

Replacement of Gas Turbine at Futtsu Thermal Power Station

1. Outline of Futtsu Thermal Power Station

- (1) Location: 25 Shintomi, Futtsu City, Chiba Prefecture.
- (2) Plant chief: Toshimitsu Ogawa
- (3) Site area: Approx. 1160 thousand m²
- (4) Output: 5160 MW
- (5) Facility overview

*Generation efficiency is evaluated by lower heating value base

Gr	Overview	
Gr 1	Output	1000 MW* *Authorized output (Unit 1-1~1-6: 167MW×6 units, Unit 1-7: 165MW×1 unit)
	Generation system	Unit 1-1~1-6: 1150 _C class combined cycle generation (CC) Unit 1-7: 1100 _C class combined cycle generation (CC)
	Generation efficiency*	Unit1-1, 1-3, 1-5, 1-6: 51.4%, Unit1-2, 1-4: 50.5%, Unit1-7: 47.2%
	Fuel	LNG (Liquefied natural gas)
Gr 2	Output	1120 MW* *Reported output (Unit 2-1, 2-2, 2-4, 2-5, 2-7: 160 MW×5 units Unit 2-3: 165 MW×1 unit, Unit 2-6:162 MW×1 unit)
	Generation system	Unit 2-1, 2-2, 2-4~2-7: 1300 _C class combined cycle generation (ACC) Unit 2-3: 1100 _C class combined cycle generation (CC)
	Generation efficiency*	Unit 2-1, 2-2, 2-4, 2-5, 2-7: 54.3%, Unit2-3: 47.2%, Unit2-6: 54.4%
	Fuel	LNG (Liquefied natural gas)
Gr 3	Output	1520 MW (380MW×4 units)
	Generation system	1300 _C class combined cycle generation(ACC)
	Generation efficiency*	55.3%
	Fuel	LNG (Liquefied natural gas)

Gr 4	Output	1520 MW (507MW×3 units)
	Generation system	1500℃ class combined cycle generation(MACC)
	Generation efficiency*	58.6%
	Fuel	LNG (Liquefied natural gas)

2. Gas Turbine Replacement Plan of Group 1 and 2

	Futtsu Thermal Power Station Group 1						Futtsu Thermal Power Station Group 2						
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Rated output	165 MW/each→167 MW						165 MW→160 MW(2-1・2-2・2-4・2-5・2-7) 165 MW→162 MW(2-3・2-6)						
Operation start	November 1986						November 1988						
Designed heat efficiency (LHV)	47.2%→51.4%(1-1・1-3・1-5・1-6) →50.5%(1-2・1-4)						47.2%→54.3%(2-1・2-2・2-4・2-5・2-7) →54.4%(2-3・2-6)						
Type of generation	LNG(CC)						LNG(CC)→LNG(ACC)						
Start of operation	June. 2017 completed	Dec. 2017 completed	July. 2018 completed	Sept. 2017 completed	July. 2019 completed	Mar. 2019 completed	July. 2016 completed	Mar. 2018 completed	Aug. 2019	Aug. 2018 completed	Mar. 2017 completed	Mar. 2019 completed	Aug. 2017 completed

* Futtsu Thermal Power Station Group 1 is comprised of 7 units. The scope of the replacement work is Unit 1 to 6.

3. Gas Turbine Replacement Plan

The gas turbine and other equipment are replaced to improve the generating efficiency and output.

Layout of the Replacement Areas

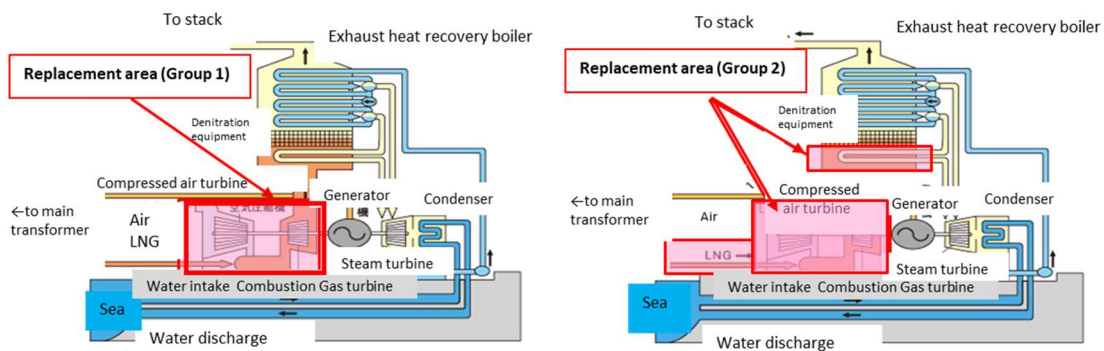


Image: Replacement of Group 1 Unit 5



Transporting new gas turbine rotors into the plant



Placing new gas turbine temporary before installation



Lifting new gas turbine rotors