW = $1M

The lesser amount, $1,000,000 is deducted from the posted security.

$20M (deposit)

- 1M ($10K/MW)

$19M Recovered by IC

Withdrawals Refunds and Recovery (Cont.)

Withdrawal between the initial posting and the deadline for the second posting for a cluster project

Example 2:

1,250 MW project

IFS posted for NUs: $20M

50% of posted amount or $10K/MW, whichever is less is calculated:

50% of $20M = $10M

$10K x 1,250 MW = $12.5M

The lesser amount, $10M is deducted from the posted security.

$20M (deposit)

- 10M (50%)

$10M Recovered by IC

Withdrawals Refunds and Recovery (Cont.)

Withdrawal between the second posting and the commencement of construction activities for a cluster project

Example 1:

Project size: 100 MW

IFS posted for NUs: $20M

50% of posted amount or $20K/MW, whichever is less is calculated:

50% of $20M = $10M

$20K x 100 MW = $2M

The lesser amount, $2M is deducted from the posted security.

$20M (deposit)

- 2M ($20K/MW)

$18M Recovered by IC

Withdrawals Refunds and Recovery (Cont.)

Withdrawal between the second posting and the commencement of construction activities for a cluster project

Example 2:

Project size: 1,000 MW

IFS posted for NUs: $20M

50% of posted amount or $20K/MW, whichever is less is calculated:

50% of $20M = $10M

$20K x 1K MW = $20M

The lesser amount, $10M is deducted from the posted security.

$20M (deposit)

- 10M (50%)

$10M Recovered by IC

Questions?

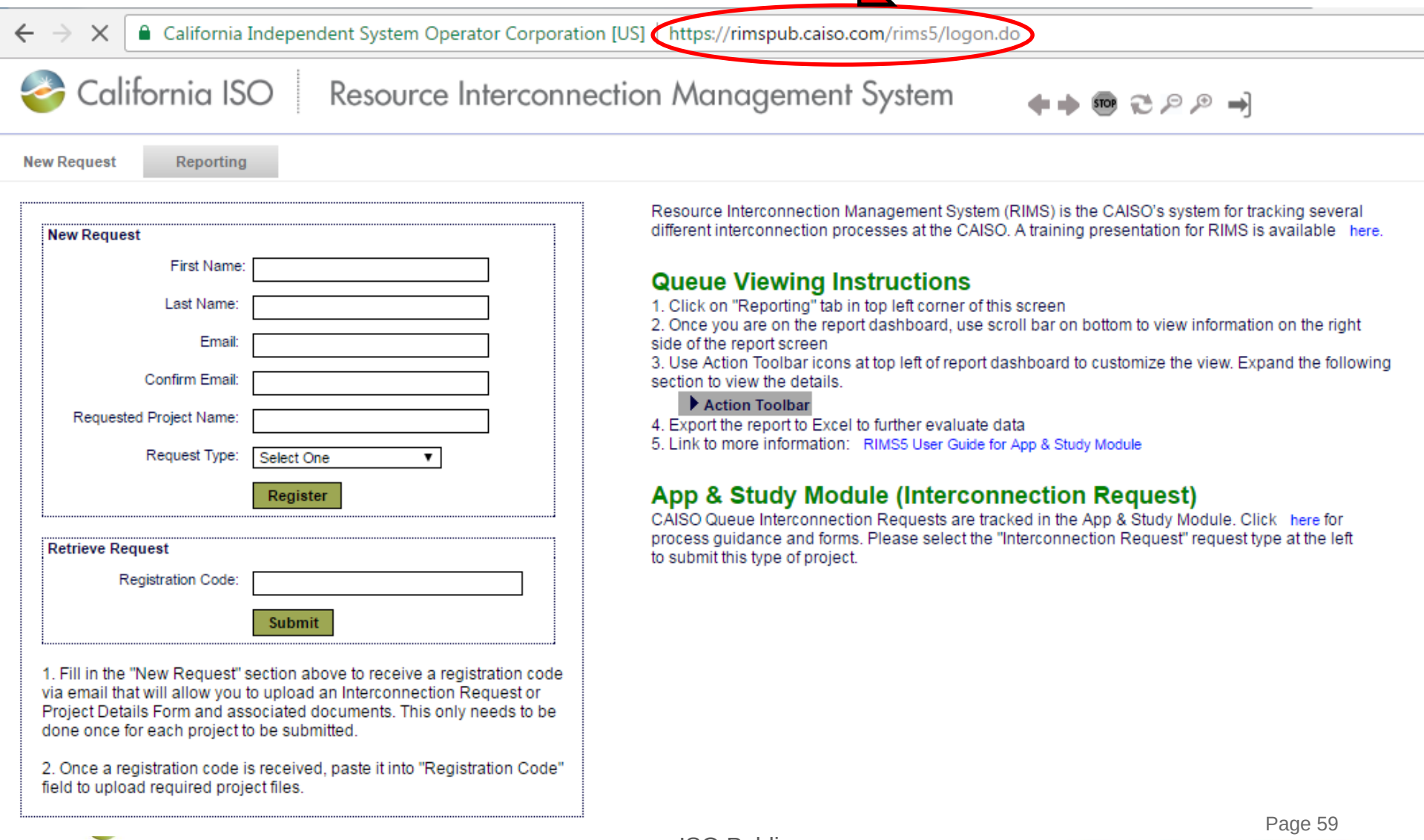
RIMS App & Study Module

Linda Wright, Sr. Interconnection Specialist

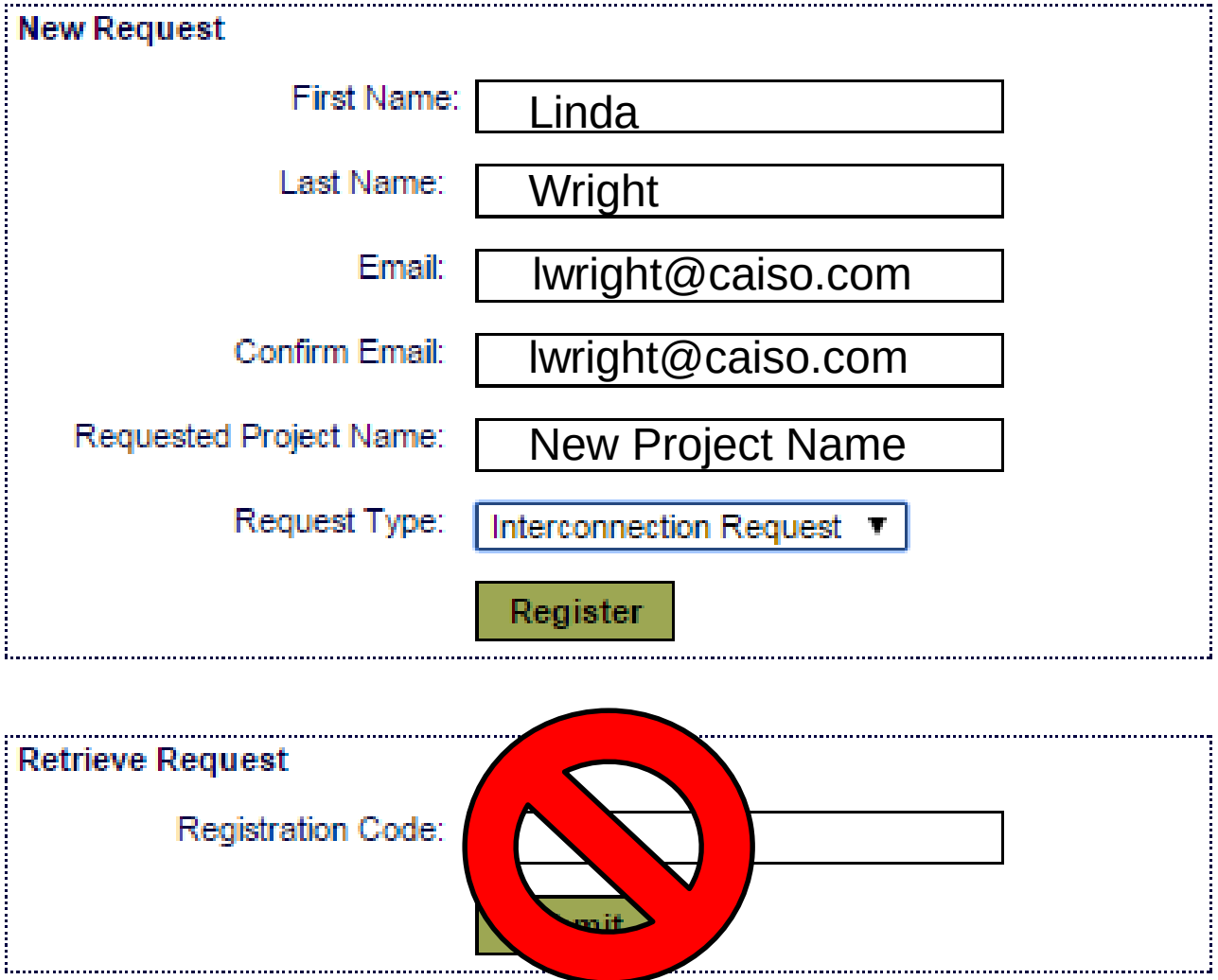
Electronic Interconnection Request Submission

- Resource Interconnection Management System (RIMS) is a secure web-based database application
- Electronic submission of Interconnection Requests accomplished via a user interface from the CAISO website
- RIMS5 User Guide is available on-line
- Access to RIMS is established by the CAISO's Access and Identity Management (AIM) system

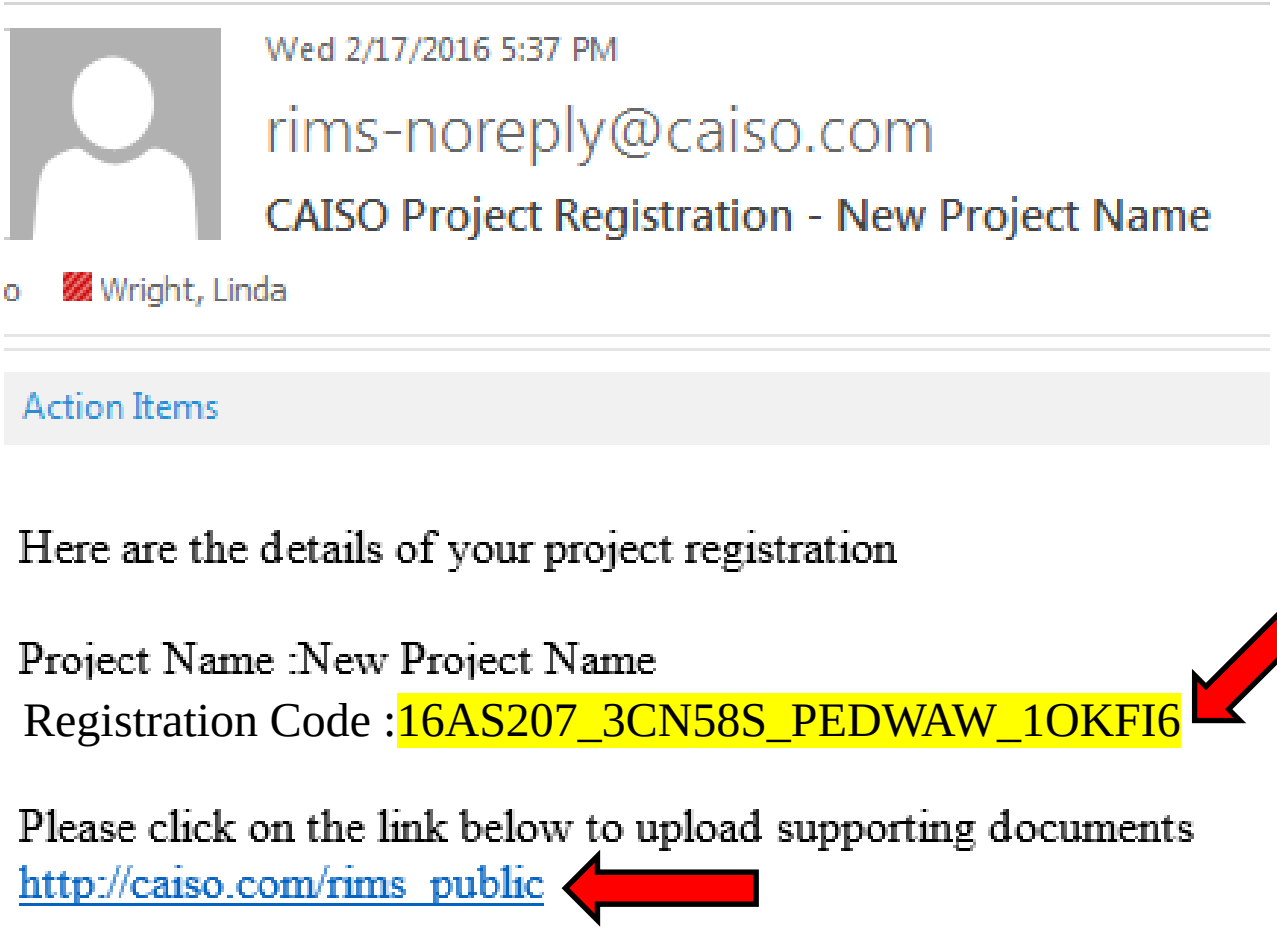
https://rimspub.caiso.com



Electronic Interconnection Request Submission (cont'd)



Electronic Interconnection Request Submission (cont'd)



Wed 2/17/2016 5:37 PM

rims-noreply@caiso.com

CAISO Project Registration - New Project Name

o Wright, Linda

Action Items

Here are the details of your project registration

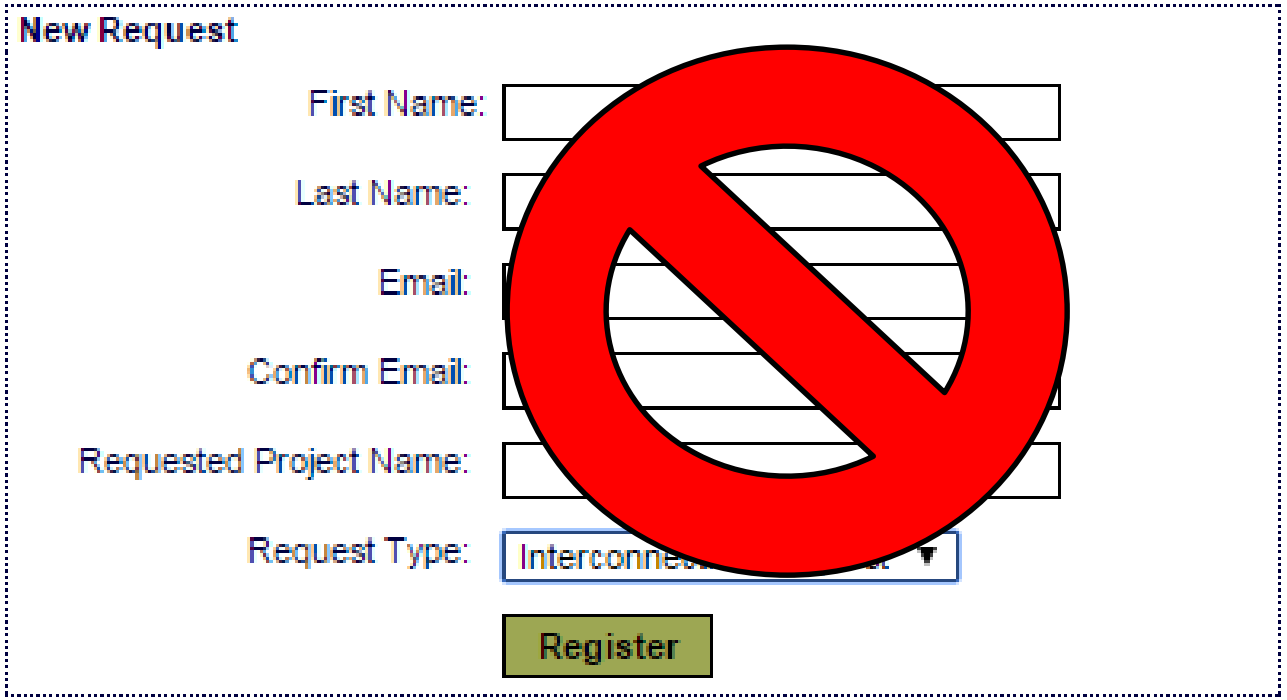
Project Name :New Project Name

Registration Code :16AS207_3CN58S_PEDWAW_1OKFI6

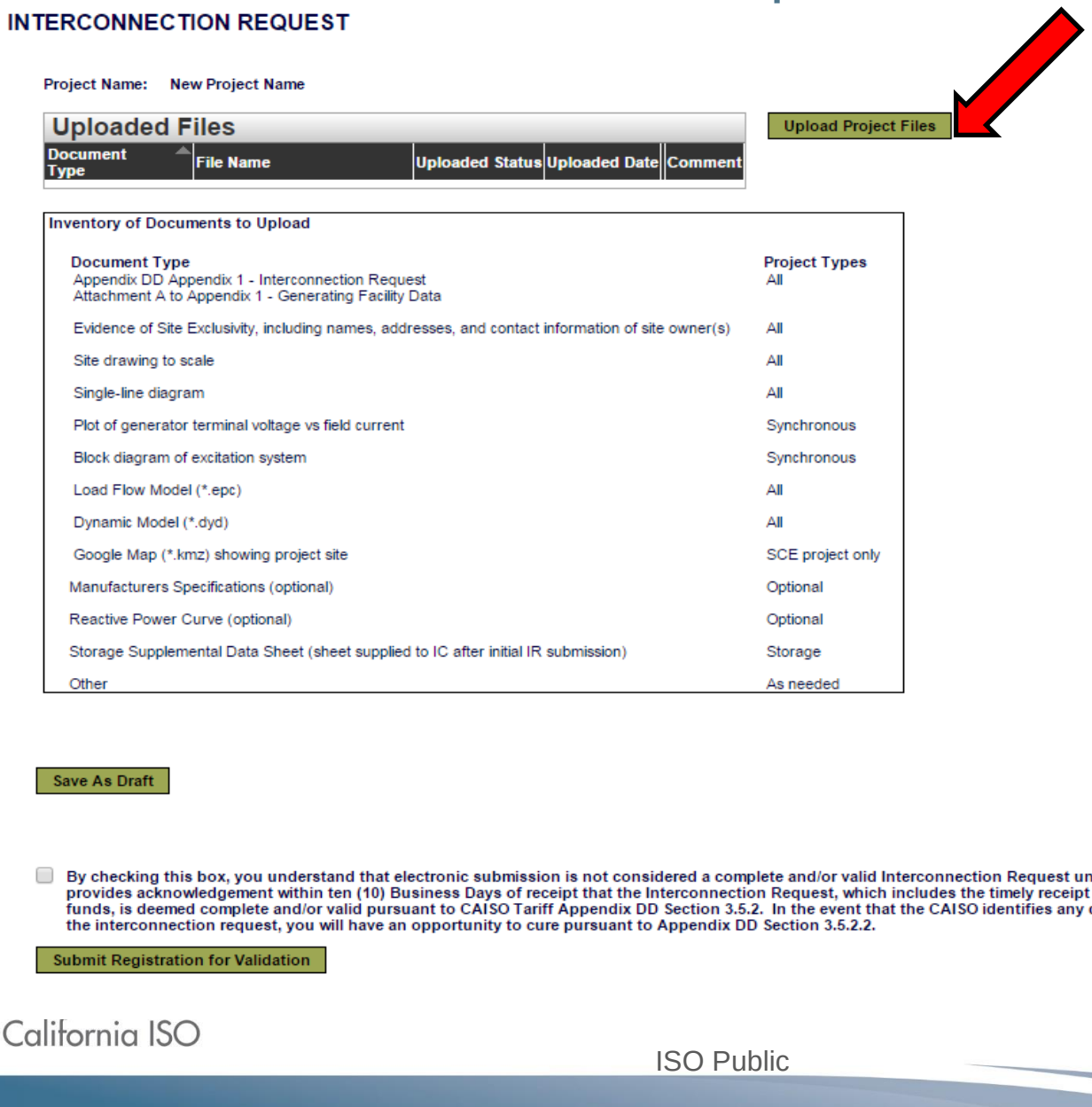
Please click on the link below to upload supporting documents

http://caiso.com/rims_public

Electronic Interconnection Request Submission (cont'd)



Electronic Interconnection Request Submission (cont'd)



INTERCONNECTION REQUEST

Project Name: New Project Name

Uploaded Files

Upload Project Files

Document Type	File Name	Uploaded Status	Uploaded Date	Comment

Inventory of Documents to Upload

Document Type	Project Types
Appendix DD Appendix 1 - Interconnection Request Attachment A to Appendix 1 - Generating Facility Data	All
Evidence of Site Exclusivity, including names, addresses, and contact information of site owner(s)	All
Site drawing to scale	All
Single-line diagram	All
Plot of generator terminal voltage vs field current	Synchronous
Block diagram of excitation system	Synchronous
Load Flow Model (*.epc)	All
Dynamic Model (*.dyd)	All
Google Map (*.kmz) showing project site	SCE project only
Manufacturers Specifications (optional)	Optional
Reactive Power Curve (optional)	Optional
Storage Supplemental Data Sheet (sheet supplied to IC after initial IR submission)	Storage
Other	As needed

