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CES Working Papers

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Suggested Citation: Rotaru, Delia Vasilica (2014) : Specifics of the Energy Markets, CES Working Papers, ISSN 2067-7693, Alexandru Ioan Cuza University of Iasi, Centre for European Studies, Iasi, Vol. 6, Iss. 3, pp. 76-85

This Version is available at:

<https://hdl.handle.net/10419/198341>

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SPECIFICS OF THE ENERGY MARKETS

Delia Vasilica ROTARU*

Abstract: *In this paper we have analyzed the specific characteristics of the energy markets in general and the products transacted, in particular. Due to its unique features, electricity, one of the most important products for the economic development of a country, has brought challenges to the organization of a liberalized market to be transacted on. The paper also offers a view on the evolution of the supply and demand on the energy market in the last past years, along with a forecast analysis. The last part of the paper offers a presentation of the specific steps taken in the deregulation of the energy market process.*

Keywords: energy market; electricity; oil; gas; coal; supply; demand

JEL Classification: L51; Q48

INTRODUCTION

The energy industry is structured according to the products exploited and although some features are specific to each product, we can find some common organizational structures such as the generation, transport, distribution and supply. In recent decades, it was promoted the idea that the liberalization of energy markets will support the economic development of countries, by eliminating the burden of subsidies and indebtedness of the state. Taking action in this matter it was noted that energy markets have certain specific features that should be considered when making the transition to a free market. Given these features, we can see that unlike the approach to liberalization of other sectors, the liberalization of energy markets has certain specifics, for example, it begins by restructuring the entire energy sector and the privatization is made at the subdivisions of the sector. Some of these subdivisions, such as the transport, are preferable to remain under the government's rule.

The liberalization of energy markets is still in progress worldwide and its results are still put into question, especially because it is not initially characterized by lower prices for consumers. It takes time for the market to normalize and to bring benefits such as competitive prices and quality services. However, this liberalization could translate into beneficial investment in the generation plants, transmission and distribution, investments that could correlate with decreased production costs and lower prices for consumers.

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1. CHARACTERISTICS OF THE PRODUCTS TRANSACTED ON THE ENERGY MARKET

Unlike the other goods such as coal, gas and oil, electricity is characterized by an important feature that gives this product its specificity, **the fact that it cannot be stored**. The only way to store energy is through batteries but they have a limited life span and cannot supply any consumer. For this reason it is necessary to continuously balance electricity supply and demand in the market. Without the ability to store it, the consumer cannot act on the market like in the case of any other product, as he can't buy the product when it's cheaper to use when it gets more expensive.

On a market where goods can be stored, substituted and measured, the price of these goods is set at the intersection between supply and demand. The customer determines the demand for a good and sellers determine supply. Most markets for goods and services are nowadays liberalized and prices are competitive. On a liberalized market, the prices are intended to provide different information on the evolution of a particular sector of the market, as well; this is influencing the allocation of resources. The energy market comes with a particular feature because the amount of power required to be provided at a specific moment needs to be delivered in real time, although its fluctuations are not known.

Natural gas, on the other hand, can be stored, but in this case these deposits must be dimensioned by the suppliers so that they can provide the greatest potential demand satisfaction. Small consumers do not have the ability to store natural gas resources and this is bringing limitations to its application in the market as in the case of electricity.

Another important feature of electricity is that it **is not a tangible good** and consumers pay for it only after the product is delivered. Electricity becomes a product only through complex financial and market management. Because of these characteristics the organization of the electricity market requires specific actions and processes in order to function properly, unlike other markets for goods and services.

The characteristic for both electricity and gas as necessary resources is the fact that users are unable to replace the product, as these **cannot be substituted with other ones on short term**. Thus, if there is a price increase for electricity and natural gas, consumers do not replace them with other products to avoid increased costs. In the longer term they can take action so they can decrease consumption by various methods such as switching from gas to electricity for heating, better insulation of the building, etc., however, these measures involve a new set of investments.

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On the other hand, electricity is primarily a homogeneous product, which means that there is no difference between units coming from different generators. Thus, a consumer can always change the supplier if there is one offering better prices. The price of electricity may vary depending on the source that generates it. Transmission is, however, limited and this implies the impossibility of creating a global market. It is practically impossible to transmit electricity from the United States to Singapore for consumption. Also, as mentioned before, electricity cannot be stored and this requires a constant balance between the quantity demanded by consumers and the quantity supplied to the market (Bar, Hoang, 2011). All these features are highlighted other important power in the diagram below.

