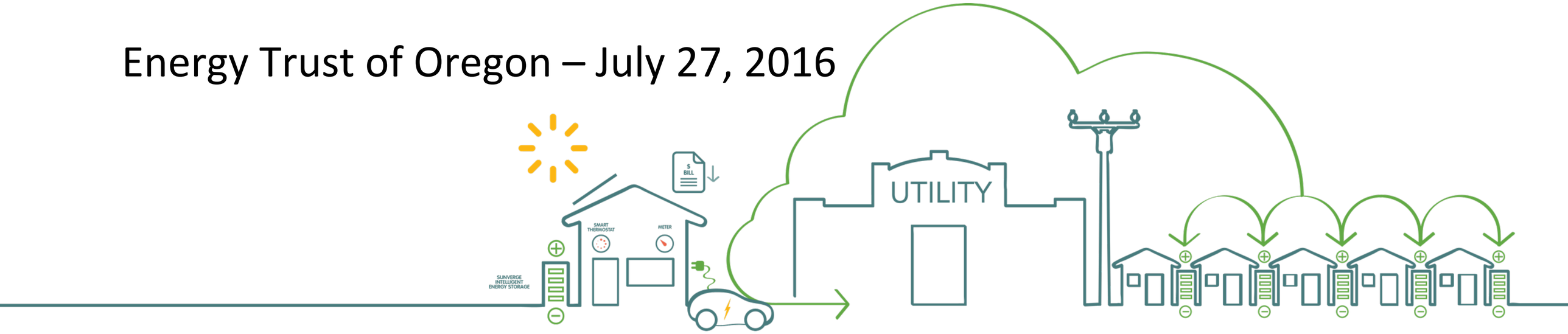
Introduction to Sunverge Energy

Renewable Advisory Council

Energy Trust of Oregon – July 27, 2016



Company background

FOUNDED

2009

HEADQUARTERED IN

SAN FRANCISCO

SEED (2009)

1st DEVICE INSTALLED (2010)

SERIES A (2011)

SERIES C (2016)

52

EMPLOYEES

CUSTOMERS

North America (AZ, CA, HI, KY, NY, NV & Canada)
New Zealand
Australia
South Korea
Germany

650

UNITS IN PRODUCTION AROUND THE WORLD

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Vision

To make renewable power reliable, economical and accessible to all

Values

- Safety
- Reliability
- Quality
- Performance

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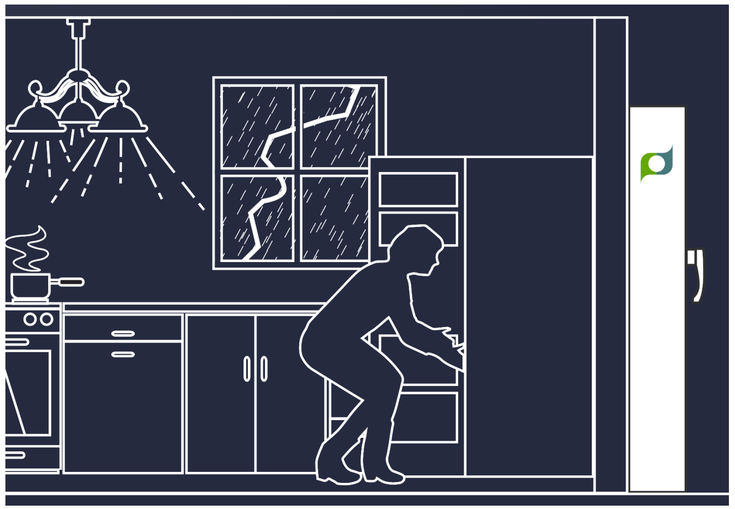
A complete solar integration system

