2020 QUALIFYING CAPACITY METHODOLOGY MANUAL

November 2020

CONTENTS

LIST OF ACRONYMS

CAISO	California Independent System Operator	MW	Megawatt
CIRA	Customer Interface for Resource Adequacy	NERC	North American Reliability Corporation
COD	Commercial Operation Date	NQC	Net Qualifying Capacity
CPUC	California Public Utilities Commission	PMax	Maximum output of a resource
DR	Demand Response	PV	Photovoltaic
ELCC	Effective Load Carrying Capability	QC	Qualifying Capacity
GADS	Generating Availability Data System	RAAIM	Resource Adequacy Availability Incentive Mechanism
ITC	Investment Tax Credit	SC	Scheduling Coordinator
LIP	Load Impact Protocol	SGIA	Small Generator Interconnection Agreement
LOLE	Loss of Load Expectation	SGIP	Small Generator Interconnection Procedure
LGIP	Large Generator Interconnection Procedures		

1 INTRODUCTION

This manual describes the current California Public Utilities Commission (CPUC) qualifying capacity (QC) counting rules and the methodologies for implementing them. Each year, CPUC staff work with the California Independent System Operator (CAISO) to publish a net qualifying capacity (NQC) list which describes the amount of capacity from each resource that can be counted towards meeting Resource Adequacy (RA) requirements in the CPUC's RA program.

The QC of each resource is set by the methodologies described in this document. Then, if the QC is not fully deliverable to aggregate CAISO load, the QC is adjusted to its deliverable capacity resulting in the NQC. For the purposes of this manual, the term 'resource' is used to refer to a generator that has a resource ID on the Master CAISO Control Area Generation Capability List (Generation Capability List)[1] or CAISO Masterfile or a demand response resource which may or may not be listed.

Sections 2 through 4 describe how resource classifications, deliverability, and data conventions affect QC calculations. Sections 5 through 11 provide details on the specific calculation methodologies for each of the resource classifications.

[1] http://oasis.caiso.com/mrioasis/logon.do select Master Control Area Generating Capability List under Atlas Reference.

2 RESOURCE CLASSIFICATION

Classification is based on the dispatchability and technology type of the resource. Primary guidance comes from the most recent Master Control Area Generation Capability Data List and CAISO Masterfile. Demand response (DR) resources are not always listed on the Generation Capability List; these resources are addressed in Section 11.

First, resources are grouped and classified according to the "Unit Type" and "Energy Source" columns. Resources listed with the energy source "wind" are classified as wind and resources with the energy source "sun" are classified as solar. Resources with "water" as their energy source are classified as hydro resources. Biomass and geothermal facilities are also classified using the Master Generation Capability Data List. Cogeneration resources are classified using the CAISO Masterfile and the CPUC Baseline Generator Unit List for SERVM and RESOLVE.[2] Hybrid and co-located resources (renewable generators and battery storage located at the same point of interconnection) are identified with assistance of the CAISO. Then, resources are sub-classified by dispatchability, as described below.

Resources that are classified as dispatchable by the scheduling coordinator (SC) or the CAISO are classified as dispatchable generation. Apart from wind, solar, and hydro resources, dispatchable generation resources receive QC values according to the methodology described in Section 5. This classification includes a variety of technologies: steam turbines; combustion turbines; combined cycle gas turbines; reciprocating engines; energy storage; dispatchable combined heat and power (CHP);

[2] ftp://ftp.cpuc.ca.gov/energy/modeling/cpuc_public_generator_list_servm_resolve.csv.

biomass and geothermal resources. Use limited resources may be classified as dispatchable.

Wind and solar facilities receive a QC value based on the method explained in Section 6. Non-dispatchable cogeneration and biomass facilities receive a QC based on the method explained in Section 7, and non-dispatchable hydro and geothermal facilities receive a QC based on the method explained in Section 8.

D.20-06-031 adopted a voluntary QC methodology for dispatchable hydro resources. Generators may either receive a QC methodology according to the methodology for dispatchable generation described in Section 5 or may receive a QC value based on the methodology described in Section 9.

