

TM2500® Mobile Gas Turbine Generator 50/60Hz Applications

fact sheet



Quickly Installed Mobile Power

The TM2500® Mobile Power Unit is a perfect fit for temporary power applications including:

- Base load bridge to a permanent power installation/maintenance
- Peak shaving
- Emergency or backup power

The TM2500 is GE's proven LM2500® gas turbine mounted on wheels...literally, a power plant contained on a mobile, four-trailer assembly. After minimal site and/or foundation preparation, it can reach full power within as few as three days from arrival on site and has less than a ten-minute start cycle to full power. The units are extremely flexible and have been transported via land, sea, and air to some of the most remote places in the world by an extremely experienced project management team.

GE offers the TM2500 for both rental and sale.

What does it come with?

The TM2500 mobile power plant kit includes four trailers assembled together to create the power station:

1. Main Trailer – Includes LM2500 Power Turbine and Brush Generator
2. Air Inlet Trailer – Provides air for cooling and combustion
3. Exhaust Trailer – Provides exhaust discharge and noise control
4. Control Trailer – Contains all operating controls and interface skids

The TM2500 is manufactured with new or fully OEM-qualified overhauled LM2500 engines and new components. A project includes the appropriate services and consumables associated with the units:

- Installation
- Commissioning
- Project management
- Decommissioning
- Consumable parts kit (filters/lubricants for operation needs)

In addition, GE offers many other services associated with the project including, but not limited to:

- Operation and maintenance
- Operation and maintenance training
- Transportation
- Transportation advisory services
- Fuel treatment
- Performance testing
- Various levels of support for the balance of plant scope



Customer's Scope

At the start of the project, GE and the customer will discuss and complete a detailed division of responsibilities matrix. Prior to this agreement, GE's assumption is that the customer is responsible for:

- Providing sufficient space for unit assembly
- Obtaining appropriate permits
- Providing fuel to TM2500 specification to the TM2500 flange
- Providing balance of plant requirements per desired scope

Key Product Features and Specifications

- Output: 21.8 MW @ 50 Hz; 22.8 MW @ 60 Hz (ISO)
- Dual Frequency – 50/60 Hz quick conversion (no reduction gear)
- Heat Rate: 9800 Btu/kW-hr @ 50 Hz; 9500 Btu/kW-hr @ 60 Hz (ISO)
- Voltage: 11.0kV (50Hz); 13.8 kV (60Hz)
- Liquid or natural gas fuel capability
- Brush Air-cooled 2-pole generator with brushless excitation
- Multiple units started/controlled through a single desktop PC
- Low emissions with demineralized water injection: 25 ppm (gas), 42 ppm (liquid)
- Woodward Micronet® control system
- Inlet air heating/cooling provisions
- Electro-hydraulic starting system
- Single unit footprint ~110' x 70'
- Sound level at 3 ft. 90 dBA



For more information, contact your GE representative or visit www.ge-energy.com.

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TM2500

AERODERIVATIVE GAS TURBINE

50/60_{HZ}



32 MW AT 30°C

HOT-DAY PERFORMANCE

SWITCHING FROM A DIESEL ENGINE AND ELECTRIC GENERATOR (DIESEL GENSET) TO A TM2500 BURNING LIQUEFIED PETROLEUM GAS (LPG) CAN SAVE UP TO \$7 MILLION PER YEAR IN OPERATING COSTS.

UP TO
75%

H₂ CAPABILITY
(TM2500 +G4 SAC[†])

[†]package changes are required

	TM2500 (50 Hz)	TM2500 (60 Hz)
SC PLANT PERFORMANCE	SC Net Output (MW)	34.6
	SC Net Heat Rate (Btu/kWh, LHV)	9,783
	SC Net Heat Rate (kJ/kWh, LHV)	10,321
	SC Net Efficiency (% , LHV)	34.9%
1X CC PLANT PERFORMANCE	CC Net Output (MW)	49.2
	CC Net Heat Rate (Btu/kWh, LHV)	6,870
	CC Net Heat Rate (kJ/kWh, LHV)	7,248
	CC Net Efficiency (% , LHV)	49.7%
	Plant Turndown – Minimum Load (%)	35.0%
	Ramp Rate (MW/min)	30
	Startup Time (RR Hot [†] , Minutes)	30
2X CC PLANT PERFORMANCE	CC Net Output (MW)	99.2
	CC Net Heat Rate (Btu/kWh, LHV)	6,814
	CC Net Heat Rate (kJ/kWh, LHV)	7,189
	CC Net Efficiency (% , LHV)	50.1%
	Plant Turndown – Minimum Load (%)	35.0%
	Ramp Rate (MW/min)	60
	Startup Time (RR Hot [†] , Minutes)	30

NOTE: All ratings are net plant, based on ISO conditions and natural gas fuel. Actual performance will vary with project-specific conditions and fuel.

[†] Rapid Response/Hot Start

The TM2500 is ideal for providing a baseload bridge to permanent power installations or for generating backup power in the wake of a natural disaster, plant shutdowns, or grid instability. Our complete solutions, including a trailer-mounted gas turbine generator set and containerized balance of plant, can put power on the grid within as little as 30 days of the contract signature. This fast power provides the greatest power density among gas turbine trailer-mounted offerings.

