

Western Resource Adequacy Program

Change Request Form

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Type of Change Requested
Check one*: ☐ Correction (<i>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</i>) ☐ Clarification (<i>i.e., revising language to better represent existing intent, no changes to functionality or policy</i>) ☒ Enhancement (<i>i.e., revising language to expand upon existing intent or functionality</i>) ☐ New Protocol, Business Practice, Criteria, Tariff (<i>i.e., new language to accommodate new functionality or policy not existing today</i>) ☒ Change (<i>i.e., a change in the existing policy – will replace an existing language</i>) ☐ Other (<i>i.e., changes that do not fall into the categories listed above</i>)

Description of Change

Provide a description of the issue*:

Currently, the WRAP Loss of Load Expectation (LOLE) model includes an additional 6% of load as a proxy for the 3% load/3% generation Contingency Reserve (CR) requirement established under BAL-002-WECC-3. This additional load is modeled in the same manner as other load, meaning that a loss of contingency reserves is treated as a “loss of load.” Based on modeling experience, the Program Operator estimates that this treatment increases the Forward Showing Planning Reserve Margin (FSPRM) by approximately 4%.

FERC approved the retirement of BAL-002-WECC-3, effective April 14, 2026. Following its retirement, the Western Power Pool (WPP) Reserve Sharing Group (RSG) established a new CR methodology. Under the new methodology, the RSG footprint must carry CR equal to 200% of the previous calendar year’s average Most Severe Single Contingency (MSSC). The total RSG CR requirement is allocated to individual Balancing Authorities (BAs) based on each BA’s weighted pro rata share of generation plus load relative to total generation plus load across the RSG footprint.

The PRM Task Force reached consensus that the CR requirement reflected in the WRAP LOLE model should remain aligned with the CR requirement established by the RSG.

New Footprint Requirement

The previous WRAP methodology was based on the 3% load/3% generation requirement and was represented in WRAP as an additional 6% of Participant load. Under the new methodology, the CR requirement is instead based on 200% of the previous calendar year’s average MSSC for the entire RSG footprint.

Because the WRAP Region is a subset of the RSG footprint, WRAP will reflect the portion of the RSG CR requirement attributable to WRAP Participants rather than the entire RSG requirement.

Allocation to WRAP Participants in Forward Showing

Within the RSG, each BA’s CR requirement is calculated as follows:

$$BA\ CR\ Requirement\ (CRO) = (200\% \times Previous\ Year's\ Average\ MSSC) \times (BA\ Average\ Hourly\ Gen + BA\ Average\ Hourly\ Load) / (RSG\ Average\ Hourly\ Gen + RSG\ Average\ Hourly\ Load)$$

Two adjustments are needed to translate the RSG methodology to WRAP.

First, WRAP Participants are required to bring sufficient capacity to meet their load obligations. Therefore, for purposes of allocating the CR requirement among WRAP Participants, the

allocation will be based on load rather than generation plus load. This is analogous to the existing WRAP methodology, which represents the 3% load/3% generation requirement as 6% of load.

Second, RSG requirements are established at the BA level, while WRAP participation occurs at the Load Responsible Entity (LRE) level. When a BA is the WRAP Participant and represents the entire BA load in WRAP, the BA CR requirement is the same as the LRE CR requirement. When a BA includes multiple LREs participating in WRAP or has only part of its load participating in WRAP, the BA's CR requirement will therefore be allocated among those LREs based on their respective shares of BA load:

WRAP LRE CR Requirement = BA CR Requirement x (LRE Average Hourly Load / BA Average Hourly Load)

A few additional points apply:

- If the entirety of a BA's load is represented in WRAP, the BA CRO and the aggregate WRAP CR requirement for all LREs within the BA are the same.
- All average hourly load values will be based on the previous calendar year.
- WRAP will coordinate with RSG leadership to obtain the data necessary to implement this methodology.
- The existing policy regarding CR adjustments will remain unchanged.

Application in the Operations Program

Unlike the previous 3% load/3% generation methodology, the new CR requirement produces a static value for the applicable period. As a result, the CR requirement used in the Operations Program will not vary from the CR requirement established for Forward Showing. Accordingly, no separate adjustment to the CR requirement will be needed in the Sharing Calculation.

Timing

The RSG establishes a new MSSC value each April using data from the previous calendar year. For each WRAP Advance Assessment, the Program Operator will use the RSG CR requirement in effect at the time the Advance Assessment is performed as an input to the LOLE modeling.

Implementation

This methodology is expected to be incorporated into the regular WRAP modeling cadence beginning with Binding Season Summer 2028.

For Binding Seasons for which FSPRM values have already been approved using the prior CR methodology, WPP may develop downward adjustments to the approved FSPRMs if the change to the applicable NERC or WECC CR requirement becomes effective after Board approval and

would result in lower FSPRMs. The adjustment may be informed by comparative modeling of the capacity requirement under the prior and revised CR methodologies. Any such adjustment would be subject to Board approval in accordance with the WRAP Tariff.

For the initial implementation, WPP expects to use comparative modeling performed for Winter 2028/2029 under both CR methodologies to inform any proposed adjustment to previously approved Winter FSPRMs.

The WRAP Tariff changes related to this proposal had already been approved by the WPP Board and are included in FERC filing submitted on 9/30/2026.

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

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

The following documents contain references to Contingency Reserves and need updating to the proposed policy:

- BPM 101 – Advance Assessment
- BPM 102 – Forward Showing Reliability Metrics
- BPM 103 – Forward Showing Capacity Requirements
- BPM 202 – Participant Sharing Calculation Inputs

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

See redlines to the above documents attached.

Impact of Change

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

This change will align the WRAP Contingency Reserve (CR) requirement with the current WPP Reserve Sharing Group (RSG) methodology following the retirement of BAL-002-WECC-3. The updated approach reflects the determination that the prior regional requirement was no longer necessary and is expected to support more efficient use of resources while maintaining reliability. Using an RSG-based requirement also provides a more direct representation of the contingency reserve needs applicable to WRAP Participants, rather than continuing to rely on the existing 6% of load proxy.

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):

The expected peak Summer load in WRAP required a total of 4781 MW of Contingency Reserves at the time of the Forward Showing in October 2025. This updated methodology represents over 2000 MW savings for the regions and underscores the importance of implementing this change.

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



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101 Advance Assessment

Revision History

Manual Number	Version	Description	Revised By	Date
101	0.1	RAPC Glance Version	Rebecca Sexton	9/12/2023
101	0.2	Public Comment	Rebecca Sexton	9/15/2023
101	0.3	RAPC & PRC Discussion	Rebecca Sexton	10/23/2023
101	0.4	RAPC Endorsement	Rebecca Sexton	11/9/2023
101	0.5	Board Consideration	Rebecca Sexton	11/11/2023
101	1.0	Board Approved	Rebecca Sexton	12/6/2023
101	2.0	Annual BPM Review	Maya McNichol	3/19/2026
<u>101</u>	<u>2.1</u>	<u>NTFP-07 Contingency Reserves</u>	<u>Maya McNichol</u>	<u>10/6/2026</u>



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101 Advance Assessment

1. Introduction

The Advance Assessment Business Practice Manual (BPM) consists of two sections. The Advance Assessment Timeline section outlines the Program Operator's schedule for Forward Showing Planning Reserve Margin (FSPRM) and Qualifying Capacity Contribution (QCC) studies that will be completed 12 months in advance of the Forward Showing (FS) Deadline for the relevant Binding Season.

The section describes the Program Operator processes to calculate the FSPRMs and QCCs for the Western Resource Adequacy Program (WRAP) Region. FSPRMs and aggregated QCC values will be available publicly to all Participants. QCCs for individual resources will be provided only to the Participant that submitted the data.

1.1. Intended Audience

BPM 101 is intended for WRAP Participants and other interested individuals or entities and is particularly useful for those responsible for their organization's FS Submittal that need to ensure their organizations submit the necessary data by the correct time for the Advance Assessment.

1.2. What You Will Find in This Manual

BPM 101 includes two main sections: 1) Advance Assessment Timeline and 2) .

1.3. Purpose

To provide an overview of the Advance Assessment Timeline and Data Submittal processes for determining the QCC of Qualifying Resources and the FSPRM.

1.4. Definitions

All capitalized terms that are not otherwise defined in BPM 101 or another BPM have their meaning set forth in the [Tariff](#).

Advance Assessment Data Request: Data request from Program Operator to Participants for input into resource adequacy model to conduct Advance Assessment.

Advisory FSPRM: FSPRM calculated for a future season (T+3) during annual assessments. This is a non-binding but guiding value.

Customer Resource: A resource providing power generation and/or storage at a customer's property, such as but not limited to a solar photovoltaic system, a rechargeable battery system, or a battery-electric vehicle and charging system with vehicle to grid capabilities.



Data Request Instruction Manual: The set of instructions provided by the Western Power Pool (WPP) to facilitate Participants filling out the Advance Assessment Data Request.

Historical Load Data: Load data from one or more Years prior to the current Year, such as the previous 10 Years. Historical Load Data is expected to consist of 8,760 hours (or 8784 hours for a leap Year) of data for a Year.

