

## Conserving Electricity to Save the Mother Earth

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### ABSTRACT

*Electricity is the basic need in every aspect of our daily life. It is the most convenient form of energy. Hence, various other forms of energy are being transformed into electrical energy in final application. Transport sector is the glaring example where it may be railways, roadways, water ways or even space mission. Its consumption has become a measure of the growth of a nation. In view of the challenges imposed by the climate change, it has become all the more to minimize/avoid the burning of fossil fuels to obtain electricity. The best way out is to conserve the energy by demand side management and energy efficiency and maximize the use of environment friendly renewable energy. The scientific approach to conserve energy is to monitor the consumption and take corrective measures to minimize the wastage.*

**Keywords:** Energy conservation, energy consumption, energy efficiency, best practices in energy saving, star rating

### I INTRODUCTION

Electricity is a flexible and most convenient form of secondary energy which is generated from primary sources of energy like fossil fuels, Hydro, Nuclear or Renewable Energy like Solar, wind, hydro, Biomass, etc. The energy is needed to cook food, light and cool/heat our homes, run appliances in our homes. Electricity is also needed for transport, industry, commercial, institutional, recreational, medical and governmental activities. Electricity is the costliest but the cleanest and highest quality energy and can be

used to do all types of works which no other forms of energy can do. It is said that in future all the works will be performed using electrical energy. Hence, it is necessary to understand and follow the best practices in the intelligent and smart use of electricity with the objective to minimize/avoidwastage of electricity. [1]

Figure 1 shows a changing scenario of mother earth from green and environment friendly to present polluting environment resulting in global warming which is harming the health of mother earth.



**Fig. 1 Save our Mother Earth [2]**

### II BENEFITS OF CONSERVING ELECTRICITY

Electricity is directly linked with the following **3-dimensions of sustainable development**.

Economic, Social and Environmental.

Thus, it is important to use electricity efficiently and judiciously. Saving electricity not only helps us in reducing our bills but also results in several fringe benefits to the society, nation and the planet. Some of the benefits are listed below:

- (a) **Economic Benefits** - Electricity is produced in power plants which require huge capital investments by the public and private sectors. Further, there are recurring expenses for fuel, maintenance, salaries etc. The losses in generation, transmission, distribution add to the cost. The country is spending more than Rs. 11 Lakh Cr. per year on electricity. It costs 2 times more to generate than to conserve same amount of electricity due to losses taking place in power transmission, distribution and utilization. The electricity cannot be stored also (except in batteries; which again adds to costs) it is

therefore economically more prudent to use electricity smartly and intelligently.

- (b) **Social Benefits** - All the villages in India have been electrified. However, still all the homes are not having electric supply connections which may be 10-15% of our population; mostly in rural areas due to which they are dependent on polluting fuel Kerosene to light their homes. By saving electricity, we can share the same with the underprivileged population. The availability of electricity will help in social benefits to the rural population. Their children can get better education and health facilities. With the availability of the electricity, their economy also improves as their active hours are increased.
- (c) **Environmental Benefits** - The efficient use of electricity minimises the emission of CO<sub>2</sub> and other Green house gases and particulate matters. With more emphasis and adoption on electric vehicles, the pollution in cities will substantially reduce which will reduce expending on import of crude oil.

From the above, one can understand how important it is to conserve electricity. It is very much possible by using electricity intelligently and smartly without sacrificing on comfort.

### III METHOD OF CONSERVING ELECTRICITY

Basically, electricity can be conserved by following 3-measures, namely energy conservation, efficiency and renewable.[1]

- (a) **Conservation Measures**- These measures require understanding of how each electricity consuming item needs to be used. There are Dos and Don'ts and certain techniques which must be explained to all family members and followed strictly.
- (b) **Efficiency Measures**- These measures require retrofitting of existing inefficient gadgets/appliances with the highest efficiency ones available in the market. These measures are implemented with external help and still need to be monitored.

