Micro – Level Analysis of Rural Domestic Energy Consumption Pattern in India – A Case Study of Daryapur Block

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Abstract- The study is carried out from the point of view of energy planner and energy resource allocation is carried out. In the micro-level energy planning, region is defined a village, block or district. In energy planning at the micro-level, a village or a group of villages are chosen and energy plans are developed. In micro-level energy planning, scenarios can be developed for the region.

The successful implementation of energy plan depends on accurate estimation of energy demand and resource availability. The energy demand can be estimated on the basis of per capita energy requirement of the region and can be used as most appropriate basis for future estimation of energy requirements. The energy resource availability can be estimated on the basis of available conversion technologies.

This papers focus on the micro level analysis of rural domestic energy consumption pattern in Daryapur Block in 2011 – 12. Taking into account the different energy sources used to provide different end-use services through different end-use devices, the paper present a use of Microsoft Excel programme to determine the PCEC activity-wise & resource-wise for the sampled villages in the region, further average PCEC use to determine the activity-wise & resource-wise energy requirement of the region. Among the 100 selected (stratified sampling method) households from 135 villages of Daryapur tahsil were studied, survey shows that most of them still use traditional fuel wood stoves for cooking (97.92 %) and water heating (98.3 %). Analysis of other sources of energy for domestic purposes shows that electricity, kerosene, LPG, and biogas are used for cooking, water heating and lighting in a rational manner

Keywords - PCEC, Renewable energy, Adult equivalent, Micro level.

I. INTRODUCTION

Energy is essential for economic and social development of a region or a country. Improving energy efficiency and de-linking economic development from energy consumption (particularly of fossil fuels) is essential for sustainable development of a region. Energy is required for all the economic activities. Energy supplies are essential for both intermediate production as well as final consumption. So, economic development is dependent on the energy system of the country [1]. In turn, the implementation of technologies or improvement of the energy system is dependent on economic factors such as capital costs, energy prices etc. Also, the demand supply balances involve the flow of energy from source as primary energy to service as useful energy. At each stage of the energy flow, technologies are involved with different conversion efficiencies and losses. These complexities and inter-linkages can be understood through a model, which is a simplified representation of reality. A model is a tool for analysis, a method for clarifying the past, understanding the present, and visualizing the future.

Rural areas in developing countries essentially depend on traditional fuels for all their energy requirements, such as thermal and electricity requirements. Also, dual energy and environment crisis, i.e. a lack of sufficient energy sources on one hand and the exploitation of forests for fuel-wood creating ecological imbalances on the other hand are issues to be addressed [2].

II. About this work

Rural energy planning that depends solely on the existing levels of energy consumption in domestic sector. In India, energy requirements for cooking and water heating depend predominantly on biomass fuels, which are often burnt in traditional stoves (efficiency < 10%), while kerosene and electricity are used for lighting. A sound environmental development of a region needs promotion of conservation activities among local communities and application of traditional environmentally sound technologies. Environmental research activities in recent years have generated large data on energy processes, mainly on commercial sources of energy such as, coal, oil, natural gas, and electricity are generally available, a lot of effort is still required to quantify traditional sources of energy.

2.1 Objectives of the Study –

The main objective is to analyse and evaluate the energy requirement for the various activities of rural domestic energy consumption pattern by using Microsoft Excel programme which is capable of performing the following activities:

1. Determine activity-wise PCEC for sampled villages
2. Determine resource-wise PCEC for sampled villages
3. Determine activity-wise average PCEC for village population group
4. Determine resource-wise average PCEC for village population group
5. Determine the rural/regional activity-wise domestic energy consumption pattern and the parameters involved in the variation and level of consumption.
6. Determine the rural/regional activity-wise domestic energy consumption pattern and the parameters involved in the variation and level of consumption.
7. Determine the rural/regional resource-wise domestic energy consumption pattern and the parameters involved in the variation and level of consumption.

Thus the overall objective of this study is to development the set of tool aimed at transforming data into information and aid decisions for domestic energy consumption.

2.2 Need of Survey –

The section highlights need of survey and significance data in the survey. A detailed discussion on major local influencing parameters on rural economy such as population distribution and landholdings, cropping patterns and irrigation intensity, and crop residues is presented. The equations employed for calculating end-use energy requirements are discussed and then followed by estimated end-use energy requirements and energy resource availability of the surveyed region is also presented.