D.20-06-031 also adopted a QC methodology for hybrid and co-located resources. This methodology is described in Section 10.

The QC of demand response is addressed in Section 11.

3 DELIVERABILITY

Deliverability is the ability of the output of a generating resource to be delivered to aggregate CAISO load. If a resource's QC exceeds its deliverable capacity as determined by CAISO Deliverability Assessments, its QC is adjusted downwards to its deliverable capacity or NQC. In most cases, a resource is fully deliverable and there is no difference between QC and NQC. There are three other deliverability states a resource can have: interim deliverability, partial deliverability, or energy only deliverability.

CAISO assesses the deliverability of new and existing resources two to three times per year. A Deliverability Assessment is a required part of the Large Generator Interconnection Procedures (LGIP).[3] Existing resources retain priority for deliverability over new resources and existing deliverable resources are not expected to lose deliverability rights unless the resource is unable to produce its deliverable capacity for at least three consecutive years.[4] The deliverability study provides new resources with information to understand which network upgrades are necessary to achieve full deliverability.

The ability of the output from a new generation project and existing generation to be delivered to aggregate load within CAISO during a resource shortage condition is

[3] See Appendix U of the California ISO Tariff: http://www.caiso.com/Documents/AppendixU-LargeGeneratorInterconnectionProcedures-asof-Nov27-2018.pdf. See also: Section 5.1.3.4 of CAISO's Business Practice Manual for Reliability Requirements: https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Reliability%20Requirements.

[4] The exception to this rule is reduction in deliverability caused by any degradations of the transmission system which are not repaired promptly, for example due to fires or other force majeure events.

evaluated pursuant to the ISO's LGIP and the CAISO Deliverability Assessment Methodology posted on the CAISO's website.[5]

The CAISO Tariff defines a generation project's deliverability as full deliverability, partial deliverability, interim deliverability, or energy only deliverability. Full Capacity Deliverability Status and Energy-Only Deliverability Status are the most common deliverability statuses, and equate to either 100% or 0% deliverability, meaning the resource receives either 100% or 0% of its QC, respectively as its NQC. Partial Deliverability Status equates to a resource-specific MW limit that is between 0 and 100% deliverable. Interim Deliverability Status means the resource is either fully or partially deliverable, but only temporarily and contingent on other developments, such as new generators that will reduce available deliverability or transmission upgrades that will create additional deliverability. Either a power line is under construction or another resource is under construction that affects the resource's final deliverability status. A finding of deliverability does not ensure that a resource will not experience congestion, especially during non-peak periods, but the status is important for RA purposes.

Not all new resources use the LGIP. Some resources connected to the transmission system with nameplate capacity 20 MW or less use the Small Generator Interconnection Procedure (SGIP). The SGIP does not include a Deliverability Assessment, and resources that use SGIP have an NQC equal to zero.[6] Other small resources that are connected to the distribution system may use a Small Generator Interconnection

[5] http://www.caiso.com/planning/Pages/GeneratorInterconnection/Default.aspx.

[6] See Appendix S to the California ISO Tariff: http://www.caiso.com/Documents/AppendixS-SmallGeneratorInterconnectionProcedures-asof-Nov27-2018.pdf.

Agreement (SGIA) with the distribution system owner.[7] These SGIAs include deliverability assessments which are accepted by CAISO. Therefore, these resources can be deliverable up to 100% of their QC.

[7] SGIA interconnections use the Wholesale Distribution Access Tariff (WDAT).

4 DATA CONVENTIONS

This section lists certain conventions used by CPUC staff in calculating the QC of non-dispatchable generating facilities:

- Historical production data are used to determine QC values for non-dispatchable hydro and geothermal resources. Production data are represented by "Actual Settlement Quality Meter Data" and equal the total hourly settled MWh quantity produced by the resource and injected into the CAISO-controlled grid. These data are obtained by the CPUC on an hour and unit specific basis via subpoena to CAISO.

