Journal of International Management, Educational and Economics Perspectives

JIMEP

RENEWABLE ENERGY RESOURCES AND ENVIRONMENT

Emre YİĞİT[1]

ABSTRACT

Energy resources are divided into renewable and non-renewable energy sources. Renewable energy sources, also called fossil-based fuels, have caused serious environmental problems. The limited reserves of fossil-based fuels have accelerated the search for alternative sources. In this study, non-renewable energy sources and renewable energy sources are considered and the relation with the environment is evaluated. As a result of the study, it was emphasized that encouraging researches on renewable energy sources, emphasizing the importance of renewable energy sources in the exhibitions, in terms of sustainable development.

Key Words: *Renewable Energy, Non-Renewable Energy, Environment*

Jel Codes: *Q20, Q50, Q56*

YENİLENEBİLİR ENERJİ KAYNAKLARI VE ÇEVRE

ÖZ

Enerji kaynakları yenilenebilir ve yenilenemeyen enerji kaynakları olmak üzere ikiye ayrılmıştır. Fosil kökenli yakıtlar olarak da isimlendirilen yenilenemeyen enerji kaynakları, ciddi çevre sorunlarına sebebiyet vermiştir. Fosil kökenli yakıtların rezervlerinin sınırlı olması alternatif kaynak arayışlarını hızlandırmıştır. Bu çalışmada yenilenemeyen enerji kaynakları ve yenilenebilir enerji kaynakları ele alınmış olup, çevre ile olan ilişkileri değerlendirilmiştir. Çalışma sonucunda yenilenebilir enerji kaynaklarına yönelik araştırmaların teşvik edilmesi, okullarda, sergilerde yenilenebilir enerji kaynaklarının öneminin vurgulanması sürdürülebilir kalkınma açısından önem arzedeceğine dair vurgu yapılmıştır.

Anahtar Kelimeler: *Yenilenebilir Enerji, Yenilenemeyen Enerji, Çevre*

Jel Kodları: *Q20, Q50, Q56*

[1] Gaziosmanpaşa University, Institute of Social Sciences, Department of Economics, Ph.D., E-mail: emreygt88@gmail.com.

INTRODUCTION

One of the most important sources needed for country economies and people it is energy. It is one of the indispensable elements of economic and social life. The rapid increase in technological developments along with the increase in industrial demand for energy, transportation and utilization of energy in transportation have become increasingly important, making energy an indispensable element in the sustainability of social life. The increase in population, the development of the industry and the increase of living standards also increase energy consumption. Fossil-based fuels such as coal, oil, and natural gas in the world are the main sources in meeting the rising energy demand. However, as fossil fuels are non-renewable energy sources, renewable energy sources such as solar energy, wind energy and hydrogen energy are gaining importance in meeting rising energy demands.

The use of fossil fuels brings many environmental problems. These problems include global warming, climate change, and greenhouse gas emissions. Global climate change is the biggest threat facing the environment. The way to prevent this threat is to change the form of energy production and consumption. Depletion of fossil-based energy sources such as coal, oil, natural gas and the negative effects on the environment have accelerated the search for alternative energy sources. Because of the political and economic instability in the Middle East, countries are obliged to turn to nuclear and renewable energy sources.

1.ENERGY DEFINITION AND ENERGY RESOURCES

Energy is derived from the word "energeia", which comes from the combination of the Greek "en" and "ergon" words when looking at the origin of the Word. Energy is generally defined as the ability to generate heat from objects beneath the earth's surface, either by different methods or by direct sunlight capture (Bhattacharyya, 2011: 1). In economic terms, the ability of a cismin, machine or material system to function is seen as energy (Berberoglu, 1982: 9).

Energy was used to spread heat and light around in the early ages. For this reason, it is estimated that the historical process of energy begins with the fire of mankind (Demir,2010:15-21). In the early ages, wood was used as fuel for a long time in order to take advantage of the fire. Mankind meets basic household needs such as heating and cooking with wood. Because of its abundance and comfort in the country, wood has been an important source of energy for people in the early ages. However, when this energy source proved that it could not support the growing economies in Europe and America, the 19th century was rooted in petroleum and natural gas in the 20th century (Timmons, 2014: 3).

1.1. Energy Resources

Energy sources that are defined as sources of energy by various means in economic terms can be grouped according to their availability and their convertibility. According to their availability, they are divided into renewable and non-renewable energy sources in themselves; According to their convertibility, they are divided into primary energy and secondary energy sources (Koc ve Senel, 2013: 1).