Request Management System (RMS): Software the Program Operator uses to receive and answer questions and requests from Participants.

Study Period: The timeframe being studied in the Advance Assessment, i.e., a Summer Season or a Winter Season occurring two Years and five Years after the Advance Assessment.

Thermal Resource: A resource using conventional thermal fuels such as, but not limited to, coal, natural gas, nuclear, and biofuel.

2. Advance Assessment Timeline

Table 1 shows the Advance Assessment timeline from the time the Program Operator sends out the request to Participants to fill out their Advance Assessment Data Request to the Board approval of the resulting metrics. (both the two-Year-ahead binding metrics and the five-Year-ahead advisory metrics).

Table 1. Advance Assessment and Data Submittal Timeline¹

Activity/Milestone	Summer	Winter
Program Operator sends out Advance Assessment Data Request	January 15 (T-2)	
Participant provides data to Program Operator for Advance Assessment	March 1 (T-2)	
Participant Reviews input data	April 1 – April 15 (T-2)	October 1 – October 15 (T-2)
Program Operator provides Participants with draft modeling outputs	September 15 (T-2)	February 15 (T-1)
Participant reviews modeling output data and addresses any discrepancies with Program Operator	September 15 - October 1 (T-2)	February 15 - March 1 (T-1)
Program Operator publishes final modeling outputs	October 31 (T-2)	March 31 (T-1)
Deadline for Board of Directors review and approval of Binding FSPRM	January 31 (T-1)	June 30 (T-1)
FS Deadline for Binding Season	October 31 (T-1)	March 31 (T-0)
Binding Season	June 1 – September 15	November 1 – March 15

¹ In this Table 1, T (or T-0) refers to the Year in which a Binding Season begins; T-x refers to the Year that is x Years before T; and T+x refers to the Year that is x Years after T.



	(T-0)	(T-0 – T+1)
Season for which an Advisory FSPRM is Supplied	June 1 – September 15 (T+3)	November 1 – March 15 (T+3 – T+4)

Table 2 is an example timeline beginning with the Program Operator sending the Advance Assessment Data Request for the Binding Seasons in 2030-2031; note that the Program Operator will also supply Advisory FSPRMs for Binding Seasons in 2033 and 2034.

Table 2. Example Advance Assessment and Data Submittal Timeline

Activity/Milestone	Summer	Winter
Program Operator sends out Advance Assessment Data Request	January 15, 2028	
Participant provides data to Program Operator for Advance Assessment	March 1, 2028	
Participant Reviews input data	April 1 – April 15, 2028	October 1 – October 15, 2028
Program Operator provides Participants with draft modeling outputs	September 15, 2028	February 15, 2029
Participant reviews modeling output data and addresses any discrepancies with Program Operator	September 15 – October 1, 2028	February 15 – March 1, 2029
Program Operator publishes final modeling outputs	October 31, 2028	March 31, 2029
Deadline for Board of Directors review and approval of Binding FSPRM	January 31, 2029	June 30, 2029

FS Deadline for Binding Season	October 31, 2029	March 31, 2030
Binding Season	June 1 – September 15, 2030	November 1 – March 15, 2030-2031
Advisory Binding Season	June 1 – September 15, 2033	November 1 – March 15, 2033-2034

3. ~~Data Submittal~~Process

3.1. Advance Assessment Data Submittal Process

To support the Advance Assessment, the Program Operator will develop a resource adequacy model that represents the WRAP Region. Inputs to this model will be submitted from the Participants and will represent each of the Participant's loads and resources. The Program Operator will send data requests to the Participants for the items described in Table 3 below, which are necessary to complete the upcoming Advance Assessment for the applicable Summer and Winter Season. The WPP will post to its website a Data Request Instruction Manual for Participants' use in completing the Advance Assessment Data Request.

Table 3. Participant Provided Modeling Data

Advance Assessment Data Items
Participant Thermal Resource and Long Duration Storage data for all owned or operated units planned to be in-service for all or a portion of the Study Period as specified in the Data Request Instruction Manual.
North American Electric Reliability Corporation (NERC) Generating Availability Data System (i.e., GADS) or equivalent outage data (information on providing equivalent outage data will be posted on the WPP website) that can be used to calculate Equivalent Forced Outage Rates/Factors (i.e., EFOR/EFOF) for the last six Years for existing Thermal Resources and Long Duration Storage.
Hourly Load Profiles – Participant must provide Historical Load Data for the previous 10 Years. If a Participant participated in the WRAP in prior Years, such load data may already be available to the Program Operator and may not need to be resupplied.
Wind, solar, Storage Hydro, Energy Storage Resources (ESR), Run-of-River (ROR) resources, and Demand Response Capacity Resources (by resource) that are planned to be in-service for all or a portion of the Study Period, as further detailed in the Data Request Instruction Manual.

Hourly generation profiles for the last 10 Years for existing wind, solar, and ROR resources.

Nameplate (for wind, solar, Storage Hydro, ESR, and ROR resources).

Storage Hydro monthly QCC values (as calculated by the Storage Hydro Workbook – see [BPM 105 Qualifying Resources](#)) from the two most recently submitted FS Submittals (Winter and Summer Seasons), adjusted for any material changes anticipated for the applicable Binding Season being assessed.

3.2. Resource Registration Implications

Resources that are submitted with the complete set of required information by the Participant in the Advance Assessment Data Request will be considered registered by the Participant for the applicable Binding Season(s). Those registered resources, known as Qualifying Resources, will be included in the applicable Loss of Load Expectation (LOLE)/FSPRM assessment (in which they will be assumed to be available to mitigate loss of load for the WRAP Region) and will receive QCC values for that Binding Season. See [BPM 105 Qualifying Resources](#) for additional information on resource registration.

Resources for which Participants have planned retirement dates within the Study Period may need additional consideration. A resource for which a retirement is planned but for which the retirement date may not be considered firm may, at the Participant's option, continue to be submitted into the applicable LOLE/FSPRM assessment (in which the resource will be assumed to be available to mitigate loss of load for the WRAP Region) and submitted for QCC assessments, whether for determination of Effective Load Carrying Capability (ELCC) or of Unforced Capacity (UCAP). Alternatively, at the Participant's option, the resource may be omitted from the LOLE/FSPRM assessment (i.e., the resource will be assumed to not be available to mitigate loss of load for the WRAP Region) but may still be requested to have a QCC determined, and the resource registered for potential use by the Participant in the FS Submittal. Finally, the Participant may choose not to submit the resource into the Advance Assessment at all, in which case the resource would not be registered, and would not be a Qualifying Resource (see [BPM 105 Qualifying Resources](#) for late registration options). Resources planned for retirement that are not submitted for the Advance Assessment but are later identified for use in the FS Submittal will be considered late registered resources.

Excepting resources planned for retirement, Participants must register all owned or operated resources planned to be in-service for all or a portion of the Study Period.

3.3. Modeling Data from Forward Showing Submittal

Certain data from previous FS Submittals will be able to be used for the Advance Assessment. The data in Table 4 will be taken from the Participant's previous FS Submittal, unless the Participant identifies changes to such data applicable to upcoming Binding Seasons and provides updated information. New Participants to the WRAP will be requested to provide this data separately (see [BPM 401 New Participant Process](#)).

Table 4. Modeling Data taken from Previous FS Submittals

Data Items
Contracts included in past FS Submittals (imports or exports) with counterparties external to the WRAP Region with contract end dates after the start of the season being modeled.
Capacity value of import/export transactions.

3.4. Participant Review and Verification Process of Input Data

Once the Program Operator has input all necessary data into the resource adequacy model, Participants will be allowed a review of the input data (in the format used by the resource adequacy model or a format developed by the Program Operator) for their respective loads and resources. Model simulations will not be scheduled to occur prior to Participant review of input data. Participants will inform the Program Operator if there is a discrepancy or error in the data and will work with the Program Operator to remedy the error; any Participant who has not informed the Program Operator about any discrepancies or errors prior to the deadline will be considered to have reviewed and approved their data.

3.5. Draft Modeling Output Results Review

The Program Operator will provide draft Advance Assessment modeling results to the Participants for their review. The modeling outputs that will be available for Participant review are listed in Table 5.

Table 5. Draft Output from Advance Assessment for Participant Review

Outputs
ELCC values by Variable Energy Resources Zone.
Proposed FSPRM for each Month of the Binding Season under study.

Participants will have an opportunity, as set forth in Table 2 of BPM 101, to review the draft results and work with the Program Operator to analyze any potential discrepancies from expected results.

3.6. Advance Assessment Result Distribution

The final Advance Assessment results will consist of a LOLE study report that gives details of the study analysis, makes recommendations for a proposed FSPRM for each Month of the applicable Binding Season, and provides an Advisory FSPRM for each Month of the Binding Season five Years ahead. QCC studies or reports provided by the Program Operator will include the monthly ELCC study results for wind, solar, and short-term storage, as well as monthly QCC results for ROR, Thermal Resources, Long Duration Storage, and Demand Response for the applicable Binding Season. Advisory information will include ELCC curves for wind, solar, and short-term storage that can be used to determine future capacity values for new resources dependent upon the penetration of resources. A summary of studies and the output results is provided in

Table 6. QCC values for individual resources will be provided directly to the Participant that submitted the data for the Advance Assessment.

