Continued Discussion on Accreditation Reforms – Performance Weighting

ELCCSTF

February 19, 2025

Reflect improved performance in accreditation and risk model as it happens, and quicker than status quo

- Under status quo, all historical days in a temperature-performance bin are weighted equally when making Monte Carlo draws
- By using a weighting approach, more recent historical days in a temperature-performance bin can receive a higher weight, making such days to be more likely to be drawn by the Monte Carlo (and therefore, older historical days in a bin, less likely to be drawn)
- This increases investment incentives given more recent observations of performance will now hold greater weight when determining the capacity value of resources and the capacity compensation they receive going forward

Approach to Weight Years: Exponential Smoothing (ES)

As an example, let's assume there are 11 historical days in a temperature-performance bin from 11 different Delivery Years

Delivery Year Rank (Performance Temperature bin)	Weight	alpha = 0.1	alpha = 0.05
1	α	0.1000	0.0500
2	$\alpha(1-\alpha)$	0.0900	0.0475
3	$\alpha(1-\alpha)^2$	0.0810	0.0451
4	$\alpha(1-\alpha)^3$	0.0729	0.0429
5	$\alpha(1-\alpha)^4$	0.0656	0.0407
6	$\alpha(1-\alpha)^5$	0.0590	0.0387
7	$\alpha(1-\alpha)^6$	0.0531	0.0368
8	$\alpha(1-\alpha)^7$	0.0478	0.0349
9	$\alpha(1-\alpha)^8$	0.0430	0.0332
10	$\alpha(1-\alpha)^9$	0.0387	0.0315
11	$\alpha(1-\alpha)^{10}$	0.0349	0.0299

Interpretation:
If alpha=0.1, the Monte Carlo method will sample 0.1/0.0387, which is 2.6 times more often from performance in a day in Delivery Year Rank 1 than from performance in a day in Delivery Year Rank 10

How Weighting using ES Impacts the Monte Carlo Sampling in a Temperature-Performance Bin

For example, let's use the 9 historical days in the coldest bin used in the analysis of the 25/26 BRA planning parameters

Sampling weight calculated for each Date

Date	DY	DY Rank	Weight (alpha=0.05)	Weight (alpha=0.1)	Weight (alpha=0.25)
1/31/2019	2018/19	1	0.05	0.1	0.25
1/30/2019	2018/19	1	0.05	0.1	0.25
2/24/2015	2014/15	2	0.0475	0.09	0.1875
2/20/2015	2014/15	2	0.0475	0.09	0.1875
2/16/2015	2014/15	2	0.0475	0.09	0.1875
1/8/2015	2014/15	2	0.0475	0.09	0.1875
1/28/2014	2013/14	3	0.0451	0.081	0.1406
1/22/2014	2013/14	3	0.0451	0.081	0.1406
1/7/2014	2013/14	3	0.0451	0.081	0.1406

Expected sampling from each Date (out of 100 samples)

Date	Status Quo	Weight (alpha=0.05)	Weight (alpha=0.1)	Weight (alpha=0.25)
1/31/2019	11.11	11.76	12.45	14.95
1/30/2019	11.11	11.76	12.45	14.95
2/24/2015	11.11	11.17	11.21	11.22
2/20/2015	11.11	11.17	11.21	11.22
2/16/2015	11.11	11.17	11.21	11.22
1/8/2015	11.11	11.17	11.21	11.22
1/28/2014	11.11	10.60	10.09	8.41
1/22/2014	11.11	10.60	10.09	8.41
1/7/2014	11.11	10.60	10.09	8.41
Total	**100**	**100**	**100**	**100**

As the alpha value increases the older observations in the bin
(from Jan. 2014) are less likely to be drawn in the Monte Carlo sampling
(e.g., 8.41 < 10.09 < 10.6)

Sensitivity Analysis

- Inputs / Assumptions for Weighting Approach Sensitivity Analysis
  - Based on 2026/27 BRA case from June 2024
    - Note: The resulting parameters from such case will no longer be used due to the postponement of that BRA
  - PJM decided to merge the two coldest temperature bins because it was likely that an approach weighing more recent performance more heavily would result in WSE performance, located in the second coldest bin, to contribute more risk than the PV1 performance, located in the coldest bin (and such an outcome would be counterintuitive if we believe that the worst system conditions during winter should occur during days in the coldest bin)
  - PJM used ES with 3 different alpha values (0.05, 0.1 and 0.25) to determine the sampling weights in each of the temperature-performance bins

Sensitivity Analysis (cont'd)

	LOLH Risk Contribution of Jan 7 2014 Performance Pattern	LOLH Risk Contribution of Dec 24 2022 Performance Pattern	LOLH Risk Contribution of Winter 2013/14 Performance Pattern	LOLH Risk Contribution of Winter 2022/23 Performance Pattern	Overall Winter LOLH Share	IRM
Status Quo	37.5%	13.3%	51.5%	17.5%	71.3%	18.6%
Alpha = 0.05	18.0%	27.3%	37.7%	35.9%	75.6%	18.7%
Alpha = 0.10	14.7%	29.7%	33.4%	41.4%	76.6%	18.7%
Alpha = 0.25	10.0%	44.1%	20.8%	58.4%	81.1%	19.0%

