

Growth Pattern of Residential Electricity Consumption in India

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Abstract

India has experienced fast growing changes in the consumption pattern of the people especially durable goods which are run with electricity. The accelerating trend of consumption of electronic equipment has resulted in a higher electricity bill. The electricity consumption of the households increased but the production almost constant. Though the government has risen the per unit charge of electricity consumption. The Electricity production dilemma has not been much affected at any point of consumption. Therefore, the household electricity consumption has increased in pace with the consumption of electric equipment. This study aims to analyse the household electricity consumption pattern and identify the challenges occurring with the increased electricity consumption of the household and finally suggest solutions to manage emerging problems. The study used secondary data which were sourced from the Central Electricity Authority, Government of India, The Center for Policy Research and Prayas (Energy Group).

Keywords: Household energy, electricity consumption, per capita availability, sectoral consumption.

Introduction

Electricity is regarded as the major form of energy to households in India. The electrified houses are considered as a status symbol in earlier periods but now most of the houses are electrified before the residence. The government has easily provided the household connection of electricity with the subsidy. Thus, electricity emerged as the dominated form of household energy and most of the home appliances are designed to run with electricity. The higher standard of living of the people and demonstration of purchasing pattern has resulted in an excess demand for modern electronic home appliances which lift the electricity consumption level. For example, the mass adoption of the washing machine than manual washing has added the extra amount in electricity bill especially in urban India. The modern home consists of all the electronic equipment to fast up household activities irrespective of economic status. All the sections of the society, rich or poor, are using most home appliances as it treated as essential. The cheap rate and higher access of these electronic goods made affordable to all. Television, radio, Mixer Grinder, Fan, Computer, etc. are commonly used by people. It is to say that the use of these appliances would determine the consumption pattern of residential electricity.

Residential Electricity Consumption establishes a quarter of the aggregate electricity consumption in India. The utilization of energy in building relies upon elements like encompassing temperature, climate condition, light hours, building plan; natural proficiency of hardware utilized and introduced the effectiveness of equipment utilized (Kaja, 2018). During summer electric fans, cooling plants are utilized to furnish the cool environment. What's more, in winter, warming apparatuses are utilized to keep the room warm. Electric ringers, press and stove are things of consistently utilize. Individuals keep iceboxes in their homes to keep their sustenance in a crisp condition. To be sure power fills in as a loyal local hireling in every day life (Pragyan Dash, 2013). In India, 92.7% of urban family units relied upon electricity as the essential vitality hotspot for lighting amid 2011, zap for provincial families was 55.3% in 2011 as against 43.6% in 2001 (TERI Energy and Environment Data Diary and Yearbook 2014/15, 2015). During the period from 2001– 02 to 2014– 15, there was an expansion in the offer of local utilization (25% to 27%) and business utilization (7% to 10%) and a decrease in agriculture utilization (25% to 21%). The electricity generation in the nation has additionally seen expanded development amid the last couple of Plan periods with CAGR of 5.16% in tenth Plan (2002– 07), 5.77% in eleventh Plan (2007– 12) and 6.0% in twelfth Plan (2012 to 2015– 16) (The Energy Resource Institute, 2017).

Generally, the industrial segment had the most noteworthy electricity utilize, however alternate divisions have turned out to be considerably more imperative since the 1970s. The industrial sector was as yet one of the main two clients of power in the mid-2000s, however, proceeded with development in the private segment has turned out to be equivalent to modern interest or has turned out to be somewhat more noteworthy. The share going to agrarian utilize developed between the 1990s, however, that share diminished by the mid-2000s (US Energy Information Administration, 2014). NSSO (2011) reports that urban family units spent a normal of 138 rupees on fuel and light in 2009-10, of which 70 rupees was for electricity (51% of fuel and light); for provincial territories, normal spending for fuel and light was 85 rupees, with somewhat less than 19 rupees going to power (about 22% of fuel and light).

The aggregate electricity devoured by family units in India is presently in excess of multiple times that of 1971 because of the expanded number of families, rising salaries, and noteworthy charge. The share of residential electricity consumption in aggregate power utilization has additionally gone up from 4% in 1971 to 22% in 2014. The power utilization in the Industry area and the residential segment has expanded at a much quicker pace contrasted with different areas amid 2007-08 to 2016-17 with CAGRs of 8.46% and 7.93% separately (Prayas, 2015). The investigation intends to break down the pattern of residential electricity consumption in the country.

Objectives of the Study

The study has the general objective to analyse the household electricity consumption scenario in India. In spite of this, the study has a few specific objectives which are pointed below.

1. To study the residential electricity consumption pattern in India.
2. To identify trend of per capita and sectoral consumption of electricity in India

Methodology

The study is based entirely on secondary sources of data. The major data sources constitute the reports of Central Electricity Authority, Government of India, The Center for Policy Research and Prayas (Energy Group) and NSSO Survey. Moreover, journals, books, reports and working papers were served as other sources of data. The time series data on annual per capita electricity consumption and sector wise electricity consumption from 2005-06 to 2015-16 has been analysed. The study was divided into three major parts- the first part deals with electricity consumption trend in India, second part devoted to the discussion of residential electricity consumption and use of home appliances and third part analyses the challenges in residential electricity energy consumption and production and strategies for solving challenges. The data has represented graphically to show the trend.

