# Western Resource Adequacy Program

## Change Request Form

| Lead Sponsor Information | |
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|---|---|
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| Name: | Organization: |
| Phone Number: | Email: |

### Type of Change Requested

- ☒ Correction *(i.e., revising erroneous language or language that needs clean-up for grammatical errors or inconsistency across governing documents - no changes to intent or policy)*
- ☒ Clarification *(i.e., revising language to better represent existing intent, no changes to functionality or policy)*
- ☐ Enhancement *(i.e., revising language to expand upon existing intent or functionality)*
- ☐ New Protocol, Business Practice, Criteria, Tariff *(i.e., new language to accommodate new functionality or policy not existing today)*
- ☐ Change *(i.e., a change in the existing policy – will replace an existing language)*
- ☐ Other *(i.e., changes that do not fall into the categories listed above)*

## Description of Change

### Provide a description of the issue*:

Business Practice Manual (BPM) 105 Forward Showing Qualifying Resources – Current language states that Participants must complete Operational Tests during the 12-Month period prior to the FS Submittal due date. Participants should be permitted to complete Operational Tests up to the end of the Cure Period to allow them to cure an identified deficiency related to an Operational Test.

BPM 202 Participant Sharing Calculation Inputs – Language in Section 5.1 Load Forecast requires clarification to ensure the Load Forecast data being submitted in the Operations Program is based on the same load that was submitted in a Participant's corresponding Forward Showing.

### Please provide the following information if known and/or available.

1. Provide a proposed solution to the issue described:

2026-NTFP-02 modifies two WRAP BPMs (BPM 105 and BPM 202) as detailed below:

BPM 105 Forward Showing Qualifying Resources – Language in Section 3.4.1, Section 3.4.3.1 and Section 3.4.3.2 has been expanded to allow Operational Testing to be completed through the end of the Cure Period.

BPM 202 Participant Sharing Calculation Inputs – Language in Section 5.1 has been modified to clarify that the Load Forecast submitted by Participants in the Operations Program shall be based on the same load that was submitted in the Participant's Forward Showing.

2. Provide the specific document and language you would like changed:

See attached redlines to BPM 105 and BPM 202.

3. Provide a suggestion for how language could be updated to address issue:

See attached redlines to BPM 105 and BPM 202.

## Impact of Change

**Describe the benefits that will be realized from this change*:**

The changes in BPM 105 Forward Showing Qualifying Resources will provide WRAP Participants with additional time to complete Operational Tests.

The changes in BPM 202 Participant Sharing Calculation Inputs provide WRAP Participants with clarity on the load forecasting requirements in the Operations Program.

**Please provide the following information if known and/or available.**

1. Any data/information available that would characterize the importance or magnitude of the issue (allows for file attachments):

See attached redlines to BPM 105 and BPM 202.

## Non-Task Force Proposal Request (optional)

A flag as a Non-Task Force Proposal indicates the Concept could be implemented without requiring further development into a Proposal by a Task Force. Please check the box below if you would like this to be considered as a Non-Task Force Proposal

☒ I would like this to be flagged as a Non-Task Force Proposal

WRAP
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# Western Resource Adequacy Program

## 105 Qualifying Resources

100 – Forward Showing

| ***Manual Number*** | **Version** | **Description** | **Revised By** | **Date** |
|---|---|---|---|---|
| *105* | 0.1 | RAPC Glance Version | Rebecca Sexton | 5/9/2023 |
| *105* | 0.2 | Public Comment Version | Rebecca Sexton | 6/23/2023 |
| *105* | 0.3 | RAPC & PRC Discussion | Rebecca Sexton | 8/10/2023 |
| *105* | 0.4 | RAPC Endorsement | Rebecca Sexton | 8/11/2023 |
| *105* | 0.5 | Board Consideration | Rebecca Sexton | 8/17/2023 |
| *105* | 1.0 | Board Approved | Rebecca Sexton | 8/23/2023 |
| *105* | 2.0 | 2026-Expedited-Proposal-1 | Maya McNichol | 2/3/2026 |
| *105* | 3.0 | Annual BPM Review | Dave Zvareck | 3/19/2026 |
| *105* | 4.0 | 2026-NTFP-02 | Dave Zvareck | |

# Revision History

# Table of Contents

# 105 Qualifying Resources

## 1. Introduction

The Qualifying Resources Business Practice Manual (BPM) consists of two sections. The Resource Registration~~Resource Registration~~ section outlines the processes for Participants to register their Qualifying Resources with the Program Operator to be included in the Advance Assessment to receive a Qualifying Capacity Contribution (QCC). The Qualifying Capacity Contribution of Resources~~Qualifying Capacity Contribution of Resources~~ section outlines the processes that the Program Operator will undertake to calculate QCC values for all registered Qualifying Resources.

### 1.1 Intended Audience

BPM 105 is intended for Western Power Pool (WPP) Western Resource Adequacy Program (WRAP) Participants and other interested individuals or entities. BPM 105 is particularly useful for those individuals that are responsible for their Participant organization's Forward Showing (FS) Submittal and need to ensure that their organization's Qualifying Resources are properly registered, will be included in the Advance Assessment, and will receive QCC values.

### 1.2 What You Will Find in This Manual

BPM 105 includes two separate Business Practices: 1) Resource Registration~~Resource Registration~~ and 2) Qualifying Capacity Contribution of Resources~~Qualifying Capacity Contribution of Resources~~.

### 1.3 Purpose

To provide an overview of resource registration and qualification processes and the process for determining the QCC for Qualified Resources.

### 1.4 Definitions

All capitalized terms that are not otherwise defined in BPM 105 have their meaning set forth in the Tariff. Any capitalized terms not found in the Tariff that are specific to BPM 105 are defined here.

**Advance Assessment Data Request:** As defined in *BPM 101 Advance Assessment.*

**ASHRAE Rated Ambient Temperature**: The ambient temperature employed for Capability Testing of a resource for the Summer Season, as determined for the resource location on a dry-bulb basis in accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Fundamentals Handbook,[1] Climatic Design Information, Cooling and Dehumidification Design Conditions Appendix

[1] ASHRAE Fundamentals Handbook

using the – "Cooling DB/MCWB 0.4%" values. If the resource is located within 30 miles of the nearest weather station reported in the Handbook, then the temperatures employed for the Rated Ambient Temperature will be those reported for the nearest station. For all other resource locations, the Rated Ambient Temperatures shall be determined by interpolating between those reported for appropriate weather stations using the resource location's latitude and longitude.

**Capability Test:** The demonstration of capability of certain Qualifying Resources by generating at their rated capability under specified test conditions and test duration.

**Cascaded Dual Plant:** Two Storage Hydro Qualifying Resources that are on the same river systems and operated in a coordinated manner.

**Cure Period:** As defined in *BPM 108 Forward Showing Submittal Process*

**Data Request Instruction Manual:** As defined in *BPM 101 Advance Assessment*.

**Fuel Type:** A resource's primary fuel source, such as coal, natural gas, wind, or hydroelectric.

**Hybrid Facility:** A resource that is composed of two or more resources of different fuel or technology types where one of those resources is an Energy Storage Resource with the same interconnection point.

**Hydro QCC Workbook:** The workbook that determines the QCC of a Storage Hydro resource(s).

**Long Duration Storage:** A resource designed to capture energy produced at one time for use at a later time, and capable of sustained delivery for over eight hours (such as pumped Storage Hydro facilities or thermal energy storage devices).

**Net Generating Capability:** The gross maximum output of a Qualifying Resource reduced by any power used for auxiliary power requirements demonstrated through a Capability Test. May be used interchangeably with Installed Capacity when referencing Thermal Resources.

**Operational Test:** The annual demonstration of the functional ability of a Qualifying Resource.

## 2. Background

Participant owned and contracted Qualifying Resources capable of providing capacity may be used to meet a Participant's FS Capacity Requirement. In order to receive a

QCC for these Qualifying Resources, a Participant must provide the necessary information and data to the Program Operator. The Program Operator will develop and maintain a registration and certification process for all Qualifying Resources identified for the FS Program as outlined in BPM 105. BPM 105 does not cover timelines associated with Participants and the Program Operator completing the registration and QCC assessment process. Timelines for registration can be found in *BPM 101 Advance Assessment*.

# 3. Resource Registration

## 3.1 Resource Eligibility

A Participant will register all owned resources in its portfolio and all resources acquired in resource specific contracts in order for those resources to receive QCC values, subject to the exceptions described in BPM 105.

Resource registrations, including the appropriate modeling data required by the Program Operator, shall be submitted in accordance with deadlines stated in *BPM 101 Advance Assessment*, relating to the timeline for the Advance Assessment.

Participants shall employ the Advance Assessment Data Request, and the guidance and instructions in the Data Request Instruction Manual for providing resource registration information. The then-effective versions of the Advance Assessment Data Request and the Data Request Instruction Manual are available on the WPP website. The QCC calculations for all Qualified Resources will be updated during each Advance Assessment to be used for the applicable Binding Season.

Resources owned and operated by entities that are not Participants and contracted to Participants with resource specific contracts (i.e., not System Sales or block contracts) must be registered with the Program Operator and provide the necessary data in order for Participants to claim the full QCC from these resources toward their FS Capacity Requirements.

Qualified Resources must be 1 MW minimum to qualify for registration (see Section 3.3). The registration process for all Qualifying Resources, other than Storage Hydro Qualifying Resources, will require, but will not be limited to, provision of the information set forth in Table 1~~Table 1~~ and Table 2~~Table 2~~ to the Program Operator, by means of the Advance Assessment Data Request. Registration of Storage Hydro Qualifying Resources will require, but will not be limited to, the provisions of items set forth in Table 3~~Table 3~~ to the Program Operator, by means of the Advance Assessment Data Request.

## 3.2 Late Registration of Resources

Resources that are unable to register by the deadline of the Advance Assessment Data Request may still be able to register through the following processes. Such resources may include those owned by Participants or those contracted to Participants with resource specific contracts.

A Participant may register a resource after the Advance Assessment deadline and prior to the FS Submittal Deadline (the process and timeline for submitting the FS Submittal can be found in *BPM 108 Forward Showing Submittal*) provided the Participant provides the necessary information in Table 1~~Table 1~~ and Table 2~~Table 2~~ (or Table 3~~Table 3~~ for Storage Hydro resources). The QCC that will be allowed for late registered resources will be either the class average of similar resources or will be a discounted QCC based on the circumstances of the data provided as further described in Generator Testing (Section 3.4) and Qualifying Capacity Contribution of Resources (Section 4).

Given that the program has very little information about late registered Qualified Resources, such resources may constitute no more than 10% of the total FS Capacity Requirement for an individual Participant, unless that Participant can demonstrate an increase in the load participating in the WRAP after the Advance Assessment data collection deadline. During the Transition Period, late registered resources may constitute as much as 20% of an individual Participant's total FS Capacity Requirement, unless that Participant can demonstrate an increase in the load participating in the WRAP after the Advance Assessment data collection deadline. In the case of increased load, the Participant may provide late registered resources to meet the FS Capacity Requirement for the additional load, as well as for the load anticipated to participate at the time of the Advance Assessment data collection deadline.

