Stakeholder Comments on the EORM/MERM Study Methodologies and Development Process

The following are comments on the EORM/MERM study project received by ERCOT staff outside of EORM workshop forums, along with ERCOT responses. Updates of this document will be posted to the Resource Adequacy Web page on at least a monthly basis. New comments and responses since the last update are indicated with red font.

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1. **At the workshop today we talked about a sensitivity or scenario around solar as the marginal unit and for use in determining CONE. [I] think it is very worthwhile in today's environment so should be considered.**

   ERCOT Response: Several Workshop participants expressed their desire to have these studies conducted. At the April 14 EORM Workshop, ERCOT proposed a separate joint ERCOT-stakeholder process to consider, endorse, define, and vet these types of scenario/sensitivity studies. This process would start with the presentation of a study proposal and preliminary timeline at a future SAWG meeting, followed by review and approvals at WMS and TAC meetings. ERCOT anticipates completing the basic EORM study and a limited set of sensitivity analyses for the inaugural study cycle in 2018 before tackling other studies.

2. **The following informational filing with the PUCT outlines key market items that need to be modeled in the EORM and MERM to ensure we are accurate.**
   http://interchange.puc.texas.gov/WebApp/Interchange/application/dbapps/filings/pgSearch_Results.asp?TXT_CNTR_NO=45572&TXT_ITEM_NO=25

   ERCOT Response: For the inaugural EORM study in 2018, ERCOT will model a market design based on the PUCT and ERCOT rules in place at that time unless the PUCT directs ERCOT to do otherwise. The price formation reforms described in this report could be modeled as a set of sensitivities or a single scenario. Any such analyses would need to go through the stakeholder scenario/sensitivity review process outlined in the previous ERCOT response.

3. **A "risk-averse" EORM was specifically considered and subject to several rounds of comments from stakeholders in Project No. 42302. The Commission did not adopt this "risk-averse" approach in directing ERCOT to move forward in identifying the economically optimal reserve margin, so no risk weighting or similar adjustments should be made in the EORM model runs.**

   ERCOT Response: ERCOT agrees that the development and reporting of risk-adjusted Reserve Margin values is not within the scope of the EORM/MERM study process. Output results of the Monte Carlo simulations, such as the distribution of production costs and energy margins, can be used by stakeholders to assess the risk attributes associated with different reserve margin levels.

4. **I was looking at the presentation link below. Using the top 20 load hours for assessing ERCOT wind/solar capacity contribution is not valid given the size of wind. ERCOT needs to look at how much wind reduces the top 20 "Net Demand" (raw demand less wind generation) hours relative to the top 20 "raw demand" hours. The Net Demand peak hours may occur on different days/hours than the top 20 raw demand hours. You'll find that the average reduction divided by wind nameplate capacity yields a lower capacity contribution % if you use the Net Demand method.**
http://www.ercot.com/content/wcm/lists/114801/ERCOT_EORMWorkshop_4-14-2017_Revised.pptx

   ERCOT Response: Loss-of-Load modeling conducted for ERCOT reserve margin studies uses hourly wind output profiles rather than the capacity contribution percentages, so Net Load versus Total Load is not an issue for the EORM study. ERCOT is planning to revisit wind and solar capacity contribution methodologies for the CDR. The use of Net Load is expected to be considered.

5. **Will there be coordination on the use of natural gas price assumptions for the 2018 Long Term System Assessment (LTRA) and EORM/MERM study? [From the Regional Planning Group Meeting, 5/16/17]**

   ERCOT Response: ERCOT has not yet officially decided on what natural gas forecast assumptions to use for the EORM/MERM study. However, like the 2018 LTSA, we anticipate using NYMEX futures prices. Based on tentative schedules for the 2018 LTSA and 2018 EORM/MERM study, model updates are expected to occur about eight to nine months apart (LTSA in Fall 2017; EORM/MERM in summer 2018.)

