

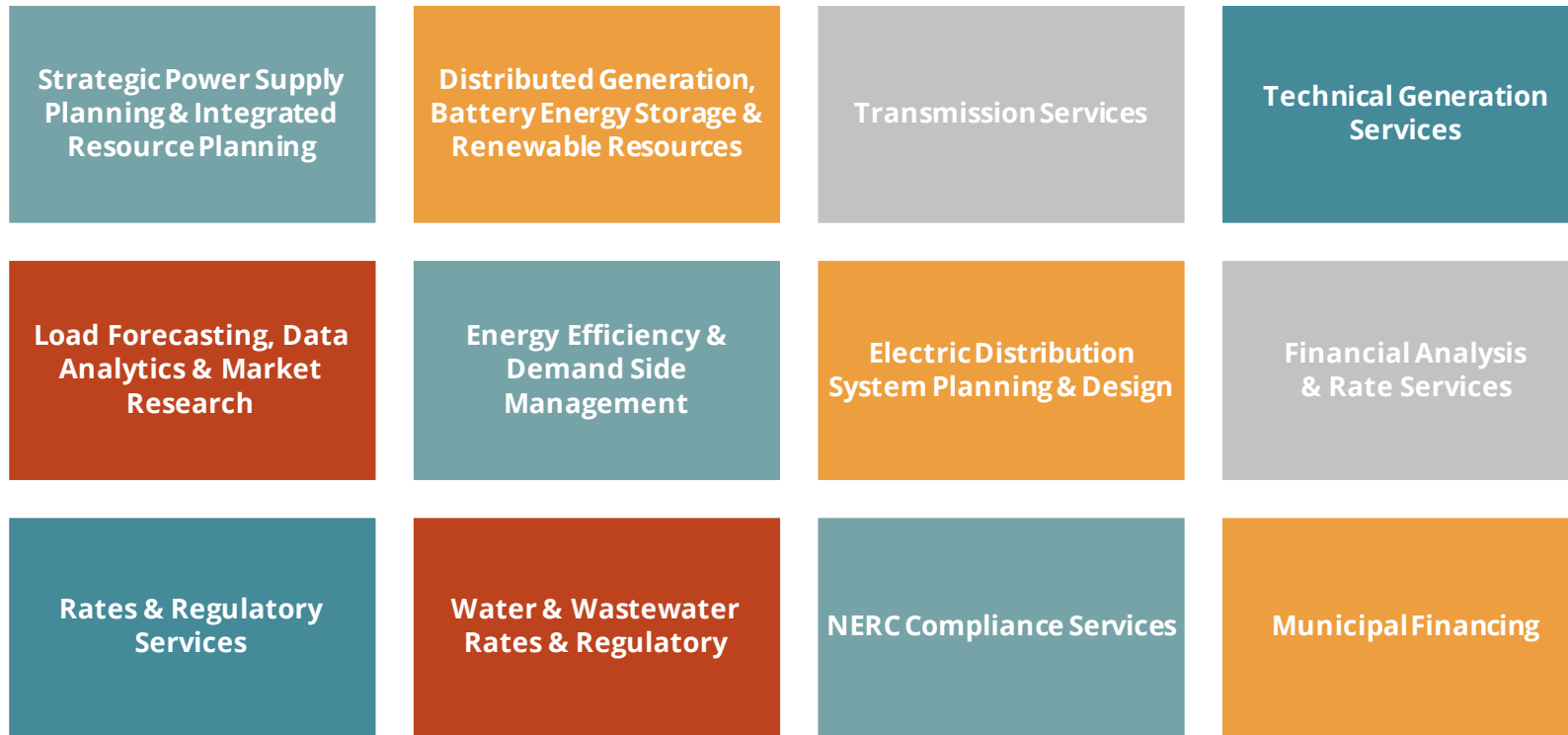


PRESENTED BY GDS ASSOCIATES, INC.

