SolarCity

Lightning In A Bottle: Part 2
NESEA BuildingEnergy Boston 2016

Betty Watson

Deputy Director, Policy & Electricity Markets

Massachusetts
HIC 168572 EL-1136MR

SolarCity, the #1 full-service Residential and Commercial solar provider in America*

The national leader in solar, SolarCity has:

|	
9	Years of experience
27	States with installations
90+	Facilities
340+	Batteries deployed
1,800+	MW installed
2,000+	Commercial projects
~15,000	Employees
230,000+	Installed Customers
$9 Billion+	Of solar projects financed

Battery System   Smart Devices   Monitoring

* According to the Q4 2015 GTM Research U.S. PV Leaderboard.

SolarCity

Storage Technology Leadership

- SolarCity has worked for 4+ years on batteries

- Developed suite of battery products + internal software

- Fully integrated grid scale and distributed storage

- Over 340 batteries deployed by SolarCity
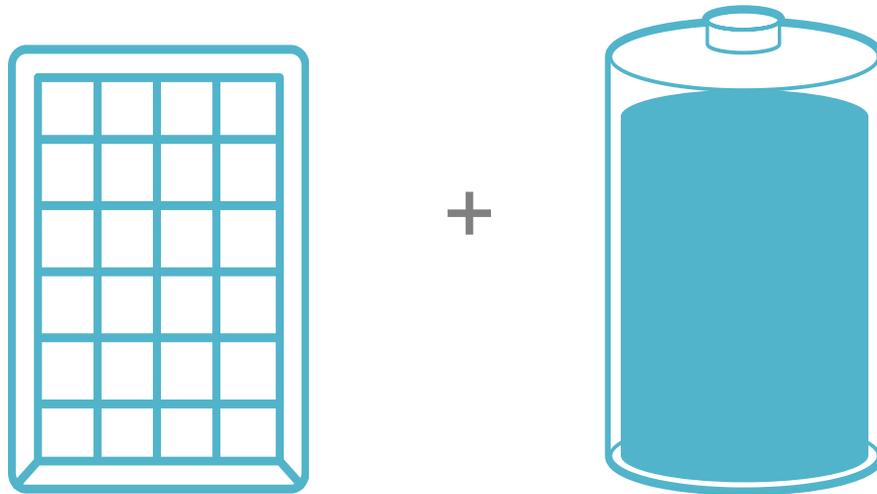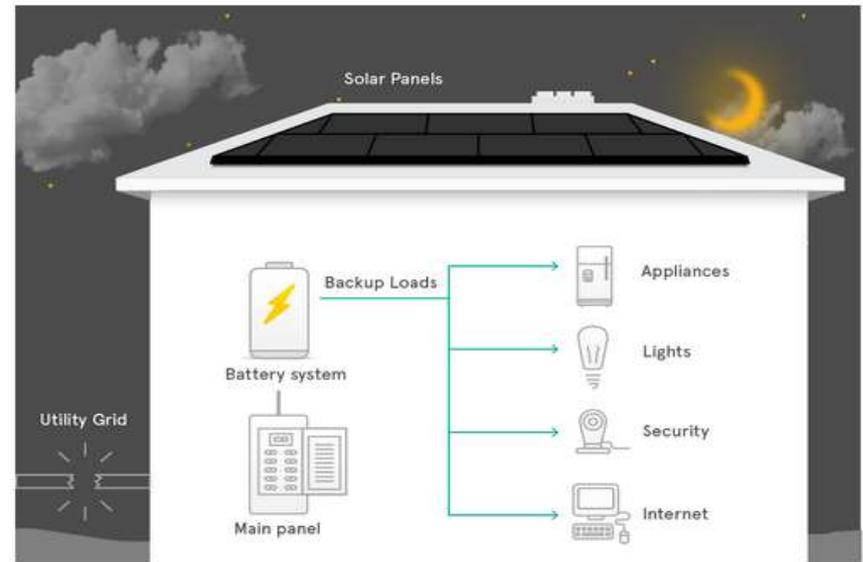

SolarCity

SolarCity residential solar+storage

- Battery charges 100% from solar panels, even during grid outages
- Provides backup power to select electrical circuits
- Complies with IEEE 1547 and UL 1741 standards for disconnection from utility grid
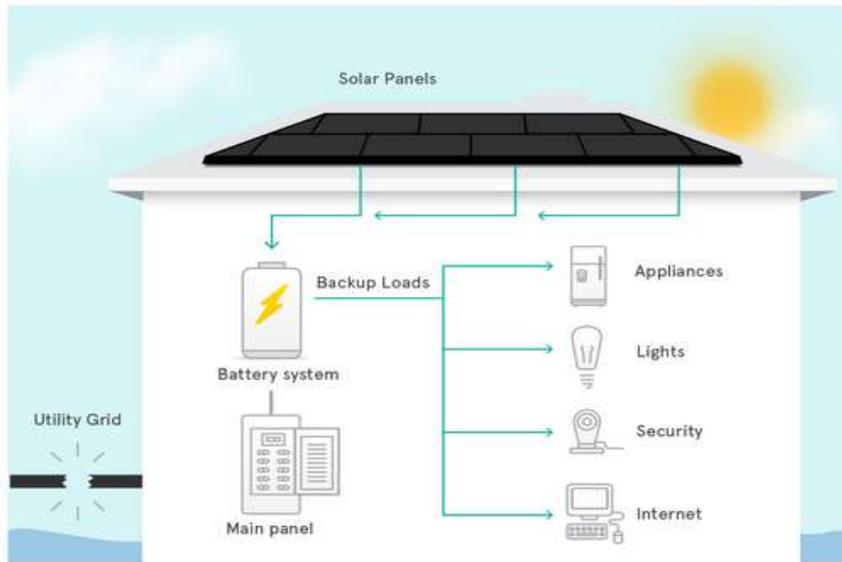
During the day, solar energy charges your battery while it powers your home.