***Table 1. Information Required for Resource Registration***

| | Description / Instructions |
|---|---|
| **Facility Name** | Plant name of the resources. If possible, utilize the Energy Information Administration (EIA)-860[2] plant name given for U.S. resources. |
| **Unit ID** | The unique generator identification commonly used by plant management. If possible, utilize the EIA-860 Generator ID given for U.S. resources. |
| **Prime Mover** | Utilize the predetermined dropdown list of EIA-860 Prime Mover identifiers. For combined |

[2] https://www.eia.gov/electricity/data/eia860/

| Description / Instructions | |
|---|---|
| | cycle resources, a prime mover code must be entered for each generator. |
| **Fuel Type** | Utilize the predetermined dropdown list in the workbook of Fuel Types used as the primary energy source to power the generator. |
| **Host Balancing Authority** | Provide the Balancing Authority Area (BAA) in which the resource is located. |
| **Ownership or Contracted Percentage for Participant** | Enter the percentage of resource capability owned or contracted by the Participant. This should also include the percentage of any power purchase agreement (PPA) where the Participant has fully contracted for the capacity from a facility but would not include a PPA with another Participant. For example, if the Participant has a PPA with a wind developer, solar developer, or city that has local generation for an extended period of time (i.e., 15 Years or life of the facility) then the percentage of the offtake of that facility should be listed here. |
| **Summer Max Capacity or Nameplate (MW)** | Provide the generator's Net Generating Capability for the primary energy source. This can be i) the net expected capacity, as determined from a summer Capability Test performed in accordance with the procedures on generator testing, Section 3.4 ii) the EIA-860 nameplate capacity for Wind, Solar, Run-of-River (ROR), and Energy Storage Resources (ESR) located in the U.S. and iii) the nameplate capacity for Wind, Solar, ROR and ESR located outside of the U.S. |
| **Winter Max Capacity or Nameplate (MW)** | Provide the generator's Net Generating Capability for the primary energy source. This can be i) the net expected capacity, as determined from a winter Capability Test performed in accordance with the procedures on generator testing, Section 3.4 ii) the EIA-860 nameplate capacity for Wind, Solar, ROR, and ESR located in the U.S. and iii) the |

| Description / Instructions | |
|---|---|
| | nameplate capacity for Wind, Solar, ROR and ESR located outside of the U.S. |
| **In-Service Date Month-Year** | Provide the Month and Year of the original in-service date (or commercial operation date) that the resource became operational (if possible, the operating Year used in EIA-860 should be submitted for all resources within the U.S.). For details on the format of the submittal, refer to the Data Request Instruction Manual on the WPP website. |
| **Retirement Date Month-Year** | Provide the Month and Year for resources that have been either formally announced or marked for retirement. |
| **State or Province** | Enter the state acronym where the resource is physically located. For resources in Canada, enter the province. |
| **County** | For resources in the U.S., enter the county (or county equivalent) where the resource is located. |
| **Inverter Loading Ratio (Only for Solar and Wind)** | For solar and wind resources only, enter the loading ratio of the inverter compared to the nameplate of the resource. As an example, if the nameplate of a solar resource is 150 MW and the inverter is limited to 125 MW (oversizing of solar panels), then the ratio would be 1.2 (150 / 125). If the nameplate of the resource is the same as the inverter, or the loading ratio is not known, the provided loading ratio would be 1.0. |
| **ESR Duration (Only for ESRs)** | For ESRs, enter the maximum continuous number of hours for which the ESR can be utilized at its maximum capacity. |
| **Facility Limitation MW (Only for Hybrid Facilities)** | For Hybrid Facilities, provide the maximum capability which the combined amount of the component resources can output to the system. This is typically based on the inverter limit before generation is output to the system. |

| Description / Instructions | |
|---|---|
| **Comments** | Enter, if applicable, any additional comments about the submitted information. |

***Table 2. Additional Information Required for Resource Registration***

| Description / Instructions |
|---|
| Thermal Resources - North American Electric Reliability Corporation (NERC) Generating Availability Data System (GADS) or equivalent data is required for all Thermal Resources. For further details on the format of the submittal, refer to the Data Request Instruction Manual on the WPP website. |
| Wind, ROR, Solar Resources – hourly output profiles for the last 10 Years or as much as is available. For further details on the format of the submittal, refer to the Data Request Instruction Manual on the WPP website. |

The registration process for all Storage Hydro Qualifying Resources will require, but will not be limited to, the items in Table 3~~Table 3~~, as follows:

***Table 3. Storage Hydro Qualifying Resource Registration***

| Description / Instructions | |
|---|---|
| **Facility Name** | Plant name of the Storage Hydro Qualifying Resource. If possible, utilize the EIA-860 plant name given for U.S. Storage Hydro Qualifying Resources. |
| **Unit ID** | The unique generator identification commonly used by plant management. If possible, utilize the EIA-860 Generator ID given for U.S. Storage Hydro Qualifying Resources. |
| **Prime Mover** | Utilize the predetermined dropdown list of EIA-860 prime mover identifiers. |
| **Host Balancing Authority** | Provide the BAA location of the Storage Hydro Qualifying Resources. |
| **Ownership or Contracted Percentage for Participant** | Enter the percentage owned or contracted by the Participant. This should also include the percentage of any PPA where the Participant has fully contracted for the capacity from a facility but would not include a PPA with another Participant. |
| **Individual Monthly QCC (MW)** | QCC values by Month (all Months of the Year) for all Storage Hydro Qualifying Resources. The QCC of the Storage Hydro Qualifying Resources is determined by Section 4. |

| Description / Instructions | |
|---|---|
| **In-Service Date Month-Year** | Provide the Month and Year of the original in-service or commercial operation date that the Storage Hydro Qualifying Resource became operational (if possible, the operating Year used in EIA-860 should be submitted for all Storage Hydro Qualifying Resources within the U.S.). For planned Storage Hydro resources, enter the Month and Year the Storage Hydro Qualifying Resource is projected to become operational. |
| **Retirement Date Month-Year** | Provide the Month and Year for resources that have been either formally announced or marked for retirement. |
| **State or Province** | Enter the state abbreviation where the Storage Hydro Qualifying Resource is physically located. For Storage Hydro Qualifying Resources in Canada, enter the province. |
| **County** | For Storage Hydro Qualifying Resources in the U.S., enter the county (or county equivalent) where the Storage Hydro Qualifying Resource is located. |
| **Comments** | Enter, if applicable, any additional comments about the submitted information. |

## 3.3 Qualifying Resource Aggregation (Resources <1 MW)

Qualifying Resources that are less than 1 MW in size may be aggregated to obtain the minimum 1 MW registration requirement.

Qualifying Resources that are aggregated will need to have a common injection point of capacity to the transmission system. Aggregations of generators at different distribution substations may be allowed provided the generators are in the same BAA, same zone (as applicable by resource type), and are the same resource type.

For Qualifying Resources that are requested to be aggregated, the following information should be provided to the Program Operator.

- For the aggregated facility:
  - Quantity of generators being aggregated.
  - Combined nameplate of generators being aggregated.
  - One-line diagram of the transmission/distribution system at which the generators are located.
- For each generator being aggregated:
  - Nameplate.
  - Location of power injection to the transmission system (substation).

- Supporting information for QCC evaluation.

This information will be provided to the Program Operator during the Advance Assessment Data Request submission.

## 3.4 Generator Testing

### *3.4.1 Background*

Qualifying Resources must have Capability Tests and Operational Tests performed and provided by the Participant, as applicable and in accordance with the guidelines contained in BPM 105. Capability Tests will be required for resources as detailed below. ~~All Qualifying Resources must perform annual Operational Tests completed in the 12-Month period prior to the FS Submittal due date that may be conducted within or outside of a Binding Season (at Participant's discretion).~~

### *3.4.2 Capability Testing*

Capability Tests will be required for Thermal Resources, Long Duration Storage resources, and Demand Response resources (as defined in BPM 105) with exceptions as noted in this section.

For units that are required to perform Capability Tests, the Participant may choose whether to use Capability Tests on a unit-by-unit basis or on a plant-level basis; regardless of the approach, all units requiring a QCC must be tested (see bullet 3 below). Capability Test duration shall be a minimum of one hour. Once a qualifying Capability Test is submitted to the Program Operator by the FS Submittal Deadline, the five-Year submittal window will be reset. The Capability Test may be performed at the convenience of the Participant and can be completed more often than every five Years. The most recent testing data will be used to determine a generator's QCC if a Capabilty Test is performed between the Advance Assessment and the FS Submittal.

For Storage Hydro, ROR Hydro, Wind, Solar, and ESR, the annual Operational Test will suffice as the Capability Test.

#### 3.4.2.1 Capability Test Requirements for Thermal Resources

Capability Tests conducted for Thermal Resources are used as the base accredited value to which Unforced Capacity (UCAP) calculations are applied (see Section 4.2) to determine final QCC values. A Thermal Resource that is not subject to generator testing requirements (i.e., are not subject to NERC MOD-025 requirements) may have its QCC values determined in accordance with Section 4.2, Option 1, in lieu of performing the Capability Test.

Capability Tests for Thermal Resources will be performed during the Summer Season and must meet the testing requirements specified in BPM 105. A resource may use its Summer Season Capability Test value for both the Summer Season and the Winter Season. If a unit has a greater Net Generating Capability for the Winter Season than for the Summer Season, a separate Capability Test will need to be performed during the Winter Season to claim the higher Net Generating Capability value.

The following requirements must be met for a Thermal Resource Capability Test, documentation of which will be provided to the Program Operator at the time of the FS Submittal Deadline:

1) Summer Capability Tests are to be conducted during a time when the ambient dry-bulb temperature is no more than 10 degrees Fahrenheit below the station ASHRAE Rated Ambient Temperature. At the time of testing, the most recent version of the ASHRAE Fundamentals Handbook shall be utilized. If the dry-bulb temperature exceeds 10 degrees below the ASHRAE Rated Ambient Temperature, a penalty of 5% plus an additional 0.5% per degree for each additional degree below 10 degrees, up to 20 degrees, will be applied to the Capability Test result. A summer Capability Test shall not be performed below 20 degrees of the ASHRAE Rated Ambient Temperature. There is no ambient temperature requirement for Winter Capability Tests.
2) The unit shall be brought to the desired test load and allowed to stabilize. Once the test period has begun, only minor changes in unit controls shall be made as required to maintain the unit in normal, steady-state operation.
3) The unit capability shall be determined separately for each generating unit in a power plant where the input to the prime mover of the unit is independent of the others. Units that are aggregated into a single Resource Registration and prefer testing aligned with their registered resource and/or are dependent upon common systems (i.e., fuel, steam supply, auxiliary equipment, transmission, etc.) which restrict total output shall be tested simultaneously. Each unit shall be assigned an individual capability by apportioning the combined capability among the units.
4) The fuel used during testing shall be the type expected to be used during peak load conditions.
5) The capability of a unit or plant obtained through non-typical operation (i.e., bypassing feedwater heaters, varying steam conditions, alternate control mode, etc.) is acceptable.

#### 3.4.2.2 Capability Testing of Long Duration Storage Resources

Capability Tests for Long Duration Storage resources are used as the base accredited value to which UCAP calculations are applied (See Section 4.2) to determine final QCC values. A Long Duration Storage resource that is not subject to generator testing requirements (i.e., are not subject to NERC MOD-025 requirements) may have its QCC values determined in accordance with Section 4.2, Option 1, in lieu of performing the Capability Test. There are no temperature or timing requirements on the Long Duration Storage Capability Test, other than the five-Year frequency.

1) The unit shall be brought to the desired test load and allowed to stabilize. Once the test period has begun, only minor changes in unit controls shall be made as required to maintain the unit in normal, steady-state operation.
2) The unit capability shall be determined separately for each generating unit in a plant where the input to the prime mover of the unit is independent of the others. Units that are aggregated into a single Resource Registration and prefer testing aligned with their registered resource and/or are dependent upon common systems (i.e., fuel, steam supply, auxiliary equipment, transmission, etc.) which restrict total output shall be tested simultaneously. Each unit shall be assigned an individual capability by apportioning the combined capability among the units.
3) The fuel used during testing shall be the type expected to be used during peak load conditions.
4) The capability of a unit or plant obtained through non-typical operation (i.e., bypassing feedwater heaters, varying steam conditions, alternate control mode, etc.) is acceptable.

