



March 17, 2022

Elk Neck Virtual Power Plant Pilot

PJM Emerging Technologies Forum

Delmarva Power | Albert Phan, Principal Program Manager
Sunverge Energy | Martin Milani, CEO

Agenda

1. Background
2. Project Overview
3. PJM Pilot Roles and Responsibilities
4. Status Update
5. Sunverge Technology Overview

Elk Neck VPP Project is part of the MD Energy Storage Pilot Program



Statutory Mandate

1. In May 2019, **MD Energy Storage Pilot Project Act** signed into law by Gov. Hogan
2. **Law directed MD PSC** to establish MD Energy Storage Pilot Program
3. Pilot program will inform **future of energy storage policy** in Maryland



Regulatory Program

1. In November 2020, **MD PSC approved** proposed Exelon utility projects
2. **Enables utilities to explore business models** to maximize value of storage to customers, utilities, and the grid



PJM Pilot

1. **First aggregated BTM storage** resource in PJM territory
2. Pilot will help **better understand operational capabilities & market opportunities** for this use case
3. Pilot may **inform existing and future market rules** for DER aggregations

Elk Neck VPP – Project Overview

Community

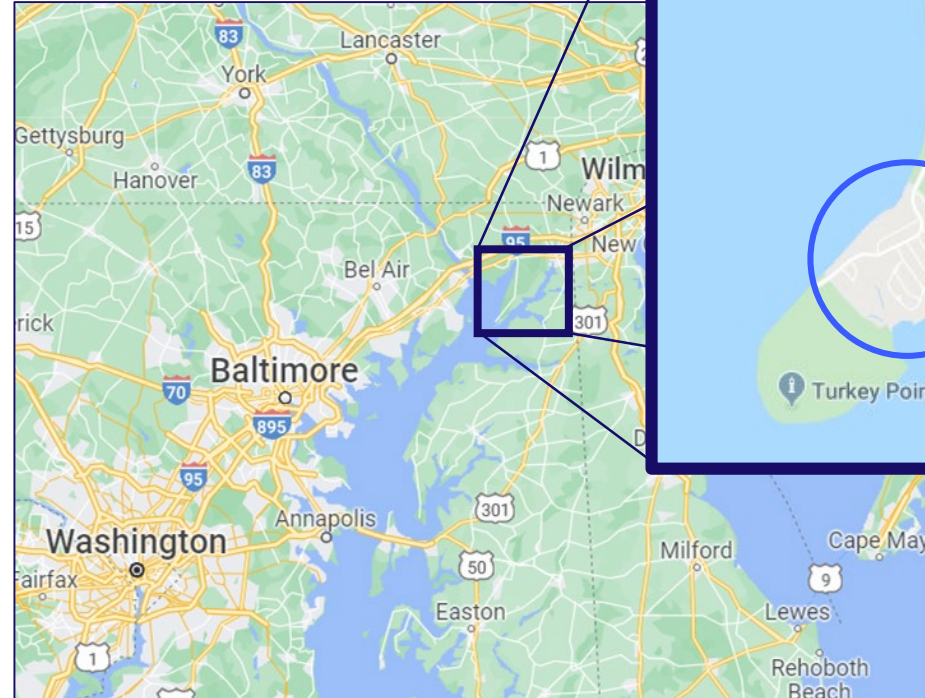
- Residential community located in the Elk Neck area
- 300+ residential customers south of Elk Neck State Park fed by a four-mile radial feeder

Use Cases

- Emergency Distribution Operations / Load Relief
- Customer Reliability & Resiliency
- PJM Market Participation

Technology

- **Count:** 110 behind-the-meter residential systems
- **Total System Capacity (EOL):** 0.5 MW / 1.5 MWh
- **Hardware:** LG Chem - 5 kW / 19.6 kWh
- **Vendor:** Sunverge Energy, Inc.



Roles & Responsibilities for PJM Pilot

Delmarva

1. Project sponsor
2. Ensuring safety and reliability of distribution system
3. Performing interconnection studies
4. Performing state regulatory reporting

Sunverge

1. VPP owner & operator
2. Owner of individual batteries
3. PJM Market Participant

PJM

1. Providing guidance on registration of VPP as a DR resource
2. Exploring new opportunities resulting from FERC Order 2222

