IJBPAS, January, 2015, 4(1): 122-136

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

THE EFFECT OF FINANCIAL DEVELOPMENT ON ENERGY CONSUMPTION: THE ROLE OF INDUSTRIALIZATION AND URBANIZATION IN IRAN

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ABSTRACT

Due to the limitation and scarcity of especial resources energy factor and also role and wide significance of this scarce factor in supply chain as final product for consumers as well as input in production, the study of effective factors on energy demand is considered for economists and politician in recent decades. The developing countries in order to accelerating their economic growth attempts expanding necessary institution especially financial institution, whereas, expanding these financial institutions insert doubled pressure on energy demand growth.

The aim of this research is to study the effect of financial development on energy consumption with emphasizing on urbanization and industrialization for period of the year 1769 until 2012 in Iran. Statistics and information related to Iran has been extracted from the World Bank and the Center Bank. Dependent variable of energy consumption and independent variables are as follows: financial development, urbanization, industrialization and Gross Domestic Product (GDP). The econometric method has been used in this research is return method with distributed pausing which we will use from Eviews software and Microsoft software. Before estimating long term link among pattern variables, it has been dealt with the study of variables stationary in order to ensure of reliability of results. Then, in order to study the long term and short term link, it has been used ARDL method. The results show that financial development variable has negative and significant effect on dependent energy consumption variable. Urbanization variable has positive and significant effect on dependent energy consumption variable. Industrialization index has

positive and significant effect on dependent energy consumption variable. Gross Domestic Product (GDP) has positive and significant effect on dependent energy consumption variable. In other words, the increase in Gross Domestic Product will lead to the increase in need for energy as a factor of production and ate the end energy consumption will be increased.

Keywords: Financial Development, Energy Consumption, Urbanization, Industrialization

INTRODUCTION

The relationship between financial part and economic development has been axis of many discussions of development economists. But there has not been any consultation among economic scientists. However, today, deepening with financial development is a precondition of growth and economic development. The study has shown that countries that their finance part has less depth, the financial resources is not assigned efficient among their needs, or sometimes these countries face to the problem of unavailability of suitable financial instruments that in this case, enough resources are not collected. The concept of financial development after posing the financial concept of suppression; in the Seventies, was under and after two decades science consultation, the literature of link between financial development and economic growth reached to a kind of maturity. At the macro level, it is clear that financial development has positive and significant effect on economic growth. Nevertheless, still conflicting theories find out between financial development and economic growth. Energy Consumption has important share in increasing production and vital role in economic growth in any country. Optimal energy consumption has improved the efficiency and create important role for person and family. The role of energy in economic growth has known and available in existed literature related to economic energy. While so far, almost for all countries, rich or poor, the issue of economic growth has been under the attention. Global warming and climate change, creates anxiety and considers serious warning.

Energy consumption as an important factor of production can be an effective role in economic growth. Therefore, the study of link energy consumption and economic growth specially in economic parts has a lot importance and it is s most important population phenomenon obtained of development and economic growth and country industrialization and fast growth of cities and urbanization population that has massive effects and consequences of social

economic, but its most important effect is on energy consumption pattern particularly.

Urbanization might lead to use more energy and on the other hand, industrialization effects on energy consumption direct and indirectly. Therefore, we should deal with expansion of production and strengthen energy generator plants. Economic growth with growing middle part helps to energy consumption and economic growth. In addition, industrial growth also increases the demand for labor force and as a result, it causes the improvement and increase in income, and income increase is along with energy consumption.

The study of link between energy consumption and economic growth is important and if this link performs, we should encourage the protection policies of decreasing CO2 and production greenhouse gas emissions. On the other hand, decrease energy policies might have inverted effect on economic growth. If energy consumption causes the economic growth, the role of financial development will discuss in economic widely.

Foong (2009) showed that an efficient financial system increases investment and energy consumption and consequently increase the energy demand. Improvement in money transfer mechanism as a result of financial freedom encourages investment and saving and it causes the economic growth. The opposite idea in obtained literature expressed that financial development is a result of economic growth.

Craft study (1987) showed that economic growth has caused the growth in energy demand in period of the year 1947 until 1974 in USA. The **Veld and Rafael (2009)** and **Apergis and Payne (2009, 2010)** study showed that the increase in energy demand in developing countries is because of increase in income. For answering to growing needs of people in developing countries, needs of production is more and it cause more energy consumption **(Mehr Ara and Mousay, 2012)**.

