Hybrid Resources Initiative:
Metering & Telemetry Technical Workgroup

August 27, 2019

Agenda

Time	Item
9-9:05AM	Welcome and introduction
9:05-9:30AM	Background
9:30-11:45AM	Metering & telemetry technical discussion
11:45AM-12PM	Next steps

Initiative Schedule

Date	Milestone
September 26	Straw Proposal
October 3	Stakeholder Meeting on Straw Proposal
December	Revised Straw Proposal
February	Second Revised Straw Proposal
April	Draft Final Proposal
TBD	Board of Governors Meeting

BACKGROUND

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 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 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

Objectives

- Provide Stakeholders with technical guidance on current hybrid resource implementation of metering and telemetry requirements
  - This presentation provides the current approaches available for hybrid resource projects
- Identify potential areas for updates or improvements to metering and telemetry requirements for hybrids
- Clarify prior discussion from issue paper stakeholder meeting

Stakeholder comments on issue paper metering and telemetry topic

- Many statements about beliefs that metering and telemetry solutions may eliminate forecasting risk, can solve operational issues, etc.
- Requests for clarity and clarification of existing metering and telemetry requirements
- Need for certification of DC meters

Metering and telemetry requirements for hybrid resources are slightly different depending upon the project configuration

- A meter is needed for each resource ID, and, depending upon where the meter is connected, the meter will need to be compensated for losses to the point of interconnection with the CAISO controlled grid
- Unit output telemetry for the single resource ID charging from the on-site generating unit can be the net output of the generating units
- However, separate telemetry will be needed for a single resource ID projects selecting option for charging from the CAISO grid

Limiting schemes are necessary for hybrid resources

- If the sum of the resource component's ability to generate is greater than the approved interconnection capacity amount:
  - A generation output limiting scheme is required to limit the energy output from the generating facility to the grid
- If a hybrid resource has a single resource ID configuration and elects to charge an energy storage unit from the on-site generating unit:
  - No negative generation can occur therefore a limiting scheme is also required to prevent generating facility from charging from the grid

