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Energy Conservation Measures Adopted For the Conservation of Energy in Domestic Sector

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Abstract— An attempt has been made in this paper to reveal the role of energy measures adopted for the conservation of energy in Domestic sector in order to conserve the energy in domestic sector. Energy consumption or demand generally refers to the term energy management which means saving of energy. The most important law governing the transfer of energy from one to the other form is the law of conservation of energy which states that energy can neither be created nor be destroyed; however, it can be converted from one form to another form. Energy auditing is not an exact science, but a number of opportunities are available for improving the accuracy of the recommendations. The energy management is often referred to as demand management. Energy demand management usually implies actions that affect the quantity of energy consumed by users. It also includes actions targeting reduction of peak demand during periods when energy supply systems are constrained. The study of energy management is very important for any engineer who wants to excel in the technical field. This research paper is a concise approach to the field of energy management in agriculture sector. This paper will act as an important tool for technical persons in providing an insight into the field of energy conservation and energy management. In this research paper it is described how we can conserve the energy in Domestic sector. By adapting simple measures and energy conservation techniques we can help in saving wastage of energy and raw material that we used in Domestic sector.

Keywords— Fluorescent tube lamps; air conditioners; energy conservation measures; compact fluorescent lamp; kilovolt; Kilowatt.

I. INTRODUCTION

Energy conservation refers to the methods of reduction in energy consumption by way of elimination of wastage and promotion of efficiency. We know that due to the vast gap between demand and supply, lot of efforts is being done to bridge the gap in terms of generation of more electricity which requires lot of capital investment and apart from it creates lot of environmental concerns. Energy conservation is the key element of energy management. We can reduce the energy consumption by adopting various ways of energy conservation which includes efficient use of technologies and avoiding energy wastages [1]. We know that one unit of electricity saved is equal to 3 to 4 units of electricity generated. The various principles involved in energy conservations are:

- Optimal control
- Optimize capacity
- Optimize load
- Use efficient processes
- Reduce losses
- Energy containment
- Examine energy conservation opportunities
- Energy storage facilities

II. ENERGY CONSERVATION NEEDS AND OBJECTIVES

More than 8% of the electricity you buy is probably wasted due to the design of your equipment and the way it has been installed. This is in addition to the energy wasted by running equipment for longer than necessary. Electricity is the most expensive form of energy available - about 8 times the cost of coal and six times the cost of gas - this expensive fuel must be used wisely. A motor consumes electricity to the equivalent of its capital cost in just three weeks of continuous - use high efficiency motors save money over the whole of their long life. Energy is lost in all cables. Using the minimum regulation size means greater losses and hotter running. Using larger sizes saves energy and costs less over the lifetime of the installation - the energy saved is worth many times the slightly increased cost of larger cables. Power losses in electrical equipment are due to the electrical resistance in conductors and losses in the magnetic material and occur primarily in motors, transformers and in all cabling. The conductor losses are proportional to the resistance and the square of the current (I R losses) and can be minimized by using the optimum size of conductor for the application. Magnetic losses can be reduced by the use of better materials and production methods [2],[4]. The available savings in energy costs and accrue over the whole of the life of the installation. Electrical energy is undisputedly the most vital element for industrial growth of any country. India is one of the many developing countries, which is suffering from acute power shortages. Almost all the states of India are not able to manage the demand from the three main sectors, viz., domestic, agriculture and industrial sectors. The recent domestic growth due to economic reforms further worsened the situation. This results in exhaustion of fossil fuels and causes ecological imbalance. Therefore, there is an ample opportunity of energy conservation in domestic Sector.

III. ENERGY CONSERVATION AND ITS NEED

Energy conservation is the key element in energy management. Energy conservation refers to efforts made to reduce energy consumption. Energy conservation can be

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achieved through increased efficient energy use, in conjunction with decreased energy consumption and/or reduced consumption from conventional energy sources. Energy conservation can result in increased financial capital, environmental quality, national security, personal security and human comfort. Individuals and organizations that are direct consumers of energy choose to conserve energy to reduce energy costs and promote economic security. Industrial and commercial users can increase energy use efficiency to maximize profit [5-8]. Electrical energy conservation is an important element of energy policy. Energy conservation reduces the energy consumption and energy demand per capita and thus offsets some of the growth in energy supply needed to keep up with population growth. This reduces the rise in energy costs and can reduce the need for new power plants and energy imports. This reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production. By reducing emissions, energy conservation is an important part of lessening climate change. Energy conservation facilitates the replacement of non-renewable resources with renewable energy. Energy conservation is often the most economical solution to energy shortages and is a more environmentally being alternative to increased energy production.

