

**RENEWABLE ENERGY:  
IDEAS FOR DEVELOPING COUNTRIES**

by

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**The idea of renewable energy:  
Policy lessons for developing countries-  
European Union and Turkey**

**Abstract**

The concept “**energy**” has always been one of the strategic concepts. Its increasing dominance in economics has resulted in important outcomes in both national and international politics. The security of energy supply and the sustainable use of energy sources have become two main problems that have to be solved along with environmental concerns like climate change and socio- economic concerns like sustainable development. The idea of Renewable Energy (RE) has become a crucial factor in the current energy debates.

The paper will examine RE policies of the European Union (EU) and Turkey. Although the EU is a pioneer in RE efforts, it has also policy implementation problems because of its multi-national structure. Turkey can acquire some benefits from the EU policies and practices for improving its energy structure and future policies.

## **Introduction**

Does anybody ever think about: “Why energy is so important for us?” Or “What can people do after two or three hours of electricity cuts? Or “How can we survive(!) if the heating is off in winter?” There may be no sense to answer such questions because energy has always been an important part of human life since the discovery of fire. Not only for our daily life but also for all economic and social activities, we are inevitably bound to energy sources to some extent.

Nature was generally seen as a “mother” because of her productivity in early times of world history. But after the Industrial Revolution, the pace of industrialization was so fast that nature began to be seen as something that should be in the service of humankind with all her endless(!) sources. Today, the reason is not so different but the content and its outcome are enormous. The world economic market is so competitive that the high pace of industrialization of the countries has risen day by day. Thus, the notion of energy has become one of the strategic notions of recent decades.

From the days of the first oil crisis of the 1970s, the issues of “security of energy supply” and “sustainable use of energy sources” have become very important policy issues. Along with the economic reasons, our world is faced with two other serious problems: the environmental problem like “Climate Change” and the socioeconomic problem like “Sustainable Development”.

Climate change has occurred mainly because of human activities like industrialization or transportation in which conventional energy sources producing harmful CO<sub>2</sub> are used. Sustainable Development is a policy outcome of the recent economic developments that indicate limited amounts of natural energy sources. Furthermore, the process of globalization increases inequalities among and within societies who are deprived of economic and social benefits. As a result, energy lies at the heart of these problems.

It is estimated that global energy demand will increase by two thirds between 2001- 2030 (IEA, 2002a). And the main share will come from developing countries like China and India. Unfortunately, the expanding demand for energy will be on fossil fuels which create potential risks for the environment and security of supply. The EU and Turkey are mainly dependent bodies in terms of conventional energy sources (more than 50% and 70% of their energy demands are imported respectively).

The concept of Renewable Energy (RE) is now at the heart of environmental and energy debates. Especially after the crisis of the 1970s, it came to the agenda. One of main advantages of RE is that its sources can be found domestically and naturally in every part of the world depending on the geographical and geological conditions. And they are environmentally friendly energy sources. They can easily relieve the dependency problem of the countries on external energy sources. On the other hand, RE has serious political and economic barriers that prevent its development such as high investment costs, an unequal market structure and lack of public and political support.

The main aim of this article is to discuss the RE policies of the EU and Turkey. Then some policy recommendations will be deduced. The EU is selected as the main participant since it can be seen as the pioneer in attempts for the development ideal of RE in the world. In addition to its feasible natural conditions and being on the crossroads of energy routes Turkey looks likely to have a high potential in terms of being an important world country with high economic growth rates and population increase. As a candidate nation for the membership of the European Union, Turkey should seriously take care in the issues of environment and energy. Unfortunately, the idea of RE is not discussed adequately in academic and political circles.

## **Why renewable energy?**

After the oil shocks of the 1970's, countries were faced with immense oil supply problems. During the recession period that followed, they became aware of threats of energy problems like dependency on external sources and the security of energy supply. Moreover, within the raising green movement, environmental problems became dominant in policy agenda.

