

Original Article: Challenges and Solutions in the Field of Energy in the Islamic Republic of Iran

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ABSTRACT

Energy has always been considered as one of the most important human needs today and it affects many relationships and policies of a country and regulates the supply and demand of energy. Therefore, governments try to provide the necessary infrastructure to regulate the two countries in the form of planned planning, while estimating their country's energy supply and demand in the future. Reducing energy waste is one of the categories that is closely related to energy pricing policies; as the use of price tools, as one of the methods of consumption management in the world is considered a common method. However, in Iran, due to the policy without an energy subsidy program, this tool has practically lost its effectiveness. In our country, due to problems in the field of energy production, consumption, and planning, energy supply, and demand regulation is good. It does not happen that this has caused many problems such as huge energy loss in various sectors of consumption, lack of comprehensive strategy in regulating energy policies to different parts of the country, and lack of management and planning in the country. A look at the most important energy indicators of Iran and the world shows that although the primary energy consumption in the country is lower than in industrialized countries, but Iran's "energy intensity" index is higher than in these countries.

Introduction

Iran has large energy resources and reserves, but the current trend of uncontrolled growth of energy consumption in the country will change Iran from an energy exporter to an importer [1-4]. To counter this threat, energy optimization and reform strategies need to be

implemented; the pattern of energy consumption is essential [5-9]. If so, Iran's presence in international energy markets will be guaranteed for a long time. Energy optimization is a profitable and low-cost industry for the national economy, and its promotion leads to widespread employment. Creating energy security and reducing environmental pollution are other benefits of

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implementing energy efficiency strategies [10-13].

Given the increase in energy consumption in Iran, moving in the direction of sustainable development and environmental protection, energy wastage and waste should be avoided as much as possible [14-17]. Taking into account the vital role of energy for human societies and the very influential role in the development and sustainable development of countries, today, the optimal use of resources to meet the needs of society requires turning to energy management and optimizing its consumption [18-20]. Energy management is the factor of supply, optimal consumption, and conservation of energy, which is defined as a set of measures that are taken for the effective use of existing energy resources, including energy saving, energy consumption, and replacement of energy resources [21-23].

It is the serious responsibility of energy sector experts in the country to design and introduce solutions to optimize energy consumption, so that energy losses are reduced without reducing welfare and access to energy services. This is important when looking at energy as a national asset and not treating it scientifically with judgments of taste and section. Given that pricing strategies and pricing policies are very difficult due to the special complexities that exist in the Iranian economy and have many economic consequences for society, identifying non-pricing strategies to improve the pattern of energy consumption can be a better option [24-26], which will have less negative economic consequences. The following strategies and rules can be considered:

- a) Promoting public awareness of consumers about primary energy;
- b) guiding consumers towards rational consumption and energy;
- c) consumer awareness of energy-saving methods to reduce its losses; and
- d) replacement of electrical energy with other energies in the consumption environment.

Challenges in the field of energy

Reducing energy waste is one of the categories that is closely related to energy pricing policies; as the use of price tools, it is as one of the methods of consumption management in the world [27-30]. It has caused many problems such as huge loss of energy in different sectors of consumption, lack of comprehensive strategy in regulating energy policies to different parts of the country, and lack of management and planning in the country and services. Energy intensity is calculated in terms of primary energy supply or final energy consumption, and this index is usually used on a macro level and shows the degree of optimization of energy use in a country [31-35]. According to this energy balance, the energy intensity in Iran is five times the global average. This situation, of course, is a matter of concern and a serious warning for the government and parliament to try to change economic policies to improve energy intensity by enacting laws [36-38].