Electricity Consumption in India

The electricity consumption in Indian homes has been expanding throughout the years (Center for Policy Research, 2017). The electrification of the family units has expanded from 55 per cent in 2001 to 80 per cent in 2017. As per the Central Electricity Authority, the states like Assam, Bihar, Chhattisgarh and Jharkhand with low dimension family charge have higher electricity utilization though, the states like Delhi, Punjab, Haryana and Tamil Nadu with higher household electrification denoted a lower private power utilization yet it is developing step by step. According to NSSO Surveys, almost 20 per cent of the energized family units expend under 300 units of electricity in per month, though, around 80 per cent of the families devour under 100 units per month. In rural areas, 90 per cent of the zapped families expend under 100 units. The projection of US Energy Information Administration in its report 'Worldwide Energy Outlook', 2017 uncovered that among every one of the nations in the globe, the growth of residential electricity consumption will be high in India by 2040. The electricity utilization anticipated that would develop by a normal of 2.4 per cent every year from 2015 to 2040. Table 1 demonstrates the pattern of yearly per capita utilization of electricity in India.

Table 1: Annual Per Capita Consumption of Electricity in India

Year	Per Capita Consumption (kWh)
2005-06	631.4
2006-07	671.9
2007-08	717.1
2008-09	733.5
2009-10	778.6

2010-11	818.8
2011-12	883.63
2012-13	914.41
2013-14	957
2014-15	1010
2015-16	1075
2016-17	1122
2017-18	1149

Source: Central Electricity Authority

The per capita electricity utilization in India has expanding continuously throughout the years. It is evident from the table that the per capita electricity utilization has expanded from 631.4 kWh in 2005-06 to 818.8 kWh in 2010-11. The per capita electricity utilization remained at 1075 kWh in 2015-16. The per capita utilization in 2016-17 is 1122 kWh which has expanded to 1149 kWh in 1149. The per capita utilization achieved 1000 kWh first time in 2014-15. The per capita electricity utilization expanded on a normal of 6 per cent inconsistently. This demonstrating the expanding pattern of electricity generation in the nation.

The sector-wise consumption of electricity in India is shown in table 2. The electricity consumption in all sectors has been increased during 2007-17. The electricity consumption in the industrial sector has increased from 189424 kWh in 2007-08 to 365989 kWh in 2012-13 and stood at 426665 kWh in 2016-17. The compound annual growth rate is 8.46 per cent. The electricity consumption in the agriculture sector has marked an increase from 104182 kWh in 2007-08 to 147462 kWh in 2012-13 and reached 195473 kWh in 2016-17. The compound annual growth rate of this sector during 2007-2017 is 6.50 per cent.

Table 2: Consumption of electricity by sectors in India

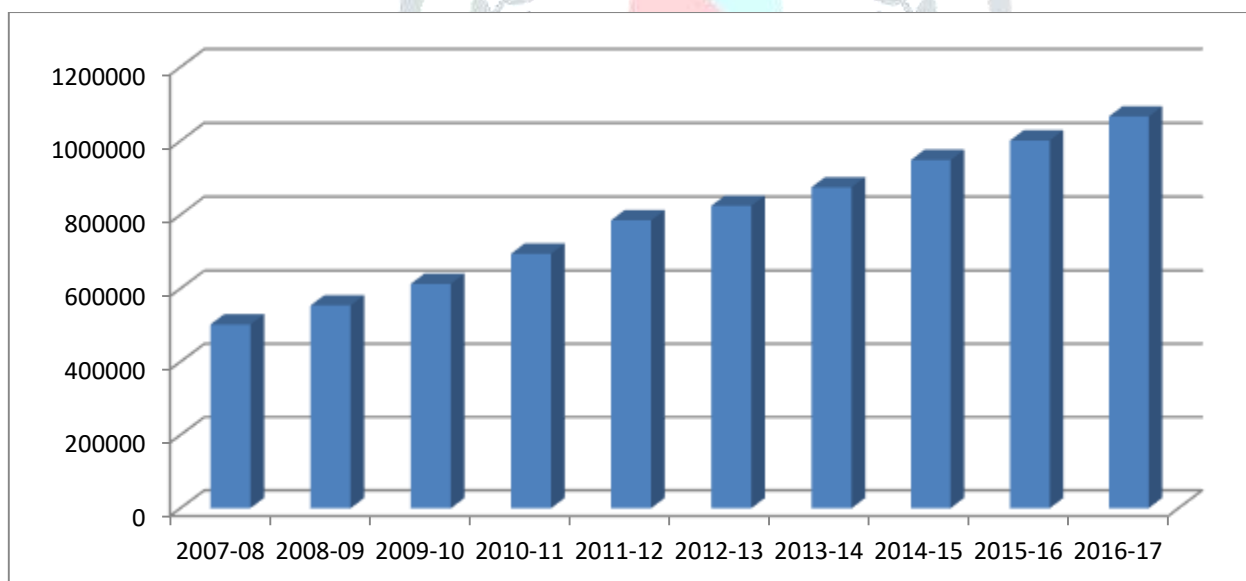
Year	Industry	Agriculture	Domestic	Commercial	Tractions & Railways	Others	Total Electricity Consumed
2007-08	189424	104182	120918	46685	11108	29660	501977
2008-09	209474	109610	131720	54189	11425	37577	553995
2009-10	236752	120209	146080	60600	12408	36595	612645
2010-11	272589	131967	169326	67289	14003	39218	694392
2011-12	352291	140960	171104	65381	14206	41252	785194
2012-13	365989	147462	183700	72794	14100	40256	824301
2013-14	384418	152744	199842	74247	15540	47418	874209
2014-15	418346	168913	217405	79393	16177	49289	948522
2015-16	423523	173185	238876	86037	16594	62976	1001191
2016-17	426665	195473	259311	98333	17217	69269	1066268

