ENERGY SUPPLY SECURITY AND RENEWABLE ENERGY POLICIES IN TURKEY

Mustafa Kemal TOPCU*
Poyraz GÜRSON**

* Dr., Ankara Chamber of Industry, Ankara, Turkey
** Associate Professor, Kocaeli University, Istanbul, Turkey

As a result of Turkey's geopolitical position and its related requirements, energy is one of the fields where innovation is to be speeded up. However, as a natural consequence of unplanned and incorrect energy policies, Turkey's rate of dependency on energy has reached 72%. Since the need for energy is increasingly growing, especially as a result of the manufacturing industry in Turkey, and a large part of the consumed energy is imported, dependency seems to continue to increase. Toward this end, this article focuses on studies related to reducing external dependency on energy, while also reviewing and discussing literature survey methodology and making policy recommendations concerning energy supply security. Renewable energy has been attached great importance worldwide as well as nationwide because of providing a reliable energy source that meets economic and environmental requirements. In order to meet the increasing electricity needs of Turkey as a developing country the number on renewable energy facilities has been growing. Domestic production of equipment for renewable energy, and producing and integrating those into the conventional system are of high importance because energy supply is a security factor, sustaining reserves is a major need and reducing foreign dependency is a policy priority.

Key words: *renewable energy, current deficit, energy supply security.*

1. INTRODUCTION

The Tenth Development Plan covering the 2014-2018 time period and that is in compliance with the 2023 goals of Turkey, , iterates international competition power alongside with high and consistent economic growth. Outreaching high value-added systems it is aimed to enhance Turkey's international competitive edge and to promote exports of advanced technology with a vision of *"being a manufacture site for middle and high technology goods in Eurasia"*.

In this context, energy is one of need-oriented areas accepted among the ones to be improved in the Research&Development (R&D) activities in accordance with Turkey's geopolitical position and needs of (TUBITAK, 2010). Turkey has become dependent on the foreign energy markets. Thus, 72% of its consumed energy is imported due to wrong and unplanned energy policies. Turkey ranks the 59th in the Global Competitiveness Report of the World Economic Forum (WEF) for the 2011-2012 time

period and in accordance with the global competitiveness index its dependency on energy imports has been deepening by day. What is more, its need for energy is likely to keep growing given its rapid economic development. Thus, through the implementation of a domestic resource-based energy production program (The 10 th Development Plan, 2013) it aims at increasing the share of domestic energy resource derived from oil drilling and natural gas from 28% to 35% by the end of 2018. However, within an international context, studies on the issue of energy supply security emphasize the frame of international relations and reciprocity. For instance, Bayraç (2009) considers global energy policies in terms of oil and natural gas, Özkan (2010) approaches the subject regionally by focusing on the Nabucco Project, whereas Belet (2013) analyzes the Trans Anatolian Natural Gas Pipeline Project. In the same manner, Ayhan (2009) and Kaysi (2011) evaluate the relationship between Turkey and the EU regarding energy supply security. With a view to all of the above, it is undoubtedly clear that Turkey requires a deliberate study to clarify the current state of renewable energy and a roadmap.

Turkey does not have enough natural resources in comparison with its intensive energy consumption (Kayıkçı, 2011). That impacts its high-rated foreign-dependency and places pressure on the current account balance, as well as on the field of energy supply security. In this respect, Çalışkan's (2009) work focuses on the subject of Turkey's foreign-dependency on energy and indicates the current state of renewable energy employment. However, it does not clearly reveal how to react regarding energy supply security.

Towards this end, this study aims to find a new way to bring into the limelight issues such as diversification of energy, policies toward using renewable energy and energy supply security. After studies on energy supply security are discussed, the situation in Turkey is elaborated and then global studies are reviewed. Last but not the least, some recommendations are presented.

2. A CONCEPTUAL DISCUSSION ON ENERGY SUPPLY SECURITY

Literature review indicates that academicians sometimes adopt a narrow perspective on energy supply security ignoring challenges encountered, or they make use of a wide perspective that cannot be restricted to only security or economics. Thus, energy supply security is described as *"the implementation of environment-friendly, continuous, sufficient and qualified energy supply, transport and demand at an appropriate cost/price and within the scope of production, transmission, consumption activities"* (Erdal & Karakaya, 2012).

