GE Power

POWERing the World

2016

WITH GAS POWER SYSTEMS

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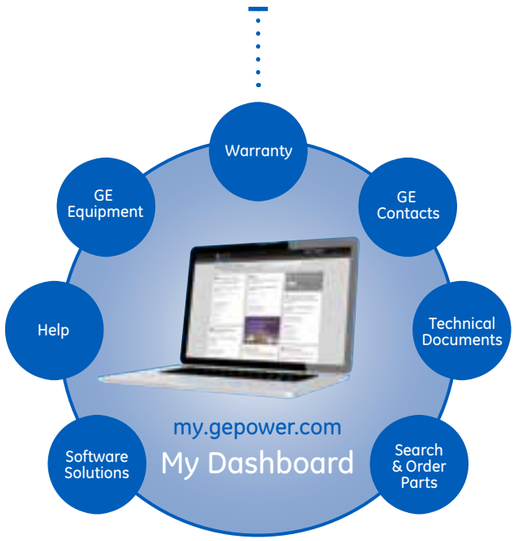

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POWERing the World

WITH GAS POWER SYSTEMS

GE Power's Gas Power Systems business unites the strengths of GE and Alstom, with their combined 210 years of experience in the power industry, to deliver even greater value to our customers. With more than half the world's installed capacity of gas and combined cycle power plants, GE brings together the global reach, scale, technology leadership, and plant innovation capability of these two industry leaders to further advance the efficient, clean and cost-effective conversion of gas and liquid fuels to power.

The Gas Power Systems portfolio is strengthened and expanded across the entire plant, from leading gas turbines, steam turbines and generators, to heat recovery steam generators, condensers, and other balance of plant equipment. Beyond the equipment, GE's total plant design and integration capability is greatly enhanced, enabling a wide range of scope offerings to meet differing customer needs. GE and Alstom both bring extensive experience across diverse applications serving a broad variety of utility, industrial, and commercial customers. Each company has a strong track record of delivering complex projects on time, on budget, and with the highest standards of quality. Continued technology leadership and innovation across the Gas Power Systems business positions GE to create significant value for our customers through increased plant efficiencies, lower emissions, greater operating flexibility, broader fuels capability, and reliable power.

We are pleased to introduce the comprehensive combined portfolio of product and plant solutions to help our customers POWER the world with Gas Power Systems.

Joe Mastrangelo
President and CEO
Gas Power Systems

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POWER GENERATION

APPLICATION CONSIDERATIONS

GE has the world's most comprehensive and competitive gas power systems portfolio. Choosing the right products and plant configuration for a project requires an intimate understanding of customer needs as well as equipment features and benefits. At GE, our sales, product management, and engineering teams work hand-in-hand with you to fully understand project requirements and performance expectations, and develop a customized plant solution delivering the best life cycle economic value.

The path to product and plant configuration selection begins with a set of key considerations:

1 What type of power is required?

- Electrical power
- Combined heat and power
- Mechanical power

2 What operating profile is expected?

- Baseload
- Cyclic or seasonal
- Peaking
- Stand-by
- Ancillary services

3 How much power is desired?

- 20 MW to multi-GW solutions

4 Is speed to power online critical?

- Fast, mobile power solutions, online in as little as 30 days from contract signing

5 Is a waste gas or alternative fuel available?

- Waste-to-power solutions

6 Options to extend existing plant capability

- Combined cycle add-ons and repowering

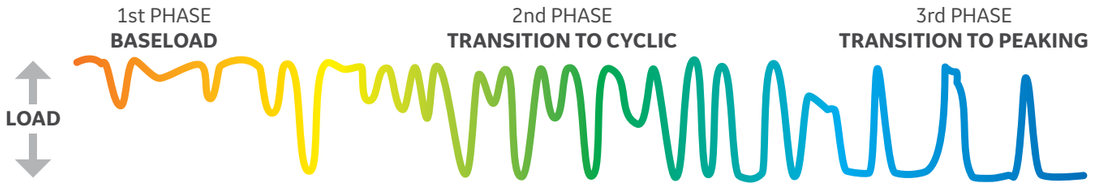
Electrical Power Applications

Electric power has become a fundamental necessity for the growth and well-being of all countries. Utilities, independent power producers (IPPs), industrials, and commercial customers around the world develop, own, and operate power plants to generate the electricity to meet this demand. Customers seek the most cost-effective and reliable power plant offerings to serve the power demands of their local grid or service territory. A variety of power products or duty cycles are required, as highlighted in the table below. Providing the lowest cost solution for each requires unique attributes or plant characteristics. GE's broad portfolio of gas power system offerings provides solutions from as small as 20 MW to multi-GW combined cycle plants.

Power Products	Purpose (dispatch)	Desired Attributes
Base Load	Provide continuous (or near-continuous) power (>6000 h/y)	• High efficiency • Lowest $/MWh
Cyclic	Cover real-time fluctuations between demand and supply from intermittent renewables (1500-6000 h/y)	• High efficiency • Operating flexibility • Low $/MWh
Peaking	Supply intermittent power for seasonal peak hour demands (100-1500 h/y)	• Low $/kW • Low NOx emissions • High start reliability
Stand-by	Back-up power for reliability (<100 h/y)	• Low $/kW • Black-start capability • Small footprint
Ancillary Services	Frequency regulation, spinning and non-spinning reserves, reactive power	• Fast start and ramping • Black-start capability • Frequency response

The operating profile of a plant can change over its life. Plants initially purchased to provide baseload generation may experience a decrease in their dispatch over time and migrate towards cyclic operation as newer technologies are added to the grid, with even lower variable operating costs. In other cases, plants initially built as peakers are converted to combined cycle to improve the economic return on their investment over time. GE provides solutions that can be adapted to changing industry needs and help you sustain and even grow the value of your plant assets over time.

Changes in Lifecycle Duty



Baseload plants, by definition, are developed to command the greatest hours of dispatch and provide reliable, steady power supply to the grid. In most competitive power grids, plants with the lowest variable cost of generation dispatch first. GE works closely with customers to provide plant solutions enabling the lowest life cycle cost of electricity. Fuel is typically the largest expense with a baseload plant, so high-efficiency offerings can save customers and consumers millions in annual operating costs.

Cyclic operation plants are required to respond to demand fluctuations in the grid throughout normal daily load cycles. In high-renewable penetrated regions, operational flexibility characteristics, such as fast start and ramping, low minimum load, and high part load efficiency, must be provided in addition to low life cycle cost of electricity. GE's H-class, F-class, and aeroderivative gas turbines lead the industry in both efficiency and operational flexibility, providing customers the ability to develop their optimal balance of cost-effective, flexible power.

Peaking plants are used to deliver cost-effective, reliable power to cover intermittent peak seasonal demands, and typically dispatch less than 1,500 hours per year. Due to limited operating hours, customers seek to construct the lowest CAPEX solutions to meet this demand, which are almost exclusively simple cycle power plants due to their lower cost. Simple cycle gas turbines may avoid the cost associated with high-temperature selective catalytic reduction (SCR) if nitrous oxide (NO_X) emissions meet the site regulatory requirements. As such, peaking units with low NO_X emissions are desired. GE's F-class and aeroderivative gas turbines offer the desired combination of fast start and ramping capability, along with low capital investment and low NO_X emissions.

Stand-by power is often desired by industrial or commercial facilities to back up their grid connection in the event of a power outage. Stand-by power units run very few hours per year (typically <100 h/y) during grid outages. As such, stand-by power offerings are almost exclusively simple cycle turbines or reciprocating engines that provide a low CAPEX solution with black-start capability and a small footprint. GE's aeroderivative and heavy duty gas turbines make good stand-by power solutions for large industrial complexes or data centers.

Ancillary services address short-term imbalances in electricity markets by dispatching resources within seconds or minutes to maintain grid stability and security. These services generally include frequency control, reactive power-voltage regulation, spinning reserves, and operating reserves. In deregulated markets, these ancillary services offer customers additional revenue sources beyond capacity and energy revenues. GE's Digital Power Plant can operate as a virtual battery, providing regulation support previously limited to battery or fly-wheel technologies.

Exelon

Exelon, one of the largest competitive U.S. power generators, turned to GE for four 7HA gas turbines, two D600 steam turbines, six generators, and a contractual service agreement for the Wolf Hollow and Colorado Bend gas combined cycle projects, totaling an additional 2,000 MW of capacity for the projects.

"GE's high-output and high-efficiency H-class technologies will enable us to provide our customers with reliable and low-cost energy," said Ken Cornew, president and CEO, Exelon Generation. Additionally, the plants will use GE's latest power generation technology, with air-cooled condensers that need just 10 percent of the water amount typically required to cool such large installations. This will save millions of gallons of water a day, which is critical for a drought-stricken area like Texas. The plants are due to be operational in 2017.

Techint Group

Techint Group selected GE's F-class technology for their Central Electrica Pesqueria combined cycle power plant to provide 900 MW of capacity, marking the first power plant in Mexico to use this power generation equipment. This plant will utilize three 7F.05 gas turbines, a steam turbine and associated generators, and will profit from GE's maintenance expertise through a contractual service agreement. GE´s full speed, full load test facility located in Greenville, SC is a world class, full-scale gas turbine and compressor validation facility that provides comprehensive understanding of design processes, technology and capability to give our customers the confidence of having chosen well tested technology.

"This advanced technology will help us be more sustainable, while we provide reliable and efficient energy to the region's manufacturing plants." said Humberto Fernandez, CEO of the Pesqueria power plant. "The rigorous test validation of the technology performed at the test facility in Greenville, SC is very helpful to provide certainty when selecting the technology instead of having to wait for an important amount of cumulative operational hours."

Golden Spread Electric Cooperative

In the summer heat of the Texas panhandle, farmers rely on irrigation to keep their fields fertile. Golden Spread Electric Cooperative Inc. began using GE's 7F.05 turbine, operating on the advanced DLN2.6+ combustion system in commercial operation at its Elk Station power plant in June 2015. This system allows for even lower emissions compared to GE's previous combustion technology. Due to its flexibility, the Elk Station's 7F.05 unit can integrate with wind energy by providing over 75 percent of full load capacity within 10 minutes. During testing at Elk Station, the 7F.05 turbine with the new DLN2.6+ combustion system achieved 4.8 ppm NO_X at site baseload—the first time this low level was achieved. This represents a 46 percent reduction in NO_X emissions at the then current baseload conditions. The 7F.05 unit continues to demonstrate NO_X at the rated performance below 5.0 ppm.

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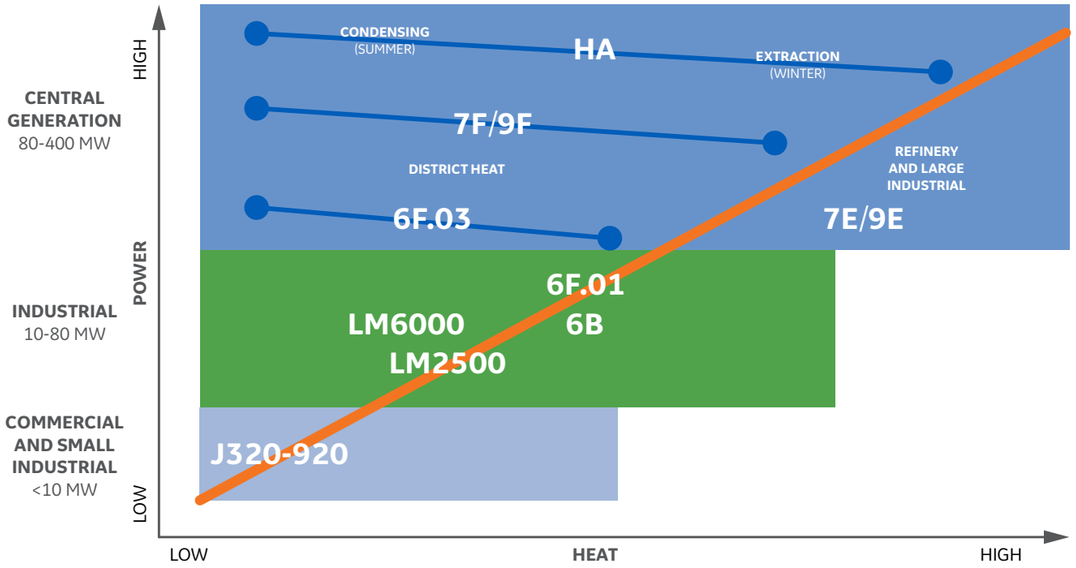
Combined Heat and Power Applications

Combined heat and power (CHP) systems, also called cogeneration power plants, are designed to generate both electrical power and heat for use in a process application. Utilizing exhaust energy from gas turbines, steam can be generated through a heat exchanger, which can then be used in any number of applications or processes with no additional fuel consumption or emissions. As a result, the overall efficiency of CHP systems can exceed 80 percent, making CHP one of the most energy-efficient methods of power generation. With the broadest gas turbine product portfolio in the industry, GE is uniquely positioned to provide the right products to meet the required ratio of power to heat for your CHP projects. Some common applications of CHP power plants are as follows:



TGK-16

TGK-16, an independent heat and electricity producer owned by TAIF, will utilize an advanced power generation system based on GE's 9HA.01 gas turbine installed at a combined heat and power (CHP) plant in Kazan, Russia. This project will help ensure the reliability of Kazan's power supply by decreasing the regional power deficit. GE's air-cooled HA technology will operate on natural gas and provide additional electricity for businesses and homes, along with heat for continuous petrochemical production. GE's 9HA power generation system will replace existing gas-fired boilers and increase the CHP facility's electrical production from 384 MW to 773 MW while using 30 percent less fuel, creating a total plant efficiency of approximately 80 percent.

Madison Gas and Electric

The West Campus Cogeneration Facility, operated by Madison Gas and Electric (MGE) in Madison, Wisconsin, churns out steam to heat and chilled water to cool the University of Wisconsin-Madison campus. In addition, the combined heat and power (CHP) system provides electric power to MGE utility customers in the surrounding community. The plant has advanced emission controls that reduce NO_X, CO, and VOC emissions.

GE's two LM6000 aeroderivative gas turbines drive generators to produce electricity. Exhaust gases from each turbine are converted to high- and low-pressure steam in a heat recovery steam generator (HRSG). GE's dual-pressure, extracting/condensing steam turbine paired with an electric generator receives the steam, sends steam heat to the UW-Madison campus and produces power for the Madison area. Exhaust steam is condensed, cooled and turned into reusable water. The plant's overall net efficiency rate is 70 percent, double that of conventional plants, and with reduced greenhouse gas, mercury and sulfur dioxide emissions. Win-win!

Commercial and Small Industrial CHP customers are seeking to reduce utility expenses by generating the needed electricity and heat for their operations locally. Typical customers include hospitals, universities, small industrials or office parks that generally seek less than 10 MW of electrical power with limited thermal output for heating or cooling. Reciprocating engine technology is often utilized, due to the smaller power requirements.

Industrial CHP applications are typically in the 10 MW to 80 MW electrical range. These customers are seeking to reduce utility expenses by generating the needed electricity and heat for their process or operation locally. Equally important to many of these customers is the requirement that the power source be highly reliable. In certain processes, such as aluminum smelting, a loss of power can cause enormous disruption and expense. We offer a variety of aeroderivative and heavy duty gas turbines, covering a wide range of power-to-heat ratios, to meet the unique power and thermal needs of industrial CHP applications.

Central Generation CHP is a segment in which electrical output is the primary deliverable and heat is secondary, and can often vary seasonally. These tend to be projects above 80 MW electrical output and the customers are often utilities and large industrials. Typical applications include district heating and desalination projects, as well as large refineries. We offer a wide range of competitive, high-efficiency product and plant solutions for central generation CHP projects, balancing the changing thermal and electrical needs cost-effectively.

- **District heating** power plants employ CHP technology to provide both electricity and heating for local facilities and homes. The exhaust energy of the gas turbines is used to generate steam that is then distributed to consumers for use in heating. District heating plants can range from large, centralized generating facilities for high-population areas to smaller facilities that serve more remote locations. If the power block employed is a combined cycle system, the steam turbines need to be engineered to support steam extractions and provide the required amount of steam at the desired temperature and pressure. Because the demand for steam varies seasonally, customers building a district heating facility require the lowest life cycle cost of electricity and steam over a wide range of operating conditions with varying power to heat ratios.
- **Desalination** power plants generate electricity and provide thermal energy in the form of steam for use in the operation of distillation equipment to produce freshwater from seawater. These are typically utility-scale power plants where both the electrical and thermal energy are fairly stable throughout the year. Therefore, customers developing desalination power plants seek power generation solutions with a specific power-to-heat ratio required to meet the desired electrical and thermal demand while delivering the lowest life cycle cost of electricity and steam.

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Mechanical Drive Applications

Mechanical drive applications of gas turbines and steam turbines use the rotational energy of the machine to drive pumps, compressors, or blowers in an industrial process. Gas turbines are widely used as mechanical drives in the oil and gas industry.

Secondary recovery methods enable producers to extract more oil from older wells. Many of these technologies incorporate injection processes that use engine-driven compressors. GE's aeroderivative gas turbines are widely used to drive compressors at production sites that typically run on raw gas taken directly from the wellhead for gas lift. The compressors inject gas into an oil well casing and pass it through lift valves at various elevations, causing oil to be lifted out of the well. For gas injection, the compressor injects gas into an oil formation to increase pressure and force more oil and gas out through the well pipe.

Gas transmission pipelines are hundreds of miles long. As gas moves through a pipeline, the pressure in the line drops, which slows the flow of gas. To boost line pressure and keep the gas moving, gas turbine-driven compressors are stationed at various points along the pipeline.

Given the critical role these products play in our customers' production processes, extremely high reliability and availability, proven technology, and horsepower fit are the primary considerations in the equipment selection for mechanical drive applications. GE's portfolio offers a variety of robust gas turbines for mechanical drive applications from 20 MW to over 140 MW.

Dominion

Increased natural gas production in the United States has producers looking for ways to get their natural gas to global markets. To serve this need, Dominion's Cove Point Liquefaction Project in Maryland, U.S.A. is modifying the existing liquefied natural gas (LNG) import terminal to become the first on the U.S. East Coast capable of importing and exporting LNG. At the heart of the liquefaction process will be two GE 7E.03 gas turbines driving the refrigeration compressors supplied by GE Oil & Gas. This single-train design will have the capacity to procure approximately 5.25 million metric tons per annum of LNG. With an installed fleet of over 800 units, the 7E.03 equipped with the DLN combustion system for reduced emissions is a proven, reliable performer.

Fast Power Applications

When customers need power fast, whether to quickly expand domestic capacity in response to unanticipated rapid growth in electricity demand or emergent requirements due to natural disasters, GE has a range of offerings to meet the need.

Emergency/Mobile Power
GE helps customers respond to emergency power situations, bring power to remote areas, and generate backup power to support maintenance, overhauls, or outages at power plants or for large-scale projects. The TM2500 trailer-mounted aeroderivative gas turbine unit can be swiftly transported by land, air, or sea, and can be commissioned in less than 11 days to provide up to 31 MW of reliable power. The mobility of the TM2500 allows customers the flexibility to reposition power at the point of use as demands change.

Quick Shipment/Construction
Electricity demand is not always easy to predict, so when a customer suddenly needs to add significant generating capacity to their operation or grid, GE has the speed and scale to respond. As the largest provider of gas turbine power generation systems in the world, we often have the required gas turbine, steam turbine, and generator products in the manufacturing process to enable fast delivery and shorten the time to commissioning and achieving electrification goals. And with our modular packaging and power island offerings, installation times are significantly reduced as well, bringing power online quickly.

Bridging Power
When the time required for a power plant configuration best suited for the required economics does not meet the customer's commercial operation needs, we can offer bridging power to close that gap. With a combination of mobile TM2500 units to meet the short-term power needs and the right long-term plant offering, GE is able to provide the optimum combination to deliver the best overall plant economics. Think of it as the "loaner car" until your new power plant is online.

Egypt

In record time, empty land became a power station, generating about 1000 MW to support Upper Egypt's power needs—just in time to meet the rising seasonal electricity demand. GE helped power this transformation through a major contract with the Egyptian government for 46 turbines: 34 aeroderivative gas turbines and 12 heavy duty gas turbines that will help to generate more than 2.6 GW of electricity—equivalent to power more than 8.7 million homes. In December 2014, within hours of signing contracts with the government of Egypt, GE dispatched its advanced gas turbine technology to construction sites across the country. Currently, four of the 9E turbines are running on natural gas and the remaining eight 9E units have fired on both distillate oil as well as heavy fuel oil.

EXPO Power Systems S.A.

When Greece's EXPO Power Systems S.A. needed a solution to meet the summer peak power demands of the Rhodes, Greece electricity grid, the company purchased a TM2500+ gas turbine generator. The TM2500+ gas turbine-generator set was commissioned within 10 days of arrival, and was ready to provide a fast, permanent source of power generation, staving off blackouts and power failures on this Greek Isle. The TM2500+ turbine-generator set is capable of producing up to 30 MW of power and can achieve full power in less than 10 minutes. That makes it ideal for providing a baseload bridge to permanent power installations, or for generating backup power to support natural disaster relief, plant shutdowns, or equipment maintenance.

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Waste-to-Power Applications

An industry pioneer in the use of alternative fuels in gas turbines, GE has the experience, expertise and equipment you rely on to turn waste into power. In many cases, the availability of such alternative fuels provides an economically beneficial fuel, compared to purchasing traditional fuels such as natural gas or distillate oil. With a fleet of gas turbines larger than all of our competitors combined, we have more operational experience handling, treating, and burning alternative fuels, as well as understanding the relative maintenance impacts of their use.

Blast Furnace Gas
Rising energy costs and high demand for power are major challenges for the steel industry. Gases created as "free" by-products during steel production processes serve as an attractive option for efficient power generation. In addition to the economic benefit these gases provide, using them as fuel reduces industrial CO_2 emissions and saves natural energy sources.

Coal Mine Gas
Released methane gas from underground coal mines forms a highly explosive mixture when combined with air. This mine gas not only poses a major threat to miners, it also is a large contributor to global warming when released into the atmosphere. The potential danger of coal mine gas (CMG) and methane emissions can be greatly reduced when they are harnessed properly for power generation. GE's aeroderivative gas turbines are designed to operate on full load, despite low gas pressure, high humidity, dust load, and altitude. The generated energy can be used in the coal mine to meet electricity requirements or feed into the public power grid. Thermal energy can be used on site.

Biogas
These days everyone is talking about sustainable energy, but actions speak louder than words. Using biogas from the fermentation of organic waste in agriculture, food and beverage production, and other industries, GE's aeroderivative gas turbines can efficiently create heat and power as a reliable alternative energy source to power your business today, tomorrow and in the future.

Saudi Electric Company

Saudi Electricity Company (SEC) and GE received the 2015 Saudi Water & Power Forum Award for innovation recognizing SEC's focus on adopting cutting edge technologies and its commitment to innovation at Power Plant (PP) 12 in Riyadh, Saudi Arabia. "PP12 is one of the most important combined cycle projects in Saudi Arabia and will enable us to provide the additional electricity needed to support Saudi Arabia's ongoing economic growth," said Eng. Ziyad M. Alshiha, president and CEO of SEC. The nearly 2,000 MW combined cycle plant, enough to power the equivalent of about 770,000 Saudi homes, features eight 7F.05 units in combined cycle. Fuel flexibility is a significant advantage of the 7F.05 turbines, which can operate on natural gas, distillate fuel or Arabian Super Light crude. GE's F-class gas turbines are the first to offer customers the ability to operate on crude oil.

Combined Cycle Add-on and Repowering Applications

What if your power plant could grow in capacity and become more efficient as your requirements change? It's not a fantasy if you already operate a simple cycle gas turbine or existing gas, oil or coal-fired steam generation.

Combined Cycle Add-ons
GE brings the bottoming cycle system engineering expertise and major equipment needed to convert your simple cycle units into combined cycle power plants. With a broad portfolio of both non-reheat and reheat steam turbines, combined with deep expertise in engineering these products into the thermodynamic system with the HRSG and heat rejection systems, we can provide an offering to convert your existing gas turbine's exhaust energy into more megawatts with no additional fuel consumption, significantly increasing the efficiency of your plant.

Repowering
We can provide gas turbine and heat recovery steam generator offerings to replace boilers in an aging steam plant, extending the economic life of existing steam turbines and significantly reducing plant emissions. By utilizing the existing steam turbines, cooling system, and additional plant equipment and infrastructure, the capital investment is minimized. We bring a full portfolio of offerings and the expertise to repower existing plants, worldwide.

Alghanim International

Alghanim International, the Kuwait-based multi-national conglomerate, chose Alstom Power, now part of GE Gas Power Systems, to supply a 400 MW steam tail, consisting of two steam turbines and five HRSG units to convert the existing 800 MW Az-Zour simple cycle gas-fired power plant into a combined cycle power plant. This quick and reliable solution will help meet Kuwait's growing electricity demand by boosting the power output and increasing the efficiency by 50 percent without additional fuel consumption.

"We were really impressed with Alstom Power's reactivity and fast track erection, especially considering Az-Zour was its first steam tail project in Kuwait, but definitely not the first in the region. The additional power delivered by this project is contributing to the stability of the country's electricity network, while ensuring high operational flexibility of the plant," said Mohammed Alghanim, CEO Alghanim International, Az-Zour.

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POWER GENERATION

TECHNOLOGY-DRIVEN PRODUCT AND PLANT LEADERSHIP

This catalog documents the accomplishments of thousands of engineers devoted to developing more efficient, cleaner, and cost-effective conversion of fuel to power. This effort starts years before a product or product improvement is introduced; it begins when fundamental technology research is completed in one of GE's many global research centers—in many cases with the support of the United States Department of Energy. Our technology research is centered on providing better performance, which then results in both lower fuel costs and increased power density for economy of scale. In today's gas turbine combined cycle technology, approximately 70 percent of the opportunity for performance improvement is related to the gas turbine, with the remaining 25 percent associated with the steam turbine, generator and plant equipment. In addition to performance, we have greatly improved the number and types of fuel that can be burned. This means that you have the opportunity to operate on the cheapest fuels available.

The following table provides a brief snapshot of the technologies that have driven product improvements described in this catalog.

Technology	Customer Benefits	Accomplishments
Coatings	• Approximately 2 percent output and 0.4 percent heat rate improvement • Hotter temperatures and/or less cooling flow • Better parts life expectancies Applicable to HA, 9E.04, 7F.05, 6F.03 and 6F.01 gas turbines	• 600°F temperature increase in the past decade • New plasma spray coating process • New higher temperature abradable coatings
Sealing	• Approximately 0.5 percent output and 0.1 percent heat rate improvement • Reduced leakage between stationary and rotating parts • Improved part life expectancies (since hot gases are kept in the flow path) Applicable to HA, 9E.04, 7F.05, 6F.03 and 6F.01 gas turbines	• First large turbine rig designed to reduce rotor leakage • New high-resolution unsteady fluid dynamics computer modeling • Thermal mapping testing to confirm performance benefits • 3-D features resulting in sculptured shapes
Steam Turbine Last Stage	• Enhanced plant efficiency driven through improvements to last stage buckets (blades) • Approximately 0.3 percent heat rate improvement • Reduced costs and increased flexibility for side or down exhaust Applicable to HA- and F-class power plants	• Largest last stage bucket currently offered • Curved axial dovetail to manage stress • Integral cover and mid-span shroud for enhanced stiffness and vibration control
Fuel Flexibility	• Lower water usage on distallate fuel resulting in over 5 percent better heat rate • Lower cost fuels such as ethane and crude oil	• Arabian Super Light crude oil operation offered in Middle East • Full scale low water usage combustion testing • As high as 100 percent ethane operation offered

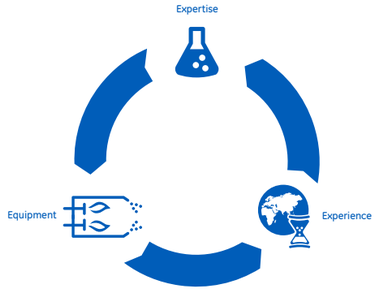
The future remains bright...

Advanced Testing	• GE is collaborating with Notre Dame University on a high-speed research turbine to focus on unsteady flow losses. • GE and the University of Munich are working together to advance compressor technology. • New aeroderivative technology is expected to improve combined cycle efficiency by 1 percent in the next decade.	**Ceramic Material**	• A leader in the development of advanced ceramic materials for gas turbines, GE has accumulated more than 30,000 hours of operation using ceramic components. • GE's 7HA gas turbine is being tested with a ceramic shroud, and we will offer a 7F ceramic shroud uprate as well. • Ceramic materials offer increased efficiency due to the ability to operate as much as 500°F hotter than metal super alloys.

FUELS AND COMBUSTION

INDUSTRY-LEADING FUELS CAPABILITY

Choosing a fuel for electrical power generation is a complex task, influenced by factors like fuel price and availability. Gas turbines, which play a key role in global power generation, can operate on a variety of gaseous and liquid fuels. GE's gas turbines offer broad fuel capability that is continually expanding to support the power generation industry. For instance, GE's gas turbines and accessory systems can be set up to operate either in dual or tri-fuel configurations. The continuous advancement in this capability is supported by hardware capable of operating on a wide variety of gaseous and liquid fuels, and extensive fuel and combustion experience in the lab and in the field.



Expertise – We are committed to providing efficient and reliable power from a wide variety of fuels. GE Power draws on leading fuels and combustion experts from across the company, including our Aviation and Oil & Gas businesses and our global research centers. Our experts actively enhance our combustion technologies to further expand the available range of fuel sources for gas turbine operation and to further lower emissions. We can test nearly any fuel at our world-class facilities in Greenville, SC; Niskayuna, NY; and other locations around the globe. Over the last decade, GE's experts have performed more than 20,000 hours of combustion testing to validate our technology and to develop new technologies and expanded fuel capabilities. As a result, our gas turbines can efficiently use liquid and gaseous fuels to produce electricity.

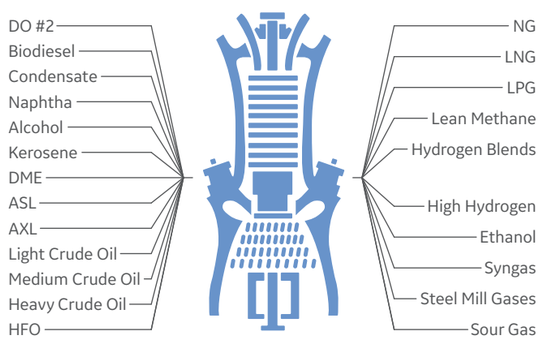
Equipment – GE offers combustion technologies, hardware, and controls to help you use a broad range of fuels. We continually evolve our proven gas turbine combustion technology, a process that started more than 30 years ago, leading to the development of the first Dry Low NO_X (DLN) combustion system. Since then, our range of combustion systems has accrued over 190 million fired hours. Today, modern systems continue to evolve to meet new fuel challenges, providing new capabilities. The technology required to operate on a variety of fuels includes not only the combustor, but the accessory and control systems needed to support reliable operation.

Experience – With more than 4,500 of GE's heavy duty gas turbines installed around the world and operating on more than 50 different fuels and fuel blends, we know the challenges operators face—volatile fuel prices, variability in fuel sources, increasingly strict environmental regulations, and the need for more power generation flexibility. Our broad industry experience allows us to reliably convert the full spectrum of fuels to mechanical, electrical, and thermal energy, giving us the ability to deliver solutions that meet your specific fuel needs.

GE's Industry-Leading Fuels Capability

GE's vast experience operating on natural gas and alternative fuels sets us apart from other original equipment manufacturers (OEMs). Our gas turbines are versatile and they operate on a variety of fuels, including gases with a wide range of heating values, like steel mill gases, syngas, lean methane fuels, natural gas, higher order hydrocarbons (such as ethane and propane from shale gas), and high hydrogen fuels. They also accommodate liquid fuels, including refined products such as distillate and naphtha, and a range of ash bearing fuels, including light, medium, and heavy crude oils, as well as heavy fuel oil (HFO).

The use of these fuels is important for a wide range of applications, including refineries, petrochemical plants, oil and gas production, and steel mills. As such, GE's experts implement the required fuel conditioning processes for safe and reliable operation in our gas turbines. This gives you the confidence and flexibility to operate reliably and efficiently on alternative fuels, while mitigating the risks associated with varying fuel compositions and contaminant levels.



Fuel Conditioning

As a world leader in the development of gas turbine combustion system technology, GE is not only focused on delivering quality system hardware, but also on systems and components for cleaning and conditioning fuel prior to combustion in the gas turbine. With the largest fleet of gas turbines operating on non-traditional fuels, GE's flexible fuel solutions typically outperform comparable technologies in both efficiency and reliability. We offer a range of combustion system technologies to support operation on a wide variety of fuels. The following fuel conditioning processes may be applied as a pre-treatment along the liquid or gas fuel systems, to the turbine or combustor to mitigate risks, or as a post-treatment—primarily in the heat recovery steam generator (HRSG)—providing environmental safeguards.

Pre-treatment	Removal	Some fuels contain high concentrations of compounds that are corrosive or toxic. The removal of these compounds can be accomplished chemically.
	Filtration	Filtration often is required to address gases or liquid fuels that might contain sediment, other solid contaminants, or excess moisture. This treatment removes constituents that otherwise might damage fuel system components, or impact gas turbine operability.
	Wash	Washing is a treatment used to remove water-soluble contaminants (for example, alkali metals such as sodium and potassium) from a fuel prior to use to avoid potential hot gas path corrosion. This can be accomplished using water injection and a series of centrifuges.
	Additive	Additives are used to modify physical or chemical properties of a fuel, or to prevent damage created by an inherent deficiency in a fuel. Examples include additives for lubricity or liquid fuel stabilization.
	Inhibitor	Many ash bearing fuels, such as crude oil, HFO, and residual fuel oil, contain vanadium, which creates highly corrosive compounds that can damage coatings and components in a gas turbine's hot gas path. Inhibitors are added to the liquid fuel upstream of the gas turbine to mitigate the risk of hot corrosion.
Combustor	Blend	Gas turbines are capable of operating on a variety of fuels, including blends of gases or liquids. Blending can be applicable when there is an insufficient supply of an opportunity fuel or to limit operational risks stemming from use of certain fuels.
	Heat	Gas fuel heating may be required to accommodate changes in gas quality or to improve gas turbine performance. Liquid fuel heating may be required to reduce viscosity and allow it to flow through the liquid fuel system.
	Startup	Some fuels are too lean (not enough energy/volume) to be capable of starting a gas turbine, or could create a safety risk if they do not ignite. In these cases, a startup fuel is used. Once operating, the turbine can transfer to the primary fuel.
	Dilute	To mitigate combustion-related risks, including those associated with increased fuel reactivity or higher NO_X emissions levels, diluents (typically water or steam) are injected in the combustor through dedicated passages in the fuel nozzle.
	Controls	Advanced controls are needed to ensure optimal operation of the gas turbine while operating on a variety of alternative or opportunity fuels. Such controls enhance fuel capabilities and address variations in the Modified Wobbe Index.
Turbine	Wash	Ash buildup in a gas turbine may impact performance. Higher levels of ash can occur naturally in some fuels; in other cases the ash formed is a result of the reaction with a vanadium inhibitor. A turbine wash can be used to remove the materials that collect on the hot gas path's components.
Post-treatment	Wash	Sulfates are created when sulfur and ammonia react in a selective catalytic reduction system. These materials can reduce HRSG performance by blocking flow paths and reducing heat transfer, requiring an HRSG (post) wash with cleaning agents.
	Removal	To conform to NO_X and CO environmental regulations, post-combustion removal of such substances from the HRSG may be required.

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Combustion System Fundamentals

Modern gas turbines that use a wide variety of gaseous and liquid fuels must operate within a series of constraints, with NO_X and CO emissions being the most notable. The formation of NO_X compounds is dependent on the temperature of the reaction in the combustor. If fuel and air are allowed to mix in a stoichiometric proportion (a balanced chemical reaction), they will burn in a diffusion flame, similar to the flame of a candle, near the highest possible temperature of the reaction. A consequence of burning fuel at a high flame temperature is the production of a large amount of NO_X. However, if extra air is introduced into the reaction, the resulting lean mixture burns with a lower flame temperature and the reaction generates significantly lower levels of NO_X. This is known as lean combustion. In addition to developing combustion technologies that reduce emissions, GE's advanced gas turbine combustion systems mitigate the potential risk of combustion dynamics while simultaneously meeting other key operability requirements. The overall system configuration is based on a balance of parameters that require a deep domain expertise in fuel and combustion technology.

Premixed Combustion Systems

Multiple combustion systems are available for application across GE's gas turbine portfolio. Since we introduced our dry low NO_X (DLN) systems in the 1970s, development programs have focused on evolutionary systems capable of meeting the extremely low NO_X level requirements of current and future regulations, while providing customers with a range of operational and fuel flexibility options. Our DLN combustion systems are available for all heavy duty gas turbines:

- The DLN1 and DLN1+ combustion systems are available on E-class gas turbines.
- The DLN2 family of combustion systems (DLN2.5, DLN2.6, DLN2.6+, DLN2.6+AFS) is available on F- and H-class gas turbines.
- The DLE (dry low emissions) combustion system is available on LM, TM, and LMS series aeroderivative gas turbines.

DLN1/DLN1+

The DLN1 and DLN1+ combustion systems are proven technology platforms that help power plant operators meet increasingly strict environmental standards, while providing operational and fuel flexibility.

- Globally, more than 870 E-class gas turbines have an installed DLN1 or DLN1+ system.
- The DLN1+ combustion system has been in operation for more than 28 million hours, including more than 730,000 fired hours.
- The DLN1+ system delivers NO_X emissions of 5 ppm or less for GE's 6B, 7E and 9E gas turbines.
- These systems are highly fuel flexible and capable of operating on a wide variety of gas fuels, including gases with high ethane and propane content, as well as distillate oil and other liquid fuels.
- These systems are available in gas-only or dual fuel configurations.

DLN2

The DLN2 family of combustion systems enables GE's F- and H-class gas turbines to reduce NO_X emissions while extending outage intervals. GE's DLN2.6+ combustion system, which is the base combustion configuration on the 7F, 9F and HA gas turbines, has been installed globally on more than 75 gas turbines and has accumulated over 1.6 million fired hours.

- Globally, more than 1,150 gas turbines have an installed DLN2 system.
- Units with these systems have accumulated more than 50 million operating hours, displaying proven operational experience in providing customers with a multitude of benefits, including increased operational and fuel flexibility, reduced emissions, extended intervals, and higher performance while maintaining life cycle costs.
- DLN2 units can operate on a wide variety of gas and liquid fuels.
- These systems are available in gas-only and dual fuel configurations.

DLE

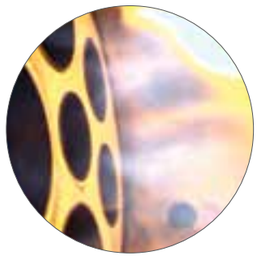
GE's DLE combustion technology achieves NO_X emissions of 15 ppm without water or steam injection.

- DLE technology is installed on more than 950 gas turbines globally.
- Units with these systems have accumulated more than 21 million operating hours; displaying proven operational experience in providing customers with a multitude of benefits, including increased operational and fuel flexibility, reduced emissions, extended intervals, and higher performance while maintaining life cycle costs.
- DLE units can operate on a wide variety of gas and liquid fuels.
- These units are available in gas-only, liquid-only, and dual fuel configurations.

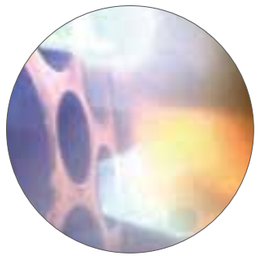
Advanced Liquid Fuel Technology

The use of distillate fuel continues to be an important fuel option for many global power plants. For some plants, distillate fuel is the only option as natural gas is not available, while for many other power plants across the globe distillate fuel oil #2 is the backup fuel of choice. Traditional liquid fuel systems inject water to meet NO_X emission levels for global, regional and/or national environmental regulations. The use of diluent has an impact on overall cycle efficiency and power plant economics. GE is developing a liquid fuel technology that dramatically reduces, if not completely eliminates, the amount of water injection required to meet NO_X emissions.

