



# EMERGING TECHNOLOGIES



**Customized  
Energy Solutions**

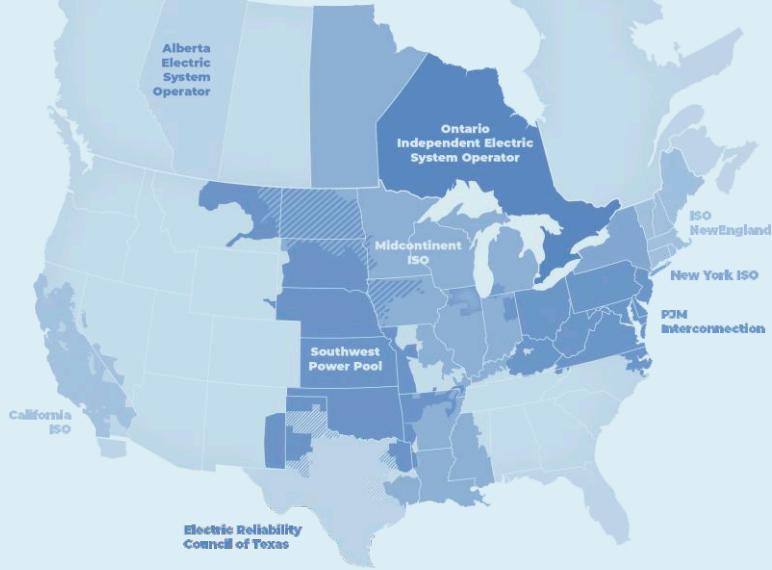
ANALYZE. SIMPLIFY. IMPLEMENT.

Enabling the adoption of newer energy storage technologies and advancement of competitive markets to foster the energy transition of tomorrow

## CES Emerging Technologies

CES Emerging Technologies is at the forefront of the energy transition powered by newer technologies like energy storage, electric vehicles and green hydrogen. Over the past decade, CES has made significant investments in developing an integrated ecosystem spanning energy market operations, market intelligence, policy expertise, technical capabilities, advanced modeling tools, optimization algorithms and software platforms.

We offer an industry leading range of consulting services to project developers, investors, technology companies and market participants to understand the evolving



market rules, quantify the impacts and discover the value proposition of new technologies.

With a presence across all north American competitive markets, the CES Emerging Technologies team has provided consulting and services to over 10 GWh of advanced energy storage resources globally.

## Market Intelligence Services

### Market Overviews:

Reports across regional energy markets that provide insights on market characteristics, key drivers, revenue opportunities, price trends and policy developments impacting storage and renewable paired projects. Available for all North American ISO/RTO's, these reports are essential reads for new entrants to the energy storage industry.

### CES Market IQ:

Monthly reports that help all segments of the market, from largest integrated utilities to the smallest storage developers across all the ISO's, to navigate the most complicated set of rules, tariffs, manuals, protocols, processes. Regular monthly phone conference with the team consisting of regulatory, market and policy experts, help maximize profitability and enable clear decision-making abilities.

### Research Reports:

Detailed sectoral reports on technologies like Electric Vehicles and Green Hydrogen provide an in-depth view into technology details, key drivers, applications, present scenario, ecosystem analysis, policy outlook, forecast deployment, costs and economics, market projections and challenges. The reports include information on major players in the market and key strategies that target sustained growth.



## Market Advisory Services

### Strategy Consulting

Our strategy consulting services help clients successfully enter and navigate the emerging technologies markets and help achieve key organizational objectives. Specifically, we help clients:

- Perform critical due diligence of technologies
- Evaluate the market environment, applicable rules, laws and regulations
- Analyze the competitor landscape, identify key players and prevalent business models
- Align strategic vision with business goals, identify business options and develop strategies
- Develop strategic implementation plans for specific opportunities
- Perform full financial analysis around project development and forecast business profitability

### Project Development Analytics

We provide customized analytical offerings to help clients discover development potential for siting energy storage projects over large geographical footprints. Our analytics enable:

- Geographic assessment of project siting and development opportunities
- A methodical approach that combines qualitative and quantitative aspects of site prospecting
- Assessment of revenue potential that is derived from industry standard price forecasting models
- Layered approach with market intelligence and evolving electric system level data
- Significant cost savings with prioritization of project development efforts

## Revenue Modeling and Optimization

### Comprehensive Market Evaluation Tools for Storage (CoMETS):

CES has developed an advanced set of dispatch modeling and optimization tools for energy storage and related technologies called CoMETS. It is developed in Python from the ground up and the core optimization engine is based on mixed integer linear programming methods which provide for maximization of an objective function subject to technology and market constraints.

