# POWERING THE FUTURE:
Revolutionizing Energy Management with Virtual Power Plants and AI Optimization

Introduction

In this white paper, we will explore the capabilities of the **Viridi RPS150** BESS units and the **Vcom** IoT monitoring and optimization device. We will discuss how these technologies enable the creation of a virtual power plant (VPP) and how they optimize energy use and production.
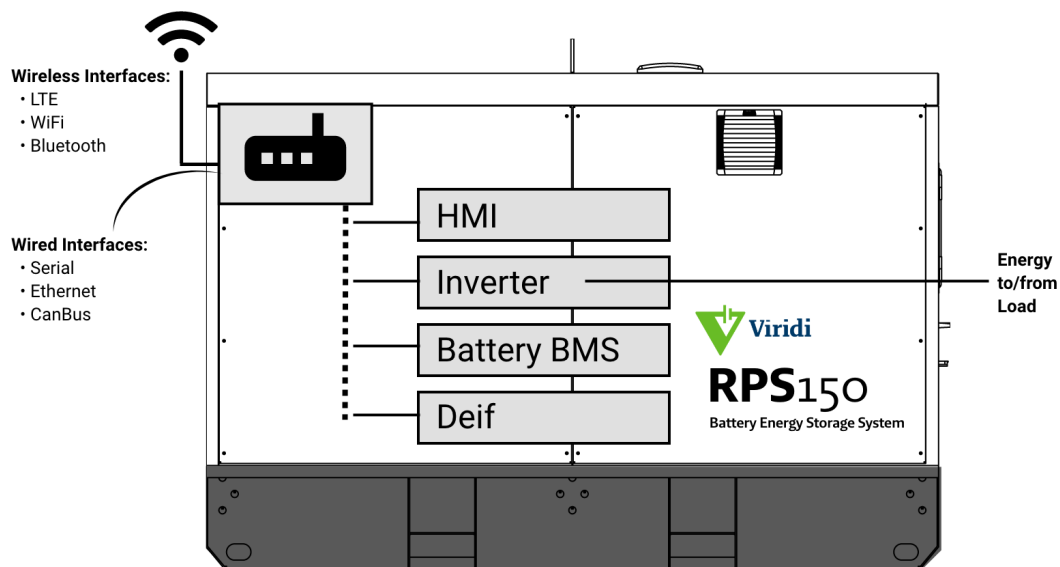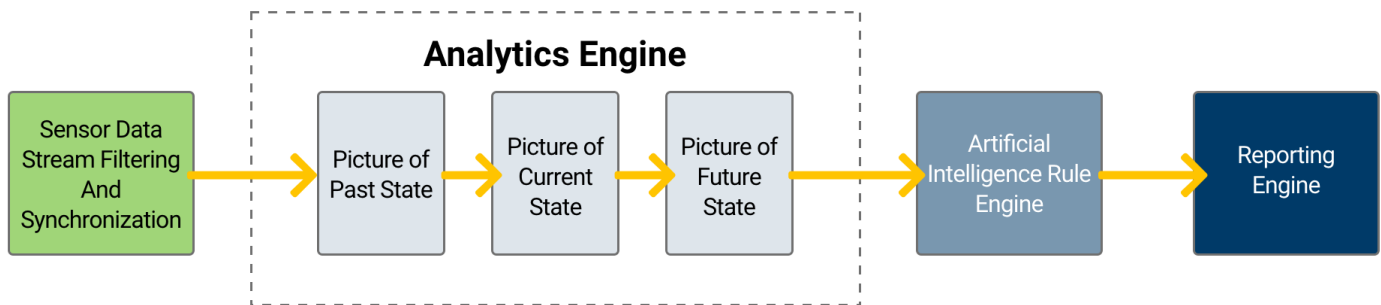

