



Stem

NY-ISO DER Roadmap
December 5, 2016

stem

Stem: Energy storage is ready



Largest Market Share

250+ Systems Operational

Working with 20% of Fortune 500



Most Project Finance

Largest, most innovative funds

\$350M+



Most Utility Contracts



Wholesale Market Leader

1st in Real-Time & Day-Ahead

Hundreds of bids, 100% execution



High Caliber Investors



Distinguished Awards



Premium Partners



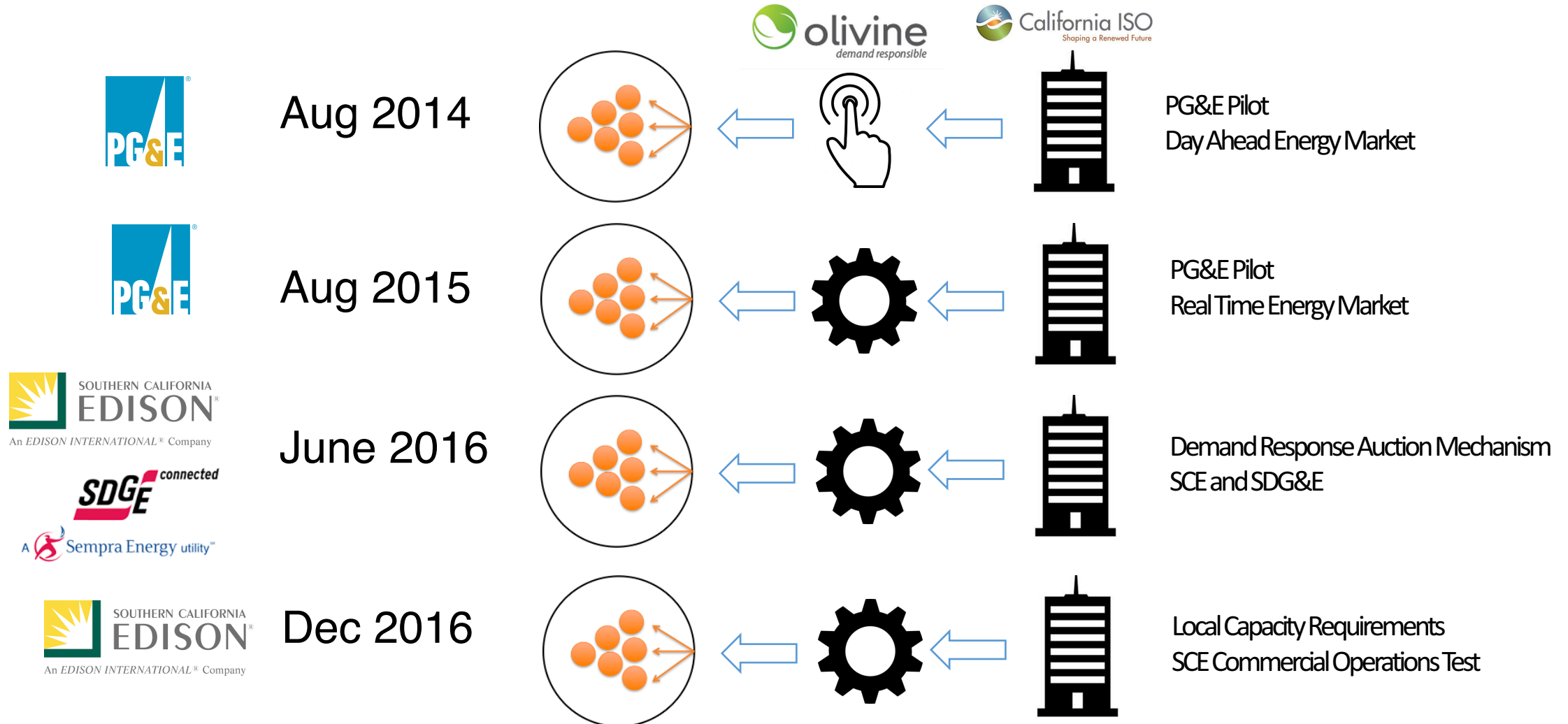
Thought Leader

National and industry press

Frequent analyst coverage

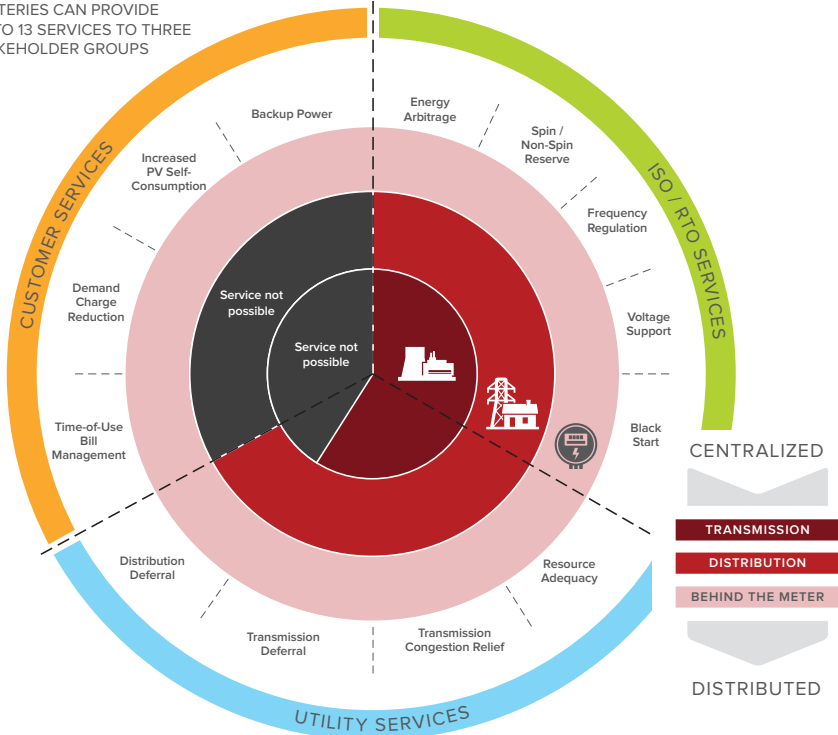
500M+ media impressions per year

Stem Market Participation



Enable, don't Re-invent

FIGURE ES2
 BATTERIES CAN PROVIDE
 UP TO 13 SERVICES TO THREE
 STAKEHOLDER GROUPS

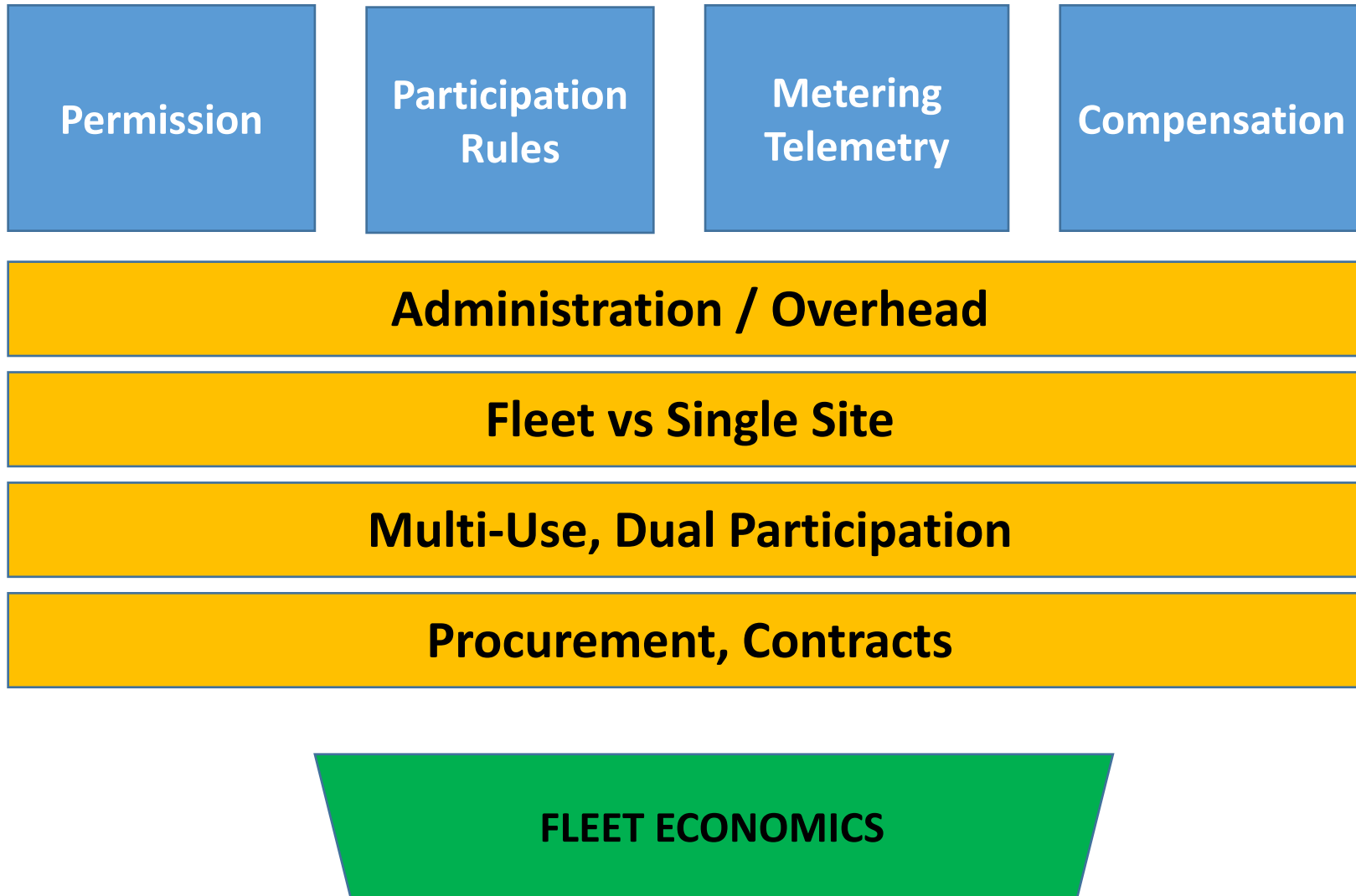