Energy use patterns are closely linked to agro-climatic and socio-economic conditions. Energy problems in rural areas are also closely linked to soil fertility, landholding, livestock holding, etc. Energy planning of any region should be based on the existing levels of energy consumption. However, the information available in published form is either at the state level or at the national level. Devdas a, b and c [3] highlighted that the regional developmental activities have to be based on detailed information from each sector. Hence, a detailed energy survey was conducted by visiting and consulting local people, to understand the domestic energy use patterns in various socio-economic zones. For this purpose, survey was conducted to investigate domestic household energy consumption due to cooking, lighting, cooling, heating and appliances in the identified villages.

2.3 B-1 Methodology of Survey:

Amravati district is located in Vidharbha Region of state Maharashtra, India, is one of the prosperous districts of Maharashtra with an area of 5929 sq. km. Most of the part of the district is falling under semi-arid zone. The main energy resources in Amravati district are traditional fuels, mainly fuel-wood, agricultural residue and dung. The households in rural areas of Amravati district possess their own land, cultivate cotton, pulses, sunflower and safflower as the major crops and are dependent on agricultural revenue Fig 1.

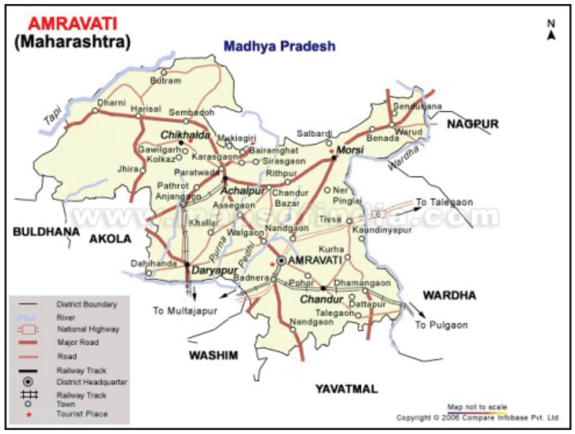

Fig: 1 - Map of Amravati District, Maharashtra. India

Preliminary investigations were conducted in nearest three Block of Amravati district for domestic energy needs such as energy resource availability, accessibility, technological support and local cooperation / support by visiting the villages to choose the region for investigation. After the preliminary investigations Daryapur Block is identified as a study Block for analysis & evaluation for regional domestic energy consumption pattern. Detailed information of Daryapur is given in Table – 1. Daryapur is famous as a cotton producing town with numerous ginning and pressing factories. It also excels in production of cereals like 'Mug' and 'Chana'. Soyabeen production in recent years is also growing. As of 2001 India census [4], males constitute 52% of the population and females 48%. In Daryapur Block, 13% of the population is under 6 years of age.

Table: 1 - Geographical Information of Daryapur Block

Coordinates	20°56′N 77°20′E / 20.93°N 77.33°E
Country	India
State	Maharashtra
District	Amravati
Sex-Ratio	Nearly Equal ♂/♀
Time-Zone	IST (UTC+05:30))
Elevation	(945 ft)
Codes: Pin-code-444803, Telephone-++91(0)7224	

The ten villages i.e. Ajitpur**,** Bhambora, Jasapur, Antargaon, Wadalgaon, Shivar, Darapur, Shingnapur, Pimplod & Yeoda are considered to study of end use energy demand and end use energy supply on the basis of population, distance of the village from the main road. By dividing the ten villages in four groups i.e.

A) 0-500 population range (Three villages)
B) 501-1000 population range (Two villages)
C) 1001-2000 population range (Two villages) and
D) 2001-Onwards population (Three villages).

Ten sample house- hold was selected from each identified village on the basis of land-holding. Fig 2 gives the detailed road map and geography of the Daryapur Block.

