

2018 NASEO Annual Meeting

*Utility Rate Design Innovations &
Reinventing Distribution System Planning:*

A BTM Storage Developer's Perspective

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Stem Overview



Stem operates the world's smartest and largest digital energy storage network

Founded:	2009
Headquarters:	Millbrae, CA
Employees:	150+
Operations In:	CA, HI, NY, TX, MA, Japan, ONT
Pipeline & Installed:	900+ sites, 250+ MWh
Installed:	400+ sites, 3.5M+ device hours
8 utility contracts:	350 MWh
Project Finance:	\$650 MM

High Caliber Global Investors



RWE

MITHRIL



ANGELENO GROUP



Distinguished Honors & Awards

Greentech Media: 2018 Grid Edge Innovation Award
SEPA Power Player 2017: Innovative Partner of the Year



Stem's Solution Components



Athena™ Artificial Intelligence

Automatically controls when energy storage charges and discharges to optimize timing, maximize savings, and create virtual power plants.

Energy Storage Systems

Modular options for all facility sizes and locations. Batteries from leading global manufacturers.



Small indoor
18 kW modules

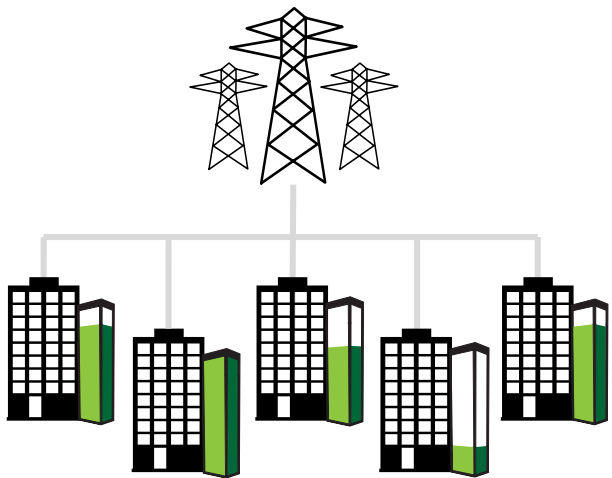


Large outdoor
Scalable from 100 kW to 5+ MW



Medium indoor
132 kW modules

Virtual Power Plants



Energy Superintelligence™

- Stem's network of storage systems can be dispatched as a "Virtual Power Plants" for utilities and grid operators
- Cloud-based AI software automatically optimizes each system to help the customer and the grid at the same time
- Machine learning and big data processing allow software to learn from each event and grow smarter



Transforming the Energy Sector: Distribution Planning & Tariff Design

CA DRP/IDER Approach

- DRP – Planning for the Grid
 - Integration/Hosting Capacity Analysis – where, what & how much?
 - Locational Net Benefits Analysis
 - Distribution Deferral Opportunities/Non-Wires Alternatives
- IDER – Sourcing DER
 - Focus has so far been IOU procurement
- Grid Modernization
 - Balance IOU investments with 3rd Party DER sourcing
 - Need to avoid over-investment / stranded investments

Utility Vs. DER Investments

- Move from utility capital investments to 3rd party & software + services sourcing
- DER Sourcing Options:
 - Procurement
 - Pricing/Tariffs
 - Programs
 - Market Mechanisms
- No “one-size-fits-all” approach – different needs/timing require different solutions
- Need to modify regulatory framework to support DER/clean energy integration
- Performance Based Regulation is a good starting point

Rate Design Principles for DER

- In General, Avoid Resource-Specific Tariffs
- Dynamic Pricing Options
 - Temporally (TOU, RTP, etc.)
 - Locationally (LMP, Options Tariffs, etc.)
- Separate tariffs for services (versus consumption)
 - Energy, Capacity, Ancillary Services (Voltage/Frequency Support)
- Move from Non-Coincident Peak Demand to Coincident Peak
 - Coincident with either system or distribution circuit peak
 - Daily Demand Charges (DER as Non-Wires Alternatives)

Market Mechanisms

- It's all about the data!
- Locationally granular
 - How granular should we get?
- Timing
 - Short-term, small investments vs. long-term capital investments
- Contingency
 - May help resolve contingency concerns associated with procurement, tariffs or program sourcing mechanisms
 - Depends on having a well-designed, well-functioning market

