



FRM Offer Cap Amendment

Ben Griffiths | Markets Committee | November 7-8 2023

About LS Power

LS Power is a development, investment and operating company focused on the North American power and energy infrastructure sector

- Founded in 1990, LS Power has 280 employees across its principal and affiliate offices in New York, New Jersey, Missouri, Texas and California
- LS Power is at the leading edge of the industry's transition to low-carbon energy by commercializing new technologies and developing new markets.
 - **Utility-scale power projects across multiple fuel and technology types**, such as pumped storage hydro, wind, solar and natural gas-fired generation
 - **Battery energy storage**, market-leading utility-scale solutions that complement weather dependent renewables like wind and solar energy
 - **High voltage electric transmission infrastructure**, which is key to increasing grid reliability and efficiency, as well as carrying renewable energy from remote locations to population centers
 - **EVgo, the nation's largest public fast charging platform for electric vehicles** and first platform to be 100% powered by renewable energy
 - **CPower Energy Management**, the largest demand response provider in the country that is dedicated solely to the commercial and industrial sector
- Since inception, LS Power has developed, constructed, managed and acquired competitive power generation and transmission infrastructure, for which **we have raised over \$47 billion in debt and equity financing.**
 - **Developed over 11,000 MW of power generation** (both conventional and renewable) across the United States
 - **Acquired over 34,000 MW of power generation assets** (both conventional and renewable)
 - **Developed over 660 miles of high voltage transmission**, with ~400 miles of additional transmission under development

Utilize deep industry expertise as owner/operator

Position Summary

- Setting a reasonable FRM offer cap is essential to a well functioning market
 - A too low offer cap may discourage resources from participating in FRM, which would increase the likelihood of the market clearing at its cap
- LS agrees with the IMM's suggestion that the current \$9,000/MW-mo offer cap is too high, largely because PfP events are a lot less common than region anticipated in 2016
- LS also agrees that the FRM offer cap should be “based on an expectation of a reasonable upper-limit on the bid-in cost for a hypothetical forward reserve resource” [1]
- The ISO's estimation approach does not reflect a “reasonable upper-limit” on costs
- **More nuanced estimates suggest cap should fall in the \$7,700/MW-mo range**

1. 1. IMM 2023 Spring Quarterly Markets Report at 44; see also ER16-921 Filing Letter at 8: “the FRM offer cap will be set reflecting the high end of the ISO's estimate of costs for a representative, existing resource to assume an obligation to provide forward reserves”

General Comments on the ISO's Approach

- LS appreciates the transparency and thoughtfulness with which the IMM and ISO have gone about proposing updates to the FRM offer cap
 - The two ISO presentations are clear about how they work and the ISO made important changes based on stakeholder feedback
- LS is concerned about how the ISO is estimating
 - Foregone Energy and Ancillary Service Revenues during non-scarcity periods (Item 1.3)
 - Failure-to-Activate & Failure-to-Reserve Penalties (Item 2.2)
- The 15% risk premium is too small to “cover”, or account for, the shortfalls in these items
- Separately, while LS disagrees that historic offer data should be offered at lag, we are not seeking any changes to those aspects of the proposal

LS Alternative Offer Cap Roll-up (based on ISO's Nov MC Values)

Updated Offer Cap (\$/MW-Month)				
Item Number	Item Description	ISO Revised Item Value (Nov MC)	LS Alternative	Item Units
1	Foregone Revenue			
1.1	Number of Reserve Shortage Hours	5.4	5.4	hours/year
1.2	Reserve Shortage Hour Reserve Revenue	1,989	1,989	\$/MW-month
1.2(a)	Minimum Total Reserve Req. Shortage Revenue	1,350	1,350	\$/MW-month
1.2(b)	Ten-Minute Reserve Req. Shortage Revenue	639	639	\$/MW-month
1.3	Energy and Reserve Market Revenue	2,170	3,233	\$/MW-month
Item 1 Subtotal	Foregone Revenue Subtotal	4,159	5,222	\$/MW-month
2	Penalties			
2.1	Failure to Reserve (30.8%)*	1,281	1,281	\$/MW-month
2.2	Failure to Activate (4.50%)**	187	187	\$/MW-month
Item 2 Subtotal	Penalty Subtotal	1,468	1,468	\$/MW-month
3	Supplier Risk Premium ([Item 1 subtotal + Item 2 subtotal]*15%)	844	1004	\$/MW-month
				\$/MW-month
4	Total Offer Cap (Item 1 + Item 2 + Item 3)	6,471	7,694	\$/MW-month
Item 4 Rounded	Updated Forward Reserve Offer Cap	6,500	7,700	\$/MW-month

