



## BASE AND PEAK LOAD ELECTRICITY

### Types of generating capacity

Electricity cannot be stored, and must therefore be used as it is generated. It is important that the amount of electricity needed at any point in time should be matched by the amount generated. Due to the fact that electricity demand is not constant, different types of power stations are required to meet this fluctuating demand. Two main categories of power stations can be identified: **base load** stations which supply electricity around the clock and **peak load** stations which can react swiftly to sudden increases or decreases in demand.

Eskom's National Control Centre draws on these different types of power stations to provide a balance between supply and demand.

### Base load

Base load power stations, largely coal-fired in South Africa, are designed to operate continuously at a steady load. They require a minimum period of 8 hours from cold start-up to full load. In addition, starting up these power station units requires large quantities of expensive fuel oil. Base load power stations are generally only shut-down for scheduled maintenance or emergency repairs. Base load power can also be supplied by nuclear power stations and, in countries with abundant water resources, hydro power stations. South Africa's inconsistent rainfall and limited water resources preclude the use of hydro-power stations for base load needs. The country's abundant and relatively cheap low-grade coal makes coal-fired power stations an attractive base load choice.

### Peak load

Peak load indicates the additional demand placed on the system over and above the normal base load requirements. In South Africa, peak demand periods occur in the early mornings and early evenings. The morning peak is a combination of industrial and domestic demand whereas the evening peak is mainly domestic. In winter, record evening peaks occur with the increased use of domestic heating appliances. In summer, air conditioning has the same effect.

Peaking power stations can react quickly to changes in demand and provide power to supplement that generated by base load stations. South Africa's peaking power stations are hydroelectric, hydro pumped storage and gas turbine stations.

### The Electricity network

The electricity network in South Africa is controlled to a frequency of 50Hz. If demand exceeds supply there is an excessive "drain" on the electricity available, which causes the frequency to drop below 50Hz. Conversely, if supply exceeds demand, the frequency will rise above 50Hz. Such oscillations can damage electronic devices and cause fluctuations which are most noticeable in electronic timing equipment, causing them to operate either slower or more quickly.

If the frequency drops too low, some consumers may be deliberately cut off in order to maintain the balance between demand and supply. This is known as load shedding. Load shedding is a last resort to prevent a major low frequency incident from shutting down large sections of the national network. Restoring the power supply after an incident of this magnitude could take hours – if not days – to accomplish.

In the power stations, protection equipment will shut generating sets down if necessary to prevent them from being damaged.

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