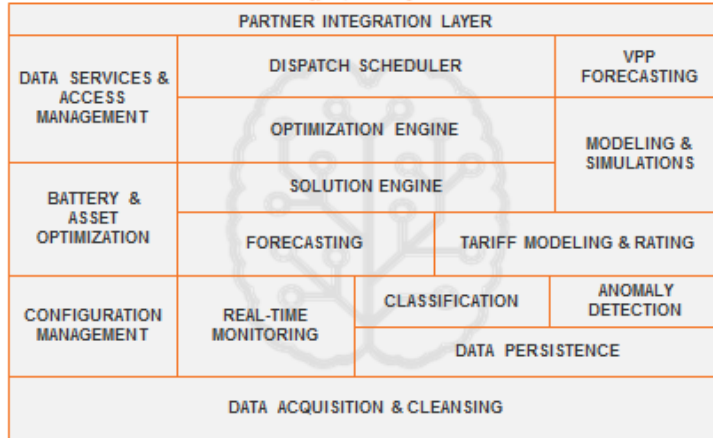
Stem's AI-Driven VPP Approach

The Stem Energy Platform – Athena

- > Real-time telemetry and multiple external data services stream information to Stem's predictive analytics and optimization engine
- > Stem's machine learning algorithms optimize the asset's operations to deliver value for customers
- > Provides grid assets for the utility's needs

