

# BESS Integration with Renewables in ERCOT

A leading multinational renewable energy corporation selected CES to model and analyze the dispatch and financial performance of a battery energy storage system (BESS) added to wind and solar project sites located in the ERCOT market.

## OBJECTIVE

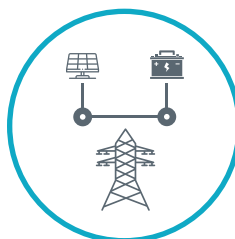
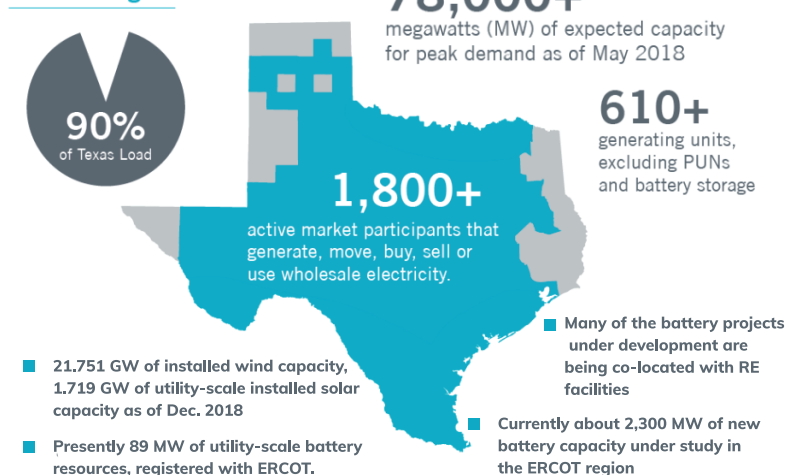
- Assess the potential for incremental market revenues and overall financial performance to value the investment potential from the deployment of battery energy storage system (BESS) to existing wind farm and solar sites in Texas, under the ERCOT market.
- Analyze deployment of the BESS in various sizes and layouts: Co-Located, Coupled with grid charging and Coupled without grid charging to investigate optimal configurations and operational strategies.
- Include considerations to specific power purchase agreements (PPA) and revenue hedges available for each site.

## OUR APPROACH

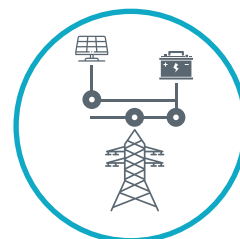
CES team performed a methodical assessment of the asset deployment opportunity that included the following steps:

- Sizing options of BESS based on RE generation and LMPs
- Development of ERCOT market price forecasts
- Selection of Ancillary Services
- Identification of opportunity costs for BESS charging from RE generation
- BESS degradation and energy throughput
- Complexity of Frequency Regulation signals in ERCOT
- De-rating of BESS to enforce cycling limits
- Investment Tax Credit (ITC) benefits
- Revenue assessment and financial ratios

