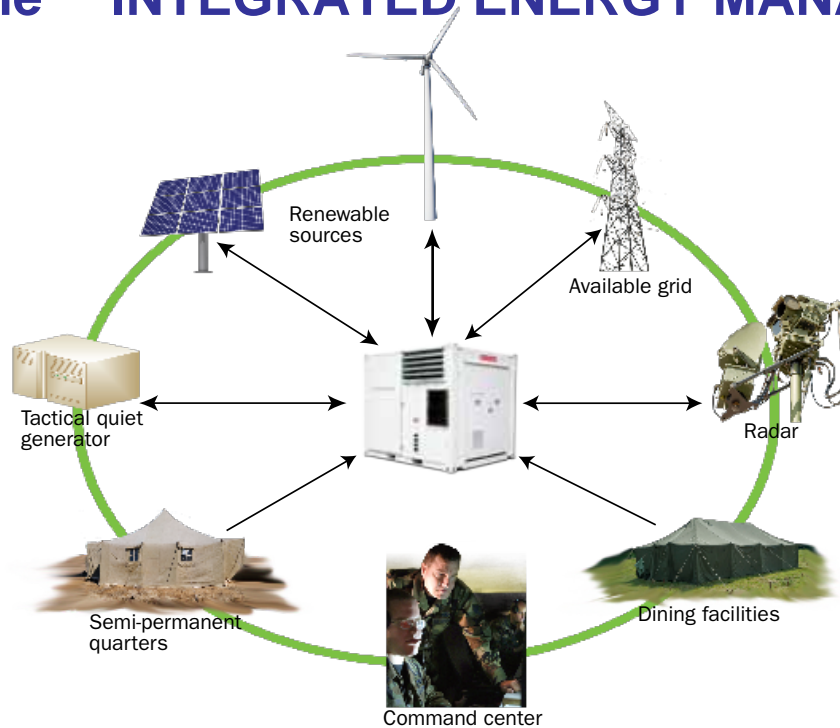


# TimesOne™ INTEGRATED ENERGY MANAGEMENT



## TimesOne™ FUEL EFFICIENCY Systems (200Kwh to 1000 Kwh with Modules)

The Load in a telecom repeater station is a 5Kw load steady state. It includes a 2Kw transceiver and a 3kw air conditioner, on start of the compressor or ventilation motors an in rush current of 3 to 5 times steady state running current occurs. So an oversized 15Kva generator is needed on a 5kw steady state load.

- This high peak to average load factor **reduces fuel efficiency.**

3.5 liters/hour are consumed by the motor instead of consuming 2 liters per hour of diesel fuel.

The storage battery in the hybrid drive dual conversion ups is used for smoothing out widely fluctuating load conditions from the motor. **This provides from 10 to 30% fuel efficiency improvement.**

Applications are motors which continually change speed from running to stopping. Examples are cranes, water pumps, ventilation, air conditioning, propulsion systems for mass transport, conveyers in production.

- **Example: The rotational speed of the motor-generator follows the load profile, 50% of its normal speed at 50% load.**

A fast responding high stability voltage regulator maintains the correct line voltage to the load. This shifts the fuel consumption operating efficiency up by 10% to 30% depending on the load factor and speed reduction.

The fuel consumption should now be 2 liters per hour instead of 3.5 liters per hour. The load is almost constant on a telecom tower.

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## SELF-SUSTAINING MILITARY OPERATING BASE

“Just Fire up and Forget”

The need for reliable electric power in the battlefield is a requirement that cuts across all services, and as more advanced electrical devices are deployed in the field, the need for reliable and low-maintenance electric power will only increase.

**TimesOne™ FUEL EFFICIENCY Systems** solution is an integrated, scalable power management system that reduces the number of towed generators needed at command posts through generation and intelligent management of electric power for deployed units. The configuration is based on the decades of experience in developing hybrid electric propulsion systems — the fuel efficiency system is composed of the same production components used in 3,000 powered buses on the street today. These systems have logged more than 20 million hours of operation and 200 million miles of revenue service.

### Features:

- ✓ Fully automated, unattended operation
- ✓ Configurable to accept and manage renewables
- ✓ Other distributed power source inputs from wind, solar, and rotational generators
- ✓ Provides high- power quality , even during heavy transients
- ✓ Variable-speed internal engine eliminates “wet stacking”
- ✓ Embedded diagnostics and prognostics system provides early warning indicator of required maintenance
- ✓ Optimal use of assets due to intelligent genset control
- ✓ Energy storage absorbs large transients, mitigating need for extra gensets running unloaded
- ✓ More efficient under light load conditions

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## Energy Management & Propulsion Control System



### Features

- Selectable acceleration and regenerative braking settings
- Minimal internal interconnects
- Onboard diagnostics
- SAE 1939 CAN interface
- System control and vehicle interface electronics mounted externally
- Optional “Chopped DC” output to support electric heater resistor

