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CIFP – RA Stage 3 Perspectives **#1** – **POST MEETING UPDATE**

August 14, 2023

# LS Power Group Overview

At the leading edge of making the nation’s energy system cleaner, more affordable, and more reliable

- 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 **320+ employees** across New York, New Jersey, Missouri, Texas, California, and remotely
- In total, LS Power has **raised \$50 billion** in debt and equity capital to develop or acquire more than **47,000 MW of power generation**

LS Power Group				
Investment Partnerships		Development		
Flagship Infrastructure Funds	Other Partnerships	Transmission	Generation	Renewables & Energy Storage

- **In-house functional expertise** and platform resources provide direct due diligence and **actively drive value for all project investments and portfolio companies**
- **\$10.2 billion in equity capital** commitments raised
- **Own and operate 19,000 MW of power generation** (conventional and renewable); acquired over 34,000 MW since inception
- **Portfolio of nation-leading Energy Transition Platforms:** CPower Energy Management, Endurant Energy, EVgo, REV Renewables, Rise Light & Power, Craft Work Capital Investments, and Waste-to-Energy initiatives
- **~\$6 billion in 16 transmission projects** across 6 ISO/RTOs and 8 States; **~680 miles** completed with an additional 200+ miles and multiple substations under development/construction
- **615 MW battery storage portfolio** in CA, including Gateway Energy, the world’s largest battery at 250 MW when energized in 2020
- **Developed over 13,000 MW** across 30+ power generation projects

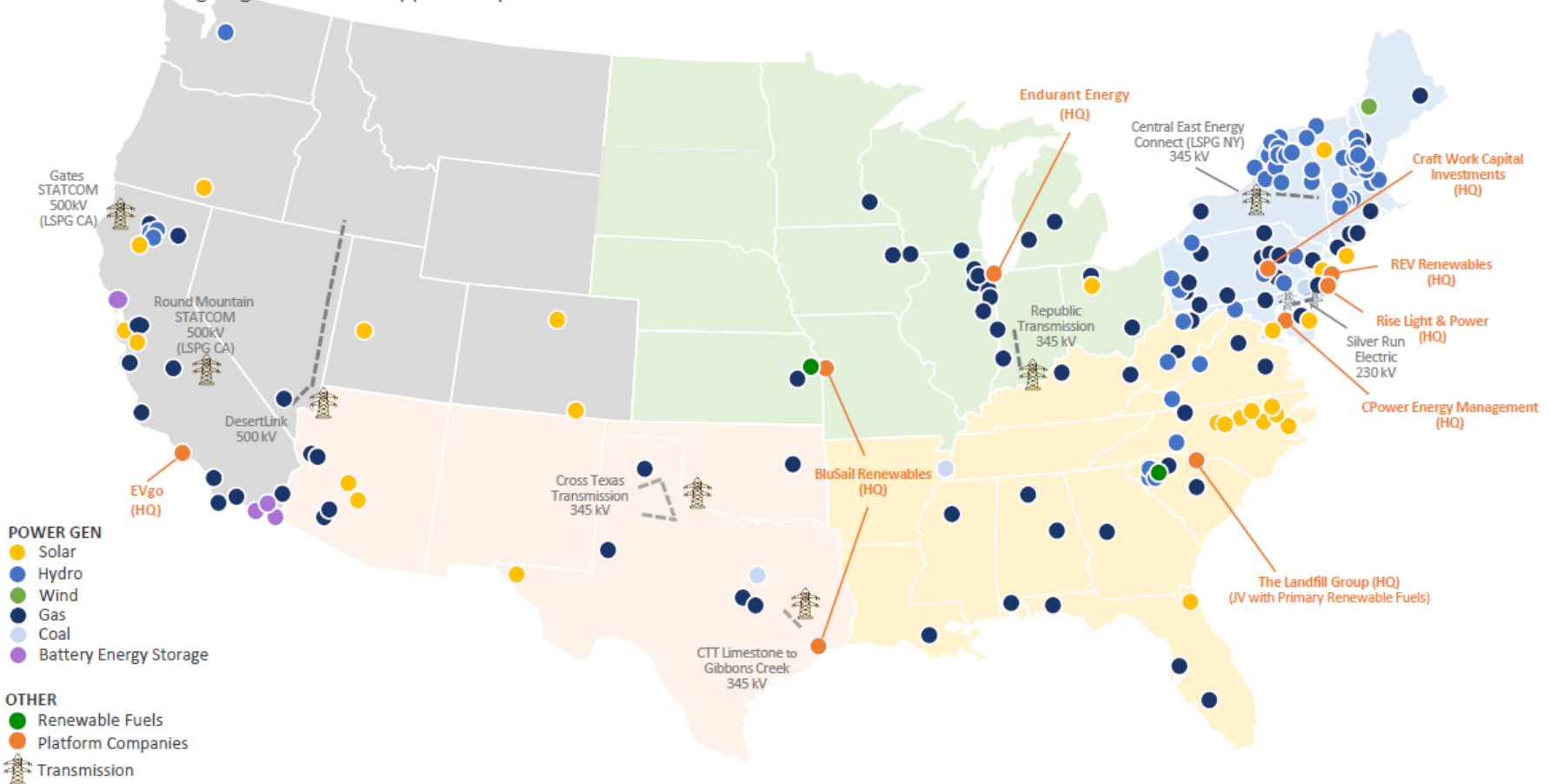
Note: Through 2021, assets under LS Power control avoided 80.7 million metric tons of CO2e, equivalent to nearly 187 million barrels of oil not consumed or more than 17.5 million cars taken off the road for one year. Please see the LS Power [Sustainability](#) page for additional details and calculation methodology.



