



Thoughts on RCA: Treatment of Atypical Equipment Outages

Ben Griffiths | Markets Committee | May 2024

LS Power: An Industry-leading Developer, Operator, and Investor



Innovation and Investment in Energy

1990	Inception
>47	GW Developed and Acquired
>160	Power Generation Projects
>780	Miles of High-Voltage Transmission Completed
6	Transmission Utilities
8	Energy Services Platform Companies
>370	Professionals Across Five Offices

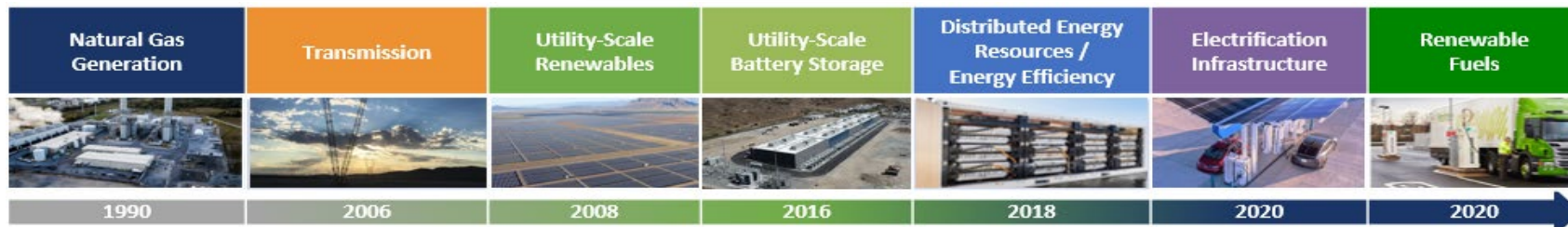
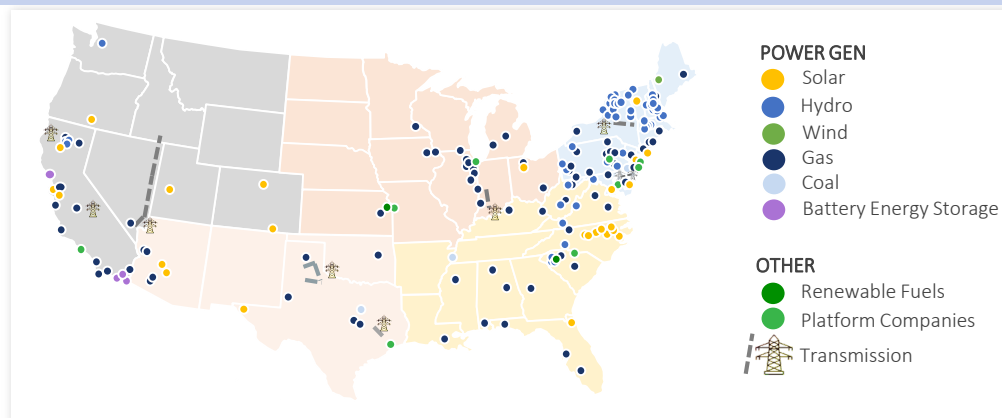
LS Power Group

Power Generation

Transmission

Energy Storage & Renewables

- Developed/Acquired ~50,000 MW of generation
- 16 transmission projects developed including 6 utilities across 5 ISO/RTOs and 8 states
- Nation leading energy transition businesses representing electric vehicle charging, demand response (virtual power plants), microgrids, renewable fuels and waste-to-energy platforms



Presentation Summary

- Sometimes things break. While many forced outages are routine, others are catastrophic or otherwise atypical
- Resources can have equipment-related outages of extended duration that, once resolved, should not be expected to occur again. In these instances, *historic* performance is a poor predictor of *future* performance
- Nevertheless, the ISO's current proposal will include that outage for 3-5 years
 - As discussed last month, this can result in non-representative performance estimates for resources of all sorts (IPRs, ADCR, thermal) *see appendix for examples*
- **Proposal:** When there is either a major equipment-related outage that has since been resolved, or a material shift in resource composition, a resource should be able to challenge its default value and propose a substitute that better reflects expected output
 - Aligns new RCA performance inputs with existing Significant Decrease provisions
- **New this month:** LS offers two methods to identify atypical forced outages for adjustment. Methods can be used separately or combined