Images from combustion testing in GE's Gas Turbine Technology Lab



Natural gas flame



Advanced technology distillate oil flame

Diffusion Flame Combustion Systems

In addition to the DLN combustion systems, GE offers three diffusion flame combustion systems for use in the following non-traditional fuel applications:

- Single nozzle
- Multi-nozzle quiet combustors (MNQC)
- Single annular combustor (SAC) – available on LM, TM, and LMS series aeroderivative gas turbines

Single Nozzle and MNQC

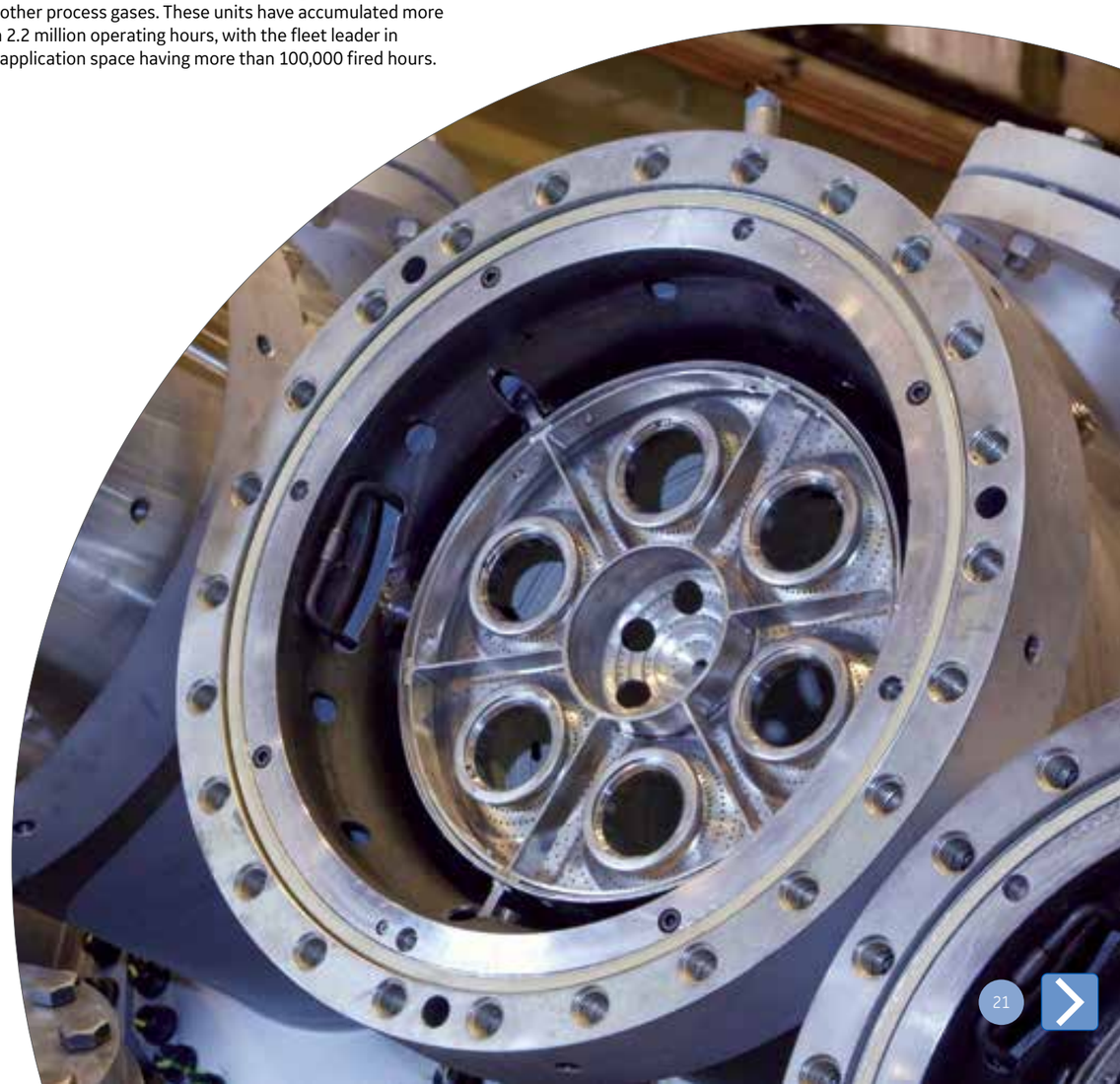
GE's diffusion flame combustion systems have been installed on more than 1,700 gas turbines, providing robust power generation solutions using a variety of non-traditional fuels for more than 30 years. Applications include refineries, steel mills, petrochemical plants, IGCC power plants, as well as power in a variety of oil and gas settings.

- More than 270 E-class gas turbines configured with the single nozzle combustor operate on HFO.
- Single nozzle and multi-nozzle combustors have been installed on more than 50 E- and F-class gas turbines in low calorific gas applications, such as syngas, blast furnace gas, coke oven gas, and other process gases. These units have accumulated more than 2.2 million operating hours, with the fleet leader in this application space having more than 100,000 fired hours.

Single Annular

Single annular combustors achieve NO_X emissions abatement with water or steam injection to suppress the firing temperature and reduce the formation of NO_X.

- Globally, more than 2,360 gas turbines with single annular combustors have been installed.
- These units have accumulated more than 83 million operating hours, displaying proven operational experience in providing customers with a multitude of benefits, including increased operational and fuel flexibility, reduced emissions, extended intervals, and higher performance while maintaining life cycle costs.
- Gas turbines with single annular combustors can operate on a wide variety of gas and liquid fuels.
- These combustors are available in gas-only and dual fuel configurations.



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Fuel Flexibility

For more than 50 years, GE has developed close collaborative relationships with owners, operators, and fuel suppliers, with the goals of understanding new fuel trends, expanding fuel flexibility capabilities for existing fuels, qualifying new fuels, and actively investing in new combustion technologies. This impressive fuel flexibility legacy has spurred GE's industry leadership as we reliably convert the full spectrum of fuels to mechanical, electrical, and thermal energy. Our model-based gas turbine control systems provide real-time, closed-loop tuning of the combustion system, which allows for stable operation even as gaseous fuel energy content varies. Liquid fuels include refined products, such as distillate and naphtha, and a range of ash bearing fuels, including light, medium, and heavy crude oils as well as HFO. These advanced control systems also enable starting on a variety on alternative fuels, and switching to and from fuels on the fly while still meeting emissions requirements.

- GE's gas turbines have operated on more than 52 different fuel types.
- Our units have accumulated more than 7 million operating hours on heavy fuels, and more than 25 combined cycle plants operate with crude/residual fuel.
- More than 140 of our gas turbines operate on various alternative gases (such as refinery off-gases, industrial by-product gases, and syngas), and almost 400 of our gas turbines burn liquids other than diesel oil (such as crude oil, residual fuels, or naphtha).
- More than 50 of our gas turbines operate on low-BTU fuels, and these turbines have accumulated more than 2.1 million operating hours, including over 400,000 fired hours on F-class units.
- GE is the only gas turbine manufacturer running F-class machines on Arabian Super Light (ASL) crude oil.

		AERODERIVATIVE			HEAVY DUTY									
	FUELS	LM/TM2500	LM6000	LMS100	6B.03	7E.03	9E	GT13E2	6F.01	6F.03	7F	9F	7HA	9HA
Gases	High C_2+ (Ethane, etc.)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Liquefied Petroleum Gas (LPG)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Flare Gas and Associated Gas	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Natural Gas	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Liquefied Natural Gas (LNG)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Coal Bed Methane (CBM)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	H_2 Blends	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Lean Methane (Weak NG)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	High H_2	✖	✖	✖	✖	✖	✖		✖		✖	✖	✖	✖
	Syngas (O_2 Blown)	✖			✖	✖	✖		✖	✖	✖	✖	✖	✖
	Blast Furnace Gas (BFG)	✖	✖	✖	✖	✖	✖			✖				
	Coke Oven Gas (COG)	✖	✖	✖	✖	✖	✖			✖				
	Sour Gas	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Refinery/Process Off Gas	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Landfill/Digester Gas	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Liquids	Distillate Oil (#2)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Marine Gas Oil (MGO)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Naphtha	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Condensate (NGL)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Biodiesel (GE DO#2 Spec)	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Alcohols (i.e. Ethanol, Methanol)	✖	✖	✖	✖	✖	✖		✖	✖	✖	✖	✖	✖
	Kerosene/Jet Fuel	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Butane	✖	✖	✖	✖	✖	✖		✖	✖				
	Gasoline	✖	✖	✖				✖						
	Dimethyl Ether (DME)	✖	✖	✖	✖	✖	✖		✖	✖	✖	✖	✖	✖
	Super/Extra Light Crude Oil (ASL, AXL)				✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
	Light Crude Oil				✖	✖	✖	✖						
	Medium Crude Oil				✖	✖	✖							
	Heavy Crude Oil				✖	✖	✖							
	Heavy Fuel Oil (HFO)				✖	✖	✖							

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POWER PLANT EXCELLENCE

POWER PLANT CONFIGURATION OPTIONS

Gas turbine-based power plants are available in a wide range of output and in either simple cycle or combined cycle configurations.

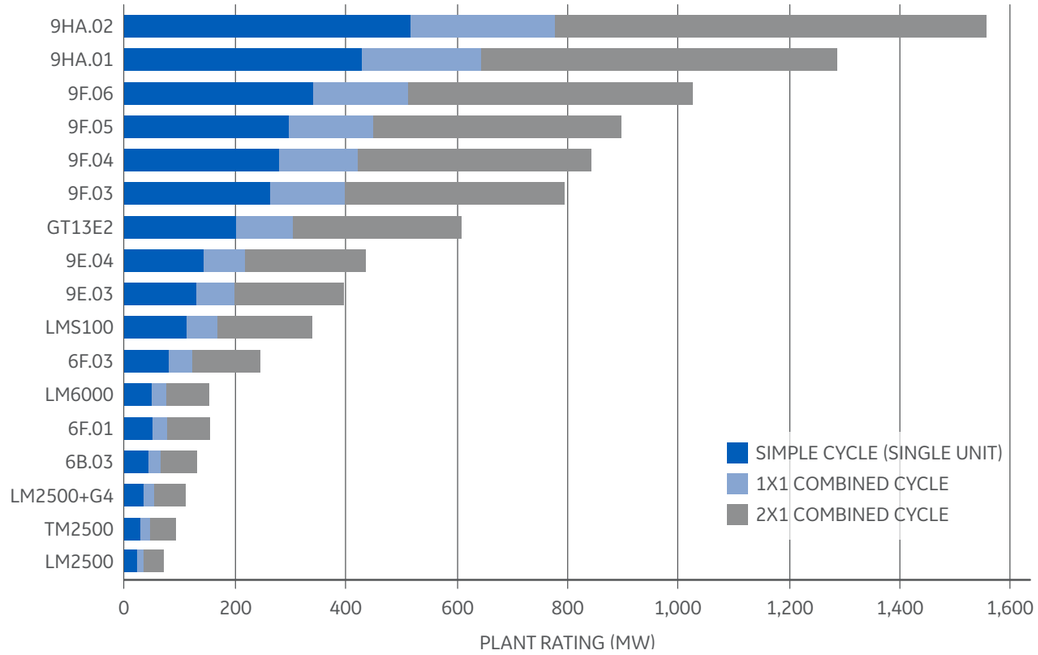
In a simple cycle plant, the gas turbine drives its associated generator to generate electricity. The energy in the exhaust from the gas turbine is not captured and is expelled through the stack. Typical simple cycle plant efficiency is approximately 40 percent.

In a combined cycle plant, the gas turbine drives its associated generator and may have a steam turbine on the same shaft line (single shaft) or the steam turbine may be on a separate shaft line with its own generator (multi-shaft). A combined cycle plant recovers the energy in the gas turbine exhaust in a heat recovery steam generator (HRSG) where steam is produced to drive the steam turbines. Current combined cycle plants are capable of greater than 60 percent efficiency. In addition to this significant increase in efficiency, the output of a combined cycle plant is approximately 50 percent greater than a simple cycle plant, while burning the same amount of fuel.

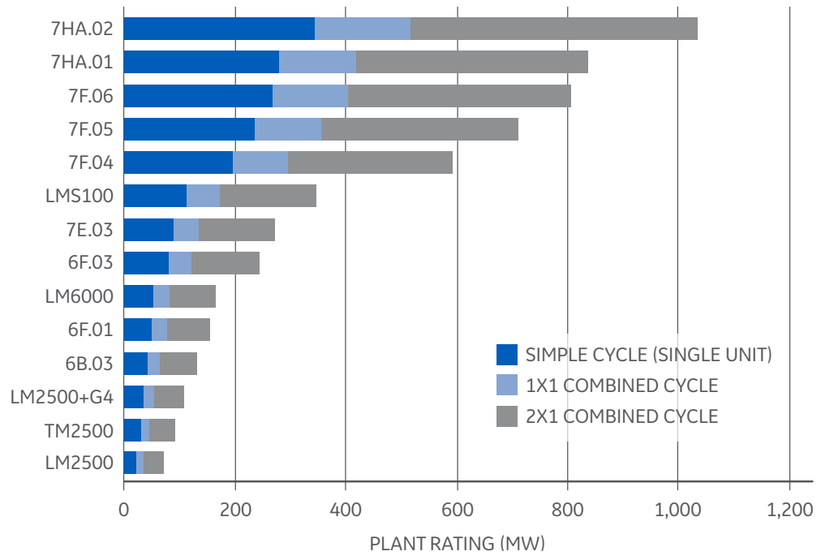
The choice of simple cycle or combined cycle, and single shaft or multi-shaft depends on numerous customer-specific requirements such as land availability, grid access constraints, funds availability, and expected operating profile. In all cases, GE has a high performance gas turbine-based power plant solution to meet your unique situation.

	Simple Cycle	Combined Cycle	
		Single Gas Turbine Site	Multiple Gas Turbine Site
Applications	Peaking Power • Emergent power demands (can later be converted to combined cycle) • Mechanical drive	• Mid-merit to baseload • Grid connected, utility scale • Combined heat and power (CHP)	• Mid-merit to baseload • Grid connected, utility scale • Combined heat and power (CHP)
Advantages (Single shaft compared to Multi-shaft)	Not Applicable	• Smaller footprint/highest power density (MW/m^2) • Lower CAPEX and lower $/kW	• Better single gas turbine efficiency • Improved redundancy • Phased block construction flexibility
Advantages (Multi-shaft compared to Single-shaft)	Not Applicable	• Able to accommodate higher levels of CHP and supplemental firing • Amenable to conversion from simple cycle to combined cycle	• Highest efficiency entitlement • Lower CAPEX and lower $/kW • Able to accommodate higher levels of CHP and supplemental firing • Amenable to conversion from simple cycle to combined cycle

50 Hz Portfolio Plant Ratings



60 Hz Portfolio Plant Ratings



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Breaking the Plant Down to Five Parent Systems

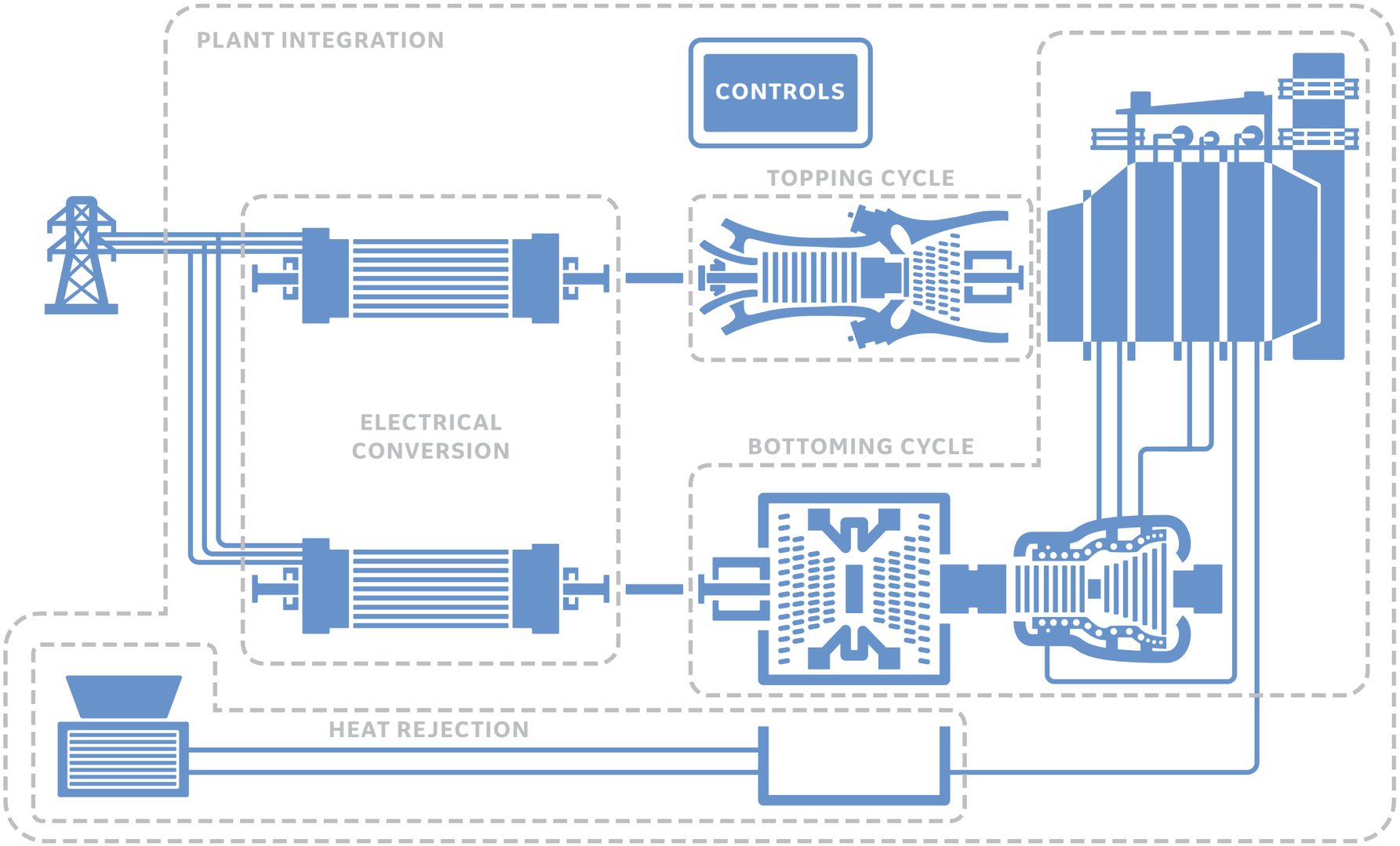
GE's simple and combined cycle power plants are flexible in their operation and include features such as fast starting and load ramping, low turndown, and high full- and part-load efficiencies. This flexibility delivers improved plant economics, including:

- Reduced capital costs
- Reduced operation and maintenance costs
- Shorter installation times to reduce installation costs and produce revenue faster
- Improved reliability and availability

As an example, the auxiliary systems for our HA plants are largely pre-configured modules that are factory tested, fully assembled, drop-in enclosures that lower the amount of field connections, piping, and valves required. This translates to a simpler installation that reduces field schedule and installation quality risks while improving overall installation times—up to 25 percent quicker than smaller F-class plants.

GE's integrated systems approach includes analysis and development of the power generation equipment components as well as the balance of plant systems. Performance and cost are measured at both the component and plant level to increase customer value. We accomplish this by segmenting the plant into five major systems. At the heart of each system is GE's power generation offerings: gas turbines, steam turbines, generators, and controls. Each system, and our associated power generation offerings, are discussed in the subsequent sections of this catalog.

- **Topping cycle** – The gas turbine and its dedicated systems
- **Bottoming cycle** – The steam turbine, HRSG, condensate, feedwater and associated systems
- **Heat rejection** – The systems that reject heat to the environment
- **Electrical** – The systems that produce and export power to the grid or supply power to plant equipment
- **Plant integration** – The systems that support the main plant equipment in converting fuel to electrical power



POWER PLANT INTEGRATION

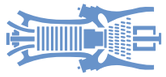
CUSTOMIZED SCOPES OF SUPPLY TO MEET YOUR PROCUREMENT STRATEGY

GE has been supplying gas turbine-based power plants for more than 65 years. We have the experience, know-how, and intimate knowledge of each plant component, enabling us to develop a customized solution for your specific application, and to extract value from every piece of equipment.

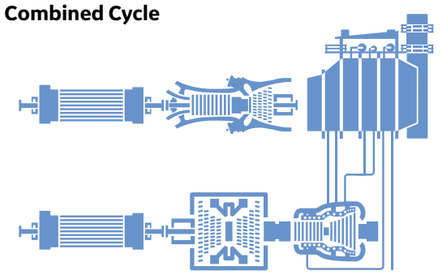
Some customers want to be actively involved in the selection of each piece of equipment in their plant, while others prefer to leave these specifications up to a third party, such as an EPC contractor. Moving beyond an "equipment-only" scope of supply enables GE to provide more comprehensive performance and operability guarantees, and reduce the risk of gaps in scope between suppliers and contractors. These improved guarantees and reduced execution risk may position customers to obtain more favorable financing and insurance terms. Regardless of your preferred approach, flexible scopes of supply are available from GE to meet your procurement strategy and risk profile. Examples of typical scopes of supply are shown below.

Equipment Scope for Integrated Solutions

Mechanical Drive Gas Turbine

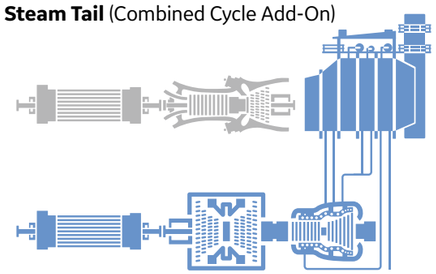


Combined Cycle

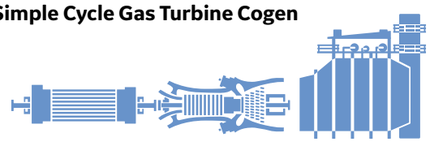


Simple Cycle Gas Turbine

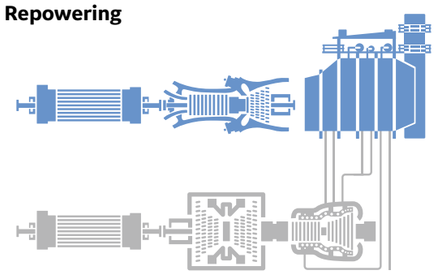
Steam Tail (Combined Cycle Add-On)



Simple Cycle Gas Turbine Cogen



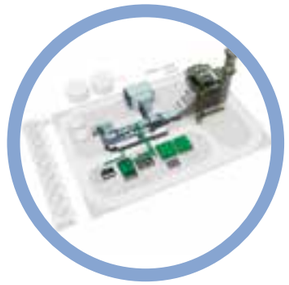
Repowering



Extended Scope of Supply

Engineered Equipment Package (EEP)

Equipment scope plus:
- Condenser
- Mark* VIe Distributed Control System
- Emissions monitoring system
- Critical control valves

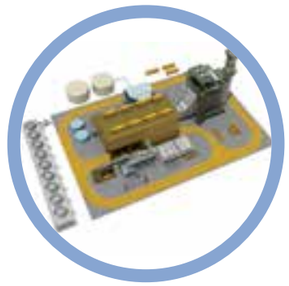


Power island (PI)

EEP scope plus:
- Electrical rooms
- Power island transformers, cables, raceways, pumps, piping, instrumentation

Total Plant Equipment (TPE)

PI scope plus:
- Cooling tower
- Tanks
- All other balance of plant equipment



Turnkey (TK)

TPE scope plus:
- Roads
- Buildings
- Switchyard
- Foundations

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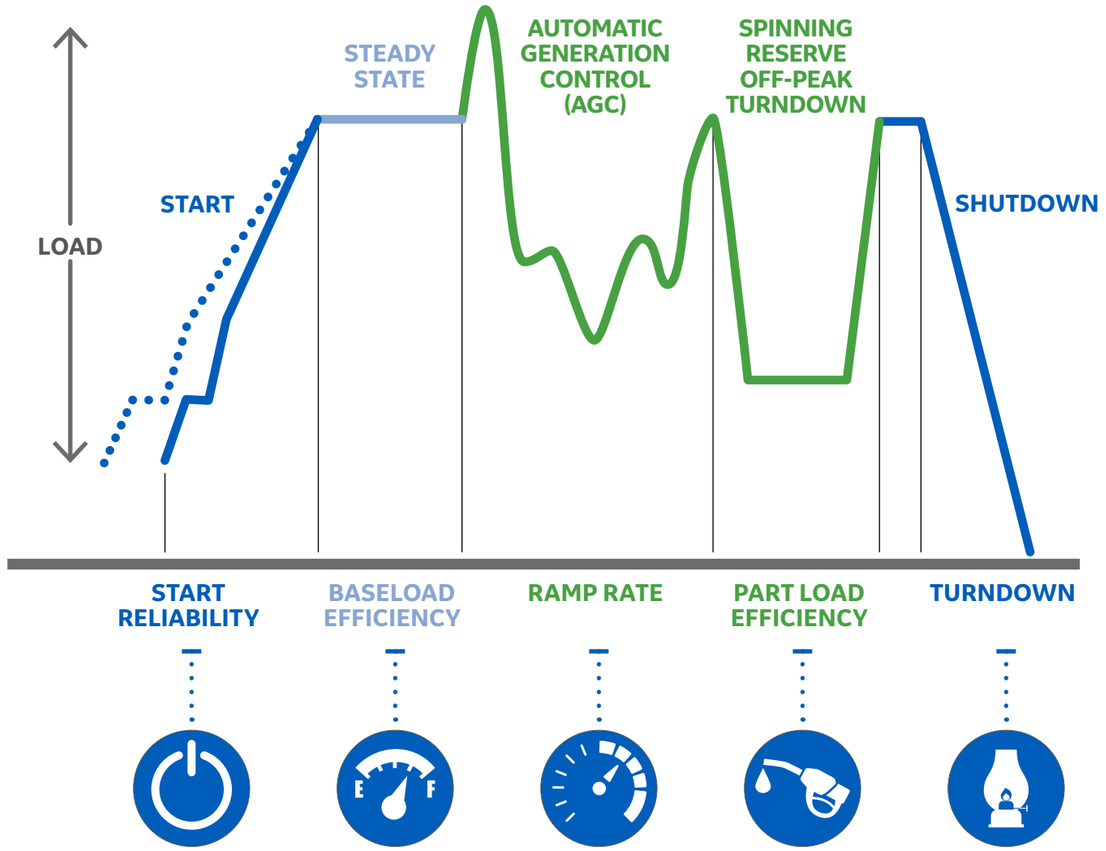
OPERATIONAL FLEXIBILITY

FLEXIBILITY WITHOUT SACRIFICING EFFICIENCY

The demand for energy is continually growing, and while needs and priorities differ from application to application, the desire for reliable and efficient power remains constant. With flexibility at the forefront of our technology innovation, GE is focused on delivering products that enable gas turbine power plants to operate seamlessly with renewable energy resources.

Operational flexibility is a total plant system capability—each component must complement and enable the capabilities of the others and all must work together to achieve high levels of efficiency. As a manufacturer of all major power plant equipment, GE is uniquely qualified to develop plant-level solutions that carefully consider the capability of each component to satisfy the demand for plant-level flexibility.



Fast and Reliable Startup

The fast start capabilities of our gas turbines enable power generation in response to sudden demand. With the ability to go from cold iron to full power in as little as five minutes, and to start and stop in short cycles, our gas turbines accommodate fluctuating supply or demand with high efficiency.

Baseload Efficiency

Some gas turbines are required to operate under baseload conditions at certain periods of time. GE's gas turbines are among the most efficient in the industry, reducing fuel costs when providing the maximum amount of power needed by the grid.

Enhanced Ramp Rates

Fast ramping is the rapid increasing or decreasing of plant load, to smoothly track changing load requirements without inducing undue thermal or mechanical stress in the equipment. Grid support services are enhanced to provide operational benefits and better financial returns from the plant.

Part Load Efficiency

During periods of low electricity demand, such as during overnight periods, gas turbines may be required to operate under part load conditions. GE's gas turbines maintain high efficiency levels under part load. This helps you economically operate your plant under a wide range of grid demand scenarios.

Turndown for Emissions and Cost Control

This capability extends low emissions operation to lower load levels, enabling reduced fuel consumption and lower total emissions at minimum loads. This translates to improved economics to remain online during off-peak demand periods to alleviate shutdown and startup costs. This enhanced turndown capability also extends the available load range for operation, improving dispatch flexibility and enabling greater participation in regulating reserve markets.

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DIGITAL POWER PLANT

SMART – CUSTOMIZED – ADAPTABLE – CONNECTED

The Digital Power Plant (DPP) is the next chapter in the evolution of GE's HA gas turbine. GE's Digital Power Plant combines the physical strengths of the HA machine with agile digital technologies, enabling the potential for additional benefits, such as new sources of revenue, improved reliability and availability, reduced production costs, and improved dispatch.

The DPP is an integral part of our vision for the future of power generation. Powered by Predix* software, the Digital Power Plant combines a heritage of adaptability and reliability with an agile digital infrastructure and a suite of innovative applications built for the Industrial Internet.

See more at: https://powergen.gepower.com/plan-build/products/power-plants/digital-power-plant.html.

The 2016 Digital Power Plant base offering is available for any HA gas turbine and includes a powerful suite of tools and software solutions.

Asset Performance: *Next Generation Monitoring and Diagnostics*

- An enterprise-level historian with dashboards and ad hoc query capability creates a single source of data for all plant assets across the fleet.
- Plant- and fleet-wide predictive advisories, expert diagnostics, and situational troubleshooting to foresee and prevent issues.

Operation Optimization: *KPI-focused Analytics*

- This plant-level tool locates and quantifies production losses down to a sub-system level, and enables corrective actions.
- By providing analytics on the transitional processes in a power plant, this tool enables operators to detect and address non-optimal processes.

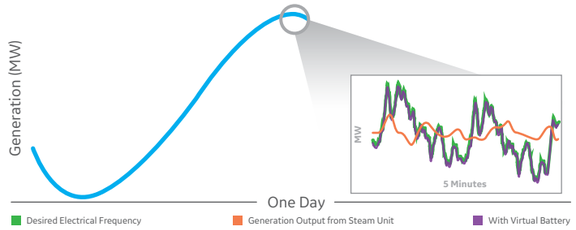
Business Optimization: *Monetize Full Operational Capability*

- This tool provides transparency to forecasted capability of the plant(s) for market operations and trading.

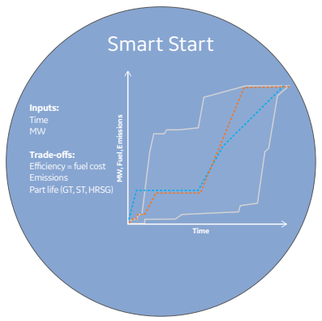
Suite of HA DPP Applications

Depending on your plant's environment, the HA plant can be configured through three applications to generate new revenue streams and improve operations. These DPP applications are specifically engineered for the HA gas turbine:

- **Virtual Battery** – The HA DPP is configurable to provide frequency regulation and participate in ancillary markets, where available, serving as a virtual battery, similar to the capability provided by flywheels or batteries on the grid today.
- **Ancillary Response** – The ancillary response application provides improved primary frequency response or reactive power response to meet grid demands in real time.
  1. Rate of Change of Frequency Ride Through – frequency regulation
  2. Generator dynamic D-curve – voltage regulation



- **Smart Start** – Smart Start enables real-time decision making on the value of faster starts versus parts lives and grid demands.



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CONTROLS AND SOFTWARE SOLUTIONS

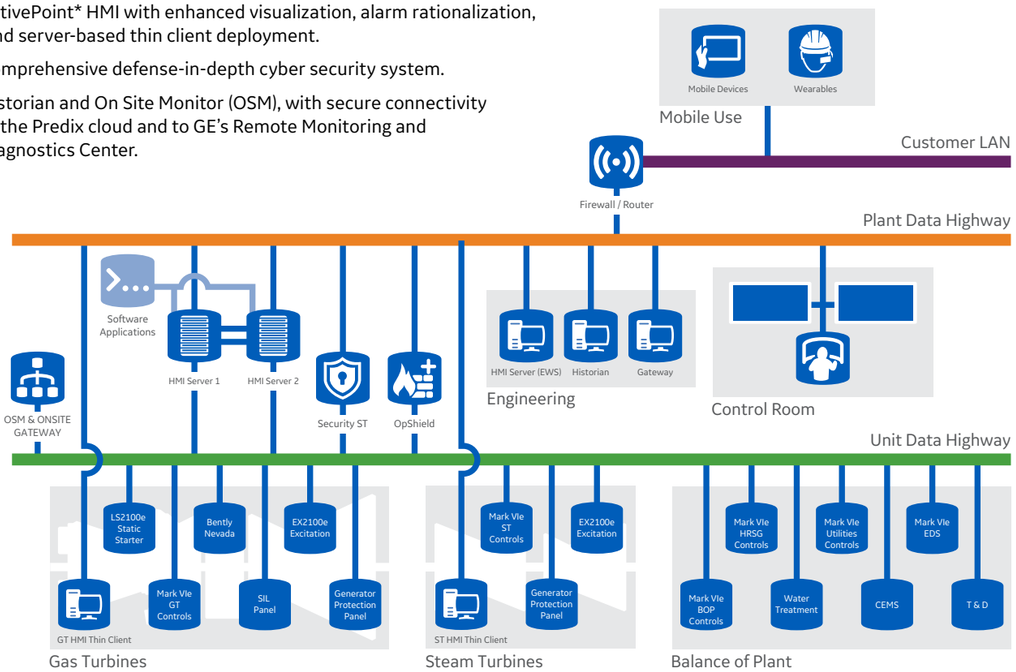
MARK VIe PLANT CONTROL SYSTEM

The ability to protect, control, monitor and improve performance of the entire plant is critical to realizing its greatest value. GE's Mark VIe based control system unifies and simplifies protection, control and monitoring of the entire plant to enhance performance and deliver predictable operation.

Using a modular Predix machine-enabled platform, the Mark VIe control system provides a flexible and scalable architecture for applications ranging from turbine-level to plant-level control. This modular approach facilitates future technology upgrades and protects against obsolescence.

To simplify plant operations and maintenance, the plant control system includes the following primary elements that share common architecture, software tools, and operator interfaces.

- Mark VIe Turbine Control Panels for each gas turbine and steam turbine.
- Mark VIe Distributed Control System (DCS) platform for HRSG and plant control.
- Mark VIeS Safety Controller, a locked configuration, when required for SIL certification.
- ActivePoint* HMI with enhanced visualization, alarm rationalization, and server-based thin client deployment.
- Comprehensive defense-in-depth cyber security system.
- Historian and On Site Monitor (OSM), with secure connectivity to the Predix cloud and to GE's Remote Monitoring and Diagnostics Center.

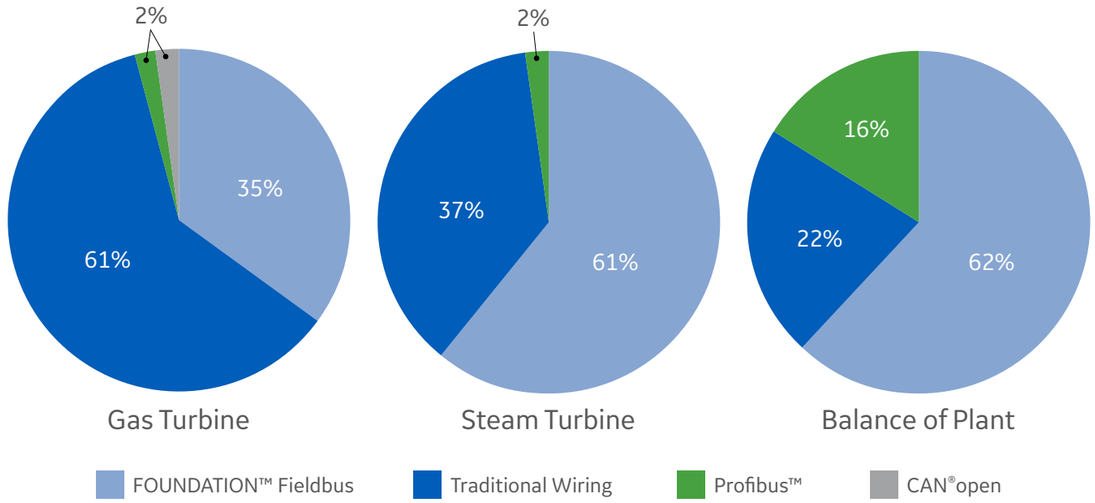


Notable Features/Aspects of the Mark VIe Control System

Digital Bus Protocols

GE's Mark VIe Plant Control System hosts several digital data bus technologies to facilitate communication among the controllers and sensors, as well as the actuators and electrical equipment. In contrast to traditional methods, digital bus technologies allow several signals to be transmitted over one set of wires for control and monitoring purposes. Digital bus devices can also exchange additional information with the controller and remote platforms, such as identification, health, diagnostics, and control settings.

Digital bus connection methods and the additional information provided decrease total installed cost by significantly reducing the amount of effort spent on interconnecting wires and terminations, thus, simplifying and speeding up checkout and commissioning. A typical 9HA plant with digital bus technology will realize approximately $1 million in cost savings. The technology also can provide long-term operational benefits to power plant owners and operators through improved fault detection and diagnostics.



Control Software Applications

GE's position as an OEM enables the use of strong domain expertise to differentiate turbine and plant performance and operability with controls. High-fidelity physics-based models of the plant components are embedded within the controls logic to run in real time, and are the backbone of adaptive control strategies that protect assets and enhance operation. Features and benefits of this model-based control strategy include:

- Startup agility, providing fast, reliable, repeatable starts with low emissions
- Combustion versatility and improved turndown, providing robust operation during variations in weather, fuel, and grid
- Load flexibility, for load range expansion, and improved efficiency and responsiveness
- System reliability enhancements for reliable, cost-effective operations

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ActivePoint HMI (Human Machine Interface)
To improve worker efficiency, reduce operating costs, and deliver a superior power plant user experience, GE engineered the ActivePoint HMI in close collaboration with more than 100 operators globally. The ActvePoint HMI is in compliance with ISA 18.2, the High Performance HMI Handbook, and other industry standards. It is a total solution enabling system monitoring and controlling from any device, anytime, anywhere. HMI screens for all GE power generation equipment will conform to this new design guideline to provide a common interface across the entire plant and to create a user experience that is visually appealing and enhances situational awareness.

Alarm and Protection Rationalization
GE's new alarm management system is fully integrated into the ActivePoint HMI. Alarms are now directly represented and actionable within both HMI screens and dedicated lists, and are based on GE's three-step alarm rationalization process (Design, Categorization, and Alarm Prioritization). By applying common philosophies and rationalization rules across all equipment within the plant, enunciated items are categorized as Events, Diagnostics, Alerts, or Alarms (levels 1, 2, and 3) to greatly improve operator responsiveness.

Actionable alarms can be reduced by as much as 80 percent and are organized into parent-child hierarchies to simplify determining root causes. The alarm management system details the urgency, consequences, potential causes, and suggested actions. Using the Mark VIe distributed control system (DCS) for controlling the entire plant enables enhanced alarm configuration and presentation capability, as well as an integrated operating experience across GE equipment.

Similar to alarm rationalization, GE developed a consistent process for rationalizing the controls protection system associated with plant equipment (Trips, Shutdowns, Runbacks, Pre-Start Checks, and Permissives). Trip optimization reduces or eliminates nuisance trips. Startups are streamlined through the categorization of pre-start checks (not required for startup) and permissives (required for startup).