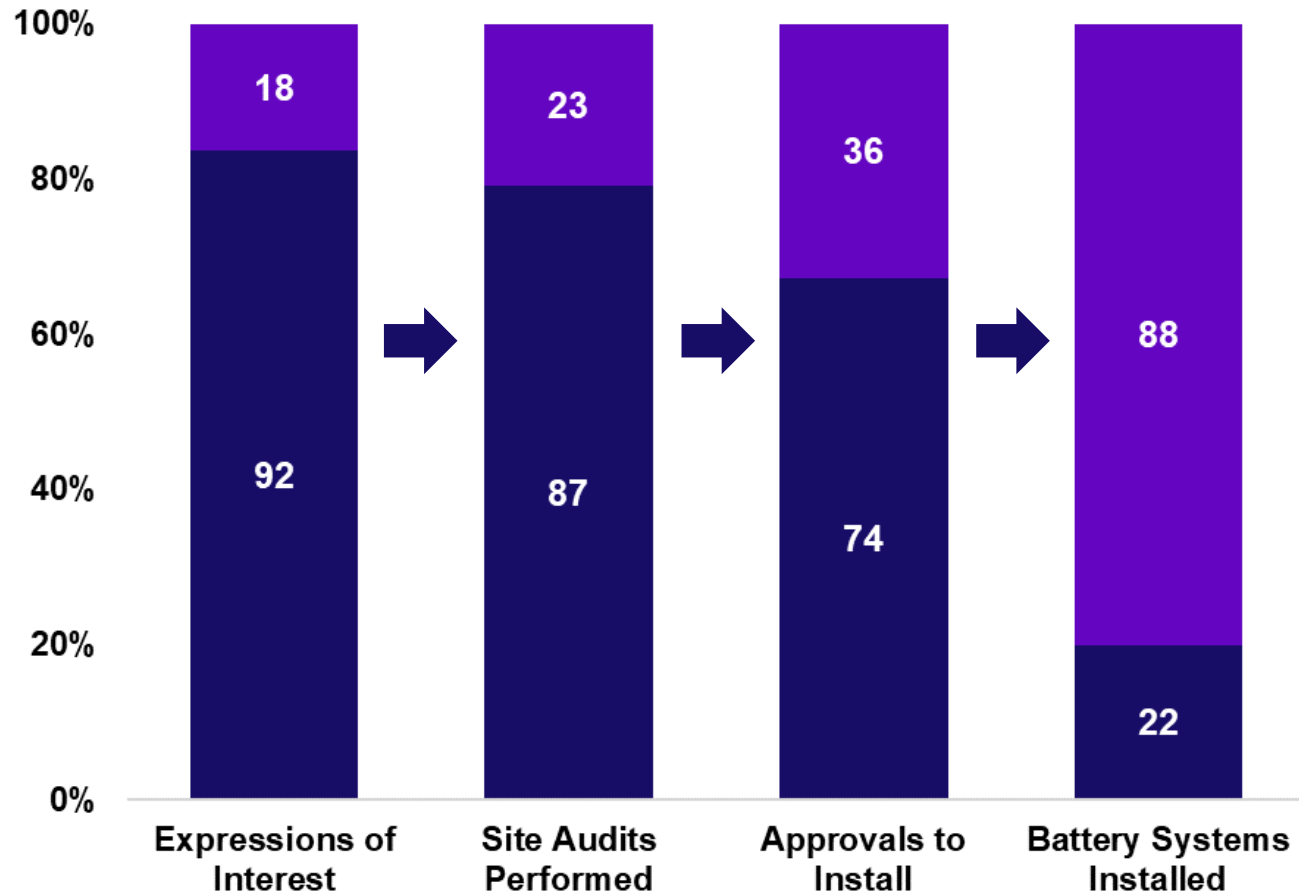
All Parties

1. Developing and documenting VPP performance in the PJM market (for Delmarva, post review of market activities)
2. Identifying and quantifying barriers to market participation, including resource limitations

Status Update

Deployment Metrics

■ Remaining ■ Current



1. **Delays:** Original February 2022 completion delayed by weather, seasonality of residents, and COVID surge
2. **Schedule:** Deployment now on track to complete final installation in July 2022
3. **Kickoff:** PJM Pilot Kickoff Meeting on February 11, 2022
4. **Market Participation:** Market participation targeted as soon as practicable after final installation



