



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK



SPECIAL ISSUE FOR NATIONAL LEVEL CONFERENCE "RENEWABLE ENERGY RESOURCES & IT'S APPLICATION"

ASSESSMENT OF HOME ENERGY AUDIT: A REVIEW

PROF. S. C. MAKWANA

Associate Professor, College of Engineering and Technology, Akola.

Accepted Date: 12/03/2016; Published Date: 02/04/2016

Abstract: A home energy audit, also known as a home energy assessment, can help you understand the whole picture of your home's energy use. An audit can help you determine how much energy your home uses, where your home is losing energy, and which problem areas and fixes you should prioritize to make your home more efficient and comfortable. A home energy audit should be your first step before making energy-saving home improvements, as well as before adding a renewable energy system to your home. Reducing energy use in your home saves you money, increases our energy security, and reduces the pollution that is emitted from non-renewable sources of energy. You can save money and energy at home by choosing energy efficient appliances and electronics and reducing the amount you use them. Here in this paper various points to reduce your electricity use and power bills like Estimating appliance and electronic energy use & Energy efficient computer use are studied.

Keywords: Assessment, Energy Audit, Energy Efficient Appliances, Computer.



PAPER-QR CODE

Corresponding Author: PROF. S. C. MAKWANA

Co Author: -

Access Online On:

www.ijpret.com

How to Cite This Article:

S. C. Makwana, IJPRET, 2016; Volume 4 (8): 1-6

INTRODUCTION

A home energy audit, also known as a home energy assessment, can help you understand the whole picture of your home's energy use. An audit can help you determine how much energy your home uses, where your home is losing energy, and which problem areas and fixes you should prioritize to make your home more efficient and comfortable. A home energy audit should be your first step before making energy-saving home improvements, as well as before adding a renewable energy system to your home. Reducing energy use in your home saves you money, increases our energy security, and reduces the pollution that is emitted from non-renewable sources of energy. You can save money and energy at home by choosing energy efficient appliances and electronics and reducing the amount you use them. Here in this paper various points to reduce your electricity use and power bills like Estimating appliance and electronic energy use & Energy efficient computer use are studied.

HOME ENERGY AUDIT:

A professional home energy audit will provide a thorough assessment of your home's energy use. In addition to a room-by-room examination of the home, an auditor may employ equipment such as blower doors, infrared cameras, and (rarely) PerFluorocarbon tracer gas.

While a professional home energy audit is the best way to determine where your home is losing energy and where you can save, you can conduct your own simple but diligent walk-through and spot many problems in any type of house. This "do-it-yourself" home energy audit will not be as thorough as a professional home energy assessment, but it can help you pinpoint some of the easier areas to address. When walking through your home, keep a checklist of areas you have inspected and problems you found. This list will help you prioritize your energy efficiency upgrades. Do not assume that just because your home is recently constructed—or even new—that there are no opportunities to save energy. Energy-saving technology has evolved rapidly over the past few years, outpacing training commonly available to many builders, including some of the most reputable.

LOCATE AIR LEAKS (for Air Conditioner / Air Cooler rooms):

First, make a list of obvious air leaks (drafts). The potential energy savings from reducing drafts in a home may range from 5% to 30% per year, and the home is generally much more comfortable afterward.

Check for indoor air leaks, such as gaps along the baseboard or edge of the flooring and at junctures of the walls and ceiling. Also check for leaks on the outside of your home, especially in areas where two different building materials meet. See detecting air leaks for detailed instructions on finding air leaks yourself.

Seal Air Leaks

You should plug and caulk holes or penetrations for faucets, pipes, electric outlets, and wiring. Look for cracks and holes in the mortar, foundation, and siding, and look for leaks around windows and doors. Seal them with the appropriate material.

Consider Ventilation

When sealing any home, you must always be aware of the danger of indoor air pollution and combustion appliance "backdrafts." Back drafting is when the various combustion appliances and exhaust fans in the home compete for air. An exhaust fan may pull the combustion gases back into the living space. This can obviously create a very dangerous and unhealthy situation in the home.

In homes where a fuel is burned (i.e., natural gas, fuel oil, propane, or wood) for heating, be certain the appliance has an adequate air supply. Generally, one square inch of vent opening is required for each 1,000 Btu of appliance input heat. Burn marks or soot around the appliance burner or at the vent collar, or visible smoke anywhere in the utility room while the appliance is operating, indicate poor draft.

INSPECT HEATING AND COOLING EQUIPMENT

Inspect heating and cooling equipment annually, or as recommended by the manufacturer. If the unit is more than 15 years old, you should consider replacing your system with one of the newer, energy-efficient units. A new unit would greatly reduce your energy consumption, especially if the existing equipment is in poor condition. Check your ductwork for dirt streaks, especially near seams. These indicate air leaks, and they should be sealed with a duct mastic. Insulate any ducts or pipes that travel through unheated spaces.

LIGHTING

Energy for lighting accounts for about 10% of your electric bill. Examine the light bulbs in your house and consider replacing inefficient bulbs with a more efficient choice, such as energy-saving incandescent, compact fluorescent lamps (CFLs), or light-emitting diodes (LEDs). When shopping for bulbs, consider the brightness of the bulbs you want and look for lumens and the Lighting Facts label.