ISO already allows for adjustment of generator capacity values via the Significant Decrease provisions

- Today, the only thing that affects a resource's FCM Qualified Capacity value is its audited capability. Some metrics of unit performance, such as EFOR are included in FCM – but only on the demand side
- Resources can have performance-related decreases in their capability adjusted upward by the ISO in some instances, using the Significant Decrease provisions (13.1.2.2.4)
- If audited capability falls by the lesser of 10 MW or 10%, then the resource can
 - “submit a critical path schedule...describing the measures that will be taken and showing that the Existing Generating Capacity Resource...will be able to provide an amount of capacity consistent with the summer Qualified Capacity...by the start of the relevant Capacity Commitment Period”
- Subject to ISO approval, a resource can restore its FCM QC back to its expected future output
- This same logic can and should be extended to other portions of the RCA design, such as thermal xEFOR, IPR generation profiles, ADCR offer profiles. **A failure to allow for this adjustment will skew RCA results and increase consumer costs**

A conceptual solution: reconstitute equipment-related outages

- Equipment issues that have been remedied (or have a credible, approved plan to remedy them) should not be carried forward, *at least in instances of major failure*
 - ADCR should be allowed similar change in instances of meaningful shift in composition
- Procedurally, the ISO should replace historic, outage-affected data with simulated/proxy performance data in the same period
 - This simulated/proxy data would need to include a representation of expected outage. For IPRs, data from DNV already includes such an adjustment
- An example: assume there is a major equipment failure that results in zero output for 1 month
 - In auction qualification process (or related window), resource would notify the ISO that a non-routine reduction that has occurred, and what was, or will, be done to resolve the issue
 - ISO would review that restoration plan or work completed to resolve the issue
 - If approved, ISO would,
 - For renewables: replace that month's actual data with simulated data from DNV or another source for that month
 - For others: adjust EFOR to remove that outage and replace with typical outage data
 - Reconstituted output would be used in RCA-based risk modeling and accreditation processes

LS proposes 2 different approaches for identifying atypical outages

■ Qualitative: Shift Responsibility to Market Participant, but Limit to 1 Event every 3-5 Years

- Market participants already provide the ISO with event-by-event outage information
- A market participant would be allowed to identify a *single* outage, for a given resource, in a 3-to-5 year calendar period to eliminate from that outage log
- ISO would calculate that unit's xEFOR, excluding the one atypical outage

■ Pros

- Truly atypical outages should be rare, but you “know one when you see one”
- Market participant makes its own judgement about what outage is worth reconstituting
- Puts a hard cap on number of possible requests, helping ISO manage workload
- Does not allow a resource with many sustained forced outages to fully reconstitute its performance. At some point region a resource that has a 6-month forced outage every year due to equipment failure really is only 50% available. A quantitative method that reconstitutes all such outages might over-value a resource like this

■ Cons

- If a good unit has two+ atypical outages in quick succession, only one would be adjusted

LS proposes 2 different approaches for identifying atypical outages

■ Quantitative: Adjust Forced Outages only if outage lasts longer than 14 Equivalent Days

- Anecdotal review of outage data suggests that there are vanishingly few forced outages more than 14 Equivalent Days in duration.

$$\text{Equivalent Days} = \text{Actual Duration} \times (\text{Derated MW} / \text{Unit Capacity})$$

- Equivalent Days concept implicitly accounts for energy content of outage
 - A 2-week full outage and a 4-week 50% derate both have the same Equivalent Outage Days
- Using a sample of outage data, LS suggests that a 14 Equivalent Day threshold would eliminate 99%+ of possible forced outages from reconstitution
 - ISO-NE could adapt this analysis using a more fulsome dataset to pick a sufficiently high threshold for reconstitution
- **Pros**
 - Rule-based logic does not require additional judgement calls from the ISO
 - Excludes almost all outages from possible adjustment
- **Cons**
 - Potentially allows resources with repeated failures to get over-accredited