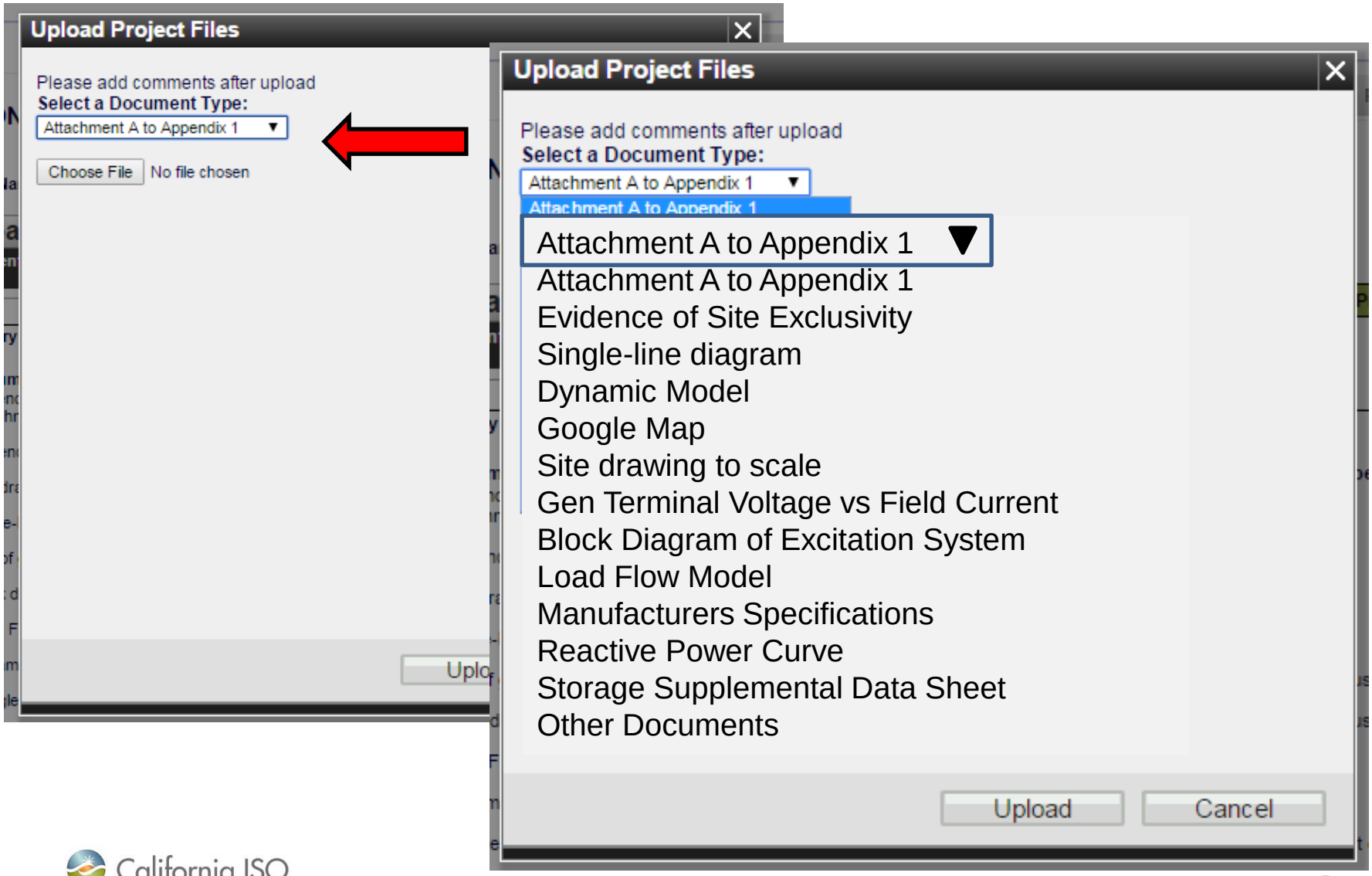
Save As Draft

☐ By checking this box, you understand that electronic submission is not considered a complete and/or valid Interconnection Request until the CAISO provides acknowledgement within ten (10) Business Days of receipt that the Interconnection Request, which includes the timely receipt of study deposit funds, is deemed complete and/or valid pursuant to CAISO Tariff Appendix DD Section 3.5.2. In the event that the CAISO identifies any deficiencies in the interconnection request, you will have an opportunity to cure pursuant to Appendix DD Section 3.5.2.2.

Submit Registration for Validation

NOTE: The Interconnection Request form found on the Generation Interconnection webpage is the **ONLY** version that is compatible with the electronic submission process

Electronic Interconnection Request Submission (cont'd)



Electronic Interconnection Request Submission (cont'd)

Accessing RIMS

Once RIMS access is established via AIM, those provisioned access to a project will be able to:

- See screens that detail the project and its progress
- Access uploaded documents
- Upload documents
- View IC, CAISO and PTO contact information

Resource Summary

Project Name: Cluster Project - TEST

Queue Position: 1A

Queue Date:

Project Cost Code:

Study Type: Queue Cluster Process

Cluster Number: C9

PTO: OTHER

Affected PTO: OTHER

POI: Otay Mesa Switchyard 230 kV

Ch

Voltage Level(kV): 145

Project Status: WITHDRAWN

Che

Reason For Withdraw: None

Project Status Date: 10/20/2016

QM Project Standing:

Requested Deliverability: Full Capacity

Current Approved Net MW: 100

Ch

Comments: my comments

Interconnection Request Info

Contact First Name: RIMS

Contact Last Name: Tester05

Contact Title: Director

Signature Date: 03/21/2016

Current Interconnection Customer

Interconnection Customer(Legal Name):

Company Type: Limited Liability Company

State Incorporated: California

Parent Company: Parent Company

Project Location

Address: Address

City: City

County: County

State: California

Zip Code: 11111

Latitude: 1234.22

Longitude: 1234.33

Available RIMS Screens

Equipment Configuration

General Description

equipment configuration comments with updates

NEW/EXISTING Generation

- (•) New Generation Facility
- ( ) Existing Generation Facility

Fuel Type and Generation Type

Generator Type	Fuel Type	Net MW
Hydro	Water	55
Wind Turbine	Wind	222

Other Generation and Fuel Type

Other Generator Type	Other Fuel Type	Net MW	Comments
other gen type	other fuel type	444	other comments

Project Milestones

Type	In Service Date	Trial Operation Date	COD Date	Term of Service	Send COD date change Notification
IR	01/01/2016	02/01/2016	03/01/2016	10	
CURRENT	01/01/2016	02/01/2016	03/01/2016	10	
FINAL	11/01/2016	11/01/2016	11/01/2017	12	

Downsizing Requests

Date Received	Original MW Size	Post Downsizing MW	Deposit Date	Withdrawn Date

Deliverability and Transmission Implementation Details

Requested Deliverability: Full Capacity

Annual Full Capacity Deliverability

Received Date	Study Cluster	Assigned MW	Allocation Date	Percentage (%)

TPD Affidavit

Affidavit Type	Date Received	Valid	Score	Comments	Allocation Detail (MW)	Accepted (MW)	Parked (MW)	Energy Only (MW)	Withdrawn (MW)

Affected Systems Mitigations will appear on Weekly Digest Emails to responsible project contacts as listed in Notification Contacts table when the Current Approved Initial Synchronization Date (from the Project Milestone table) is less than 180 days away, and Affected Status Mitigation Status is not set as complete. Also, a Bulk Loader is available for this table.

Affected Systems

Affected System	Potential or Identified?	Mitigation Type	Mitigation Status	Mitigation Date Completed	Send task reminder?	Notes

Transmission as Modeled and Implemented

Phase Description	Phase ID	Primary Purpose	Utility Project Status	Phase has SPS/RAS	Approved In-Service Date	Full Network Model DB#	Complete?

Transmission as Identified by Transmission Planning

NUID	Study	Queue Position	PTO	Type	Upgrade Description	Voltage	Needed for	Allocation (%)	Allocated Constant Cost ($k)	Allocated Escalated Cost ($k)	Estimated Time to Construct (Months)	History

Maximum Cost Exposure (MCE) ($k)	Maximum Cost Responsibility (MCR) ($k)	Current Cost Responsibility (CCR) ($k)	Current Cost Allocation ($k)

PTO Name	Sum of Allocated Constant Cost ($k)	Sum of Allocated Escalated Cost ($k)

RNU Reimbursement ($/MW):

PTO	RNU Cap ($/MW)

Transmission as Modeled and Implemented

Phase Description	Phase ID	Primary Purpose	Utility Project Status	Phase has SPS/RAS	Approved In-Service Date	Full Network Model DB#	Complete?

Project Details

IR Checklist

Interconnection Request

Checklist Item	Status	Status Date	History	Comments
Interconnection Request Form	**Received**	**03/24/2016**		**0 Comments**
Attachment A to Appendix 1	Received	03/24/2016		0 Comments
Study Deposit	Received	10/24/2016		0 Comments
Site Exclusivity	Documents	10/24/2016		0 Comments
PTO IR Review	Valid Received from PTO	03/30/2016		2 Comments
IR Package				0 Comments
PTO Engagement Letter				0 Comments
Scoping Meeting				0 Comments
Scoping Meeting Minutes				0 Comments
Point of Interconnection				0 Comments
Study Agreement				0 Comments
IR Tab Status				0 Comments

Phase I Checklist

Phase I Study

Checklist Item	Status	Status Date	History	Comments
Phase I Study Report				**0 Comments**
Phase I Study Results Meeting				0 Comments
Phase I Study Meeting Minutes				0 Comments
Appendix B				0 Comments
Phase I Tab Status				0 Comments

Phase II Checklist

GIA Checklist

Financial Security

Study Costs

Study Costs

Project Status : WITHDRAWN

Amounts Invoiced as of 02/21/2017

Project Billing

Project Cost Code:
Project Name: Cluster Project - TEST
Study deposit:

To Date Cost

Invoiced by PTO:
Accrued by ISO:
Total:

Study Refund to IC:
Invoice to IC:
Payment from IC:

Cluster Study Charges

Scoping Meeting			Phase I Study			Phase II Study		
PTO Charges	ISO Charges	Total Charges	PTO Charges	ISO Charges	Total Charges	PTO Charges	ISO Charges	Total Charges

Uploaded Invoice

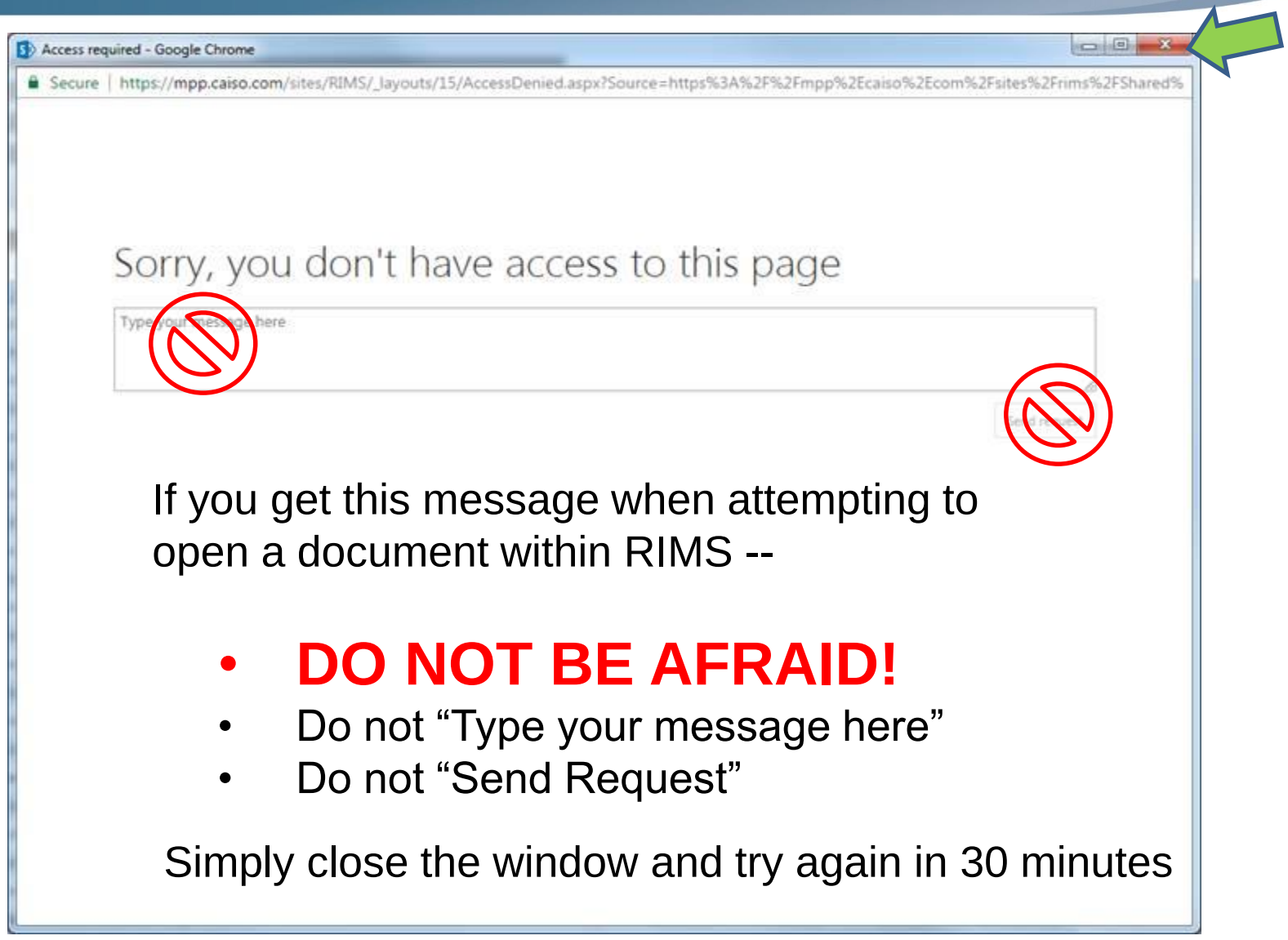
Document Group	Document Type	File Name	Sharepoint Link	Uploaded Status	User	Uploaded Date
INVOICE	Invoice	invoice.pdf		SUCCESS	HXU	03/31/2016

Documents

Uploaded Files

Document Group	Document Type	File Name	Sharepoint Link	Uploaded Status	User	Uploaded Date	Comment	
IR	Dynamic Data	dynamic_model.dyd		SUCCESS	HXU	03/31/2016	0 Comments	Delete
IR	Attachment A to Appendix 1	AS_IR_FORM_Cluster_v4(1).docx		SUCCESS	RTester05	03/23/2016	0 Comments	Delete
IR	Load Flow Model	load_flow_model.epc		SUCCESS	RTester05	03/24/2016	0 Comments	Delete
IR	Map	google_map.kmz		SUCCESS	RTester05	03/24/2016	0 Comments	Delete
IR	Other Documents	misc.txt		SUCCESS	HXU	03/31/2016	0 Comments	Delete
IR	Other Documents	other_project_file.zip		SUCCESS	HXU	10/31/2016	0 Comments	Delete
IR	Site Exclusivity	site_exclusive.txt		SUCCESS	HXU	03/31/2016	0 Comments	Delete
IR	Single Line Diagram	single_line_diagram.jpg		SUCCESS	RTester05	03/24/2016	0 Comments	Delete
IR	Storage Supplemental Data Sheet	storage_supplemental.txt		SUCCESS	HXU	03/31/2016	0 Comments	Delete
PHASE2	Reassessment Downsizing Report	reassessment.txt		SUCCESS	HXU	10/31/2016	0 Comments	Delete

Upload Project Files



If you get this message when attempting to open a document within RIMS --

- **DO NOT BE AFRAID!**
- Do not “Type your message here”
- Do not “Send Request”

Simply close the window and try again in 30 minutes

Project Contacts

The Project Manager for your project is:

CAISO Project Manager

Name	Contact Type	Role	Email	Phone
Haitao Xu	ISO Project Manager	ISO Admin	hxu@caiso.com	(916) 802-0875

Please contact the Project Manager first for project inquiries and activities.

CAISO Contacts

Name	Contact Type	Role	Email	Phone
Haitao Xu	ISO Engineer	ISO Admin	hxu@caiso.com	(916) 802-0875
Judy Brown	ISO Interconnection Specialist	ISO Admin	jbrown@caiso.com	916-608-7062
Raeann Quadro	ISO Queue Management	ISO Admin	rquadro@caiso.com	(916) 749-8392

External Contacts (from AIM)

Name	Contact Type	Role	Email	Phone	Address 1	Address 2	City	State	Zip Code

Notification Contacts

First Name	Last Name	Contact Type	Role	Email	Phone	Address 1	Address 2	City	State	Zip Code
John	Smith	IC Primary	notification	jsmith@abc.test	123-4567				Arizona	
Susie	Queue	PTO Engineer	notification	susie@email.test					None	

Planning to submit an Interconnection Request in Cluster 13?

- Submit IR early
  - Establish your RIMS IR registration and access for your team
  - RIMS could reject your IR form for incomplete or invalid information
    PRO TIP: DO NOT CUT AND PASTE INFORAMTION!
  - Apply early -- allows time to resolve IR data deficiencies
  - Cluster 13 application window is April 1-15, 2020

Resources

Affidavit for Cluster 5 and Later Queue Clusters seeking Transmission Planning Deliverability

http://www.caiso.com/Documents/AffidavitTemplate-Cluster5-LaterQueueClustersSeekingTPDeliverability.doc

Appendix B to Generator Interconnection Study Process Agreement

http://www.caiso.com/Documents/AppendixB-GeneratorInterconnectionStudyProcessAgreement.doc

Business Practice Manuals (BPM)

- **Generator Interconnection and Deliverability Allocation Procedures (GIDAP)**

  http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Generator%20Interconnection%20and%20Deliverability%20Allocation%20Procedures
- **Generator Management**

  http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Generator Management

Deliverability Allocation Customer Options Form

http://www.caiso.com/Documents/DeliverabilityAllocationCustomerOptionsForm.doc

Energy Storage Roadmap

http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyStorageInterconnection.aspx

Resources

Generator Interconnection and Deliverability Allocation Procedures Cluster Process Summary
http://www.caiso.com/Documents/GeneratorInterconnection-DeliverabilityAllocationProceduresClusterProcessSummary.pdf

GIDAP Customer Guidelines
http://www.caiso.com/Documents/GIDAPCustomerGuidelines.xls

Generator Interconnection Webpage
http://www.caiso.com/planning/Pages/GeneratorInterconnection/Default.aspx

Interconnection Request and Generating Facility Data
(Tariff Appendix DD Appendix 1 – IR, and Attachment A to Appendix 1 – Technical Data)
http://www.caiso.com/Documents/GIDAPAppendix1-AttachmentA-Appendix1-InterconnectionRequest-GeneratingFacilityData.doc

ISO Generator Interconnection Queue
http://www.caiso.com/Documents/ISOGeneratorInterconnectionQueueExcel.xls

Participating Transmission Owner financial security instruments
http://www.caiso.com/planning/Pages/GeneratorInterconnection/GeneratorInterconnectionApplicationProcess/Default.aspx

Resources

Participating Transmission Owner per unit costs
http://www.caiso.com/planning/Pages/GeneratorInterconnection/GeneratorInterconnectionApplicationProcess/Default.aspx

Resource Interconnection Fair Webpage
http://www.caiso.com/informed/Pages/MeetingsEvents/PublicForums/Default.aspx

Sample IR/Tech Data
http://www.caiso.com/Documents/SampleInterconnectionRequest-TechnicalData-Solar-Wind.pdf
http://www.caiso.com/Documents/SampleInterconnectionRequest-TechnicalData-Thermal.pdf

Tariff Section 25
http://www.caiso.com/Documents/Section25_Interconnection-GeneratingUnits-Facilities_Dec3_2013.pdf

Tariff Appendix DD (GIDAP)
http://www.caiso.com/Documents/AppendixDD_GeneratorInterconnection-DeliverabiltyAllocationProcess_Dec3_2013.pdf

Technical Bulletin: Reassessment Process Reallocation of Cost Shares for Network Upgrades and Posting
http://www.caiso.com/Documents/TechnicalBulletin_GIDAP-ReassessmentProcessReallocation-CostShares-NetworkUpgrades-Posting.pdf

Questions?