- The weighting approach (with the 3 alpha values) reduces the LOLH Risk Contribution of Jan 7, 2014 and Winter 2013/14 Performance Pattern relative to Status Quo
- As the alpha value increases, the LOLH Risk Contribution of Jan 7, 2014 and Winter 2013/14 Performance Pattern decreases. Conversely, the LOLH Risk Contribution of Dec 24, 2022 and Winter 2022/23 Performance Pattern increases.
- As the alpha value increases, the overall winter LOLH share increases. In other words, winter becomes riskier than summer. This is because several of the high forced outage observations in the "hottest" bins have occurred in the past and are less likely to be drawn in the summer temperature-performance bins.
- As the alpha value increases, the IRM increases. This effectively means that the model observes more overall risk when more recent observations have a higher sampling weight in each temperature-performance bin.

Sensitivity Analysis (cont'd)

Impact on ELCC Class Ratings under the sensitivity of Alpha=0.1

ELCC Class	2026 BRA Rating	Alpha = 0.1 Rating	Delta
Onshore Wind	34%	37%	3%
Offshore Wind	61%	61%	0%
Fixed-Tilt Solar	8%	7%	-1%
Tracking Solar	13%	11%	-2%
Landfill Intermittent	54%	50%	-4%
Hydro Intermittent	38%	38%	0%
4-hr Storage	57%	52%	-5%
6-hr Storage	65%	62%	-3%
8-hr Storage	68%	65%	-3%
10-hr Storage	78%	75%	-3%
Demand Response	74%	70%	-4%
Coal	84%	83%	-1%
Diesel Utility	91%	90%	-1%
Gas Combined Cycle	78%	76%	-2%
Gas Combustion Turbine	68%	68%	0%
Gas Combustion Turbine Dual	79%	81%	2%
Nuclear	95%	95%	0%
Steam	74%	75%	1%

Sensitivity Analysis (cont'd)

Impact on historical weighting of individual resource performance in determining Accredited UCAP for resources in an ELCC Class (under varying alpha assumptions):

Delivery Year	Status Quo	0.05	0.1	0.25
2012/2013	4.0%	2.7%	2.1%	0.7%
2013/2014	24.7%	23.2%	21.1%	15.7%
2014/2015	24.9%	20.6%	20.0%	17.9%
2015/2016	2.2%	1.9%	1.7%	0.9%
2016/2017	3.8%	3.1%	2.9%	1.7%
2017/2018	11.7%	18.8%	19.3%	20.6%
2018/2019	14.1%	10.9%	11.5%	13.1%
2019/2020	2.8%	2.6%	2.7%	2.3%
2020/2021	2.6%	2.7%	3.0%	3.1%
2021/2022	3.2%	3.5%	4.2%	5.4%
2022/2023	6.0%	9.9%	11.6%	18.5%
	100%	**100%**	**100%**	**100%**

- Under a higher alpha value, the greater the impact that recent observations of individual unit performance will have when determining ELCC Resource Performance Adjustments and Accredited UCAP, directionally increasing investment incentives
- For example: If we had been under this accreditation framework going into 22/23 with that DY as the most recent, the impact that a resource's performance during WSE would have had on its accreditation under a 0.25 alpha is significantly greater than under status quo.

Conclusions

- The Weighting Approach using Exponential Smoothing (ES) to the Delivery Year Rank observations within a temperature-performance bin effectively decreases the LOLH Risk Contribution of older performance observations relative to newer ones
  - The degree of such decrease depends on the value of the parameter alpha.
- Because LOLH Risk Contribution is the key factor driving ELCC accreditation resulting from the ELCC model, we can conclude that the Weighting Approach using ES could also result in accreditation values that are more heavily impacted by recent performance during extreme weather (as observed on the prior slide), which directionally increases incentives for investment and improved future performance.
- There are other impacts to consider when deciding the “best” alpha value. For instance, the IRM, which can provide a measure of overall system risk.

Appendix

Additional Sensitivities on Alpha Weighting based on 2026/27 BRA Run from June 2024

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Alpha = 0.05	18.0%	27.3%	37.7%	35.9%	75.6%	18.7%
Alpha = 0.10	14.7%	29.7%	33.4%	41.4%	76.6%	18.7%
Alpha = 0.25	10.0%	44.1%	20.8%	58.4%	81.1%	19.0%
Alpha = 0.35	6.8%	53.9%	13.7%	71%	86.3%	19.5%
Alpha = 0.5	2.3%	66.8%	5.5%	86.0%	92.4%	20.4%
Only merging of two coldest temp. bins	22.1%	24.1%	43.2%	31.1%	75.6%	18.7%

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