Figure 1 – Characteristics of electricity



Source: Burger, Graeber, Schindlmayr, 2008, p. 27

Due to the complexity of this sector, over time it was noticed that the vertical structure was preferred in its organization, so that all the components are owned by one company that belonged normally to the local government. Vertical integration was preferred because of the supply of electricity process. In order to get the electricity from the generator to the final consumer it is necessary the permanent balance between supply and demand. This is a difficult task that requires the existence of a central authority to govern both the demand and supply of electricity along power cables. Only in the mid-70s, scientists have suggested that the generation sector could be organized as a competitive market. Transmission and distribution, on the other hand, were to stay organized as a monopoly and these activities continued to be regulated (Michaels, 2006). The reason behind this

is the need to always maintain the balance between supply and demand, but also because these components are capital intensive, requiring significant investment to maintain the necessary infrastructure to meet the needs of electricity consumers. Investment period is very long, involving planning and continuous monitoring (Domanico, 2007).

Unlike other products, electricity and gas are essential items nowadays, failing to provide them even for a short period of time can lead to interruption in the supply of various services and possible hazards. Consumers can't postpone the purchase of these products. They may be absent for a short period of time, but cannot totally eliminate the long-term use. The electricity and gas are capital intensive and require access to financial markets to support daily operations, trading and investment programs. It is necessary to maintain a certain level of investment in these sectors to support long-term development of infrastructure.

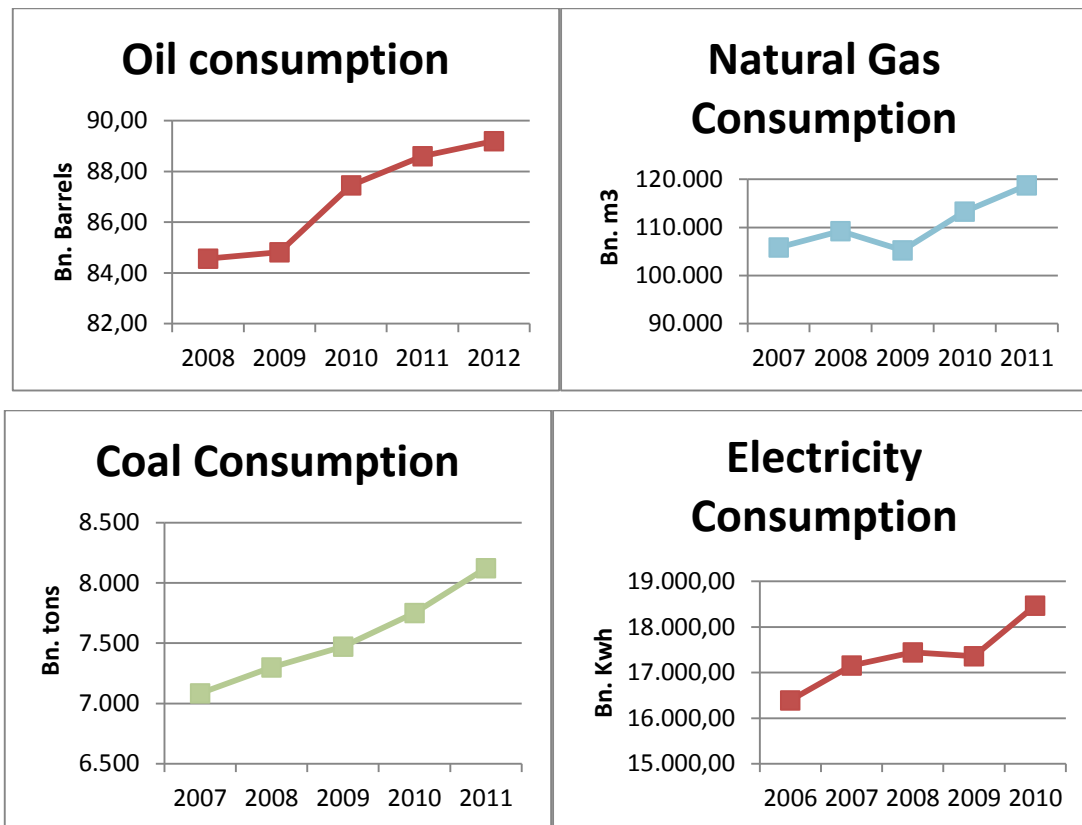
Analyzing the specific features of the products traded on the energy market we can conclude that the market is characterized by the need for a permanent balance between supply and demand, because demand is volatile and inelastic. As a consequence, traditional mechanisms of compensation, such as late delivery or replacement with a substitute are not available in the case of electricity. All of this involves electricity price volatility and makes the security of the system more vulnerable to environmental conditions.