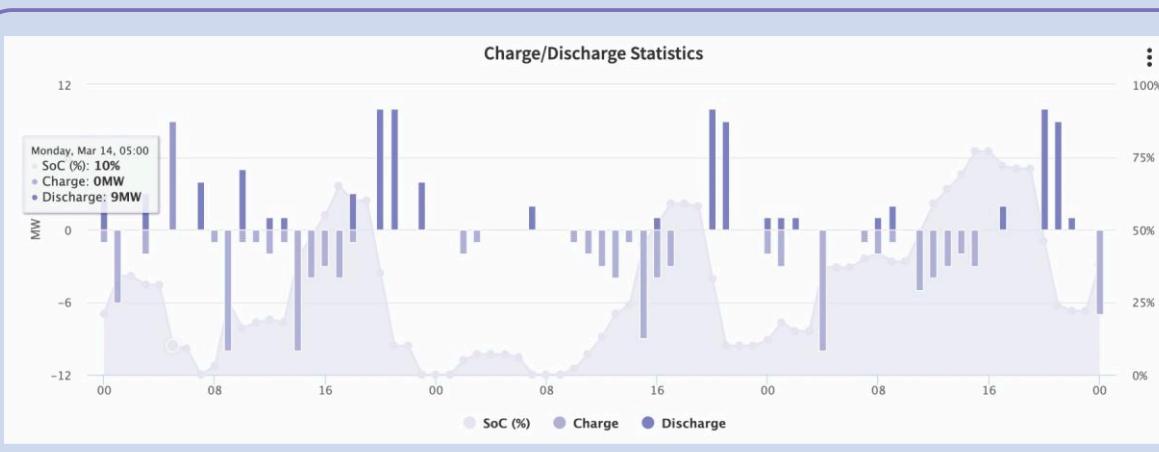
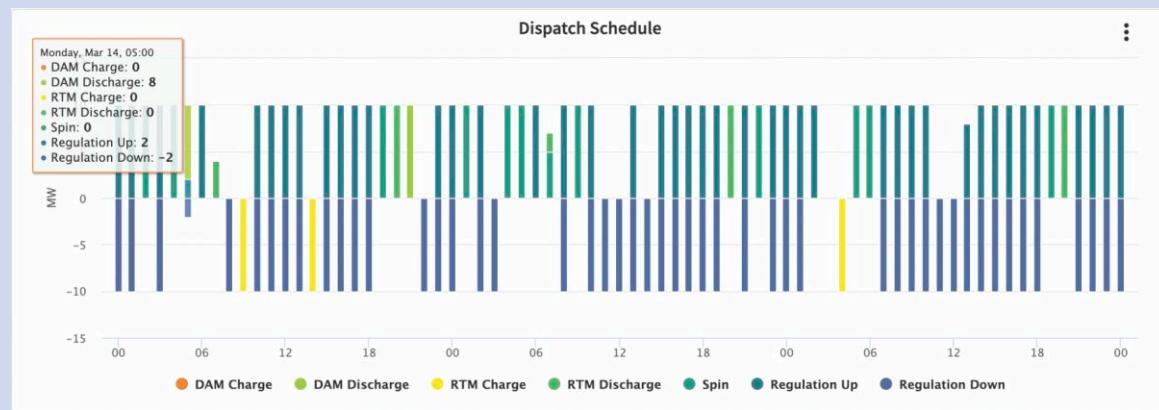
Used by numerous clients across North America and internationally, our modeling tools are ever evolving in response to emerging technologies, market rules, project configurations, couplings with renewable energy projects and power purchase agreement structures.

Our practical experience managing over 500 MW of advanced energy storage resources across major markets informs our modeling methodologies and that sets us apart from competition

- Standalone Storage
- Behind the Utility Meter Storage
- Distribution connected storage with exposure to demand charges
- Solar plus Storage with AC/DC coupling
- Dispatch from Frequency Regulation
- Behind the Retail Meter Storage
- Microgrids

## Salient Features of CoMETS:

- Integrated Market Price Forecasts
- Multi-Stack Revenue Optimization
- Sub-Hourly/Hourly Dispatch
- RE Charging and Optimization
- Degradation Modeling
- Operating Restrictions



