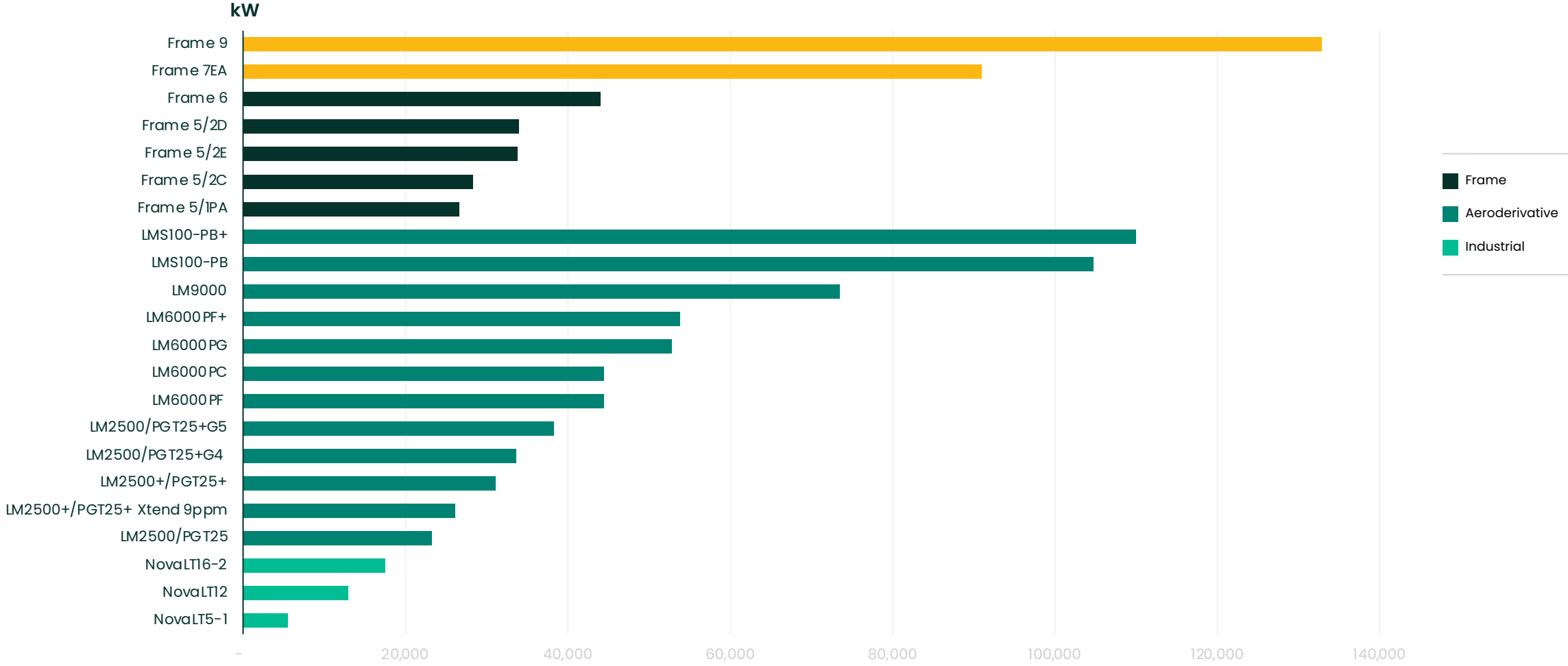


Frame 9/1E gas turbine (132 MW, 50 Hz)

