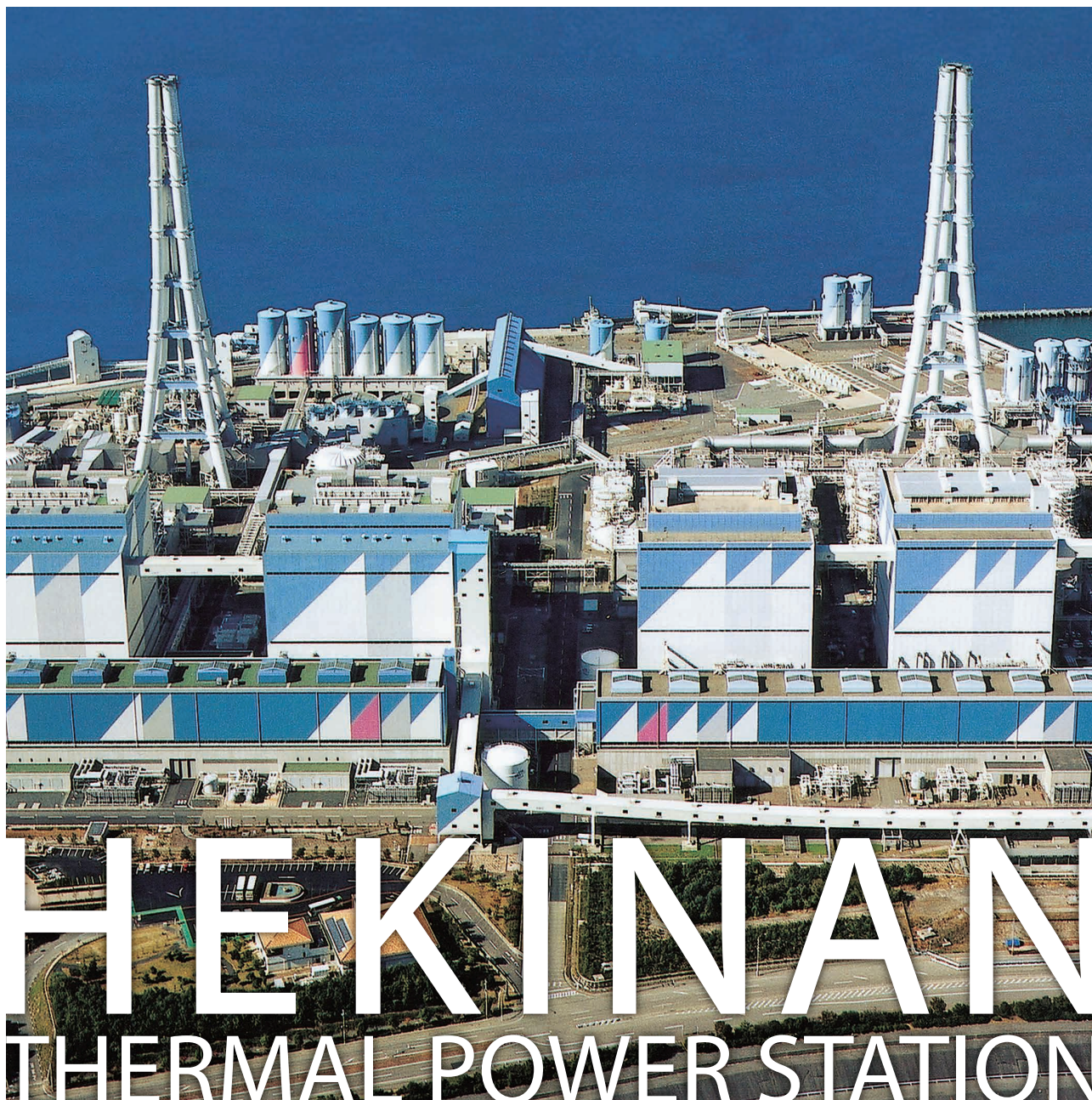


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WELCOME TO HEKINAN THERMAL POWER STATION!

#### Features and key points of the Hekinan Thermal Power Station

- The vast site has a coal storage yard where a large amount of coal is stacked.
- The rooftop of the boiler building has commanding views of the power station site.

