



Maximizing Investment in Energy Assets & Enabling Active Energy Supply to Increase Security

Presentation to AEE

September 2011

Laura Manz
Senior Vice President
Viridity Energy, Inc.
Imanz@ViridityEnergy.com

Industry, market, technology and business experience to transform the power/energy industry:

- Founded in 2008
- Leadership team substantial experience in power grid and market operations and power system system technologies
- Focus on large energy users, e.g - universities, hospitals, commercial buildings, transit agencies, water utilities, industrial sites and military/government

Corporate Objective:

Assist clients to minimize electric power expenses by maximizing the opportunities to use their energy assets to reduce supply costs by converting controllable load, storage and distributed generation into fully dispatchable virtual power plants. (DR ++)

Customer load and energy resources provide maximum benefit when integrated and aligned with real time power grid operations

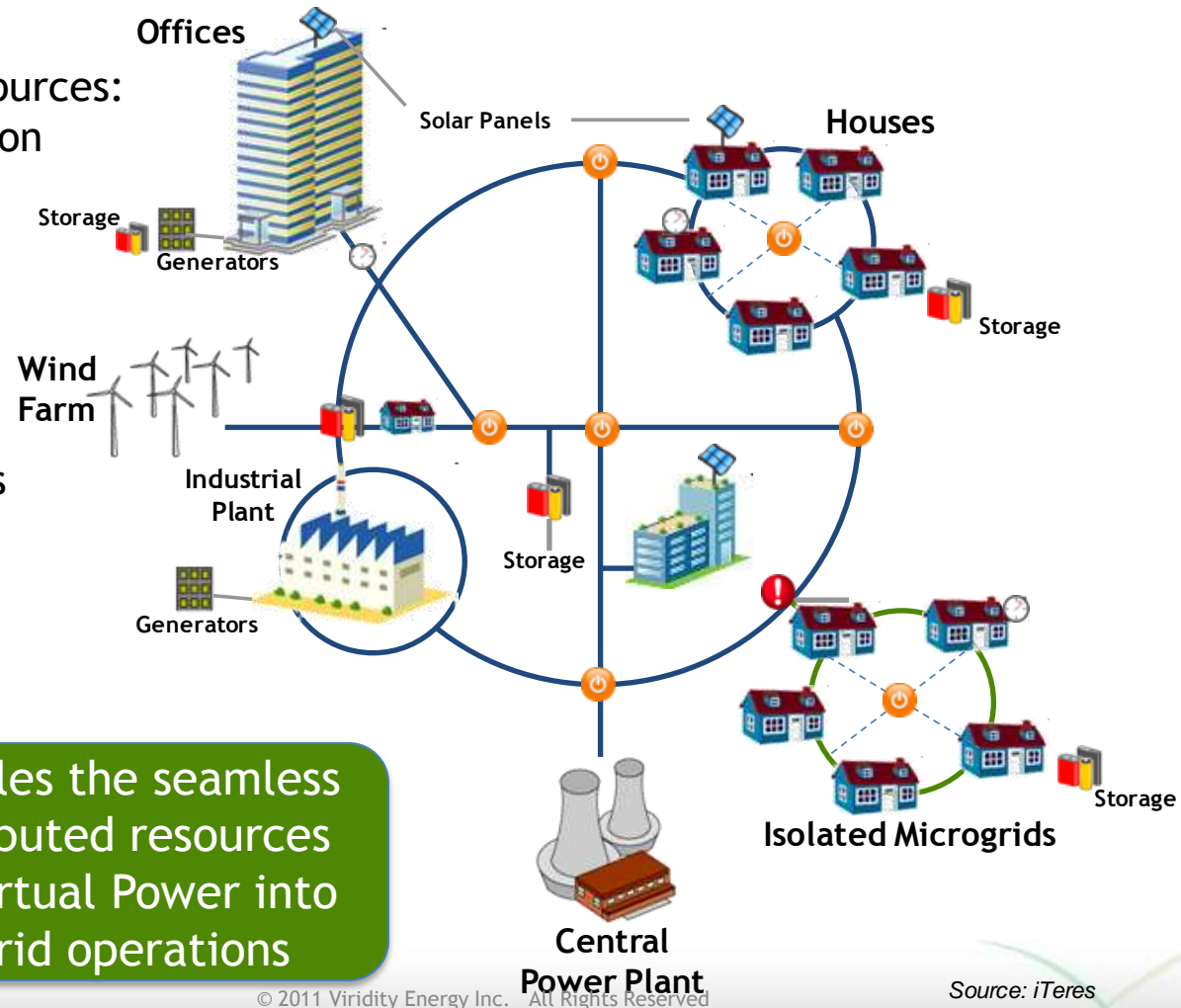
The Grid is a Single Machine

Global proliferation of distributed energy resources:

- Distributed generation
- Distributed storage
- Controllable load

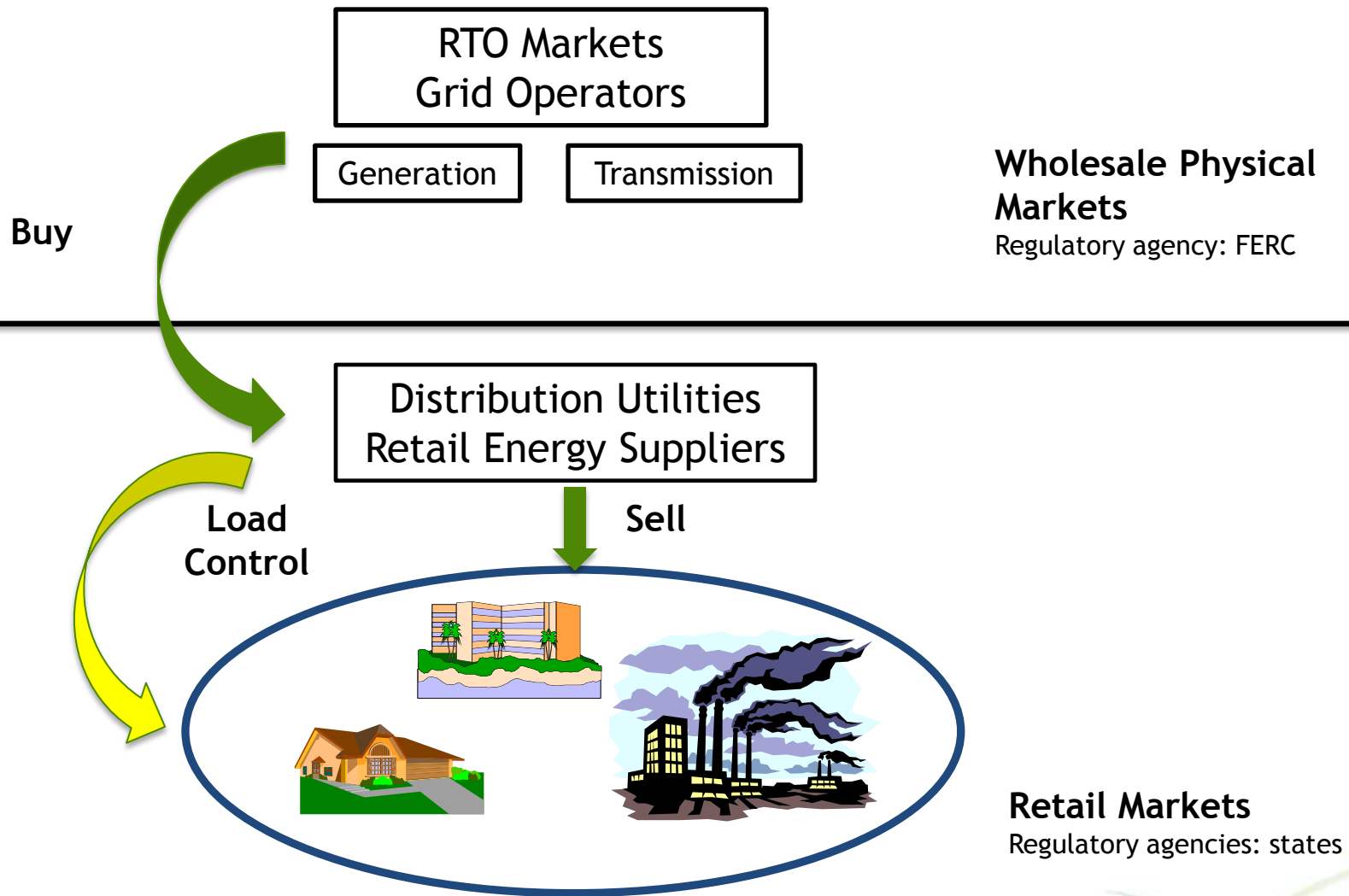
The Smart Power Grid is a real time a network of distributed systems and microgrids capable of:

- Self-healing
- Self-coordination
- Self-scheduling

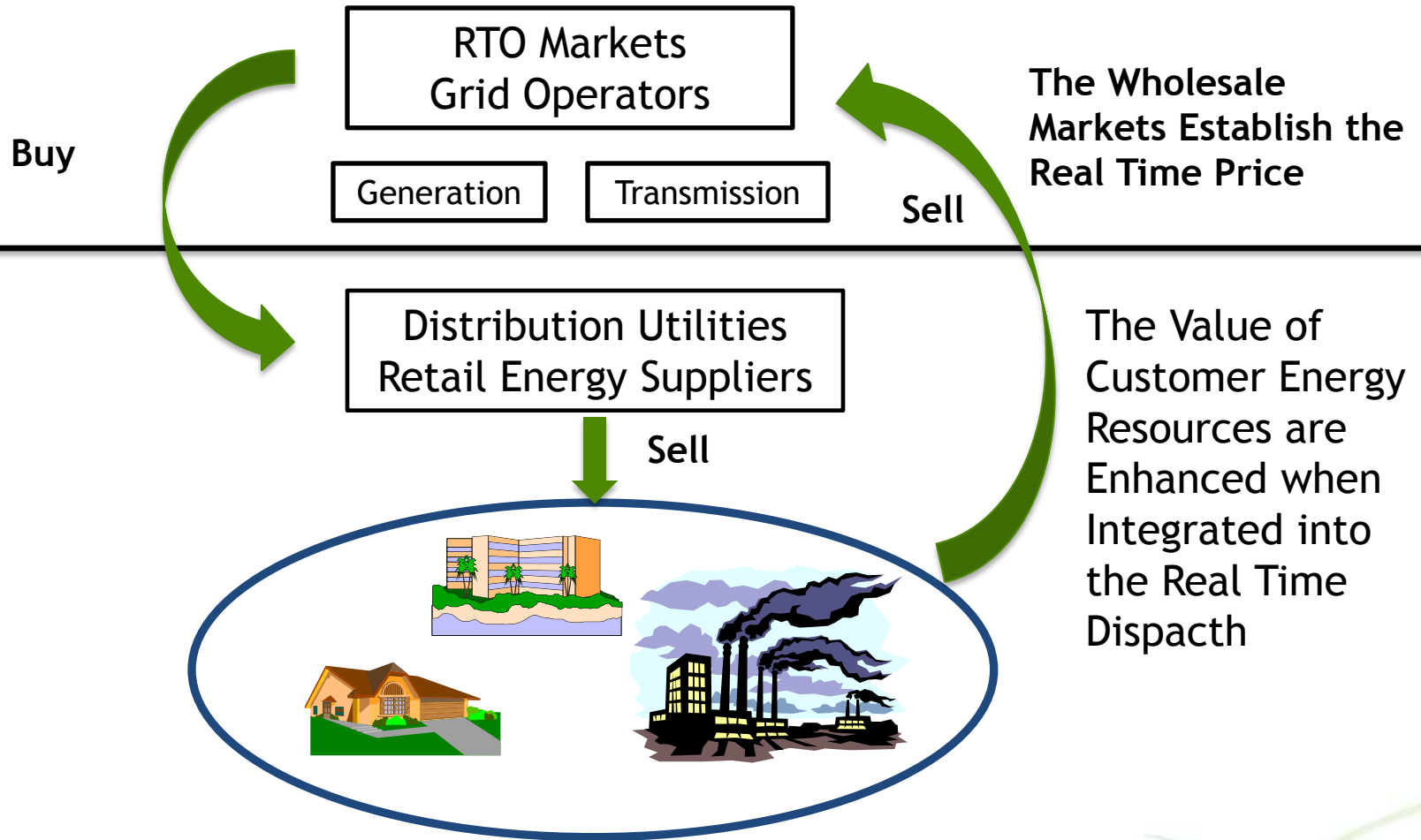


Viridity Energy enables the seamless integration of distributed resources and microgrids as Virtual Power into real time power grid operations

Traditional Demand Response is a Directed Action to Minimize Stress on the Grid



Viridity Energy's Demand Optimization (vs. Traditional Demand Response) integrates controlled load into real time market operations as a virtual power resource (a closed loop system)