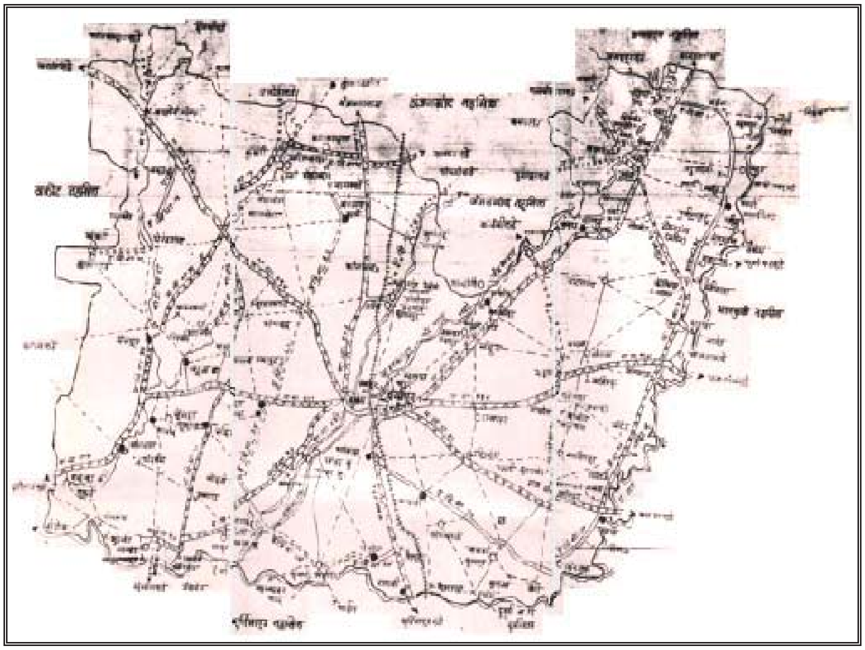

Fig: 2 - Map of Daryapur Block

The detailed energy survey was then conducted in ten selected villages, consisting mainly of secondary and primary data. The secondary data is collected from respective government offices and is used to prepare framework for the primary survey. The energy needs were estimated for various household end-uses such as cooking, heating, cooling, lighting and appliances. During the initial survey period, it is observed that only 2 to 3 houses in the village are using pumps for pumping end-use. Therefore, the pumping end-use energy requirement for household is neglected for the present study. Most of the data such as landholding, demography, and livestock population, was collected form government offices. Landholding particulars for each household were collected from Village Accountants' offices (Patwari). Data on village wise demography and occupational and infrastructural facilities was collected from the Tahsildar's office at Daryapur. Data on livestock population was collected from the veterinary departments of the Block at Daryapur. Fig 3 show information related to demography and livestock of the surveyed villages.

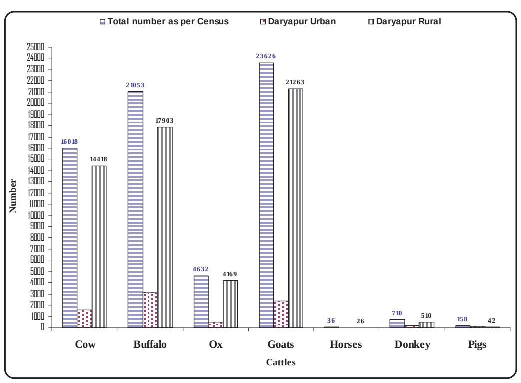

Fig: 3 - Cattle availability in Daryapur Tahsil as per senses.

2.4 B-2 Collection of Primary Data through Survey:

The information was analysed to select households for stratified sampling (based on landholdings and community) for the energy survey. Households in the village were categorized into landless, small, medium and large farmers based on the landholdings. Under each category, households were grouped community wise, and samples were selected from each category.

2.5 B-3 Population Distribution and Landholding:

Population is an important parameter having direct impact on energy consumption, demand and supply of energy in rural regions. Agriculture being the major source of income in the study area, the size of the operational landholdings is an important parameter, which determines the demand and supply of energy, and the distribution of energy consumption. Hence, it is essential to consider the population distribution in the rural region in terms of the size of farms. The classification adopted for the survey based on landholding is: (i) landless, (ii) small farmers (0±1 ha), (iii) medium farmers (1±2.5 ha), (v) large farmers (2.5±5ha) and (vi) very large farmers (>5ha), keeping in view the fragmented landholding scenario of the village. Table 2 shows the landholding and number of households in the surveyed villages. Numbers of households are estimated by consulting Sarpanch and senior citizens of respective villages. Fig: 4 show percentage Population Distributions According to Landholdings for surveyed village (Avg.)

Table: 2 - Landholding and Number of Households of Surveyed Village

Name of Village	Landless	Small farmers (0±1ha)	Medium farmers (1±2.5ha)	Large farmers (2.5±5ha)	Very large farmers (>5ha)	Number of households
Ajitpur	2(5%)	18(45%)	14(35%)	5(12.5%)	1(0.25%)	40
Bhambora	5(6%)	48(50%)	29(30%)	8(10%)	5(6%)	95
Jasapur	4(3%)	41(34)	50(42%)	17(14%)	8(7%)	120
Antargaon	9(6%)	54(35%)	65(41%)	19(12%)	10(6%)	157
Wadalgaon	10(6%)	71(41%)	54(31%)	27(15%)	13(7%)	175
Shivar(B)	18(9%)	83(41%)	61(31%)	27(13%)	11(6%)	200
Darapur	37(9%)	163(41%)	122(31%)	58(14%)	20(5%)	400
Shinganapur	52(10%)	250(47%)	175(33%)	30(6%)	23(4%)	530
Pimplod	75(12%)	250(38%)	200(31%)	97(15%)	28(4%)	650
Yeoda	248(13%)	783(41%)	637(34%)	183(10%)	49(2%)	1900