Table 6. Advance Assessment Results

Study	Resource Type	Methodology	Output Results
LOLE			FSPRM for each Month of the applicable Summer Seasons and Winter Seasons in the Study Period.
QCC Studies	Wind, Solar, and Energy Storage	ELCC	QCC values by Month for all wind, solar, and Energy Storage Qualifying Resources. Aggregated QCC values for wind, solar, and Energy Storage Qualifying Resources will be available to all Participants.
	Thermal and Long Duration Storage	UCAP	QCC values for Thermal Resources and Long Duration Storage. Resource-level $EFOF_{CCH}$ for determining the QCC of Thermal Resources will be available to the resource owner. Aggregated QCC values for Thermal Resources and Long Duration Storage will be available to all Participants.

	ROR	Historical Performance	QCC values by Month. Aggregated QCC values will be available to all Participants.
	Hybrid Resources	"Sum of Parts"	QCC values by Month. Aggregated QCC values will be available to all Participants.
	Customer Resources	Determined by Resource type	QCC values by Binding Season for customer-side resources. QCC values for all customer-side resources will be available to all Participants. Calculations for determining the QCC of customer-side resources will be available to the resource owner.

3.7.4. Board Approval of FSPRM

The adopted FSPRM values for each Month of a Binding Season are those approved by the Board of Directors. No later than nine months before the FS Deadline for such Binding Season, the Board of Directors shall take its final action regarding approval of the FSPRM values for each Month of such Binding Season. The Program Operator and Program Administrator will provide to the Board of Directors the study scope documentation prior to conducting the LOLE and ELCC studies.

If, after the Board of Directors has approved the FSPRM values for a Binding Season, a change to a NERC or WECC Reliability Standard or other applicable NERC or WECC requirement governing Contingency Reserves becomes effective, and implementation of such change would result in a decrease to one or more Monthly FSPRM values for that Binding Season, WPP may adjust the affected Monthly FSPRM values solely to reflect the effect of such change. The Board of Directors may approve such revised Monthly FSPRM values, provided that such approval occurs more than three months before the FS Deadline for that Binding Season. Any revised Monthly FSPRM approved pursuant to this WRAP Tariff Section 14.3.3 may only decrease, and may not increase, a Monthly FSPRM value previously approved for that Binding Season.



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102 Forward Showing Reliability
Metrics

Revision History

Manual Number	Version	Description	Revised By	Date
102	0.1	RAPC Glance Version	Michael O'Brien	1/18/2024
102	0.2	Public Comment Version	Michael O'Brien	1/19/2024
102	0.3	RAPC & PRC Discussion	Michael O'Brien	2/14/2024
102	0.4	RAPC Endorsement	Michael O'Brien	7/11/2024
102	0.5	Board Consideration	Michael O'Brien	9/13/2024
102	1.0	Board Approved	Rebecca Sexton	9/19/2024
102	2.0	Expedited Proposal	Rebecca Sexton	12/10/2025
102	3.0	Annual BPM Review	Maya McNichol	3/29/2026
<u>102</u>	<u>3.1</u>	<u>NTFP-07 Contingency Reserves – Public Comment</u>	<u>Maya McNichol</u>	<u>9/10/2026</u>
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102 Forward Showing Reliability Metrics

1. Introduction

The Forward Showing Reliability Metrics Business Practice Manual (BPM 102) provides an overview of how the Program Operator will conduct the Loss of Load Expectation (LOLE) Study and set the Monthly FS Planning Reserve Margins (FSPRM) to be approved by the Board. In addition to the guidance provided in this BPM, the Program Operator will provide scoping documents with additional technical details on the modeling approach prior to conducting the LOLE Study each year.

1.1 Intended Audience

BPM 102 is intended for WRAP Participants and other interested individuals or entities and will be particularly useful for individuals that are responsible for their Participant organization's Forward Showing Submittal or that need to ensure their organizations are submitting the required MW quantity of Qualifying Resources to meet the Forward Showing Capacity Requirement. BPM 102 will be most informative to individuals in Participant organizations that have an interest in the LOLE Study and the setting of FSPRMs. Qualifying Capacity Contribution (QCC) methodologies - such as Effective Load Carrying Capability (ELCC) for Variable Energy Resources (VER) and Unforced Capacity (UCAP) for thermal resources - can be found in [BPM 105 Qualifying Resources](#).

1.2 What You Will Find in This Manual

BPM 102 provides details, assumptions, methodologies, and procedures for conducting the LOLE Study and determining Monthly FSPRMs. This BPM explains how the Program Operator models variations in load and variations in generation, how numerous scenarios of variations in weather and variations in resource performance and outages are simulated from historical data, the Load and Resource Zones used in the LOLE Study simulations, the Subregions for which potentially differing FSPRM values are studied, how Contingency Reserves (CR) are accounted for, how the LOLE threshold is identified, how the simulations are conducted, and how FSPRMs are calculated.

1.3 Purpose

BPM 102 details the components of the LOLE Study and how the Program Operator will determine the FSPRMs in the LOLE Study for the Binding Seasons.

1.4 Definitions

All capitalized terms that are not defined in BPM 102 have their meaning set forth in the [Tariff](#) or in another BPM.

Capability Test: As defined in [BPM 105 Qualifying Resources](#).



Change Request Form: As defined in [*BPM 301 Program Review Committee Workplan Development and Approval*](#).

Fuel Type: As defined in [*BPM 105 Qualifying Resources*](#).

Historical Load Data: As defined in [*BPM 101 Advance Assessment*](#).

LOLE Study: A probabilistic simulation of variations in load and variations in generation to determine the amount of capacity needed for each Month of a Binding Season to meet the no more than a single event-day of loss of load in ten years reliability metric across a Binding Season.

Net Generating Capability: As defined in [*BPM 105 Qualifying Resources*](#).

Regional P50 Peak Load Forecast: Forecast based on total Participant load in the WRAP Region or total Participant Load in a Subregion depending on results being sought.

Study Scope Document: a document that defines the scope of an LOLE Study.

2. Background

The FSPRMs are the capacity margins above a Participant's monthly P50 Peak Load Forecast required to meet the reliability metric of no more than a single event-day of loss of load in ten years across a Binding Season (as calculated per Section 8). The total amount of monthly qualifying capacity needed to meet the reliability metric will be simulated in the LOLE Study using probabilistic analysis (see Section 7), taking into account variability in load (see Section 5) and variation in generation (see Section 6) while maintaining Contingency Reserves (see Section 6.10).

The [Tariff](#) provides that the FSPRM determination employs:

- i. a simulated resource stack using capacity accreditation principles consistent with those used for WRAP QCC determinations (see Section 6);
- ii. an adjustment in the total WRAP-required QCC value as needed to meet a one event-day in ten years LOLE across a Binding Season (see Section 8), and
- iii. a standard that each Month will have at least 0.01 annual LOLE (i.e., one event-day in 100 years), while maintaining the overall one event-day in ten years LOLE across a Binding Season (see Section 8).

FSPRMs are determined for each Month of the Binding Season and for each Subregion (see Section 4.1) as well as the WRAP Region as a whole (see Section 4.1.1) in connection with the Advance Assessment. The timing and deadlines for data collection and study completion for the Advance Assessment can be found in [BPM 101 Advance Assessment Timeline](#). The LOLE Study will be defined by a Study Scope Document (see Section 3).

3. Study Scoping Process

The LOLE Study for each Binding Season will be preceded by a Study Scope Document that will define the scope of work. The Study Scope Document will adhere to applicable [Tariff](#) requirements and the further guidance and implementing details described in BPM 102. The Study Scope Document may also specify additional technical details as necessary to complete the applicable LOLE Study for the subject Binding Season. The Program Operator will provide the Board and RAPC a timely opportunity to review and comment upon the Study Scope Document prior to the Program Operator's commencement of the applicable LOLE Study and will highlight any notable changes in scope or methodology compared to prior LOLE Studies. In addition to other key study methodologies and assumptions, the Study Scope Document will identify the planning software or system modeling software to be utilized for the subject LOLE Study.

4. Load and Resource Zones

The WRAP Region will be modeled in each LOLE Study as divided among the separate load and resource zones (LRZs) shown below in Figure 1, in order to consider weather variability across the WRAP Region and within Subregions. LRZs will be used primarily to distinguish weather modeling for loads and associated resources. To that end, the LOLE Study will not limit the import and export capabilities between LRZs when determining the FSPRMs for the WRAP Region or within Subregions. Changes to the LRZs shown in Figure 1 will be as noted in the Study Scope Document for the Binding Season to which such changes will apply.