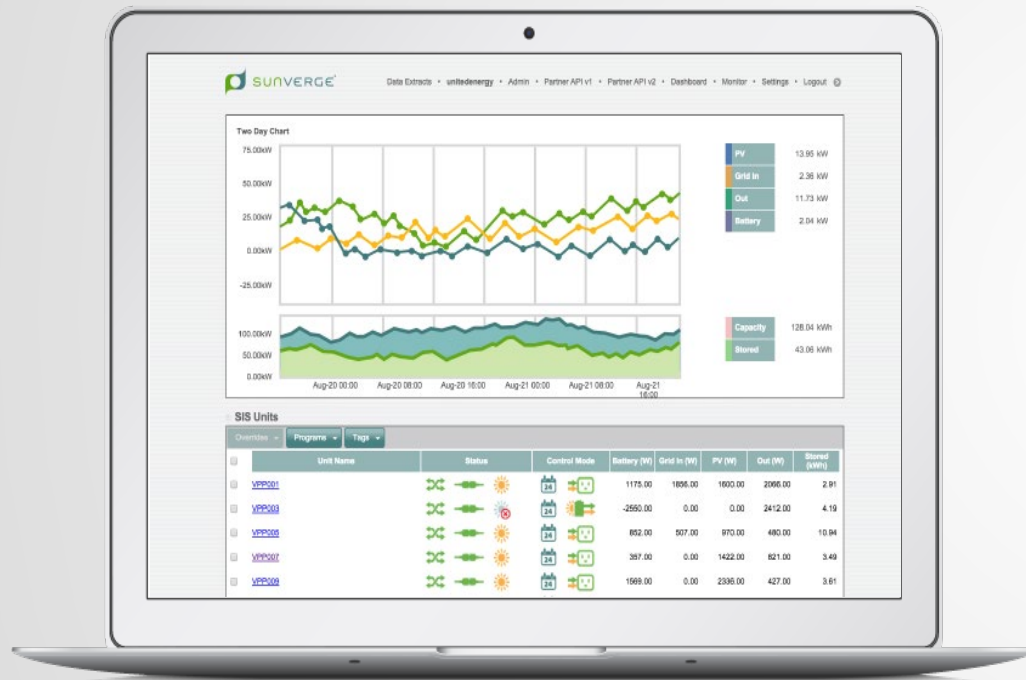
SUNVERGE

2022 Company Summary

Martin Milani, CEO



The Sunverge real time DER control, orchestration and aggregation Platform

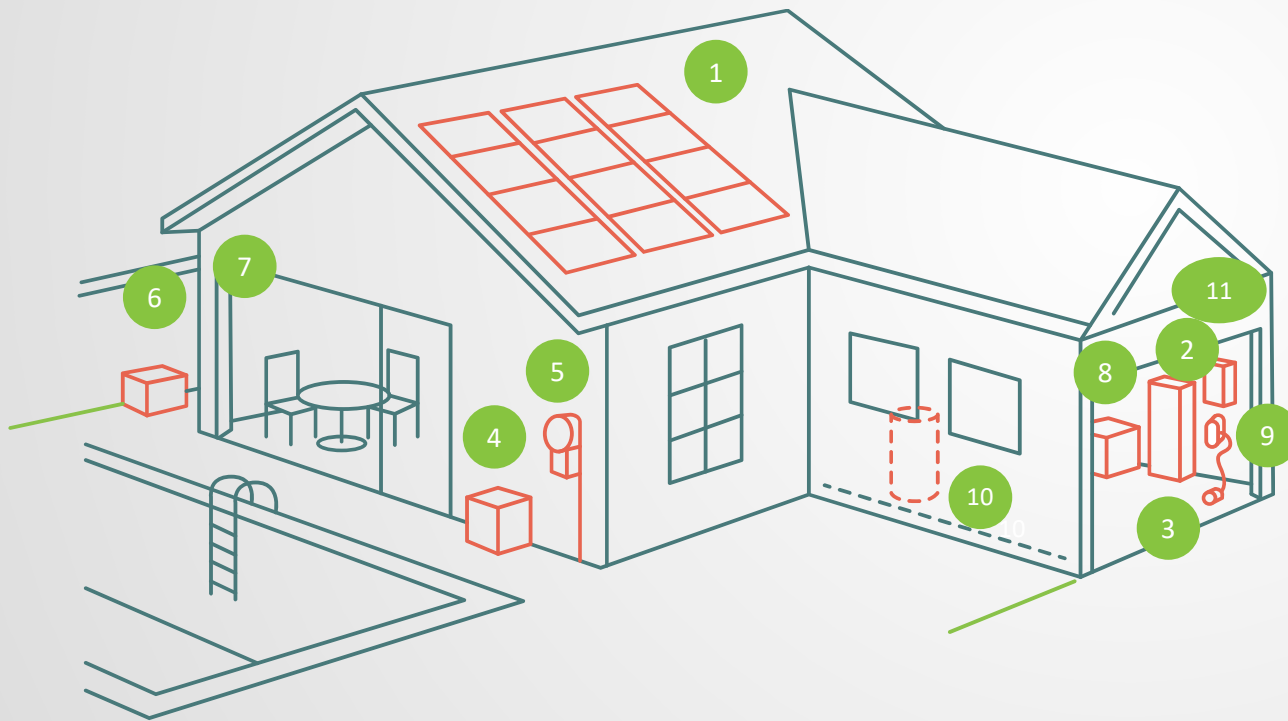


- **Real-time visibility, control, orchestration and optimization** of behind-the-meter DER's such as PV, Storage, Thermostats, AC, smart home appliances, digital circuit breakers, EVs and EV charging- managing site as a non-grid (Consumer Services)
- **Real-time Controlling, orchestrating and aggregating** of fleets of Distributed Energy Resources (DERs) into Dynamic, multi-service and multi-asset Virtual Power Plants (DVPP) (Grid Services)
- **Dynamic and real-time orchestration and aggregation** of DER assets to better manage utility distribution network load, operations, critical supply events, Grid modernization efforts and T&D Non-Wire Alternatives
- **Manage and facilitate** bidding of excess and emergency energy supply into wholesale Energy Markets- Demand Response, Capacity, Operating Reserve, Resource Adequacy, Frequency Regulation, etc. (Market Services)
- **Dynamic Multi-objective optimization and value stacking** of behind the meter consumer/prosumer, grid services, market services
- **Drive the Integration** of Demand-Side Management and Grid Management – **Long sought-after Holy Grail**
- **Enabling the emergence of Distribution level transactional Markets (DSO) and tangential ancillary service markets**

Multi-Asset Edge-Level Intelligent Unit Control and Optimization

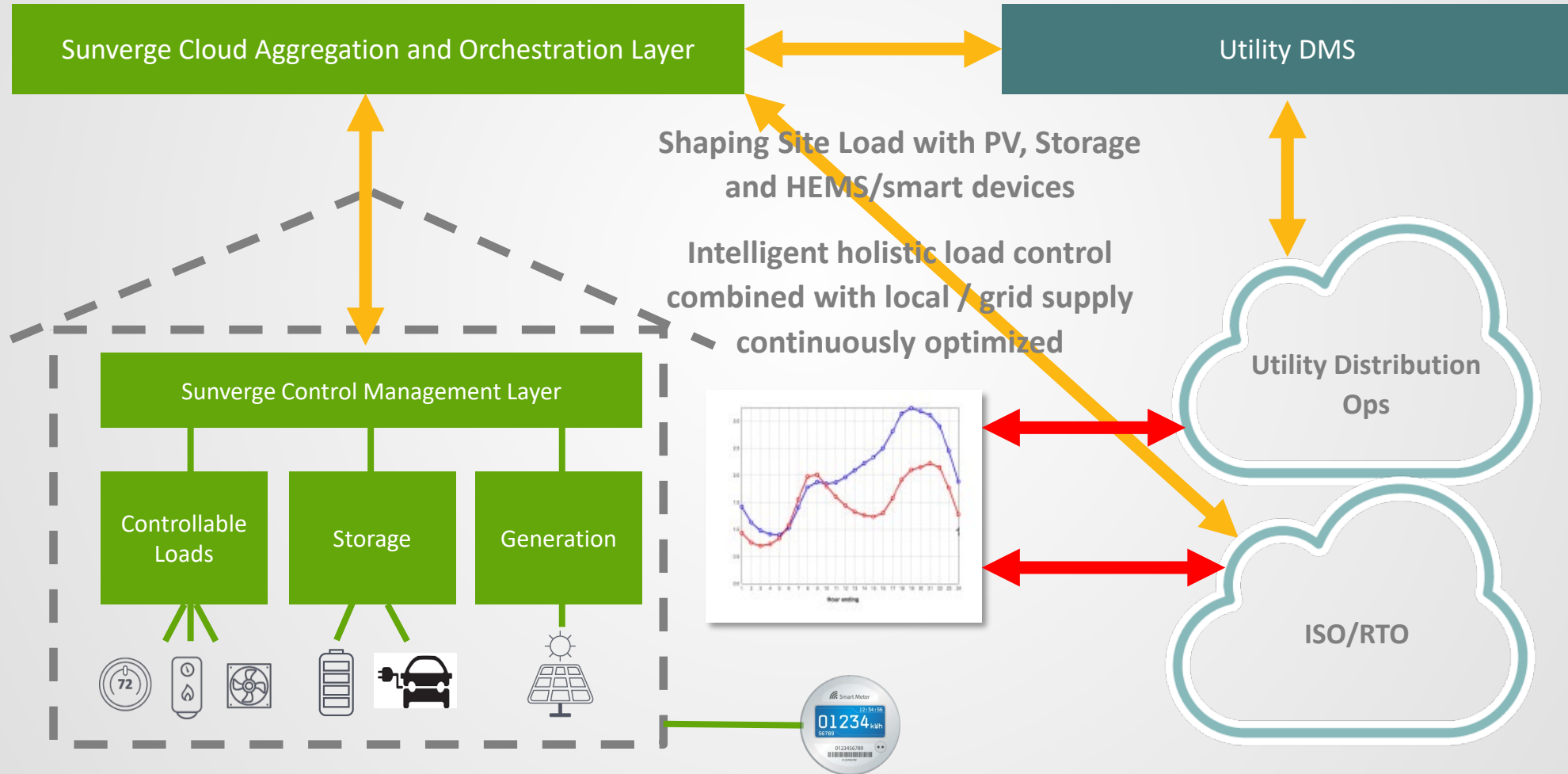
Multi-Service Cloud-level Dynamic Fleet Control, Aggregation & Orchestration

