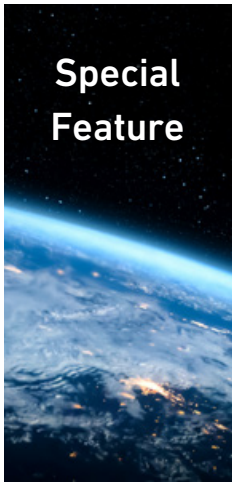


MISSION NET ZERO

Energy Transition

MHI Group offers realistic Energy Transition solutions tailored to the individual circumstances and challenges of our customers—which vary by country and region—to achieve Carbon Neutrality.

The Group's Energy Transition strategy centers on three pillars: Decarbonization of existing infrastructure, Implementation of a hydrogen solutions ecosystem, and Building a CO_2 solutions ecosystem. To decarbonize existing infrastructure, we are focusing on increasing the efficiency of thermal power and converting to carbon-free fuels, as well as contributing to the maximum utilization of nuclear power and the decarbonization of industries such as steelmaking. To implement a hydrogen solutions ecosystem, we are working to establish a value chain encompassing the production, transportation, storage, and utilization of hydrogen to be used as a fuel for power generation. To build a CO_2 solutions ecosystem, we will leverage our expertise in CO_2 capture technology to provide solutions for the capture, transport, storage, and utilization of CO_2 in hard-to-abate industries.

In this special feature, we outline our approach to the Energy Transition in thermal power systems, part of the critical power infrastructure that supports modern society.

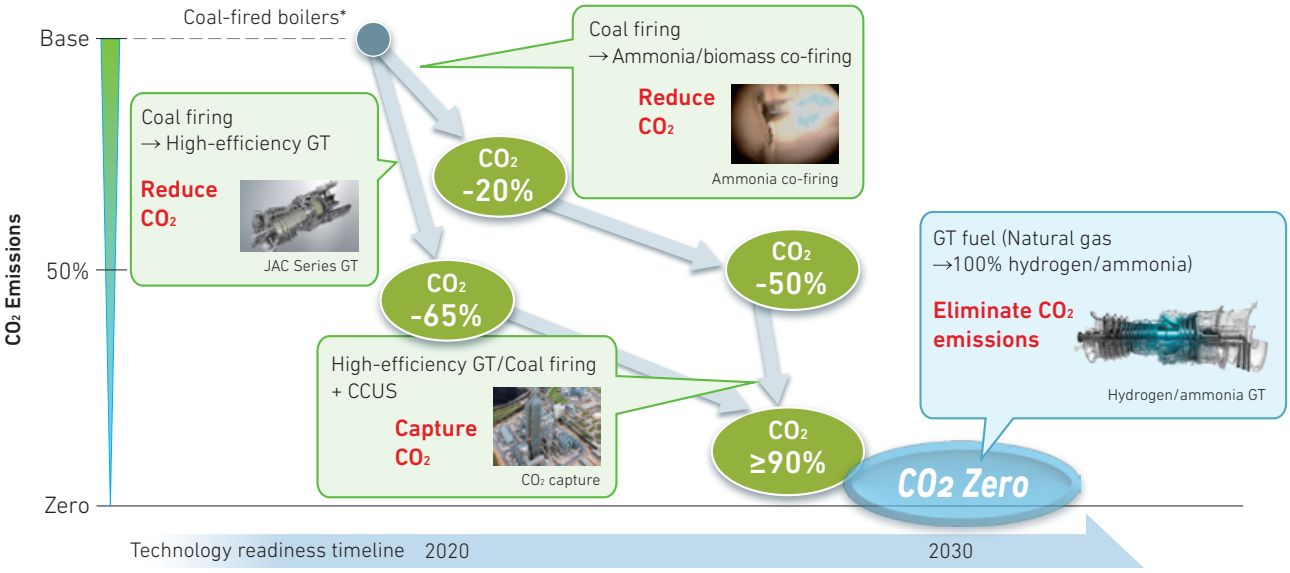
MHI Group Technological Capabilities Backed by a Long History of Extensive Achievements

Going all the way back to Japan's first domestically produced steam turbine in 1908, MHI Group's Gas & Steam Power Systems businesses have developed in step with the world's growing demand for electricity. Throughout our history of development and production spanning more than a century, MHI has grown into one of the world's top-class manufacturers of gas turbines for power generation applications. The ability to fire fuel at high temperatures is essential to achieving high efficiency in a gas turbine, which is currently one of our mainstay products. Thanks to cutting-edge technology development efforts in such areas as aerodynamics, cooling, and materials science, MHI brought the world's first 1,600°C J-series gas turbine to market in 2011.