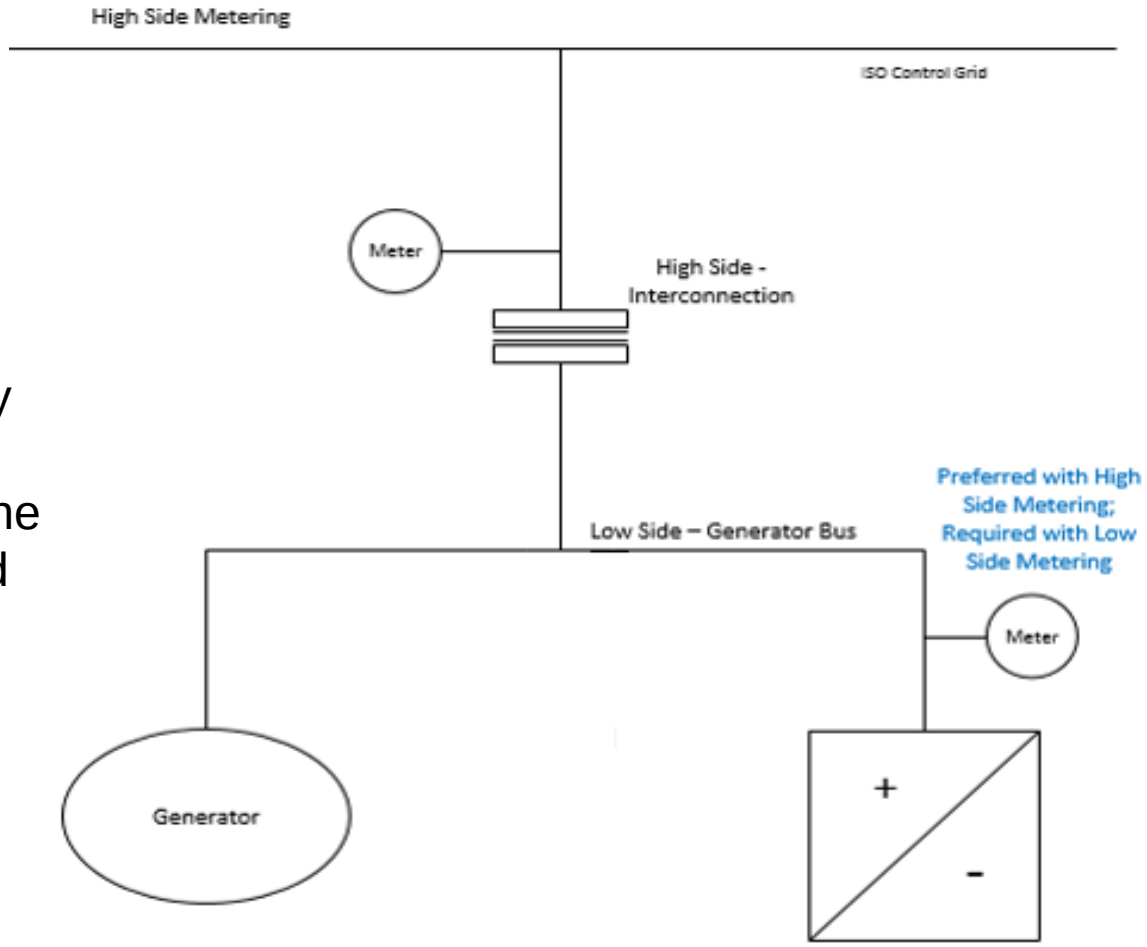
METERING & TELEMETRY TECHNICAL DISCUSSION

Metering and telemetry for storage charging hybrid configurations

- Hybrid resource facilities can be connected at either the CAISO controlled grid or a utilities' sub-transmission or distribution voltage level
- There are a number of metering configurations that are available to the generating facilities
- Diagrams are provided to illustrate the different potential metering layout configurations

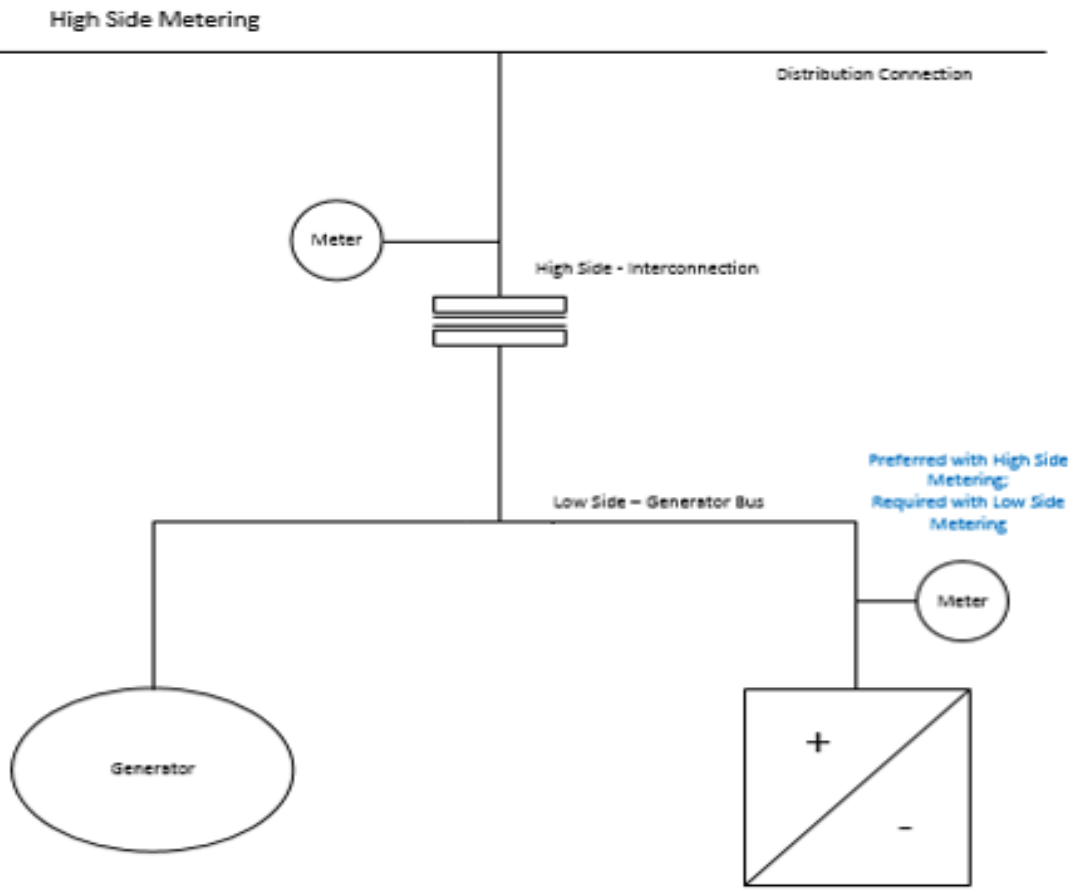
High side metering layout for CAISO Controlled Grid Connected Generating Facilities

- High side meter will measure the total resource output
- Additional meter may be required on the battery to measure the battery Charging and Discharging