# Project Portfolio

## Extensive development and operating experience across multiple markets and technologies

- With \$50 billion in equity and debt raised, LS Power has developed or acquired 160 Power Generation projects (renewable and conventional), 7 Transmission projects, and multiple Energy Transition Platforms
- A reduction in the carbon intensity of the system is a secular long-term trend – one which we anticipated in constructing our portfolios and that informs our ongoing views of the opportunity set



# Energy Transition Platforms



Leader in the development, acquisition and operation of renewables and energy storage with a ~2.8 GW operating portfolio across solar and wind generation, pumped storage hydro and battery projects



One of the nation's largest public fast charging network for electric vehicles, powered 100% by renewable energy, with over 900 locations and 500,000+ customers across more than 30 states



Leading U.S. demand-side energy management solutions provider, helping 2,400+ organizations across 17,000+ sites save on energy costs, enhance sustainability efforts, and support the decarbonization and reliability of the electric grid



Landfill waste-to-RNG company that provides a complete solution spanning across development, operations, construction, equipment manufacturing, and ownership to municipal and private landfill owners



Leading provider of on-site energy and microgrid solutions in North America that develops, builds, and owns a variety of technologies including combined heat and power, ground source heat pumps, batteries, fuel cells, and solar



Waste-to-energy platform JV with BioStar Renewables and ARM Energy, focused on reducing GHG emissions and providing renewable energy to support farming and other government, commercial and industrial users with their waste management needs



Regional manager and developer which provides ~20% of New York City's generating capacity and advances the state's clean energy goals through the modernization of facilities and investment in large-scale renewable projects, such as offshore wind interconnection, battery storage, zero carbon thermal energy, and more



Strategic investor in electrical and mechanical contracting firms (plumbing, pipefitting, boiler heating, ventilation, and air conditioning) focused on serving the needs of the Municipal, University, School and Healthcare (MUSH) market, as well as private sector commercial and industrial customers



14 GW fleet of fast-starting natural gas-fired power projects complementing the intermittency of wind and solar, improving overall grid reliability



Developed and operating ~680 miles of high voltage transmission, with an additional 100+ miles and multiple substations under construction, delivering energy resources to millions of homes and businesses

Conventional Generation

Transmission

Renewable Generation

Utility-Scale  
Battery Storage

Distributed Energy Resources /  
Energy Efficiency

Electrification  
Infrastructure

Renewable  
Fuels

## PJM Board Direction

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- The PJM Board letter of February 24, 2023 was clear the CIFP should focus on the following four issues that the Board highlighted as having “a direct benefit to reliability” –
  - Enhanced risk modeling
  - Evaluation of potential modifications to the Capacity Performance construct and alignment of permitted offers to the risk taken by suppliers
  - Improved accreditation
  - Synchronization between the RPM and Fixed Resource Requirement (FRR) rules
- LS Power agrees with the PJM Board’s direction to address these issues in the short-term and that the appropriate focus is the reliability of the system through the energy transition
- PJM’s current proposal (noting that the proposal has been changing with each CIFP meeting) goes well-beyond the PJM Board’s direction and includes changes that are not ready for implementation