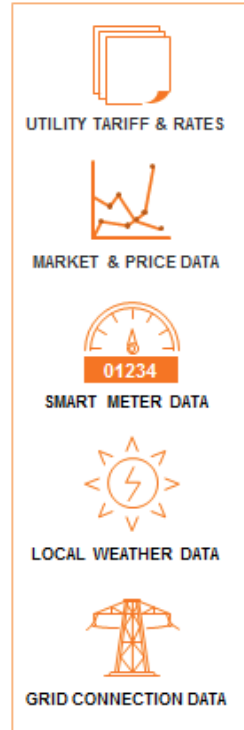


UTILITY & GRID CONTROL SYSTEMS

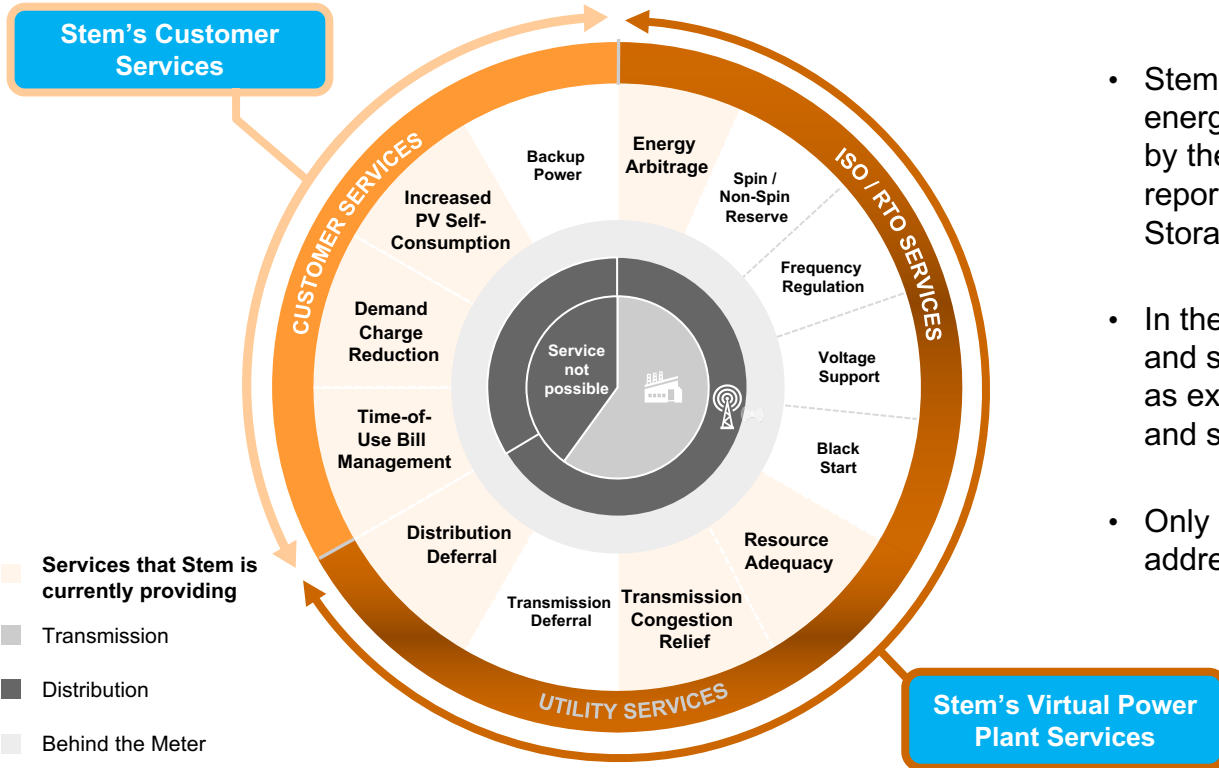


REAL-TIME TELEMETRY AND EVENT DATA

REAL-TIME SUPERVISORY AND OPERATIONAL CONTROL SIGNALS



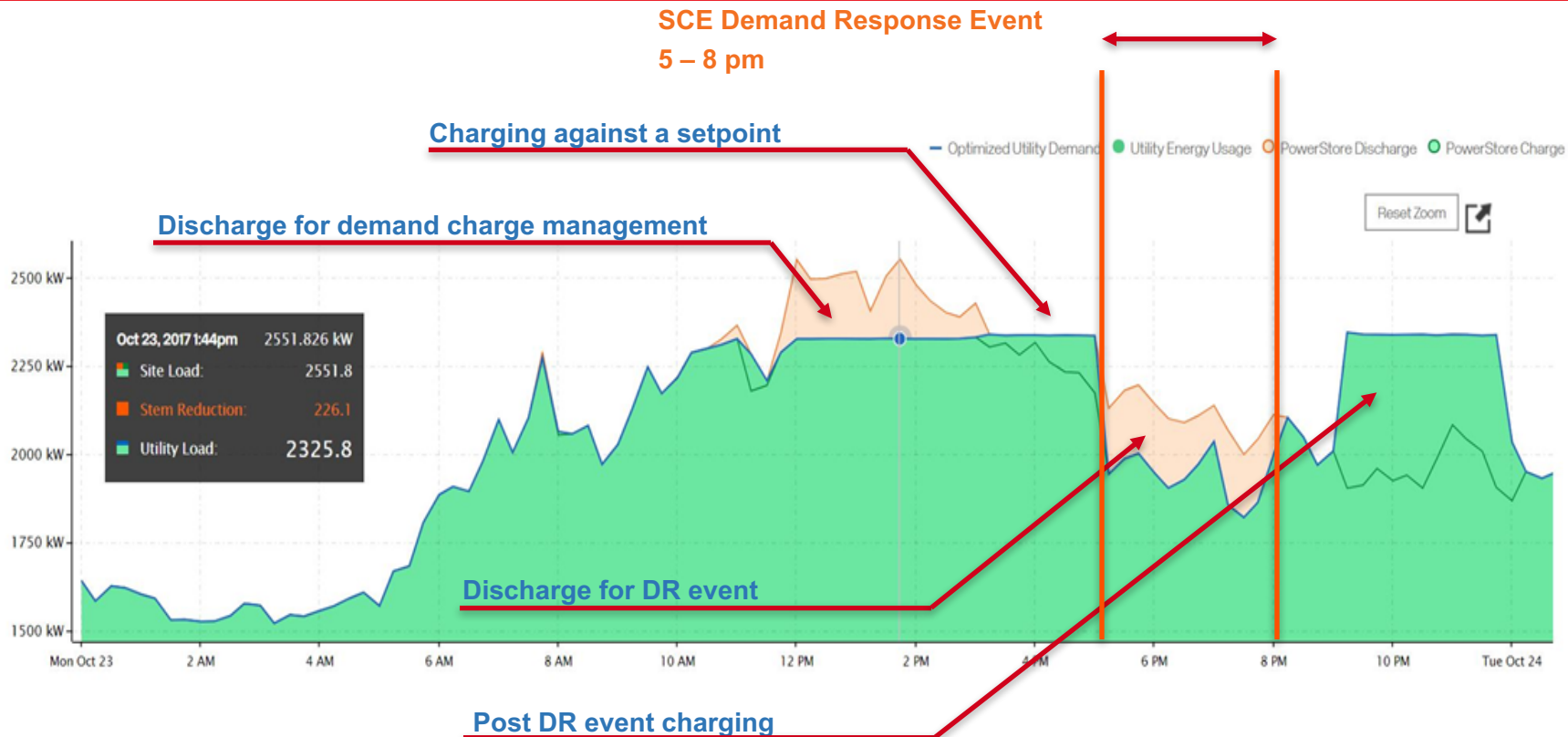
AI-driven optimization of customer & grid benefits