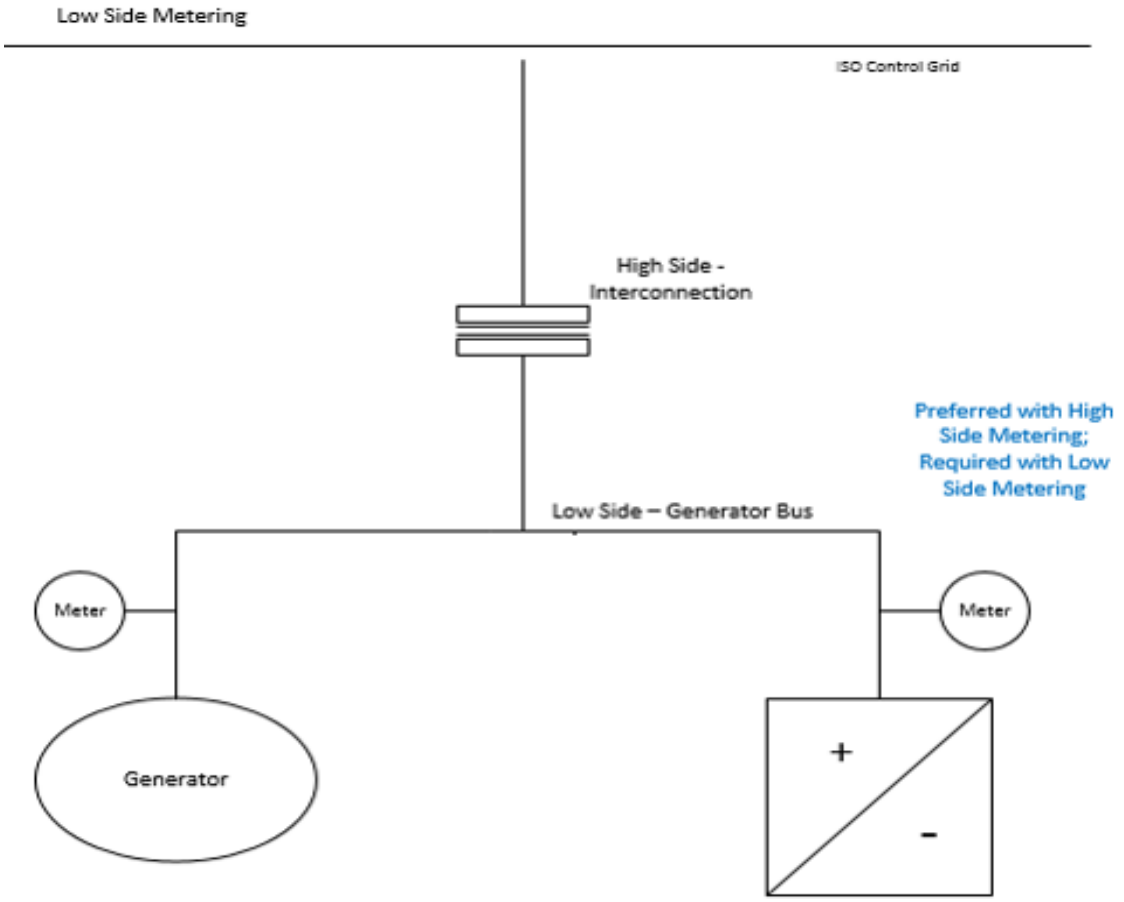
High side metering layout for Distribution Connected Generating Facilities

- High side meter will measure the total resource output
- High side meter needs to be compensated to the ISO Point of Interconnection
- Additional meter may be required on the battery to measure the battery Charging and Discharging



