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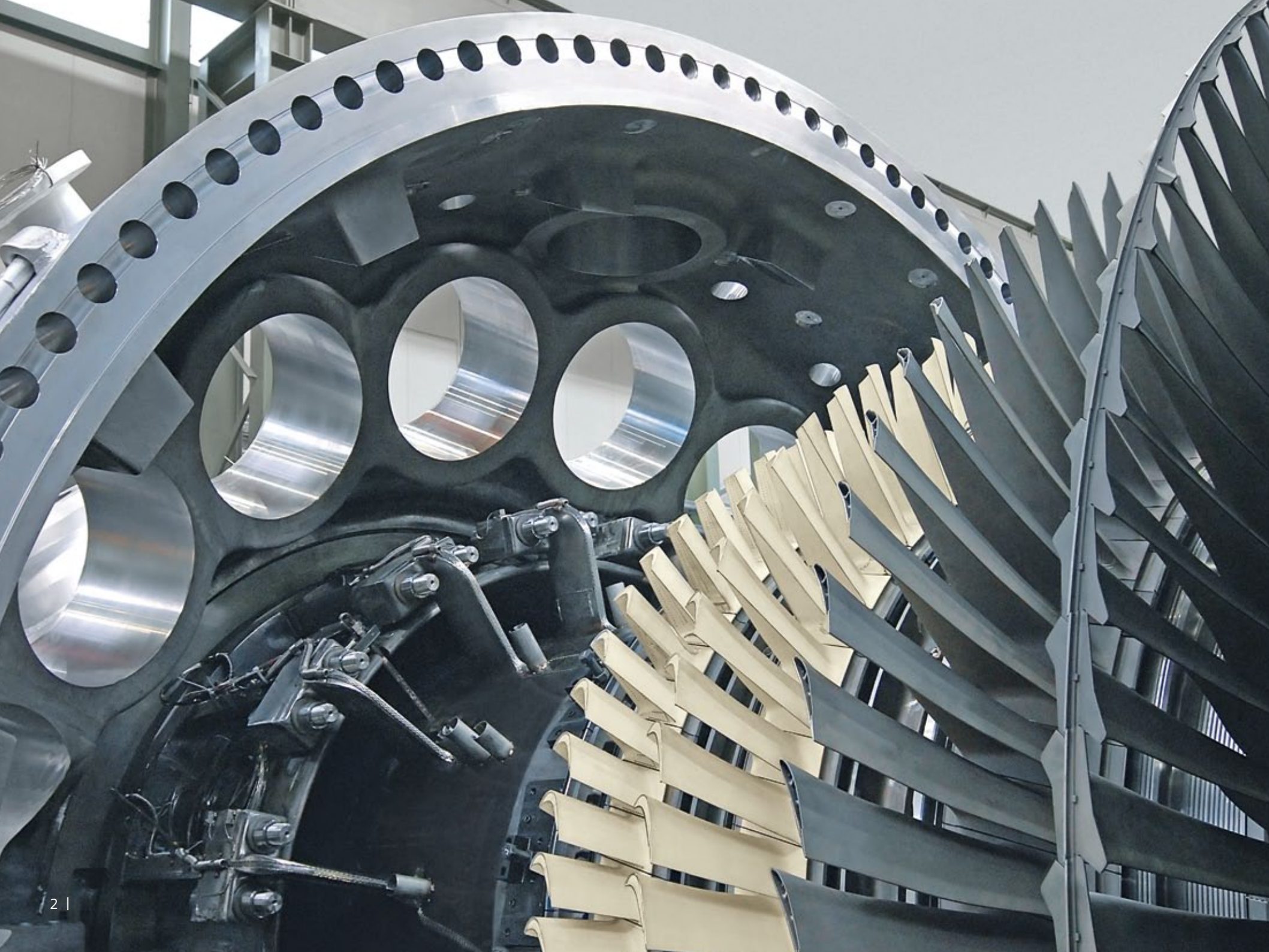
The SGT5-8000H – proven in commercial operation

Answers for energy.



375 MW

Output of the Siemens Gas Turbine SGT5-8000H.*

* Gross: ISO ambient conditions

375 MW

Rated output of 375 MW in simple cycle operation.

Reducing emissions and preserving our environment for future generations were key goals driving Siemens development of its new generation H-class gas turbine (SGT™), the SGT-8000H series. The 50 Hz version was built, shipped, and validated at a gas turbine power plant in Irsching, Germany, where it has demonstrated its capabilities under real operating conditions. This innovative gas turbine is designed for:

- efficiency of 40 percent in simple cycle operation
- low lifecycle costs
- high reliability and availability
- operational flexibility
- low emissions

Several turbines from the SGT-8000H series have been sold or are already in commercial operation around the world.