As the day transitions to night, your battery backup system is ready to keep things running smoothly if the grid does down.

The future of solar + storage

- "For utilities and grid operators, the technology is designed to enable remote-aggregated control of solar battery systems."

    -Peter Rive, SolarCity Co-Founder and CTO

- "SolarCity's customer contract explicitly contemplates future market opportunities and creates a revenue-sharing opportunity for customer."
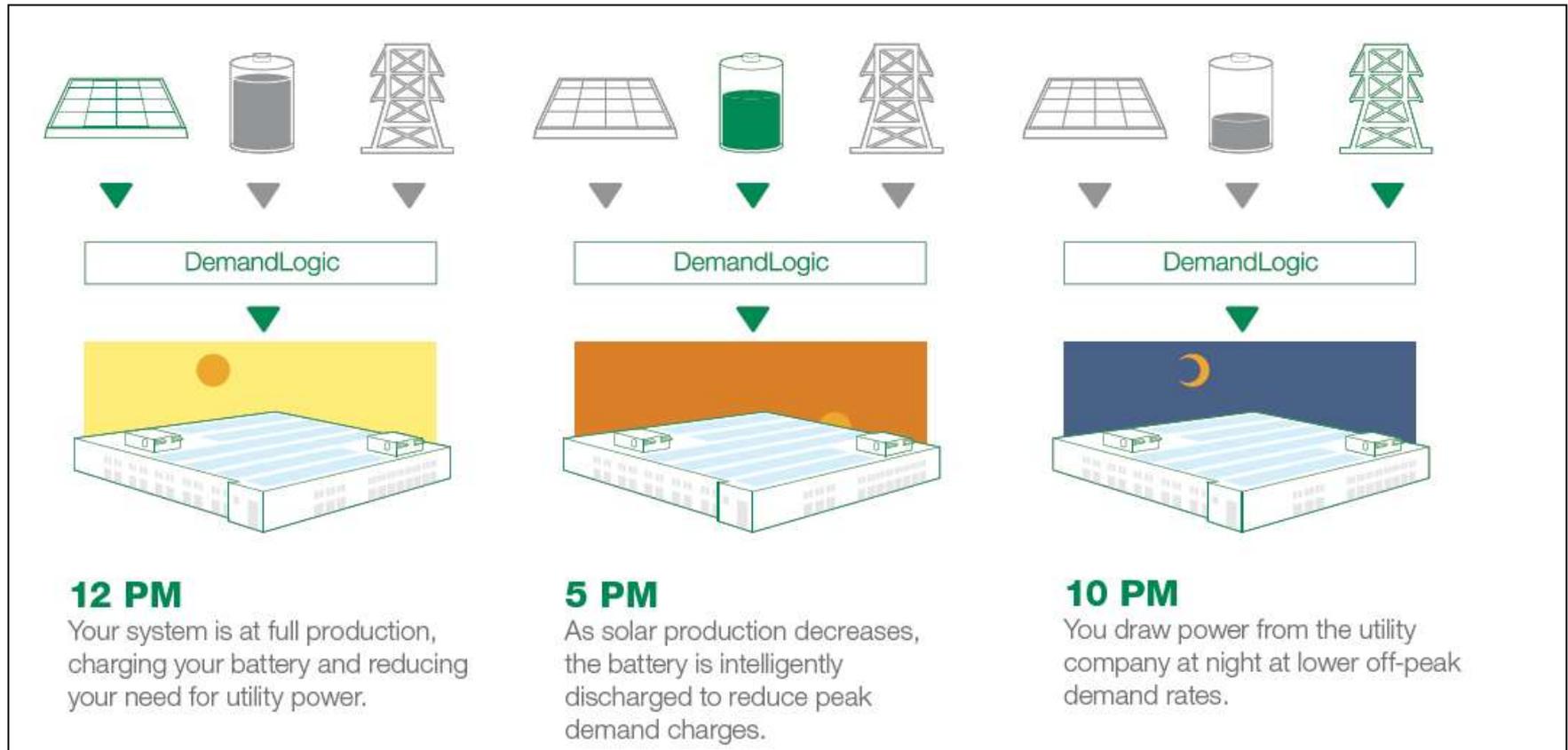
Today

Tomorrow
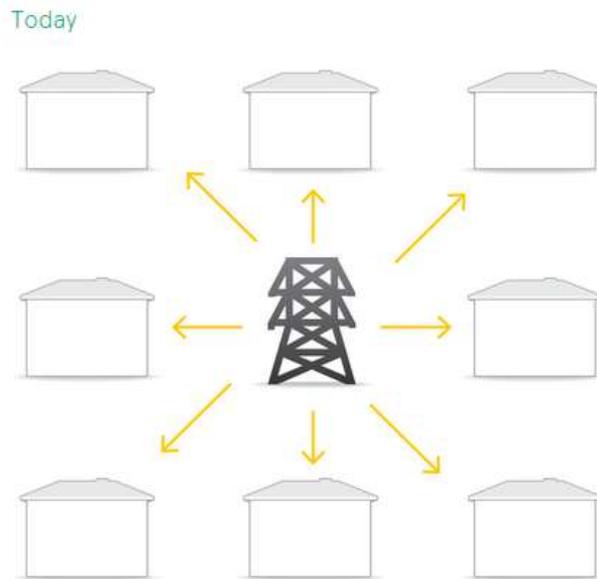
Your energy comes from centralized – and often dirty – sources and your money goes directly to the utility.
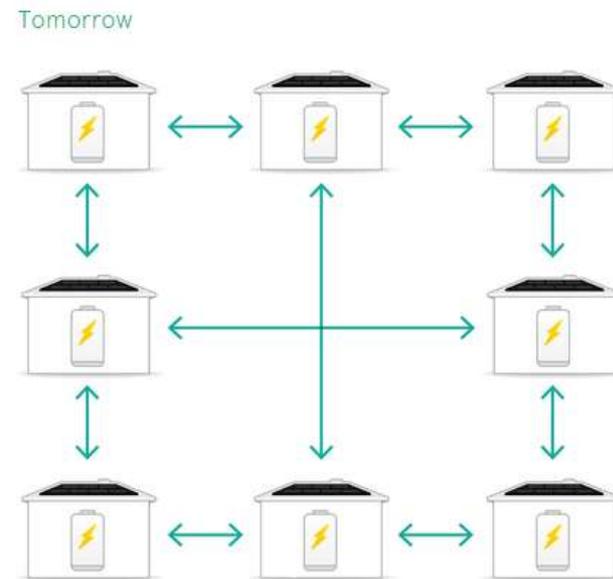
Clean energy is shared between you and your neighbors, and each home has the potential to earn money for what they produce.