However, energy supply security does not carry the same meaning to everybody. While energy exporting countries evaluate the increase in demand that will enhance their reserves, for Russia it means sovereignty in the fields of strategic resources and distribution network. On the other hand, developing countries pay attention to how the balance of payment is affected by energy prices. Emerging markets such as China and India are looking

for a way to adapt to the global market. EU researches how to get rid of dependency on natural gas. For transit countries like Turkey, the security of energy transmission lines is of great significance.

The above mentioned concerns are consequences of the meaning attached to the concept of energy supply security since the 1973 crisis and indicate that energy supply security is based on not allowing oil exporting countries to create problems (Yergin, 2006). In today's contemporary world, this definition has to be widened to also include whole supply chain and infrastructure.

For instance, Erdal and Karakaya (2012), who consider energy supply as a security and environmental risk, discuss political, social and economic factors that determine energy supply security in detail and consider that being accessible, economical, obtainable and acceptable are requirements for energy supply security. Sovacool and Mukherjee (2001) refer to a five-factor structure composed of accessibility, cost, technology development, sustainability and regulations.

Within this understanding, the main goals of a strategy that is successful at ensuring energy security may be listed as follows (UN ESCAP, 2010):

- Reducing the deficit between energy demand and supply to the minimum;
- Increasing energy savings and productivity by reducing energy density;
- Generating the optimal energy mix;
- Diversifying the supply of energy;
- Investing in improvement of the energy infrastructure;
- Diverging to alternative and renewable energy sources;
- Promoting innovation and competition with R&D activities;
- Reducing the vulnerability against fluctuations in price of energy;
- Ensuring *"good governance"* in the energy sector.

Diversification of energy sources and suppliers, utilization of domestic resources, complete liberalization of the domestic market, increasing cross border investments, improvements of energy storing capacity, increasing energy productivity and savings in energy consumption might be considered among the measures to increase energy supply security, as well (Erdal & Karakaya, 2012).

3. ENERGY USE IN TURKEY

It is crucial that Turkey's energy and electric demands should be estimated scientifically, and both resource supply and investment plans should be projected accordingly. According to the capacity projection, which is prepared by TETC (Turkish Electricity Transmission Company) for the 2012-2021 period, electric energy demand is estimated to increase by 7.5% annually (6.5% in a pessimistic scenario scenario) and the demand may increase by 75%-93% in the next 10 years. Hence, an increase in energy demand can be observed in the graph in **Figure 1**.

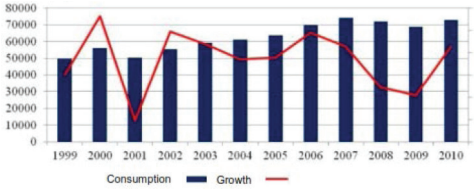

Fig. no.1. Energy consumption in Turkey (1999-2010)

The objective is to provide sufficient, high quality, continuous, low-cost and environment-friendly

electricity to consumers. The Turkish electricity market, which is in close relation with the economic and political developments in this country and in the world, is undergoing an extremely dynamic process characterized by an increase in demand.

The electric market constitutes approximately 3% of Turkey's GDP. In order to meet the demand that is growing by 6.3% to 8.4% annually, participation of the private sector needs to be ensured, and to reduce the cost, competition should be provided (Güner & Albostan, 2007).

In this regard, as economies are dependent on energy the strategic importance of energy resources and alternative energy oriented technologies gain a growing importance. Alternative policies to decrease dependency on foreign energy sources will have a positive effect on current account deficit and economic growth, as well. Towards this end, increasing renewable energy production is of great importance. In addition, the share of renewable energy resources in electricity production is forecasted to increase from 20% to 29% in 2035 (Tenth Development Plan, 2013).

