



**A2EP – 2xEP Energy Productivity Summit**  
**04-05 April, 2017**  
**Australian National Maritime Museum**  
**Darling Harbour, Sydney**

**Session 13**  
**Integrated clean energy (ICE)**

Dan Sturrock

James Lewis

Nick Smith

*Martin Symes > presentation follows*

Tim Stock

Matt Grover

*Chair: Travis Hughes*



*Doing more. Using less.*



## Virtual Power Plants

Realising the value of distributed storage systems through aggregation and integration

Martin Symes - Director of Sales, Australia and New Zealand

A2EP | April 2017

# Contents

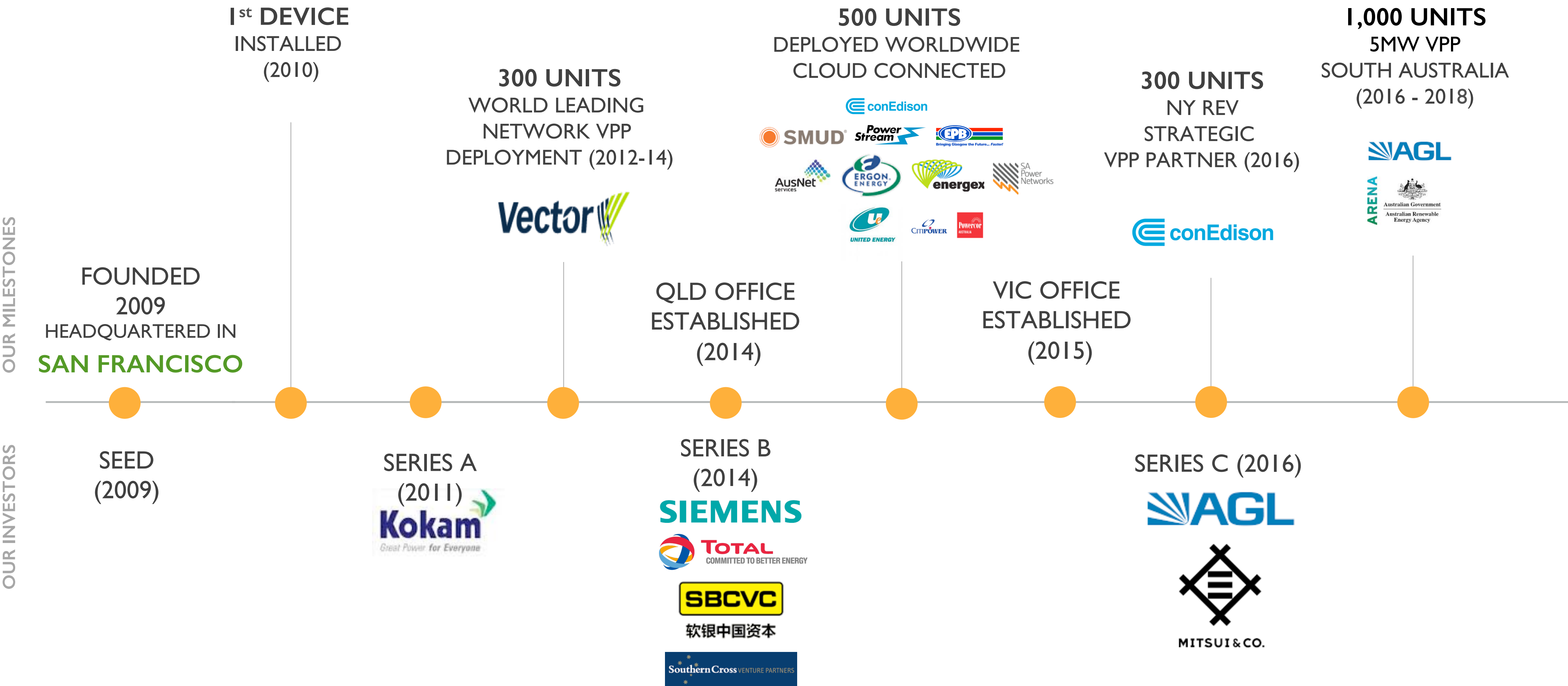
- Company overview
- Product overview
- VPPs - realising value through aggregation and integration