IV. Energy Conservation In Domestic Sector

Energy conservation in domestic sector is a good point to start as about 20% of the total energy generated is utilized for domestic purpose, which is considerable share. Domestic power consumption in India takes about l/5th of the total power consumption, which is substantially high. Previously the power was subsidized in all the states of India and people misused power liberally without worrying about efficiency of the appliances. Because of the economic reforms, the subsidy in being withdrawn in power sector in a phased manner throughout India and tin-power tariff is steadily increasing and the people began to realize the need for energy conservation. Even the Government of India made an act for energy conservation in 2001, which shows the seriousness of the power situation. Since domestic sector use the power in variety of applications, this is a potential area to be considered for energy optimization. By reducing the domestic energy consumption, the other sectors will get more power thereby helping the country to prosper further. Energy used at home comprises of energy for cooking and processing food and luxuries. While an urban home largely depends on cooking gas and electricity for its energy requirements. Most of the energy demand of a rural home is dependent on fire wood or fuel wood. It is said that 50% of the energy consumption of the country is utilized for cooking activity considering commercial as well as non-commercial energy. The domestic energy expenditure, with the increasing cost of energy, is gradually assuming a sizable share of the total domestic expenditure. The per capita electricity consumption in the country is reported to be about 400 units per annum with Gujarat on the top with an average of about 650 units. The share electricity consumption in the domestic sector is about 15-20%. The average cost of one unit of electricity in the country is in the range of Rs. 3.50 to Ks. 4.0 and monthly electricity bill of an average household is about Rs. 500. Some of the energy intensive electrical gadgets used at home are geysers, oven/microwave, air conditioners, refrigerators and pumps. Cheap and sub-standard gadgets consume more energy as compared to expensive standard gadgets and prove to be costlier on a long run. Consideration should be given to the "life cycle cost" rather than the capital cost while purchasing any gadget. Energy consumption in Indian domestic sector mostly comprises of electricity used in homes for lighting, refrigeration and power supply for other gadgets. Other forms of energy used are fuel for cooking etc. So there is an angle opportunity of energy conservation in electrical energy used in domestic sector in India. The consumption pattern of electrical energy in Indian domestic sector is as follows

TABLE I. The consumption pattern of electrical energy in Indian domestic sector.

S.No.	Application	%age Power Consumption
1	Lightning	35-40%
2	Fanning	20-25%
3	Refrigeration	10-15%
4	HVAC etc.	15%
5	Others (gadgets etc.)	10-15%

So, electrical energy saving potential lies in lighting luminaries, refrigeration equipment and gadgets. Lot of energy can be saved by adopting latest technology in these equipment. As we know that electric lighting burns considerable amount of the average home energy budget. The electricity used over the lifetime of a single incandescent bulb costs 5 to 10 times the original purchase price of the bulb itself. Compact Fluorescent Lights (CFL) and Light Emitting Diode (LED) bulbs have revolutionized energy-efficient lighting. CFLs are simply miniature versions of lull sized fluorescents. They screw into standard lamp sockets and give off light that looks just like the common incandescent bulbs - not like the fluorescent lighting we associate with factories and schools. LEDs are small, solid light bulbs which are extremely energy-efficient. New LED bulbs are grouped in clusters with diffuser lenses which have broadened the applications for LED use in the home.

V. Energy Conservation Strategies In Domestic Sector

Lot of electrical energy can be saved in the domestic sector by adopting the suitable energy conservation techniques in the following equipment used in household

- Luminaries (lamps etc.)
- Fans/regulators
- Refrigeration equipments
- Heating equipment
- Gadgets etc.