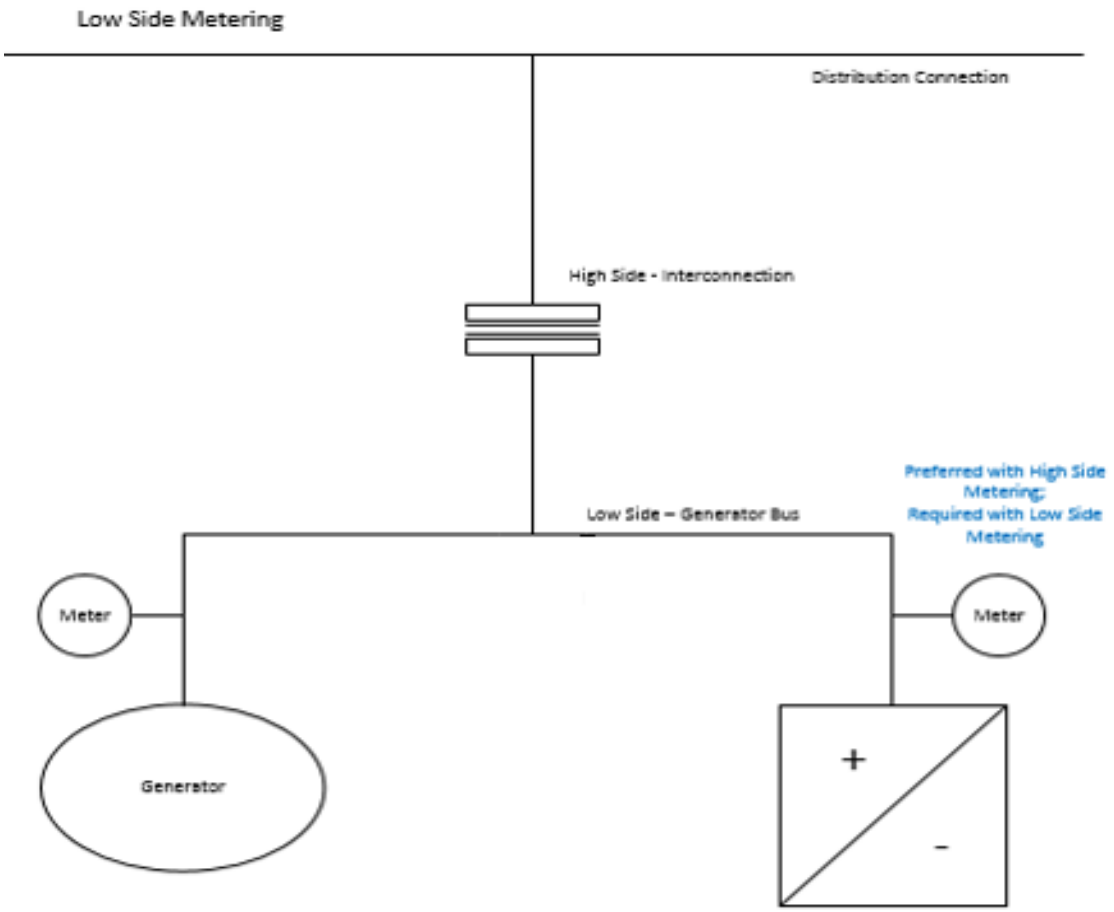
Low side metering layout for CAISO Controlled Grid Connected Generating Facilities

- Low side meters needs to be compensated for Transformer Losses



Low side metering layout for Distribution Connected Generating Facilities

- Low side meter needs to be compensated for both Transformer and Transmission line losses



Single resource ID charging from on-site generating unit

- For a single resource ID hybrid resource that only charges the energy storage unit from its own on-site generating unit – CAISO would only see the output of combined generating facility
- Resource components would not be individually subject to CAISO dispatch instructions for generation, charging, or discharging purposes
- All settlements for the project will be at point of delivery, based on metered output to CAISO controlled grid as adjusted for losses, at five-minute intervals

Single resource ID charging from grid

- For a single resource ID for the combined hybrid resource, each resource component will be required to be separately metered and telemetered
- CAISO will issue dispatch instructions to the single resource ID
  - Individual resource components would not be separately subject to CAISO dispatch instructions for generation, charging or discharging purposes
  - Resource SC must manage the overall resource output (and charging) to deliver any CAISO market awards
- All settlements for project will be at point of delivery, based on the metered output to CAISO controlled grid as adjusted for losses, at five-minute intervals

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 for each resource ID, based on metered output to the CAISO controlled grid as adjusted for losses, at five-minute intervals