SolarCity

DemandLogic- Solar+Storage for Demand Charge Reduction

12 PM
Your system is at full production, charging your battery and reducing your need for utility power.

5 PM
As solar production decreases, the battery is intelligently discharged to reduce peak demand charges.

10 PM
You draw power from the utility company at night at lower off-peak demand rates.

SolarCity

Example Customer (K-12)

K-12 - Original Load Profile

SCE Ratepayer - Example School - Original Load Profile
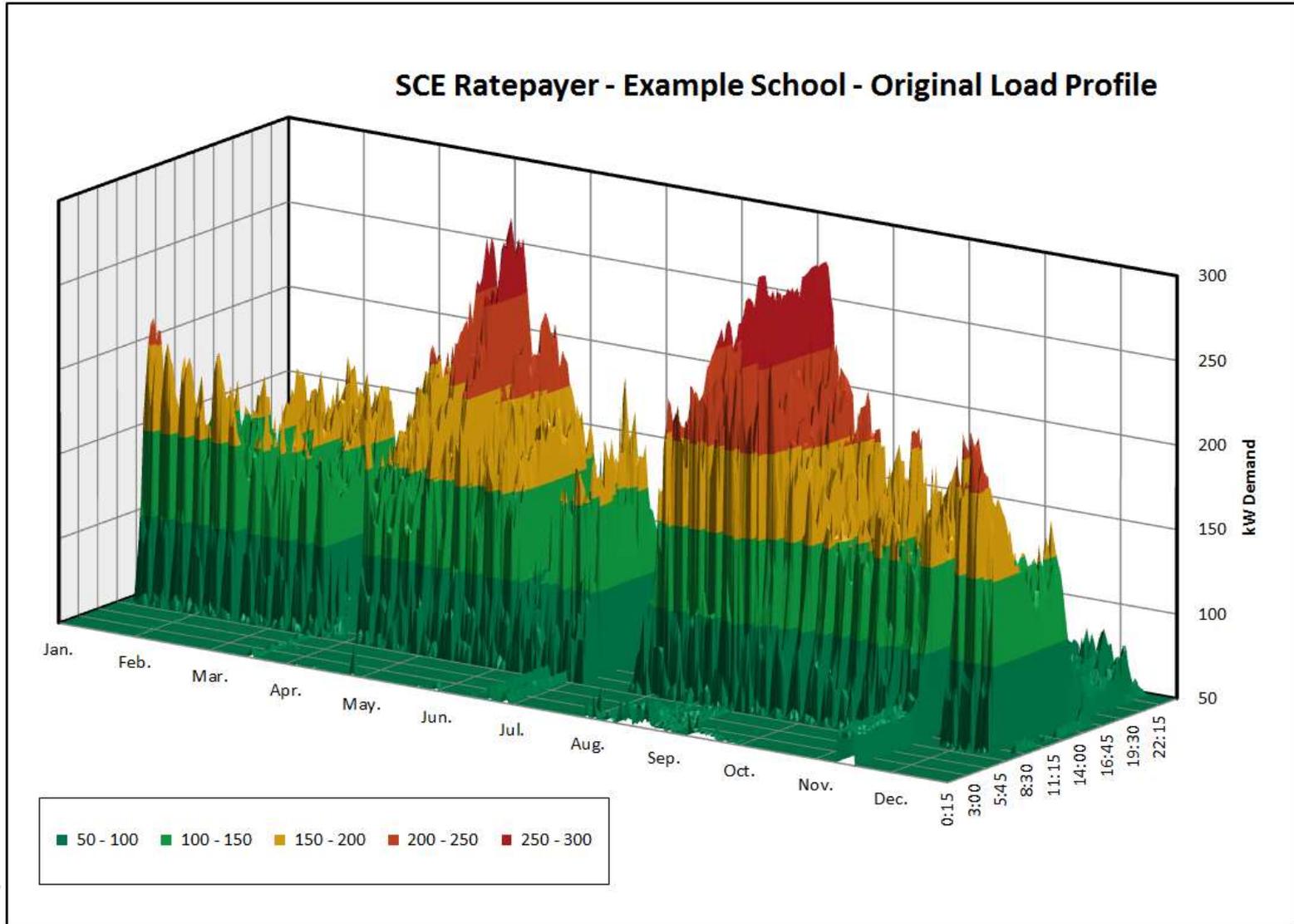
K-12 - Load Profile after DemandLogic