# COMPANY OVERVIEW

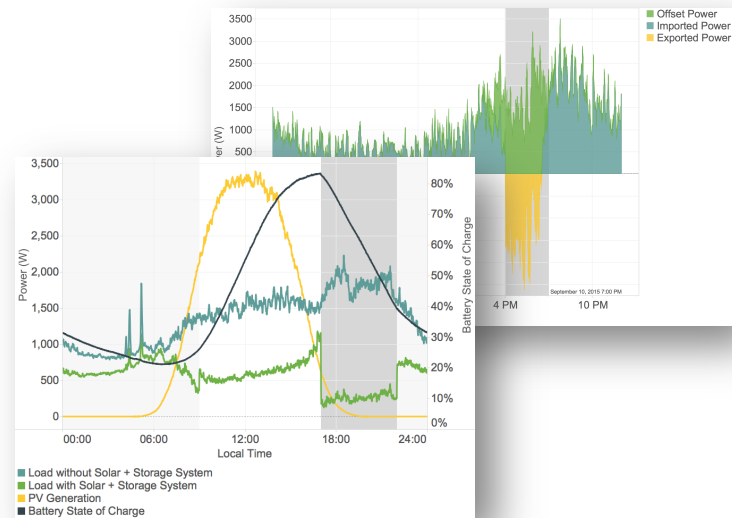




# Company background



# Sunverge Vision and Strategy

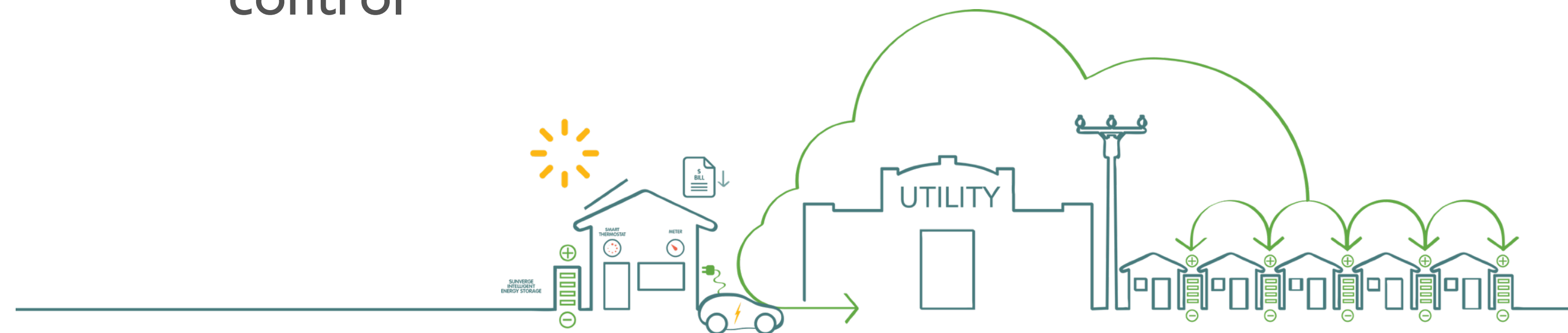


optimise solar self-consumption by delivering stored solar when it is most needed

access utility and energy market benefits through demand management, demand response, voltage and frequency control

maximise customer benefits for different dynamic tariff scenarios

manage a fleet of disparate devices to provide greater network and market benefits



# PRODUCT OVERVIEW





# Distributed Energy Storage System

Sunverge One is an intelligent distributed energy storage system that:

- captures solar power and delivers it when needed most
- combines batteries, power electronics, and multiple energy inputs in a UL-certified appliance controlled by software running locally and in the cloud
- is a utility-grade product designed for the residential and small commercial markets