1.1.1. Primary Energy Resources

The ready-made resources that can not be touched by human beings in any way in the nature and are directly available are defined as "primary energy sources" (Berberoglu, 1982: 11). Examples of primary energy sources are oil, natural gas, wood and nuclear energy. Primary energy sources can be divided into two groups, renewable and renewable energy sources (Smith, 1994: 136-140).

1.1.1.1. Non-renewable Energy Resources

Non-renewable energy sources are mainly fossil energy sources (coal, oil, natural gas, etc.) (Koç, 2013: 1). Non-renewable energy sources with limited stocks are the sources that are consumed faster than they are formed. Because millions of years pass before these resources can be formed, consumption takes place in a much shorter time than production (Ertas, 2011: 92).

Coal

From the point of view of the date of use of energy sources, the oldest source of energy after coal is coal. Coal is energy raw material with different structure, consisting of carbon, hydrogen and oxygen, which contain sulfur and nitrogen in small quantities, physical and chemical (TKİ, 2003: 17-18).

Coal, which is the main raw material of the electricity and heat energy production sectors, is an important source of energy production due to its dependence on imported energy, availability at a competitive price level, availability and ready availability (Doganay, 1998: 9-11).

Oil

Petroleum, the most powerful source of energy in the 20th century, is the most efficient and the largest non-renewable energy source of fossil fuels. Petroleum, which has an important place in our life, is used as raw material in heating, electricity generation, chemistry and other industrial branches (Ablabekova, 2008: 20).

According to other sources, oil is easy to transport and can be produced with less labor, which is advantageous in favor of oil and effective in bringing forward (Smith, 1994: 127). When you look at some of the weaknesses of the oil, there is a lot of pollution in the environment. In addition, the need for advanced technology to explore and extract oil and the high cost are among the disadvantages of petroleum (Ablabekova, 2008: 20).

Natural gas

Natural gas, which has the same form as petroleum, is included in the group of fossil fuels. Much methane is composed of ethane, propane atom, butane and CO_2 in small amounts. It is a clean energy source that is easy to produce compared to petroleum, which is not rich and odorous (Ucak, 2010: 68). Due to the fact that natural gas is a clean energy source, pollution effect of the environment is much less than other energy sources (Gultekın and Orgun, 1993: 37).

1.2.1. Secondary Energy Sources

Primary sources of energy are called secondary sources of energy that are the result of an operation. Examples of these sources are fuel oil, diesel, electric energy (Uslu, 2004: 155). Secondary energy sources are more expensive than primary energy sources because of the loss of some losses during the conversion process. In order to reach secondary energy sources, high technology petroleum refineries, such as thermal power plants, are needed (Goel, 2005: 26-30).

2. RENEWABLE ENERGY RESOURCES AND ENVIRONMENTAL INTERACTION

Renewable energy sources are energy resources that are never used once they are used, can be used again and again, and are not consumed. Examples of these sources are solar energy, wind energy, geothermal energy, hydrogen energy, hydroelectric energy, biomass energy and marine energy resources (Bilginoglu, 1991: 123).

Renewable energy sources have two major advantages. The province is cheaper than renewable energy sources because of the scarcity of resources. A second advantage is that it is much cleaner than non-renewable energy sources (Demirbas, 2008: 1114-1119).

2.1. Solar Energy

Solar energy, which warms the world and provides continuity, is at the top of renewable energy sources. Solar energy is used to convert energy from sunlight into heat or electricity. The solar energy system is divided into three as photovoltaic solar panel systems, thermal solar energy systems and condensed solar systems (ETKB, 2012).

Photovoltaic solar panel system is a system that enables photovoltaic cells made from a material without full conductivity to turn solar light directly into electricity. Solar solar energy systems are the systems that provide heat recovery from solar energy. ondensing solar systems are defined as systems in which sunlight collected by mirrors is converted to high temperature heat and electrical energy (Yılmaz, 2014).

The use of solar energy has many advantages. These advantages are;

- To be found abundantly in many parts of the world,
- It is an endless and clean energy,
- Not to be dependent on outsiders,
- Solar energy systems must be reliable,
- They should be in a simple structure,
- Solar energy systems can be easily transported and can be ordered as (MEB, 2002: 16).