During the Energy Transition, to achieve the widespread implementation of decarbonization solutions—including efficiency improvements in existing infrastructure, conversions from fossil to clean fuels, and CO_2 capture—it will take time for existing infrastructure to be replaced in a phased manner. Technology development will also require sustained effort over a long time frame. Here, MHI's strengths will be on full display: analysis of operations data gathered during often decades of providing after-sales services for our products, continuous development of our technologies and
human capital, and a stable financial foundation to support these efforts.

Roadmap for Energy Transition in Thermal Power

To decarbonize thermal power, MHI Group is pursuing three approaches: reducing, capturing, and eliminating CO_2 emissions. As shown in the diagram below, each of these solutions will contribute steadily to reducing CO_2 emissions.



*Based on CO_2 emissions from subcritical pressure coal-fired boilers

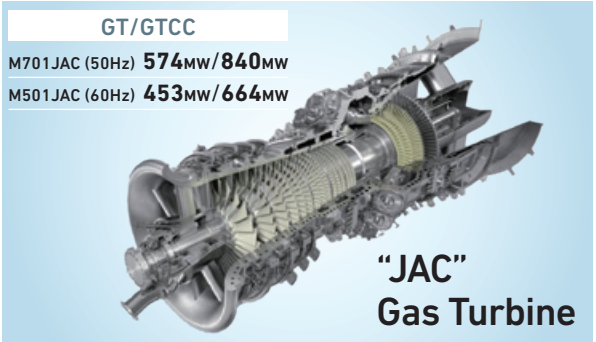
Conversion of Coal-Fired Power to Decarbonized Fuels and Replacement with GTCC

At every stage of the process, from gas turbine R&D, design, validation, manufacture, installation, and trial operation to after-sales services, MHI Group provides quality that customers trust. In addition, existing coal-fired thermal power generation systems can reduce CO_2 through the co-firing of low-carbon or decarbonized fuels, such as ammonia and biomass. CO_2 can also be reduced by replacing coal-fired systems with high-efficiency gas turbines. GTCC power generation systems using cutting-edge JAC[1] gas turbines have achieved a power generation efficiency of 64%, the highest level in the world. The result is up to 65% reduction in CO_2 emissions compared to conventional coal-fired thermal power systems. MHI's high-efficiency, highly reliable JAC gas turbines also satisfy customer needs as a lower-carbon alternative to coal-fired thermal power as a baseload power source.

1 JAC: J-series Air-Cooled gas turbines

Cutting-Edge JAC Gas Turbine

Replacing a coal-fired thermal power system with a gas-fired GTCC can cut CO_2 emissions by up to 65%.



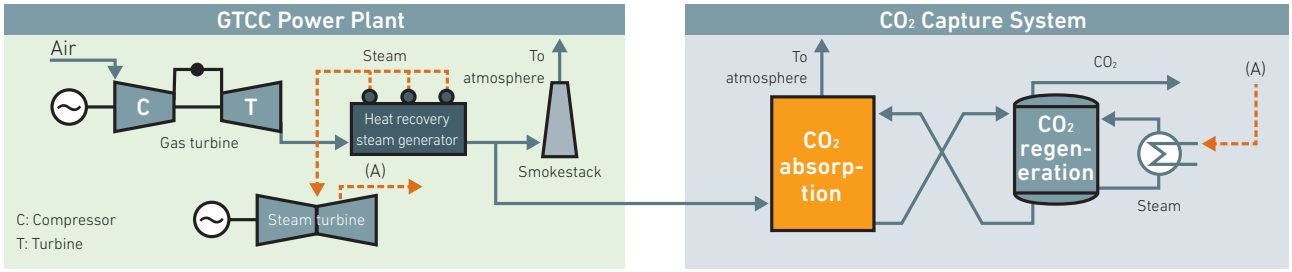
High efficiency: 64% CC efficiency	■ High pressure ratio compressor (25:1) ■ Enhanced air-cooled combustors ■ Advanced thermal barrier coating (TBC)
Reliability: 99.5% reliability	■ Cumulative operation hours: > 2.4 million hours ■ Booked units: 136 units (J-series as of July 31, 2024)
Fuel flexibility: Compatible with a variety of fuels	■ Fossil fuels (natural gas, oil) ■ Clean fuels (hydrogen)

High-Efficiency GTCC + CO_2 Capture System

MHI Group has worked to develop the KM CDR Process™ and Advanced KM CDR Process™ in collaboration with The Kansai Electric Power Co., Inc. since 1990. Both of these technologies employ a chemical absorption method using a proprietary amine absorbent. We have delivered CO_2 capture systems for use in chemical plants and power generation facilities worldwide. As of September 2024, we have the world's highest market share in commercial flue gas CO_2 capture plants on a capacity basis.

