

ENERGY SECTOR IN INDIA & KERALA – AN OVERVIEW

Rani S Mohan¹

INTRODUCTION

In economics, the term ‘energy’ was not acknowledged by Adam Smith (1723-1790), Malthus (1766-1834) and Ricardo (1722-1823). In the classical economic theories of growth, energy was not even a divergent input in production. But today, energy is not only a aspect necessary for the growth of production and productivity but it is also one of the aspect limiting world development. Development economists even consider energy as an index of economic development. Thus on the whole economic development of a nation, energy is crucial to guarantee ample and continued supply of commodities and services in each zones of the country. The Bible claims that energy in the form of light is God’s gift. It is the most basic of all natural resources without which the life of mankind is almost impossible. As Schumacher says, “There is no substitute for energy; the whole construction of modern life is built upon it. Although energy can be bought and sold like any other commodity, it is not ‘just another commodity, but the pre-condition of all commodities, a basic feature that is equal to water and earth”. Energy can exist in many forms and can be renewed from one form to another. In fact everything, which happens in the world, is the manifestation of flow of energy in one of its forms.

Position and growth of Energy access: Energy has been documented as the core power performer of several development progressions. It is necessary for all sectors precise from each day need, amenities and entertainments. Energy is essential for the people and the society in their each stroll of life. Energy is one of the chief inputs for the economic development of any nation. In the case of the developing countries, the energy sector presume a significant importance in view of the ever growing energy wants require vast investments to accumulate them. This paper provides an thoroughly study of energy; its classification and is trying to scheme the position of International, National and Kerala in the energy map of the world.

International, National and Regional Energy consumption pattern: Dependable, reasonable, safe, fresh and equitable energy supply is necessary to global economic growth and human development and there huge challenges for us. The world is increasingly stirring

¹ Research Scholar. Post Graduate & Research Department of Economics (M.G University)
M.A College, Kothamangalam

that basic modification will be essential to meet the growing demand for energy. The world around has changed considerably over the past 20 years. Technology has become one of the main drivers of economic and social development. The rapid growth of Information Technology (IT) all over the world has transformed not only the way we think, but also the way we act. All feature of human life have been affected by IT and the internet, in particular. Superfluous to say that virtually all technologies run on energy and therefore the share of energy is rising rapidly, faster than Total Primary Energy Supply (TPES).

India is both a major producer and consumer of energy among the world nations. Currently the country ranks as the world's third largest energy producer even though the country accounts for only 4.8 percent of the world's total annual energy production. It is evident from table 1 that China, Russia, USA and Saudi Arabia are well ahead of India in the production scenario. In fact India's output is less than one fourth of Chinese and less than one third of the US. Nevertheless there has occurred an increase of nearly 4 percent in Indian output in the past two decades as efforts are being made to extract even the renewable sources of energy despite their higher cost of extraction. (WEC 2017)

As 18 percent of the world population resides in the country, India is also the world's third largest energy consumer. Even though the nation is considered by international energy agencies as a fast growing one with respect to increased energy demand its consumption accounts for only 6 percent of the world's primary energy consumption. For instance in the country the energy demand has increased annually by 6.5 percent, and as the production has lagged behind with an increase of just 3.6 percent per annum, around 37 percent of our energy use is met by imports. The percapita energy consumption of the country is also low as it comes only to one third of the world average and around 240 million people in India are reported still as not having access to electricity (IER 2017). The consumption and import export details of some major world nations are also shown in table -1 India to place the country's status in the energy atlas.

Table 1

Total Production and Consumption of Energy in Different Countries of the World Over the Last Two Decades

Country/ Year	Production (Mtoe)				Consumption (Mtoe)				Import /export in 2016 as % of consumption/ production
	1996	2006	2016	% change	1996	2006	2016	% change	
UK	269	187	120	-2.8	226	219	178	1.1	32.58
Spain	33	32	35	0.3	99	142	121	1.1	71.07
Japan	101	100	38	-3.1	504	518	437	0.7	91.30
India	328	416	586	3.9	383	543	884	6.5	33.71
China	1091	1830	2538	6.6	1073	1982	3123	9.6	18.73
Russia	969	1227	1346	1.9	634	670	692	0.5	48.6 (export)
USA	1647	1655	1952	0.9	2108	2298	2204	0.2	11.43
Germany	143	139	118	-0.9	348	346	311	0.5	62.06
France	132	136	129	-0.1	251	266	243	0.2	46.91
Brazil	119	207	287	7.1	170	223	289	3.5	0.69
South Korea	23	48	63	8.7	158	218	288	4.1	78.13