2.2. Wind Power

The wind is the event of the displacement of air masses. Wind energy is the most developed type of renewable energy resources and the most suitable type of energy for commercial purposes. Considering the advantages of wind energy;

Abundant quantities in the world,

- The absence of a situation such as exhaustion and price increases,
- Being continuous and environmentally friendly, not dependent on the outside,
- No fuel cost,
- Operating costs are relatively cheaper than other energy sources,
- Extensive coverage of wind turbines that do not damage nature,
- There are many advantages such as creating employment (Ersoy, 2010: 287-288).

2.3. Geothermal Energy

The heat, which is accumulated in various depths of the earth, is used as energy raw material in various industrial plants in electricity generation, cooling and heating, which contains more

dissolved minerals, different salts and gases than the normal underground and surface waters around it, hot water and steam under pressure are called geothermal energy to heat energy that can always be transported to the surface (Ozturk, 2008: 196).

When the advantages of geothermal energy source are considered;

- The geothermal energy source, which has a very high efficiency, is a low cost, domestic, clean and renewable energy source,
- Unlike wind energy, it is not affected by climate change,
- Unlike other power plants, it seems that there are many advantages such as the construction of geothermal power plants is shorter (Ersoy, 2010: 299-309).

2.4. Hydrogen Energy

The simplest and most common element is hydrogen, a non-toxic, odorless, light and colorless gas. The most known compound of this element, which is not found in nature alone, is sudur. Hydrogen can be used in many places after being obtained from water using any primary energy source, such as solar energy (Ozturk, 2008: 338).

Considering the advantages of hydrogen energy;

- Do not cause environmental problems due to not having CO_2.
- It has the advantages such that the energy it carries can be converted very easily into electric energy (MEB, 2002: 32).

2.5. Hydroelectric Energy

Hydroelectric energy, which is the power provided by the waters on the move, seems to be the most advanced energy source when it comes to technological development. Having found a technology that transmits electricity to distances, hydraulic energy has become much more usable (MEB, 2002: 27)

Hydroelectric power plants, which have the biggest share in energy production from renewable energy sources, are converted into electricity energy through potential energy of turbines and generators (Ozturk, 2008: 372). Especially conventional hydroelectric power plants have been used for electricity generation for a long time because they can make power distribution proportional to the network by generating electricity if needed (Yılmaz, 2014: 59).

Given the advantages of hydroelectric energy;

- Hydroelectric power plants do not emit airborne greenhouse gases at the time of electricity generation, contribute a great deal to reduce global warming emissions,
- Preventing the occurrence of floods and floods by controlling the regimes of rivers,
- Hydroelectric power plants have important advantages such as their life span is much longer than other power plants (Ersoy, 2010: 252-256).

2.6. Biomass Energy

Biomass energy is the type of energy provided by various means from organic matter. Energy sources such as wood and sawdust which are included in biomass sources are mostly used for heating and cooking purposes (Iskender, 2005: 30-31).

Biomass energy can be handled in two groups, classical and modern. The province is wood and animal wastes which are used as fuel obtained from trees. The second can be listed as vegetable, urban and agricultural-based industrial waste in the agricultural area (MEB, 2002: 24).

Biomass resources have a significant greenhouse gas reduction potential because they can be re-cultivated sustainably. Some effects of biomass energy applications such as socioeconomic health and poverty, biodiversity in environmental terms and land use in spatial direction are seen (Yılmaz, 2014: 56).

Given the advantages of biomass energy;

- Having an extremely important potential in alternative energy sources because it is a source of energy continuously,
- It can be stored very easily compared to other renewable energy sources,
- Being an indigenous resource and increasing local production,
- Creation of employment and not causing CO_2 increase (Ersoy, 2010: 314-315).

2.7. Wave and Tidal Energy (Marine Origin Energy Resources)

Energy sources from the oceans and seas are alternative energy sources thought to meet rising energy demand. The oceans and seas have a considerable potential at a serious rate, due to the fact that they cover three quarters of the earth. The most important types of energy obtained from the oceans are wave and tidal energy (Karacan, 2007: 327-329).

Wave energy is the source of energy obtained by using waves in seas and oceans. Wave energy, a renewable energy source, has begun to benefit from European countries. Compared to more advanced technologies like wind energy, it is much newer. One of its key features is the highest value of energy intensity among renewable energy sources (MEB, 2002: 29-30).

Tidal energy allows the generation of electricity by benefiting from the rising and falling of waters. Energy is obtained by two methods; first, the water accumulates in a depot, and the difference between the depot and the sea level is the difference in height. Thus, electricity is obtained from potential energy. In the second method, the water rises and falls and turns the turbines placed in front of it. And electricity is generated from generators connected to this type. However, this method is often not used due to the need for very large turbines (Simsek, 2005: 297-300).