Cyber Security
GE provides cyber security protection through a defense-in-depth approach, which includes the following:

- Achilles™ certified Mark VIe controllers that are compliant with the proposed North American Electric Reliability Corporation (NERC) Version 5 Critical Infrastructure Protection Reliability Standards.
- Wurldtech OpShield* intrusion detection and prevention system that creates zones of protection within the plant and unit data highways. This system enforces a combination of operational protocol policies and signature-based intrusion detection to identify and prevent unwanted or malicious network traffic while providing information that can be used for auditing and compliance purposes.
- SecurityST*, an optional IT security appliance that provides a set of centralized tools and services to manage user accounts and perform tasks such as software patching and anti-virus updates. This appliance also collects and stores logging data for the control system, and provides firewall segmentation/intrusion detection capabilities.

Thin Client Deployment
GE now offers a simplified architecture system to address the requirements of power plant HMI users and maintainers. The integrated server-based thin client solution can be easily scaled, based on the number of clients and the client type (Webspace or Virtual Machine). The result is an enhanced centralized server solution and elimination of multiple thick client PCs. This system improves the power plant ease of maintenance, simplifies software configuration management, and reduces life cycle costs associated with the HMI system.

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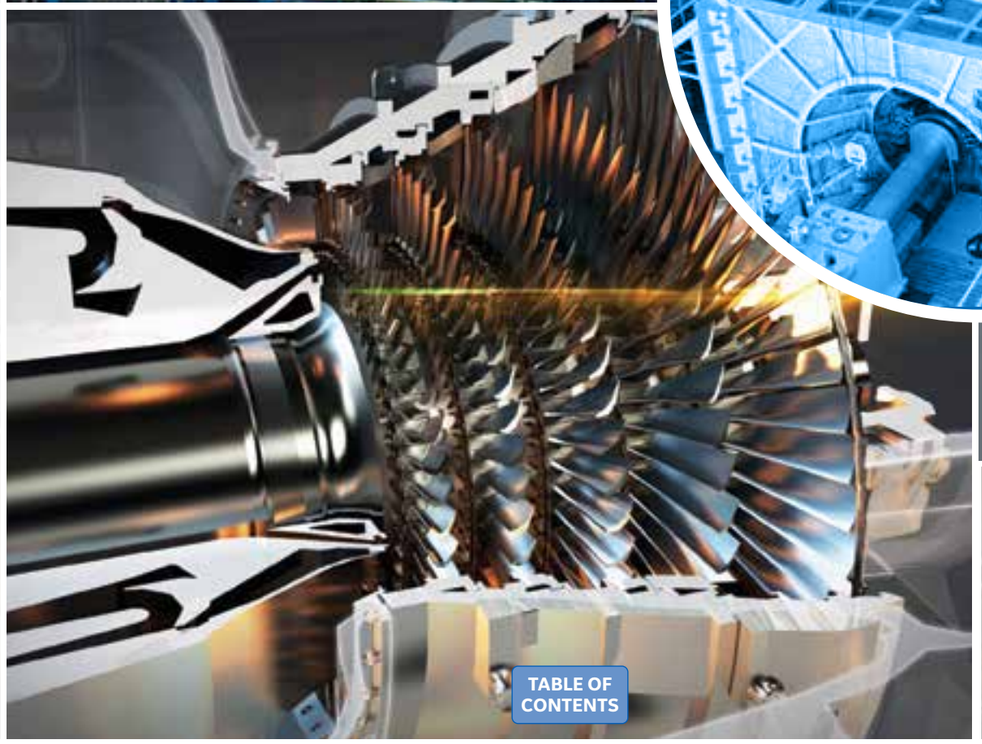
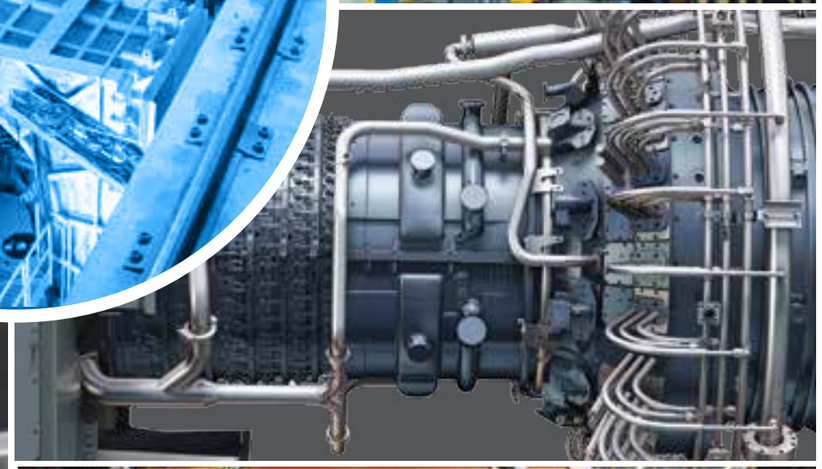
2016 PRODUCT PORTFOLIO





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TOPPING CYCLE

OVERVIEW AND SCOPE

PORTFOLIO AND OVERVIEW

H-CLASS WORLDWIDE DISTRIBUTION AND TIMELINE

POWER GENERATION DEVELOPMENT AND VALIDATION FACILITIES

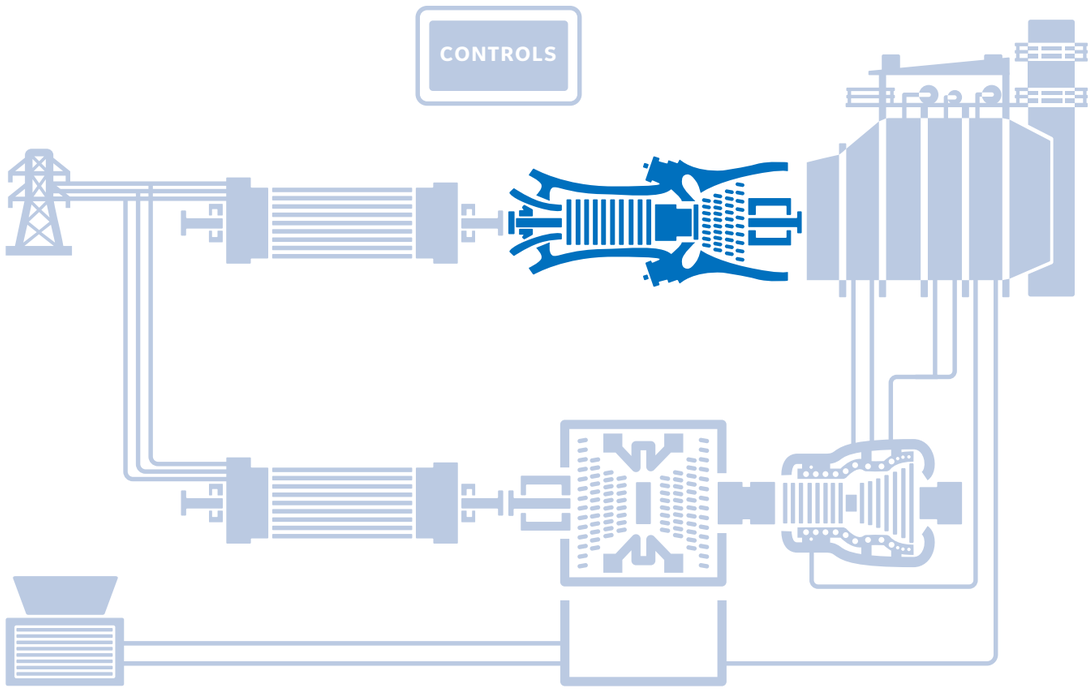
TOPPING CYCLE OFFERINGS

OVERVIEW AND SCOPE

Comprised of the gas turbine and supporting accessory systems, the topping cycle is the most significant and technologically challenging step in the conversion of fuel to electrical power. The topping cycle contributes to more than two-thirds of a power plant's total output and defines combined cycle efficiency entitlement based on operating temperature capability.

GE maintains a plant-level priority while focusing on the key considerations for topping cycle development: performance, emissions, reliability, and cost. Each of our topping cycle configurations strikes a balance between pressure ratio, firing temperature, and airflow to achieve optimum plant performance at world-class emissions levels.

Most importantly, we recognize that these factors, much like plant requirements and operating circumstances, vary greatly from customer to customer. As such, GE engages you early on in the development process to gain an intimate understanding of your needs and wants. This ensures that the topping cycle delivered provides customer value, no matter what the application.



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GAS TURBINES

PORTFOLIO AND OVERVIEW

Efficient, Flexible, Reliable Power

GE's portfolio of heavy duty and aeroderivative gas turbines helps provide a sense of certainty in an uncertain world, delivering operational flexibility and performance needed to adapt to a rapidly evolving power generation environment. With gas turbine products ranging in individual output from 22 MW to 519 MW, GE has a solution to reliably and efficiently deliver the power needed by utility power generators, industrial operators, and communities. Even in remote locations and harsh conditions, you can count on GE to deliver a gas turbine that will meet your needs.

All of our gas turbines share the common heritage of jet engine technology pioneered by GE in the first half of the 20th century. They are typically categorized as either heavy duty (sometimes also called "frame") or aeroderivative gas turbines, although some turbines recently have adopted features of both design types. In general, the differences between the aeroderivative and heavy duty gas turbines are weight, size, combustor type, and turbine design. Heavy duty gas turbines are usually field constructed and maintained in place, whereas aeroderivative gas turbines are designed to allow for quick replacement of the entire engine when maintenance is required.

High-Efficiency H-Class

- Most cost-effective conversion of natural gas to electricity in the H-class industry
- Includes the world's largest high efficiency turbine: 519 MW
- First H-class gas turbine fleet to reach 240,000 operating hours

Industry-Leading F-Class

- Introduced F-class technology nearly 30 years ago
- World's largest fleet, with more than 1,100 installed units and 50 million operating hours of experience
- Industry's best reliability at 99.4 percent

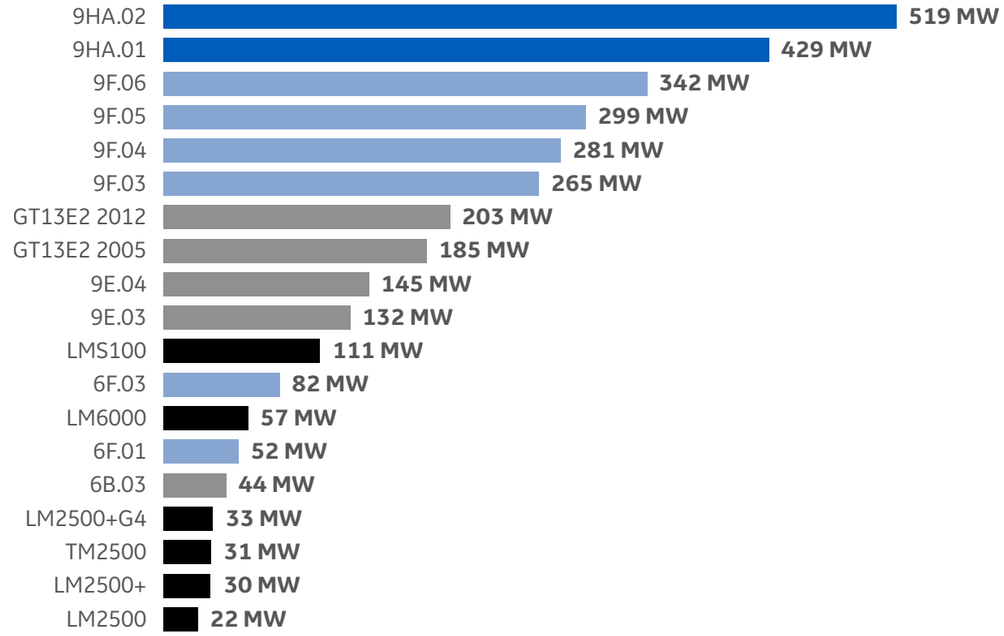
Reliable E-Class

- Rugged and available, even in harsh climates
- Industry-leading fuel flexibility, burning more than 50 gases and liquids
- Quick installation for fast-track projects
- More than 3,000 units installed
- More than 143 million operating hours of experience

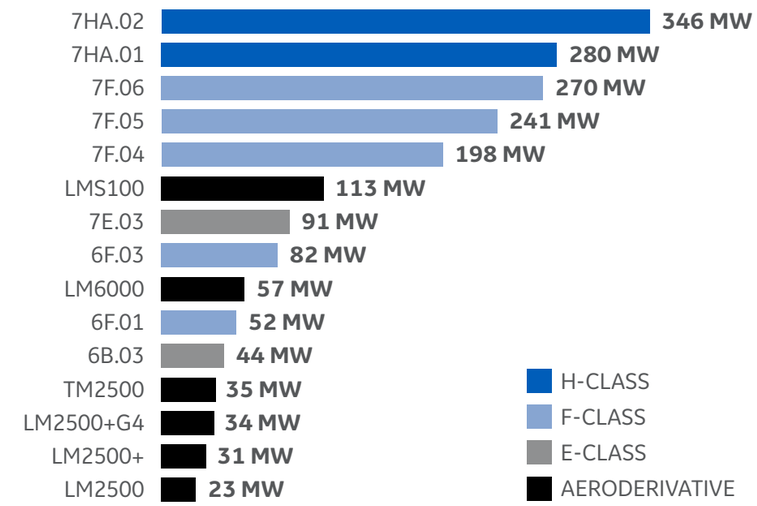
Compact and Proven Aeroderivatives

- Flexible and reliable power generation packages with aviation derived engines
- Over 100 million operating hours of experience
- Up to 56 percent combined cycle efficiency and over 80 percent efficiency in cogeneration applications

50 Hz Portfolio by Rating



60 Hz Portfolio by Rating



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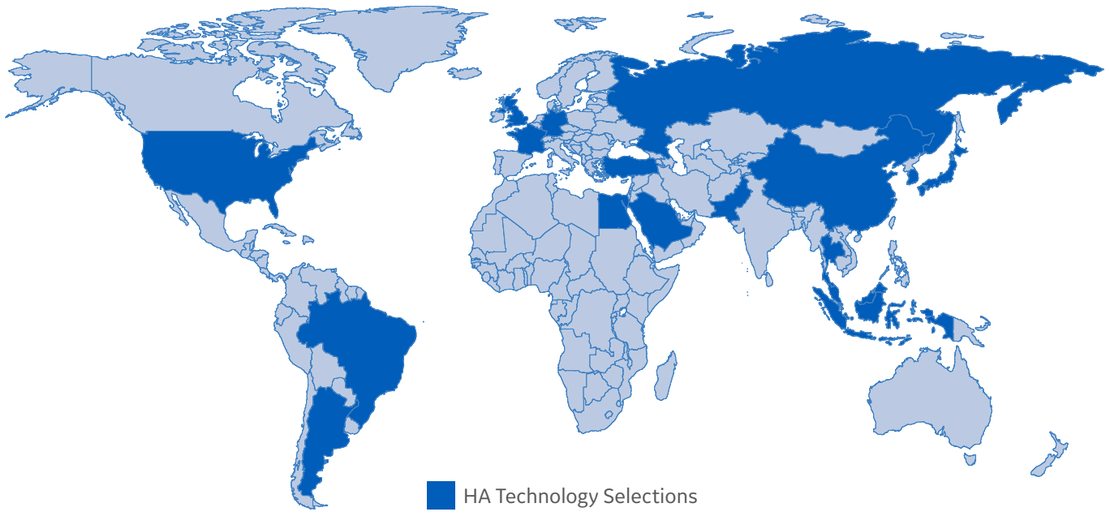
HA Gas Turbines: Worldwide Distribution

GE's 9HA and 7HA gas turbines have been selected by over 25 customers in more than 15 countries around the world. Five continents will soon be generating power with our largest and most efficient heavy duty gas turbines. We continue to place the ever-increasing power needs of our customers as our number one priority.



HA Timeline

1990
F-class technology first introduced by GE

1992
GE begins development of the H System

1995
H System technology introduced

1998
Full speed, no load testing of the 9H gas turbine

2000
Full speed, no load testing of the 7H gas turbine

2003
First 9H gas turbine enters commercial operation

2008
First 7H gas turbine enters commercial operation

2011
GE launches the FlexEfficiency 50 combined cycle power plant for 50 Hz regions; can provide more than 61% combined cycle efficiency

2012
GE launches the FlexEfficiency 60 combined cycle power plant for 60 Hz regions; can provide more than 61% combined cycle efficiency

2014
GE introduces 7HA/9HA next-generation H-class machines

GE's H-class gas turbines achieve > 220,000 operating hours

2015
Full-speed, full-load testing of the 9HA gas turbine completed

Manufacturing completed, testing initiated on the 7HA gas turbine

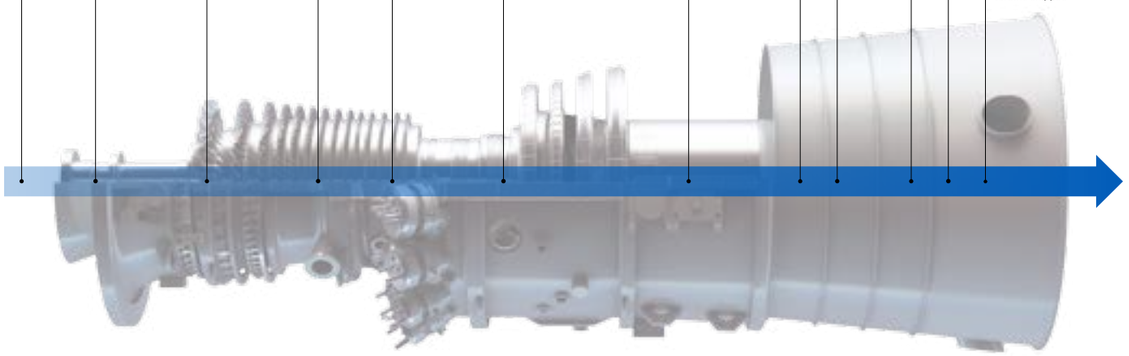
First two 9HA gas turbines shipped

GE launches Digital Power Plant

2016
Full-speed, full-load testing of the 7HA gas turbine completed

First 9HA in commercial operation

First 7HA gas turbine shipped



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POWER GENERATION DEVELOPMENT AND VALIDATION

Being a technology leader and innovator in the power generation industry requires a relentless drive to expand engineering capabilities and domain expertise. To bring new technological advances to the industry and have them reliably deliver value to customers, GE relies on a rigorous and methodical validation philosophy, a process at the heart of our engineering practices.

The physical evidence of this commitment, one we take pride in sharing with our customers, is the broad suite of development and validation facilities used by our power generation technology teams. These laboratories and test stands serve all of the major products and enable validation of new technology throughout the product life cycle—everything from characterization of new materials and manufacturing methods to the validation of a complete gas turbine system. They even consider new tooling and processes for the most efficient servicing of products in the field.

As a result of our investment in these capabilities, we are accelerating the pace at which new technology and products are being introduced into an increasingly demanding industry. Our goal is to offer proven, validated products that give you the confidence you need to make GE your power generation solution provider.

The World's Largest and Most Powerful Variable Speed, Variable Load, Non-Grid Connected Gas Turbine Test Facility

Located in Greenville, South Carolina, USA, GE's $200 million gas turbine test facility includes variable speed, variable load, off-grid testing to fully validate our gas turbines at and above full load conditions. Capable of replicating a real-world grid environment at full capacity, the facility tests 50 Hz and 60 Hz gas turbines well beyond normal power plant conditions seen in the field. The test facility includes control room, data center, and nerve center areas, all connected by an advanced communication system that facilitates thorough data collection during each test. The Mark VIe control system operates the gas turbine throughout testing to validate and refine the control logic and advanced models.

The validation facility's data collection system enables the recording of a tremendous amount of part-specific temperature information on casing structures, rotor, and hot gas path components throughout the transient and steady state loaded conditions. This data provides GE with an unrivaled understanding of actual component temperatures, which is crucial in confirming the thermal strain on the parts for accurate component life analyses.

This level of testing prepares turbines for nearly any condition they may experience once installed and operating, and provides GE with invaluable knowledge of turbine performance under the most demanding conditions. New gas turbine models are then proven in their operability, performance, and durability prior to entering commercial service.

HA Gas Turbine Validation: Proven Achievements

PERFORMANCE AND EMISSIONS

...better than expected across entire spectum of operating conditions

ROBUST ARCHITECTURE

...more comprehensive than 8,000 h grid-connected ...LEG2 coverage from insurers

OPERATING FLEXIBILITY

...start time, ramp rate, minimum load, transient operation all better than expected

FUEL CAPABILITY

...gas and liquid operation ...lean to rich gases ...fuel transfers on the fly ...light crudes

RESPONSE TO EXTREME GRID EVENTS

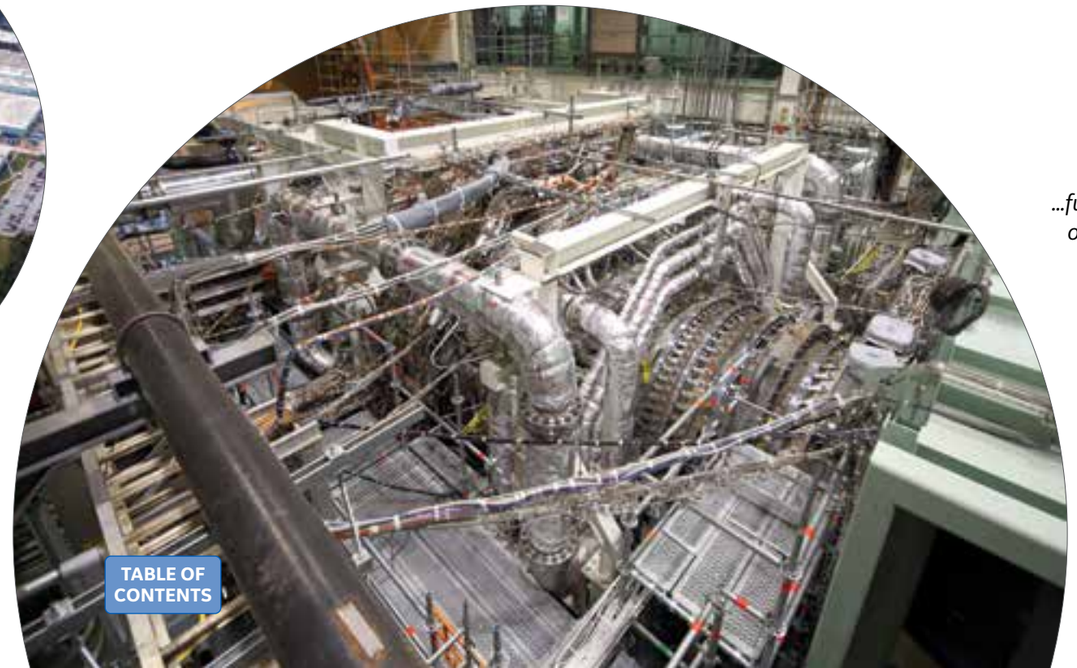
...grid code compliance ...load stepping, frequency containment and load rejection

SERVICEABILITY AND OUTAGE DURATION

...hot gas path outage performed using new procedures and tools ...duration confirmed

FUTURE GROWTH CAPABILITY

...fully mapped compressor operability, combustion NOx, and turbine temperature profiles



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9F.03/.04
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9E.03/.04
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6F.03
LM6000
6F.01
6B.03
TM2500
LM2500

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H-CLASS

9HA.01/.02 GAS TURBINES (50 Hz)

THE WORLD'S LARGEST AND MOST EFFICIENT HEAVY DUTY GAS TURBINE

The 9HA high efficiency, air-cooled gas turbine is the industry leader. With two available models—the 9HA.01 unit at 429 MW and the 9HA.02 unit at 519 MW—you can select the right capacity to meet your generation needs. Thanks to a simplified air-cooled architecture, advanced materials, and proven operability and reliability, GE's 9HA units deliver exceptionally low life cycle cost per megawatt. The economies of scale created by this high power density gas turbine, combined with its nearly 63 percent combined cycle efficiency, enable remarkably cost-effective conversion of fuel to electricity to help you meet increasingly dynamic power demands.

429-519 MW
SIMPLE CYCLE OUTPUT
>62% COMBINED CYCLE EFFICIENCY

Industry-Leading Operational Flexibility for Increased Dispatch and Ancillary Revenue

- Units offer fast, 12-minute ramp-up from start command to gas turbine full load.
- Up to 70 MW/minute ramping capability is achieved within emissions compliance.
- Turndown as low as 30 percent of gas turbine baseload output is reached within emissions compliance.
- Fuel flexible accommodates gas and liquid fuels with wide gas variability, including high ethane (shale) gas and liquefied natural gas.

Simpler H-Class Offering

- Features a less complex configuration than GE's previous H-class units, and one that does not require cooled air.
- Modular systems ease installation and reduce onsite labor requirements by reducing field mechanical welds by 25 percent and reducing field installed valves by a factor of 10.
- Maintenance is streamlined with quick-removal turbine roof, field-replaceable blades, and 100 percent borescope inspection coverage for all blades.
- Simplified dual fuel system uses less water, eliminates recirculation, and utilizes enhanced liquid purge for improved reliability and dependability.

Full-Load Validation

- At the heart of GE's heavy duty gas turbine validation program is the advanced full-speed, full-load test facility in Greenville, SC.
- GE's 9HA gas turbine successfully completed its full-speed, full-load validation in 2015, exceeding engineering performance expectations.
- The 9HA technology has secured insurance coverage from all major insurers.

		9HA.01	9HA.02
SC Plant Performance	SC Net Output (MW)	429	519
	SC Net Heat Rate (Btu/kWh, LHV)	8,040	8,000
	SC Net Heat Rate (kJ/kWh, LHV)	8,483	8,440
	SC Net Efficiency (%, LHV)	42.4%	42.7%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,171	1,177
	Exhaust Temperature (°C)	633	636
	Exhaust Energy (MM Btu/hr)	1,993	2,385
	Exhaust Energy (MM kJ/hr)	2,103	2,516
	GT Turndown Minimum Load (%)	30%	30%
	GT Ramp Rate (MW/min)	65	70
	NO_X (ppmvd) at baseload (@15% O_2)	25	25
	CO (ppm) at Min. Turndown w/o Abatement	9	9
	Wobbe Variation (%)	+/-15%	+/-15%
	Startup Time (Conventional/Peaking, Minutes)	23/12	23/12
1x CC Plant Performance	CC Net Output (MW)	643	774
	CC Net Heat Rate (Btu/kWh, LHV)	5,450	5,440
	CC Net Heat Rate (kJ/kWh, LHV)	5,750	5,739
	CC Net Efficiency (%, LHV)	62.6%	62.7%
	Plant Turndown – Minimum Load (%)	38%	38%
	Ramp Rate (MW/min)	65	70
	Startup Time (RR Hot, Minutes)	<30	<30
2x CC Plant Performance	CC Net Output (MW)	1,289	1,552
	CC Net Heat Rate (Btu/kWh, LHV)	5,440	5,430
	CC Net Heat Rate (kJ/kWh, LHV)	5,739	5,729
	CC Net Efficiency (%, LHV)	62.7%	62.8%
	Plant Turndown – Minimum Load (%)	18%	18%
	Ramp Rate (MW/min)	130	140
	Startup Time (RR Hot, Minutes)	<30	<30

Full engine validation of the 9HA was completed in GE's $200M+ full-speed, full-load test facility in Greenville, SC. Every aspect of the testing was a success, with all achievements exceeding expectations (performance, flexibility, fatigue response, fuel capability, grid response, serviceability, and future growth). In addition, the industry-leading first commercial 9HA has undergone first fire and will go COD later this year.

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F-CLASS

9F.06 GAS TURBINE (50 Hz)

F-CLASS LEADERSHIP WITH ROOM TO GROW

All power plants are different, but one requirement remains the same—the lowest life cycle cost in the right size for your project. The newest member of GE's 50 Hz portfolio, the 9F.06 gas turbine, delivers higher output and efficiency than any other GE F-class gas turbine. These units provide an unprecedented balance of performance and flexibility, with a baseload simple cycle rating of 342 MW and over 41 percent efficiency, coupled with a fast ramp capability of 65 MW per minute. As a result, the 9F.06 turbine provides you with greater capacity for flexibility, including renewable energy support. In combined cycle operation, the 9F.06 gas turbine's efficiency of over 61 percent provides the lowest cost of electricity in 50 Hz F-class technology. Benefitting from 2,000 hours of full-speed, full-load validation testing on previous F-class and H-class gas turbines, 9F.06 units are engineered to meet the availability and life cycle economics you have come to expect from GE's F-class gas turbines.

342 MW
SIMPLE CYCLE OUTPUT
>61% COMBINED CYCLE EFFICIENCY

GE's Most Powerful and Efficient F-Class Gas Turbine

- F-class firing temperatures provide extended operation between planned maintenance events at 32,000 hour intervals.
- Similar architecture enables future upgrades to 9HA performance as plant requirements grow over time.
- Significant flexibility allows for customization for the specific power and exhaust condition needs of each project.
- Modular systems ease installation and reduce onsite labor requirements by reducing field mechanical welds by 25 percent and reducing field installed valves by a factor of 10.
- Maintenance is streamlined with quick-removal turbine roof, field-replaceable blades, and 100 percent borescope inspection coverage for all blades.
- Simplified dual fuel system uses less water, eliminates recirculation, and utilizes enhanced liquid purge for improved reliability and dependability.

		9F.06
SC Plant Performance	SC Net Output (MW)	342
	SC Net Heat Rate (Btu/kWh, LHV)	8,310
	SC Net Heat Rate (kJ/kWh, LHV)	8,768
	SC Net Efficiency (%, LHV)	41.1%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,144
	Exhaust Temperature (°C)	618
	Exhaust Energy (MM Btu/hr)	1,768
	Exhaust Energy (MM kJ/hr)	1,767
	GT Turndown Minimum Load (%)	38%
	GT Ramp Rate (MW/min)	65
	NO_X (ppmvd) at baseload (@15% O_2)	15
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+/-15%
	Startup Time (Conventional/Peaking, Minutes)	23/12
1x CC Plant Performance	CC Net Output (MW)	508
	CC Net Heat Rate (Btu/kWh, LHV)	5,580
	CC Net Heat Rate (kJ/kWh, LHV)	5,887
	CC Net Efficiency (%, LHV)	61.1%
	Plant Turndown – Minimum Load (%)	49%
	Ramp Rate (MW/min)	65
	Startup Time (RR Hot, Minutes)	<30
2x CC Plant Performance	CC Net Output (MW)	1,020
	CC Net Heat Rate (Btu/kWh, LHV)	5,560
	CC Net Heat Rate (kJ/kWh, LHV)	5,866
	CC Net Efficiency (%, LHV)	61.4%
	Plant Turndown – Minimum Load (%)	23%
	Ramp Rate (MW/min)	130
	Startup Time (RR Hot, Minutes)	<30

The 9F.06 gas turbine offers a way to bridge the F-class to H-class performance gap for specific customer needs in 50Hz applications. By applying all our previous F and H-class learnings and performance validation results, we can now offer our largest F-class gas turbine with over 61 percent combined cycle efficiency.

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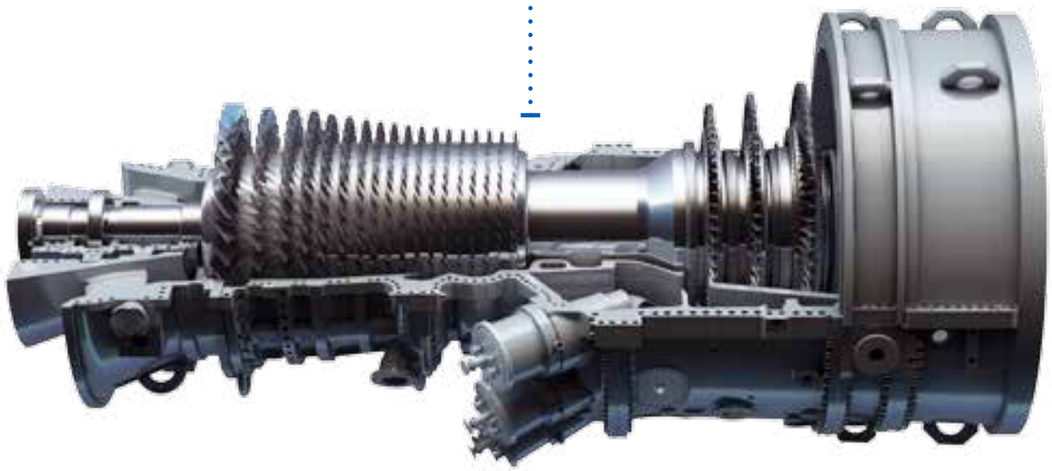
F-CLASS

9F.05 GAS TURBINE (50 Hz)

WHEN FIT COMES FIRST

Capacity constraints are an important part of power project development. GE understands that one size doesn't fit every application, but you don't need to sacrifice efficiency to get the right size solution. Our 9F.05 gas turbine meets the demand for cleaner, reliable, cost-effective power in a 299 MW simple cycle package. With a fleet of more than 50 units and 800,000 hours of operation, the 9F.05 turbine is a proven performer with a combined cycle efficiency of more than 60 percent, and running reliability in excess of 99 percent. These units deliver extended maintenance inspection intervals, fuel flexibility, low NO_X emissions, low CO emission compliant turndown, and fast start options.

299 MW
SIMPLE CYCLE OUTPUT
>60% COMBINED CYCLE EFFICIENCY



Enhanced Architecture for Performance and Reliability

- 9F.05 units are well suited for high fuel cost combined cycle applications or combined heat and power applications.
- Extended 32,000 hour maintenance inspection intervals with multi-interval part life increases availability.
- Mark* VIe control system real-time, physics-based modeling increases overall performance, operability, and reliability.
- Three-stage hot gas path (HGP) turbine has Advanced Gas Path features with improved materials, cooling and sealing that provide enhanced performance and longer parts durability.
- Inlet guide vane enhancements dramatically reduce degradation and stress on wear related components and lengthen compressor life cycle.

Improved Operational Flexibility

- Turndown to 35 percent of baseload within emissions compliance.
- Advanced Dry Low NOx (DLN) 2.6+ combustion system enables 25 ppm NO_X emissions.
- OpFlex* AutoTune improves DLN combustion system operability, providing ability to operate on a wide range of natural gas compositions.
- Fast start options provide flexibility to shorten time required to produce power.

		9F.05
SC Plant Performance	SC Net Output (MW)	299
	SC Net Heat Rate (Btu/kWh, LHV)	8,810
	SC Net Heat Rate (kJ/kWh, LHV)	9,295
	SC Net Efficiency (%, LHV)	38.7%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,187
	Exhaust Temperature (°C)	642
	Exhaust Energy (MM Btu/hr)	1,593
	Exhaust Energy (MM kJ/hr)	1,681
	GT Turndown Minimum Load (%)	35%
	GT Ramp Rate (MW/min)	24
	NO_X (ppmvd) at baseload (@15% O_2)	25
	CO (ppm) at Min. Turndown w/o Abatement	24
	Wobbe Variation (%)	+/-10%
	Startup Time (Conventional/Peaking, Minutes)	23/20
1x CC Plant Performance	CC Net Output (MW)	462
	CC Net Heat Rate (Btu/kWh, LHV)	5,640
	CC Net Heat Rate (kJ/kWh, LHV)	5,951
	CC Net Efficiency (%, LHV)	60.5%
	Plant Turndown – Minimum Load (%)	46%
	Ramp Rate (MW/min)	24
	Startup Time (RR Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	929
	CC Net Heat Rate (Btu/kWh, LHV)	5,610
	CC Net Heat Rate (kJ/kWh, LHV)	5,919
	CC Net Efficiency (%, LHV)	60.8%
	Plant Turndown – Minimum Load (%)	23%
	Ramp Rate (MW/min)	48
	Startup Time (RR Hot, Minutes)	39

The 9F.05 gas turbine provides efficiency without compromising operational flexibility. It is our best offering for size constrained, high fuel cost applications.

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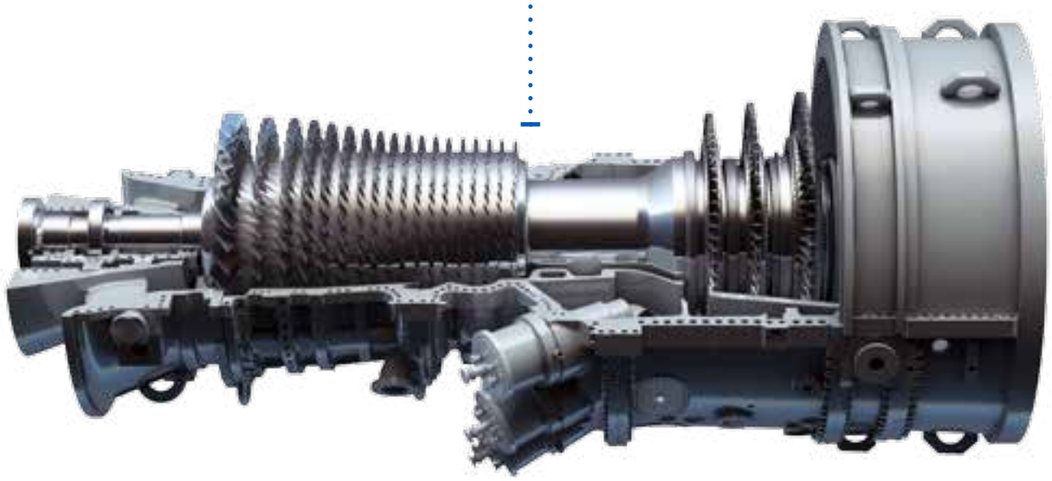
F-CLASS

9F.03/.04 GAS TURBINES (50 Hz)

PROVEN SOLUTION TO MEET GROWING POWER DEMAND

For more than 15 years, GE's rugged 9F.03 heavy duty gas turbine has delivered industry leading reliability across a fleet of more than 250 units boasting millions of hours of operation. Our 9F.03 units have been installed with a variety of operating profiles under a wide range of ambient conditions. They operate in diverse applications ranging from power generation to combined heat and power (CHP). The 9F.03 gas turbine delivers extended maintenance inspection intervals, fuel flexibility, low NO_X emissions, low CO emission compliant turndown, and fast start options.

265-281 MW
SIMPLE CYCLE OUTPUT
>59% COMBINED CYCLE EFFICIENCY



Lowest Life Cycle Cost in its Class

- Combustion and hot gas path inspection intervals have been extended to 32,000 hours, with parts lasting multiple cycles to increase availability.
- Mark VIe control system real-time, physics-based modeling increases overall performance, operability, and reliability.
- OpFlex AutoTune software improves DLN system capability, allowing operation on a wide range of natural gas compositions.

9F.04... Enhancing the 9F.03 with the Proven 7F Advanced Gas Path

- 9F.04 technology is built on more than 140 F-class Advanced Gas Path (AGP) installations and over 500,000 operating hours.
- AGP uses improved materials and cooling/sealing technology to provide enhanced performance with reliable, cost-effective operation.
- Power augmentation options are available to meet peak generation requirements up to 300 MW.

Quick and Efficient Response When Needs Change

- Average start-up reliability is greater than 97 percent.
- Low cumulative NO_X emissions meet annual tonnage limits even while operating in cyclic duty.
- Fast start option provides flexibility to shorten time required to produce power.