Saudi Arabia	469	565	685	2.3	90	136	223	7.4	67.5 (export)
Canada	361	412	471	1.5	238	268	273	0.7	42.0 (export)
Australia	190	270	384	5.1	100	118	117	0.9	69.5 (export)

Source - Global energy statistical yearbook 2017. Imports are shown as percentages of consumption and exports are shown as percentage of production

Energy is an vital input in all sectors of the economy of any nation. The standard of living of a given country can be directly relation to per capita energy utilization. Energy is an important facet in improving the living standards of a country where higher quantities of energy should be consumed. Energy is one of the most important sectors included in 'infrastructure 'along with other sectors such as transport, telecommunications, water supply and others. Efficient infrastructure is a pre-requisite for mobilizing economic development (Parikh, 1997).

In Table 2 is shown the sector wise Energy consumption pattern in different sectors at international, national and regional level. At the International level energy is mostly used in Industrial sector (51%) whereas at the National level energy consumption is high in the transport sector (30%) and at the regional level in the state of Kerala it is high in the domestic sector (49%) (World outlook 2013).

Table 2

Sector Wise Percentage of Energy Consumption Pattern –A Comparison

Sector	International level	National level	State level
Industry	51.7	29	25
Transport	26.6	30	0.6
Domestic	13.9	27	49

Commercial	7.8	9	17
Others	0	5	8.4

Source: World outlook 2013 and various sources

PRODUCTION IN INDIA AND KERALA – A COMPARISON

Many and varied are the energy sources in India, due to the national diversities and peculiarities. Still there of course is the predominance of thermal power which meets 66 percent of the energy demand at the national level and 48 percent at the state level. The rest is met by hydro power, nuclear power and power extracted from renewable sources like solar and wind. The nation stumbles upon some real obstacles in meeting the energy requirements and making provisions for adequate and uninterrupted supply of power to consumers in a sustainable manner and at reasonable costs.

The state of Kerala is also a power deficit one and meets 60 percent of its requirements by imports from other states (GOK 2013). However it is a matter of pride that the state has achieved full electrification in all villages. Hence the need for power has increased. At the same time the production of power is yet to be increased.

In table 3 is shown the recent statistics regarding the installed capacity of power utilities in India and Kerala including the allocated shares in joint and central sector utilities. The total installed capacity of power in India was 330861 MW as on Dec.31st 2017. Of this, installed capacity in Kerala is only 4990 MW which is just 1.5 percent of the nation as a whole. India's power sector leans heavily on thermal power and hydro power constitutes only 16 percent. Renewable sources are also explored extensively nowadays and around 18 percent comes from this source.

Kerala is a land blessed with water resources with plentiful rains. So there is much scope for hydroelectric power and it constitute around 37 percentage of the power generated in the state. However, after the promulgation of the Forest Conservation Act in 1980, the implementation of new hydroelectric projects is seriously opposed and the more costly thermal energy had to be generated / purchased to meet the increasing demand which is estimated as 48 percent of our total use. As environmental agitations restrict further scope of power generation in the state any rise in the supply of power depends on the extent of rains

available every year. Once the monsoon fails or during summer therefore the state experiences heavy shortage of power. Actually, shortage of power is the prime obstacle in starting new initiatives in the industrial field.

Realising this situation the state government has taken many a serious effort to exploit the maximum possible renewable energy to substitute the conventional sources of power and use of fossil fuels. The government has even established an agency for non-conventional energy and rural technology (ANERT) in 1986 as an autonomous organization to ‘acquire, develop and demonstrate’ appropriate renewable energy technologies. The agency is also expected to estimate energy resources in the state identify the barriers to access them, popularize the use of renewable energy, increase capacity of renewable sources and introduce policy options to enhance energy efficiency by energy conservation and management efforts and through renewable energy mix. Currently off-grid and grid-tied solar photovoltaic power plants are also being promoted in a big way by the government with subsidized provisions to the users. Along with the Ministry of Rural Energy the state has also encouraged the installation of improved chulahs and biogas facilities with the technical assistance of ANERT. While the former reduces pollution from smoke the latter utilizes solid waste to recover energy and convert wastes into fertilizer after energy extraction. All such efforts improve sanitation, protect environment and also generate employment opportunities.

