



www.greencharge.net

New England Electricity Restructuring Roundtable

Vic Shao, CEO



GreenCharge

An ENGIE Company

- Largest independent owner and operator of commercial energy storage deployments
 - Interconnected coast to coast
 - 5 years of live operations, over 200,000 hours of runtime
- 50% of portfolio co-located with solar
- Industry's first & trusted no cost, no risk shared savings model
- Acquired in 2016 by the largest independent power producer in the world - ENGIE



ENVIRONMENTAL LEADER PRODUCT OF THE YEAR 2015



ENERGY STORAGE NORTH AMERICA GOLD AWARD 2014 & 2015



GREENTECH MEDIA'S GRID EDGE 20 2015



STEVIE'S AMERICAN BUSINESS AWARDS FINALIST 2015



PLATTS GLOBAL ENERGY AWARDS FINALIST 2015



FIERCE INNOVATION AWARD WINNER 2015



SMART GRID NEWS TOP 15 COMPANIES FINALIST 2015



GLOBAL CLEANTECH TOP 100 COMPANY 2015

ENGIE

- #1 independent power producer
- #1 energy efficiency services provider
- #3 largest commercial electricity supplier in the U.S.
- Ecova, Opterra, Retroficiency
- \$76 billion in revenue
- \$175 billion in assets
- 125 GW of generation assets
- Operating in 70 countries
- 155,000 employees



**ENERGY
CHARGES
(kWh)**

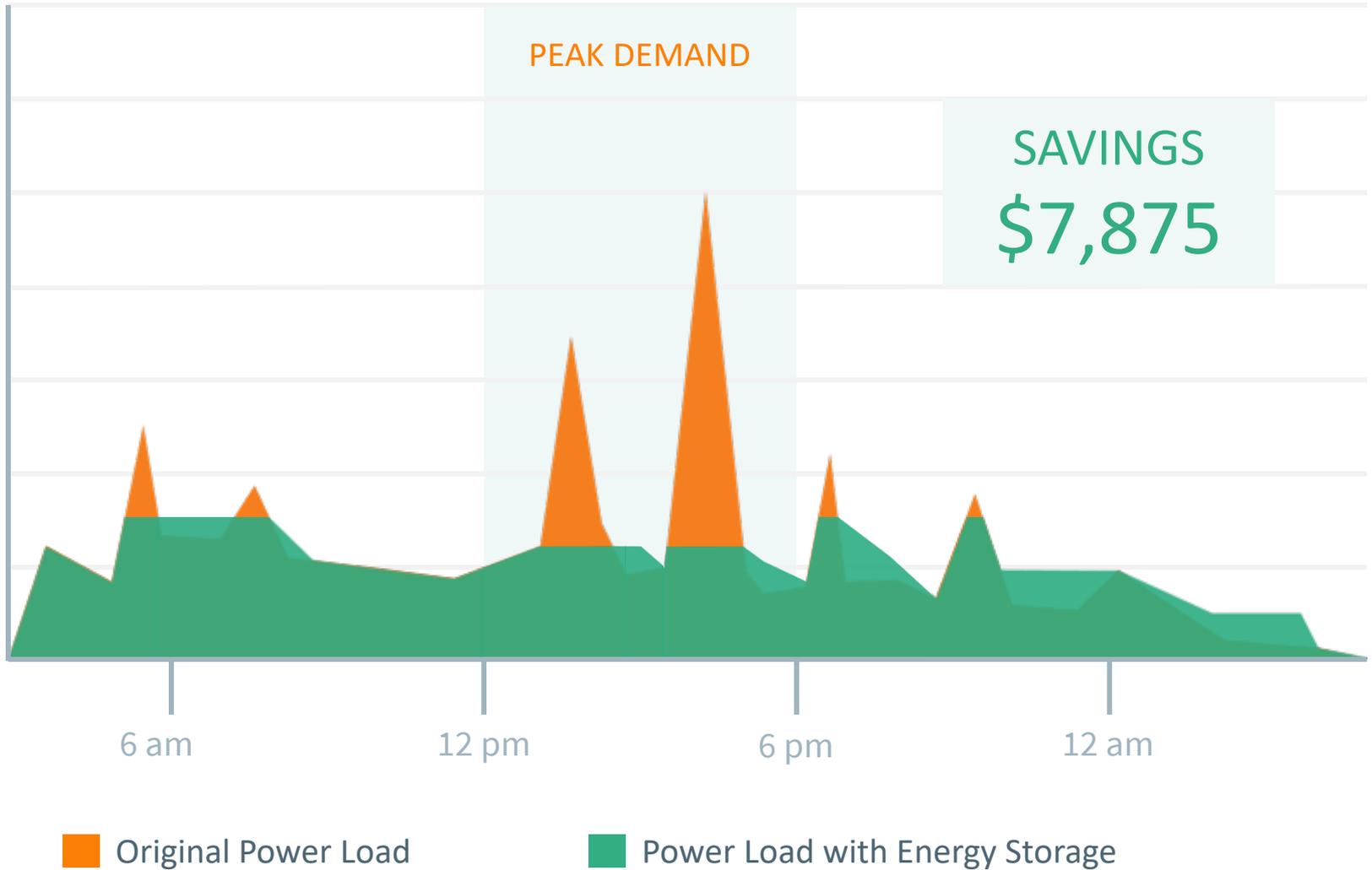
Total amount of
energy use.