Therefore, based on what it is mentioned above, the main issue in this research is the effect of financial development on energy consumption with emphasizing on urbanization and industrialization in Iran.

Literature Survey

Relationship among Energy Consumption and Economic Growth and Financial Development

Economic growth and energy consumption at the beginning have increased the pollution based on the Kooznets environmental curve and after the passage of time from the pollution increased causes the increase

financial development and economic growth with creating more economic growth and finally reduction in the amount of pollution. Energy consumption and the pollution caused by that is effective on economic growth and is one of the important today posing issue in economic growth and financial development which has been ender the attention for economists and environmental researcher. Current measures of consolidation and equilibrium emissions and reduce it to acceptable level is not sufficient and it needs more attempt. The recent report of intergovernmental panel has definitively stated that the effect of climate changes with regard to the condition prevailing in different regions will be different. However, with regard to strength and weakness in outbreak of these symptoms and their effects arise substantial annual losses of this phenomenon that its amount will increase with rising global temperature. Nowadays, our country also faces to a variety of environmental issue **(Kazeruni and Pheshari, 2010)**.

On the other hand, the financial development effects on economic growth with improve investment by level affects and efficiency. The effect of efficiency level leads to change from incompetent projects to profitable investments. This transparency in financial markets and reporting system, through the increase in investors' confidence will attract domestic and foreign investors **(Zadarski,** 2010**)**. The effect of efficiency suggests that financial development prepares financial resources for most efficient projects. This shows that the effect of financial development and energy on economic growth is significant and positive. **Zadarski (**2010**)** with the use of different index of financial development in twenty-two emerging economies during the period 1990-2006 showed that the effect of financial development on energy demand is significant and positive but is small. **Shahbaz and *et al.*, (2010)**, showed that there is a significant and positive effect of financial development on energy consumption in Pakistan. The analysis of causality link showed that the link between financial development and energy consumption is two-way.

Despite ambiguity in the role of the financial development on economic growth, the slow effects of on encouraging investment is clear. **Birdsal and Viler (1993), Frankel and Roz (2002)**, have argued that the developing countries might access to new environmental technologies with financial development. On the other hand, **Jensen (1996)** has pointed out that financial development may lead to the increase of industrial activities which in turn

could lead to industrial pollution **(Nooral and *et al.*, 2011)**.

In one side the environmental laws and controlling pollution can be effective on financial development and economic growth and on the other side, based on the Kooznets environmental curve, economic growth and energy consumption have extended pollution in the amount and from that amount it causes to reduce the pollution. In this direction, financial development is highly impressible from both economic growth and environmental laws.

Economic Development and Urbanization and Industrialization

The explosive growth of urbanization in the world, mostly appeared after the industrial revolution and firstly in European countries and then in developing countries or developed countries. Iran has been also the rapid development of cities and visible increase in urban during the years. Migration and urbanization growth rate has effected energy consumption in Iran. According to the latest published report, the average of yearly energy consumption in Iran has been equal to 155 million tons (420 million liter per day) and Iran from this point is in ranked thirteenth in the world. Indiscriminate increase in energy consumption has a lot negative consequences. Varieties of environmental damage such as: pollution in seas, rivers, weather in short term and global warming and perforation of Ozone layer in long term, are considered as these consequences. With regard to fast expanding the urban and dynamic growth of urbanization and on the other hand, the alarming increase in use of energy in Iran during recent years, the need of study about the link between urbanization and energy consumption feels for policies of long term energy. An important population phenomenon obtained by economic development and industrialization of countries, is fast growth in cities and urbanization. The most important factor that caused migration of rural labor force is the concentration of factories and production companies in center of cities. From the Michael Todaroo view, the decision to migration from rural to urban is the estimation operation of two main variables desorption and absorption. These two variables are as follows: the visible difference of income in city and village, and possibility of accessing job in cities **(Todaroo, 1980)**. Anyway, urbanization is the integral part and history shows that urbanization growth leads to improve the life standards. However, this spatial distribution of population have followed the concerns of many countries and the congestion caused by that might makes problem for provision of urban infrastructure

(housing, roads, sanitation and social service). Also this issue might find as a common problem in finance. Maybe most of the social migration cost emerges when the government decides to access some facilities for urban population which it has not offered for rural population. If government chooses better facilities for cities than village, it prepares the reason of migration from rural to cities in order to have better opportunities of increase in education, health care and social services **(Gilis, 2000)**. During the recent decades, urbanization consequences and its harmful affect, specially its effect on environment and accelerate the process of reducing nonrenewable resources, is one of the most important issue for economists.