The large proportion of today's energy supply is still made up of fossil fuels. As energy demand will grow in the future, more than 90% of the demand will still be met by fossil fuels. It is known that fossil fuels have renewable features in some senses. But, consumption is more than output. It is predicted that fossil fuels can only meet the world's energy demand just for three decades more (IEA, 2002a). In addition to that, the environmental damage that is created by fossil fuels is also another crucial danger in the future. It is estimated that more than 80% of activities that give rise to climate change (CC) have been the result of human activities. As well as environmental damages, CC has also created economic and social losses. If the current pace continues, annual weather and climate losses will reach almost \$150 billion by the next decade (IEA, 2002a). Because of these reasons, RE has gained great importance in the energy policy agenda.

In a broad sense Renewable Energy Sources (RES) can be considered as constantly self-renewing and also less polluting as energy systems. They contain no CO<sub>2</sub> like fossil fuels that creates CC problem. Solar, wind, biomass, geothermal and hydro are the main types of RES. The main advantage of RES is that they can be found in every part of the world depending on geographical and geological situations. In other words, they are indigenous energy sources. The countries do not need to import them, which means they can relieve the dependency problem.

Biomass energy is accepted as a worldwide energy source. Wood, animal or crop residues can be used in many forms. In rural areas, they are used for heating and cooking. But, on a large scale application, they can also be used for electricity production. Its main

advantage is the variety of feedstock. Wind energy can be considered as the most important and fastest growing type of RE.

The share of RES in the world primary energy supply is 2%. Among the OECD countries RES provided 328 Million Tons Oil Equivalent (Mtoe) – 6.2% of Total Primary Energy Supply (TPES)- in 2000. On the other hand, in Non- OECD countries the share of RE is 1043 Mtoe (22.4% TPES). Among the countries of the International Energy Agency (IEA), the share was about 6% in 1999. But, the global share of RE in energy use is projected to decline from 14% (1997) to 12% (2020) (IEA, 2002b) Because, although there has been significant progress in renewable energy technology, there cannot still become feasible for economic activities. Unfortunately, growth in world energy production and consumption in the next three decades is projected to be 65% higher than the growth in the past 30 years (IEA, 2005) The big share of the demand will be on the conventional energy sources, like fossil fuels.

Wind energy is mainly used in electricity generation processes. It can feed into electricity grids (either individual or large scale applications) or used in stand- alone, off- grid applications (IEA, 2002). Solar thermal systems are utilized extensively in heating and providing hot water service for residential or commercial use. One of its main advantages is that unlike the others it produces no air pollution. Geothermal energy is used widely in heating. In many countries, like Turkey, it can be used also in nature and health tourism that may make great contribution to the economic development.

RE has also many economic and social benefits; such as job creation. Employment can be provided at many levels; such as research, production, distribution or deployment. Today, more than 14 million jobs have been created worldwide in RE activities (IEA, 2002a). In the EU, more than 900.000 jobs will be created across Europe by 2020. The US World Watch Institute has estimated that solar thermal systems would generate from 2 to 2.5 times as many jobs as coal and nuclear (Aitken, 2004). Because, RE supports a labour intensive technology and these jobs can be created at local, regional and national levels.

RE technologies are also seen as one of the best solutions for the problem of energy and electricity poverty in underdeveloped regions. After the investigation of the sources, the suitable ones can be provided productively. It brings a new way of life as well as new economic hopes for these regions. RE technologies such as solar, wind and biomass may be viable options for specific off-grid or end-use applications in terms of cost, availability and easy service (IEA, 2002a).

As for the management of the demand for energy, RES may have a proactive role in the energy needs of buildings. New buildings should be designed according to green technology. They can be used efficiently in heating, cooling, lighting or ventilation. After transportation, the building sector is accepted as the biggest sector that consumes energy.

People are so bound to conventional energy sources which have been used for many centuries. But, the idea of RE as a policy issue has existed just for 30 or 40 years. That is to say, RES are a *less experienced* type of energy. For that reason, they have faced explicitly economic and cognitive problems. Economically, investment in RES is still not cost-efficient since market mechanisms like pricing and tax systems are not established properly for the use of RE. Besides, the possible contributions of RE to people's lives are not well known in public opinion.

