



Solar-Battery Hybrid Proposal (Package C)- Regulation Design Element

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Solar-Battery Hybrid Resources : Regulation Proposal

Regulation is “the capability of a specific resource with appropriate telecommunications, control and response capability to increase or decrease its output in response to a regulating control signal to control for frequency deviations.”*

*Definition of regulation from PJM Glossary

PJM’s hybrid proposal:

“Status quo, except non-energy regulation only mode of ESR Participation Model is not available”*, where the *status quo* is:

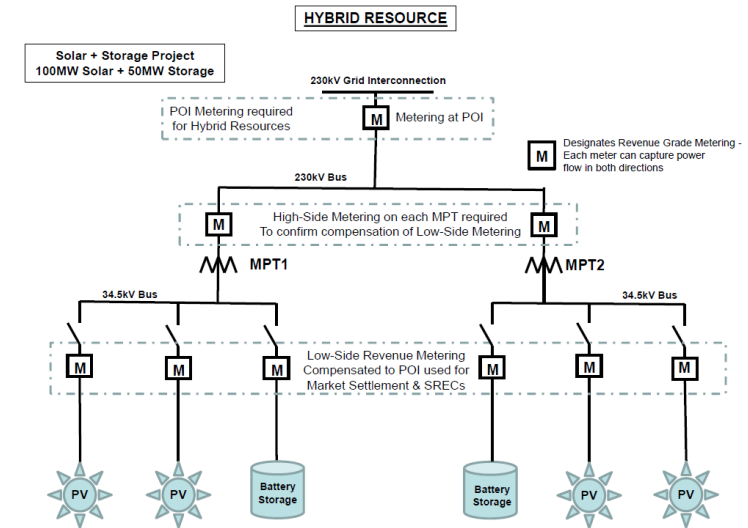
“**All resources can participate in Regulation if they meet performance requirements.** For co-located resources, battery resource can participate in Regulation if submeter telemetry is provided.”^

*Design element description from Package Matrix

^Design element description from Options Matrix

PJM’s proposal does not address the asymmetry that exists for the solar and battery units part of a hybrid resource.

For example, there may be an instance in which the solar resource over generates causing a deviation, whereas the battery resource is providing regulation to mitigate that frequency deviation caused by the solar resource.