Distribution (%)	40.01	18.33	24.32	9.22	1.61	6.50	100.00
Growth rate of 2016-17 over 2015-16 (%).	0.74	12.87	8.55	14.29	3.75	9.99	6.50
CAGR 2007-08 To 2016-17 (%).	8.46	6.50	7.98	7.93	4.48	8.85	7.82

Source: Central Electricity Authority, India.

The domestic sector has marked the lowest electricity consumption of 120918 kWh in 2007-08 which has increased to 183700 kWh in 2012-13 and then to 259300 kWh in 2016-17. The compound annual growth rate is 7.98 per cent. The commercial sector witnessed a growth in the electricity consumption from 46685 kWh in 2007-08 to 72794 kWh in 2012-13 and further increased to 98333 kWh in 2016-17. The compound annual growth rate of this sector during 2007-2017 is 7.93 per cent. The tractions and railways have consumed 11108 kWh electricity in 2007-08 and 17217 kWh in 2016-17. The compound annual growth rate is 4.48 per cent, the lowest growth rate compared with other sectors.

Figure 1: Total Electricity Consumption in India



The total electricity consumption has increased from 501977 kWh in 2007-08 to 824301 kWh in 2012-13. The electricity consumption in 2015-16 is 1001191 kWh and 2016-17 is 1066268 kWh. The growth rate of total electricity consumption during 2015-2017 is 6.50 per cent. The compound annual growth rate is 7.82 per cent. The industrial sector forms the dominant sector in consuming electricity followed by domestic and agriculture sector.

Residential Electricity Consumption

India is the second most astounding populated and seventh biggest nation. Since independence, the nation has encountered quick urbanization which has brought about the development of the urban populace. The higher development of populace and the higher expectation for everyday comforts have expanded the utilization of electricity. The residential sector is one of the biggest shoppers of power in India. The accessibility of electricity has expanded from 689780 kWh in 2007-08 to 1168317 kWh in 2016. The accessibility of electricity for utilization has expanded by 5.80 per cent in 2016-17 as contrasted and earlier year development.

Table 2: Residential electricity consumption in India

Year	Electricity Consumption in Residence (Per cent)
1950-51	12.6
1960-61	10.7
1970-71	8.8
1980-81	11.2
1990-91	16.8
2000-01	23.9
2010-11	25.2

Source: Central Electricity Authority, India.

The residential electricity consumption in 1950-51 was 12.6 per cent of the total electricity consumption which has been decreased to 8.8 per cent in 1970-71. The residential electricity consumption has been increasing since 1980-81. In 1980-81, the residential electricity consumption was 11.2 per cent which has increased to 16.8 per cent in 1990-91, 23.9 per cent in 2000-01 and 25.2 per cent in 2010-11.

The lightning and major home appliances like ceiling fans, television, refrigerator and air conditioner consuming 80 per cent of the residence electricity (India electricity scenario-2047, Govt. of India). The use of appliances has increased the household consumption of electricity (Sugiura, Miwa, & Uno, 2013). The globalisation has facilitated the large-scale transfer of technologies and its cheap availability. Therefore, people have consumed home appliances that have raised electricity consumption. Indian society has subjected to continues cultural transmission and changing lifestyle pattern has gradually shifted to the electricity-powered appliances. The increasing population has demanding electricity for consumption but the production of electricity causing the pollution of the environment. The need for sustainable energy is the necessity to meet future demand. The solar energy is the most appropriate to the households for lightening and running home appliances and pollution free. Therefore, the adoption of the solar photovoltaic system is the appropriate solution to solve the present day energy crisis in the country.

Conclusion

The higher population growth has resulted in higher demand for electricity. Moreover, the government goal of complete household electrification has increased the consumption. The increasing per capita consumption of electricity over the years is an indication of the improvement in production. The residential electricity consumption showing an increasing trend. The higher growth rate has marked since the 1980s. The use of home appliances and lighting are the major contributors to household energy consumption. The increased supply has met the growing demand but the production has caused pollution and environmental damage that has addressed by various national and international agencies. The high availability of sunlight has offered a potential opportunity to use the solar photovoltaic system for households in the country. In spite of electricity, households have to use solar energy to meet the daily requirements which will sustain the environment and reduce climate change risks.

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