2024 Probabilistic Assessment

Narrative Guide

# General Instructions

Please adhere to the following guidelines when addressing the narrative questions below. Some questions will require specific actionable items or studies:

* Provide complete and accurate information in response to each question. These should be specific to the execution of the ProbA and description of the input assumptions. References to the LTRA can be used.
* Provide a discussion of any variances/differences from the studies that underly the LTRA responses and ProbA data assumptions.
* Provide links to any documentation (e.g. studies, assessments) that will help explain your answers. If the study is non-public, please provide it directly to NERC staff.
* Do not modify the questions.
* Narratives should also include assumptions made on Demand-Side Management (DSM) modeling within the load shapes and forecasts. See the DSM section.
* The ProbA narrative summary to be used in the 2024 Long-Term Reliability Assessment and the Summary of Inputs and Assumptions table in the Appendix section will be produced by the assessment area after these answers have been reviewed in the peer review process and further reviewed by NERC and made consistent in style.
* Confidentiality – All responses will be posted to a secure site.
* Please contact NERC staff with any questions regarding this request.

# Model Discussion

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| **MD1- Provide general details describing the software model and the assumptions in the ProbA.** * Generally describe the software model deployed for conducting the ProbA. Describe the key attributes of the model and details of the simulation,its type, number of trials/iterations if Monte Carlo, and convolution description.
* Highlight any differences from the LTRA data that is based on other probabilistic modeling, such as capacity contributions, reserve margins, etc. Responses to the narrative questions can cite the LTRA.
* Discuss any common mode failure, correlation or weather dependent modeling.
* Discuss whether the impacts of weather driven variations in load and VERs is modeled exogenously or endogenously to the model. If endogenous, what is contained in the input file, and if exogenous, how is it modeled. Reference to LTRA if discussed in that narrative.
* Responses will be summarized in the ProbA methods and assumptions matrix to be included in the LTRA.
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# Demand

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| **D1- Provide details describing the demand modeling assumptions.** Summarize differences from the LTRA descriptions and provide links to any online documents and/or LTRA. * Provide a load modeling description of the ProbA model, with details on the 50/50 base forecast and the uncertainty levels
* Discuss how Load Forecast Uncertainty (LFU) is developed. Describe any sources of load variability that are currently not incorporated—or only partially incorporated—in the LFU. (For example, resources on the distribution system such as PV DER.)
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# Demand-Side Management

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| **DSM1- Explain how Controllable and Dispatchable Demand Response programs are modeled in the ProbA.** Provide a narrative on modeling methodology.* How are limitations associated with controllable DR accounted for in the model (e.g., approaches described in technical guidance? Include limitations based on program performance and/or contractual obligations as a load modifier or energy limited resource.
* If the probabilistic approach is not available and a net value of MW reduction impact is used in the model, provide details of how the net value is calculated.
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# Distributed Energy Resources (DERs) Forecast

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| **DER1- Provide details on how DERs are modeled in the ProbA and how they are differentiated from VERs .** * Provide any references or applicable documentation for how DERs are modeled in the ProbA. Are they modeled as embedded in the forecast, modeled as load modifiers, or as capacity resources?
* Highlight any modifications made to these methods or assumptions since the 2022 ProbA.
* Behind the Meter (BTM) Generation is a generating unit or multiple generating units on the customer’s side of the retail meter that serve all or part of the retail load with electric energy. There is a wide array of methodologies on how the BTM generators can be incorporated in each Assessment Area. Discuss whether there are BTM resources other than the BTM solar PV data assumed in the ProbA and/or you provided in the LTRA data form.
* If there are BTM resources other than solar PV embedded in the demand model data, discuss those resources on a grouped basis.
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# Generation/Capacity Resource Modeling

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| **G1 - Describe the development of thermal resource model.** * Discuss how the capacity ratings were developed. Are there seasonal/monthly ratings derived from testing/performance, or other methods? Does it align with the LTRA?
* Discuss how outage rates are developed. Include whether it is a derate, forced outage rate, transition rate, energy profile, or other method. Are they by individual unit, class average, fuel type, etc. Do they vary by season/month?
* Describe how Scheduled Outages are modeled. Is the schedule developed by the model or externally done? Describe whether they are fixed or random events.
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| **G2 - If done, describe any modeling of Net Demand Ramping in the ProbA. (see RAS white paper:** [**Essential Reliability Services Forward-Looking Net Demand Ramping Assessment**](https://www.nerc.com/comm/PC/Reliability%20Assessment%20Subcommittee%20RAS%202013/Measure6_Pilot_Recommendation_July_2020.pdf)**).** * Provide information on any detailed hourly ramping and flexibility attributes of the model and associated data construct.
* If a detailed ramping model is not employed, describe any approaches to determine ramping needs or identification of flexible capacity in the ProbA results, if any.
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| **G3 – Describe all methods and assumptions used to model Variable Energy Resources (wind, solar, and hydro), and Energy Storage (stand alone and hybrid) for the ProbA.** Response should include:* Describe the modeling methods and data construct for these resources. Provide a description of the level of detail and modeling construct:
	+ If used, describe how the ELCC or Capacity Contribution is modeled across the year. If available, monthly or seasonal ELCCs, Capacity Contribution that are used.
	+ If used, describe the hourly profiles (time series) for these resources and the basis for the profiles, based on years of history (include number of years), or synthetic methods.
	+ If used, describe the methodology for the determination of the probability distribution function and seasonal accredited values for VER.
* Highlight any modifications made to these methods or assumptions since the 2022 ProbA.
* For energy storage resources, how are supply duration and state of modeled? Is there a minimum supply duration required, and if so, what is it? (e.g., 2-hour battery discharge capability). How is the capacity contribution of stand-alone battery storage and hybrid resources determined?
* Describe methodologies on modeling energy limited resources.
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| **G4 - Describe any probabilistic studies conducted by your area to identify risks as a result of inverter based resource (IBR) performance issues.** Describe any modeling in the ProbA to assess loss of these resources. |
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| **G5 - Are confirmed and aggregated unconfirmed retirements and all installations (Tier 1, Tier 2, and Tier 3) modeled in the ProbA and are probabilistic approaches used?** Describe any probabilistic treatment (deration, probability distribution) of resources not retiring or being installed.  |
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| **G6 – Generator Fuel Supply Issues. How are natural gas limitations and electric-gas interoperability issues considered in the ProbA?** Describe the modeling for identified adverse reliability impacts (e.g., resource adequacy, energy risk, planning or operational impacts, etc.) resulting from generator fuel supply and/or fuel deliverability constraints (any fuel type). Include a description of planning assumptions for the following factors, or discuss considerations:* Normal and extreme winter conditions
* Different seasonal impacts on fuel supply and delivery.
* firm vs. non-firm gas supply and transportation capacity, and how this can affect generation availability and output in the assessment area during normal and extreme conditions
* Generation contingencies that are studied based on planner’s understanding of natural gas system vulnerabilities, including historic constraint points along the relevant gas transportation systems.
* Projected gas-fired capacity additions
* Deration of generation capacity to reflect potential limitations due to extreme cold weather.
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# Capacity Transfers

