

# JELECTRIFICATION

JELEC Energy Management System  
Battery Energy Storage System



eco norig

MAKING

OIL & GAS  
ORIGINAL & GREEN

JELEC

# JEMS

## JELEC Energy Management System

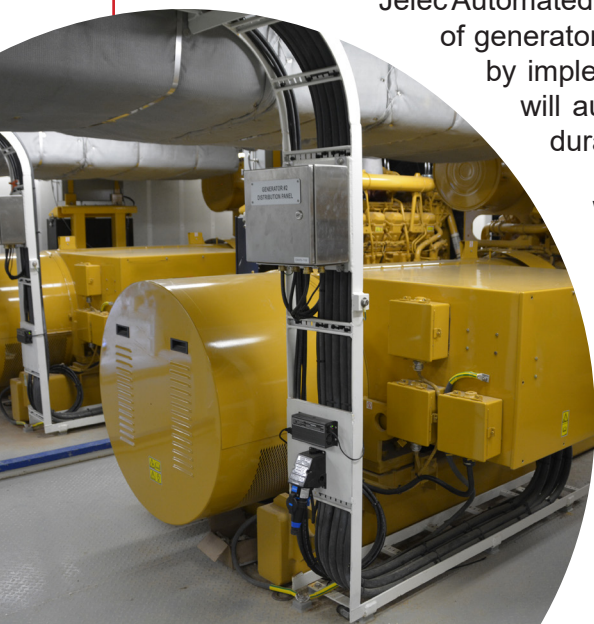
### Automated Power Management System (APMS)

Jelec Automated Power Management System is an initial step towards optimizing the number of generator sets operating and increase the average efficiency of each generator set by implementing a Load-Dependent Starting and Stopping system (LDSS), which will automatically turn on and off generator sets based upon specific load and duration criteria.

When excess generator use is eliminated, the fuel consumption, running hours and carbon footprint will all drop, saving significant operating costs. Reduced engine hours also result in less rig downtime and significant savings on regular maintenance costs.

### Design Principle

The APMS is linked with the Drilling Control System: based on the drilling schedule in progress, the APMS will evaluate the power needs and automatically assign the required generators to keep the engines load as high as possible.



### Features

- ⚡ Continuous monitoring and control of the generators to achieve a proper load sharing between the active generators.
- ⚡ Continuous monitoring of Real Power (kW) and Total Power (kVA). The consumed power levels are evaluated against the power capacity of the generators.
- ⚡ The APMS allows individual engines/generators to operate in manual or automatic modes and only starts and stops engines that are in automatic mode of operation.
- ⚡ Automatically engaging the standby generator on a confirmed power demand.

### Fuel & Emissions Monitoring System (FEMS)

- ⚡ Continuous monitoring of the daily fuel consumption from the fuel tank. This value is compared to the engines total fuel consumption. The APMS will quantify the amount of fuel used for “consumers” other than the main generators.
- ⚡ Continuous monitoring of calculated quantity of Greenhouse Gas (CO<sub>2</sub>) and Nitrate Oxide (NO<sub>x</sub>) generated by each engine.
- ⚡ Continuous monitoring of the input and return fuel line flow to calculate the fuel consumption of each diesel engine. When the measured fuel consumption is higher than the theoretical fuel consumption based on the generated kW of the engine, the APMS generates an “Excessive Fuel Consumption” Alarm which can be preemptive to a mechanical issue in the engine.

#### Continuous Emissions Monitoring System (CEMS)

Jelec offers a cost-effective continuous emissions analyzer for measuring greenhouse gases (GHG) at engines exhaust. Our system allows to track improvements, when using our Jelec Energy Management System, as the operators and oilfield companies work towards ‘net zero’ on their operating sites. Our system offers simple installation and are easy to maintain.



# BESS: Battery Energy Storage System

The Battery Energy Storage System offers a means of storing the energy from the main generators and/or being regenerated while braking the drawworks during operations such as tripping, running casing and redistributing that energy to the drilling system in order to optimize the generator load.

In the event of a load spike (such as Drawworks hook load, for example), the batteries will take that load instead of the engines - which will continue to run steady as a result.

The energy storage system consists of, Lithium-ion batteries, a Battery Management System, any necessary DC/DC or DC/AC power conversion / charging equipment, plus a suitable Power Management System.