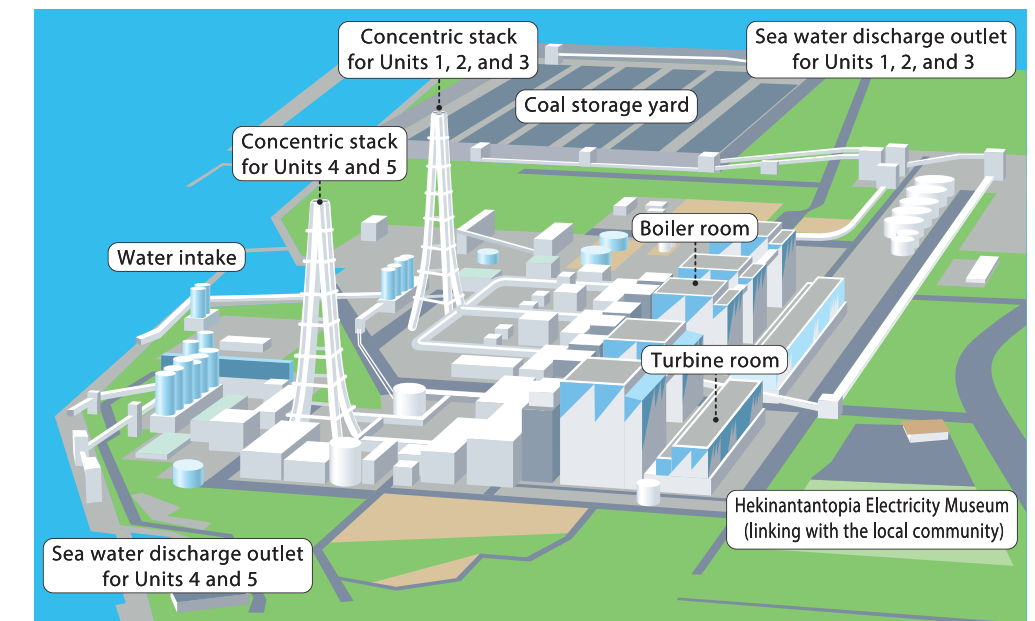




## Turbines and generators

The ultra-high-pressure and high-temperature steam generated by a boiler drives a turbine and a generator directly connected to the turbine at 3,600 rpm to generate electricity of 700 MW (Units 1 to 3) and 1,000 MW (Units 4 and 5). Units 4 and 5 are the world's first single axis type operating at 3,600 rpm in 1,000MW class.

## Overall layout of the power station



## Outline of facilities

Unit No.	Output (MW)	Fuel	COD	Power generation type
Unit 1	700	Coal	October 1991	Steam
Unit 2	700		June 1992	
Unit 3	700		April 1993	
Unit 4	1000		November 2001	
Unit 5	1000		November 2002	