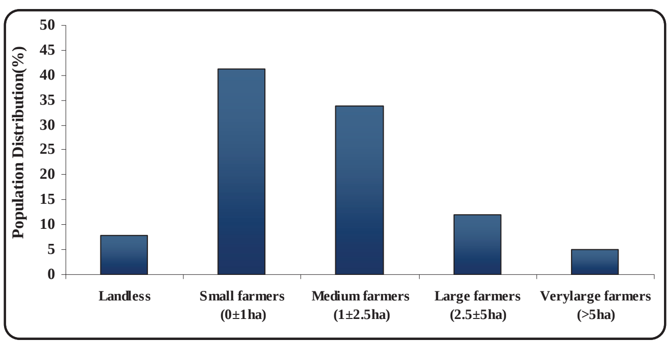

Fig: 4 - Population Distributions According to Landholdings for surveyed village (Avg.)

2.6 Equations Employed for Calculating the End-use Energy Requirements-

The detailed survey questionnaire is developed to collect relevant data for various end-use energy requirements per household is shown in Appendix I. To calculate energy requirement per household, primary survey is conducted by visiting these villages. End-use energy requirements are categorized as cooking, lighting, heating, cooling, and appliances.

The primary survey has considered only five important end-uses and for each end-use commonly used devices have been considered. The equations used to compute the energy requirements for device-end use combination are as follows:

Energy consumption = (Number of devices used) x (energy consumed for 1 hour of usage) x (Average number of hours of usage of the device) x (Number of days of usage in a year)

Computation of Per Capita Energy Consumption (PCEC)

Per capita energy consumption is calculated by using following formula.

PCEC= EC/p
Where, **EC** = energy consumed per day and
p = number of adult equivalents, for whom the energy is used.
Assumptions made and reference data taken while computation of PCEC are:

1. More than one type of fuel is used for cooking and heating end-use in many households. The daily consumption of different fuels is calculated separately. The utility of different fuels for different end use and end use of different devices are given in Table 3 and 4 respectively.

Table: 3 - Energy Resources and End-use Combination

Energy Resources	Cooking	Lighting	Heating	Cooling	EA
Dung cake	1	--	19	--	--
Biomass	2	--	20	--	--
LPG	3	--	--	--	--
Kerosene	4	12	--	--	--
Biogas	5	13	21	--	--
Solar thermal	6	--	22	--	--
Biogas electricity	7	14	23	28	33
Biomass electricity	8	15	24	29	34
PV electricity	9	16	25	30	35
Diesel electricity	10	17	26	31	36
Grid electricity	11	18	27	32	37

Table: 4 - External and End-use efficiency for different energy resource-end use combination

Energy Resources	External efficiency	Cooking	Lighting	Heating	Cooling	EA
		EUD efficiency	EUD efficiency	EUD efficiency	EUD efficiency	EUD efficiency
Dung cake	95	17	--	17	--	--
Biomass	95	17	--	17	--	--
LPG	72	50	--	--	--	--
Kerosene	72	45	45	--	--	--
Biogas	88	50	1	50	--	--
Solar thermal	--	100	--	100	--	--
Biogas electricity	35.20	80	40	60	60	60
Biomass electricity	27.36	80	40	60	60	60
PV electricity	15	80	40	60	60	60
Diesel electricity	28.80	80	40	60	60	60
Grid electricity	23	80	40	60	60	60

***EUD**: End use device efficiency*, ***EA**: Electrical Appliances* [*Source: Ramchandranet.al, 2005, 5*]

2. These daily consumption values in each household are then converted into equivalent energy (KJ/kg) using the gross calorific value of each type of residue. The calorific values of different fuels are given in Table 5.

Table: 5 - Energy Resource and its Calorific Value [5]

Energy Source	Calorific Value*, MJ/kg
Dung cake	11.26
Biomass	15.00
LPG	46.00
Kerosene	44.00
Biogas	20.14[a] ($/m^3$)

**Cooking fuel option help guide, United Nations Joint Logistic Centre*

3. The daily energy consumption of each household is further converted to per adult energy consumption using the adult equivalent of the number of people, which is computed assuming the conversion factors shown in Table 6.