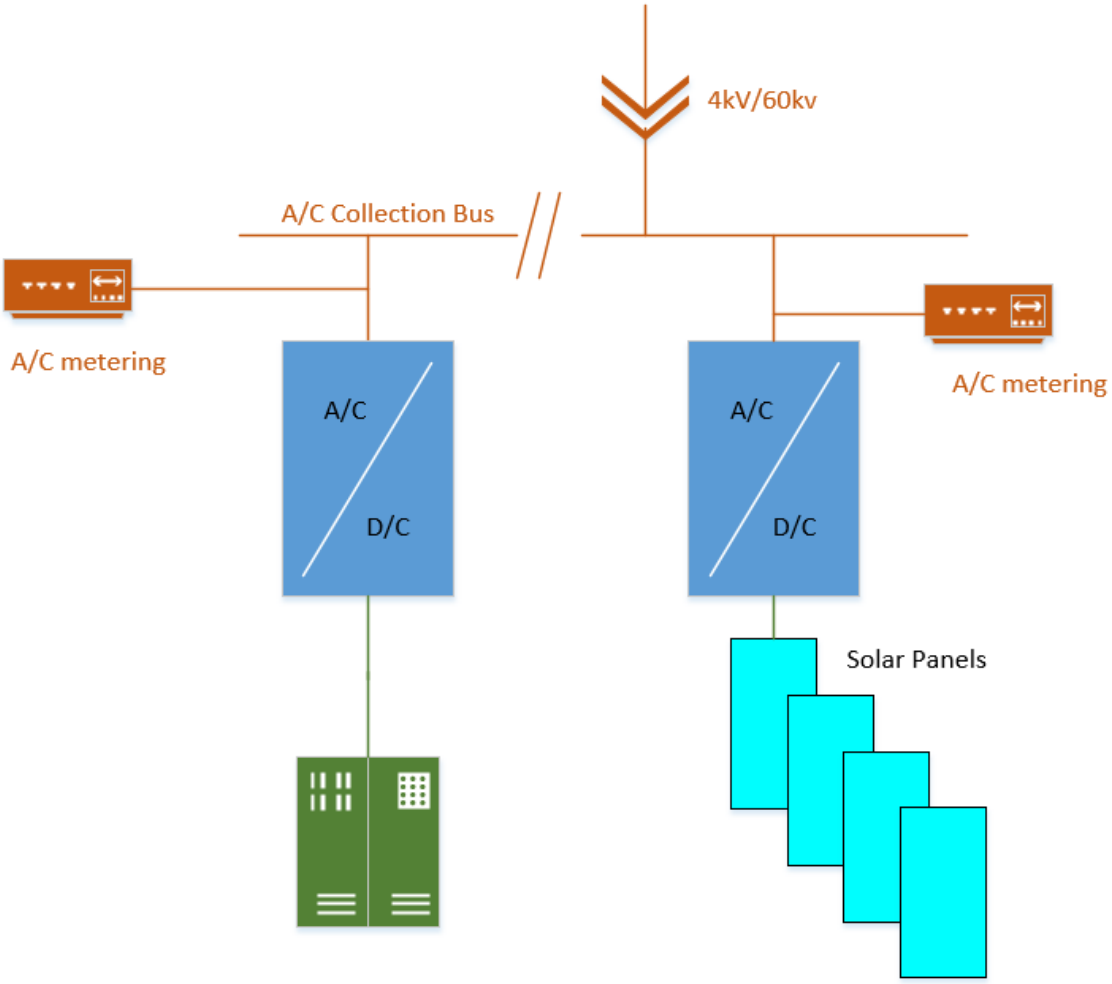
WREGIS RPS reporting metering related issues

- Two or more resource IDs charging from on-site generating unit may require additional metering for WREGIS RPS reporting purposes
  - Today, CAISO does not require this additional metering but will be exploring the potential need for future modifications to metering related requirements
- In order to measure the power that is flowing into the battery from the renewable resource component, additional meters may be required for WREGIS RPS reporting purposes