Bureau of Energy efficiency, Ministry of Power sets the standards and labels for marking star-rating of appliances. The star ratings are provided to the appliances in the form of 5-stars. Higher the number of stars, lower is the energy consumption. The star label shows at a glance a basic sense of energy efficiency to facilitate the consumer. The power saving guide is with explanation is shown in Figure 2.

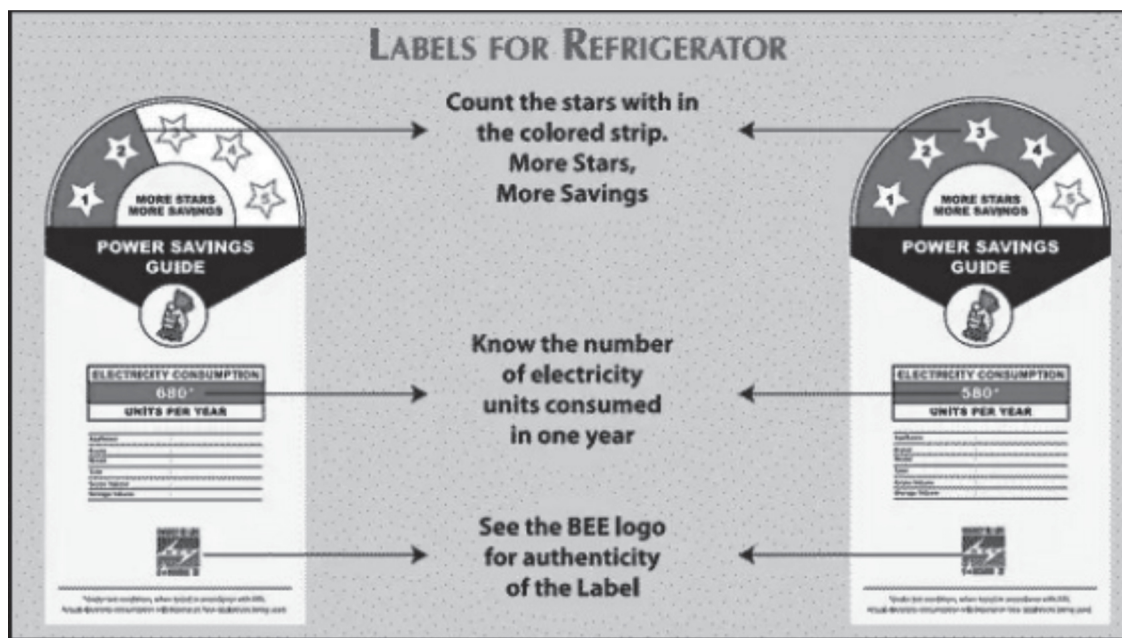


Fig. 2 Power saving guide [3]

- (c) **Renewable Energy Measures**- These measures require replacing electricity consuming gadgets with solar energy based gadgets and also need external help and expert advice.

The above -approaches have been depicted in the form of a pyramid shown in Figure 3.