Storage Appliance + Renewable Power + Cloud Software



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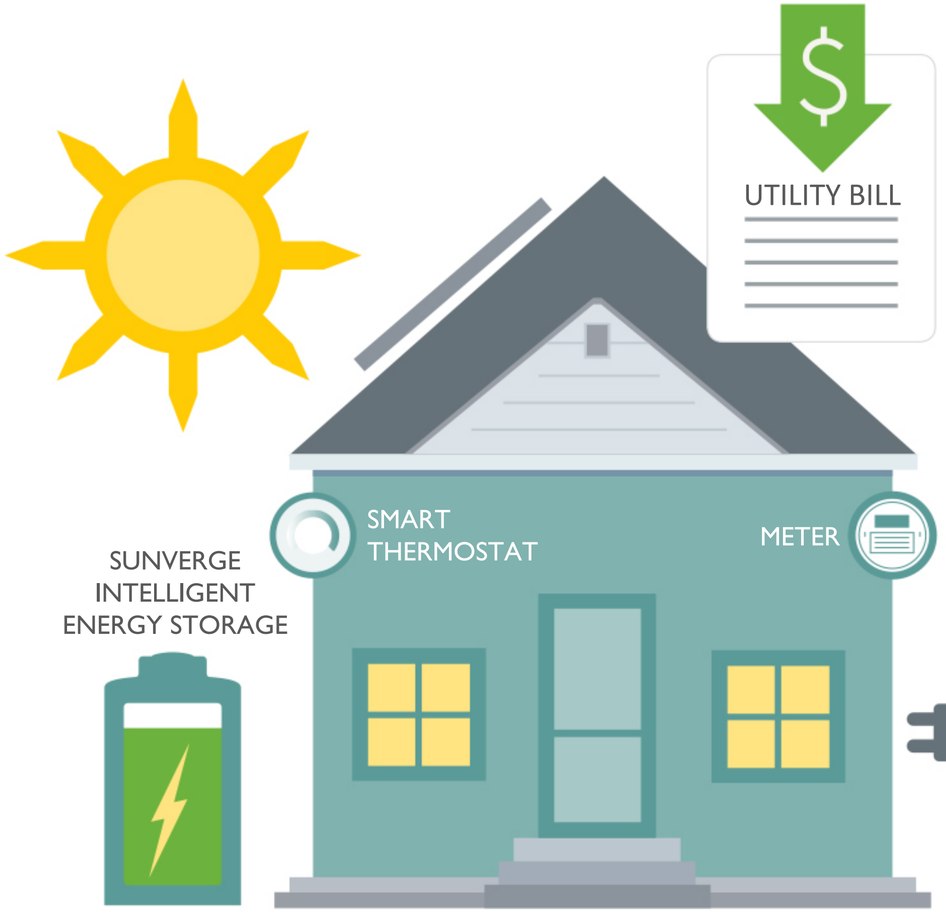
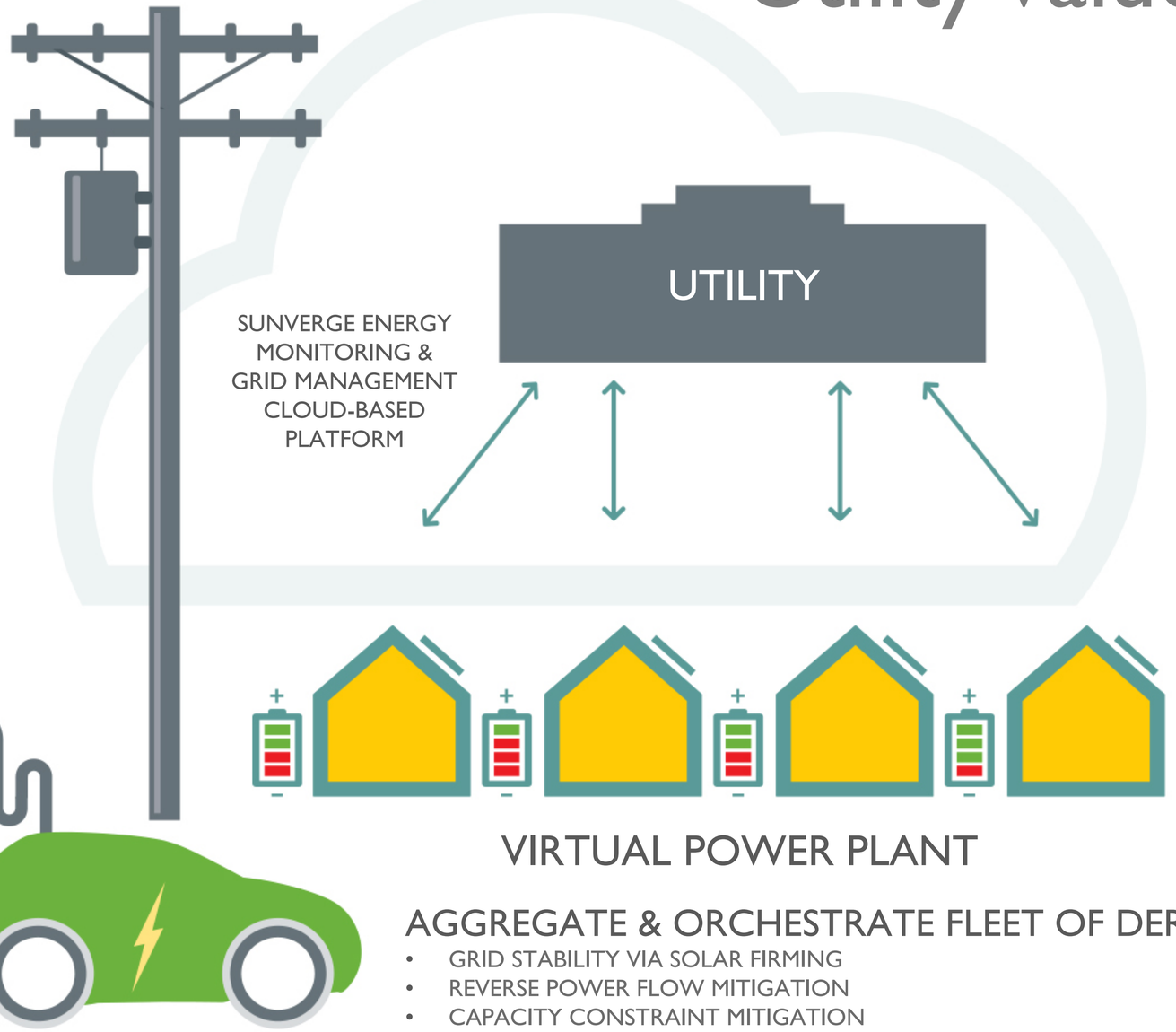
Consumer Value