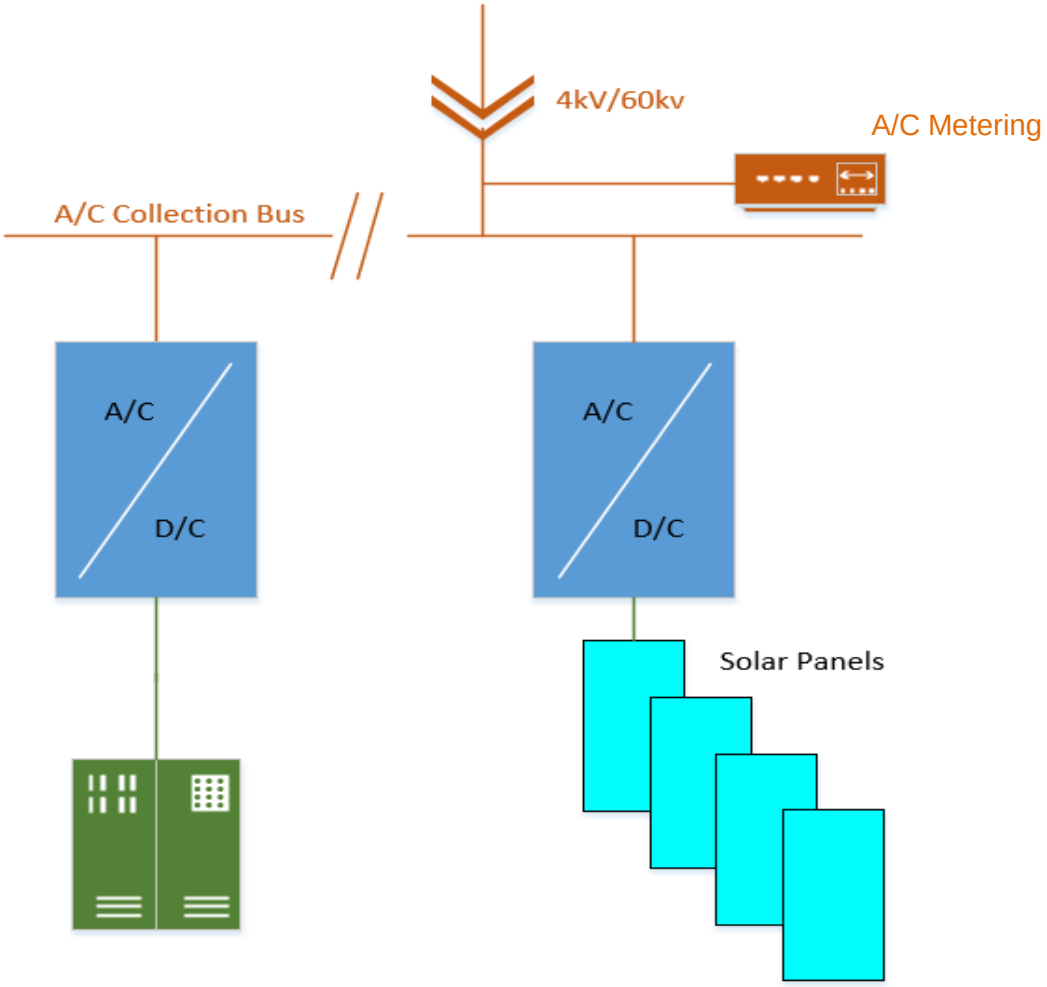
Metering and telemetry for AC and DC configurations

- There are important differences in existing metering and telemetry requirements for hybrid resources participating under AC or DC configurations
- When a solar and storage hybrid resource are both participating as separate resource IDs, separate meters are required for each of the generating units

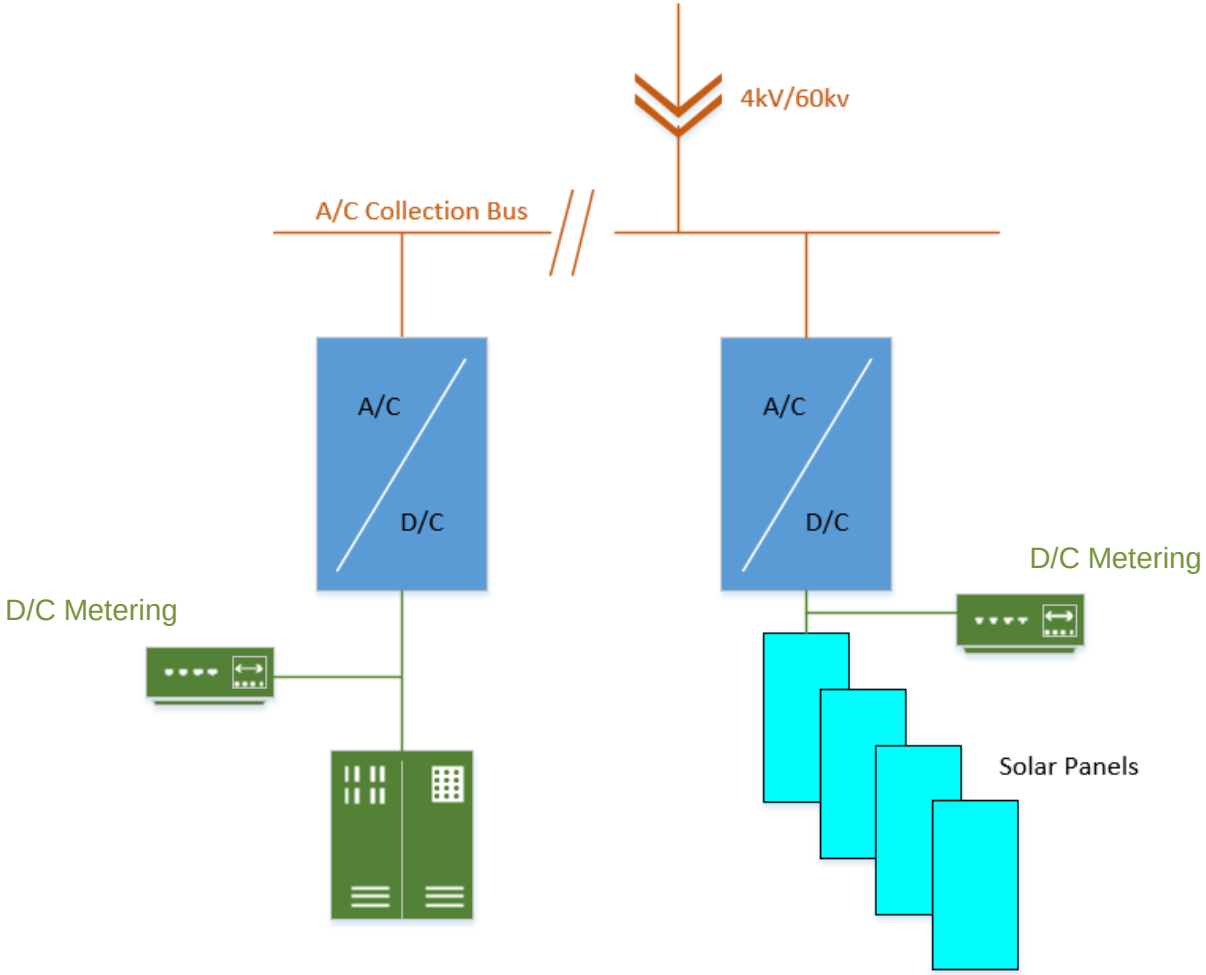
AC connection metering layout for separate resource IDs – Both SCME and ISOME options are available.