THE ECONOMICS OF BATTERY ENERGY STORAGE | 4

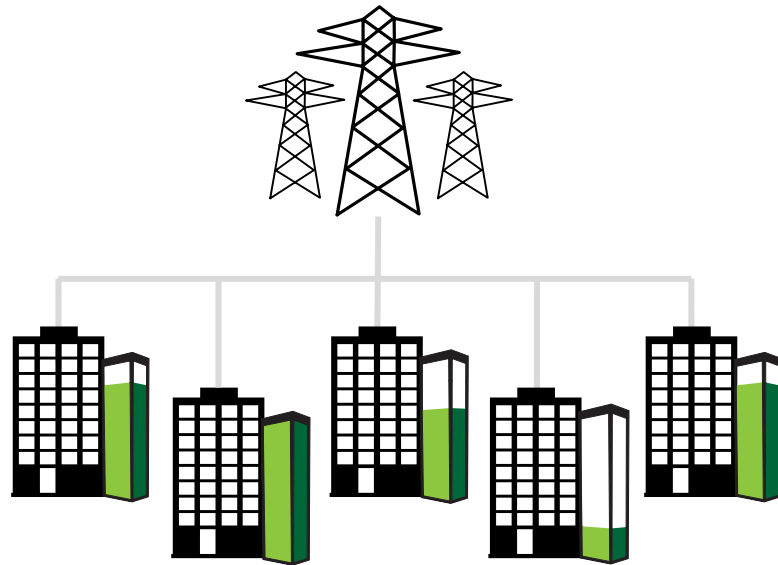
- Most ISO/RTO's exploring distributed storage aggregation
- Accelerate NY-ISO DER Roadmap with lessons learned from operational markets
- Don't boil the ocean – practical, simplest application can be implemented quickly
- Enabling aggregated, non-exporting storage minimizes effort while gaining real experience