Intermittency is another disadvantage. Wind power especially is criticized because of noise and visual pollution and also the danger for bird life along with intermittency. Large scale projects of hydro power may disturb local ecosystems and reduce biological diversity. They may cause socioeconomic damage by displacing local populations. On the other hand, its generated power and supply are not feasible for huge industrial activities in terms of security of supply and thus for a totally national energy concept. Indeed, it must be accepted as a credible complement to it.

## **The importance of renewable energy for the EU**

In order to cope with the dependency problem on imported energy sources and environmental problems like CC, the promotion of RES is very crucial for the EU. *White Paper (COM/97/599)*, launched in 1997, is the main policy attempt to promote the use of RES (EU, 1997, p.4).

*“Renewable Energy sources are indigenous, and can therefore contribute to reducing dependency on energy imports and increasing security of supply. Development of renewable energy sources can actively contribute to job creation... which are so central to the Community economic fabric...Deployment of renewables can be a key feature in regional development with the aim of achieving greater social cohesion within the Community...”*

It is obvious that the notion of security of supply is the most important and serious problem for the future of the EU. Because, the dependency level is projected as 71% by 2020 if no measures are taken and the dependency will obviously be on conventional energy sources like oil and gas. The role of RES comes out in that sense: as indigenous source of energy they reduce the level of energy imports with positive implications for trade and security. The second important subject is environment. In order to fulfill the Kyoto commitments before 2010, promoting the use of environmental energy sources is a must. The target is set at 12% for the contribution by renewable sources of energy to the European Union's gross inland energy consumption by 2010 (6% in 2001) (EU, 1997).

The second point of RES for the EU is the contribution to social and economic conditions by creating job opportunities. For example, in Germany, after the approval of the “Electricity Feed- in Law” in 1990, approximately 40.000 new jobs were created in the first 12 years. Moreover, according to the U.S. Department of Energy, only in 2002, 25.000 new jobs were created in the photovoltaic (PV) industry (Aitken, 2004). In addition to job creation, RE is growing as an industrial sector. It offers many business opportunities indeed; especially for the EU. 86% of the wind energy capacity of the world is concentrated in 4 countries: Germany, Denmark, Spain and USA.



In the White Paper, an action plan was set to provide fair market opportunities for RE without excessive financial burdens. Electricity is the most important sector with its 40% of gross energy consumption in the EU 15. In that sense, RE access to the electricity networks at fair prices is therefore a critical step in its development (EU, 1997).

The scope of RES is defined as hydro power, biomass, wind, wave, tidal, solar geothermal, landfill gas, sewage treatment plant gas and biogases. The share of biomass is 3% of total inland energy consumption in the EU. Austria, Finland and Sweden are seen as the best countries that use biomass. The economic benefits of hydro- power are proved but, its main disadvantage is its geographical constraint. Due to the maintenance problems all hydro- power cannot be used. It is stated that the technology of wind energy is the fastest growing feature. And its economic contribution as an industry is amazing. About 90% of the world's manufacturers of medium and large sized wind turbines are European (EU, 1997). The paper puts the objectives for 2010 as: 40 GW wind energy (2.5 GW in 1995), 135 Mtoe Biomass (44.8 Mtoe in 1995) and 100 million m<sup>2</sup> Solar Thermal Collectors (6.5 million m<sup>2</sup> in 1995)

In order to figure out the targets, the EU put many programmes on the agenda like TERES (best practice scenario) and SAFIRE (energy simulation model). Moreover, the programmes like JOULE- THERMIE, INCO and FAIR made a great contribution to the development of RE industry in every sector. The 5<sup>th</sup> and 6<sup>th</sup> Framework Programmes gave special emphasis to the technological developments of RES and the ALTENER programme was the first programme that adopted specific financial instruments for RE promotion (EU, 1997). ALTENER II is to support the establishment, implementation and monitoring of the policy progress. The EU's recent programme "Intelligent- Energy Europe" aims to promote efficient energy use and the use of RE as well as removing market barriers and support local and regional applications.