ENERGY STORAGE ENHANCEMENTS WORKSHOP

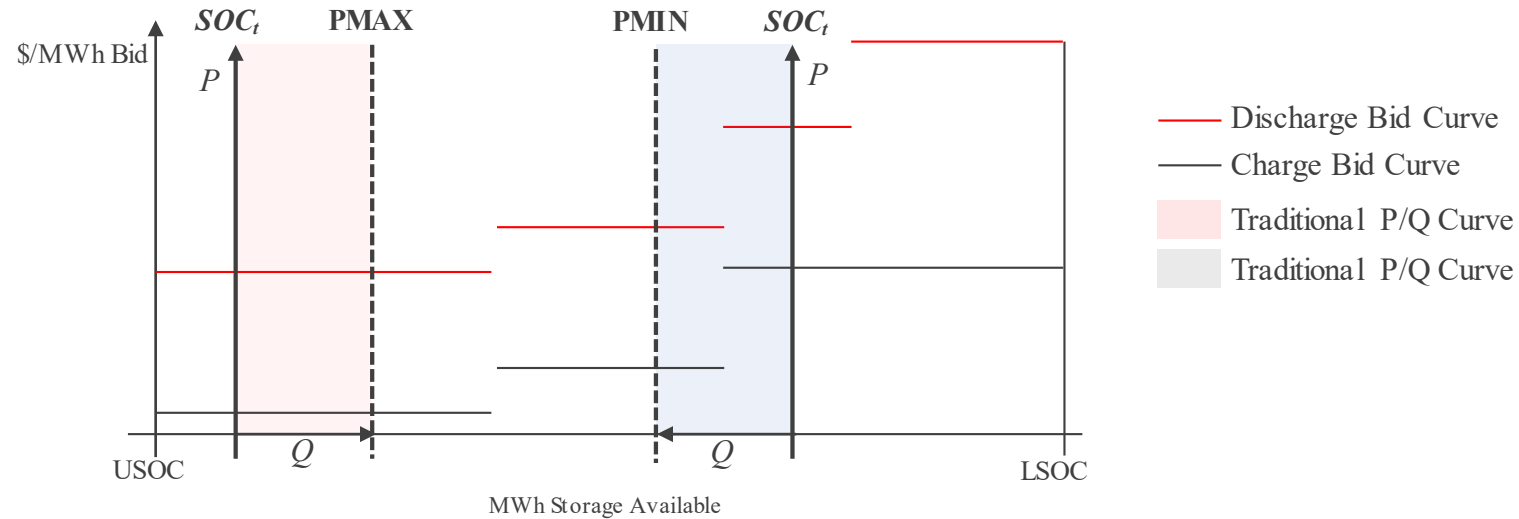
April 13, 2022

ABOUT GDS



- **GDS provides engineering and consulting services to electric utility clients across the country**
- **GDS's 185 consultants assisted over 700 clients in 2021**

ENERGY STORAGE RESOURCE MODEL ALLOWS MORE EFFICIENT MANAGEMENT OF SOC BY RESOURCE



- Dynamically updates the bid curve within the operating hour
- Accurately reflects higher cost to operate at higher/lower SOC
- Risk of inadequate SOC in the future can be directly reflected in bid

NEED FOR OUT-OF-MARKET ACTIONS SIGNIFICANTLY REDUCED BY ESR MODEL

- ❑ **Understand that it is unrealistic to completely eliminate need for ExD**
 - *Need settlement approach to reflect forgone energy revenues*
- ❑ **Ideal dispatch over ExD period and battery's full duration is a reasonable calculation MWh impact**
- ❑ **The price impact is likely overstated because ExD keeps resource's bids out of the bid stack**
- ❑ **Reasonable approach given expectation that need for this ExD will be rare given ESR model**

GIVEN INTRODUCTION OF ESR MODEL, UNSURE IF ADDITIONAL CONSTRAINTS ARE NEEDED

- **Limited data to support claims storage being always on-line is causing a concern to existing MOCs**
 - *Why is SOC ExD insufficient if this is rarely needed?*

- **Contingency modeling enhancement, which would have priced minimum online constraint, was not implemented**
 - *Can prior CME prototype be used to evaluate if there is actually a need?*

- **Significantly more documentation is needed on how “these requirements will be imposed as constraints ... and factored into market prices”**
 - *This seems rushed. CME took 4 years to develop and wasn't implemented.*
 - *Why would this not be considered in the pending Price Formation initiative?*

ABOUT US



Perry Servedio

Mr. Servedio has over 13 years of experience in the electric energy industry with more than three years of service at the Federal Energy Regulatory Commission (FERC) and nine years of operations and policy development experience at California ISO (CAISO). Mr. Servedio has led the design, contemplation, and review among stakeholders of CRR market, day-ahead market, and real-time market reforms. His expertise in CAISO markets and the Western Energy Imbalance Market provides an excellent resource to evaluate changing market landscape in California and the Western Interconnection.



Matt Smith

Mr. Smith has over 17 years of engineering experience in utility scale renewable power generation technology and battery energy storage systems. A large part of his professional career has been centered around technical analysis of solar, wind, and battery energy storage systems, and supporting the economic feasibility analysis for performance and maintenance of those assets, including appropriate O&M schedules and programs to maintain reliability of the projects for the duration of the expected life. His extensive expertise in battery performance and operations, maintenance protocols, and capacity sizing provides an excellent resource to asset developers, owners, and operators.