



HYBRID RESOURCE ISSUES

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GUIDANCE ON USE AND APPLICATION OF HYBRID RESOURCE DYNAMIC LIMITS

GUIDANCE ON USE AND APPLICATION OF HYBRID RESOURCE DYNAMIC LIMITS

Problem Statement: Lack of Clarity and Consistency in the Permitted Applications of Dynamic Limits for Hybrid Resources Creates Ambiguity and Potential for Misinterpretation

- CAISO Tariff broadly "contemplates" the use of Dynamic Limits (DL), particularly for reflecting hybrid resource availability based on operating capabilities (e.g., State of Charge (SOC) and forecasted output) and managing onsite charging (Section 30.5.6.2) – However, the practical interpretation is unclear
- BPM for Market Operations provides specific scenarios for submitting hybrid DLs (ambient unavailability, lack of renewable fuel, state of charge, and onsite charging) – (Section 2.1.21.1)
- **The relationship between these scenarios and the broader concept of "SOC management" needs to be explicitly clarified**

GUIDANCE ON USE AND APPLICATION OF HYBRID RESOURCE DYNAMIC LIMITS

- CAISO has removed prior terminology related to DLs explicitly referencing "*SOC management*" in the BPM, but the continued presence of "*reflecting onsite charging*" and "*manage onsite charging*" remains, which presents challenges because these concepts are inherently linked to SOC management
- Existing language in the BPM stating "*Resource operators will need to manage the state of charge of any storage component through typical (Price, MW) bid submissions*" **seems to contradict – or at least does not clearly align with** – prior CAISO proposals and Board Memo statements on the intended use of DLs that included SOC management
- **Results in ambiguity regarding the appropriate scope of DL uses and presents compliance and monitoring challenges**

GUIDANCE ON USE AND APPLICATION OF HYBRID RESOURCE DYNAMIC LIMITS

Problem Statement: Storage Bidding Rule Changes and the Evolving Understanding of Hybrid Resource Operations Necessitates Clarification of the Appropriate Use Cases for Dynamic Limits

- The dynamic and complex nature of hybrid resource operational considerations requires a shared understanding of how DLs are necessary to ensure CAISO provides feasible awards and dispatch targets to effectively support market participation and reliability
- Despite prior initiative discussion and subsequent Board approval, resulting Tariff provisions and more recent updates modifying related BPM language causes a clear need to thoroughly discuss and solidify the appropriate use cases and applications of DLs to avoid any ambiguity or misinterpretation

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- CAISO's discussion paper reiterates that: "dynamic limit capacity representation must be in good faith, and any withholding of capacity for economic gain may be subject to FERC referral under Section 39 of the ISO Tariff." – at p.12
 - The CAISO's focus and emphasis here further underscores the critical need for clear guidelines to prevent unintended violations due to ambiguity in the provisions for utilization of DLs
- CAISO should clarify that DLs may be utilized for SOC management to avoid the potential for unintended or premature SOC depletion, particularly for those grid charging restricted hybrids
- **"Storage Design and Modeling" effort should develop a clear consensus and detailed guidance on the appropriate use of DLs** – Otherwise Scheduling Coordinators will continue to face challenges in optimizing hybrid resource performance, managing operational constraints, and ensuring compliance with market rules, including the good faith tariff requirements



HYBRID RESOURCE ANCILLARY SERVICES CERTIFICATION AND PROVISION ISSUES

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Problem Statement: The Absence of Clear and Explicit Guidance for Hybrid Resources Ancillary Services Creates Uncertainty and Inconsistency in the Certification Process and Participation

- CAISO has not provided guidance or provisions to clearly document any nuances specific to hybrid resource within the Ancillary Service (AS) certification process and has not developed consistent guidance for hybrid resources to provide AS
- While Appendix K and the Market Instruments BPM address Non-Generator Resource (NGR) AS certification and provision in detail, they lack any specific discussion or tailored guidance for hybrid resources, which possess unique operational characteristics – a unique type of NGR that requires further AS-related policy development and documentation

HYBRID RESOURCE ANCILLARY SERVICES CERTIFICATION AND PROVISION ISSUES



- Lack of clear provisions has led to relatively ad-hoc application of certification requirements for hybrids, resulting in inconsistent expectations and lack of transparency for market participants
- Evolution of expectations now requires hybrids providing Regulation to submit outages through OMS to reflect availability changes due to VER variability or SOC limitations
- Introduces a significant time-lag (approximately 35–45 minutes) between outage submission and its reflection in market processes, subsequent awards, and dispatch instructions, making it difficult for hybrids provide AS without overly conservative management by Scheduling Coordinators
- Status quo hinders the efficient integration of hybrid resources into the AS market, potentially impeding their participation and limiting the benefits they could provide