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

## LTO Batteries

JEMS Battery Energy Storage System is equipped with Toshiba SCiB™ Battery Module using Lithium Titanium Oxide (LTO technology) to achieve excellent characteristics.

## Safe and Reliable



### Extremely low fire hazard

SCiB™ is suitable for various applications requiring high levels of safety and reliability. No fire suppression system required when installed in a building.



### 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 storage battery 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™ can store a large amount of regenerative power produced by lowering a load and provide a high current necessary for a motor to start to pick a load with the Drawworks for example.



### Full State Of Charge (SOC)

SCiB™ can be used over the SOC range of 0% to 100%. This makes it possible to reduce the number of batteries mounted on a system.



### 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. No HVAC requirement when installed in buildings.



## THE RIG FOR GEOTHERMAL ACTIVITIES

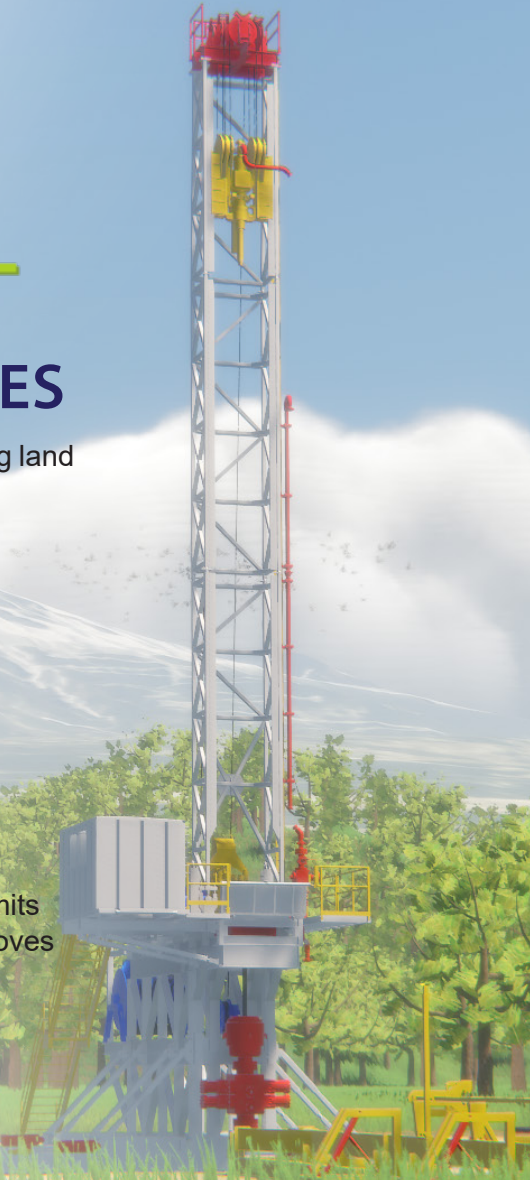
Using proven cutting edge technology, the EconoRig is a made-to-measure drilling land rig for oil, gas and geothermal drilling.

### Main Technical Characteristics

- Designed to accommodate ESG requirements
- Designed and tailored to customer requirements
- Rig Range: 600HP to 3000HP
- Modular drilling land rigs for small and sensitive locations
- Small Foot Print 2,000m<sup>2</sup> / 21,500 sf
- Built according to environmental regulations regarding noise and emission limits
- Containerized Substructure to limit transportation loads to ensure agile rig moves
- Drilling Control Software
- Pipe Handling Automation
- Energy Management System (JEMS)
- Built and certified in compliance with the latest regulations

### Options

- Battery Energy Storage System
- Power Substation to connect the rig to the Grid.
- Natural Gas Power Generation Plan





# JELECTRIFICATION

## Electrification by JELEC

The Oil and Gas industry could significantly reduce Greenhouse Gas (GHG) emissions by replacing the diesel engines with electrical motors controlled and Variable Frequency Drives (VFDs).

- Better energy efficiency and reduced greenhouse gas emissions
- Lower operation and maintenance costs
- Greater safety and a better work environment
- Lower operating noise level

## Electrical Power Supply Options

Connection to the Grid using Portable Substation with step down transformer and Harmonics Filter.

Combined Natural Gas Generator with a Battery Energy Storage System (BESS)

Leveraging the BESS system has significant advantages:

- Reduced fuel consumption and emissions production.
- Reduced maintenance requirements and longer engine life as a result of more consistent operational loads.
- Reduced engine generator costs by minimizing the number of sequentially operating generators.