2. DEMAND ON THE ENERGY MARKET

The demand on energy market translates into the amount of energy used by consumers at specific time. As mentioned before, not all consumers have access to energy resources and this may lead to future growth of the amount of energy required. As energy resources (gas, coal and oil) are finite and demand is constantly growing, today the focus is moving towards the search for alternative resources in order to ensure the future consumption efficiency. At the moment, for the generation of electricity, renewable sources such as sunlight, wind, water are being exploited.

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Figure 2 – Evolution of energy consumption between 2006 and 2012

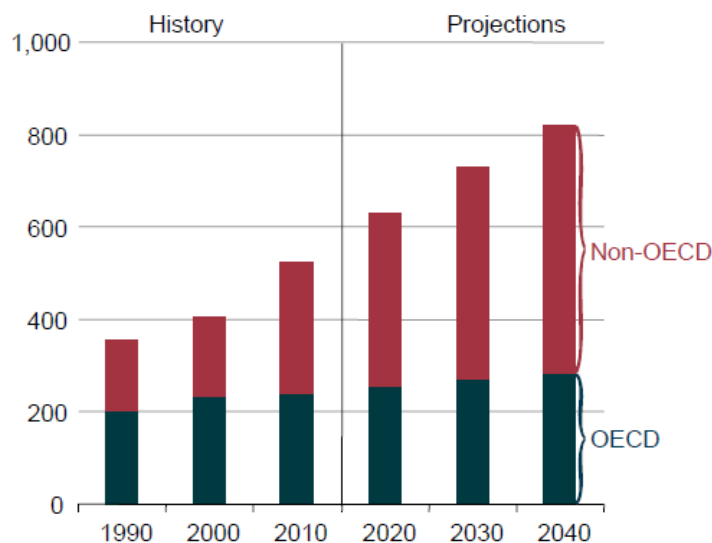


Source: U.S. Energy Information Administration Database

As shown in the analysis of the latest consumption data available for five years, the demand in the energy industry generally follows an ascendant trend, only the consumption of electricity and natural gas declines during the economic crisis of 2009 most probably as a reaction to this, in an attempt of the consumers to reduce costs. It is expected that future demand for energy will continue to grow as the countries will continue their economic development and people's access to energy resources will increase.

In these circumstances, the International Energy Agency has made an estimate of changes in consumption in coming years, a trend shown in the following figure.

Figure 3 – Evolution of energy consumption (quadrillion btu*)