Sunverge's platform incorporates Solar, Storage, EV & EV Charging, and Home intelligent device operation for intelligent, automated, dynamic flexible load management, and multi-service (grid, consumer, market) and holistic multi-asset operations and optimization



- 1 Solar PV
- 2 Sunverge Infinity Gateway
- 3 Sunverge One Energy Storage System
- 4 HVAC
- 5 Smart Meter
- 6 Pool Pump Loader Controller
- 7 Smart Thermostat
- 8 Electric Clothes Washer and Dryer
- 9 Electric Vehicle Charging Station
- 10 Smart Water Heater
- 11 Smart Digital Circuit Breaker

Real-time Control, Optimization and Orchestration of Local Generation, Storage, & Controllable Loads



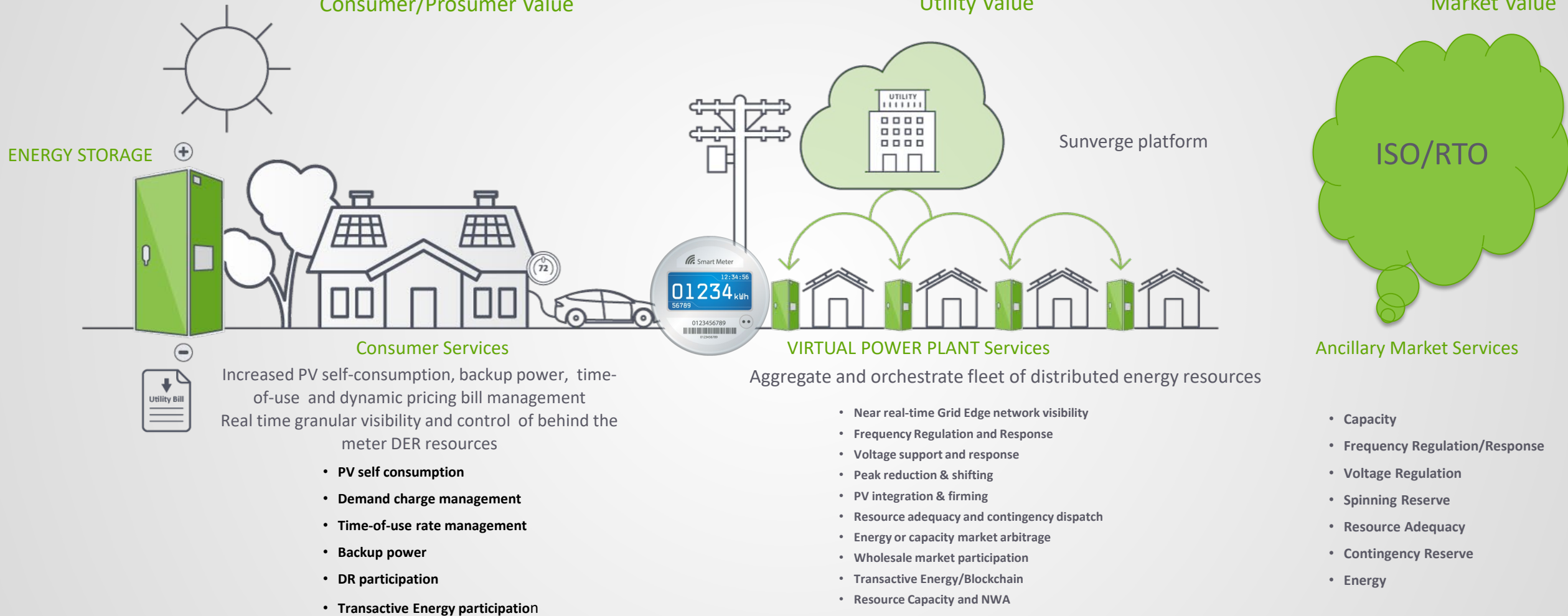
Multi-objective optimization of Consumer/Prosumer, Grid, Market Services