Input changes in **red**; formulaic changed values in **yellow**

Issue 1: Energy & (Non-Scarcity) Ancillary Service Revenues

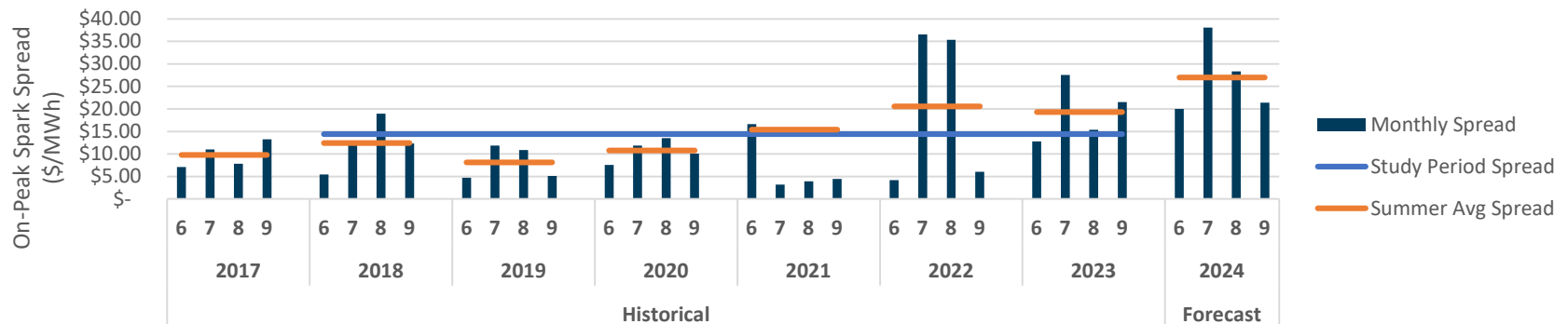
- 50% difference in EAS revenue from IMM & ISO using conceptually similar approaches
 - ISO-NE estimates foregone E&AS revenues at **\$2,170/MW-mo**
 - Estimate relies on the “CONE reset” dispatch models, several years of historic pricing data, and unit parameters based on a “more efficient unit” [1]
 - IMM estimated the same foregone revenues at **\$3,233/MW-mo**; nearly 50% higher!
 - Energy estimated at \$2,091/MW-mo based on the 90% percentile of observed summer energy revenues, over six summer seasons for a relatively new dual-fuel peaking resource [2]
 - Non-Scarcity Reserve Revenues estimated at \$1,142/MW-mo based on 90% percentile value of available reserve revenue on observed over four summer seasons [2]
 - The difference in these two estimates, **\$1,063/MW-mo**, is larger than the *entire* 15% risk premium offered by the ISO (\$844/MW-mo)!
- Two problems with the ISO modeling:
 - No effort to adjust pricing data to reflect expected market conditions in 2024-25
 - Revenues estimates are based on *combined* E&AS revenues, even though energy and ancillary revenues are uncorrelated