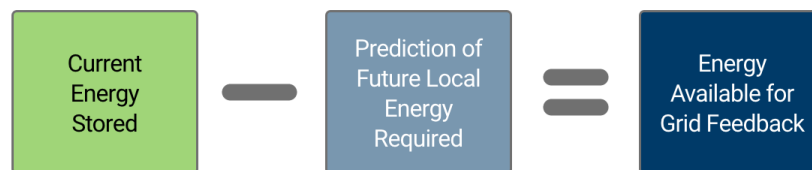## Vcom IoT Monitoring and Optimization Device

The Vcom system, equipped with the Viridi RPS150 BESS units, offers multiple wired and wireless interfaces to connect to building and grid level energy management systems. This includes integration with demand response systems, allowing for effective energy optimization.

Revolutionizing The Way Energy Is Used And Stored
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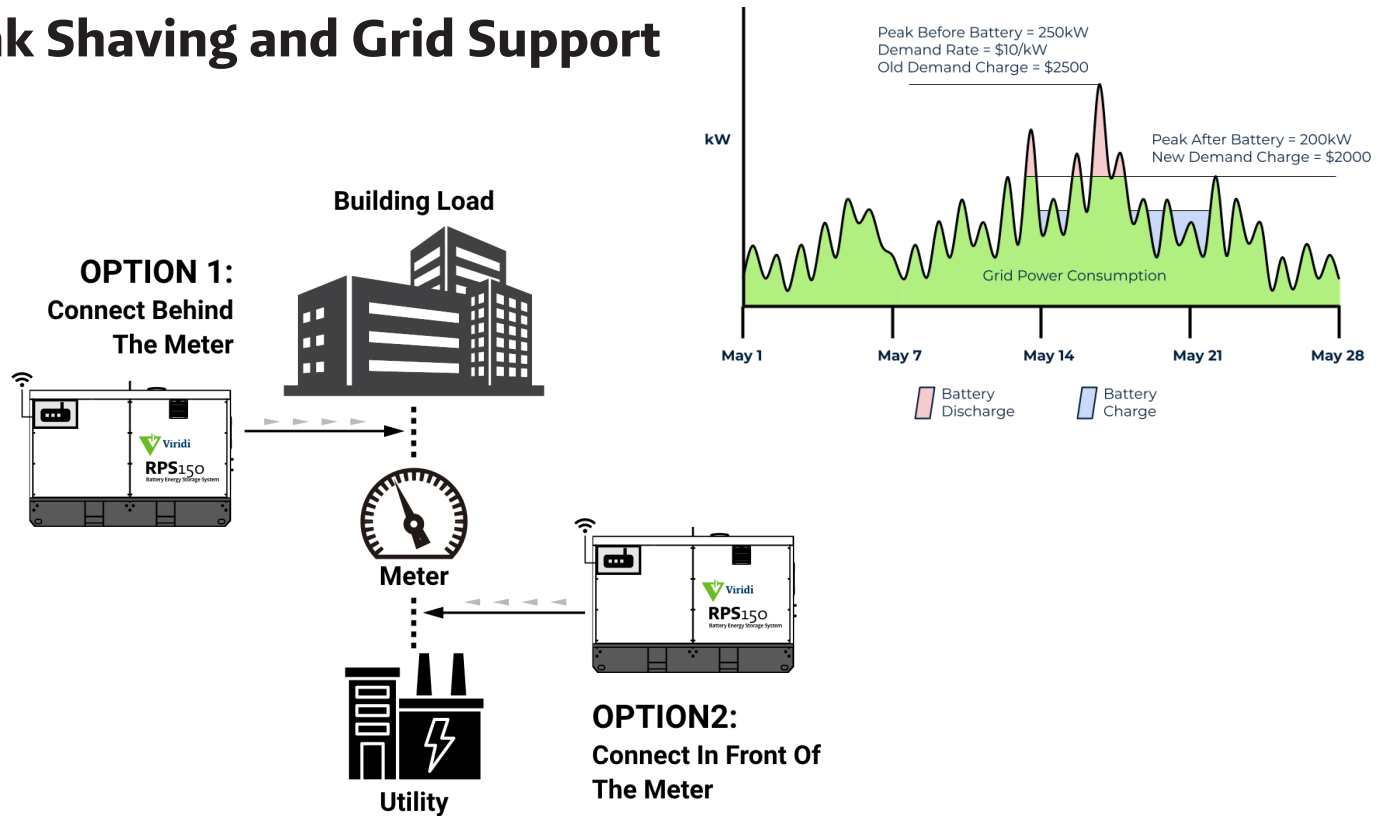
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Control of BESS Operations