		9F.03	9F.04
SC Plant Performance	SC Net Output (MW)	265	281
	SC Net Heat Rate (Btu/kWh, LHV)	9,020	8,830
	SC Net Heat Rate (kJ/kWh, LHV)	9,517	9,316
	SC Net Efficiency (%, LHV)	37.8%	38.6%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,104	1,127
	Exhaust Temperature (°C)	596	608
	Exhaust Energy (MM Btu/hr)	1,458	1,498
	Exhaust Energy (MM kJ/hr)	1,538	1,581
	GT Turndown Minimum Load (%)	35%	35%
	GT Ramp Rate (MW/min)	22	23
	NO_X (ppmvd) at baseload (@15% O_2)	15	15
	CO (ppm) at Min. Turndown w/o Abatement	24	24
	Wobbe Variation (%)	+/-15%	+/-15%
	Startup Time (Conventional/Peaking, Minutes)	23/20	23/20
1x CC Plant Performance	CC Net Output (MW)	405	429
	CC Net Heat Rate (Btu/kWh, LHV)	5,840	5,740
	CC Net Heat Rate (kJ/kWh, LHV)	6,162	6,056
	CC Net Efficiency (%, LHV)	58.4%	59.4%
	Plant Turndown – Minimum Load (%)	46%	45%
	Ramp Rate (MW/min)	22	22
	Startup Time (RR Hot, Minutes)	30	30
2x CC Plant Performance	CC Net Output (MW)	815	861
	CC Net Heat Rate (Btu/kWh, LHV)	5,810	5,710
	CC Net Heat Rate (kJ/kWh, LHV)	6,130	6,024
	CC Net Efficiency (%, LHV)	58.7%	59.8%
	Plant Turndown – Minimum Load (%)	22%	22%
	Ramp Rate (MW/min)	44	44
	Startup Time (RR Hot, Minutes)	39	39

The 9F.03/.04 unit is the gas turbine of choice for growing grids due to its ability to provide fast and efficient power. Twenty six fast-track 9F.03 machines achieved commercial operation in 2015, increasing Algeria's electrical capacity by 70 percent.

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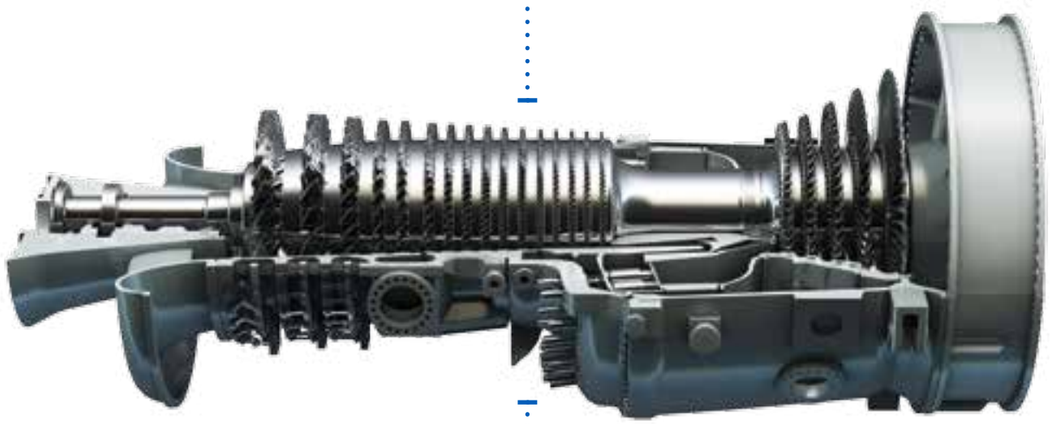
E-CLASS

GT13E2 GAS TURBINE (50 Hz)

THE HIGHEST EFFICIENCY E-CLASS GAS TURBINE

Delivering excellent performance across a wide range of applications, GE's GT13E2 gas turbine offers industry-leading efficiency in the E-class segment. Two variants, the GT13E2 2012 and the GT13E2 2005, provide the flexibility you need to select the gas turbine that best fits your needs. From simple cycle and combined cycle power plants to co-generation and industrial applications, these units offer winning solutions. Not only can you select a turbine configuration that matches your site-specific output needs, but you can switch online between two operating modes—one optimizing performance, the other substantially extending standard inspection intervals. This unique capability offers the potential for financial savings, by allowing you to react quickly to fluctuating power demands, while keeping costs in line.

185-203 MW
SIMPLE CYCLE OUTPUT
>55% COMBINED CYCLE EFFICIENCY



Proven Performance and Reliability

- More than 10 million operating hours and 66,000 starts have been reached across an operating fleet of more than 150 units.
- Five-year reliability, availability, and maintenance rating exceeds class averages, with reliability reaching 99.1 percent.
- Extended inspection intervals of 36,000 operating hours, reduce maintenance outage time and lower maintenance costs.

GT13E2 2012... Enhanced Efficiency and Flexibility

- Delivers 38 percent simple cycle efficiency and 55.2 percent combined cycle efficiency.
- Quickly responds to changing power demand with 15-minute startup times from initiation to baseload and turndown capability down to 50 percent load.
- Three rows of variable guide vanes enable superior part-load efficiency and the widest ambient operating range.
- Superior fuel versatility enables a wide range of fuel compositions without hardware changes and best-in-class Wobbe Index and C2+ tolerance.
- Offers the capability to switch from gas to oil while the turbine remains in operation.

		GT13E2 2005	GT13E2 2012
SC Plant Performance	SC Net Output (MW)	185	203
	SC Net Heat Rate (Btu/kWh, LHV)	9,027	8,980
	SC Net Heat Rate (kJ/kWh, LHV)	9,524	9,474
	SC Net Efficiency (%, LHV)	37.8%	38.0%
Gas Turbine Parameters	Exhaust Temperature (°F)	941	934
	Exhaust Temperature (°C)	505	501
	Exhaust Energy (MM Btu/hr)	1,055	1,155
	Exhaust Energy (MM kJ/hr)	1,113	1,219
	GT Turndown Minimum Load (%)	65%[4]	50%[4]/70%[5]
	GT Ramp Rate (MW/min)	12	14
	NO_X (ppmvd) at baseload (@15% O_2)	25	15
	CO (ppm) at Min. Turndown w/o Abatement	80	80
	Wobbe Variation (%)	+/-10%	+/-10%
	Startup Time (Conventional/Peaking, Minutes)	25/15	15/10
1x CC Plant Performance	CC Net Output (MW)	264	289
	CC Net Heat Rate (Btu/kWh, LHV)	6,209	6,206
	CC Net Heat Rate (kJ/kWh, LHV)	6,551	6,548
	CC Net Efficiency (%, LHV)	55.0%	55.0%
	Plant Turndown – Minimum Load (%)	69%[4]	56%[4]/71%[5]
	Ramp Rate (MW/min)	12	14
	Startup Time (RR Hot, Minutes)	80	80
2x CC Plant Performance	CC Net Output (MW)	530	581
	CC Net Heat Rate (Btu/kWh, LHV)	6,186	6,178
	CC Net Heat Rate (kJ/kWh, LHV)	6,527	6,518
	CC Net Efficiency (%, LHV)	55.2%	55.2%
	Plant Turndown – Minimum Load (%)	69%[4]	56%[4]/72%[5]
	Ramp Rate (MW/min)	24	28
	Startup Time (RR Hot, Minutes)	80	80

The GT13E2 gas turbine is a reliable workhorse for both natural gas and fuel oil. It has accumulated over 10 million fired hours. The turbine has earned its position as the world's most reliable heavy duty gas turbine in its class for 50 Hz. Most remarkable is its reliability reaching 99.1 percent over a five year period.

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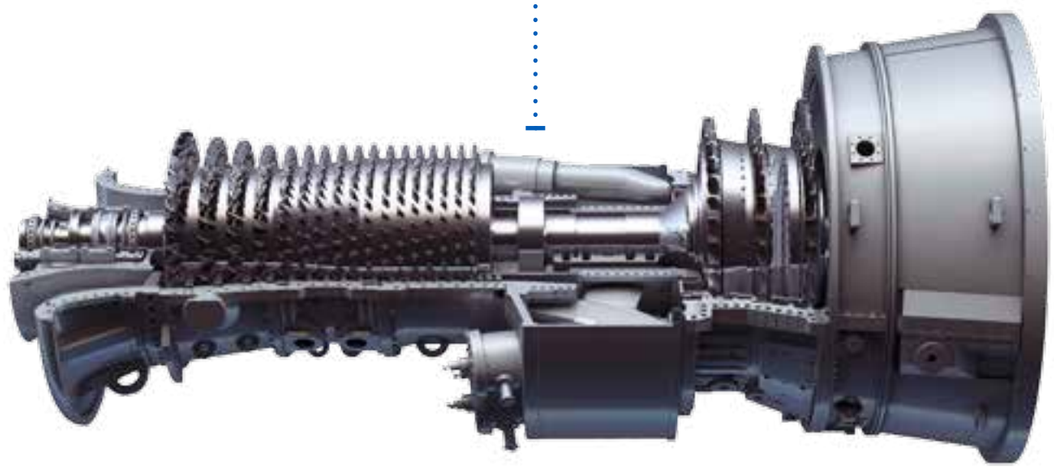
E-CLASS

9E.03/.04 GAS TURBINES (50 Hz)

FLEXIBLE, ADAPTABLE PERFORMANCE

From desert climates to the tropics, to the arctic cold, GE's rugged 9E.03 heavy duty gas turbine provides essential power and performs in a vast number of duty cycles and applications. It is one of the most fuel-flexible products in the industry, capable of using more than 50 types of fuel—almost the entire fuel spectrum. The 9E.04 heavy duty gas turbine provides increased power and performance while maintaining the simplicity and operational strengths of the 9E.03 gas turbine. The result is a platform that delivers high availability, reliability, and durability while lowering the overall cost per kilowatt.

132-145 MW
SIMPLE CYCLE OUTPUT
>54% COMBINED CYCLE EFFICIENCY



Rapidly Getting You from Decision to Power Delivery

- Demonstrated order to operation is achieved in less than six months.
- Modular architecture and prepackaged components make for quick installation in challenging environments.
- Simple cycle, combined cycle, and various industrial applications are available across a broad range of industries, including electrical utilities/independent power producers, industrial oil and gas refineries, IWPP, aluminum industry for smelting, steel mills, and LNG.
- Fast-start and fast-load capabilities provide operational flexibility.
- Units offer exceptionally long maintenance intervals without reduced performance—32,000 hours for combustion and hot gas inspections.

9E.04 Offers Enhanced Power and Performance

- A nearly 5 percent reduction in installed $/kW price, translates to a quicker return on investment.
- New four-stage turbine module fits within the same footprint as an already installed 9E gas turbine unit.
- Uses proven E- and F-class materials, fired at lower E-class temperatures in the hot gas path, with cooling and sealing improvements, improved clearances, and optimized work splits between stages.

		9E.03	9E.04
SC Plant Performance	SC Net Output (MW)	132	145
	SC Net Heat Rate (Btu/kWh, LHV)	9,860	9,210
	SC Net Heat Rate (kJ/kWh, LHV)	10,403	9,717
	SC Net Efficiency (%, LHV)	34.6%	37.0%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,012	1,007
	Exhaust Temperature (°C)	544	542
	Exhaust Energy (MM Btu/hr)	828	818
	Exhaust Energy (MM kJ/hr)	874	863
	GT Turndown Minimum Load (%)	35%	35%
	GT Ramp Rate (MW/min)	50	16
	NO_X (ppmvd) at baseload (@15% O_2)	5	15
	CO (ppm) at Min. Turndown w/o Abatement	25	25
	Wobbe Variation (%)	>+/-30%	>+/-30%
	Startup Time (Conventional/Peaking, Minutes)	30/10	30/10
1x CC Plant Performance	CC Net Output (MW)	201	212
	CC Net Heat Rate (Btu/kWh, LHV)	6,460	6,270
	CC Net Heat Rate (kJ/kWh, LHV)	6,816	6,615
	CC Net Efficiency (%, LHV)	52.8%	54.4%
	Plant Turndown – Minimum Load (%)	46%	46%
	Ramp Rate (MW/min)	50	12
	Startup Time (RR Hot, Minutes)	38	38
2x CC Plant Performance	CC Net Output (MW)	405	428
	CC Net Heat Rate (Btu/kWh, LHV)	6,410	6,220
	CC Net Heat Rate (kJ/kWh, LHV)	6,763	6,562
	CC Net Efficiency (%, LHV)	53.2%	54.9%
	Plant Turndown – Minimum Load (%)	22%	22%
	Ramp Rate (MW/min)	100	25
	Startup Time (RR Hot, Minutes)	38	38

Our 9E.03 gas turbines have provided essential and reliable power for our customers for decades. The 9E.04 unit includes a completely redesigned four-stage turbine section, which is also available as an uprate to existing 9E.03 units. This enhancement increases output by 10 percent and combined cycle efficiency by 2.4 points.

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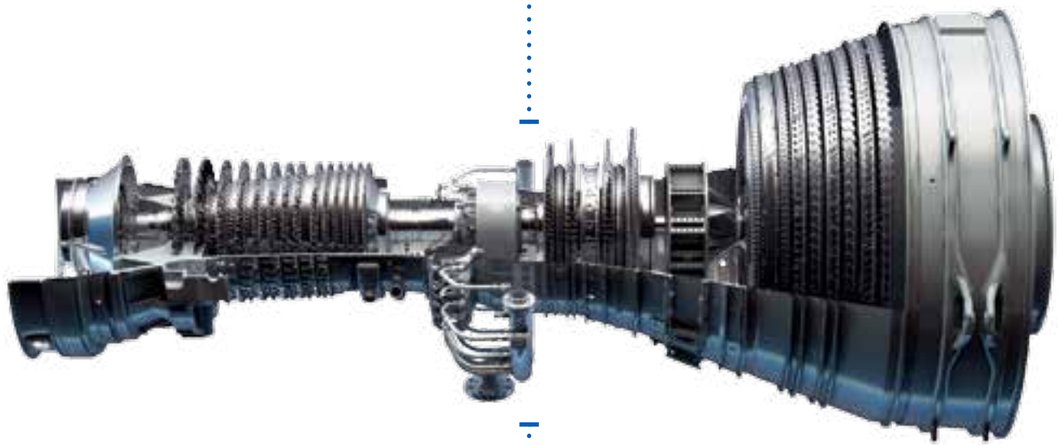
AERODERIVATIVE

LMS100 GAS TURBINE (50 Hz)

HIGHEST SIMPLE CYCLE EFFICIENCY GAS TURBINE IN THE WORLD

To meet the increasingly dynamic operating demands of today's global energy industry, power producers are looking for flexible, efficient, and reliable technology. GE's LMS100* intercooled gas turbine system provides rapid startup, outstanding cycling, and power regulation capability, all with simple cycle thermal efficiencies of over 43 percent and emissions meeting stringent requirements. The LMS100-PA+/PB+ gas turbines provide 105 MW to 111 MW of power with either water injection or dry low emissions (DLE) for NO_X control. The LMS100 fleet of more than 53 gas turbine generator sets has achieved 99.7 percent reliability with over 400,000 hours of operation.

105-111 MW
SIMPLE CYCLE OUTPUT
>43% SIMPLE CYCLE EFFICIENCY



Operational Flexibility from Peaking to Baseload

- Unrestricted daily starts and stops.
- Fast start-up in less than 10 minutes, option for less than eight minutes available.
- Emergency response rate of up to 500 MW/minute (50 MW in six seconds demonstrated).
- Available with synchronous condensing and high inertia generators.
- High part-load efficiency up to 37.8 percent at 50 percent power.
- Modular configuration for ease of maintenance and high availability, 48 hour supercore swap.
- Intercooler secondary water available for integration with plant processes (desalination, district heating, feed-water heating).
- Minimal power derate at high ambient temperature.

LMS100 PA+: Proven SAC Combustion

- Emissions compliant down to 25 percent power with treatment.
- Fuel flexibility with water injection for emission control.
- High fuel flexibility with capability to burn naptha, propane, coke oven gas, ethanol, and LNG.
- Dual fuel with ability to switch at full power.

LMS100 PB+: DLE for Reduced Water Use

- Simple cycle efficiencies greater than 43 percent.
- No water consumption for emissions control.

		LMS100 PA+	LMS100 PB+
Gas Turbine Rating	ISO Base Rating (MW)	114	108
	Gross Heat Rate (Btu/kWh, LHV)	7,885	7,776
	Gross Heat Rate (kJ/kWh, LHV)	8,319	8,204
	Gross Efficiency (%, LHV)	43.3%	43.9%
	Exhaust Temperature (°F)	792	790
	Exhaust Temperature (°C)	422	421
	Exhaust Energy (MM Btu/hr)	358	344
	Exhaust Energy (MM kJ/hr)	377	363
Gas Turbine Parameters	GT Turndown Minimum Load (%)	25%	50%
	GT Ramp Rate (MW/min)	50	50
	NO_X (ppm) (@15% O_2)	25	25
	CO (ppm) (@15% O_2)	113/139	113/125
	Wobbe Variation (%)	+/-20%	+/-25%
	Startup Time (Hot, Minutes)	10	10
SC Plant Performance	SC Net Output (MW)	111	105
	SC Net Heat Rate (Btu/kWh, LHV)	8,021	7,918
	SC Net Heat Rate (kJ/kWh, LHV)	8,463	8,354
	SC Net Efficiency (%, LHV)	42.5%	43.1%
1x CC Plant Performance	CC Net Output (MW)	135	127
	CC Net Heat Rate (Btu/kWh, LHV)	6,626	6,517
	CC Net Heat Rate (kJ/kWh, LHV)	6,991	6,876
	CC Net Efficiency (%, LHV)	51.5%	52.4%
	Plant Turndown – Minimum Load (%)	21%	42%
	Ramp Rate (MW/min)	50	50
	Startup Time (Hot, Minutes)	30	30
2x CC Plant Performance	CC Net Output (MW)	270	256
	CC Net Heat Rate (Btu/kWh, LHV)	6,608	6,498
	CC Net Heat Rate (kJ/kWh, LHV)	6,971	6,856
	CC Net Efficiency (%, LHV)	51.6%	52.5%
	Plant Turndown – Minimum Load (%)	21%	21%
	Ramp Rate (MW/min)	100	100
	Startup Time (Hot, Minutes)	30	30

The LMS100 gas turbine has proven its operating reliability, particularly in heavily renewables penetrated regions where it is often called upon to start and stop multiple times per day. GE is now offering up to 10 percent more power with the LMS100 PA+ units.

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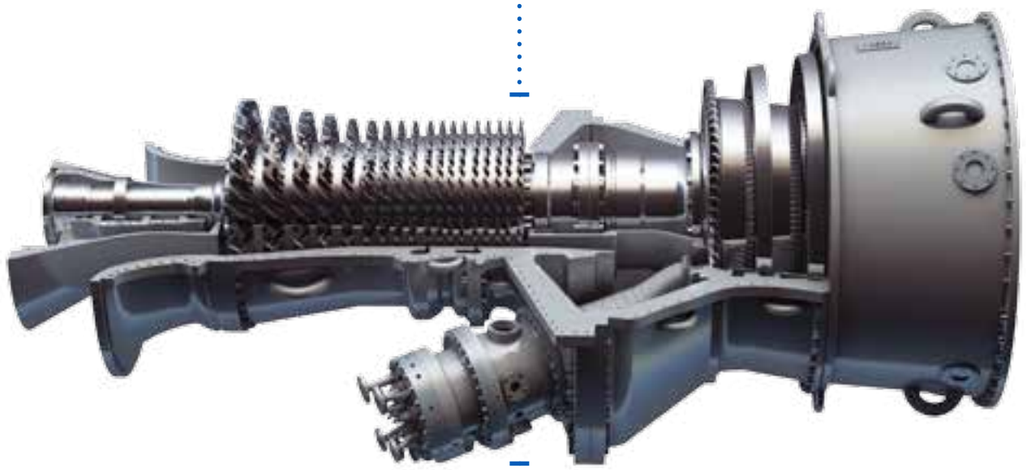
F-CLASS

6F.03 GAS TURBINE (50 Hz)

ADVANCED TECHNOLOGY FOR DECENTRALIZED POWER

Whether you need to generate power onsite or produce steam for petrochemical or district heating operations, the 6F.03 heavy duty gas turbine operating in simple or combined cycle delivers high levels of efficiency, availability, flexibility, and reliability. Its high exhaust energy and the benefits of utilizing multiple combustion systems make the 6F.03 gas turbine ideal for 50 Hz or 60 Hz midsize applications. In addition, when operating off-grid 6F.03 units bring the right power density with proven islanding mode performance and improved grid transient response capabilities.

82 MW
SIMPLE CYCLE OUTPUT
>55% COMBINED CYCLE EFFICIENCY



Durable, Compact Configuration for Diverse Applications

- Flexible layout, including lateral or axial air inlet and indoor or outdoor acoustic enclosures, overcome space constraints.
- Rugged architecture allows for performance in harsh and remote environments.
- Robust DLN 2.6 combustion system enables lower emissions—less than 15 ppm NO_X or 9 ppm CO—and up to 32,000-hour combustion inspection intervals.
- Turndown to 52 percent turbine load with DLN 2.6 combustion results in fewer starts and lower fuel costs.
- Online transfer from natural gas to light distillate improves uptime.
- Multi-Nozzle Quiet Combustor (MNQC) accommodates syngas from 20 percent to 90 percent hydrogen; MNQC employing steam or nitrogen injection achieves less than 25 ppm NO_X emissions on syngas.
- The 6F.03 unit continues to evolve by incorporating proven technologies for outstanding efficiency, heat rate and CC/CHP performance in its class.
- All technologies are retrofittable into the installed base so that both current and new customers can benefit from the versatility and reliability of GE's technologies.

		6F.03
SC Plant Performance	SC Net Output (MW)	82
	SC Net Heat Rate (Btu/kWh, LHV)	9,470
	SC Net Heat Rate (kJ/kWh, LHV)	9,991
	SC Net Efficiency (%, LHV)	36.0%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,135
	Exhaust Temperature (°C)	613
	Exhaust Energy (MM Btu/hr)	482
	Exhaust Energy (MM kJ/hr)	509
	GT Turndown Minimum Load (%)	52%
	GT Ramp Rate (MW/min)	7
	NO_X (ppmvd) at baseload (@15% O_2)	15
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+10%, -15%
	Startup Time (Conventional/Peaking, Minutes)	29/-
1x CC Plant Performance	CC Net Output (MW)	124
	CC Net Heat Rate (Btu/kWh, LHV)	6,155
	CC Net Heat Rate (kJ/kWh, LHV)	6,494
	CC Net Efficiency (%, LHV)	55.4%
	Plant Turndown – Minimum Load (%)	59%
	Ramp Rate (MW/min)	7
	Startup Time (RR Hot, Minutes)	45
2x CC Plant Performance	CC Net Output (MW)	250
	CC Net Heat Rate (Btu/kWh, LHV)	6,120
	CC Net Heat Rate (kJ/kWh, LHV)	6,457
	CC Net Efficiency (%, LHV)	55.8%
	Plant Turndown – Minimum Load (%)	30%
	Ramp Rate (MW/min)	13
	Startup Time (RR Hot, Minutes)	45

The 6F.03 gas turbine is the little F engine that will change the way you think about heat and power. With a fleet of nearly 200 units, more customers have selected the 6F.03 than any other turbine in its class. It continues to evolve by incorporating proven technologies for outstanding efficiency, heat rate and CC/CHP performance.

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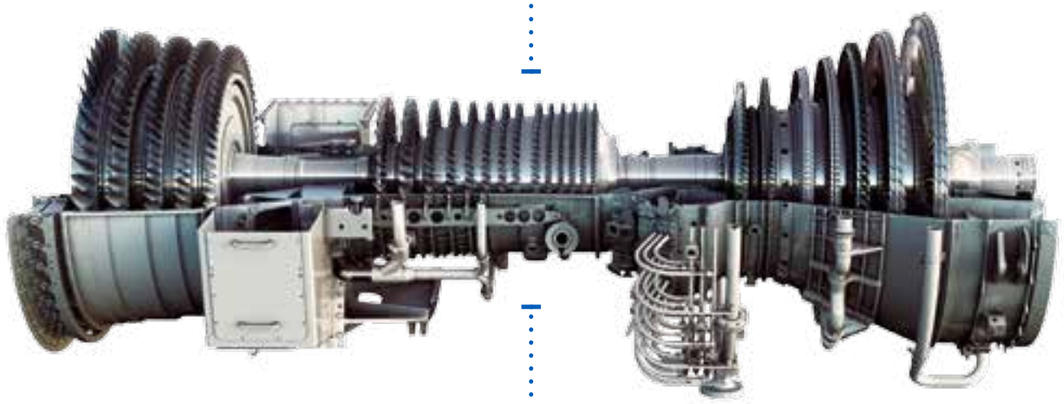
AERODERIVATIVE

LM6000 GAS TURBINE (50 Hz)

A COMPACT AND EFFICIENT SOLUTION THAT DELIVERS PROVEN FLEXIBILITY

GE's LM6000* family of aeroderivative gas turbines has achieved more than 31 million operating hours with over 1,100 units shipped to customers globally—more than ten times the experience of all other competing gas turbines in its class combined. The LM6000 aeroderivative gas turbine offers 49 MW to 57 MW of power, proven reliability, and efficiency in a package that can be tailored to meet the unique operating requirements of almost any distributed power application. Its fuel flexibility is critical for isolated installations with black start requirements, and a choice of combustion technologies helps operators meet stringent CO_2 and NO_X emissions requirements.

49-57 MW
SIMPLE CYCLE OUTPUT
>56% COMBINED CYCLE EFFICIENCY



Fast, Flexible Solution for Changing Industry Needs

- Fast start with ramp-up to full power in five minutes or less.
- Engineered to cost-effectively cycle multiple times per day to meet dispatch profiles.
- Lightweight modular configuration for easier transport, installation, and onsite maintenance.
- Optimized hot day performance with Sprint, a wet compression inlet treatment for power augmentation.
- Robust design with industry-leading reliability (>99.8 percent) and availability (>98.4 percent).
- Proven simple cycle and combined cycle performance for efficient operation in duties from peaking to baseload.

LM6000 PC/PG:

- 50 MW/minute ramping capability with emissions-compliant turndown as low as 25 percent.
- Proven SAC combustion provides fuel flexibility with water injection for emission control.
- High fuel flexibility with capability to burn naphtha, propane, coke oven gas, ethanol, and LNG.

LM6000 PF/PF+:

- Combined cycle efficiencies of more than 56 percent.
- 50 MW/minute ramping capability.
- Proven dual fuel DLE combustion with 15 ppm NO_X on gas fuel capability.

		LM6000 PC	LM6000 PG	LM6000 PF	LM6000 PF+
Gas Turbine Rating	ISO Base Rating (MW)	51	59	50	57
	Gross Heat Rate (Btu/kWh, LHV)	8,456	8,564	8,132	8,239
	Gross Heat Rate (kJ/kWh, LHV)	8,922	9,035	8,580	8,693
	Gross Efficiency (%, LHV)	40.4%	39.8%	42.0%	41.4%
	Exhaust Temperature (°F)	841	896	858	914
	Exhaust Temperature (°C)	449	480	459	490
	Exhaust Energy (MM Btu/hr)	224	258	221	255
	Exhaust Energy (MM kJ/hr)	236	273	233	269
Gas Turbine Parameters	GT Turndown Minimum Load (%)	25%	25%	50%	50%
	GT Ramp Rate (MW/min)	50	50	50	50
	NO_X (ppm) (@15% O_2)	25	25	25	25
	CO (ppm) (@15% O_2)	89/150	94/150	25/70	25/25
	Wobbe Variation (%)	+/-20%	+/-20%	+/-25%	+/-25%
	Startup Time (Hot, Minutes)	5	5	5	5
SC Plant Performance	SC Net Output (MW)	51	57	49	55
	SC Net Heat Rate (Btu/kWh, LHV)	8,647	8,745	8,315	8,414
	SC Net Heat Rate (kJ/kWh, LHV)	9,123	9,226	8,773	8,877
	SC Net Efficiency (%, LHV)	39.5%	39.0%	41.0%	40.6%
1x CC Plant Performance	CC Net Output (MW)	58	73	58	70
	CC Net Heat Rate (Btu/kWh, LHV)	6,621	6,535	6,214	6,101
	CC Net Heat Rate (kJ/kWh, LHV)	6,986	6,894	6,556	6,437
	CC Net Efficiency (%, LHV)	51.5%	52.2%	54.9%	55.9%
	Plant Turndown – Minimum Load (%)	19%	19%	37%	37%
	Ramp Rate (MW/min)	50	50	50	50
	Startup Time (Hot, Minutes)	30	30	30	30
2x CC Plant Performance	CC Net Output (MW)	116	146	117	140
	CC Net Heat Rate (Btu/kWh, LHV)	6,603	6,515	6,196	6,081
	CC Net Heat Rate (kJ/kWh, LHV)	6,966	6,873	6,537	6,416
	CC Net Efficiency (%, LHV)	51.7%	52.4%	55.1%	56.1%
	Plant Turndown – Minimum Load (%)	19%	19%	19%	18%
	Ramp Rate (MW/min)	100	100	100	100
	Startup Time (Hot, Minutes)	30	30	30	30

If you need a unit that can be quickly installed, and you want to operate simple cycle to begin with, and then convert to combined cycle in a year or two, you can't beat LM6000 technology.

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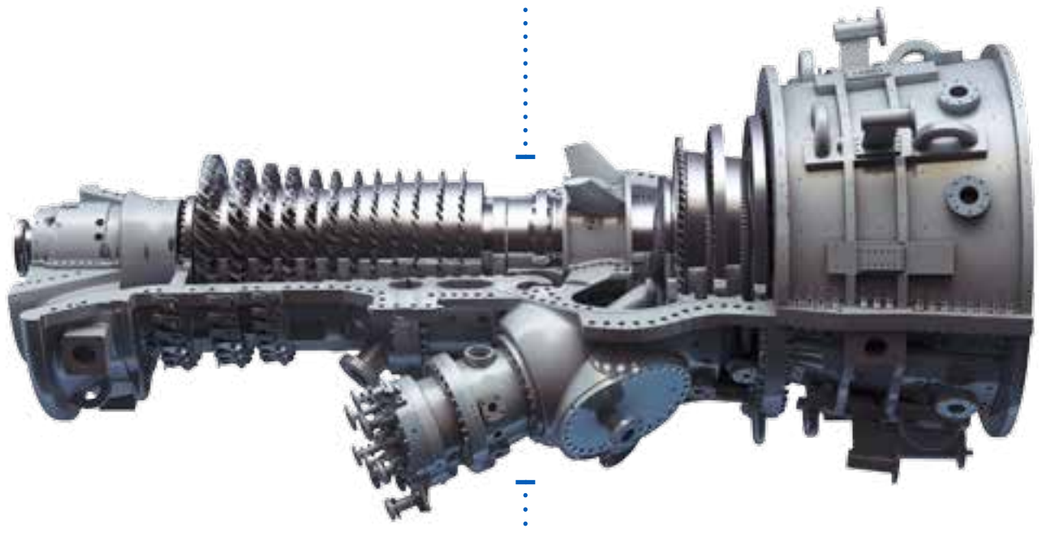
F-CLASS

6F.01 GAS TURBINE (50 Hz)

THE MOST EFFICIENT COMBINED CYCLE/COGENERATION BELOW 100 MW

GE's 6F.01 gas turbine is built from our 6C technology that was introduced to the industry almost 15 years ago. Through proven technology improvements over time, our 6F.01 turbine now achieves nearly 57 percent efficiency in cogeneration operation. Its segment-leading exhaust energy supports flexible and economic plant solutions for combined cycle power generation or cogeneration. Available with cold-end or hot-end drive configurations, the 6F.01 unit provides customizable new plant or plant-repowering solutions.

52 MW
SIMPLE CYCLE OUTPUT
>56% COMBINED CYCLE EFFICIENCY



Proven Experience with High Reliability and Availability

- 110,000 operating hours and 2,250 starts achieved by fleet leaders in Turkey with 99.2 percent reliability over the past four years.
- Proven hot gas path and combustion materials featured on 7F.05, 9F.05 and H-class turbines support higher temperatures.
- Established DLN 2.5 combustion system with over a decade of operating experience.
- Combustion and hot gas path maintenance intervals of 32,000 hours and 900 starts.
- Field replaceable compressor airfoils capable of wet compression power augmentation.
- 1,120°F (600°C) exhaust temperature enables an F-class industry standard 1,050°F (565°C) steam cycle.
- Compact and modular cold-end drive configuration for new plants.
- Hot-end drive option for 6B flange-to-flange replacement solution brings more than five points in efficiency improvement.

		6F.01
SC Plant Performance	SC Net Output (MW)	52
	SC Net Heat Rate (Btu/kWh, LHV)	8,880
	SC Net Heat Rate (kJ/kWh, LHV)	9,369
	SC Net Efficiency (%, LHV)	38.4%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,117
	Exhaust Temperature (°C)	603
	Exhaust Energy (MM Btu/hr)	280
	Exhaust Energy (MM kJ/hr)	295
	GT Turndown Minimum Load (%)	40%
	GT Ramp Rate (MW/min)	12
	NO_X (ppmvd) at baseload (@15% O_2)	25
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+/-10%
	Startup Time (Conventional/Peaking, Minutes)	12/10
1x CC Plant Performance	CC Net Output (MW)	76
	CC Net Heat Rate (Btu/kWh, LHV)	6,030
	CC Net Heat Rate (kJ/kWh, LHV)	6,362
	CC Net Efficiency (%, LHV)	56.6%
	Plant Turndown – Minimum Load (%)	53%
	Ramp Rate (MW/min)	12
	Startup Time (RR Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	154
	CC Net Heat Rate (Btu/kWh, LHV)	6,000
	CC Net Heat Rate (kJ/kWh, LHV)	6,330
	CC Net Efficiency (%, LHV)	56.9%
	Plant Turndown – Minimum Load (%)	27%
	Ramp Rate (MW/min)	24
	Startup Time (RR Hot, Minutes)	30

Since its reintroduction in 2014, our customers have responded in a big way to the 6F.01 unit's segment leading efficiency and exhaust energy, helping GE regain leadership in this space.

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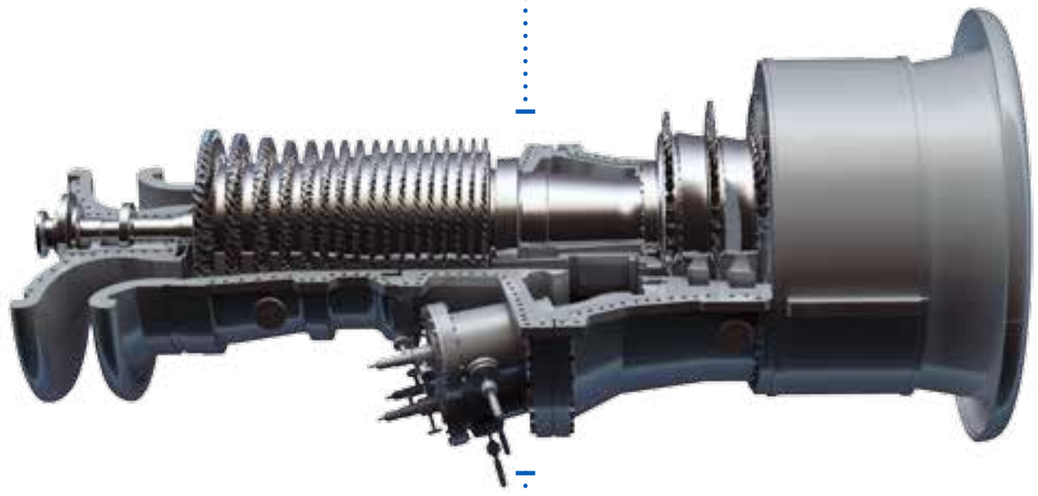
E-CLASS

6B.03 GAS TURBINE (50 Hz)

INDUSTRIAL-STRENGTH, FIELD-PROVEN RELIABILITY

The rugged, reliable 6B.03 heavy duty gas turbine is a popular choice for refineries, natural gas liquefaction power, combined heat and power (CHP) and industrial power applications. Its ability to operate in island mode, coupled with its 94.6 percent availability, make the 6B.03 gas turbine an ideal solution for remote installations and extreme operating conditions far from the grid. With 99 percent reliability, proven and tested with more than 55 million operating hours, GE's 6B.03 gas turbines provide cost-effective power you can count on.

44 MW
SIMPLE CYCLE OUTPUT
>51% COMBINED CYCLE EFFICIENCY



Dependable, Cost-Effective Solution

- Accommodates the multiple start-ups required for seasonal CHP.
- Capable of black starts for volatile grid environments.
- Built to stay online in extreme and remote conditions.
- Pre-assembled gas turbine package with accessories for easier transport and faster site installation; as low as six months from order to operation.

Industry-Leading Fuel Flexibility

- Operates on a broad range of fuels:
  - DLN combustion supports low-cost gas and liquid fuels, including process gases, low calorific gases, and up to 30 percent hydrogen, 100 percent ethane, 100 percent propane and 50 percent nitrogen.
  - Standard combustor is capable of up to 95 percent hydrogen, or heavy fuel oil with up to 200 ppm vanadium; also supports naptha, bioethanol, methanol, synthetic gases, and steel mill gases.
- 20 MW in less than five seconds measured onsite with Dry Low NO_X combustion system to support a grid power deficit.
- 289 MMBtu/hr exhaust energy at 549°C can generate a high quantity of steam with pressure up to 110 bar for industrial steam without supplementary firing.

		6B.03
SC Plant Performance	SC Net Output (MW)	44
	SC Net Heat Rate (Btu/kWh, LHV)	10,180
	SC Net Heat Rate (kJ/kWh, LHV)	10,740
	SC Net Efficiency (%, LHV)	33.5%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,019
	Exhaust Temperature (°C)	548
	Exhaust Energy (MM Btu/hr)	289
	Exhaust Energy (MM kJ/hr)	305
	GT Turndown Minimum Load (%)	50%
	GT Ramp Rate (MW/min)	20
	NO_X (ppmvd) at baseload (@15% O_2)	4
	CO (ppm) at Min. Turndown w/o Abatement	25
	Wobbe Variation (%)	>+/-30%
	Startup Time (Conventional/Peaking, Minutes)	12/10
1x CC Plant Performance	CC Net Output (MW)	67
	CC Net Heat Rate (Btu/kWh, LHV)	6,630
	CC Net Heat Rate (kJ/kWh, LHV)	6,995
	CC Net Efficiency (%, LHV)	51.5%
	Plant Turndown – Minimum Load (%)	57%
	Ramp Rate (MW/min)	20
	Startup Time (RR Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	135
	CC Net Heat Rate (Btu/kWh, LHV)	6,600
	CC Net Heat Rate (kJ/kWh, LHV)	6,963
	CC Net Efficiency (%, LHV)	51.7%
	Plant Turndown – Minimum Load (%)	29%
	Ramp Rate (MW/min)	40
	Startup Time (RR Hot, Minutes)	30

We are striving to ensure the 6B.03 gas turbine continues to be the first choice for non-standard fuels in cogeneration, industrial and oil and gas power generation operations. With new technology introductions, such as DLN1/1+ Ultra Low NO_X technology, customers looking to operate on a blend of gases—including high-hydrogen blends—can realize lower NO_X emissions and reduced operating costs with increased performance.

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AERODERIVATIVE

TM2500 MOBILE GAS TURBINE-GENERATOR SET (50 Hz)

FAST AND FLEXIBLE POWER PLANT—WHEN AND WHERE IT'S NEEDED

GE's TM2500* fast power solution harnesses the highly successful LM2500+G4 aeroderivative gas turbine to solve a number of industry challenges, positioning power at—or near—the point of use. Known as the "power plant on wheels," the TM2500 generator set is ideal for providing a baseload bridge to permanent power installations or for generating backup power in support of natural disaster relief, plant shutdowns, grid instability due to renewables adoption, or equipment maintenance.

31 MW
SIMPLE CYCLE OUTPUT
COMMERCIAL OPERATION IN
<11 DAYS

Focused on Solving Fast Power Challenges

- On-demand power plants delivered in weeks, not months, and commissioned in as few as 11 days from parking the first trailer.
- Mounted on a mobile, two-trailer assembly that can be transported via land, sea, or air to remote locations.
- A complete turnkey solution.
- Scalable blocks of power that can be aggregated to meet any site-specific need.
- Full power achieved within 10 minutes or less.
- Fuel flexibility that allows operation on natural gas, distillate oil, or condensates.
- 50 percent lower emissions compared to diesel generators when operating on natural gas.

