

**ANALYSIS OF TEMPORAL AND SPATIAL CHANGES OF
ENERGY CONSUMPTION PATTERNS IN RURAL AREAS,
CASE STUDY, TOWNSHIP SARDASHT**

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Abstract

In today's world, the amount of energy consumption and production are among basic factors in every country's the economy. Studying the world energy supply and demand shows that currently in most countries, fossil fuels are considered as the main source of energy. However, oil and wood are still the main sources of energy in rural areas. Due to unavailability and high cost of LPG, this form of energy has a very small share in rural energy consumption. This research presents an overview in energy consumption in rural areas is Sardasht Township. For this purpose, 238 households were selected from 10 villages with more than 50 households as energy consumption samples in the period of 2009 to 2012 and data were analyzed with SPSS. The results show that energy consumption varies around the villages where the difference is obvious in the total number and types of fuel due to a variety of geographic features and economic development of local energy sources. Furthermore, usage of firewood for fuel is important in villages studied. Also, electricity consumption had an increasing trend in the villages studied.

Key words: energy, consumption patterns, change of time and place, Sardasht Township

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Introduction

Energy consumption growth in rural economy Sardasht city, is covered a region incredible and in 2002 a profound change from the pattern of rural energy, deserves more attention from Different perspectives has created including energy demand, land degradation, pollution, and changes in the rural way of life. Energy surely plays a significant role in the development of the country. Today, the power of capital and manpower, as one of the main factors in the world are produced. Therefore, developing appropriate strategies and policies to optimize the use and allocation of energy is very important. The major long-term energy planning is performed in our country, which is known as the Energy Plan (Mobini Dehkordi, 2009). The importance and necessity of saving energy has been discussed years, but achieving a reasonable solution to the Iranian economy is still fundamental problems and challenges. The rapid growth of energy consumption in the past two decades has caused serious problems to secure domestic energy supply. Overall of energy consumption over the past two decades, factors such as economic growth, population growth and urbanization, relatively low energy prices, the fastest growing energy industries, transportation, and lack of compliance with energy efficiency in building construction (Amirmoeni , 2009).

Demand for energy in rural areas, the importance of fossil resources (especially petroleum product price increases have been unprecedented in recent years). Exhaustible fossil fuels, environmental impact, fuel transportation and distribution problems in rural areas raises Importance of local and renewable energy sources to supply energy to the areas such as solar energy, hydro energy, wind energy and energy from tide. Villages in the country have a significant share in the final energy consumption. In 2002, nearly 10% of final energy use in rural households, equivalent to 82 million barrels of oil equivalent have been. Commercial energy supply in rural areas, the high cost of energy issues and the use of local resources and potentials of renewable energies. Therefore, the development of efficient energy systems in rural areas and rural energy is essential to identify the optimal methods (Borborazhdry, 2003).

Unfortunately, the biggest factor in the country's energy consumption, domestic consumption requirements. In urban areas, or rural areas where there is impossible that natural gas consumption, mainly white oil or diesel fuel in heating appliances, are used including heaters and oil heaters . Unfortunately, traditional temples and thermal design of these items are related to the past 50 years and so far they have been no scientific and systematic design (Ministry of

Energy, 2003). The main carrier of this paper is included petroleum products, fuel, electricity that is local and 98 percent of total final energy consumption. Paper presented is an overview of energy consumption in rural areas Sardasht city, in terms of the spatial and temporal changes.

Steadily declining share of use and increased use of biomass fuels make up in rural areas of the study such as electricity, oil, fuel, environmental and other sources the main source of energy in rural areas Sardasht city. Therefore, energy consumption varies across the city.

This study examines pays the patterns and determinants of energy consumption in rural areas creating Sardasht city them and try to answer the following questions.

Research questions

- What is the relationship between cycle temporal and energy consumption, the villagers Sardasht city?
- What is the relationship between geographical factors and energy consumption Sardasht rural city?

Research hypothesis

1. There is no significant relationship between the periods of time and rural energy consumption
2. There is a significant relationship between the geographical factors, environment and energy consumption in rural areas.

Research objectives

Examine the patterns of energy consumption in rural areas Sardasht city

Strategies for identifying sources of energy in rural areas

Background of research

Jarjrazadeh and Iqbali (2006) investigated assess the impact of oil revenues on the income distribution in Iran, The results show that the more unequal the income distribution of oil revenues in the country are in urban areas. But this effect cannot comment explicitly on the rural environment. Khalilpour (2007) did in a study to investigate the relationship between energy consumption and economic growth in Iran (1968-2003), using the regression model the results indicate a positive relationship between total energy consumption and energy demand due to economic growth and a negative relationship between economic growth and energy demand are final. Abonori and Rahimi (2008) has done examined the pattern of electricity consumption in households in East Azerbaijan Our results indicate that the existing tariff subsidies from the higher classes of household electricity consumption has increased considerably. Recovery and

colleagues (2009) began Examined the relationship between total electricity consumption and economic growth in Iran (1968-2006). Amadeh (2010) to investigate the relationship between energy consumption and economic growth in various sectors of Iran's economy. Danshmyah and et al (2010) have examined the patterns of energy consumption in rural households in Bangladesh. Zhu et al (2009) was analyzed Changes in the structure of household energy in northern China, a case study evaluated. Qaderi and Estedlal (2010) did examined the impact of energy price increases on various welfare net income in the period from 1968 to 2003 for five income groups .The results show will be reduced that the policy of subsidizing electricity prices direct to the public welfare, community groups, low and medium rise and prosperity of the community groups .