Deliver value for both sides of the meter

Consumer/Prosumer Value

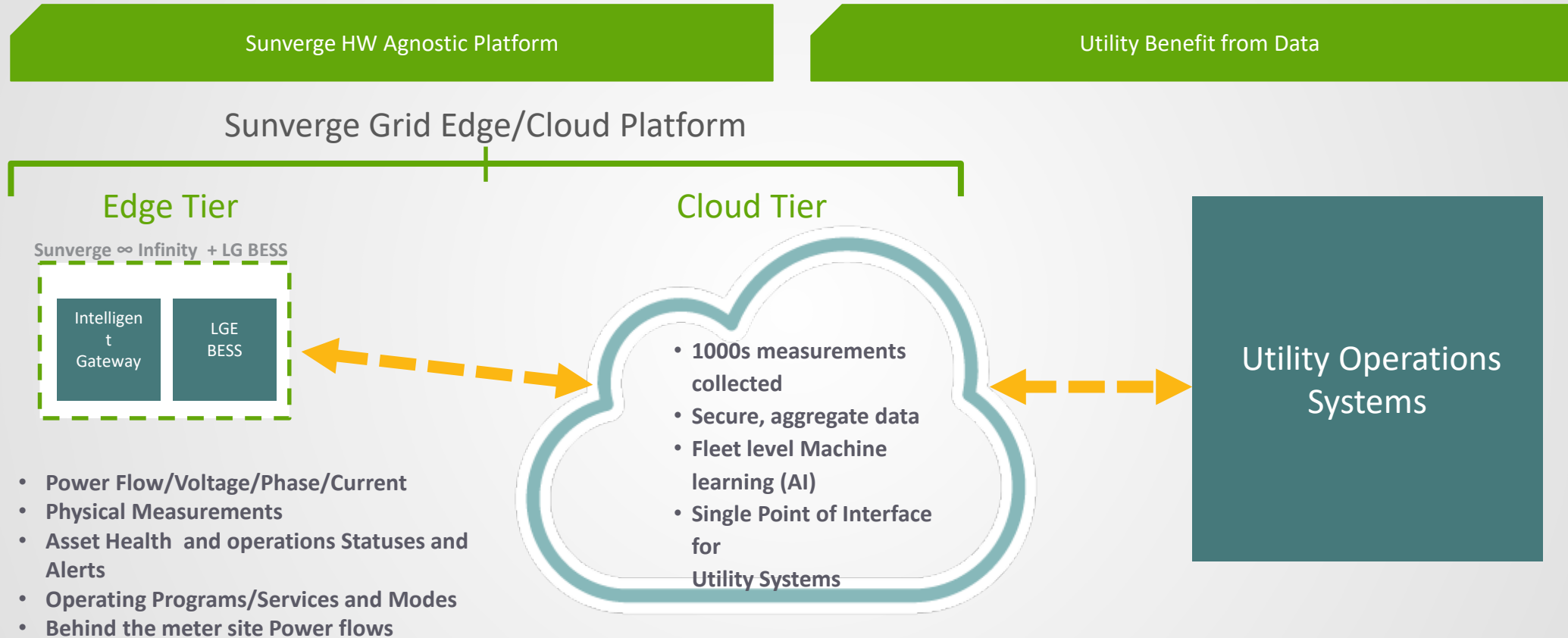
Utility Value

Market Value



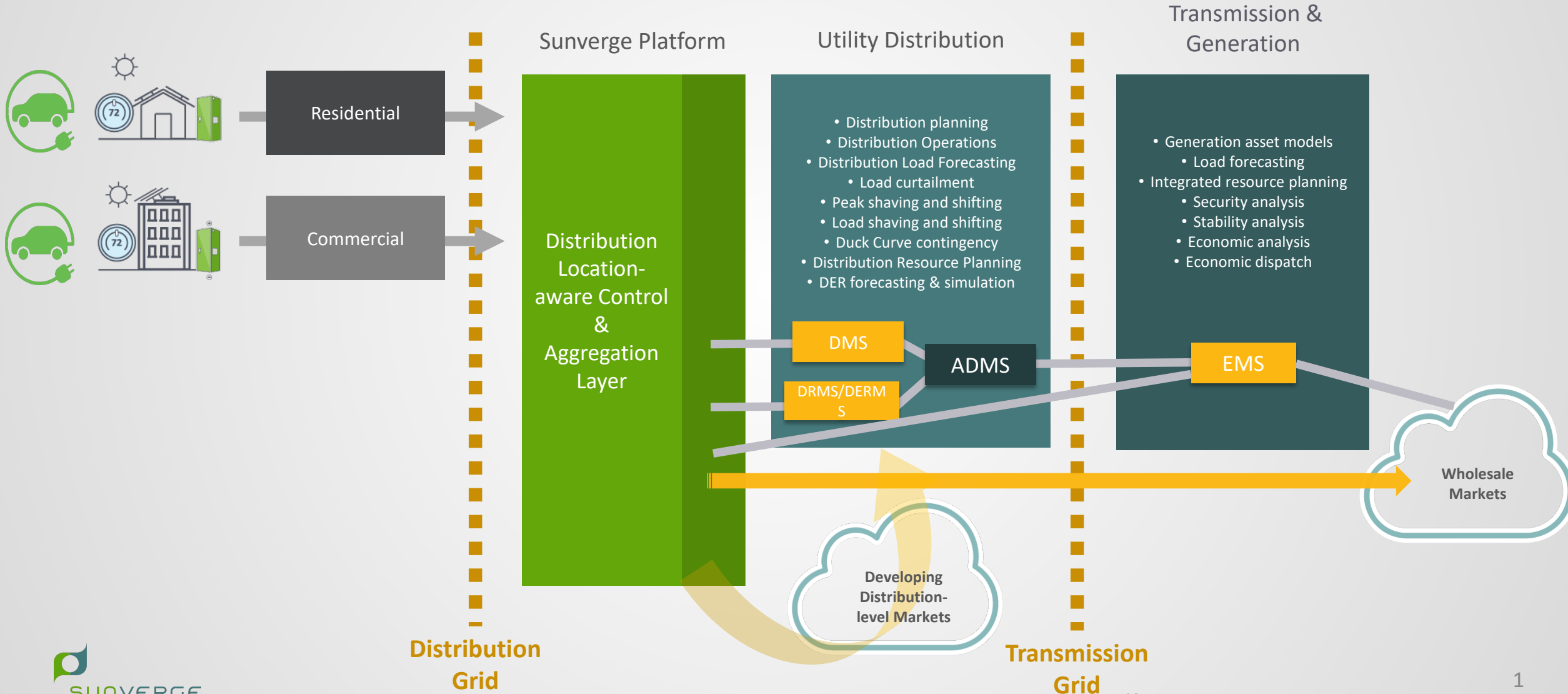
The Sunverge Grid Edge/Cloud Platform architecture

High resolution and high frequency visibility and control enabling real-time dynamic and adaptive management