Table 1. Development and Forecasts in Energy Industry

	2006	**2012**	**2013**	**2018**
Primary Energy Demand (BTEP)	99.642	119.302	123.600	154.000
Electricity Demand (GWh)	174.637	241.949	255.000	341.000
Per Capita Primary Energy Consumption (TEP/person)	1.44	1.59	1.62	1.92
Share of Natural Gas in Electricity Production (%)	2.517	3.231	3.351	4.241
Share of Renewable Energy Resources in Electricity Production (%)*	45.8	43.2	43.0	41.0
Electric Utilities Power (MW)	25.3	27.0	27.7	29.0
Energy Density (TEP/1000 USD)	40.565	57.058	58.500	78.000
Primary Energy Demand (BTEP)	0.288	0.276	0.272	0.243

* The European Commission Report in 2005 indicates that renewable energy resources generate 12.1% of electricity production in Europe in 2030.

For these reasons, many countries focus on energy investments and engage in efficient and effective use of natural sources to meet increasing energy requirements. According to forecasts in the field, renewable energy will be the second largest energy production source in 2015 and, along with coal, will become a fundamental energy source in 2035, (İzmir Development Agency, 2013).

Like in many other countries, renewable energy resources are seen as crucial in Turkey and meant to provide secure energy for economic, social and environmental reasons (Uysal, 2011). Turkey has significant potential in terms of renewable energy resources. Turkey is suitable for establishing various power sources including solar, biomass, wind, and geothermal energy across the country. For instance, Koç (1998) addresses one of the best solutions for environmental problems, which is wind power, in Ayvalık region and emphasizes its economic and social contributions to the economy.

Despite the recent developments in energy investments in Turkey, the main problems with renewable energy investments are lack of incentives mechanisms, regulations, human resources and technological developments (İzmir Development Agency, 2013). For instance, potential and accurate data for wind energy have never been examined (Soydal, Mızrak & Çetinkaya, 2012). Concerning alternative energy investments, energy production is not the main issue; it is required that the domestic sources are used for energy production and domestic producers are supported by the government (İzmir Development Agency, 2013).

4. GLOBAL BEST PRACTICES

While Turkey mainly approaches energy security from the perspective of using the advantage of its strategic location, other countries handle the issue in terms of sustainability, environmental impacts and reducing their dependency. In comparison with Turkey's qualitative studies, other countries concentrate on quantitative research including methodological suggestions or future projections.

Sovacool and Mukherjee (2001) suggest a 5-factor and 20-component typology, and highlight accessibility, cost, technological development, sustainability and regulations. Accessibility is directly related to energy supply and frees countries from dependence by encompassing different energy types and technologies. Similarly, Yergin (2006) argues that energy safety is not just about petroleum and natural gas, and notes the drawbacks of energy dependence citing the sanctions imposed by Russia after its tension with Ukraine in 2006. Consequently, European Union (EU) leaned to other resources after experiencing gas cuts. As a result of Iran's nuclear program, resource diversification gained more attention. EU's decision making process for energy matters does not go without energy supply safety, environmental targets and competition strategies. For this reason, in its search for alternative resources, EU tries to develop projects with Iran, Iraq, Turkmenistan, Kazakhstan, Azerbaijan and Egypt (Ayhan, 2009).

Diversifying resources for energy supply security or considering energy as just a commodity for electricity production is not enough. It is also important to reduce carbon emissions, protect environment and provide sustainability in order to use energy effectively (Hurlbutt, 2010).

Stern (2004), as opposed to most academicians and practitioners, paid significant attention to the Gross National Product - energy relation and referred to five factors affecting this relation: substitutability of energy, technological change, change in the composition of energy input and change in the output. Likewise, Lund and Mathiesen (2009) worked on a methodology for Denmark and researched the energy input and output ratio e by mapping the energy need of Denmark for the 2030-2050 time period. The researchers specified their concrete aims as obtaining energy supply security, reducing the CO_2 emissions by half, creating employment and promoting export.

Malaysia, which has been trying to elaborate a national strategy in the field for 30 years, centered its strategy on supply, environment, and productivity (Hashim ve Ho, 2011).