- A combination of settlement data and bidding and scheduling data is used to calculate QC values for pre-dispatch cogeneration and biomass facilities. This information is also received by the CPUC from the CAISO via a subpoena. Bidding and scheduling data represent the actual MW amount that the resource is scheduled or bid into the CAISO day ahead market. If there is no scheduled MW amount available or settlement quantity exceeds the amount dispatched in the day ahead market, the settlement data for that hour are used. These data are obtained on an hour specific and unit specific basis.

- New, non-dispatchable resources produce energy in advance of officially reaching a Commercial Operation Date (COD). Data created before the resource reaches a COD are called "test data" and are discarded for the QC calculation. CPUC staff only utilizes historical production data beginning on the date a resource (or phase of a resource) reaches COD.

- A resource that reaches COD by the 15th day of a particular month will receive a QC calculated from historical production data from the first month it is online. A resource that reaches COD on the 16th (or later) will have QC calculated from historical production data beginning in the following month.

- If facilities have less than three years of historical production and bidding data (based on COD), the QC value is a composite of calculations based on historical production/bidding data for phases that have reached COD and technology factors attributed to the remaining phases or time periods before the resource reached COD. Production data are used for calculations for months that have sufficient settlement or scheduled MW data available (more than 15 days of production), while monthly technology factors are used for the remainder of the three years. For example, a resource that reached COD in July 2019 would receive a 2021 QC based on six months of actual production data and 30 months of values generated from technology factors.

- Technology factors are generated based on production of the fleet of non-dispatchable generators for each resource type over the three-year period. during the RA Measurement Hours (4:00-9:00 p.m.). New, non-dispatchable resources with less than three years of historical production data for any month receive a QC for months without data based on multiplying the resource's PMax by the applicable technology factor (Equation 1).

$$MonthlyQC_{\mathrm{Re}\,source} = NDC_{\mathrm{Re}\,source} * \frac{\sum_{ExistingNon-Dispatchable\,\mathrm{Re}\,sources} MonthlyQC}{\sum_{ExistingNon-Dispatchable\,\mathrm{Re}\,sources} NDC}$$

Equation 1. QC for Non-Dispatchable Resources with no Available Data

5 DISPATCHABLE GENERATION

Dispatchable generation resources besides solar, wind, and hydro resources receive NQC values based on their available capacity,[8] subject to the checks described in Section 3. The SC of the resource submits a proposed QC value to the CAISO, along with a reference to the resource's most recent maximum power plant output (PMax) test[9] that is in CAISO's Masterfile. This information is submitted to the CAISO in a standard format through the Customer Interface for Resource Adequacy (CIRA) system.[10] The CAISO then checks the submitted value for consistency with the resource's PMax and deliverability status. If the proposed QC value is less than or equal to the PMax and the maximum deliverable capacity, it is accepted as the NQC value. If not, the PMax or maximum deliverable amount (if below Pmax) is accepted as the NQC value.

[8] See also, Section 5 of CAISO's Business Practice Manual for Reliability Requirements: https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Reliability%20Requirements.

[9] California ISO coordinates with SCs for resources to schedule PMax tests at a time selected by the SC. Generally, SCs select the timing of a PMax test to demonstrate output of the resource at or near its maximum possible output.

[10] See http://www.caiso.com/Documents/NetQualifyingCapacityRequestForm.xls.

6 WIND AND SOLAR

The QC of wind, solar PV, and solar thermal facilities is based on effective load carrying capability (ELCC) modeling under an approach adopted in D.17-06-027 and updated in D.19-06-026. As outlined in Appendix A of D.19-06-026, monthly ELCC values are determined according to the following six step process:

1. Conduct a Monthly Loss of Load Expectation (LOLE) study, including projected loads and expected resources for that month targeting a desired monthly reliability level. Energy Division targeted a range of LOLE between 0.02 to 0.03 each month. If results are either more or less reliable than desired, capacity is to be added or subtracted until each month's reliability results are in the desired range.

