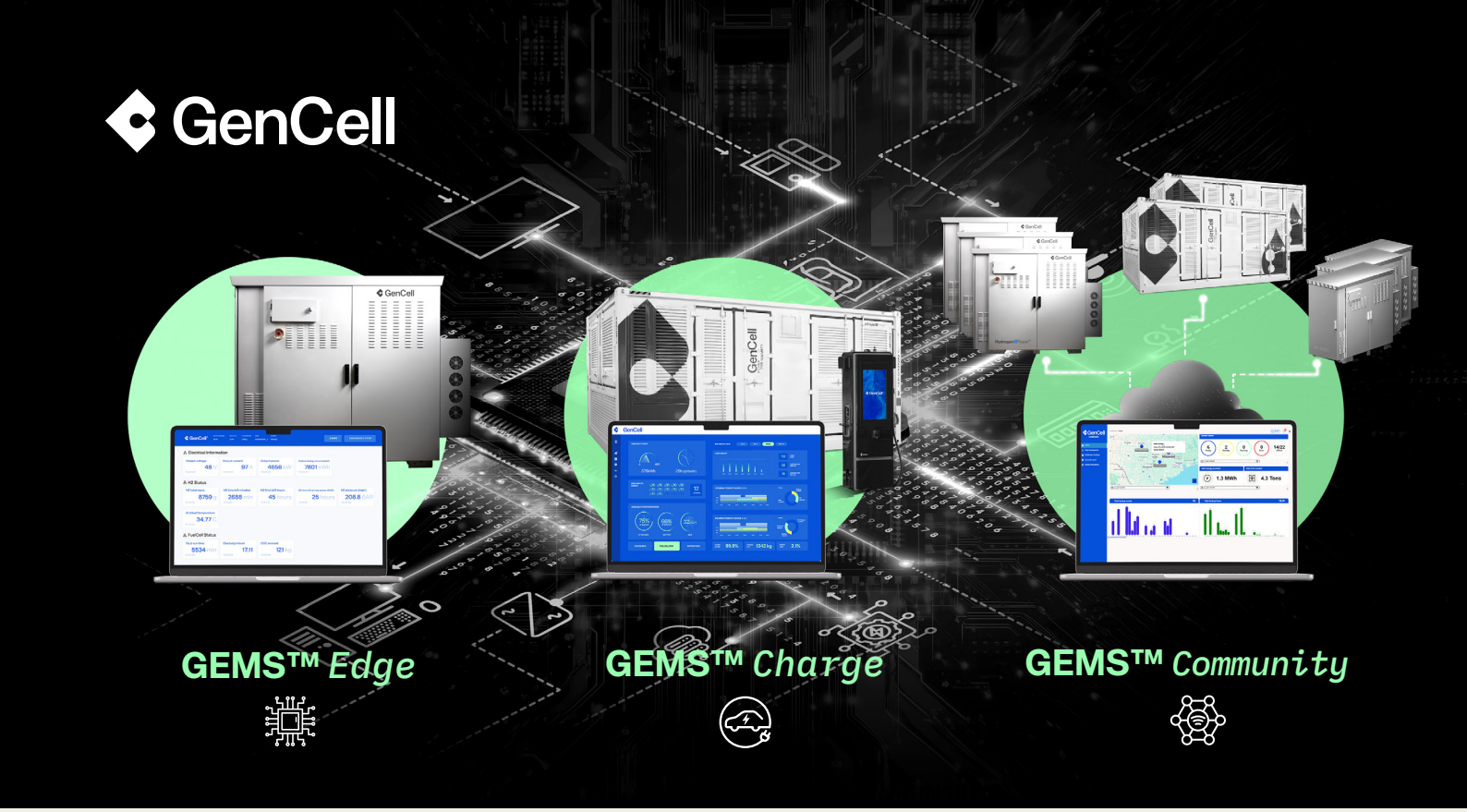


GENCELL GEMS: THE CROWN JEWEL OF ENERGY MANAGEMENT - ENRICHING EQUIPMENT PERFORMANCE

GenCell GEMS™

When operating backup and off-grid power solutions, failure is not an option. Mission-critical equipment in utilities, telecom, homeland security, healthcare, and niche industrial applications must always be ready to kick-in and immediately provide power. With severe weather events becoming more frequent and longer in duration, extending days and weeks, resilient backup and off-grid power solutions are more crucial than ever. Users rely on these systems to provide flawless performance and reliability to keep essential services running and to manage emergencies effectively. Operational intelligence, visibility and interoperability are key to meeting these tough challenges.

The energy sector must withstand the impact of climate while at the same time transition to zero-emission power sources. Fossil fuel use during climate emergencies conflicts with decarbonization goals, and the influx of renewable energy resources increases grid volatility, straining stability, especially during outages. GenCell's green backup power solutions integrate energy management software to monitor CO2 emissions and enable replacement of polluting generators. These smart systems balance renewable variability, providing resilient, stable, long-duration power.

Enhancing equipment functionality by enabling rapid remote issue resolution, accurate monitoring, and real-time and historical analysis, digitization supports broad interoperability, maximum system visibility, better synchronization and improved decision-making during crises.

The GenCell GEMS™ (GenCell Energy Management System) is a comprehensive and powerful suite of software tools designed to manage GenCell's power generation units more efficiently, simplify the planned and corrective maintenance of EV charging and related backup power operations and provide customers with the control and operational intelligence needed to maximize resources using a proactive approach.