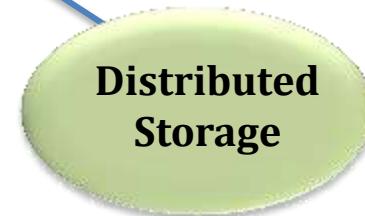


Virtual Power require a “central nervous system” to direct the operations of controllable load and distributed resources

Viridity Energy’s VPower™ system integrates and optimizes customer distributed energy resources



The resources appear to the utility and system operators as a “virtual generator” that is integrated into the dispatch



Distributed Resources

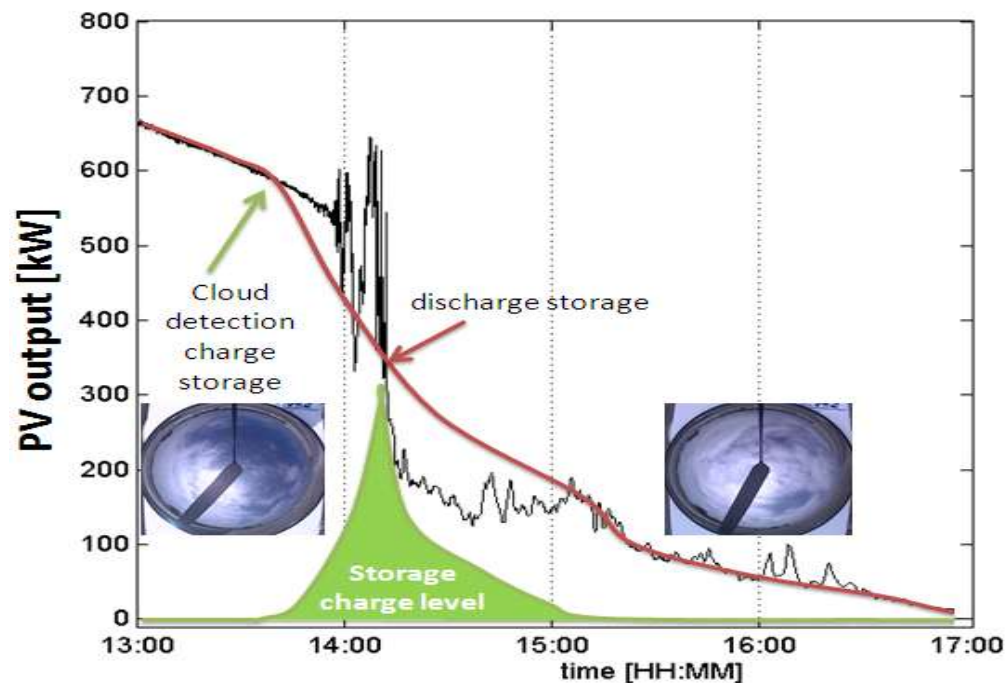
Integration of Solar with Storage Optimization