**Storage  
Appliance**



**Renewable  
Generation**



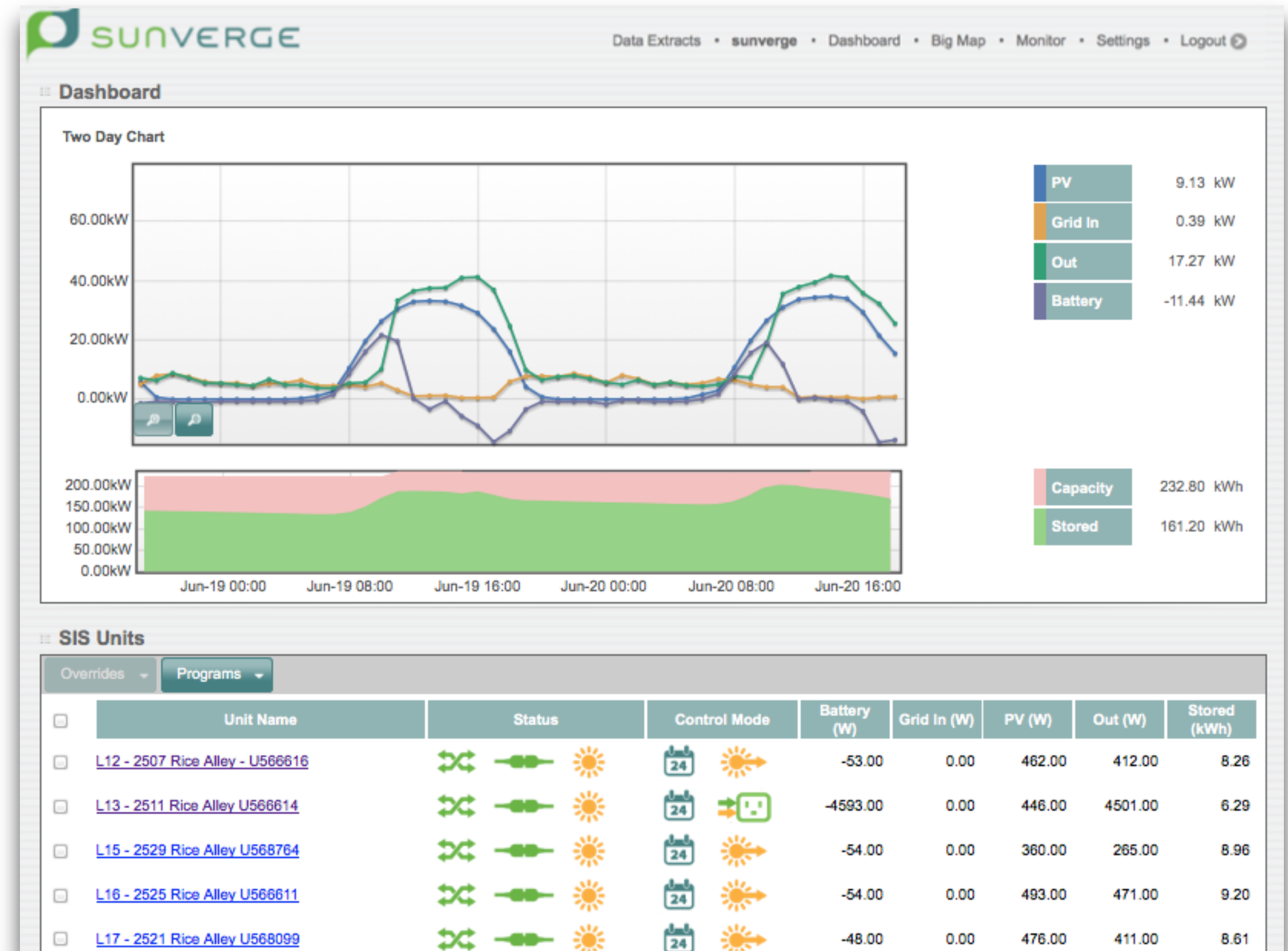
**Software as  
a Service**

**Product roadmap  
based on multiple  
battery and  
inverter  
partnerships  
to create  
customer choice**



# High level VPP functionality

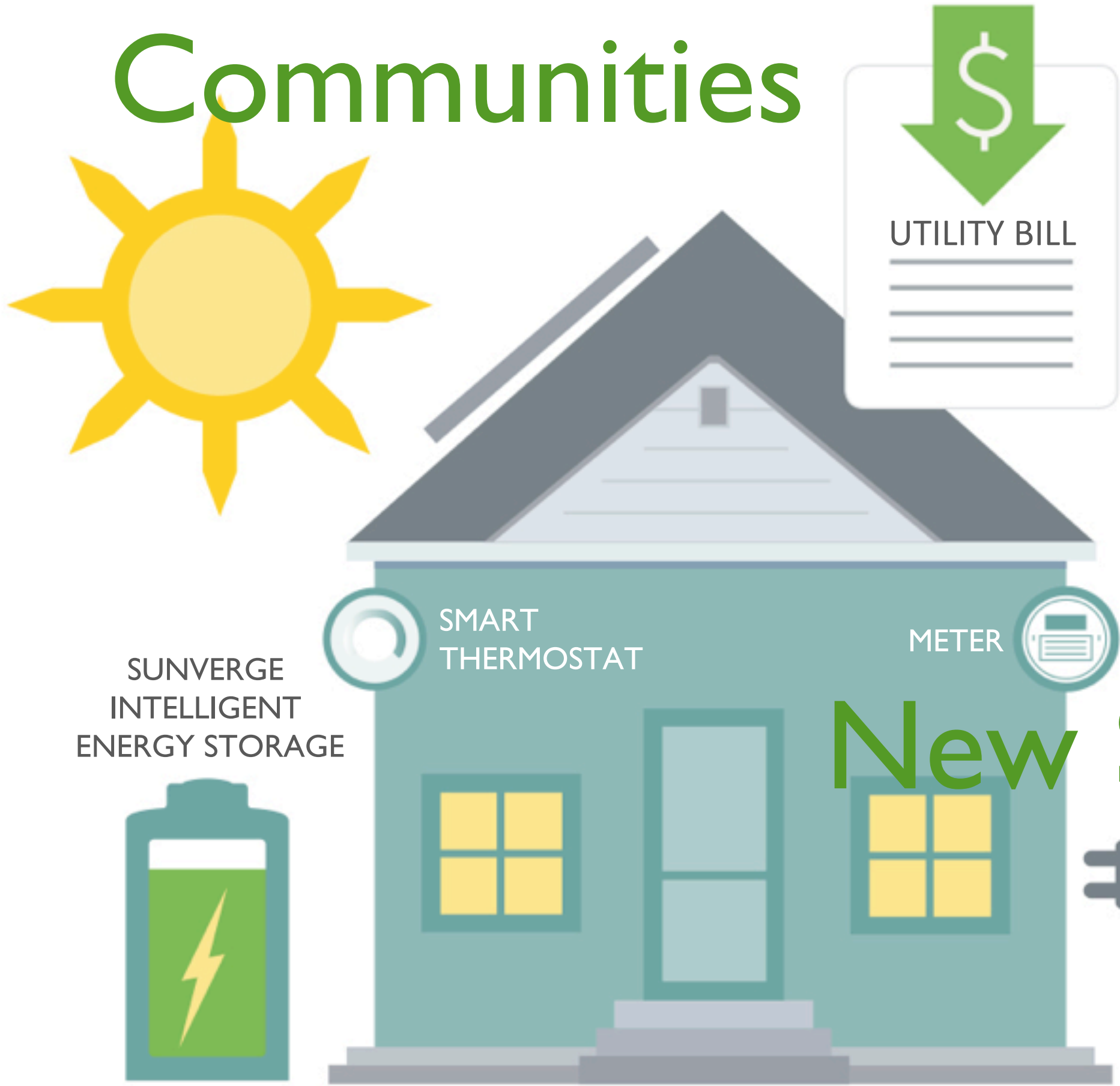
- Up to 900 data points gathered every 4-12 seconds, over 3G/internet
- Sophisticated rule sets and algorithms
- Optimisation and Analytics
- NOC Service
- Fleet Management UI
- Consumer UI
- Energy Markets
- Advanced DMS
- Capacity as a Service
- Forward Scheduling
- Demand Charge Reduction
- Demand Response
- Peak Load Shifting
- Capacity Reserve
- Device Virtualization/Drivers
- API integration
- Hardware Integration (multiple inverter makes, battery makes, HEMS, Genset, Thermostats, EV etc)



