



TIPS FOR CONSERVATION OF ENERGY IN INDUSTRIES

TIPS FOR THERMAL ENERGY CONSERVATION (SOURCE PCRA)

GENERAL

- ◆ Undertake regular energy audits.
- ◆ Plug all oil leakage. Leakage of one drop of oil per second amounts to a loss of over 2000 litres/year.
- ◆ Filter oil in stages. Impurities in oil affect combustion.
- ◆ Pre-heat the oil. For proper combustion, oil should be at right viscosity at the burner tip. Provide adequate pre-heat capacity.
- ◆ Incomplete combustion leads to wastage of fuel. Observe the colour of smoke emitted from chimney. Black smoke indicates improper combustion and fuel wastage. White smoke indicates excess air and hence loss of heat. Hazy brown smoke indicates proper combustion.
- ◆ Use of low air pressure “film burners”, which helps save oil upto 15% in furnaces.
- ◆ Recover and utilize waste heat from furnace fuel gases for pre-heating of combustion air. Every 210C rise in combustion air temperature results in 1% fuel oil savings.

FURNACE

- ◆ Control excess air in furnaces. A 10% drop in excess air amounts to 1% saving of fuel in furnaces. For an annual consumption of 3000 kl of furnace oil, this means saving of Rs. 3 Lakhs (cost of furnace oil- Rs. 10 per litre).
- ◆ Reduce heat losses through furnace openings. Observations show that a furnace operating at a temperature of 10000C having an open door (1500mm*750mm) results in a fuel loss of 10 litre/hr. For 4000 hrs. furnace operation, this translates into a loss of approx. Rs. 4 lakhs per year.
- ◆ Improve insulation if the surface temperature exceeds 200C above ambient. Studies have revealed that heat loss from a furnace wall 115mm thick at 6500C amounting to 2650 Kcal/m²/hr can be cut down to 850 kcal/m²/hr by using 65 mm thick insulation on the 115 mm wall.
- ◆ Proper design of lids of melting furnaces and training of operators to close lids helps reduce losses by 10-20% in foundries.





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BOILER

- ◆ Remove soot deposits when fuel gas temperature rises 400C above the normal. A coating of 3mm thick soot on the heat transfer surface can cause an increase in fuel consumption of as much as 2.5%.
- ◆ Recover heat from steam condense. For every 60C rise in boiler feed water temperature through condense return, there is 1% saving in fuel.
- ◆ Improve boiler efficiency. Boilers should be monitored for fuel gas losses, radiation losses, incomplete combustion, blow down losses, excess air etc. Proper control can decrease the consumption upto 20%.
- ◆ Use only treated water in boilers. A scale formation of 1mm thickness on the waterside would increase fuel consumption by 5-8%.
- ◆ Stop steam leakage. Steam leakage from a 3 mm-diameter hole on a pipeline carrying steam at 7kg/cm² would waste 32 kl of fuel oil per year amounting to a loss of Rs. 3 lakhs.
- ◆ Maintain steam pipe insulation. It has been estimated that a bare steam pipe, 150 mm in diameter and 100m in length, carrying saturated steam at 8kg/cm² would waste 25 kl of furnace oil in a year amounting to an annual loss of Rs. 2.5 lakhs.

DG SETS

- ◆ Maintain diesel engines regularly.
- ◆ A poorly maintained injection pump increases fuel consumption by 4gm/KWh.
- ◆ A faulty nozzle increases fuel consumption by 2gm/KWh.
- ◆ Blocked filters increase fuel consumption by 2gm/KWh.
- ◆ A continuously running DG set can generate 0.5 ton/hr of steam at 10 to 12 bars from the residual heat of the engine exhaust per MW of the generator capacity.
- ◆ Measure fuel consumption per KWh of electricity generated regularly. Take corrective action in case this shows a rising trend.





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TIPS FOR ELECTRICAL ENERGY CONSERVATION

GENERAL

- ◆ Improve power factor by installing capacitors to reduce KVA demand charges and also line losses within plant.
- ◆ Improvement of power factor from 0.85 to 0.96 will give 11.5% reduction of peak KVA and 21.6% reduction in peak losses. This corresponds to 14.5% reduction in average losses for a load factor of 0.8.
- ◆ Avoid repeated rewinding of motors. Observations show that rewound motors practically have an efficiency loss of upto 5%. This is mainly due to increase in no load losses. Hence use such rewound motors on low duty cycle applications only.
- ◆ Use of variable frequency drives, slip power recovery systems and fluid couplings for variable speed applications such as fans, pumps etc. helps in minimizing consumption.

