

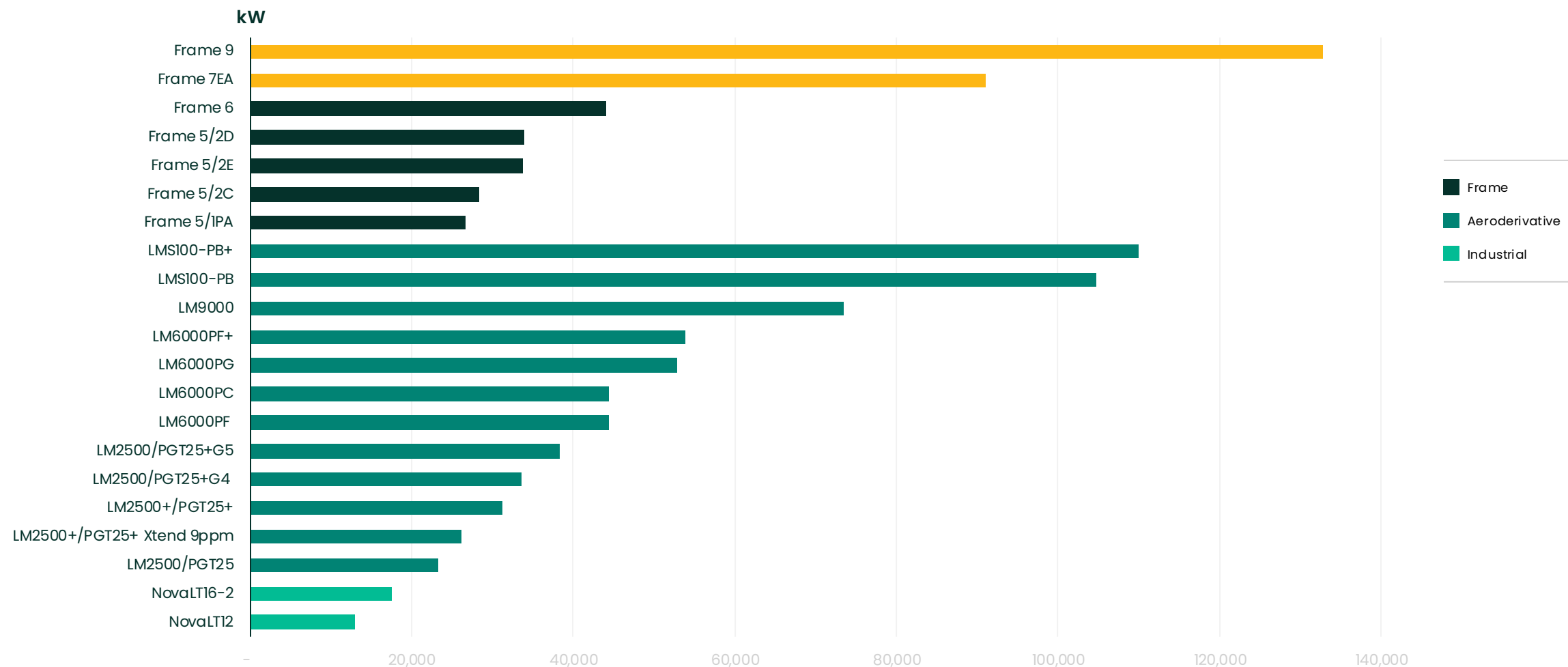
# Frame 9/1E gas turbine (132 MW, 50 Hz)

Frame 9/1E gas turbine, the right fit in a wide variety of applications

Exclusive distributor of GE Power products for the oil and gas market

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# Industry leader in gas turbine technology



# Frame 9/1E

Single-shaft gas turbine with hot-end drive for high reliability and availability.

The Frame 9/1E is a well-proven, cost-effective gas turbine with more than 25 years operating in the field. It's a fuel-flexible turbine that can operate on most types of fuel (single, dual, or tri-fuel configuration) natural gas, liquefied natural gas (LNG), distillate, and treated residual oil in a variety of applications.

There are over 700 units installed worldwide with over 42 million operating hours—and high reliability and availability in both power-generation and mechanical-drive applications.

They're continually improved year after year by advanced technology injections through our conversions, modifications, and upgrades.

## Key technical and benefits

- Output: 132,000 kW
- Efficiency: 34.6%
- Combustion chamber system is available in both standard (diffusive) and DLN1+ (Dry Low NOx) versions
- Enhanced fuel flexibility with no impact on combustor's operability or integrity