16 advanced weather stations across campus provide dense network of microclimate data

Automated Cloud Detection Alert has the potential to Manage Energy Storage in Real Time

- Automated cloud detection and alert
- Energy storage control based on PV output drop
- Decrease PV ramp rates from 50 kW/sec to 1 kW/sec
- Avoid voltage flicker and power outages

Energy Storage Controller for High PV Penetration



Microgrid Development: University of California San Diego - RESCO - Summary



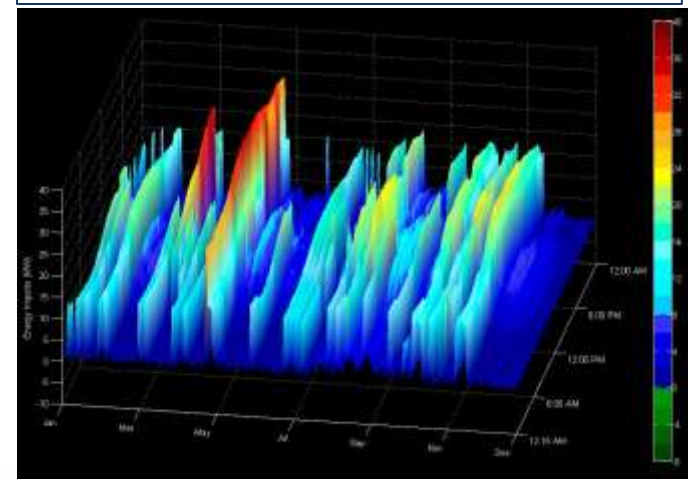
UC San Diego operates a 42 MW microgrid with a widely diverse portfolio of distributed energy resources

- With a daily population of over 45,000, UC San Diego is the size and complexity of a small city
- 11 million sq. ft. of buildings, \$250M/yr of building growth
- Self generates 82% of annual demand
- 30 MW Natural Gas Cogeneration plant
- 2.8 MW of Fuel Cells contracted
- 1.2 MW of Photovoltaic Solar panels installed, additional 2 MW planned
- 20 Nissan Leaf Vehicles
- Viridity/EDSA co-optimize the campus buildings and distributed resources, taking into account static and dynamic voltage stability constraints on the microgrid