INCREASED PV SELF-CONSUMPTION, BACKUP POWER & TIME-OF-USE BILL MANAGEMENT

Utility Value



VIRTUAL POWER PLANT

AGGREGATE & ORCHESTRATE FLEET OF DER

- GRID STABILITY VIA SOLAR FIRMING
- REVERSE POWER FLOW MITIGATION
- CAPACITY CONSTRAINT MITIGATION
- PEAK LOAD SHAPING, SHIFTING & SHAVING
- VOLTAGE OPTIMIZATION
- SYSTEM UPGRADE COST DEFERRAL

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Sunverge Hardware

Hybrid Inverter
Scaleable to 6 kW

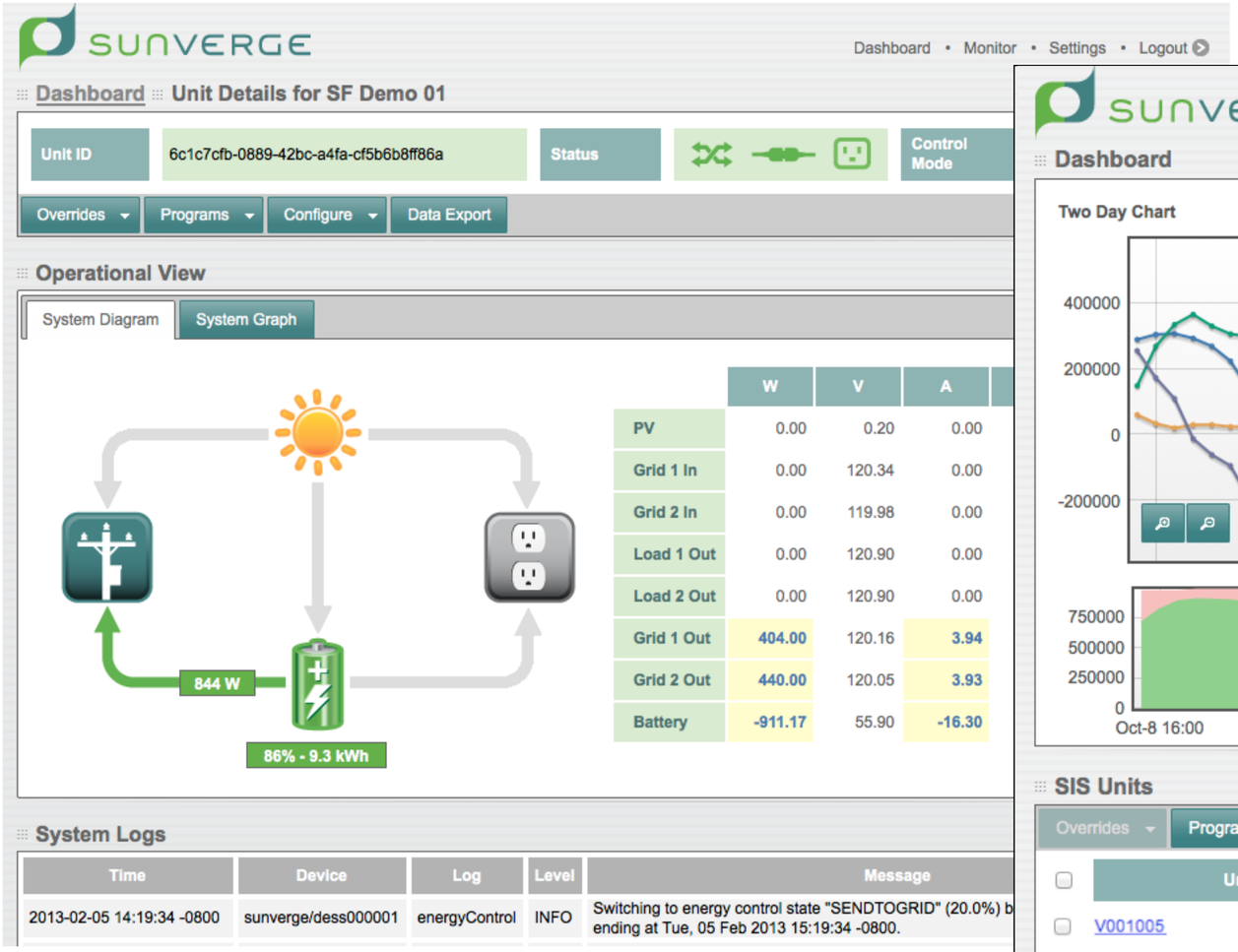
Balance of System

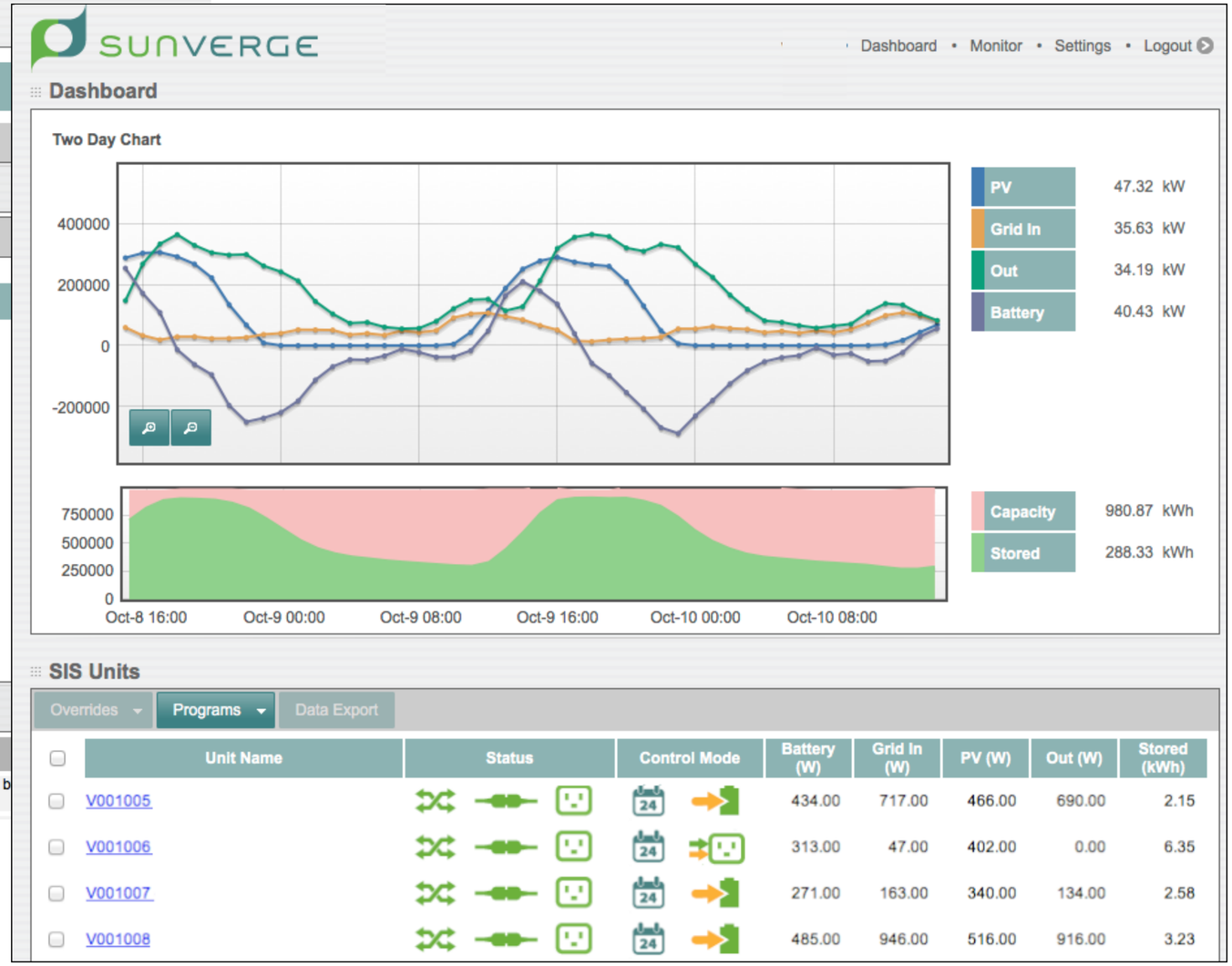
Application Gateway

Lithium-ion Battery
Scaleable to 19.4 kWh

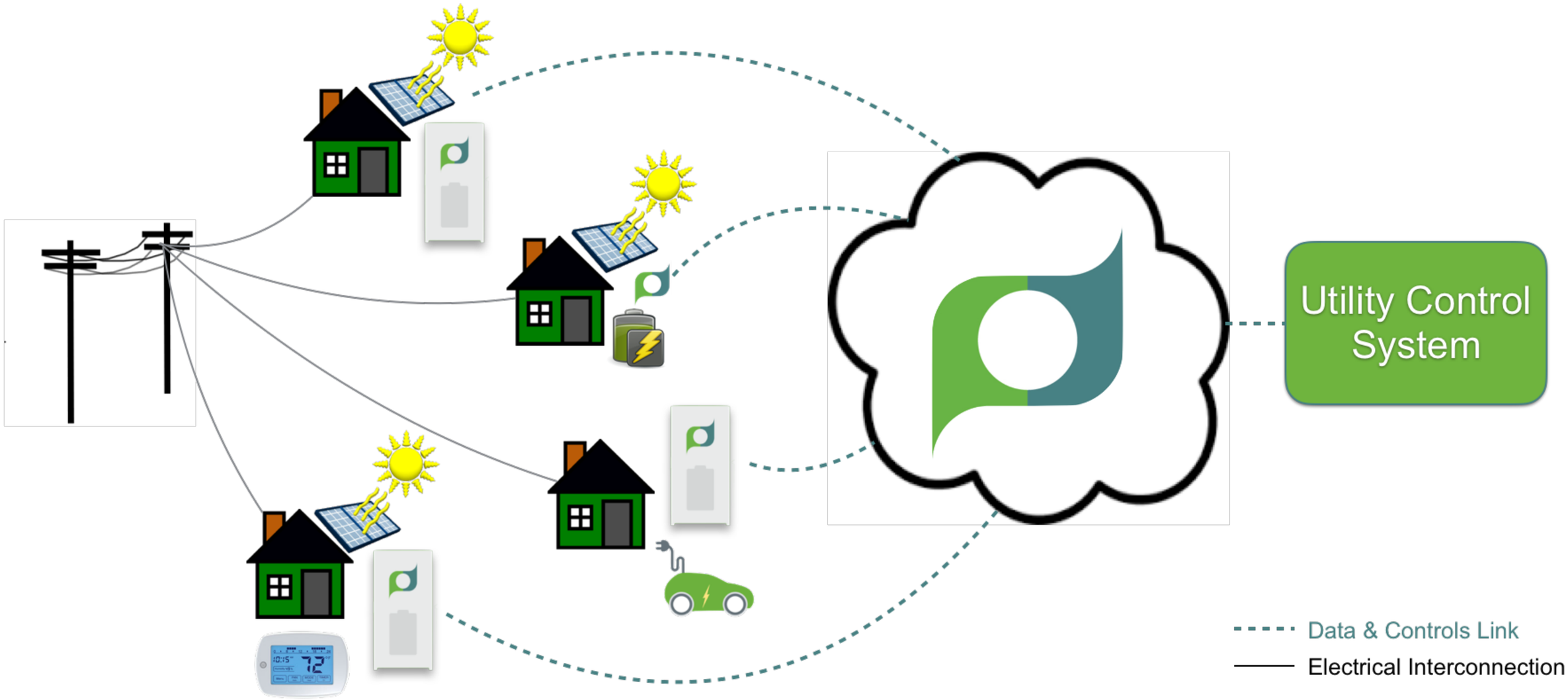
NEMA 3R Enclosure

Fleet Management





Manage Multiple DERs via One Integration



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Affordable Housing Project & Sacramento Municipal Utility District (SMUD)

PROJECT DESCRIPTION