Table 1. Energy consumption in different parts of the country

Section	Percentage of growth compared to 2005	Million barrels of crude oil
Home and business	15.33	411.850
Agriculture	9.3	36.320
Transportation	6.69	266.440
Industry	2.72	302.450
Thermal power plants	5.9	279.900

Iran's distance from other countries confirms that the first priority of the government and parliament to reform the consumption pattern should be done in the field of consumption and economic policies to optimize energy consumption change beyond the previous methods [39-42]. Also, liberalizing the price of energy carriers without having a support plan to reform the consumption structure will cause the competitive opportunities of domestic production to be lost in comparison with foreign production. The following strategies should be prioritized:

1. Gradual liberalization of prices and prevention of energy waste in production, distribution, and consumption;
2. developing a new model of energy consumption among the income deciles of society;
3. encouraging the productive sectors to increase energy efficiency rates;
4. implementing an action plan to prevent the growth of energy consumption in the public and private sectors;
5. national investment and support for the promotion of energy efficiency index and energy storage;
6. adopting transparent rules and regulations with an incentive and punishment approach in energy consumption; and
7. provide statistics and official reports on the process of reducing energy consumption

by the government and government agencies [43-46].

The most important problems in the field of energy in the country

Negligence in applying consumption standards

One of the major challenges in optimizing energy consumption in the country is legal gaps in this way. In this regard, even though standards have been developed by the Fuel Consumption Optimization Organization in the country, the application of these standards is neglected, because these standards do not have the desired support and implementation guarantee [47-51]. The importance of this becomes clear when, according to the available statistics, considering the current 30 million young population of the country and considering the equal share of boys and girls in this population, shortly about 15 million households will be added to the total households. This account doubles the number of households in the country. It is obvious that if the current trend of entering the current high-consumption devices enters the market, energy consumption will suddenly face a significant jump [52-55]. Therefore, if standards are not currently set and applied to a limited number of energy equipment manufacturers, in the future the need to save and use energy-efficient appliances for millions of households will have to be multiplied at a cost [56-60].

Lack of planning and attention to regional potentials in providing energy to different parts of the country

One of the key issues in providing energy to different consumers is having a plan to identify the most suitable carrier in each region, based on which the country's energy portfolio is determined. The more diverse this portfolio is, the greater the country's reliance on a particular energy carrier will be, the greater the security of energy, and the greater the possibility of conserving fossil energy resources, especially oil and gas [61-65]. Since Iran is among the exporters of oil and gas, in case of replacing part of oil and gas with other energy carriers (such as coal, hydropower, and new energy), the possibility of export and attention to neglected categories such as conversions seems important. Gas or injection of gas into oil reservoirs, which create high added value, is provided [66-69]. The carrier should be selected for each part of the country and a suitable basket for the country's energy should be set. It is very important that in determining such a thing, not only economic parameters can be considered, but also factors such as energy security, the impact of using that carrier in increasing exports [70-73]. Or creating added value with the help of oil and gas, the effect on social structures such as employment rate, environmental impacts, and other factors must also be quantified and included in the development of this plan. Burning of about 15 billion cubic meters of gas per capita wells that resurrect 10% of the total gas consumption of the country, the production of 2 phases of South Pars, 1.5 times the consumption of the industrial sector, three times the current exports and 6 times the consumption of petrochemicals, has been considered as one of the challenges in the energy sector [74-77].

Lack of management and planning of the energy unit in the country

One of the most important issues is responding to the needs of energy consumers in the management of the energy unit. In Iran, unsuccessful efforts have been made to create

the management of the energy unit, the most important reasons for which can be:

- 1- Entry of the Ministries of Oil and Energy into the fields of tenure, executive, and operational;
- 2- lack of constructive understanding between the two Ministries of Oil and Energy, especially in the field of policy-making;
- 3- simplification of the category of energy unit management in the country by the officials; and
- 4- lack of transparency of the country's energy actors and the implementation of extra-organizational decisions [78-81].