**DEMAND
CHARGES
(kW)**

Highest 15 minute
peak.

Demand Charges can account for **over 50%** of an electric bill.

STATE
OF
CHARGE



Year				Cost Per kW
2005	\$23.30	\$16.10	\$16.19	
2006	\$26.62	\$22.07	\$18.65	
2007	\$25.43	\$22.13	\$15.42	
2008	\$26.11	\$18.28	\$21.31	
2009	\$28.16	\$21.13	\$25.38	
2010	\$29.22	\$21.43	\$24.75	
2011	\$27.40	\$21.31	\$28.02	
2012	\$28.10	\$26.19	\$30.68	
2013	\$33.14	\$28.40	\$35.68	
2014	\$38.14	\$30.96	\$41.87	
2015	\$43.14	\$36.46	\$45.75	
Avg. Year Over Year Increase '05 – '15	7.7%	11.5%	16.6%	

SDG&E demand charges have gone up **180%** over the past decade and **49%** over just the last three years!

End-to-End Energy Storage Project Developer

QUALIFY

FINANCE

BUILD

OPERATE

20,000+ site ESS assessments conducted

Pioneered PEA™, leading financing structure in CA

Multi-vendor system integrator

Field-tested GridSynergy™ command and control platform



ADDITIONAL VALUE STREAMS

Demand Savings

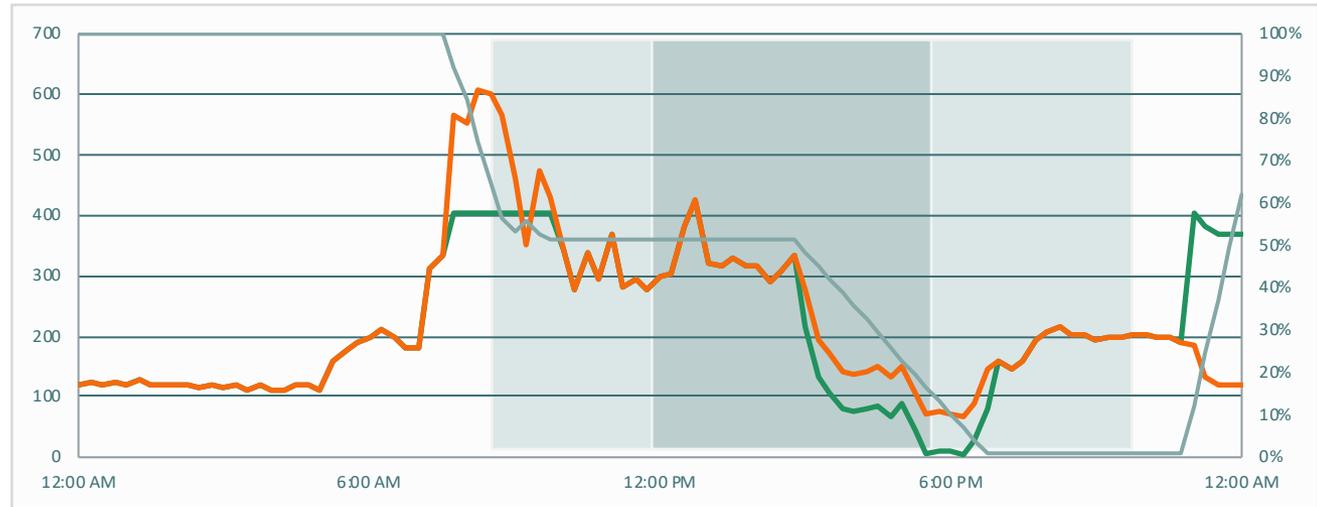
Tariff Optimization

Energy Arbitrage

Demand Response

Wholesale Market*

High School in SCE



The GridSynergy Software Platform Optimizes Across Multiple Revenue Streams to Maximize Benefits

(2.7MW / 5.4MWh across 17 sites in the school district)

Demand Savings	Tariff Optimization	Energy Arbitrage	Demand Response	Annual Total Benefit
\$207,908	\$144,997	\$81,355	\$42,660	\$476,920
44%	31%	17%	9%	-

*Future Upside



POWER EFFICIENCY AGREEMENT

No cost. No risk. Just savings.

A no cost financing option with equipment, installation, warranty and maintenance all included.

- No cost or financial risk
