ESTIMATE FOR SAVING IN CARBON DIOXIDE EMISSION FROM ONE UNIT OF MANGAL TURBINE USED FOR IRRIGATION PURPOSE

A. Assumptions
1. One unit of Mangal Turbine will lift water from stream which is equivalent to 25 HP diesel pump set and irrigate a command area of 50 ha. For this purpose in Northern India conditions Mangal Turbine will be used as under
   a. During September or supplement any irrigation of 40 days Kharif crops and in October for pre-sowing irrigation of Rabi crops.
   b. From Nov. to April irrigation of Rabi crops 150 days
   Total 190 days
2. One each working day Mangal Turbine will be run for 11 hrs. for irrigation purpose. Thus it will avoid use of 25 HP diesel pump set for 11 hrs./day which uses diesel @4 liters/hour. Thus, use of 44 liters of diesel/day will be saved from each unit of Mangal Turbine.
3. Normal working life of one unit of Mangal Turbine is estimated to be 15 years.

B. Estimation of savings in Carbon Dioxide Emission from one unit of Mangal Turbine
1. Diesel carbon content/gallon 2778 gm
2. Oxidation factor 0.99
3. \[ \text{CO}_2 \text{ emission/gallon} = \frac{\text{carbon content} \times \text{Oxidation factor}}{\text{Molecular of } \text{CO}_2 \times \text{Molecular wt of carbon}} \]
   \[ = \frac{2778 \times 0.99}{44 \times 12} = 10084 \text{ gm} = 10.1 \text{ kg} \]
4. 1 gallon = 3.7854 liters
5. 10.1 kg/gallon = 2.668 kg/liter
6. Use of diesel by 25 hp pump set = 44 liters/day
7. Use of diesel by 25 hp pumpset in a year (i.e. 190 days) for irrigation = 44 x 190 = 8360 liters
8. Saving of diesel by Mangal Turbine for 15 years = 8360 x 15 = 125400 liters
9. Saving in \text{CO}_2 \text{ emission} by Mangal Turbine/unit = 125400 liters x 2.668 kg/ltr. = 334567 kg. = 335 tonnes

Note- In addition to irrigation, the Mangal Turbine can also be used for threshing of agricultural produce, cane crushing and other agricultural produce processing which can be performed during nights or when the turbine is not being used for irrigation. So, saving in \text{CO}_2 \text{ emission} for these operations will be additional to above estimate of irrigation purpose.