6. **[8/29/2017 Email Submission] I saw your weighting of historical years and 2011 is lowest. What you aren't factoring into the weighting is that 2011 was a [good] renewables year for both wind and solar. As solar grows you may want to increase the weighting of 2011 just to capture that year's renewables benefits. You can normalize the demands to 1 per unit each year and apply a seven step load uncertainty to the demand based on weather affecting the magnitude of the demand which includes 2011's effect and that uncertainty is applied to the projected study year, so there is really no need to derate 2011. I do this and it works very nicely and 2011 is not the year with the highest LOLE when there are high renewables in the mix.**

   Based on ERCOT's request for clarifications regarding the load forecast uncertainty modeling approach outlined in the original email, below is a detailed outline of the advocated approach:

   (1) Convert historical ERCOT system-wide hourly loads for the most recent six years (e.g., 2010-2015) to normalized hourly values; that is, peak values for each year are scaled downward to one, and all other hourly values for each year are proportionally scaled downward to the range [0, 1].
   (2) Create six additional historical load shapes by using six probability points along a normal distribution curve to approximate load amounts at positive/negative one, two, and three Standard Deviations from the mean. The seven load shapes—which include the original "mean" load shape—represent load forecast uncertainty with a range of about ±3% error.
   (3) Calculate normalized hourly values for coastal/noncoastal wind and solar generation for the same six-year period.
   (4) Multiply the normalized load, wind, and solar shapes calculated in steps 1, 2 and 3 by the peak load, wind, and solar capacity forecasts for a future simulation year.

(5) Create hourly Net Load forecasts by subtracting the hourly forecasted wind and solar generation from the corresponding hourly forecasted loads. The renewable generation is thus treated as a "load reducer" that maintains time correlation with respect to the historical load shapes. The final result is a total of 42 Net Load forecasts for the future simulation year.
(6) Use a Capacity Outage Probability Table (COPT), the load and capacity data, and the convolution method (a method to combine independent probability distributions) to calculate the probabilities and percentage of time that ERCOT generation will be unavailable to serve the 42 Net Load forecasts. The results are used to calculate a Loss of Load Expectation (LOLE) for the simulation year. Note that generator capacity is expected to be available regardless of cost, unless forced out of service.

ERCOT Response: Since the comments and recommendations cover several topics, ERCOT's response is organized accordingly.

- *"ERCOT is not factoring into the weighting that 2011 was a good renewables year"*: The renewable generation profiles for 2011 that are included in ERCOT's stochastic production cost modeling account for the hourly dynamic behavior of wind and solar generation at actual and potential wind plant sites based on meteorological conditions for that year. As a result, ERCOT does not believe that weighting for renewable generation impacts is warranted.
- *Modeling Net Load:* Modeling wind and solar generation as separate hourly shapes is equivalent to directly reducing loads using those shapes. See the response to #4 above.
- *Use of a seven-step probabilistic load uncertainty approach:* ERCOT is already using a similar approach for modeling the load forecast error associated with economic and population growth (i.e., non-weather-related LFE). ERCOT uses five error multipliers and associated normal-curve-based probabilities to represent an uncertainty distribution. The advantage of modeling a separate non-weather LFE component is that, on a forward-looking basis, non-weather-related LFE increases over time whereas weather-related LFE does not. Regarding the statement that the advocated approach doesn't need "derating" for year 2011, the 2011 normalized load shape still reflects "extreme outlier" weather conditions for that year, so ERCOT believes that this load shape should be weighted appropriately, or alternatively, excluded altogether.
- *Creating future-year hourly load forecasts by multiplying normalized historical hourly load shapes by the peak load hour forecast:* This approach assumes that historical load shapes are a reasonable proxy for future-year load shapes. However, this method fails to account for expected changes in non-weather based drivers of ERCOT's hourly load forecast; e.g., recent premise count and sectoral economic growth forecasts that are reflected in the ERCOT long-term load forecast model.
- *Use of a COPT and convolution method to determine the Loss of Load Expectation for the ERCOT system:* It is not clear if the commenter is advocating that the approach be used for EORM/MERM studies, or just for other types of ERCOT resource adequacy analyses. The commenter confirmed that the approach is strictly a physical reliability assessment model. However, EORM/MERM studies require a production cost model that accounts for system costs and related factors such as scarcity pricing mechanisms, economic commitment/dispatch behavior, operating reserves, and load control/demand response programs.