SCE Ratepayer - Example School - Load Profile After PV + DemandLogic

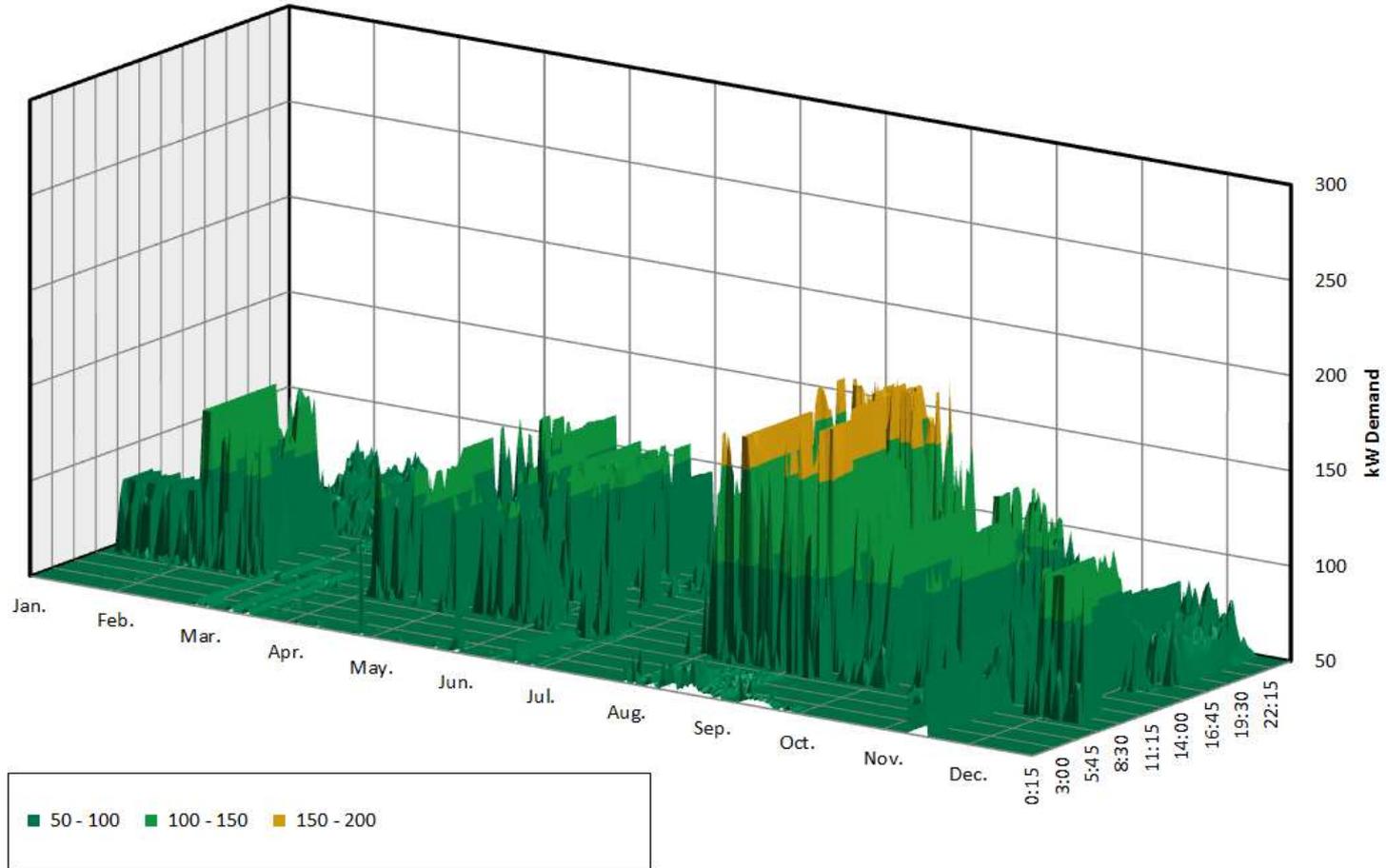Legend: ■ 50 - 100 ■ 100 - 150 ■ 150 - 200

SolarCity

K-12 - Economic Overview

Avoided Energy Cost ($/kWH)	$	0.145
Solar PPA Rate ($/kWh)	$	0.125
Avoided Demand Cost ($/kW)	$	10.25
SolarCity Demand Rate ($/kW)	$	8.00

PV System Size (kW)	315
Storage System Size (kW)	100
Storage System Size (kWh)	200

Month	Demand			Energy			
	MAX Demand Reduction (kW)	Demand Payments to SolarCity	Utility Demand Cost Reduction	Solar Production (kWh)	Energy Payments to SolarCity	Utility Energy Cost Reduction	Total Project Savings
January	98	$ 784	$ 1,005	26,238	$ 3,280	$ 3,805	$ 745
February	98	$ 784	$ 1,005	30,583	$ 3,823	$ 4,435	$ 832
March	98	$ 784	$ 1,005	41,152	$ 5,144	$ 5,967	$ 1,044
April	98	$ 784	$ 1,005	29,347	$ 3,668	$ 4,255	$ 807
May	98	$ 784	$ 1,005	55,983	$ 6,998	$ 8,117	$ 1,340
June	98	$ 784	$ 1,005	55,847	$ 6,981	$ 8,098	$ 1,337
July	98	$ 784	$ 1,005	54,156	$ 6,770	$ 7,853	$ 1,304
August	98	$ 784	$ 1,005	52,782	$ 6,598	$ 7,653	$ 1,276
September	98	$ 784	$ 1,005	47,863	$ 5,983	$ 6,940	$ 1,178
October	98	$ 784	$ 1,005	34,307	$ 4,288	$ 4,974	$ 907
November	98	$ 784	$ 1,005	26,057	$ 3,257	$ 3,778	$ 742
December	98	$ 784	$ 1,005	18,593	$ 2,324	$ 2,696	$ 592
Annual Totals	**1,176**	**9,408**	$ **12,054**	**472,908**	$ **59,114**	$ **68,572**	$ **12,104**
Estimated savings:	Savings from DemandLogic:		$ 2,646			Savings from Solar	$ 9,458

SolarCity

Example Customer
(Industrial)