UC San Diego Campus

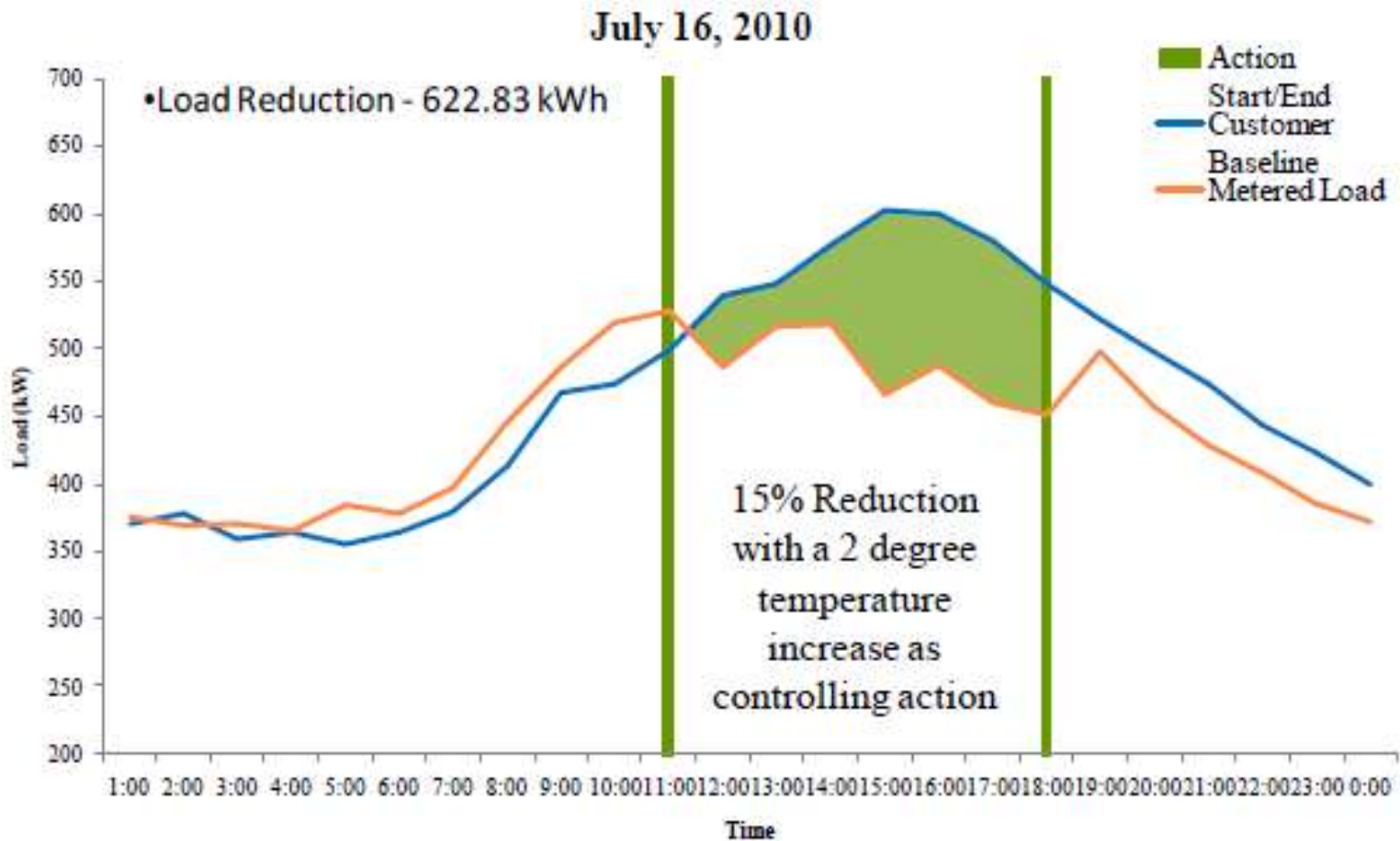


UC San Diego Grid Imports, 2007



The Value of Optimized Load in a Real Time Wholesale Market

One Day in July: How Viridity Optimizes Distributed Resource Economic Value



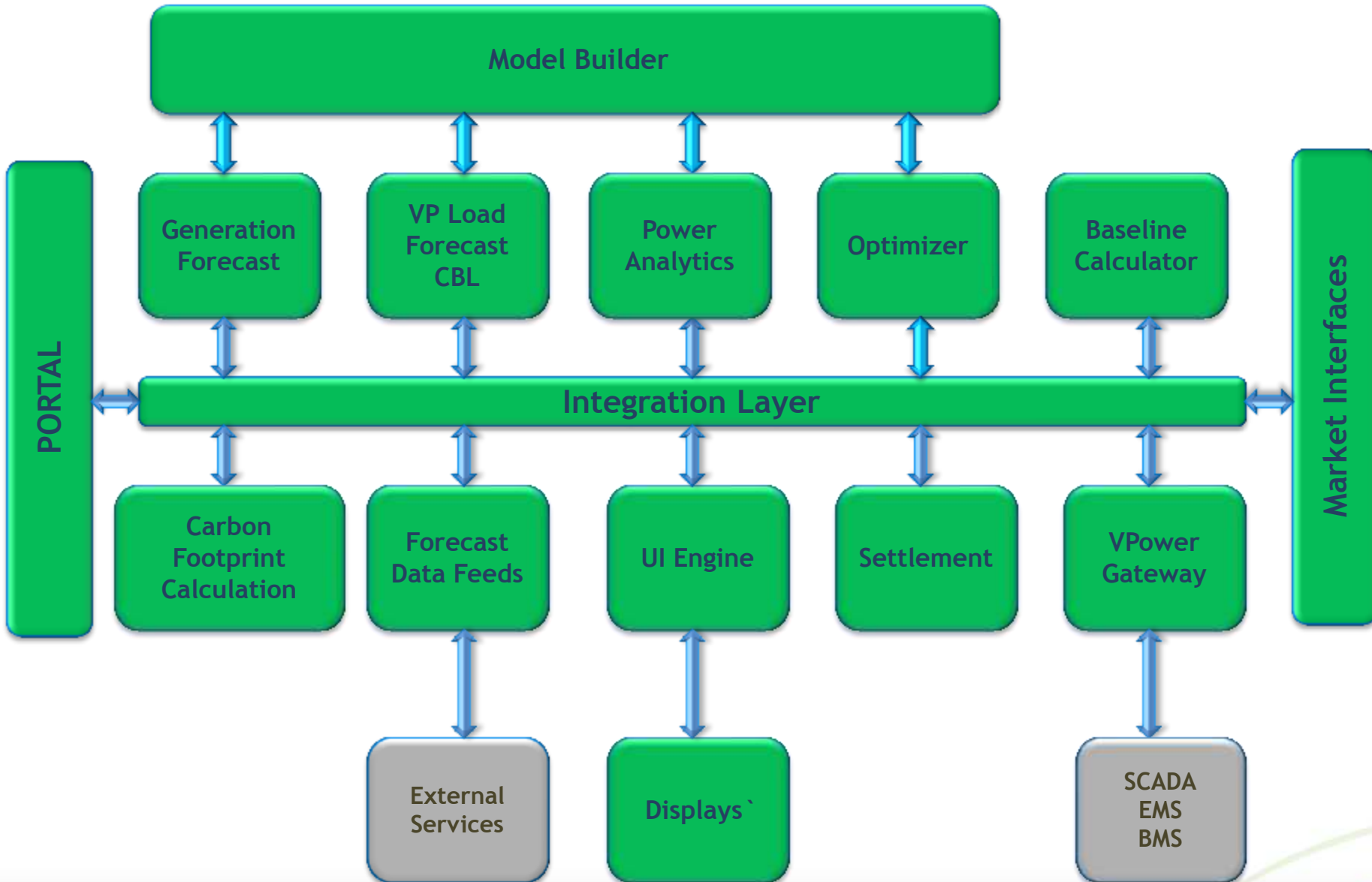
Best in class grid optimization applied to behind the meter environments



- Advanced and predictive building and campus load forecasting
- Renewable resource optimization based on weather and price
- Multipurpose system capable of integrating full spectrum of energy assets
- Automated system management
- Predictive/adaptive optimal control over adjustable time period
- Load control opportunities co-optimized over multiple system requirements, e.g.
 - Traditional Demand Response
 - Energy
 - Ancillaries: Regulation and Synchronized Reserves
 - Distribution System Reliability

Example of Battery/PV Optimization Generation Mix





Rail Transportation: SEPTA Integrated Battery Storage



SEPTA is the nation's sixth-largest public transportation system, and the fifth-largest electricity user in the Philadelphia, PA metro region

- SEPTA installing advanced battery storage system to recapture and deploy power from trains' regenerative braking
- Viridity to optimize SEPTA's power and voltage quality and use the excess stored energy as a resource that provides energy service and reliability benefits to PJM and PECO
- Creates a replicable, scalable model for energy savings and power optimization that may be deployed nationally

SEPTA: Southeastern PA Transportation Agency



Projected savings for Letterly Substation

- \$1,664,833 / yr
- 46,080 tons CO2 emissions / yr

Viridity Energy's solution suite provides the essential capabilities for virtual power and microgrids to maximize economic, environmental and security value

Viridity Energy eliminates the “seams” between bulk power grid operations and microgrid deployments

Versatile and comprehensive software and managed service solution

Only software solution that fully integrates renewables, storage and controllable load as fully dispatchable virtual power

Proprietary system with two pending patents.