IR Application Generator Facility Data Form Overview

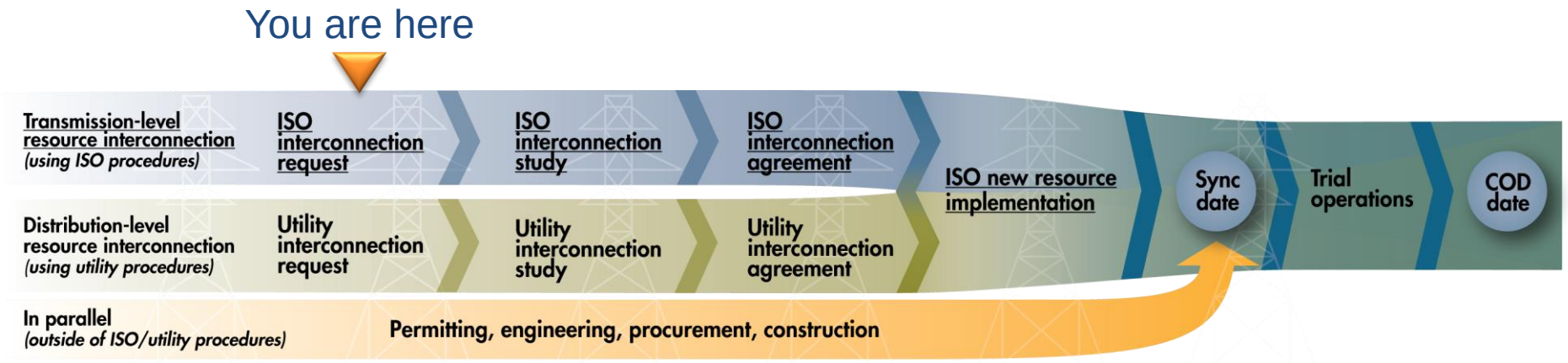
Songzhe Zhu, Sr. Advisor Regional Transmission Engineer

March 11, 2020

Objective – IR Application Generator Facility Data Form Overview

- Understand how to fill out the required documents for each Interconnection Application
  - Appendix 1, Interconnection Request (Word)
  - Attachment A to Appendix 1, Generator Facility Data (Excel)
- Have all documents completed and validated in time for the studies

Interconnection Process Map



Appendix 1 and Attachment A Instructions tab

- Attachment A Instructions tab must match Appendix 1
- Guidelines and directions provided in Instructions tab

California ISO

Appendix 1 Interconnection Request
INTERCONNECTION REQUEST

NO HARD COPY REQUIRED FOR INTERCONNECTION REQUESTS SUBMITTED ELECTRONICALLY VIA RIMS

Provide **one hard copy** of this completed form pursuant to Section 7 of this Appendix 1 below for non-electronic submissions.

1. The undersigned Interconnection Customer submits this request to interconnect its Generating Facility with the CAISO Controlled Grid pursuant to the CAISO Tariff (**check only one**):
   - ☒ Queue Cluster Process.
   - ☐ Deliverability from Non-Participating TOs pursuant t

2. This Interconnection Request is for (**check only one**):
   - ☒ A proposed new Generating Facility.
   - ☐ An increase in the generating capacity, repowering, Generating Facility.

3. Requested Deliverability Statuses are:

   On-Peak (for purposes of Net Qualifying Capacity -- ch
   - ☒ Full Capacity
   - ☐ Partial Deliverability for ____ % of electrical output
   - ☐ Energy Only

   Off-Peak: (for Projects Containing Wind or Solar -- ch
   - ☒ Off-Peak Deliverability
   - ☐ Economic Only

Attachment A, Generating Facility Data
to GIDAP Appendix 1 Interconnection Request

GENERATING FACILITY DATA

California ISO

	CAISO Public Document
	Version: 13.2
	Last Updated: Feb 25, 2020

Project Information Completed by Interconnection Customer (Must match Appendix 1)

Project Name	
Q# (if assigned)	
Interconnection Customer Name	
Interconnection Customer Contact	
Requested Point of Interconnection (POI)	

Please read the instructions below!

Table of Contents	**Descriptions**
Instructions	Project Specific Information (above) & Guidelines for this document
I. Project Configuration	Project Data Input
II. Technical Validation	Validation Calcs based on Project Data input on Tab I.
III. Power Flow Model	Power Flow Model Tool
IV. Dynamic Model	Dynamic Model Data Tool
V. IR Validation & Comments	IR Review and Validation questions and verifications

Attachment A Project Configuration tab

- Project data and information
- Fill in Section I, II and all other applicable sections consistent with Appendix 1

			0	
Item #		UNITS		
	I. Overall Project MW Information			
I.1	Total Generating Facility gross capacity	MVA	0	
I.2	Total Generating Facility gross output	MW		*The gross MW output to achieve requested MW at POI*
I.3	Generating Facility Auxiliary Load	MW		
I.4	Project net capacity at Generating Facility	MW	0	
I.5	Anticipated Losses between the Generating Facility and POI	MW		*include all transformer and line losses between the generating units and the POI at total Generating Facility gross output as calculated by the power flow model in .epc file*
I.6	Desired net output at POI	MW	0	*must match MW value derived from power flow model in .epc file*
I.7	Standby Load when Generating Facility is off-line	MW		
I.8	For combined cycle plants, specify the plant net output capacity for an outage of the steam turbine or an outage of a single combustion turbine	MW		

	II. Individual Generating Facility Characteristics									
II.1	**Generating Facility Name**		BESS	Solar-BESS	Gen Type3	Gen Type5	Gen Type6	Gen Type7	Gen Type8	Gen Type9	Gen TypeX
II.2	Technology *(Tip box on the right)*									
II.3	Type (*Tip box on the right*)									
II.4	Manufacturer									
II.5	Model Name									
II.6	Model Number									
II.7	Version (if applicable)									
II.8	Year Manufactured									
II.9	Number of Individual Generators or Inverters									
II.10	Nominal Terminal Voltage	kV								
II.13	Expected average high ambient temperature for the site	°C								
II.11	Individual generator rated MVA **at the temperature above**	MVA								
II.12	Individual generator rated MW **at the temperature above**	MW								
II.14	Individual generator power factor at rated MW									
II.15	Individual generator power factor regulation range at rated MW output	Leading (-)								
II.16		Lagging (+)								
II.17	Generator Voltage Regulation Range (+/-)	%								
II.18	Phase									
II.19	Connection									
II.20	ACTION REQUIRED:	Please submit generator reactive capability curves								

Tips:
Use "paste value only" to copy and paste;
Use "clear content" to remove content.

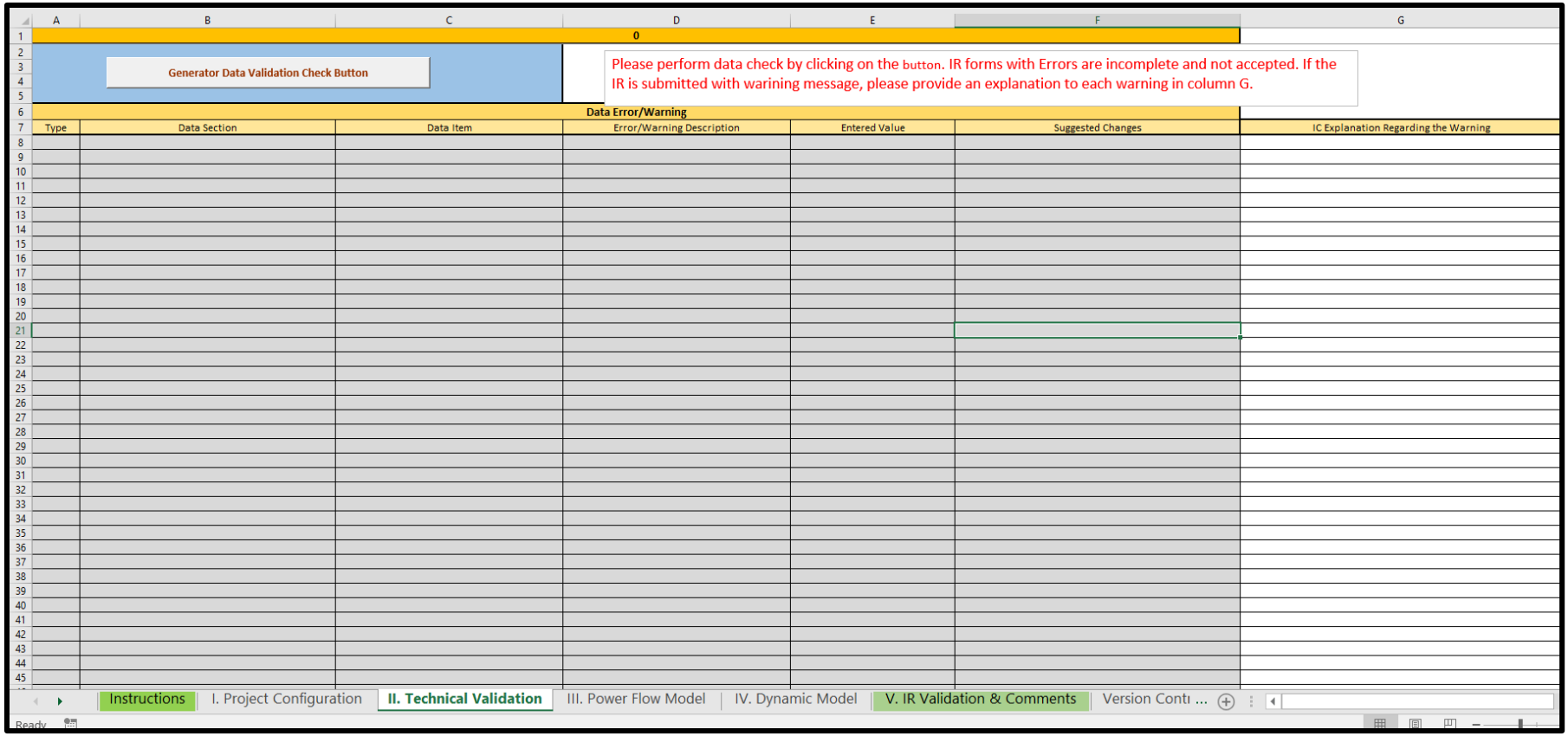
Click here to proceed.

Please click this button after filling out or modifying Section II data.

Show All Sections Below

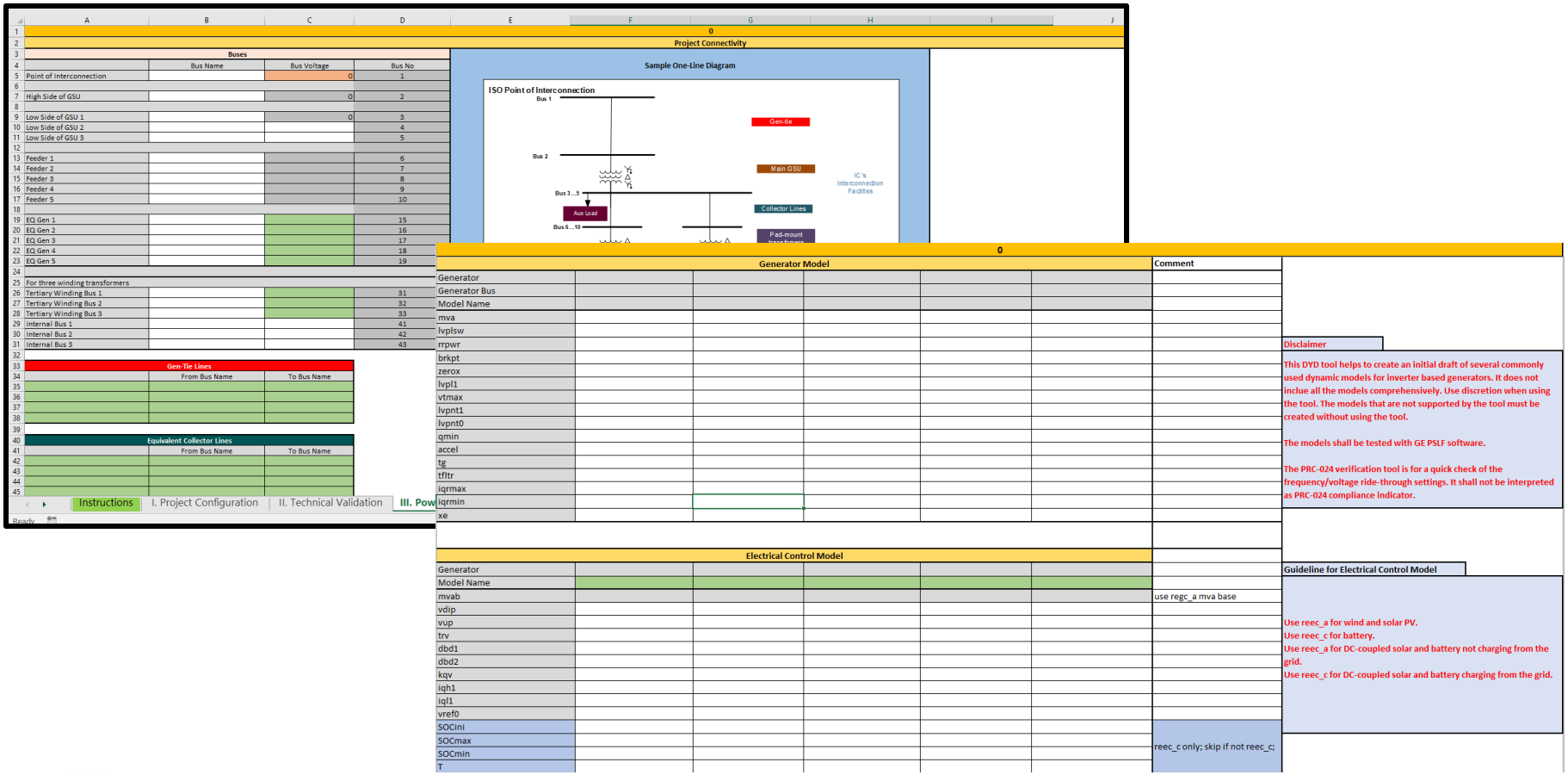
Attachment A Technical Validation tab

- Provides feedback on errors or missing data on Project Configuration tab
- All errors must be corrected before submitting form
- All warning messages must provide an explanation



Attachment A Power Flow and Dynamic Model tabs

- Powerflow and dynamic data input and output
- Tools to help create *.epc and *.dyd files (use of tool is optional)
- May not fit all project configurations and must be tested before submission



Buses

	Bus Name	Bus Voltage	Bus No
Point of Interconnection		0	1
High Side of GSU		0	2
Low Side of GSU 1		0	3
Low Side of GSU 2			4
Low Side of GSU 3			5
Feeder 1			6
Feeder 2			7
Feeder 3			8
Feeder 4			9
Feeder 5			10
EQ Gen 1			15
EQ Gen 2			16
EQ Gen 3			17
EQ Gen 4			18
EQ Gen 5			19
For three winding transformers			
Tertiary Winding Bus 1			31
Tertiary Winding Bus 2			32
Tertiary Winding Bus 3			33
Internal Bus 1			41
Internal Bus 2			42
Internal Bus 3			43

Gen-Tie Lines

From Bus Name	To Bus Name

Equivalent Collector Lines

From Bus Name	To Bus Name

Project Connectivity

Sample One-Line Diagram

Instructions | I. Project Configuration | II. Technical Validation | III. Pow

Ready

0

Generator Model						Comment
Generator						
Generator Bus						
Model Name						
mva						
lvplsw						
rrpwr						
brkpt						
zerox						
lvpl1						
vtmax						
lvpnt1						
lvpnt0						
qmin						
accel						
tg						
tfltr						
iqrmax						
iqrmin						
xe						

Electrical Control Model						
Generator						
Model Name						
mvab						use regc_a mva base
vdip						
vup						
trv						
dbd1						
dbd2						
kqv						
iqh1						
iql1						
vref0						
SOCini						reec_c only; skip if not reec_c;
SOCmax						
SOCmin						
T						

Disclaimer

This DYD tool helps to create an initial draft of several commonly used dynamic models for inverter based generators. It does not inclue all the models comprehensively. Use discretion when using the tool. The models that are not supported by the tool must be created without using the tool.

The models shall be tested with GE PSLF software.

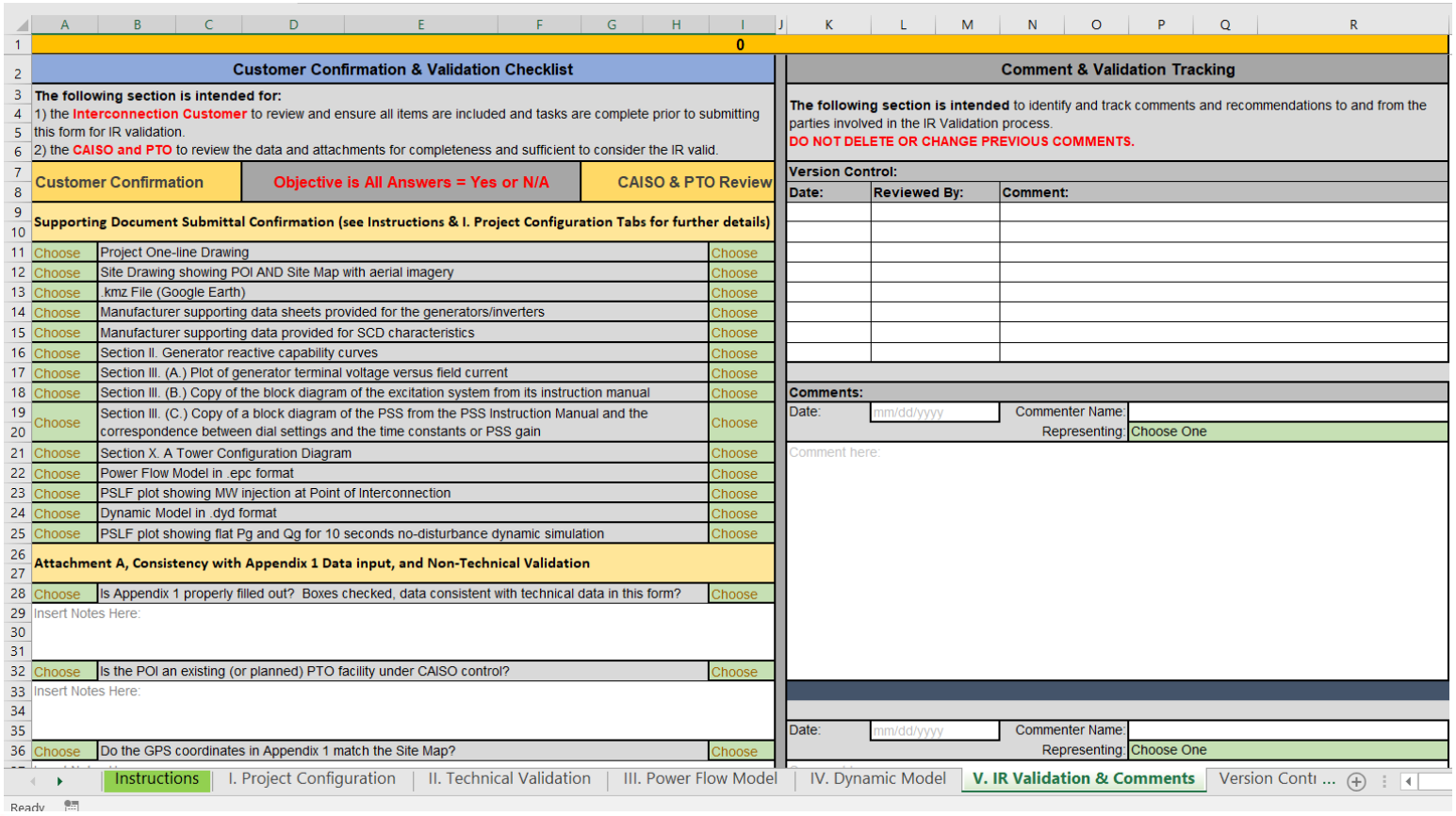
The PRC-024 verification tool is for a quick check of the frequency/voltage ride-through settings. It shall not be interpreted as PRC-024 compliance indicator.

Guideline for Electrical Control Model

Use reec_a for wind and solar PV.
Use reec_c for battery.
Use reec_a for DC-coupled solar and battery not charging from the grid.
Use reec_c for DC-coupled solar and battery charging from the grid.

Attachment A IR Validation & Comments tab

- Interconnection Customer to confirm prior to IR submission – make a selection in all question boxes in Column A
- ISO & PTO to confirm during IR validation process



Customer Confirmation & Validation Checklist		
The following section is intended for: 1) the **Interconnection Customer** to review and ensure all items are included and tasks are complete prior to submitting this form for IR validation. 2) the **CAISO and PTO** to review the data and attachments for completeness and sufficient to consider the IR valid.		
Customer Confirmation	**Objective is All Answers = Yes or N/A**	**CAISO & PTO Review**
Supporting Document Submittal Confirmation (see Instructions & I. Project Configuration Tabs for further details)		
Choose	Project One-line Drawing	Choose
Choose	Site Drawing showing POI AND Site Map with aerial imagery	Choose
Choose	.kmz File (Google Earth)	Choose
Choose	Manufacturer supporting data sheets provided for the generators/inverters	Choose
Choose	Manufacturer supporting data provided for SCD characteristics	Choose
Choose	Section II. Generator reactive capability curves	Choose
Choose	Section III. (A.) Plot of generator terminal voltage versus field current	Choose
Choose	Section III. (B.) Copy of the block diagram of the excitation system from its instruction manual	Choose
Choose	Section III. (C.) Copy of a block diagram of the PSS from the PSS Instruction Manual and the correspondence between dial settings and the time constants or PSS gain	Choose
Choose	Section X. A Tower Configuration Diagram	Choose
Choose	Power Flow Model in .epc format	Choose
Choose	PSLF plot showing MW injection at Point of Interconnection	Choose
Choose	Dynamic Model in .dyd format	Choose
Choose	PSLF plot showing flat Pg and Qg for 10 seconds no-disturbance dynamic simulation	Choose
Attachment A, Consistency with Appendix 1 Data input, and Non-Technical Validation		
Choose	Is Appendix 1 properly filled out? Boxes checked, data consistent with technical data in this form?	Choose
Insert Notes Here:		
Choose	Is the POI an existing (or planned) PTO facility under CAISO control?	Choose
Insert Notes Here:		
Choose	Do the GPS coordinates in Appendix 1 match the Site Map?	Choose

Comment & Validation Tracking		
The following section is intended to identify and track comments and recommendations to and from the parties involved in the IR Validation process. **DO NOT DELETE OR CHANGE PREVIOUS COMMENTS.**		
Version Control:		
Date:	**Reviewed By:**	**Comment:**

Comments:

Date: mm/dd/yyyy — Commenter Name: — Representing: Choose One

Comment here:

Date: mm/dd/yyyy — Commenter Name: — Representing: Choose One

Instructions | I. Project Configuration | II. Technical Validation | III. Power Flow Model | IV. Dynamic Model | V. IR Validation & Comments | Version Contı ...

