ENERGY CONSERVATION TABLE AND SAMPLE CALCULATION FOR ANNUAL ENERGY CONSUMPTION IN TERMS OF MTOE

Sl. No		
1	1 Kwh	860 Kcal
2	1 kg Coal / Coke	Gross calorific value as per suppliers (Coal Company's) fastest Certificate
3	1 Kg Charcoal	6900 Kcal or as per supplier certificate
4	1 Kg Furnace Oil/Residual Fuel Oil/Low Sulphur Heavy Stock – Naptha	10.050 kcal (density = 0.9337 kg/Litre) or as per supplier certificate
5	High Speed Diesel	11840 kcal (density = 0.8263 kg/Litre) or as per supplier certificate
6	1 Kg Petrol	11200 kcal (density = 0.8253 kg/Litre) or as per supplier certificate
7	1 Kg Kerosene	11,110 kcal (density of SKO= 0.7782 kg/Litre) or as per supplier certificate
8	1 m^3 Natural Gas	8,000 to 10,500 kCal or as per supplier Certificate
9	Other fuels or waste material of by products used a fuel	Gross Calorific value as per the Certificate from central / State Govt. approved laboratory.

* For the purpose of this table. 1 Kg of oil equivalent = 10,000 k-Cal
1 metric tonne of oil equivalent (MTOE) = 10×10^6 Kcal

## Assumption :- Annual Energy Consumption Figure

A. ELECTRICITY

(i)   Purchased - 2200 Lakhs kWh/Yr

MTOE Equivalent $= 2200 \times 10^5 \times 860 = 1892 \times 10^2$ Million kCal

$$= \frac{1892 \times 10^8}{10 \times 10^6} = 18920 \text{ MTOE}$$

(ii)   Own Generation
- Through DG Set
- Power Generation   = 288 kwh/yr
- Diesel Consumption = 7565 KL

Note :   **MTOE will be calculated for Diesel input to generator, not for the power generation from generator**

MTOE Equivalent =   7565 KL (Density **= 0.8263 Kg/Lit)**

    =   **$7565 \times 10^3 \times 0.8263 = 6251 \times 10^3$ Kg**

    = $6251 \times 10^3 \times 11840 = 74011$ Million KCal

    = $\dfrac{74011 \times 10^5}{10 \times 10^6}$ =   7401 MTOE

(iii)   Co Generation
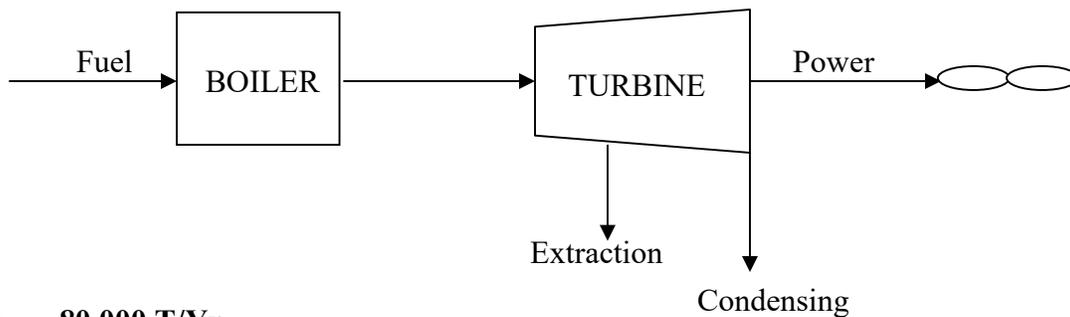
Coal = 80,000 T/Yr
G.C.V.= 5000 Kcal/Kg

> **Note : MTOE will be calculated for fuel input to the boiler, not the power generation from turbine, similarly approach may be deployed for calculating MTOE in Gas turbine**

$$\text{MTOE Equivalent} = 80{,}000 \times 10^3 \times 5000$$
$$= 40 \times 10^{10} \text{ K-cal}$$
$$= \frac{40 \times 10^{10}}{10 \times 10^6} = 40{,}000 \text{ MTOE}$$

B. **Direct fuel fired equivalent such as Boilers, oven, dryers, furnaces and other equipments.**

Annual furnace oil consumption in furnace

$$= 5000 \text{ KL (Density} = 0.9337 \text{ Kg / Lit)}$$
$$= 5000 \times 10^3 \times 9337 = 4668 \times 10^3 \text{ Kg}$$
$$= \frac{4668 \times 10^3 \times 10.050}{10 \times 10^4}$$
$$= 4691 \text{ MTOE}$$

Note:

(i) If fuel is used as raw materials, it should not be considered for calculating MTOE. For example, natural gas is being used a raw material as well as fuel in fertilizer plant. The quantity of Natural Gas used as a raw material may be deducted.

(ii) For chlor alkali manufacturing process. Hydrogen is generated as a by-product and is being used as a fuel, may be considered as a fuel input

(iii) In some process liquid and solid waste is being generated having a substantial heating value for example in wood based paper industry black liquor and saw dust is generated as a by-products and used for process stem generation, may be considered as a fuel input.