Source: U.S. Energy Information Administration, 2013

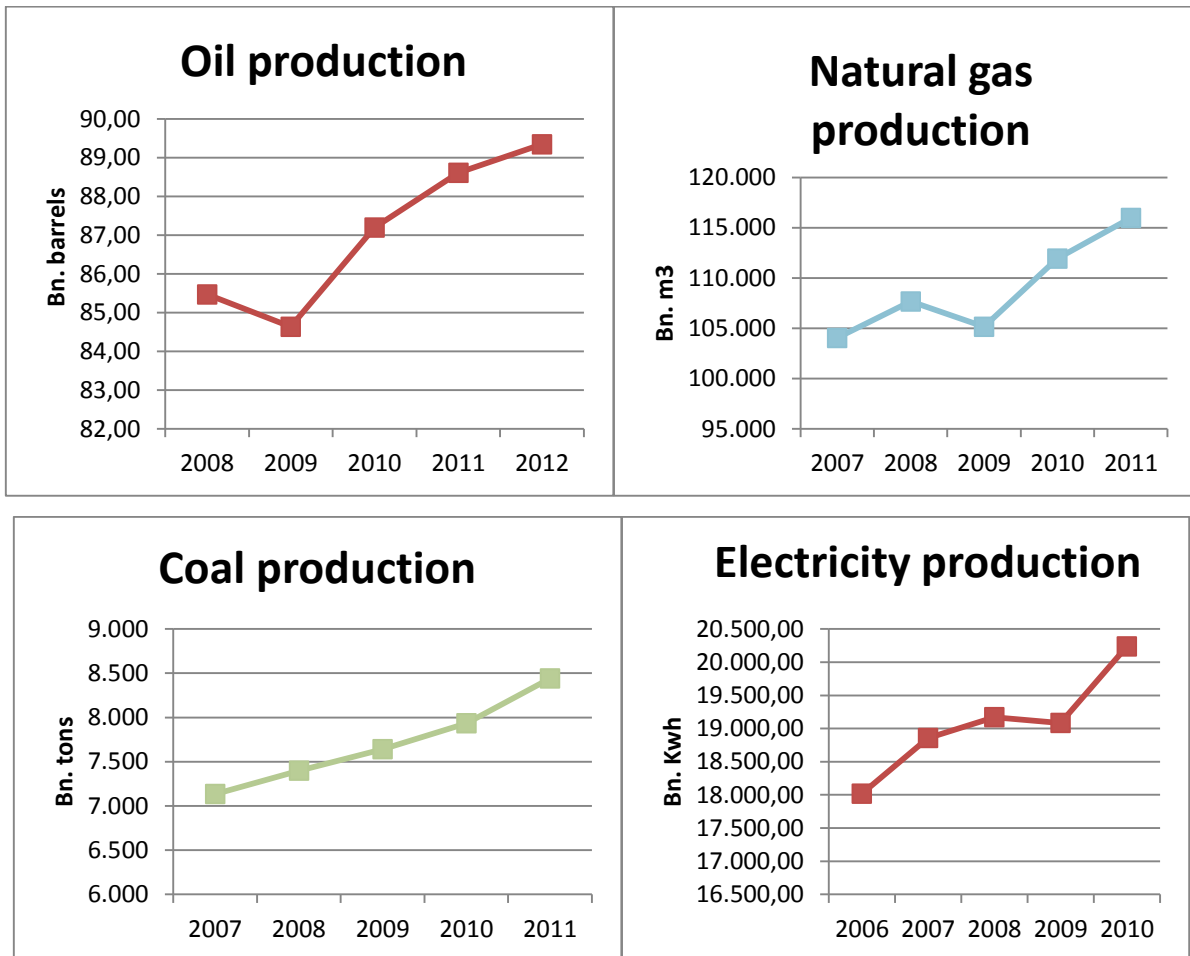
Analyzing the energy consumption of resources so far, it is expected that these will increase in the future about 1.5% per year worldwide, China and India being the countries with the most important growing need for energy resources. Currently, the demand for energy resources in these two countries represent around 24% of the global total and is expected to reach 34% in 2040. Economic growth is one of the most important factors considered when estimating changes in the world energy consumption. The estimation made by the International Energy Agency has been taken into consideration assumptions about regional economic growth, as measured by the real gross domestic product in 2005 (US dollars). World economic growth has fluctuated substantially in recent years with a decline of 1.1% in 2009 followed by an increase of 4.9% in 2010, 3.8% in 2011 and 2.8% in 2012. In the projections analysis is considered that these fluctuations will stabilize, this representing the major source of uncertainty in such studies. In this study, it is estimated that the world energy consumption in 2040 will be of 840 quadrillion btu, of which 285 will be consumed by the OECD countries and 555 by the ones that are not members of the organization. Considering the optimistic version of the economic growth in the coming years (the highest possible rates), it is estimated that the consumption will rise until 946 quadrillion btu, whilst the pessimistic version estimates a consumption of only 733 quadrillion btu (U.S. Energy Information Administration, 2013).

* British thermal unit is a unit of heat that measures the amount of energy required to raise the temperature of a pound of water by one degree Fahrenheit. 1 btu ~ 1055.056 J.

3. SUPPLY ON THE ENERGY MARKET

Supply on the energy market refers to the amount of energy that can be produced and offered for sale at a specific time. The graph that follows examines the evolution of energy markets offer products.