The Vcom system has full control over the charge and discharge cycles of the BESS. Utilizing an AI application, the system learns usage profiles for individual installations and predicts future consumption. When connected to a utility demand response system, the AI algorithm predicts local energy requirements, determines the available capacity in the BESS, and optimizes the amount of energy supplied back to the grid.

Analytics Engine

| Sensor Data Stream Filtering And Synchronization | → | Picture of Past State | → | Picture of Current State | → | Picture of Future State | → | Artificial Intelligence Rule Engine | → | Reporting Engine |

The Vcom system also optimizes the flow of energy from the BESS to maximize the available energy output.

Current Energy Stored — Prediction of Future Local Energy Required = Energy Available for Grid Feedback

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Peak Shaving and Grid Support

Building Load

OPTION 1:
Connect Behind The Meter

Meter

Utility

OPTION2:
Connect In Front Of The Meter

Peak Before Battery = 250kW
Demand Rate = $10/kW
Old Demand Charge = $2500

Peak After Battery = 200kW
New Demand Charge = $2000

kW

Grid Power Consumption

May 1   May 7   May 14   May 21   May 28

Battery Discharge   Battery Charge

Option 1: Connect BESS behind the meter
### Run on ON-GRID CHARGE/DISCHARGE MODE

- Charge at a low demand time

- Discharge or peak shave at a high demand rate OR when the call is made
  If fully charged, the machine can sit idle in mode and wait until commanded to discharge

Option 2: Connect BESS Infront of the meter
Run on ON-GRID CHARGE/DISCHARGE MODE

- Charge at a low demand time

- Discharge or peak shave at a high demand rate OR when the call is made
  If fully charged, the machine can sit idle in mode and wait until commanded to discharge

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Vista Data Reporting and Analytics System

The Vcom IoT system includes the Vista data reporting and analytics system. This system provides customers with extensive analytics and performance reports. Additionally, Vista serves as the interface to the utility demand response system, facilitating constant communication with all deployed Viridi units. Vista coordinates the energy flow from each asset, creating a virtual power plant within a region.
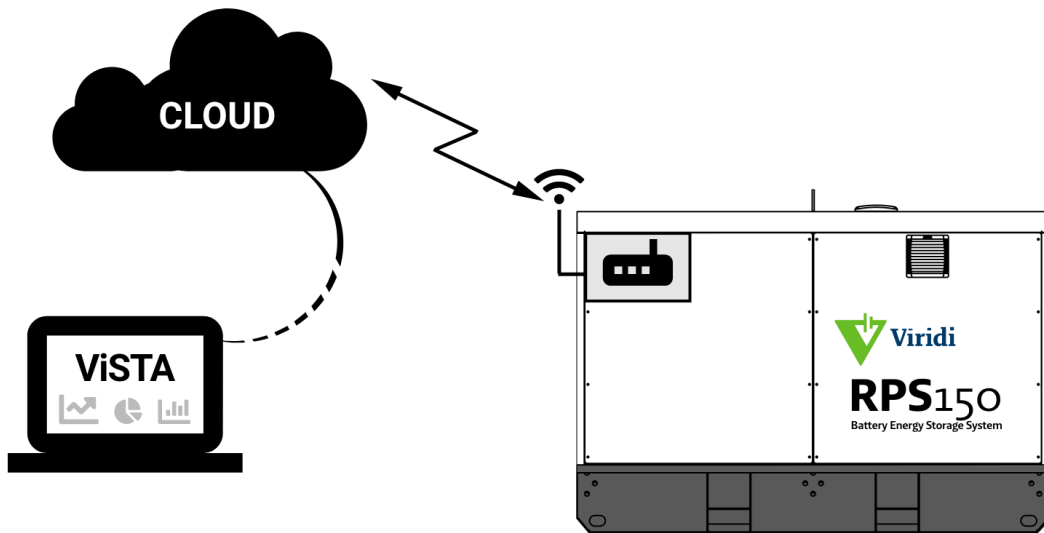
DATA	BENEFIT
voltage, current, soc%	system operator can monitor status of individual RPS150, or all grouped units–data includes historical graphs and can help with predictive analytics
temperature	controlling BESS temp maximizes system longevity
fault status	minimizes troubleshooting–system operator can find the source of a problem quickly
alerts & alarms	gives you critical push notifications
fuel & CO2 savings	applicable if operating alongside a diesel generator

