SGT-800 Industrial Gas Turbine

Power Generation: (ISO) 47.0 MW(e)

The Siemens SGT-800 industrial gas turbine combines reliable, industrial design with the high efficiency and low emissions of the latest gas turbine technology.

Designed for heavy-duty operation, the SGT-800 affords very competitive economy for a variety of industrial power generation customers such as energy companies, independent power producers, utilities and municipalities.

The high exhaust gas temperature of the SGT-800, combined with its high efficiency, makes it outstanding in cogeneration and combined cycle installations, including process industries and district heating schemes.

The robust design and high reliability also makes the SGT-800 an excellent choice for oil and gas, refinery, simple cycle and standby power generation applications.

The SGT-800 has true dual-fuel Dry Low Emission (DLE) combustion to minimize NO_x emissions and ensure that the turbine complies with both global and regional emission regulations.

Flexible maintenance, high availability

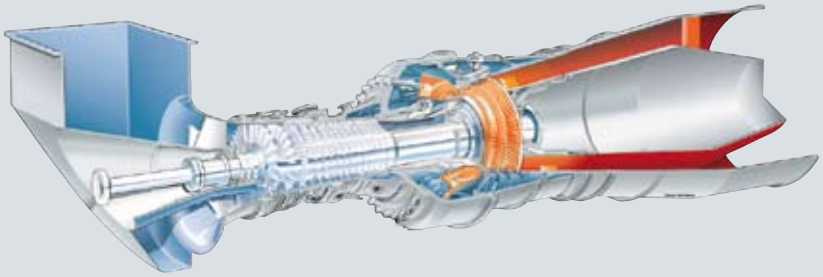
With the option of on-site maintenance or modular overhaul, the structural arrangement of the SGT-800 offers a flexible and financially beneficial maintenance concept. This maintainability combined with the turbine's robust, single-shaft arrangement, ensures its high operational availability. The high power-to-footprint ratio results in lower construction costs and allows for convenient siting in restricted industrial areas.

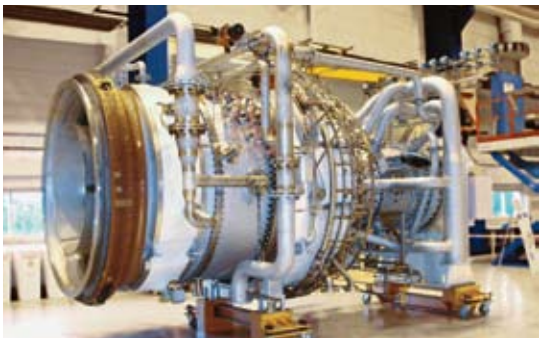
Industrial Gas Turbines

Answers for energy.

SIEMENS

SGT-800 Industrial Gas Turbine





SGT-800 workshop package assembly.

Technical specifications

Overview

- Power generation: 47.0 MW(e)
- Frequency: 50/60 Hz
- Electrical efficiency: 37.5 %
- Heat rate: 9,597 kJ/kWh (9,096 Btu/kWh)
- Turbine speed: 6,608 rpm
- Compressor pressure ratio: 19.9:1
- Exhaust gas flow: 131.5 kg/s (289.9 lb/s)
- Exhaust temperature: 544° C (1,011° F)
- NO_x emissions: (with DLE corrected to 15 % O_2 dry)
  - Natural gas: ≤15ppmV
  - Liquid fuel: ≤42ppmV

Axial Compressor

- 15-stage axial-flow compressor
  - 3 stages variable guide vanes
- Electron-beam welded rotor
- Cr-steel blades and vanes
- Abradable seals
- Controlled Diffusion Airfoils

Combustion

- 30 dual-fuel Dry Low Emissions burners
- Welded annular sheet metal design
- Thermal-barrier-coated inner surface

Turbine

- Single-module high-efficiency 3-stage turbine
  - two first stages and stator flanges are air-cooled
  - first stage of single-crystal material
  - third stage with interlocking shrouds

Bearings

- Tilting-pad radial and thrust bearings
- Vibration and temperature monitoring

Fuel System

- Natural gas – Liquid fuel – Dual fuel
- On-load fuel changeover capability
- Load-rejection capability
- Gas-supply pressure requirement: 27-30 bar(a) (390-435 psi(a))

Speed Reduction Gearbox

- Double helical design
- Cold-end-driven generator
- Speeds of 1,500 rpm and 1,800 rpm to suit 50 Hz or 60 Hz operation

Generator

- Four-pole design
- Rated voltage: 10.5 kV/11.0 kV/13.8 kV
- 50 Hz or 60 Hz
- Protection IP54
- PMG for excitation power supply
- Complies with -IEC/EN 6034-1 standard