Figure 1 - WRAP Load and Resources Zones (LRZs)¹ as listed in Section 4.1

4.1 Subregions Used for Determination of Monthly FSPRMs

Two Subregions have been identified in the WRAP Region: the Northwest Subregion and the Southwest and East Subregion. LOLE Study simulations are conducted separately for each of the Subregions. Each Subregion is comprised of load and generation from within certain Balancing Authority Areas, and the boundaries of each Subregion are defined by the boundaries of the combined area of the component Balancing Authority Areas. The component Balancing Authority Areas for each Subregion are as follows:

- Northwest Subregion (Zones 1, 2, 3, 4)
 - Avista Corporation
 - BC Hydro and Power Authority¹
 - Bonneville Power Authority
 - Chelan County PUD #1
 - Douglas County PUD #1
 - Grant County PUD #2

¹ The WRAP Region is solely located within the United States of America, and any transactions required by the WRAP Operations Program associated with loads or resources located in Canada are effected inside the borders of the United States.

- NorthWestern Energy
 - PacifiCorp West
 - Portland General Electric
 - Puget Sound Energy
 - Seattle City and Light
 - Tacoma Power
- Southwest and East Subregion (Zones 5, 6, 7, 8, 11)
 - Arizona Public Service
 - Basin Electric
 - Black Hills
 - Idaho Power Company
 - NV Energy
 - PacifiCorp East
 - Public Service Company of New Mexico
 - Salt River Project

Beginning with the Winter 2027–2028 Binding Season, the LOLE Study to determine the FSPRM values will reflect the following, updated Balancing Authority Areas for the Northwest Subregion and Southwest and East Subregion, respectively:

- Northwest Subregion (Zones 1, 2, 3, 4, 5)
 - Avista Corporation
 - BC Hydro and Power Authority¹
 - Bonneville Power Authority
 - Chelan County PUD #1
 - Douglas County PUD #1
 - Grant County PUD #2
 - Idaho Power Company
 - NorthWestern Energy
 - PacifiCorp West
 - Portland General Electric
 - Puget Sound Energy
 - Seattle City and Light
 - Tacoma Power
- Southwest and East Subregion (Zones 5, 6, 7, 8, 11)
 - Arizona Public Service
 - Basin Electric
 - Black Hills
 - NV Energy
 - PacifiCorp East

- Public Service Company of New Mexico
- Salt River Project
- Tucson Electric Power

Any load for which a Participant is responsible (that has not been excluded – see [BPM 103 Forward Showing Capacity Requirement](#)) that does not reside within one of the Balancing Authority Areas listed above will be added to one of the Subregions.

In the event a significant change to the transmission system is identified (e.g. new transmission capacity, changes in transmission rights ownership), the boundaries of the Subregions above may be reconsidered. A Participant may:

1. Request the Program Administrator conduct analysis of the potential impact of the change to the Subregion. The Program Administrator will take input from the requesting Participant and will determine the appropriate form and focus of such analysis. As possible, this analysis will be made public, in accordance with confidentiality guidelines set out in the [Tariff](#).
2. File a Change Request Form (see [BPM 301 Program Review Committee Workplan Development and Approval](#)) requesting the Balancing Authority Area within which some portion of its load (for which it is the LRE) be reassigned to another Subregion.
 - a. Following submission of the Change Request Form, other Participants with loads within the identified Balancing Authority Area will be given 30 days to provide comment. Any comments received will be added to the Change Request Form as appendices.
 - b. Following the comment period in step 2a, the Change Request Form will be treated as a Non-Task Force Proposal (see [BPM 301](#)).
 - c. Such Change Request Forms must be submitted at least 9 months prior to the deadline for the Advance Assessment Data Request for the Binding Season such change is requested (see [BPM 101 Advance Assessment](#)). For example, if a change to Subregion boundaries is requested for Summer 2032, the Advance Assessment Data Request for Summer 2032 is due March 1, 2030, so such a request would need to be submitted by June 1, 2029.

A new Participant will be assigned by WPP to an appropriate Subregion (and thus modify the boundary thereof) subject to objection of the RAPC to such assignment,

expressed by action of the RAPC. During the Transition Period, the Program Administrator may include in the Advance Assessment new participants committed to binding participation in the season being studied

4.1.1 WRAP Region Analysis

In addition to the Subregion analyses, WRAP Region FSPRMs will be determined by running LOLE Study simulations on the entire WRAP Region with unconstrained transmission (i.e., assuming no transmission constraints) between the Subregions.

5. Load Modeling in the LOLE Study

The FSPRMs are the capacity margins above a Participant's monthly P50 Peak Load Forecast required to meet the reliability metric of no more than a single event-day of loss of load in ten years across a Binding Season. The total amount of monthly qualifying capacity needed to meet the reliability metric will be simulated in the LOLE Study using probabilistic analysis (see the Study Scope Document for further details), taking into account variability in load (as well as variations in generation – see Section 6). For each Winter Season and each Summer Season, the Program Operator will model the effects of weather variability by developing a minimum of forty historical weather years that reflect the impact of weather on load. To model the effects of weather variability on load, a load shape provided by Participants for recent years (e.g. five most recent years of Historical Load Data) will be combined with historical weather data to synthesize at least forty years of synthetic historical weather data. Relationships between weather observations and load will be developed based on the historical weather and Historical Load Data (see [BPM 101 Advance Assessment](#) and [BPM 103 Forward Showing Capacity Requirement](#)) from recent data sets. The historical weather data will consist of hourly temperature data from a representative selection of weather stations in each Subregion. Weather data will be used from a back-up weather station if there are data quality issues for some periods in an initially selected station. The Study Scope document will identify when synthesized load shapes will be redetermined by the Program Operator; frequency of such updates will consider factors such as changes in load patterns, sharp increases in load due to large new customers, or changes in climate.

Other inputs into historical weather data will include an hour-of-week factor (in determining temperature-to-load comparisons for daylight hours versus darkness hours, as well as weekends versus Business Days) as well as temperature and average temperatures from the preceding eight, 24, and 48 hours. Different weather and load relationships will be built for the Winter Season and Summer Season. These weather and load relationships will be applied to the multiple years of weather data to develop



synthetic load shapes for the study years. Equal probabilities will be given to each of the forty annual load shapes in the simulations.

6. Generator Modeling in the LOLE Study

The FSPRMs are the capacity margins above a Participant's monthly P50 Peak Load Forecast required to meet the reliability metric of no more than a single event-day of loss of load in ten years across a Binding Season. The LOLE Study will simulate the aggregated stack of Qualifying Resources provided to the Program Operator by Participants in the Advance Assessment data collection, using the methodologies described below. In summary, the LOLE Study will model:

- The qualifying capacity of thermal resources based on Net Generating Capability (interchangeable with ICAP for thermal resources) taking into account equivalent forced outage rate-demand (EFORd) (see Section 6.1); note that EFORd is different than the equivalent forced outage factor during Capacity Critical Hours (EFOFcch) used to determine thermal resource QCC (see Table 1).
- QCC values for Storage Hydro (see Section 6.2)
- Participants' wind Qualified Resources as a single wind resource per LRZ using historical and synthesized resource performance profiles (see Section 6.3)
- Participants' solar Qualified Resources as a single solar resource per LRZ based on solar profiles developed from weather data (see Section 6.4)
- Energy Storage Resources (ESRs) as dischargeable only when there is a lack of other Qualified Resources available to serve load (see Section 6.5)
- Participants' Run-of-River (ROR) Qualified Resources as a single ROR resource per LRZ, using historical and synthesized resource performance profiles (see Section 6.6)
- Demand Response (DR) with properties provided by Participants (see Section 6.7)
- Dispatchable and controllable behind-the-meter Qualified Resources as equivalent sized resources (see Section 6.8)
- Capacity transactions resulting in either a net import or net export from the WRAP Region as hourly generators in the applicable LRZ (see Section 6.9)

- Contingency Reserves to maintain the required amounts (see Section 6.10).

The total amount of monthly qualifying capacity needed to meet the reliability metric will be simulated as a resource stack in the LOLE Study using probabilistic analysis, taking into account variations in generation (as well as load – see Section 5). The monthly Qualifying Resource simulated capacities (in MWs) needed to meet the reliability metric each month will then be converted to unforced capacity (UCAP) values (see Section 8) to calculate the FSPRMs (as a percentage).

6.1 Thermal Generator Modeling

Thermal Resources and Long Duration Storage Resources will be modeled in the LOLE Study at their Net Generating Capability value (as indicated by the Capability Test – see [BPM 105 Qualifying Resources](#)) while forced outages for each resource will be modeled in accordance with their EFORD when determining the amount of monthly qualifying capacity to meet the reliability metric.² The Capability Test data will be provided by each Participant in its FS Submittal as discussed in [BPM 105 Qualifying Resources](#) and [BPM 108 Forward Showing Submittal Process](#). All Thermal Resources and Long Duration Storage Resources will be modeled in the LOLE Study, unless information provided by the relevant Participant in the Advance Assessment Data Request indicates the resource will not be available in the study period, such as a retirement date, future in-service date, or similar reason.

Forced outage modeling for Thermal Resources and Long Duration Storage Resources will use annual EFORD values (based on the EFORD equation as defined by NERC GADS³), forced outage durations, and outage events sourced from NERC GADS (or equivalent) data provided by Participants. For Thermal Resources and Long Duration Storage Resources that do not submit such data, an average forced outage rate will be applied based on size, technology type, Fuel Type and resource age. At a minimum, the most recent five years of historical NERC GADS (or equivalent) data will be considered in the LOLE Study. The models will be updated every Year to reflect the latest outage rates.