The GenCell GEMS software suite has been designed to optimize energy management capabilities for deep visibility and extended operational intelligence across customer sites. The software enables our customers to optimally control GenCell solutions with intuitive and sophisticated operational intelligence and supports a variety of power supply use cases; it optimally monitors and controls equipment remotely in real-time and offers reporting and analytical tools for long-term continuous improvement, allowing maximum ROI from energy systems. Structured into hierarchical levels, the GEMS suite offers customers the flexibility to scale from installations of a few power generation units up to large-scale multiple unit deployments.

At present, the full suite consists of three software applications, GenCell GEMS Edge, GEMS Charge and GEMS Community.

GEMS™ *Edge*

the core component of GEMS, is delivered as an embedded element of every GenCell solution for connectivity, computing and optimal system control and monitoring at the devices' edge.

GEMS™ *Charge*

the software application delivered with the GenCell EVOX, has been developed to accurately track power availability in real-time and optimize allocation of the resources fueling EVOX.

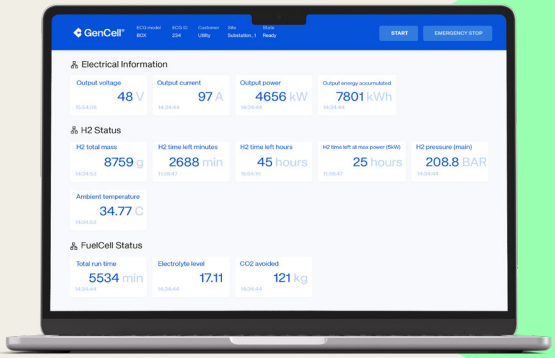
GEMS™ *Community*

the perfect solution for large-scale installations, is a cloud-based or on-premises management software application designed for efficient remote unified management, monitoring and control of multiple power generation units.

GenCell GEMS™ *Edge*

The GEMS Edge software application carries out the processing and computing operations within the fuel cell at the edge layer. It connects the fuel cell unit to external equipment controllers, a central data server and can connect to the customers' proprietary asset management & control applications. The GEMS Edge interoperates with relevant customer EMS/SCADA systems as required, seamlessly interfacing with these applications via generic communication protocols.

The GenCell GEMS Edge software offers an optimal application user interface, providing comprehensive and easy access to the management and control of all system components of each fuel cell.