Table 3

*Installed Capacity of Power Utilities in India and Kerala**

Fuel	India (As On 31.11.2017)		Kerala (As On 31.10.2017)	
	MW	As % of total	MW	As % of total
Thermal	2,18,960	66.2	2416.72	48.4
Hydro	44,963	13.6	1881.50	37.7
Nuclear	6,780	2.00	362.00	7.2
Renewable Sources*	60,158	18.2	330.59	6.6
Total	3,30,861	100	4,990.81	100

Source: Central Electricity Authority 2017 * including allocated shares in joint & central sector utilities

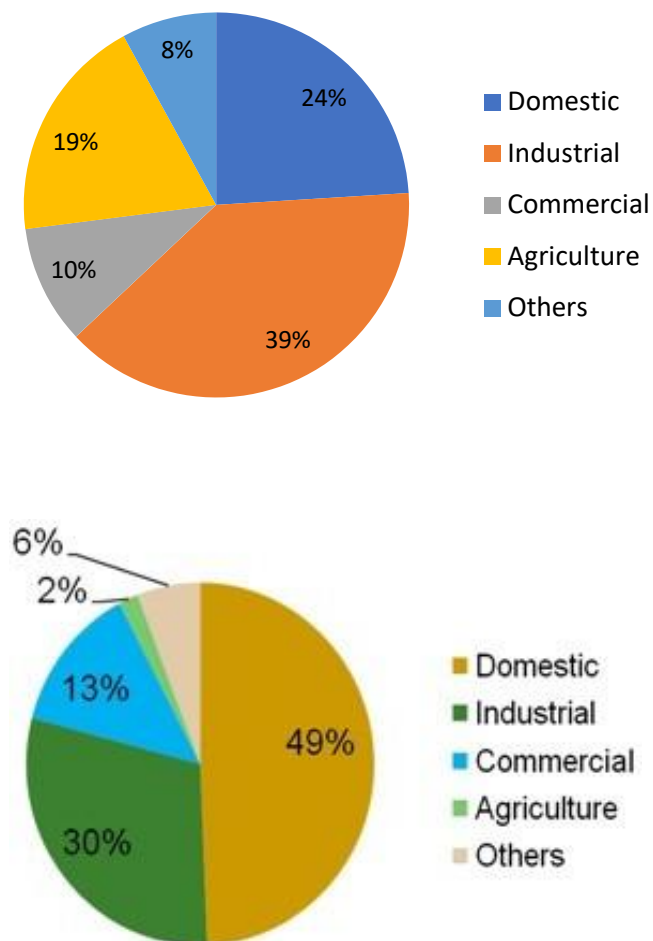
CONSUMPTION OF ENERGY IN INDIA AND KERALA

The per capita consumption of energy in India is very low compared to the developed countries of the world. In comparison, it can be said that an individual Indian is consuming approximately one third of the electricity – the major source of domestic consumption compared to the rest of the individuals in the world. The domestic consumption of power in the country remains far below the world average and is ten-times lower than OECD levels. The average residential per capita consumption of power in some states in India like Bihar is at around 50 Kilo Watt-hours (KWh) per year, which is equivalent to the use of a fan, a mobile telephone and two compact fluorescent light bulbs for less than five hours per day (IER 2018).

Power consumers in India can be generally categorized into industrial, agricultural, domestic and commercial consumers. Of them industries account for 39 of percent of overall consumption which is highest followed by agriculture sector which accounts for 19 percent. Twenty four percent of the consumption is accounted by the domestic consumers and 10 percent is under the head of commercial use. Compared to this, the scenario in Kerala is entirely different where 49 percent of the energy consumed is in the domestic sector. In fact the residential consumers in Kerala showed a growth rate of more than 6 percent in recent years. The per capita consumption of energy in the state has also increased from 16 KWh to 650 KWh. Even a slight change in the pattern of household consumption can bring substantial changes to the overall energy consumption. With the phenomenal increase in international energy prices, the economy of Kerala is under heavy strain to face the challenge of shocking rise in production costs. Again due to limited scope for generation of additional capacity and shortfall in rains, Kerala is going through a period of severe and enduring energy scarcity. Viewed in this background a study on household use of energy at the micro level is again found worth a while. The general consumption pattern of power in India and Kerala in the year 2017 is shown through pie charts in fig 1.

Figure 1

Consumption Pattern of Power in India and Kerala (Source KSE B 2017)



The pattern of household energy consumption represents the status of welfare as well as the stage of economic development. As the economy develops, more and cleaner energy is consumed. Disparities in household energy use exist between rural and urban populations and also between high and low income groups. These inequalities in energy consumption demonstrate some unique characteristics of the region. If highlighted, it can be of immense use to the policy makers. For instance the rural households freely collect fuel from various sources: animals, forest land or open land surrounding their villages, local retailers, etc while in many urban regions, these fuels have become traded goods. So, wide disparities may exist in the nature of fuel consumed and expenditure incurred by rural and urban households. The

regional differences in the nature of fuel usage within India and Kerala as available from the Census 2011 are shown in table 4 & 5. The distribution of households by source of lighting is depicted in table 4 whereas the same for cooking are shown in table 5.