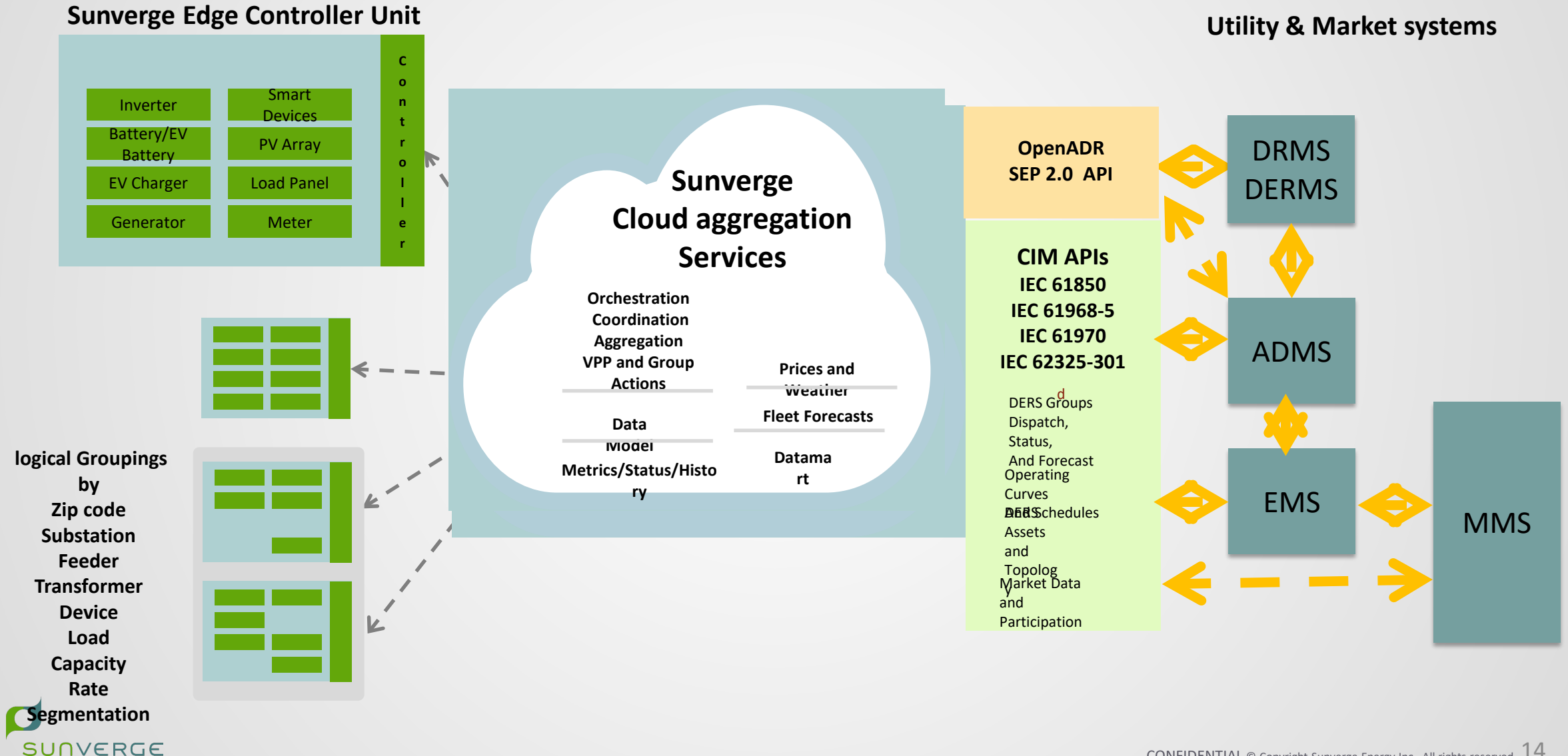
The Sunverge real time DER control, orchestration and aggregation Platform