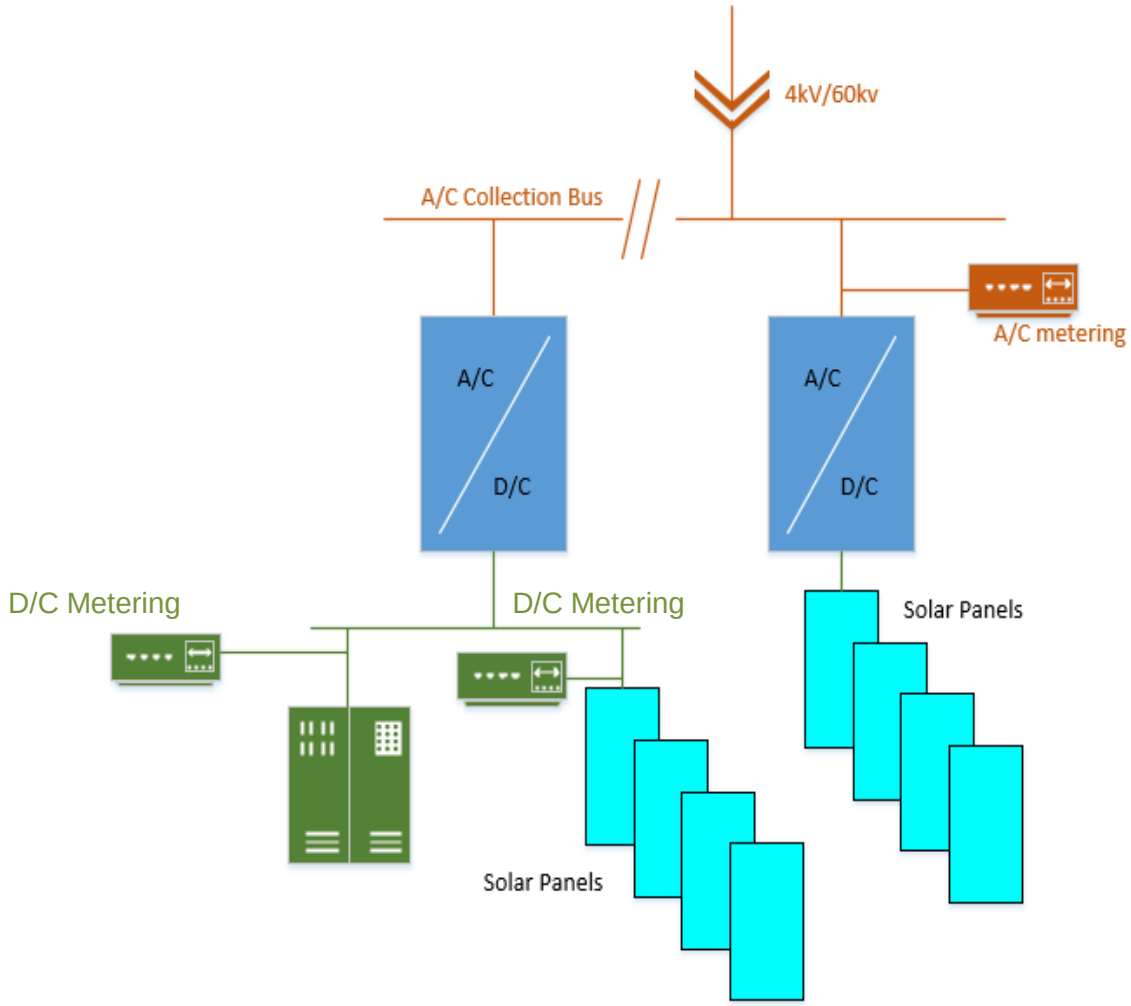
AC connection metering layout for single resource ID Both SCME and ISOME options are available.