# Financial Analysis

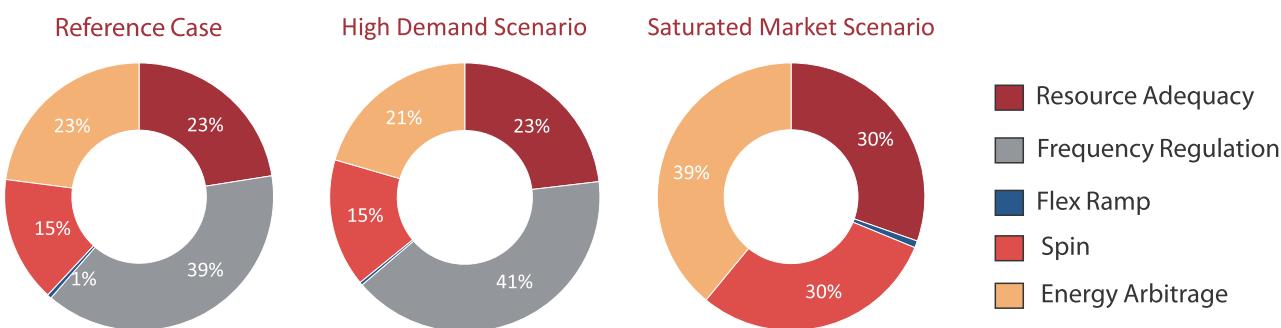
**Project Financial Modeling:** Our spreadsheet-based project finance models are integrated with CES CoMETS. Our financial models cover standalone, co-located and hybrid energy storage projects under merchant as well as power purchase agreement contracts. Our models enable clients to:

- Size standalone and coupled projects
- Select AC/DC coupling method
- Assess financial impacts of capacity augmentation
- Determine preferred operating model: Co-Located vs Hybrid
- Assess sensitivities to variations of capex and opex inputs

**Portfolio Due Diligence and Valuation:** We offer portfolio due diligence, investment review and financial valuation services for portfolios of energy storage projects, both front and behind the retail meter. Our models can simulate optimal dispatch for multiple project sites and assess revenue potential at the portfolio level. Our services include:

- Analysis of Sellers Pro-Forma
- Review of investment pitch-book and presentation
- Financial due-diligence and risk analysis
- Independent valuation of project portfolio

## Annualized Revenues



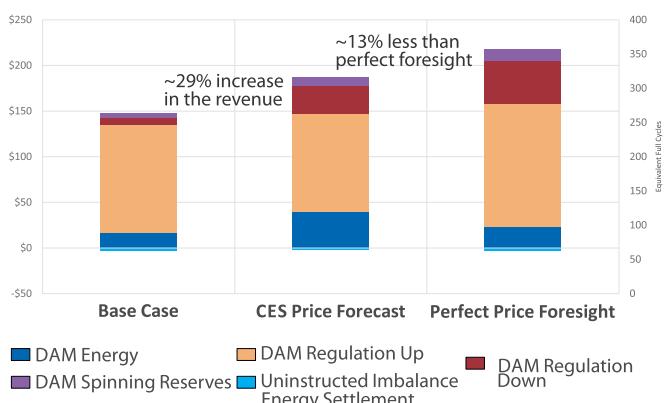
# Market Operations and Optimization

**Market Operations:** Our 24-hour Market Operations Center (MOC) and Operations Control Center (OCC) provides full spectrum market scheduling and dispatch services to energy market participants. Our services include real time markets, operations strategy, curtailment management, outage coordination, optimization strategies. CES currently manages over 500 MW of advanced energy storage resources across major wholesale energy markets.

**Bid Offer Optimization:** Powered by our ML based GridBOOST platform, CES offers advanced bid offer optimization services to market participants. GridBOOST provides a dynamic strategy for optimal price- quantity bidding and addresses market price dynamics, forecast uncertainties and complexities of market rules.

## GridBOOST includes:

- Optimization with multi-value stack
- Consideration of technology constraints
- Characteristics of battery degradation
- Integration with third party forecasts
- Ability to optimize at sub-hourly level



## About CES

Customized Energy Solutions is a leading energy advisory and services company headquartered in Philadelphia, PA. Established in 1998, CES assists clients in managing and staying ahead of the changes in the wholesale and retail electricity and natural gas markets. CES has steadily expanded its best-in-class hosted market operations platforms and services globally and is now serving more than 400 customers operating in the United States, Canada, India, Japan, and Mexico.

**Customized Energy Solutions is proud to have been recognized 11 times in Inc. 5000 as one of the most successful companies in the United States.**

Customized Energy Solutions is committed to promoting economic development through the advancement of transparent, efficient, and nondiscriminatory wholesale and retail electricity and natural gas energy markets. CES focuses on empowering clients by sharing a detailed understanding of the workings of the energy markets and related new technologies and supporting our clients' operations in those markets.

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