 - Green Charge owns and operates
 - Lower financial risk
 - No operational impact to customers
- Just savings
 - Shared savings model
 - 10 year term
 - Aligned incentives to increase savings



ENERGY STORAGE SOLUTION

- Intelligent Cloud-Based Software
- Lithium-ion Energy Storage
- Integrated Risk Free Financing

“They install it, they pay for it, and over 10 years we split the savings. How could you possibly say no to that?”

- Rex Parris, Mayor, City of Lancaster



Optimization Algorithm delivers multiple services to host customers and the grid

- Peak Shaving
- Solar Firming
- Wholesale DR (CAISO)
- Energy Arbitrage

Operation Date: Q4 2015 – Q4 2016

GridSynergy
GCN
gmeouchy@greencharge.net

OVERVIEW OPERATIONS PORTFOLIO BILLING ANALYSIS SUPPORT

MONITOR DETAILS HEALTH ALERTS

ALL VPPS / Mountain view & Los Altos HS

Aug 22, 2016 - Aug 23, 2016

today 1 week 1 month 6 months 1 year

POWER LOAD ANALYZER

Peak shaving Solar Firming Wholesale DR

Legend: Original (red), Net Solar (orange), Net Storage (green)

PEAK SHAVING

Legend: Original (red), Net Solar (orange), Net Storage (green), Battery SOC (grey), Demand Threshold (blue)

	DISTRIBUTED GENERATION	STORAGE CAPACITY	STORAGE POWER	STATUS MONITOR
	526.8 kW	0 kWh reserve 519 kWh avail	13.3 kW	2

CURTAILMENT LOAD

	ON-PEAK	PART-PEAK	OFF-PEAK	TOTAL
PEAK SHAVED	376,206 kW	320,227 kW	233,173 kW	929,605 kW
TARIFF	\$16.68 per kW	\$4.57 per kW	\$14.06 per kW	
FINANCIAL IMPACT	\$6,275.11	\$1,463.42	\$3,278.40	\$11,016.93

Sort By VPP name Filter By All

FRONT-OF-METER BENEFITS

Wholesale Ancillary Services

Wholesale DR

Capacity

Distribution Upgrade Defer.