Lamps

Indian domestic illumination is totally dominated by the incandescent lamps if varying wattage (40 W/60 W/80 W/100

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W). Despite their inefficiency, they are ill preferred in lower income groups just because of their very low initial cost. Fluorescent lamps are also popular and are used mainly in the utility areas like reading rooms, bedrooms and living rooms, though they are costlier by more than 10 to 15 times than incandescent lamps. Even in the fluorescent lamps, aluminum chokes are predominant, which cost much less compared to copper choke. In India, about 80% of the domestic lighting is through incandescent lamps. Hence it is one area that should be concentrated most for conservation of energy. Now-a-days use of CFLs (Compact Fluorescent Lamp) is steadily increasing because of their very low power consumption, long life and better illumination over incandescent lamps. Table shows the comparison of the various popular types of lamps.

TABLE III. Types of lamp used in Indian domestic sector

S.No	Type of Lamp	Power Factor	Power consumption	Output lumens	Efficiency Lumens/Watt
1	Incandescent	1.0	100 W	1200	12.0
2	Fluorescent Tube Lamp	0.6	52.48 W	2460	46.87
3	Fluorescent Tube Lamp with electronic choke	0.98	33.17 W	2890	68.0
4	CFL	0.90	19.6 W	900	45.91
5	Incandescent	1.0	100 W	1200	12.0

REPLACEMENT OF INCANDESCENT WITH FTL

For calculations it is assumed that the operation hours are 5 hours per day and the cost of energy as Rs. 3 per Kwh.

Cost of FTL with copper choke	Rs. 275
Cost of incandescent lamp	Rs. 15
Difference in cost	Rs. 260
Power consumed by incandescent lamp	100 W
Power consumed by FTL	53 W
Saving in power	47 W
Payback period	1 year

REPLACEMENT OF INCANDESCENT WITH CFL

Cost of CFL	Rs. 100
Cost of incandescent lamp	Rs. 15
Difference in cost	Rs. 85
Power consumed by incandescent lamp	100 W
Power consumed by CFL	19.6 W
Saving in power	80.4 W
Payback period	3months

In both the cases, it can be observed that the savings are very impressive and hence replacement of incandescent lamps is highly recommended. The payback period is inversely proportional to the period of usage. In both the cases, it can be observed that the savings are very impressive and hence replacement of incandescent lamps is highly recommended. The payback period is inversely proportional to the period of usage. Another method to conserve energy in this area is to use the natural light effectively so that the period of usage of lamps may be minimized. Apart from it, energy efficient LED lamps can also be used in place of incandescent lamps.

FANS AND REGULATORS

Fans, once a luxury, became essential now for Indian climatic conditions where temperatures rise to as high as 45°C in summer. In India, fans available at 1 varying cost ranging from as low as Rs. 400 to Rs. 1500. Cheap fans normally use substandard core laminations and aluminum windings. Standard fans are made with quality material but cost two to three times. The power consumption varies from 60 Watts to 90 Watts depending on the quality of the fan. Though electronic regulators are available in the market at costs ranging from Rs. 50 to Rs. 250 (low cost electronic regulators don't contain proper shielding to prevent RF interference), the conventional regulators are predominant chiefly because they come along with the fan. The user has no choice for opting for an electronic regulator. At medium speeds, a saving of about 14 Watts was observed with the use of electronic regulator. Replacement of low efficient fan with series regulator with high efficient fan with electronic regulator is highly recommended.

Following is a comparison of economics of a High Cost Fan (HCF) and Low Cost Fan (LCF), at a nominal 8 hours a day.

Cost of HCF with electronic regulator	Rs. 1650
Cost of LCF	Rs. 450
Difference in cost	Rs. 1200
Power consumption of HCF	
At medium speed	50 W
Power consumption of LCF	
At medium speed	90 W
Power savings	40 W
Payback period	2.3 years

REFRIGERATORS

Refrigerator is another common appliance in middle and upper classes in India. Single door refrigerators take a share of more than 80% and almost all are right hinged (operated with right hand). These are available in variety of capacities and models, but the most popular among them is the single door 165 liters capacity. Almost all the refrigerators have right hinged doors (operated with right hand). Operation of the refrigerator with right hand takes longer time since door opening and handing the contents is to be done by right hand only. This is particularly true with cooking items since they are normally touched with right hand only in India. This leads to loss of cooling and can be saved to some extent if a left hinged door is provided. Refrigerators in India are mostly used for preservation of food items and for cold water. If two separate compartments are provided, there can be good energy savings since the loss of cooling due to door opening is confined to that compartment only. In fact, a tap may be provided for cold water, which minimizes the openings of the door by about 60%. Normally, defrosting is done only when the deep freezer is completely choked with ice, which hampers the effectiveness thus making a refrigerator inefficient. Another common flaw is insufficient space behind the refrigerator, which deteriorates the heat transfer. The vendors should educate the consumers to ensure periodical defrosting

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and not to place the refrigerators close to the walls. Now-a-days "No frost" models are available, which are very efficient and consume less power than the normal models.