Table: 6 - Standard Adult Equivalent [6]

Age/Gender	Standard Adult Equivalent
Men 18-59 yr.	1
Men 18-59 yr. & Women 18-59 yr.	0.8
Women>59yrs	0.8
Boys & Girls 5-18 yr.	0.5
Kids1-5 yr.	0.35
child <1 yr.	0.25

(Source: Ramchandra et.al. 2001)

4. The data is grouped based on landholding category. Then the average values for each end-use are calculated.

2.7 C-1. Cooking Energy End-use-

The energy sources considered for the end-use are firewood, dung cake and LPG. The devices considered are ordinary chulah, and LPG stoves. Cooking energy requirement per person is estimated on the basis of amount of firewood, dung cakes consumed per day, and time duration for consumption of one LPG cylinder. The set of equations used for calculating cooking end-use energy requirement are

Amount of firewood consumed = (Amount of firewood consumed per day) x (Net calorific value) x (End-use device efficiency) x (Number of days in the year)

Similarly amount of dung cake consumed and amount of LPG consumed is calculated and the daily consumption of energy source for cooking in each household is further converted to PCEC.

Assumption made in the above equations is ***Number of days of usage in a year taken to be 365 days***

2.8 C-2. Lighting Energy End-use-

The energy sources considered for the end-use are kerosene and electricity and the devices considered for illumination are lanterns, incandescent bulbs (40 W, 60 W, 100 W, and 15 W), and tube lights (40 W) assuming on average basis the light/tube light of 60 W. Lighting energy requirement per person is estimated on the basis of number incandescent bulbs, tube lights, their wattages and usage period. The set of equations used for calculating lighting end-use energy requirement are

Amount of Kerosene consumed = (Amount of kerosene consumed per day) x (Net calorific value) x (End-use device efficiency) x (Number of days in the year)

Electricity consumed for Incandescent Bulbs = (Number of bulbs of each type) x(Electricity consumed for one hour of usage) x (Average number of hours of usage) x (End-use device efficiency) x (Number of days of usage in the year).

Similarly amount of electricity consumed for tube light is calculated & the daily consumption of energy source for lighting in each household is further converted to PCEC.

Assumption made in the above equations is ***the average usage period of 2 hours is assumed for electricity consumption based on the observations. Number of days of usage in a year taken to be 365 days***

2.9 C-3. Heating Energy End-use-

Heating end-use is considered for water heating and room heating purposes. The energy sources considered for the end-use are firewood, dung cakes and electricity. The devices considered are ordinary chulah, and electric geysers. Heating energy requirement per person is estimated on the basis of water heater/electric rod, firewood and dung cake consumed per day for water heating application.

The set of equations used for calculating heating end-use energy requirement are

Amount of firewood consumed = (Amount of firewood consumed per day) x (Net calorific value) x (End-use device efficiency) x (Number of days in the year)

Amount of dung cake consumed = (Amount of dung cake consumed per day) x (Net calorific value) x (End-use device efficiency) x (Number of days in the year) micro, macro level analysis
Amount of Electricity used = (Number of immersion-rods or geysers) x (Electricity consumption for one hour of usage) x (Number of hours of usage) x (End-use device efficiency) x (Number of days of usage in the year)
Similarly amount of firewood and dung cake consumed is calculated & the daily consumption of energy source for heating in each household is further converted to PCEC.
Assumption made in the above equation is ***Number of days of usage in a year taken to be 240 days***
Available electric heating sources such as immersion rod (mainly 1000W or 1500W), and geyser (3000W) are considered.

2.10C-4. Cooling Energy End-use-

Cooling end-use is considered for conditioning the room and for refrigeration purpose. The energy source considered for the end-use is electricity. The devices considered are refrigerator, air coolers, and electric fans. Cooling energy requirement per person is estimated on the basis of number of fans, coolers and refrigerators used their wattages and usage period.
The set of equations used for calculating cooling end-use energy requirement are
Amount of Electricity used = (Number of cooling devices used) x (Electricity consumption for one hour of usage of each device) x (Number of hours of usage of each device) x (End-use device efficiency) x (Number of days of usage in the year)
The daily consumption of energy source for cooling end-use in each household is further converted to PCEC.