Renewable Energy Firming

Generation / Load Shifting

Energy Balancing

BEHIND-THE-METER BENEFITS

Peak Shaving

Energy Arbitrage

Reliability

2009/16



GREEN CHARGE SOLUTION installed distributed ESS for aggregated bidding into CAISO wholesale day ahead and real-time market

Sites

Total VPP Size

5

448 kWh

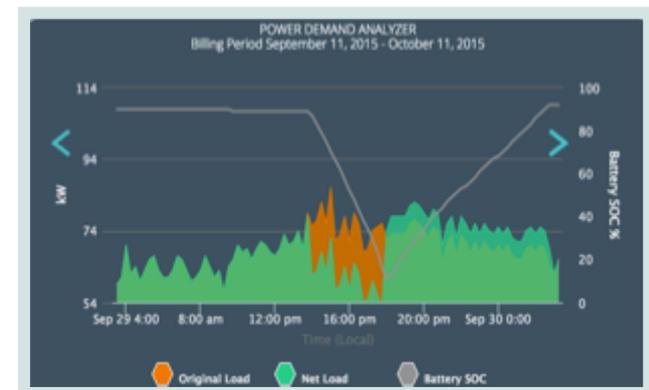
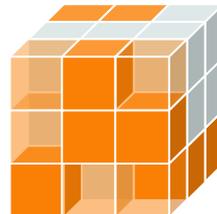
VPP Aggregation and Control



Con Edison dispatch directly from Manhattan Control Center—distributed to all ESS

ESS Service Schedule Optimization

Determines value of next-day kWh for DMP peak reduction, and establishes tolerance for peak-shaving



FRONT-OF-METER BENEFITS

Wholesale Ancillary Services

Wholesale DR

Resource Adequacy

Distribution Upgrade Defer.

Renewable Energy Firming

Generation / Load Shifting

Energy Balancing

BEHIND-THE-METER BENEFITS

Peak Shaving

Energy Arbitrage

Reliability



GREEN CHARGE SOLUTION: sourcing 10 ESS on target feeder for DERMS machine-to-machine communication & settlement demo

Sites

22

Total VPP Size

1.44 MWh

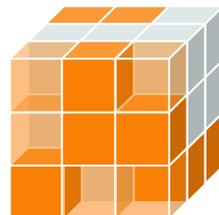
VPP Aggregation and Control



Green Charge aggregation into single resource for PG&E machine-to-machine communication

ESS Service Schedule Optimization

Sets prioritization schedule based on real-time machine-to-machine



communication. Real-time two-way price signals settle market.



FRONT-OF-METER BENEFITS

Wholesale Ancillary Services

Wholesale DR

Resource Adequacy

Distribution Upgrade Defer.

Renewable Energy Firming

Generation / Load Shifting

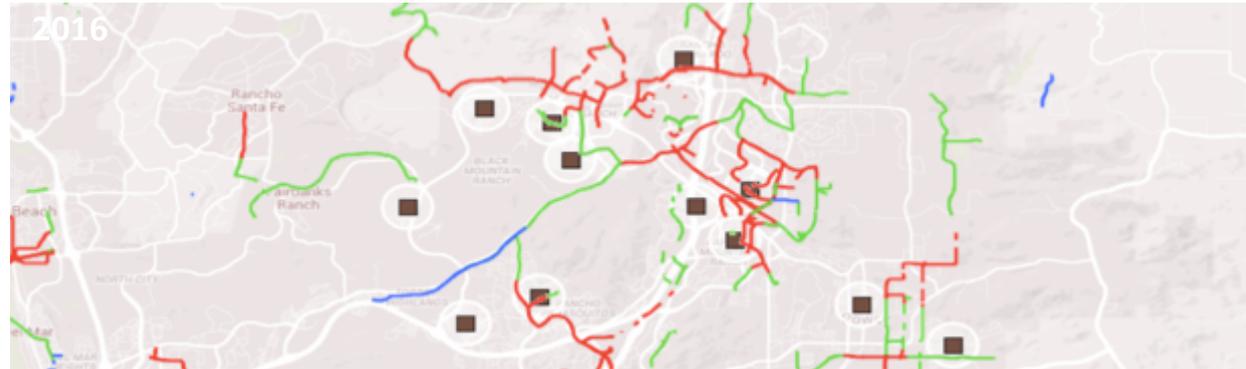
Energy Balancing

BEHIND-THE-METER BENEFITS

Peak Shaving

Energy Arbitrage

Reliability



GREEN CHARGE SOLUTION: sourced 22 distributed ESS hosting candidates on target feeders, all contracted within 6 months

