



Hybrid Resources in MISO

Market Perspective

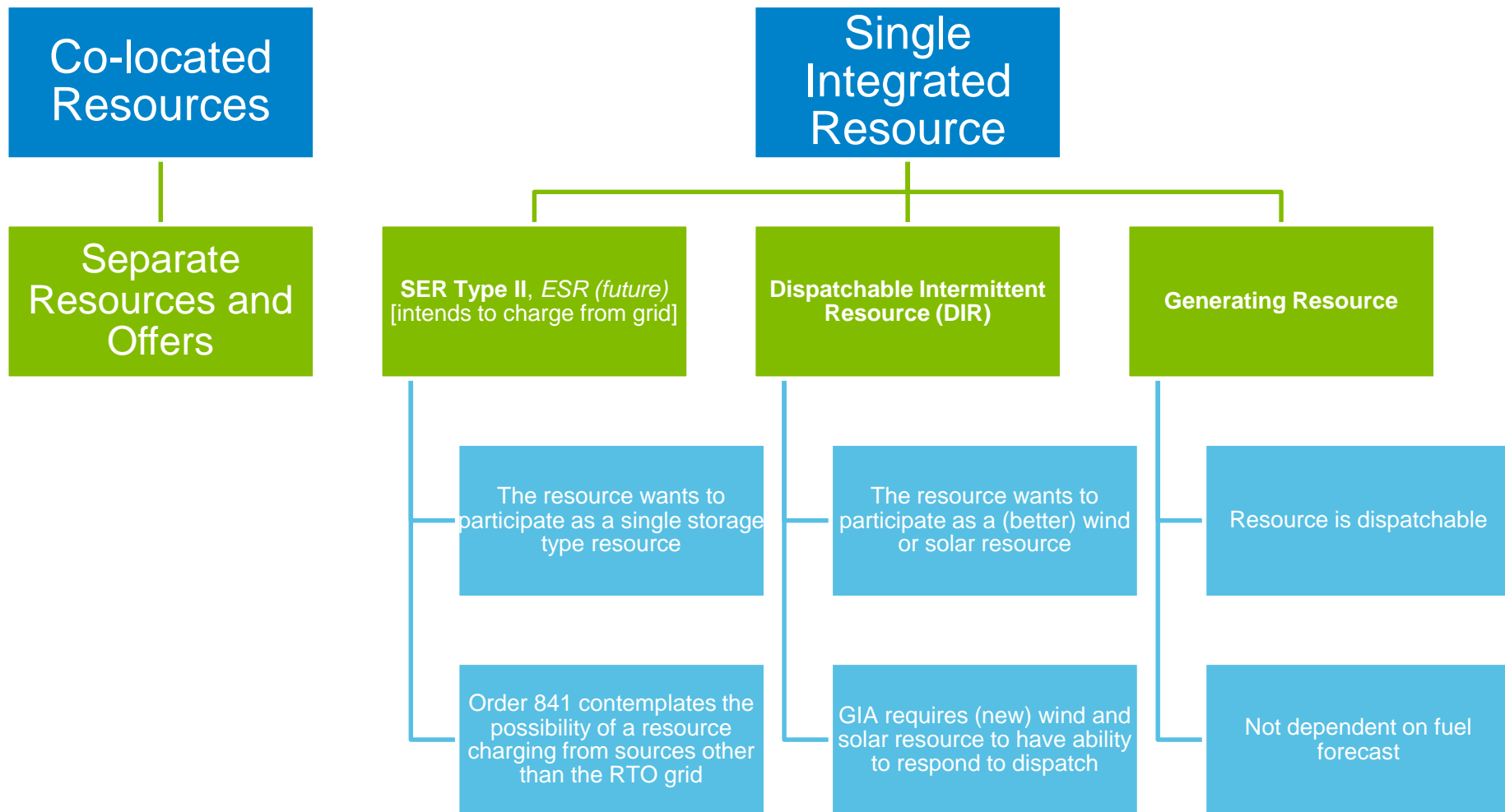
**National Energy Technology
Laboratory**

Advance Energy Storage Project Review
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Hybrid Resources Background

- FERC Order 845 allows Interconnection Customers to request interconnection service that is lower than generating facility capacity
- Existing market rules and models facilitate participation of Hybrid Resources, including;
 - Generating Resources, Dispatchable Intermittent Resources, Stored Energy Resources
- Hybrid working definition:
 - A Generation Facility that has multiple energy production devices that have more than one Fuel Source and participates in MISO Markets as a single asset with Interconnection Service that may be less than the total Generating Facility Capacity
- FERC Order 841 Electric Storage Resource (ESR) Participation Model will be implemented in June 2022
- New Hybrid Participation Model is in early phases of development

Hybrid Resource with Storage Registration Options



Valuing Storage capabilities in Wholesale Markets

- Improved Ramp capability
 - RTO Market Models typically allow limited Ramp Rate offer options and transition points, leading to conservative representation of physical capabilities. Storage can allow improved ramp capability and modeling, resulting in better performance and higher revenues
- Regulation Maximum Limit vs Energy Maximum Limit
 - Storage can eliminate limitations on Resource Min/Max offer to capture more revenue
- Provide Operating reserves when conventional generation is unavailable
 - Offer regulation, spinning or supplemental reserves, receiving additional revenue
- Increased Capacity Credit for combined resource

Capacity Accreditation for Hybrid Resources

- For Surplus Interconnection, MISO has proposed applying existing accreditation rules for each resource behind the interconnection
 - If total accreditation calculation for both resources utilizing Surplus Interconnection exceeds the Interconnection Service can be split between resources to determine capacity credits
- For Hybrid Resources, MISO is considering accrediting underlying resources separately to assign capacity credits while we develop longer term accreditation based on construct changes and resource performance data

Contact

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Work related to hybrid resources is underway in the following MISO stakeholder forums:

Stakeholder Forum	Topic
Resource Adequacy Subcommittee (RASC)	Work on hybrid resource accreditation will begin in the September RASC.
Market Subcommittee (MSC)	MISO will present hybrid registration options under the existing Tariff in the September MSC.
Renewable Integration Impact Assessment (RIIA) Workshop Series	In Phase 2s and 3, the RIIA team is exploring the impacts of battery storage, higher levels of solar, and the introduction of hybrid resources. The next RIIA workshop is tentatively scheduled for end of September.
MTEP21 Workshop Series	A new resource profile designed for utility-scale PV + storage was introduced in the MTEP21 cycle (Futures Whitepaper). Discussions on resource additions and siting are underway in the MTEP workshop series.
Interconnection Process Working Group (IPWG)	MISO is presenting final language on a Tariff revision to clarify the use of existing studies for the Surplus process in the September IPWG.