2. Conduct a Monthly Portfolio ELCC study. Remove all wind, solar, and energy storage electric generation facilities inside the CAISO aggregated region. Then add Perfect Capacity in each month individually until the resulting LOLE results are again within the desired range. The amount of Perfect Capacity in megawatts (MW) added is equal to the Portfolio ELCC of all wind, solar and storage resources.

3. Perform ELCC modeling on each category individually.

    a. Put the wind and storage resources back and leave solar generators removed. Remove blocks of Perfect Capacity iteratively from each month until reliability levels are within the desired range. The result is the standalone ELCC of solar generators. Record the monthly levels of Perfect Capacity modeled.
    b. Perform Step A in reverse by adding back solar generators and removing wind generators. Remove blocks of Perfect Capacity iteratively from each month. Remove Perfect Capacity until the reliability level again falls within the desired range in each month. The result is the standalone ELCC of wind generators. Record the monthly levels of Perfect Capacity or added load modeled.
    c. Finally perform the standalone ELCC study for storage resources by putting back wind and solar and removing storage. Remove or add blocks of Perfect Capacity iteratively from each month. Remove Perfect Capacity

until the reliability level again falls within the desired range in each month. The result is the standalone ELCC of wind generators. Record the monthly levels of Perfect Capacity or added load modeled.

4. Add the standalone ELCC of wind, storage, and solar generators, and compare the total to the Portfolio ELCC calculated earlier. The difference (either positive or negative) is the diversity adjustment. The diversity adjustment will be negative when the standalone ELCC values total greater than the Portfolio ELCC, and positive when the standalone totals are less than Portfolio ELCC. This is the result of modeling an individual category of generator that provides benefit to another while another category of generator is still included. Some of the reliability contribution it imparts is applied as diversity.

   If it is found that any standalone ELCC study results in ELCC of 100 percent, and there are positive diversity adjustments to allocate, Energy Division will not allocate further ELCC diversity adjustment to the resource class. This would translate to a situation where an existing generator would more easily offset LOLE than Perfect Capacity. Energy Division will instead allocate the adjustment to resource classes with standalone ELCC values less than 100 percent and that can be determined to be most responsible for creating the diversity.

5. Use the ELCC MW amounts that represent the diversity adjusted Perfect Capacity equivalent amounts resulting from Step 4 and divide those MW amounts by the total nameplate installed MW of that technology, and the resulting monthly percentage values represent the ELCC percentages that are applied to the nameplate MW values of each individual generating facility to create the Qualifying Capacity of the generator.

6. Any further steps to create locational factors to break up wind and solar further into location or sub technology specific factors would follow from this point, and thus would be added as steps 7 and on. Future Monthly ELCC studies would require restarting the sequence of studies from Step 1.

The ELCC modeling results in monthly percentages for each resource type. QC values are calculated by multiplying the ELCC value by a resource's nameplate capacity.

7 COGENERATION AND BIOMASS

Pursuant to D.15-06-063, a new classification was created for qualifying facilities that were QF cogeneration. Many of these facilities were in the process of migrating to contracts that allow for utility predispatch and are called utility predispatch facilities (UPF). This 'predispatch' classification was adjusted in D. 16-06-045 and expanded to apply to all cogeneration and biomass facilities that are able to bid or self-schedule in the day ahead market but are not fully dispatchable. If a cogeneration or biomass facility is dispatchable, it may request a QC value based on Pmax.

These decisions adopted a QC methodology which relies on bidding and scheduling history rather than settlement data. In hours where the resource was self-scheduled or bid into the day ahead market, the greater of the self-scheduled amount, day ahead market bid or settlement amount is used. In hours where the scheduling MW data is non-existent for a particular resource (the resource did not submit a MW schedule amount) or bidding and scheduling data are missing, the settlement data for that hour are used.

A month-specific average of the maximum of bidding/self-scheduling/production during the RA Measurement Hours (Table 1) is created to generate the QC for each resource.

All Months	HE17 - HE21[11] (4:00 p.m. - 9:00 p.m.)