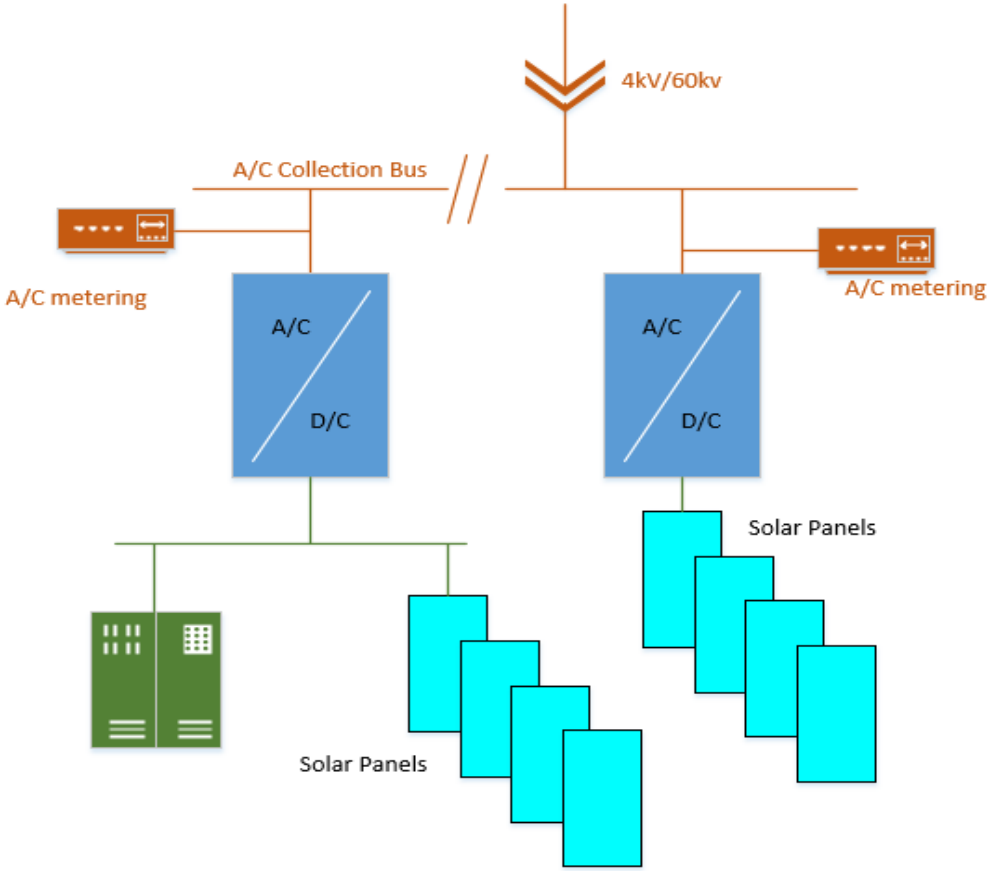
DC connection metering layout for separate resource IDs – Only SCME option.



DC connection metering layout for single resource ID - Battery charging from Solar. Only SCME option.



DC connection metering layout for separate resource IDs – Battery charging from Solar. Both SCME and ISOME options are available.



Other metering and telemetry needs for hybrid resources configured with DC connections

- For example: under separate resource IDs – Either of the generating units, or both can have DC metering and can participate as SCME
- The inverter, transformer and line losses (if any) must be calculated and compensated
- Resource should have a transducer on the DC side that meets the LRA or ISO accuracy requirements
- Both the meters can be aggregated and SQMD can be submitted to the ISO under SCME option

For DC connected hybrid resource with a storage unit charging from the other generation unit under separate resource IDs

- Both resource components are required to be metered and can participate as SCME
- The inverter, transformer and line losses (if any) must be calculated and compensated
- Resource should have a transducer on the DC side that meets the LRA or ISO accuracy requirements

Next Steps

- Stakeholders may submit written comments by September 10, 2019
  - Submit to initiativecomments@caiso.com
- Straw Proposal scheduled for publishing: September 26
- Stakeholder Meeting on Straw Proposal: October 3