

DOMESTIC ENERGY CONSUMPTION IN KERALA: A SPECIAL FOCUS ON ERNAKULAM DISTRICT

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Abstract

The most significant input for any economic activity-may it be production or consumption is energy. Its sources varied in importance from time to time and from place to place. Still without access to one or other forms of energy economic life comes to a standstill. We cannot imagine today a world without coal, electricity or petroleum products. They have become so inevitable to mankind that modern technology of production leans heavily on these energy sources. This situation has also led to an ever increasing competition and search for cost effective and ecofriendly energy resources. At the same time there is also the need for conservation of the available supply as most energy resources are non-renewable in nature. This paper is an attempt to report the observations of a study on household consumption pattern of energy especially that of electricity conducted in Ernakulam District. The study focuses generally on all types of energy used for the domestic purposes like lighting, heating and cooking to assess the energy demand. In the present study an attempt is made to have a micro level observation of the nature and pattern of utilization of energy consumption in a rural area in comparison with an urban area. This is done with a view to find out whether the households observed are using the scarce energy resources economically and efficiently. A sample of 200 households 100 each from a rural and an urban area of Ernakulam district were observed to make inferences on the nature and pattern of usage of energy.

INTRODUCTION

Infra structural development is inevitable for economic development and energy is the pivot on which all infrastructural expansions spin around. In fact, the discovery of the energy sources and their proper utilization has been a blessing to mankind. Modern civilizations cannot exist if a crisis occurs in the uninterrupted supply of various forms of energy that ranges from firewood to nuclear power. As the most commonly used energy sources are either nonrenewable or get depleted fast it is necessary that there should be economy in its utilization. But with rapid growth of population, industrialization, modernization and

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urbanization there is reckless use of all energy sources and its consumption has increased substantially all over the world since the second half of the 19th century.

India is both a major energy producer and a consumer. Currently the country ranks as the world's fifth largest energy producer, accounting for about 2.4 percent of the world's total annual energy production and 14 percent of the Asian continent. The country is also the world's third largest energy consumer, accounting for about 3.3 percent of the world's total annual energy consumption and 16 percent of Asian nations. So even inspite of having a large energy production, India is still a net importer of energy with high energy intensity. This can be mostly due to the large imbalance between production and consumption and also due to less efficiency in energy use. However in terms of energy intensity which is measured in terms of energy consumption per unit of GDP, India's position is high among the developing nations and it stands in comparison with other developed countries. It is 0.141(Kgoe/\$US2005p) which is in parity with the world average (Global energy statistical yearbook 2015). Low energy intensity indicates a lower price or cost of converting energy into GDP. The energy intensity has been found to be declining in most world nations in the last two decades. The drop has been larger for China, Russia and India than for the United States (US) and the European Union. Several reasons explain this decline: faster growth of GDP than energy demand, the services sector having a growing share of the economy, energy efficiency programmes, etc. Some relevant information with regard to production, consumption and exchange of energy among the world nations are depicted in Table 1.

Table 1

Energy Statistics of Different Countries of the World

Country	Production (Mtoe)	Consumption (Mtoe)	Energy Intensity (Kgoe/\$2005p)	Energy Import/export (Mtoe)
Columbia	124	35	0.065	86
UK	108	178	0.082	86
Spain	32	114	0.093	90
Japan	26	437	0.107	424

India	571	872	0.141	300
China	2555	3034	0.203	511
Russia	1334	751	0.340	568
USA	1989	2224	0.150	278
Germany	121	307	0.106	195
France	138	243	0.124	112
Brazil	269	306	0.017	40
South Korea	59	277	0.171	231

Source- Global energy statistical yearbook 2015

Kerala is one of the small states of the country having a population of merely 3.3 crores and 77.16 lakh households. Still the present energy consumption in the state as it is 168338.24 million units (Economic Review 2013) with 94.4 percent of electricity is mainly goes to domestic purpose (49%). Taking the country as a whole only 67.3 percent of the households are electrified and around one third of them still use kerosene lamps. The overview of energy use in our country and region gives us only a glimpse of the pattern consumption and utilization of energy. It also enables the energy planners to know the differences in the intensity of preferences of consumers for modern energy, such as electricity, liquefied petroleum gas and off-grid electricity sources. The potential willingness and ability of the households to pay for them facilitates the assessment of the potential demand for the clean energy sources. This paper analyses the information from a field survey on 200 households in Ernakulam District regarding their current energy usage and expenditures. Of these households 100 were from a rural area and 100 were from an urban area in Ernakulam district.