#### 3.4.2.3 Capability Testing of Demand Response Programs

A Capability Test for a Demand Response (DR) program registered as a Qualifying Resource will be used to confirm the claimed capability of the DR program, as well as the claimed duration of the load reduction (up to five hours). Capacity testing of the DR program will consist of a sustained reduction in load attributable to the deployment of the controllable and dispatchable program by the Participant for up to five hours. If a DR program fails to achieve the claimed load reduction capability and duration during the Capability Test, the DR program's QCC will be determined using the tested values instead. If the DR resource has a higher capacity value in one of the two Binding Seasons, the Capability Test must be conducted during the Binding Season with the higher capacity value; the DR resource does not need to be re-tested during the season with a lower capacity value. There are no temperature requirements for the DR Capacity Test.

As noted in Section 4.6, new DR programs, or the newly expanded portion of a DR program, will be assigned a QCC of 50% of the expected capability. If the Participant desires a higher QCC than 50% of the expected capability, Participant may conduct a Capability Test outside of the expected peak season of the DR program. Testing outside of the peak season will only be considered a Capability Test during the first Year of operation or during the expansion of an existing DR program. An Operational Test shall then be performed during the upcoming Binding Season and reported to the Program Operator (see Section 3.4.3.6).

#### 3.4.2.4 Forced Outages Affecting Capability Testing

If a unit is due for a Capability Test, but unable to perform the Capability Test due to a forced outage, a maintenance outage, or a forced de-rate, the most current Capability Test results may be used, provided it is used only for the immediately succeeding Summer Season and Winter Season. The unit will be required to perform an Operational Test per the Operational Testing~~Operational Testing~~ procedures (Section 3.4.3) before the next Summer Season. For example, if a unit enters a forced outage while performing a Capability Test and the repair for the unit cannot be completed until after the Summer Season, then when the unit is repaired, an Operational Test must be completed. In that case, the previous Capability Test will be used to satisfy the generator testing requirements for the upcoming Summer Season FS submittal. A Capability Test must be performed in the next Summer Season for the next FS submittal. If the unit fails to complete the make-up Capability Test, the unit cannot be claimed on the FS Submittal.

### *3.4.3 Operational Testing*

All Qualifying Resources must perform annual Operational Tests completed in the 12-Month period prior to the FS Submittal due date, or within the Cure Period, that may be conducted within or outside of a Binding Season (at Participant's discretion).

#### ~~3.4.2.5~~3.4.3.1 Thermal Resources and Long Duration Storage

An Operational Test serves as an annual demonstration of the functional capability of a Qualifying Resource to generate at a high-level of its Net Generating Capability in the upcoming Binding Season. ~~This test must be completed in the 12-Month period prior to the FS Submittal due date and can be conducted within or outside of a Binding Season (at Participant's discretion).~~ Test data shall be compiled and submitted via the FS Submittal process, as outlined in *BPM 108 Forward Showing Submittal*. The Operational Test must be conducted at a minimum of 90% of the Summer Net Generating Capability. The Operational Test shall be conducted for a minimum of one hour, and for Thermal Resources there are no Rated Ambient Temperature requirements for Operational Tests. Any hour with the unit operating at or above 90% of the Net Generating Capability may be deemed a successful Operational Test. In case of failure

to meet 90% of the Net Generating Capability, the resource can only claim what it can achieve on the Operational Test (to which the UCAP calculations are applied – see Section 4.2) for purposes of determining its QCC for the upcoming FS Submittal.

### ~~3.4.2.6~~3.4.3.2 Storage Hydro Resources

An Operational Test serves as a verification that the resource can meet its QCC values on a plant-level basis as determined by the Storage Hydro QCC methodology. ~~This test must be completed in the 12-Month period directly prior to the FS Submittal due date and can be conducted within or outside a Binding Season (at Participant's discretion).~~ Test data shall be compiled and submitted via the FS Submittal process, as outlined in *BPM 108 Forward Showing Submittal*. The Operational Test must achieve a minimum of 90% of the plant's highest monthly QCC value from the FS Submittal being submitted. The Operational Test shall be conducted for a minimum of one hour and there are no Rated Ambient Temperature requirements for Operational Tests. Any hour with the plant operating at or above 90% of the highest monthly QCC submitted for the current and previous Binding Season may be deemed a successful Operational Test. In case of failure to meet 90% of the highest monthly QCC, the resource can claim no more than what it achieved on the Operational Test for purposes of determining its QCC for the upcoming FS Submittal.

Given that the Operational Test can be performed on any hour in a 12-Month period, the Operational Test should be scheduled (or re-scheduled) for a time when outages/de-rates are not occurring. If one or more units were on outage or de-rated at the time of the Operational Test, in order to claim the full QCC value provided by the Storage Hydro QCC methodology, the Participant shall:

1) Demonstrate that the unit(s) out/de-rated at the time of the Operational Test were offline/de-rated for more than 90 consecutive days of the 12 Months preceding the FS Submittal due date.
2) Demonstrate that the unit was out/de-rated for the entirety of one of the Months with the three highest monthly QCC values for the plant.
3) Provide operational data demonstrating the unit(s) performance on any hour within the 12 Months preceding the FS Submittal due date, or within the Cure Period.
4) Add the sustained hour-long operational value from the hour identified in (3) to the Operational Test values.

If 90% of the highest monthly QCC value cannot be achieved after this addition, the Participant can claim no more than the Operational Test (after the addition in (4) above) for any Month's QCC value.

### ~~3.4.2.7~~3.4.3.3 ESRs

Operational Tests for ESRs should at least be conducted for the claimed duration of the device – i.e., two-hour, four-hour, etc. An ESR must be able to achieve its full QCC as determined in the QCC process for ESRs.

### ~~3.4.2.8~~3.4.3.4 ROR Hydro

Operational Tests shall be conducted at a minimum of 90% of the QCC for either Binding Season. Any hour with the resource operating at or above 90% of the QCC may be deemed a successful Operational Test. In case of failure to meet 90% of the QCC, the resource can only claim what it can achieve on the Operational Test for purposes of determining its QCC for the upcoming FS Submittal.

### ~~3.4.2.9~~3.4.3.5 Wind and Solar Qualifying Resources

Operational Tests shall be conducted at a minimum of 100% of the seasonal QCC for either Binding Season. Any hour with the resource operating at or above 100% of the QCC may be deemed a successful Operational Test. In case of failure to meet 100% of the QCC, the resource can only claim what it can achieve on the Operational Test for purposes of determining its QCC for the upcoming FS Submittal.

### ~~3.4.2.10~~3.4.3.6 Demand Response Resources

An Operational Test will be conducted yearly during the Participant's peak Binding Season and at a minimum of 50% of the DR program's claimed load reduction capability (to avoid unnecessary disruption to the Participant's customers). The duration of an Operational Test shall be for a minimum of one hour.

### ~~*3.4.3*~~*3.4.4 New or Upgraded Resource Operational Testing*

For newly installed resources and resources undergoing a physical or operational modification which could impact the Net Generating Capability, design output may be used for the first FS Submittal of the appropriate Binding Season to allow sufficient time for Operational and Capability Tests to be conducted. For resources required to do so, a Capability/Operational Test shall be performed in the Binding Season addressed by such first FS Submittal, in order to establish the new Net Generating Capability for all succeeding Binding Seasons.

### ~~*3.4.4*~~*3.4.5 Operational Testing for Late Registered Resources*

Late Registered resources will be required to submit applicable generator Operational Test reports as required by the resource Fuel Type. If a Participant demonstrates that it has contracted for a resource not previously registered with the WRAP after the Advance Assessment Data Request deadline for the Binding Season in which capacity is being claimed to meet FS Capacity Requirements, the resource will be treated as if it had tested at 95% of its Installed Capacity. A resource previously registered with the

WRAP that does not have any form of generator test results provided will be assumed to have tested at 70% of its Installed Capacity. Resources not owned or operated by a Participant that have test reports provided in a form other than the WRAP format, will be evaluated by the Program Operator and assigned an appropriate testing value based on comparability to testing requirements established in BPM 105; testing reports determined not comparable will be assumed to have tested at 70% of Installed Capacity. If the resource is newly installed or upgraded, the applicable section on new and upgraded resources will be followed.

#### ~~3.4.5~~3.4.6 *Provision of Test Reports in the FS Submittal*

Test reports will be provided to the Program Operator in the FS Submittal (see *BPM 108 Forward Showing Submittal* for more details). The QCC values for resources will be based on the Capability Tests and/or Operational Tests provided in the FS Submittal.

## 4. Qualifying Capacity Contribution of Resources

### 4.1 Background

A resource will not be assigned a Resource QCC or counted toward Portfolio QCC unless it is a Qualifying Resource. Qualifying Resources are those that, before they are included in an FS Submittal, are first registered in the WRAP. A Participant seeking registration of a resource must submit a request for registration providing the resource information described in Section 3.

This section describes the methodology used to assign Resource QCCs to Qualifying Resources when resources are registered through the Advance Assessment based on resource type, as well as when Qualifying Resources of each resource type are registered after the Advance Assessment Data Request deadline (as a late registered resource).

### 4.2 Thermal or Long Duration Storage Resources

For dispatchable resources that use conventional thermal fuels such as coal, gas, Equivalent Forced Outage Factors (EFOF) biofuel, and nuclear, or Long Duration Storage, the FS Program will use an EFOF methodology to determine the QCC. Accreditation of non-dispatchable Thermal Resources is covered in Section 4.8.2.

The seasonal QCC will be determined for each resource by applying the $EFOF_{CCH}$ to the Net Generating Capability (or Installed Capacity) as determined in Section 3. The Capacity Critical Hours (CCH)[3] will be used to determine the hours to be used in calculating the EFOF for each resource. The $EFOF_{CCH}$ calculation, as set forth in the formula in Section 4.2.1 below, will be performed for each Year of the most recent six-

[3] CCH are calculated in accordance with *BPM 104 Capacity Critical Hours.*

Year historical look-back period. The equivalent outage factor is calculated by removing the worst performing Year (for each Summer and Winter Season) and then taking an average of the remaining five Years of data. The final calculated $EFOF_{CCH}$ will be applied to the Net Generating Capability to calculate the QCC amount for the thermal generator for the entire Binding Season.

Planned outages and any outage properly reported as "outside management control" are not included in $EFOF_{CCH}$ calculations[4].

For resources new to the FS Program that do not have sufficient data over the historical period used for determining a QCC, class average data for resources of similar size will be used.

### *4.2.1 $EFOF_{CCH}$ Equation*

$$EFOF(CCH) = 1 - \frac{\sum FOH_{CCH} + EFDH_{CCH}}{total_{CCH}} * 100\%$$

Where:

$FOH_{CCH}$ is Forced Outage Hours occurring on CCH,

$EFDH_{CCH}$ is Equivalent Forced Derating Hours occurring on CCH, and

$Total_{CCH}$ is total number of CCH for the timeframe of interest.

Definitions of $FOH_{CCH}$ and $EFDH_{CCH}$ can be found in Table 4~~Table 4~~.