Sites

Total VPP Size

VPP Aggregation and Control

22

14 MWh

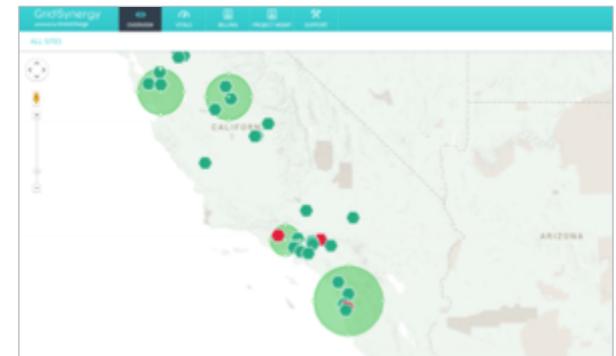
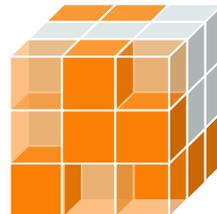


Green Charge aggregation into single resource for SDG&E dispatch

ESS Service Schedule Optimization

Sets prioritization schedule for SDG&E

Demand Response reservation versus customer-site renewables firming and peak shaving

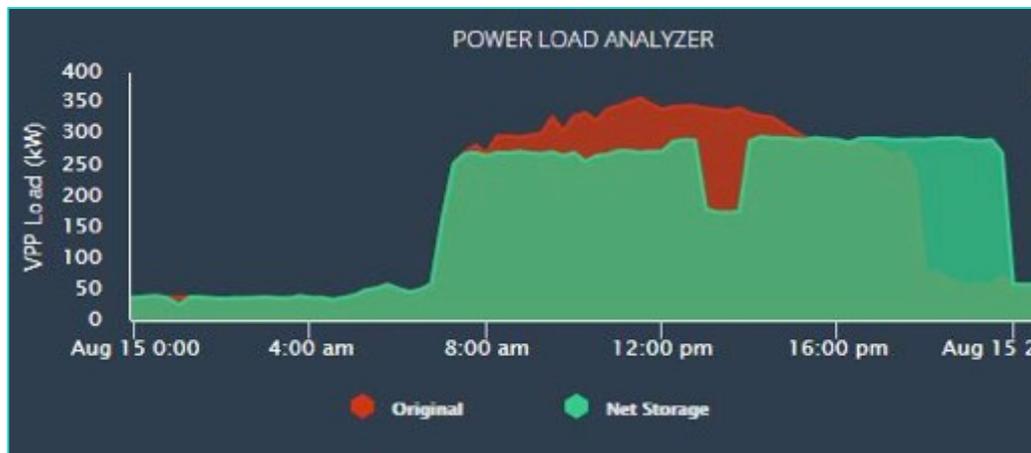


Demand Response Auction Mechanism

- Introduces competitive capacity market to BTM resources
- Gives DR dispatch control to Aggregators
- Integrate price bids with capacity availability forecasts

Future CAISO Opportunity

- Multi-year DRAM contracts
- Increased Product Complexity
- BTM Frequency Regulation
- Load Consumption Product



Operation Date: Q2 2016 – Q4 2016



A leader in distributed Energy Storage Systems (ESS), providing benefits across both sides of the meter.

Wholesale Ancillary Services

Wholesale Capacity Services

Distribution Upgrade Deferral

Voltage Regulation

Renewable Energy Firming

Generation / Load Shifting

Energy Balancing

**Front-of-Meter
Benefits**

**Behind-the-Meter
Benefits**



Peak Shaving

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