Overview of the study area

Position 45 degrees 32 minutes east city Sardasht of the Greenwich meridian and 36 degrees north latitude is 9 minutes and 15 seconds. The city, with an area of over 1,411 km, is located in the southwestern province of West Azerbaijan.

Sardasht city above sea level is 1789 m and limits north-west of the city Piranshahr, south Kurdistan, Iraq to the West, the North East and East of the city of Mahabad, Bukan city and have 96 km whit Iraq a common border. According to the 2007 census, the city population is 104,146 people. Of these, 40% city and 60% live in rural areas. The city is made up of two parts, central and Zarina. Central part is consists of four rural district (Gawork, Basquekolsah, Beryajy and Aalan) and Zarina have two rural district (Gaworknahlien and Malkary). (This town ship has with a population of 272 villages (Khezri, 2010).

Table 1 - General characteristics of the studied villages Sardasht city

row	Name of village	Villages elevation m	No. of households		The population of people	
			1997	2007	1997	2007
1	Aalvatan	1570	113	139	821	977
2	Islamabad	1100	171	176	957	817
3	Bytoosh	1330	125	179	654	817
4	Dolahtow	1380	38	113	540	678
5	Nestan	1522	107	113	790	686
6	Zoran	1590	91	105	543	543

7	Shalmash	1250	77	79	466	457
8	Hendabad	1540	61	58	435	289
9	Davoodabad	1500	64	110	371	611
10	Berisow	1050	50	61	390	367

Source: Statistical Center of Iran, the city prosperity identity Sardasht from 1997 to 2007

Materials and Methods

This survey research and its methods, descriptive - analytic study. Statistical population kidney villages are over the 50 families, using a random sample of 10 villages, of which 238 are common among consumers of energy were chosen. Information needed for the study are based on annual data for the period 2009 - 2012 from a variety of sources, including data management, power management and city fuel energy balance, has been prepared. The field study method of information collection and data processing was performed using Spss software. In the analytical, were considered based on the variables discussed, including time periods and geographical factors of the environment, as independent variables, and pattern of energy consumption as dependent variables,. Also used according to the type of variables and assumptions provided by the Pearson correlation test to prove the assumptions and the results were analyzed.

Results & Discussion

Consumer of biofuels

Firewood are used to, as appropriate resources the samples collected from the forest and the trees about forestry and other production systems play a significant role. Each year, many of villages are the area of energy through the fuel of wood can provide. On the other hand, the conditions in which the people of these villages do not have access to modern forms of energy, such as gas, etc, dependent on to fuel wood for cooking bread or biomass . And to continue the process that creates instability in terms of environmental impact. Fuel wood is also very useful in these villages are include roots, twigs, etc.

Fossil fuel energy

With growing rural population and Limitation of resources, some of villages were faced with the problem of energy. Energy is a key issue for all people in all facets of their lives, the village until 2002, environmental fuels ((Timber and firewood) made up in the village is the basis of energy. In recent decades, is replaced by this type of energy alternative energy such as oil. The villagers bring this energy requires large costs for rural areas is very expensive. The share of oil in the

country is remarkable. This is the fundamental factor to the energy loss and its performance is concerned. The rural energy problem is caused by the rapid growth of energy consumption and Limitation of resources of traditional. It was said that the main source of energy during this research village, is more dependent on oil and that there are a few villages.

The following table shows the contribution of each of the villages, consumption of petroleum products in city of Sardasht.

Table 2 - Consumption of petroleum products in the study villages of Sardasht

Villages	Oil consumption in the study villages (per thousand liters)				Mean	Standard deviation	Percent coefficient of variation
	2009	2010	2011	2012			
Aalvatan	222.4	278	389.2	444.8	333.6	101.51	30.43
Islamabad	228.8	316.8	616	721.6	470.8	235.42	50.00
Bytoosh	411.7	375.9	662.3	733.9	545.95	178.70	32.73
Dolahtow	288.15	316.4	395.5	485.9	371.49	88.78	23.90
Nestan	302.84	334.48	406.8	468.95	378.27	74.48	19.69
Zoran	304.5	262.5	357	420	336	68.05	20.25
Shalmash	252.8	189.6	260.7	308.1	252.8	48.70	19.26
Hendabad	162.4	153.7	174	214.6	176.17	26.93	15.29
Dawodabad	286	330	383.9	462	365.47	75.79	20.74
Berisow	179.95	189.1	213.5	262.3	210.45	45.13	17.46

Source: Research findings

Table 2, the amount of energy consumption in rural show. This type of energy in rural areas, the most widely used fossil fuel currently is mostly due to the ease of transportation and storage than other fuel is. According to Table 2, the type of fuel has increased from 2009 to 2012. In the villages studied Bytoosh average of 545,950 thousand liters of oil consumption accounted for the largest share. Percent coefficient of variation in this village 32/73 percent of the maximum fuel oil in this village in 2012. In general, in all the villages studied, energy consumption has increased in the period from 2009 to 2012.