The Directive 2001/77/EC, launched in September 2001, is another crucial step to *the promotion of electricity produced from renewable energy sources in the internal*

*electricity market*<sup>1</sup>; i.e. liberalization process which is an important policy tool for the EU's energy sector. The target for the energy market is the liberalization of 33% of the energy market in the first instance. The main aim is to supply cheap, continuous and secure energy service along with environmentally friendly sources. All the market barriers and also institutional deficiencies are aimed at being removed in order to reach a Single Energy Market ideal. (EU, 2001)

This directive sets the framework that facilitates the increase in electricity by RE within the EU. According to Jensen (2003), it “constitutes an important milestone in shaping the regulatory framework for RES- E generation in the EU. The target for the share of RE in the total electricity consumption is determined at 22% by 2010. It is believed the target can be reached when all the members have established their own national policies according to the directive. All the targets should take into account the commitments of the Kyoto Protocol.

One of the main policy problems for the EU is the harmonization/ coherence problem between the national and international policies. The institutional, political and even cultural differences between the member states show its impact over all national implementation procedures. There are many official papers, directives and other documents regarding energy policy. But, today, EU officials are not happy with the results of the efforts made until now. The problem will be more serious after the coming of new candidate states. It is not easy to find a compatible way for policies at an international level. These show that the EU has important policy problems although it looks a well- planned and properly governed international institution. The EU as a superior body always recommends the member states to establish necessary national goals and policies about energy: “EU targets can only be reached by the full implementation of the EU's framework by member states together with complementary proactive measures geared to national conditions” (EU, 2004a). But, the problem looks more serious: “it is difficult at this stage to anticipate whether current policies and

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<sup>1</sup> The official name of the Directive

measures implemented in the member states will allow these national objectives to be reached” (EU, 2004b)

For Europeans, RE will be an important factor in order to reach a future ideal like sustainable societies with welfare and social cohesion in a well protected environment. On the other hand, they have also problems in terms of policies. The EU still cannot establish a fully coherent energy framework among the member states which prevents them from reaching the targets of the Lisbon Strategy. But, the EU is the world leader in terms of promoting the use of RE and even in environmental issues; developing countries can learn more from these experiences.

### **Renewable energy and Turkey**

In terms of energy sources, Turkey is a dependent country like the EU. More than half of its energy supplies are imported from different countries. Oil had the biggest share with 58.2% in 2001. Natural gas imports started in 1987. Its share in the total energy imports was 28.3% for the same year. Turkey can only produce 7.7% of her oil consumption domestically. It is estimated that her energy demand will double in the next 10 years. (TUBİTAK, 2003a)

There are two important aspects of energy policies of Turkey like two sides of the coin: one is to put emphasis domestic sources and to deal with inevitable dependency. Another main problem is that it consumes less energy than the other countries. But, it cannot use it on a productive or efficient and clean way. The share of unofficial use of electricity and losses is 20% of total consumption. Moreover, almost 30% of her population lives in rural areas. The socio- economic gap between the regions is so high. About 0.02% of villages do not have electricity services at all. (DİE, 2004). There are so many villages that use traditional ways for cooking and heating like wood, plant and animal residues

Due to her geographical advantage, RE looks likely to have a great potential; especially solar, wind, hydro and geothermal energy. But, the efforts in these directions are not well

developed. Only 35% of total hydro power (128 billion kWh), none of 10 billion kWh wind energy and only 5% of geothermal energy is in use.

The RE sources are the second biggest domestic energy sources in Turkey (after coal). The share of RE sources in TPES was 18.2 % in 1990. Unfortunately, the share fell to 12.3% in 2001 (TUBİTAK, 2003b). However, the first wind energy plant was established in 1998.

In the “National Programme” which is prepared within the scope of *acquis communautaire* for the membership to EU, energy has a special topic that is #14. And the promotion of RE is set as a short- term target. The main aim is specified as making the necessary legal regulations in order to promote the use of RE and to increase its use in the energy market without damaging the existing free market mechanisms. To achieve this target, the bill on “Use of Renewable Energy Sources in the Production of Electricity” #646 has been established where social participation, (i.e. NGOs, universities...etc) remains weak to some extent.