1. To study the existing pattern of energy use among the rural and urban households in Ernakulam District.
2. To assess the measures adopted by the households to conserve and economise the use of energy sources.

MAIN SOURCES OF ENERGY IN THE SAMPLE HOUSEHOLDS

Electricity was the predominantly used form of energy in all sample households both in the urban and rural areas for lighting and for working appliances. All households in the sample were found to be electrified and were willing and able to pay for electricity. In this context it should be noted that as a source of lighting this energy had positive income elasticity and nearly inelastic price elasticity. Only during power failure these households used kerosene lamps, or candles for lighting. But their use of kerosene was found to be limited to the amount they got at the subsidized rate from PDS. Around half of the urban households and one fifth of the rural households had invertors. Four urban households and two rural households had solar panels. The next important domestic usage of energy is for cooking which is inevitable and indispensable for the running of a household. All these households used LPG, electricity and firewood simultaneously and each of these sources were found to have been related as substitutes with strong cross elasticity.

In our survey, nearly three fourth of the urban households and all of the rural households used firewood for cooking, but it was not found to be their only source. No household was found to be dependent on any single source alone. In fact in all these houses there were actually two kitchens or at least a partitioned one for traditional type choolas and another with LPG stove and induction cookers, microwave ovens or heaters. Even in those houses where firewood was available in plenty they showed preferences for these appliances. The result is that 55 percent of rural and 83 percent of the urban households used electricity as an alternate source of fuel for cooking. Again 96 percent rural households and all urban households had LPG connections also. Around 25 percent of rural households had kerosene stoves but kerosene stoves were not found in urban households. Though one third of urban households also used firewood for cooking, they used them very sparingly during holidays or in case of an emergency when the refilling of LPG cylinders took time.

QUANTUM OF ENERGY CONSUMED IN THE SAMPLE HOUSEHOLDS

The quantum of energy consumed is of very great significance to know the pattern of energy use. For calculating this, electricity bills, ration cards and domestic gas consumer cards were scrutinized. The households were asked to provide a three month average of the use of electricity to know the electricity consumption. The entries in the ration card for kerosene marked the amount of kerosene used as no households in the sample bought

kerosene from the open market. The total unit of electricity consumed in the sample households for one month comes to 77446 KWh. In rural areas this appears to be around 23499 KWh and in urban areas it is 53947 KWh. Hence the consumption per household of electricity was found to be 387.23 KWh. While the per household consumption in rural area was 234.99 units it was revealed as 539.47 in urban areas. This difference in consumption is indeed high as the urban household's use of electricity is more than twice than that of the rural households (Survey data). However rural households utilized more kerosene than their urban counterparts as their average use is nearly double than the urban households. The average household consumption of kerosene was found to be 0.27 litres per month. This was mainly because the urban households used kerosene only for lighting and not for cooking. Even in most rural household's kerosene stoves were not used for cooking. The difficulties of getting kerosene at subsidized rates from the ration shops and high price in the open market dissuade consumers in the same households against its use on a wider scale.

The average consumption of LPG in the rural households was found to be 9.80 kilograms a month and in urban households this comes to 14.20 kilograms making the average of total households to be 12 kilograms. As the weight of the fuel in one cylinder is 14.2 kilograms it can be concluded that the rural houses need only less than one cylinder for a month's cooking whereas the urban houses required more than one cylinder. Here again household consumption of the fuel unlike electricity is more or less the same in the urban and rural areas. In the case of firewood average consumption is 26570 kilograms in all households together. The rural household consumption per month was 165.70 kilograms and the urban houses on an average used 100 kilograms. The per day consumption of firewood was also calculated and it was arrived at as 5.52 kilograms in rural areas and 3.33 kilograms in urban areas. In ten households in the rural area and six households in the urban area bio gas plants were also used. The usage of biogas enabled them to extent the use of a gas cylinder for more than three months.

It is evident that the consumption of LPG and electricity are higher in urban areas than the rural areas. This information is further corroborated by the per capita consumption of these fuels in the two areas during a period of one month. The increase in consumption in urban areas is more than around 159 percent in the case of electricity and 63.81 percent in the case of LPG. The rural households on the other hand registered more than forty five percent consumption in the case of kerosene and more than 47 percent in the case of firewood.