***Table 4. Definitions of FOH and EFDH***

| Definitions | |
|---|---|
| **$FOH_{CCH}$** | Sum of all CCH experienced during Forced Outages (U1, U2, and U3) + Startup Failures[5]. |
| **$EFDH_{CCH}$** | Each forced derating (D1, D2, and D3)[6] transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of the |

[4] https://www.nerc.com/pa/RAPA/gads/Pages/Data%20Reporting%20Instructions.aspx

[5] See NERC GADS reporting instructions at https://www.nerc.com/pa/RAPA/gads/DataReportingInstructions/GADS_DRI_2023.pdf

[6] Ibid.

| Definitions | |
|---|---|
| | reduction (MW) and dividing by the net maximum capacity. These equivalent hour(s) are then summed by CCH.<br><br>$$\frac{Derating\ Hours * Size\ of\ Reduction}{Net\ Maximum\ Capacity}$$ |

Additional Thermal QCC calculation considerations:

- Calculation is performed for each resource seasonally and for each historical Year. QCC will be assigned to each resource for the entire Binding Season.
- Six Years of data will be used for the calculation. The worst performing Winter Season and the worst performing Summer Season will be removed from the calculations, allowing for a five-Year average.
- Only forced outages or de-rates occurring during CCHs will be used to calculate QCC. Outages during hours that are not deemed to be capacity critical will not negatively impact QCC.
- All Years (of the five Years) will have equal weighting.
- Outside of Management Control outages as reported under NERC GADS Appendix K[7] (or equivalent) will be excluded from the calculation.
- For Participants relying on resource specific transactions external to the FS Program, those Qualified Resources will follow the same QCC calculation for Thermal Resources and the Participant will be responsible to make sure the information is provided to the Program Operator.
- The Program Operator will break out each event by hour. If the NERC GADS (or equivalent) data is reported in minutes, then the hour that contains the outage will be equalized to account for the minutes. For example: if an outage starts on June 1, 2020 at 4:25 PPT, then the hour duration for that hour will be less than one since the outage does not start at the top of the hour. The total hours for

[7] Appendix K of NERC GADS: https://www.nerc.com/globalassets/programs/rapa/gads/conventional/appendix_k_outside_management_control_2024_dri.pdf

June 1, 2020 on hour beginning 4:00 PPT would be 0.583 *([60 Minutes – 25 minutes] / 60 minutes in an hour).*

- Diversity of time zones will be considered. Participants are required to list the time zone that is appropriate for their respective data.
- When comparing the event hours to the CCH hour identification should be consistent.

### *4.2.2 Late Registered Thermal Resources*

If a Participant seeks to claim capacity from a Thermal Resource not registered at the time of the Advance Assessment Data Request, the Participant may use the late registered resource options (described generally in Section 3.2), choosing one of the following approaches:

1) Demonstrate that the resource was acquired following the Advance Assessment Data Request due date for the Binding Season in question, in which case the resource will be permitted to use the class average QCC for Thermal Resources in the program; or
2) Claim a decremented QCC of 70% of the class average for Thermal Resources in the program.

### *4.2.3 Thermal Resources That Are Not Required to Report GADS Data*

Certain Thermal Resources are not required to report GADS data. GADS data applies to generator owners who are NERC registered with Qualified Resources that are 1) connected to the Bulk Electric System and 2) are synchronous machines of 20MVA or larger, or distributed generation facilities of 75MVA or larger. Smaller Qualified Resources interconnected to the power system as well as behind the meter resources may not be required to report GADS data. For these Qualified Resources, the Participant will have two options to pursue in order to have QCC determined.

Option 1 – Historical Output. The first option will determine QCC based on the monthly average performance of such resource during CCH. The Participant will provide 10 Years of historical hourly dispatch data. This data will be provided with the data submittal (see *BPM 101 Advance Assessment*). A workbook posted on the WPP website that contains the latest set of CCH will allow the Participant to calculate their QCC for the FS Submittal. The workbook will allow the Participant to calculate the QCC values taking the average of the facility output during the CCH. If less than 10 Years of historical data is available for use in

determining the QCC, the Program Operator will utilize the methodology described in Section 4.8.2.

Option 2 – Historical Outage Evaluation – The second option will determine QCC based on the monthly outage records provided by the Participant for the resource in question. A workbook detailing what outage information is required for a QCC calculation can be found on the WPP website. The Participant will provide five Years of outage information as provided in the workbook. The Program Operator will determine the QCC of the resource in question using a methodology similar to the $EFOF_{CCH}$ methodology applied to all Thermal Resources.

For all Qualified Resources not providing GADS reporting data, the Participant will be required to provide an attestation (provided in *BPM 108 Forward Showing Submittal*) attesting that the resource is not subject to GADS reporting and the workbooks submitted by the Participant are an accurate depiction of either the historical performance or historical outage data of the resource.

## 4.3 Variable Energy Resources

The QCC for Variable Energy Resources (VERs), including but not limited to wind and solar resources, will be determined for each Month of the Binding Season through the use of an Effective Load Carrying Capability (ELCC) analysis and a subsequent allocation process. Each Binding Season will have its own ELCC analysis performed during the Advance Assessment and each resource will be assigned a new QCC in advance of each Binding Season. Each Binding Season's ELCC analysis will have a scope document that will detail the study.

### *4.3.1 Source Data for Resources Under Study*

In accordance with Section 3 and the Advance Assessment data submittal described in *BPM 101 Advance Assessement*, the Participant will submit historical output data for wind and solar resources that are requested to have QCC determined. A Participant must submit three and may submit up to 10 Years of historical output data for wind and solar resources.

For newer resources that do not have 10 Years of operational data and historical output, the Participant may provide engineering data from the wind or solar plant operator. The Program Operator will evaluate the data provided and determine its usefulness in the ELCC process. The engineering data will need to provide synthesized outputs for the facility for at least the most recent three Years of historical conditions.

Otherwise, the Program Operator will use either synthesized data or average output data of other VER resources in the appropriate VER Zone.

### *4.3.2 Late Registered VERs*

If a Participant seeks to claim capacity from a VER not registered at the time of the Advance Assessment Data Request, the Participant may use options for late registering a resource, choosing one of the following approaches:

1) Demonstrate that the resource was acquired following the Advance Assessment Data Request due date for the Binding Season in question and claim the average ELCC of the VER Zone in which the resource is located, or
2) Claim a decremented QCC of 70% the average ELCC in the VER Zone in which the resource is located.

### *4.3.3 ELCC Study Process*

The ELCC will be determined for the VERs in the WRAP Region. The ELCC study will consist of analyses utilizing Loss of Load Expectation (LOLE) metrics to determine the capacity provided by the VERs being analyzed. The LOLE benchmark metric to be used in the ELCC accreditation study will be a one event in 10-Year threshold.The ELCC of VERs will be calculated first on a seasonal basis then later prorated to a monthly QCC value. For the ELCC study, loss of load events will be tabulated during the Binding Season months for determination of the 1-in-10 LOLE. Loss of load events that occur outside of the Binding Season months will not go into the calculation of the capacity value of VERs. Pure Capacity will be applied to the simulation process to derive the 0.1 Day per Year reliability threshold. If the resulting LOLE is greater than the 0.1 Day per Year threshold, Pure Capacity will be added until the 0.1 threshold is achieved. If LOLE is less than the 0.1 Day per Year threshold, negative Pure Capacity will be added until the 0.1 threshold is achieved. The VER of interest will be excluded from the benchmark system. All other VER types will be included. For example, if the wind resource type is being analyzed, only wind will be excluded from the benchmark system.

The capacity calculated is designated in Figure 1 as Pure Capacity 1.

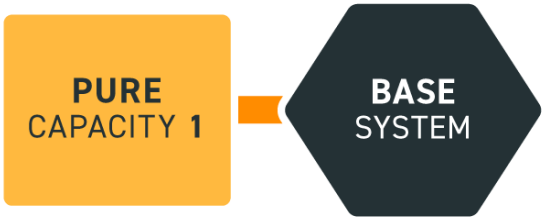


***Figure 1. Diagram of system without renewable resources.***

Next, a LOLE value for all wind generating resources will be determined, repeating the steps described previously. The Pure Capacity value calculated is designated in Figure 2~~Figure 2~~ as Pure Capacity 2.


***Figure 2. Diagram of system with renewable resources.***

The difference between the results of these two steps is considered the ELCC QCC value of the resources being studied.

$$ELCC\ of\ VER\ (under\ study) = Pure\ Capacity\ 1 - Pure\ Capacity\ 2$$

These processes are repeated to determine QCC for all weather Years that are studied. This process is repeated for summer and winter separately.

Zonal shapes have been developed for the LOLE study based on facility locations in each VER Zone and correlated wind and solar activity with temperatures in those VER Zones dating back to 1980. The ELCC study will be performed using the synthetic shapes dating back to 1980, which are also used in the LOLE studies. The data provided by the Participants will be used in the establishment of the synthetic shapes and used in the allocation process for establishing the QCC of each VER resource as later outlined in Section 4.3.5.

The Program Operator will conduct the ELCC study by performing probabilistic simulations in a manner that resources in the WRAP Region will be randomly forced out of service during each hour of the study. Each simulation accounts for a different variation of forced outages and load uncertainty for all hours of the Year, similar to the LOLE study utilized to establish the FS Planning Reserve Margin.

### *4.3.4 Determination of ELCC Within VER Zones*

The ELCC study will determine the amount of capacity provided by all VERs (of the specified type, e.g., wind) analyzed in the WRAP Region. The FS Program will employ the VER Zones for each VER type set forth inSection 4.3.6, as they may be revised from time to time. Each VER of a given type will be assigned to one of the VER Zones for that type. ELCC studies will be performed for each VER Zone (and VER type),

calculating a total capacity value for the resource of interest in that zone. The capacity calculated for each VER Zone will be allocated to VERs of that type in that zone on a pro-rata basis.

### *4.3.5 Determination of System Wide ELCC and Allocation to Individual VER Zones*

To avoid over-accreditation of VERs the Program Operator will conduct an ELCC study of the entire WRAP Region and calculate a total capacity value for all VERs in the WRAP Region. Additionally, all ESRs in a Subregion will be studied together. After all VER Zone capacity totals (for each VER type) and the capacity totals of ESRs in each Subregion have been determined, the sum of the VER Zone and ESR Subregion totals will be compared to the regional VER plus ESR total. If the sum of the VER Zones and ESR Subregion is greater than the regional total, all VER Zone and ESR Subregion totals will be scaled down until the totals match the regional total. Table 5 ~~Table 5~~ provides an example of the calculations to determine total VER capacity.

***Table 5. Example[8] ELCC Study of WRAP Region to Calculate Total Capacity.***

| **A study of two wind zones and two solar zones reveals the following capacity values for each zone:** | | | | |
|---|---|---|---|---|
| Wind Zone 1 | Wind Zone 2 | Solar Zone 1 | Solar Zone 2 | **Total** |
| 1,000 MW | 800 MW | 700 MW | 1,000 MW | **3,500 MW** |
| **A study of the region reveals the following capacity value for the region's wind and solar:** | | | | |
| Regional VERs | | | | |
| The zones will be recalculated as follows: | | | | |
| Wind Zone 1 | Wind Zone 2 | Solar Zone 1 | Solar Zone 2 | **Total** |
| 1,000 * (3,200/3,500) | 800 * (3,200/3,500) | 700 * (3,200/3,500) | 1,000 * (3,200/3,500) | |
| 914 MW | 732 MW | 640 MW | 914 MW | **3,200 MW** |

ESRs, which are discussed in more detail below (Section 4.4), are also included in the system ELCC allocation and study.

[8] These examples are strictly illustrative, and do not set or limit any actual ELCC study results.