↳ Key Features & Benefits

Monitoring and Data Collection

- Monitors fuel cell operations, hydrogen fuel status and local environmental conditions – temperature, pressure, humidity and other relevant parameters.
- Collects data into a local database enabling easy access to historical events and trends.

System Utilization Tracking

- Generates reports of historical data.
- Sends automatic notifications for events, alarms, and other critical updates from the specific fuel cell unit.

Management Software Integration

- Supports most standard and advanced communication protocols.
- Allows selective filtering of data for transmission across the network.
- Acts as a gateway for remote service and maintenance.

Web-Based Remote Monitoring and Control

- Provides secure remote control to a single fuel cell.
- Remotely displays real-time status, including total power, runtime, hydrogen fuel levels and other key attributes.
- Presents local historical data such as fuel cell logs, operational logs, ambient temperature, avoided CO2 emissions, etc.
- Offers web-based activation – leveraging client-less capabilities for maximal flexibility.

Hydrogen-Level Calculations

- Calculating hydrogen fuel levels requires a special matrix that takes into account temperature, volume, and pressure. The GEMS Edge software monitors these values, estimates the gas level and remaining runtime, and sends notifications when hydrogen thresholds are low.

GenCell GEMS™ *Charge*

GEMS Charge, which is implemented in conjunction with GEMS Edge, has been developed to optimize the performance of the GenCell EVOX® multipurpose power solution for DC fast charging, backup and emergency operations. GEMS Charge optimizes the allocation of power from the different resources available to an EVOX unit. The software tracks and analyzes energy production and consumption in real-time from these sources at different times of day using algorithms to maximize cost-efficiency. Interoperating with the chargers' CPMS software to dynamically manage the chargers' power load, GEMS Charge ensures that the EVOX delivers the power required to always meet the chargers' load, thus satisfying the customers' demand.

Because the EVOX focuses both on both production and consumption operations, the GEMS Charge software bridges between EMS and CPMS functionalities, giving users a holistic, cost-effective view of the entire EV charging process.

↳ Key Features & Benefits

Off-the-shelf system includes tested, validated plug and play integration with all power resources and devices

- Significantly reduces integration and development time

Dynamic power resource management, focused on DC fast electric vehicle charging

- Based on real-time calculation of energy availability across resources
- Optimizes power resource load sharing

Ensures seamless transition between grid-connected and off-grid charging

- Optimizes allocation of power between consumers
- Algorithm tracks the charging demand curve in real-time and regularly adjusts the power supply to meet the changing load requirements, ensuring sufficient power availability at every time of day, supporting peak demand while cost-effectively managing power resources

Cloud-Based Monitoring and Control

- Provides secure remote control of EVOX operation (start, stop, maintenance, etc.)
- Leveraging clientless capabilities for maximal flexibility
- Dashboard displays real-time EVOX components' operational status, including total power, State of Charge (SOC), gas levels, grid availability, key alarms, local environmental conditions – temperature, pressure, humidity and other relevant parameters
- Cloud-based tracking and long-duration historical record of operational events, logs and trends
- Calculates and monitors CO2 emission levels

Control of Transitions between Distinct Charging Sessions

- Seamlessly handles the impact on power system continuity during vehicle plugging and unplugging from the charger
- Ensures electrical protection of all power consumers connected to the system.

Connectivity with CPMS

- Reporting of accurate power availability in real-time, in sync with dynamic load management

Robust self-recovery – software automatically manages operations and recovers from operational issues

Seamless, simple and rapid connectivity with any EMS system via standard industry protocols

Site autonomy, no remote Internet connection required

Comprehensive Management of Diverse Power Resources:

- Battery Electric Storage System (BESS); Fuel Cells, Electric Grid, Solar PV

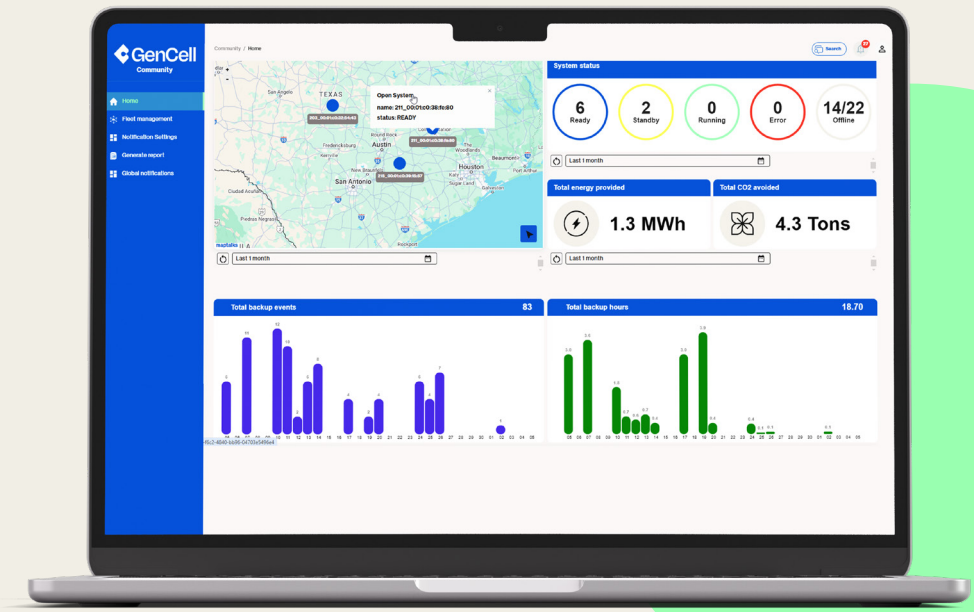
GenCell GEMS™ *Community (add-on)*

GEMS Community software application, a component of the GEMS software suite, concurrently manages the numerous distributed units from one central portal.

GEMS Community is a cloud-based or on-premises management software application designed to efficiently manage, monitor, and control multiple GenCell equipment. The Community software enables customers to avoid difficulties in tracking system versions and required maintenance activities. Thanks to GEMS Community regularly monitoring equipment health state status, the software prevents the unexpected occurrence of maintenance problems due to low hydrogen fuel levels, unresolved critical alarms, and ensures that the embedded software components are always up to date.

The GEMS Community can address all these issues by monitoring accurate values, sending maintenance notifications, and prioritizing critical alarms. It also functions as a remote asset management tool, allowing bulk configurations, patches, and updates to be sent to field systems. This plug-and-play solution streamlines integration processes, reducing integration time and minimizing potential errors. With GEMS Community, you can effortlessly expand your installation base and stay up to date without the need for onsite visits. Simply click a button from your web browser to manage updates.

GEMS Community leverages GenCell's flexible software architecture. Customers can choose to operate the software on the GenCell GEMS cloud, or to install the platform on an on-premise server at the customer site. The GEMS Community software enables full management of all assets, including core services such as data storage, dashboard, reporting, and aggregated alerts.



↳ Key Features & Benefits

Unified Manager View

- Provides a comprehensive overview of the entire installed base, including status, utilization, and performance of key indicators.

Centralized System Control

- Enables centralized control over a wide array of systems and devices.
- Supports integration with third-party software systems (eg. ERP, WMS, MES, MMS etc.) via APIs or web services.

Analytics Reports

- Offers detailed analytics reports aggregating data from multiple devices indicating detailed information such as quantity and duration of backup power events, fuel usage, CO2 footprint, fault reports, etc.

Assets Management

- Supports remote patch management to upgrade the equipment firmware, including updates, configurations and other enhancements.