Esazade and Mehranfar (2012) in an article entitled "the relationship between energy consumption and the level of urbanization in Iran (Application of vector error correction model and method of analysis)" with the use of vector error correction model (VECM), the link of Granger Causality between energy consumption and level of urbanization will study during the year 1973 to 2006 for long time period and short time period. In the meantime, in order to deeper understanding and available mechanism in changing energy consumption, the amount of the key factors stimulus energy consumption and the contribution of each of these factors in energy demand, Factor Decomposition Model (FDM) is used to analyze. The results related to Granger Causality show that there is a one direction link from whole energy consumption to urbanization in short time. While in the long term, energy consumption has double directional link with urbanization. The results of analysis model suggest that in the period under review, technology level, urbanization and economic growth have had the highest share in total energy consumption changes.

Ebrahimi and Al-Murad (2011) in an article entitled "The development of financial markets and energy consumption in the D8 group countries" expressed in a way that due to the limitation and scarcity resources and also with regard to the role and importance of energy in growth and expanding economic of countries, determining the effective factors on energy demand has the special importance. The results have shown the positive and significant effect of developed financial market on energy consumption. The coefficient index of bank development obtained bigger than the developed stock exchange. This indicates show that the capital market has less development to compare with money market in countries of D8. Also, the coefficients of urbanization and energy

intensity obtained positive and significant, however, inflation had negative effect on energy consumption.

Albertini (2013) in an article entitled "Do environmental management to improve financial performance? Analysis and Review" has dealt with the study of 52 evaluated study about this issue during 35 years. The analysis shows that there is a significant relation between environmental measures and financial performance which is influenced by regional differences, economic activity sector and duration of study.

Sadorski in the year 2011 in order to study the link between development financial market and energy consumption for nine east and center Europe countries has been used of development stock exchange market and development money market for financial market. The results of this study which has used of time series data and regression technique and Generalized Method of Moments (GMM), show that there is a significant link between development financial market and energy consumption.

Model

This research has been used of Sadorski 2011 pattern.

$$E = \alpha_0 + \alpha_1 M + \alpha_2 I + \alpha_3 P + \alpha_4 GDP + \varepsilon \quad \ldots(1)$$

This study has been used of data during the year 1959 till 2012. The dependent variable energy consumption (E) and independent variables are financial development (M), urbanization (P), industrialization (I) and Gross Domestic Product (GDP). The econometric method has been used in this research is Autoregressive Distributed Lag Model that we will use of Eviews and Microsoft software. Before estimating long time and short time link among pattern variables for result reliability has been dealt with the study of variables stationary with the use of Dicky Fuller test generalized and then in order to study the long time and short time link we use ARDL method to estimate them and then we deal with changing their coefficient.

Pattern Estimation

Variables Stationary Test

With regard to **Table (1)** there is a sign of stationary of research variables with using of Dicky Fuller test and all variables except Gross Domestic Product growth variable are stationary with first level difference. In this research the method has been used to estimate the pattern is ARDL which in continue the result of research review by using this method.

Estimate Dynamic ARDL Model

At the beginning it deals with the study of the optimal lag model that with regard to statistics of Akaeek and Shoartz and Hanan Queen, first optimal lag has been chosen. According to those statistics which mentioned above the optimal lag is one **(Table 2)**.

The result **(Table 3)** in short time show that all variables in research are effective on energy consumption and estimated symbol is corresponded with expected symbol. Determined coefficient shows the power of explaining model in 98 percent and statistical Watson camera shows the lack of autocorrelation in model.

One percent change in energy consumption with one lag has caused 61 percent increase in energy consumption.

One percent change in financial development has caused 32 percent decrease in energy consumption.

One percent change in financial development with one lag has caused 33 percent decrease in energy consumption.

One percent change in urbanization has caused 37 percent increase in energy consumption.

One percent change in urbanization with one lag has caused 50 percent increase in energy consumption.