Market Participation Framework



CAISO – Proxy Demand Resource



- Permission
 - Energy, “Capacity”, reserves; no FreqReg
 - 100 KW minimum aggregation
 - Dual Participation restrictions
- Participation Rules: As awarded, Use-limited
- Metering / Telemetry: Aggregated
- Compensation: 10-in-10 Baseline evolved to MGO
- Overhead
 - Demand Response Provider registration
 - Site registration in fleet
 - Settlement through 3 entities
- Contrast to DERP
 - 24x7 settlement
 - Exporting, can do Freq Reg

CA Demand Response Auction Mechanism (DRAM)

2016 Pilot Award

- 100 KW with SCE
- 250 KW with SDG&E

Online date: June 2016

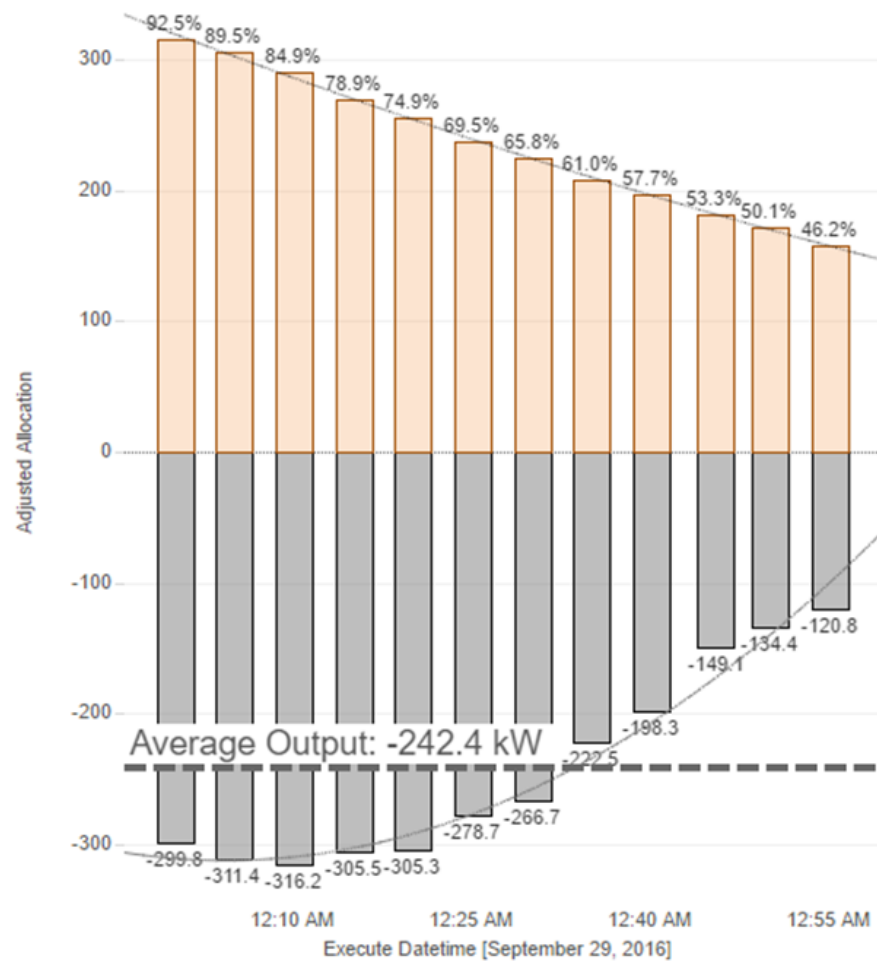
Term: 7 months

- CAISO Proxy Demand Resource
- First multi-use example
 - system resource adequacy (RA) requirements
 - Customer demand charge mgmt