ENERGY CONSERVATION TIPS IN THE KITCHEN

Housewives can save up to 30% of cooking gas or kerosene by following a few simple 'fuel-saving tips'

- Avoid an idle flame by keeping all materials required for cooking within reach, before lighting the stove. Experiments have revealed that keeping the flame of the larger burner burning unnecessarily in a gas stove, results even a few paisa saved everyday will amount to a sizeable saving by the end of a month. Remember. Light the stove only after keeping all the ingredients within reach and ready for cooking. Put off an idle flame at once.
- Pressure cooking is one of the fastest and most economical ways of cooking. Experiments have shown fuel (kerosene or cooking gas) savings of 20% on rice, 46% on soaked gram dal and 41.5% on meat, as compared to ordinary cooking is possible. The savings in cooking time are equally high. To obtain further savings from a pressure cooker, use the separators of the cooker to cook different items such as rice, vegetable and dal, all at the same time.
- The quantity of water used differs for various dishes. And even for the same dish, different housewives use varying quantities of water. Since water is extensively used in cooking, one should remember that surplus water wastes fuel. Besides, when the excess water is drained subsequently, precious nutrients are lost. An experiment on cooking rice with double the required quantity of water has revealed that fuel consumption increases by 65% so always prefer to use only the optimum quantity of water for cooking. Remember: Surplus water consumes additional fuel which could otherwise be saved.
- Experiments have shown that soaking ingredients such as dal and rice for various intervals of time before cooking saves fuel. 250 gm of kabuli chana (chick peas) when soaked overnight in water consumed 22% less fuel as compared to the fuel required for the same quantity of unsoaked kabuli chana.
- When a vessel's contents reach boiling point, a low flame is enough to keep it boiling. Addition of more heat at the boiling stage causes further evaporation of the liquid without serving any useful purpose. Hence, when water or any other liquid is boiling, reduction in the flame will reduce wastage. This is possible in a gas stove by turning the knob to 'simmer' position or in a kerosene stove by lowering the wicks. Experiments conducted have revealed a saving of 25% fuel when the flame is reduced after boiling had started.
- It is important to/clean the burner of your gas range regularly and trim or replace the wicks of the kerosene stove. Soot clogged gas burners and charred wick-ends of a kerosene stove increase fuel consumption. Regular maintenance of your stove helps you save fuel. In case stove knobs do not move freely, get them attended to.
- Cold milk, frozen meal or any other cold food-stuff from the refrigerator should not be taken straight to the cooking pot. Keep it out of the refrigerator should not be taken straight to the cooking pot. Keep it out of the refrigerator for some time before putting if on the stove.

ENERGY SAVING TIPS IN THE DOMESTIC SECTOR

- Switch off light when not required.
- Use a table lamp instead of an overhead light when reading at a desk.
- Replace 40W tube light by equivalent light output 36W (Slim) tube lights.
- Use Electronic ballasts in place of conventional electromagnetic ballasts Tube Lights.
- Replace filament lamps with Compact Fluorescent Lamps (CFL)
- Construction of a house should be designed to get maximum sunlight & ventilation.
- Use sunlight wherever & whenever available.
- Use only adequate illumination" or the work involved.
- Clean bulbs and tube lights periodically to avoid reduction in illumination.
- Clean fan blades periodically.
- Lubricate bearings of motor periodically.
- Use electronic regulators for the fans.
- Switch off fans when not required.
- Use Light Weight/Energy efficient fans.
- Adopt large scale ironing. Avoid ironing one or two cloths daily.
- Always use nylon belt in Grinders.
- Clean & Lubricate grinder parts periodically.
- Use energy efficient motor for the grinder.
- Use grinder to its full capacity.
- Use Washing Machine to its full capacity.
- Avoid using dryer in washing machines whenever possible.
- When immersion rods are used, switch off when water is heated to the required level. Cover the container with a lid to avoid wastage.
- Switch off directional vanes provided in the air-conditioner when not required.
- Avoid rewinding motors.
- Avoid leakage of water in taps/joints.
- Use energy efficient water pumps.
- Use correct size PVC Piping System, in water lines.
- Use capacitors for water pumps, to improve power factor.
- Avoid frequent closing and opening of refrigeration door.
- Keep refrigerator away from the wall by at least 200 mm.
- Use Non-Conventional Energy Sources liked Biogas, Solar Heaters/ Cookers, Wind Mills to the extent possible.
- Periodical inspection of wiring may be done to defect leakage if any. Use Earth leakage circuit breakers.
- Use correct size wires, preferably copper wires.
- Dim the lights where you can.