## Applications

### Snubbing Unit

Replacement of the Diesel Hydraulic Power Pack with a fully Electrical Hydraulic Power Pack using Electrical Motors controlled by VFDs.

### Workover Rigs


Replacement of the Drawworks & Mud Pumps Engines as well as the Top Drive Hydraulic Power Pack with AC Electrical Motors controlled by VFDs.

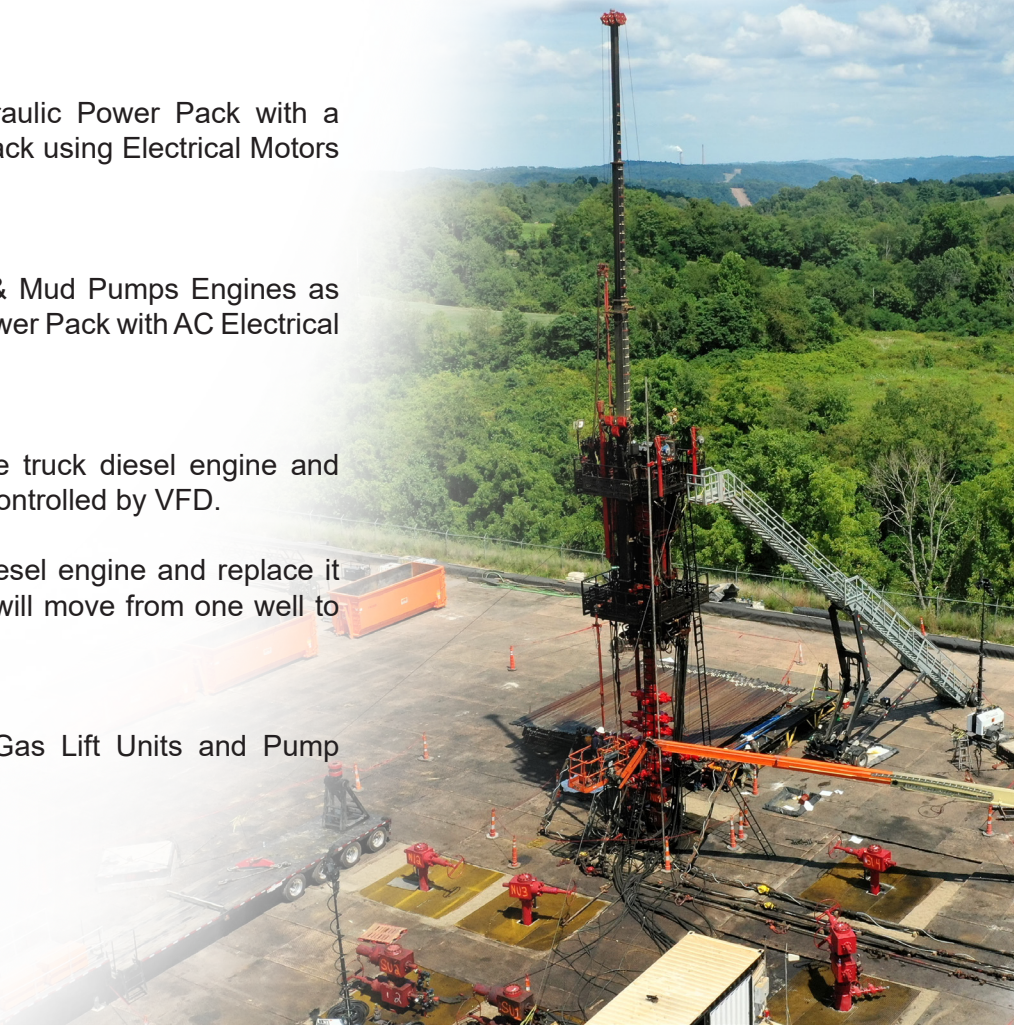
### Service Rigs

Separate the drawworks from the truck diesel engine and replace with AC Electrical motor controlled by VFD.

Alternatively, remove the truck diesel engine and replace it with Batteries. The Service Rigs will move from one well to another with **Zero Emissions**.

### Artificial Lifting

 Electrification of High-Pressure Gas Lift Units and Pump Jacks.





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