# VPP - REALISING VALUE THROUGH AGGREGATION AND INTEGRATION



# Consumer Value Communities



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



# Utility Value Network Generation

## Retail

SUNVERGE ENERGY  
MONITORING &  
GRID MANAGEMENT  
CLOUD-BASED  
PLATFORM



## Wholesale

# New Service Providers



VIRTUAL POWER PLANT

AGGREGATE & ORCHESTRATE FLEET OF  
DISTRIBUTED ENERGY RESOURCES



# Market Operator



# Sunverge VPP 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.



**Self consumption and tariff optimisation:** Each SIS unit responds to pre-determined rules to maximise solar self-consumption and optimise customer tariff outcomes (including Demand Charge Management).



**Fast Frequency Regulation:** Through integration with market operator / 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.



**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.

## Sharing costs, optimising & sharing value across the energy ecosystem



# USA: VPP for Con Edison New York ISO

## 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



## 1.8 MW SOLAR AND STORAGE VIRTUAL POWER PLANT





# USA: Projects in California and Kentucky

Project Partner



## Description

Construction of 34 new homes in Sacramento, CA outfitted with solar panel system integrated with Sunverge energy storage hardware and control software in the cloud

Glasgow installed SIS units in 165 homes to capture power from the grid when demand and cost are low and then release when demand and costs are high, reducing need for additional power from traditional generating plants

## Project Goal

- Cost effectively design and build affordable, zero-net-energy homes
- Evaluate how high penetrations of renewables could yield maximum value through customer-sited storage solutions

- Reduce peak demand by 25%
- Quantify benefits of integrating Sunverge systems with ecobee smart thermostats and GE tankless water heaters to improve overall energy efficiency