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| **CT1- Are any severe scenarios from other planning studies whereby the capacity transfers would be limited (e.g., wide-area extreme hot or cold event) modeled specifically in the ProbA base case?.**  |
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| **CT2- Describe the model developed for capacity transfers during peak and non-peak hours with neighboring assessment areas.*** Outline the methods and assumptions for capacity transfers, especially those to prevent double counting and to recognize internal and external transmission and capacity constraints.
* Highlight any modifications made to these methods or assumptions since the 2022 ProbA.
* Discuss the treatment of firm, non firm, and emergency assistance transfers.
* Variability of transmission path limits either deterministically or probabilistically.
* Does the assessment area have any reserve sharing agreements in place and modeled?
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# Transmission Modeling

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| **T1- Summarize any major transmission projects that are in the ProbA base case.** Discuss transmission additions and retirements for years two and four that are included in the modeling: explain any differences between the modeled transmission additions and retirements, and explain the differences between the transmission addition and retirement data provided for the LTRA. |
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| **T2- Describe transmission limitations or transmission constrained areas modeled in the ProbA*** How are reliability impacts to planning and operations impacting resource adequacy within the assessment period captured. How are the transmission limits determined?
* Describe the modeling approach, including how limitations are developed and included, reflective of deliverability and availability of resources, whether it is a nodal, zonal, or other methodology.
* How are grid enhancing (controllable devices, etc) modeled in the ProbA?
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## Emergency Operating Procedures (EOP)

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| **EO1- Describe the modeling of EOPs in the ProbA.** Emergency operating procedures (EOP) provide a plan for system operators when responding to capacity and energy emergencies on their respective systems. These procedures generally include alerts, warnings, as well as event levels to mitigate capacity and energy deficiencies in real-time. Describe how the following EOP considerations are included in the probabilistic assessment: * The number of steps, description, priority, and the variability in the amount of load or capacity shortage relief obtainable in each step.
* Describe the methodology in determining the amount of EOP benefits for each EOP step and whether the amount can vary through the year or be limited to a number of calls or diminishes from non response.
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# Prob A Results

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| **PR1 - Provide a discussion of the results of the 2024 ProbA. If the Probabilistic Base Case results indicated measurable loss of load hours (LOLH), EUE, or other metric (measure) either at peak net demand hour or outside of this hour, describe the conditions and reliability factors that contribute to the risk.** *Discuss the relationship of the drivers and the variable hourly loads and resources and how they have resulted in the reported value of the probabilistic reliability metric. Include the following:* * Time of day of occurrence(s) or period of day *(e.g. morning, afternoon, evening, overnight)*
* Reliability factors or reliability risk drivers that cause the loss of load or resource adequacy risk, including:
	+ Off-peak capacity limitations (e.g., solar PV reductions in non-peak hours)
	+ Off-peak demand changes (e.g., large motor loads increase in non-peak hours)
	+ Limited fuel or energy availability
	+ Resource outages different from the reported peak hour
	+ Transmission limitations
	+ Others identified in the ProbA
* Discuss the visualization of the risk hour and adjacent hours to help with the above. The visualization will be developed from the provided 8760 hourly data file
* Resource, system changes or planning strategy that are being implemented or considered to mitigate loss of load or resource adequacy risks. These could be based on LTRA or Probabilistic Assessment Base Case results
* Other trends or areas of interest
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# Proposed Summary Narrative (Publicly releasable for the 2024 LTRA)

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| **Provide a proposed Prob A narrative write-up for each assessment area, including information based on the responses to the above ProbA requests.** This will include pertinent highlight bullets of findings to be included in the LTRA dashboard section, and a draft ProbA section for the LTRA based on the responses to the ProbA narrative guide above. This will also be used to fill out the assumptions matrix:* Risk Identification and drivers
* Energy Assessment, including non-peak hour risk
* Demand Plots including LFU
* Distributed Energy Resources Contributions
* Visualization of critical hourly periods based on the provided probA data file
* Monthly plots
* Table and discussion of metrics (LOLH, EUE, NEUE) and margins
* Icicle plot of hourly margins showing surplus and deficits
* Any other proposed charts/graphs
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