

## FUEL SUPPLY SYSTEM

Gas turbines operate on two types of fuel, natural gas and extra light fuel oil. There is a gas pipeline built to the power plant to provide a natural gas supply; the pipeline ends with the measuring reducing gas station. Two local gas pipelines run from there, one to PB2 and PB3 (20 bar), while the other pipeline leads to PB4 and PB5 (27 bar).

The system for storage and supply of extra light fuel oil comprises three aboveground tanks with a total storage capacity of 3 x 6,500 m<sup>3</sup>, the fuel pumping station, connecting pipelines, measuring equipment, fire-fighting system and a road-tanker loading and unloading facility.



## CHEMICAL WATER TREATMENT PLANT

To accommodate the power generation process there is a need for decarbonized and demineralized water, which is produced in the chemical water treatment plant. The plant capacity is up to 175 m<sup>3</sup>/h of decarbonized water and 70m<sup>3</sup>/h of demineralized water.



## FIRE PROTECTION

Due to its important role and fuel used (in accordance with fire risk level factors), Brestanica Thermal Power Plant has a very high fire risk level; therefore, suitable fire protection has been organised.

All main buildings, equipment and technological systems are protected with in-built systems of active fire protection. In the event of fire the surveillance system enables instant intervention by a qualified fire brigade.



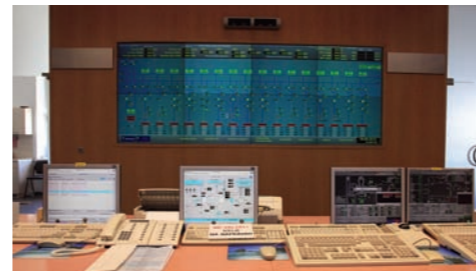
A BS OHSAS 18001 - Occupational Health and Safety and Fire Protection management system has been implemented in Brestanica Thermal Power Plant which facilitates assessment and systematic risk control concerning the safety and protection against fire and occupational health and safety at work.



## CONTROL SYSTEMS

All processes in the power plant, as for example the operation of gas turbine units, steam boilers, steam turbines, switchyards 110, 10.5 in 0.4 kV, chemical water treatment, operational monitoring, liquid fuel tanks measurements, and water pumping station have been made automated and controlled at the elementary level by means of a process computer system.

Operators supervise all the above mentioned processes from the central control point, i.e. from the control room of the power plant, via supervisory computers and operations stations. In the event of a computer failure, the process can be controlled via a process computer at the elementary level. There is also information connection with the management system of the GEN Energija d.o.o. Group which permits the transfer of important information on the plant's production process status to the centre as well as the transfer of various commands and requests concerning the production processes from the management centre to the power plant (turbine start-up, turbine shut-down, secondary regulation requests, etc.)



## ENVIRONMENT

Brestanica Thermal Power Plant is committed to meeting the requirements of environmental legal regulations; moreover, for a number of years it has been bound by international environmental management standards, sustainable management of natural resources, and a global, systematic, and responsible environment management. While respecting the principles of environmental policy, Brestanica Thermal Power Plant obtained the international standard of environment management ISO 14001 which ensures safe and environmentally friendly electric power generation in accordance with the legal requirements.

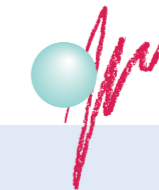


In line with the Environment Protection Act of 2007, Brestanica Thermal Power Plant obtained the so-called environment protection permit which gives witness to a responsible stance of the business and its operation in accordance with the law, which sets maximum values for its particle emissions into the air, and water, sound emission, electromagnetic radiation, waste management, efficient water and fuel consumption, equipment safety, and global risk management.

## OSNOVNI PODATKI

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Due to its use of gas turbine technology and its strategic location, Brestanica Thermal Power Plant has a special place in the Slovenian national grid, having the attribute of a highly flexible and reliable electric power generation company and system services provider:

- during the national grid peak load period,
- for the safety of Krško Nuclear Power Plant, and
- in the frame of daily start-stop and peaking operation.