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- Light-colored walls reflect more light and so need less lamps.

KITCHEN VENTILATION

- There should be proper ventilation to the outside for the cook-tops and ranges, especially while cooking with gas. But the fan should not be running longer than the need or will result in wasting the energy in heating the home. And make sure the fan in use in the downdraft vent is not too large since that would waste energy too.
- Ventilation fans create a slight vacuum. To balance the air pressure, cold air is sucked in from the outside through cracks in the walls, around windows and doors, etc. Then the heater starts in to heat up the cold air. This is why too big a fan leads to energy waste.
- Worse, if the fan draws out so much air that cold air cannot come into the house fast enough to equalize the pressure, oil or gas heating system may not vent properly. This situation may lead to a back draft of combustible gases into the house.
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ENERGY SAVING COOKWARE

- Choosing the right pan for the job can actually save energy—small amounts per meal.
- Smaller is better. Smaller pans need less energy to heat up. Microwaves use less energy than full-size ovens. Smaller ovens use less energy than larger ones. Then put the pan on the burner that fits it best. Remember that smaller burners use less electricity.
- Every type of heating element on an electric cook-top (coils, solid disk elements and radiant elements under ceramic glass) works more efficiently when the bottom of the pan is flat.
- Convection ovens are more energy-efficient than standard ovens. They continuously circulate heat around the food which distributes the heat more evenly so temperatures and cooking time can be decreased.
- In fact, the most efficient pan has a slightly concave bottom, which flattens out when the metal heats up. The more rounded or warped the pan, the less direct contact it has with the burner so the harder the element has to work to heat up the pan.
- Copper-bottom pans heap up faster than other pans. (And they look neat also)
- The flame on your gas burner should be blue. A yellow flame means the gas is not burning efficiently. Call the gas company to check it.
- Microwave will work more efficiently if the inside surfaces are clean.
- The tighter the fit on the pot lid, the less heat escapes.
- Using glass or ceramic pans in the oven allows turning down the temperature about 25 degrees Fahrenheit and stitl cook the food in the same amount of time.
- Pressure cookers, which build up steam pressure, reduce cooking time and energy use.

ENERGY CONSERVATION MEASURES IN OFFICE

Similar to the energy conservation opportunities and measures applicable in the domestic house, we can save substantial amount of electrical energy by adopting simple techniques or measures in the office as well. Most of the energy consumed in the office is in the form of electrical energy for lighting, running ACs, operating office equipment etc. Energy can be saved by optimizing the use of these equipment and using energy efficient technologies. Also the design of office building plays on important role in energy conservation. Energy awareness campaign plays crucial role in energy conservation efforts in an organization's building.

- Replace incandescent lights with Compact Fluorescent Lights (CFLs) or Light Emitting Diodes (LEDs) for desk lamps and overhead lighting. Using CFLs instead of comparable incandescent bulbs can save about 50% on your lighting costs. CFLs use only one-fourth the energy and last up to 10 times longer.
- Switch off all unnecessary lights. Use dimmers, motion sensors or occupancy sensors to automatically turn off lighting when not in use to reduce energy use and costs.
- Turn off lights when you leave at night.
- Use natural lighting or day lighting. When feasible, turn off lights near windows.
- Use task lighting; instead of brightly lighting an entire room, focus the light where you need it; to directly illuminate work areas.
- Use energy efficient products.
- Close or adjust window blinds to block direct sunlight to reduce cooling needs during warm months. Overhangs or exterior window covers are most effective to block sunlight on south facing windows.
- Unplug equipment that drains energy when not in use (i.e., cell phone chargers, fans, coffeemakers, desktop printers, radios, etc.)