Thus, in Malaysia's policies increasing renewable energy usage, legislative arrangement, incentives for renewable energy usage, human resources and R&D activities and courses of action have been set as priorities.

5. CONCLUSION

It is likely for discussions about energy supply security to increasingly continue. Literature review indicates that academicians adopt either a narrow perspective on energy supply security ignoring challenges encountered, or they make use of a wide perspective whose context cannot be restricted to only security or economics. Moreover, the meanings attached to the concept vary by country, as already indicated in the body of this article. In the widest sense, energy supply security is about the provision of energy by oil exporting countries to countries in need. Energy supply includes infrastructure costs, as well as costs incurred by the financial and political instability in the supply or demand countries. The second factor is accessibility. Concerning accessibility, differentiation of energy resources, differentiation of energy production, transmission and distribution and storage of energy may be employed (Jansen, van Arkel and Boosts, 2004:5; Elkind, 2010:119).

Another dimension of energy security is its producibility. Fluctuation of energy prices due to crisis and speculative reasons may cause countries' exposure to economic losses, social harms and even political instability (Erdal & Karakaya, 2012:113). The last dimension of energy safety is sustainability. Sustainability includes both sustainability in energy supply and concern for today's resources, environment included, in the name of future generations' best interests.

The current state in energy supply shows a diversification of energy resources. Therefore, trying to innovate becomes an obligation and introducing the renewable energy concept is beneficial.

This study proposes that the concepts of energy supply security and renewable energy Tare handled from a perspective that pays more attention to accessibility and sustainability rather than to a political and strategic outlook.

Turkey which has attained a steady growth needs more and more energy as time goes by. It is not easy for Turkey, whose energy dependency level is currently at 70%, to handle power and sustain its future. Hence, Turkey should ensure energy supply security in order to satisfy its energy demand. Turkey can make itself secure by evaluating its geostrategic position and putting itself at the center of the conventional distribution network since using the current system has always less cost and both suppliers and demanders benefit from it. In this respect, Turkey can strengthen its position by playing up to its strengths in the field and by not keeping away from EU's studies on resource diversification.

On the other hand, energy supply security may be ensured by diminishing dependency on external providers and enhancing resource diversity. One way to do that is to diversify the pool of energy suppliers and not to buy oil and natural gas from just one country. In addition, it

is possible to ensure energy supply security by enhancing the use of renewable energy. For instance, the cooperation agreement with the United Arab Emirates (UAE) on the use of Afşin-Elbistan lignite reserves in electricity production, the Tuz Gölü Natural Gas Underground Storage Project, and the inter-governmental agreement with Azerbaijan on the Trans-Anatolian Natural Gas Pipeline Project can be taken as efforts of Turkey on this issue. Thus, Turkey can evaluate its natural resources, reduce its external dependency on energy sources and suppliers, establish balance between export and import, and improve its current account deficit.

Unfortunately, there is no study for Turkey to present a roadmap and methodology except for some conceptual studies. Only foresights included in legal reports are currently being used. Actually, energy supply security is not an issue that would be taken as a sole factor. It is also related to environmental concerns and economic aims. Renewable energy use, while increasing energy supply security, also affects macroeconomic variables such as current account deficit, growth or employment by supporting sustainable national competitiveness as a result of innovation.

To this end, it is rational to choose different types of energies such as hydraulics, biomass, solar, geothermal, wave and wind as areas of interest and investment. Use of energy resources as substitutes may serve security issues. On the other hand, control over energy demand may support energy supply security by enhancing energy productivity. Turkey has become dependent on especially Russia in terms of natural gas. In order to decrease the pressure on it, Turkey should diversify its foreign resources.

Issues covered in this study have become well-accepted terms for energy supply security in national and international areas. However, it is clear that Turkey needs methodological studies. To this end, it is significant that academicians and politicians put forward more concrete typologies in order to constitute more rational and optimal studies. With systematic and planned studies, Turkey not only ensures energy supply security, but also attains sustainability.

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