Reasonable Adjustments Benefit both Generation and Load

- It is in everybody's interest to have resources be represented in RCA accurately
 - Generators of all sorts should not be over-penalized for historic poor performance that should not be expected to occur in the delivery period
 - Unreasonably high EFOR values (or low output profiles) will result in higher-than-accurate Installed Capacity Requirements, increasing consumer costs
- The 3-5 year lookback period for performance estimates is generally reasonable, but there should be mechanism to allow for adjustment in certain circumstances
 - Allowing adjustment provides an incentive for generators to expeditiously repair their equipment or make other reliability-enhancing investments
- There are trade-offs between the two concepts LS proposes to flag atypical forced outages.
 - The two aspects could also be combined to blend quantitative thresholds with hard limits on reconstitution frequency
- LS welcomes feedback from the committee on these concepts and thresholds

Appendix

Three Examples: Thermal Resources

- Under the ISO proposal, thermal resources will be derated for their forced outage rate (EFOR)
 - Forced outage rates are a function of historic performance in the past 5 years
- In general, this approach makes sense, but there can be instances where it does not
- Consider a 100 MW thermal resource operating with a perfect operating history *except* for a year-long outage related to an equipment failure. After that equipment failure is resolved, the unit returns to perfect service
 - To the extent that the outage also leads to a Significant Decrease affecting seasonal QC, the ISO tariff already provides the ability to provide restoration plan documenting how the issue will be resolved
 - However, because 1 year in 5 has zero availability, it will have a forced outage rate of 20%
 - RCA will imbue that resource with an 80 MW QMRIC for the next five years (until the bad year rolls off the lookback window)
- **Is it really representative to assume that major outage will occur with same frequency going forward? No**

Three Examples: Intermittent Power Resources

- Under the ISO proposal, renewable resources will be modeled using historic output profiles
 - In general, ISO proposes to rely on hourly normalized profiles for past five years reflecting a combination of historical performance (when commercial) and simulated/proxy performance (when non-commercial)
 - Solar summer profile tied to 2021 observed performance
- In general, this approach makes sense, but there can be instances where it does not
- Consider a 100 MW renewable resource operating with a perfect (100%) output history *except* for a year-long outage related to an equipment failure. After that equipment failure is resolved, the unit returns to perfect service
 - For the failure year, renewable resource profile will show zero output
 - RCA will imbue that resource with an 80 MW QMRIC for the next five years (until the outage year rolls off the lookback window)
 - Note that for solar, this could lead to a 0 MW QMRIC if the outage year was 2021
- **Is it really representative to assume that major outage will occur with same frequency going forward? No**

Three Examples: Active Demand Capacity Resources

- Under the ISO proposal, ADCR will be modeled using a profile based on its historic offer quantity in certain intervals
 - In general, ISO proposes to rely on hourly normalized profiles for past three years. Includes a term that reflects outage rates (the “performance factor”)
- In general, this approach makes sense, but there can be instances where it does not
- An ADCR resource is composed of one or more Demand Response Resources (DRRs) which are typically comprised of many smaller Demand Response Assets, or DRAs, (e.g. industrial facilities) located within a given DRR Aggregation Zone.
 - The underlying composition of an ADCR can change over time, as individual DRAs are added or removed from the portfolio
- Consider a 3 MW ADCR portfolio comprised of three 1 MW DRAs – two can produce 1 MW in all hours without any failure, one can produce zero output in all hours
 - RCA will provide that resource with a derate of 33% and a QMRIC of 2 MW
 - If the low value DRA is removed, then ADCR drops in size to 2 MW but will earn 1.33 MW QMRIC, even though it can produce 2 MW of value in practice. Reduction lasts 3 years
 - **Is it representative to assume that ADCR composition will remain constant? No**