Bernhard Fischer

"In actual operation, the SGT5-8000H has more than met our high expectations: During roughly 1,200 hours of testing in Irsching, Block 4, we were able to experience the performance of the world's most powerful gas turbine for ourselves. Now, after the expansion this innovative combined cycle power plant has set new benchmarks in terms of efficiency and flexibility."

Dr. Bernhard Fischer,
CEO E.ON Generation

Proven efficiency and output – proven economic advantages

With the SGT5-8000H, sustainable power generation has entered a new dimension. Under reference site conditions at Irsching, the results of the turbine's test run set a new world record, achieving an energy efficiency rate of over 60.75 percent at an output of 578 MW in combined cycle operation.

Bundled experience and expertise

The new, advanced SGT-8000H series gas turbines and the SCC-8000H series combined cycle power plants feature best-in-class technology derived from our long line of large direct-drive Siemens 50 Hz and 60 Hz heavy-duty gas turbines and power plants.
These turbines also integrate proven Siemens dry low NO_x can-annular system designed to minimize plant exhaust emissions. A highly qualified international team of over 250 experienced engineers and over 500 employees worked hand-in-hand to develop, manufacture, and assemble this new gas turbine, which has been tested and validated both in the Berlin test facility and at the Irsching reference plant.

From the customer's point of view

The advanced technology of the fully air-cooled SGT-8000H series gas turbine continues our long-standing tradition of satisfying the needs of our customers all around the world. We take an evolutionary approach when designing our new turbines by incorporating proven features based on the experience acquired from our reliable operating units over decades. In developing the world's largest H-class gas turbine for unmatched combined cycle efficiency, we combined the best features of our proven 50 Hz and 60 Hz Siemens heavy-duty gas turbine product lines with new, innovative technological developments.

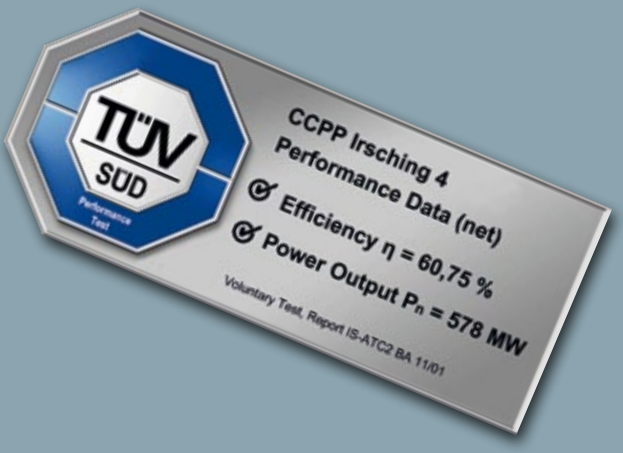
Less complexity for more flexibility

To achieve higher operational flexibility for both the gas turbine and the power plant, this gas turbine features less complex but proven technology, including the use of air cooling rather than steam cooling in the H-class.

As a design strategy, air cooling also makes the SGT-8000H series gas turbines an excellent choice for repowering, as there are no ties to the steam cycle for the required cooling.

>60%

Efficiency of the Siemens Combined Cycle power plant SCC-8000H at Irsching.*



* Net: ISO ambient conditions

>60%

Over 60 percent demonstrated efficiency in combined cycle operation.

The SCC-8000H combined cycle power plant is designed to lower lifecycle costs through:

- over 60 percent efficiency in combined cycle mode and reduced emissions at partial load
- its less complex engine and parts, which can lower maintenance and operating costs
- a straightforward operating concept

570 MW

Output of the Siemens Combined Cycle power plant SCC5-8000H 1S.*

* Net: ISO ambient conditions

570 MW

Beyond 60 percent – pioneering H-class efficiency with world-class flexibility.

Proven in commercial operation, the SCC5-8000H 1S has an output of 570 MW and a net efficiency of over 60 percent in combined cycle operation.

Efficiency features:
- new compressor with advanced blade design
- state-of-the-art materials to increase the firing and exhaust-gas temperature
- innovative sealing system to prevent cooling air loss
- advanced water/steam cycle (up to 600 °C) with Benson® HRSG

Flexibility features:
- up to ½ GW in less than ½ hour
- an air-cooled engine, a cooling method that is always present at speed
- fast start-up and cycling capability to support intermediate load requirements
- less complexity in engine and plant design, resulting in more flexibility in operation and reduced start-up time
- improved turndown capability for high efficiency and lower emissions in partial-load operation

Innovative plant technology that benefits our customers

The latest addition to our comprehensive gas turbine product line – the new SGT-8000H series and the Siemens Combined Cycle power plant (SCC™), the SCC-8000H series – addresses the worldwide demand for more environmentally compatible energy. This new gas turbine frame combines the best features of the existing product lines with the most recent advances in technology.