2.11C-5. Appliances Energy End-use-

Appliance end-use is considered for electrical appliances such as mixer, television, music system etc. The energy source considered for the end-use is electricity. Appliance energy requirement per person is estimated on the basis of use of television, mixer, music system, washing machine etc. used their wattages, and usage period.
The equation used for calculating appliance end-use energy requirement is
Amount of Electricity used =
(Number of Appliances used) x (Electricity consumption for one hour of usage of each electric appliance) x(Number of hours of usage of each appliance) x (End-use device efficiency) x (Number of days of usage in the year)
The quantity of each type of appliance is dependent on size of family and income of the family. The daily consumption of energy source for cooling end-use in each household is further converted to PCEC.

2.12D- Energy Requirement Analysis-

This section includes the observation and calculated data of the surveyed villages in the region of study. The observed data is also represented with the help of graphs. The section is divided into six parts namely-

1. Determination of activity-wise (i.e. Cooking, Heating, Lighting etc.) energy end use in the surveyed villages and corresponding PCEC.
2. Determination of resource-wise (i.e. fuel wood, electricity, kerosene etc.) energy consumption and PCEC in the surveyed villages.
3. Determination of average PCEC for defined village population range activity-wise
4. Determination of average PCEC for defined village population range resource wise
5. Projections of activity wise energy end use and annual energy requirement in the study region.
6. Projections of resource wise energy end use and annual energy requirement in the study region.

III. RESULT & DISCUSSION

From the results it is observed that the Lighting PCEC is in the range of 0.0276 (kWh/day) to 0.4149 (kWh/day) for surveyed villages. In some cases it is found that the annual energy consumption of particular house-hold is more than the other but still the PCEC is less that is because of the family size and adult equivalent of that house-hold. PCEC of group A and C villages is more than group B villages it is because of availability of single phase grid network in that area & low load shading. PCEC of group D village is quite more than other group and the reason for that, villages in this group belong to high population range villages and located on the main approach road of the surveyed region and belonging high landholding & socio-economical population.

It is observed that cooking PCEC is in the range of 0.1569 to 1.0194 (kWh/day) for surveyed villages. From the survey it is observed that in rural area mostly people use LPG-stove for cooking purposes only and the use of LPG is very limited, it may because of non-availability of retail circulation network or sufficient availability of fire-wood, dung cake and kerosene in that region.

Heating PCEC is in the range of 0.087 to 1.452 (kWh/day) for surveyed villages. It is observed that in rural area people rarely use LPG stove for heating purposes hence the value of LPG consumption for heating activity is considered zero for calculating total energy requirement. The use of kerosene for heating activity is in between 0.02Lit to 0.125Lit, some house-hold use KS for burning fire-wood where as some house hold use for burning as well as kerosene stove.

From the survey it is observed that cooling PCEC is in the range of 0.0 to 1.1168 (kWh/day) for surveyed villages. 90% house hold of the surveyed villages use fan, 28% air cooler and 10% Refrigerator for cooling activity. The use of the Air cooler and Refrigerator is associated with the landholding and socio-economic condition of the people in the region hence the use of refrigerator is so less followed by Air cooler. In some cases it is found that the PCEC for cooling activity of some house-hold is zero and the reason for that is smaller family size of landless or low landholding capacity with poor economic condition.

Electrical appliances PCEC is in the range of 0.0 to 0.4000 (kWh/day) for surveyed villages. 80% house hold of the surveyed villages use TV, 28% Music system, 36% Mixer and 00% Computer, as electrical appliances. The use of Computer is observed nearly 0% i.e. because of non-utility of that appliance in the surveyed region. The use of Television is reasonably more followed by Mixer and Music system; as TV became the essential source of entertainment/knowledge and hence the use of Music system is comparatively reduce.

Result shows that the use of fire-wood for cooking activity is 56% and heating activity 44%. The use of Dung-cake for cooking activity is 42% and heating activity 58% & the use of kerosene for cooking activity is 32%, heating activity 27% and lighting activity 41%. The use of kerosene is comparatively more in case of lighting and that is because of heavy load shading in the surveyed area.

Among the 100 randomly selected households from 135 villages of Daryapur tahsil were studied. Survey shows that most of them still use traditional fuel wood stoves for cooking (97.92 %) and water heating (98.3 %). Analysis of other sources of energy for domestic purposes shows that electricity, kerosene, LPG, and biogas are used for cooking, water heating and lighting in a rational manner.

3.1 Projection of Annual Energy Requirement in the Region of Study-

The 136 villages are divided into four category population wise and the annual energy requirement activity and resource wise is calculated in this section. The averaging of the PCECs is firstly done considering the village category and these PCECs are used for final calculation. The annual energy consumption is calculated in KWh/year.