One percent change in industrialization has caused 38 percent increase in energy consumption.

One percent change in industrialization with one lag has caused 42 percent increase in energy consumption.

One percent change in Gross Domestic Product has caused 51 percent increase in energy consumption.

One percent change in Gross Domestic Product with one lag has caused 57 percent increase in energy consumption.

Diagnostic Test

For better confirming the good estimation of model and absence of any problem in terms of variance anisotropy and absence of autocorrelation, it deals with the study of require test that results is as follow **Table 4**.

As it is obvious in **Table 4**, in serial correlation of the residuals with regard to probability of higher than 5 percent indicates the absence of autocorrelation in model.

Variance anisotropy of residuals test shows the absence of variance anisotropy.

According to F test which is the probability of less than 5 percent indicates of good estimation of model.

Test of Convergence

To prove the convergence relation, or on the other words, to prove the long time relation in time series model, tests and different methods

have been posed. In econometric, autoregressive distributed lag model (ARDL) for studying the convergence relation, there are two famous tests such as: 1- bounds test, is offered by **Pesaran and Shin (1996)**. This test is offered based on critical amount of F statistics for up bounds and down bounds. 2- The convergence relation test based on t statistics is offered by Banerji, **Dolado and Master (1992)**. We have based on offered convergence test by Banerji, **Dolado and Master (1992)**:

$$t = \frac{\hat{\alpha}_1 - 1}{S_{\hat{\alpha}_1}} = \frac{0.420 - 1}{0.106} = -5.37$$

Critical statistic	Significant level
2.92	**%1**
2.13	**%5**
1.64	**%10**

Obtained of long term coefficient and convergence	**-5.37**	**Banerji, Dolado and Master**	**Convergence**
Obtained convergence	**-3.45**	**Bounds test (F)**	**Convergence**

Estimation of Long Term Model

The result in long term is as below:

One percent change in financial development causes -0/39 percent decrease in energy consumption.

One percent change in urbanization causes 0/4 increase in energy consumption.

One percent change in industrialization causes 0/45 increase in energy consumption.

One percent change in Gross Domestic Product causes 0/60 increase in energy consumption.

Estimation of ECM Model

These models are very famous in experimental work. The main reason for the famous of ECM models is that they connect short term fluctuations of variables to its long term equilibrium values. The coefficient of the error correction model has been -0/58 which is significant in terms of statistic, because probability amount is below zero. According to coefficient of error correction in ECM model, we can mention that speed of adjustment towards equilibrium and long term is low. In a way that every year 58 percent of error would be adjusted and show the low speed of cointegration in this model **(Table 6)**.

Test of Stability Pattern

As it can be seen in **Figure 1** CUSUM and CUSUMSQ have been located in the area between two critical lines, in the level of 5 percent. Th--erefore, the stability of coefficient long term model of research is confirmed.

Table 1: Result of variables stationary

	With Dicky Fuller test generalized		
Result	**Probability**	**Statistical t**	**Variables**
I(1)	**0.0000**	**-6.280272**	**Energy consumption**
I(0)	**0.0074**	**-3.677499**	**Gross Domestic Product**
I(1)	**0.0104**	**-4.137957**	**Financial development**
I(1)	**0.0128**	**-3.474659**	**Industrialization**
I(1)	**0.0002**	**-4.940614**	**Urbanization**

Source: research findings

Table 2: Specified optimal lag

HQ	SC	AIC	FPE	LR	LogL	Lag
15.71046	**15.82686**	**15.64910**	**73.52738**	**NA**	**-269.8593**	**0**
3.896377*	**4.478344***	**3.589574***	**0.000429***	**389.2145***	**-42.81754**	**1**
12.98790	**16.76579**	**19.76574**	**10.436543**	**435.89798**	**-534. 65870**	**2**
13.65462	**18.09823**	**11.98687**	**54.98678**	**518.876578**	**-543.01247**	**3**

Source: research finding

Then, according to specified lag, it has dealt with estimating short time impact model.