The main target of the law is to provide the necessary conditions to promote the use of RE in the electricity market. The other aims are to determine the resources properly, to support investments while providing R&D incentives and carry out technological developments. The local applications are also given special emphasis in the law. The prior aims are generally the same as the other RE efforts like keeping for energy security in the future, decreasing the dependency on external energy sources and also reaching the international Kyoto targets (TBMM, 2004).

In order to support RE investments, some regulations were established. There are two important regulations in the Electricity Market Law (EPDK, 2004):

- The legal entities applying for licenses for construction of renewable energy facilities are required to pay only 1% of the total licence fee. The licence fee is not taken for the following years.

- Also renewables based generation facilities are exempt from paying the annual license fees for the first eight years following the facility completion date as specified in the licence.

In order to break the force of the monopoly in the prices, the fields of activities were re-organized and the method of pricing according to performance was implemented.

With the EU, Turkey has some joint programmes, SAVE, ALTENER I-II and INOGATE for the structuring of legislative and executive bodies in the energy sector.

Turkey does really need a proper energy vision with definite targets and models. The future projections should be logical and coherent with other social and economic ideals. Moreover, R&D activities and scientific research are very weak. Because of these deficiencies, the efforts for RE cannot be strengthened. The EU membership process will be very beneficial especially in terms of establishing an energy vision. Turkey has to increase its international co- operation with the EU and neighbouring countries in terms of energy.

### **Policy lessons**

The notion of energy is now one of the trenchant issues of our new age which can be described as a wide economic competition era among the world countries. As the industrial competition continues, the dependency of countries on energy sources has risen day by day. After the oil crisis of the 1970s, the notions of security of energy supply and possible energy scarcity problems in the future began to be discussed in the world political agenda. Today, our world is in a new crisis in terms of oil prices. A slight change in energy prices creates many economic and social problems in all energy-dependent countries.

Energy is so wide a concept that it affects many different aspects of our lives; like industrial activities, transportation, electricity, environment...etc. For that reason, energy policies cannot be discussed in a single topic. Along with economic activities, the social and environmental aspects, like the social development of poor regions or the climate change problem, should be included in policy processes.

Energy policies have two main pillars: demand and supply. The former one is much related to the economic and social way of life of a country. The demand management policies are very crucial in that sense. The latter pillar is related to international, economic and social politics and also how much a country is dependent on imported energy sources. The security of energy supply will be the most critical political issue in the near future; since high industrialization, that causes more use of energy, continues. It is obvious that the dependency on energy sources will always exist for countries. There are two main possible policies to cope with this dependency problem and so to secure the energy supply: diversification of energy sources and investment in new sources like Renewable Energy.

Diversification is very important because it is obvious that energy self- sufficiency in a full manner is impossible (a country cannot meet all of its energy demands from its own domestic sources) and also there can be no one single energy option that can meet all demands. In terms of securing the supply and providing the use of new energy sources, RE has become a crucial factor. But, it is well known that with the current condition of RE, it is impossible to substitute the use of conventional energy sources. For that reason, the policies of RE should be accepted as a *complementary* factor regarding the energy efforts.

The development of RES is definitely a policy issue. Without any political and public awareness and support it is impossible to promote them. The countries are so bound to conventional energy sources since they have been used for more than 5 centuries. But, the promotion of RE as a substitute for conventional sources has been discussed politically just for 30 or 40 years.

At first, developing countries should properly establish their own definite energy vision including clear and flexible targets. Of course, this vision should be prepared in accordance with their own economic and social visions. Configuring the future pathways will bring harmony and adequate policy processes to countries. And the targets related to RE should be determined according to that whole energy vision. In that way, the stability in the domestic energy market which makes the investments easier for RE should be provided. Flexibility gives the ability to change the vision according to the possible events and situations. But, as we noticed above, it is impossible for a country to be fully developed in all kind of RES. For that reason, they should determine more reliable RES according to their economic, social (i.e. social and energy requirements of poor regions) and even geographical and geological conditions.