## Main applications

- Simple cycle and cogeneration
- Combined cycle with steam turbine
- LNG

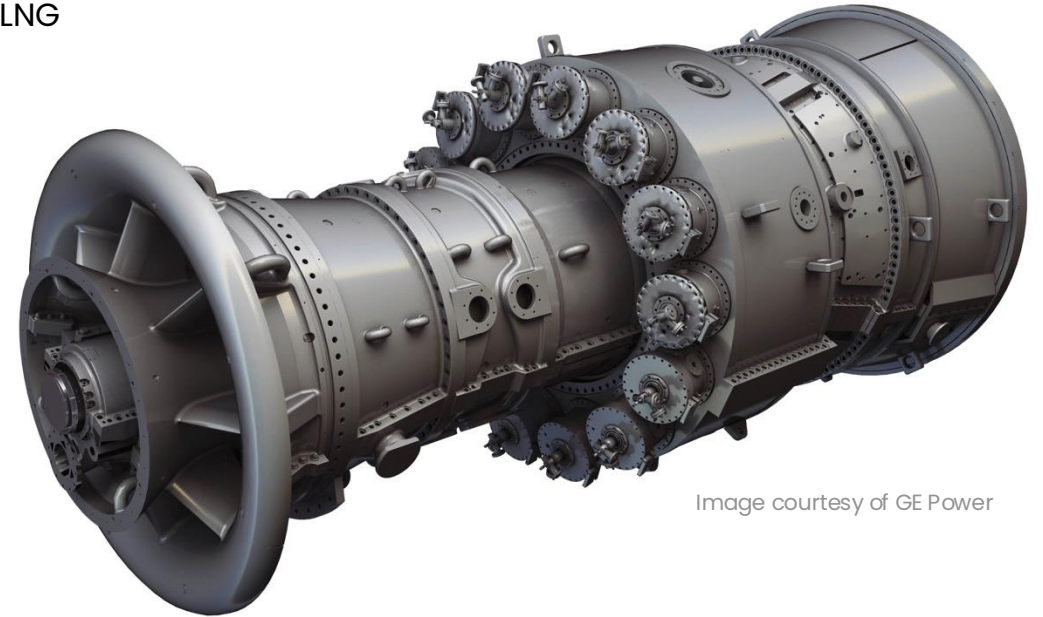
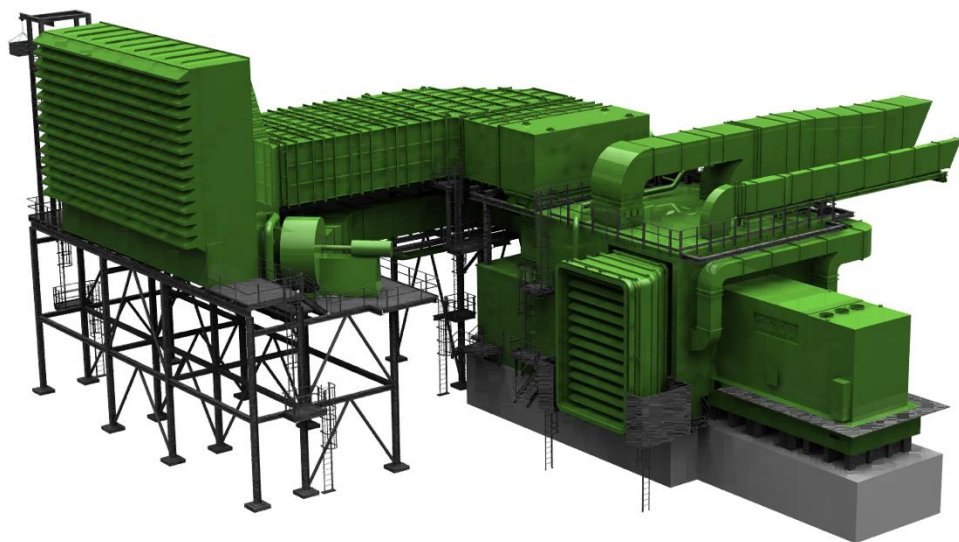


Image courtesy of GE Power

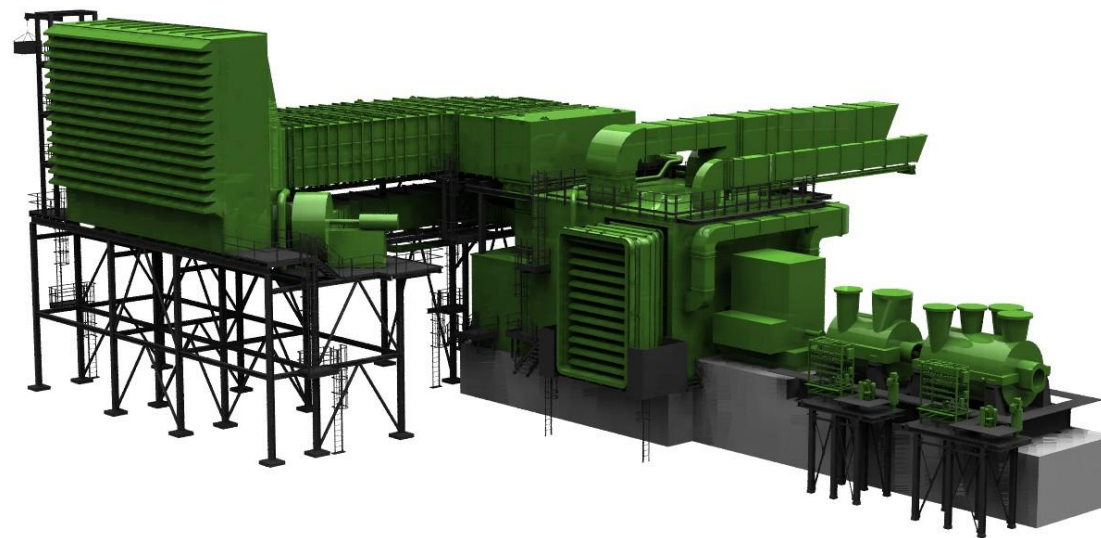
# Package

## Compact design

- Compact and quick to install
- Suitable for generator drive and mechanical drive applications
- Dual-base configuration for auxiliaries and engine.