Impressive results from commercial operation in Irsching, Germany

Beginning with simple cycle testing in early 2008, the Irsching plant went into commercial operation in July 2011. As of August 2011, more than 9,000 EOH for the gas turbine and more than 5,000 EOH in combined cycle operation were successfully achieved. The world-record test run at the Irsching site proved a net efficiency level of 60.75 percent. This made Siemens the pioneer in breaking the 60 percent combined cycle efficiency barrier. Our customers can benefit from high starting reliability and excellent operating availability.

Environmentally responsible power generation

With its extra two percentage points of efficiency compared to many standard F-series combined cycle power plants, every SCC5-8000H single-shaft power plant can conserve approximately 43,000 metric tons* of carbon dioxide emissions annually.

Best value for the customer

Siemens plant solutions provide an optimal balance between capital costs, plant performance, and operational and maintenance considerations. Thanks to its fully air-cooled design, the SGT-8000H series is designed for high reliability and availability and reduced lifecycle costs. The Benson® HRSG is designed to achieve the steam temperatures of 600 °C required to break through the 60 percent efficiency barrier. As a result, single-shaft SCC-8000H series power plants can offer our customers maximum value and long-term investment security.

* Assumes base-loaded operation during full year

Working day and night – for a business that never sleeps

The people who work at Siemens are passionate about power plants. Their dedication is key to the excellent performance of the power plants we plan, build, service, operate, and modernize.

Always at your service: our maintenance team

In times of widely fluctuating energy prices, market instability, and a highly competitive environment, Siemens remains a consistent and reliable partner. More than 4,000 highly qualified power plant engineers, technicians, and service specialists are at work all over the world keeping our technology running. The SGT-8000H series is designed for outstanding serviceability. A number of tools and features, such as the combustor handling tool, are designed for efficient maintenance and reduced scheduled down time throughout the lifecycle. All blades are designed to be removable without rotor lift, while Stage 1 removal is also possible without cover lift for easy inspection. Optimized outage times mean higher reliability and availability.

Dedicated to success

Our customized performance enhancement programs help prepare power plants for tomorrow and beyond. There are many options available, including raising the combustion temperature, changing the fuel, converting the system, redesigning turbines, generators, boilers, and control technology, and reducing emissions. We continue to develop and implement new technologies to meet future energy needs head-on.

Every step matters

A service program is the best way to plan ahead to support your long-term goals. Siemens helps proactively maintain plant performance with a variety of service options. We offer customized service programs that can include scheduled inspections, preventive maintenance, replacement-part programs, training, and more.

100%

Reliable service.

100%

100 percent reliable service.

Siemens offers maintenance expertise for optimal plant reliability. We work day and night to make your energy business as successful as possible. Our service includes:

- consulting
- training
- implementing
- operating
- maintaining
- repairing
- modernizing
- lifetime extension

Performance that speaks for itself

With the SGT-8000H gas turbine series and the SCC-8000H combined cycle power plant series, we are entering a new dimension of sustainable electricity generation. Compared to state-of-the-art F-class engines, this latest series of advanced gas turbines can reduce annual CO_2 emissions by up to 43,000 tons in base-load operation for a full year. The series is available for both 50 Hz and 60 Hz applications.

Siemens Gas Turbine*	50 Hz	60 Hz
	SGT5-8000H	**SGT6-8000H**
Gross power output [MW]	375	274
Gross efficiency [%]	40	40
Pressure ratio	19.2	20.0
Exhaust temperature [°C/°F]	625/1,157	620/1,148
Exhaust mass flow [kg/s]	820	600
Exhaust mass flow [lb/s]	1,808	1,330
Gas turbine emissions	**SGT5-8000H**	**SGT6-8000H**
NO_x [ppm]	25	25
CO [ppm]	10	10
Gas turbine physical dimensions	**SGT5-8000H**	**SGT6-8000H**
Weight [t]	440	280
Length [m]	13.2	11
Height [m]	5	4.2
Width [m]	5.5	4.2

Siemens Combined Cycle power plant*	50 Hz	60 Hz
Single shaft	**SCC5-8000H**	**SCC6-8000H**
Net power output [MW]	570	410
Net efficiency [%]	> 60	> 60
Net heat rate [kJ/kWh]	6,000	6,000
Net heat rate [Btu/kWh]	5,687	5,687
Start-up time [expected minutes for hot start]	~ 40	~ 40

* ISO ambient conditions

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