



## **BUILDING A COAL FIRED POWER STATION**

The building of a power station is a lengthy, costly, complicated process and a large number of factors influence the final decision.

### **The Decision-making Process**

Any decision on new capacity is based on Eskom's Integrated Strategic Electricity Plan (ISEP). The plan takes numerous factors into account to estimate future growth in electricity demand. The nature of the growth must also be taken into consideration as an increase in either base load requirements or peaks in demand, will determine the type of power station to be built and the priority of construction. Eskom's planning processes are matched by similar processes carried out by the Department of Minerals and Energy Affairs and the National Electricity Regulator (NER).

### **Site Selection**

When deciding on the location of a power station, factors such as the following are taken into consideration:

- availability and accessibility of primary energy - coal and water
- the ease with which the new station can be integrated into the national transmission network
- environmental impacts of both the power station and its related infrastructure, such as transmission lines
- construction period
- impact on the local area in terms of its communities and natural environment
- emissions - particulate and gaseous
- capital costs
- operating costs
- employment

The site selection process starts with broad, minimum criteria, resulting in the identification of a relatively large number of potential sites. In the case of a coal-fired power station a priority is the availability of coal and water. Once the potential sites have been identified, more rigorous criteria are applied to narrow down the number of possible sites still further.

### **Legal Processes: Licences and Approvals**

A number of Government departments and regulatory bodies are involved in the process of constructing a power station.

### **The Environmental Impact Assessment Process:**

An important step in the process of building a power station, is obtaining the necessary environmental approvals from the Department of Environmental Affairs and Tourism (DEAT). This is achieved by means of an Environmental Impact Assessment (EIA) process, which includes a wide variety of specialist studies and a strong public participation component. By means of the EIA process, all possible impacts of the project on the natural and social environment are identified and mitigation measures developed. The outcome of the EIA process is an Environmental Impact Report, which is submitted to DEAT for approval. After due consideration, DEAT will issue a Record of Decision (ROD).

### **Licences to Operate:**

The following licences and/or permits have to be obtained:

- The NER has to issue a licence to construct and operate the new station. Licences will also be required to transmit and distribute the electricity.
- The Department of Water Affairs and Forestry (DWAF) has to issue a permit for the required water use.
- The Chief Air Pollution Control Officer (CAPCO) in DEAT has to issue a licence prescribing the emissions the station is allowed to release.
- District Councils and local municipalities issuing licence prescribing the emissions the station is allowed to release.

## **Construction Phases**

### **1. Awarding of Contracts**

The civil works, boiler, turbine, auxiliary plant, electrical and control and instrumentation contracts form part of the main contracts in terms of which the overall construction plan is implemented. Derived from these, many smaller companies are involved as sub-contractors.

### **2. Site Establishment**

This phase deals with the provision of the infrastructure required for the main contractors to begin work. Land needs to be levelled, water, sewerage and electrical services to be provided, roads constructed and construction offices established. The terrain needs to be fenced off and security control and first aid facilities put in place.

### **3. Construction**

Construction starts with the setting out and excavation of foundations. If the power station is to use a conventional wet-cooling system, the trenches and pipe work for the cooling water ductings must be in place before construction of the turbine hall commences.

Although a number of areas are under construction at the same time, the main areas are the foundations of the boiler house, turbine hall, cooling towers and chimneys.

The period from site establishment and commencement of civil work, to the point where the first boiler and turbine can be commissioned, is approximately four years. Subsequent units would be commissioned at intervals of nine to twelve months.

### **4. Commissioning**

Auxiliary plant systems need to be commissioned first to provide logistical support for boiler and turbine operation. These include water treatment, coal supply and ash handling systems, electrical supplies and the transmission network.

Boiler and turbine commissioning initially involves the cleaning of all water, steam and auxiliary pipework. Important equipment such as motors, pumps, lights and control circuits are among the first items to be commissioned.

Safety checks and testing are carried out before any plant is commissioned.

Plant and equipment that has been commissioned is "taken over" by Eskom, although the contractor still remains responsible for defects. A production unit (boiler, turbine and generator) is taken over by Eskom and put into commercial operation once all the tests have been successfully carried out.

### **5. Staffing**

Eskom will manage all contracts in accordance its new build policy. Eskom personnel who will be responsible for the running and maintenance of the plant are appointed and trained during construction. By working closely with the contractors during the commissioning and take-over phases they are readied for the moment when the power station is finally connected to the grid for commercial production of electricity.

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