Electric energy

Including rural electrification work in an environment that has multiple effects. Social aspects of electrical power - economic, cultural and affects the rural community.

The main factors affecting power consumption villages

1 - Electricity Prices

- 2 - Income Households
- 3 – Appliances
- 4 - Building the foundation
- 5 - Building insulation and temperature

Inferential analysis

As independent variables in the study period from 2009 to 2012, and other geographic factors impact on the environment, energy consumption is the dependent variable and the following results were obtained Pearson correlation test.

Table 3 - Results of the Pearson correlation coefficient between variables

Description	Allowable error rate (P)	Significance level	Correlation (R)
Periods	0/05	0/009	-0/236
Height	0/05	0/022	-0/291
Types of weather	0/05	0/017	-0/311

According to Table 4, the significance level of the test period, which is smaller than the allowable error rate with 95% confidence the hypothesis, is accepted. And the Pearson correlation coefficient was calculated, it can be said that these two variables have a significant relationship with indirect or inverse correlation is -. /236. Whatever is the past tense of energy consumption in rural areas is of a great change. In subsequent tests, the significance level is smaller than the allowable error rate of 95% is accepted test. The Pearson correlation coefficient was calculated and it can be said that these two variables have a correlation coefficient -. /291 are indirect or reverse. That means that the height is increased or decreased has influence the amount of energy.

Where the height is too cold makes more use of fuel sources, On the contrary, where height is not very high is reduced in terms of energy usage. This is due to the mountainous region is extremely important. Finally, the last test of the important factors in the climate of the usage of energy resources at all points Due to the significance level, which is smaller than the allowable error rate, with 95% of the research hypothesis that the geographical factors of the environment and energy consumption in rural areas, there is a significant relationship, be accepted. According to test, Pearson correlation coefficient was calculated, it can be said that these two variables have an inverse correlation -. /311.

Since the weather is very important geographical factor in energy consumption is one of the main factors to be studied in all villages. Due to the geographic location of the study area, which has a cold climate and mountainous, intense changes in temperature the seasons life has affected these areas, So that, with the start of the cold season in the winter to significantly increase energy consumption can be reduced even in warm seasons.

Most of the villages studied are in the winter and spring, Due to Intense frost in these areas, the snow remains on the ground for a long time and finally in the areas of climate and environment are more harsh, more energy is consumed. The result of the analysis, the assumption has been tested, and there is a significant relationship between the variables.

Conclusions

In today's world energy reserves and producing properties, a major factor in the economy of any country. Energy demand and supply situation in the world shows that most countries in the world at present, fossil fuels is considered as the main source of energy. The oil, firewood and wood are still the main sources of energy in rural areas. What is presented in this paper, an overview of the energy consumption in terms of spatial and temporal variations in the rural city's Sardasht? The descriptive results of the studied villages, Bytoosh with an average of 545.95 thousand liters studied volume, the largest oil consumer in the rural city studied the Sardasht, it is allocated. In general, in all the villages studied, the energy consumption, the trend has been upward for the period 2009 to 2012. Handabad, the lowest share of energy consumption is in rural areas studied. According to the study, the total number the studied subscribers in rural areas in 2012 is equal to 1093 subscribers. Average monthly average consumption, a common in the period the studied 2009 until 2012 are consumed, in the village Aalvaatan equal to 213/8, 239 in Islamabad, Bytoosh 248, Dolatow 245/75, Nestan 244/5, Zoran 240/5, 225 Shalmash , Hendabad 242/75, Dawodabad 245/75 and Berisow 231/75, kilowatt hours of electricity.

The highest coefficient of variability in these villages is changed 8/54 in the village Hendabad up to 37/4 in Aalvataan village. Thus, variation in power much difference shows between households in periods the studied, According to which the total amount of electricity in all villages has increased rapidly. Analysis of the tests, it was observed that the significance level of tests periods, which are smaller than the allowable error of 95% reject the hypothesis H_0 , Under test Pearson correlation coefficient was calculated, we can say that these variables are

correlated with indirect or reverse the result, showing a significant relationship between the variables is examined.

Suggestions

In this study, the following is recommended in order to save energy.

1. The use of glass and double glazed windows to reduce energy waste
2. Reduce energy consumption at night and use thick clothes and blankets to relax and reduce heat energy consumption at night
3. Improvement patterns of energy consumption in rural areas by providing alternative energy needs and can be changed.
4. Since most fossil fuel energy is used to fuel domestic, Trying to use the fuel in order to reduce costs and avoid wasting fuel, energy efficiency is an important step.

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