However, in actual practice, every power station has a useful life ranging from fifty to sixty years. From the time the power station is installed, its equipment steadily deteriorates due to wear and tear so that there is a gradual reduction in the value of the plant. This reduction in the value of plant every year is known as annual depreciation. Due to depreciation, the plant has to be replaced by the new one after its useful life. Therefore, suitable amount must be set aside every year so that by the time the plant retires, the collected amount by way of depreciation equals the cost of replacement. It becomes obvious that while determining the cost of production, annual depreciation charges must be included. There are several methods of finding the annual depreciation charges

Cost of Electrical Ener Cost of Electrical Energy

The total cost of electrical energy generated can be divided into three parts, namely ;

(i) Fixed cost ;

(ii) Semi-fixed cost ;

(iii) Running or operating cost.

(i) Fixed cost.

It is the cost which is independent of maximum demand and units generated. The fixed cost is due to the annual cost of central organisation, interest on capital cost of land and salaries of high officials. The annual expenditure on the central organisation and salaries of high officials is fixed since it has to be met whether the plant has high or low maximum demand or it generates less or more units. Further, the capital investment on the land is fixed and hence the amount of interest is also fixed.

(ii) Semi-fixed cost.

It is the cost which depends upon maximum demand but is independent of units generated. The semi-fixed cost is directly proportional to the maximum demand on power station and is on account of annual interest and depreciation on capital investment of building and equipment, taxes, salaries of management and clerical staff. The maximum demand on the power station determines its size and cost of installation. The greater the maximum demand on a power station, the greater is its size and cost of installation. Further, the taxes and clerical staff depend upon the size of the plant and hence upon maximum demand.

(iii) Running cost.

It is the cost which depends only upon the number of units generated. The running cost is on account of annual cost of fuel, lubricating oil, maintenance, repairs and salaries of operating staff. Since these charges depend upon the energy output, the running cost is directly proportional to the number of units generated by the station. In other words, if the power station generates more units, it will have higher running cost and vice-versa.

Expressions for Cost of Electrical Ener essions for Cost of Electrical Energy

The overall annual cost of electrical energy generated by a power station can be expressed in two forms viz three part form and two part form.

(i) Three part form.

In this method, the overall annual cost of electrical energy generated is divided into three parts viz fixed cost, semi-fixed cost and running cost i.e. Total annual cost of energy = Fixed cost + Semi-fixed cost + Running cost = Constant + Proportional to max. demand + Proportional to kWh generated. = Rs (a + b kW + c kWh) where a = annual fixed cost independent of maximum demand and energy output. It is on account of the costs mentioned

b = constant which when multiplied by maximum kW demand on the station gives the annual semi-fixed cost. c = a constant which when multiplied by kWh output per annum gives the annual running cost.

(ii) Two part form.

It is sometimes convenient to give the annual cost of energy in two part form. In this case, the annual cost of energy is divided into two parts viz., a fixed sum per kW of maximum demand plus a running charge per unit of energy.

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The expression for the annual cost of energy then becomes : Total annual cost of energy = Rs. (A kW + B kWh) where A = a constant which when multiplied by maximum kW demand on the station gives the annual cost of the first part. B = a constant which when multiplied by the annual kWh generated gives the annual running cost. It is interesting to see here that two-part form is a simplification of three-part form. A little reflection shows that constant “a” of the three part form has been merged in fixed sum per kW maximum demand (i.e. constant A) in the two-part form

Methods of Determining Depreciation

There is reduction in the value of the equipment and other property of the plant every year due to depreciation. Therefore, a suitable amount (known as depreciation charge) must be set aside annually so that by the time the life span of the plant is over, the collected amount equals the cost of replacement of the plant. The following are the commonly used methods for determining the annual depreciation charge :

(i) Straight line method ;

(ii) (ii) Diminishing value method ;

(iii) (iii) Sinking fund method.

(i) Straight line method.

In this method, a constant depreciation charge is made every year on the basis of total depreciation and the useful life of the property. Obviously, annual depreciation charge will be equal to the total depreciation divided by the useful life of the property.

Thus, if the initial cost of equipment is Rs 1,00,000 and its scrap value is Rs 10,000 after a useful life of 20 years, then, Annual depreciation charge = Total depreciation Useful life = 100 000 10 000 − 20 ,, , = Rs 4,500

In general, the annual depreciation charge on the straight line method may be expressed as :

Annual depreciation charge = P S n − where P = Initial cost of equipment n = Useful life of equipment in years S = Scrap or salvage value after the useful life of the plant. The straight line method is extremely simple and is easy to apply as the annual depreciation charge can be readily calculated from the total depreciation and useful life of the equipment. Fig.shows the graphical representation of the method. It is clear that initial value P of the equipment reduces uniformly, through depreciation, to the scrap value S in the useful life of the equipment.