### *4.3.6 VER Zones for Wind and Solar*

***WPP has established separate VER Zones for wind resources and solar resources, as shown, respectively, in Figure 3 and Figure 4.****Error! Reference source not found.*

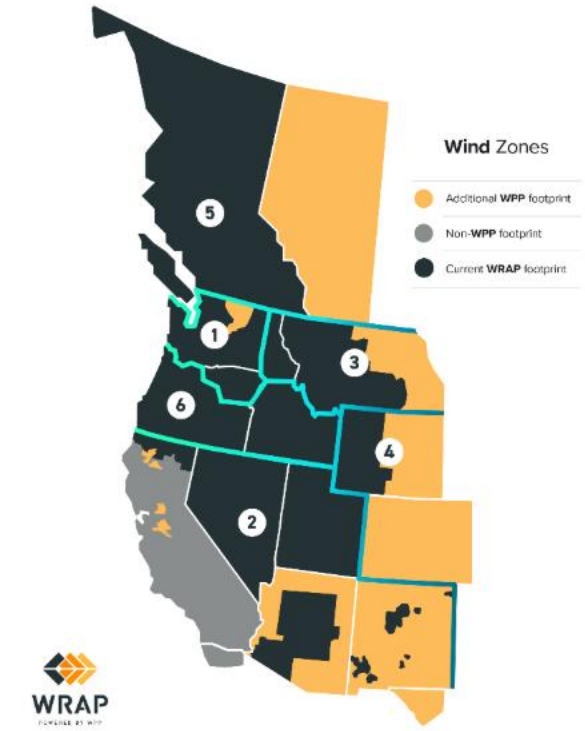


*Figure 3. Wind VER Zones*

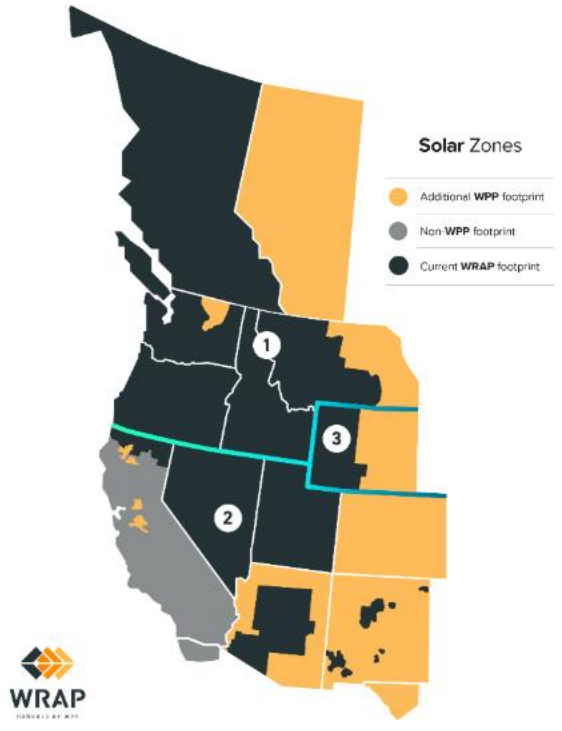


*Figure 4. Solar VER Zones*

### *4.3.7 Allocation of VER ELCC*

#### 4.3.7.1 Allocation of System Wide ELCC On a Resource Basis

Once the ELCC has been determined for each VER Zone for each Binding Season, two additional calculations must occur. The first step, which will occur before the system ELCC adjustment, takes the ELCC seasonal values for each VER Zone and converts them to a monthly basis for monthly QCC. Monthly QCC values for each VER Zone will be calculated by shaping the seasonal ELCC value in accordance with aggregate performance of all resources in the VER Zone during the CCH. Months that have higher resource performance during the CCH will be allocated a higher portion of the ELCC across the Binding Season. The QCC of each Month will average to the seasonal ELCC value. An example is given below in Table 6~~Table 6~~.

***Table 6. Example[9] Monthly QCC Calculation for Wind VER Zone***

| | | Summer Season | | | |
|---|---|---|---|---|---|
| | | **June** | **July** | **Aug** | **Sept** |
| **Average Production on CCH per Month** | Calculated from historical performance data from wind in this VER Zone on a monthly basis | 120MW | 95MW | 90MW | 130MW |
| **Average Production on CCH Across Season** | Calculated from historical performance data from wind in this VER Zone on a seasonal basis | 108.75MW | | | |
| **Monthly Multiplier** | Divides each Month's production on CCH by the seasonal average | 110% | 87% | 83% | 120% |
| **Seasonal ELCC** | Value resulting from ELCC study | 100MW | | | |
| **Monthly QCC** | Multiplies the monthly multiplier by the seasonal ELCC value | 110MW | 87MW | 83MW | 120MW |

The monthly QCC values for each VER Zone are then used to determine the system ELCC value discussed in the section above.

The second step, which occurs after the system ELCC adjustment, will allocate the monthly QCC values to each resource based on the individual resource's performance during the CCH.

$$\textit{Resource ELCC} = \textit{Monthly ELCC MW} * \left(\frac{\textit{Resource average hourly net power output on top 5\% of net load hours (CCH)}}{\textit{Zone total average hourly net power output on top 5\% of net load hours (CCH)}}\right)$$

#### 4.3.7.2 QCC Allocations for VERs with Three Years or More of Operational Data

To allocate the ELCC MW to each resource, the Program Operator will utilize the historical hourly data for each resource provided by the Participant. For resources that have at least three Years of actual historical data, or at least three Years of engineered data for newer resources, the Program Operator will utilize the most recent three Years

[9] These examples are strictly illustrative, and do not set or limit any actual ELCC study results.

(up to 10 Years) of data when determining the resource's average hourly net power output.

#### 4.3.7.3 QCC Allocations for New VERs or VERs with less than Three Years of Operational Data

The Program Operator will utilize the following method for newer VERs when determining the historical average hourly net power output:

1) No less than three Years will be utilized; and
2) A Participant (or resource owner) can supply synthesized data if at least three Years of actual data is not available, using:
    a) Manufacturer's engineering or performance data and actual weather (preferably from on-site, but not from outside of 50-mile radius); or
    b) Historical performance of similar resources within a 50-mile radius.
3) If three Years of data is not provided by the Participant, either through synthetic data or actual output, the resource will receive an ELCC value equal to the product of a calculated class average ELCC percentage times the nameplate capacity of the resource at issue. The Program Operator will use the synthesized wind output shape for the appropriate VER Zone to determine the class average ELCC percentage.

As actual data is accrued, it will replace synthesized data as it becomes available (e.g., one Year of actuals plus two Years of synthesized; two Years actuals plus one Year synthesized, then eventually three Years of actuals). Once a new or repowered facility has a full Year of operational data the synthesized data for Years two and three will be evaluated for reasonableness. If the synthesized data significantly understated or overstated the forecasted generation of the resource, the Year two and three synthesized data will be adjusted by the Program Operator accordingly.

#### 4.3.7.4 Determination of ELCC for Future VERs

It is understood that as VERs are added to a system, the capacity value provided by all similar VERs as a function of the nameplate value of those resources will decrease. It therefore becomes important for Participants to have an understanding of how VER QCC values may change over time as the penetration of similar VERs increases.

After the QCC values of all existing and near-term planned VERs have been calculated and allocated, additional ELCC studies will be performed to account for future VERs of each type. These additional wind and solar resource amounts will be created by scaling up the number of wind turbines (nameplate capacity) or solar photovoltaic panels in each VER Zone. The Program Operator will provide an ELCC curve, useful for guidance purposes on a strictly non-binding basis, that can be used to estimate future capacity

values for new resources dependent upon the penetration of resources in that VER Zone.

## 4.4 Energy Storage

The QCC for ESRs will be determined using the same general ELCC methodology used for wind and solar resources (see Section 4.3) with any specific differences being highlighted in this section and will be limited to ESRs that have the capability to store energy equal to or greater than the energy output by the ESR over four continuous hours (or longer) of operation. The ELCC study for each Binding Season will have a scope document that details the analysis. ESRs with eight-hour or longer durations are considered Long Duration Storage (Section 4.2).

ESRs will be modeled as energy limited devices that will charge and discharge in accordance with their equipment specifications. ESRs will be modeled to charge and discharge in a preserve reliability mode, which means they will only be discharged to mitigate potential loss of load when there is a lack of other resources available to serve load.

### *4.4.1 ESR with Four- to Eight-Hour Rating*

Based on the four-hour minimum continuous time duration requirement, four-hour ESR or ESRs with longer duration ratings will receive QCC values based on the four-hour curve for the ESR penetration level of all ESRs on the system at the time of the ELCC assessment.

### *4.4.2 ESR with Rating Less than Four Hours*

Based on the four-hour minimum continuous time duration requirement, ESRs with ratings less than four hours will receive QCC values based on the four-hour curve for the ESR penetration level of all ESRs on the system at the time of the ELCC assessment. For example, two-hour rated ESRs would receive no more than 50% QCC value of a four-hour ESR with the same maximum output.

### *4.4.3 Allocation of ELCC for ESRs*

All ESRs in a WRAP defined Subregion will be studied together. All ESRs within a Subregion will receive the average ELCC value of ESRs with a four-hour rating in that Subregion, subject to the limitations outlined in Section 4.4.2. To ensure that over-accreditation of ESRs does not occur, ESRs will be included in the ELCC study of all VERs of the WRAP Region and a total combined capacity value for all VERs and ESRs in the WRAP Region will be calculated. After all ESR Subregions and VER Zone capacity totals have been determined, the sum of the VER Zone and ESR Subregion totals will be compared to the WRAP Region VER total. If the sum of the VER Zones and ESR

Subregion is greater than the regional total, all VER Zone and ESR Subregion totals will be scaled down until the totals match the regional total.

#### *4.4.4 Late Registered ESRs*

If a Participant seeks to claim capacity from an ESR not registered at the time of the Advance Assessment Data Request, the Participant may use the late registered resource options (described generally in Section 3.2), choosing one of the following approaches:

1) Demonstrate that the resource was acquired following the Advance Assessment Data Request due date for the Binding Season in question, in which case the resource will be permitted to use the class average QCC for the ESRs within the Subregion; or
2) Claim a decremented QCC of 70% of the class average for ESRs in the Subregion.

### 4.5 Hybrid Facilities

Hybrid Facilities are resources that have at least two different fuels or technologies at a common location where one of those resources is an ESR. The QCC for hybrid resources will be determined by applying the appropriate methodology to each component of the facility and summing them and capping the total at the interconnection limit. While hybrid resources are modeled as they would operate in the LOLE study, determining QCC for combined hybrid resource is not performed due to the inability to perform ELCC analysis for similar type resources.

### 4.6 Demand Response

DR can be utilized as a Qualifying Resource if it is greater than 1 MW in aggregate (see Section 3.3) and can be demonstrated to be controllable and dispatchable by the Participant or host utility. DR programs that register as Qualifying Resources will be assigned a seasonal QCC value (one value for each Binding Season) and will need to meet testing criteria and demonstrate load reduction (see Section 3.4.2.3) for a period of up to five continuous hours. A DR program may be able to demonstrate load reduction for a period beyond five continuous hours, but cannot receive QCC above 100% of what is demonstrated for the five hour duration. Programs that are not able to provide five hours of load reduction will have their load reduction prorated over the course of five hours for the determination of QCC value. Participants registering a DR Qualifying Resource must either i) demonstrate that the DR program was not operated historically and has therefore not impacted the Historical Load Data provided by the Participant for determination of their P50 load value, or ii) provide historical information about the operations of the DR program such that the load reduction impacts of the DR

program can be removed from the historical data prior to determination of the P50 load value.

The QCC value of the DR Qualified Resource is determined by multiplying the maximum load reduction (in MW) the resource is capable of sustaining by the number of hours the resource can demonstrate such sustained load reduction capability (up to five hours, maximum) divided by five.

A DR Qualifying Resource will be reflected in the FS Submittal as a capacity resource by submitting it as a 'Resource' in the FS Submittal. As with all resources, the QCC value of the DR Qualifying Resource will count toward a Participant meeting its FS Capacity Requirement.

If DR does not meet the criteria of a Qualifying Resource, its contribution to the load reduction may be captured in the historical data used to calculate the P50 load in the FS.

#### *4.6.1 New, Expanded, or Late Registered DR Resources*

DR programs intended to be used as Qualifying Resources in the first Year of operation or expansion of an existing program or DR programs not registered at the time of the Advance Assessment will be reported at 50% of the expected capability, unless validated by testing the program to 100% of the claimed capability prior to the Binding Season. See the section related to DR testing requirements (within Section 3.4.2) for more information.

### 4.7 Hydro Resources

#### *4.7.1 Storage Hydro (Also see Appendix A – Qualified Capacity Contribution for Storage Hydro Resources)*

QCCs for Storage Hydro resources are calculated by the Participant owners and the results are provided to the Program Operator for review, through the provision of the 'results tab' of the workbook. The Program Operator may ask the Participant for information from the Storage Hydro QCC methodology, subject to limitations described in the Tariff, as part of the verification and validation process. The Storage Hydro QCC methodology is based on the ability of Storage Hydro to maximize output during the CCHs each Day of the historical record, subject to operational limitations and non-power constraints of each plant. Limitations include available water in storage and all constraints that restrict the use of the Net Generating Capability. These constraints include, but are not limited to, discharge limits, tailrace and forebay elevation limits, and rate of change limits.