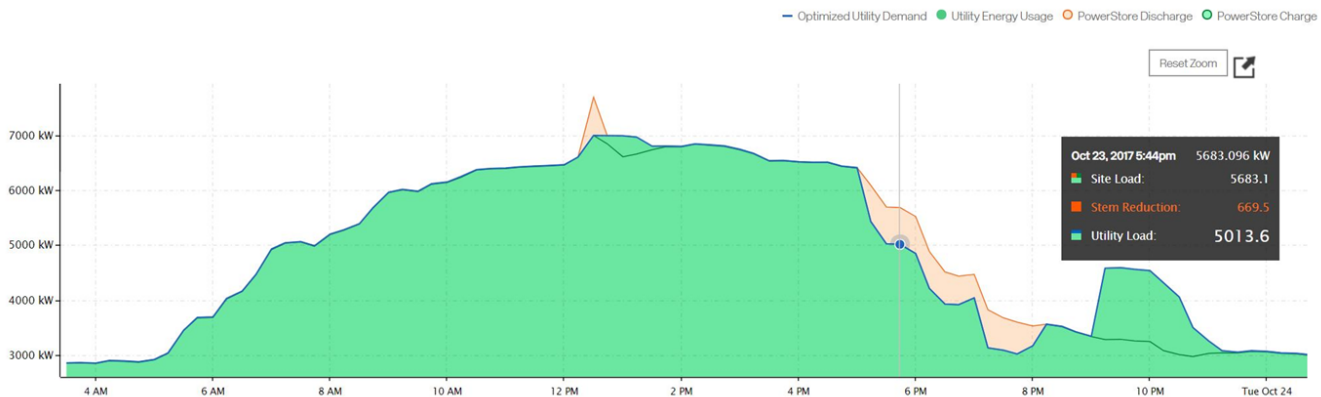
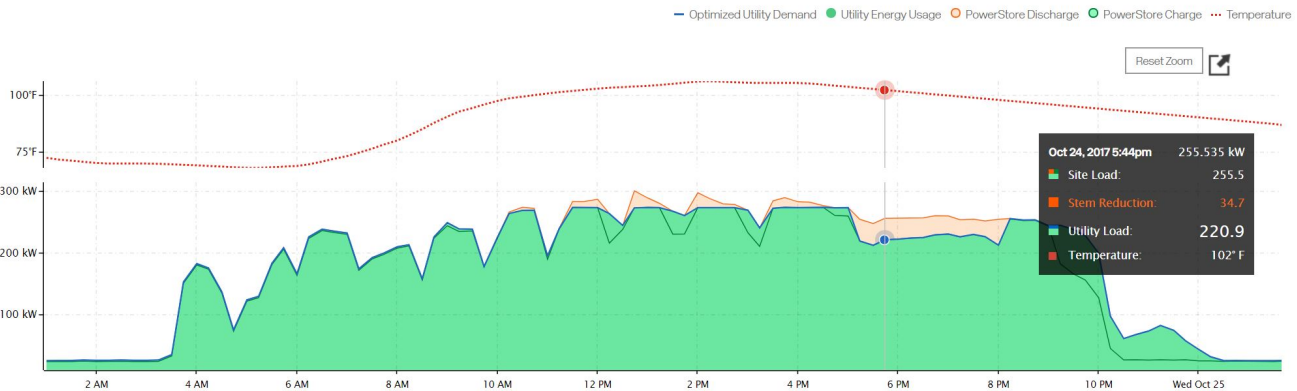
- Stem is currently monetizing 7 of the 13 energy storage value streams as identified by the Rocky Mountain Institute in their report “The Economics of Battery Energy Storage”
- In the future, Stem intends to co-optimize and stack these revenue streams as well as expand the scope of available offerings and services
- Only behind-the-meter solutions can address all 13 value streams

Source: Rocky Mountain Institute.