HYBRID RESOURCE OUTAGE MANAGEMENT ISSUES

Problem Statement: Lack of Granular Outage Management System (OMS) Functionality at the Component Level for Hybrid Resources Prevents Accurate Market Forecasting and Resource Management

- Current OMS lacks the capability to reflect outage or derate submissions at the individual sub-resource ID (component) level for hybrid resources, such as inverters for subset of arrays or battery racks within a larger hybrid resource facility
- This limitation prevents accurate and detailed information about component-level outages or derates from flowing into CAISO's market processes, leading to an incomplete picture of a hybrid resource's true availability
- Outages or derates of the Variable Energy Resource (VER) component within a hybrid do not currently feed into the CAISO VER forecast for hybrids

HYBRID RESOURCE OUTAGE MANAGEMENT ISSUES



- Potential negative impact on system-wide Residual Unit Commitment (RUC) forecasts and the anticipated RUC need, leading to inaccurate RUC procurement targets and inefficient market outcomes
- Inability to precisely reflect VER component outages/derates in the forecast makes it difficult for participants to accurately forecast RUC procurement and pricing (impacting both RUC and energy prices), resulting in inefficient and potentially overly conservative bidding and resource management by Scheduling Coordinators
- **CAISO should commit to exploring the feasibility and impact of updating OMS to allow for sub-resource ID component level outage or derate submissions** – If pursued, CAISO should subsequently ensure this granular information flows into the hybrid VER component forecasting and other relevant market processes

Problem Statement: The Evolving Landscape of Resource Adequacy (RA) with Concepts like Unforced Capacity (UCAP) Necessitates the Development of Component-Level Data for Hybrid Resources to Ensure Fair and Accurate RA Accreditation

- Contemplation of Unforced Capacity (UCAP) for storage capacity accreditation by the California Public Utilities Commission (CPUC) and CAISO introduces a critical need for more detailed, component-level information regarding hybrid resource derates or outages
- Without granular data on the availability and performance of individual components within a hybrid resource, it will be challenging to fairly and accurately apply the UCAP concept for hybrid resources in RA accreditation

HYBRID RESOURCE OUTAGE MANAGEMENT ISSUES



- Lack of hybrid resource component-level outage/derate data could lead to an imprecise assessment of a hybrid resource's true firm capacity, potentially disadvantaging these resources in RA procurement and undermining the integrity of the UCAP calculation
 - To ensure equitable and efficient RA mechanisms for hybrid resources, CAISO must work towards enabling the collection and utilization of hybrid component-level data, which is essential for effectuating any fair resource-specific application of the UCAP concept
- **Updating OMS – Time is of the essence**
 - CPUC has indicated a **probable UCAP go-live in 2028** with multi-year outage data utilization for resource specific accreditation also likely
 - Equitable hybrid resource and storage resource treatment UCAP is critical and OMS design and outage card type updates deserve prioritization under this effort and RA Modeling and Program Design (RAMPD) initiative – **closer coordination and urgency is needed**



HYBRID RESOURCE MITIGATION & DEB CONSIDERATIONS

HYBRID RESOURCE MITIGATION & DEFAULT ENERGY BID CONSIDERATIONS

Problem Statement: Applying Mitigation to Hybrid Resources Without Clarification on Mechanisms for Managing SOC and Grid Charging Restrictions May Lead to Operational Inefficiencies and SOC Mismanagement and Compliance Challenges

- The composite nature of hybrid resources with multiple fuel types necessitates a DEB formulation that accounts for varying marginal and variable costs, which can fluctuate dynamically over different timeframes (days, hours, sub-hourly), and operational complexity in managing SOC and grid charging restrictions may not be well reflected
- Existing market design and additional potential for mitigation without explicit allowance for Dynamic Limits to be utilized for SOC management may result in SCs inability to manage SOC, leading to unintended premature depletion, potentially impacting resource availability
- Without clear provisions for dynamic limits, SCs will struggle to observe grid charging limitations and consistently meet CAISO dispatch instructions, introducing operational risks and potential compliance challenges