

BESS • BATTERY ENERGY STORAGE SYSTEM

JEMS • JELEC ENERGY MANAGEMENT SYSTEM



 **JELEC**
ENERGIES

BESS: Jelec Battery Energy Storage System

In the transition to a decarbonized electric power system, variable renewable energy (VRE) resources such as wind and solar photovoltaics play a vital role due to their availability, scalability, and affordability. However, the degree to which VRE resources can be successfully deployed to decarbonize the electric power system hinges on the future availability and cost of energy storage technologies.

Battery Energy Storage Systems help make better use of electricity system assets, including wind and solar farms, natural gas power plants, and transmission lines. They can defer or eliminate unnecessary investment in these capital-intensive assets.

Jelec's Battery Energy Storage System (BESS) is a comprehensive and proven solution that includes battery units and battery management system software. This ensures maximum efficiency and safety for each customer.

The Jelec Battery Energy Storage System consists of, lithium-ion batteries, a Battery / Energy Management System, any necessary DC/DC, or DC/AC power conversion / charging Equipment, a filter to mitigate the level of harmonics, and a reliable Power Management System.



JEMS: Jelec Energy Management System

Battery Management System

Battery Management Systems (BMS) monitor and regulate the charging and discharge of batteries. The battery characteristics that are monitored include voltages, temperature, capacity, state of charge (SoC), power consumption, remaining operating time, charging cycles, and some advanced indicators like State of health (SoH).

The task of battery management systems is to ensure the optimal and safe use of the battery. To avoid loading the batteries, BMS systems protect the batteries from deep discharge and over-voltage. The battery management system also provides a cell balancing function to ensure that different battery cells stay equal, keeping the system in peak performance condition at all times.

Automatic Power Management System

The Jelec Automated Power Management System (JAPMS) is a solution to optimize the number of generator sets in operation and increasing the average efficiency of each generator set. This is achieved by implementing a Load Dependent Starting and Stopping System (LDSS) that automatically turns on and off generator sets based upon specific load and duration criteria.

When excess generator usage is eliminated, fuel consumption, running hours, and carbon footprint are all reduced, resulting in significant operating cost savings. Reduced engine hours also result in less rig downtime and significant savings on regular maintenance costs.

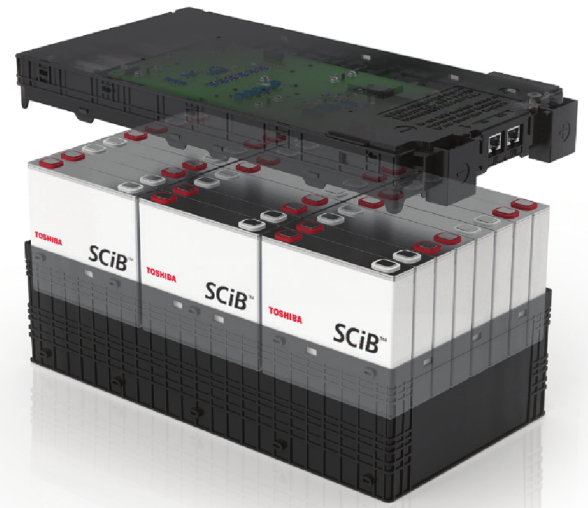
Features:

- Generators are speed and voltage controlled, in isochronous, to offer fast and optimal load sharing.
- Continuous monitoring of Real Power (kW) and Total Power (kVA).
- JAPMS allows individual engines/generators to operate in manual or automatic modes and only starts and stops engines that are in automatic mode of operation.
- Automatic start of standby generators to meet power demand.



Toshiba LTO Batteries

Jelec Battery Energy Storage System is equipped with Toshiba Battery Modules "SCiB™" using Lithium Titanium Oxide (LTO) to achieve excellent characteristics.



Safe and Reliable



Extremely low fire hazard

SCiB™ is suitable for various applications requiring high levels of safety and reliability.



Over 20,000 cycles

Only a small degree of capacity degradation occurs even after more than 20,000 cycles of charging and discharging. Low maintenance requirement when it is used in applications that require frequent charging/discharging such as large-scale Battery Energy Storage Systems.



Charged to 80% capacity in 14 minutes

The use of SCiB™ allows BESS to be charged as quickly as the necessary time to make a drill pipe connection. Frequent rapid charging does not cause significant deterioration in capacity.