SolarCity

Industrial -- Original Load Profile

Industrial - Original Load Profile
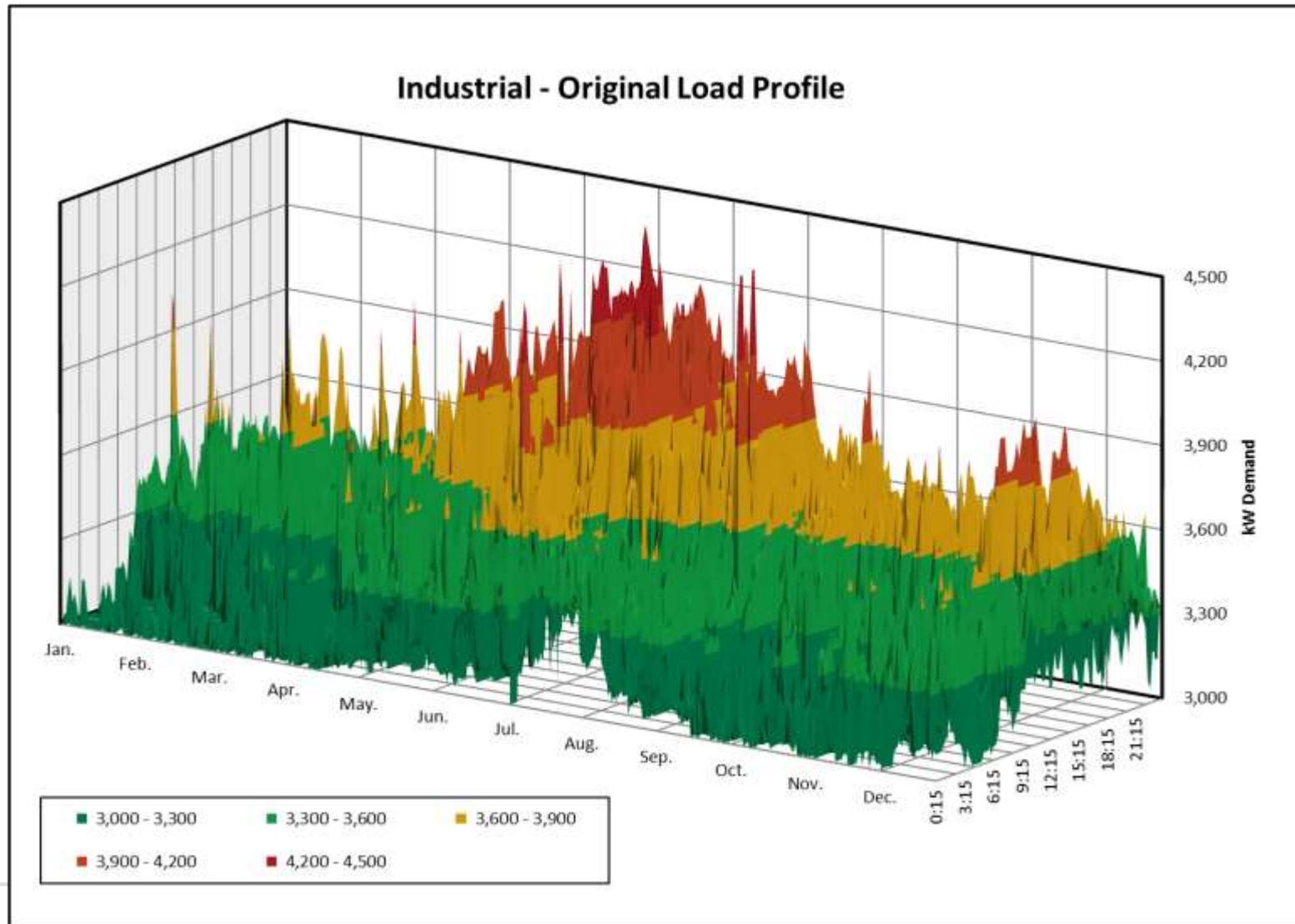
SolarCity

Industrial -- Load Profile with DemandLogic

Industrial -- Economic Overview

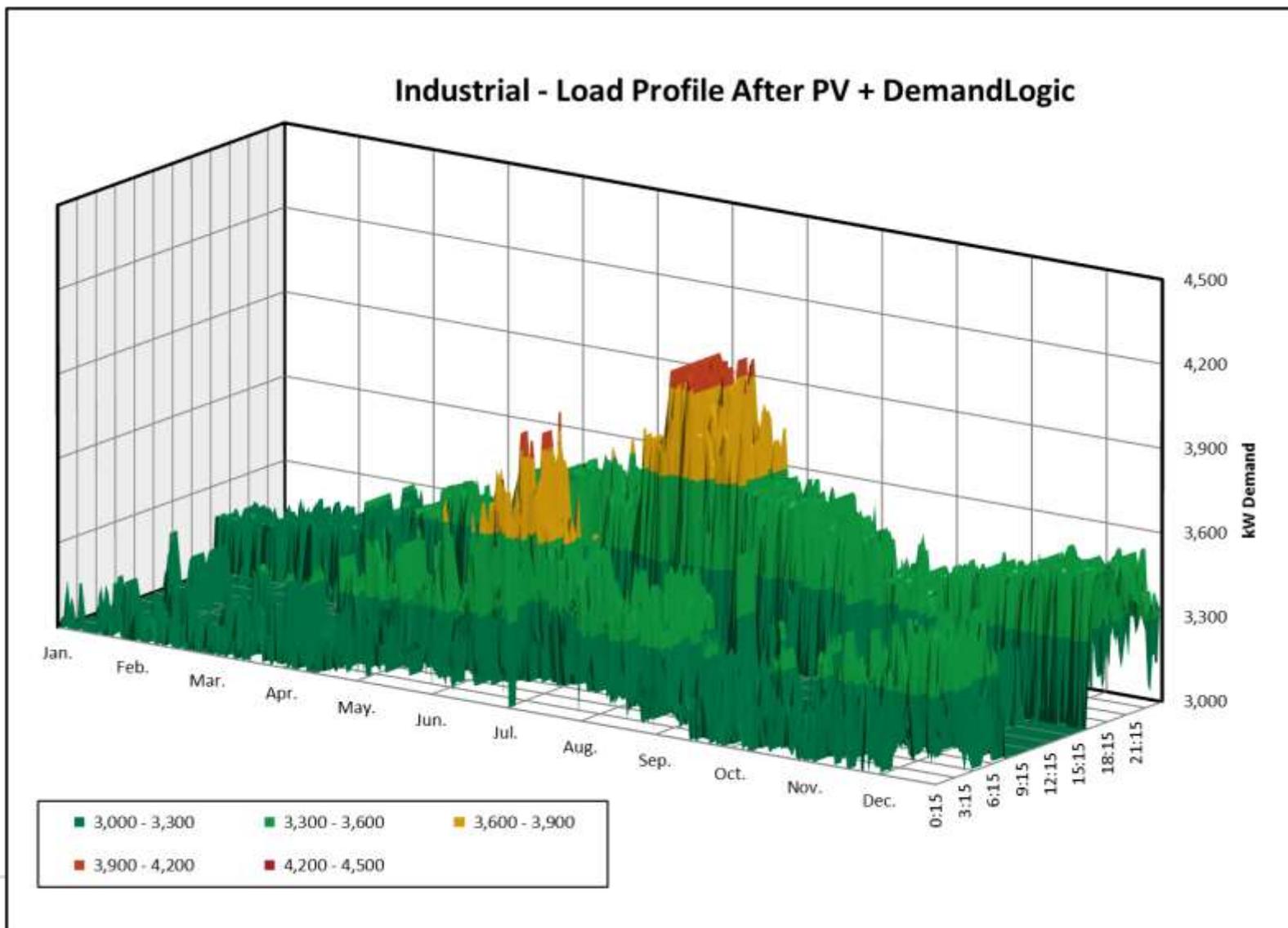|		
Avoided Energy Cost ($/kWH)	$	0.100
Solar PPA Rate ($/kWh)	$	0.093
Avoided Demand Cost ($/kW)	$	12.05
SolarCity Demand Rate ($/kW)	$	9.00

