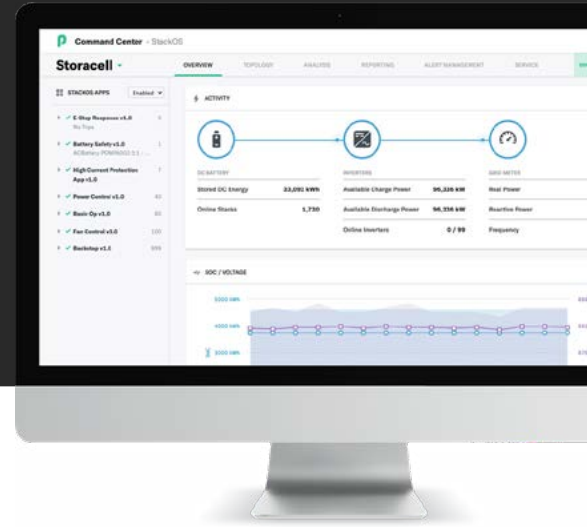


# STACK OS AN INTEGRATED PLATFORM

StackOS is an energy storage operating system built out of hardware and software that were designed together for each other. StackOS makes everything simple for our partners, from monitoring equipment safety to responding to grid conditions and use cases. It is an all-encompassing Battery Management System (BMS), Energy Management System (EMS), and Thermal Management System (TMS). In other words, it manages batteries, energy, and thermal conditions.



## Battery Management System (BMS)

The BMS is the core of StackOS's functionality and differentiation. It enables cell-level monitoring, control, and safety. Additionally, Powin offers a vendor-agnostic cell integration approach within our platform ensuring that our customers will always have a competitive battery supply for their projects while maintaining the same exact control and software platform.



## Energy Management System (EMS)

The EMS is the interface between our storage system, its operators, and the grid. It provides full control and visibility of all the different components of our system through the command center interface. StackOS includes a dynamic suite of applications to ensure our system's functionality in a diverse set of real-world use cases.



## Thermal Management System (TMS)

StackOS provides full control over the redundant thermal management hardware within our energy storage systems. The TMS incorporates algorithms to control the HVAC thermostats and the intake and exhaust fans of each Stack, while dynamically adjusting the settings depending on ambient cell temperatures and operational status of the system.



# STACK OS VALUES



## Full Safety

StackOS includes a suite of built-in safety applications and features which are always installed, always enabled, and always functioning at the highest priority. Additionally, Powin supports all sites with daily scans for essential safety. If engaged with a long-term service agreement, Powin comprehensively monitors the system 24 hours a day, seven days a week.

### Automated Alarms, Warnings and Errors

StackOS proactively senses potential issues within the system and automatically notifies the system operators with detailed information to diagnose and remediate the issues efficiently.

### Innovative Safety

Integrated controls that cover fire detection, suppression, and prevention, as well as tight thermal management controls to keep all battery cells in a safe operating condition, Powin has also developed unique First Responder and Emergency HMIs to support local responders.

### Advanced Cybersecurity

Powin has operating projects that comply with the most stringent utility customer requirements. StackOS standard architecture incorporates antimalware, virus protection, patching, and encryption. Every StackOS project is NERC CIP compliant.



## Full Control

Having a unified BMS and EMS platform allows our proprietary active balancing battery architecture to dynamically change based on which use case is performed. StackOS enables Powin's customers dynamically control our seamlessly integrated energy storage solutions through open standard dispatch protocols. The StackOS software package is Powin's standard software offering that is incorporated into all our energy storage installations.

### Full System Control

Powin's StackOS commands all aspects of an energy storage system including the Power Conversion System (PCS), Fire Suppression Systems (FSS), HVAC, and Battery Stacks.

### Dynamic Application Suite

A comprehensive collection of apps that provide system control, thermal management, and efficient maintenance of our systems. StackOS provides customers the ability to dispatch Powin systems using their own trading desk and remote operations center. Inclusive of DC Coupled, Automated Frequency Response, and Signal Response, among others.

### Cell Level Controls

StackOS includes Proprietary active balancing modes adjusted based on the use case to maximize available energy and battery life. It will also detect patterns in energy dispatch and cell discharge properties to determine which cells need more attention at different stages of the system's life cycle.



## Full Transparency

Powin understands that it is critical we provide full transparency of the status and data of your operating systems. The StackOS command center is a rich visual user interface that allows system operators to monitor and control Powin systems from anywhere through an internet browser. Comprehensive and secure, it displays readings from all levels of the system —from collective overview to individual cells.

### Warranty Tracking and Violation Prevention

StackOS closely monitors the current state and historical usage of each and every battery cell providing real-time insight into battery health and warranty status. StackOS monitors all system equipment to prevent warranty violations. It does this by keeping track of how each device's activities compare to the guidelines and limits written into that device's warranty.

### The Command Center provides:

- Full System Monitoring and Transparency
- Information from the battery management system visualized with graphs and charts
- A display of all BESS Status Codes
- Full control of StackOS Apps