## LS Power Concerns with PJM Proposal - Process

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- PJM's use of the CIFP process to introduce changes that go beyond the Board's direction has led to unnecessary delays, confusion, and concerns including concerns on the impact of reliability, directly contrary to the Board's direction
- PJM originally scheduled CIFP for eight (8) meetings; to date, PJM has had to schedule six (6) additional meetings trying to sufficiently describe the PJM proposal and changes to that proposal and other interested parties' proposals and comments
  - PJM has yet to produce a comprehensive package, despite the number of extra meetings and extensive discussions
- In order to produce a viable package in this process, PJM must focus on the four items addressed in the Board's letter and defer the other items to either a CIFP Phase II or the RASTF which is anticipated to continue after CIFP
- **LS Power generally supports the PJM Package 2 which is for the Annual Auction with the changes outlined here-in**

# LSP Power concerns over moving too fast to impose seasonal aspects to the capacity market

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- One of the more concerning parts of PJM's proposal, which is clearly outside of the scope of the Board's letter and direction, is the Seasonal Market including Seasonal Demand Curves, introduced in Stage 3, six meetings into the CIFP process
- After a number of comments, concerns, questions, etc. from the Members, PJM has continued to modify the proposal but there remain many unanswered questions and concerns
- Given the lack of clarity on PJM's proposed design, LS Power cannot take a position on the proposed Seasonal Market including Seasonal Demand Curves
  - The design remains not fully described
  - PJM has not communicated how it will be implemented
  - No analyses showing the impact on the market have been produced
- LS Power is pleased that PJM has included the alternative for an Annual Auction
  - LS Power remains concerned about pursuing the Seasonal Market proposal without further exploration
  - Given the complexity and significance, it belongs in a CIFP Phase II process or the RASTF for further vetting by both PJM and the members and should not be a part of this process
- Continuing to push an unvetted Seasonal Market Design or aspects thereof will only lead to unintended consequences that could negatively impact the capacity market and impact reliability

# LS Power Concerns with PJM Proposal – Other

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## ■ Transfers of PAI Obligations

– Only introduced in the August 1 PJM presentation, it may be an effective proposal, however and again, the lack of detail is concerning

## ■ PAI Bonus Recipients

– First, PJM needs to unambiguously define “Committed Capacity” since their entire PAI/Bonus structure is measured using this term. Regarding Capacity, there are now five (5) different terms affecting the capacity in various aspects of the Capacity Market – ICAP, UCAP, MFO, CIRs, and now Committed Capacity.

– Regarding Bonus Payments – PJM has proposed excluding all uncommitted capacity, including Energy Only resources from bonus payment eligibility.

■ LS Power disagrees with this and is concerned this could lead to reliability concerns

– WSE was not a “Capacity” shortage (PJM procured >20% reserve margin in the 22/23 BRA) but an “Energy” shortage

■ Such exclusion also places undue importance on PJM’s ability to properly accredit resources

■ Combined with excessive stop-loss proposal, unfavorable reliability impacts are likely



## **LS Power supports the aspects of PJM's proposal that specifically address the Board's four items – Improved Accreditation**

- One of the more important items to LS Power
- Using the Equivalent Unavailability Factor-weighted (EUFw) for thermal resources (described on slide 11) in lieu of ELCC for thermal is more effective method to accurately accredit thermal resources
- Use of EUFw will eliminate the need to separately accredit thermal resources with varying fuel supply arrangements – EUFw will capture the operations and outage associated with lack of fuel or other fuel supply issues
- With the future development of more granular markets, LS Power supports seasonal accreditation, where winter accreditation is based on the winter, not summer, ICAP
  - Additional winter CIRs should be issued reflective of the winter ICAP

## **LS Power supports the aspects of PJM's proposal that specifically address the Board's four items – MSOC**

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- LS Power appreciates and supports PJM's proposal to improve the MSOC and allow sellers to reflect risk in their offers
- LS Power proposes to conduct the Capacity Market similar to the Energy Market by requiring Market Sellers to provide a Market-Based offer and a Cost-Based offer.
  - The marginal resource offer would be reviewed by the Market Monitor for market power using a method other than the current Three Pivotal Supplier (TPS) Test that is used throughout other commodity markets for determining market power.
  - If the marginal offer fails the market power test, the Market-Based offer will be replaced by the Cost-Based offer (MSOC) and the auction re-run.
  - The process continues until the marginal offer does not fail the market power test.
- The Market-Based offer shall be accompanied by a certification similar to the certification used by Market Buyers (next slide which is the only mitigation imposed on Market Buyers) certifying the offer is not an exercise of market power.
- The Cost-Based Offer (MSOC) shall be determined as follows:
  - Gross ACR = [Adjustment Factor \* (AOML + AAE + AFAE + AME + AVE + ATFI + ACC + ACLE) + ARPIR + APIR + CPQR]
  - MSOC = Net ACR = max(Gross ACR - E&AS Offset, CPQR, 0)