Rapidly achieving high power

SCiB™ can be charged and discharged at high current. Therefore, SCiB™ is perfectly suited to discharge a very large amount of power to help the power plant (e.g., drawworks peak acceleration) or charge rapidly to prevent power plant overspeed / over frequency when a large load goes away.



Full State Of Charge (SOC)

SCiB™ can be used over the SOC range of 0% to 100%.



Extreme temperature tolerance

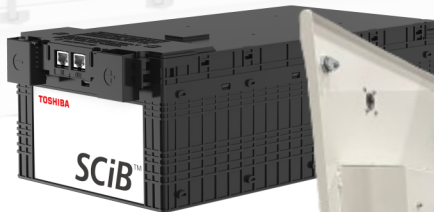
SCiB™ can be charged and discharged repeatedly at temperatures as low as -30°C. Operating ambient temperature: -30°C to +45°C.



Thermal Runaway

Thermal Runaway is SCiB™ cell based on Lithium Titanium Oxide (LTO) topology alongside with state-of-the-art monitoring devices, and with Jelec BESS Management System controlling the charge and discharge of the battery modules, greatly reduces the potential for Thermal Runaway suffered by other lithium chemistry.

Jelec Batteries Rack & BESS Building Design



Battery Rack

- The Batteries Racks are fully designed by Jelec using FEA (Finite Element Analysis) software for structural validation and CFD (Computational Fluid Dynamics) software to predict airflow and optimize cooling to each single battery module.
- Finger Safe Battery Racks: no exposed live parts.

BESS Building

- Automatic Climate Control: necessity to maintain the correct building inside temperature to avoid condensation.
- Scalable in size: storage capacity can easily be adapted to meet capacity requirements.

Applications

The Battery Energy Storage System offers highly efficient and cost-effective energy storage solutions to a wide range of customers, including renewable energy producers, conventional thermal power plant operators, transmission and distribution grid operators, industrial electricity consumers, and onshore drilling rigs and Oil & Gas service units.

- Energy Time Shift / Peak Shaving
- System Frequency Regulation and Load Balancing
- Activation and Delivery of energy resources
- Load Following and Ramping
- Additional Reserve Capabilities
- Black Start without using cold-start engine
- Extended Maintenance Intervals.

Drilling Rigs

The Jelec Battery Energy Storage System, in association with the Jelec Automated Power Management System, provides a means of storing energy from the main generators and redistributing it to the drilling system to optimize generator load. In the event of a load spike (such as the drawworks hook load), the batteries will take on the load instead of the engines, which will as a result continue to run steadily.

Advantages:

- Better energy efficiency and reduced greenhouse gas (GHG) and nitrogen oxides (NOx) emissions.
- Lower operation and maintenance costs.
- Greater safety and a better work environment.
- Lower operating noise level.

Black Start

The Battery Energy Storage System has the ability to provide black start services for portions of a microgrid that are subject to possible blackouts. This includes the restarting of conventional power plants, such as those with gas turbines, without the support of external power supply or backup-fueled power generation.

O&G Field Microgrid

To significantly decrease greenhouse gas (GHG) emissions and reduce operating costs through fuel savings, O&G operators are looking to create hybrid microgrids based on reciprocating natural gas generators and Battery Energy Storage Systems to power drilling rigs, workover and service rigs, artificial lifting installations, and more.

Renewable Energy Shifting & Smoothing

Renewable wind and solar energy are intermittent sources of power. The combination with Battery Energy Storage System has the ability to assist system operators in smoothing short-term fluctuations and regulating the frequency to the grid.

Momentary Outages

For customers with critical installations such as data centers, hospitals, and food centers that are equipped with standby generators in case of power grid failure, BESS is used to prevent monetary outages between the time they lose power from the grid and the time the standby generator(s) pick up the load.

Energy Arbitrage

Since the price of electricity fluctuates throughout the day and year, a Battery Energy Storage System (BESS) can be charged during low-price periods and discharge when the facility's load is high to offset the cost, particularly when Time of Use (TOU) pricing is implemented. Some states' building energy efficiency standards include requirements for solar plus storage on all commercial and multifamily homes, while also mandating that all new residential construction, which already necessitates solar, be energy storage ready.

Hydrogen Fuel Cell (HFC) Power Generator

Hydrogen Fuel Cell Power Generators are becoming the complete backup or primary energy generation system providing clean, reliable power to the industry like for Data Centers, Warehouse, car and truck battery charger centers, ...