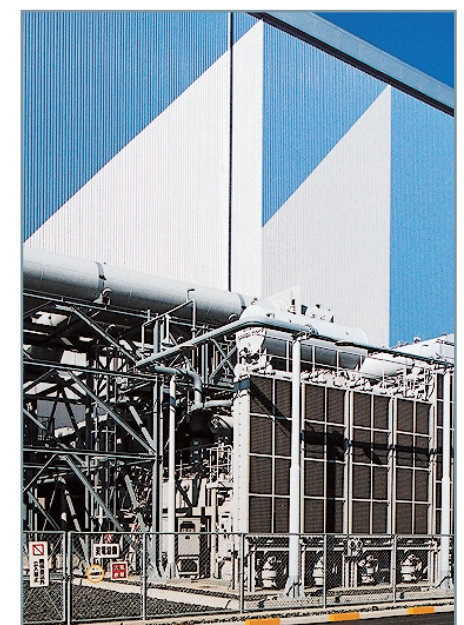
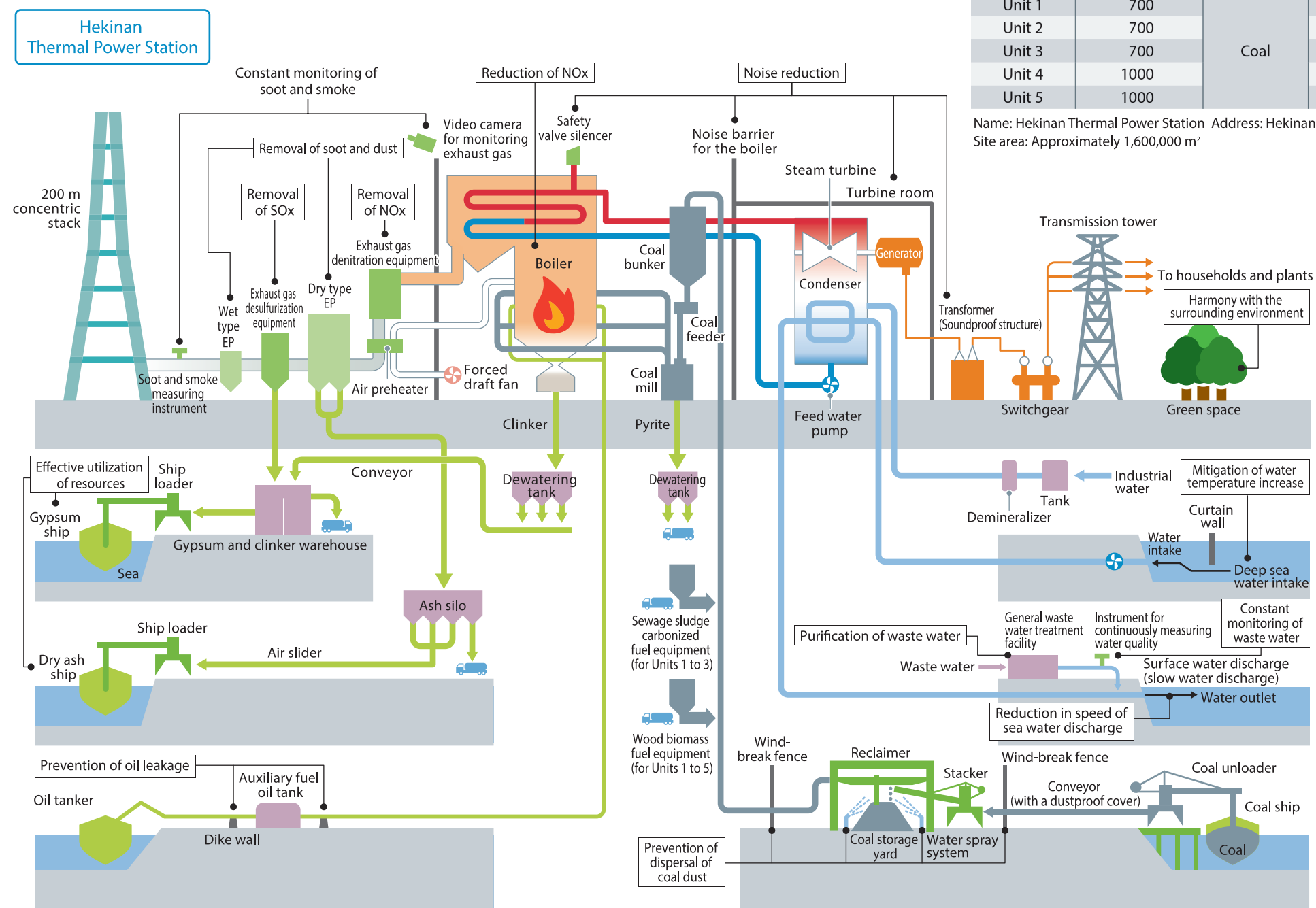
Name: Hekinan Thermal Power Station Address: Hekinan City, Aichi Prefecture  
Site area: Approximately 1,600,000 m<sup>2</sup>

## A coal-fired thermal power station with the largest output in Japan also one of the largest in the world

The Hekinan Thermal Power Station is a coal-fired thermal power station located on the shore of Kinuura Bay in the southern part of Hekinan City, Aichi Prefecture, approximately 40 km south of Nagoya City. It serves as a high availability power station to provide a stable supply of electricity to the Chubu and other areas. After Unit 1 went into commercial operation in 1991, power generation facilities have been added sequentially to meet increasing demand for electricity. With Unit 5 coming into operation in 2002, the total output increased to 4,100 MW, which is the largest output in Japan and is among the largest in the world for a coal-fired thermal power station. The vast site has the main equipment for the power station such as boilers, turbines, and generators as well as facilities specific to a coal-fired thermal power station such as a coal storage yard, ash pond, and environment-related equipment. The main equipment features a design based on a yacht sailing on the blue sea of Mikawa Bay to ensure color harmony with the landscape.

## Boiler

The coal transferred from the coal storage yard is pulverized and burned to generate ultra-high-pressure and -high-temperature steam.



## Main transformer

The voltage of the electricity generated by the generator is stepped up from 25,000V to 275,000V by the main transformer for efficient transmission. The electricity is sent to households and plants via a substation through a transmission line.