Notifications Management Hub

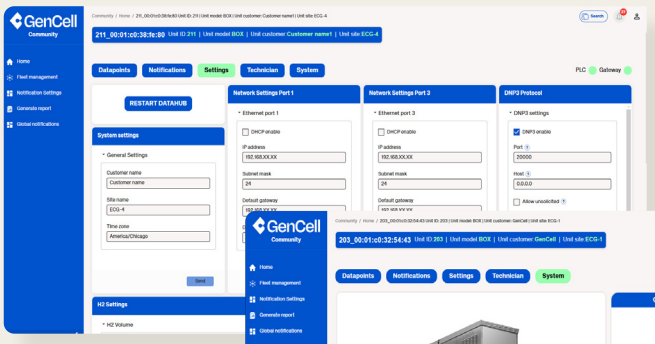
- Efficient centralized management of notification creation and distribution across multiple units.

Data Storage

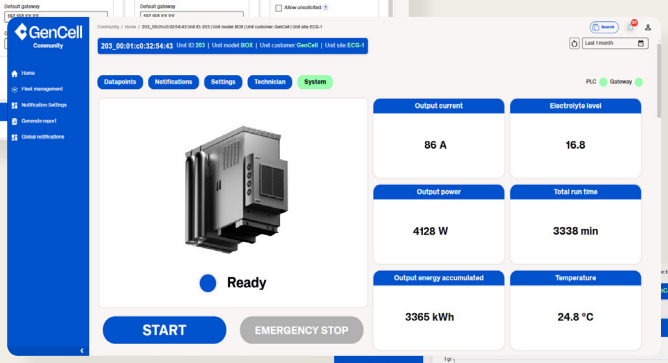
- Stores data for extended periods.

Enhanced Maintenance

- Increased efficiency and manageability of maintenance activities (planned and corrective maintenance) via automatic fault alerts and detailed periodic fault analytics and reports. 70% to 80% of corrective maintenance can be achieved electronically by simplifying and maximizing resources via an internet connection.



