

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the NERC Reliability Standards Glossary of Terms or the MRO Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Midwest Reliability Organization (“MRO”) Glossary. NERC and MRO defined terms are capitalized in the standard.

Resource Adequacy¹ is defined as the ability of supply-side and demand-side resources to meet the aggregate electrical demand and energy requirements of the end-use customers with a specified degree of reliability.

¹ Historically, the Resource Adequacy requirement was referred to as the planning reserve margin in MAIN Guide #6 and the Reserve Capacity Obligation (“RCO”) in the MAPP Generation Reserve Sharing Pool Handbook.

A. Introduction

1. **Title:** Planned Resource Adequacy Assessment²
2. **Number:** RES-501-MRO-02
3. **Purpose:** To establish common criteria by which to assess Resource Adequacy in the MRO for the 10 year planning horizon.
4. **Applicability**
 - 4.1. Planning Coordinator
 - 4.2. ~~Resource Planner~~
5. **Effective Date:** 1st day of the 1st quarter following all appropriate Regulatory Authority Approvals, financial sanctions will become effective.

B. Requirements

- R1.** The Planning Coordinator shall perform and possess the documentation of a planned Resource Adequacy assessment. [*Violation Risk Factor: Medium*] [*Time Horizon: Long-Term Planning*]

To be valid, the Resource Adequacy assessment shall:

R1.1 Be performed annually unless a document summarizing a review of system data that concludes that changes to system data used in the assessment do not warrant such a study is provided to the MRO. A study is warranted if changes have occurred that require revisions in any key assumptions such as generation mix and transmission limitations that are not covered by a sensitivity study. The planned Resource Adequacy assessment is to be conducted for Year One through Year Ten. Year One is defined as the year that begins with the upcoming annual peak season.

R1.2³ Be performed to meet a LOLP of no greater than 0.1 day in one (1) year which equals the sum of the LOLE for the integrated daily peak hours for each year. This shall be done for a minimum of 3 periods within the Year One through Year Ten (as defined in R1.1) to ensure meeting one (1) day in ten (10) years. These periods are Year One, a minimum of one year in years 2 through 5, and a minimum of one year in years 6 through 10. Analysis shall:

R1.2.1 Use loads developed from the expected 50:50 probability load forecast,

R1.2.2 Include load forecast uncertainty such as uncertainty due to load diversity, seasonal load variation, load variability due to other region economic forecasts or other factors.

² In accordance with the Energy Policy Act of 2005, this standard does not authorize the MRO, ERO or FERC to order the construction of additional generation or transmission capacity or to set and enforce compliance with standards for adequacy or safety of electric facilities or services. Nothing in this standard shall be construed to preempt any authority of any State/Province to take action to ensure the safety, adequacy, and reliability of electric service within that State, as long as such action is not inconsistent with any reliability standard, as long as such action does not result in lesser reliability outside the State/Province than that provided by the reliability standards.

³ [MRO BOD white paper clarification as reference](#)

R1.2.3 Be performed for every day of each year throughout the period in R1.1.

Expected Unserved Energy may be performed as the method to meet R1.2 provided the results of such an assessment is compared with an LOLP analysis and the comparison is documented.

R1.3 Include, at a minimum, documentation of how and why the following were/were not included in the analysis:

R1.3.1 Resource availabilities

R1.3.1.1 Historic resource performance and any projected changes

R1.3.1.2 Seasonal resource ratings

R1.3.1.3 Modeling assumptions of non-conventional resources such as wind and cogeneration

R1.3.1.4 Energy limitations of hydroelectric units.

R1.3.1.5 Merchant plant availabilities

R1.3.1.6 Modeling assumptions of firm capacity purchases from and sales to entities outside the Planning Coordinator area

R1.3.1.7 Availability and deliverability of fuel

R1.3.1.8 Common mode outages that effect resource adequacy

R1.3.1.9 Other environmental or regulatory restrictions of resource availability

R1.3.1.10 Available Demand-Side Management

R1.3.1.11 Resource maintenance outage schedules

R1.3.1.12 Sensitivity to resource outage rates and resource capabilities

R1.3.1.13 Consider impacts of extreme weather/drought conditions

R1.3.2 Load Characteristics

R1.3.2.1 Load forecasts

R1.3.2.2 Load forecast uncertainty

R1.3.2.3 Load diversity

R1.3.2.4 Seasonal load variations

R1.3.2.5 Load variability due to weather, regional economic forecasts, etc.