Ready

Voltage Ride-Through Requirement for Asynchronous Generating Facilities

Voltage Ride-through Capability

1. Remain online for voltage disturbance
2. Momentary cessation is prohibited unless when the transient high voltage ≥ 1.2 pu
3. For transient low voltage conditions, inject reactive current proportional to terminal voltage reduction and reaches full reactive current at voltage of 0.5 pu
4. For transient high voltage between 1.0 pu and 1.2 pu, absorb reactive current
5. Automatically transition to normal current injection upon voltage recovery to 0.9 pu ~ 1.1 pu and ramp up active current at a minimum ramp rate of 100% per second

Voltage Ride-through Capability

6. Inverters may not trip or cease current injection for momentary loss of the phase lock loop
7. Following an inverter trip, make at lease one attempt to resynchronize with 2.5 min unless tripped due to a fatal fault code
8. Coordinate inverter controls with plant level controller

Diagnostic Equipment Requirements for Inverter-based Generation

For plants with net export > 20 MW

1. Plant level data: monitor plant voltage, current and power factor, and any plant protective relay trips.
2. Inverter level data: record ride through events and phase lock loop status
3. Time synchronization of data (1 mSec)
4. Data retention: retain data for 30 calendar days
5. Data reporting: provide data within 10 calendar days
6. Install a PMU or equivalent (minimum 30 samples per sec). Real time telemetry is not required.

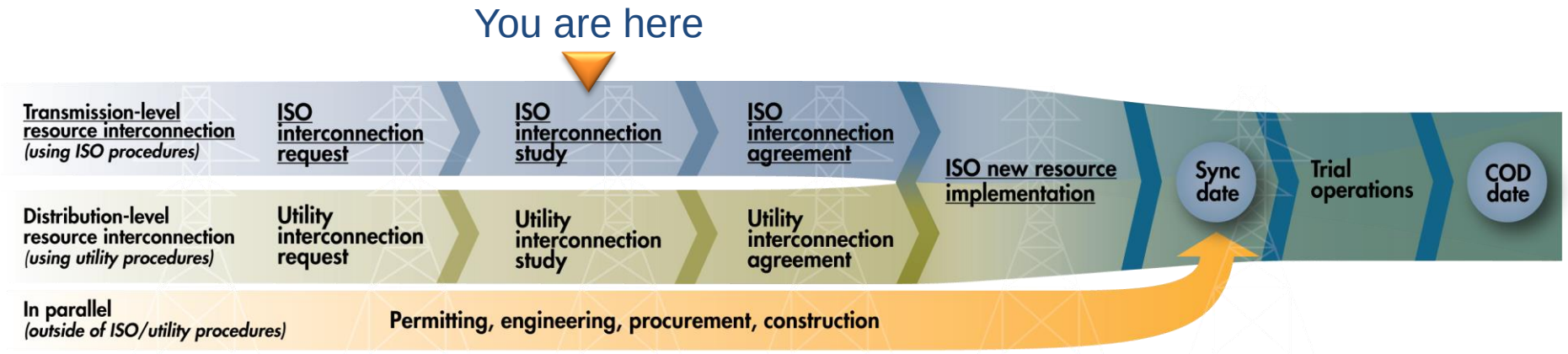
Questions?

Studies & Study Results

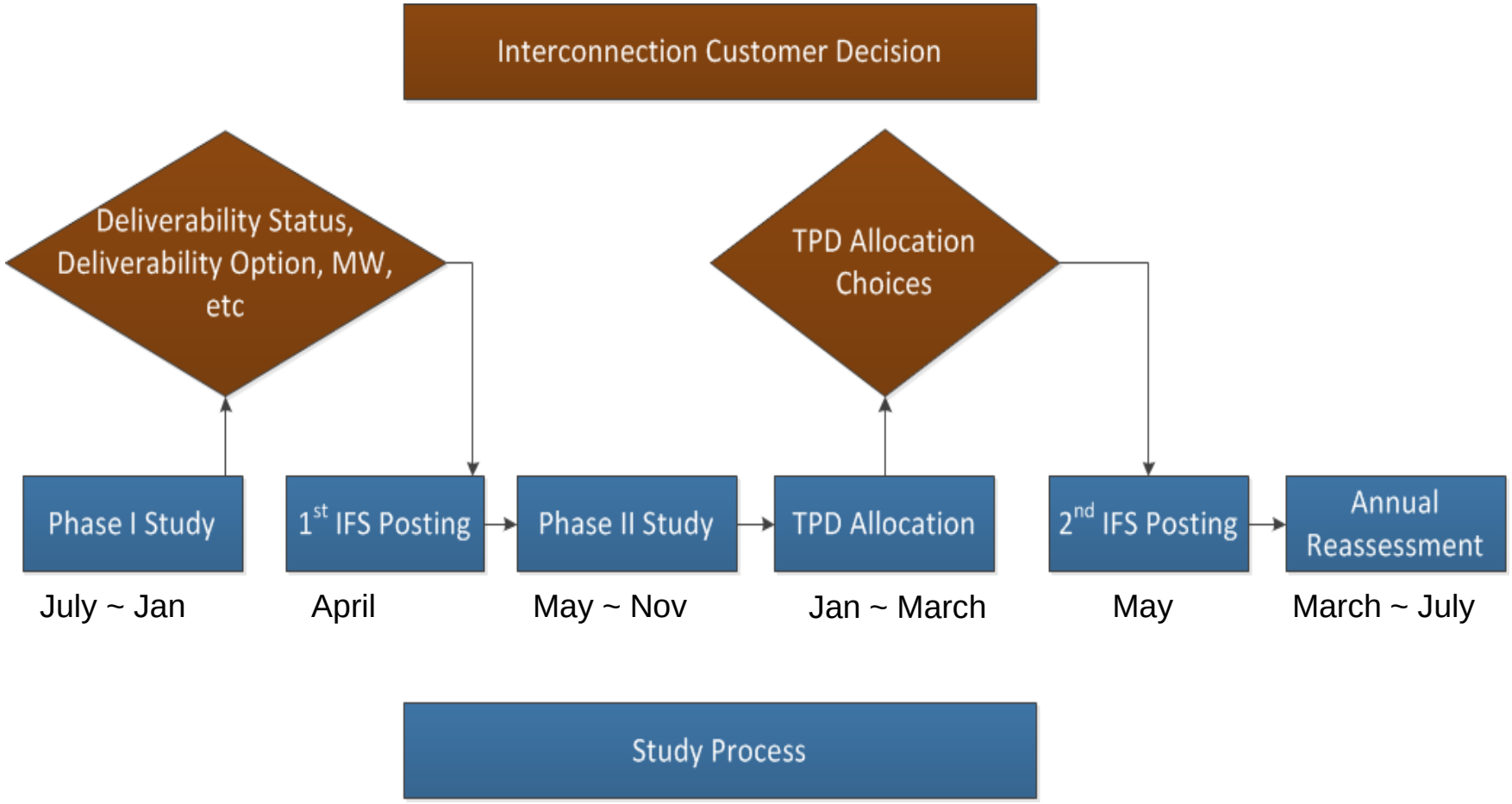
Objective – Studies, Study Results

- Understand the study processes and study results
- Understand generation deliverability
- Understand different types of network upgrades
- Understand cost allocation and cost responsibilities
- Understand requirements for posting financial security

Interconnection Process Map



Generation Interconnection Study Process-General Timeline



Acronyms:
IFS - Interconnection Financial Security
TPD – Transmission Plan Deliverability

Scope of Interconnection Studies

- Deliverability Assessment
  - On-Peak Deliverability Assessment
  - Off-Peak Deliverability Assessment

- Reliability Assessment
  - Power Flow Contingency Analysis
  - Post-Transient Stability Analysis
  - Transient Stability Analysis
  - Energy Storage Charging Analysis
  - Short Circuit Analysis

Deliverability Assessment

	On-Peak	Off-Peak
Purpose	Ensure system reliability, i.e. generation capacity is not constrained by the transmission capability when needed for reliability; for Resource Adequacy purpose	Address renewable curtailment due to local transmission constraints
Resources under Test	FCDS/PCDS	Wind and Solar
Load Condition	Summer peak sale and peak consumption	55% ~ 60% of summer peak sale; corresponding to load levels in many hours in all seasons
Non-intermittent Resources	QC	Historical minimum
Intermittent Resources	Low to medium output per methodology	Medium to high output per methodology

Deliverability Statuses

- On-Peak: for Resource Adequacy (RA)
  - Full Capacity Deliverability Status (FCDS), Partial Capacity Deliverability Status (PCDS) or Energy-Only (EO)
  - FCDS and PCDS resources can count for Resource Adequacy; EO can't
- Off-Peak*: Reduces curtailment risk; not required for RA
  - Off-Peak Deliverability Status (OPDS) or Economic Only (ECO)
  - OPDS resources can self-schedule; ECO can't self-schedule except for self-scheduling in RTM up to DAM award

* Pending FERC approval

On-Peak Deliverability Assessment

- Ensure generation capacity is not constrained by the transmission when needed for system reliability
- Two study scenarios that align the generation outputs with the load conditions when the system capacity needs are the highest
- Two types of constraints and associated upgrades are identified
  - Local Delivery Network Upgrades for local constraints
  - Area Delivery Network Upgrades for area constraints

Area Constraints and Transmission Plan Deliverability (TPD)

- For each area constraint, a Transmission Plan Deliverability (TPD) is calculated
  - Renewable portfolios are developed by the CPUC and then utilized in the ISO Transmission Planning Process (TPP)
  - ISO TPP approves new transmission upgrades to meet reliability, economic planning and policy needs
  - The transmission system with the TPP approved transmission upgrades provides capability to support a certain level of generation deliverability behind each area constraint, which is called Transmission Plan Deliverability (TPD)

Deliverability Option Associated with FCDS/PCDS

- Option (A)
  - The interconnection request requires Transmission Plan Deliverability to move forward
- Option (B)
  - The interconnection customer is willing to fund ADNUs if they fail to receive a TPD allocation

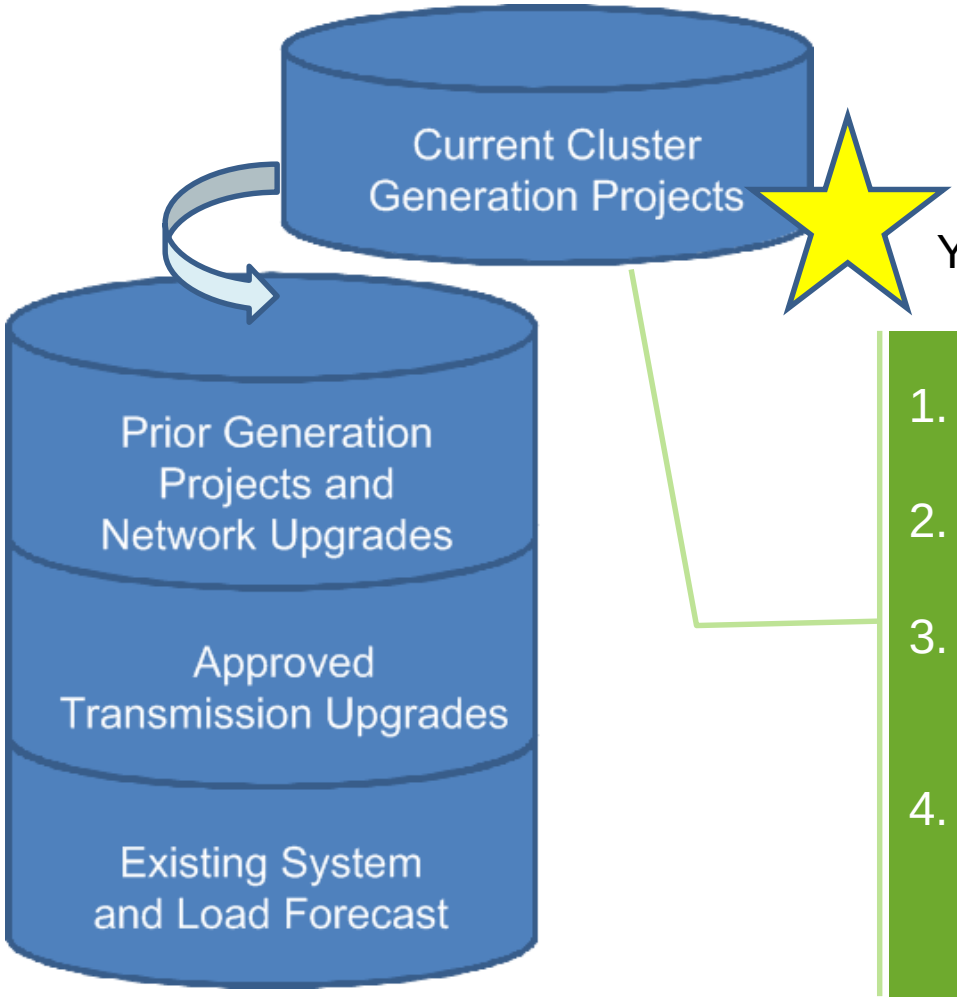
Questions?

Study Process

Phase I and Phase II Studies

Phase I and Phase II Studies – Model Development

Study Assumptions



Your project is here!

1. Cluster projects in ISO Queue
2. Cluster projects in WDAT Queue
3. ISP projects requesting deliverability in ISO Queue
4. ISP projects requesting deliverability in WDAT Queue

Acronyms:
WDAT – Wholesale Distribution Access Tariff
ISP – Independent Study Process

Phase I and Phase II Studies

Studies are performed based on applicable ISO Tariff and in coordination with the applicable PTOs

- Deliverability Assessment
  - Generating Mode
    - On Peak
    - Off-Peak
- Reliability Assessment
  - Generating Mode (Simultaneous maximum generation)
    - On Peak
    - Off-Peak
  - Charging Mode (Simultaneous max charging)
    - Peak or Shoulder Peak
    - Off-Peak

Additional Phase II Operational Study

Current Cluster date-based transmission assessment is performed.

- Year by year peak deliverability assessments
- Year by year reliability assessments
- One study model per study year
- Transmission upgrades are modeled according to their in-service dates
- Generation projects are modeled according to their commercial operation dates

Phase I and Phase II Studies – what to expect out of the studies

- Facilities required to interconnect the project
  - Some are PTO's Interconnection Facilities (IF)
  - Some are Interconnection Reliability Network Upgrades (IRNU)
- Upgrades to mitigate adverse impacts and deliver power to the grid
  - General Reliability Network Upgrades (GRNU)
  - Local Delivery Network Upgrades (LDNU)
  - Area Delivery Network Upgrades (ADNU)
  - Local Off Peak Delivery Network Upgrades (LOPNU)
  - Area Off Peak Delivery Network Upgrades (AOPNU)

Phase I and Phase II Studies – what to expect out of the studies (Cont'd)

- Estimated costs and construction time for IFs and NUs
- Potential Affected System impacts and coordination

Purposes of Network Upgrades

IRNU	Achieve physical interconnection to the grid e.g. equipping a bus position at the POI substation to terminate the gen-tie
GRNU	Mitigate reliability impacts e.g. circuit breaker upgrades, RAS
LDNU	Mitigate local deliverability constraints to be able to count for Resource Adequacy e.g. line reconductoring needed for a few generators in a small localized area
ADNU	Increase generation deliverability behind an area constraint e.g. a major upgrade to provide incremental deliverability for generators spread in a wide area
LOPNU	Mitigate local transmission constraints due to high wind and solar output
AOPNU	Relieve area transmission constraints due to high wind and solar output (information only)

Applicability of Network Upgrades

IRNU	All interconnection requests
GRNU	All interconnection requests
LDNU	FCDS/PCDS interconnection requests
ADNU	Option B FCDS/PCDS interconnection requests
LOPNU	OPDS interconnection requests that contain wind or solar*
AOPNU	For information only

* Pending FERC approval

Affected Systems

- The ISO does not comprehensively study the impacts on Affected Systems
- The Interconnection Customer shall:
  - cooperate with the ISO in all matters related to the Affected System studies,
  - enter into a study agreement with the Identified Affected System Operator to evaluate potential impacts on the Identified Affected System, and
  - pay for necessary studies and any upgrades necessary to mitigate the impacts of the interconnection on the Identified Affected Systems

Questions?

Study Process

Annual Reassessment

TPD Allocation

- All projects must meet the criteria for one of the seven allocation groups (eligible) to receive TPD allocation
- In an electrical area ***without*** ***binding area constraints***, all eligible projects receive TPD allocation
- In an electrical area ***with*** ***binding area constraints***
  - TPD is first reserved for prior commitments;
  - TPD is then allocated to current generation projects in the electrical area based on the grouping and ranking scores reflecting the project development status in the submitted affidavits
- Option (A) and Option (B) projects get the same treatment in the TPD allocation study

TPD Allocation (Cont.)

- If a project does not receive full allocation for its requested deliverability status
  - Option (A) projects may park the entire or a portion of the project and get a second chance of TPD allocation, and a third chance of TPD allocation if TPD is still available and not assigned NUs needed by other projects in the same or later clusters
  - Both Option (A) and Option (B) projects may change the project size or deliverability status to match the allocation

Reassessment

- The Network Upgrade requirements could change after the Phase II study due to:
  - Generation project withdrawals
  - Generation project downsizing
  - Generation project modifications allowed by the tariff
  - System condition changes, such as newly approved transmission upgrades, resource retirement, etc.
- The reassessment is completed to update the Network Upgrade requirements and cost responsibility following TPD allocation

Questions?

For Cluster 10 and prior

Cost Responsibility and Max Cost Responsibility

Cost Re-allocation in the Annual Reassessment

- NU cost re-allocation (CR)
  - If an NU is no longer needed for all projects in the reassessment, the cost is removed
  - If an NU or its alternative is needed, the cost is allocated to the remaining projects in the original responsible group *pro rata* on the Phase II cost allocation factors
- Maximum (RNU + LDNU) cost responsibility (MCR)
  - Original MCR: lower between Phase I and Phase II
  - Current MCR: maximum RNU and LDNU cost responsibility effective until the reassessment is issued
  - Updated MCR: maximum RNU and LDNU cost responsibility updated in the reassessment and effective once the reassessment is issued

Final Costs in the Annual Reassessment

- Updated maximum (RNU+LDNU) cost responsibility
  - If (CR) is at least 20% lower and at least $1M lower than the current MCR,

    updated MCR = min{*current MCR*,

    sum of 100% costs of all remaining (RNU + LDNU)}
  - If {(CR) > current MCR} and {current MCR < original MCR},

    updated MCR = min{*(CR)*, *original MCR*}
  - Otherwise, ***updated MCR*** = current MCR
- ***Current cost responsibility (CCR)*** = min {*(CR)*, *(Updated MCR)*}

Questions?

For Cluster 11 and beyond

Cost Responsibility, Max Cost Responsibility and Max Cost Exposure

Network Upgrade Groups

- Assigned Network Upgrade (ANU)

  RNUs, LDNUs and LOPNUs for which the Interconnection Customer has a direct cost responsibility.*

- Conditionally Assigned Network Upgrade (CANU)

  RNUs, LDNUs and LOPNUs whose cost responsibility is assigned to an earlier Interconnection Customer, but which may fall to the then current Interconnection Customer.

- Precursor Network Upgrade (PNU)

  Network Upgrades required for an Interconnection Customer that consist of (1) Network Upgrades whose cost responsibility is assigned to an earlier Interconnection Customer that has executed its GIA; and (2) Network Upgrades in the approved CAISO Transmission Plan.

* Inclusion of LOPNUs is pending FERC approval

Cost Responsibility Definitions

- Current Cost Responsibility (CCR)

  The sum of the Interconnection Customer's current allocated costs for ANUs, not to exceed the MCR. This cost is used to calculate the Interconnection Customer's IFS requirement.

