WESTERN POWERPOOL



Western Resource Adequacy Program

104 Determination of Capacity Critical Hours

100 – Forward Showing

Revision History

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104 Determination of Capacity Critical Hours

1. Introduction

The Capacity Critical Hours Business Practice Manual (BPM 104) describes the methodology for identifying the Capacity Critical Hours (CCH) for a given period (the "Capacity Critical Hours Methodology"). CCH are those hours when the Net Subregional Capacity Need for each Subregion in the WRAP Region is expected to be above the 95th percentile, based on historical and synthesized data for each Subregion's net load (load - variable energy resource performance) and other adjustments. CCH are used to help determine the capability of certain resource types during periods of highest system capacity need, in order to calculate the Qualifying Capacity Contribution (QCC) of such resources. CCH determination results in a set of hours for each Subregion for the relevant period. Resources may vary in terms of whether they operate during the determined CCH, but all resources in a Subregion that use CCH in the QCC determination are assessed against the same common set of CCH for that Subregion for the same relevant period.

1.1. Intended Audience

BPM 104 is intended for WRAP Participants and other interested individuals or entities. BPM 104 is particularly useful for those individuals that are responsible for determining CCH used in the development of QCC for resources.

1.2. What You Will Find in This Manual

BPM 104 describes the methodology for determining CCH.

1.3. Purpose

To provide an overview of CCH and the processes for determining the CCH for the WRAP Region.

1.4. Definitions

All capitalized terms that are not otherwise defined in BPM 104 or another BPM have their meaning set forth in the Tariff.

Capacity Critical Hours Methodology: The methodology used to determine the hours where the net regional capacity need is above the 95th percentile (highest capacity need hours).

Historical Load Data: As defined in *BPM 101 Advance Assessment*.

Net Subregional Capacity Need: The Subregion's net need for capacity during a given hour, as calculated in accordance with the procedure described in BPM 104.

Resource-Specific Capacity Agreement: as defined in *BPM 106 Qualifying Contracts*.

2. Background

CCH are those hours where the Net Subregional Capacity Need of the Subregion is above the 95th percentile. CCH are used in the methodology to determine the QCC of storage hydro, thermal, run-of-river (RoR), non-dispatchable resources, and contracts (based on individual resource accreditation). CCH may differ from the peak load hours of the Subregion, because CCH determination considers not only load, but also the performance of Variable Energy Resources (VERs), and may include other adjustments such as the interchange across the footprint to arrive at a Net Subregional Capacity Need:

Definition: Net Subregional Capacity Need

$$\textbf{Net Subregional Capacity Need} = \textbf{Load} - \textbf{Wind} - \textbf{Solar} - \textbf{RoR} + \textbf{other adjustments}$$

where

Load is the aggregate Historical Load Data of all Participants in the Subregion in MW from the most recent ten-Year period,

Wind is the output of proposed and installed wind resources in the Subregion in MW for the most recent ten-Year period, including synthesized output for such period for resources that have fewer than ten years of output data;

Solar is the output of proposed and installed solar resources in the Subregion in MW for the most recent ten-Year period, including synthesized output for such period for resources that have fewer than ten years of output data;

Run-of-river (RoR) is the output of proposed and installed RoR resource in the Subregion in MW for the most recent ten-Year period, including synthesized output for such period for resources that have fewer than ten years of output data;

and

other adjustments that may include regional interchange, impact of scarcity as determined by price, or other factors that may materially impact the determination of CCH.

Peak load hours, standing alone, are not the best indication of regional capacity need because hours of significant changes in resource performance or other factors can

significantly affect the region's need for capacity. For example, while there may be instances of high loads during the month of June, there is also usually an abundance of RoR generation. Since the output from RoR resources must be used at the time of such output, higher RoR output could result in periods of excess capacity even while loads are generally high. Higher wind or solar output can have similar effects, particularly as wind and solar resources increase their share of the resource portfolio in the WRAP Region.