Optimizing Energy Flow in the Virtual Power Plant

By setting operating rules and performance goals for the entire VPP, the system operator can ensure optimal performance during demand response events. The AI in the individual Vcom units on each BESS optimizes the energy flow to meet these overall goals. This distributed intelligence methodology enhances system resilience and maximizes energy output.
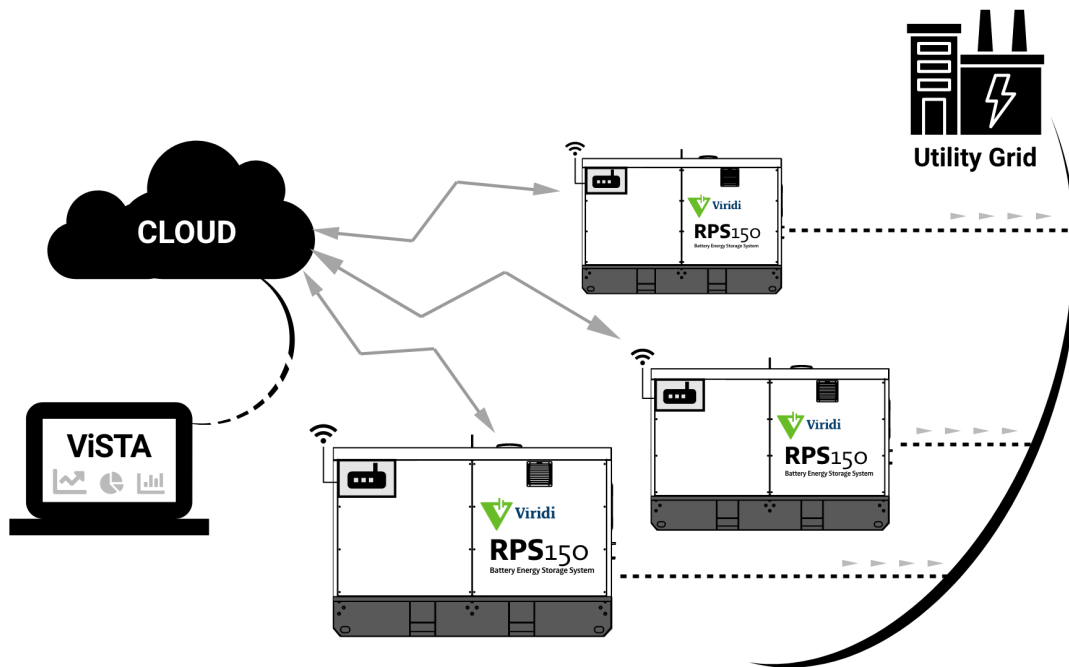
Conclusion

The **Viridi RPS150** BESS units and the **Vcom** IoT monitoring and optimization device offer a comprehensive solution for creating virtual power plants. With their advanced control capabilities and integration with demand response systems, these technologies enable efficient energy use and contribute to a more resilient energy infrastructure.

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