Lubrication

- Lubricating oil system placed on separate skid
- 3 x 50 % AC-driven lube oil pumps with DC backup

Starting

- Electric start-motor connected to gearbox

Control System

- Siemens Simatic control system
- Distributed Inputs/Outputs

Other

- Straight axial exhaust

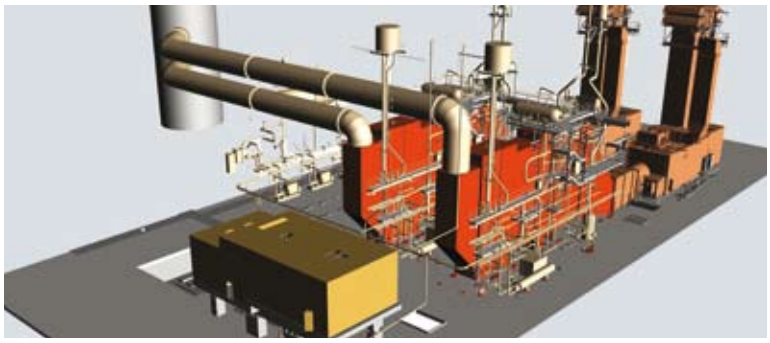
Gas turbine

Key features

- Robust industrial heavy-duty design
- High electrical efficiency
- High exhaust energy, giving excellent cogeneration/combined cycle characteristics
- Dual-fuel Dry Low Emissions (DLE) technology
- Fuel-changeover capability
- Long-term efficiency – low deterioration
- Stable load-rejection capability, < 5 % overspeed
- Low gas-supply pressure
- Cold-end drive enabling straight and simple fit with HRSG
- Excellent operational availability and reliability

Maintenance

- Established on-site service concept, eliminating need for special workshop maintenance
- Compact, modular layout enabling easy on-site maintenance
- Gas turbine can be removed on rollers through the sliding door
- Removable burners for quick and easy inspection
- Vertically split compressor casing
- Staff training in operation and maintenance
- 24/7 Siemens support
- Remote diagnostics available



Example showing in-house installation of two SGT-800 gas turbines, two HRSGs and a Siemens SST-900 steam turbine in a combined-cycle plant.

The combined-cycle cogeneration (district heating) plant of Göteborg Energi AB (Rya, Gothenburg) has a total efficiency of 94 %.

Industrial plants based on the SGT-800

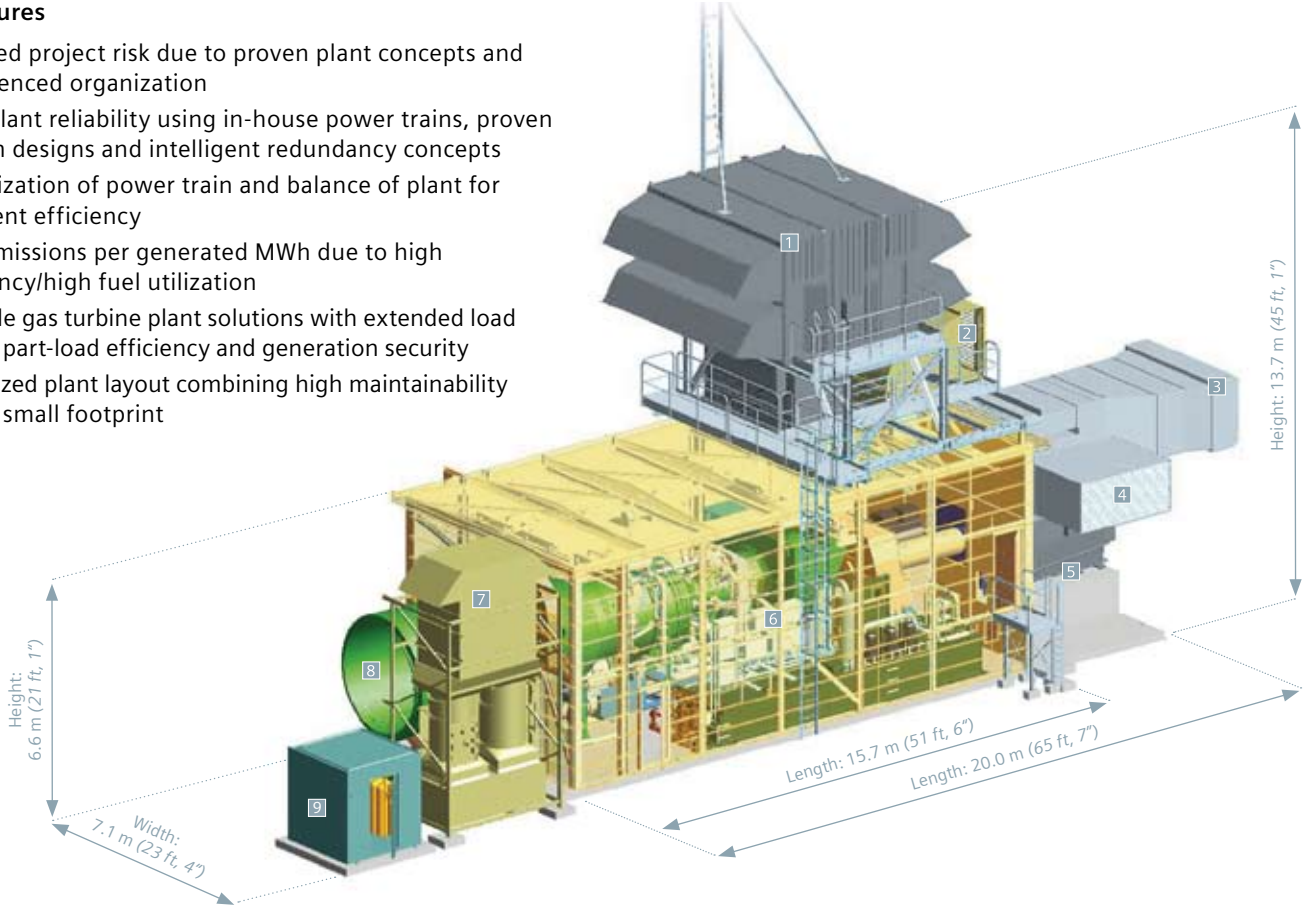
Siemens offers industrial plant solutions based on the SGT-800 for power generation or cogeneration in simple or combined cycle modes. Experience from many operating plants, long-standing relations with key suppliers and the ability to offer up to full EPC solutions and service/maintenance/availability agreement packages are further advantages in the delivery of SCC-800 plants.