As a result of these factors, planning on energy carriers is done in part and there is no single institution to decide and coordinate the implementation of energy planning in the country. At the same time, a view of energy in the world is now obsolete and the policy of "energy supply" is implemented instead of "gas supply" or "electricity supply", so a single institution is planning on energy. This incorrect process of energy planning, which is due to structural problems in the field of energy, has had adverse effects in the country, examples of which can be described in the field of various types of energy carriers as follows:

- a) Petroleum products: Currently, more than 30% of the product portfolio of the country's refineries is dedicated to fueling oil, which is cheaper than imported feed (crude oil). Policies in this area also prevent serious moves to reduce fuel oil production. Therefore, the overall outcome of this project has not been of much benefit to the country;
- b) renewable energy: One of the most important challenges in the development of renewable energy in the country is the weakness of protection laws, which is due to the lack of knowledge of the authorities of the existing potentials in this field [30]; and
- c) natural gas: Since the structure of the country's gas department is very large and this carrier has the largest share in the country's energy supply, the problems caused by the lack of management of the energy unit in the

country in this carrier are higher than other carriers.

The trend of foreign investment in Iran

According to the approvals of the fourth development plan, about 70% of investments in the development of oil and gas fields should be provided from the foreign investment sector. With this in mind, and considering the figure obtained for investment to maintain the level of exports (4536.34 million \$), approximately 31175.438 million \$ of foreign investment is needed to maintain the level of production. Given the negative growth of foreign investment in the oil and gas sector in recent years, it seems unlikely that the capital needed to develop the fields in the coming years can be provided, because this requires more foreign investment, which is not possible. In general, Iran is a moderate player in the global energy market with average capabilities and capacities. To play an effective role in the region and the world, Iran needs to use all its territorial resources, and oil is one of the most important of them. Iran's position in the world oil market has been undermined. Iran, which produced 6 million barrels of oil per day in 1974 and played a key role in OPEC and in the global energy market, has not been able to increase its production to this level since the Islamic Revolution. Factors such as war, limited investment, sanctions, and the high rate of decline in the country's oil well production are the main reasons for this. Iran's oil wells need structural reconstruction and extensive oil reclamation. The annual reduction rate of Iranian oil wells is equivalent to eight percent on land and ten percent at sea, and at the same time, the recovery rate of Iranian wells is ten percent lower than the global average [31].

Meanwhile, in the global energy market, Iran is at the center of attention and the center of international interactions for two reasons: First, Iran has a special geopolitical position in the center of the global energy ellipse. Accordingly, Jeffrey Kemp, influenced by Hartland McInder's theory, refers to the global energy ellipse or the geopolitical heartland.

Second, Iran plays a vital role in global energy security. Having a key role in the world's energy supply, which guarantees sufficient income for the country's development, will also ensure the country's national security. In a world where the national security of countries is tied to energy supply, maintaining this special position is of strategic importance to Iran. Therefore, the strategic goal of the country's oil and gas sector could be "to gain more share in meeting global energy demand" over the next two decades [81-83].

Conclusion

The trend of energy consumption in developing countries shows that population growth, technical development, political authority, national independence, etc. are directly related to energy consumption. However, the growth of energy consumption and the increase in energy demand on the one hand and the limitations of reserves and the depletion of fossil energy resources, and environmental problems caused by the consumption of these resources, on the other hand, are significant reasons for the need to save energy. In Iran, even though according to the religious beliefs of the society, saving and avoiding extravagance is a good thing, the cheap price of energy carriers and the availability of various resources has caused our society to think with a significant delay about the need to optimize energy consumption. However, adopting appropriate measures to prevent waste and wasteful consumption of energy and reform the consumption pattern in the country is becoming more and more felt, because preventing the waste of fossil fuels, in addition to achieving faster sustainable development and conservation of resources for generations. The future will also lead to the reduction of environmental pollution, which is one of the main problems of today's societies, and considering the global measures to reduce pollutants, this is another factor for more efforts in this field. The implications of the present study can be a positive step towards adopting policies and non-price strategies to

improve the pattern of energy consumption in Iran.

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