PV System Size (kW)	11,400
Storage System Size (kW)	2,000
Storage System Size (kWh)	4,000

| Month | Demand | | | Energy | | | |
	MAX Demand Reduction (kW)	Demand Payments to SolarCity	Utility Demand Cost Reduction	Solar Production (kWh)	Energy Payments to SolarCity	Utility Energy Cost Reduction	Total Project Savings
January	1,208	$ 10,872	$ 14,556	922,820	$ 85,822	$ 92,282	$ 10,144
February	1,208	$ 10,872	$ 14,556	1,075,625	$ 100,033	$ 107,563	$ 11,214
March	1,208	$ 10,872	$ 14,556	1,447,352	$ 134,604	$ 144,735	$ 13,816
April	1,208	$ 10,872	$ 14,556	1,032,165	$ 95,991	$ 103,217	$ 10,910
May	1,208	$ 10,872	$ 14,556	1,968,942	$ 183,112	$ 196,894	$ 17,467
June	1,208	$ 10,872	$ 14,556	1,964,161	$ 182,667	$ 196,416	$ 17,434
July	1,208	$ 10,872	$ 14,556	1,904,705	$ 177,138	$ 190,471	$ 17,017
August	1,208	$ 10,872	$ 14,556	1,856,356	$ 172,641	$ 185,636	$ 16,679
September	1,208	$ 10,872	$ 14,556	1,683,353	$ 156,552	$ 168,335	$ 15,468
October	1,208	$ 10,872	$ 14,556	1,206,591	$ 112,213	$ 120,659	$ 12,131
November	1,208	$ 10,872	$ 14,556	916,441	$ 85,229	$ 91,644	$ 10,099
December	1,208	$ 10,872	$ 14,556	653,927	$ 60,815	$ 65,393	$ 8,262
Annual Totals	**14,496**	**130,464**	**$ 174,677**	**16,632,438**	**$ 1,546,817**	**$ 1,663,244**	**$ 160,640**
	Savings from DemandLogic:	$ 44,213			Savings from Solar	$ 116,427	

SolarCity

Policy Can Drive Storage Deployment in Buildings

Building Benefits

Grid Benefits

Customer Value

SolarCity
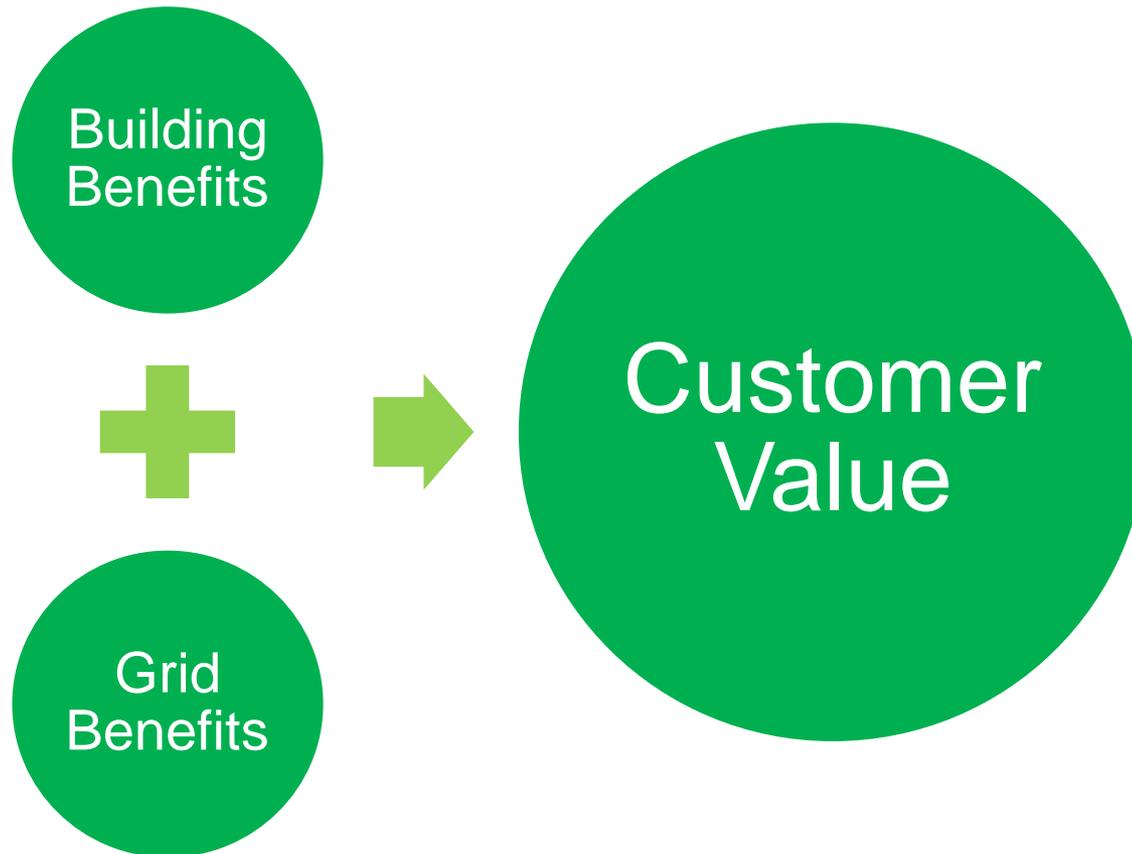
Massachusetts Could Avoid $600 Million Annually