Table 1: RA Measurement Hours

[11] HE indicates "hour ending", or the 60 minutes that end at the numbered hour, in 24 hour time. For example, HE17 indicates the 60 minutes beginning at 16:00 (i.e. 4:00 p.m.) and ending at 17:00.

8 HYDRO AND GEOTHERMAL

Non-dispatchable hydro and geothermal resources receive monthly QC values based on a three-year rolling average of production during the specified hours in Table 1. Production for these facilities is calculated from settlement quality meter data only. The three most recent years of available data are used. For example, the 2021 QC is calculated based on 2017-2019 data.

Each monthly value is calculated as an average of the production during the specified hours (Equation 2). The 36 monthly average values are calculated as:

$$Average_{Month}(MW) = \frac{\sum_{Month} Production(MWh)}{\sum_{Month} Hours(h)}$$

Equation 2. Monthly Average Production for Non-Dispatchable Hydro and Geothermal Resources

Then, the monthly values are averaged together for all (up to three) years of available data to calculate the final QC for each month (Equation 3).

$$FinalQC_{Month} = \frac{1}{\{NumberOfYearsOfData_{Month}\}} * \sum_{AllYearsOfData} Average_{Month}$$

Equation 3. Final QC of Non-Dispatchable Hydro and Geothermal Resources

Technology factors are also created for each resource type based on average output of the fleet of resources during the RA Measurement Hours. New, non-dispatchable resources with less than three years of historical production data for any month receive QC for missing months based on multiplying the resource's PMax by the applicable technology factor (Equation 4).

$$MonthlyQC_{\mathrm{Re}\,source} = NDC_{\mathrm{Re}\,source} * \frac{\sum_{ExistingNon-Dispatchable\,\mathrm{Re}\,sources} MonthlyQC}{\sum_{ExistingNon-Dispatchable\,\mathrm{Re}\,sources} NDC}$$

Equation 4. QC for Non-Dispatchable Resources with no Available Data

9 DISPATCHABLE HYDRO

A new QC methodology was adopted for dispatchable hydro in D.20-06-031 for implementation in 2021. The methodology is based on the amount of capacity bid or self-scheduled into the CAISO market during the CAISO availability assessment hours over the previous 10 years. Derates of capacity bid are included if they are related to water availability, but not if they are due to mechanical outages.

When available, staff use outage data such as the North American Electrical Reliability Corporation's (NERC) Generating Availability Data System (GADS) data to identify mechanical derates. The amount of the mechanical derate is added to the amount bid to identify the capacity not bid due to lack of water.

Then, for each month of the 10-year period, staff generate a median (50 percent exceedance) and 10 percent exceedance value based on the capacity bid or self-scheduled into the CAISO market discounting mechanical derates. To determine monthly QC values, the median value is weighted 80 percent and the 10 percent exceedance value is weighted 20 percent.

This methodology is applied as a default to all dispatchable hydro resources though it is voluntary. Generators may request to raise their monthly NQC value to their maximum deliverable capacity. However, an exemption from CAISO Resource Adequacy Availability Incentive Mechanism (RAAIM) penalties for water availability-related derates will not apply to generators that increase their QC value.

10 HYBRID AND CO-LOCATED RESOURCES

Increasingly, developers are siting energy storage at the same point of interconnection as generating resources. D.20-06-031 defined these resources as hybrids (resources that operate in the CAISO market under a single market ID and co-located resources (those that operate under or multiple resource IDs).

D.20-06-031 adopted a QC methodology for hybrid and co-located resources receiving the Investment Tax Credit (ITC). The methodology is applied when both the renewable generator and battery are deliverable and assumes that the battery charges solely from the renewable. The total capacity of the hybrid or co-located resource is capped at the point of interconnection limit.

According to the methodology, the QC value of the storage component is based on the maximum deliverable capacity of the battery or the renewable charging energy transferred to the battery in the allotted time period divided by four if the battery is not expected to fully charge. The QC value of the renewable component is determined by applying the ELCC percentage to the difference between the renewable's nameplate capacity and the capacity needed to charge the battery at a constant rate over the available charging hours.