Table 2

Per capita Consumption of Energy by Source in the sample Households

Energy Source	Per capita consumption			Percentage change between urban and rural areas
	Rural	Urban	Total	
Electricity(KWh)	72.97	189.28	127.58	159.39
Kerosene(Litres)	0.18	0.10	0.09	44.44
LPG(Kgs)	3.04	4.98	3.95	63.81
Fire wood	51.45	35.08	43.77	46.66
Bio-gas	0.24	0.21	0.23	2.1

Source: Survey data

COST OF ENERGY CONSUMPTION IN THE SAMPLE HOUSEHOLDS

While the rural households pay Rs.485/- for electricity a month, the urban households incur an expenditure of Rs.738/-.In the case of kerosene only a meager amount is spent and the total average comes to Rs.10.3 rupees. This is because the households limited their purchase of kerosene to the quantity available from the ration shops. For LPG the rural households spend Rs.424/- and the urban households spend Rs.460/- a month. Firewood is the most expensive fuel in rural households compared to urban households if you impute a value to calculate the expenses. But a considerable portion of it comes free from the surroundings of the rural and urban households. In the present study we imputed a value of the firewood used as it is available at Rs.7/- per kilogram in both rural and urban areas. Thus Rs.1159.9 worth of firewood is used in rural household and Rs.700/-worth firewood is used in the urban areas. Together all the fuels costs Rs.2084/-in rural areas and Rs.1908/-in urban areas.

The percentage share of each fuels total expenditure was calculated in table 3.Firewood is still the main energy source on which the sample households spend a major share of their expenditure on fuel followed by electricity and then LPG.The shares come to be

48.82 and 18.41 respectively when all households are taken together. In rural areas the respective shares are 61 and 13 percent. In urban areas they come to 37 and 24 percent.

Table 3

Percentage Share of Each Fuel in per Household Expenditure

Energy Source	Rural	Urban	Total
Electricity	25	38.67	32.09
Kerosene	0.715	0.366	0.54
LPG	12.70	24.10	18.41
Fire-wood	61.00	36.68	48.82
Bio-gas	0.084	0.167	0.126
Total expenditure	100.00	100.00	100.00

Source: Computed from survey data

The expenditure on electricity in rural areas when compared to urban areas is around 72 percent less and in the case of LPG urban areas spend more than double the amount per head. In the case of firewood the rural areas spend more than 79 percent of what is being spent on urban areas. In total the urban areas spend 657.63 percent on fuel than the rural areas.

The total numbers of incandescent bulbs used in the rural households come to be 200 and in urban households it comes to 177. At the same time the use of tube lights is found to be rare in rural areas as hundred households together used only 64 tube lights. CFL lamps are not much popular in rural areas. When asked about the reason for the sparse use of fluorescent lamps it was revealed that price of these lamps and fittings were beyond their reach. The urban households use more tube lights than the rural households. It was revealed that they together used 184 tube lights. Again there were 319 power plugs in urban households and only 223 in rural households. Forty-eight households used inverters in urban area where as in rural area its use was limited to 21 households.

CONCLUSION

The basic objective of the present study was to observe the nature of preference of the households in the study area with regard to their preference for fuel as a source of lighting and for cooking. Having got conclusive evidences of marked preferences to LPG and electricity by the families that we studied our next attempt was an estimate of the quantity and expenditure on energy used by the sample households. An effort was also made to recognize the differences in the usage of energy and extent of expenditure on each energy source between the rural and urban regions.

Questions were also asked on their efforts to conserve energy. But the answers were often vague and inconsequential, but few measures suggested were, switch off fan and lights when leaving room, not to use light at daytime, use CFL and LED for household use, not to use fan at rainy season, iron all clothes together, reduced the usage of energy from 7 to 10 evening and morning, usage of energy efficient appliances like * refrigerators etc. The overall impression the survey gave us is that the people are not much bothered about the volume of their energy consumption and does not make much efforts to reduce their consumption and save money by reducing their expenditure. This negligence is to be removed with massive awareness campaigns to the new generation that is to begin from childhood itself from both at home and the school level. KSEB should organize and plan advertisement through mass media that will catch the minds of the young and the adolescent groups. To restrict the elder age group it is high time that subsidy on domestic usage of energy is to be lifted or it is to be limited to the poorest of the poor. As all free or semi free goods will be overused and abused from the point of view of energy conservation at least economic wisdom advises us to confine the subsidies on all sources of energy to the poor and the needy.

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