The methodology considers each resource's actual generation output, residual generating capability, water in storage, reservoir levels (if applicable), upstream discharge from Cascaded Dual Plants and plant constraints over the most recent 10-Year historical period. The QCC of the Storage Hydro resource is determined using a calculation of how much historical actual generation could have been increased during CCHs by utilizing water in storage each Day to increase generation, while respecting all operating constraints. The QCC is the monthly average of this hypothetical increased generation during the CCHs, for the same Month of the historical record. The resulting QCC is determined as the average contribution to the CCHs for each Winter Season and Summer Season over the previous 10 Years. The Storage Hydro QCC Workbook captures the aforementioned Storage Hydro QCC methodology and is available for use by WRAP Participants. If historical data is not available for 10 Years, a comparable facility may be utilized or some other reasonable approach that provides similar confidence in the computed QCC may be proposed by the Participant and adopted at the discretion of the WPP. The Participant will provide all required detailed data for the plant.

The detailed Storage Hydro QCC methodology can be found in Appendix A – Qualified Capacity Contribution for Storage Hydro Resources~~Appendix A – Qualified Capacity Contribution for Storage Hydro Resources~~.

#### 4.7.1.1 Late Registered Storage Hydro Resources

If a Participant seeks to claim capacity from a Storage Hydro resource not registered at the time of the Advance Assessment Data Request, the Participant may use the late registered resource options, choosing one of the following approaches:

1) Demonstrate that the resource was acquired following the Advance Assessment Data Request due date for the Binding Season in question and utilize the established Storage Hydro QCC methodology described above, or
2) Claim a decremented QCC of 70% of the average Storage Hydro QCCs in the program.

### *4.7.2 Run-of-River (ROR) Hydro*

ROR Hydro resources will have their QCC determined on the historical performance of the resources during the CCH over the most recent 10-Year period. The data provided by the Participant in the Advance Assessment data submittal (see *BPM 101 Advance Assessment*) will be used for the determination of QCC.

If less than 10 Years of historical data is available for use in determining the QCC of a ROR Hydro plant, the Program Operator will utilize the following method when determining the historical average hourly net power output:

1. No less than three Years will be utilized.
2. A Participant (or resource owner) can supply synthesized data if at least three Years of actual data is not available, using:
    a. Manufacturer's engineering or performance data;
    b. Actual water conditions (preferably from on-site, but not from a different river); or
    c. Historical performance of similar resources on the same river system.
3. If three Years of data is not provided by the Participant, either through synthetic data or actual output, the resource cannot receive a QCC value.

As actual data is accrued, it will replace synthesized data as it becomes available (e.g., one Year of actuals plus two Years of synthesized; two Years actuals plus one Year synthesized, then eventually three Years of actuals). Once a new or repowered facility has a full Year of operational data, the synthesized data for Years two and three will be evaluated for reasonableness. If the synthesized data significantly understated or overstated the forecasted generation of the resource, the Year two and three synthesized data will be adjusted by the Program Operator accordingly.

#### 4.7.2.1 Late Registered ROR Hydro Resources

If a Participant seeks to claim capacity from a ROR Hydro resource not registered at the time of the Advance Assessment Data Request, the Participant may use the late registered resource options, choosing one of the following approaches:

1) Demonstrate that the resource was acquired following the Advance Assessment Data Request due date for the Binding Season in question and execute the methodology described above for ROR Hydro Resources (for validation by the Program Operator), or
2) Claim a decremented QCC of 70% of the average ROR Hydro QCCs in the program.

## 4.8 Other Resources

### *4.8.1 Customer Resources*

Resources that are generally located on the customer-side of the meter can be included in the FS Program. To be eligible as a Qualifying Resource, the Customer Resource must 1) be controllable and dispatchable by the Participant or host transmission operator and 2) not have already been used to modify the Participant's Load Forecast (i.e., serving a portion or all of the load not included in Load Forecast). The resource shall meet testing criteria applicable for resource type and will be awarded a QCC value based on the appropriate methodolgy for the resource type. Customer Resources (behind the meter resources) can be aggregated to the 1 MW requirement to be

considered a capacity resource, granted that they are in the same BAA, controllable and dispatchable, and visible to the Ops Program.

### *4.8.2 Non-Dispatchable, Must Take Resources*

For resources that are either i) not dispatchable; or ii) require the purchaser of energy from the resource to take energy as available from such resource, including but not limited to a qualifying facility as defined under the Public Utility Regulatory Policies Act (PURPA), the QCC will be determined based on the monthly average performance of such resource during CCH. The Participant will provide 10 Years of historical hourly dispatch data. This data may be provided within the Advance Assessment data submittal (see *BPM 101 Advance Assessement*) or a workbook found on the WPP website. The workbook will allow the Participant to calculate the QCC values taking the average of the facility output during the CCH.

If less than 10 Years of historical data is available for use in determining the QCC of a non-dispatchable, must take resource, the Program Operator will utilize the methodology described in BPM 105 for the specific resource type. If the resource type is not covered in Sections 4.2 through 4.7 the Program Operator will utilize the following method when determining the historical average hourly net power output:

1. No less than three Years will be utilized.
2. A Participant (or resource owner) can supply synthesized data if at least three Years of actual data is not available, using:
    a. Manufacturer's engineering or performance data;
    b. Known or historical information about fuel availability;
    c. Known or historical information about unit performance; or
    d. Historical performance characteristics of similar resources.
3. If three Years of data is not provided by the Participant, either through synthetic data or actual output, the resource cannot receive a QCC value.

#### 4.8.2.1 Late Registered Non-Dispatchable, Must Take Resources

If a Participant seeks to claim capacity from a non-dispatachable, must take resource not registered at the time of the Advance Assessment Data Request, the Participant will be required to execute the methodology described above for such resource (for validation by the Program Operator).

# Appendix A – Qualified Capacity Contribution for Storage Hydro Resources

## A.1 Time Period Approach for Summer and Winter Season Requirements

Storage Hydro resources will use a "time period" approach to determine the QCC. A time period approach consists of a historical look-back of the generation output during CCH to determine how much capacity should be expected to be available during high load periods in the future. While this approach is limited to a daily window for determining available capacity, it does establish a common and transparent method for determining the QCC for Storage Hydro Resources.

The following methodology would be used to determine the QCC value using the time period approach described above, and Table A-1~~Table A-1~~ summarizes the resource information required to apply the methodology:

- For each Day found to contain one or more CCHs, the Storage Hydro resource will be evaluated to determine the maximum available capacity for each CCH, based on the conditions of the storage associated with the hydro resource on that Day.
- For each Storage Hydro resource, for each CCH, determine:
    - Maximum generation output during the CCH.
    - Usable water in storage at the end of the CCH.
    - QCC for each hour, which would be the historical generation output plus additional generation for capacity, up to the maximum generation capability (adjusted for reservoir elevation head as applicable), taking into account plant or unit-specific limitations (e.g., units on a common penstock, transformer limitations, etc.) and the resource's Equivalent Demand Forced Outage Rate (EFORd).
    - For calendar days with multiple CCHs, the QCC will be limited to the actual historical generation, plus the usable energy in storage over that Day.Non-power operational constraints that limit the use of energy in storage.

***Table A-1. Resource information required to apply the time period methodology for QCC.***

| Information Needed | Notes |
|---|---|
| **Reservoir Elevation Range** | Min and Max – this may be seasonally adjusted. |
| **Reservoir Storage Curve** | Indicating volume of water in storage based on the reservoir elevation. |
| **Capacity as a Function of Elevation** | Plant maximum capacity at a given forebay elevation. |
| **CCH Adjusted $EFOF_{CCH}$ or Historical Outage Evaluation Equivalent** | Historical Forced Outage Factor. |
| **Power as a Function of Discharge** | For the "discharge method". |
| **H/K as a Function of Elevation** | For the "elevation method". |
| **Hourly Historical Data** | – Actual generation<br>– Starting reservoir elevation<br>– Ending reservoir elevation |

From the information in Table A-1~~Table A-1~~, the hourly values in Table A-2~~Table A-2~~ can be estimated for each CCH:

***Table A-2. Hourly values that can be estimated for each CCH.***

| Estimated Values | Notes |
|---|---|
| Actual water in storage | Using the elevation and storage (kcfs or cms) tables. |
| Additional capacity available beyond the actual generation | Subject to forebay elevation restrictions. |
| Cumulative additional generation | The running total of the additional generation claimed in each CCH for the Day, used to deplete the elevation of the reservoir to validate the feasibility of using additional capacity in each CCH on each calendar Day. |
| Hourly QCC | The sum of the actual generation plus the additional capacity available. |

The Storage Hydro capacity contribution towards the FS Capacity Requirement is calculated by the resource owner as the simple average of the hourly QCC values in each CCH over the 10 Years studied. These QCC values are averaged over each Month in each Binding Season to determine final monthly QCC values.

## A.2 Treatment of Planned Outages

In addition to accounting for forced outages, the UCAP values used in the FS workbooks may (at the Participant's option), be reduced for planned outages. Planned outages that are not included in the UCAP values will need to be planned in a manner similar to Thermal Resources, meaning those planned outages will be taken from the Participant's surplus capacity in excess to the Participant's FS Capacity Requirement.

Table A-3~~Table A-3~~ and Table A-4~~Table A-4~~ below illustrate the QCC calculation over a four-hour consecutive period using the UCAP methodology and the UCAP + planned outages methodology.

*Table A-3. Calculating QCC using UCAP = 125 MW.*

| Consecutive CCHs | Historical Generation | Historical Storage | UCAP (125 MW) | Draft to Maximize Capacity | Storage After Draft | QCC |
|---|---|---|---|---|---|---|
| | MW | MWh | MW | MWh | MWh | MW |
| **1** | 50 | 250 | 125 | 75 | 175 | 125 |
| **2** | 50 | | 125 | 75 | 100 | 125 |
| **3** | 50 | | 125 | 75 | 25 | 125 |
| **4** | 50 | | 125 | 25 | 0 | 75 |
| **Storage empty after 25 MW draft** | | | | 4-hour average | | 113 |

*Table A-4. Calculating QCC using UCAP + Planned Outages = 100 MW.*

| Consecutive CCHs | Historical Generation | Historical Storage | UCAP + Planned Outages (100 MW) | Draft to Maximize Capacity | Storage After Draft | QCC |
|---|---|---|---|---|---|---|
| | MW | MWh | MW | MWh | MWh | MW |
| **1** | 50 | 250 | 100 | 50 | 200 | 100 |
| **2** | 50 | | 100 | 50 | 150 | 100 |
| **3** | 50 | | 100 | 50 | 100 | 100 |
| **4** | 50 | | 100 | 50 | 50 | 100 |
| A 25 MW planned outage decreased QCC by 13 MW | | | | 4-hour average | | 100 |

The four consecutive CCHs in Table A-3~~Table A-3~~ illustrate how the QCC is limited due to insufficient storage. In Table A-4~~Table A-4~~, the UCAP is reduced by a 25 MW planned outage. This reduced capacity requires less draft from storage in CCHs 1-3 to maximize the QCC in those hours. This reduction in draft provides sufficient storage in CCH 4 to maximize the QCC.

For FS purposes, planned outages may be included or excluded in the QCC calculation at the choice of the Participant pursuant to the requirements in Section 16.2.8 of the Tariff.

## A.3 Treatment of Non-Power Constraints

Each Participant is asked to review the methodology and incorporate the specific non-power constraints that are applicable to the individual plants, thus reducing the QCC value of each plant to a level that is believed to reflect the plants operational capability for the upcoming Binding Season. This is done through creating additional constraint logic in the spreadsheet that adds current and future non-power constraints to all 10 Years' worth of evaluation.