The equation below outlines this methodology.

- *Total QC = Effective ES QC + Effective Renewable QC*
- *Effective ES QC* equals the minimum of:

  (1) The energy (MWh) production from the renewable resource from 2 hours after the net load peak until 2 hours before the net load peak assuming charging is done at a rate less than or equal to the energy storage's capacity. This renewable charging energy is then divided by 4 hours to determine the QC; or

(2) The QC of the energy storage device.

- *Effective Renewable QC* equals the remaining renewable capacity, net of the capacity required to charge the battery at a constant rate over the available charging hours, multiplied by the ELCC factor for the month.

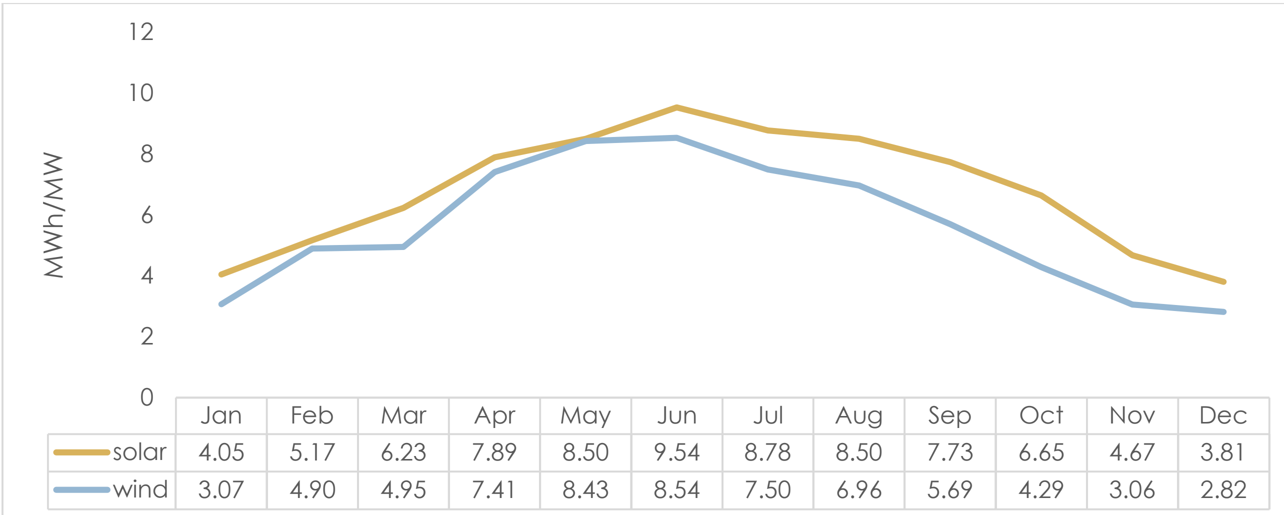
For resources that have existing solar or wind generators with three years of production data as standalone resources, actual production profiles are used. Staff also use settlement data to create monthly production profiles of the expected renewable generation during the period from two hours after the net load peak to two hours before the net load peak on the following day. These profiles are used for new hybrid and co-located resources.

In order to create these profiles, Staff first used results of the CAISO flexible capacity study to determine the projected peak net load hour for each month in 2021 (Table 2).

Hour	Months
HE19	January-March, November-December
HE20	September-October
HE21	April-August

Table 2: Hours of Net Load Peak by Month

Next, settlement data for the existing fleet of wind and solar generators was used to create production profiles for each month for the period from two hours after net load peak to two hours before net load peak (i.e. for April-August production from HE23 through HE19 was used). This corresponds to the amount of generation expected to be available to charge the storage device for each MW of installed capacity so that it will be available for dispatch during the peak net load hours (Figure 1).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
solar	4.05	5.17	6.23	7.89	8.50	9.54	8.78	8.50	7.73	6.65	4.67	3.81
wind	3.07	4.90	4.95	7.41	8.43	8.54	7.50	6.96	5.69	4.29	3.06	2.82

Figure 1: Daily production profiles for solar and wind generation by month

These profiles are used to estimate the expected daily production. Then the energy needed to fully charge the battery each day is subtracted as described above. If there is remaining expected energy production, this is converted back to capacity using the production factors and the ELCC factors are then applied to calculate the capacity value of the renewable component of the hybrid or co-located resource.