R1.3.2.6 Daily demand modeling assumptions (firm, interruptible)

R1.3.3 Transmission limitations that prevent the delivery of generation reserves

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

1.4. Additional Compliance Information.

None specified

2. Violation Severity Levels

R #	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	<p><u>The Planning Coordinator Resource Adequacy analysis failed to consider 1 or 2 of the Resource availability characteristics subcomponents under R1.3.1 and documentation of how and why they were included in the analysis or why they were not included</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to consider Transmission limitations and document how and why they were included in the analysis or why they were not included per R1.3.3</u></p> <p>OR</p> <p><u>The assessment was only performed for Year One.</u></p>	<p><u>The Planning Coordinator Resource Adequacy analysis failed to express the planning reserve margin developed from R1.2 as a percentage of the net Median forecast peak Load per R1.4</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include 1 of the Resource Availability subcomponents under R1.3.1 and documentation of its use</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include 1 of the Load forecast Characteristics subcomponents under R1.3.2 and documentation of its use</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy</u></p>	<p><u>The Planning Coordinator Resource Adequacy analysis failed to be performed or verified separately for individual years of Year One through Year Ten per R1.1</u></p> <p>OR</p> <p><u>The Planning Coordinator failed to perform an analysis or verification for one year in the 2 through 5 year period or one year in the 6 through 10 year period or both per R1.2</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include 2 or more of the Resource Availability subcomponents under R1.3.1 and documentation of their use</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include 2 or more of the Load forecast</u></p>	<p><u>The Planning Coordinator failed to perform and document a Resource Adequacy analysis annually per R1.</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to calculate a Planning reserve margin that will result in the sum of the probabilities for loss of Load for the integrated peak hour for all days of each planning year analyzed for each planning period being equal to 0.1 per R1.2</u></p> <p>OR</p> <p><u>The Planning Coordinator failed to perform an analysis for Year One per R1.2</u></p> <p>A Valid assessment was not performed and documentation was not provided.</p>

		<p><u>analysis failed to document that all Load in the Planning Coordinator area is appropriately accounted for in its Resource Adequacy analysis per R1.6</u></p> <p>The assessment was missing the long term assessment.</p> <p>OR</p> <p>The assessment was performed accurately but documentation was not complete.</p>	<p><u>Characteristics subcomponents under R1.3.2 and documentation of their use</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include Transmission limitations and documentation of its use per R1.3.3</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to include assistance from other interconnected systems and documentation of its use per R1.3.5</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to consider 3 or more Resource availability characteristics subcomponents under R1.3.1 and documentation of how and why they were included in the analysis or why they were not included</u></p> <p>OR</p> <p><u>The Planning Coordinator Resource Adequacy analysis failed to</u></p>	
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			<p><u>document that capacity resources are appropriately accounted for in its Resource Adequacy analysis per R1.5</u>The assessment was missing the long-term and midterm assessments</p>	
R2	<p><u>The Planning Coordinator failed to document the projected Load and resource capability, for each area or Transmission constrained sub-area identified in the Resource Adequacy analysis for one of the years in the 6 through 10 year period per R1.2.</u></p> <p><u>The Planning Coordinator failed to publicly post the documents as specified per requirement R2.1 and R2.2 30 calendar days prior to the beginning of Year One per R2.3</u>The Entity performed an annual comparison of its resource capability and planning reserve margin for at least 9 years of the 10 year period.</p>	<p><u>The Planning Coordinator failed to document the projected Load and resource capability, for each area or Transmission constrained sub-area identified in the Resource Adequacy analysis for one of the years in the 2 through 510 year period per R1.2.4.</u></p> <p>OR</p> <p><u>The Planning Coordinator failed to document the Planning Reserve margin calculated per requirement R1.1 for each of the three years in the analysis per R2.2.</u>The Entity performed an annual comparison of its resource capability and planning reserve margin for at least half of the 10 year period.</p>	<p><u>The Planning Coordinator failed to document the projected Load and resource capability, for each area or Transmission constrained sub-area identified in the Resource Adequacy analysis for YYear 1 of the 10 year period per R1.2.4.</u></p> <p>OR</p> <p><u>The Planning Coordinator failed to document the projected Load and resource capability, for each area or Transmission constrained sub-area identified in the Resource Adequacy analysis for two or more of the years in the 2 through 10 year period per R2.1.</u>Not Applicable</p>	<p><u>The Planning Coordinator did not document an assessment of its Resource Adequacy by comparing its load and resource capability</u>The Planning Coordinator failed to document the projected Load and resource capability, for each area or Transmission constrained sub-area identified in the Resource Adequacy analysis per R2.The Entity did not perform an annual comparison of its resource capability and planning reserve margin.</p>