## Homeowner Result

- Utility bills 85% lower than comparable homes

- Lower utility bills and reliable backup power

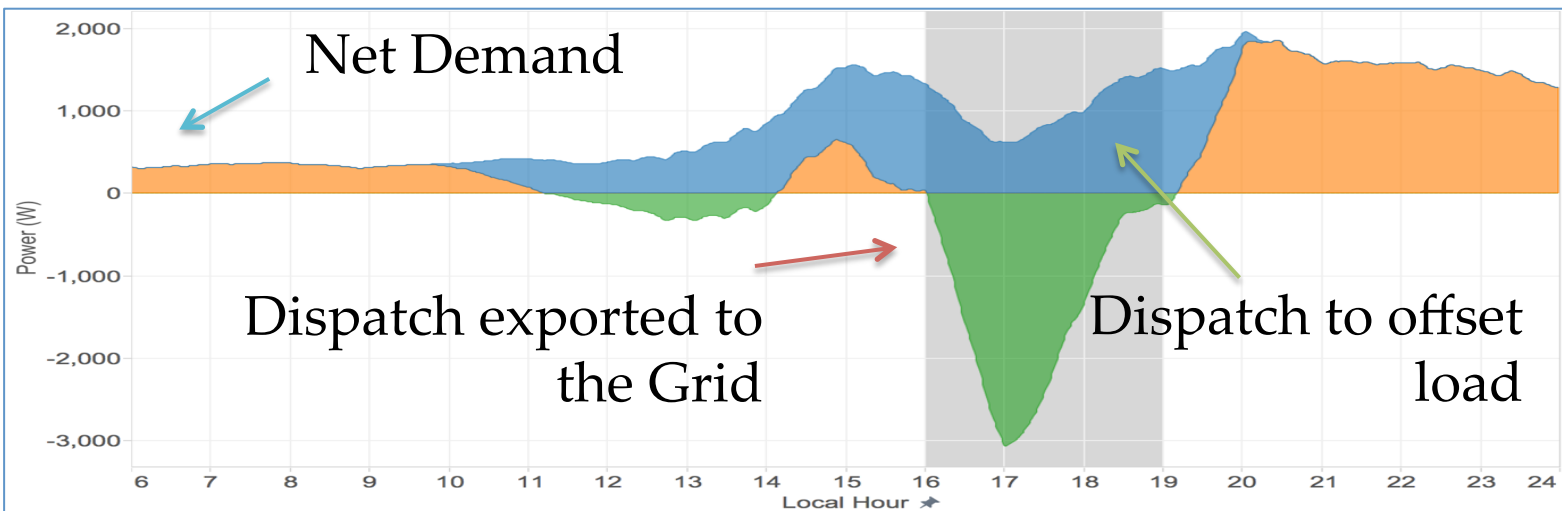
## Utility Result

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

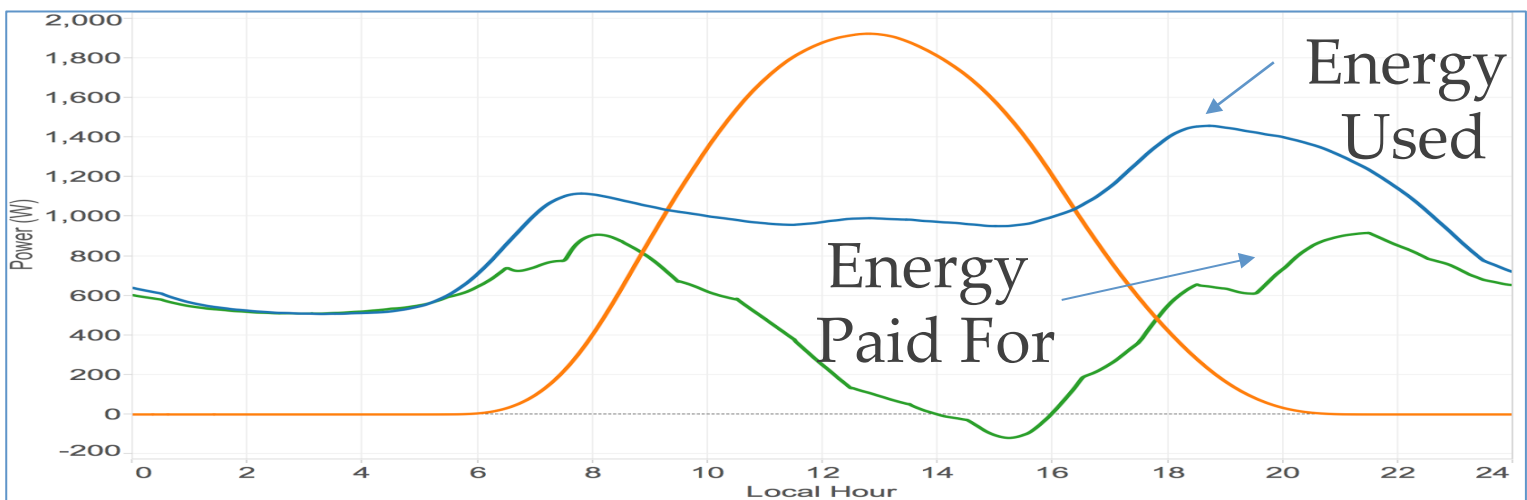
- Aggregated SIS systems allow Glasgow to deliver energy to the grid from a VPP
- 25 hours of backup power provided to date and reduced peak demand by 51%

## Case Study Data

Demand Response Performance



Bill Savings for Customers





# Canada: PowerStream



## Project Description

- Ontario utility PowerStream launched a 20-unit solar+storage pilot northwest of Toronto
- The 11 KWh Sunverge systems will be used in a VPP model that aims to reduce peak demand, manage consumer-generated solar, and reduce customer power bills by 60%
  - Homeowners will pay US\$3,800 for the Sunverge unit
- A monthly service fee will cover the management of the VPP and provide homeowners with real-time data they can use to manage their demand and further lower their bills