34 new homes in downtown Sacramento, Calif. outfitted with a solar panel system integrated with Sunverge energy storage hardware and control software in the cloud.

PROJECT GOAL

- Cost effectively design and build affordable, zero-net-energy homes in advance of tough new state energy efficiency standards.
- Evaluate how high penetrations of renewables could yield maximum value through customer-sited storage solutions.
  - Simulate demand response signals, peak load shifting, PV firming and model benefits of integration with home energy management systems.
  - Phase II is looking at benefits of aggregating fleets for Virtual Power Plant.

SMUD

SMUD®
Sacramento Municipal Utility District

Affordable Housing Project & Sacramento Municipal Utility District (SMUD)

SMUD®
Sacramento Municipal Utility District

RESULTS

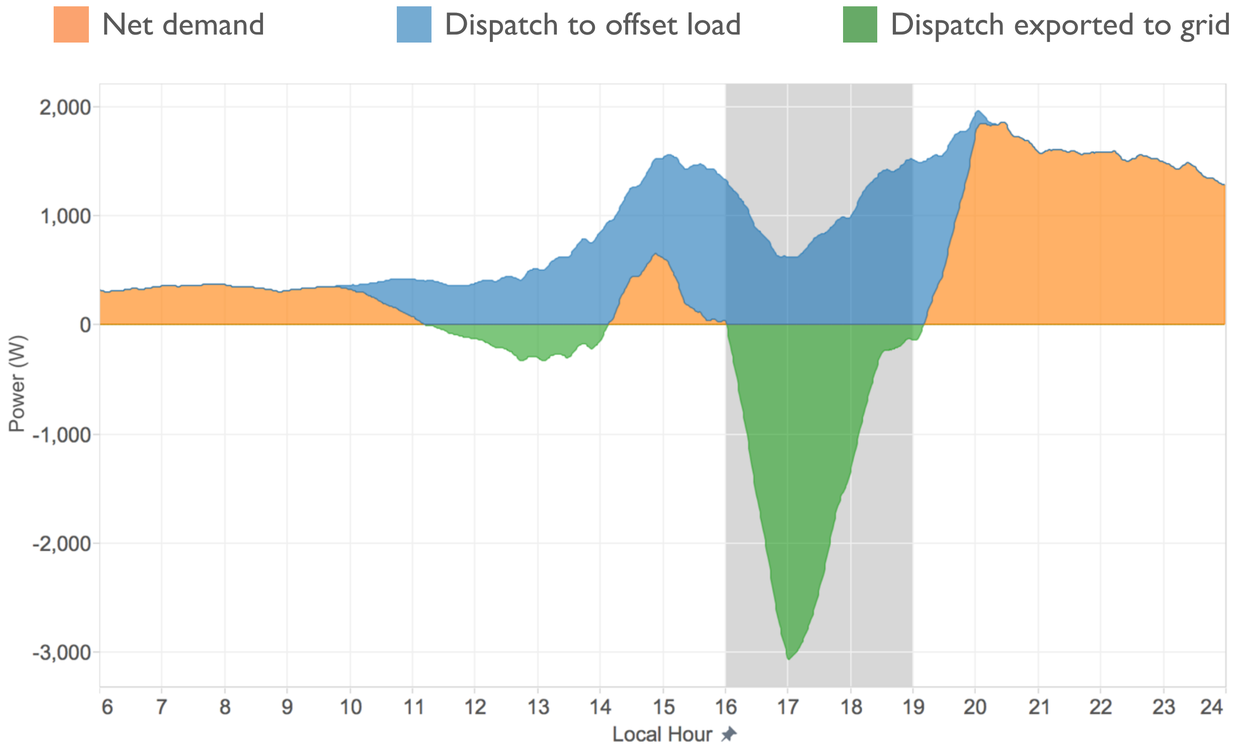
Homeowners:
Electric bills 85% lower than comparable homes.