The demand for combinations of high-efficiency GTCC power systems with CO_2 capture systems is increasing worldwide, driven by the establishment of legal frameworks supporting decarbonization, such as the Inflation Reduction Act (IRA) in the U.S. We have been awarded front-end engineering design (FEED) contracts for CO_2 capture systems to be applied to GTCC power plants, primarily in North America and Europe. In January 2024, we agreed with The Kansai Electric Power Co., Inc. to install a new CO_2 capture pilot plant at Himeji No. 2 Power Plant with plans to demonstrate next-generation CO_2 capture technology using flue gas from a GTCC system. This next-generation technology is currently under joint development with ExxonMobil. We will continue to enhance our competitiveness and steadily develop the CCUS business leveraging our proprietary CO_2 capture technology.

By installing a CO_2 capture system at a high-efficiency GTCC power plant, it is possible to capture over 90% of the CO_2 generated.



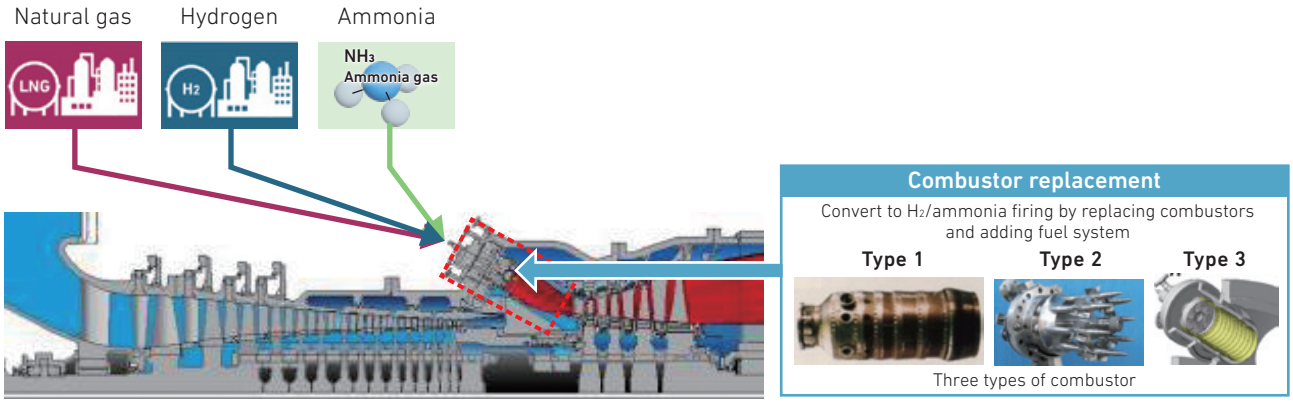
Hydrogen- and Ammonia-Fired Gas Turbine Development

In response to customer requests for a method to effectively utilize oil refinery and steel mill off-gas, since the 1970s, MHI Group has manufactured gas turbines which fire off-gas containing hydrogen. Since the 1980s, MHI has worked to develop technology to fire hydrogen in 15 MW-class gas turbines. Leveraging our experience developing and operating combustors for these industrial applications, MHI is working hard to develop next-generation combustion techniques which will make 100% hydrogen firing possible by resolving technical issues, such as hydrogen's especially high rate of combustion.

MHI has completed development of a large frame gas turbine combustor enabling 30% hydrogen co-firing. We also successfully conducted a combustion test with a 50% hydrogen mix in 2022. This was an important milestone at which we effectively gained the ability to comply with the EU Taxonomy's 270 g/kWh CO_2 emissions standard. Following this successful combustor test, in November 2023, we used our state-of-the-art 1,650°C class J Series Air-Cooled (JAC) gas turbine at Takasago Machinery Works' GTCC demonstration facility. This validation operation, which used a fuel mixture of natural gas blended with 30% hydrogen, was successful. We will continue validation operations with a 50% hydrogen mix at the same facility. In parallel, we are working to develop a 100% hydrogen-fired gas turbine using a new multi-cluster combustor design, with commercialization planned for 2030 or thereafter.

Another valid approach to decarbonization is utilizing ammonia, which acts as a hydrogen carrier and is easier to handle than hydrogen. The use of ammonia will help stabilize energy supplies and address environmental issues, thus facilitating a smooth Energy Transition. MHI has also begun work on the development of a 40 MW-class gas turbine that directly uses 100% ammonia fuel. We are pursuing combustor development in the lead-up to commercial unit operation and market launch in 2025 or thereafter.