- Coal unloader  
Machinery for unloading coal transported by ship
- Stacker  
Machinery for stacking coal in the coal storage yard
- Reclaimer  
Machinery for recovering coal from a stockpile in the coal storage yard and transferring it to a belt conveyor
- Stacker-reclaimer  
Machinery capable of both stacking and reclaiming coal
- Berth  
Equipment for mooring ships for loading and unloading operations

## Coal unloading, storage, and transport equipment

The coal transported by coal ship is unloaded onto a belt conveyor using an unloader. The unloaded coal is transferred by the conveyor to the coal storage yard where it is stacked into a pile by a stacker (or stacker-reclaimer) for storage. The coal is then reclaimed from the stockpile by a reclaimer (or stacker-reclaimer) and transferred on a belt conveyor to a boiler. The coal storage yard covers approximately 300,000 m<sup>2</sup> and can store 880,000 t of coal, which is equivalent to the amount consumed in approximately one month.

There are three types of coal ship: our specialized vessels, a fixed-route vessel which transports coal based on an annual contract for a specific number of shipments, and general vessels. Both the specialized vessels and the fixed-route vessel are 80,000 to 90,000 t-class, while the general vessels are 50,000 to 60,000 t-class. These vessels transport coal from Australia, Indonesia, and other countries to the Hekinan Thermal Power Station.



Coal ship (Shonai-maru)

### Coal ships (as of January 2019)

- Specialized vessels: Shin'yahagi-maru, Tenryu-maru, Isuzu-maru, Nagara-maru, Oi-maru, Shonai-maru
- Fixed route vessel: Tatsuki-maru

## Installation of a wind-break fence

A wind-break fence 18 to 20 m high is installed around the coal storage yard to minimize the effects of the wind. Water is sprinkled as necessary, and a dustproof cover is fitted on the coal unloading and handling equipment to help prevent the scattering of coal dust.





# Environmental Initiatives

## Preventing air pollution

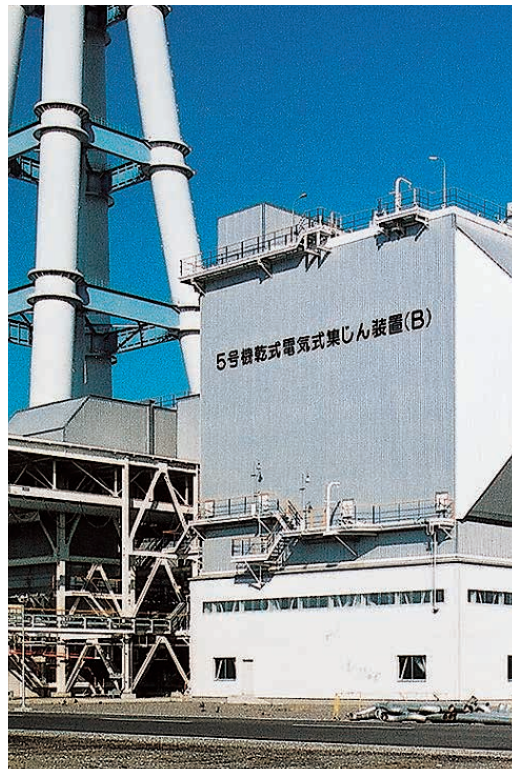
A range of measures have been taken to ensure that the environment in the area surrounding the power station is pleasant. Air pollutants such as nitrogen oxide, soot, and sulfur dioxide, which are produced during the combustion of coal, are removed using exhaust gas denitration equipment, electrostatic precipitators, and exhaust gas desulfurization equipment, and the exhaust gas is then released into the air from a stack.

## Keeping the oceans clean

The equipment cleaning water and general waste water generated at the power station undergoes pre-processing such as neutralization. It is then purified by means of condensation, sedimentation, filtration and neutralization, and the water quality is checked before it is discharged.

## Protecting the global environment

Since power stations make use of the earth's enriched resources, it is important to achieve high level of thermal efficiency when generating electricity due to preservation of the global environment. In addition, greater generating efficiency means that less carbon dioxide, which causes global warming, is produced. We are committed to conserve the earth's finite resources and curb global warming by leveraging the technical capabilities we have accumulated over the years and by introducing highly efficient power generating equipment.



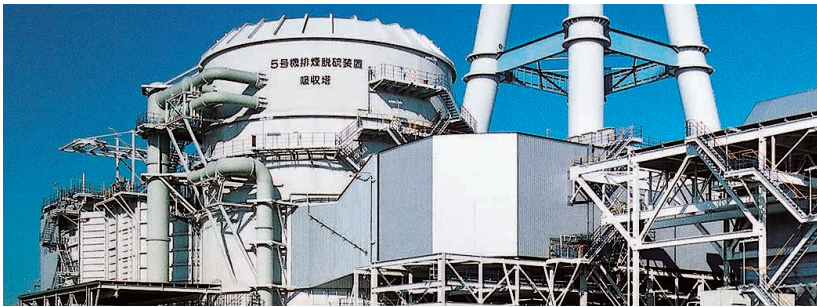
## Installation of precipitators

The high-performance dry and wet type electrostatic precipitators reduce emissions of soot and dust.