Utility:

- Improved energy supply reliability during outages and demand reduction events.
- Provide tangible bill-reduction benefits and backup power.

Builder:
Homes sold out in less than a year (Prices: US$350,000 to US$450,000 for 1,250 to 1,700 sq. ft. homes).

DEMAND RESPONSE PERFORMANCE



SIS dispatches to offset load in homes and export maximum additional energy to utility grid during DR events

Note: Height of graph shows total energy used in the home

Graph shows average demand response performance, July - September 2014

New Zealand Utility Vector Delivers New Value Stream & Preserves Marketshare

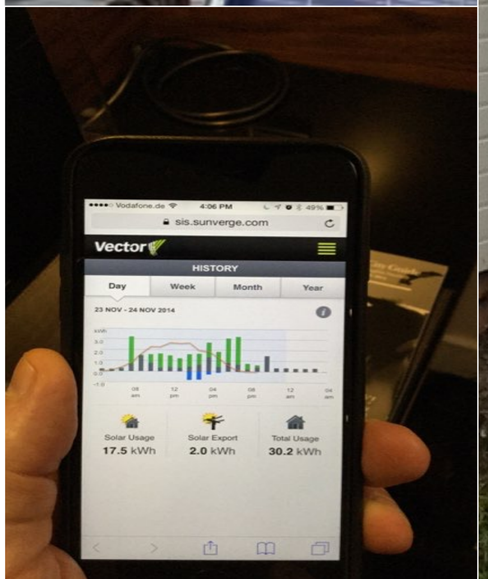
PROJECT DESCRIPTION

Through SunGenie Program, Vector outfits 300 new and existing homes in Auckland with a solar panel system integrated with Sunverge energy storage hardware and cloud-based software. Plans for further deployment and integration with other storage providers in 2016.

PROJECT GOAL

- Provide utility customers with new, high-value service offering and protect market share.
- Prove Capex and OpEx costs could be reduced.
- Test benefits of solar + storage at individual home and network levels.
- Phase II will model benefits of Virtual Power Plant.

VECTOR



Vector

300 UNITS DEPLOYED

3.5 MWh OF CAPACITY AND GROWING

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New Zealand Utility Vector Delivers New Value Stream & Preserves Marketshare

RESULTS

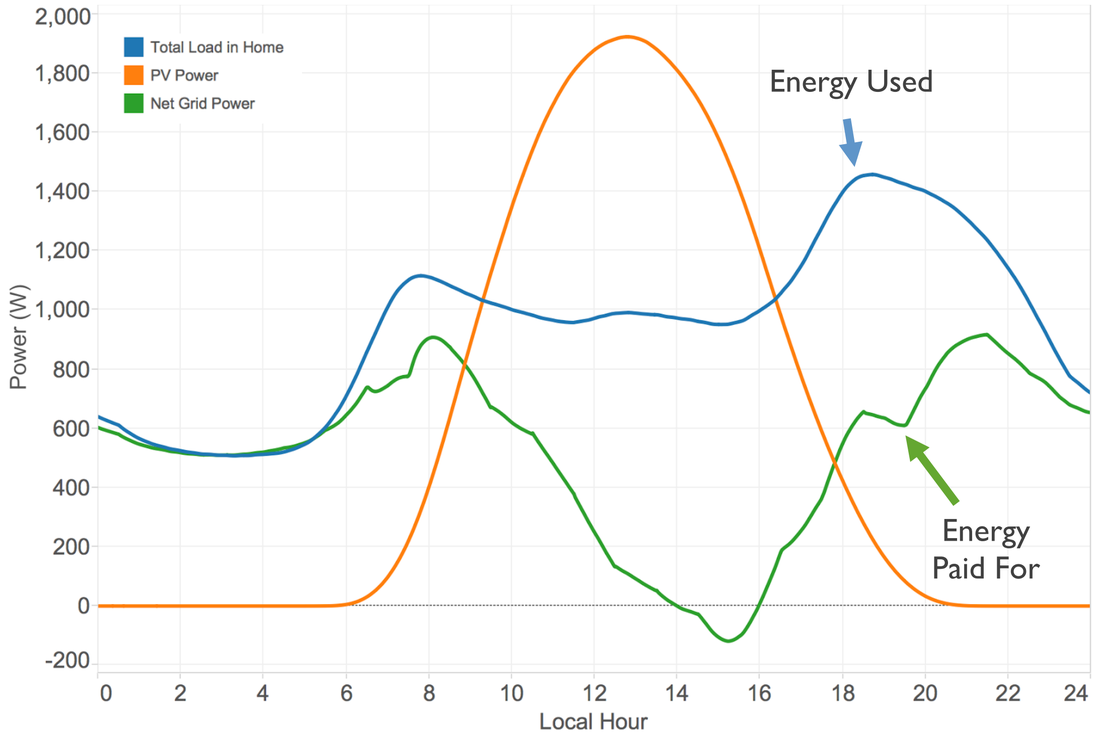
Homeowners:
SunGenie system produces on average around 12kWh per day – roughly half the power required by a typical Auckland home.