		TM2500
Gas Turbine Rating	ISO Base Rating (MW)	34.3
	Gross Heat Rate (Btu/kWh, LHV)	9,665
	Gross Heat Rate (kJ/kWh, LHV)	10,197
	Gross Efficiency (%, LHV)	35.3%
	Exhaust Temperature (°F)	963
	Exhaust Temperature (°C)	517
	Exhaust Energy (MM Btu/hr)	187
	Exhaust Energy (MM kJ/hr)	197
Gas Turbine Parameters	GT Turndown Minimum Load (%)	50%
	GT Ramp Rate (MW/min)	30
	NO_X (ppm) (@15% O_2)	25
	CO (ppm) (@15% O_2)	250/275
	Wobbe Variation (%)	+/-20%
	Startup Time (Hot, Minutes)	10
SC Plant Performance	SC Net Output (MW)	30.7
	SC Net Heat Rate (Btu/kWh, LHV)	9,832
	SC Net Heat Rate (kJ/kWh, LHV)	10,374
	SC Net Efficiency (%, LHV)	34.7%
1x CC Plant Performance	CC Net Output (MW)	44
	CC Net Heat Rate (Btu/kWh, LHV)	6,909
	CC Net Heat Rate (kJ/kWh, LHV)	7,289
	CC Net Efficiency (%, LHV)	49.4%
	Plant Turndown – Minimum Load (%)	35%
	Ramp Rate (MW/min)	30
	Startup Time (Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	88
	CC Net Heat Rate (Btu/kWh, LHV)	6,885
	CC Net Heat Rate (kJ/kWh, LHV)	7,264
	CC Net Efficiency (%, LHV)	49.6%
	Plant Turndown – Minimum Load (%)	35%
	Ramp Rate (MW/min)	60
	Startup Time (Hot, Minutes)	30

We have heard the customer and we are now able to deliver a TM2500 solution with around 24 percent more hot day power and a 20 percent reduction in installation cycle.

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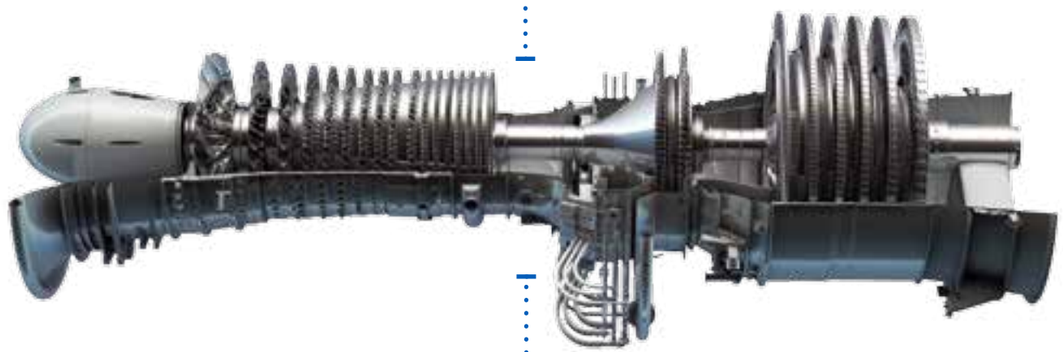
AERODERIVATIVE

LM2500 GAS TURBINE (50 Hz)

UNSURPASSED RELIABILITY, PROVEN EXPERIENCE, AND CONTINUOUS INNOVATION

The LM2500* series gas turbines serve a variety of operating applications in the oil and gas and industrial segments with 22 MW to 33 MW of power in simple cycle operation. The product family, which includes LM2500, LM2500+, and LM2500+G4 units, boasts over 2,100 units shipped and more than 75 million hours of operating experience. The LM2500 unit has been one of the top selling aeroderivative gas turbines for over 40 years and continues to build its reputation as the most reliable industrial gas turbine generator in its class. Ideal for onshore and offshore mechanical drive, in-plant power generation, pipeline, platform, cogeneration, and combined cycle applications, the LM2500 family continues to evolve to provide increased customer value.

22-33 MW
SIMPLE CYCLE OUTPUT
>36% SIMPLE CYCLE EFFICIENCY



Serving the Needs of the Oil & Gas and Industrial Segments

- Lightweight and compact for quick installation and ease of maintenance.
- Robust design with greater than 99 percent; availability greater than 98 percent.
- Proven capability to achieve fast startup (<10 minutes) and operate in highly cyclic environments.
- Dual fuel capability for distillate and natural gas.
- Can accommodate naptha, propane, coke oven gas, ethanol, and LNG.
- Reduced NOx (<15 ppm) with the DLE combustor; also available with optional steam or water injection system for NO_X emission control.

LM2500+: More Power with the Same Proven Reliability

- Additional one stage of compression for another 8 MW of simple cycle output.
- One-piece first stage “blisk” (blade+disk) for increased ruggedness.
- Enhanced fit for pipeline, peaking power, and CHP applications.

LM2500+G4: Highest Efficiency of the LM2500 Family

- Modified first stage for increased air flow and pressure ratio.
- Improved design and materials in the compressor and turbine sections to enhance performance.

		LM2500	LM2500+	LM2500+G4
Gas Turbine Rating	ISO Base Rating (MW)	22.4	31.1	33.4
	Gross Heat Rate (Btu/kWh, LHV)	9,626	9,169	9,166
	Gross Heat Rate (kJ/kWh, LHV)	10,156	9,674	9,671
	Gross Efficiency (%, LHV)	35.4%	37.2%	37.2%
	Exhaust Temperature (°F)	1,017	1,003	1,026
	Exhaust Temperature (°C)	547	539	552
	Exhaust Energy (MM Btu/hr)	137	175	188
	Exhaust Energy (MM kJ/hr)	145	185	199
Gas Turbine Parameters	GT Turndown Minimum Load (%)	50%	50%	50%
	GT Ramp Rate (MW/min)	30	30	30
	NO_X (ppm) (@15% O_2)	15	25	25
	CO (ppm) (@15% O_2)	25/25	25/25	25/25
	Wobbe Variation (%)	+/-25%	+/-25%	+/-25%
	Startup Time (Hot, Minutes)	10	10	10
SC Plant Performance	SC Net Output (MW)	21.8	30.1	32.5
	SC Net Heat Rate (Btu/kWh, LHV)	9,835	9,338	9,352
	SC Net Heat Rate (kJ/kWh, LHV)	10,376	9,852	9,867
	SC Net Efficiency (%, LHV)	34.7%	36.5%	36.5%
1x CC Plant Performance	CC Net Output (MW)	32.8	44.0	47.7
	CC Net Heat Rate (Btu/kWh, LHV)	6,533	6,384	6,343
	CC Net Heat Rate (kJ/kWh, LHV)	6,892	6,736	6,693
	CC Net Efficiency (%, LHV)	52.2%	53.4%	53.8%
	Plant Turndown – Minimum Load (%)	33%	34%	34%
	Ramp Rate (MW/min)	30	30	30
	Startup Time (Hot, Minutes)	30	30	30
2x CC Plant Performance	CC Net Output (MW)	66	88	96
	CC Net Heat Rate (Btu/kWh, LHV)	6,507	6,361	6,320
	CC Net Heat Rate (kJ/kWh, LHV)	6,865	6,711	6,668
	CC Net Efficiency (%, LHV)	52.4%	53.6%	54.0%
	Plant Turndown – Minimum Load (%)	17%	17%	17%
	Ramp Rate (MW/min)	60	60	60
	Startup Time (Hot, Minutes)	30	30	30

The latest development in the LM2500 product is a modular package design, including a repower driver module that can be installed in less than 30 days, or a complete generator set with a 10 percent to 15 percent lower total installed cost.

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TOPPING CYCLE 60 Hz PRODUCTS

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6F.03
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6F.01
6B.03
TM2500
LM2500

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H-CLASS

7HA.01/.02 GAS TURBINES (60 Hz)

THE WORLD'S LARGEST AND MOST EFFICIENT HEAVY DUTY GAS TURBINE

GE's 7HA high efficiency, air-cooled gas turbine is an industry leader, and is available in two models: the 7HA.01 unit at 280 MW; and the 7HA.02 unit at 346 MW. Performance growth for the 7HA platform continues due to the successful 9HA validation that has enabled the 7HA.01 units to deliver 5 MW of additional output and 60 Btu/kWh better heat rate than 2015 ratings. Similarly, the 7HA.02 units now deliver an additional 9 MW and 130 Btu/kWh better heat rate than 2015 ratings. Thanks to a simplified air-cooled architecture, advanced materials, and proven operability and reliability, the 7HA turbine delivers a low life cycle cost per megawatt for 60 Hz applications. The economies of scale created by this high power density gas turbine, combined with its more than 62 percent combined cycle efficiency, enable cost-effective conversion of fuel to electricity to help you meet increasingly dynamic power demands.

280-346 MW
SIMPLE CYCLE OUTPUT
>62% COMBINED CYCLE EFFICIENCY

Industry-Leading Operational Flexibility for Increased Dispatch and Ancillary Revenue

- Peaking start capability offers a 10 minute ramp-up from start command to gas turbine full load.
- 50 MW/minute ramping capability is realized within emissions compliance.
- Reaches turndown as low as 25 percent of gas turbine baseload output within emissions compliance.
- Fuel flexible accommodates gas and liquid fuels with wide gas variability, including high ethane (shale) gas and liquefied natural gas.

Simpler H-Class Offering

- Features a less complex configuration than GE's previous H-class units, and one that does not require cooled air.
- An air-cooled generator is now available for simplified installation and maintainability.
- Modular systems ease installation with 10,000 fewer man-hours than GE's 7F.03 gas turbine.
- Maintenance is streamlined with a quick-removal turbine roof, field-replaceable blades, and 100 percent borescope inspection coverage for all blades.
- Simplified dual fuel system uses less water, eliminates recirculation, and utilizes enhanced liquid purge for improved reliability and dependability.

Full-Load Validation

- The 2016 testing of 7HA technology in GE's full-speed, full-load test facility in Greenville, SC, reinforces the impressive performance and robust capabilities of these units.
- The test stand enables validation of the 7HA gas turbine over an operating envelope larger than the variances an entire fleet of turbines would experience in the field, an approach already proven on the 9HA turbine, superior to operating a field prototype for 8,000 hours.

		7HA.01	7HA.02
SC Plant Performance	SC Net Output (MW)	280	346
	SC Net Heat Rate (Btu/kWh, LHV)	8,180	8,080
	SC Net Heat Rate (kJ/kWh, LHV)	8,630	8,525
	SC Net Efficiency (%, LHV)	41.7%	42.2%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,159	1,153
	Exhaust Temperature (°C)	626	623
	Exhaust Energy (MM Btu/hr)	1,338	1,617
	Exhaust Energy (MM kJ/hr)	1,412	1,705
	GT Turndown Minimum Load (%)	25%	30%
	GT Ramp Rate (MW/min)	50	50
	NO_X (ppmvd) at baseload (@15% O_2)	25	25
	CO (ppm) at Min. Turndown w/o Abatement	9	9
	Wobbe Variation (%)	+/-10%	+/-10%
	Startup Time (Conventional/Peaking, Minutes)	21/10	21/10
1x CC Plant Performance	CC Net Output (MW)	419	509
	CC Net Heat Rate (Btu/kWh, LHV)	5,520	5,500
	CC Net Heat Rate (kJ/kWh, LHV)	5,824	5,803
	CC Net Efficiency (%, LHV)	61.8%	62.0%
	Plant Turndown – Minimum Load (%)	33.0%	38.0%
	Ramp Rate (MW/min)	50	50
	Startup Time (RR Hot, Minutes)	<30	<30
2x CC Plant Performance	CC Net Output (MW)	842	1,021
	CC Net Heat Rate (Btu/kWh, LHV)	5,500	5,480
	CC Net Heat Rate (kJ/kWh, LHV)	5,803	5,782
	CC Net Efficiency (%, LHV)	62.0%	62.3%
	Plant Turndown – Minimum Load (%)	16.0%	18.0%
	Ramp Rate (MW/min)	100	100
	Startup Time (RR Hot, Minutes)	<30	<30

This is an exciting time for our 7FA products, as the first unit left the factory and was installed in our full-speed, full-load test facility in Greenville, SC. The 7HA units have followed the "footsteps" of the 9HA, undergoing extensive validation, and the first commercial 7HA units are shipping to our launch customer, Chubu Electric in Japan.

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F-CLASS

7F.06 GAS TURBINE (60 Hz)

F-CLASS LEADERSHIP WITH ROOM TO GROW

All power plants are different, but one requirement remains the same—the lowest life cycle cost in the right size for your project. The newest member of GE's 60 Hz portfolio, the 7F.06 gas turbine, delivers higher output and efficiency than any other 60 Hz F-class gas turbine while maintaining 9 ppm NO_X and CO emissions. These units provide an unprecedented balance of performance and flexibility, with a baseload simple cycle rating of 270 MW and over 41 percent efficiency, coupled with fast start capability of gas turbine full load in 10 minutes and fast ramp capability of 50 MW per minute. As a result, the 7F.06 gas turbine provides you with greater capacity for flexibility, including renewable energy support. In combined cycle operation, the 7F.06 gas turbine's output advantage and efficiency of over 60 percent provides the lowest cost of electricity in 60 Hz F-class technology. Benefitting from over 2,000 hours of full-speed, full-load validation testing on our F-class and H-class gas turbines, the 7F.06 units are engineered to meet the availability and life cycle economics you have come to expect from GE's F-class gas turbines.

270 MW
SIMPLE CYCLE OUTPUT
>60% COMBINED CYCLE EFFICIENCY

The Largest and Most Efficient 60 Hz F-Class Gas Turbine

- F-class firing temperatures provide extended operation between planned maintenance events at 32,000 hour intervals.
- Built on the 7F.05 compressor, GE's industry-leading DLN2.6+ combustion system, and H-class derived four stage hot gas path.
- Similar architecture enables future upgrades to 7HA performance as plant requirements grow over time.
- Significant flexibility allows for customization for the specific power and exhaust condition needs of each project.
- An optional air-cooled generator provides simplified installation and maintainability.
- Modular systems ease installation with 10,000 fewer man-hours than GE's 7F.03 gas turbine.
- Maintenance is streamlined with a quick-removal turbine roof, field-replaceable blades, and 100 percent borescope inspection coverage for all blades.
- Simplified dual fuel system uses less water, eliminates recirculation, and utilizes enhanced liquid purge for improved reliability and dependability.

		7F.06
SC Plant Performance	SC Net Output (MW)	270
	SC Net Heat Rate (Btu/kWh, LHV)	8,250
	SC Net Heat Rate (kJ/kWh, LHV)	8,704
	SC Net Efficiency (%, LHV)	41.4%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,100
	Exhaust Temperature (°C)	593
	Exhaust Energy (MM Btu/hr)	1,301
	Exhaust Energy (MM kJ/hr)	1,373
	GT Turndown Minimum Load (%)	30%
	GT Ramp Rate (MW/min)	50
	NO_X (ppmvd) at baseload (@15% O_2)	9
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+/-7.5%
	Startup Time (Conventional/Peaking, Minutes)	21/10
1x CC Plant Performance	CC Net Output (MW)	394
	CC Net Heat Rate (Btu/kWh, LHV)	5,650
	CC Net Heat Rate (kJ/kWh, LHV)	5,961
	CC Net Efficiency (%, LHV)	60.4%
	Plant Turndown – Minimum Load (%)	38%
	Ramp Rate (MW/min)	50
	Startup Time (RR Hot, Minutes)	<30
2x CC Plant Performance	CC Net Output (MW)	792
	CC Net Heat Rate (Btu/kWh, LHV)	5,620
	CC Net Heat Rate (kJ/kWh, LHV)	5,929
	CC Net Efficiency (%, LHV)	60.7%
	Plant Turndown – Minimum Load (%)	17.4%
	Ramp Rate (MW/min)	100
	Startup Time (RR Hot, Minutes)	<30

At GE, we are committed to giving our customers the most CAPEX and OPEX efficient products, and the 7F.06 gas turbine is simply our latest installment. It provides the most full-load megawatts, the fastest ramp rates, the most megawatts in 10 minutes, the lowest turndown, and the highest efficiency—all while operating below 9ppm NO_X—making it ideal for renewables grid support. And in combined cycle, the 7F.06 unit provides all of the same benefits, but at an efficiency of nearly 61 percent."

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F-CLASS

7F.05 GAS TURBINE (60 Hz)

PROVEN LEADER IN F-CLASS FLEXIBILITY AND LOW EMISSIONS

GE's 7F.05 gas turbine was designed to raise the standard for F-class flexibility and efficiency. With a rapidly growing installed base on three continents and over 20,000 hours of operation, the 7F.05 gas turbine just keeps getting better. Demonstrated operation on natural gas, distillate oil, and crude oil, fast starts of 200 MW in ten minutes, and a ramp rate of 40 MW per minute have established the 7F.05 turbine as a premier flexible, quick-response machine. Representing a new standard in combustion technology, these units emit less than 5 ppm NO_X at rated baseload while delivering world-class efficiency. When peak power is the primary consideration, the 7F.05 turbine will deliver up to 241 MW of reliable output.

232-241 MW
SIMPLE CYCLE OUTPUT
>60% COMBINED CYCLE EFFICIENCY

Reliable and Efficient

- Combustion systems accommodate a wide range of fuels, including natural gas, distillate oil, lean methane, pure ethane, hydrogen, syngas, and light crude oils.
- 98.8 percent reliability leads F-class offerings.[1]
- Proven and demonstrated
  - Fast start capabiity delivers 200 MW in ten minutes.
  - Fast ramp rate is 40 MW per minute.
  - Less than 5 PPM NO_X emitted at rated baseload.
- Performance packages support most customer demands across the ambient spectrum, including wet compression for enhanced hot day performance.
- An optional air-cooled generator offers simplified installation and maintainability.
- Turndown to 43 percent of gas turbine baseload increases spinning reserve capability and lowers fuel costs.
- Advanced compressor with superfinish 3-D aero airfoils reduces degradation and improves fuel efficiency.

Maintenance with Your Needs in Mind

- Field-replaceable compressor blades reduce replacement time, downtime and costs.
- 100 percent borescope coverage simplifies and fortifies inspections.
- Air-cooled architecture combined with proven materials provides the lowest life cycle cost in its class.

[1] Source: ORAP Simple cycle equipment, 12 month average, April '13 through March '14.

		7F.05 (5ppm NO_X)	7F.05 (9ppm NO_X)	7F.05 (12ppm NO_X)
SC Plant Performance	SC Net Output (MW)	232	241	—
	SC Net Heat Rate (Btu/kWh, LHV)	8,610	8,580	—
	SC Net Heat Rate (kJ/kWh, LHV)	9,084	9,052	—
	SC Net Efficiency (%, LHV)	39.6%	39.8%	—
Gas Turbine Parameters	Exhaust Temperature (°F)	1,122	1,171	1,189
	Exhaust Temperature (°C)	605	633	643
	Exhaust Energy (MM Btu/hr)	1,209	1,250	1,265
	Exhaust Energy (MM kJ/hr)	1,276	1,319	1,335
	GT Turndown Minimum Load (%)	46%	44%	43%
	GT Ramp Rate (MW/min)	40	40	40
	NO_X (ppmvd) at baseload (@15% O_2)	5	9	12
	CO (ppm) at Min. Turndown w/o Abatement	9	9	9
	Wobbe Variation (%)	+/-7.5%	+/-7.5%	+/-7.5%
	Startup Time (Conventional/Peaking, Minutes)	21/11	21/11	21/11
1x CC Plant Performance	CC Net Output (MW)	—	—	376
	CC Net Heat Rate (Btu/kWh, LHV)	—	—	5,660
	CC Net Heat Rate (kJ/kWh, LHV)	—	—	5,972
	CC Net Efficiency (%, LHV)	—	—	60.3%
	Plant Turndown – Minimum Load (%)	—	—	47.9%
	Ramp Rate (MW/min)	—	—	40
	Startup Time (RR Hot, Minutes)	—	—	25
2x CC Plant Performance	CC Net Output (MW)	—	—	756
	CC Net Heat Rate (Btu/kWh, LHV)	—	—	5,660
	CC Net Heat Rate (kJ/kWh, LHV)	—	—	5,972
	CC Net Efficiency (%, LHV)	—	—	60.3%
	Plant Turndown – Minimum Load (%)	—	—	24.0%
	Ramp Rate (MW/min)	—	—	80
	Startup Time (RR Hot, Minutes)	—	—	25

The 7F.05 gas turbine, affectionately referred to as the "The Beast" by Golden Spread Electric Cooperative, has proven to be renewable power's best friend. It delivers the flexibility and performance required to support intermittent wind and solar generation while achieving the lowest NO_X emissions in its class.

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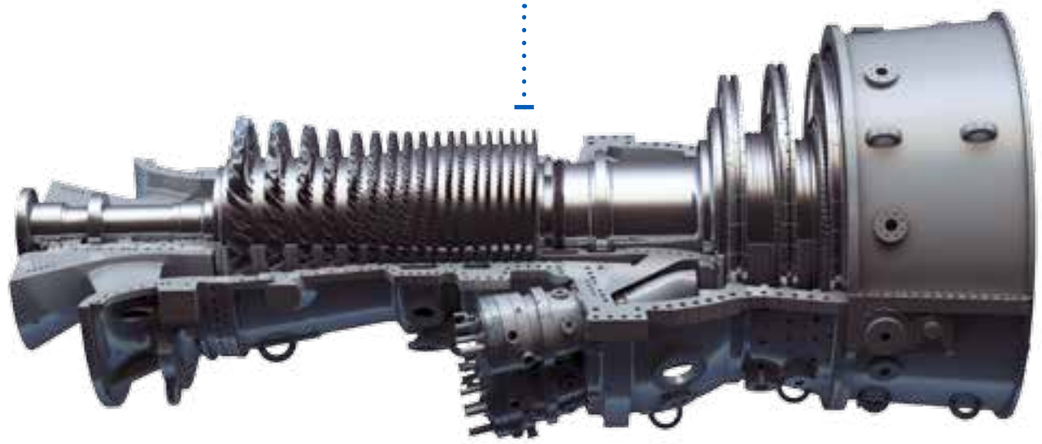
F-CLASS

7F.04 GAS TURBINE (60 Hz)

PROVEN WORLD CLASS FUEL AND DISPATCH FLEXIBILITY

With over 40 new 7F.04 gas turbines shipped and more than 150 conversions from 7F.03 units, GE's 7F.04 is quickly becoming the largest 60 Hz F-class fleet in the world. The 7F.04 offers world-leading reliability and availability and it's fuel flexibility is unmatched. Our units are operating on natural gas, distillate and crude oil and we have orders for machines to run on gas with high ethane content. Today, GE powers the globe with more than 1,100 installed F-class units, producing 260 GW of power in 58 countries. With greater than 99 percent reliability, customers receive five to six more days of operation per year than the industry average. A 10-minute fast start enables increased revenue and dispatchability during peak demand.

193-198 MW
SIMPLE CYCLE OUTPUT
>59% COMBINED CYCLE EFFICIENCY



Customer Value with the Lowest Life Cycle Cost in Its Class

- Enhanced compressor and hot gas path cooling and sealing technologies improve performance and durability.
- Single crystal materials and directionally solidified blades provide extended maintenance intervals and lengthened component life.
- Low fuel pressure requirements reduce the need for an onsite fuel compressor.
- Industry-leading DLN 2.5+ combustion system lowers emissions across a wide range of natural gas and distillate fuel compositions.
- Superior fuel flexibility; GE is the only manufacturer to offer an F-class heavy duty gas turbine that burns Arabian Super Light crude oil and also offers 15 percent C2, +20/-10 percent modified Wobbe index, plus capability for up to 5 percent hydrogen and 25 percent ethane.

Ready to Respond

- 99 percent reliability provides five to six more days of operation per year than the industry average.
- 10-minute fast start capability helps increase revenue and dispatchability.
- 98.3 percent start reliability delivers the power you need during peak demand.
- 50 percent turndown enables wider operating ranges and the ability to respond quickly to changing demand.
- 30 MW per minute ramp rate achieved while maintaining 9 ppm NO_X emissions.

Global Product Support and Services

- Dispatch-ready teams located around the globe respond to unplanned outages with expertise, equipment and onsite engineers to help reduce downtime and recover faster.

		7F.04 (5ppm NO_X)	7F.04 (9ppm NO_X)
SC Plant Performance	SC Net Output (MW)	193	198
	SC Net Heat Rate (Btu/kWh, LHV)	8,860	8,840
	SC Net Heat Rate (kJ/kWh, LHV)	9,348	9,327
	SC Net Efficiency (%, LHV)	38.5%	38.6%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,129	1,151
	Exhaust Temperature (°C)	609	622
	Exhaust Energy (MM Btu/hr)	1,034	1,059
	Exhaust Energy (MM kJ/hr)	1,091	1,117
	GT Turndown Minimum Load (%)	50%	49%
	GT Ramp Rate (MW/min)	30	30
	NO_X (ppmvd) at baseload (@15% O_2)	5	9
	CO (ppm) at Min. Turndown w/o Abatement	9	9
	Wobbe Variation (%)	+20%, -10%	+/-7.5%
	Startup Time (Conventional/Peaking, Minutes)	21/11	21/11
1x CC Plant Performance	CC Net Output (MW)	—	302
	CC Net Heat Rate (Btu/kWh, LHV)	—	5,760
	CC Net Heat Rate (kJ/kWh, LHV)	—	6,077
	CC Net Efficiency (%, LHV)	—	59.2%
	Plant Turndown – Minimum Load (%)	—	58.4%
	Ramp Rate (MW/min)	—	30
	Startup Time (RR Hot, Minutes)	—	28
2x CC Plant Performance	CC Net Output (MW)	—	609
	CC Net Heat Rate (Btu/kWh, LHV)	—	5,710
	CC Net Heat Rate (kJ/kWh, LHV)	—	6,024
	CC Net Efficiency (%, LHV)	—	59.8%
	Plant Turndown – Minimum Load (%)	—	29.4%
	Ramp Rate (MW/min)	—	60
	Startup Time (RR Hot, Minutes)	—	28

The 7F.04 gas turbine demonstrates our commitment to continued investment in our customers' fleet of gas turbines. From the first 7F units introduced in 1986, we have increased output by 45 MW and efficiency by 5 percent while reducing emissions and providing greater operating flexibility.

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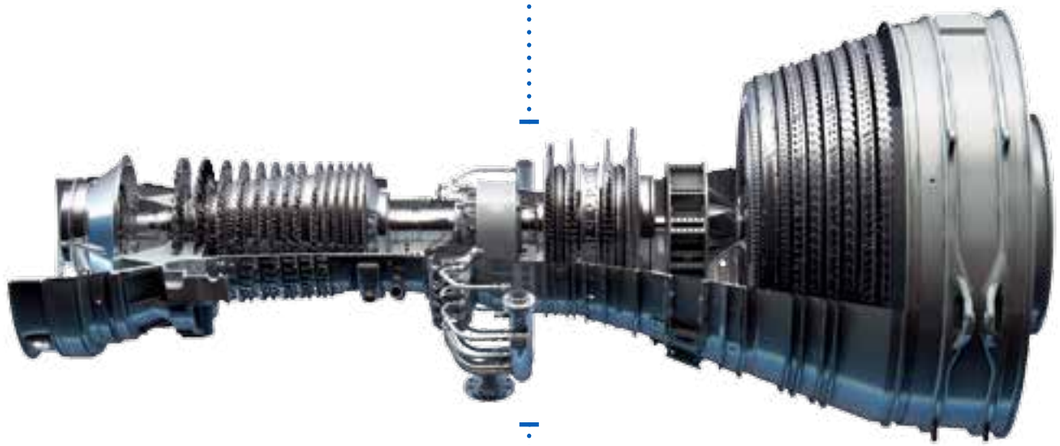
AERODERIVATIVE

LMS100 GAS TURBINE (60 Hz)

HIGHEST SIMPLE CYCLE EFFICIENCY GAS TURBINE IN THE WORLD

To meet the increasingly dynamic operating demands of today's global energy industry, power producers are looking for flexible, efficient, and reliable technology. GE's LMS100 intercooled gas turbine system provides rapid startup, outstanding cycling, and power regulation capability, all with simple cycle thermal efficiencies of over 43 percent and emissions meeting stringent requirements. The LMS100-PA+/PB+ gas turbines provide 106 MW to 113 MW of power with either water injection or dry low emissions (DLE) for NO_X control. The LMS100 fleet of more than 53 gas turbine generator sets has achieved 99.7 percent reliability with over 400,000 hours of operation.

106-113 MW
SIMPLE CYCLE OUTPUT
>43% SIMPLE CYCLE EFFICIENCY



Operational Flexibility from Peaking to Baseload

- Unrestricted daily starts and stops.
- Fast start-up in less than 10 minutes, option for less than eight minutes available.
- Emergency response rate of up to 500 MW/minute (50 MW in six seconds demonstrated).
- Available with synchronous condensing and high inertia generators.
- High part-load efficiency up to 37.8 percent at 50 percent power.
- Modular configuration for ease of maintenance and high availability, 48 hour supercore swap.
- Intercooler secondary water available for integration with plant processes (desalination, district heating, feed-water heating).
- Minimal power derate at high ambient temperature.

LMS100 PA+: Proven SAC Combustion

- Emissions compliant down to 25 percent power with treatment.
- Fuel flexibility with water injection for emission control.
- High fuel flexibility with capability to burn naptha, propane, coke oven gas, ethanol, and LNG.
- Dual fuel with ability to switch at full power.

LMS100 PB+: DLE for Reduced Water Use

- Simple cycle efficiencies greater than 43 percent.
- No water consumption for emissions control.

		LMS100 PA+	LMS100 PB+
Gas Turbine Rating	ISO Base Rating (MW)	117	109
	Gross Heat Rate (Btu/kWh, LHV)	7,763	7,746
	Gross Heat Rate (kJ/kWh, LHV)	8,191	8,172
	Gross Efficiency (%, LHV)	44.0%	44.1%
	Exhaust Temperature (°F)	781	784
	Exhaust Temperature (°C)	416	418
	Exhaust Energy (MM Btu/hr)	351	341
	Exhaust Energy (MM kJ/hr)	371	359
Gas Turbine Parameters	GT Turndown Minimum Load (%)	25%	50%
	GT Ramp Rate (MW/min)	50	50
	NO_X (ppm) (@15% O_2)	25	25
	CO (ppm) (@15% O_2)	113/139	113/125
	Wobbe Variation (%)	+/-20%	+/-25%
	Startup Time (Hot, Minutes)	10	10
SC Plant Performance	SC Net Output (MW)	113	106
	SC Net Heat Rate (Btu/kWh, LHV)	7,905	7,887
	SC Net Heat Rate (kJ/kWh, LHV)	8,340	8,321
	SC Net Efficiency (%, LHV)	43.2%	43.3%
1x CC Plant Performance	CC Net Output (MW)	136	128
	CC Net Heat Rate (Btu/kWh, LHV)	6,591	6,521
	CC Net Heat Rate (kJ/kWh, LHV)	6,953	6,880
	CC Net Efficiency (%, LHV)	51.8%	52.3%
	Plant Turndown – Minimum Load (%)	21%	42%
	Ramp Rate (MW/min)	50	50
	Startup Time (Hot, Minutes)	30	30
2x CC Plant Performance	CC Net Output (MW)	273	256
	CC Net Heat Rate (Btu/kWh, LHV)	6,573	6,503
	CC Net Heat Rate (kJ/kWh, LHV)	6,934	6,861
	CC Net Efficiency (%, LHV)	51.9%	52.5%
	Plant Turndown – Minimum Load (%)	21%	21%
	Ramp Rate (MW/min)	100	100
	Startup Time (Hot, Minutes)	30	30

The LMS100 gas turbine has proven its operating reliability, particularly in heavily renewables penetrated regions where it is often called upon to start and stop multiple times per day. GE is now offering up to 10 percent more power with the LMS100 PA+ units.

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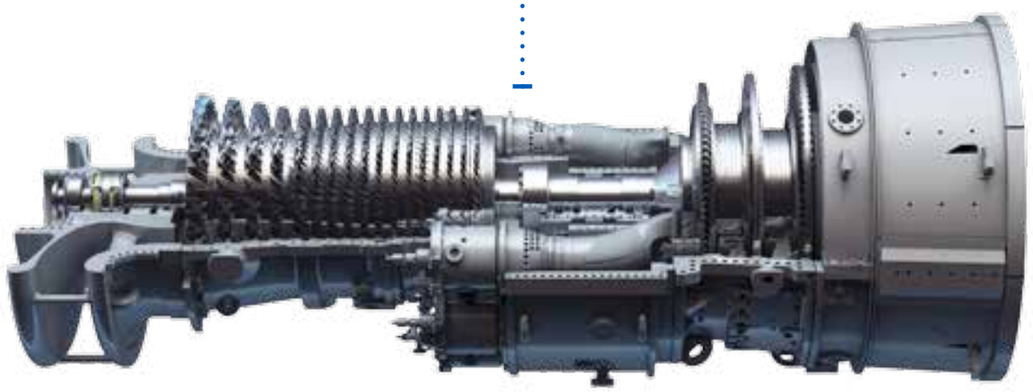
E-CLASS

7E.03 GAS TURBINE (60 Hz)

VERSATILITY FOR EXTREME OPERATING ENVIRONMENTS

GE's 7E.03 gas turbine is a recognized industry leader for 60 Hz industrial power applications where reliability and availability are the most critical attributes. Its robust architecture and operational flexibility make it well suited for a variety of peaking, cyclic, and baseload applications. With advanced technology fuel handling equipment, multi-fuel combustion system options, and advanced gas path features, the 7E.03 gas turbine can accommodate a full range of fuel alternatives while delivering better efficiency and lower emissions than other technologies in its class. Whether providing raw horsepower to drive industrial and petrochemical processes or steady, reliable output for CHP operation, these units keep your operation running.

91 MW
SIMPLE CYCLE OUTPUT
>52% COMBINED CYCLE EFFICIENCY



Proven Performance

- 98.3 percent reliability—more than 0.2 percent higher than the industry average—equates to an additional 1,500 MWh or more per year.
- 32,000-hour inspection intervals provide more than two extra days of operation per year.
- The unit's exhaust energy profile and high mass flow enhance steam production in cogeneration applications.
- Millions of hours of operational experience have been accumulated on crude and residual oils.

Best in Class Fuel Flexiibility

- Tri- or dual-fuel capability lets you switch fuels, while running under load or during shutdown.
- Optional DLN 1+ combustion technology achieves industry-leading sub-3 ppm NO_X without selective catalytic reduction (SCR) and meets stringent emissions regulations.
- Available upgrade to DLN combustion systems provides hardware and controls modifications configured for either extended turndown or peak fire, all while remaining emissions-compliant:
  - Reduces NO_X/CO compliant turndown to 35 percent of baseload with inlet bleed heating, a 25 percent improvement from previous limits.
  - Increases simple cycle output by up to 7.6 percent by peak firing up to 100°F with no impact on NO_X emissions or turndown.

		7E.03
SC Plant Performance	SC Net Output (MW)	91
	SC Net Heat Rate (Btu/kWh, LHV)	10,060
	SC Net Heat Rate (kJ/kWh, LHV)	10,614
	SC Net Efficiency (%, LHV)	33.9%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,026
	Exhaust Temperature (°C)	552
	Exhaust Energy (MM Btu/hr)	592
	Exhaust Energy (MM kJ/hr)	624
	GT Turndown Minimum Load (%)	35%
	GT Ramp Rate (MW/min)	40
	NO_X (ppmvd) at baseload (@15% O_2)	4
	CO (ppm) at Min. Turndown w/o Abatement	25
	Wobbe Variation (%)	>+/-30%
	Startup Time (Conventional/Peaking, Minutes)	23/10
1x CC Plant Performance	CC Net Output (MW)	141
	CC Net Heat Rate (Btu/kWh, LHV)	6,560
	CC Net Heat Rate (kJ/kWh, LHV)	6,921
	CC Net Efficiency (%, LHV)	52.0%
	Plant Turndown – Minimum Load (%)	44%
	Ramp Rate (MW/min)	40
	Startup Time (RR Hot, Minutes)	35
2x CC Plant Performance	CC Net Output (MW)	283
	CC Net Heat Rate (Btu/kWh, LHV)	6,530
	CC Net Heat Rate (kJ/kWh, LHV)	6,890
	CC Net Efficiency (%, LHV)	52.3%
	Plant Turndown – Minimum Load (%)	22%
	Ramp Rate (MW/min)	80
	Startup Time (RR Hot, Minutes)	35

With four years of continuous operation before the machine needs to be opened for maintenance, the 7E.03 gas turbine is a proven workhorse. It has the largest installed base among E-class technologies and has been the product of choice for industrial cogeneration and mechanical drive applications in some of the world's most extreme operating environments.

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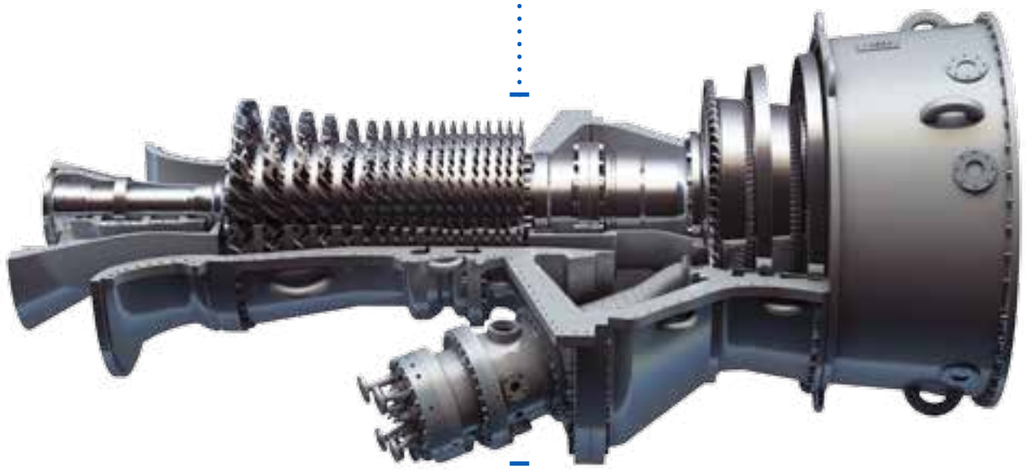
F-CLASS

6F.03 GAS TURBINE (60 Hz)

ADVANCED TECHNOLOGY FOR DECENTRALIZED POWER

Whether you need to generate power onsite or produce steam for petrochemical or district heating operations, the 6F.03 heavy duty gas turbine operating in simple or combined cycle delivers high levels of efficiency, availability, flexibility, and reliability. Its high exhaust energy and the benefits of utilizing multiple combustion systems make the 6F.03 gas turbine ideal for 50 Hz or 60 Hz midsize applications. In addition, when operating off-grid, the 6F.03 units bring the right power density with proven islanding mode performance and improved grid transient response capabilities.

82 MW
SIMPLE CYCLE OUTPUT
>55% COMBINED CYCLE EFFICIENCY



Durable, Compact Configuration for Diverse Applications

- Flexible layout, including lateral or axial air inlet and indoor or outdoor acoustic enclosures, overcome space constraints.
- Rugged architecture allows for performance in harsh and remote environments.
- Robust DLN 2.6 combustion system enables lower emissions—less than 15 ppm NO_X or 9 ppm CO—and up to 32,000-hour combustion inspection intervals.
- Turndown to 52 percent turbine load with DLN 2.6 combustion results in fewer starts and lower fuel costs.
- Online transfer from natural gas to light distillate improves uptime.
- Multi-Nozzle Quiet Combustor (MNQC) accommodates syngas from 20 percent to 90 percent hydrogen; MNQC employing steam or nitrogen injection achieves less than 25 ppm NO_X emissions on syngas.
- The 6F.03 unit continues to evolve by incorporating proven technologies for outstanding efficiency, heat rate and CC/CHP performance in its class.
- All technologies are retrofittable into the installed base so that both current and new customers can benefit from the versatility and reliability of GE's technologies.