## Installation of an exhaust gas denitration equipment

A two-stage combustion system is employed for the boiler, and measures for improving the combustion of the burner minimize the generation of nitrogen oxides. An exhaust gas denitration equipment adds ammonia to turn the nitrogen oxides into harmless nitrogen and water.



## Installation of an exhaust gas desulfurization equipment

The exhaust gas desulfurization equipment causes sulfur oxides to react with limestone to form calcium sulfate, which is then removed and recycled.

## Installation of environmental measuring instruments

SOx and NOx measuring instruments are installed in the flue for constant monitoring. The air environment around the station is also monitored at measuring stations.

## Measures against coal ash

Most coal ash is recycled as a raw material for cement and a chemical admixture for concrete. The remainder is humidified and disposed of at the ash pond. For shore protection of the ash pond, steel sheet piles form a water barrier structure that prevents coal ash flowing out into the sea, while the surface of the reclaimed ground is covered with soil to prevent the coal ash from scattering.



## Installation of biomass fuel equipment

To help achieve a low carbon society, electricity is generated by biomass mixing combustion. Two types of biomass fuel are used: woody biomass fuel (produced by using timber from forest thinning) and sewage sludge carbonized fuel (produced by carbonizing sewage sludge).



## Installation of a general waste water treatment facility

Waste water generated during operation of the power station is treated and purified by a general waste water treatment facility before being discharged.



## Measures against warm waste water

A curtain wall is installed around the intake of sea water used by the condenser. Low-temperature deep sea water is slowly drawn in, and the used water is slowly discharged to the surface to minimize the impact of warm waste water on the sea around the station.



## A well-established accident prevention system

While coal is used as the main fuel, heavy oil is also used as an auxiliary fuel. The power station has a robust system to prevent fires from occurring and spreading. In the event of a fire, the station's chemical fire engine and fire truck are dispatched for initial firefighting activities.



## Greening

Approximately 25% of the power station site is covered by greenery to help conserve the environment.

## Measures for suppressing noise

Measures for suppressing noise from the boilers, turbines, main transformers, and other equipment such as a forced draft fan include locating the equipment in buildings and installing noise barriers and silencers. Low-noise main transformers are used for Units 4 and 5.



# Automated equipment

The power generation system including coal-related equipment can be operated (from unit startup to shutdown) by a handful of operators in the main control room. The controllers consist mainly of computers for respective generator units as well as function distribution and hierarchical systems in which various digital devices are connected in a well-coordinated manner. Many CRT monitors are installed to enable advanced automation based on visual monitoring. Meanwhile, equipment related to the environment and fuel is installed at various locations on the station site. To ensure coordination with the power generation system and achieve efficient operation, a digital controller is mounted on each piece of equipment to enable operation and monitoring with a small number of operators from the environmental equipment control room and coal handling control room.



The environmental equipment control room to operate and monitor waste water treatment equipment and ash treatment equipment. The station also has a coal handling control room to operate and monitor coal unloading, storage, and transport equipment.

## Introduction of facilities to ensure harmony with the local community



Hekinantantopia Electricity Museum  
– Electricity and Blue Sky and Sea –

Open: 9:00 to 16:30 (Admission to the Healing Garden and Eco Park: 9:00 to 16:00)  
Closed: Mondays (On the following day when the national holiday falls on Monday), New Year holidays  
<https://www.jera.co.jp/hekinan-pr/>



**Electric Power Museum** – Learn how electricity is used in our daily lives and efforts to protect the environment –

The Electric Power Museum at the power station clearly explains how coal-fired thermal power generation works. At this experience-oriented museum, visitors can enjoy using large models and watching videos.



### Healing Garden

– A healing and communication plaza –

The Healing Garden is located on the south side of the Electric Power Museum. The facility is based on the theme of healing and communication, and features a lawn plaza, experience-oriented flower bed, “splash” ponds for children, chrysanthemum garden, water garden, and herb garden.



### Eco Park

– A sanctuary for wild birds –

The Eco Park is in the southeastern part of the Healing Garden and enables visitors to observe wild birds and insects. The park features facilities including a pond for wild birds and a nature observation facility.



### Fishing Plaza

– A fishing spot for anglers –

The Fishing Plaza is located near the sea water discharge outlet around the north of the power station. Species that anglers can catch include Japanese black porgy, Japanese rockfish, fat greenling, and Japanese sea bass.

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**Jera**