An Overview of Electricity Consumption and Energy Savings in Houses and Buildings

Divya Shakti[1] Anurag Choudhary[2] Dr. Akhilendra Yadav[3]
[1,2]P.G. Student [3]Associate Professor
[1,2,3]Department of Electrical Engineering
[1,2]NITTTR Chandigarh, India [3]College of Engineering Roorkee, Uttarakhand, India

Abstract— The concept of this paper based on electricity consumption and energy savings. The energy consumption is important in energy management includes planning and operation of energy-related production and utility units. We also presents the strategy for purchase and use of electrical equipments and house appliances, which consumers' decision and behaviour within a framework of their culture to manage electricity consumption and bills in the household and building sectors. About 4 in 5 respondents indicated that their households used CFL (Compact Fluorescent Lamps) or LED (Light-Emitting Diode) lights. 94.8% of the respondents who used CFL/LED lights and more than 70% of the survey respondents indicated, off the top of their heads, that purchasing a more energy efficient fridge or air conditioner (more energy label 'ticks') aware that doing so would help them save electricity. For successful electricity consumption and energy savings policy will need to take these factors into account.

Key words: Energy Consumption, Energy Savings, Household

I. INTRODUCTION

Household and building Electricity consumption and energy savings has been a topic of interest within applied social and environmental research for a number of decades.[1] There is relatively little research that has critically examined the relationship between energy saving in communication computing and other energy consumption equipment. Much it's assumed that energy saving techniques which can easily be manipulated to optimize the environmental performance of buildings, infrastructure network and cities. For instance they can stimulate new demands for movement and mobility, enhance the efficiency and attractiveness of Buildings and increase the effective capacity of older energy efficient equipments are used with little critical debate about the environmental implications.[2]The most common rationalizations of energy-related behaviors are that they are economically efficient, followed by situational constraints or opportunities. Environmental efficiency and inconvenience are also common rationalizations. The reasonably high levels of sunshine most households receive offer an opportunity to improve the uptake of solar hot water heating systems in this area. [3] In the India buildings are responsible for about 50% of energy consumption and are responsible for a similar proportion of Co_2 emissions. The total estimated Co_2 emissions from the household sector increase day by day to 29% of total India energy-related emissions. [4]

The residential sector includes apartments, villas, residential flats and other places where people live. [5] The commercial sector includes hospitals, small industries schools, businesses, and the residential and commercial sectors are put together because they use energy for similar tasks—for air conditioning, cooling, heating, water heating, lighting appliances and many other electronics equipments. [6] A large part of this energy is not put to good use or it's wasted. Heated or cooled air leaks out of homes through doors and walls, floors, ceilings, windows, attics and basements that are not proper insulated in which small current is flow and this energy wasted in the form of heat. Some machines and appliances use energy 24 hours a day, and we waste energy with bad habits of useful electrical equipment used in cooling and heating systems are mostly using a large part of energy than any other systems in our homes. [7] Natural gas and electricity are used to heat most homes, electricity to cool almost all. The energy sources that power these heating and cooling systems can contribute carbon dioxide emissions to the atmosphere. Using these systems wisely can reduce environmental emissions. With all heating and air conditioning systems, about half of the average family's utility bills is for keeping homes at comfortable temperatures and you can save energy and money too, by having proper sealing air leaks, proper insulation, maintaining the equipment, and practicing energy-saving behaviors.[8]

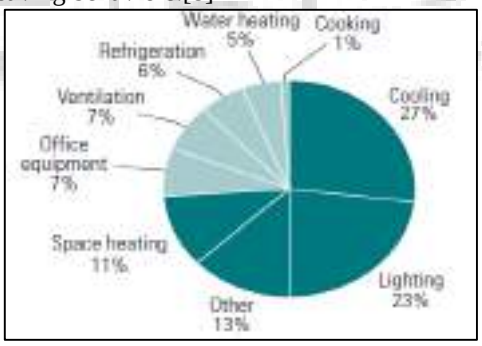

Fig. 1: Electricity consumption in houses

Appliances, machines, and electronic devices use about 29% of a typical household's energy, with refrigerators, freezers, clothes-washers and dryers at the top of the list. [9] Any appliance that is designed to change temperature uses a lot of energy. You can save energy by:

- Turning off appliances and machines when you aren't using them;
- Using the energy-saver setting on dishwashers and refrigerators;
- Keeping the doors closed as much as possible on refrigerators and freezers—know what you want before you open the doors;
- Being aware that many machines use energy even when turned off—save energy by unplugging them; and using machines and appliances during the morning and evening, not during peak demand time.[10]

When you shop for a new appliance, you should think of two price tags. The first one covers the purchase price—the down payment. The second price tag is the cost of operating the appliance. [11] You will pay the second price tag on your utility bill every month for the next 10 to 20 years. An energy efficient appliance will usually cost more, but it will save a lot of money in energy costs. An energy efficient model is almost always a better deal.[12]

II. HOUSEHOLD APPLIANCE POWER CONSUMPTION AND OPERATING

A. Annual consumption of electrical appliances in the kitchen

Type of appliance	Capacity	Length of use	Consumption / year
Combi fridge-freezer A+	150 to 200 W	365 days - continuously	201 kWh
Combi fridge-freezer C	200 to 350 W	365 days - continuously	500 kWh
Dishwasher	1200 W	48 weeks - 5 x per week	288 kWh
Coffee machine	500 to 1000 W	335 days - 10 mins./day	42 kWh
Cooker hood	70 to 150 W	335 days - 40 mins./day	25 kWh
Microwave oven	1000 to 1500 W	48 weeks - 1.5 h/week	90 kWh
Conventional electric oven	2000 to 2500 W	48 weeks - 1.5 h/week	162 kWh

Table 1: Annual consumption of electrical appliances in the kitchen

B. Annual consumption of electrical appliances in the living room

Type of appliance		**Capacity**	**Length of use**	**Consumption/year**
LCD TV	On	90 to 250 W	335 days - 4 hours per day	241 kWh
LCD TV	In sleep mode	3 W	365 days - continuously	22 kWh
old Plasma TV	On	261 to 344 W	335 days - 4 hours per day	402 kWh
old Plasma TV	In sleep mode	3 W	365 days - continuously	22 kWh
LED TV	On	20 to 60 W	335 days - 4 hours per day	54 kWh
LED TV	In sleep mode	0.3 W	365 days - continuously	2,2 kWh
Low-energy light bulbs		12 W	335 days - 5 hours per day	20 kWh
Game console		20 to 180 W	5 to 6 x per week - 1h20mins. = 387 hours per year	7.75 to 69.5 kWh
TVD/ADSL decoder			365 days - continuously	277 kWh + 112 kWh = 389 kWh
Halogen lamps		300 W	335 days - 5 hours per day	503 kWh

Table 2: Annual consumption of electrical appliances in the living room

C. Annual consumption of electrical appliances in the laundry room

Type of appliance	**Capacity**	**Length of use**	**Consumption/year**
Tumble dryer C	2500 to 3000 W	32 weeks - 2 x per week	192 kWh
Washing machine A+++	2500 to 3000 W	48 weeks - 4 x per week (0.9 kWh/cycle)	173 kWh
Washing machine B	2500 to 3000 W	48 weeks - 4 x per week (1.35 kWh/cycle)	259 kWh
Iron	750 to 1100 W	48 weeks - 5 hours per week	260 kWh
Vacuum cleaner	650 to 800 W	48 weeks - 2 hours per week	70 kWh

Table 3: Annual consumption of electrical appliances in the laundry room

D. Annual consumption of electrical appliances at the office

Type of appliance		**Capacity**	**Length of use**	**Consumption/year**
Computer with flat screen	On	70 to 80 W	240 days - 4 hours per day	72 kWh
Computer with flat screen	In sleep mode	3 W	365 days - continuously	25 kWh
Low-energy light bulbs		15 to 25 W	365 days - 5 hours per day	34 kWh
Mobile phone charger		5 W	365 days - 1 hour per day	1.85 kWh

Table 4: Annual consumption of electrical appliances at the office

E. Annual consumption of electrical appliances in the bedroom

Type of appliance		**Capacity**	**Length of use**	**Consumption/year**
Computer with cathode monitor	On	100 to 120 W	240 days - 4 hour per day	106 kWh
Computer with cathode monitor	In sleep mode	40 to 60 W	365 days - continuously	400 kWh
TV with cathode ray tube	On	80 to 100 W	335 days - 4 hour per day	121 kWh
TV with cathode ray tube	In sleep mode	4 to 10 W	365 days - continuously	59 kWh
Radio alarm		3 to 6 W	365 days - continuously	20 kWh

Table 5: Annual consumption of electrical appliances in the bedroom