It is expected that Participants will include such non-power constraints that accurately reflect their forecasted QCC capability, to facilitate reliance on Storage Hydro Resource QCC values in the Operations Program and for other purposes.

## A.4 Treatment of Cascaded and Coordinated Hydro Systems

A Cascaded Dual Plant methodology was also developed specifically for cascaded and coordinated hydro systems. For cascaded hydro resources on the same river systems that are operated in a coordinated manner, when determining the QCC, the useable water in storage at the downstream resource could be enhanced by the operations at the upstream resource, thereby maximizing the contribution of the combined cascaded systems. The Cascaded Dual Plant methodology does not attempt to optimize use of the upstream storage to maximize the combined QCC, but it does allow the downstream plant to utilize the discharge from the upstream plant.

## A.5 Form To Complete Storage Hydro Resource QCC

The Hydro QCC Workbook will be completed by the Participant. The workbook is located on the WPP website.

WESTERN POWERPOOL

# Western Resource Adequacy Program

## 202 Participant Sharing Calculation Inputs

200 – Operations

## Revision History

| Manual Number | Version | Description | Revised By | Date |
|---|---|---|---|---|
| **202** | 0.1 | RAPC Glance Version | Beau Beljean | 7/5/2024 |
| **202** | 0.2 | Public Comment | Beau Beljean | 7/9/2024 |
| **202** | 0.3 | RAPC & PRC Discussion | Beau Beljean | 8/14/2024 |
| **202** | 0.4 | RAPC Endorsement | Beau Beljean | 9/4/2024 |
| **202** | 0.5 | Board Consideration | Beau Beljean | 9/13/2024 |
| **202** | 1.0 | Board Approved | Rebecca Sexton | 9/19/2024 |
| **202** | 2.0 | Annual BPM Changes | Michael O'Brien | 3/19/2026 |
| **202** | 3.0 | 2026-NTFP-02 | Dave Zvareck | |

# Table of Contents

# 1. Introduction

The Participant Sharing Calculation Inputs Business Practice Manual (BPM 202) outlines data inputs submitted by Participants in the Operations Program and used in the Sharing Calculation to identify any hour in which a Participant is forecast to have a capacity deficit and other Participants are forecast to have a capacity surplus (a Sharing Event). BPM 202 describes each of these Participant inputs and explains the Sharing Calculation.

## 1.1 Intended Audience

BPM 202 is intended for individuals or entities that are interested in or currently participating in the Western Resource Adequacy Program (WRAP). BPM 202 is particularly useful for those that support and have responsibility for the Operations Program on a day-to-day basis. This could include trading and scheduling staff, front-office technology and systems support staff, or other similar roles.

## 1.2 What You Will Find in This Manual

BPM 202 contains an explanation on all inputs to the Sharing Calculation that Participants submit for the Operations Program.

## 1.3 Purpose

The purpose of BPM 202 is to explain Participant-supplied inputs to the Sharing Calculation and how they are used in the Operations Program.

## 1.4 Definitions

All capitalized terms that are not otherwise defined in BPM 202 or another BPM have the meaning set forth in the Tariff:

**Contingency Reserves Adjustment:** As defined in *BPM 103 FS Capacity Requirement*.

**Contingency Reserves Obligation (CRO)**: The amount of contingency reserves the Participant is carrying during the operating hour equal to:

i) 3% of Load Forecast for which the Participant is the LRE and maintains the contingency reserve requirement
ii) plus 3% of load for which the Participant is not the LRE but has assumed an obligation to carry Contingency Reserve through a contractual arrangement
iii) plus 3% of generation used to meet any load for which the Participant is the LRE and maintains its Contingency Reserve requirement
iv) plus 3% of generation utilized to meet load for which the Participant is not the LRE but has assumed an obligation to carry Contingency Reserve through a contractual arrangement.

**Forced Outages:** For Thermal Resources, Storage Hydro Qualifying Resources (using QCC MWs) or Energy Storage Resources, the immediate reduction in capacity, output, unanticipated failure, curtailment or derate of network service, firm or conditional firm transmission or other cause that is beyond the control of the owner or operator of the resource.

**Operations Program Capacity Need:** A Sharing Calculation component that refers to the total hourly capacity requirement a Participant has forecasted in the Operations Program. The Hourly Capacity Need is the sum of a Participant's Load Forecast adjusted for Demand Response Capacity Resource (i.e. load reduction) plus the hourly forecasted CRO and the Uncertainty Factor.

**Performance Adjustments:** A Sharing Calculation component that is the sum of variances of over and under performance for hourly forecasts of Run-of-River, wind and solar resources and the net hourly value of Forced Outages relative to the monthly value submitted in the Participant's FS Submittal.

**Program Interface Tool (PIT):** As defined in *BPM 201 Operations Program Timeline*.

**Resource-Specific Capacity Agreements:** As defined in *BPM 106 Qualifying Contracts*

**Thermal Resource:** As defined in *BPM 101 Advance Assessment*.

## 2. Background

Participants are required to submit specific data for the Forward Showing (see *BPM 108 Forward Showing Submittal Process*). Some of these data are also used as inputs into the Operations Program. For example, VERs, ROR, Contingency Reserves, and Forced Outages included in or submitted as part of the FS Submittal are compared to nearer term forecasts submitted during the Operations Program. This leads to a comparison between near term forecast values in the Operations Program and the values submitted in the Forward Showing, resulting in delta values for the inputs that are used in the Sharing Calculation. BPM 202 describes the required Participant inputs to the Sharing Calculation.

## 3. Components of the Sharing Calculation equation

The Sharing Calculation compares each Participant's FS Capacity Requirement (see *BPM 103 Forward Showing Capacity Requirement*) - adjusted for Forced Outages and hourly forecasts of resource availability, resource performance, load, and Contingency Reserves relative to those included in or submitted as part of the FS Submittal - to each Participant's capacity need for each hour in the Multi-Day-Ahead Assessment, Preschedule Day, and Operating Day. The values submitted by the Participant for each hour are compared to the values submitted in the in the corresponding monthly FS Submittal. For a given hour the

Sharing Calculation identifies Sharing Events in which any Participants are forecast to have negative Sharing Calculation results. Additional program (i.e., non-Participant) inputs to the Sharing Calculation, such as the Uncertainty Factor, are described in *BPM 203 Program Sharing Calculation Inputs*. The Sharing Calculation is defined as:

**Equation 1 – Simplified Sharing Calculation**

$$\boldsymbol{Sharing\ Calculation} = \boldsymbol{FS\ Capacity\ Requirement} - \boldsymbol{Operations\ Program\ Capacity\ Need} + \boldsymbol{Performance\ Adjustments}$$

**where**

$$\boldsymbol{FS\ Capacity\ Requirement} = (P50\ Peak\ Load\ Forecast) * (1 + FSPRM) + Contingency\ Reserve\ Adjustment$$

**and**

$$\boldsymbol{Operations\ Program\ Capacity\ Need} = \boldsymbol{Load\ Forecast} - \boldsymbol{Demand\ Response\ Capacity\ Resources} + \boldsymbol{Contingency\ Reserve\ Obligation} + \boldsymbol{Uncertainty\ Factor}$$

**and**

$$\boldsymbol{Performance\ Adjustments} = \Delta\boldsymbol{Forced\ Outages} + \Delta\boldsymbol{RoR\ Performance} + \Delta\boldsymbol{VER\ Performance}$$

Where:

***Demand Response Capacity Resource,*** as defined in the Tariff, refers to a capacity resource with a demonstrated capability to provide a reduction in load or otherwise control load. Its value is treated as a reduction to the hourly Load Forecast in the Operations Capacity Need component of the Sharing Calculation.

***Load Forecast*** is the hourly forecast of a Participant's WRAP load, expressed in MW, and to be submitted for each operating hour.

***Uncertainty Factor***, as described in the Tariff, is an input to the Sharing Calculation and is meant to account for the variances between forecasts of load, VERs, and Run-of-River Qualifying Resources for each operating hour on the Preschedule Day and the actual load and resource performance during such hour on the Operating Day. See *BPM 203 Program Sharing Calculation Inputs* for more details.

***Δ Forced Outages*** refers, for any given operating hour, to the sum of:

(i) any change in Forced Outages of any of the Thermal Resources included in a Participant's Portfolio QCC, relative to the Forced Outages assumed in the FS Submittal by application of the Forced Outage Factor;
(ii) any change in Forced Outages of any of the Storage Hydro Qualifying Resources relative to the Forced Outages assumed in the calculation of a Participant's Resource QCC (expressed as forced QCC MWs);
(iii) any reduction in output capability of any of the Energy Storage Resources due to equipment failure or protection.
   a. In the first four (4) hours the Forced Outages MWs that can be claimed are equal to [(charge MW x duration)/ 4].
   b. For all hours beyond four (4) hours, the Forced Outages MW amount that can be claimed for an Energy Storage Resource shall not be greater than the monthly QCC.
(iv) any reduction in capacity of a Participant's Portfolio QCC resulting from constraints on firm transmission service rights.

***Δ ROR Performance*** refers to any change, for any given operating hour, in expected performance of any of the ROR in the Participant's Portfolio QCC relative to the QCC of that Qualifying Resource.

***Δ VER Performance*** refers to any change, for the subject hour, in expected performance of the VERs in the Participant's Portfolio QCC relative to the QCC of that Qualifying Resource. As defined in the Tariff, VERs are resources powered by a renewable energy source that cannot be stored by the facility owner or operator and that has variability that is beyond the control of the facility owner or operator, including but not limited to a solar or wind resource.

In summary:

**Equation 2 – Detailed Sharing Calculation**

$$\begin{aligned}&\boldsymbol{Sharing\ Calculation} = \\ &[(\boldsymbol{P50\ Peak\ Load\ Forecast}) * (\mathbf{1} + \boldsymbol{FSPRM}) + \boldsymbol{Contingency\ Reserve\ Adjustment}] \\ &- [\boldsymbol{Load\ Forecast} - \boldsymbol{Demand\ Response\ Capacity\ Resource} \\ &\qquad + \boldsymbol{Contingency\ Reserve\ Obligation} + \boldsymbol{Uncertainty\ Factor}] \\ &+ [\boldsymbol{\Delta Forced\ Outages} + \boldsymbol{\Delta RoR\ Performance} + \boldsymbol{\Delta VER\ Performance}]\end{aligned}$$

## 4. Inputs from Forward Showing Submittal

The Operations Program relies on data submitted in the Forward Showing Submittal (FS Submittal) that includes monthly values of the following:

(i) P50 Peak Load Forecast

(ii) FSPRM
(iii) Forced Outages
(iv) ROR QCC
(v) Solar QCC
(vi) Wind QCC
(vii) Contingency Reserves Adjustments

In addition, for Resource-Specific Capacity Agreements included in the FS Submittal such as "slice" contracts, adjustments are applied to the calculation of Forced Outages and Over/Under Performance. These adjustments are accounted for in data sent to the Operations Program, prior to the start of each Binding Season.

## 5. Inputs from the Operations Program

In the Operations Program, Participants are required to prepare and provide data in a format specified by the Program Operator. These data must adhere to a submission schedule to allow the Sharing Calculations to run with as up-to-date and complete data as possible. The Program Operator is responsible for the transfer of input data that is processed according to a predefined schedule to inform Participants of any Sharing Events. A user interface provides Participants the means to view input upload status and error details, notifications and alerts, and Sharing Calculation results – this is called the Program Interface Tool (PIT) or Ops Client.

Moreover, it is the responsibility of the Program Operator to develop, test, implement and maintain the form and format of all inputs and to ensure the latest version of these are made available to Participants. The Program Operator also ensures that Participants are given access to portals, links, and/or any other data upload protocols prior to the start of any Binding Season to allow successful participation in the Operations Program. Any procedures, guides or reference materials can be found in the Input Data File Specification document located on the WPP website.