Figure 4 - The evolution of energy production in the years 2006 – 2012



Source: U.S. Energy Information Administration Database

The evolution of energy supply was also growing in the last five years to meet the needs of the population, except in 2009 for oil, electricity and natural gas, due to the economic crisis that has manifested worldwide. In comparison, while the supply and demand for oil, natural gas and coal seems balanced, electricity supply is always higher than the demand, because of its inelasticity and the need to deliver real-time amount of energy required.

With the demand for energy products continuously growing in the future, the supply will also have to increase in order to meet consumer needs. A report conducted by the International Energy

Agency states that according to the latest estimations regarding oil resources we have left available about 2670 billion barrels, but the quantity is not limited as new exploitation technologies are being developed and new types of resources are taken into consideration. Regarding electricity generation, it is expected that by 2035, 35% of electricity will come from renewable resources (International Energy Agency, 2013).

Future increased demand can be satisfied as long as the competition is present in order to stimulate innovation, to unlock resources and to encourage efficiency. For these reasons, there is a positive attitude regarding the future generation of energy needed to support the further economic growth worldwide.

4. ENERGY MARKET LIBERALIZATION SPECIFICS

The energy market liberalization process has reached different levels worldwide depending on how each individual country has approached this process. While some countries have seen the liberalization of energy markets as a necessity in order to maintain prosperity, development, international competitiveness and economic growth, others have preferred to keep the sector under state monopoly.

In addressing the liberalization process, there can be identified some common, sector-specific elements, such as:

- **Restructuring** in order to allow the introduction and development of competition. In this respect it is necessary to act by separating energy industry sectors - generation, transmission, distribution and retail providers and their removal under state monopoly;

- **Privatization** of distributors and suppliers because it is expected that entities owned by several actors facilitate competition. Private investors and other actors are expected to bring financial resources and managerial expertise in the generation and supply areas;

- **Development of a new regulatory framework.** Regulations on energy markets are still needed especially in the areas of electricity supply that remains dominated by one or a few operators to prevent their abuse. It is often chosen as a solution the establishment of an independent regulatory body. This way, private investors receive insurance that prices, supply and demand cannot be politically manipulated. However, there is an extensive literature on the distorting effects of state regulation even when the market is under the supervision of dedicated bodies (Guasch, Hahn, 1999).

The stage of privatization is one of the difficult reforms. Although the structure of the energy markets in different countries has changed radically in recent years, only a few countries have fully

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privatized energy market. The reason is often a political one, given by the fact that governments prefer to keep the power on market competition. Many times governments have considerable economic interests in energy companies, which could constrain certain business decisions and therefore it represents an obstacle to the acquisition of such companies by private investors.

CONCLUSIONS

The energy market is one of the most challengeable sectors when it comes to the approach of the liberalization. The liberalization of the market in general is complex and quite long, which makes the transition from a planned economy to freedom of decision and action hard.

The complexity of this process is given by the specific features of the products on the market, especially electricity. The liberalization of energy markets begins primarily with the restructuring of the various areas of activity followed by their privatization and competitiveness. Regulation of the electricity market can bring benefits and risks simultaneously. The fact that electricity is a good that cannot be stored, a constant balancing of supply and demand is required and that it cannot be substituted by another product gives great importance to the administration of these markets and the need for a body to oversee the work of operators. The importance of this sector can lead to serious economic disruption if the process is not closely supervised and that happens because these industries are restructured after almost a century of monopolistic regulation. The unique characteristics of electricity makes this market very vulnerable and the prices will increase extremely quickly when demand is low. The deregulation process is complicated and the responsible institutions are not always adequately addressing all technical and institutional issues involved by the introduction of wholesale and retail.

Moreover, in recent years, in addition to the need of finding the best way to restructure this sector, countries were forced to face a new challenge. As least developed countries evolve, there is a growing demand in the energy market, threatening the security of future supply of electricity, oil and gas. It thus emphasizes the need for innovation in the field, for increasing investment and exploitation of renewable energy resources, most developed countries being involved in various projects in this regard. Pollution is another issue to be considered when aiming at the reorganization and modernization of the energy industries. Creating high living standards for the population requires increased accessibility to energy resources, regardless of type, but this implies the need to focus on the application of new technologies, cleaner, complying with certain conditions that are feasible for the population.

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