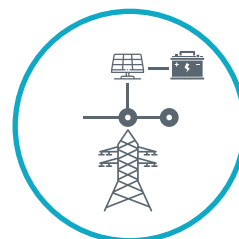
### ERCOT Region



Co-Located with RE



Coupled with Grid Charging

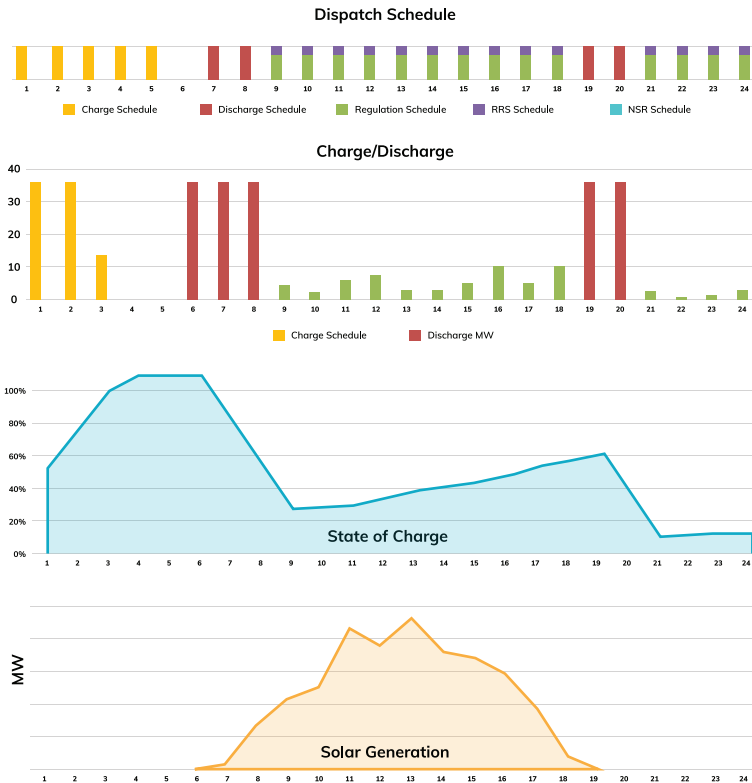


Coupled w/o Grid Charging

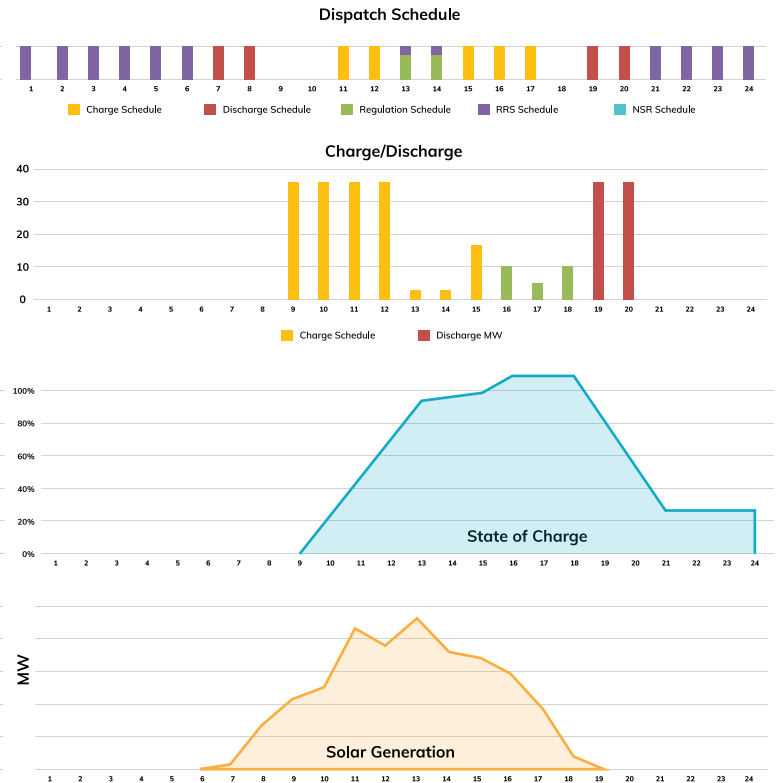
## FACTORS INFLUENCING BESS DISPATCH

- Availability of RE generation
- PPA commitments, hedging contracts
- BESS sizing, reserve capacity
- Opportunity costs of RE Generation
- Market participation rules
- Selection of services
- State of Charge (SOC) Management
- Degradation and Cycling
- Provision of multiple services in the same market hour
- Value Stacking

## BESS Coupled with Grid Charging



## BESS Coupled without Grid Charging



Sample dispatch of the BESS providing Energy Arbitrage, Frequency Regulation (FRS) and Spinning Reserve (RRS) Services to the ERCOT Market

## OUTCOMES

CES developed project term revenue projections for a BESS offering various stacked services to the ERCOT market, utilizing dispatch simulations from our proprietary CoMETS platform and our market price forecasts. CES analysis included modeling sensitivities for various BESS sizes and layout configurations and formulation of key financial ratios of IRR and NPV for comparative valuation of the investment opportunity. Key outputs from our financial pro-forma were used by the client in further project analysis and internal financial modeling.

### Incremental Rate of Return (IRR)

#### Coupled with Grid Charging



## ABOUT CES

Established in 1998, Customized Energy Solutions (CES) is a consulting and services company with over 20 years of diversified experience across North American energy markets. CES offers best-in-class hosted energy market operations platforms and a wide spectrum of consulting services. CES is committed to promoting economic development through the advancement of transparent, efficient, and non-discriminatory wholesale, retail electricity and natural gas markets. Our practical experience running daily operations of over 220 MW of advanced energy storage facilities and advising clients on policy matters provides our team with superior credentials that sets our consulting services apart from other providers.

## CONTACT US

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