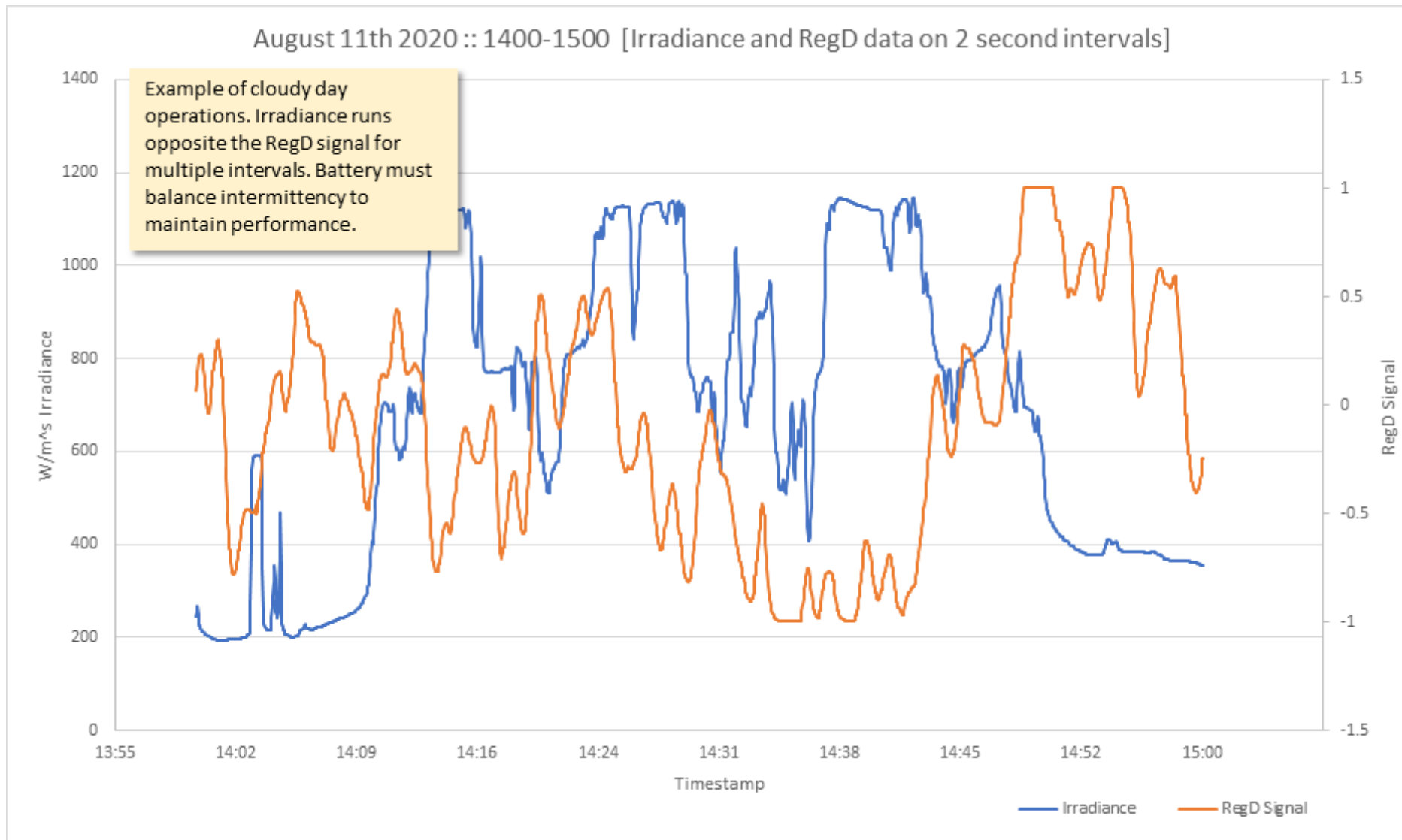
Dominion Energy proposes to add to the Regulation Design Element the following*:

“For hybrid resources, two ways to provide regulation service are available:

- (1) Battery output is used to balance out intermittent renewable output, where resource response is measured at the point of interconnection meter.
- (2) Battery output is not used to balance out intermittent renewable output, and resource response is instead measured independently for the battery component level using submeter output/telemetry.”

*All other design components part of the Dominion Energy proposal (Package C) are the same as the PJM proposal.

Example of irradiance running counter to regulation signal



The chart demonstrates the asymmetry that would exist between solar and battery units part of a hybrid resource.

The plot trend highlights the need for clear rules to accommodate a battery that is part of a hybrid resource and meets the criteria to provide regulation.

Hybrid Storage Component Regulation Participation

Considerations	PJM Proposal (Storage component required to balance intermittent output while providing regulation)	Dominion Energy Proposal (Package C) (Storage component not required to balance intermittent output while providing regulation)
Equitable Participation	<ul style="list-style-type: none"> ➤ Hybrids that are required to balance intermittent output will have lower performance scores and are much less likely to clear the regulation market in the future. ➤ Regulation D resources typically require high scores to clear, since there is a limited amount of competitively procured volume. Year-to-date in 2021, 80% of Reg D MW are committed via self scheduling (price takers). 	Resources that are physically capable will be indifferent to the choice between hybrid and co-located.
Impact to Load	Load <i>will bear the cost</i> of decreased competition in the regulation market if hybrid resources aren't able to participate on a level playing field with standalone storage resources.	Load <i>will benefit</i> from the increased competition for regulation service due to the additional supply and competition provided by the storage component of hybrids.
System control for PJM (single unit systems opposed to co-located)	<ul style="list-style-type: none"> ➤ Any resource that can elect co-location will do so to participate in regulation market given the drawbacks of the hybrid model. ➤ <i>More</i> standalone resources will be added onto the system as a result of skewed incentives, leading to more volatility for PJM to manage across all products (energy, regulation, and reserves). 	<i>Fewer</i> standalone resources will be added onto the system as a result of removing skewed incentives, leading to less volatility for PJM to manage across all products (energy, regulation, and reserves).



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