The following FS Program methodologies rely on the CCH methodology (see *BPM 105 Qualifying Resources*):

- Storage Hydro QCC methodology determination
- Thermal Resource QCC determination
- Run of River QCC determination
- QCC determination of contracts (see the resource accreditation of each contract)
- QCC determination of VERs
- QCC determination of non-dispatchable, must-take resources

3. Derivation of the Net Subregional Capacity Need components

3.1. Load (Demand)

Each Participant is responsible for providing ten Years of Historical Load Data for their respective system in accordance with *BPM 101 Advance Assessment*. This data from each Participant will be compiled by the Program Operator to form the WRAP coincident peak load shape for the ten-Year period.

3.2. Wind Resource Output

Each Participant is responsible for providing the hourly generation profiles for the last ten Years from wind resources per *BPM 101 Advance Assessment* for their wind Qualified Resources and for wind resources in their Resource-Specific Capacity Agreements. Participants will also provide their prospective wind resources that are expected to be in service for the Year that is studied two Years ahead in the applicable Advance Assessment (see *BPM 101 Advance Assessment Timeline* for more information). The data from all Participant wind resources will be compiled by the Program Operator into an aggregate subregional wind resource output for the ten-Year period.

For wind resources that have less than ten Years of output data, the Program Operator will complete the ten-Year period by using the synthesized wind output data that was developed for the same VER Zone in which the resource is located in the Loss of Load

Expectation (LOLE) study (see *BPM 102 Forward Showing Reliability Metrics*) for the Binding Season at issue.

3.3. Solar Resource Output

Each Participant is responsible for providing the hourly generation profiles for the last ten Years from solar resources per *BPM 101 Advance Assessment* for their solar Qualified Resources and for solar resources in their Resource-Specific Capacity Agreements. Participants will also provide their prospective solar resources that are expected to be in service for the Year that is studied two years ahead in the applicable Advance Assessment. The data from all Participant solar resources will be compiled by the Program Operator into an aggregate subregional solar resource output for the ten-Year period.

For solar resources that have less than ten Years of output data, the Program Operator will complete the ten-Year period by using the synthesized solar output data that was developed for the same VER Zone in which the resource is located in the LOLE study (see *BPM 102 Forward Showing Reliability Metrics*) for the Binding Season at issue.

3.4. Run of River Output

Each Participant is responsible for providing the hourly generation profiles for the last ten Years from RoR resources per *BPM 101 Advance Assessment* for their RoR Qualified Resources and for RoR resources in their Resource-Specific Capacity Agreements. Participants will also provide their prospective RoR resources that are expected to be in service for the Year that is studied two years ahead in the applicable Advance Assessment. The data from all Participant RoR resources will be compiled by the Program Operator into an aggregate subregional RoR resource output for the ten-Year period.

For RoR resources that have less than ten Years of output data, the Program Operator will complete the ten-Year period by using the synthesized RoR output data that was developed for the same Subregion in which the resource is located in the LOLE study for the Binding Season at issue.

3.5. Additional Adjustments

In determining Net Subregional Capacity Need, the Program Operator may apply additional adjustments when necessary to account for factors not otherwise reflected in the load and resource output components described in Sections 3.1 through 3.4 that may materially impact the determination of the CCH.

Additional adjustments may include regional interchange, impact of scarcity as determined by price, or other factors that affect the availability or need for capacity within a Subregion. The applicability and methodology for any such adjustment will be determined based on the circumstances and available data for the applicable Subregion and study period.

Any additional adjustment incorporated into the Net Subregional Capacity Need calculation will be applied on an hourly basis and in a manner intended to produce a representative measure of capacity need for the applicable Subregion. The Program Operator will document the data and methodology used for any additional material adjustment as part of the applicable CCH determination.

4. Determining the CCHs

Once the data from Section 3 is collected and aggregated by the Program Operator, the Net Subregional Capacity Need is calculated for each hour in the ten-Year period. Then the 95th percentile of the Net Subregional Capacity Need for the ten-Year period is determined and each hour with a Net Subregional Capacity Need greater than that 95th percentile value is designated as a CCH, and each hour with a Net Subregional Capacity Need less than or equal to that 95th percentile value is not designated as a CCH.

CCH will be re-determined on an annual cycle (or more frequently, if the Program Administrator deems necessary due to signification changes in participation or calculation inputs) in conjunction with the Advanced Assessment, as detailed in *BPM 101 Advanced Assessment*. The CCH will be posted on the Western Power Pool website.