² Note: Resource EFORD is used in LOLE Study for determination of FSPRMs, and differs from the EFOF (Equivalent Forced Outage Factor) used for the determination of QCC for thermal resources during Capacity Critical Hours (CCHs) – see [BPM 105 Qualifying Resources](#).

³ NERC, 2023 GADS Data Reporting Instructions, January 2023, Appendix F, p9, Section 25, available at: [GADS DRI 2023.pdf \(nerc.com\)](#)



Planned outages for thermal resources will not be modeled in the LOLE study. All Thermal Resources and Long Duration Storage Resources will be modeled as available at any given hour if the Qualifying Resource is not on a forced outage.

6.2 Storage Hydro Qualifying Resources

The LOLE Study will model Storage Hydro Qualifying Resources utilizing the Monthly QCC values determined with the methodology described in [BPM 105 Qualifying Resources](#) for such resources. The methodology utilized to assess QCC values for Storage Hydro Qualifying Resources accounts for the availability of storage such that it is appropriate in the LOLE modeling to assume the facility can output the Monthly QCC value for each hour in the LOLE Study. No additional outage modeling will be applied to the Storage Hydro Qualifying Resources in the LOLE Study, since the QCC values consider historical outages.

6.3 Wind Resources

Wind resources provided by Participants will be modeled together as a single wind resource per LRZ in the LOLE Study. Operational wind data (preferred and used when available) and synthesized wind data will be utilized for the analysis: recent historic wind resource performance is correlated to the corresponding peak load profiles so that synthesized wind performance data can be developed from similar load profiles in earlier years for use in the resource variability simulations. For example, actual historical resource performance profiles from a recent period (e.g., 2014-2020) are taken, and the load profiles for those days are matched with daily load profiles (+/-25 days) from older years (e.g., 1980-2014) that best align with the peak load profile of the day in question. Actual resource output will be used when available. The Program Operator will identify in the Study Scope Document whether synthesized wind shapes for years where historical data is insufficient or not available will be redetermined for the upcoming LOLE Study. Wind resources provided that have not gone through the above synthesis process will use wind operational and synthesized data that is similar (i.e. the same LRZ) as the resource being added.

6.4 Solar Resources

Solar resources provided by Participants will be modeled together as a single solar resource per LRZ in the LOLE Study. When operational solar data is unavailable, solar profiles for resources will be developed using irradiance and weather data that will be obtained for weather station sites for the years after 1998 from the National Renewable Energy Laboratory's (NREL) National Solar Radiation Database (NSRDB) Data Viewer. Data will be obtained from the NREL System Advisor Model (SAM) for each Year and site to generate 8,760 hourly profiles. Profiles from 1980-1998 will be selected by using



daily profiles from the day that best matches the peak load out of all the days +/- 3 days of the source day of the 7-year period from 1998 to the most current year. The Program Operator will identify in the Study Scope whether synthesized solar shapes for years where historical data is insufficient or not available will be redetermined for the upcoming LOLE Study. Solar resources provided that have not gone through the above synthetization process will use previous solar operational and synthesized irradiance data that is similar (e.g. the same LRZ) as the resource being added.

6.5 Energy Storage Resources

ESRs will be modeled in the LOLE Study 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, meaning that they will only be discharged when there is a lack of other resources available to serve load. ESRs will be discharged prior to Demand Response (DR) programs. ESRs will not be restricted to charging from co-located resources or in a hybrid configuration unless specified by the Participant.

6.6 Run of River Qualifying Resources

ROR Qualifying Resources provided by Participants will be modeled together as a single ROR per LRZ in the LOLE Study. Operational and synthesized ROR data will be utilized for the analysis. Recent historic ROR resource performance is correlated to the corresponding peak load profiles so that synthesized ROR resource performance data can be developed from similar load profiles in earlier years for use in the resource variability simulations. For example, actual historical ROR resource performance profiles from a recent period (e.g., 2014-2020) are taken, and the load profiles for those days are matched with daily load profiles (+/-25 days) from older years (e.g., 1980-2014) that best align with the peak load profile of the day in question. The Program Operator will identify in the Study Scope whether synthesized ROR shapes for years where historical data is insufficient or not available will be redetermined for the upcoming LOLE Study. ROR resources provided that have not gone through the above synthetization process will use previous ROR operational and synthesized river flow data that is similar (e.g. on the same river system) as the resource being added.

6.7 Demand Response Programs

The LOLE Study will include properties and values of DR programs provided by Participants. DR programs will be modeled, such that these representative resources would be dispatched last in the LOLE Study to reflect DR operating scenarios. Forced outage rates will not be assigned to DR programs.

6.8 Behind-the-Meter Generation

Behind-the-meter generation reported by Participants as capacity resources that are controllable and dispatchable by the Participant will be modeled in the LOLE Study as generation (per the aggregation requirements in [BPM 105 Qualifying Resources](#)). These resources will be assigned parameters and forced outage information from equivalent-sized resources.

6.9 External Capacity Modeling

Any external capacity transactions that are supported by firm commitments in the Advance Assessment Data Request (see [BPM 101 Advance Assessment](#)) will be modeled as hourly generators in the applicable LRZ in the LOLE Study. External transactions include any firm capacity transactions from or obligations to non-participating entities external to the WRAP Region. If the transaction is a sale to a non-participating entity, it will be an export of capacity. If the transaction is a purchase from a non-participating entity, it will be modeled as an import of capacity; forced outage rates will not be assigned to these transactions.

6.10 Contingency Reserves Modeling

In accordance with [BAL-002-3](#) and ~~standard BAL-002-WECC-3, Balancing Authorities (and the WPP Reserve Sharing Group (RSG)s), a WRAP Participant is required to maintain its allocated share of the total Contingency Reserve requirement of the RSG footprint which is and required to maintain a minimum CR amount that is equal to 200% times the previous Year's average most severe single contingency (MSSC). the greater of either:~~

- ~~i. the loss of the most severe single contingency or~~
- ~~ii. the sum of three percent (3%) of hourly integrated load and three percent (3%) of hourly integrated generation.~~

Within the RSG, each BA's Contingency Reserve requirement is calculated as follows:

$$\begin{aligned} & \text{BA Contingency Reserve requirement} \\ &= (200\% * \text{Previous Year's Average MSSC}) \\ & \quad * \frac{\text{BA Average Hourly Gen} + \text{BA Average Hourly Load}}{\text{RSG Average Hourly Gen} + \text{RSG Average Hourly Load}} \end{aligned}$$

RSG requirements are established at the BA level, while WRAP participation occurs at the Load Responsible Entity (LRE) level. When a BA is the WRAP Participant and represents the entire BA load in WRAP, the BA Contingency Reserve requirement is the same as the LRE Contingency Reserve requirement. When a BA includes multiple LREs participating in WRAP or has on part of its load participating in WRAP, the BA's Contingency Reserve



requirement will therefore be allocated among those LREs based on their respective shares of BA load:

LRE Contingency Reserve Obligation

$$= \text{BA Contingency Reserve requirement} * \frac{\text{LRE Average Hourly Load}}{\text{BA Average Hourly Load}}$$

The total WRAP Contingency Reserve requirement is the sum of all WRAP LRE Contingency Reserve requirements.

The LOLE Study will ensure all Contingency Reserve amounts are maintained during tallied loss of load events. WPP RSG will provide data on the MSSG, BA loads, and BA CR requirements. To ensure this, the LOLE Study will assume an average six percent (6%) of the Regional P50 Peak Load Forecast CR requirement when determining the capacity requirements to maintain the one event day in 10 year LOLE requirement.

WRAP uses the most up-to-date MSSC value provided by the RSG at the time of modeling.

If, after the Board of Directors has approved the FSPRM values for a Binding Season, a change to a NERC or WECC Reliability Standard or other applicable NERC or WECC requirement governing Contingency Reserves becomes effective, and implementation of such change would result in a decrease to one or more Monthly FSPRM values for that Binding Season, WPP may adjust the affected Monthly FSPRM values solely to reflect the effect of such change. Such change shall be determined by reviewing the new Contingency Reserve requirement in a subsequent study to determine the difference between the previous requirement and new requirement and then applying that difference to the applicable Binding Season FSPRM values. Per *BPM 101 – Advance Assessment* and the WRAP Tariff, this adjustment may only decrease, and may not increase, a Monthly FSPRM value previously approved for that Binding Season.

7. LOLE Study

Once the capacity contributions of the components of the resource stack have been determined (see Section 6) the LOLE Study simulation will be performed for the Subregions and WRAP Region to determine the capacity needed each Month to meet the reliability metric.

The probabilistic LOLE Study will model load variability (i.e., one of the forty (or more) synthetic load shapes) for all hours of the Year and random forced outages for Qualifying Resources in the WRAP Region and Subregions during each hour of the study. The LOLE Study will count loss of load events (insufficient Qualified Resource



capacity to meet load) during all hours of the Binding Season against the reliability metric of the no more than one event-day in ten-year LOLE across a Binding Season. Loss of load events that occur during hours outside of the Binding Season will not be considered.