Typical power-generation package



Typical mechanical-drive package

# Package

## Installation and maintenance

The Frame 9/1E gas turbine is delivered with auxiliary skid.

### Mechanically driven accessories

- Lubricating oil system
- Hydraulic system

### All accessories on one base, tested in factory

- Starting system
- Accessory gear
- Fuel system

Horizontal mid-split casings enable easier access to turbine components, and facilitate maintenance at site.

### Service/upgrades

To improve the performance of aged models, a wide range of upgrade kits are available, including:

- Power output increase MW
- Efficiency % increase
- Maintenance intervals extension
- Emissions reduction

### Frame 9/1E interval extension capability

	Maintenance intervals: factored fired hours (FFH)/factored fired starts (FFS)
<b>Standard combustor</b>	
Basic hardware	8,000/900
Extendor combustion system or CL-Extendor combustion system	12,000/900
Advanced Extendor combustion system1	32,000/900
<b>DLN1 combustor</b>	
Basic hardware	12,000/450
Extendor combustion system or CL-Extendor combustion system	24,000/450
Advanced Extendor combustion system (including AGP)	32,000/900

Note: Frame 9/1E gas turbine maintenance in public GER3620



# Datasheet

## Main architecture attributes

- 17-stage axial compressor
- Three turbine stages with air-cooled first and second-stage nozzles and buckets
- 14 combustion chambers with reverse-flow STD/DLN combustion systems (single-digit NOx emissions)
- Able to burn a wide range of fuels including crude oil
- Dual-fuel capability with STD/DLN combustion system; up to 100% H<sub>2</sub> burnability with STD combustor
- Direct coupling with electrical generator for 50 Hz power generation (no load gearbox required)

## Mechanical-drive package (typical dimensions and weights)

		GT skid	Aux skid	CE CO+ Helper skid
LxWxH	m	10.7x4.8x5.0	8.4x3.6x4.0	20.5x7.5x5.0
Weight	kg	220,000	45,000	560,000

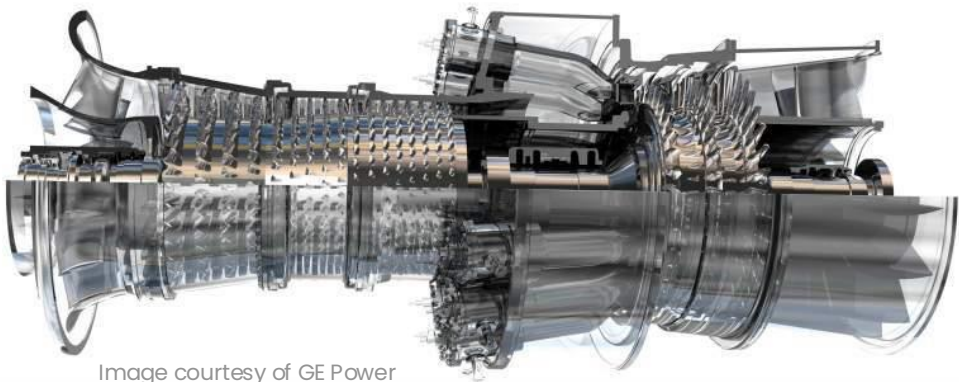
## Power-generation package (typical dimensions and weights)

		GT skid	Aux skid	EG skid
LxWxH	m	10.7x5.0x4.8	8.4x3.6x4.0	9.5x4.5x5.6
Weight	kg	220,000	45,000	207,000

ISO conditions with natural gas fuel, ambient temperature 15°C, no inlet or exhaust losses, sea level, 60% relative humidity.  
Assuming average losses for EG and GB.

## Power generation

		DLN
Power	MW	132
Efficiency	%	34.6
NOx	ppm	5
Exhaust	°C	544
Speed	rpm	3,000



# Projects

## Qatar LNG plant

The Qatargas and Rasgas LNG facilities in Ras Laffan are the world's largest mechanical-drive application. Frame 9/1E drives large centrifugal compressors.



## Power-generation modules

Gorgon, one of the world's largest natural gas developments, is located off the coast of Western Australia.

Power from the Frame 9/1E modules will drive the Barrow Island compressors and refrigeration units that will liquefy natural gas coming from the sea floor.



## Avenza plant

Proven experience, expertise, and resources to test Frame 9/1EA and other large gas turbines in string configuration with driven equipment.