		6F.03
SC Plant Performance	SC Net Output (MW)	82
	SC Net Heat Rate (Btu/kWh, LHV)	9,470
	SC Net Heat Rate (kJ/kWh, LHV)	9,991
	SC Net Efficiency (%, LHV)	36.0%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,135
	Exhaust Temperature (°C)	613
	Exhaust Energy (MM Btu/hr)	482
	Exhaust Energy (MM kJ/hr)	509
	GT Turndown Minimum Load (%)	52%
	GT Ramp Rate (MW/min)	7
	NO_X (ppmvd) at baseload (@15% O_2)	15
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+10%, -15%
	Startup Time (Conventional/Peaking, Minutes)	29/-
1x CC Plant Performance	CC Net Output (MW)	124
	CC Net Heat Rate (Btu/kWh, LHV)	6,155
	CC Net Heat Rate (kJ/kWh, LHV)	6,494
	CC Net Efficiency (%, LHV)	55.4%
	Plant Turndown – Minimum Load (%)	59%
	Ramp Rate (MW/min)	7
	Startup Time (RR Hot, Minutes)	45
2x CC Plant Performance	CC Net Output (MW)	250
	CC Net Heat Rate (Btu/kWh, LHV)	6,120
	CC Net Heat Rate (kJ/kWh, LHV)	6,457
	CC Net Efficiency (%, LHV)	55.8%
	Plant Turndown – Minimum Load (%)	30%
	Ramp Rate (MW/min)	13
	Startup Time (RR Hot, Minutes)	45

The 6F.03 gas turbine is the little F engine that will change the way you think about heat and power. With a fleet of nearly 200 units, more customers have selected the 6F.03 than any other turbine in its class. It continues to evolve by incorporating proven technologies for outstanding efficiency, heat rate and CC/CHP performance.

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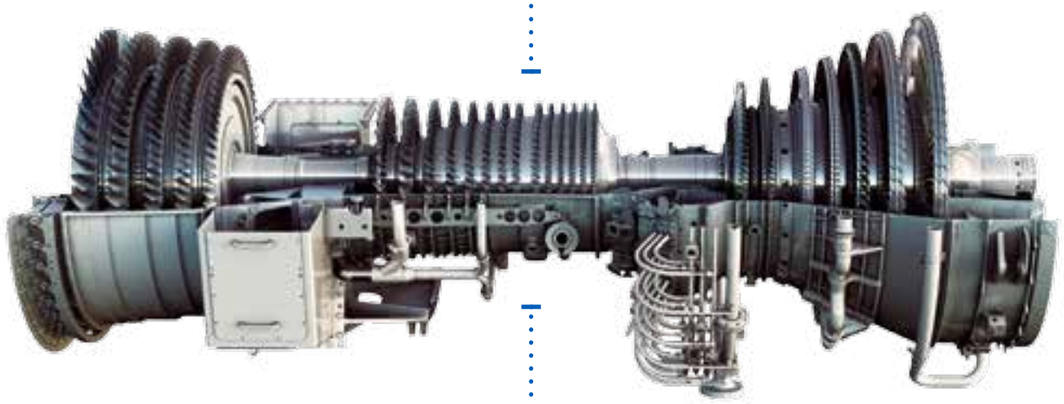
AERODERIVATIVE

LM6000 GAS TURBINE (60 Hz)

A COMPACT AND EFFICIENT SOLUTION THAT DELIVERS PROVEN FLEXIBILITY

GE's LM6000 family of aeroderivative gas turbines has achieved more than 31 million operating hours with over 1,100 units shipped to customers globally—more than ten times the experience of all other competing gas turbines in its class combined. The LM6000 aeroderivative gas turbine offers 49 MW to 57 MW of power, proven reliability, and efficiency in a package that can be tailored to meet the unique operating requirements of almost any distributed power application. Its fuel flexibility is critical for isolated installations with black start requirements, and a choice of combustion technologies helps operators meet stringent CO_2 and NO_X emissions requirements.

49-57 MW
SIMPLE CYCLE OUTPUT
>56% COMBINED CYCLE EFFICIENCY



Fast, Flexible Solution for Changing Industry Needs

- Fast start with ramp-up to full power in five minutes or less.
- Engineered to cost-effectively cycle multiple times per day to meet dispatch profiles.
- Lightweight modular configuration for easier transport, installation, and onsite maintenance.
- Optimized hot day performance with Sprint, a wet compression inlet treatment for power augmentation.
- Robust design with industry-leading reliability (>99.8 percent) and availability (>98.4 percent).
- Proven simple cycle and combined cycle performance for efficient operation in duties from peaking to baseload.

LM6000 PC/PG:

- 50 MW/minute ramping capability with emissions-compliant turndown as low as 25 percent.
- Proven SAC combustion provides fuel flexibility with water injection for emission control.
- High fuel flexibility with capability to burn naphtha, propane, coke oven gas, ethanol, and LNG.

LM6000 PF/PF+:

- Combined cycle efficiencies of up to 56 percent.
- 50 MW/minute ramping capability.
- Proven dual fuel DLE combustion with 15 ppm NO_X on gas fuel capability.

		LM6000 PC	LM6000 PG	LM6000 PF	LM6000 PF+
Gas Turbine Rating	ISO Base Rating (MW)	52	59	50	57
	Gross Heat Rate (Btu/kWh, LHV)	8,444	8,581	8,109	8,256
	Gross Heat Rate (kJ/kWh, LHV)	8,909	9,053	8,555	8,711
	Gross Efficiency (%, LHV)	40.4%	39.8%	42.1%	41.3%
	Exhaust Temperature (°F)	851	897	865	914
	Exhaust Temperature (°C)	455	480	463	490
	Exhaust Energy (MM Btu/hr)	225	258	221	255
	Exhaust Energy (MM kJ/hr)	237	273	233	269
Gas Turbine Parameters	GT Turndown Minimum Load (%)	25%	25%	50%	50%
	GT Ramp Rate (MW/min)	50	50	50	50
	NO_X (ppm) (@15% O_2)	25	25	25	25
	CO (ppm) (@15% O_2)	89/150	94/150	25/70	25/25
	Wobbe Variation (%)	+/-20%	+/-20%	+/-25%	+/-25%
	Startup Time (Hot, Minutes)	5	5	5	5
SC Plant Performance	SC Net Output (MW)	50	57	49	55
	SC Net Heat Rate (Btu/kWh, LHV)	8,619	8,746	8,281	8,419
	SC Net Heat Rate (kJ/kWh, LHV)	9,093	9,227	8,737	8,883
	SC Net Efficiency (%, LHV)	39.6%	39.0%	41.2%	40.5%
1x CC Plant Performance	CC Net Output (MW)	58.6	72.8	58.3	69.8
	CC Net Heat Rate (Btu/kWh, LHV)	6,573	6,535	6,179	6,105
	CC Net Heat Rate (kJ/kWh, LHV)	6,935	6,895	6,520	6,441
	CC Net Efficiency (%, LHV)	51.9%	52.2%	55.2%	55.9%
	Plant Turndown – Minimum Load (%)	19%	19%	37%	37%
	Ramp Rate (MW/min)	50	50	50	50
	Startup Time (Hot, Minutes)	30	30	30	30
2x CC Plant Performance	CC Net Output (MW)	118	146	117	140
	CC Net Heat Rate (Btu/kWh, LHV)	6,555	6,516	6,161	6,085
	CC Net Heat Rate (kJ/kWh, LHV)	6,916	6,874	6,500	6,420
	CC Net Efficiency (%, LHV)	52.1%	52.4%	55.4%	56.1%
	Plant Turndown – Minimum Load (%)	19%	19%	19%	18%
	Ramp Rate (MW/min)	100	100	100	100
	Startup Time (Hot, Minutes)	30	30	30	30

If you need a unit that can be quickly installed, and you want to operate simple cycle to begin with, and then convert to combined cycle in a year or two, you can't beat LM6000 technology.

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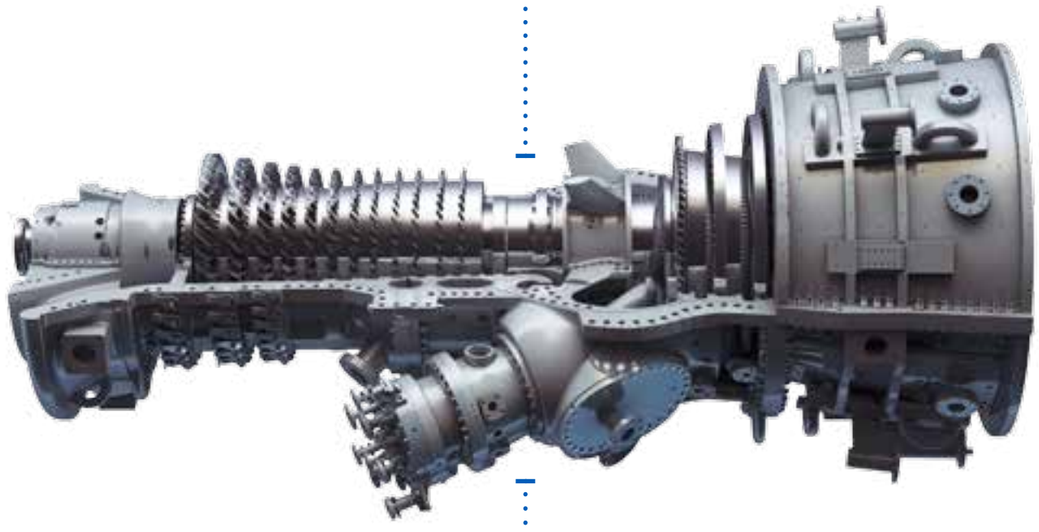
F-CLASS

6F.01 GAS TURBINE (60 Hz)

THE MOST EFFICIENT COMBINED CYCLE/COGENERATION BELOW 100 MW

GE's 6F.01 gas turbine is built from our 6C technology that was introduced to the industry almost 15 years ago. Through proven technology improvements over time, our 6F.01 turbine now achieves nearly 57 percent efficiency in cogeneration operation. Its segment-leading exhaust energy supports flexible and economic plant solutions for combined cycle power generation or cogeneration. Available with cold-end or hot-end drive configurations, our 6F.01 units provide customizable new plant or plant-repowering solutions.

52 MW
SIMPLE CYCLE OUTPUT
>56% COMBINED CYCLE EFFICIENCY



Proven Experience with High Reliability and Availability

- 110,000 operating hours and 2,250 starts achieved by fleet leaders in Turkey with 99.2 percent reliability over the past four years.
- Proven hot gas path and combustion materials featured on 7F.05, 9F.05 and H-class turbines support higher temperatures.
- Established DLN 2.5 combustion system with over a decade of operating experience.
- Combustion and hot gas path maintenance intervals of 32,000 hours and 900 starts.
- Field replaceable compressor airfoils capable of wet compression power augmentation.
- 1,120°F (600°C) exhaust temperature enables an F-class industry standard 1,050°F (565°C) steam cycle.
- Compact and modular cold-end drive configuration for new plants.
- Hot-end drive option for 6B flange-to-flange replacement solution brings more than five points in efficiency improvement.

		6F.01
SC Plant Performance	SC Net Output (MW)	52
	SC Net Heat Rate (Btu/kWh, LHV)	8,880
	SC Net Heat Rate (kJ/kWh, LHV)	9,369
	SC Net Efficiency (%, LHV)	38.4%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,117
	Exhaust Temperature (°C)	603
	Exhaust Energy (MM Btu/hr)	280
	Exhaust Energy (MM kJ/hr)	296
	GT Turndown Minimum Load (%)	40%
	GT Ramp Rate (MW/min)	12
	NO_X (ppmvd) at baseload (@15% O_2)	25
	CO (ppm) at Min. Turndown w/o Abatement	9
	Wobbe Variation (%)	+/-10%
	Startup Time (Conventional/Peaking, Minutes)	12/10
1x CC Plant Performance	CC Net Output (MW)	76
	CC Net Heat Rate (Btu/kWh, LHV)	6,030
	CC Net Heat Rate (kJ/kWh, LHV)	6,362
	CC Net Efficiency (%, LHV)	56.6%
	Plant Turndown – Minimum Load (%)	53%
	Ramp Rate (MW/min)	12
	Startup Time (RR Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	154
	CC Net Heat Rate (Btu/kWh, LHV)	6,000
	CC Net Heat Rate (kJ/kWh, LHV)	6,330
	CC Net Efficiency (%, LHV)	56.9%
	Plant Turndown – Minimum Load (%)	27%
	Ramp Rate (MW/min)	24
	Startup Time (RR Hot, Minutes)	30

Since its reintroduction in 2014, our customers have responded in a big way to the 6F.01 unit's segment leading efficiency and exhaust energy, helping GE regain leadership in this space.

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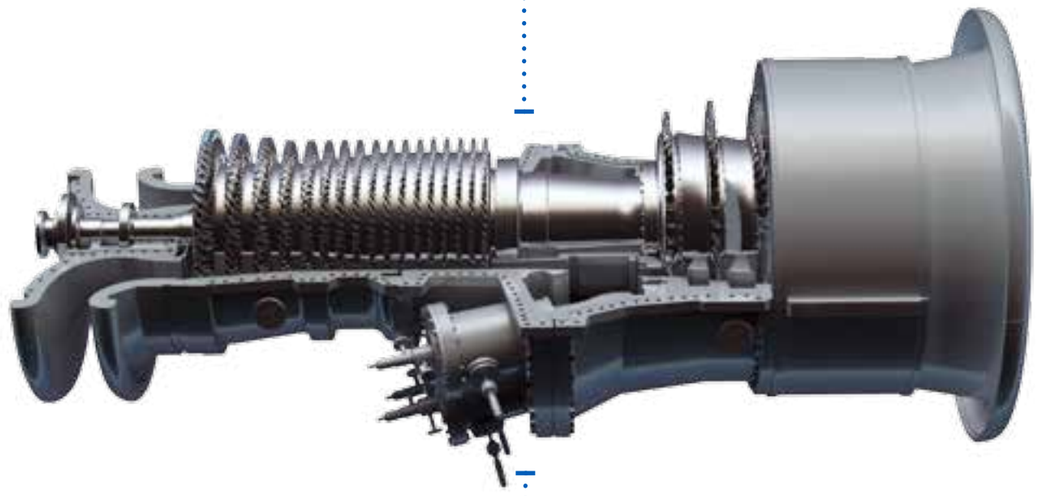
E-CLASS

6B.03 GAS TURBINE (60 Hz)

INDUSTRIAL-STRENGTH, FIELD-PROVEN RELIABILITY

The rugged, reliable 6B.03 heavy duty gas turbine is a popular choice for refineries, natural gas liquefaction power, combined heat and power (CHP), and industrial power applications. Its ability to operate in island mode, coupled with its 94.6 percent availability, make the 6B.03 gas turbine an ideal solution for remote installations and extreme operating conditions far from the grid. With 99 percent reliability, proven and tested with more than 55 million operating hours, GE's 6B.03 gas turbines provide cost-effective power you can count on.

44 MW
SIMPLE CYCLE OUTPUT
>51% COMBINED CYCLE EFFICIENCY



Dependable, Cost-Effective Solution

- Accommodates the multiple start-ups required for seasonal CHP.
- Capable of black starts for volatile grid environments.
- Built to stay online in extreme and remote conditions.
- Pre-assembled gas turbine package with accessories for easier transport and faster site installation; as low as six months from order to operation.

Industry-Leading Fuel Flexibility

- Operates on a broad range of fuels:
  - DLN combustion supports low-cost gas and liquid fuels, including process gases, low calorific gases, and up to 30 percent hydrogen, 100 percent ethane, 100 percent propane and 50 percent nitrogen.
  - Standard combustor is capable of up to 95 percent hydrogen, or heavy fuel oil with up to 200 ppm vanadium; also supports naptha, bioethanol, methanol, synthetic gases, and steel mill gases.
- 20 MW in less than five seconds measured onsite with Dry Low NO_X combustion system to support a grid power deficit.
- 289 MMBtu/hr exhaust energy at 549°C can generate a high quantity of steam with pressure up to 110 bar for industrial steam without supplementary firing.

		6B.03
SC Plant Performance	SC Net Output (MW)	44
	SC Net Heat Rate (Btu/kWh, LHV)	10,180
	SC Net Heat Rate (kJ/kWh, LHV)	10,740
	SC Net Efficiency (%, LHV)	33.5%
Gas Turbine Parameters	Exhaust Temperature (°F)	1,019
	Exhaust Temperature (°C)	548
	Exhaust Energy (MM Btu/hr)	289
	Exhaust Energy (MM kJ/hr)	305
	GT Turndown Minimum Load (%)	50%
	GT Ramp Rate (MW/min)	20
	NO_X (ppmvd) at baseload (@15% O_2)	4
	CO (ppm) at Min. Turndown w/o Abatement	25
	Wobbe Variation (%)	>+/-30%
	Startup Time (Conventional/Peaking, Minutes)	12/10
1x CC Plant Performance	CC Net Output (MW)	67
	CC Net Heat Rate (Btu/kWh, LHV)	6,630
	CC Net Heat Rate (kJ/kWh, LHV)	6,995
	CC Net Efficiency (%, LHV)	51.5%
	Plant Turndown – Minimum Load (%)	57%
	Ramp Rate (MW/min)	20
	Startup Time (RR Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	135
	CC Net Heat Rate (Btu/kWh, LHV)	6,600
	CC Net Heat Rate (kJ/kWh, LHV)	6,963
	CC Net Efficiency (%, LHV)	51.7%
	Plant Turndown – Minimum Load (%)	29%
	Ramp Rate (MW/min)	40
	Startup Time (RR Hot, Minutes)	30

We are striving to ensure the 6B.03 gas turbine continues to be the first choice for non-standard fuels in cogeneration, industrial and oil and gas power generation operations. With new technology introductions, such as DLN1/1+ Ultra Low NO_X technology, customers looking to operate on a blend of gases—including high-hydrogen blends—can realize lower NO_X emissions and reduced operating costs with increased performance.

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AERODERIVATIVE

TM2500 MOBILE GAS TURBINE-GENERATOR SET (60 Hz)

FAST AND FLEXIBLE POWER PLANT—WHEN AND WHERE IT'S NEEDED

GE's TM2500 fast power solution harnesses the highly successful LM2500+G4 aeroderivative gas turbine to solve a number of industry challenges, positioning power at—or near—the point of use. Known as the "power plant on wheels," the TM2500 generator set is ideal for providing a baseload bridge to permanent power installations or for generating backup power in support of natural disaster relief, plant shutdowns, grid instability due to renewables adoption, or equipment maintenance.

35 MW
SIMPLE CYCLE OUTPUT
COMMERCIAL OPERATION IN
<11 DAYS

Focused on Solving Fast Power Challenges

- On-demand power plants delivered in weeks, not months, and commissioned in as few as 11 days from parking the first trailer.
- Mounted on a mobile, two-trailer assembly that can be transported via land, sea, or air to remote locations.
- A complete turnkey solution.
- Scalable blocks of power that can be aggregated to meet any site-specific need.
- Full power achieved within 10 minutes or less.
- Fuel flexibility that allows operation on natural gas, distillate oil, or condensates.
- 50 percent lower emissions compared to diesel generators when operating on natural gas.

		TM2500
Gas Turbine Rating	ISO Base Rating (MW)	37.1
	Gross Heat Rate (Btu/kWh, LHV)	9,171
	Gross Heat Rate (kJ/kWh, LHV)	9,676
	Gross Efficiency (%, LHV)	37.2%
	Exhaust Temperature (°F)	950
	Exhaust Temperature (°C)	510
	Exhaust Energy (MM Btu/hr)	185
	Exhaust Energy (MM kJ/hr)	195
Gas Turbine Parameters	GT Turndown Minimum Load (%)	50%
	GT Ramp Rate (MW/min)	30
	NO_X (ppm) (@15% O_2)	25
	CO (ppm) (@15% O_2)	250/275
	Wobbe Variation (%)	+/-20%
	Startup Time (Hot, Minutes)	10
SC Plant Performance	SC Net Output (MW)	34.9
	SC Net Heat Rate (Btu/kWh, LHV)	9,341
	SC Net Heat Rate (kJ/kWh, LHV)	9,856
	SC Net Efficiency (%, LHV)	36.5%
1x CC Plant Performance	CC Net Output (MW)	49
	CC Net Heat Rate (Btu/kWh, LHV)	6,730
	CC Net Heat Rate (kJ/kWh, LHV)	7,100
	CC Net Efficiency (%, LHV)	50.7%
	Plant Turndown – Minimum Load (%)	36%
	Ramp Rate (MW/min)	30
	Startup Time (Hot, Minutes)	30
2x CC Plant Performance	CC Net Output (MW)	98
	CC Net Heat Rate (Btu/kWh, LHV)	6,708
	CC Net Heat Rate (kJ/kWh, LHV)	7,077
	CC Net Efficiency (%, LHV)	50.9%
	Plant Turndown – Minimum Load (%)	36%
	Ramp Rate (MW/min)	60
	Startup Time (Hot, Minutes)	30

We have heard the customer and we are now able to deliver a TM2500 solution with around 24 percent more hot day power and a 20 percent reduction in installation cycle.

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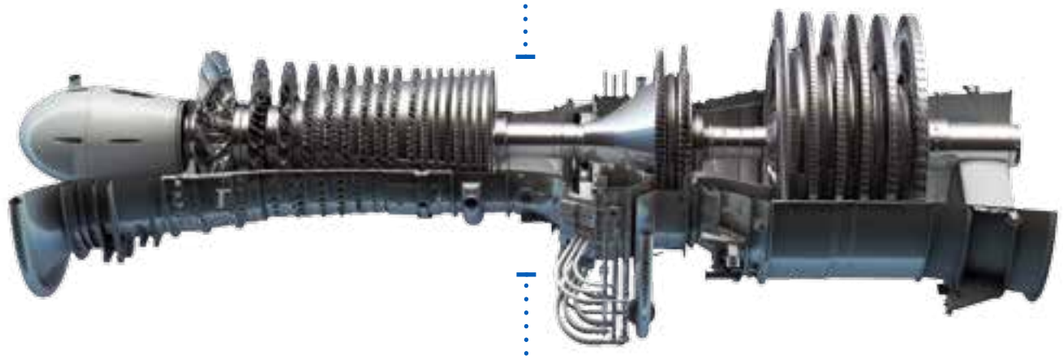
AERODERIVATIVE

LM2500 GAS TURBINE (60 Hz)

UNSURPASSED RELIABILITY, PROVEN EXPERIENCE, AND CONTINUOUS INNOVATION

The LM2500 series gas turbines serve a variety of operating applications in the oil and gas and industrial segments with 23 MW to 34 MW of power in simple cycle operation. The product family, which includes the LM2500, LM2500+, and LM2500+G4 units, boasts over 2,100 units shipped and more than 75 million hours of operating experience. Maintaining a high degree of commonality with the CF6 aircraft engine, the LM2500 family has been one of the top selling aeroderivative gas turbines for over 40 years and continues to build its reputation as the most reliable industrial gas turbine generator in its class. Ideal for onshore and offshore mechanical drive, in-plant power generation, pipeline, platform, cogeneration, and combined cycle applications, the LM2500 family continues to evolve to provide increased customer value.

23-34 MW
SIMPLE CYCLE OUTPUT
>38% SIMPLE CYCLE EFFICIENCY



Serving the Needs of the Oil & Gas and Industrial Segments

- Lightweight and compact for quick installation and ease of maintenance.
- Robust design with greater than 99 percent; availability greater than 98 percent.
- Proven capability to achieve fast startup (<10 minutes) and operate in highly cyclic environments.
- Dual fuel capability for distillate and natural gas.
- Can accommodate naptha, propane, coke oven gas, ethanol, and LNG.
- Reduced NO_X (<15 ppm) with the DLE combustor; also available with optional steam or water injection system for NO_X emission control.

LM2500+: More Power with the Same Proven Reliability

- Additional one stage of compression for another 11 MW of simple cycle output.
- One-piece first stage “blisk” (blade+disk) for increased ruggedness.
- Enhanced fit for pipeline, peaking power, and CHP applications.

LM2500+G4: Highest Efficiency of the LM2500 Family

- Modified first stage for increased air flow and pressure ratio.
- Improved design and materials in the compressor and turbine sections to enhance performance.

		LM2500	LM2500+	LM2500+G4
Gas Turbine Rating	ISO Base Rating (MW)	23.2	31.9	34.5
	Gross Heat Rate (Btu/kWh, LHV)	9,317	8,785	8,709
	Gross Heat Rate (kJ/kWh, LHV)	9,830	9,269	9,188
	Gross Efficiency (%, LHV)	36.6%	38.8%	39.2%
	Exhaust Temperature (°F)	1,002	978	995
	Exhaust Temperature (°C)	539	525	535
	Exhaust Energy (MM Btu/hr)	134	168	179
	Exhaust Energy (MM kJ/hr)	142	177	189
Gas Turbine Parameters	GT Turndown Minimum Load (%)	50%	50%	50%
	GT Ramp Rate (MW/min)	30	30	30
	NO_X (ppm) (@15% O_2)	15	25	25
	CO (ppm) (@15% O_2)	25/25	25/25	25/25
	Wobbe Variation (%)	+/-25%	+/-25%	+/-25%
	Startup Time (Hot, Minutes)	10	10	10
SC Plant Performance	SC Net Output (MW)	22.7	30.6	33.6
	SC Net Heat Rate (Btu/kWh, LHV)	9,501	8,988	8,897
	SC Net Heat Rate (kJ/kWh, LHV)	10,024	9,482	9,387
	SC Net Efficiency (%, LHV)	35.9%	38.0%	38.4%
1x CC Plant Performance	CC Net Output (MW)	33.2	43.9	47.7
	CC Net Heat Rate (Btu/kWh, LHV)	6,456	6,299	6,239
	CC Net Heat Rate (kJ/kWh, LHV)	6,811	6,645	6,583
	CC Net Efficiency (%, LHV)	52.9%	54.2%	54.7%
	Plant Turndown – Minimum Load (%)	34%	35%	35%
	Ramp Rate (MW/min)	30	30	30
	Startup Time (Hot, Minutes)	30	30	30
2x CC Plant Performance	CC Net Output (MW)	66.6	88.2	95.7
	CC Net Heat Rate (Btu/kWh, LHV)	6,431	6,277	6,218
	CC Net Heat Rate (kJ/kWh, LHV)	6,785	6,622	6,560
	CC Net Efficiency (%, LHV)	53.1%	54.4%	54.9%
	Plant Turndown – Minimum Load (%)	17%	17%	18%
	Ramp Rate (MW/min)	60	60	60
	Startup Time (Hot, Minutes)	30	30	30

The latest development in the LM2500 product is a modular package design, including a repower driver module that can be installed in less than 30 days, or a complete generator set with a 10 percent to 15 percent lower total installed cost.

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OVERVIEW AND SCOPE

HRSG OFFERINGS

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REHEAT STEAM TURBINES

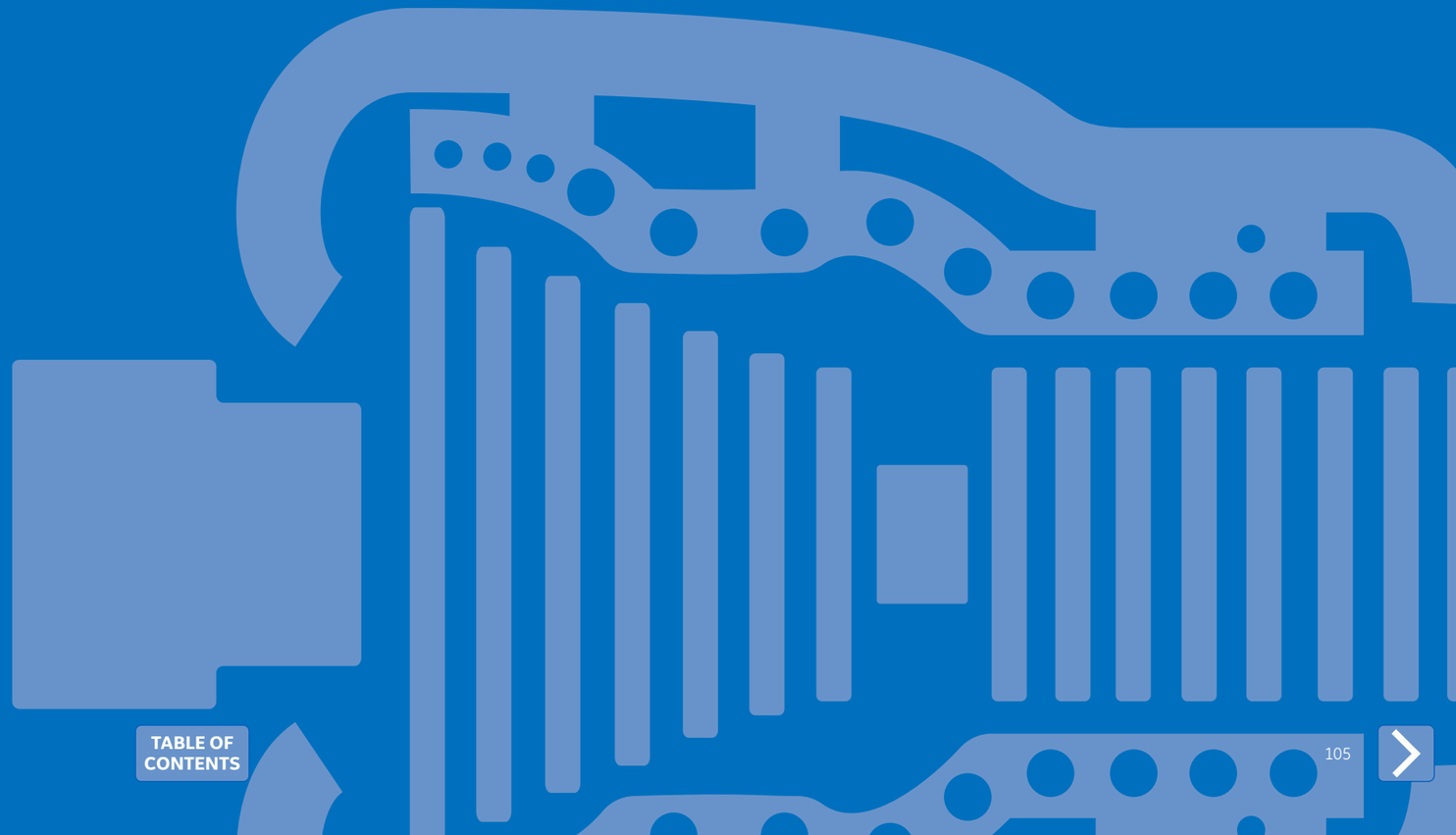
D650

D600/D400

A650/A450

NON-REHEAT STEAM TURBINES

D200/A200



BOTTOMING CYCLE OFFERINGS

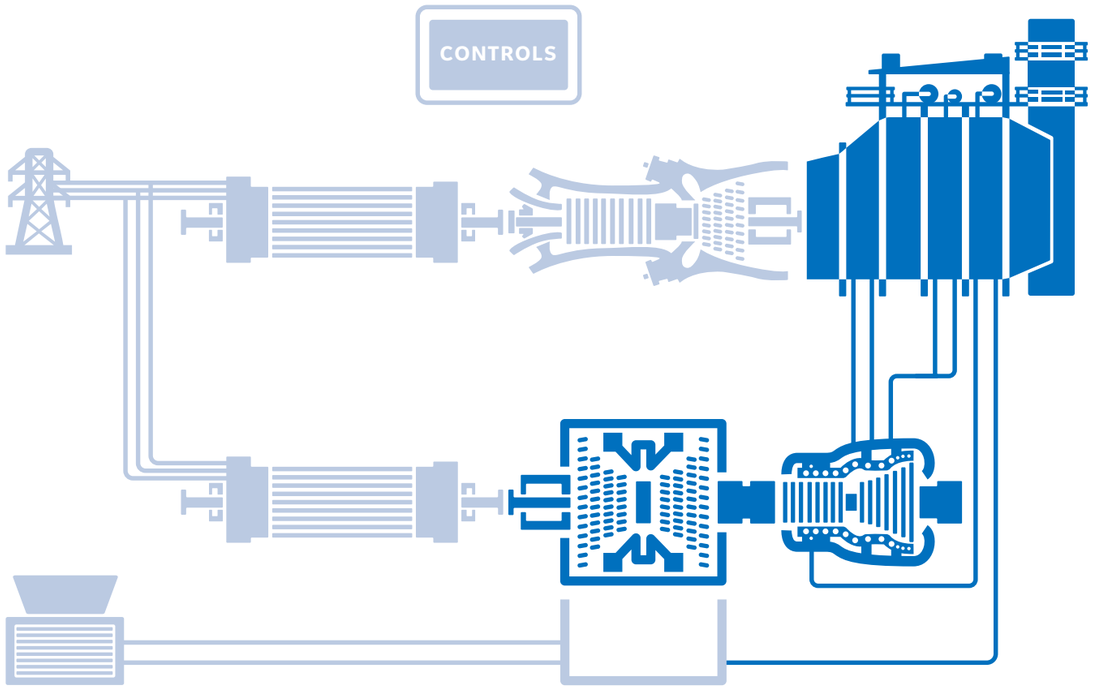
OVERVIEW AND SCOPE

A bottoming cycle (BC) generates revenue by reclaiming the waste energy in the gas turbine exhaust. In fact, there is so much free energy available that the BC can increase total output and efficiency of a simple cycle power plant by more than 50 percent. These additional megawatts are delivered at no additional fuel cost or emissions. Unlike other zero-fuel, zero-emissions technologies, the bottoming cycle is fully dispatchable. The BC of a combined cycle power plant has lower CAPEX than wind and solar solutions of the same capacity and duty cycle.

To maximize the benefits of a bottoming cycle, it must be configured to fully exploit the site-specific thermal conditions. There are two major components in the BC: the heat recovery steam generator (HRSG) and the steam turbine. The HRSG is used to create steam from the hot gas turbine exhaust. Use of multiple steam pressures, high temperature superheaters or reheaters, auxiliary firing, exhaust gas bypass systems, and emissions reduction systems are all part of a custom solution. The steam turbine's steam path is customized for every site—the combination of pressure modules (HP, IP, LP), rotor stages, and blade sizes is dependent on site-specific elements such as exhaust back pressure, thermal and ambient conditions, and steam extraction and admission requirements.

The HRSG and steam turbine are both large, complex pieces of equipment. Therefore, it is critical to balance performance against life cycle cost, constructability, and maintainability in order to provide solutions that preserve the value proposition of the plant and increase the return on investment for the customer.

GE is a plant integrator and original equipment manufacturer of both HRSGs and steam turbines. We draw on over 100 years of cumulative power generation experience, significant technical expertise, and our exceptionally large and flexible product portfolio to deliver custom bottoming cycle solutions with excellent customer value.



"GE builds on more than 100 years of power generation experience, significant technical expertise, and our exceptionally large and flexible product portfolio to deliver custom bottoming cycle solutions with excellent customer value. Our ability to provide all of the power island equipment lets us achieve a heat rate improvement that averages 30 BTU/kWh better than our previous offerings."

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HRSG OFFERINGS

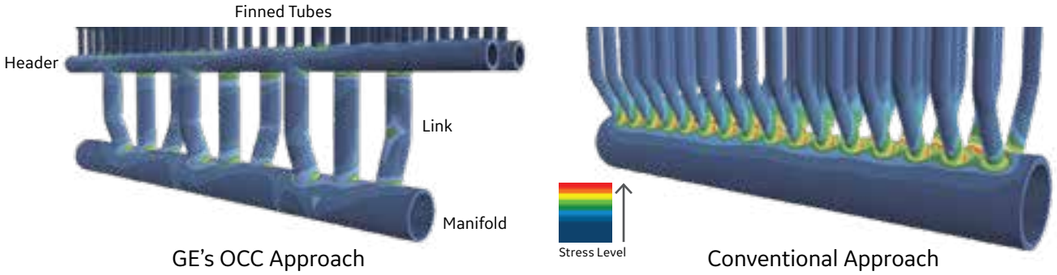
OVERVIEW AND SCOPE

The heat recovery steam generator (HRSG) is a primary component in the bottoming cycle of a combined cycle power plant. It provides the thermodynamic link between the gas turbines and steam turbines. Each HRSG solution is custom engineered to meet your desired operating flexibility and performance requirements.

GE's HRSG units are cost-effectively designed for heavy cycling operations that allow owners to reduce the cost of electricity, boost performance, increase reliability, and enhance flexibility. Numerous options are available, such as supplementary firing, SCR for NO_x abatement, CO catalyst for emissions reduction, and exhaust gas bypass systems for simple cycle gas operation in a combined cycle installation.

Optimized for Cycling and Constructability (OCC*)

Our approach alleviates thermal expansion issues associated with start-stop operating regimes (hot restarts and daily load following). The stepped arrangement—from the manifold, to a link, to a header, and finally to the finned tubes—reduces thermal stress by as much as 60 percent compared to the industry standard approach. With this superior capability for cyclic operations, you benefit from lower maintenance costs and increased life cycle.



GE's OCC Approach

Conventional Approach

A choice of modular construction options lets you choose the delivery method that best fits your specific project site infrastructure, transportation, and labor cost restrictions.

Harp Bundle

For sites with:

- Transportation restrictions
- Large crane scarcity
- Low site labor costs

Modules

For sites with:

- Fewer transportation restrictions
- Large crane availability

C-Frame

For sites with:

- Unrestricted transportation
- Large crane availability

Fully Assembled

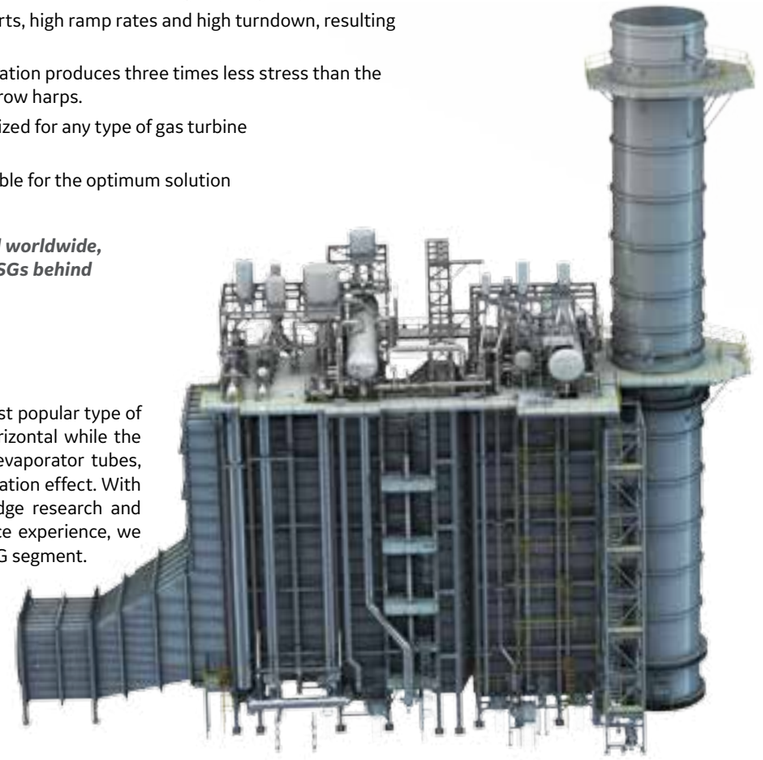
For sites with:

- Unrestricted crane and transportation availability
- High site labor costs

Why Choose GE's HRSG?

- The OCC design provides unparalleled flexibility for reliable high-cycling duty.
- Our HRSG units are capable of fast starts, high ramp rates and high turndown, resulting in enhanced flexibility.
- An innovative single-row harp configuration produces three times less stress than the industry-standard conventional multi-row harps.
- Our units can be configured and optimized for any type of gas turbine and steam cycle.
- A variety of modular options are available for the optimum solution to meet virtually any need.