Version History

Version	Date	Action	Change Tracking

White Paper for MRO Board
Proposed MRO Reliability Standard Clarification
RES-501-MRO-1

Introduction:

Loss of Load Expectation (LOLE) is an adequacy index that identifies the likelihood that generation will be insufficient to meet demand during a part of the year. As used in this standard, the index is defined as the expected number of days in the year when the daily peak demand exceeds the available generating capacity. It is obtained by using the load for the peak hour of all 365 days in a year and calculating the probability of each daily peak demand exceeding the available capacity and adding these probabilities for all the days in the year. LOLE is sometimes referred to as Loss-of-Load-Probability (LOLP). LOLE and LOLP are used interchangeably in this document.

History of RES-501-MRO-1 standard development

The final Resource Adequacy Assessment Standards Authorization Request (SAR) was posted for review July, 2005. As a result, a drafting team was established to develop a draft standard, consistent with the MRO standards development process. There have been 6 drafts of this standard and 5 commenting periods since that time. The final draft was balloted and a re-circulation ballot was conducted. The Regional Ballot Body (RBB) approved this draft standard in both the ballot and re-circulation ballot. The final results were that all 7 segments approved this draft standard. The Standards Committee authorized this draft standard to be sent to the Board for approval. After Board approval, the proposed standard would be sent to NERC and regulators to assure enforceability.

At the Board meeting on March 22, 2007, the staff was directed to have a legal review of the proposed standard to assure that it did not conflict with Section 215 authority (e.g. no requirement to build or set a specific reserve requirement).

MAPP Pool Administrative Committee (PAC) Issues

The MAPP PAC has raised a concern that was not received through the standards setting process, either verbally or in writing. The MAPP PAC voted “to abstain” from this standards ballot. Therefore, staff is addressing this as an ad hoc discussion item, in response to the MRO Board’s request.

Our understanding of the PAC's concern is related to the wording of R1.2 of RES-501- MRO-1. The wording of R.1.2 is as follows:

R1.2 Perform the assessment with LOLP of no greater than 0.1 day in one (1) year which equals the sum of the LOLE for the integrated daily peak hours for each year. This is done for each year of the ten year period in R1.1 to ensure meeting one (1) day in ten (10) years. Analysis to:

R1.2.2 Include load forecast uncertainty such as uncertainty due to load diversity, seasonal load variation, and load variability due to other region economic forecasts or other factors.

R1.2.3 Be performed for every day of each year throughout the period in R1.1.

Expected Unserved Energy may be performed as the method to meet R1.2 provided the results of such an assessment is compared with an LOLP analysis and the comparison is documented.

The PAC believes that R1.2 needs to be clarified to resolve a perceived conflict in wording between the first and second sentence. The PAC is concerned because this wording, they believe, could result in an increase in the planning reserve requirement.

Staff / drafting team response:

Section R1.2 clearly requires that the assessment meet 0.1 days per year for each of 10 years in which case it will automatically be able to meet one day in ten years. It was recognized by the drafting team that this requirement is more difficult to meet than simply meeting one day in ten years with no limit on the LOLE for individual years. However this does not create a conflict between the first and second sentences of R1.2. An entity can have 0.1 day/year LOLP or less for each year of the 10 year study period and be compliant. If the entity has 0.0 days/year for 9 years and 1 day/year in the last year, the R1.2 requirement would not be met even though the result would be 1 day in 10 years. This is what the drafting team intended and there is no conflict in the language.

The wording of this requirement was subject to comments and was resolved through the standards setting process. Staff and the drafting team therefore believe that the requirement is clear and has been vetted properly through the standard setting process.