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

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

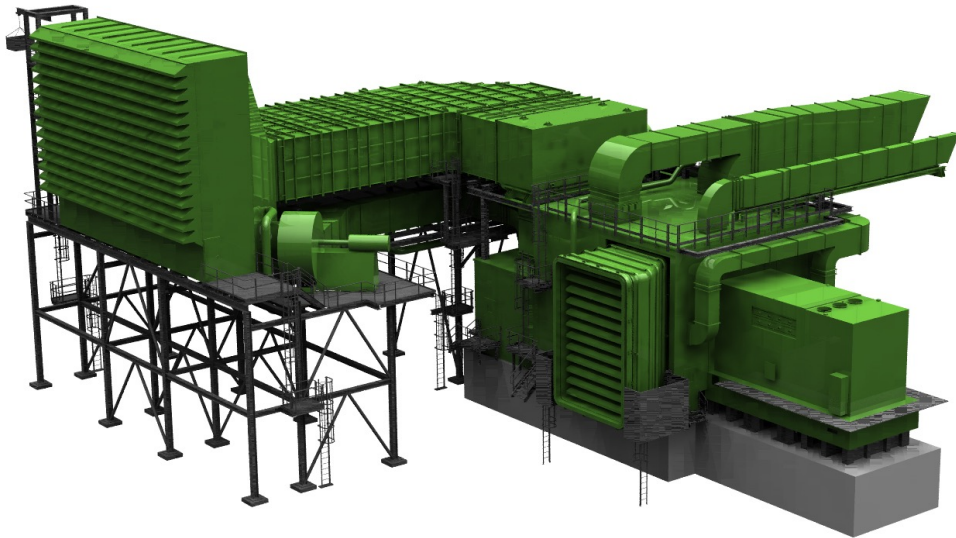


Image courtesy of GE Power

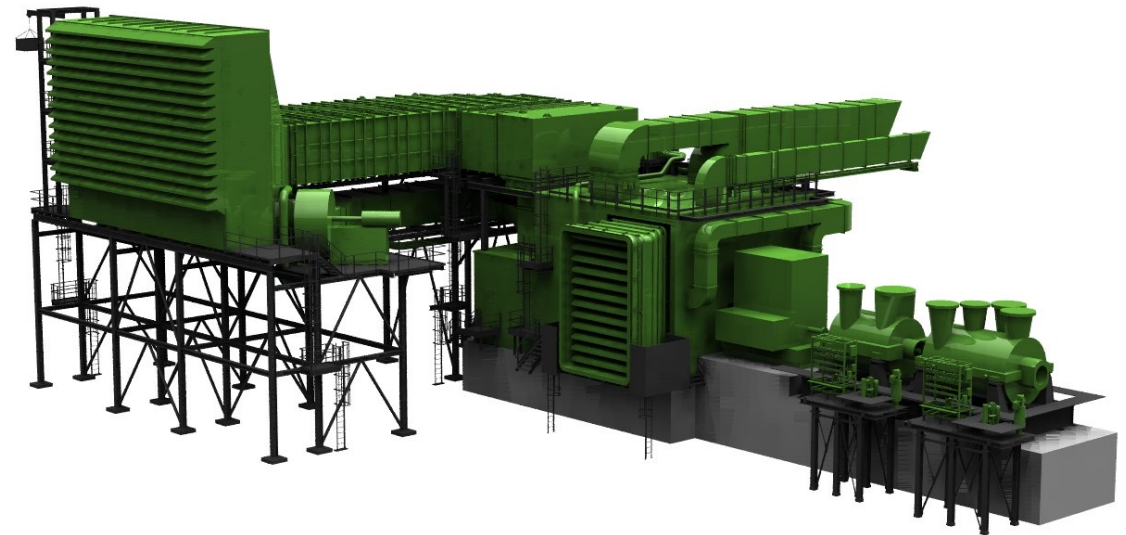
Package

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) |
|---|---|
| Standard combustor | |
| Basic hardware | 8,000/900 |
| Extendor combustion system or CL-Extendor combustion system | 12,000/900 |
| Advanced Extendor combustion system ¹ | 32,000/900 |
| DLNI combustor | |
| 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% H₂ 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 |

Power generation

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

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.

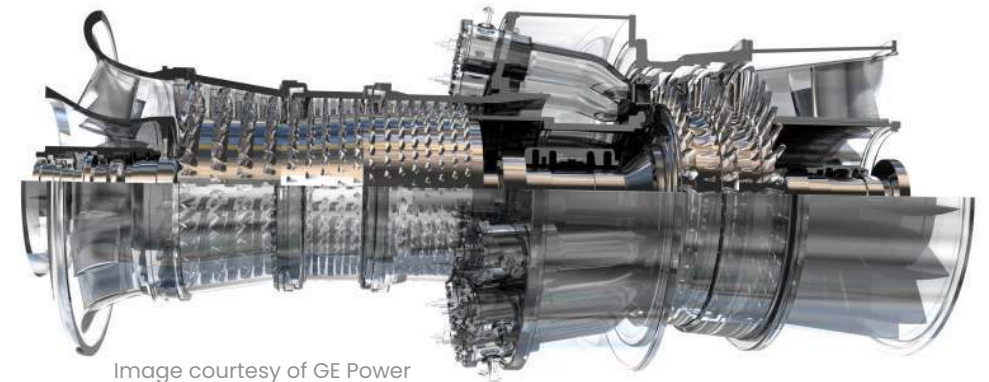


Image courtesy of GE Power

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.