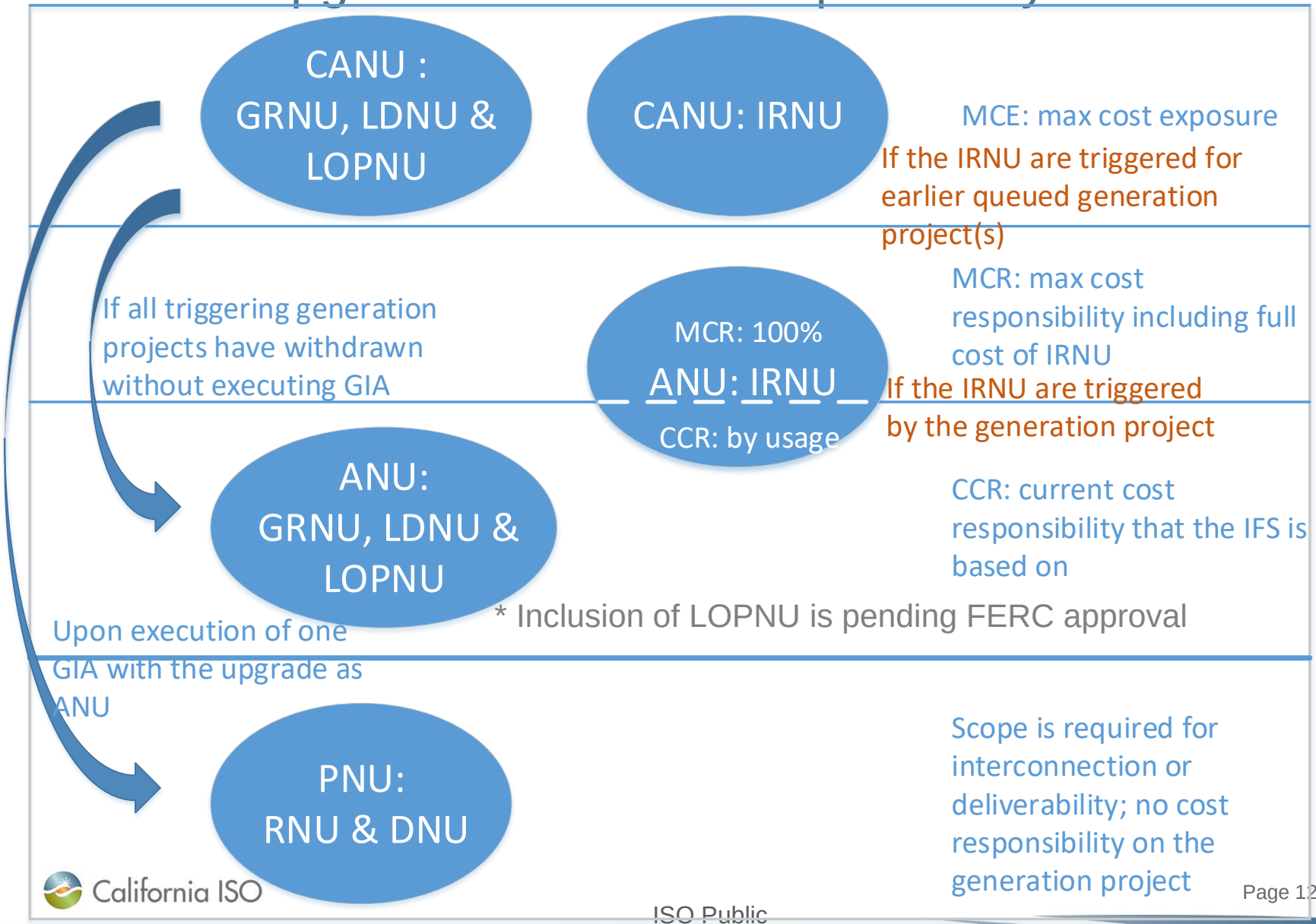
- Maximum Cost Responsibility (MCR)

  The lower sum of an Interconnection Customer's (1) full cost of assigned IRNUs and (2) allocated costs for all other ANUs, from its Phase I or Phase II Interconnection Studies, not to exceed the MCE.

- Maximum Cost Exposure (MCE)

  The sum of (1) the Interconnection Customer's MCR and (2) the cost of the Interconnection Customer's CANUs from its Phase I or Phase II Interconnection Studies.

Network Upgrades and Cost Responsibility



Phase I and Phase II Cost Allocation

- RNU, LDNU and LOPNU cost allocation

Network Upgrade Type	ANU		CANU
	CCR Allocation	MCR Allocation	MCE Allocation
IRNU	Equally divided	Full cost	Full cost
GRNU – short circuit upgrades	Pro rata by short circuit contributions		
GRNU – other	Pro rata by MWs at POI		
LDNU	Pro rata by flow impacts		
LOPNU*	Pro rata by flow impacts		

* LOPNU cost allocation is pending FERC approval

- Phase I ADNU assignment: Project MW x Cost Rate
- Phase II ADNU cost allocation for Option (B): pro rata by flow impacts

CCR, MCR and MCE at Phase I

- Upon completion of Phase I study
  - CCR = allocated ANU: basis for first IFS posting
  - MCR = full cost of IRNU + other allocated ANU
  - MCE = MCR + CANU allocation
- Option (B) interconnection requests also post IFS for assigned ADNU cost

CCR, MCR and MCE at Phase II

- Upon completion of Phase II study
  - MCR = lower between(Phase I ANU MCR + Phase I CANU converting to ANU in Phase II, Phase II ANU MCR allocation)
  - CCR = lower between (Phase II ANU CCR allocation, Phase II MCR): basis for second IFS posting
  - MCE = Phase II MCR + Phase II CANU allocation
- Option (B) interconnection requests not receiving TPD allocation also post IFS for allocated ADNU cost

  * CCR and MCE cost could be higher in Phase II than Phase I

Cost Re-Allocation in Reassessment

- For ANU in reassessment
  - If new upgrades are identified for the first time, allocate cost the same as Phase I and Phase II
  - Otherwise, re-allocate among remaining active projects by normalizing Phase II cost shares

- For CANU in reassessment
  - No re-allocation after Phase II, i.e. fixed at Phase II allocation in reassessment if still needed

CCR, MCR and MCE in Reassessment

- If a CANU is no longer needed or becomes PNU, MCE is reduced by the Phase II allocated CANU cost.
- If a CANU becomes ANU, MCR increases by the Phase II allocated CANU cost.
- If projects in the same cluster triggering an IRNU as ANU posted 3rd IFS, the MCR for other projects sharing the IRNU is reduced by the posted amount.

CCR, MCR and MCE in Reassessment (Cont'd)

- If ANU reallocation is at least 20% lower and at least $1M lower than the MCR,

  MCR = min{*MCR*, *sum of 100% costs of all remaining ANUs*}

- If ANU reallocation > MCR and MCR < Phase II MCR,

  MCR = min{ANU reallocation, Phase II MCR + Phase II CANU converted to ANU}

- *CCR = min{ANU reallocation, MCR}*

Questions?

Study Reports

Phase I and Phase II Study Reports and Addenda

- During the life-cycle of interconnection process, an IC will receive various project reports from the ISO
  - Final Phase I and Phase II study reports
  - Addendum to Phase I and/or Phase II report
    - Correction to non-substantial errors or omissions
    - Remove cost responsibility after an assigned NU is approved in TPP
    - Does not change the next IFS posting due date
  - Revised Phase I and/or Phase II reports
    - Correction to substantial errors or omissions
    - May change the next IFS posting due date

Post-Phase II Notification and Updates

- During the life cycle of interconnection process, an IC will also receive from the ISO:
  - Notification of TPD allocation results
    - Information about the TPD allocation results
  - Annual reassessment reports
    - Updated NU requirements and cost responsibility

Resources

- Deliverability assessment methodology (to be updated)

  http://www.caiso.com/Documents/PLANNING/Reliability%20requirements/Deliverability/Deliverability%20assessment%20methodologies
- TPP and TPD

  http://www.caiso.com/planning/Pages/TransmissionPlanning/Default.aspx
- Study plans, data and reports

  https://portal.caiso.com/tp/Pages/default.aspx

  (This is a secure website that requires signed NDA with the ISO and certificate)
- Network upgrade cost responsibility

  http://www.caiso.com/Documents/Upgrade-Cost-Responsibility-Implementation.pdf

Resources

- Instruction to Transmission Plan Data NDA submission

  http://www.caiso.com/Documents/RegionalTransmissionNonDisclosureAgreementSubmissionInstructions.pdf
- Regional Transmission NDA Form

  http://www.caiso.com/Documents/RegionalTransmissionNDA.pdf

Questions?

Agreements and Retirements

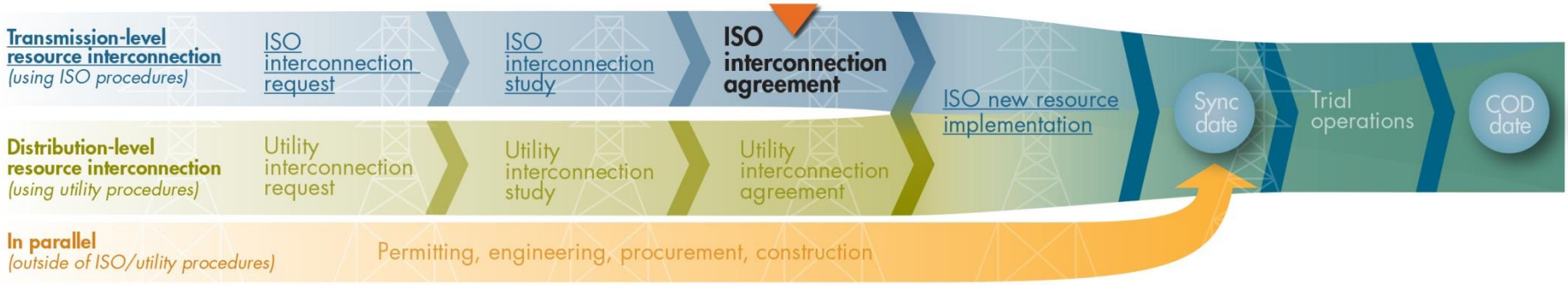
Infrastructure Contracts and Management

Riddhi Ray, Contract Negotiation
Julia Payton, Regulatory Contracts
Angela Randall, Regulatory Contracts

March 11, 2020

Interconnection Process Map

You are here



Contract Negotiation

Riddhi Ray, Sr. Contracts Negotiator

Generator Interconnection Agreement (GIA)

- A Project interconnecting to the CAISO Controlled Grid shall execute a Generator Interconnection Agreement (GIA) between the Interconnection Customer, the Participating TO, and the CAISO

- The GIA consists of:
  - Pro forma approved by Federal Energy Regulatory Commission
  - Appendices specific to an Interconnection Customer and Generating Facility at a single Point of Interconnection
  - The GIA is specific to an interconnection customer and its generating facility and may cover more than one Resource ID and CAISO Queue Position

- A Project interconnecting to the non-CAISO controlled grid may execute an agreement with the Participating TO or the Utility Distribution Company (UDC)

Generating Unit Conversions to the CAISO Markets

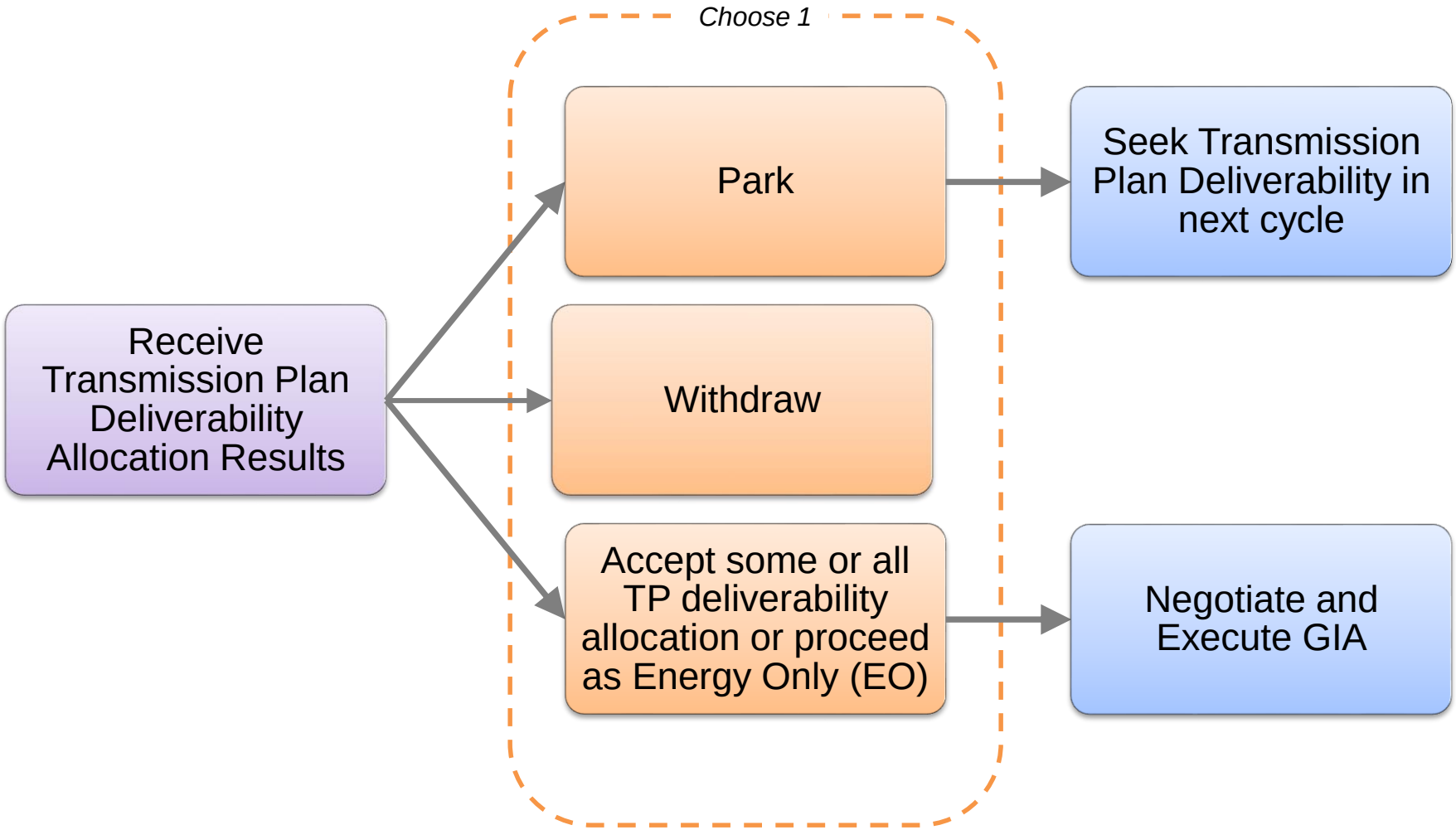
- Qualifying Facilities (QFs) and other existing generators usually convert in accordance with Section 25.1.2 of CAISO Tariff, upon termination or expiration of their power purchase agreements and interconnection agreements

- Details about the process for can be found at the following link: http://www.caiso.com/participate/Pages/ResourceInterconnectionGuide/default.aspx

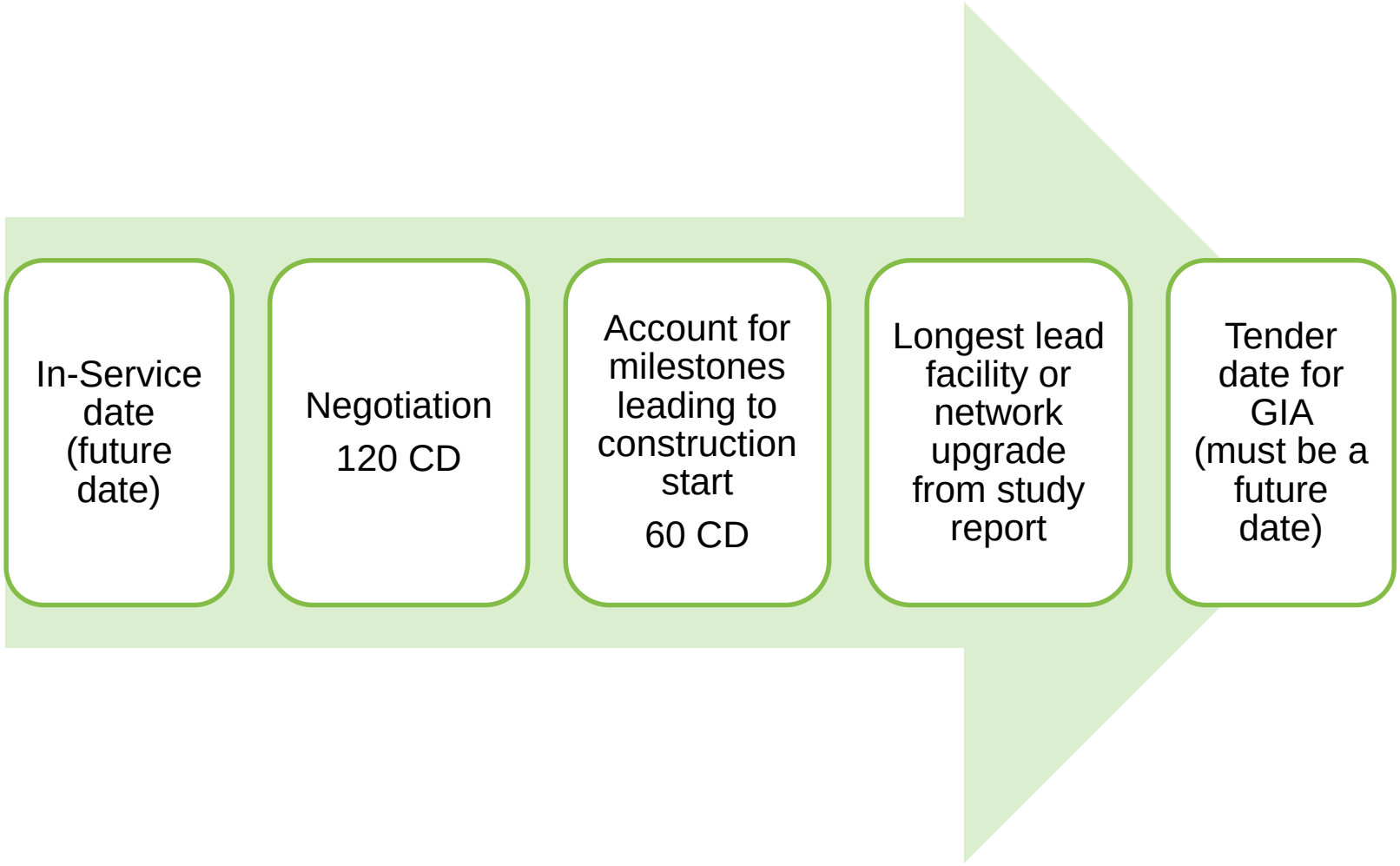
- An email request to RegulatoryContracts@caiso.com initiates the conversion process

- Generating Unit conversions require completion of the New Resource Implementation process

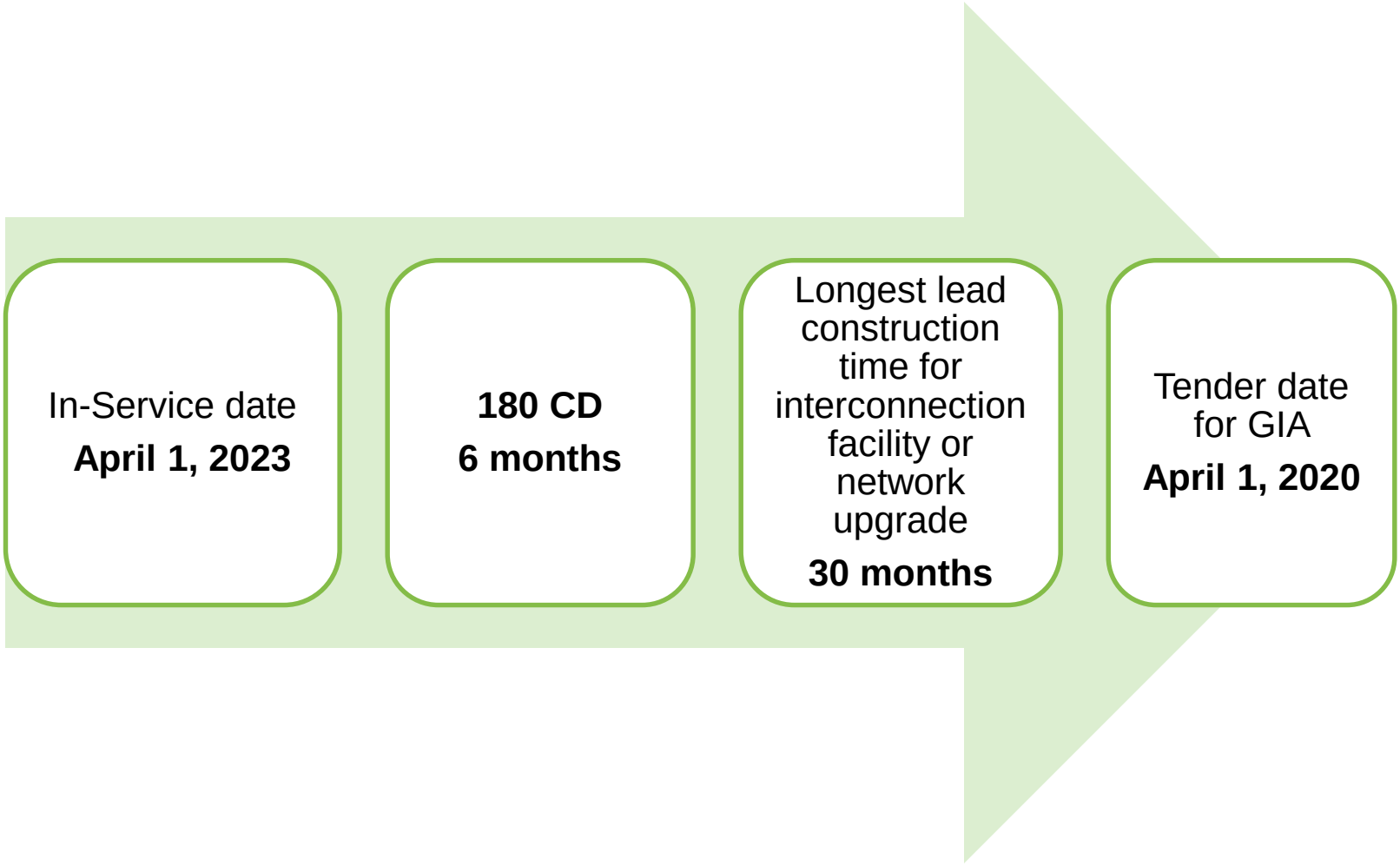
GIA Implications for Transmission Plan Deliverability Allocation Choices