1. November MC presentation, Slides 20-24; Oct MC presentation, Slide 8 suggests HR of 9,575 BTU/kWh

2. IMM 2023 Spring Quarterly Markets Report at 50

Forwards suggest higher spark spreads in Summer 2024

- FRM will likely be sunset starting March 2025, so any changes to the cap should reflect a reasonable upper-limit on offers for the June 2024 – February 2025 timeframe
- Historic prices used by ISO are *not* representative of future market conditions
 - Using unadjusted prices will lead to downward bias in revenue estimates and FRM cap because historical period had lower margin than forwards suggest for Summer 2024
- Chart below estimates on-peak spark spreads for each month in study period as well as based on current forward prices (as of 11/3/2023)
 - Recall, Spark Spread = [Avg On-Peak LMP] – [9.575 MMBtu/MWh HR] x [Avg Algonquin Price]
 - Historical sparks range from \$4 to \$36/MWh (avg = \$14.44/MWh)
 - Forward sparks range from \$20 to \$38/MWh (avg = \$26.96/MWh) → **87% higher**



Lack of correlation between reserves and energy revenues mean that these two value streams should be treated as independent

- While reserve prices and energy prices are correlated on an hour to hour basis, there is no real correlation between energy revenues and reserve revenues on a monthly basis
 - E.g., a generally low margin month from an energy perspective might have high reserve revenues due to the system tightening (but not hitting scarcity)
- A review of historical summer data from June 2017 to July 2023 shows the lack of relationship between energy and reserve prices. The correlation between
 - the (a) number of hours with positive reserve prices and (b) average DA LMP is -0.28
 - The (a) average combined TMNSR+TMOR price and (b) average DA LMP is +0.22
- As regressions, same variables yield R-squared value of 0.009 and 0.08 respectively
- **Separate estimates for energy and ancillaries, like IMM proposed, better reflects the lack of relationship**

Issue 1: Recommendation on foregone E&AS revenues

- The “first best” solution to remedying the EAS inaccuracy would be to **(1)** re-estimate foregone revenue based on forwards-adjusted LMPs and fuel costs and **(2)** to treat energy and reserve revenues as independent when computing cost components
 - LS requested the ISO EAS models to do this analysis on 11-Oct-2023 but has not yet received them, so cannot perform this exercise for the committee
 - A simple scaling of the ISO’s EAS revenues based on the difference in spark spreads would result in an offset of \$4,058/MW-mo ($\$2,170/\text{MW-mo} \times 187\%$), but this is probably too high because spark spread is not exactly the same as short-run margin
- The “second best” solution would be to rely on the IMM’s **\$3,233/MW-mo** cost estimate from the Spring 2023 Markets Report

Issue 2: Failure-to-Reserve & Failure-to-Activate cost estimates are not based on marginal costs

- Generator's are supposed to offer based on their *marginal* costs (MC)
- ISO-NE's F-to-R and F-to-A estimates, based on $(\text{total penalties})/(\text{FRM MW})$, are measurements of *average* costs (AC)
- For companies like LS with a *portfolio* of resources into FRM, MC will exceed AC
- LS has seven identical units at its Wallingford facility, all can offer into the FRM
 - If it sells one unit into FRM, it can cover its obligation with any of the other 6
 - If it sells all seven units into FRM, then its F-to-A and F-to-R risk goes up enormously because there is no physical hedge for performance
- LS should be able to bid the increasing risk of non-performance in FRM
 - Based on a review of historical data, shared with the ISO, our marginal F-to-A risk is double or triple the ISO estimate, due to these portfolio effects

Issue 2: Recommendation on F-to-R and F-to-A penalties

- LS recognizes that different companies will find themselves in different positions based on their specific FRM portfolio
- It would be reasonable to include this issue within the general 15% risk premium – but as noted previously – the too low EAS revenue estimates already exceed the entire proposed premium
- Correcting the too-low EAS revenues would “free up” risk premium to account for supplier portfolio variability
- Otherwise, the ISO should raise the risk premium to 20%

Amendment

- Given the ISO's timeline, LS proposes a simple amendment which replaces the ISO's E&AS revenue value with the values computed by the IMM. This has the effect of increasing foregone revenues by \$1,063/MW-mo
 - Additionally, the increased foregone E&AS revenues result in a formulaic increase in the Supplier Risk Premium of \$159/MW-mo
- These elements taken together would set the FRM offer cap at \$7,700/MW-mo
- Redlines are simple: "Forward Reserve Offer Cap is ~~\$9,000~~\$7,700/megawatt-month."

Questions?