Table 3: Estimating optimal model

Probability	Statistical t	Coefficients	Variables
0.000	**9.62**	**0.61**	**Energy consumption with one lag**
0.000	**-6.76**	**-0.32**	**Financial development**
0.000	**-8.32**	**-0.33**	**Financial development with one lag**
0.001	**4.04**	**0.37**	**Urbanization**
0.053	**2.09**	**0.50**	**Urbanization with one lag**
0.000	**12.01**	**0.38**	**Industrialization**
0.000	**15.13**	**0.42**	**Industrialization with one lag**
0.000	**4.92**	**0.51**	**Gross Domestic Product**
0.000	**4.32**	**0.57**	**Gross Domestic Product with one lag**
R^2 :0.98			
DW-statistic: 2.096			
F:.683.47 0/00			

Source: research findings

Table 4: Diagnostic test

Result of test	Statistic of test	Name of test	Kind of test
Absence of autocorrelation	0.2674 (probability: 0/32)	LM test with statistical t	Serial correlation of the residuals
Good estimation	683.47 (probability: 0/001)	Test F	Good estimation test
Absence of variance anisotropy	0.0243 (probability: 0/57)	Arch test	Variance anisotropy of the residuals
Residuals normal sentence	1.29 (probability: 0/52)	Jakoobra test	Residuals normal sentence

Table 5: The results of long term effect of model

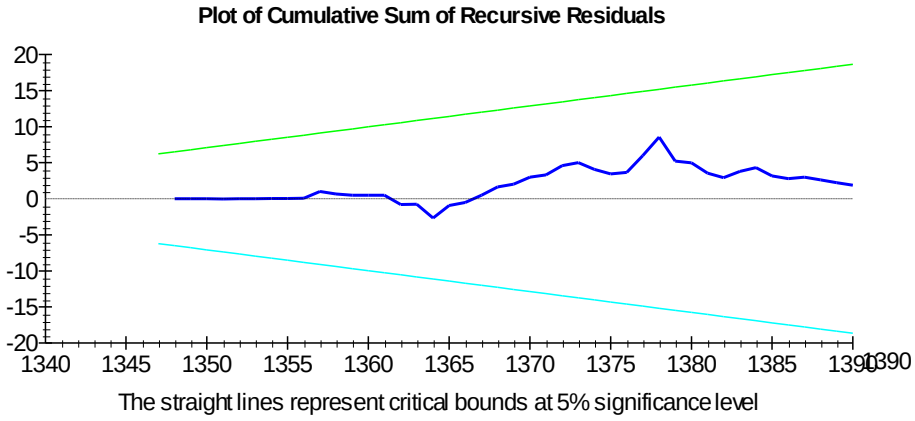
Probability	T statistics	Coefficient	Variables
.000	-5.32	-0.39	Financial development
.000	3.57	0.4	Urbanization
.000	2.26	0.45	Industrialization
0.05	4.04	0.60	Gross Domestic Product

Source: research findings

Table 6: The result of ECM model

Probability	Statistic t	Coefficients	Variables
.000	-4.4763	-.2101	Difference financial development variable
.000	5.4783	.1902	Difference urbanization variable
0.024	1.9542	.2013	Difference industrialization variable
.000	5.4763	.3432	Difference Gross Domestic Product variable
.000	-6.2319	-.58	ecm(-1)
R^2 :0.89			
DW-statistic: 1.82			