APPLIANCES AND ELECTRONICS

The appliances and electronics you choose and how you use them affect your energy use and costs. Examine the appliances and electronics in your home and estimate their energy use. Consider strategies for reducing the energy use of your appliances and electronics.

You might consider the following:

- Unplugging an item when it is not in use to prevent phantom loads
 - Changing the settings or using the item less often
 - Purchasing a new, more efficient product. Learn more about shopping for efficient appliances and electronics.
- Reducing energy use in your home saves you money, increases our energy security, and reduces the pollution that is emitted from non-renewable sources of energy.

You can save money and energy at home by choosing energy efficient appliances and electronics and reducing the amount you use them. Some the points to reduce your electricity use and bills:

- **Estimating appliance and electronic energy use**
- **Energy efficient computer use**
- **Reducing electricity use**
- **Reading electric meters**
- **Shopping for appliances**
- **Kitchen appliances**
- **Laundry**
- **Smart appliances**
- **Home office and electronics.**

ESTIMATING APPLIANCE AND ELECTRONIC ENERGY USE:

Estimate for one light bulb of 100 W used per day for 12 hours for a month of 30 days. Cost of electricity as per MAHADISCOM (Mahavitaran, Maharashtra State Electricity Distribution Co. Ltd, A Government of Maharashtra Undertaking.) Unit consumer is 36 for a Low Tension connection under domestic plan of 03 Phase electricity costs Rs. 331.02 as per new Tariff implemented from 01/06/2015. Figure 1 shows the sample copy of bill.

FIGURE 1: Sample Copy of Bill. (Source: <http://www.mahadiscom.in/>)



Our appliance and electronic energy use calculator allows you to estimate your annual energy use and cost to operate specific products. The wattage values provided are samples only; actual wattage of products varies depending on product age and features. Enter a wattage value for your own product for the most accurate estimate. (<https://wss.mahadiscom.in/> [consumption calculator])

Determining how much electricity your appliances and home electronics use can help you understand how much money you are spending to use them. Use the information below to estimate how much electricity an appliance is using and how much the electricity costs so you can decide whether to invest in a more energy-efficient appliance.

CALCULATING ANNUAL ELECTRICITY CONSUMPTION AND COSTS:

Follow these steps for finding the annual energy consumption of a product, as well as the cost to operate it.

Estimate The Number of Hours Per Day An Appliance Runs.

There are two ways to do this:

a. ROUGH ESTIMATE:

If you know about how much you use an appliance every day, you can roughly estimate the number of hours it runs. For example, if you know you normally watch about 4 hours of television every day, you can use that number. If you know you run your whole house fan 4 hours every night before shutting it off, you can use that number. To estimate the number of hours that a refrigerator actually operates at its maximum wattage, divide the total time the refrigerator is plugged in by three. Refrigerators, although turned "on" all the time, actually cycle on and off as needed to maintain interior temperatures.

b. KEEP A LOG:

It may be practical for you to keep a usage log for some appliances. For example, you could record the cooking time each time you use your microwave, work on your computer, watch your television, or leave a light on in a room or outdoors.

Find the wattage of the product.

There are three ways to find the wattage an appliance uses:

a. STAMPED ON THE APPLIANCE:

The wattage of most appliances is usually stamped on the bottom or back of the appliance, or on its nameplate. The wattage listed is the maximum power drawn by the appliance. Many appliances have a range of settings, so the actual amount of power an appliance may consume depends on the setting being used. For example, a radio set at high volume uses more power than one set at low volume. A fan set at a higher speed uses more power than one set at a lower speed.

Multiply the appliance ampere usage by the appliance voltage usage:

If the wattage is not listed on the appliance, you can still estimate it by finding the electrical current draw (in amperes) and multiplying that by the voltage used by the appliance. Most small appliances in the India use 110 volts. Larger appliances, such as clothes dryers and electric cooktops, use 240 volts. The amperes might be stamped on the unit in place of the wattage, or listed in the owner's manual or specification sheet.

Use online sources to find typical wattages or the wattage of specific products you are considering purchasing.

ENERGY STAR offers energy-use information on specific products that have earned the ENERGY STAR. The information varies across products, but if you are considering purchasing a new, efficient product, ENERGY STAR allows you to select and compare specific models. In some cases, you can use the provided information to do your own estimates using the equations here. The information may also help you compare your current appliances with more efficient models, so you understand potential savings from upgrading to a more efficient appliance.

Find the daily energy consumption using the following formula:

(Wattage × Hours Used Per Day) ÷ 1000 = Daily Kilowatt-hour (kWh) consumption

Find the annual energy consumption using the following formula:

Daily kWh consumption × number of days used per year = annual energy consumption

Find the annual cost to run the appliance using the following formula:

Annual energy consumption × utility rate per kWh = annual cost to run appliance

Do's and Don'ts

Following are the Do's and Don'ts given by MAHADISCOM (Mahavitaran, Maharashtra State Electricity Distribution Co. Ltd, A Government of Maharashtra Undertaking.).