## GAS TURBINE UNITS PB1, PB2 and PB3

Gas turbine units PB1, PB2 and PB3 represent a complete production unit and are able to operate in simple or combined cycle. The gas turbines are of a package design with a capacity of 3 x 23 MW. In simple cycle the exhaust gases are led past boilers through bypass channel, while in combined cycle they are led through the boilers where waste heat is used for steam generation. Each steam boiler generates 40 tons of steam per hour at a temperature of 440°C and 40 bar pressure. This steam drives two steam turbines of a capacity of 12,5 and 13,5 MW. All three gas turbines are powered by extra light fuel oil, while gas turbines PB2 and PB3 are also able to use natural gas. The start-up of the gas turbines takes 15 minutes, while the steam process start-up takes approximately one hour and a half.



## PRINCIPAL TECHNICAL DATA OF PB1, PB2 AND PB3

**Gas Turbine (AEG-PG 5341), year of installation: 1974**  
 Nominal capacity 23 MW  
 Number of units 3  
 Process Simple or combined cycle

**Gas Turbine Generator Set (AEG), year of installation: 1974**  
 Nominal capacity 32 MVA  
 Nominal voltage 10.5 kV  
 Number of units 3

## GAS TURBINE UNITS PB4 and PB5

Gas turbine units PB4 and PB5 with a capacity of 2 x 114 MW operate in simple cycle. They are able to operate on gas, extra light fuel oil or on mixture of both types of fuels. Turbines' operation is environmentally friendly; the emission values (NO<sub>x</sub>, CO, SO<sub>2</sub>) in exhaust gases and noise emissions are below the legal limits. The turbines feature a rapid start-up which is less than 15 minutes from the start request to full power. They also feature rapid change of load, a very high level of automation and capability of remote control operation.



## PRINCIPAL TECHNICAL DATA OF PB4 and PB5

**Gas Turbine (ABB –GT11N2), year of installation: 1999**  
 Number of units 2  
 Time to synchronisation 9-10 min

### Operation with extra light fuel oil

Nominal capacity 114.20 MW  
 Efficiency (gen. terminals) 32.7 %  
 Fuel consumption 8.3 kg/s  
 Demi water consumption 7.7 kg/s  
 Exhaust gas flow 379 kg/s  
 Exhaust gas temp. 523 oC

### Operation with natural gas

Nominal capacity 108.9 MW  
 Efficiency (gen. terminals) 34 %  
 Fuel consumption 6.5 kg/s  
 Exhaust gas flow 370 kg/s  
 Exhaust gas temp. 527 oC

### Generator Set (ABB)

Number of units 2  
 Nominal capacity 155 MVA  
 Nominal voltage 11.5 kV  
 Nominal current 7785 A

### Block transformer (ABB)

Number of units 2  
 Nominal capacity 150 MVA  
 Voltage ratio 11.5/110 kV

### Own-use transformer (ABB)

Number of units 2  
 Nominal capacity 7/5.6/1.5 MVA  
 Voltage ratio 11.5/2.1/0.4 kV

## SOLAR MODULES

Brestanica Thermal Power Plant currently possesses three solar power facilities:

- MFE TEB 1 with a nominal capacity of 38.08 kW, located on the roof of the business premises;
- MFE TEB 2 with a nominal capacity of 81.78 kW, located on the roof of the parking space;
- MFE TEB 3 with a nominal capacity of 49.09 kW, located on the roof of the turbine hall of gas turbine units PB4 and PB5.



Anticipated annual production of all three solar plants is 178 MWh.

## SWITCHYARDS

Brestanica Thermal Power Plant is connected to the electric power system via a 110 kV Gas Insulated Switchyard. To accommodate the reserve supply of own consumption it is connected also to a 20 kV distribution system. To facilitate the electric power distribution at lower voltage levels, there are two additional switchyards, i.e. 10.5 kV and 0.4 kV.

- switchyard 110 kV (GIS – SF6); 8 main line bays, 8 transformer bays, 1 double busbar with bus coupler bay;
- switchyard 10.5 kV; 12 nitrogen insulated cells, with closed double-system busbars; and
- switchyard 0.4 kV; four sectors.