GIA Tender


In-Service date (future date)
Negotiation 120 CD
Account for milestones leading to construction start 60 CD
Longest lead facility or network upgrade from study report
Tender date for GIA (must be a future date)

GIA Tender (Calculation Example)



GIA Negotiation

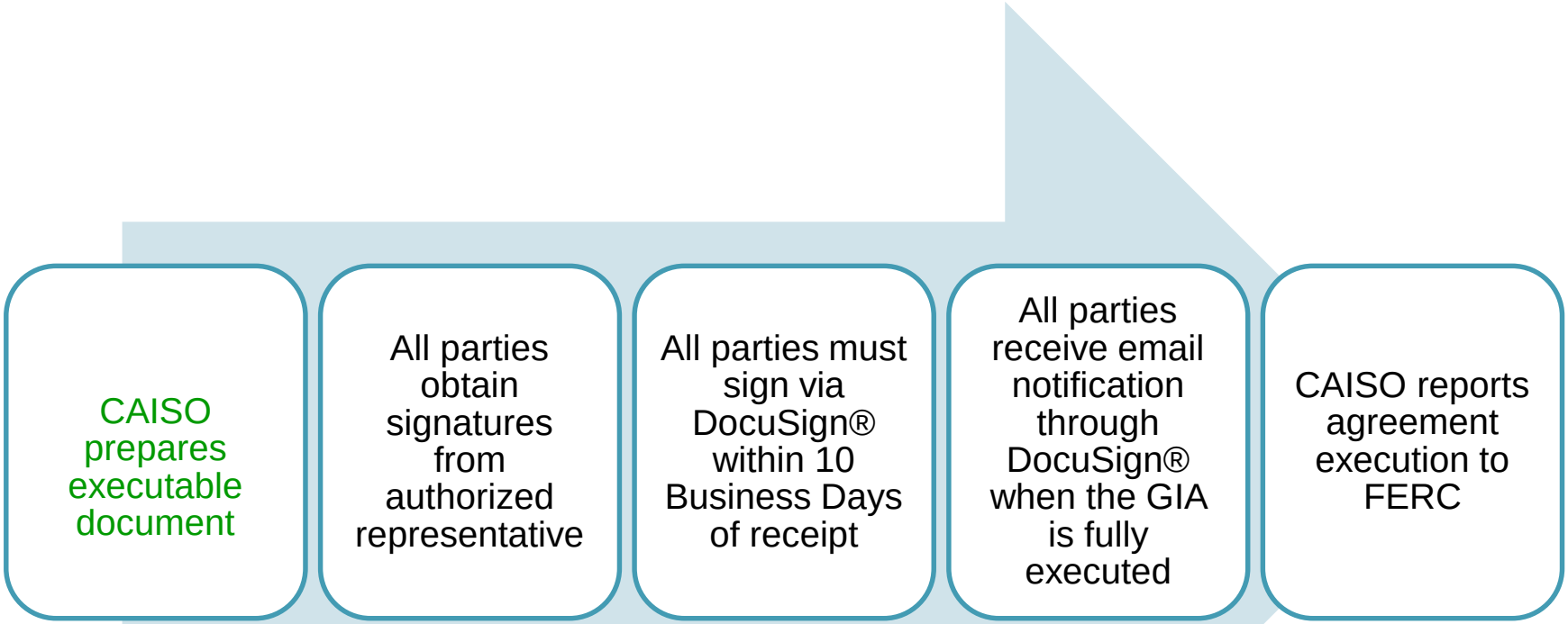
- Participating TO tenders the GIA and all parties negotiate the GIA to finalization
- Participating TO sends execution ready GIA to CAISO following finalization and approval by all parties
- CAISO contract negotiator receives signatory information from the Participating TO and Interconnection Customer, and sends the package to CAISO regulatory contracts to process for execution

Questions?

Regulatory Contracts
Agreement Execution and Changes

Julia Payton, Contracts Analyst

GIA Execution Process



- Agreement are distributed for execution via email through DocuSign.
- Final version of executed GIA is available for parties to download or print
- DocuSign Account is not mandatory in order to use their service

Market Agreements

- Terms for participating in CAISO markets
  - Participating Generator Agreement (PGA) or Net Scheduled Participating Generator Agreement (NSPGA)
  - Participating Load Agreement (PLA) (e.g., pumps, pump-generating, energy storage)
  - Meter Service Agreement for a CAISO Metered Entity (MSACAISOME)
  - Meter Service Agreement for Scheduling Coordinators (MSASC)
  - Scheduling Coordinator Agreement (SCA)

Contract Changes

Submit requests to RegulatoryContracts@caiso.com

Changes to Customer Information

- Assignments to affiliates and non affiliates
  - Assignee must meet the PTO's Interconnection Financial Security ("IFS") posting requirements
- Entity Name changes only
- Ownership changes

Required Documentation (varies on type of change)

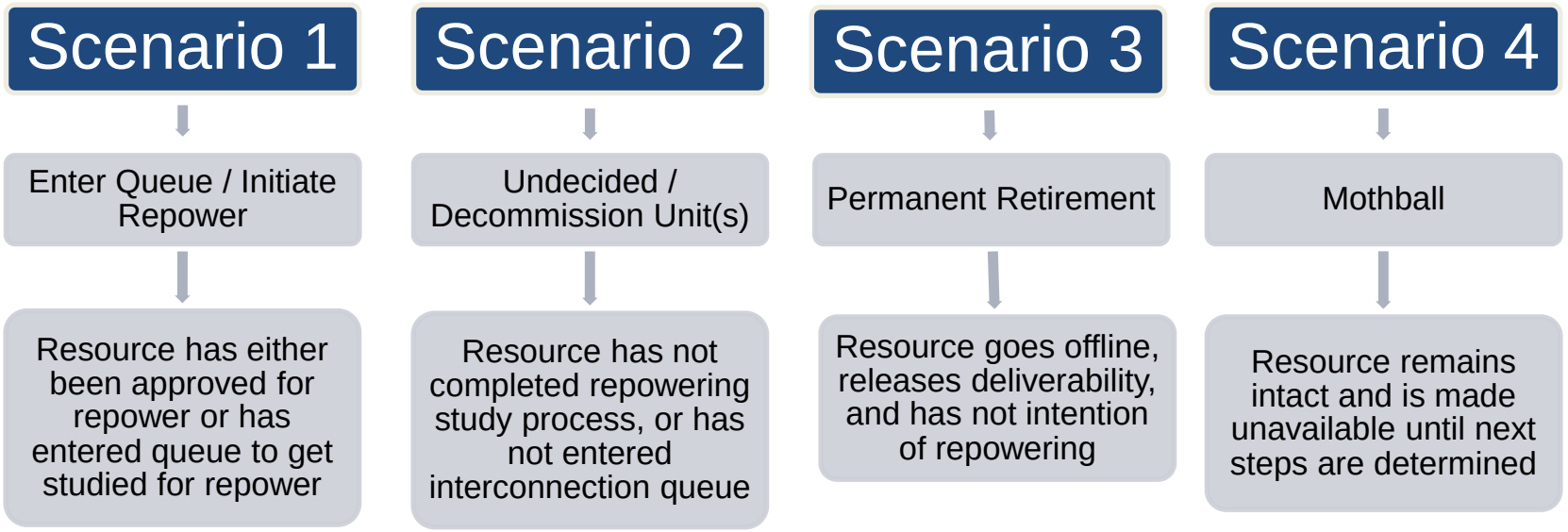
- Secretary of State certificate
- Proof of ownership
  - Sale agreement
  - Membership interest agreement

Questions?

Regulatory Contracts
Resource Retirements

Angela Randall, Sr. Contracts Administrator

Resource Retirements – Scenarios



Resource Retirements – Deliverability Retention

Deliverability Retention Period
3 years from effective date

CAISO receives notarized *Notice of Retirement or Mothball Affidavit* and formal retirement request

Deliverability Study Assessment results are available within 90 calendar days.

Depending on which scenario the retirement falls under, the generator owner *may* have specific actions to take during the Deliverability Retention Period.

Retirement requests must be submitted to RegulatoryContracts@caiso.com at least 90 calendar days prior to effective date.

Resource Retirements – Affidavit for Retirement

Notice of Generating Unit Retirement or Mothball Affidavit

- Must be turned in alongside the retirement request.
- Affidavit will be reviewed by Regulatory Contracts for completion and accuracy.
- Regulatory Contracts reserves the right to request further information in order to process the retirement request.
- Retirement cannot be approved unless documentation is verified and/or notarized

Notice of Generating Unit Retirement or Mothball

Including Rescission of Retirement or Mothball

This is a notification of the retirement or mothballing of a Generating Unit in accordance with Section 41 of the CAISO Tariff and the CAISO BPM for Generator Management. An electronic copy of this completed form should be sent to the CAISO at RegulatoryContracts@caiso.com.

The CAISO may request additional information as reasonably necessary to support its review of planned non-operations.

Legal Owner of the Generating Unit: _____

Legal Owner's state of organization or incorporation: _____

Name of Scheduling Coordinator:_____

Identity of Generating Unit(s) Subject to Retirement/Mothball (Resource Name, Resource ID): _____

_____

Category of Retirement: _____

Reason for retirement: _____

Pursuant to the terms of the CAISO Tariff, Owner hereby certifies that:

[ ] In accordance with the Business Practice Manual for Generator Management, it is retiring the Generating Unit effective _____ [month],_____ [day], _____ [year]. The Generating Unit does not have a contract for Resource Adequacy Capacity for [check one or both] _____ the current year and/or _____ the upcoming year, it is uneconomic for the Generating Unit to remain in service for such year(s), and the decision to retire is definite unless the CAISO procures the Generating Unit, the Generating Unit is sold to an unaffiliated third-party, a third-party contracts with the Generating Unit for Resource Adequacy purposes, or the Generating Unit obtains some other contract.

[ ] In accordance with the Business Practice Manual for Generator Management, it is retiring the Generating Unit effective _____ [month], _____ [day], _____ [year]. The Generating Unit does not have a contract for Resource Adequacy Capacity for [check one or both] _____ the current year and/or _____ the upcoming year, it is retiring the Generating Unit for reasons other than it is uneconomic for the unit to remain in service during such year(s).

Owner is retiring the Generating Unit for the following reason(s) (state with specificity the reason for retiring the unit):

_____

Resources

- Contracts and agreements
  http://www.caiso.com/rules/Pages/ContractsAgreements/Default.aspx
- Generating unit conversion process (located under “Already connected?”)
  http://www.caiso.com/participate/Pages/ResourceInterconnectionGuide/default.aspx
- Reliability Requirement information
  http://www.caiso.com/planning/Pages/ReliabilityRequirements/Default.aspx
- Business Practice Manual for Generator Management
  https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Generator Management
- Notice of Generating Unit Retirement or Mothball Affidavit
  http://www.caiso.com/Documents/Notice-GeneratingUnitRetirement-Mothball.docx
- Announced Retirement and Mothball List:
  http://www.caiso.com/Documents/AnnouncedRetirementAndMothballList.xlsx

Questions?

Thank you!

- If you have any further questions on the content in this presentation, please send them to

  RegulatoryContracts@caiso.com

California ISO

RESOURCE INTERCONNECTION FAIR

Queue Management

Ryan Cox, Associate Queue Management Specialist

March 11, 2020

Agenda

- Contract Implementation
- Affected Systems
- Modifications
  - Commercial Viability
  - Energy Storage
  - The Batch MMA Process
- Suspensions
- Repowering and Limited Operation Studies
- COM vs COD

Queue Management Overview

- Part of Infrastructure Contracts and Management
  - Regulatory Contracts
  - Contract Negotiators
- Project management responsibility after Generator Interconnection Agreement (GIA) execution
- Coordination with New Resource Implementation (NRI)

Contract Implementation

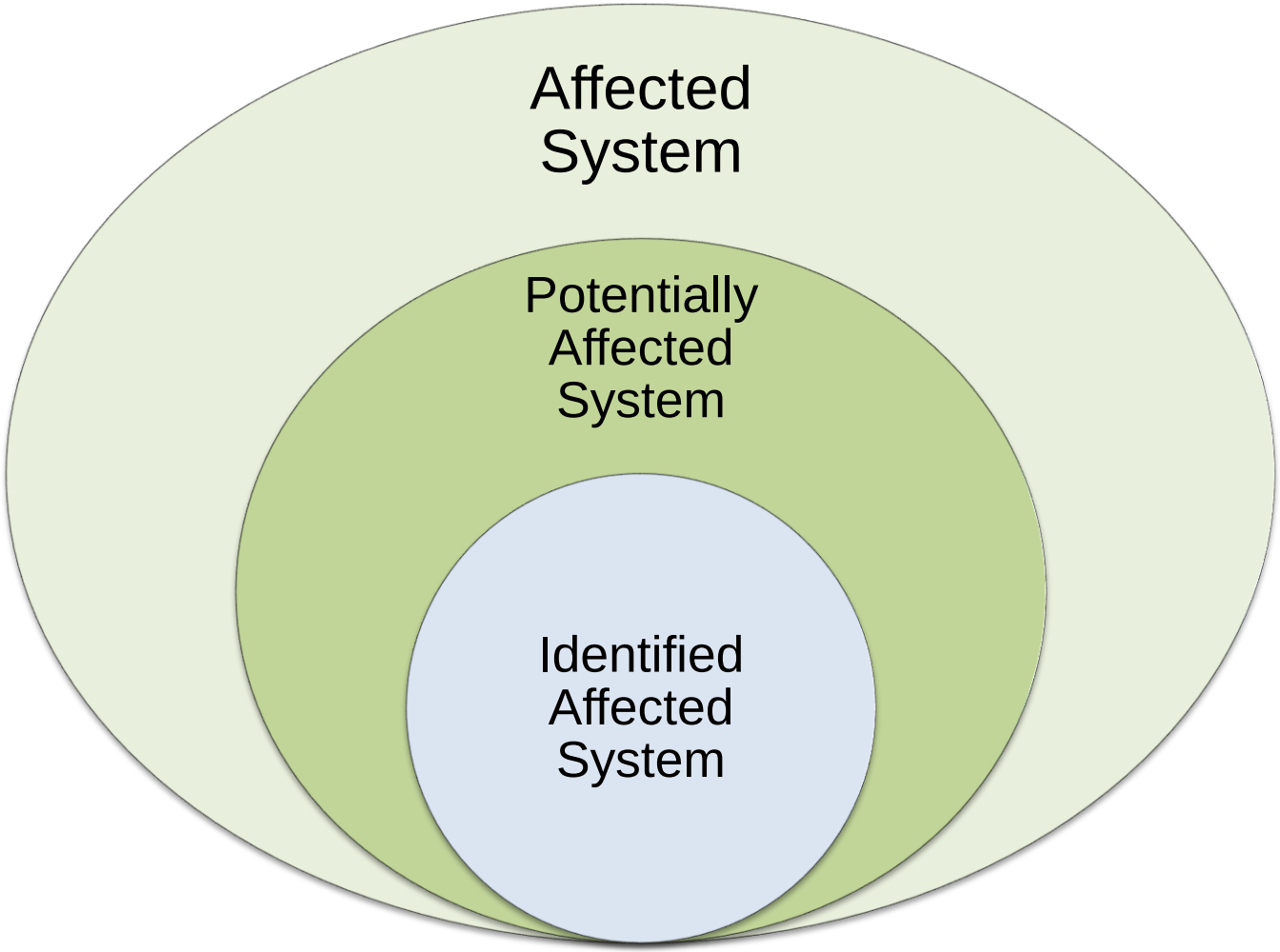
GIA Milestone tracking

- Interconnection Customers must meet the project milestones in their GIA to be in good standing
  - Deliverability may not be reserved for projects not in good standing
- Interconnection Customers provide quarterly project progress reports to Queue Management after the GIA is effective

Contract Implementation cont.

- Prior to Initial Synchronization and COD Queue Management verifies GIA obligations have been met
  - Upgrades
  - Inverters
  - Affected Systems
  - Asynchronous Obligations
  - MW values in GIA, PGA, and Master File
  - WECC Path Rating and Progress Report Policies and Procedures
- Upon verification, Queue Management provides approval in the New Resource Implementation (NRI) process

Affected Systems



Affected System Process

Potentially Affected System

- CAISO invites Potentially Affected Systems to scoping meeting and Phase I results meeting
- Must identify as Identified Affected Systems within 60 calendar days of notification from the CAISO after initial Interconnection Financial Security has been posted.

Identified Affected system

- CAISO will notify Interconnection Customer of their Identified Affected Systems
- Interconnection Customer to affirmatively contact the Identified Affected System operators and make reasonable efforts to address system impacts

Impacts Resolved

- Impacts must be resolved no later than six months prior to the generating unit's Initial Synchronization Date

Upcoming Affected System Outreach

- **Cluster 12**
  - The CAISO will reach out to Potentially Affected Systems after projects post Initial Financial Security (May 2020)
  - Potentially Affected Systems must identify themselves as Identified Affected Systems within 60 days of CAISO notification
  - CAISO will notify Interconnection Customers of their Identified Affected Systems (August 2020)

Modifications to Interconnection Requests

Before Phase II Results Meeting Minutes are published

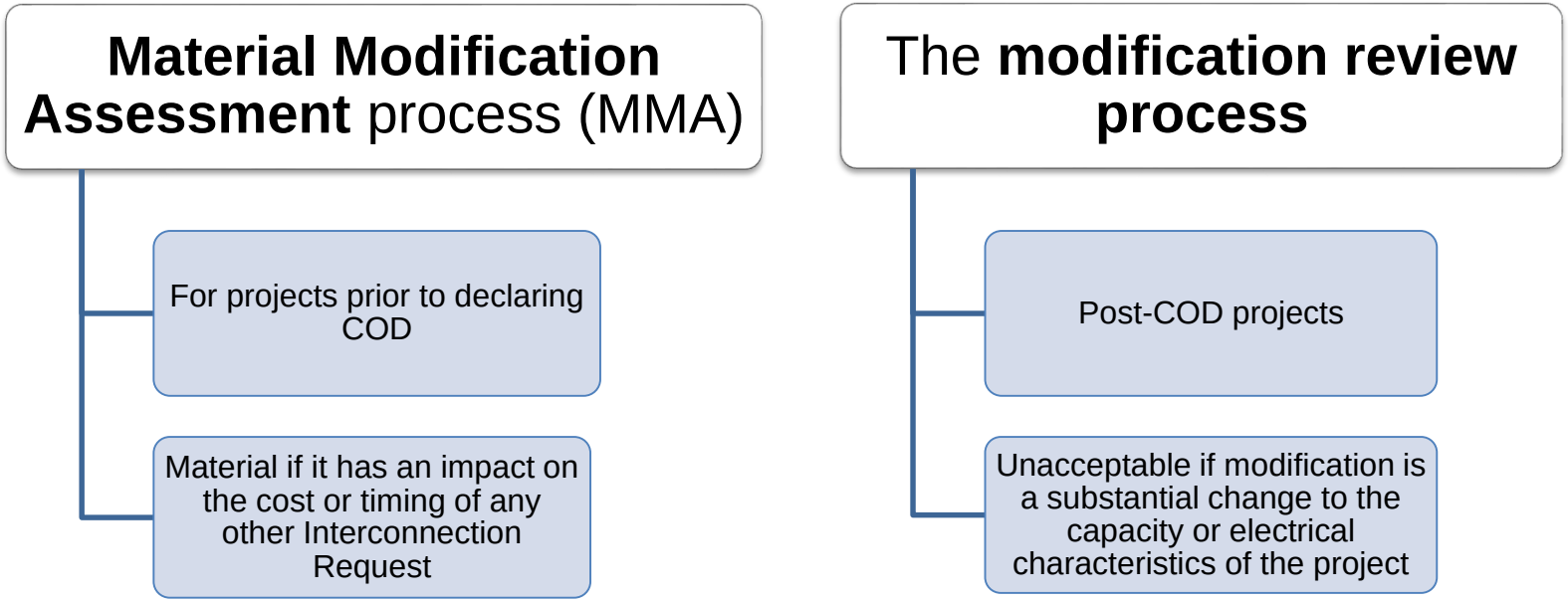
- Certain changes are allowed without a Material Modification Assessment (MMA) between Phase I and Phase II
- Modification requests are processed by your Interconnection Specialist

After Phase II Results Meeting Minutes are published

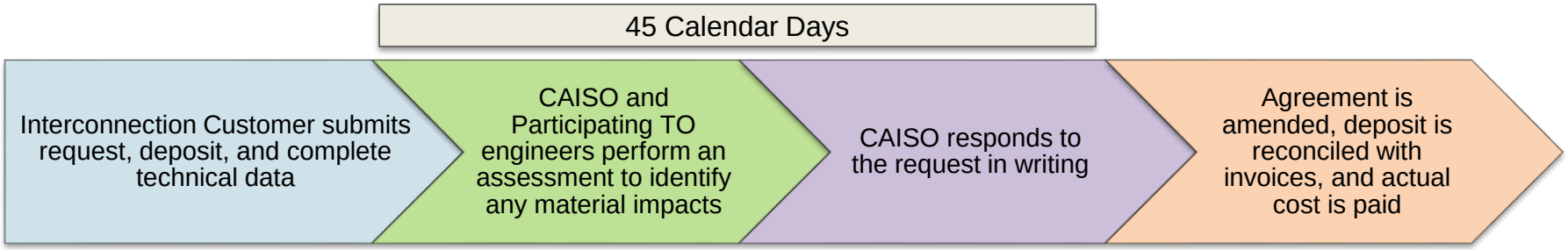
- Any modifications require MMA
- Modification requests are processed by QueueManagement@caiso.com

Modification Review Process

- Two very similar processes for modification requests



Modification Review Process cont.