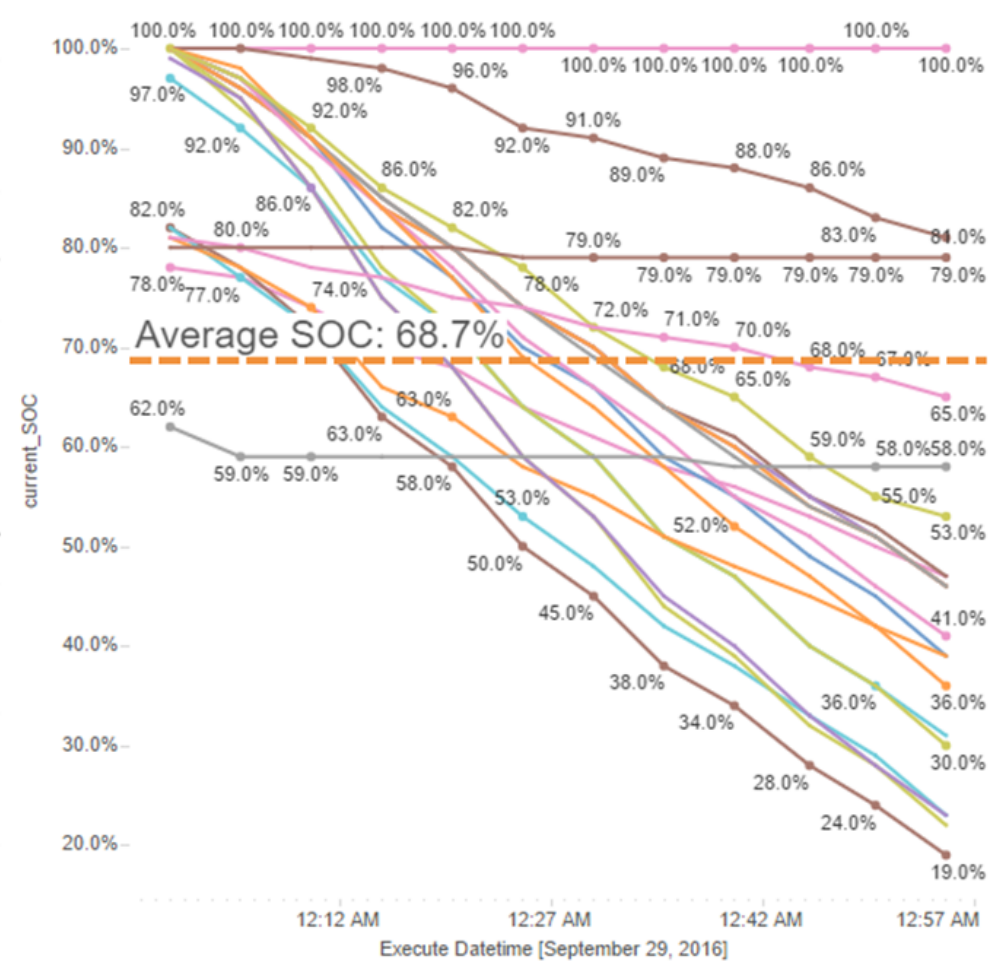


DRAM Event – Fleet Status

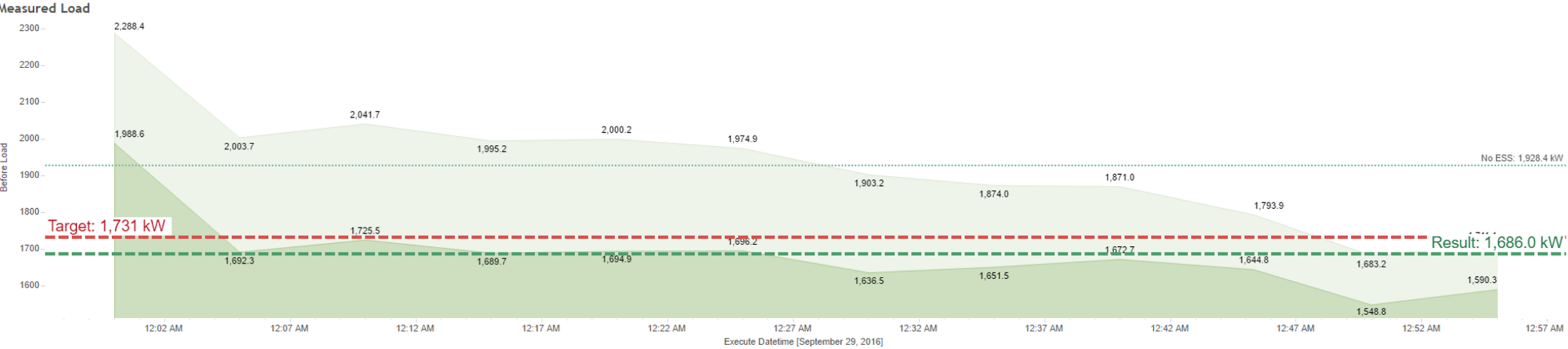
Power Output Live



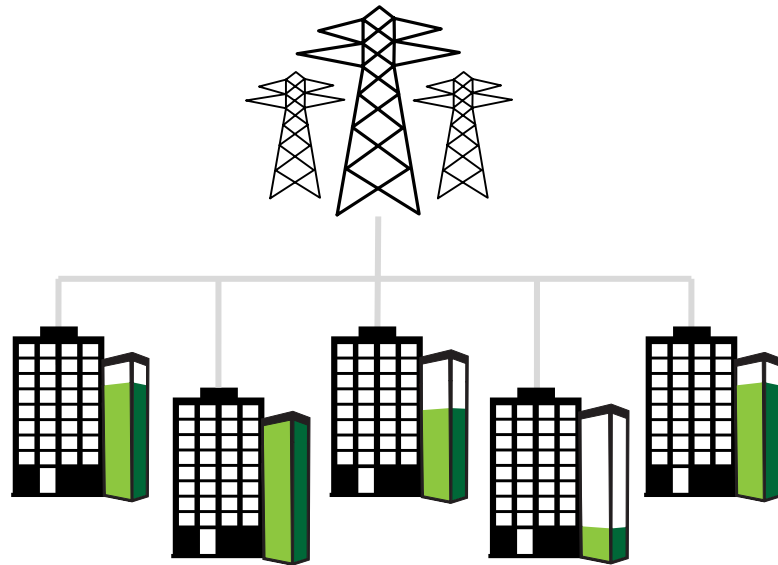
PDR SOC



DRAM Event – Aggregated Load



CAISO Aggregation – Lessons Learned



- Permission
 - Dual Participation restrictions severely limit market
- Participation Rules: Must Offer Obligations
 - Full Capacity value for less than 24x7
- Metering / Telemetry: SC costs are high
- Compensation
 - DR Baseline adds considerable risk
 - DR Baseline restricts technologies like solar+storage
 - Non-export restriction
- Overhead
 - Site registration one of largest extra costs
 - Retail meter dependence – settlement costs

NYISO DER Roadmap – First step

- “Minimum Robust Product”
 - Simplest use case
 - Rules and IT systems evolve with experience
- Aggregation of BTM resources
 - 100 KW minimum, Zonal (note FERC NOPR)
 - Non-exporting: avoids interconnection, jurisdiction issues
- Dual Participation
 - Retail bill & Wholesale service
- Metering
 - MGO metering: Simplifies software and overhead
- Performance Obligations
 - Not a generator
 - Retain only necessary restrictions