11 DEMAND RESPONSE

In D.09-06-028, the CPUC directed that the QC of demand response (DR) resources be based on the Load Impact Protocols (LIPs) adopted by D.08-04-050.[12] However, the LIPs provide far more detailed information than 12 monthly QC values. The discussion of the LIPs in this manual does not in any way impact the requirements of any previous decision in the DR proceedings or any other uses of the LIPs besides QC calculations.

The LIPs must be followed by the entity requesting that the DR resource be eligible to count for RA. That entity must work with Energy Division staff to provide the LIP information described below for the DR resource to receive QC values. The following table summarizes the use of LIPs for QC demonstration. Event based resources (i.e. AC cycling) only operate when a specific resource is dispatched, while non-event based resources (i.e. Time-Of-Use rates or permanent load shifting) operate each day, regardless of whether or not a DR event is "called."

The monthly QC of a DR resource is the average expected (*ex ante*) load impact measured over certain measurement hours. The measurement hours are the same as the RA hours in Table 1.

The hourly estimates for each of these hours from the LIP data are averaged together. These hourly estimates must be provided according to protocols 17, 21, 22, and 23. Other protocols described in this table are required for supporting data and report

[12] The LIPs are detailed in Appendix A to D.08-04-050; http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/81979.PDF.

formatting. Page and section references in this table refer to Attachment A to D.08-04-050.

Resource Type	Load Impact Protocols Required
Event Based Resources. Example IOU programs: CBP AC Cycling	<u>**Ex Post for Event Based Resources**</u> Protocol 7 requires impact estimates be reported in a table format. Uncertainty adjustments are not needed in the table. Protocol 8 requires reporting for the average across all participants notified on an average event day over the evaluation period. Only the hourly load drop across all participants notified on an average event day is required; no need to provide the following details: • Each day on which an event was called; • The average event day over the evaluation period • For the average across all participants notified on each day on which an event was called; • For the total of all participants notified on each day on which an event was called. Protocol 10 requires regression- based methods (read section 4.2.2, pg 60 for an overview of regression analysis). Any suppliers choosing not to use regression as described in Protocol 10 *must* file an evaluation plan (Protocols 1-3) well in advance of the QC demonstration deadline.[13] <u>**Ex Ante for Event Based Resources**</u> Protocol 17 requires that ex ante estimates should be informed by ex post whenever possible. Protocol 21 requires impact estimates be reported in a table format. Uncertainty adjustments are not needed in the table.

[13] The deadline is typically April 1.

	Protocol 22 requires the use of 1-in-2 weather year for the monthly system peak day. The 1-in-10 weather year, typical event day, or an average weekday for each month are not needed for QC calculation. Protocol 23 requires ex ante estimates be based on regression methodologies (read section 6.2, pg 98 for guidance). **<u>Portfolio Impacts, if Required</u>** Protocol 24 describes methodology for estimating the impacts of multiple DR programs within a portfolio. All DR resources whose participants also participate in other DR programs (potentially operated by other entities) must follow Protocol 24; such resources should also submit an evaluation plan (Protocols 1-3). **<u>Sampling if Required</u>** Protocol 25 requires certain procedures to ensure that sampling bias is minimized. Protocol 25 is not anticipated to be required for most DR resources using LIPs only to demonstrate QC; DR resources with a small number of participating customers should provide data from *all* participants, obviating the need for sampling methodologies. For resources with enough participants to adopt a sampling methodology, an evaluation plan (Protocols 1-3) is required well in advance of the QC demonstration deadline. **<u>Reporting Protocols</u>** Protocol 26 lists certain sections that should be included in the evaluation reports. These reports may be limited in scope, as described above.