Real time integration of DERs into core utility operations

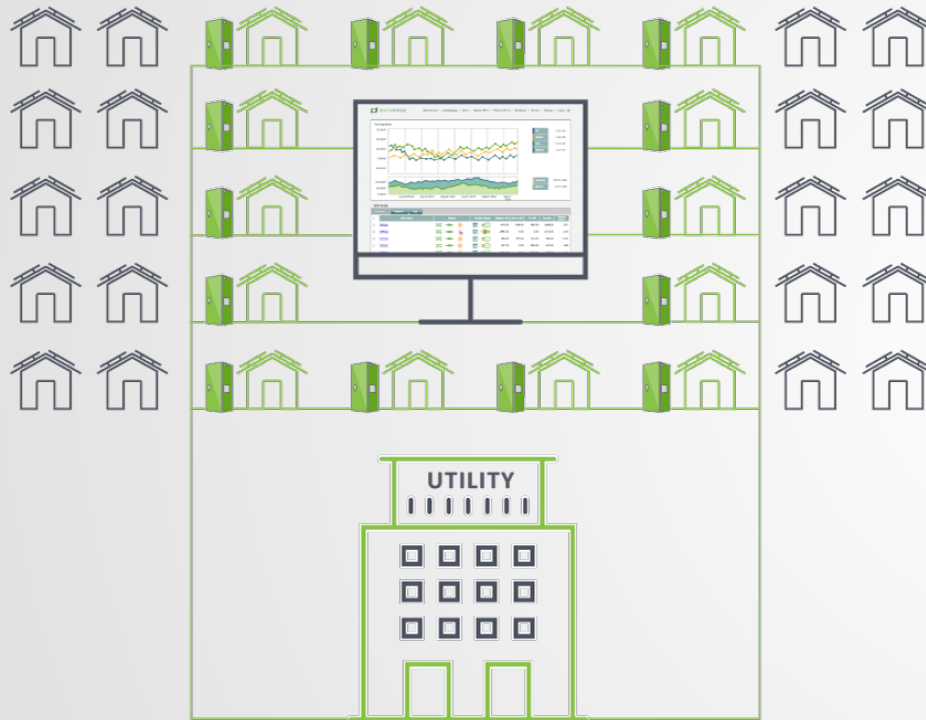


Standards based ADMS/DMS/EMS integration

Distribution Systems Operations & Market Participation



Real time, Dynamic, Adaptive, Multi-Service, Multi-Asset Virtual Power Plants

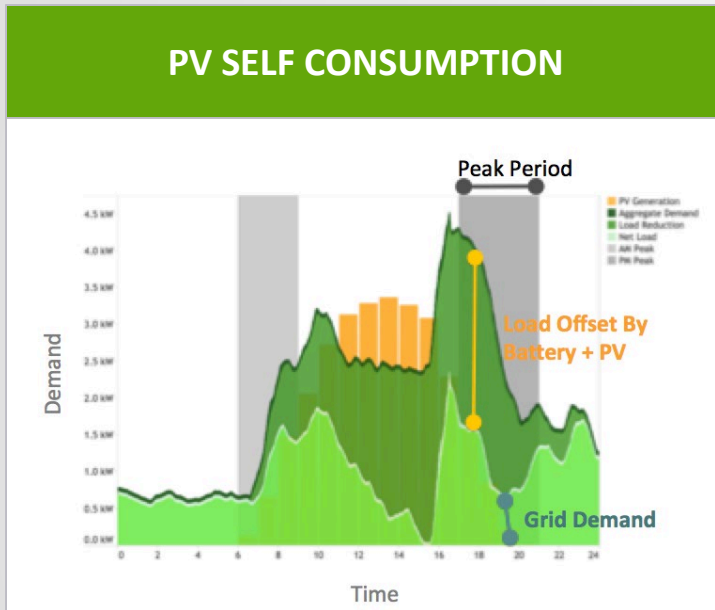


Intelligent and dynamic control, orchestration and aggregation

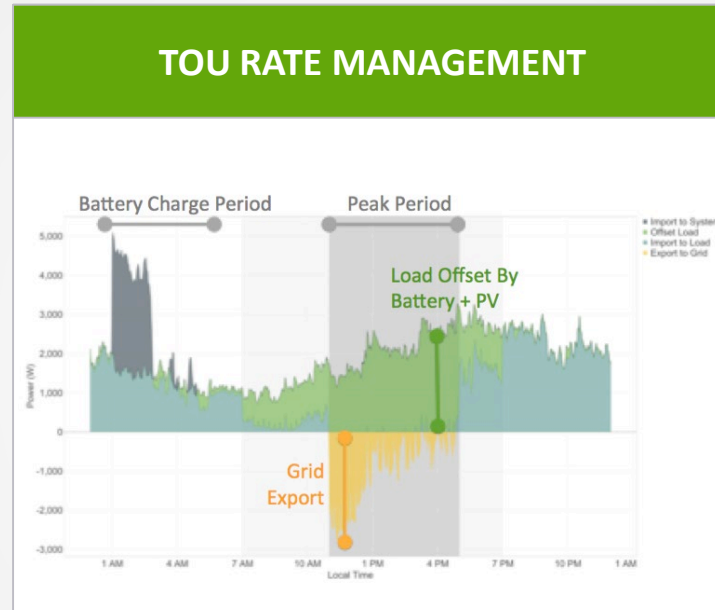
- Real-time and Intelligent orchestration and aggregation of Distributed Energy Resources to provide the same essential services as peaker plants and traditional centralized power plants
- Greater feeder-level visibility, resiliency and reliability
- Better efficiency for Distribution system operations
- Lower transmission and distribution costs
- Greater overall system efficiency
- Environmental/societal benefits
- Granular and near real-time locational data visibility into the performance of DERs and the Distribution Grid

Consumer/Prosumer Services

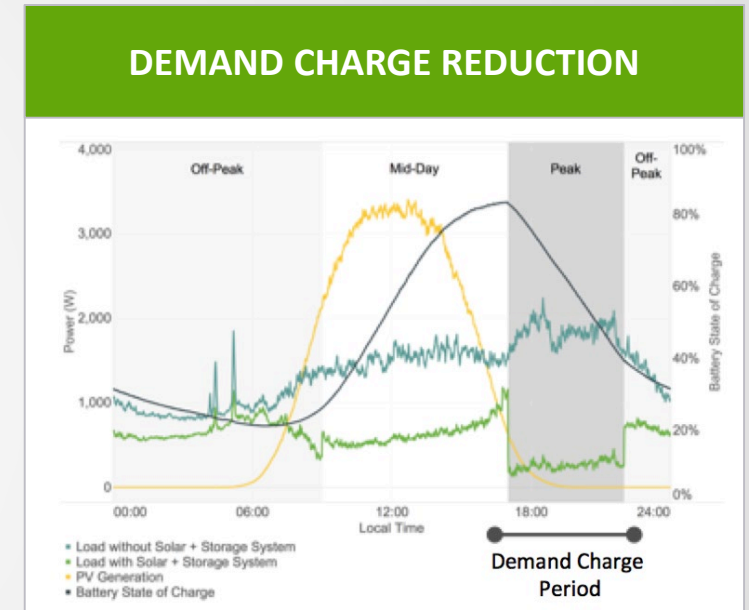
Cost, Comfort, Convenience, Resilience



By predicting load and solar PV generation, the platform automatically operates the battery to maximize PV self consumption.



Using a time-varying energy tariff, Sunverge optimizes between energy consumed and exported to maximize customer bill savings.