The Sharing Calculation, which is the mechanism to determine whether a participant is surplus or deficit on any given hour of the operating day, relies on data submitted in the Operations Program by the Participant which includes hourly values of the following:

(i) Load Forecast
(ii) Forced Outages
(iii) Forecasted ROR output
(iv) Forecasted wind output
(v) Forecasted solar output
(vi) Contingency Reserves Obligation

The Sharing Calculation also includes an Uncertainty Factor as a term in the equation. The Uncertainty Factor is not a Participant provided value and is described in more detail in *BPM 203 Program Sharing Calculation Inputs.*

## 5.1 Load Forecast

The Load Forecast is the Participant's hourly forecast of its WRAP load, expressed in MW, submitted for each operating hour. The data submitted for Load Forecasts shall account for the total load~~/demand~~ the Participant is responsible for serving under WRAP and be based on the ~~sourced from the~~ same ~~data~~ load that was utilized in the FS Submittal. If there are additional third-party loads or excluded loads within a Participant's Balancing Authority Area (BAA), these shall not be accounted for in the Load Forecasts submitted in the Operations Program.

## 5.2 Forced Outages Forecast

The Forced Outage is the hourly forecast of a Participant's Forced Outages (including derate), expressed in MW, and to be submitted for each operating hour. The data submitted for Forced Outages forecasts shall account for MW reduction in:

1. Total generating capability portfolio where the portfolio is defined as:

    a. Any resource in the Forward Showing for which the Program Operator has calculated an Equivalent Forced Outage Factor (EFOF) or the Participant has supplied a Forced Outage Factor.

    b. Any Resource-Specific Capacity Agreement in the Forward Showing where the Participant has assumed the outage risk as the purchaser. It is the responsibility of the Participant to work with the seller to determine how much of an outage is attributable to the Participant's contract.

2. A curtailment or derate of network service, firm or conditional firm transmission being utilized to bring resources and/or contracts shown in the Forward Showing Submittal to load. Curtailments and derates to non-firm transmission shall not be accounted for in the Forced Outages forecasts.

Additionally, the Forced Outages or derate must result in an actual loss of generating capability. If, for example, the outage is on a hydro unit and there is insufficient water in storage or inflow to utilize the lost capacity then the outage may not be claimed.

Due to limited dispatchability and dependency on fuel supply, must-take Thermal Resources are not given a Forced Outage Factor. Any derate, outage, or transmission

curtailment resulting in a reduction of generation capability for must-take resources, shall not be accounted for and shall be excluded from Forced Outages forecasts.

## 5.3 Forecasted ROR

The ROR forecast is the hourly forecast of a Participant's ROR performance, expressed in MW, and to be submitted for each operating hour. The data submitted for ROR forecasts shall account for the forecasted MW output on any given operating hour for the Participants' ROR included in the FS Submittal.

Unless specified under a Resource-Specific Capacity Agreement listed in a Participant's FS Submittal, a Participant with ROR will be responsible for over/under performance of ROR forecasts.

## 5.4 Forecasted Wind Output

The wind resource forecast is the hourly forecast of a Participant's wind resource performance, expressed in MW, and to be submitted for each operating hour. The data submitted for wind resource forecasts shall account for the forecasted MW output on any given operating hour for the Participant's wind resources included in the FS Submittal.

Unless otherwise specified under a Resource-Specific Capacity Agreement listed in the FS Submittal, a Participant with wind resources will be responsible for over/under performance of wind resource forecasts.

## 5.5 Forecasted Solar Output

The solar resource forecast is the hourly forecast of a Participant's solar resources performance, expressed in MW, and to be submitted for each operating hour. The data submitted for solar resource forecasts shall account for the forecasted MW output on any given operating hour for the Participants' solar resources included in the FS Submittal.

Unless otherwise specified under a Resource-Specific Capacity Agreement listed in a Participant's FS Submittal, a Participant with solar resources will be responsible for over/under performance of solar resources forecasts.

## 5.6 Contingency Reserves Obligation

As defined above, the CRO is the total amount of contingency reserves the Participant is carrying during the operating hour.

The data submitted for CRO is intended to help ensure that sufficient capacity is withheld to cover a Participant's CRO in MW for any given hour.

### 5.7 Uncertainty Factor

The Uncertainty Factor is meant to account for the variances between forecasts of load, VERs, and ROR for each operating hour on the Preschedule Day and the actual load and resource performance during such hour on the Operating Day. The Uncertainty Factor helps ensure that Participants retain capacity to account for near-term forecast error that would underestimate capacity needs, overestimate generation capability/availability (i.e., variances in the upward direction for load and variances in the downward direction for resource performance). See more details in *BPM 203 Program Sharing Calculation Inputs.*

## 6. Forecasting Methodology and Data Evaluation

There are two (2) types of forecast methodologies a Participant may use for forecasting Load, ROR, wind output and solar output:

(i) a third-party forecasting tool/software or
(ii) a proprietarily developed algorithmic forecasting tool.

A Participant may elect to use one or both of these methodologies, but in any case, is required to submit to the Program Administrator, at least 90 days prior to the start of its first Binding Season, a narrative description of the methodology used for forecasting. This narrative shall include at minimum and without limitation:

- Type of methodology (i.e., third-party or proprietarily developed)
- Description of methodology
- List of data types forecasted using the methodology submitted in the Operations Program (i.e., Load, ROR, wind output and solar output)
- Description of limitations of methodology, particularly describing any inability to manually override forecast data and inputs to the Sharing Calculation. The purpose here is to demonstrate that the Participant is not able to manually modify forecasts with the intent of increasing a Participant's access to Holdback Capacity in the Operations Program or limiting their requirement to provide Holdback Capacity in the Operations Program.

In the event there is a change in methodology, the Participant must provide an updated narrative description to the Program Administrator as soon as practicable.

In addition, the Program Administrator and the Program Operator shall monitor and evaluate on a regular basis forecast data performance and ensure feedback is provided back to Participants to help identify inaccurate data.

# 7. Input Data Files

## 7.1 Multi-Day File

The data requested in the Multi-Day (MD) file is necessary to run the Operations Program Sharing Calculation, which is the mechanism to determine whether a Participant is surplus or deficit on any given hour of the Operating Day.

MD files shall include at least seven Operating Days' worth of forecast data.

Per *BPM 201 Operations Program Timeline*, Participants are required to submit a MD file no later than 05:20 Pacific Prevailing Time (PPT) on the Preschedule Day and according the WECC scheduling calendar.

## 7.2 Operating Day File

The data requested in the Operating Day files (OD files) is mainly used for informational purposes in the Operations Program. As the binding obligations are set on the Preschedule Day under the Tariff, input data submitted in the OD files is used to post updated Sharing Calculation results, hour by hour, for the Operating Day. These updated Sharing Calculation results help inform a Participant about its position relative to the Sharing Calculation result posted on the Preschedule Day.

OD files include at least 24 (or 23 for the spring transition to daylight savings time) operating hours' worth of forecast data and are to be submitted every hour throughout the Binding Season.

Per *BPM 201 Operations Program Timeline*, Participants are required to submit an Operating Day file no later than one hundred and twenty (120) minutes prior to the start of any given operating hour.

## 7.3 Point Limit File

The data requested in the Point Limit (PL) files is to inform the Operations Program about the transmission points a Participant can deliver to and take receipt from other Participants. PL file inputs are essential to determine allocation and deliverability of any Holdback Requirement in a Subregion without a Central Hub.

PL files shall include at least 24 (or 23 for the spring transition to daylight savings time) operating hours' worth of data including but not limited to transmission points for delivery of any Holdback Requirement and order of priority.

Per *BPM 201 Operations Program Timeline,* Participants shall ensure the PL files are submitted after 05:20 PPT when the Sharing Calculation results post and before 06:35 PPT.

Data submitted in the PL files serve as input needed for optimization and validation in the Operations Program.

## 7.4 Point-To-Point Limit File

The Operations Program is designed to optimize allocation and deliverability of any Holdback Requirement. Given potential transmission constraints within a Subregion and the desire to share as much diversity as possible, the data requested in the Point-To-Point Limit (PTPL) is to inform the Operations Program about the transmission points where wheeling capability may occur. Inputs from the PTPL files are essential to determine a Participant's ability and order of priority to deliver any Holdback Requirement on defined transmission wheeling paths and inter-Subregion transmission connectivity.

PTPL files shall include at least 24 (or 23 for the spring transition to daylight savings time) operating hours' worth of data including but not limited to point-to-point transmission wheeling paths and order of priority.

Per *BPM 201 Operations Program Timeline*, Participants shall ensure the PTPL files are submitted after 05:20 PPT when the Sharing Calculation results post and before 06:35 PPT. Data submitted in the PTPL files serve as input needed for optimization and validation in the Operations Program.

## 7.5 Voluntary Holdback File

The Voluntary Holdback data submission allows Participants to indicate to the WRAP the amount of Holdback Capacity that they would like to make available in excess of the surplus resulting from the Sharing Calculation. The intent of this submission is to indicate the MW value that can be made available. The points at which the Voluntary Holdback could be made available must be included in the Point Limits File.

The data requested in the Voluntary Holdback (VH) files is to inform the Operations Program about any additional capacity made available to the Subregion for any given hour. Input from the VH files is essential to determine allocation and prioritization of any Holdback Requirement.

Per *BPM 201 Operations Program Timeline*, Participants shall ensure the VH files are submitted after 05:20 PPT when the Sharing Calculation results are posted and before 06:35 PPT. Data submitted in the VH files serve as input needed for optimization and validation of the Operations Program, particularly for any given Sharing Event.

### 7.6 Actuals File

The data requested in the Actuals (AC) files is after-the-fact in nature - equivalent to the data submitted in the MD and OD files - reflecting the actual values of the data that was forecasted. The data collected from AC files is not a Sharing Calculation input. The Program Administrator and Program Operator use AC files data for analysis and reporting, particularly for data accuracy and performance.

Participants shall ensure that AC files are submitted no later than 168 hours after any given operating hour.

## 8. Sharing Calculation Results

The Sharing Calculation relies on inputs from both the Forward Showing and Operations Program. The Sharing Calculation result for any operating hour is calculated using the Sharing Calculation equation and its inputs listed in the sections above.

If a Sharing Calculation result for any given hour is positive, this indicates the Participant has surplus capacity.

Conversely, if a Sharing Calculation result for any given hour is negative, this indicates the Participant is capacity deficient, and therefore would constitute a potential Sharing Event.

The forecast data submitted for each operating hour is compared to the values assumed in the FS Submittal. This means the values submitted for each operating hour should use the same assumptions and the same general source data as the values submitted in the Forward Showing. Any mismatch can result in a Participant being erroneously identified as surplus or deficient. A Participant's ability to ensure that the Forward Showing and the Operations Program data submissions align with one another will streamline testing and trials and maximize both individual and group benefits.

## 9. Planned Outages

In the FS Submittal, Participants are required to provide information on all Qualifying Resources that are currently out of service with a scheduled return date that falls during or after the Binding Season. Capacity associated with such resources is then deducted from Participants' Portfolio QCC to ensure no credit is granted for such resources during the planned outage.

The aggregate of any additional outages that are planned to occur during the Binding Season but have not yet begun at the FS Submittal deadline must be within the Participant's remaining surplus or replaced with other supply. If a Participant takes a planned outage during the Binding Season, they are responsible for backfilling for the

entirety of the reduction in capacity and shall submit zero Forced Outage MWs for that resource during the period of the planned outage.

A planned outage shall not justify a waiver of or exception to a Participant's holdback or energy delivery obligations under the Tariff. It is the Participant's responsibility to ensure necessary capacity is available to meet the Operations Program requirements, regardless of planned outage schedules or FS Submittal acceptance. In addition, planned outages MW amounts will not be included in the Forced Outages hourly data submitted in the Operations Program. Furthermore, if a planned outage that was included in the FS Submittal ends earlier in the month than expected and the resource becomes available, the Participant shall not include any Forced Outages MWs for that resource in the Operations Program.