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Features of the TM2500+ fast power solution



Fuel flexibility
Can operate on gas and/or distillate liquid fuel



Lower emissions
50 percent lower emissions than diesel generators when operating on gas



Proven technology
More than 1,800 GE TM2500 gas turbines deployed with 69 million operational hours of experience



Enhanced design
Two-trailer footprint for high power density



Quick lead times
On-demand power plants delivered in weeks, not months

Benefits of a TM2500+ solution

Speed

The development of a new power plant could entail months of construction and commissioning. We can shorten that time from months to days under most conditions. Once on the ground, these mobile units can generate power in about 11 days.

Reliability & availability

Due to our aviation legacy with the TM2500+ gas turbine, GE's TM2500+ fast power solution represents some of the most reliable power generation technology in the world. It has the lowest failure frequency interruptions and instabilities due to technical problems related to faulty equipment or an unstable electricity grid.

Dual fuel capability

TM2500+ solutions are capable of running on both natural gas and/or diesel at an output of up to 31 MW with water injection for NOx abatement.

Mobility

Mounted on a mobile, two-trailer assembly, TM2500+ generator sets can be transported via land, sea, and air to some of the most remote places in the world. Their mobile nature means that they can be swiftly deployed to other sites within days when they are no longer required at the original site.

Flexibility

Extremely flexible, they have a sub 10-minute start cycle to full power.

Scalability

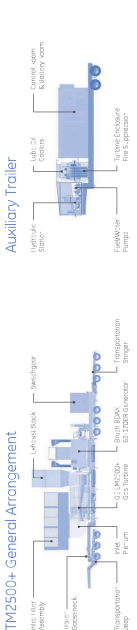
The technology is also scalable, allowing you to buy the number of units you need with the option of adding more power quickly as demand increases.

Gradual financing

Because large capital expenditure costs can be a barrier for some projects, these units can be purchased gradually for financing ease. In addition, they can be deployed where-ever demand exists without the need to invest in capital-intensive transmission and distribution infrastructure.

GE Power & Water
Distributed Power

Performance you can count on for mobile Power



Model	Water Injection @ 25 psia (bar)	Output (MW)	Heat Rate (Btu/kWh)	Efficiency (%)	Pressure Ratio	Power Turbine Speed (RPM)	Exhaust Flow (lb/hr)	Exhaust Temp (F)	Exhaust Temp (C)
4012									
TM2500+	Yes*	31.6	83,150	39.1	24.1	3,600	156,7	87.8	355.3
TM2500+	No	31.6	83,150	39.1	24.1	3,600	156,7	87.8	355.3
5012									
TM2500+	Yes*	50.1	82,400	39.5	24.1	3,600	185,3	88.0	380.0
TM2500+	No	50.1	82,400	39.5	24.1	3,600	185,3	88.0	380.0

*The performance data shown above are for standard ISO International Conditions. The 4012 has defined the following standard conditions for emergency gas turbine engines: ambient air 59°F (15°C), sea level atmospheric pressure, 24.1 psia (1.64 kg/cm² absolute), 100% relative humidity, 0.075 in. Hg (2.0 mm Hg) water vapor, cooling air 21.2°F (6°C) @ 21.2 psia.

The TM2500+ total solution and Services support

A TM2500+ fast power solution

- Installation
- Commissioning
- Project management
- Consumable parts kit (filters, lubricants for operation needs)

In addition, GE offers many services to support the ongoing operation and performance of the units including, but not limited to the following:

- On-call technical advisory services
- Maintenance planning and training
- On-site hot section, combustor and other modular exchanges
- Spare parts management for accelerated overhaul and unscheduled repairs
- Performance testing

For more information on TM2500+ mobile gas turbines, visit us at www.ge-tm2500.com

GE Distributed Power regional locations:

Houston, Texas, USA The Courtyard Houston, TX 77021 USA T +1 713 867 0920	Lima, Peru GE Power Services S.A.S. Plaza 14 San Isidro Lima 27, Peru Tel +51 81 514 4331	Moscow, Russia GE Power Services LLC Moscow 127023, Russian Federation T +7 495 981 1313
Nairobi, Kenya The Courtyard Nairobi, Kenya T +25 4204215133	Riyadh, Saudi Arabia 5th Floor "Towers" Towers Riyadh SA 11433, Saudi Arabia T +966 11 207 3838	Shanghai, China No. 1 Huo Tian Rd. Shanghai 201205, China T +86 21 3877 7888



GE imagination at work

GE Power & Water
Distributed Power

GE's TM2500+ solution offers fast, mobile and flexible power

Power whenever and wherever it's needed



a product of
ecomagination



GE imagination at work

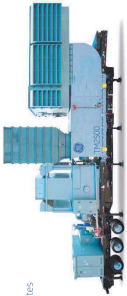
31 MW
power potential on wheels

69 MILLION HOURS
accumulated hours of successful heritage operation

~1 MONTH
from contract signing to commissioning

11 DAYS
from parking first trailer to commissioning

10 MINUTES
full power production in less than 10 minutes



Focused on solving power challenges

Currently, more than 1.1 billion people globally lack access to electricity. GE, whose technologies already help deliver a quarter of the world's electricity, is working to bridge the gap through a portfolio of distributed power solutions. These technologies enable power to be generated closer to the point of use, thereby reducing transmission losses and increasing the ability to meet their energy needs by producing power at the point of use. The TM2500+ fast power solution from GE Power & Water's Distributed Power business enables governments, utilities, and businesses around the world to fulfill their generation requirements within days. From its modular concept, fast installation features and quick production schedules, these units typically may be ordered and delivered to the project site in approximately 30 days after the purchase order is placed.