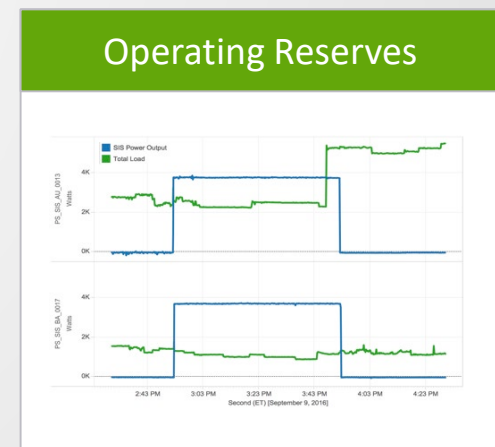
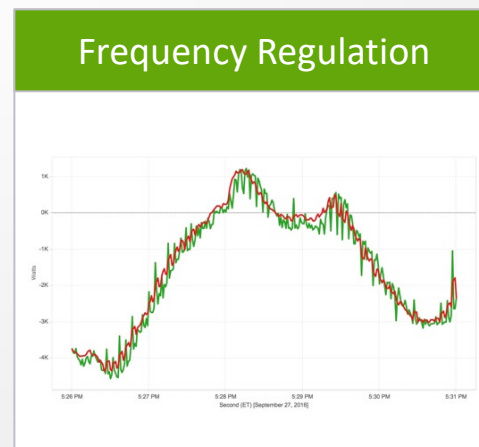
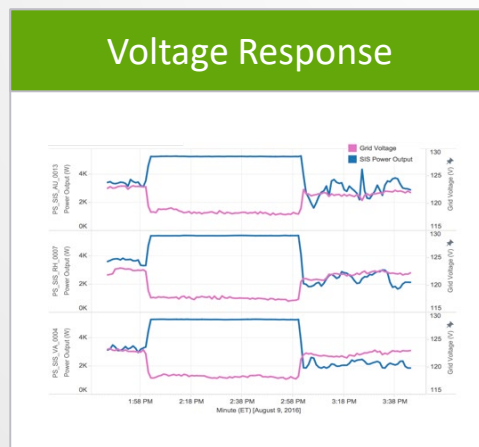
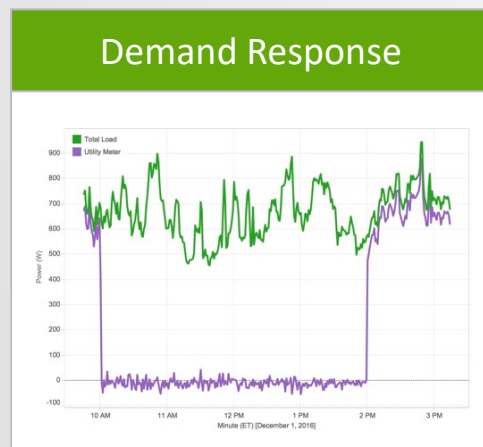
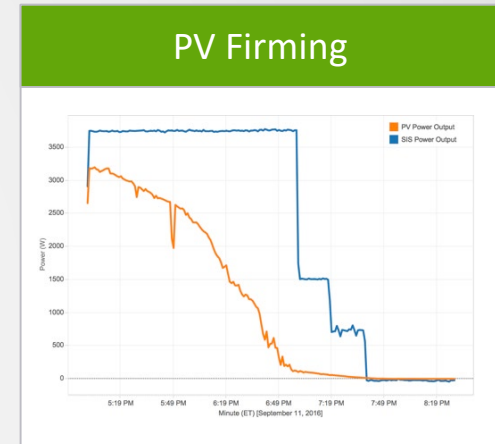
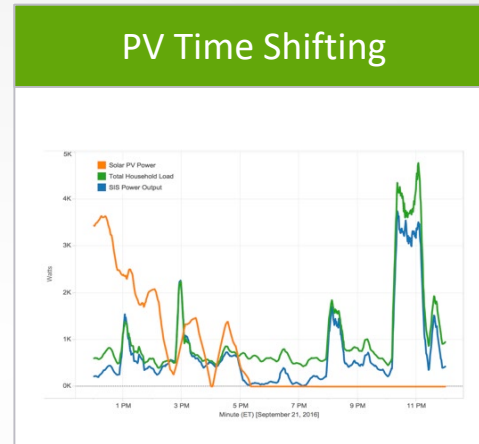
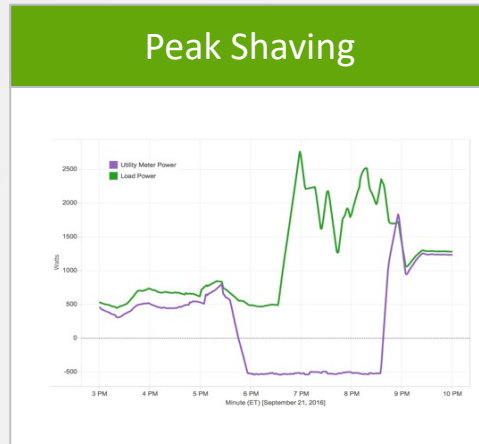
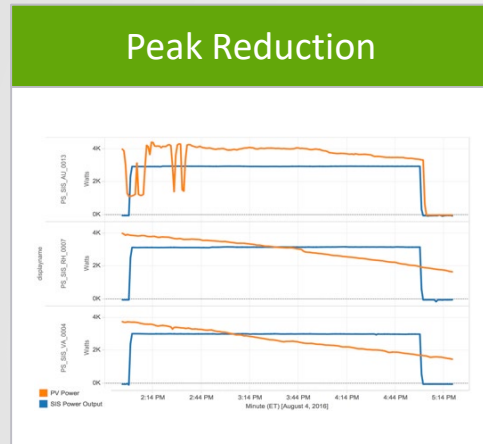


The platform works to minimize customer demand according to a residential demand charge rate structure, to optimize customer savings.

Bill Management, Solar Self Consumption, Demand Charge Reduction, Backup power

Grid and Market Services

Voltage Response, Frequency Regulation, Operating Reserve, Peak shaving and shifting



Recognized as the pioneer and the leading platform for controlling and aggregating DERs into dynamic multi-asset and multi-service VPPs

Sunverge is the only leader with a complete integrated SW/HW open platform to deliver near real-time visibility, control, orchestration and aggregation of DERs, enabling unparalleled ability to scale and providing real-time multi-optimization services on both sides of the meter

“Sunverge remains the only company in the market with a commercially functioning and advanced DER orchestration solution for residential storage.”

“We had studied many companies in this space and in our opinion Sunverge has the most technically advanced platform.”

TRACTION TROUGH UTILITIES



PARTNERS & INTEGRATION





SUNVERGE

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