

The stations in the medium range of efficiency are operated only during the two shifts of 8 hours during 16 hours of average load. □ The older or less efficient stations are used as peak or standby stations only, and are operated rarely or for short periods of time. Presently there is a tendency to use units of large capacities to reduce space costs and to handle larger loads. However, the maximum economical benefit of large sets occurs only when these are run continuously at near full load. Running of large sets for long periods at lower than maximum continuous rating increase cost of unit generated.

COST OF ELECTRICITY

A power plant should provide a reliable supply of electricity at minimum cost to the consumers / customers. The cost of electricity may be determined by the following: Fixed cost or capital cost and Operating costs. The total cost of energy produced is the sum total of fixed charges and operating charges.

Total cost = Fixed costs + Operating costs

Fixed cost or capital cost:

It is the cost required for the installation of the complete power plant. This cost includes 1. The cost of land, equipments, buildings, transmission and distribution lines cost of planning and designing the plant and many others. 2. Interest, 3. Depreciation cost, 4. Insurance, 5. Management costs, etc

1. The cost of land, equipments, buildings –

The cost of land and buildings does not change much with different types of power plants but the equipment cost changes considerably. The cost of buildings can be reduced by eliminating the superstructure on the oiler house and turbine house. To reduce the cost of equipment, unit system may be adopted, reduced by simplifying the piping system and elimination of duplicate system such as steam headers and boiler feed heaters. The cost of equipment or the plant investment cost is usually expressed on the basis of kW capacity installed. The per kW capacity may not vary for various thermal power plant where as for hydro- electric power plant, it changes a lot because the cost of hydro-electric power plant depends on the foundation availability, types of dam, available head and spillways used.

2. Interest: -

the money needed or an investment may be obtained as loans, through bonds and shares. The interest is the difference between money borrowed and money returned. The rate of interest may be simple rate expressed as % per annum or may be compounded. A suitable rate of interest must be considered on the capital invested.



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3. Depreciation cost: -

it is the amount to be set aside per year from income to meet the depreciation caused by the ages of service, wear and tear of machinery, and the decrease in the value of equipment due to obsolescence. The power plant and equipment in the plant will have a certain period useful life. After years of use, the equipment loses its efficiency or becomes obsolete and needs replacement. Sometimes equipment may have to be replaced even when they fairly new, due to more efficient machines are available in the market. Some money is put aside annually to enable for this replacement, when necessary. This is known as depreciation fund.

4. Insurance: -

nowadays, it becomes necessary to insure the costly equipments especially for the fire or accident risks. A fixed sum is set aside per year as insurance charges. The insurance premium may be 2 to 3% of the equipment cost but annual installment is quite heavy when the capital cost of the equipment is high.

5. Management cost; -

this cost includes the salary of the management employees working in the plant. This must be paid whether the plant is working or not. Therefore, this cost is included in the fixed

Operatring cost: -

the operational cost includes

- a) The cost of fuel,
- b) The cost of lubricatibg oil, greases, cooling water,
- c) The cost of maintenance and repairs,
- d) The cost of operating labour,
- e) The supervision cost and
- f) Taxes.

These costs vary with the amount of electrical energy produced.

a) Cost of fuel: - the fuel consumption depends on the amount of energy produced. As load increases the fuel consumption will increase so does the cost of fuel. The efficiency of the prime mover is the highest at the rated load. At lower loads, efficiency decreases and so the fuel consumption will increase. The selection of the fuel and the maximum economy in its use are, therefore, very important consideration in thermal plant design. The cost of the fuel includes not only its price but also its transportation and handling costs also. The cost of fuel depends on the calorific value and its availability.

b) The cost of lubricating oil, greases, cooling water: -

the cost of these materials also proportional to the amount of energy generated. this cost increases with an increase in life of the power plant as the efficiency of the power plant decreases with age

c) The cost of maintenance and repairs: -

in order to avoid breakdowns, maintenance is necessary. it includes periodic cleaning, adjustments and overhauling of equipments. the materials used for maintenance and repairs are also charged under this head. it is necessary to repair when the plant breakdown or stops due to fault in mechanism. the repairs may be major or minor and are charged to the depreciation fund of the equipment. the cost is higher for thermal power plants than hydro power plants.

d) The cost of operating labour: -

this includes the salary and wages for the operating labour working in the plant. maximum labours are needed in a thermal power plant using coal as a fuel. a hydro power plant or a diesel power plant of same capacity requires a less number of labours. in automated power plant, labour cost is reduced to a greater extent.