## Project Objectives & Results

- Help reduce overall power consumption in the service area by 535,440 MWh by 2020 as part of IESO mandate
- Test models to replace Feed-in-Tariff program, which will be replaced in late 2017 by net-metering/Value-of-Solar-Tariff program that will reward self consumption
- Over 90 hours of backup power provided, 40% load offset during peak hours to date

## PowerStream



**Estimated benefit of distribution asset deferral is ~\$180M across the PowerStream customer base**



# Japan – various projects

## PROJECT DESCRIPTION

- Integration of Sunverge One hardware with domestic fuel cells
- Pilot project in build up to full retail contestability in Tokyo (28M connection points)

## PROJECT GOAL

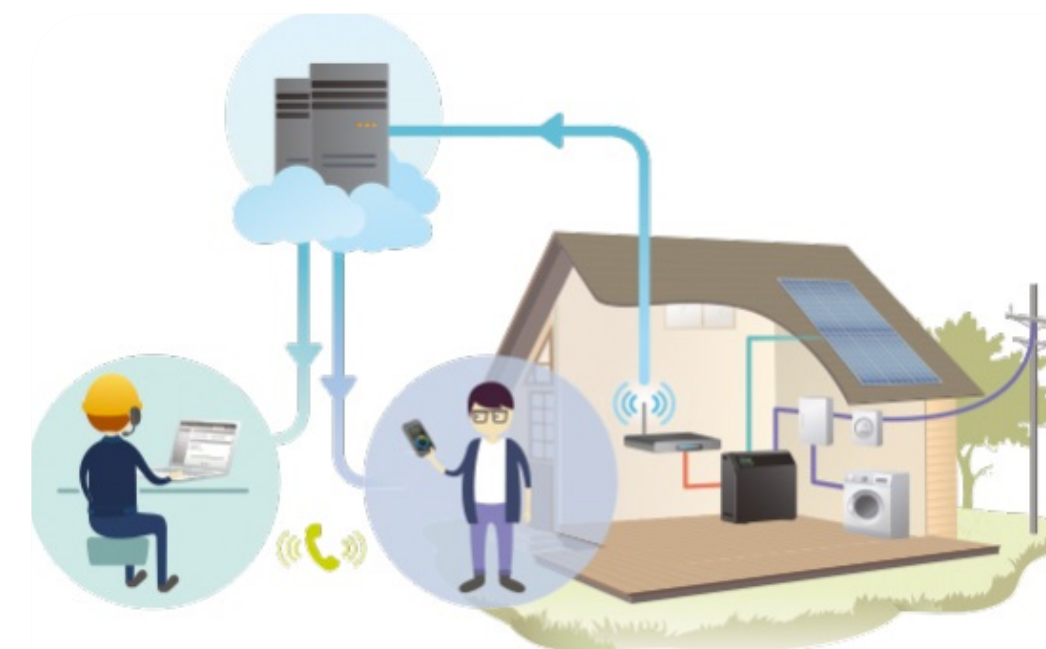
- Reduce sovereign risk
- Integrate clean distributed resources
- Optimise solar and fuel cell usage
- Enhance customer experience
- Reduce grid investment





# South Australia - 5MW Virtual Power Plant

- World's largest Virtual Power Plant (5 MW) in South Australia with Sunverge VPP Platform
- Provide 1,000 controllable batteries to SA homes and/or small businesses who have solar
- Improve stability of network and support renewable generation
- Produce zero carbon emissions
- Reduce energy bills for customers
- Demonstrate network and wholesale value
- Building the market to expedite the cost and value curve and demonstrate the business model
- Integrate and manage multiple inverter and battery types



# Summary

- Real-world projects generate invaluable insights to enhance our products and support our core premise...
- ....Integrated hardware + powerful VPP aggregation platform = optimise and share value across the energy ecosystem
- Create consumer choice and consumer focus
- More to come.....



THANK YOU