Source: Research findings



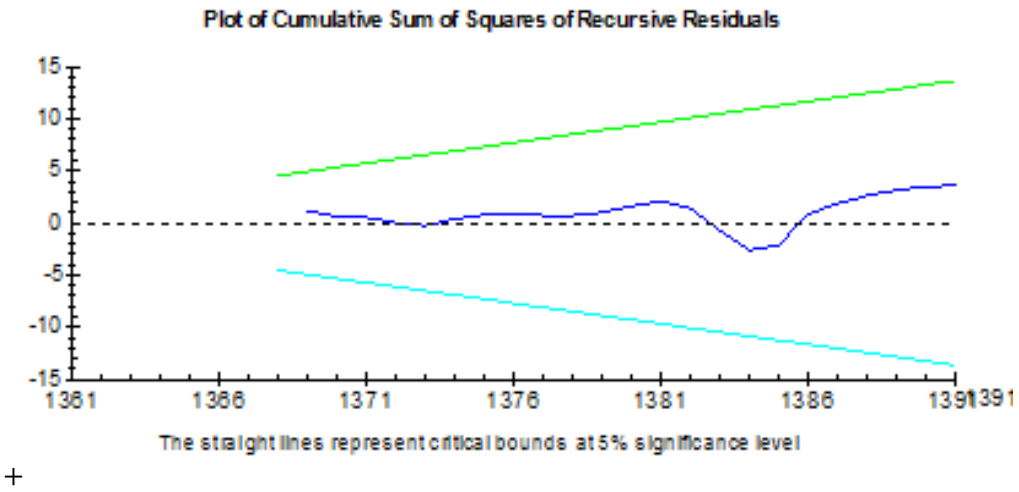


Figure 1: CUSUMSQ and CUSUM

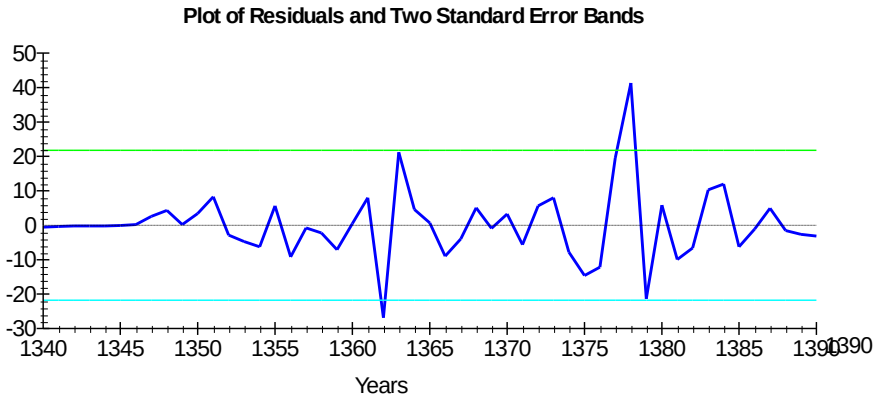


Figure 2: Stationary of remaining research

CONCLUSION

As a conclusion, the results of research show that the effect of independent financial development variable on dependent energy consumption variable is negative and significant. On the other words, increase in financial development and amount of money in country with regard to structural problem of developing countries cannot have the increase in production, however, increase in inflation and increase in energy cost and consequently reduce in energy consumption. Also increase in amount of money and liquidity in country can increase the demand for energy and finally increase in energy cost and consequently reduce in energy consumption. Also, independent urbanization variable has significant and positive effect on dependent energy consumption variable. On the other words, increase of urbanization will lead to increase to use of tools with the use of energy and therefore, energy consumption will increase. Increase in industrialization index has significant and positive effect on

dependent energy consumption variable. On the other words, increase in industrialization index leads to increase in use of industrial and as a result increase in energy consumption. At the end, the results show that increase of Gross Domestic Production has positive and significant effect on dependent energy consumption variable. On the other words, increase in Gross Domestic Production leads to increase the needs of energy as a production factor and finally increase in energy consumption.

RECOMMENDATION

Based on the results of the research that show the effect of independent financial development variable on dependent energy consumption is negative and significant, due to the increase of financial development and on the other words, amount of money in Iran with regard to structural problem, the economy of the country cannot have the increase in production, however, increase in inflation and increase in energy cost and consequently reduce in energy consumption and or increase in amount of money or liquidity in country can increase the demand for energy and then increase the energy cost and then reduce in energy consumption, therefore, it is recommended that financial development must be based on economic infrastructure and business environment and production in country. On the other words, increase the amount of money can have the adverse effects and reduce the energy consumption, unless, the production environment has less risk and suitable future.

The results also show that independent urbanization variable has significant and positive effect on dependent energy consumption variable, therefore, it can be suggested that for controlling energy consumption, we can use of urban tools.

Based on the result which has shown that increase in industrialization index has significant and positive effect on dependent energy consumption, we can suggest that industrialization index as an effective factor on energy consumption can use in order to control the energy consumption in an area.

At the end, with regard to the results of the research that increase in Gross Domestic Production has significant and positive effect on dependent energy consumption variable and due to the fact that increase in Gross Domestic production will lead to increase the demand of energy as a factor of product and therefore, use of energy will increase, in order to increase energy consumption, we can dealt with increase the production policies. In fact, if the government policies are based on the reduction of energy consumption in country,

it should be noticed that the increase of Gross Domestic Production work as an anti policy and it deals with the supply-side policies like increase in efficiency.

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