SYSTEM SETTINGS



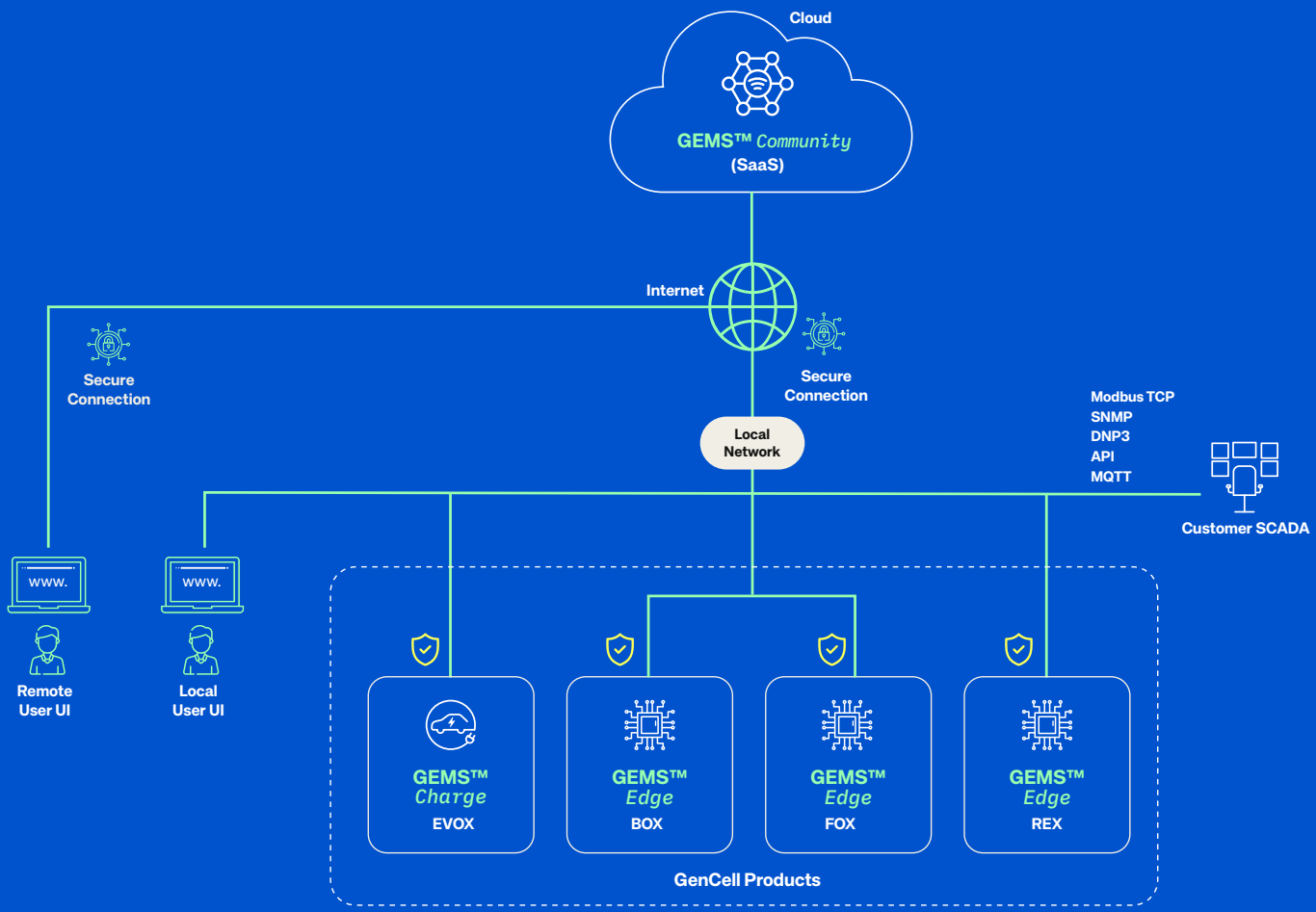
REAL-TIME SITE DRILLDOWN

SYSTEM TRENDS

↳ System Architecture

GenCell GEMS employs a flexible and scalable network architecture incorporating the most up-to-date network communication technologies compliant with the latest cybersecurity standards, encryption protocols, web and client-server models.

The diagram below shows a typical configuration in which the GenCell devices connect to the customers' local network and/or enable easy and secure remote access via the web.



↳ Cybersecurity

The GEMS software suite has been designed with robust cybersecurity measures aimed at ensuring that all communications are encrypted and free from critical vulnerabilities. These measures are crucial in safeguarding sensitive data and maintaining the integrity of operations within these systems. Regular penetration testing conducted by a reputable third-party cybersecurity company plays a pivotal role in this process. Penetration testing helps identify and address potential security weaknesses promptly, ensuring that the software complies with the latest cybersecurity standards and remains resilient against evolving threats in today's increasingly vulnerable digital landscape.

Cybersecurity in Operational Technology (OT) networks is critical for protecting industrial control systems and infrastructure. Unlike traditional IT networks, OT environments manage physical processes and require specialized security measures tailored to their unique characteristics. Working with customers running mission-critical applications has driven GenCell to ensure that its products meet the highest cybersecurity standards, safeguarding critical infrastructure where there is zero tolerance for any cybersecurity risks.

ABOUT GENCELL

GenCell Energy (TASE: GNCL) develops GreenFSG power solutions based on reliable, zero-emission alkaline fuel cells, Hydrogen2Power™, Ammonia2Power™ and Water2Power® technologies that deliver uninterrupted power to help the world #SayNoToDiesel and transition to clean energy.

The ability to produce not only clean power from GenCell's fuel cells, but also the green fuel on which the fuel cells run, sets GenCell in a far superior position as a well-to-wheel total green energy solution provider. GenCell delivers resilient, robust, and weather-resistant backup power for utilities, telecom, EV charging and other mission-critical applications which have been deployed in 23 countries. Going ahead, we are designing an ammonia-based hydrogen-on-demand solution to provide economical primary power for off-grid and poor-grid sites, as well as for rural electrification

GenCell numbers over 100 employees, including veterans of space and submarine projects. The company operates a worldwide distribution and support network and retains unique intellectual property that includes patents, trade secrets and know-how.

↳ CONTACT US

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