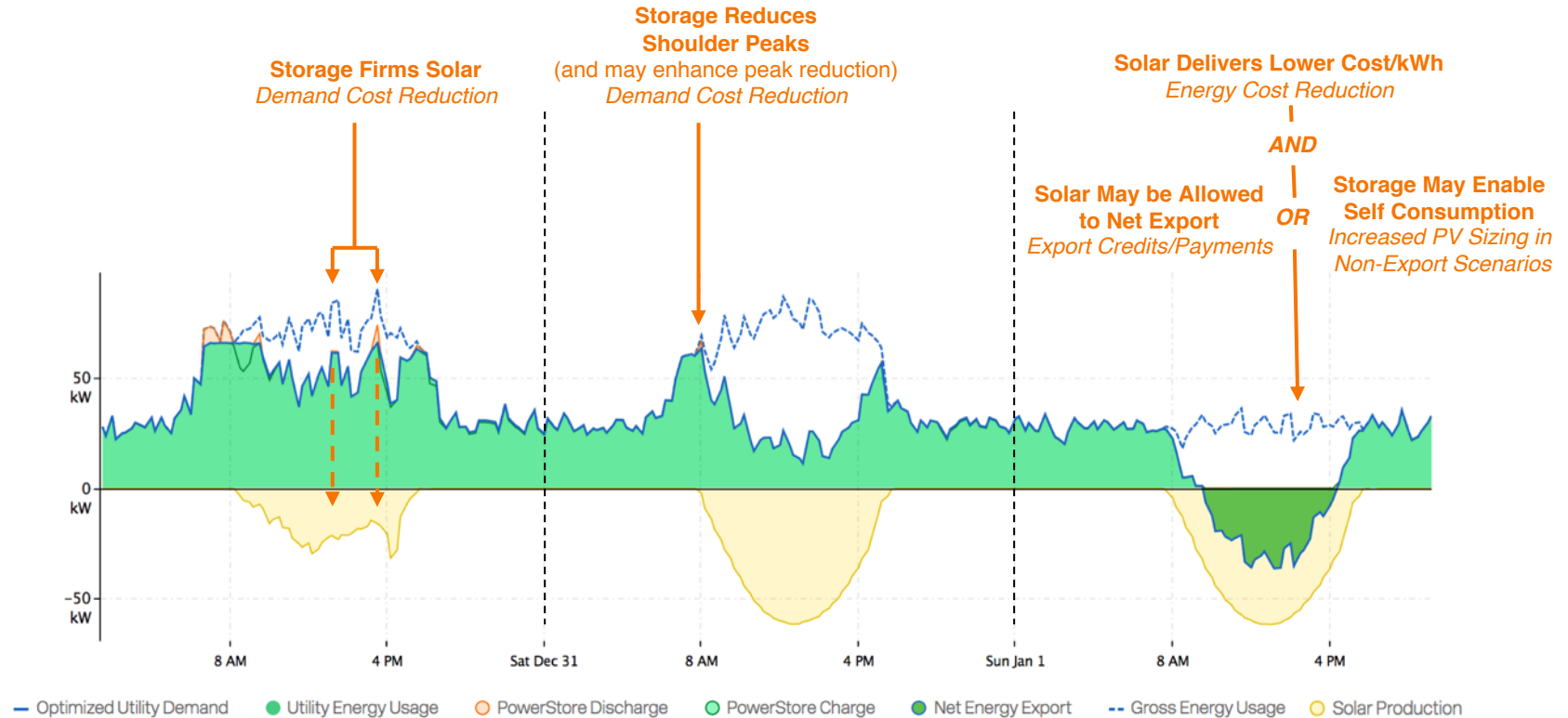
VPP: DR Event + Demand Charge Savings



VPP: Aggregated Dispatch = Multiple MW



Customer Ex: Unlocking Multiple values with PV





stem

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