- Submit request with justification in writing to QueueManagement@caiso.com
- Modifications requiring technical data take more time for technical data validation
- The deposit amount is $10,000
  - Interconnection Customer will be charged actual costs incurred by the CAISO and Participating TO, and remaining deposit, if any, is returned

Modifications Subject to Commercial Viability

- Projects requesting to extend their Commercial Operation Date (COD) beyond 7 years or modifications to projects that have already exceeded the 7 years are subject to Commercial Viability Criteria
  - Criteria includes permitting, power purchase agreement status, site exclusivity, and GIA in good standing
- Failure to meet criteria results in conversion to Energy Only deliverability status
- Limited exemption for no power purchase agreement
  - One year delay for conversion to Energy Only
- Energy Only conversion will result in a reduction to cost responsibility only if assigned upgrades are eliminated

Modifications Subject to Commercial Viability cont.

- Criteria can not be met with balance sheet financing
- Power purchase agreement must reflect the point of interconnection, capacity, fuel type, technology, and site location of project
- Fuel type modifications after the 7 year timeline are prohibited
  - Modifications to add energy storage are not considered fuel-type modifications

Modifications to Add Energy Storage

- Customers may request to add energy storage to their Interconnection Request or operating Generating Facility
  - Energy storage addition does not alter the approved Net-to-Grid MW capacity
  - If a project is wholly replaced or increasing the Net-to-Grid MW then a new Interconnection Request is required
  - If an energy storage modification request is denied, the CAISO will work with the Interconnection Customer to identify how much energy storage might be acceptable

- If an existing Generating Facility that has added energy storage is retiring, an assessment will determine if the energy storage can continue to operate

Technical Bulletin for Hybrid Energy Storage

- On October 19, 2016, the CAISO posted a technical bulletin for “Implementation of Hybrid Energy Storage Generating Facilities”
- Covers master file modeling, metering and telemetry, interconnection, and resource ID selection
- https://www.caiso.com/Documents/TechnicalBulletin-ImplementationofHybridEnergyStorageGeneratingFacilities.pdf

Hybrid Resources Initiative

- The CAISO started an initiative for Hybrid Resources in 2019 and we are hoping to have the second revised straw proposal will published in April

- Proposes modifications to implementation of hybrid and co-located resources

- http://www.caiso.com/StakeholderProcesses/Hybrid-resources

Deliverability Transfers

- Customers may request to transfer deliverability to energy storage additions or other generating units located at the same point of interconnection

- The deliverability transfer cannot result in a deliverability amount that exceeds the existing deliverability associated with the projects

- To request a deliverability transfer, send the Deliverability Transfer Request form to QueueManagement@caiso.com either as its own request or as part of an MMA

- http://www.caiso.com/Documents/DeliverabilityTransferRequestForm.docx

The Batch MMA Process

- The CAISO allowed a one time opportunity for projects to add energy storage and retain deliverability under the prior deliverability methodology

- There are 87 MMAs in the batch MMA process
  - Requests include more than 10,000 MW of energy storage additions
  - Generally process 75 MMAs per year

- The batch MMA process should be completed by late April 2020

Suspension

- LGIAs include suspension rights for a period of up to 3 years
- Suspension notifications should be sent to QueueManagement@caiso.com and the PTO
- Notifications should include the effective date of the suspension and good faith estimate of how long a suspension will last
- A material modification assessment will be required if milestone dates are changing
  - If material impacts can be mitigated the suspension can be approved
- Suspension does not apply to shared upgrades financial obligations

Repowering Requests

- Repowering is for existing generating facilities, including QFs, that wish to make changes that are not substantial
  - Facilities who propose substantial changes must enter Generation Interconnection and Deliverability Allocation Procedures (GIDAP)
  - Substantiality is determined based on impact of changed electrical characteristics as outlined in the Generator Management BPM
- Must utilize the same fuel source and point of interconnection
  - Energy storage can be considered the same fuel source
  - May require a facilities study with the Participating TO
- Repowering Affidavit to QueueManagement@caiso.com initiates the request
  - Information provided in the affidavit is subject to audit by the CAISO
- Study deposit is $50,000

Limited Operation Studies

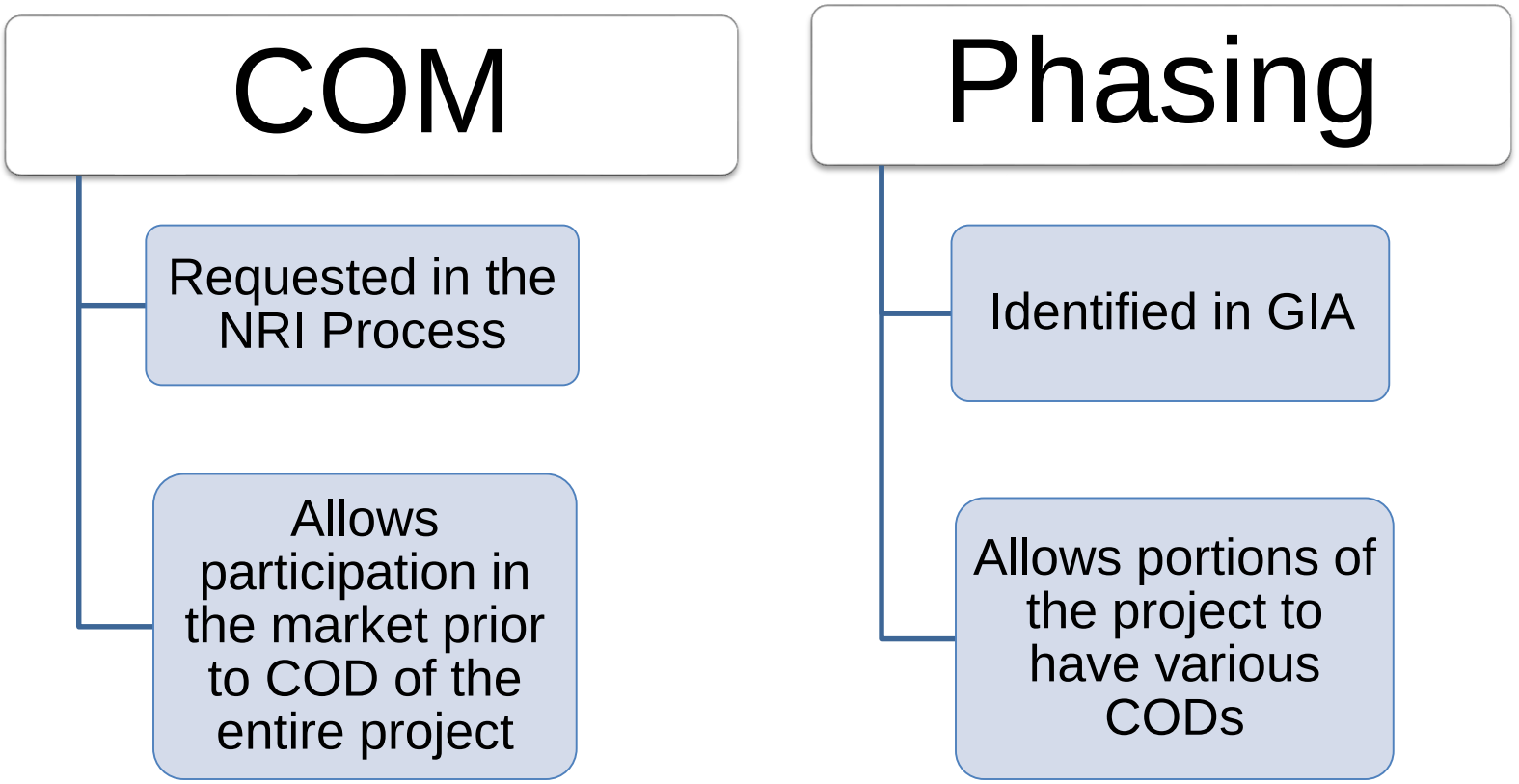
- All reliability network upgrades and pre-cursor transmission projects must be in-service prior to initial synchronization date

- Limited Operation Studies
  - Can be used to evaluate if system can support early, energy-only interconnection before network upgrades and interconnection facilities are complete
  - The study is paid for by the Interconnection Customer
  - Only within 5 months of Initial Synchronization
  - Submit request to QueueManagement@caiso.com
  - Results of the study determine the operating capability of the project

Commercial Operation for Markets (COM)

- Block implementation in advance of COD of the project
- CAISO acknowledges wind and solar block construction and ability to energize
- Portion of project is allowed to bid into CAISO markets while remaining portion is testing or under construction
- Resource adequacy eligibility requirements
  - Qualifying capacity must be obtained from the CA Public Utilities Commission
  - Obligated to meet all tariff and resource adequacy requirements (bid, penalty, etc.)
  - Reliability network upgrades must be completed

COM versus Phasing



Resources

- Hybrid Resource Stakeholder Initiative
  http://www.caiso.com/StakeholderProcesses/Hybrid-resources
- Technical Bulletin: Implementation of Hybrid Energy Storage Generating Facilities
  http://www.caiso.com/market/Pages/ReportsBulletins/Default.aspx
- Potentially Affected System Contact List
  http://www.caiso.com/Documents/GeneratorInterconnectionProcedures_AffectedSystemsContactList.xls
- Repowering Affidavit Template
  http://www.caiso.com/Documents/RepoweringAffidavitTemplate_20141002.doc
- Quarterly Status Report Template
  http://www.caiso.com/Documents/QueueManagementQuarterlyStatusReportTemplate.docx
- MMA and Deliverability Transfer Documents
  http://www.caiso.com/planning/Pages/GeneratorInterconnection/InterconnectionRequest/Default.aspx
- Opportunities for Adding Storage Presentations
  Nov 4, 2019: http://www.caiso.com/Documents/Presentation-OpportunitiesforAddingStorageatExistingorNewGenerationSites-Nov4-2019.pdf#search=opportunities%20for%20adding%20storage
  Oct 10, 2019: http://www.caiso.com/Documents/Presentation-OpportunitiesforAddingStorageatExistingorNewGenerationSites.pdf#search=opportunities%20for%20adding%20storage

Questions?

Thank you!

- If you have any further questions on the content in this presentation, please send them to

  QueueManagement@caiso.com

New Resource Implementation

Shawna Warneke, Resource Management Specialist
Christina Weiler, Resource Management Specialist
Marissa Arechavaleta, Resource Management Analyst

March 11, 2020

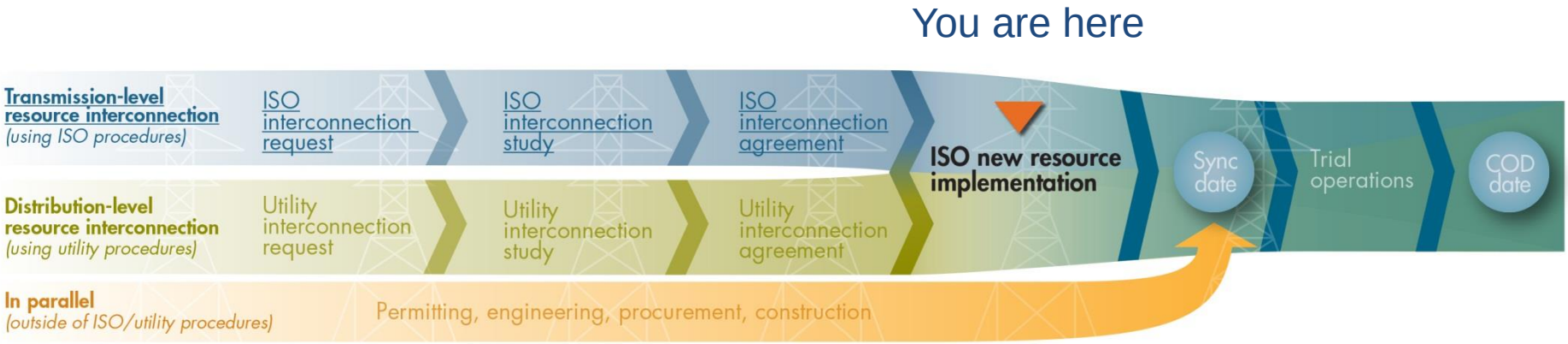
Objectives

- New Resource Implementation (NRI) process
  - Getting started
  - Bucket Requirements
  - RIMS Reminders
  - Tips for success
- NRI Hot Topics in 2020!
  - SC Association Process Update
  - GRDT
- Full Network Model Schedule
- Hybrid Resources

NRI Process

Shawna Warneke, Resource Management Specialist

Interconnection Process Map

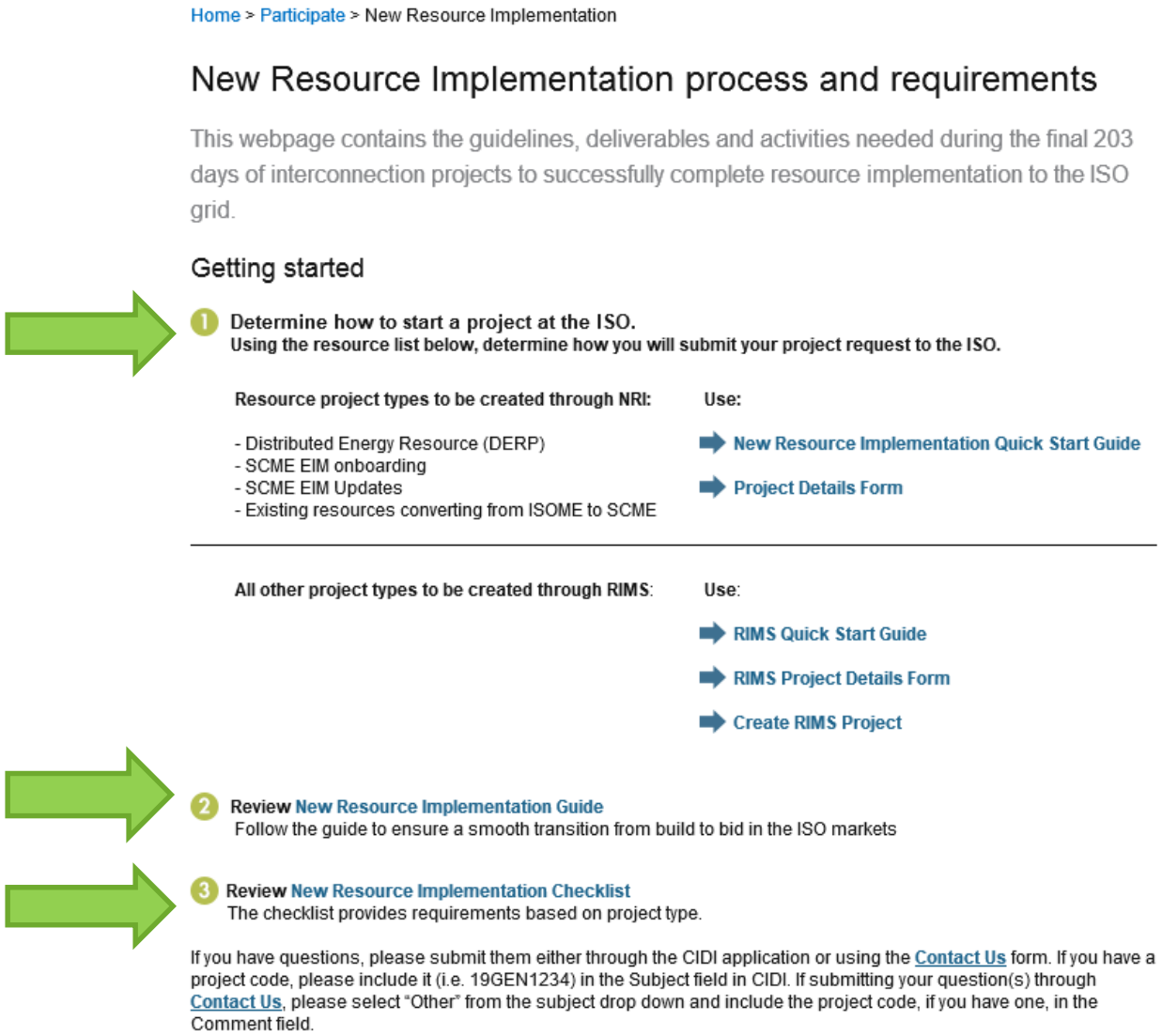


For some interconnection customers (IC), such as distribution connected and QF resources, New Resource Implementation (NRI) will be the first point of contact at the ISO.

New Resource Implementation ensures that a resource requirements are met before:

- Initial sync
- Commercial operations
- Qualified Facility conversions

Getting Started



Home > Participate > New Resource Implementation

New Resource Implementation process and requirements

This webpage contains the guidelines, deliverables and activities needed during the final 203 days of interconnection projects to successfully complete resource implementation to the ISO grid.

Getting started

1 Determine how to start a project at the ISO.
Using the resource list below, determine how you will submit your project request to the ISO.

Resource project types to be created through NRI:	**Use:**
- Distributed Energy Resource (DERP) - SCME EIM onboarding - SCME EIM Updates - Existing resources converting from ISOME to SCME	New Resource Implementation Quick Start Guide Project Details Form

All other project types to be created through RIMS:	**Use:**
	RIMS Quick Start Guide RIMS Project Details Form Create RIMS Project

2 Review New Resource Implementation Guide
Follow the guide to ensure a smooth transition from build to bid in the ISO markets

3 Review New Resource Implementation Checklist
The checklist provides requirements based on project type.

If you have questions, please submit them either through the CIDI application or using the Contact Us form. If you have a project code, please include it (i.e. 19GEN1234) in the Subject field in CIDI. If submitting your question(s) through Contact Us, please select "Other" from the subject drop down and include the project code, if you have one, in the Comment field.