Key features

- Reduced project risk due to proven plant concepts and experienced organization
- High plant reliability using in-house power trains, proven system designs and intelligent redundancy concepts
- Optimization of power train and balance of plant for excellent efficiency
- Low emissions per generated MWh due to high efficiency/high fuel utilization
- Multiple gas turbine plant solutions with extended load range, part-load efficiency and generation security
- Optimized plant layout combining high maintainability with a small footprint

Combined-cycle power with SGT-800

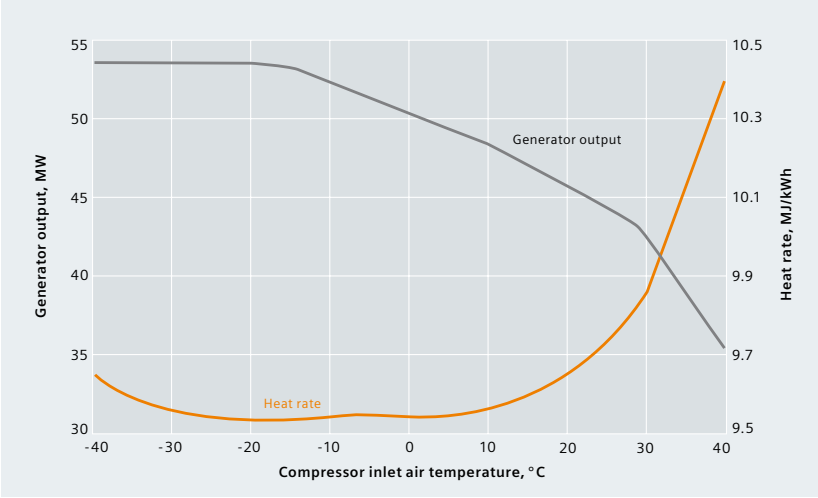
In a combined-cycle configuration, the excellent efficiency and steam-raising capability of the SGT-800 provides the core of a reliable, efficient and powerful SCC-800 plant. As an example, in condensing operation, two SGT-800 gas turbines and one SST-700 steam turbine can provide 135 MW(e) with an efficiency up to 54.4 %.



SGT-800 standard package

1. Combustion air inlet filter
2. Enclosure ventilation inlet
3. Generator cooling air inlet
4. Generator cooling air outlet
5. AC generator
6. Core engine
7. Enclosure ventilation outlet
8. Combustion exhaust
9. Fire suppression cabinet