Non-Event **Based Resource.** Example IOU programs: TOU RTP PLS	<u>**Ex Post for Non-Event Based Resources**</u> Protocol 14 (same as Protocol 7) requires impact estimates be reported in a table format. Uncertainty adjustments are not needed in the table. Protocol 15 requires reporting for the monthly system peak day. Protocol 16 requires regression based methods (read section 5.2, pg 84 for guidance). Any suppliers choosing not to use regression as described in Protocol 10 *must* file an evaluation plan (Protocols 1-3) well in advance of the QC demonstration deadline. <u>**Ex Ante for Non-Event Based Resources**</u> Protocol 17 requires ex ante estimates should be informed by ex post whenever possible. Protocol 21 requires impact estimates be reported in a table format. Uncertainty adjustments are not needed in the table. Protocol 22 requires the use of 1-in-2 weather year for the monthly system peak day. The 1-in-10 weather year, average weekday, or typical event day are not needed for QC calculation. Protocol 23 requires ex ante estimates be based on regression methodologies (read section 6.2, pg 98 for guidance). <u>**Portfolio Impacts, if Required**</u> Protocol 24 describes methodology for estimating the impacts of multiple DR programs within a portfolio. All DR resources whose participants also participate in other DR programs (potentially operated by other entities) must follow Protocol 24; such resources should also submit an evaluation plan (Protocols 1-3). <u>**Sampling if Required**</u> Protocol 25 requires certain procedures to ensure that sampling bias is minimized. Protocol 25 is not anticipated to be required for most DR resources using LIPs only to demonstrate QC; DR resources with a small number of participating customers should provide data from *all* participants, obviating the need for sampling methodologies. For resources with enough participants to

	adopt a sampling methodology, an evaluation plan (Protocols 1-3) is required well in advance of the QC demonstration deadline. **<u>Evaluation Reporting</u>** Protocol 26 lists certain sections that should be included in the evaluation reports. These reports may be limited in scope, as described above.

Table 3. Required LIPs

As noted above, in order to translate the detailed LIP information into monthly QC values, QC is measured using the average expected (*ex ante*) load impact during the appropriate measurement hours shown in Table 1. CPUC staff take the hourly estimates provided[14] according to the LIPs and averages the estimates over the relevant hours.

In order for DR programs to receive local capacity credit for RA, the load impact must be broken down by Local Area. However, this breakdown is not required for all months – it is only required for August. For August, average expected (*ex ante*) load impact must be provided by local area as follows, for each DR program:

SDG&E	SCE	PG&E
San Diego-IV	Big Creek/Ventura	Greater Bay Area
	LA Basin	Fresno
		Humboldt
		Kern
		North Coast/North Bay
		Sierra
		Stockton

[14] If assumptions underlying the LIP estimates for a particular program are unreasonable, CPUC staff accordingly adjusts the load impacts.

System (no local area)	System (no local area)	System (no local area)
Program Total	Program Total	Program Total

Table 4. Local Area Breakdown for DR Resources.

For each program, the sum of system and local capacities should equal the program total capacity. Table 4 is not intended to be a format, but simply a description of the data required. If a program operates in multiple IOU territories, expected load impacts for all relevant local areas (and for system resources located within each IOU territory area but outside any local area) should be included.

Previously, CPUC staff sourced T&D line loss data from each utility's most recent adopted General Rate Case. D.15-06-063 changed the source of data to the line loss data from the most recent LTPP scenarios and assumptions update. CPUC staff will "gross-up" the DR QC for avoided line losses. A single loss rate for each service area is calculated according to *Equation 5. Total Line Loss Factor*.

$$LossRate = 3\% + DistributionLossRate$$

Equation 5. Total Line Loss Factor

Finally, the QC of DR is calculated by grossing up by the loss rate.

$$FinalQCofDR = \frac{\sum_{MeasurementHours} AverageExAnteLoad\,\mathrm{Im}\,pact}{\{NumberOfMeasurementHours\}} * \left(\frac{1}{1 - LossRate}\right)$$

Equation 6. Final QC of DR