Creating a project

The first step of the NRI process is to:

- Submit a Project Details Form through the RIMS Public Site

Participate → Generation → New resource implementation → Create RIMS project

- Submit Project in advance of your estimated initial sync or Implementation date
- Once successfully submitted, your project will be assigned a NRI project code (i.e. 20GEN1234)
- You will need this project code to get access to your project in RIMS

Bucket Requirements

Bucket Items

BUCKET 1 10/08/2021

Bucket Item Name	Required?	File Accepted
SLD	Yes	No
IA	No	No
3LD	Yes	No
CommBlock	Yes	No
RIGDetails	Yes	No
DYNGEN	Yes	No
PSLF	Yes	No
NetAppInfo	Yes	No
TopoMap	Yes	No
SiteInfo	Yes	No

BUCKET 2 10/08/2021

Bucket Item Name	Required?	File Accepted
MeterConfig	Yes	No

BUCKET 3 12/01/2021

Bucket Item Name	Required?	File Accepted
FinalGRDT	Yes	No
PIRPLOI	Yes	No
CECPreCert	Yes	No
ControlProtection	No	No
SCSelection	Yes	No
SCAcceptance	Yes	No
24HourContact	Yes	No
CPSAgreement	Yes	No
ECNAgreement	Yes	No

BUCKET 4 12/21/2021

Bucket Item Name	Required?	File Accepted
PTO Sync Approval	Yes	No

BUCKET 5 12/30/2021

Bucket Item Name	Required?	File Accepted
PORCalc	No	No
MSVS	Yes	No
Final Control Protection	No	No

RIMS Reminders

- Keep project information current and accurate
- Bucket due dates are automatically enforced by the system
- Status of Bucket Items can be found under Bucket Notes and in the FNM Project emails
- Assigned Model Build can be found in the project view
- Sync/COD approval status can be monitored with the RIMS project view

Tips for success

- Review the NRI Guide and Checklist
- Review required project and file naming conventions
- Start the NRI process early and submit documents well before due dates
- Get access to your project in RIMS
  - UAARequests@caiso.com
- Read all email communications from RIMS
- Include your project code in all email inquiries
- Start/Update Agreements early

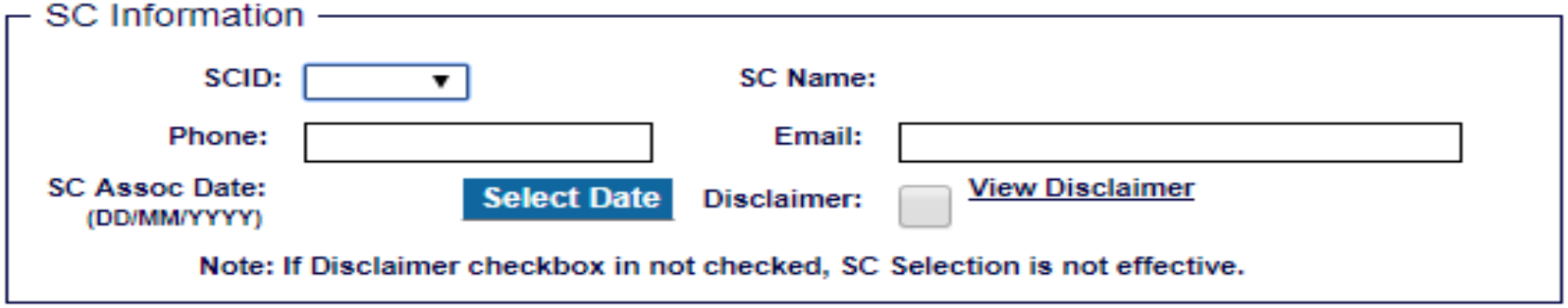
NRI Hot Topics - 2020

Christina Weiler, Resource Management Specialist

New SC Association Process

- SC Association will be able to be completed through RIMS UI
- Interconnection Customer will select their SC within RIMS
- SC will have an SC portal with ability to accept the associated roles and responsibilities and agree (or disagree) to the effective date that the IC selected.
- Stay tuned for an email notification with additional details as this initiative goes live

New SC Association Process



GRDT Supporting Docs now required

- Supporting explanation is required with GRDT giving details of how the resources design capabilities were calculated (Section 4.6.4)

- Submit into RIMS in an excel format with the following file naming convention:

  Document Title: **GRDT Explanation**

  File naming ex: 18GEN1234 FinalGRDT Explanation Ver1

  Document Title: **GRDT Supporting Docs**

  File naming ex: 18GEN1234 FinalGRDT Supporting Doc Ver1

Full Network Model Schedule

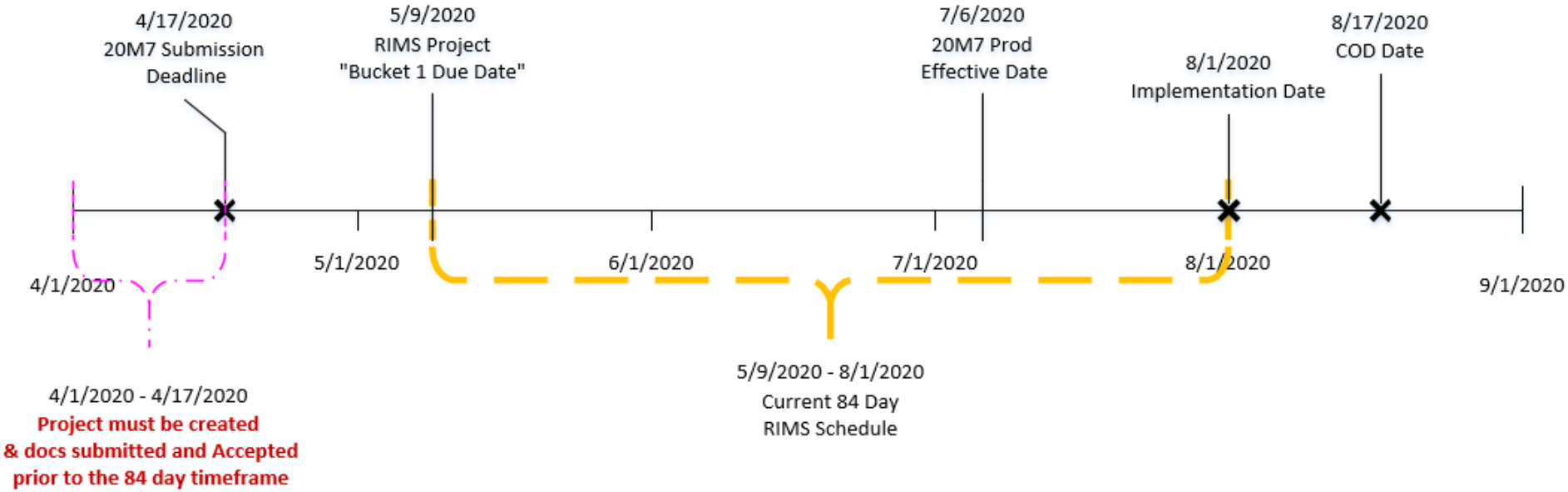
Marissa Arechavaleta, Resource Management Analyst

2020 Full Network Model Schedule

- Submission Deadline
- Review Period
- Final Scope Published
- Production Deployment
- Master File Data Freeze

FNM Label	Customer Model Document Submission Deadline	ISO Publishes Final Scope	Production Deployment
20M3	N/A[1]	N/A[1]	**Week of 3/16/2020**
20M4	2/14/2020	2/21/2020	**Week of 4/20/2020**
20M6	2/28/2020	3/20/2020	**Week of 6/1/2020**
20M7	4/17/2020	5/8/2020	**Week of 7/6/2020**
20M8	5/22/2020	6/12/2020	**Week of 8/10/2020**
20M9	6/26/2020	7/17/2020	**Week of 9/14/2020**
20M10	7/31/2020	8/21/2020	**Week of 10/19/2020**
20M12	9/11/2020	10/2/2020	**Week of 12/7/2020**

2020 Full Network Model Schedule



Hybrid Resources

Marissa Arechavaleta, Resource Management Analyst

Hybrid Resources

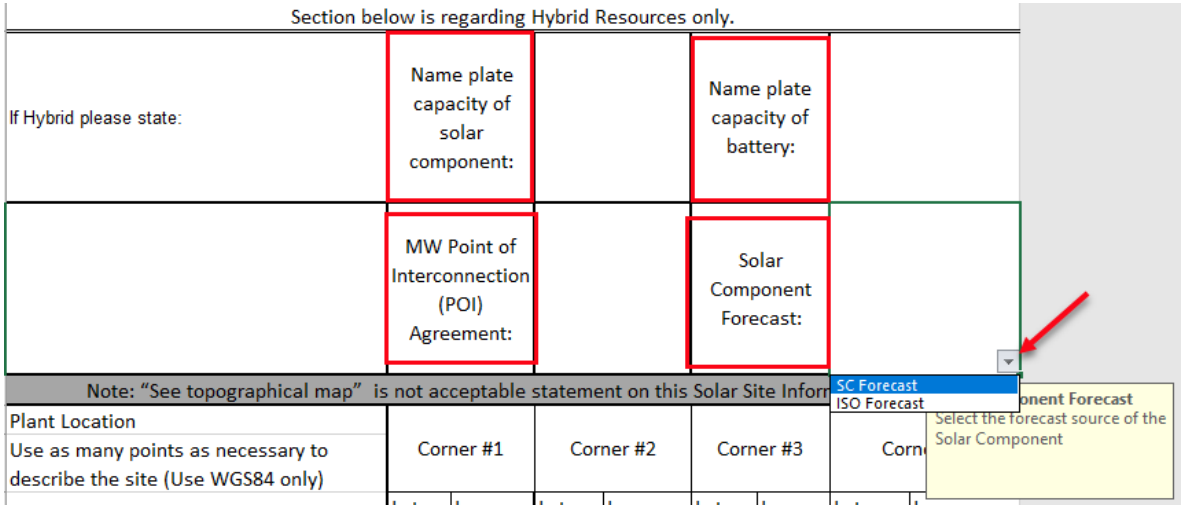
- Hybrid resource: combination of multiple technologies or fuel sources combined into a single resource with a single point of interconnection

- Hybrid Resources Initiative

  http://www.caiso.com/StakeholderProcesses/Hybrid-resources

Hybrid Resources

- NRI Process Updates
  - Checklist
  - Updated Site Info Sheet *(Solar & Wind)*



Resources: NRI Webpage, Checklist, and Guide

- New Resource Implementation webpage:
  http://www.caiso.com/participate/Pages/NewResourceImplementation/Default.aspx

- NRI Checklist:
  http://www.caiso.com/Documents/NewResourceImplementationChecklist.xls

- NRI Guide:
  http://www.caiso.com/Documents/NewResourceImplementationGuide.doc
- Hybrid Initiative
  http://www.caiso.com/StakeholderProcesses/Hybrid-resources

- 2020 Full Network Model Schedule
  http://www.caiso.com/market/Pages/NetworkandResourceModeling/Default.aspx

Questions?

California ISO

RESOURCE INTERCONNECTION FAIR

Metering and Telemetry

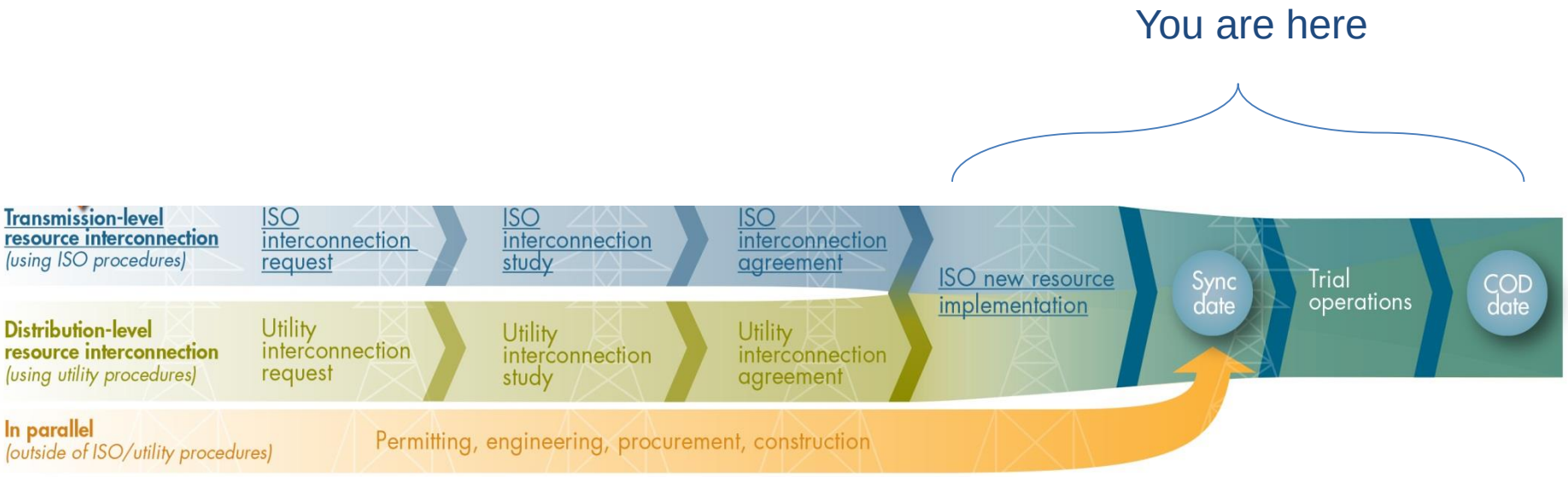
Denis Korneyenko, Energy Data Acquisition Specialist
Priyanka Namburi, Energy Data Acquisition Specialist

March 11, 2020

Topics

- What is EDAS?
- Fieldwork Projects
- EDAS Request Tool
- Telemetry Non-Compliance
- Hybrid Projects

Interconnection Process Map

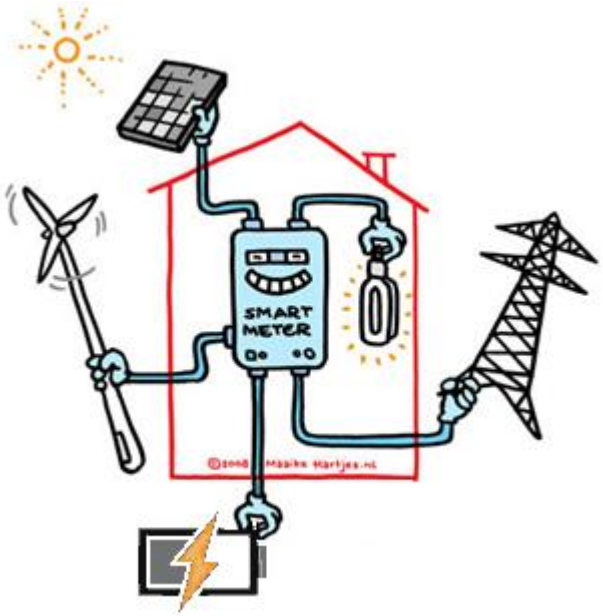


What is EDAS?

- Energy Data Acquisition Specialist Team (**EDAS**) is responsible for engineering requirements and standards for:
  - Revenue Metering via:
    - Approved CAISO Meters
    - CAISO Inspected and Certified
    - CAISO Meter data processing
    - Settlement Quality meter data (SQMD) plans
  - Direct Telemetry via:
    - Distributed Network Protocol (DNP) devices

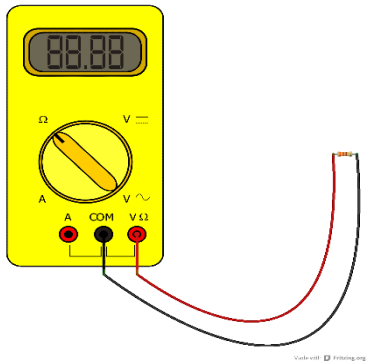
Fieldwork Projects

- Opening an NRI Project for Fieldwork
- Meters
  - Maintenance
  - Replacements
  - Reprogram
  - Communication change
- Real Time Devices
  - Replacements
  - Reconfiguration to Points List
  - Communication change or adding backup IP address



Fieldwork Projects (Cont.)

- Meter and Site Verification Sheet (MSVS) and Meter Maintenance forms should be submitted within ***5 Business days*** of meter inspection
  - Meter seals are validated on meter documentation
- Meter Documents will be sent using DocuSign for signatures
- Meter documents should be signed in DocuSign within 5 Business days



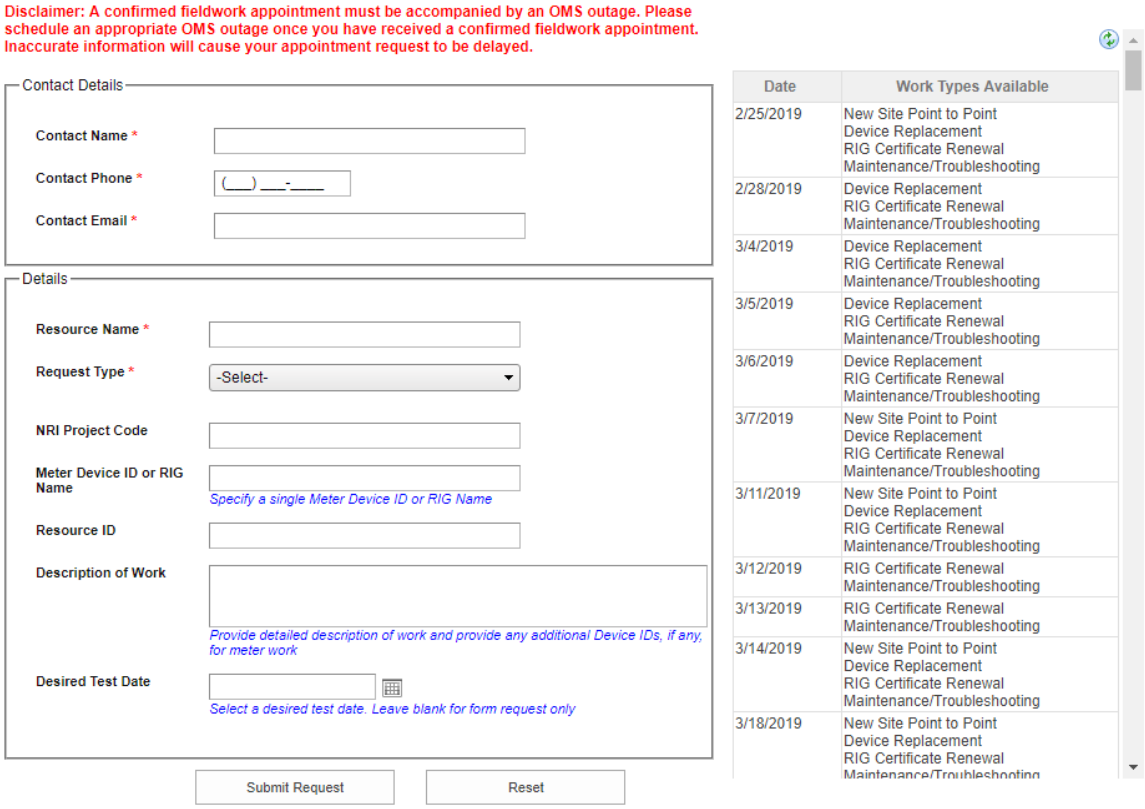
EDAS Request Tool

- Single RIMS project per Device ID
  (*Exception: new onboarding projects)
  - If two meters require annual meter maintenance; two RIMS projects must be created and two fieldwork appointment requests will be needed.
- Used to schedule Fieldwork Appointments and request pre-populated metering documents
- Shows available dates based on work type
- Upon approval, associates Device IDs to RIMS projects

Fieldwork Appointments

The below information may be required:

- NRI Project Code (Example: 17GEN1234)
- Device ID
  - ISO Meter (Ex: 5914123)
    - Required for Meter Fieldwork
  - RTU Name (Ex: IRG123)
    - Required for RIG Fieldwork
- Resource ID (Ex: INVSBL_3_TESTG1)
    - Always required



Telemetry Non-Compliance

- Telemetry BPM Section 8.4
- Loss of Telemetry emails
  - Resource Owner is responsible to expeditiously investigate and resolve the issue
  - Or request a Telemetry exemption from the ISO for providing the telemetry data
- Deadlines:
  - (5) Business days after notification of the telemetry issue for resources >= 45 MW's.
  - (14) Business days after notification of the telemetry issue for resources < 45 MW's.

Telemetry Exemptions (Cont.)

- (72) consecutive hours of good quality to be considered resolved
- Submit Telemetry Exemption requests to EDAS
- Scheduling Coordinator must contact the CAISO Real Time Generation Dispatcher to update the plant output
- Refer to Telemetry BPM Section 8.4 for guidelines on providing Telemetry value updates.

Hybrid Projects

Terms and Definitions:

- Hybrid Resources:
  - CAISO refers to hybrid projects or hybrid resources as a combination of multiple technologies or fuel sources combined into a single resource with a single point of interconnection
- CAISO Metered Entity: CAISO ME (or ISO ME)
  - Pursuant to Tariff Section 10.1, an eligible entity that has elected that the CAISO will collect and process its Revenue Quality Meter Data directly from CAISO certified revenue quality meters
- Scheduling Coordinator Metered Entity: SCME

  Pursuant to Tariff Section 10.1, an eligible entity that has elected that its Scheduling Coordinator will process and submit its Settlement Quality Meter Data to the CAISO

Metering and Telemetry

- A meter is needed for each resource ID.
- Additional Meters may be required for WREGIS reporting purposes and to measure Battery Charging and Discharging.
- Telemetry data is required for both fuel types for Grid reliability.
- However, CAISO will issue dispatch instructions to the Single Resource ID.

Two or more resource IDs with all charging options

- With two or more resource IDs for a combined generating facility, each generating unit will be separately metered and telemetered
- CAISO would issue separate dispatch instructions to each resource ID
- All settlements for the project will be at point of delivery, based on metered output to the CAISO controlled grid as adjusted for losses, at five-minute intervals

Helpful Links

- Certification of Metering Facilities

http://www.caiso.com/Documents/5710.pdf

- Meter Data Acquisition and Processing Procedure

http://www.caiso.com/Documents/5740.pdf

- Appointment Scheduling for EDAS Fieldwork

http://www.caiso.com/fieldworksupport/Pages/default.aspx

- Direct Telemetry BPM

https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Direct%20Telemetry

Helpful Links (Cont.)

- EDAS request tool

http://www.caiso.com/fieldworksupport/Pages/default.aspx

- Fieldwork Guide

http://www.caiso.com/Documents/FieldworkGuide.pdf

- RIG Acceptance Test (RAT) Procedures

http://www.caiso.com/Documents/RIGAcceptanceTest_RAT_Procedures.pdf

- RIG/DPG Validation Procedure

http://www.caiso.com/Documents/RIG_DPGValidationProcedure.pdf

- Metering Exemptions from Compliance

http://www.caiso.com/Documents/5730.pdf

Helpful Links (Cont.)

- BPM for Metering

http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Metering

- SQMD Template

http://www.caiso.com/Documents/SQMDPlanTemplate.docx

- SQMD Template Tutorial

http://www.caiso.com/Documents/SQMDResourceTemplateTutorial.pdf

- Operating Procedure 5750 – Submission and Approval Process

http://www.caiso.com/Documents/5750.pdf

- EDAS Document Checklists

http://www.caiso.com/Documents/Checklist-CommunicationBlockDrawing.pdf

http://www.caiso.com/Documents/Checklist-MeteringAndRIGDrawingRequirements.pdf

EDAS Contact Information

- **EDAS**:
  - CIDI Inquiries
  - Fieldwork Phone: (916) 608-5826
  - Email: edas@caiso.com

- **EDAS Team:**
  - Priyanka Namburi
  - Mike Ucol
  - David Acevedo
  - Denis Korneyenko
  - Vitaliy Daniliuk

Questions?

Thank you!

If you have any further questions, please send them to RIF@caiso.com