ILLUMINATION

- ◆ Use of electronic ballast in place of conventional choke saves energy upto 20%.
- ◆ Use of CFL lamp in place of GLS lamp can save energy upto 70%.
- ◆ Clean the lamps and fixtures regularly. Illumination levels fall by 20-30% due to collection of dust.
- ◆ Use of 36W tubelight instead of 40W tubelight saves electricity by 8 to 10%.
- ◆ Use of sodium vapour lamps for area lighting in place of Mercury vapour lamps saves electricity upto 40%.

COMPRESSED AIR

- ◆ Compressed air is very energy intensive. Only 5% of electrical energy is converted to useful energy. Use of compressed air for cleaning is rarely justified.
- ◆ Ensure low temperature of inlet air. Increase in inlet air temperature by 30C increases power consumption by 1%.
- ◆ It should be examined whether air at lower pressure can be used in the process. Reduction in discharge pressure by 10% saves energy consumption upto 5%.
- ◆ A leakage from a 1/2" diameter hole from a compressed air line working at a pressure of 7kg/cm² can drain almost Rs. 2500 per day.
- ◆ Air output of compressors per unit of electricity input must be measured at regular intervals. Efficiency of compressors tends to deteriorate with time.





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REFRIGERATION AND AIR CONDITIONING

- ◆ Use of double doors, automatic door closers, air curtains, double glazed windows, polyester sun films etc. reduces heat ingress and air-conditioning load of buildings.
- ◆ Maintain condensers for proper heat exchange. A 50C decrease in evaporator temperature increases the specific power consumption by 15%.
- ◆ Utilisation of air-conditioned/refrigerated space should be examined and efforts made to reduce cooling load as far as possible.
- ◆ Utilise waste heat of excess steam or fuel gases to change over from gas compression systems to absorption chilling systems and save energy costs in the range of 50-70%.
- ◆ Specific power consumption of compressors should be measured at regular intervals. The most efficient compressors to be used for continuous duty and others on standby.

COOLING TOWERS

- ◆ Replacement of inefficient aluminum or fabricated steel fans by moulded FRP fans with aerofoil designs results in electricity savings in the range of 15-0%.
- ◆ A study on a typical 20 ft. diameter fan revealed that replacing wooden blade drift eliminators with newly developed cellular PVC drift eliminators reduces the drift losses from 0.01-0.02% with a fan power energy saving of 10%.
- ◆ Install automatic ON-OFF switching of cooling tower fans and save upto 40% on electricity costs.
- ◆ Use of PVC fills in place of wooden bars results in a saving in pumping power of upto 20%.

PUMPS

- ◆ Improper selection of pumps can lead to large wastage of energy. A pump with 85% efficiency at rated flow may have only 65% efficiency at half the flow.
- ◆ Use of throttling valves instead of variable speed drives to change flow of fluids is a wasteful practice. Throttling can cause wastage of power to the tune of 50 to 60%.
- ◆ It is advisable to use a number of pumps in series and parallel to cope with variations in operating conditions by switching on or off pumps rather than running one large pump with partial load.
- ◆ Drive transmission between pumps and motors is very important. Loose belts can cause energy loss upto 1-20%.
- ◆ Modern synthetic flat belts in place of conventional V-belts can save 5% to 10% of energy.
- ◆ Properly organized maintenance is very important. Efficiency of worn out pumps can drop by 10-15% unless maintained properly.

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TIPS FOR CONSERVATION OF ENERGY IN INDUSTRIES

PROMOTIONAL SCHEMES

- ◆ Energy Auditors empanelment scheme.
- ◆ Energy Audit subsidy scheme.
- ◆ Soft loan for purchase of energy audit equipment's and instruments.
- ◆ Besides these, PCRA also conducts Energy audits, Fuel Oil diagnostic studies, Studies in small scale industries, Follow-up's; Organizes technical meets, Consumer meets, Seminars, Institutional training programmes, Workshops, Clinics; helps in organizing Action Group meetings and puts up stalls in exhibitions on conservation of petroleum products.

SAVE OIL

SAVE EARTH



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