If an LOLE Study simulation has excess capacity in a Binding Season, pure negative capacity (with no outage rate) will be added in all hours of the applicable Binding Season until the WRAP Region or any Subregion arrive at the no more than one event-day in ten years across a Binding Season reliability threshold. If an LOLE Study simulation has insufficient capacity in a Binding Season, pure positive capacity (with no outage rate) will be added in all hours of the applicable Binding Season until the WRAP Region or any Subregion reaches the no more than one event-day in ten years across a Binding Season reliability threshold. In addition, to ensure the amount of qualifying capacity is not leading to excessively low LOLEs, pure capacity will be adjusted to ensure that all Months of the applicable Binding Season have at least 0.01 day per Year LOLE in that given Month, while at the same time ensuring the LOLE for the entire Binding Season does not exceed 0.1 day per Year LOLE.

Once the reliability metric is achieved, the capacity requirement (as represented by the resource stack and pure capacity) for each Month of the Binding Season (by Subregions and WRAP Region) is converted to UCAP for calculation of the FSPRMs (see Section 8).

8. FSPRMs Calculations

The monthly capacity values of the resource stack that result from the LOLE Study simulation (see Section 7) will be replaced with UCAP values as indicated in Table 1. The intent of the UCAP approach is to represent Qualified Resources with respect to their availability.

Table 1 - Resource capacity value to calculate UCAP FSPRMs

Resource type	Conversion to UCAP Values
Thermal	The Net Generating Capability will be replaced by QCC values calculated by the Program Operator using the QCC methodology (see BPM 105)
Wind, Solar and ESR	Values for wind, solar, and ESR resources will be determined by using an ELCC analysis (see BPM 105). The capacity values attributed to wind and solar resources and ESRs will be consistent

	with the QCC values assigned to such resources in the QCC analysis (see BPM 105).
Storage Hydro	QCC values submitted by the Participants calculated using the Storage Hydro QCC methodology (see BPM 105).
Run-of-River Hydro	QCC values calculated by the Program Operator using the ROR QCC methodology (see BPM 105).
Demand Response	No conversion needed. Modeled maximum monthly capacity of all programs submitted by the Participants.
Pure Capacity adjustment to meet reliability metric	No conversion needed.

After the monthly capacity values of a resource stack are converted into UCAP values, the FSPRMs will be calculated separately for each Month of the Binding Seasons based on the Regional P50 Peak Load Forecast for each Month (Month also refers to a partial calendar month that is part of a Binding Season) as follows:

$$FSPRM (\%) = \frac{UCAP_{1-in-10} - \text{Regional P50 Load Forecast}}{\text{Regional P50 Load Forecast}} * 100$$

Where:

FSPRM(%) is the FSRPM for a specified Month in a Binding Season

UCAP_{1-in-10} is the UCAP required to meet the reliability metric for a specified Month in a Binding Season

Regional P50 Peak Load Forecast is the P50 Peak Load Forecast for the specified Month

Requirements as described in [BPM 103 FS Capacity Requirement](#). However, it should be noted that while Regional P50 Peak Load Forecasts are calculated using the same methodologies as Participant P50 Peak Load Forecasts the former use a Load Growth Factor specific to the LOLE Study (see [BPM 103 FS Capacity Requirement](#)).



Western Resource Adequacy Program

103 Participant Forward Showing
Capacity Requirements

Revision History

Manual Number	Version	Description	Revised by	Date
103	0.1	RAPC Glance Version	Michael O'Brien	5/28/2024
103	0.2	Public Comment Version	Michael O'Brien	5/30/2024
103	0.3	RAPC & PRC Discussion	Michael O'Brien	8/28/2024
103	0.4	RAPC Endorsement	Michael O'Brien	9/4/2024
103	0.5	Board Consideration	Michael O'Brien	9/12/2024
103	1.0	Board Approved	Rebecca Sexton	9/19/2024
103	2.0	2024-NTFP-4 Redlines	Michael O'Brien	3/13/2025
103	3.0	Firm Tx TF Updates	Maya McNichol	3/17/2026
103	4.0	Annual BPM Review	Maya McNichol	3/19/2026
<u>103</u>	<u>4.1</u>	<u>NTFP-07 Contingency Reserves</u>	<u>Maya McNichol</u>	<u>9/10/2026</u>



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103 Participant Forward Showing Capacity Requirements

1. Introduction

The Forward Showing (FS) Capacity Requirement is the minimum quantity of capacity a Participant is required to demonstrate for a Month of a Binding Season. Business Practice Manual (BPM) 103 describes the process for determining the components of the FS Capacity Requirement (the FS Planning Reserve Margin [FSPRM] calculations can be found in [BPM 102 Reliability Metrics](#)). BPM 103 also includes directions for a Participant seeking to exclude load from its FS Capacity Requirement, along with a discussion of the effect of using another Subregion's lower FSPRM on a Participant's FS Capacity Requirement, and considerations for load aggregation and disaggregation.

1.1. Intended Audience

BPM 103 is intended for WRAP Participants and other interested individuals or entities. BPM 103 will be particularly useful for those responsible for their Participant organization's FS Submittal as it pertains to meeting the FS Capacity Requirement, as this BPM provides an overview of the Monthly P50 Peak Load Forecast, load growth and load change considerations, and the Contingency Reserve Adjustment.

1.2. What You Will Find in This Manual

BPM 103 has the following sections: FS Capacity Requirement; P50 Peak Load Forecast; Load Growth Factor; Contingency Reserve Adjustment; Excluding Load; Submitting Loads from Multiple ; Load Aggregation/Disaggregation; and LOLE Study Load Forecast and Load Growth Rate. BPM 103 also includes Appendix A - P50 Peak Load Forecast Modifications and Appendix B - Load Exclusion.

1.3. Purpose

BPM 103 provides an overview of the components of the monthly FS Capacity Requirements calculations, including the Monthly P50 Peak Load Forecast methodology.

1.4. Definitions

All capitalized terms that are not defined in BPM 103 or another BPM have their meaning set forth in the [Tariff](#).

Contingency Reserve Adjustment: An adjustment to the FS Capacity Requirement to account for changes in Contingency Reserve requirements resulting from a Participant's contractual purchases and sales that include the Contingency Reserve as a specific part of the contract. The Contingency Reserve Adjustment has two components: Contingency Reserve Adjustment - Generation and Contingency Reserve Adjustment - Load.



Contingency Reserve Adjustment - Generation: The component of the Contingency Reserve Adjustment that accounts for differences between the system average Contingency Reserve requirement assumed in the LOLE Study and a Participant's actual purchases and sales.

Contingency Reserve Adjustment - Load: The component of the Contingency Reserve Adjustment that accounts for a Participant's specific Contingency Reserve purchases and sales.

Forward Showing (FS) Capacity Requirement Unadjusted: The FS Capacity Requirement Unadjusted takes into account the monthly P50 Peak Load Forecast and the monthly FSPRM. The FS Capacity Requirement Unadjusted does not take into account the Contingency Reserve Adjustment.

Historical Load Data: As defined in [*BPM 101 Advance Assessment*](#).

Load Forecast Ratio: The Load Forecast ratio for each Month of a Binding Season is the ratio of the monthly average of the peak loads of a Month for the last five years to the maximum of the monthly average of the peak loads of the months of a Binding Season for the last five years.

Load Growth Factor: A program-wide load growth factor applied to P50 Peak Load Forecasts that may take into account location, weather, Participant type, and Participant customer composition (balance between retail, commercial, and industrial) among other factors.

LOLE Study: As defined in [*BPM 102 Forward Showing Reliability Metrics*](#).

Regional P50 Peak Load Forecast: As defined in [*BPM 102 Forward Showing Reliability Metrics*](#).

Seasonal Peak Months: The Winter Season months of December, January, and February.

2. Demand Response Utilization

A Participant has two options when choosing how to use Demand Response to affect its Monthly FS Capacity Requirements in its FS Submittal (see [*BPM 108 Forward Showing Submittal Process*](#)).

- Option 1: A Participant may leave the effects of its historically deployed Demand Response included in its Historical Load Data (see [*BPM 101 Advance*](#)



[Assessment](#)). This will have the effect of reducing the amount of load in the LOLE Study (see [BPM 102 Forward Showing Reliability Metrics](#)), reducing maximum loads in the P50 Peak Load Forecast (see Section 4) ultimately leading to lower Monthly FS Capacity Requirements.

- Option 2: If a Participant removes the effects of historically deployed Demand Response from its Historical Load Data, the Participant may choose to utilize Demand Response as a Qualifying Resource (see attestation in [BPM 108 Forward Showing Submittal Process](#)). As described in [BPM 105 Qualifying Resources](#), a Demand Response program registered as a Qualifying Resource will require a Capability Test to confirm the claimed capability and duration of load reduction, along with a more frequent Operational Test at a portion of the program's claimed capability and duration.