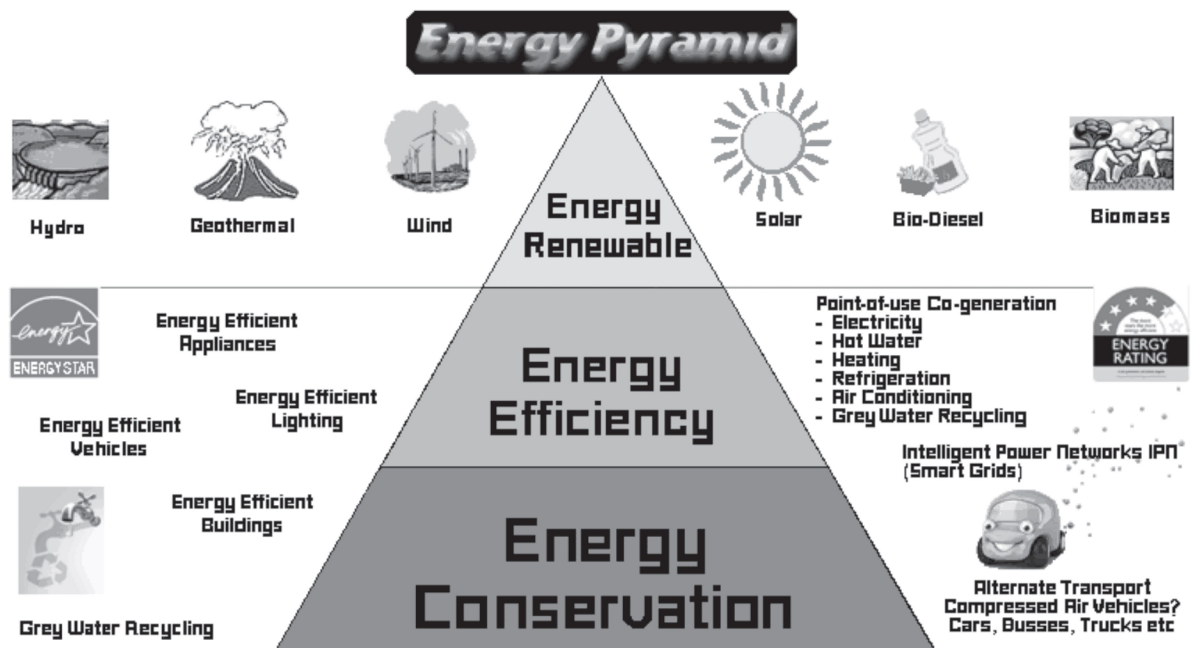


Fig. 3 Energy Conservation pyramid [4]

(d) **ABC approach to conserve electricity-** It is recommended to adopt ABC approach i.e. Accounting, Budgeting (Best Practices) and Controlling for maximum benefits.

#### IV ACCOUNTING OF ELECTRICITY CONSUMPTION

One should start with understanding how the billing is done and how much electricity is consumed by which item or appliance. Basic understanding of what is the meaning of a unit of electricity (kWh) and how it is calculated is very important. The billing is in two parts i.e Fixed Charges and Energy Charges. Fixed charges depend on the connected load and Energy charges are levied on actual consumption as per gradually increasing slab tariff. The step by step guide on how to account electricity consumption is given below: [1]

(a) **Recording Framework**

- (i) Open a file to keep records of electricity bills
- (ii) Safety First-understand all electricity safety measures before starting. Do not attempt anything which requires services of a qualified electrician.
- (iii) Understand how the electricity meter works and start taking meter readings twice a day i.e. at 7 AM and at 7 PM to see the consumption pattern in day time and night time.
- (iv) Make a list of all electricity consuming items in the home with their rated power in watts
- (v) Estimate the approximate hours of use.
- (vi) Enter the data in an Excel sheet in the format given in Table 1.

**Table 1**  
**Monitoring the electricity consumption**

Sl. No	Item Description	Rated Power (W)	Estimated Hours of Use (Hr) per day	Consumption per day (3 X4)	Consumption per month (5 X No. of days)
1	2	3	4	5	6

**(b) Activity Framework** - It may be noted that the items like Refrigerators, ACs, Geysers are provided with thermostats which switches off the compressor/ heating element once the set temperatures have been achieved. Further, Ceiling fans are provided with regulators and as such consumption depends on the regulator setting. Such appliances need more analysis to account their consumption. The following steps may be adopted to estimate approximate consumption of such appliances:

- (i) Switch off everything – check the meter to ensure that it is not working.
- (ii) Note down the initial meter reading
- (iii) Set the thermostat / regulator Fridge / AC / Fans etc. at middle point
- (iv) Start the appliance and keep it running for minimum of 2 hours
- (v) Note down the meter reading again
- (vi) The difference is the approximate consumption by the appliance for 2 hours. Multiply it by the no of hours it is used to get the daily consumption.

One may repeat the exercise in the night hours and at different settings of thermostat for better results. Similar calculations shall also be carried in different seasons.

The estimated monthly electricity consumption thus arrived should be compared with the bill to ensure that the meter is working properly and to identify the potential electricity saving measures.