- In long-term avoided costs for energy, capacity, transmission, and distribution

MA Top 100 Hours 2014
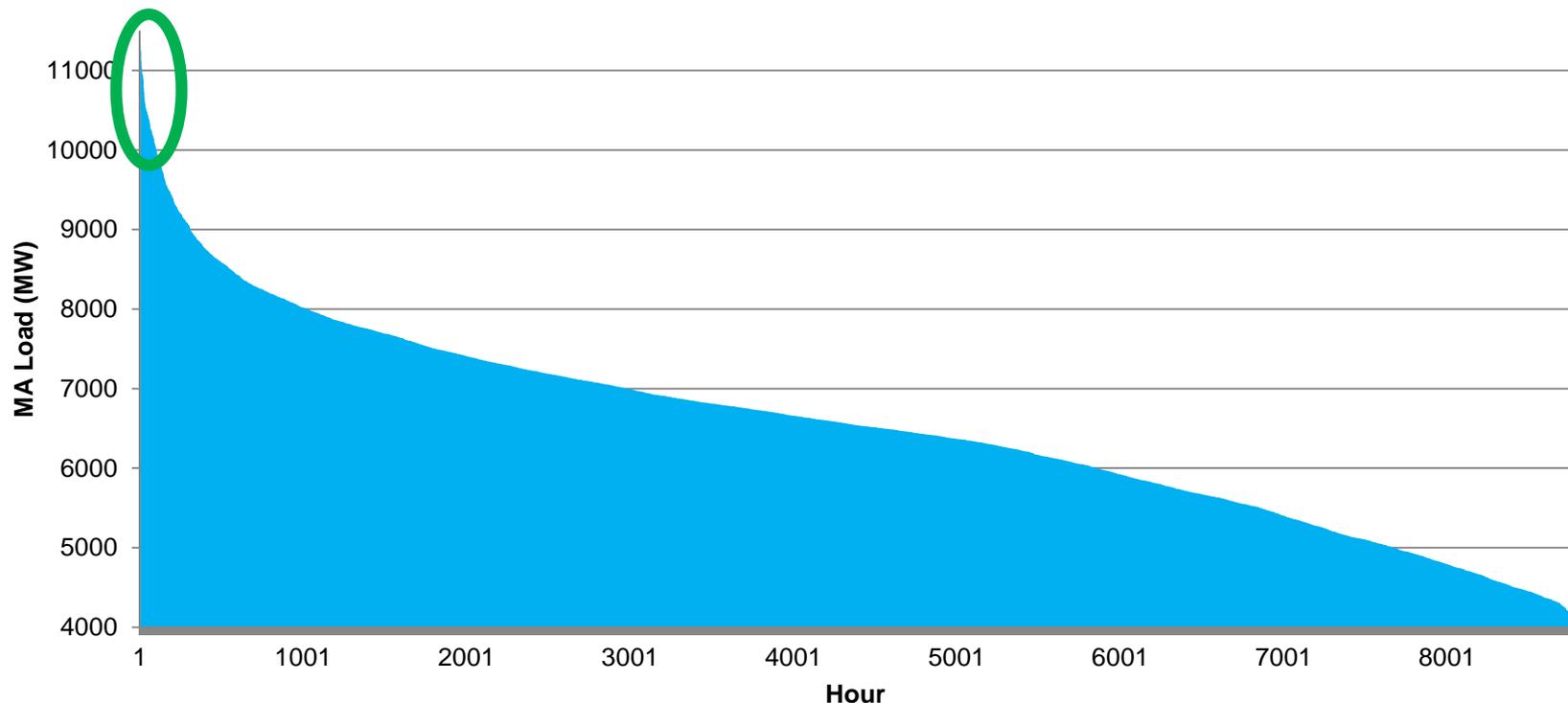
Based on 2013 AESC Study, Exhibit G-1, Summary of Electric Utilities' T&D Cost Survey and Exhibit 5 -26. CONE and Net CONE Assumptions.

SolarCity

Example Residential Storage Programs

Green Mountain Power Tesla Powerwall Pilot Program

- Customers pay:
  - $6,501 up front payment
  - $6,501 up front payment + Receive $31.76 Monthly Credit
  - $37.50/month

SDG&E Proposed "Bring Your Own Battery" Pilot

- Customers pay little or nothing
- Customers purchase qualified battery
- Receive up front incentive to nearly/completely defer customer cost
  - When combined with other incentives

*SolarCity is not involved with these programs.