"With more than 750 HRSGs installed worldwide, GE is a world leader in supplying HRSGs behind all major OEM's gas turbines."



Horizontal Drum Units

Horizontal drum HRSG units are the most popular type of steam generator. The flow of gas is horizontal while the water is heated in vertically arranged evaporator tubes, producing a natural, cost-effective circulation effect. With decades of OEM experience, cutting-edge research and development, and extensive field service experience, we are a global leader in the horizontal HRSG segment.

Vertical Drum Units

With vertical gas flows across horizontal evaporator tubes, this drum-type HRSG is ideal when site space is at a premium, for example, in add-on applications. We offer vertical drum HRSG solutions for both gas and oil operations, which are are particularly well suited for heavy fuel oil applications.

Horizontal Once-Through Units

The horizontal once-through HRSG employs the same basic arrangement as the standard horizontal HRSG, but eliminates the high-pressure drum. This results in greater thermal flexibility, high efficiency, and the ability to support unlimited daily cycling.

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STEAM TURBINES

PORTFOLIO AND OVERVIEW

Power and Performance

Over the last 100 years, GE has delivered more than 1.2 TW of power production capability totaling over 41 percent of the world's installed steam turbine base. With unparalleled global experience in engineering, manufacturing, sourcing, and services, we are delivering advanced technology steam turbine products to ensure our customers are more profitable, successful and satisfied than ever before.

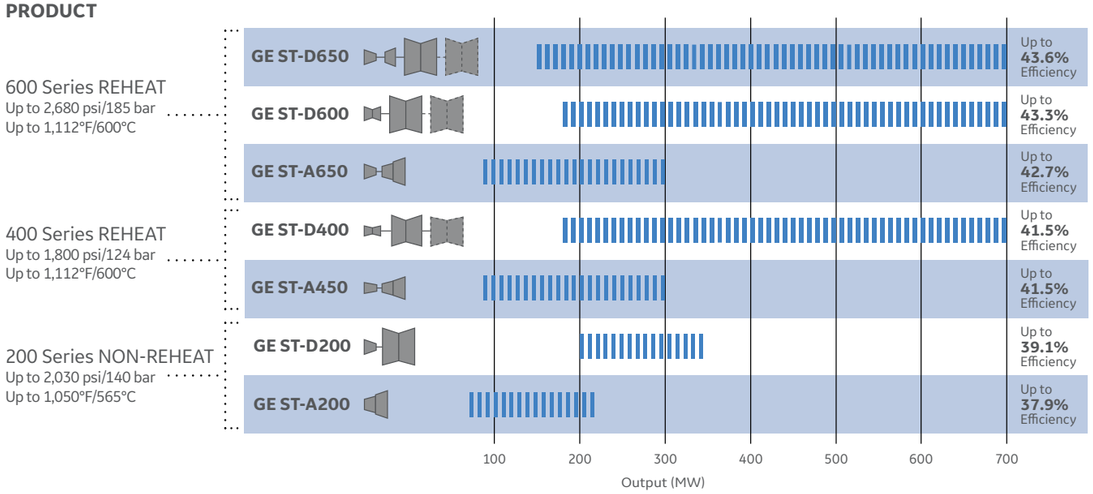
Solutions to Meet Your Power Needs

GE's steam turbine portfolio has the breadth and depth to help ensure that your specific site, operational, steam cycle, and application needs are met. We work with you from the earliest stages of your project, through construction, commissioning, and operation to provide a highly efficient and cost effective turbine that integrates smoothly with the gas turbine and overall plant operations.

Experience, Strength, and Stability

A systematic and evolutionary platform approach incorporates best practices and technology improvements based on years of experience. Our best-in-class engineering and manufacturing centers around the world enable us to provide an industry-leading portfolio of steam turbine products.

Combined Cycle Steam Turbines



Advanced Technology Features

High Efficiency Steam Paths

- High reaction 3-D blade and nozzle airfoils are designed for high pressure (HP), intermediate pressure (IP), and low pressure (LP) steam conditions to achieve industry-leading performance.
- Integral covered blades with continuous contacting surfaces provide excellent damping capability for superior mechanical integrity.
- Nozzle design provides precise control of radial clearances and throat areas to help ensure greater output and efficiency.

Welded Rotors

- With more than eight decades of welded rotor experience, our designs are proven and reliable.
- Better access for ultrasonic testing equipment translates to higher reliability.

Advanced Sealing Features

- Shaft and tip brush seals, developed in conjunction with our global research organization, improve leakage control when compared to more conventional sealing technology.
- Abradable coatings on stationary seals enable the reduction of radial clearances, decreasing long-term performance degradation.

Family of High Efficiency Last Stage Blades

- We offer a comprehensive family of last stage blades to meet your project's specific conditions.
  - — Up to 50 inch (1270 mm) for 60 Hz
  - — Up to 60 inch (1524 mm) for 50 Hz
- Robust mechanical construction features enable high reliability.
- Features such as full tip shroud, enhanced tip section with low shock loss, aerodynamic part span connector, and increased root-reaction improve steam turbine performance.
- Advanced radial vortexing improves performance and hood integration over a range of loads.

Shrink Ring Design

- GE's unique and proven shrink ring design reduces distortion, allowing critical clearances to be maintained and sustaining performance over the life of the machine.
- Compact design with smaller wall thickness provides flexible load cycling and faster startup times.

Proven Validation Methods

- GE thoroughly tests hardware to ensure every machine meets the reliability and performance standards our customers demand.
- The Low Pressure Development Turbine is a key element of our test facility in Schenectady, NY, USA. This test facility uses steam to test our LP designs for both mechanical robustness and aerodynamic efficiency.

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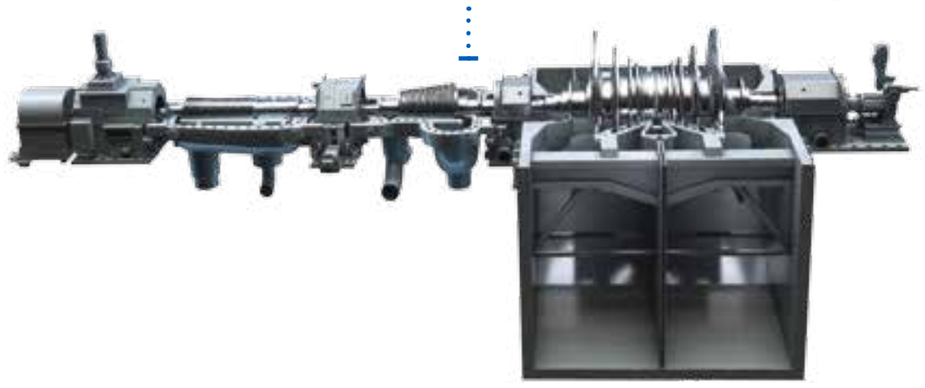
REHEAT

D650 STEAM TURBINE

THREE CASING, DOUBLE-FLOW LP SECTION, COMBINED CYCLE STEAM TURBINE

The D650 is GE's highest-performing combined cycle steam turbine and delivers the reliability and availability needed in today's demanding energy environment. It is ideally suited for 50 Hz and 60 Hz H-class and F-class gas turbine power plants that have high fuel costs and high annual hours of operation. The D650 turbine is available in both single-shaft and multi-shaft configurations, with the single-shaft configuration incorporating a clutch for enhanced operational flexibility. The D650 turbine consists of separate HP, IP, and either one or two double-flow LP sections.

150-700 MW
OUTPUT
Up to 43.6%
EFFICIENCY



Technical Data

	D650
Main Steam	Up to 2,680 psi (185 bar) Up to 1,112°F (600°C)
Reheat Temperature	Up to 1,112°F (600°C)
Frequency	50 Hz and 60 Hz
Output	150 MW – 700 MW
Steam Turbine Efficiency	Up to 43.6%

Built for Efficiency and Reliability

- Main steam inlet pressures up to 2,680 psi (185 bar) with main steam inlet and reheat temperatures up to 1,112°F (600°C).
- Single bearing design reduces construction time, increases power density and enhances reliability by avoiding load shifts.
- Side LP exhaust enables ground-level condenser connections, and reduced plant height allows BOP equipment to be positioned on one side.
- Self-synchronizing clutch reduces startup auxiliary steam demand, enabling the gas turbine to reach 85 percent load in less than 20 minutes under hot start conditions.
- HP, IP and valve units are shipped fully assembled.

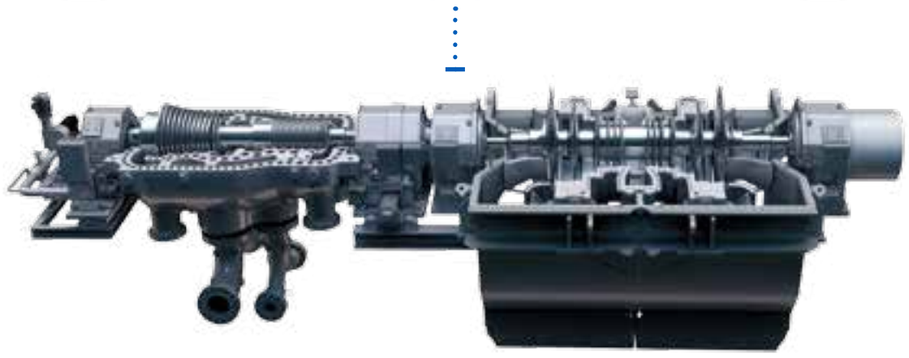
REHEAT

D600/D400 STEAM TURBINES

TWO CASING, DOUBLE-FLOW LP SECTION, COMBINED CYCLE STEAM TURBINE

GE's D600 and D400 steam turbines primarily support H-class and F-class gas turbine combined cycle plants. They were developed for highly efficient power generation in large, single-shaft or multi-shaft plants and for sites with low condenser pressure. GE's D600 and D400 steam turbines feature a combined HP and IP section and either one or two double-flow LP sections.

180-700 MW
OUTPUT
Up to 43.3%
EFFICIENCY



Technical Data

	D600	D400
Main Steam	Up to 2,400 psi (166 bar) Up to 1,112°F (600°C)	Up to 1,800 psi (124 bar) Up to 1,112°F (600°C)
Reheat Temperature	Up to 1,112°F (600°C)	Up to 1,112°F (600°C)
Frequency	50 Hz and 60 Hz	50 Hz and 60 Hz
Output	180 MW – 700 MW	180 MW – 700 MW
Steam Turbine Efficiency	Up to 43.3%	Up to 41.5%

Architecture for Reliable Performance

- Combined HP/IP section provides high power density, and side- or down-flow LP exhaust provides layout flexibility.
- One or two, double-flow LP modules enable enhanced performance at sites with low condenser pressure.

Built for Customer Value

- Main steam inlet and reheat temperatures up to 1,112°F (600°C) and inlet pressures up to 2400 psi (165 bar) and 1,800 psi (124 bar) for the D600 and D400, respectively.
- Single-shaft configurations incorporate a clutch for enhanced operational flexibility.

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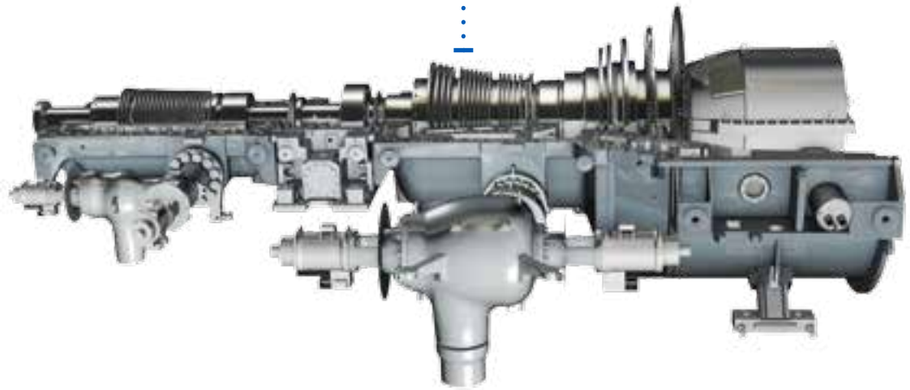
REHEAT

A650/A450 STEAM TURBINES

AXIAL EXHAUST, HIGH EFFICIENCY, COMBINED CYCLE STEAM TURBINES

GE's A650 and A450 combined cycle steam turbines deliver performance, reliability, and high shaft efficiency for today's 50 and 60 Hz applications. They can be applied in both single-shaft and multi-shaft combined cycle plants, with the single-shaft configuration incorporating a clutch for enhanced operational flexibility. These turbines have a separate HP section and combined IP and LP sections.

85-300 MW
OUTPUT
Up to 42.7%
EFFICIENCY



Technical Data

	A650	A450
Main Steam	Up to 2,680 psi (185 bar) Up to 1,112°F (600°C)	Up to 1,800 psi (124 bar) Up to 1,112°F (600°C)
Reheat Temperature	Up to 1,112°F (600°C)	Up to 1,112°F (600°C)
Frequency	50 Hz and 60 Hz	50 Hz and 60 Hz
Output	85 MW – 300 MW	85 MW – 300 MW
Steam Turbine Efficiency	Up to 42.7%	Up to 41.5%

High Performance in a Compact Footprint

- Main steam inlet pressures up to 2,680 psi (185 bar) and 1,800 psi (124 bar) for the A650 and A450, respectively, with main steam inlet and reheat temperatures up to 1,112°F (600°C).
- Fully assembled HP and IP/LP sections reduce installation times by up to three months.

Meeting Your Needs

- Compact, cost-effective configurations in both single-shaft and multi-shaft configurations.
- Available with down or straight axial exhaust to meet specific plant needs.

NON-REHEAT

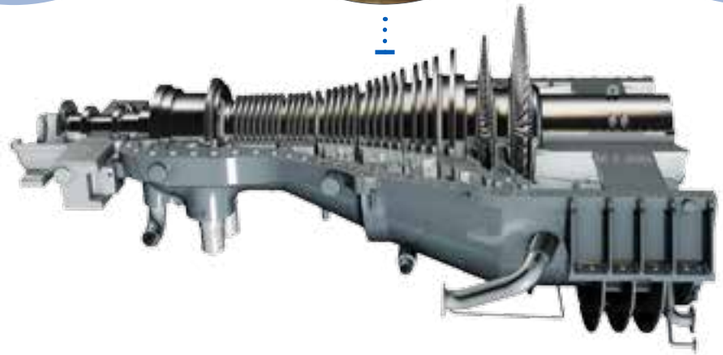
D200/A200 STEAM TURBINES

DOUBLE-FLOW AND AXIAL FLOW, NON-REHEAT COMBINED CYCLE STEAM TURBINES

GE's D200 and A200 steam turbines are ideal for non-reheat applications. The D200 is a two casing, double-flow LP machine, and the A200 is a compact axial exhaust design available in either a single or double casing. Both models are available with internally and externally controlled extractions to remove steam at any point along the steam path at the desired flow and pressure conditions. They are ideal for combined cycle conversion projects, when a bottoming cycle is added to an existing simple cycle plant. A combined cycle conversion will increase power plant output upwards of 50 percent, is fully dispatchable, and requires no additional fuel burn.

D200:
200-340 MW
OUTPUT
Up to 39.1%
EFFICIENCY

A200:
70-220 MW
OUTPUT
Up to 37.9%
EFFICIENCY



Technical Data

	D200	A200
Main Steam	Up to 2,030 psi (140 bar) Up to 1,050°F (565°C)	Up to 2,030 psi (140 bar) Up to 1,050°F (565°C)
Reheat Temperature	N/A	N/A
Frequency	50 Hz and 60 Hz	50 Hz and 60 Hz
Output	200 MW – 340 MW	70 MW – 220 MW
Steam Turbine Efficiency	Up to 39.1%	Up to 37.9%

D200: Delivering Cost and Performance

- HP ships fully assembled, enabling a five-month installation.
- LP moisture removal features improve performance and reliability, and its side-exhaust lowers the centerline for reduced plant costs.

A200: Compact and Robust

- Single casing configuration ships fully assembled, enabling a four-month installation.
- Adaptive stage technology controls low pressure extractions while intersections with valves are used for higher pressures.
- Depending on machine size, factory-tested pre-packaged units are available to minimize installation and startup times.

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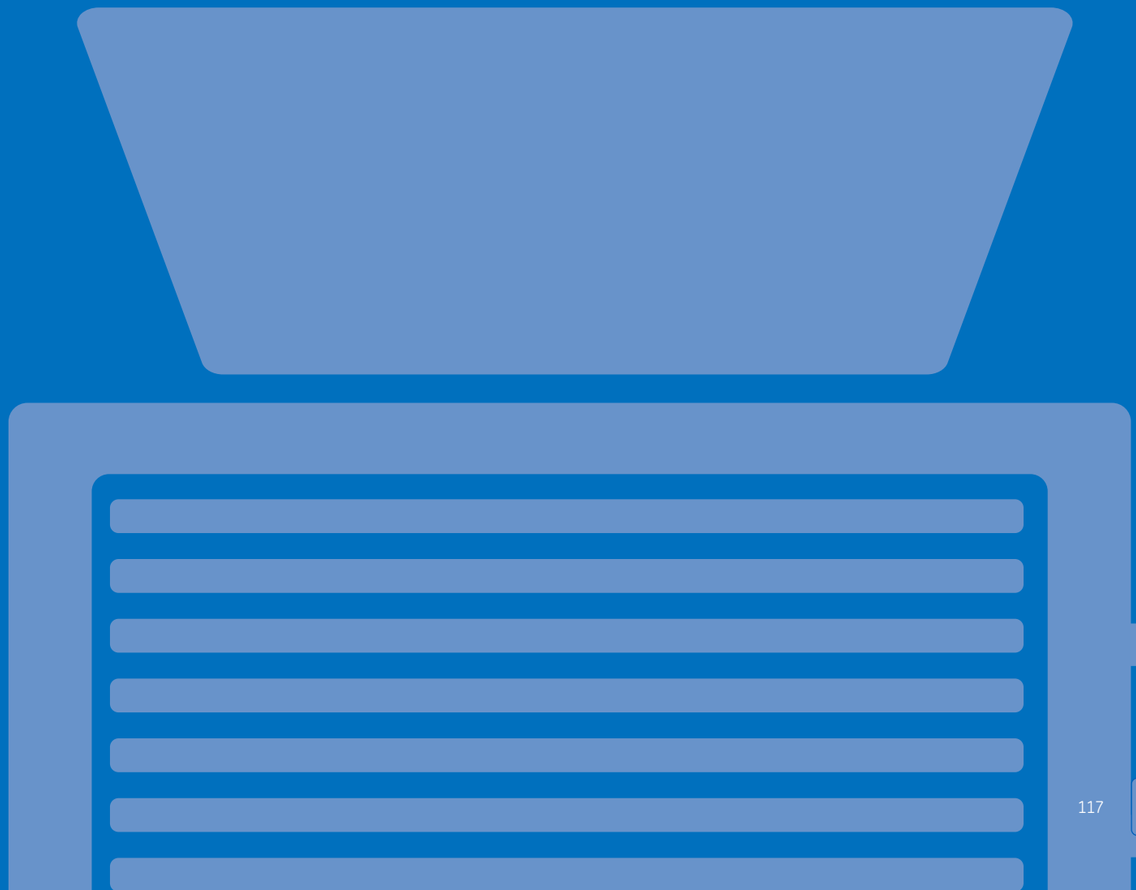
HEAT REJECTION

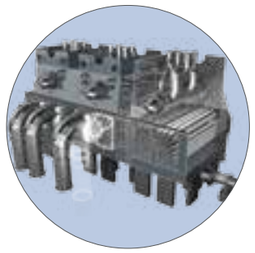
HEAT REJECTION CONSIDERATIONS



HEAT REJECTION CONSIDERATIONS

OVERVIEW AND COMPARISON

The heat rejection system is an important factor in the engineering of a combined cycle power plant and has a significant impact on overall plant efficiency. Site characteristics determine what type of condenser and heat rejection system are employed. Condensers are heat exchangers that operate at sub-atmospheric pressures (vacuum) to condense steam turbine exhaust into feedwater for the HRSG. A colder cooling fluid creates a better vacuum that allows more steam expansion through the turbine, leading to increased power output. Condensers can be water- or air-cooled. Water-cooled condensers are divided into two categories: those served directly with once-through water (sea, river, or lake), and those cooled with water in mechanical or natural draft cooling towers.



	Once-Through	Cooling Tower	Air-Cooled
Applications	Coastal or waterside locations without access restrictions	Locations where sufficient make-up water is available	Locations where water access is prohibited or uneconomical
Advantages	• Highest plant efficiency possible • Lowest condenser pressures possible • Smallest footprint • Lowest cost	• Enhanced plant site locations (not limited to waterside areas) • Better performance than air-cooled units • Lower cost than air-cooled	• Fewer water-related complications (use of air eliminates issues related to water corrosion, filtration, treatment and more) • Fewest siting and regulatory restrictions
Disadvantages	• Stringent siting requirements (direct access to a body of water) • Highest regulatory burdens	• Significant make-up water requirements • Large footprint	• Least efficient • Impacted by ambient conditions (size and effectiveness) • Largest footprint • Highest cost

Condenser Offering

High performance, high reliability: GE's patented tube bundle has a 50-year track record of outstanding performance and unrivaled reliability in both original installations and retrofits.

Highly efficient: The standardized tube bundles are scaled to meet the needs of any power plant, regardless of size. Each bundle contains between 1,600 to 7,000 tubes.

Reduced costs: Floor-mounted axial or lateral condensers simplify construction of the turbine foundation and shorten civil work and erection durations. They are delivered as fully tubed modules so that minimal welding is required on site.

Robust: Our condensers are built to handle turbine and steam generator overloads and variations in cooling water temperature. They are also resistant to impingement erosion and tube vibration.

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TOPGAS*

AIR-COOLED
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TOPACK*

ELECTRICAL CONVERSION OFFERINGS

OVERVIEW AND SCOPE

GE's approach to power plants ensures that plant systems and major equipment selections are customized to ensure a cost-effective solution. In the case of the electrical conversion system, site-specific variables include: generator output, cooling medium, mechanical configuration and installation and maintenance considerations.

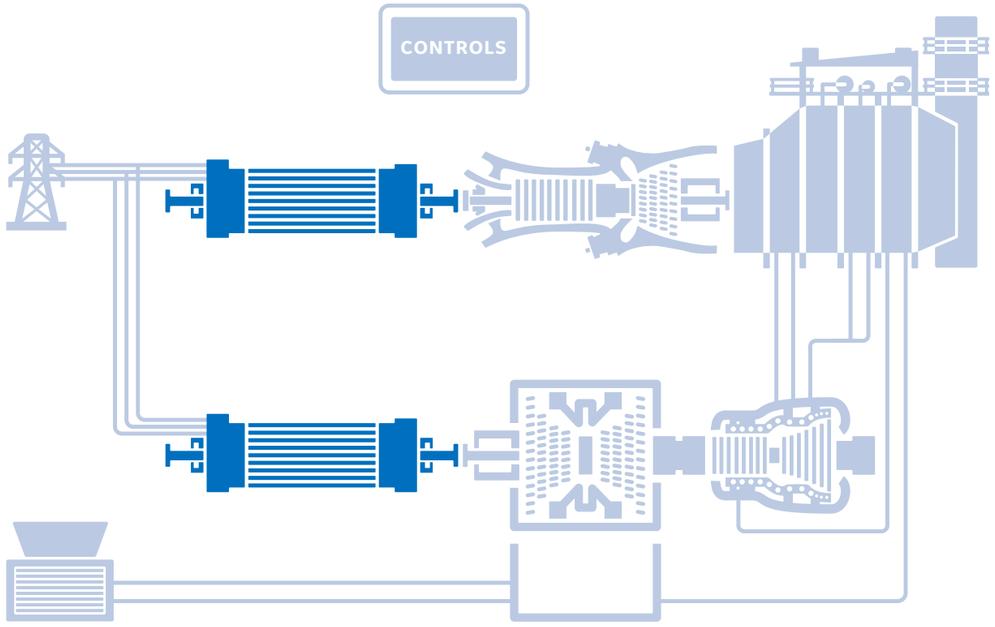
GE's generator product line is divided into three categories based on the method of cooling:

- **Water-cooled Generators** are suited for large power applications and combine the indirect gas cooling of a hydrogen-cooled unit with direct armature winding cooling via deionized (DI) water. They provide industry-leading efficiency in a small package.
- **Hydrogen-cooled Generators** are ideal for medium-sized applications and are completely sealed for operation with hydrogen gas as the cooling medium.
- **Air-cooled Generators** are the least complex and are ideal for lower output ratings. They are the easiest to maintain.

Most GE generators can support multi-shaft or single-shaft operation, with line side terminals on the top, side or bottom of the frame. All combined cycle gas turbine generators include provisions for static start features, enabling aggressive plant startup rates.

Understanding plant integration and grid interconnection requirements is critical to success. In addition to supplying power to the grid, a generator system must support the internal power demand of the plant and protect equipment from grid transient events. Accessories like the Mark VIe control system and the generator protection panel are included to provide a complete, robust and safe solution.

Regional fuel costs, local environmental conditions and hydrogen availability will drive the selection and complexity of the generator cooling method. Interconnect agreements, grid characteristics and the physical connection to the grid will influence the type of protective equipment and accessories that are required. Plant elements, like the direction of steam turbine exhaust, will establish the power train centerline height and, subsequently, the best generator line side terminal arrangement. Virtually all combined cycle integration decisions will impact the installability and maintainability of the generator equipment. These interactions must be carefully evaluated to provide an optimal solution and a healthy return throughout the plant's entire life cycle.



GENERATORS

PORTFOLIO AND OVERVIEW

GE is bringing generator technology and performance to the next level. We engineer and build our generators to meet the demanding specifications that keep you on the leading edge of efficient, reliable output. Our equipment installs quickly, integrates easily, operates reliably and delivers more power. With over 12,000 generators shipped since 1901, GE understands your challenges, and offers a complete range of configurations and cooling technologies to meet industry needs.

Our validation program is rigorous. Every new product is subjected to endurance and thermal-cyclic testing that simulate one full year of operation. This approach helps ensure that we deliver the world-class reliability you expect.

GE fully integrates engineering, manufacturing and life cycle services to keep your generators operational for the life of the equipment and to provide more value to you.

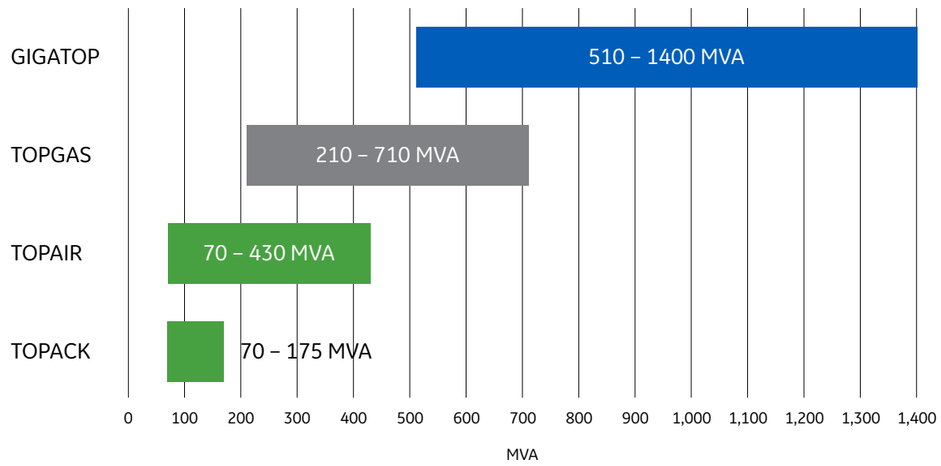
Product Families

GIGATOP (water-cooled) – Installed fleet of more than 680
These generators are the ideal solution for large combined cycle or simple cycle power plants when output requirements exceed the capabilities of conventional hydrogen-cooled machines. They are highly efficient and operate within a small footprint.

TOPGAS (hydrogen-cooled) – Installed fleet of more than 3,185
These generators are highly efficient and have a maximum power output capable of providing a cost-effective alternative to many water-cooled machines.

TOPAIR (air-cooled) – Installed fleet of more than 3,570
These generators are the choice for power plant applications that demand simple, flexible operation.

TOPACK (air-cooled) – Installed fleet of more than 1,350
These prepackaged generator solutions are reliable and arrive ready to install.



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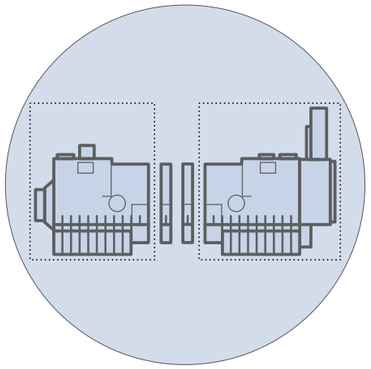
GENERATOR TECHNOLOGIES

OVERVIEW AND SCOPE



Modular Generator Architecture

- Constant cross-section core segments are used to achieve higher product ratings with common designs.
- Common end components drive greater spare parts efficiency, interchangeability, and maintenance familiarity.
- One-piece frame and flexible terminal lead arrangements provide ease of installation and reduce plant construction costs.

Armature Systems

- Micapal*, MICADUR* and DURITENAX* stator bar insulation technologies enable higher power density, advanced voltage stress, and thermal conductivity capabilities for greater armature performance.
- Robust mechanical features, such as TETRALOC* and self-retightening end winding support systems, allow thermal expansion of the winding during operational transients while simultaneously tightening the winding.
- Armature slot retention systems to ensure constant pressure on the bars, restraining them from radial and tangential motion during operation. These features include top-ripple and side-ripple springs as well as concave-convex and piggy-back wedging systems.

Water-Cooled Technology

- Stainless steel armature bar cooling tubes provide a proven method of eliminating the risk of cooling tube clogging, which can result in armature overheating.
- Advanced phosphorous-free brazed connections help reduce leakage.
- The high oxygen deionized water system prevents cuprous oxide buildup.
- Optimized for both rail and road transport. Only a small number of individual parts are transported, which translates into short delivery and faster erection time.

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WATER-COOLED

GIGATOP GENERATOR

HIGH POWER DENSITY

GE's water-cooled generators are exceptionally well suited to large power station applications where output requirements exceed the cooling capabilities of air-cooled or conventional hydrogen-cooled options. This reliable generator incorporates advanced technology and robust construction for enhanced operability and ease of maintenance.

Up to 1,400 MVA
APPARENT POWER
Up to 99.0%
EFFICIENCY

Technical Data

	50 Hz	60 Hz
Power Factor	0.80	0.85
Apparent Power	Up to 1,400 MVA	Up to 1,120 MVA
Efficiency	Up up to 99.0%	Up to 98.9%
Terminal Voltage	Up to 27 kV	Up to 26 kV

Efficient and Flexible

These units feature a cooling system that sustains a high level of efficiency within a small volume.

Industry-Leading Reliability

Use of stainless steel tubes in stator bars reduces forced outages due to cooling tube clogging.

Less Manual Intervention

Automated hydrogen gas control and sealing, enabled by the Mark VIe control system, reduces the need for manual intervention and allows more efficient accessories operation.

HYDROGEN-COOLED

TOPGAS GENERATOR

HIGHLY EFFICIENT

The low density, high specific heat and high thermal conductivity of hydrogen gas enable the highest efficiency generators in GE's portfolio. Hydrogen-cooled generators use proven technologies and advanced materials to deliver up to 99 percent efficiency. They are well suited for combined cycle or simple cycle applications on both steam and gas turbines.

Up to 710 MVA
APPARENT POWER
Up to 99.0%
EFFICIENCY

Technical Data

	50 Hz	60 Hz
Power Factor	0.80	0.85
Apparent Power	Up to 710 MVA	Up to 690 MVA
Efficiency	Up to 99.0%	Up to 99.0%
Terminal Voltage	Up to 23 kV	Up to 25 kV

Automated Hydrogen Gas Control and Sealing

Automated hydrogen gas control and sealing, enabled by the Mark VIe control system, reduces the need for manual intervention and allows more efficient accessories operation.

Enhanced Seal Performance

Upgraded end shield reduces deflection for enhanced seal system performance, accommodates increased drive train axial expansion, and improves maintenance access to seal casing and bearing housing.

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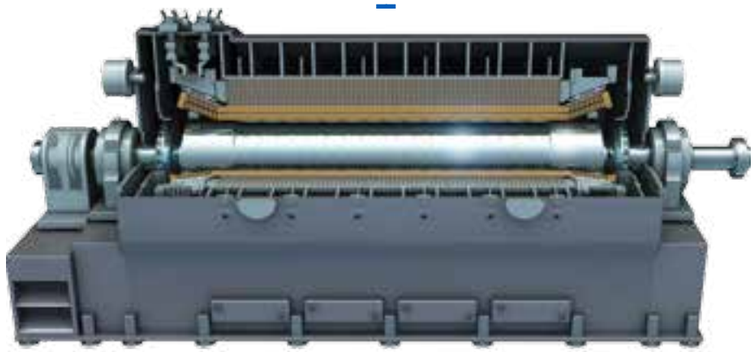
AIR-COOLED

TOPAIR GENERATOR

SIMPLICITY AND FLEXIBILITY

GE's TOPAIR generator is the world's most powerful air-cooled generator with output that frequently allows it to displace more costly and complex hydrogen-cooled generators. With a fleet of more than 3,570 units, the TOPAIR generator's design has been proven to be robust, reliable and maintainable. The continuous, evolutionary development of the TOPAIR pushes the limits of power output and efficiency while integrating lessons learned, driving simplicity and ease of operation. It is flexible and can be used with gas turbines and steam turbines in single- or multi-shaft configurations.

Up to 430 MVA
APPARENT POWER
Up to 98.9%
EFFICIENCY



Technical Data

	50 Hz	60 Hz
Power Factor	0.80	0.85
Apparent Power	Up to 430 MVA	Up to 360 MVA
Efficiency	Up to 98.9%	Up to 98.8%
Terminal Voltage	Up to 22 kV	Up to 22 kV

High Power Rating and Efficiency

A high power rating and high efficiency make the TOPAIR generator an attractive alternative to bigger, hydrogen-cooled generators.

Continuous Development

Application of the latest technology continuously improves the TOPAIR generator's efficiency, enabling it to generate more megawatts with the same frame size and weight.

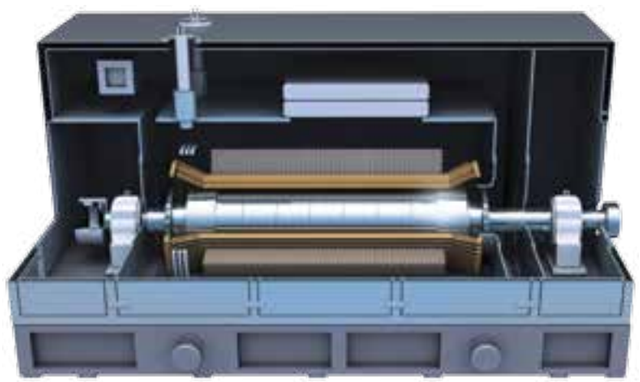
AIR-COOLED

TOPACK GENERATOR

HIGHLY RELIABLE ALL-IN-ONE SOLUTION

The TOPACK generator is more than just a generator, it is a ready-to-install, easy to integrate, packaged solution that comes complete with electrical equipment to reduce your risk and save you time, effort, and money. Its compact and modular design is based on standardized manufacturing processes, so you'll get exactly the product you need delivered when you need it.

Up to 175 MVA
APPARENT POWER
Up to 98.7%
EFFICIENCY



Technical Data

	50 Hz	60 Hz
Power Factor	0.80	0.85
Apparent Power	Up to 175 MVA	Up to 120 MVA
Efficiency	Up to 98.7%	Up to 98.6%
Terminal Voltage	Up to 15 kV	Up to 13.8 kV

Customized Packages

The TOPACK generator has a flexible list of options to meet your specific needs.

Quick and Easy

Its compact size allows for easy worldwide delivery, installation, and maintenance.

Reliable and Robust

Built to high quality standards, the TOPACK generator operates successfully in virtually any environment.