3. FS Capacity Requirement

The FS Capacity Requirement is the minimum quantity of capacity a Participant is required to demonstrate for each Month of a Binding Season in its FS Submittal (see [BPM 108 Forward Showing Submittal Process](#)). As shown in Equation 1, a Participant's FS Capacity Requirement begins with the Participant's monthly P50 Peak Load Forecast (see Section 4), which is multiplied by one plus the applicable Monthly FS Planning Reserve Margin (FSPRM - see [BPM 102 Forward Showing Reliability Metrics](#) for a Month (the net result is known as the FS Capacity Requirement Unadjusted). The Contingency Reserve Adjustment (see Section 6) is then added to the FS Capacity Requirement Unadjusted to arrive at a Participant's monthly FS Capacity Requirement.

Equation 1 – FS Capacity Requirement

$$\text{FS Capacity Requirement} = \text{FS Capacity Requirement Unadjusted} + \text{Contingency Reserve Adjustment}$$

where

$$\begin{aligned} \text{FS Capacity Requirement Unadjusted} \\ = (\text{P50 Peak Load Forecast}) * (1 + \text{FSPRM}) \end{aligned}$$

and

$$\begin{aligned} \text{Contingency Reserve Adjustment} \\ = \text{Contingency Reserve Adjustment_Generation} \\ + \text{Contingency Reserve Adjustment_Load} \end{aligned}$$

4. P50 Peak Load Forecast

A Participant's monthly P50 Peak Load Forecast for the Binding Season is calculated to determine a Participant's FS Capacity Requirement Unadjusted. The monthly P50 Peak

Load Forecast will be calculated using the following methodologies for the Winter Seasons (Section 4.1) and Summer Seasons (Section 4.2).

4.1. Winter P50 Peak Load Forecast

Example monthly P50 Peak Load Forecasts for a Winter Season is shown in Table 1 and referred to in the methodological steps below.

							2023/2024 Monthly P50 Peak Load Forecast - unadjusted	2023/2024 Monthly P50 Peak Load Forecast - adjusted for load growth
Month	Season	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022		
November	Winter	2098	1998	1899	1958	2468	1998	2042
Seasonal Peak Months	December	2060	2206	2241	2202	2273	2448	2502
	January	2363	2381	2239	2521	2302	2448	2502
	February	2448	2072	2213	2476	2477	2448	2502
	March	2070	2253	2047	1959	1806	2047	2093
Maximum		2448	2381	2241	2521	2477		

Table 1 - Example Winter Season P50 Peak Load Forecast

1. Determine the peak load for each Month of the Winter Season for the last available five Winter Seasons using the Historical Load Data submitted as part of the Advance Assessment (see [BPM 101 Advance Assessment](#)). These are the load values populating the light blue section of Table 1 (e.g., November peak load from 2019/2020 is 1899 MW).
2. Calculate the maximum peak load for each of the last available five Winter Seasons. For example, the maximum peak load for 2020/2021 is 2521 MW.
3. The Monthly P50 Peak Load Forecast for the Seasonal Peak Months is the median of step 2 which in Table 1 is 2448 MW.
4. The Monthly P50 Peak Load Forecasts for November and March are the median of the respective load values from step 1, which in Table 1 are respectively 1998 MW and 2047 MW.

An example spreadsheet showing steps 1 through 4 is posted on the WPP website.

5. Per the [Tariff](#), a Participant can modify the results of Step 1 to capture load changes during the forecast window and ensure the results of Step 3 and Step 4 are correct. If historical load data is available the affected Participants are responsible for adjusting any monthly peak loads in Step 1 that do not capture the load change. If historical load data is unavailable (e.g., a new data center) the affected Participant is responsible for generating synthetic load data and adjusting any monthly peak loads in Step 1 that do not capture the load change. Amending the results of Step 1

will be necessary until the peak load for each Month of the Winter Season for the last available five Winter Seasons automatically fully capture the impacts of the load change through the Historical Load Data submitted as part of the Advance Assessment. A Participant will need to attest to the accuracy of any modification (see Appendix A - P50 Peak Load Forecast Modifications Senior Official Attestation). Additions and removals of load are separate and distinct from Load Growth Factors discussed in Section 5 and are intended to capture significant one-time changes such as the addition or loss of a large industrial customer.

6. Per the [Tariff](#), a specified Load Growth Factor will then be applied to the results of step 5 (see Section 5) for each year following the last year in the Historical Load data. For example, the Monthly P50 Peak Load Forecast – unadjusted is multiplied by the Load Growth Factor once for 2022/2023 and again to arrive at the 2023/2024 Monthly P50 Peak Load Forecast – adjusted for load growth value in the last column in Table 2.

4.2. Summer P50 Peak Load Forecast

The monthly P50 Peak Load Forecast for the Summer Seasons utilizes a Load Forecast Ratio to reflect the potential for a Participant to experience peaks in different months of the Summer Season from year to year. An example monthly P50 Peak Load Forecast for a Summer Season is shown in Table 2 and referred to in the methodological steps below.

Month	Season	2018	2019	2020	2021	2022	Monthly Average of Peak Loads	Maximum Monthly Average of Peak Loads	Median of Maximum of Peak Loads for the last five Seasons	Load Forecast Ratio	2024 Monthly P50 Peak Load Forecast - unadjusted	2024 Monthly P50 Peak Load Forecast - adjusted for load growth
June	Summer	3071	3571	1903	2496	1957	2600	2960	3571	0.88	3136	3206
July	Summer	3672	1761	2434	3219	3715	2960			1.00	3571	3650
August	Summer	2049	2929	2661	2939	2347	2585			0.87	3119	3188
September	Summer	2308	1698	1880	1664	2443	1999			0.68	2411	2465
Maximum		3672	3571	2661	3219	3715						

Table 2 - Example Summer Season P50 Peak Load Forecast

1. Determine the peak load for each Month of the Summer Season for the last available five seasons using the Historical Load Data submitted as part of the Advance Assessment (see [BPM 101 Advance Assessment](#)). These are the load values populating the light blue section of Table 2 (e.g. June peak load from 2020 is 1903 MW).
2. Calculate the maximum peak load for each of the last available five seasons. For example, the maximum peak load for 2021 in the yellow section of Table 2 is 3219 MW.
3. Calculate the median of step 2, which in Table 2 is 3571 MW.

4. Calculate the Load Forecast Ratio.
 - 4.1. For each of the last available five Summer Seasons calculate the average of the five peak loads for each Month. For example, in August in Table 2 the average of the peak loads is 2585 MW.
 - 4.2. Identify the maximum load value from step 4.1. In the example shown in Table 2 this is the July average of 2960 MW.
 - 4.3. The Load Forecast Ratio for each Month of the Summer Season is the result of step 4.1 divided by the MW value identified in step 4.2. In the example shown in Table 2, this is 1.00 for July (and will always be 1.00 for the maximum Summer month) and 0.68 for September.
5. Multiply the Load Forecast Ratios for each Month of the Summer Season from step 4.3 by the result of step 3. These are the Monthly P50 Peak Load Forecast values unadjusted for load growth or load additions/removals (seen in red in Table 2). In the example shown in Table 2 the Monthly P50 Peak Load Forecast - unadjusted value for September is 2411 MW (0.68 multiplied by 3571 MW).

An example spreadsheet showing steps 1 through 5 is posted on the WPP website.

6. Per the [Tariff](#), a Participant can modify the results of Step 1 to capture load changes during the forecast window and ensure the results of Step 5 are correct. If historical load data is available the affected Participants are responsible for adjusting any monthly peak loads for in Step 1 that do not capture the load change. If historical load data is unavailable (e.g. a new data center) the affected Participant is responsible for generating synthetic load data and adjusting any monthly peak loads in Step 1 that do not capture the load change. Amending the results of Step 1 will be necessary until the peak load for each Month of the Summer Season for the last available five season automatically fully capture the impacts of the load change through the Historical Load Data submitted as part of the Advance Assessment. A Participant will need to attest to the accuracy of any modification (see Appendix A - P50 Peak Load Forecast Modifications Senior Official Attestation). Additions and removals of load are separate and distinct from Load Growth Factors discussed in Section 5 and are intended to capture significant one-time changes such as the addition or loss of a large industrial customer.
7. Per the [Tariff](#), a specified Load Growth Factor will then be applied to the results of step 6 (see Section 5) for each year following the last year in the Historical Load Data. For example, the Monthly P50 Peak Load Forecast – unadjusted is multiplied by the Load Growth Factor once for 2023 and again to arrive at the 2024 Monthly P50 Peak Load Forecast – adjusted for load growth value in the last column in Table 2).

5. Load Growth Factor

A Participant will have the option of using either a WPP-established WRAP-wide growth rate(s) (Section 5.1) or developing its own alternative growth rate (Section 5.2). Load growth is separate and distinct from the additions and removals of load discussed in Section 4.1 step 5 and Section 4.2 step 6.

5.1. Established Growth Rate

A WRAP-wide established growth rate (or set of established growth rates) may account for location, weather, Participant type, Participant customer composition (balance between retail, commercial, and industrial). The established growth rate is currently set at 1.1%. Changes to the established growth rate for the P50 Peak Load Forecast in BPM 103 will be reviewed, endorsed, and approved as described in the *BPM 300's Stakeholder Engagement* series.