Annual energy consumption (activity-wise) of the surveyed villages is calculated and it is observed that energy consumed for cooking activity is about 41 %, for heating 21%, lighting14 %, cooling 15%, and electrical appliances 9% (fig.5) which is mostly matches with the projected values of energy requirement for various domestic activity in the region considered in the study i.e. for cooking 42%, for heating 21%, for lighting 14%, for cooling14 % and for appliances 9% (fig. 6).

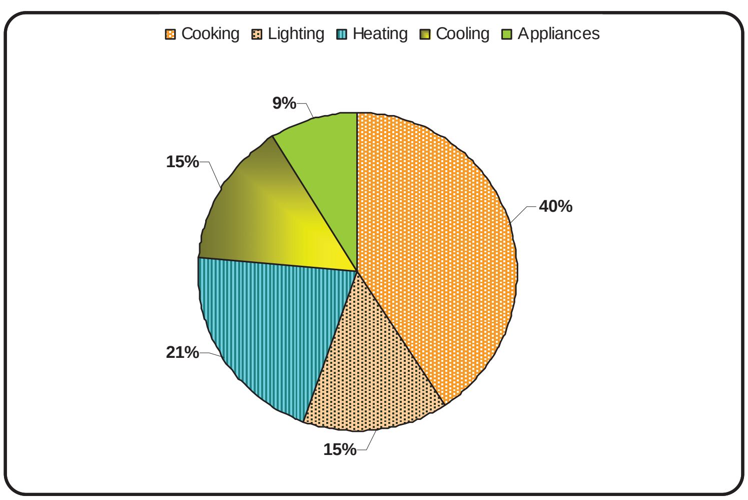

Fig: 5 - Annual Energy Consumption Pattern for Different Activity in Surveyed Area

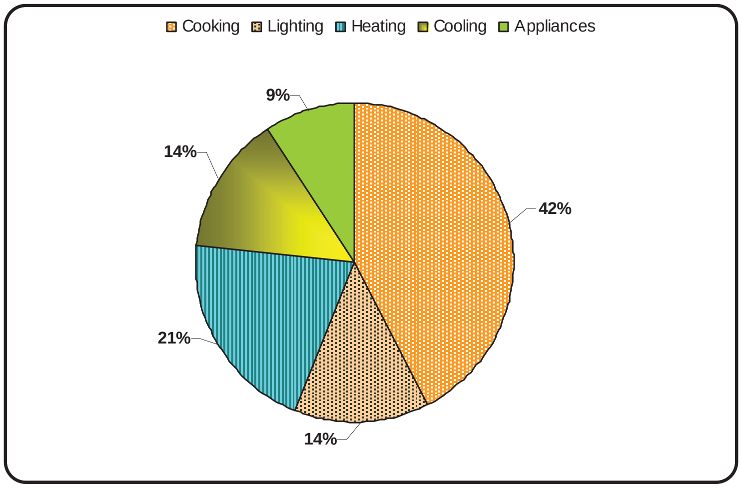

Fig: 6 - Projection of Annual Energy Consumption Pattern for Different Activity in Region

As the structure of the Block in the region does not differ much in the District it can be concluded that the pattern of energy consumption will not differ much in the area and the PCEC's calculated can be applied can be effectively use for calculation of the Amravati and allied Districts.

Annual energy consumption (Resource-wise) for the surveyed villages is calculated and it is observed that energy consumption of various resources for different activity is 48% for fire-wood, 7% for dung-cake, 14% for kerosene, 4% for liquidize petroleum gas and 27% for electricity (fig. 7), which is mostly matches with the projected values of energy requirement for various resources in the region i.e. for fire-wood47%, for dung-cake7%, for kerosene 14%, for LPG4 % and for electricity28% (fig. 8).

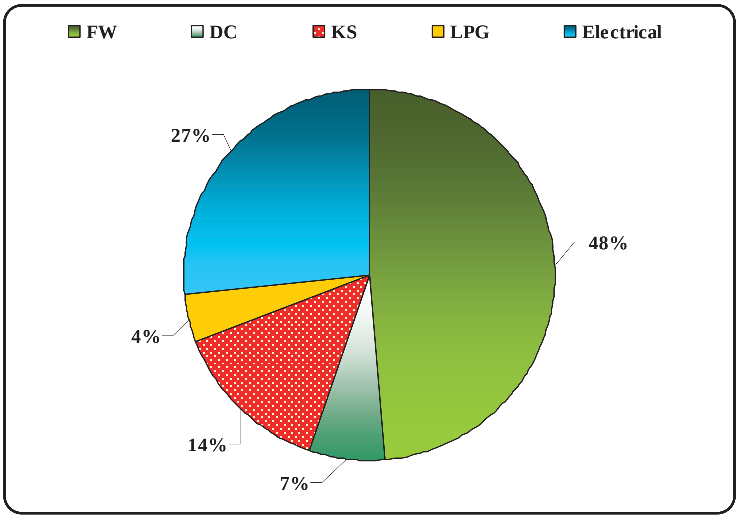

Fig: 7 - Annual Energy Consumption Pattern for Different Resource in Surveyed Area