## **LS Power supports the aspects of PJM's proposal that specifically address the Board's four items – MSOC**

- It is reasonable to replace the current mitigation method with a certification process paralleling that which is used to mitigate Buyer-Side Market Power –  
Each Capacity Market Seller must certify to the Office of Interconnection for each Generation Capacity Resource the Capacity Market Seller intends to offer into the RPM Auction, in accordance with the PJM Manuals whether or not the Capacity Market Seller acknowledges and understands that the Exercise of Supplier-Side Market Power is not permitted in RPM Auctions, and does not intend to submit a Sell Offer for their Generation Capacity Resource as an Exercise of Supplier-Side Market Power. All Capacity Market Sellers shall be responsible for the accuracy of each certification and its conformance with the Tariff irrespective of any guidance developed by the Office of the Interconnection and the Market Monitoring Unit.
- Certification is satisfactory to prevent market power on the buy side and therefore should be satisfactory to prevent market power on the sell side

# LS Power supports the aspects of PJM's proposal that specifically address the Board's four items – Enhanced Risk Modeling

- LS Power agrees with the shift to EUE from EFORD
- LS Power agrees with the shift to marginal ELCC for non-thermal resources
- LS Power has an alternative proposal for thermal generators Equivalent Unavailability Factor-weighted (EUFw) that does not rely on the type of fuel supply but captures the resulting performance impacts of the various fuel supplies

$$UCAP = ICAP \times (1 - \text{Max}(EUFw, EFORD)) - Adj_{\text{Asym Outages}}$$

Where:

$$EUFw = \frac{\sum_{i=1}^n LOLP_i \times EUF_i}{\sum_{i=1}^n LOLP_i}$$

Where

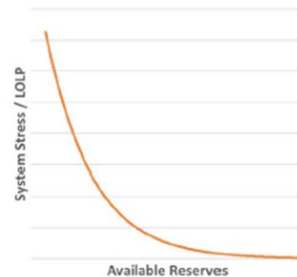
i = actual interval

n = count of actual intervals for given delivery period

LOLP = Loss of Load Probability for given delivery period

EUFi = equivalent unplanned outage rate for given delivery period

And LOLP is a curve that represents measures system stress:



## LS Power supports the aspects of PJM’s proposal that specifically address the Board’s four items – Synchronization between the RPM and FRR

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- LS Power agrees with PJM’s proposal to remove the option for FRR Entities to elect a physical penalty assessment and apply the same financial assessment to all participants for PAIs
- However, PJM’s proposal fails to address a stark difference between RPM and FRR
  - FRR Entities are only required to secure capacity to satisfy their load plus the reserve margin
    - This creates a “free rider” issue where FRR Entities rely on the BRA reserve margin above the IRM during times of system stress at the expense of customers in non-FRR Entity states
- LS Power supports the Calpine proposal to correct this fault in FRR:
  - Require the FRR Entities’ Capacity Plans to include sufficient capacity to satisfy the FRR Entity’s load plus an amount reflecting the average percentage points that RPM has cleared/procured above the IRM for the last 5 years.

## LS Power Other Items

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- LS Power is disappointed PJM did not adjust their proposed Stop-loss component of the CP construct to cap out at 2X the BRA clearing price
  - Retaining a Net CONE-based Stop-loss perpetuates the existing risk imbalance that exists between what resources earn in the capacity market and what they could quickly forfeit in a CP event
    - Concerns with reliability should move PJM to closely align market revenues and risks in order to retain at-risk generation
- The reforms proposed by PJM will not support system reliability without a commitment to directly addressing Electric/Gas Coordination issues
  - In CIFP filing, PJM must commit to development and implementation of an Electric/Gas Coordination solution that properly structures PJM operations and compensates flexible resources for the risks inherent in providing real-time operating flexibility
  - LS Power is proposing a Forward Energy Reserve Market as the starting point