5.2. Participant Alternative Growth Rate

If a Participant believes the established growth rate discussed in Section 5.1 does not accurately represent its anticipated loads in the Binding Season, the Participant may request an alternative growth rate that will be validated by the Program Administrator and Program Operator (using the form found on WPP website). The Program Administrator will consider the data presented in support of the Participant's request for an alternative growth rate, which could potentially relate to weather, economic growth, or climate. As part of the request, the Participant will demonstrate that the alternative growth rate (applied to each year following the last year in the Historical Load Data) results in a P50 Peak Load Forecast that is (in total) 5% higher or lower than the P50 Peak Load Forecast calculated using the growth rate in Section 5.1 in the Month of the Binding Season with the highest P50 Peak Load Forecast. For example, the Participant with data from Table 1 would provide an alternative load growth factor that, when applied for two years of growth, results in a P50 Peak Load value of greater than 2,627MW or less than 2,377MW for December, January, or February, and would provide supporting information for said load growth factor.

6. Contingency Reserve Adjustment

As discussed in BPM 102 Forward Showing Reliability Metrics, the LOLE Study and resulting monthly FSPRMs ensure Contingency Reserve is maintained by assuming a proxy Contingency Reserve requirement ~~of six percent (6%) of the Regional P50 Peak Load Forecast across~~ equal to the portion of the WPP Reserve Sharing Group (RSG) total Contingency Reserve Obligation requirement attributable to the LRE's in the WRAP Region. ~~However, as the BAL-002 WECC 3 standard requires a reserve equal to three percent (3%) of hourly integrated load and three percent (3%) of hourly integrated~~



~~generation, the individual Participants' Contingency Reserve requirements (and therefore FS Capacity Requirements) will be different depending on the load and generation profiles specific to them. For instance, some Participants may utilize contracted capacity to meet their FS Capacity Requirement where the seller, through a contractual arrangement, is responsible for carrying the Contingency Reserve obligation of contracted capacity, or some Participants may purchase Contingency Reserve to cover some or all of their Contingency Reserve requirements. These are categorized as Contingency Reserve adjustments and the intent is to ensure that the portion of the FSPRM attributable to Contingency Reserve is included in the FS Capacity Requirement of the LRE with the actual responsibility, whether that responsibility is driven by a BAL-002-WECC-3 compliance obligation or through a contractual arrangement. A Participant may contract with another entity to either cover Contingency Reserves for that entity or for that entity to take on some of the Contingency Reserves for the Participant. The FS Capacity Requirements Unadjusted are therefore adjusted for a Participant's Contingency Reserve requirements (plus or minus). A Participant's Contingency Reserve Adjustment has two components: Contingency Reserve Adjustment-Generation and Contingency Reserve Adjustment-Load.~~

7. Excluding Load

As described in [BPM 108 FS Submittal Process](#), a Participant will include all loads in its FS Demonstration for which it is responsible: i.e. all loads within the Western Interconnect (that are not participating in another resource adequacy program or represented by another WRAP LRE) for which the Participant has an obligation to forward procure capacity to meet any portion of the load or for which the Participant is the exclusive wholesale electricity provider to a load serving entity.

A Participant may seek to exclude loads from WRAP participation. This is distinct from a Participant modifying its P50 Peak Load Forecast to account for additions and removal of load. This is distinct from a Participant modifying its P50 Peak Load Forecast to account for additions and removal of load. As part of its FS Demonstration, the Participant will attest that the Participant is not the exclusive wholesale provider for the load (see Appendix B - Load Exclusion). As part of its FS Demonstration, the Participant will also provide documentation of notice to the end-use customer of the Participant's intent to exclude the load from WRAP in the form provided on the WPP website and acknowledged via signature by a senior official of the end-use customer. Excluded load may not be included in the Operations Program. Excluded load must be separately metered, such that the excluded load may be removed from load forecasting information to be provided in the Operations Program, as further discussed in [BPM 202](#)

[Participant Sharing Calculation Inputs](#), and from the Historical Load Data utilized in Section 4. Loads may not be partially excluded.

8. Submitting Loads from Multiple Subregions

As described in [BPM 108 Forward Showing Submittal Process](#), a Participant responsible for loads in two Subregions seeking to submit a single workbook using one monthly FSPRM may do so if the Participant can demonstrate WRAP Qualifying Transmission from the load in the Subregion with the utilized monthly FSPRM to the load in the Subregion with the higher monthly FSPRM (see [BPM 108](#) for additional information). When submitting a single FS Submittal for loads in multiple Subregions, the Participant will use historical load data including all loads when calculating the FS Capacity Requirement for that Month according to Sections 2 through 7 of this BPM. Subregion loads will be combined on a coincident peak basis to determine monthly P50 Peak Loads when submitting a single FS Submittal.

9. Load Aggregation/Disaggregation

As described in [BPM 108 Forward Showing Submittal Process](#), all loads submitted by a Participant within a single FS Submittal must be able to be served interchangeably by all Qualifying Resources and Qualifying Contracts in that same FS Demonstration, without the expectation that additional transmission rights will be required to deliver resources to load. In accordance with this, a Participant may be required to submit separate FS Demonstrations, even as to loads residing in the same Subregion, if the Program Administrator determines it is not practicable to treat such loads as if they can share in load and resource diversity for reasons that may diminish the integrity of WRAP reliability metrics, including but not limited to, if loads and resources are not operated collectively.

10. LOLE Study Load Forecast and Load Growth Rate

A LOLE Study (see [BPM 102 Forward Showing Reliability Metrics](#)) is undertaken as part of the Advance Assessment (see [BPM 101 Advance Assessment](#)) to determine a Binding Season's monthly FSPRMs. The Regional P50 Peak Load Forecasts for the Binding Seasons in the LOLE Study are calculated using the same Participant P50 Peak Load Forecast methodologies outlined in Section 4. An LOLE Study-specific program-wide load growth rate is then applied to the results. The current Load Growth Factor for the LOLE Study is set to 1.1%. Changes to the established growth rate for the LOLE Study in BPM 103 will be reviewed, endorsed, and approved as described in the BPM 300's Stakeholder Engagement series.

Appendix A - P50 Peak Load Forecast Modifications Senior Official Attestation

I, the undersigned, who as [title], serves as a senior official of [Participant], hereby attest that the peak loads for each month of the Season for the last available five seasons have been modified accurately to the best of my knowledge and belief following due inquiry to account for discrete additions and removals of load planned to take place by the corresponding Months of the Binding Season, not to include speculative or estimated load growth, to ensure accurate Monthly P50 Load Forecast values included with this attestation. Also included with this attestation is a narrative description of the loads added and/or removed from the Monthly P50 Load Forecast, including their magnitude and applicable Months.

Appendix B - Load Exclusion Senior Official Attestation

I, the undersigned, who as [title], serves as a senior official of [Participant], hereby request that the [load identifier from FS Submittal] be excluded from [Participant's] P50 Load Forecast calculation. I attest that [Participant] is not the exclusive wholesale electricity provider for this load.



WESTERN
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Western Resource Adequacy Program

202 Participant Sharing
Calculation Inputs

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	Firm Tx TF Updates	Maya McNichol	3/17/2026
202	3.0	Annual BPM Changes	Michael O'Brien	3/19/2026
202	4.0	2026-NTFP-02	Dave Zvareck	6/4/2026
<u>202</u>	<u>4.1</u>	<u>NTFP-07 Contingency Reserves</u>	<u>Maya McNichol</u>	<u>9/10/2026</u>



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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 Forward Showing Capacity Requirement](#).

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

$$\begin{aligned} & \text{LRE Contingency Reserve Obligation} \\ &= \text{BA Contingency Reserve requirement} * \frac{\text{LRE Average Hourly Load}}{\text{BA Average Hourly Load}} \end{aligned}$$

where the BA Contingency Reserve requirement is:

BA Contingency Reserve requirement

$$= (200\% * \text{Previous Year's Average MSSC}) \\ * \frac{\text{BA Average Hourly Gen} + \text{BA Average Hourly Load}}{\text{RSG Average Hourly Gen} + \text{RSG Average Hourly Load}}$$

adjusted for any Contingency Reserve Adjustment.

- ~~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 WRAP Qualifying 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	
Sharing Calculation	$= \text{FS Capacity Requirement} - \text{Operations Program Capacity Need} + \text{Performance Adjustments}$
where	$\begin{aligned} \text{FS Capacity Requirement} &= (\text{P50 Peak Load Forecast}) * (1 + \text{FSPRM}) \\ &+ \text{Contingency Reserve Adjustment} \end{aligned}$
and	$\begin{aligned} \text{Operations Program Capacity Need} &= \text{Load Forecast} - \text{Demand Response Capacity Resources} \\ &+ \text{Contingency Reserve Obligation} \\ &+ \text{Uncertainty Factor} \end{aligned}$
and	$\begin{aligned} \text{Performance Adjustments} &= \Delta \text{Forced Outages} + \Delta \text{RoR Performance} + \Delta \text{VER Performance} \end{aligned}$
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 curtailment or derate on WRAP Qualifying Transmission.

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

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

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. This 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 the Participant is responsible for serving under WRAP and be based on the same 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 WRAP Qualifying 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. Because the CRO is a fixed obligation this is the same numerical value that the Participant was required to show qualifying capacity for in the Forward Showing.

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 are posted 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.