### Benefits

- Rugged, durable, and highly reliable
- Flexible installation and cooling
- Standard communications interface
- Supports prognostics health management
- Optional “Chopped DC” output eliminates need for fuel-fired heater
- Performance can be tailored to customer needs

### RATINGS

- Power: 2 x 200 kW continuous
- Operating temperature:
- Coolant temperature: -40°C to 65°C (-40°F to 149°F)  
45°C (113°F) nominal
- External ambient: -40°C to 75°C (-40°F to 167°F)

### SIZE (over chassis)

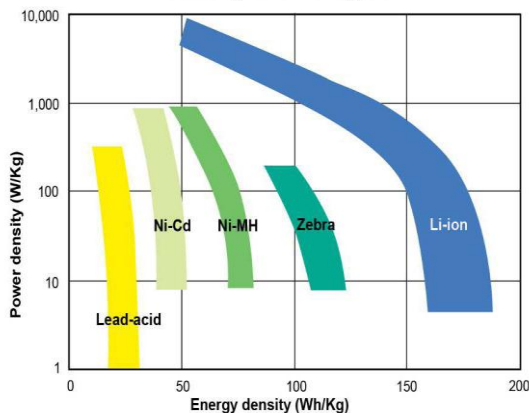
- Length: 36.2 in. (919 mm)
- Width: 22.4 in. (569 mm)
- Height: 9.3 in. (237 mm)

WEIGHT — wet: 188 lbs. (85 kg)

COOLANT — water ethylene glycol 15 gpm (57 lpm)

## Lithium-Ion Energy Storage System

**Lithium-ion provides best power and energy density of battery technologies**



### RATINGS

- Peak power: ±200 kW
  - DC bus output voltage: 500 - 700 Vdc (635 Vdc nominal)
  - Operating temperature: -40°C to 52°C (-40°F to 125°F);  
cold-weather kit required below -10°C (14°F)
- ### SIZE
- Height: 12 inches (303 mm)
  - Width: 41 inches (1,041 mm)
  - Length: 84 inches (2,135 mm)
  - Weight: 800 lbs. (363 kg), +50 lb. (+23kg) with cold-weather kit
- ### COOLANT — ambient air
- Forced ambient air
  - Provided by dual-integrated variable speed fans

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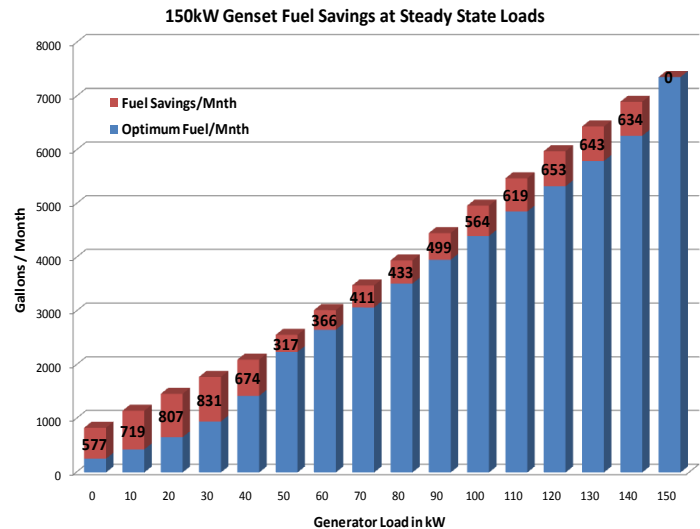
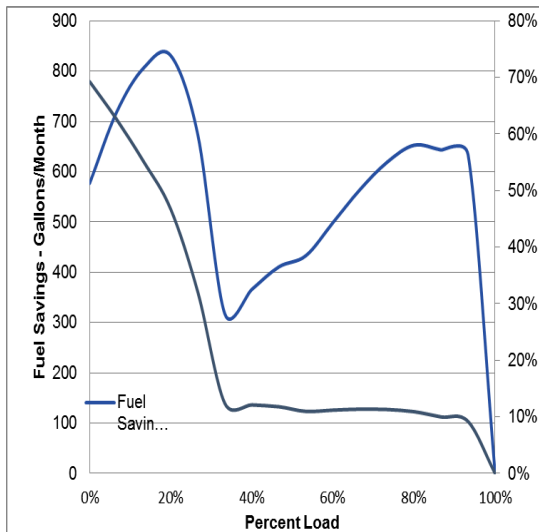
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## 150kW Genset Fuel Savings Calculations



### TimesOne™ FUEL EFFICIENCY Systems

*Above example based on Fuel data for Cummins ISB-07 6.7L Diesel Engine.*

*Assumes 24/7 operation over 1 month Assumes Steady-State Engine Mgmt. Only*

SELF-SUSTAINING MILITARY OPERATING BASE

## PERFORMANCE FOR THE MILITARY

Systems performed at experimental FOB for the USMC in summer of 2010 at 29 Palms. Several scenarios were run with no issues, and fuel savings was proven out



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PCS Proprietary information

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