A natural gas-fired gas turbine can be adapted to fire hydrogen or ammonia—and thereby achieve decarbonization—simply by replacing the combustors and adding a hydrogen or ammonia fuel supply system



Type 1 (diffusion)	100% H_2 firing	Development complete
Type 2 (premix)	30% H_2 co-firing	Development complete for large frame GTs
	Type 3 (multi-cluster)	2022: Successful combustion tests for large frame GTs
Type 3 (multi-cluster)	100% H_2 firing	After 2025: Commercialization of small and mid-size GTs After 2030: Commercialization of large frame GTs
Type 1 (diffusion)	100% ammonia firing	Validating in the lead-up to commercial unit operation and market launch in 2025 or thereafter

Decarbonization Technology Development Center Now Fully Operational

MHI Group established Takasago Hydrogen Park (Takasago City, Hyogo Prefecture) and Nagasaki Carbon Neutral Park (Nagasaki City, Nagasaki Prefecture) as development hubs for decarbonization technologies. At Takasago Hydrogen Park, we use a utility-scale GTCC demonstration facility to conduct long-term validation of the latest fundamental technologies, from hydrogen production to utilization (power generation), under real-world operating conditions. Nagasaki Carbon Neutral Park is a base for developing these fundamental technologies.

The process of bringing products to market that have undergone a series of fundamental technology development and validation cycles in conditions similar to those of commercial operations helps us improve the reliability of the products we develop.

Takasago Hydrogen Park

In 2022, we established Takasago Hydrogen Park at Takasago Machinery Works, our base for the development, design, manufacture, and validation testing of gas turbines. It is the world's first integrated hydrogen validation facility for technologies ranging from hydrogen production to utilization (power generation).

In the area of hydrogen production, we commenced operation of an alkaline water electrolyzer in the autumn of 2023. SOEC (Solid Oxide Electrolysis Cell) is a next-generation, high-efficiency hydrogen production technology, which we are developing through the application of proprietary fuel cell technologies which achieve high levels of pressure that other companies cannot replicate. An SOEC test module has been in operation since the spring of 2024. We are also developing an AEM[2] electrolyzer, which will allow us to reduce the cost and size of electrolyzer systems. We aim to produce commercial AEM electrolyzer units after completing validation operations at Takasago Hydrogen Park. Furthermore, we are developing a next-generation turquoise hydrogen production technology using a methane pyrolysis technique, which converts methane into hydrogen and solid carbon. Going forward, we will pursue validation

operations at Takasago Hydrogen Park and continue working to commercialize the large-scale production of hydrogen.

In addition to the validation testing of hydrogen-fired gas turbines, we are expanding our hydrogen production and storage facilities. We believe that using these facilities will enable us to contribute greatly to the widespread use of hydrogen and the practical implementation of hydrogen power generation.

2 AEM: Anion Exchange Membrane

Takasago Hydrogen Park Validation Schedule

		2023	2024	2025	2026	2027
Hydrogen production facilities	Alkaline water electrolyzer	Commissioning			Commercial operation started (40 units) Advanced Clean Energy Storage Project (North America)	
	SOEC	Fundamental technology testing	400 kW-class test module under validation		Multiple-MW validation operation (planned)	
	AEM electrolyzer	Fundamental technology testing and development validation				
	Turquoise hydrogen	Fundamental technology testing and development validation				Multiple-MW validation operation (planned)
Hydrogen storage facility	Hydrogen storage	350 units	Expansion (1,050 units)			
Gas turbine validation schedule	Large frame gas turbines	30% co-firing validation achieved	50% co-firing validation (planned)		Start of 30% hydrogen co-firing commercial operations in North America	
	Small- and mid-size gas turbines	100% hydrogen firing validation				

Nagasaki Carbon Neutral Park

We established Nagasaki Carbon Neutral Park within Nagasaki Shipyard and Machinery Works and the Research & Innovation Center in Nagasaki in 2023. In addition to the hydrogen production technologies to be validated at Takasago Hydrogen Park, we are developing fundamental technologies for ammonia firing, CO_2 capture, and fuel synthesis using biomass. We will leverage our long-established capabilities in the design and manufacture of thermal energy systems to accelerate the development and commercialization of new decarbonized products.

In the power generation sector, we are developing ammonia combustion technology for use in boilers, gas turbines, and gas engines. We are also conducting research and validation tests for the utilization of ammonia in marine engines.