When we look at the advantages of marine energy sources;

- Being a clean energy source,
- The continuity of the wind as it continues to flow,
- No fuel costs,
- Long life,
- Failure to cause flood floods due to the fact that the tidal barrage undertakes the breakwater duty.

Wave energy is a clean, endless, inexpensive energy that can be installed in all possible sizes and strengths of power plants as well as the cost of initial investment. Besides these, there is a high initial cost and a negative effect on tourism (MEB, 2002: 31).

3. RENEWABLE ENERGY RESOURCE AND ENVIRONMENT

The physical, social and cultural environment that people and other living beings interact with each other through their lives during their lives is called the "environment" (Ersoy, 2010: 3). Energy is of great importance in industrialization, social and economic development of countries. But from

energy production to consumption, each stage leads to environmental problems. As a result of the use of fossil fuels (coal, natural gas, petroleum), gases such as CO_2, chlorofluorocarbons, methane, nitrogen oxides that spread to the Earth are disturbing the air pollution. Due to the depletion of the airborne equilibrium, some events such as climate change, acid rain, thinning of the ozone layer occur (MEB, 2002: 6). In order to reduce these incidents to the greatest extent, renewable energy sources have begun to be directed.

One of the most important problems in the globalizing world is climate change, and it is seen that the first and most important cause of this climate change is people. In the 4th Assessment Report of the Intergovernmental Panel on Climate Change, held in 2007 as evidence, the most common cause of global warming was defined as behaviors carried out by people (Baykal and Baykal, 2008: 7-8).

Global warming occurs as a result of accumulation of carbon dioxide gas in air globes. The resulting temperature increase causes climatic changes, glaciers rising, sea level rising. In order to prevent global warming, the use of fossil fuels such as coal, oil, and natural gas should be reduced and the energy infrastructure should be brought to the appropriate position to use renewable energy resources (Keles and Hamamcı, 2002: 105).

Greenhouse effect is actually a natural and beneficial phenomenon. The reason why there is a problem today is that human activities have increased the effectiveness. Greenhouse effect, especially atmospheric gases such as CO_2, is light but keeps heat inside and causes heat increase (Ersoy, 2010: 379). It is stated that in 2014 the total greenhouse gas emissions will be 81,7% CO_2, 12,2% methane, 5% nitrogen oxides and 1,1% hydrofluorocarbons. Emissions from energy production industrial activities and activities in agriculture constitute the resulting CO_2 emissions from burning fossil fuels (UNFCCC, 2016).

The main cause of the ozone layer is the production of chlorofluorocarbons bearing chlorine. After the use of energy sources, the emission from the water pierces the ozone layer. In contrast to 65-70% diazot monoxide (N_2O), which is the result of combustion of oil, coal and natural gas, the main effect on the ozone layer is the chlorofluorocarbons (CFCS) gases (Bicici, 2008: 98).

When carbon-containing fuels are burned, they do not harm atmospheres and human health alone, they also cause damage to trees and cause destruction of these forests. In addition, these gases, by closing the pores of the leaves, do not allow photosynthesis and prevent the leaves from staying alive. The acid rain, which is a consequence of the pollution of the atmosphere, burns the leaves in the trees and plants, causing the minerals to reach the soil (MEB, 2002: 7).

CONCLUSION

Increasing environmental problems such as the piercing of the ozone layer and global warming affect human health and economic sustainability in a negative way. These drawbacks lead countries to come up with sustainable development and identify appropriate policies that can be followed. Sustainable development, which attracted the attention of developed countries only in the first years of history, is beginning to draw attention in today's developing countries. Sustainable development has social, environmental, economic and energy dimensions and these dimensions must be considered together.

For centuries, countries have resorted to fossil-based fuels to meet their energy needs. Nowadays, coal has left the place of oil and natural gas. Along with the use of coal, oil and natural gas are extremely dependent on the countries in terms of energy supply security and they are increasing the environmental problems. Increasing use of fossil energy resources, the main cause of the global warming problem, causes environmental degradation and irreversible consequences. Increasing use of

energy after the industrial revolution has increased the amount of CO_2 emissions in the atmosphere, causing climate conditions to change, causing the glaciers to flourish and the increasing number of natural disasters related to them. Today, increasing industrialization and urbanization are accelerating this process.