SolarCity

Example Commercial and Industrial Programs

New Jersey Renewable Energy Storage Incentive

- $300/kWh rebate
- Energy storage behind C&I customer meter and paired with renewable energy

California Self-Generation Incentive Program

- $1.31/W rebate (equivalent to $655/kWh for 2-hour system)
- Customer-sited energy storage with 2-hour minimum runtime
- Projects count toward utility procurement targets
- 144 MW of storage projects reserved or in progress

solarCity

State Policies that Support Energy Storage

DOER $10 Million Storage Program
- Include customer-sited energy storage

Energy Storage Procurement Target (S 1762, Downing)
- Include storage target in Energy Omnibus Bill
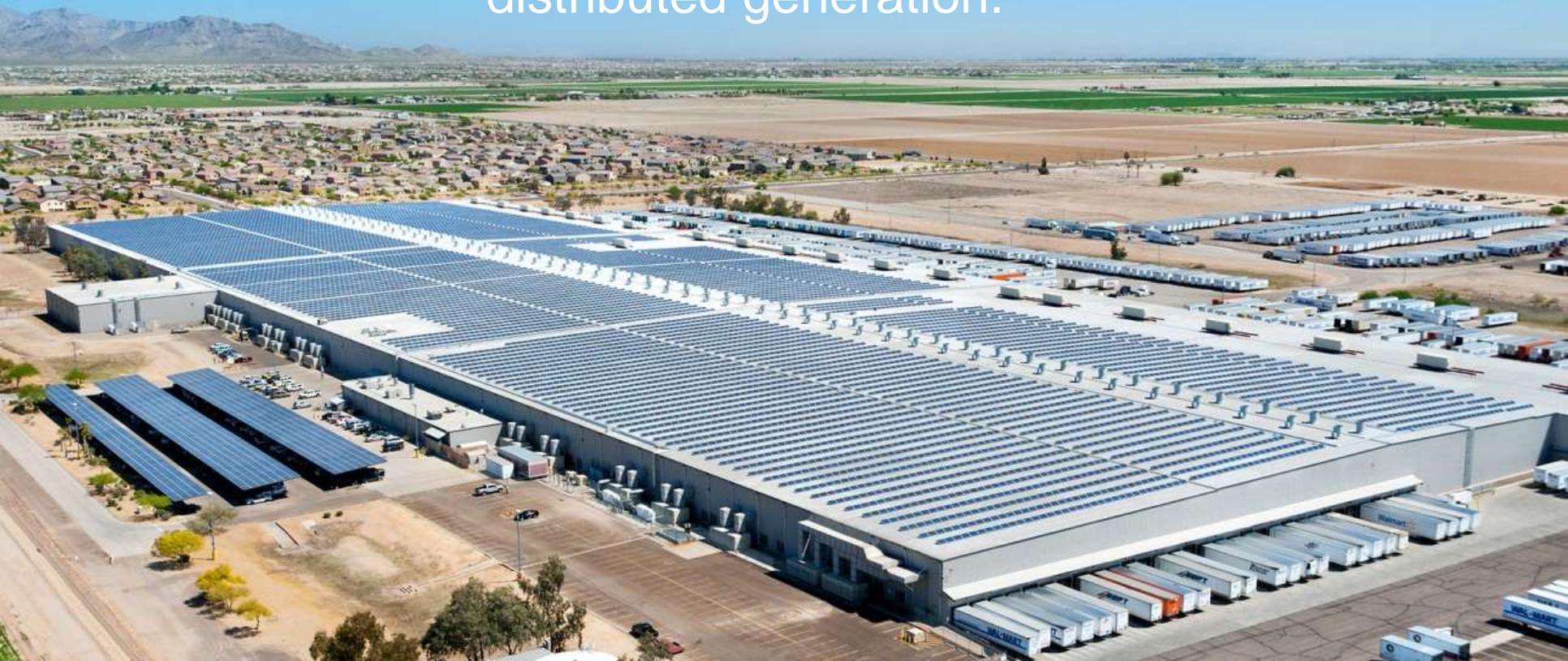- Include customer-sited energy storage

Support solar!

Make interconnection easy

Clarify participation in existing programs, like net metering

solarCity

Our Vision

Work in partnership with a committed utility to help usher in the 21st century of electric power by delivering cleaner, cheaper and more reliable energy through distributed generation.

GMP Residential Storage Program

GMP will provide Tesla Powerwall 7kWh model under with three pricing options:

Option 1: Customer Pays $6,501

  Direct Sale w/ no GMP access to battery

  No savings to ratepayers

Option 2: Customer Pays $6,501 and Receives $31.76 Monthly Credit

  Direct Sale w/ GMP shared access

  Credit based on benefit of hitting Forward Capacity Market peaks 75% of the time and Regional Network Service Peaks 50% of the time

Option 3: Customer Pays $37.50/month

  Rate Rider- $86 monthly payment + $50.70 monthly credit

  Credit based on hitting 100% of FCM peaks and 75% of RNS peaks, and energy arbitrage

System benefits based on capacity market, transmission charges, and energy arbitrage

*SolarCity is not involved with this program.

solarCity

Proposed SDG&E "Bring Your Own Battery" Pilot

- Customer purchases qualified battery

- Receives upfront incentive
  - Combined with other incentives, would nearly or completely defer customer cost
  - Tiered based on level of utility control allowed

- Customers accept dynamic rate that aligns charging and discharging with grid needs

- SDG&E directly controls storage during limited high-load hours

- Ratepayers and shareholders equally share savings

- Test the ability of customer-owned BTM storage to defer circuit upgrades

*SolarCity is not involved with this program.

San Diego Gas & Electric (July 1, 2015), Application of San Diego Gas & Electric Company (U902 E) for Approval of Distribution Resources Plan, submitted to California Public Utilities Commission.

solarCity