- Save 57%-63% per month in the summer vs. those without Sunverge. Total consumer savings: NZ$7K over life of investment.
- Increased reliability and energy independence/control.

Utility:
NZ$25K benefit over the lifetime of each device.

- SIS units provided over 1000 kWh of backup power for outages in the last six months of 2014 – an average of 3 kWh of backup power per customer.
- Reduce peak load export 66% (vs. Tesla Powerwall reduction of 29%).

BILL SAVINGS FOR CUSTOMERS



Up to **63%** per month savings during peak months

Time-of-use rate would add an additional **15%** savings

Chart shows average profile from Vector fleet

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Clean Virtual Power Plant: SunPower, Sunverge & Con Edison

PROJECT DESCRIPTION

Upon deployment, VPP Pilot of 300 units or 1.8MW of VPP capacity to test resilience, tariff design, market mechanisms and network value and rate design.

PROJECT GOAL

- REV demonstration project is designed to demonstrate how aggregated fleets of solar + storage assets in hundreds of homes can collectively provide network benefits to the grid, resiliency services to customers, monetization value to Consolidated Edison of NY.
- Provide utility customers with new, high-value service offering and protect market share.

CLEAN VIRTUAL POWER PLANT

conEdison

1.8 MW SOLAR AND STORAGE VIRTUAL POWER PLANT

"Imagine if 100,000 homes across the province adopted this type of system…there would be some gas-fired power plants that wouldn't need to come into existence or some refurbishments that may not need to happen."
Neetika Sathe, VP of Corporate Development, PowerStream, Ontario, Canada

"We want to give customers choice in how they generate and use their power."
Karl Edwards, Head of Customer Innovation & Growth, United Energy, Australia

"Energy storage will become an essential part of the electric system in coming years because so much renewable energy is being added to the grid."
Mark Rawson, Head of Technology for the Sacramento Municipal Utility District, Sacramento, California

"This is an important step towards more efficient ways to run electricity networks and also towards giving customers greater choice and control in how they manage their electricity needs."
Ian McLeod, CEO of Ergon Energy, Australia

"Our customers want us to provide more reliable service for a lower price and with fewer emissions. The technology from Sunverge Energy will help us achieve all those goals while helping us continue to evolve the way we serve our customers."
William "Billy" Ray, EPB Superintendent, Glasgow, KY

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SUNVERGE

Renewable Made Reliable

Sunverge Services

Analytics: Each SIS serves as a “SCADA-sensing node” for its location. Discrete and aggregated data delivered to utilities and grid operators assist with optimizing the operation of the grid to minimize power losses and maximize efficiency across such areas as outage management, system modeling, ADMS and other real-time applications.

Demand Response: Dispatch power to the grid and reduce demand through signals to the home energy management systems & other distributed energy resources.

Demand Management & Peak Load Reduction: Time-shift energy generated from PV or drawn from the grid to maximize peak load reduction at individual customer sites.

Voltage Optimization: Each SIS unit respond to needs for voltage control by injecting or absorbing real or reactive power at the place its needed most: nearest to the load.

Fast Frequency Regulation: Through integration with ISO or utility energy management systems, SIS units respond to regulation signals on a per-second basis.

Local Backup Power Supply: In the event of power loss, the SIS unit automatically isolates from the grid and delivers its own power to the site without any interruption in service or loss in power quality.

Solar Management: By supplementing the intermittent nature of solar with battery-stored energy, or by limiting solar exports to the grid through intelligent control, each SIS unit makes solar generation more reliable, predictable and stable.

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THANK YOU

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Renewable Made Reliable