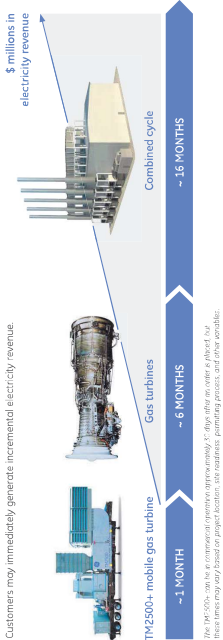
The TM2500+ fast power solution harnesses the highly successful LM2500 aeroderivative gas turbine with more than 1,800 units deployed worldwide and almost 69 million hours of operation.



GE imagination at work

The TM2500+ solution can be deployed more than 6 times faster than other technologies

Customers may immediately generate incremental electricity revenue.



The TM2500+ can be a commercial operation approximately 10 days after an order is placed. Full installation may vary based on project location, site readiness, permitting process, and other variables.

Multiple applications in a wide range of industries

The TM2500+ solution can solve a number of industry challenges. These include, but are not limited to, difficult access to the electric grid, an unstable grid, emergencies and natural disasters, rapid demand growth such as large construction projects, as well as escalating electricity prices and seasonal shortages. More details on applications of the TM2500+ mobile gas turbine generator are detailed below.

The Challenge	Description	Potential Industries	TM2500+ as a solution
Limited or no access to the electric grid	Cases with challenging access to the electric grid include: <ul style="list-style-type: none">• Lack of robust transmission and distribution network• Delayed grid access• Remote, sea and grid mobile operations	Oil and Gas Military General Industry Power generation	Speed, Reliability and Flexibility Can bridge power until new facilities are completed and go online within 10 minutes to stabilize the grid
Rapid energy demand growth	High and rapid demand for electricity in cases where the grid cannot meet the demand, as well as large off-grid construction projects	Government General Industry	Speed, Reliability Can bridge power until new facilities are completed and go online
Lengthy build-out of electricity generation infrastructure	Construction lead times on new generation facilities as well as unanticipated delays, meaning pressing electricity needs are not met	Government General Industry	Speed, Reliability Can bridge power until new facilities are completed and go online
Escalating electricity prices	Escalating electricity rates, during seasonal or peak periods requiring technologies that enable peak shaving	Government Utilities General Industry	Fuel Flexibility Can be used as a peak shaving, gas-fired, or natural gas-fired power source
Natural disaster & emergencies	Cases of emergency where power generation sources are impacted and a delay needed	Government Utilities	Speed, Reliability Can provide emergency power in a fast, reliable and mobile way
Flare gas	Natural gas flared in all fields amounts to billions of dollars wasted and millions of tons of greenhouse gas emissions	Oil and Gas	Fuel Flexibility, Mobility Can help monetize gas flaring for power generation and help reduce diesel consumption

Cases in point - Solving our customers' challenges



480 MW* of on-demand power for Algeria

Algeria faces a drastic need for more power, particularly during the hot summer months when there is close to 10 percent annual growth in electricity demand. GE delivered 24 TM2500+ mobile gas turbine generators that provided more than 480 MW of power. The units were commissioned, delivered and operational in time to meet the northern demand of the summer season. The units were also used to generate power for the port, and some of the units were deployed to other cities in the south of the country to serve as permanent power.

23 MW* for peak shaving in 10 days for Greece



The Greek island of Rhodes is a prime tourist destination. During the summer months, an influx of more than 2 million people from all over the world swells demand for power to the breaking point.

To avert blackouts, the island purchased a TM2500+ generator set, which was delivered before the summer season and commissioned within a few days of arrival onsite. This provided 23 MW of power generation in tandem with water injection to lower NOx levels to below 25 ppm.

120 MW for bridging power for Angola



Only 26 percent of Angola's population of 19 million have access to power. Rich in natural resources, the country is engaged in a priority program to create a modern energy infrastructure.

The government of Angola ordered five TM2500+ mobile gas turbine generator sets. 120 MW of power was generated, bridging the gap until a large hydropower plant construction, improving grid reliability and curtailing the rising cost of diesel fuel.

"GE's TM2500+ systems offer the right combination of efficiency and reliability needed to help the Angolan state utility, Empresa Nacional Electricidade-E.P. (ENE), reduce its fuel costs and increase the reliability of grid service in order to support continued economic growth in Angola."

Nyembo Ilunga, President, LS Energia Africa

*Power output is based on site conditions.