SGT-800 Performance



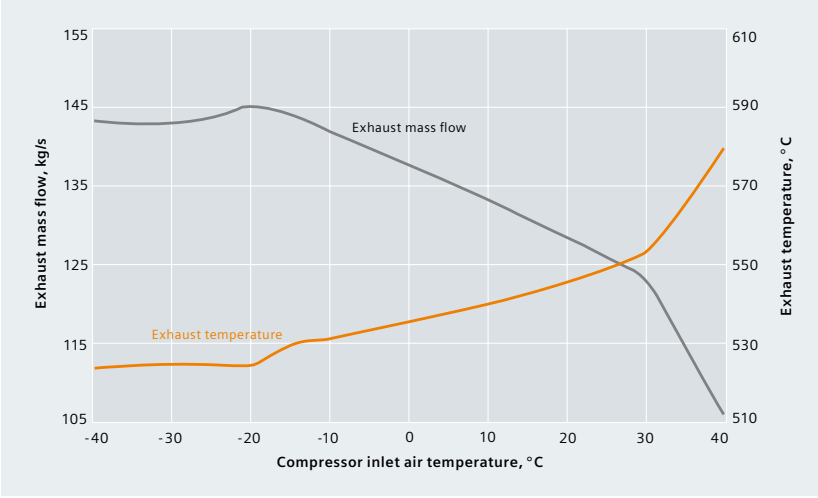
Nominal generator output and heat rate

Conditions/assumptions:

Fuel:	Natural Gas LHV, 46,798 kJ/kg (20,118 Btu/lb)
Altitude:	Sea level
Ambient pressure:	1.013bar(a) (14.7psi(a))
Relative humidity:	60 %
Inlet pressure loss:	5 mbar (2" H_2O)
Outlet pressure loss:	5 mbar (2" H_2O)
Fuel temperature:	5° C (41° F)

Diagram conversion factors:

To convert	To	Multiply by
°C	°F	(°Cx9/5)+32
MJ/kWh	Btu/kWh	949



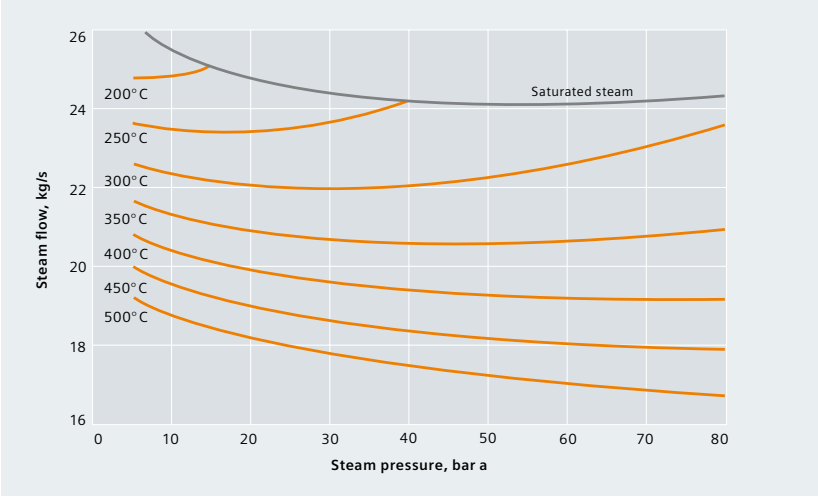
Nominal exhaust mass flow and temperature

Conditions/assumptions:

Fuel:	Natural Gas LHV, 46,798 kJ/kg (20,118 Btu/lb)
Altitude:	Sea level
Ambient pressure:	1.013bar(a) (14.7psi(a))
Relative humidity:	60 %
Inlet pressure loss:	5 mbar (2" H_2O)
Outlet pressure loss:	5 mbar (2" H_2O)
Fuel temperature:	5° C (41° F)

Diagram conversion factors:

To convert	To	Multiply by
°C	°F	(°Cx9/5)+32



Unfired heat-recovery steam generation

Conditions/assumptions:

Fuel:	Natural Gas LHV, 46,798 kJ/kg (20,118 Btu/lb)
Altitude:	Sea level
Ambient pressure:	1.013bar(a) (14.7psi(a))
Ambient temperature:	15° C (59° F)
Relative humidity:	60 %
Boiler pinch point:	8K (14F)
Boiler approach point:	5K (9F)
Inlet pressure loss:	5 mbar (2" H_2O)
Outlet pressure loss:	25 mbar (10" H_2O)

Diagram conversion factors:

To convert	To	Multiply by
°C	°F	(°Cx9/5)+32
kg/s	lb/s	2.2046
bar	psi	14.5

Published by and copyright © 2009:
Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens AG
Energy Sector
Oil & Gas Division
Wolfgang-Reuter-Platz
47053 Duisburg, Germany

Siemens Energy, Inc.
10730 Telge Road
Houston, Texas 77095, USA

Siemens Industrial Turbomachinery AB
Slottsvaegen
SE-61283 Finspong, Sweden

For more information, please contact
our Customer Support Center.
Tel: +49 180 524 70 00
Fax: +49 180 524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

Oil & Gas Division
Order No. E50001-G430-A101-V1-4A00
Printed in Germany
Dispo 34806, c4bs 7447 P WS 0909.4

Printed on elementary chlorine-free bleached paper.