Renewable energy sources composed of solar, wind, hydro, geothermal and marine sources provide important contributions from socio-economic aspects. In addition to the contribution it provides, some renewable energy sources cost more than traditional energy sources. But today's rapidly increasing technology is driving these costs down. This situation makes renewable energy sources more attractive and increases investments in this area.

The lack of long-term energy policies in the public and private sectors of developing countries, particularly Turkey, in terms of CO_2 emissions and renewable energy is a major deficiency. In countries such as Brazil, Russia, India and China, where there is a significant share of the harmful greenhouse gases released into the atmosphere, a long-lasting energy policy must be established, and these policies must be implemented promptly and decisively. Research on renewable energy should be encouraged and training activities necessary for technology production should be supported. Public support should be established in these countries for the acceptance of renewable energy sources. In this regard, training activities should be solved with exhibitions, conferences and meetings.

REFERENCES

Ablabekova, A. (2008). Comparison of Renewable Energy Sources with Fossil Fuels in Terms of Economic Activity. (Unpublished Master Thesis). Istanbul: Institute of Social Sciences, Istanbul University, Department of Economics.

Berberoglu, C. N. (1982). Electricity Problem in the Economic Development of Turkey. Eskişehir Economic and Commercial Sciences Academy Magazine. 18 (1): 1-19.

Baykal, H. and Baykal, T. (2008). Environmental Problems in a Globalized World. Mustafa Kemal University Journal of Social Sciences Institute, 5 (9).

Bhattacharyya, S. C. (2011). Energy Economics: Concepts, Issues, Markets and Governance. Springer Science & Business Media.

Bicici, R. (2008). *Energy Economy in Turkey. (Unpublished Master Thesis). Zonguldak: Zonguldak Karaelmas University, Institute of Social Sciences, Department of Economics.*

Bilginoglu, M. A. (1991), Energy Problem in Emerging Countries and Alternative Energy Policies. Erciyes University Journal of Economics and Administrative Sciences, 9, pp. 122-147.

Demir, F. (2010). Energy Game. Istanbul. Ayrım Publications.

Demirbas, A. (2008). Production of Biodiesel From Algae Oils. Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, 31(2), 163-168.

Doğanay, H. (1998). Energy sources. Safak Publishing House.

Ertas, C. (2011). Physics 9 Course Book. Ankara: Pasa Publishing.

Ersoy, A. Y. (2010). Energy Consumption in the Context of Economic Growth. Akademik Bakıs Magazine, 20, 1-11.

Goel, M. (2005). Energy Sources and Global Warming. Allied Publishers.

Gultekın, A.H. ve Orgun, Y. (1993). Natural Gas and Environment. Ecology Environment Magazine, 9, 37 - 41.

Iskender, S. (2005). Energy & Nuclear Energy Reality in Turkey and the World. Tütev Publications, Ankara.

Karacan, A. R. (2007). Environmental Economics and Policy. Ege University Publications, Journal of Faculty of Economics and Administrative Sciences, (6).

Keles, R. and Hamamcı, C. (2002). Environmental Science, Ankara: Imge Publications

Koc, E. and Senel, M. C. (2013). Energy Situation in the World and Turkey-General Evaluation. Engineer and Machinery, 54 (639), 32-44.

Ministry of Education, (MEB). (2002). Renewable Energy Technologies. Ankara.

Ozturk, H. (2008). Renewable Energy Sources and Usage. Technical Publisher. Ankara.

Smith, Z. A. (1994). The Environmental Policy Paradox. 125.

Simsek, N. E. (2005). Marine Currents and Turbines. III. Renewable Energy Resources Symposium and Exhibition.

Ministry of Energy and Natural Resources. (2012). Oil Market Sector Report, Ankara

Turkish Coal Operations, (TKİ). (2003). Roof Location in Energy Policies. İstanbul: ITU Mining Faculty Publications.

Timmons, D. Harris, J. M. ve Roach, B. (2014). The Economics of Renewable Energy. Global Development And Environment Institute, Tufts University, 52.

Ucak, S. (2010). *Alternative Energy and Energy Generation - Growth Relation in the Context of Sustainable Development: Panel Data Analysis. (Unpublished Doctoral Thesis) Kocaeli: Kocaeli University Social Sciences Institute.*

Uslu, K. (2004). Energy and Politics in the European Union, Marmara University. Journal of Faculty of Economics and Administrative Sciences, 19 (1), 155-172.

Yılmaz, S. A. (2014). *Green Jobs and Potential for Renewable Energy in Turkey. Ankara: Ministry of Development Specialization Thesis, Publication, (2887).*