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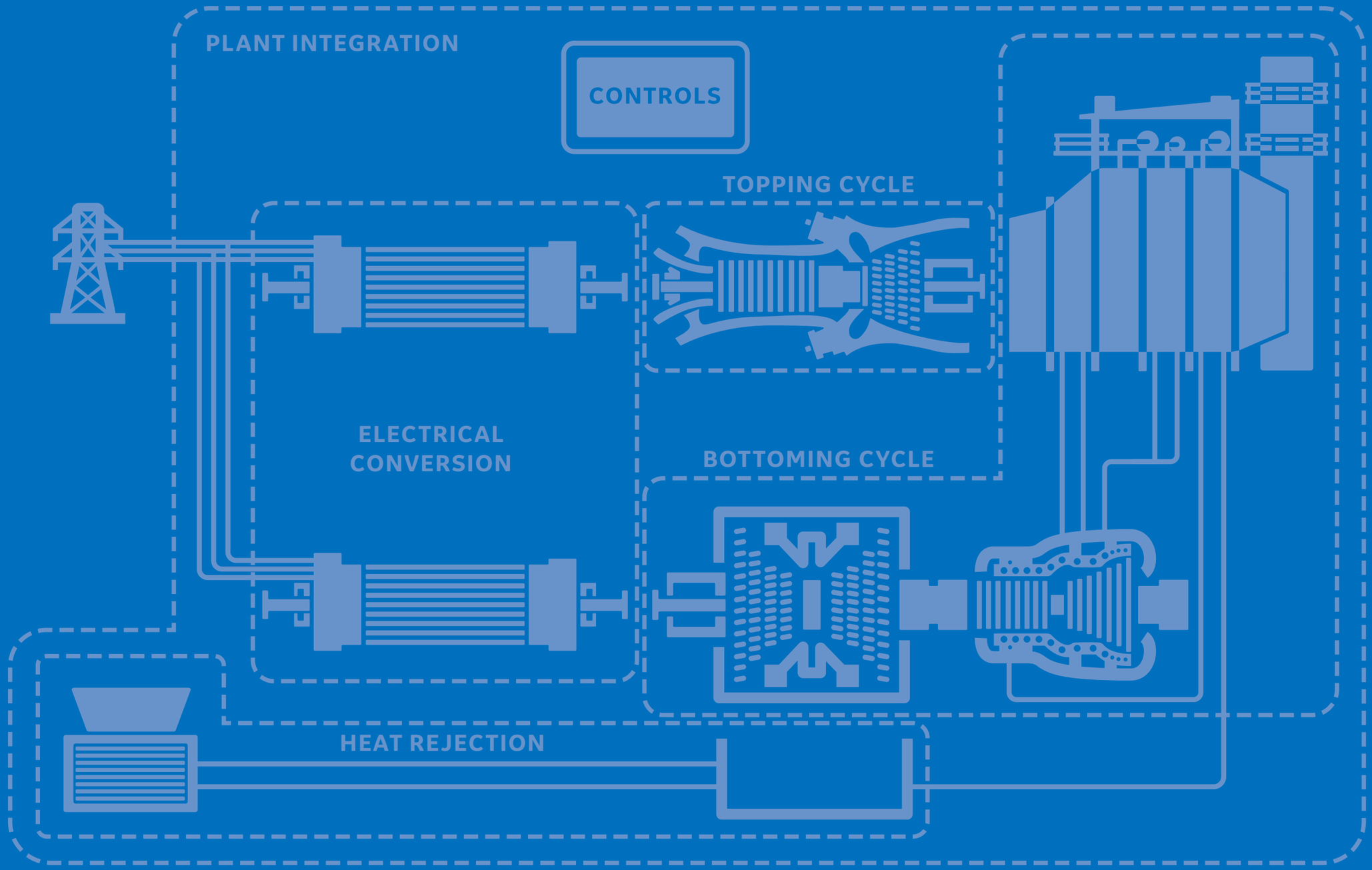
APPENDIX


PLANT INTEGRATION
CONTROLS
TOPPING CYCLE
ELECTRICAL CONVERSION
BOTTOMING CYCLE
HEAT REJECTION

TECHNICAL DATA HEAVY DUTY GAS TURBINES

		50/60 Hz (Geared)			50 Hz	
		6B.03	6F.01	6F.03	9E.03	9E.04
SC Plant Performance	SC Net Output (MW)	44	52	82	132	145
	SC Net Heat Rate (Btu/kWh, LHV)	10,180	8,880	9,470	9,860	9,210
	SC Net Heat Rate (kJ/kWh, LHV)	10,740	9,369	9,991	10,403	9,717
	SC Net Efficiency (%, LHV)	33.5%	38.4%	36.0%	34.6%	37.0%
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	12.7	21	16.4	13.1	13.3
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air
	Number of Combustor Cans	10	6	6	14	14
	Number of Compressor Stages	17	12	18	17	17
	Number of Turbine Stages	3	3	3	3	4
	Exhaust Temperature (°F)	1,019	1,117	1,135	1,012	1,007
	Exhaust Temperature (°C)	548	603	613	544	542
	Exhaust Energy (MM Btu/hr)	289	280	482	828	818
	Exhaust Energy (MM kJ/hr)	305	296	509	874	863
	GT Turndown Minimum Load (%)	50%	40%	52%	35%	35%
	GT Ramp Rate (MW/min)[1]	20	12	7	50	12
	NO_X (ppmvd) at Baseload (@15% O_2)	4	25	15	5	15
	CO (ppm) at Min. Turndown w/o Abatement	25	9	9	25	25
	Wobbe Variation (%)	>+/-30%	+/-10%	+10%, -15%	>+/-30%	>+/-30%
	Startup Time, Conventional/Peaking (Min.)[2]	12/10	12/10	29/-	30/10	30/10
1x1 CC Plant Performance	CC Net Output (MW)	67	76	124	201	212
	CC Net Heat Rate (Btu/kWh, LHV)	6,630	6,030	6,160	6,460	6,270
	CC Net Heat Rate (kJ/kWh, LHV)	6,995	6,362	6,499	6,816	6,615
	CC Net Efficiency (%, LHV)	51.5%	56.6%	55.4%	52.8%	54.4%
	Plant Turndown – Minimum Load (%)	57%	53%	59%	46%	46%
	Ramp Rate (MW/Minute)[1]	20	12	7	50	12
	Startup Time (RR Hot, Minutes)[3]	30	30	45	38	38
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condenser Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.20	1.20	1.20	1.20	1.20
	HP Throttle Press. (psia/bar)	870/60	869/60	1,044/72	1,006/69	1,015/70
	HP Throttle Temp. (°F/°C)	1,004/540	1,004/540	1,049/565	986/530	986/530
	Reheat Temp. (°F/°C)	N/A	N/A	N/A	N/A	N/A
	ST Configuration (Type)	ST-A250	ST-A250	ST-A250	ST-A200	ST-A200
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air
2x1 CC Plant Performance	CC Net Output (MW)	136	154	251	405	428
	CC Net Heat Rate (Btu/kWh, LHV)	6,600	6,000	6,100	6,410	6,220
	CC Net Heat Rate (kJ/kWh, LHV)	6,963	6,330	6,436	6,763	6,562
	CC Net Efficiency (%, LHV)	51.7%	56.9%	55.9%	53.2%	54.9%
	Plant Turndown – Minimum Load (%)	29%	27%	30%	22%	22%
	Ramp Rate (MW/Minute)[1]	40	24	13	100	25
	Startup Time (RR Hot, Minutes)[3]	30	30	45	38	38
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condensor Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.20	1.20	1.20	1.20	1.20
	HP Throttle Press. (psia/bar)	1,015/70	1,085/75	1,015/70	1,077/74	1,078/74
	HP Throttle Temp. (°F/°C)	1,004/540	1,049/565	1,049/565	986/530	986/530
	Reheat Temp. (°F/°C)	N/A	N/A	N/A	N/A	N/A
	ST Configuration (Type)	ST-A250	ST-A250	ST-A200	ST-D200	ST-D200
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air
Weights and Dimensions	Approx. Wt (lb)	220,450	154,350	220,500	471,800	482,896
	Approx. Wt (kg)	99,994	70,012	100,017	204,933	219,050
	Approx. LxWxH (ft)	41x13x13	21x14x14	33x12x15	37x17x17	37x17x17
	Approx. LxWxH (m)	13x4x4	6x4x4	10x4x5	11x5x5	11x5x5

		50 Hz							
		GT13E2 2005	GT13E2 2012	9F.03	9F.04	9F.05	9F.06	9HA.01	9HA.02
SC Plant Performance	SC Net Output (MW)	185	203	265	281	299	342	429	519
	SC Net Heat Rate (Btu/kWh, LHV)	9,027	8,980	9,020	8,830	8,810	8,310	8,040	8,000
	SC Net Heat Rate (kJ/kWh, LHV)	9,524	9,474	9,517	9,316	9,295	8,768	8,483	8,440
	SC Net Efficiency (%, LHV)	37.8%	38.0%	37.8%	38.6%	38.7%	41.1%	42.4%	42.7%
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	16.9	18.2	16.7	16.9	18.3	20	22.9	23.8
	GT Generator Type (Cooling)	Air	Air	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen
	Number of Combustor Cans	72 (EV burners)	48 (AEV burners)	18	18	18	16	16	16
	Number of Compressor Stages	21	16	18	18	18	14	14	14
	Number of Turbine Stages	5	5	3	3	3	4	4	4
	Exhaust Temperature (°F)	941	934	1,104	1,127	1,187	1,144	1,171	1,177
	Exhaust Temperature (°C)	505	501	596	608	642	618	633	636
	Exhaust Energy (MM Btu/hr)	1,055	1,155	1,458	1,498	1,593	1,675	1,993	2,385
	Exhaust Energy (MM kJ/hr)	1,113	1,219	1,538	1,581	1,681	1,767	2,103	2,516
	GT Turndown Minimum Load (%)	65%[4]	50%[4]/70%[5]	35%	35%	35%	38%	30%	30%
	GT Ramp Rate (MW/min)[1]	12	14	22	23	24	65	65	70
	NO_X (ppmvd) at Baseload (@15% O_2)	25	15	15	15	25	15	25	25
	CO (ppm) at Min. Turndown w/o Abatement	80	80	24	24	24	9	9	9
	Wobbe Variation (%)	+/-10%	+/-10%	+/-15%	+/-15%	+/-10%	+/-15%	+/-15%	+/-15%
	Startup Time, Conventional/Peaking (Min.)[2]	25/15	15/10	23/20	23/20	23/20	23/12	23/12	23/12
1x1 CC Plant Performance	CC Net Output (MW)	264	289	405	429	462	508	643	774
	CC Net Heat Rate (Btu/kWh, LHV)	6,209	6,206	5,840	5,740	5,640	5,580	5,450	5,440
	CC Net Heat Rate (kJ/kWh, LHV)	6,551	6,548	6,162	6,056	5,951	5,887	5,750	5,739
	CC Net Efficiency (%, LHV)	55.0%	55.0%	58.4%	59.4%	60.5%	61.1%	62.6%	62.7%
	Plant Turndown – Minimum Load (%)	69%	56%	46%	45%	46%	49%	38%	38%
	Ramp Rate (MW/Minute)[1]	12	14	22	22	24	65	65	70
	Startup Time (RR Hot, Minutes)[3]	80	80	30	30	30	<30	<30	<30
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	3PRH	3PRH	3PRH	3PRH	3PRH	3PRH
	Condenser Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
	HP Throttle Press. (psia/bar)	1,088/75	1,088/75	2,420/167	2,399/165	2,682/185	2,630/181	2,600/179	2,673/184
	HP Throttle Temp. (°F/°C)	923/495	914/490	1,080/582	1,085/585	1,112/600	1,112/600	1,112/600	1,112/600
	Reheat Temp. (°F/°C)	N/A	N/A	1,058/570	1,085/585	1,112/600	1,112/600	1,112/600	1,112/600
	ST Configuration (Type)	ST-A200	ST-A200	ST-A650	ST-A650	ST-D650	ST-D650	ST-D650	ST-D650
	GT Generator Type (Cooling)	Air	Air	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Water	Water
	ST Generator Type (Cooling)	Air	Air	Air	Air	Hydrogen	Hydrogen	Water	Water
2x1 CC Plant Performance	CC Net Output (MW)	530	581	815	861	929	1,020	1,289	1,552
	CC Net Heat Rate (Btu/kWh, LHV)	6,186	6,178	5,810	5,710	5,610	5,560	5,440	5,430
	CC Net Heat Rate (kJ/kWh, LHV)	6,527	6,518	6,130	6,024	5,919	5,866	5,739	5,729
	CC Net Efficiency (%, LHV)	55.2%	55.2%	58.7%	59.8%	60.8%	61.4%	62.7%	62.8%
	Plant Turndown – Minimum Load (%)	69%	56%	22%	22%	23%	23%	18%	18%
	Ramp Rate (MW/Minute)[1]	24	28	44	44	48	130	130	140
	Startup Time (RR Hot, Minutes)[3]	80	80	39	39	39	<30	<30	<30
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	3PRH	3PRH	3PRH	3PRH	3PRH	3PRH
	Condensor Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
	HP Throttle Press. (psia/bar)	1,088/75	1,160/80	2,422/167	2,392/165	2,682/185	2,617/180	2,622/181	2,661/184
	HP Throttle Temp. (°F/°C)	923/495	914/490	1,080/582	1,085/585	1,112/600	1,112/600	1,112/600	1,112/600
	Reheat Temp. (°F/°C)	N/A	N/A	1,058/570	1,085/585	1,112/600	1,085/585	1,112/600	1,112/600
	ST Configuration (Type)	ST-D200	ST-D200	ST-D650	ST-D650	ST-D650	ST-D650	ST-D650	ST-D650
	GT Generator Type (Cooling)	Air	Air	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen
	ST Generator Type (Cooling)	Air	Air	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen	Hydrogen
Weights and Dimensions	Approx. Wt (lb)	756,200	772,000	679,850	679,850	709,100	851,550	851,550	951,800
	Approx. Wt (kg)	343,006	350,173	308,375	308,375	321,642	386,257	386,257	431,729
	Approx. LxWxH (ft)	37x18x17	36x18x18	35x15x16	35x15x16	35x16x16	35x16x16	35x16x16	38x16x16
	Approx. LxWxH (m)	11x6x5	11x6x6	11x5x5	11x5x5	11x5x5	11x5x5	11x5x5	12x5x5

1.) Ramp rates are Fast Ramp via AGC.
2.) Start times recognize purge credit. Turning gear to full speed - full load (FSFL) and synchronized to grid. Peaking maintenance factors may apply depending on the operating profile.
3.) Start times are based on Rapid Response technologies in hot start conditions with purge credit recognized. Simultaneous start sequence of GT may apply depending on exact project configurations.
NOTE: All ratings are net plant based on ISO conditions and natural gas fuel. Actual performance will vary with project specific conditions and fuel. 2PNRH = Two pressure, Non-Reheat; 3PRH = Three pressure, Reheat.

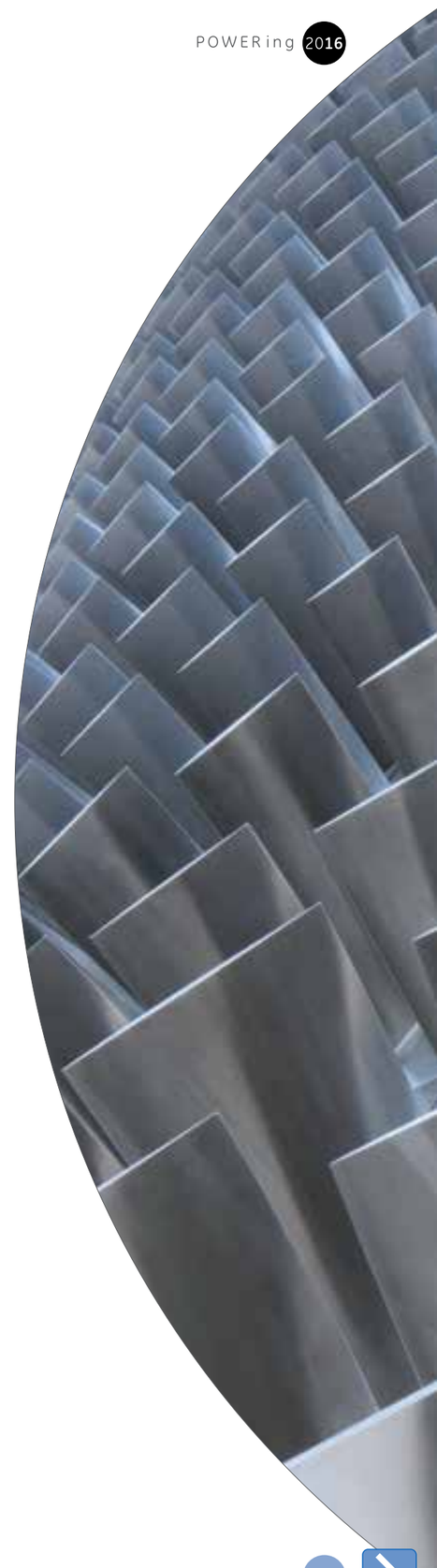
4.) NOx 25 ppm.
5.) NOx 15 ppm.

TECHNICAL DATA HEAVY DUTY GAS TURBINES (cont.)

		60 Hz				
		7E.03	7F.04	7F.04	7F.05	7F.05
SC Plant Performance	SC Net Output (MW)	91	193	198	232	241
	SC Net Heat Rate (Btu/kWh, LHV)	10,060	8,860	8,840	8,610	8,580
	SC Net Heat Rate (kJ/kWh, LHV)	10,614	9,348	9,327	9,084	9,052
	SC Net Efficiency (%, LHV)	33.9%	38.5%	38.6%	39.6%	39.8%
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	13.0	16.6	16.7	18.7	18.6
	GT Generator Type (Cooling)	Air	Hydrogen	Hydrogen	Hydrogen	Hydrogen
	Number of Combustor Cans	10	14	14	14	14
	Number of Compressor Stages	17	18	18	14	14
	Number of Turbine Stages	3	3	3	3	3
	Exhaust Temperature (°F)	1,026	1,129	1,151	1,122	1,171
	Exhaust Temperature (°C)	552	609	622	605	633
	Exhaust Energy (MM Btu/hr)	592	1,034	1,059	1,209	1,250
	Exhaust Energy (MM kJ/hr)	624	1,091	1,117	1,276	1,319
	GT Turndown Minimum Load (%)	35%	50%	49%	46%	44%
	GT Ramp Rate (MW/min)[1]	40	30	30	40	40
	NO_x (ppmvd) at Baseload (@15% O_2)	4	5	9	5	9
	CO (ppm) at Min. Turndown w/o Abatement	25	9	9	9	9
	Wobbe Variation (%)	>+/-30%	+20%, -10%	+/-7.5%	+/-7.5%	+/-7.5%
	Startup Time, Conventional/Peaking (Min.)[2]	23/10	21/11	21/11	21/11	21/11
1x1 CC Plant Performance	CC Net Output (MW)	141		302		
	CC Net Heat Rate (Btu/kWh, LHV)	6,560		5,760		
	CC Net Heat Rate (kJ/kWh, LHV)	6,921		6,077		
	CC Net Efficiency (%, LHV)	52.0%		59.2%		
	Plant Turndown – Minimum Load (%)	44%		58%		
	Ramp Rate (MW/Minute)[1]	40		30		
	Startup Time (RR Hot, Minutes)[3]	35		28		
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH		3PRH		
	Condenser Type	Once-Through		Once-Through		
	Condenser Pressure (in.Hga)	1.20		1.20		
	HP Throttle Press. (psia/bar)	870/60		1,756/121		
	HP Throttle Temp. (°F/°C)	1,004/540		1,085/585		
	Reheat Temp. (°F/°C)	N/A		1,085/585		
	ST Configuration (Type)	ST-A200		ST-A650		
	GT Generator Type (Cooling)	Air		Hydrogen		
	ST Generator Type (Cooling)	Air		Air		
2x1 CC Plant Performance	CC Net Output (MW)	283		609		
	CC Net Heat Rate (Btu/kWh, LHV)	6,530		5,710		
	CC Net Heat Rate (kJ/kWh, LHV)	6,890		6,024		
	CC Net Efficiency (%, LHV)	52.3%		59.8%		
	Plant Turndown – Minimum Load (%)	22%		29%		
	Ramp Rate (MW/Minute)[1]	80		60		
	Startup Time (RR Hot, Minutes)[3]	35		28		
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH		3PRH		
	Condensor Type	Once-Through		Once-Through		
	Condenser Pressure (in.Hga)	1.20		1.20		
	HP Throttle Press. (psia/bar)	1,148/79		2,406/166		
	HP Throttle Temp. (°F/°C)	1,004/540		1,085/585		
	Reheat Temp. (°F/°C)	N/A		1,085/585		
	ST Configuration (Type)	ST-A200		ST-D650		
	GT Generator Type (Cooling)	Air		Hydrogen		
	ST Generator Type (Cooling)	Air		Hydrogen		
Weights and Dimensions	Approx. Wt (lb)	293,000	392,000	392,000	443,400	443,400
	Approx. Wt (kg)	132,903	177,808	177,808	201,123	201,123
	Approx. LxWxH (ft)	38x12x13	28x13x13	28x13x13	28x13x13	28x13x13
	Approx. LxWxH (m)	12x4x4	9x4x4	9x4x4	9x4x4	9x4x4

60 Hz			
7F.05	7F.06	7HA.01	7HA.02
	270	280	346
	8,250	8,180	8,080
	8,704	8,630	8,525
	41.4%	41.7%	42.2%
18.6	22.1	21.6	23.1
Hydrogen	Hydrogen	Hydrogen	Hydrogen
14	12	12	12
14	14	14	14
3	4	4	4
1,189	1,100	1,159	1,153
643	593	626	623
1,265	1,301	1,338	1,617
1,335	1,373	1,412	1,705
43%	30%	25%	30%
40	50	50	50
12	9	25	25
9	9	9	9
+/-7.5%	+/-7.5%	+/-10%	+/-10%
21/11	21/10	21/10	21/10
376	394	419	509
5,660	5,650	5,520	5,500
5,972	5,961	5,824	5,803
60.3%	60.4%	61.8%	62.0%
47.9%	38%	33%	38%
40	50	50	50
25	<30	<30	<30
3PRH	3PRH	3PRH	3PRH
Once-Through	Once-Through	Once-Through	Once-Through
1.20	1.20	1.20	1.20
2,290/158	2,110/146	2,606/180	2,606/180
1,085/585	1,072/578	1,112/600	1,112/600
1,085/585	1,062/572	1,085/585	1,085/585
ST-D650	ST-D650	ST-D650	ST-D650
Hydrogen	Hydrogen	Hydrogen	Hydrogen
Air	Air	Air	Hydrogen
756	792	842	1,021
5,640	5,620	5,500	5,480
5,972	5,929	5,803	5,782
60.3%	60.7%	62.0%	62.3%
24%	17%	16%	18%
80	100	100	100
25	<30	<30	<30
3PRH	3PRH	3PRH	3PRH
Once-Through	Once-Through	Once-Through	Once-Through
1.20	1.20	1.20	1.20
2,396/165	2,388/165	2,583/178	2,611/180
1,085/585	1,072/578	1,112/600	1,112/600
1,085/585	1,062/572	1,085/585	1,085/585
ST-D650	ST-D650	ST-D650	ST-D650
Hydrogen	Hydrogen	Hydrogen	Hydrogen
Hydrogen	Hydrogen	Hydrogen	Hydrogen
443,400	547,000	547,000	602,000
201,123	248,115	248,115	273,063
28x13x13	30x13x14	30x13x14	32x13x14
9x4x4	9x4x4	9x4x4	10x4x4

1.) Ramp rates are Fast Ramp via AGC.
2.) Start times recognize purge credit. Turning gear to full speed - full load (FSFL) and synchronized to grid. Peaking maintenance factors may apply depending on the operating profile.
3.) Start times are based on Rapid Response technologies in hot start conditions with purge credit recognized. Simultaneous start sequence of GT may apply depending on exact project configurations.
NOTE: All ratings are net plant based on ISO conditions and natural gas fuel. Actual performance will vary with project specific conditions and fuel. 2PNRH = Two pressure, Non-Reheat; 3PRH = Three pressure, Reheat.



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TECHNICAL DATA AERODERIVATIVE GAS TURBINES

		TM2500		LM2500		LM2500 DLE		LM2500+
Gas Turbine Rating	Frequency	50	60	50	60	50	60	50
	ISO Base Rating (MW)	34.3	37.1	23.8	24.8	22.4	23.2	30.0
	Gross Heat Rate (Btu/kWh, LHV)	9,665	9,171	10,053	9,729	9,626	9,317	9,624
	Gross Heat Rate (kJ/kWh, LHV)	10,197	9,676	10,606	10,265	10,156	9,830	10,154
	Gross Efficiency (%, LHV)	35.3%	37.2%	33.9%	35.1%	35.4%	36.6%	35.5%
	Exhaust Temperature (°F)	963	950	986	977	1,017	1,002	920
	Exhaust Temperature (°C)	517	510	530	525	547	539	493
	Exhaust Energy (MM Btu/hr)	187	185	141	139	137	134	164
	Exhaust Energy (MM kJ/hr)	197	195	149	147	145	142	173
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	24.5	24.7	19.0	19.0	18.1	18.0	23.1
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	Number of Compressor Stages	17	17	16	16	16	16	17
	Number of Turbine Stages	6	6	6	6	6	6	6
	GT Turndown Minimum Load (%)	50%	50%	50%	50%	50%	50%	50%
	GT Ramp Rate (MW/min)	30	30	30	30	30	30	30
	NO_X (ppmvd) at Baseload (@15% O_2)	25	25	25	25	15	15	25
	CO (ppm) (@15% O_2)[1]	250/275	250/275	250/[2]	250/[2]	25/25	25/25	250/250
	Wobbe Variation (%)	+/-20%	+/-20%	+/-20%	+/-20%	+/-25%	+/-25%	+/-20%
	Startup Time (Hot, Minutes)	10	10	10	10	10	10	10
SC Plant Performance	SC Net Output (MW)	30.7	34.9	23.1	24.1	21.8	22.7	29.3
	SC Net Heat Rate (Btu/kWh, LHV)	9,832	9,341	10,265	9,920	9,835	9,501	9,826
	SC Net Heat Rate (kJ/kWh, LHV)	10,374	9,856	10,830	10,466	10,376	10,024	10,367
	SC Net Efficiency (%, LHV)	34.7%	36.5%	33.2%	34.4%	34.7%	35.9%	34.7%
1x1 CC Plant Performance	CC Net Output (MW)	44	49	34.2	35.0	32.8	33.2	41.5
	CC Net Heat Rate (Btu/kWh, LHV)	6,909	6,730	6,943	6,844	6,533	6,456	6,931
	CC Net Heat Rate (kJ/kWh, LHV)	7,289	7,100	7,325	7,221	6,892	6,811	7,312
	CC Net Efficiency (%, LHV)	49.4%	50.7%	49.1%	49.9%	52.2%	52.9%	49.2%
	Plant Turndown – Minimum Load (%)	35%	36%	34%	34%	33%	34%	35%
	Ramp Rate (MW/min)	30	30	30	30	30	30	30
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condenser Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	930/499	915/490	950/510	942/505	983/528	968/520	885/474
	ST Configuration (Type)	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
2x1 CC Plant Performance	CC Net Output (MW)	97	98	68.6	70.2	65.8	66.6	83.2
	CC Net Heat Rate (Btu/kWh, LHV)	6,885	6,708	6,916	6,819	6,507	6,431	6,907
	CC Net Heat Rate (kJ/kWh, LHV)	7,264	7,077	7,297	7,195	6,865	6,785	7,287
	CC Net Efficiency (%, LHV)	49.6%	50.9%	49.3%	50.0%	52.4%	53.1%	49.4%
	Plant Turndown – Minimum Load (%)	35%	36%	17%	17%	17%	17%	18%
	Ramp Rate (MW/min)	60	60	60	60	60	60	60
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condensor Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	930/499	915/490	950/510	942/505	983/528	968/520	885/474
	ST Configuration (Type)	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
Weights and Dimensions	Approx. Wt (lb)	247,520	247,520	250,000	250,000	250,000	250,000	250,000
	Approx. Wt (kg)	112,273	112,273	113,398	113,398	113,398	113,398	113,398
	Approx. LxWxH (ft)	105x11x13	105x11x13	57x9x10	57x9x10	57x9x10	57x9x10	57x9x10
	Approx. LxWxH (m)	32.0x3.4x3.9	32.0x3.4x3.9	17.4x2.7x3.0	17.4x2.7x3.0	17.4x2.7x3.0	17.4x2.7x3.0	17.4x2.7x3.0

		LM2500+	LM2500+ DLE		LM2500+ G4		LM2500+ G4 DLE		LM6000-PC		LM6000-PC Sprint
Gas Turbine Rating	Frequency	60	50	60	50	60	50	60	50	60	50
	ISO Base Rating (MW)	31.8	31.1	31.9	34.5	37.1	33.4	34.5	45	46	51
	Gross Heat Rate (Btu/kWh, LHV)	9,252	9,169	8,785	9,676	9,171	9,166	8,709	8,505	8,458	8,456
	Gross Heat Rate (kJ/kWh, LHV)	9,761	9,674	9,269	10,209	9,676	9,671	9,188	8,973	8,924	8,922
	Gross Efficiency (%, LHV)	36.9%	37.2%	38.8%	35.3%	37.2%	37.2%	39.2%	40.1%	40.3%	40.4%
	Exhaust Temperature (°F)	914	1,003	978	966	950	1,026	995	817	824	841
	Exhaust Temperature (°C)	490	539	525	519	510	552	535	436	440	449
	Exhaust Energy (MM Btu/hr)	162	175	168	188	185	188	179	206	207	224
	Exhaust Energy (MM kJ/hr)	171	185	177	198	195	199	189	217	218	236
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	23.1	23.6	23.1	24.6	24.7	24	23.6	29.7	29.6	31.5
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
	Number of Compressor Stages	17	17	17	17	17	17	17	19	19	19
	Number of Turbine Stages	6	6	6	6	6	6	6	7	7	7
	GT Turndown Minimum Load (%)	50%	50%	50%	50%	50%	50%	50%	25%	25%	25%
	GT Ramp Rate (MW/min)	30	30	30	30	30	30	30	50	50	50
	NO_X (ppmvd) at Baseload (@15% O_2)	25	25	25	25	25	25	25	25	25	25
	CO (ppm) (@15% O_2)[1]	250/250	25/25	25/25	250/275	250/275	25/25	25/25	89/150	89/150	89/150
	Wobbe Variation (%)	+/-20%	+/-25%	+/-25%	+/-20%	+/-20%	+/-25%	+/-25%	+/-20%	+/-20%	+/-20%
	Startup Time (Hot, Minutes)	10	10	10	10	10	10	10	5	5	5
SC Plant Performance	SC Net Output (MW)	31.0	30.1	30.6	33.6	36.2	32.5	33.6	44	45	51
	SC Net Heat Rate (Btu/kWh, LHV)	9,453	9,338	8,988	9,870	9,438	9,352	8,897	8,709	8,651	8,647
	SC Net Heat Rate (kJ/kWh, LHV)	9,973	9,852	9,482	10,413	9,862	9,867	9,387	9,189	9,127	9,123
	SC Net Efficiency (%, LHV)	36.1%	36.5%	38.0%	34.6%	36.5%	36.5%	38.4%	39.2%	39.4%	39.5%
1x1 CC Plant Performance	CC Net Output (MW)	43.0	44.0	43.9	48.2	50.3	47.7	47.7	57.9	58.6	66.5
	CC Net Heat Rate (Btu/kWh, LHV)	6,809	6,384	6,299	6,884	6,729	6,343	6,239	6,621	6,573	6,577
	CC Net Heat Rate (kJ/kWh, LHV)	7,184	6,736	6,645	7,263	7,099	6,693	6,583	6,986	6,935	6,939
	CC Net Efficiency (%, LHV)	50.1%	53.4%	54.2%	49.6%	50.7%	53.8%	54.7%	51.5%	51.9%	51.9%
	Plant Turndown – Minimum Load (%)	36%	34%	35%	35%	36%	34%	35%	19%	19%	19%
	Ramp Rate (MW/min)	30	30	30	30	30	30	30	50	50	50
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30	30	30	30
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condenser Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	880/471	962/517	945/507	930/499	915/490	990/532	962/517	781/416	788/420	813/434
	ST Configuration (Type)	–	–	–	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
2x1 CC Plant Performance	CC Net Output (MW)	86.3	88.2	88.2	96.8	100.9	95.7	95.7	116	118	133
	CC Net Heat Rate (Btu/kWh, LHV)	6,787	6,361	6,277	6,860	6,707	6,320	6,218	6,603	6,555	6,559
	CC Net Heat Rate (kJ/kWh, LHV)	7,161	6,711	6,622	7,238	7,076	6,668	6,560	6,966	6,916	6,920
	CC Net Efficiency (%, LHV)	50.3%	53.6%	54.4%	49.7%	50.9%	54.0%	54.9%	51.7%	52.1%	52.0%
	Plant Turndown – Minimum Load (%)	18%	17%	17%	17%	17%	17%	18%	19%	19%	19%
	Ramp Rate (MW/min)	60	60	60	60	60	60	60	100	100	100
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30	30	30	30
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condensor Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	880/471	962/517	945/507	930/499	915/490	990/532	962/517	781/416	788/420	813/434
	ST Configuration (Type)	–	–	–	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
Weights and Dimensions	Approx. Wt (lb)	250,000	250,000	250,000	250,000	250,000	250,000	250,000	673,370	673,370	673,370
	Approx. Wt (kg)	113,398	113,398	113,398	113,398	113,398	113,398	113,398	305,436	305,436	305,436
	Approx. LxWxH (ft)	57x9x10	57x10x10	57x10x10	65x10x10	65x10x10	65x10x10	65x10x10	65x14x15	56x14x15	65x14x15
	Approx. LxWxH (m)	17.4x2.7x3.0	17.4x2.7x3.0	17.4x2.7x3.0	19.8x2.7x3.0	19.8x2.7x3.0	19.8x2.7x3.0	19.8x2.7x3.0	19.8x4.3x4.5	17.1x4.3x4.5	19.8x4.3x4.5

1.) At baseload/minimum turndown without abatement
2.) Consult GE for project specific data
NOTE: Gas turbine ratings are at the generator terminals; 15˚C (59˚F), 60% Relative Humidity; Unity Power Factor, Natural Gas, Inlet and exhaust losses excluded. Plant ratings are on a net plant basis; 15˚C (59˚F), 60% Relative Humidity; 0.8 Power Factor, Natural Gas, Inlet and exhaust losses included. Actual performance will vary with project specific conditions and fuel. 2PNRH = Two Pressure, Non-Reheat.

TECHNICAL DATA AERODERIVATIVE GAS TURBINES (cont.)

		LM6000-PC Sprint	LM6000-PG		LM6000-PG Sprint		LM6000-PF	
Gas Turbine Rating	Frequency	60	50	60	50	60	50	60
	ISO Base Rating (MW)	52	56	56	59	59	45	45
	Gross Heat Rate (Btu/kWh, LHV)	8,444	8,506	8,524	8,564	8,581	8,126	8,097
	Gross Heat Rate (kJ/kWh, LHV)	8,909	8,974	8,993	9,035	9,053	8,573	8,543
	Gross Efficiency (%, LHV)	40.4%	40.1%	40.0%	39.8%	39.8%	42.0%	42.1%
	Exhaust Temperature (°F)	851	878	879	896	897	855	861
	Exhaust Temperature (°C)	455	470	470	480	480	457	461
	Exhaust Energy (MM Btu/hr)	225	249	250	258	258	209	208
	Exhaust Energy (MM kJ/hr)	237	263	263	273	273	220	219
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	31.3	33.5	33.5	34.0	34.0	30.1	29.8
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	Number of Compressor Stages	19	19	19	19	19	19	19
	Number of Turbine Stages	7	7	7	7	7	7	7
	GT Turndown Minimum Load (%)	25%	25%	25%	25%	25%	50%	50%
	GT Ramp Rate (MW/min)	50	50	50	50	50	50	50
	NO_X (ppmvd) at Baseload (@15% O_2)	25	25	25	25	25	15	15
	CO (ppm) (@15% O_2)[1]	89/150	94/150	94/150	94/150	94/150	25/70	25/70
	Wobbe Variation (%)	+/-20%	+/-20%	+/-20%	+/-20%	+/-20%	+/-25%	+/-25%
	Startup Time (Hot, Minutes)	5	5	5	5	5	5	5
SC Plant Performance	SC Net Output (MW)	50.3	54.9	54.9	57.0	57.0	43.7	43.7
	SC Net Heat Rate (Btu/kWh, LHV)	8,619	8,687	8,692	8,745	8,746	8,319	8,281
	SC Net Heat Rate (kJ/kWh, LHV)	9,093	9,165	9,170	9,226	9,227	8,778	8,737
	SC Net Efficiency (%, LHV)	39.6%	39.3%	39.3%	39.0%	39.0%	41.0%	41.2%
1x1 CC Plant Performance	CC Net Output (MW)	66	73	73	76	76	58	58
	CC Net Heat Rate (Btu/kWh, LHV)	6,551	6,535	6,535	6,550	6,551	6,214	6,179
	CC Net Heat Rate (kJ/kWh, LHV)	6,911	6,894	6,895	6,911	6,912	6,556	6,520
	CC Net Efficiency (%, LHV)	52.1%	52.2%	52.2%	52.1%	52.1%	54.9%	55.2%
	Plant Turndown – Minimum Load (%)	19%	19%	19%	19%	19%	37%	37%
	Ramp Rate (MW/min)	50	50	50	50	50	50	50
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condenser Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	816/436	842/450	843/450	859/460	860/460	820/438	827/442
	ST Configuration (Type)	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
2x1 CC Plant Performance	CC Net Output (MW)	133	146	146	153	153	117	117
	CC Net Heat Rate (Btu/kWh, LHV)	6,532	6,515	6,516	6,530	6,532	6,196	6,161
	CC Net Heat Rate (kJ/kWh, LHV)	6,891	6,873	6,874	6,890	6,891	6,537	6,500
	CC Net Efficiency (%, LHV)	52.2%	52.4%	52.4%	52.3%	52.2%	55.1%	55.4%
	Plant Turndown – Minimum Load (%)	19%	19%	19%	19%	19%	19%	19%
	Ramp Rate (MW/min)	100	100	100	100	100	100	100
	Startup Time (Hot, Minutes)	30	30	30	30	30	30	30
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
	Condensor Type	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	816/436	842/450	843/450	859/460	860/460	820/438	827/442
	ST Configuration (Type)	–	–	–	–	–	–	–
	GT Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
	ST Generator Type (Cooling)	Air	Air	Air	Air	Air	Air	Air
Weights and Dimensions	Approx. Wt (lb)	673,370	673,370	673,370	673,370	673,370	673,370	673,370
	Approx. Wt (kg)	305,436	305,436	305,436	305,436	305,436	305,436	305,436
	Approx. LxWxH (ft)	56x14x15	65x14x15	56x14x15	65x14x15	56x14x15	65x14x15	56x14x15
	Approx. LxWxH (m)	17.1x4.3x4.5	19.8x4.3x4.5	17.1x4.3x4.5	19.8x4.3x4.5	17.1x4.3x4.5	19.8x4.3x4.5	17.1x4.3x4.5

LM6000-PF Sprint 25		LM6000-PF+		LM6000-PF+ Sprint[2]		LMS100-PA+		LMS100-PB+	
50	60	50	60	50	60	50	60	50	60
50	50	53	53	57	57	114	117	108	109
8,132	8,109	8,154	8,175	8,239	8,256	7,885	7,763	7,776	7,746
8,580	8,555	8,603	8,625	8,693	8,711	8,319	8,191	8,204	8,172
42.0%	42.1%	41.8%	41.7%	41.4%	41.3%	43.3%	44.0%	43.9%	44.1%
858	865	932	932	914	914	792	781	790	784
459	463	500	500	490	490	422	416	421	418
221	221	245	244	255	255	358	351	344	341
233	233	258	258	269	269	377	371	363	359
31.6	31.4	32.1	32.1	34.0	34.0	42.5	42.5	42.2	42.1
Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
19	19	19	19	19	19	20	20	20	20
7	7	7	7	7	7	9	9	9	9
50%	50%	50%	50%	50%	50%	25%	25%	50%	50%
50	50	50	50	50	50	50	50	50	50
25	25	25	25	25	25	25	25	25	25
25/70	25/70	25/25	25/25	25/25	25/25	113/139	113/139	113/125	113/125
+/-25%	+/-25%	+/-25%	+/-25%	+/-25%	+/-25%	+/-20%	+/-20%	+/-25%	+/-25%
5	5	5	5	5	5	10	10	10	10
48.3	48.5	51.4	51.3	55.3	55.2	111	113	105	106
8,315	8,281	8,336	8,346	8,414	8,419	8,021	7,905	7,918	7,887
8,773	8,737	8,795	8,805	8,877	8,883	8,463	8,340	8,354	8,321
41.0%	41.2%	40.9%	40.9%	40.6%	40.5%	42.5%	43.2%	43.1%	43.3%
64	64	70	70	74	74	135	136	127	128
6,273	6,239	6,101	6,105	6,230	6,232	6,626	6,591	6,517	6,521
6,619	6,583	6,437	6,441	6,573	6,575	6,991	6,953	6,876	6,880
54.4%	54.7%	55.9%	55.9%	54.8%	54.7%	51.5%	51.8%	52.4%	52.3%
38%	38%	37%	37%	37%	37%	21%	21%	42%	42%
50	50	50	50	50	50	50	50	50	50
30	30	30	30	30	30	30	30	30	30
2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
822/439	830/443	897/480	897/481	878/470	878/470	756/402	747/397	755/402	750/399
–	–	–	–	–	–	–	–		–
Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
128	129	140	140	149	149	270	273	256	256
6,255	6,221	6,081	6,085	6,211	6,213	6,608	6,573	6,498	6,503
6,599	6,563	6,416	6,420	6,553	6,555	6,971	6,934	6,856	6,861
54.6%	54.8%	56.1%	56.1%	54.9%	54.9%	51.6%	51.9%	52.5%	52.5%
19%	19%	18%	18%	19%	19%	21%	21%	21%	21%
100	100	100	100	100	100	100	100	100	100
30	30	30	30	30	30	30	30	30	30
2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH	2PNRH
Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through	Once-Through
1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1	900/62.1
822/439	830/443	897/480	897/481	878/470	878/470	756/402	747/397	755/402	750/399
–	–	–	–	–	–	–	–	–	–
Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
673,370	673,370	673,370	673,370	673,370	673,370	1,976,589	1,976,589	1,976,589	1,976,589
305,436	305,436	305,436	305,436	305,436	305,436	896,575	896,575	896,575	896,575
65x14x15	56x14x15	65x14x15	56x14x15	65x14x15	56x14x15	111x78x50	111x78x50	111x78x50	111x78x50
19.8x4.3x4.5	17.1x4.3x4.5	19.8x4.3x4.5	17.1x4.3x4.5	19.8x4.3x4.5	17.1x4.3x4.5	33.9x23.8x15.3	33.9x23.8x15.3	33.9x23.8x15.3	33.9x23.8x15.3

1.) At base load/minimum turndown without abatement

NOTE: Gas turbine ratings are at the generator terminals; 15°C (59°F), 60% Relative Humidity; Unity Power Factor, Natural Gas, Inlet and exhaust losses excluded. Plant ratings are on a net plant basis; 15°C (59°F), 60% Relative Humidity; 0.8 Power Factor, Natural Gas, Inlet and exhaust losses included. Actual performance will vary with project specific conditions and fuel. 2PNRH = Two Pressure, Non-Reheat.

2.) Sprint flow 37 gpm

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