## V BEST PRACTICES FOR ELECTRICITY SAVINGS

As explained earlier, the electricity savings can be realized by the adoption of conservation, efficiency and renewable energy measures. Understanding the best practices in the adoption of such measures helps in maximizing gains. Some of the best practices are listed below:[1]

### (a) Conservation Measures

- (i) Basic rules to ensure switching off lights/fans/ACs etc. when not in use should be kept in mind and practiced
- (ii) Educate the family members about the losses due to ‘Standby consumers’ (Ghost Consumers) and instruct them to switch off electronic gadgets from main Switch instead of Remote.

- (iii) Set computers on power saving mode.
- (iv) Clean Lighting Fixtures, Ceiling Fans, and Filters & Coils of ACs regularly.
- (v) Make use of day lighting and ‘free cooling’ (opening the windows) as much as possible.
- (vi) Ensure that appliances are used smartly and intelligently e.g.- set thermostat of Fridge as per weather conditions / load. Read the user’s instruction manuals and follow the guidelines given. Sometimes the manufacturers will give insufficient/ wrong information. Double check the instructions and adopt them to suit your usage.
- (vii) Avoid using appliances during peak load hours (morning and evenings). Use during late night (after 10 pm) or early morning (before 6 am) to reduce peak demand. This will also keep your electric wiring in healthy condition.
- (viii) Use ACs at a higher thermostat setting along with a Ceiling Fan i.e. 27-28 Deg.C.
- (ix) Make use of Timer Sleep Mode settings for ACs and Fans (Super energy efficient fans with remote come with this facility)
- (x) Adopt ‘Task-Lighting & Cooling’ wherever possible.
- (xi) Use hand operated tools as much as possible instead of Mixer/Grinder

### (b) Efficiency Measures

- (i) Discontinue the use of Incandescent Lamps and Compact Fluorescent Lamps (CFLs)- replace them with Light Emitting Diode (LED) Lamps.
- (ii) The so-called ‘zero watt’ bulbs actually consume 10-15 watts -replace it with 0.5 watt LED lamp.
- (iii) Provide 2-3 watt LED Lamps for areas where low illumination will suffice.
- (iv) Provide 5 watt LED lamps for small rooms, bath rooms, toilets etc
- (v) Replace all T8 and T12 Fluorescent tube lights with LED tube lights.
- (vi) Replace old ceiling fans with 28 watt super energy efficient fans.
- (vii) Provide Sensors to automatically switch off lights/Fans etc when not in use.
- (viii) Replace Electric Geyser with Solar Water Heater
- (ix) Make it a policy to always buy highest efficiency latest gadgets. For example- whenever AC is to be purchased buy latest

Inverter type AC or the ones coming with highest star rating.

**(c) Renewable Energy Measures**

- (i) Replace Electric Geyser with Solar Water Heater
- (ii) Use Solar Lanterns and Torches regularly
- (iii) Use Solar DC fan for cooling requirements during power cuts instead of providing an Inverter.
- (iv) Make use of solar passive techniques to minimize the use of electrical appliances for cooling/heating etc.

- (d) Controlling Measures**—Once a system is in place to introduce all measures to conserve electricity, it becomes important to ensure that this is followed religiously by all members of the family. This part can be made interesting and rewarding by introducing an Incentive and penalty scheme. A piggy bank may be kept for this purpose and any member found wasting electricity may be fined a sum equal to potential loss in a month and asked to deposit that much money in the piggy bank. The money thus collected may be used partly to fund purchase of new energy efficient gadget and partly to have an outing for the family.

## VI CONCLUSION

Electricity is most important but its source has become critically more important in last few decades. It is directly linked with the 3-dimensions of sustainability, viz. economic, social and

environmental. In order to fight against the climate change, 3-dimensional measures are necessary. These are electricity conservation measures by demand side management. The use of energy efficient appliances play important role in energy conservation. The third measure is the adoption of energy based on renewable sources i.e. which either do not emit green house gases such as solar, wind, hydro etc. The most important tool for energy conservation is the monitoring of energy consumption and carrying our energy audit and implementing its outcome. All such measures have become all the more necessary for sustainable development and saving the mother earth.

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