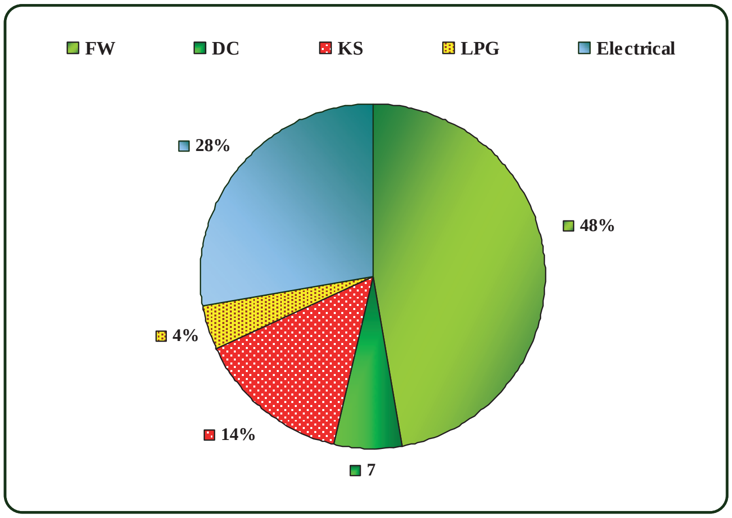

Fig: 8 - Projected Annual Energy Consumption Pattern for Different Resource in Region

3.2 Kerosene Consumption & PCEC-

Kerosene is the supporting fuel which is use in rural area for cooking, heating and lighting activity. The use of Kerosene is partially for burning fire-wood and partially for kerosene stove in cooking activity, and in heating mostly kerosene use for burning fire-wood. The end use devise use for burning kerosene is Ks-stove having efficiency 0.45%.

From calculation it is observed that PCEC of kerosene is in the range of 0.0419 to 0.9757 (kWh/day) for surveyed villages. Fig 10 shows that the use of kerosene for cooking activity is 32%, heating activity 27% and lighting activity 41%. The use of kerosene is comparatively more in case of lighting and that is because of heavy load shading in the surveyed area.

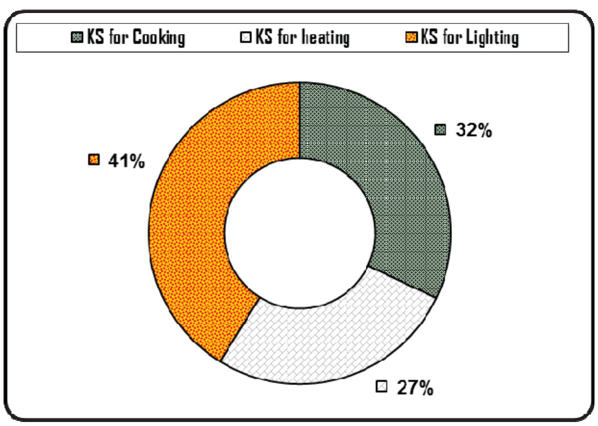

Fig: 10 - Kerosene Consumed For Different Activity

IV. CONCLUSION

Most energy planning exercises are carried out with aggregate data at the national level. At regional level namely village, block/district, there have been fewer efforts for energy planning. Energy resources and demand are spatially distributed. Aggregated analysis does not capture the spatial variation in supply and demand. DSS assists in analyzing the energy sources and demand spatially. The technologies and methods used to develop and deploy DSS to aid in domestic energy consumption make work easier for a decision maker. The possibility of quickly accessing and processing large spatial databases over high speeds, offers a tremendous improvement. In spite of rapidly advancing computer technology and the proliferation of software for decision support, relatively a few DSS have been developed for assessment of energy demand. GUI provides user an easy access of data analysis and the design and evaluation of domestic energy consumption strategies. The entire framework is designed in such a way that, user is provided with helpful tips and context-sensitive help options. Energy DSS will improve the quality of decision making at the block, district, and State level and enable the analysis and understanding of energy impacts of various decisions.

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