The Battery Energy Storage System (BESS) provides start up power to the Fuel cells, or to pick up instantaneous increase of power without any drop of voltage and frequency to increase the HFC Power Generator maximum power capability.



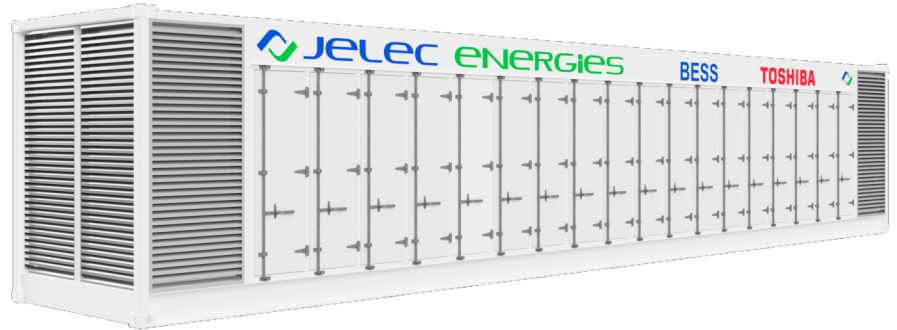
Battery Energy Storage System



The Jelec Battery Energy Storage System is a scalable and mobile solution engineered for the harsh operating conditions of the Oil and Gas industry.

The system provides storage of electrical energy using state of the art Lithium Ion LTO Batteries to smooth the power demand on drilling rigs (peak shaving) and to optimize the number of running engines in order to reduce fuel consumption and emissions.

This solution is particularly well suited for high power cycling, high operating temperature ranges, low maintenance operations and has been designed to easily interface with existing installations.



Highlight Features

Reliable

The system is made of proven components with high vibration and high temperature rating. Battery life cycle characteristic is best in class.

Scalable

The system capacity is easily increased by paralleling other power containers or adding additional battery containers.

Mobile

The system is build on Oilfield skids or ISO style containers in both 20ft and 40ft version for ease of transportation.

Safe

Finger safe screens, segregation of controls and power sections combined with the LTO battery technology helps make the system safe for operators.

Efficient

Best filtering and low internal battery resistance improves overall system efficiency.

Accessible

Built-in remote cellular and wired ethernet connection for remote support and diagnostics from anywhere when needed.

Quality

Built in house by Jelec with experience leveraged from packaging power houses, generator controls, liquid and air cool VFDs, driller's cabins and drilling controls for customer worldwide

More Questions?

Please feel free to contact us.

Specific requirements ?

We also offer custom packaging or electrical and control design to our customers.

Electrical

	JLB-1.0	JLB-2.0
Output	600Vac	600Vac
Frequency	50-60 Hz	50-60 Hz
Power - Nominal	1000 kW @ PF=1.0	2000 kW @ PF = 1.0
Power - Intermittent	1300 kW @ PF=1.0	2600 kW @ PF=1.0
Power - Overload	1 min every 10 min	1 min every 10 min
Energy Capacity	288 kWh	576 kWh
Cooling	20 Tons	40 Tons

Structural

	JLB-1.0	JLB-2.0
Frame	20ft Oilfield Skid	40ft Oilfield Skid
Dimensions - Length	25 ft	45 ft
Dimensions - Width	8 ft	8 ft
Dimensions - Height	9 ft 6 in	9 ft 6 in
Weight	46,000 lb	96,000 lb

General

Battery	Lithium Titanium Oxide (LTO) modules. Individual cell indication, continuous monitoring. Automatic isolation of faulty rack.
Inverter	Air Cool Active Front End Inverters
Cooling	Split Cooling Units
Efficiency	Application dependent Please contact us to request a sample study for your application
Temp. - Operating	-20 ... 40 °C (standard), -40 ... 40 °C (winterized)
Temp. - Transport	-30 ... 50 °C
Humidity	100 % non condensing
Convenience Features	Recessed outdoor lighting Recessed plug panel with access door and rain guard Doors with re-closing mechanism, panic hardware, sight glass, rain guard Emergency backup indoor lighting Indoor 120V service receptacles
Paint - Indoor	Dual coat white indoor walls and ceiling Dual coat ANSI grey floor with diamond insulated mat (black)
Paint - Outdoor	Triple coat outdoor white Non-skid white on outdoor walking area



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