Do's:

- a. Always, install safety equipments like Earth leakage / overload & short circuit protection (circuit breakers / switches) near point of supply.
- b. Ensure healthy earthing is installed at your premises.
- c. Ensure only IS marked cables of proper capacity are used for your installation and get the wiring done through only licensed Electrical Contractors.
- d. Use electricity only when needed, switch off the supply when not required.
- e. Always use proper capacity fuse wire in main switches.
- f. Use only ISI marked electrical equipments.
- g. While connecting additional loads like lights, fans, etc., and other electric appliances such as refrigerators, air-conditioners, Water-heaters etc., ensure that the meter capacity is adequate. If the meter capacity is not adequate, contact the Section Officer for installing higher capacity meter.
- h. Use electricity only for purpose for which the service connection has been given (i.e. domestic).
- i. Construct your building with proper clearance from the existing High Tension/Low Tension lines as per the Indian Electricity Rules 1956.(vide rule 79 & 80)
- j. Observe safety precautions to avoid electrical accidents.
- k. Replace promptly defective electrical fittings and appliances.
- l. Get the internal wiring checked up periodically not only to avoid leakage of electricity but also to safeguard the lives of the inmates in the premises.

Dont's

- a. Do not connect multiple equipments to a single point outlet to avoid excess loading.
- b. Do not use bare wires for extending supply from one point to other or from one premises to other premises. It is hazardous and causes accidents.
- c. Avoid loose connections and joints.
- d. Do not plant trees below the overhead power lines.
- e. Do not meddle with live wires/points. It may cost your life.
- f. Don't get the wiring works done by unauthorised persons, which is an offence under the Indian Electricity Rules 1956.
- g. Don't use substandard wires and wiring accessories. Don't install fittings and appliances of poor quality.

ENERGY EFFICIENT COMPUTER USE:

If you wonder when you should turn off your personal computer for energy savings, here are some general guidelines to help you make that decision.

Though there is a small surge in energy when a computer starts up, this small amount of energy is still less than the energy used when a computer is running for long periods of time.

For energy savings and convenience, consider the following guidelines:

- Turn off the monitor if you aren't going to use your PC for more than 20 minutes.
- Turn off both the CPU and monitor if you're not going to use your PC for more than 2 hours.

Make sure your monitors, printers, and other accessories are on a power strip/surge protector. When this equipment is not in use for extended periods, turn off the switch on the power strip to prevent them from drawing power even when shut off. If you don't use a power strip, unplug extra equipment when it's not in use.

Most PCs reach the end of their "useful" life due to advances in technology long before the effects of being switched on and off multiple times have a negative impact on their service life. The less time a PC is on, the longer it will "last." PCs also produce heat, so turning them off reduces building cooling loads.

Sleep Mode and Power Management Features

Many computers available today come with a sleep mode or power management feature. ENERGY STAR® estimates that using these features will save you up to Rs. 600 each year on your electricity bills. Make sure you

have the power-down feature set up on your PC through your operating system software. This has to be done by you; the power management features usually are not already enabled when a computer is purchased.

ENERGY STAR monitors consume 2 watts or less in sleep mode. Follow the instructions for your particular model to ensure power management features are enabled so your monitor will automatically go into sleep mode after a period of inactivity. You can save even more by manually turning off your monitor when you're not using it; ENERGY STAR qualified monitors consume 1 watt or less when off.

Note that screen savers are not energy savers. Using a screen saver may in fact use more energy than not using one, and the power-down feature may not work if you have a screen saver activated. In fact, modern LCD color monitors do not need screen savers at all.

Situations That May Cause Windows Computers to Not Sleep

Under certain conditions, Windows-based computers may not drop into sleep mode despite being properly configured to do so. For example, the following conditions may prevent computers from entering sleep mode:

- The PC has a file open over the network – e.g., on a network server.
- The computer uses a graphics-intensive screen saver. (ENERGY STAR recommends disabling them.)
- A Microsoft PowerPoint file is in “presentation mode.”
- Processor activity is above a certain threshold, indicating that the computer is not idle.

It is also possible for a network administrator to allow certain applications to "veto" sleep mode. This setting cannot be configured via the computer's Control Panel, but network administrators can use Group Policy to do so.

CONCLUSIONS:

The above discussion and studying energy audit at home by finding air leakages, proper ventilations, inspect heating and cooling equipment, proper lighting, considering strategies for reducing the energy use of your appliances and electronics. By estimating appliance and electronic energy use and determining how much electricity an appliances and home electronics use can help to understand how much money are spending to use them. One can follow Do's and Don'ts set by MAHAVITARAN will be able to reduce power consumption. Energy efficient computer use by Sleep Mode and Power Management Features and studying Situations That May Cause Windows Computers to Not Sleep. An unit of Energy saved is an unit energy generated.

REFERENCES:

1. <http://www.mahadiscom.in/ConsumerWebSelfService.shtm>
2. <http://www.mahadiscom.in/consumer/dodont.shtm>
3. <http://energy.gov/energysaver/appliances-and-electronics>
4. <http://energy.gov/energysaver/reducing-your-electricity-use>