Table 4

Percentage Distribution of Households by Source of Lighting- Kerala & India

SOURCES	Kerala			India		
	Rural	Urban	Total	Rural	Urban	Total
Electricity	92.1	97.0	94.4	55.3	92.7	67.3
Kerosene	7.4	2.8	5.2	43.2	6.5	31.4
Solar	0.3	0.1	0.2	0.5	0.2	0.4
Other oil	0.1	0.1	0.1	0	0	0.2
Any other	0.1	0.0	0.1	0.5	0.3	0.2
No lighting	0.0	0.0	0.0	0.5	0.3	0.5
Total	100	100	100	100	100	100

Source – Census of India & Kerala 2011

At the national level and the state level electricity is the main source of fuel for lighting. 67.3 percent households in India and 94.4 Percent households in Kerala use electricity for lighting. There is a slight difference in Kerala by region as is evident from the table. In rural areas 92.1 (55.3 in India) percent households use electricity as the prime fuel for lighting. In urban areas this percentage is slightly higher at a level of 97 (92.7 in India) percent. Use of Kerosene is also prominent in Indian households as 31 percent use it for lighting. But in Kerala only 5 percent households use kerosene as the major source of fuel. While 7 Percent households in rural Kerala use kerosene only 2.8 percent urban households use it as the main source of lighting. All other sources are insignificant in Kerala and even at the national level.

Table 5

Percentage Distribution of Households by Source of Cooking- Kerala & India

Sources	Rural	Urban	Kerala	Rural	Urban	India
Fire-wood	73.0	49.4	61.9	62.5	20.1	49.0
Crop residue	0.9	0.7	0.8	12.3	1.4	8.9
Cow dung cake	0.1	0.1	0.1	10.9	1.7	8.0
Coal,Lignite,Char coal	0.1	0.1	0.10	0.8	2.9	1.3
Kerosene	0.2	0.5	0.4	0.7	0.5	2.9
LPG/CNG	24.7	48.4	35.8	11.4	65.0	28.6
Electricity	0.0	0.0	0.0	0.1	0.1	0.1
Bio –gas	0.7	0.6	0.6	0.4	0.4	.04
Any other	0.0	0.0	0.0	110.6	0.2	0.5
No cooking	0.3	0.3	0.3	0.2	0.5	0.3
TOTAL	100	100	100	100	100	100

Source - Census of India & Kerala 2011.

The table reveals that the main source of cooking both at the national and state level is firewood. Forty nine percent households at the national level use firewood as the main source of cooking. May be due to greater availability in Kerala around 62 percent households use the same as the leading fuel. Next in importance is the LPG. At the national level 28.6 percent households use LPG and in Kerala 35.8 percent households use it as the main cooking fuel. All other sources are of not much significance at the state level.

CONCLUSION

Thus from an overview of energy use in our country and region we have got a glimpse of the pattern of utilization of energy. Household energy can be defined as the energy consumed in homes to meet the needs of the household. This will indeed provide a background for a better understanding of the analysis that is to follow in the fourth chapter. There is much that we can imagine about the potential future of energy demand. Let this be our vision for a brighter tomorrow.

REFERENCES

- Ashok, Desai. (1981).Energy Output and Consumption in India-A Methodological Review, Working paper No.97 Center of Development Studies, Thiruvanthapuram.
- Chacko, J.P. (1999). Household Energy Consumption Pattern in Rural Kerala, Ph.D.Thesis, Cochin University of Science and Technology, Cochin.
- Desai, A.V. (1978). Development and energy Consumption, Oxford Bulletin of economics and statistics, 40(3)pp 263-272.
- Dias-Bandaranaike, R.,& Munasingh, M. (1983). The demand for electricity services and the quantity of supply, Energy Journal, 4(2) pp 49-71.
- IBRD. (1981). Energy pricing in developing countries-A review of literature.
- Devi, R., & Singh. (n.d.). Energy consumption of a decentralized community in northern Haryana. Journal Renewable and sustainable energy reviews, Elsevier, Vol.13, 1 January, pp.194200.
- Economic Review: Kerala state Planning Board, 2012-2013.
- EMC Kerala (1996). Oorja samrakshanam ippol thudangaam,ivied thudangaam. TVM.
- Gerald, Leach. (1987). Household Energy in South Asia, Elsevier Applied Science publishers, London, pp.18.
- Gupta, H.K., & Roy, Sukanta. (2002). The changing Energy intensity in Indian Economy.
- Joon, V., Chandra, A.,& Bhattacharya, M. (2009).Household energy consumption pattern and socio-cultural dimensions associated with it : A case study of rural Haryana,India,Biomass and Bio energy.