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- Turn off your computer and monitors at the end of the work day, if possible. If you leave your desk for an extended time, turn off your monitor.
- Turn off photocopier at night or purchase a new copier with low standby feature. Purchase printers and fax machines with power management features and it.
- Insulate water heater, hot water piping and tanks to reduce heat loss.
- Install meters to track energy use.
- Collect your utility bills: Separate electricity and fuel bills. Target the largest energy consumer or the largest bill for energy conservation measures.
- Carpool, bike or use mass transit when commuting to work. These above mentioned energy conservation measures when adopted can brought drastic reduction in the energy bill for the office.

VI. Conclusion

The term energy management refers to the saving of energy. This notably means improving the efficiency of powered devices such as electrical equipment sand the development of Renewable energies. The energy management is often referred to as demand management. Energy demand management usually implies actions that affect the quantity of energy consumed by users. Energy conservation is the practice of decreasing the quantity of energy used while achieving a similar output at the end for use. On a larger scale, energy conservation is an element of energy policy. Cheap and sub standard gadgets consume more power as compared to expensive standard gadgets and prove to be costlier on a long run. Consideration should be given to the life Cycle cost rather than capital cost while purchasing any gadget. It should always be kept in mind that electricity saved is money saved. By adapting simple measures and energy conservation techniques we can help in saving wastage of energy and raw material that we used in agriculture sector. Energy is essential for the functioning of most of the agriculture work. Energy Management is one of the most serious issues for the future as the demand of energy is incensing day by day in comparison to its supply.

References

[1] Mehulkumar J Panchal, Dr. Ved Vyas Dwivedi, Rajendra Aparnathi, "The case study of energy conservation and audit in industry sector," International Journal of Engineering and Computer Sciences, vol.3, Issue 4, April 2014, pp.5298-5303.

[2] L.C. Witte, P.S. Schmidt and D.R. Brown, Industrial Energy Management and Utilisation, Hemisphere Publication, Washington, 1988.

[3] Parmal Singh Solanki, Venkateswara Sarma Mallela, Chengke Zhou, "An investigation of stand by energy losses in residential sector," International Journal of Energy and Environment, vol.4, Issue 1, 2013, pp.117-126.

[4] V. Thiyagarajan and V. Sekar, "Modeling of photovoltaic systems for power grid equipped houses as partial lighting system," International Journal of Engineering and Advanced Technology, vol. 1, no. 1, Dec. 2012, pp. 171 175.

[5] W.C. Turner and S. Doty, Energy Management Handbook, edition 6th, Fairmont Press, USA, 2007.

[6] C. Beggs, Energy Management Supply and conservation, edition 2nd, Killington Oxford, Elsevier Ltd, 2009.

[7] H. Elaydi, I. Ibrik and E. koundary, "Conservation and management of electrical energy in Gaza strip using low cost investment," International Journal of Engineering Research and Application, vol. 2, no. 4, April 2014, July-August 2012, pp. 5298-5303.

[8] M. k. J Pnchal, Dr. V. V. Dwivedi and R. Aparnathi, "The Case study of energy conservation and audit in industry sector," International Journal of Engineering and Computer Sciences, vol. 3, no. 4, 2014, pp. 5298-5303.

[9] B. P. Rath and Prof. J. Akhter, Understanding carbon credit prospectus for electricity generation in India, Electrical India, vol. 52, no. 5, 2012, pp. 76.

[10] H. K. Agarwal, Smart Grid Initiative in India and supreme"s Experience in Electrical India, vol. 53, no. 9, Sept. 2013, pp. 78

[11] Typical lumen outputs and energy costs for outdoor lighting,www.nofs.navy.mil/about_NoFs/staff/cbl/lumentab.html.

Sahil Gupta, Abrar Tariq, and Loveneesh Talwar, "Energy conservation measures adopted for the conservation of energy in domestic sector," *International Journal of Scientific and Technical Advancements*, Volume 2, Issue 4, pp. 33-38, 2016.