There are two important tools to overcome the economic and cognitive barriers of RES: technological learning and education. R&D efforts and scientific research will open new ideas on that subject. More knowledge or more experience will create more predictability about the future. As Funtowicz and Ravetz (1993) said: “science encompasses the management of irreducible uncertainties in knowledge and in ethics (*in every sphere*) and the recognition of different legitimate perspectives and ways of knowing”. In other words, by the learning process, guided by technological improvements, more reliable information can be provided from which politicians and the public can learn more about RE.

One of the crucial missing points of developing countries like Turkey is the lack of a “*green tradition*”. That is to say, environmental and energy ideals/ way of life have/ has not been so well developed. The old generations did not grow up with the importance of health and a green world. (For example, the first wind turbines were installed in the 1920s in Denmark. In Turkey, energy was considered first after the 1960s in the First Five Year Development Plan and its first wind turbine was established in 1998). For that reason, due to this historical absence, the awareness related to these subjects has remained always weak either publicly or politically. Education can make a great contribution in that sense.

To teach the importance of environment and also energy use in schools and universities will create more sensitive generations.

The developed countries always appear as pioneers or models in terms of dealing with complex issues. Or the international organizations such as the United Nations, World Bank or OECD that are governed by developed countries, are shaping the world economic and political conditions; like energy or environmental policies. They consume more than the developing and underdeveloped countries although they have less population. For that reason their decisions and “the decisions of industrializing countries will have an increasing influence on the level and pattern of world energy use”. (EU, 2004b)

Another good way to deal with the energy problem is by the use of demand management policies. In other words, providing the efficient use of energy is as important as providing new energy sources in terms of the dependency problem, especially for developing countries, because it is a kind of policy which is less expensive and easier to establish socially and politically. Related laws and national campaigns would be very useful in raising public awareness.

Liberalization looks like the main policy tool for the current energy market. Every nation should establish its own liberalization process which is determined according to its own goals, sources and conditions in general. And obviously these policies should be in line with other countries' liberalization policies. In addition to that, to open totally free market options will not be a good policy. The role of the state should be downgraded gradually; but, it can not be diminished completely. A totally free market without state regulation; i.e. full liberalization, will transform the market into a wide and highly competitive capitalist market. For instance, unfortunately, in the liberalization process to determine basic market prices is a very hard task indeed. That is to say, to determine the optimum tariffs for electricity is almost impossible. It requires strong state intervention which is not compatible with a liberalization ideal. And without basic regulations in tariffs and services, the citizens cannot get an energy service in an ideal sense.



Social participation in the policy process should be provided. The existence of public figures, NGO's, academics or experts, will make the acceptance of law and visions easier within the whole society. For that reason, the partnership or network between government, private business and society is very crucial. The productivity of the network will make a great contribution.

The RE ideal is very important for the future of the world. All the players, countries and international institutions who are effective in the world political agenda, should fulfill their own requirements. The developed countries should take more responsibility and be sensitive in terms of establishing a more equal and caring future world. Developing countries should be ready for their increasing role in the near future by providing necessary policies and visions not only in energy but also in all kinds of economic, social and cultural aspects. Energy is the milestone of development issues.

## **Conclusion**

It is well known that energy will be a “blade runner” issue for the future world. Since the 1970's, dependence on imported energy sources and thus the security of energy supply have been important policy issues for many countries. The level of the dependency will rise in the future and the more than half of the demand will come from the developing countries.

To decrease the dependency to external sources of energy and providing the security of energy supply, the utilization of new energy sources will be the most crucial attempt. RES deserve special emphasis in that sense because, they are totally domestic energy sources. That means that they can be found everywhere depending on the geographical and geological conditions of the country. Besides, it can have a great contribution to environmentally friendly activities and also to economic and social development efforts while providing job opportunities and local application possibilities. On the other hand, it

is still not cost- efficient in terms of investment and it has lack of political and public support. For that reason the development of RE still remains weak.

The EU can be considered as the pioneer institution in the promotion process of RE sources, in environmental and energy policy issues. But, successful implementation of energy policies is the main problem for the EU. The relationship between energy, environmental, economic and social policies and also the policies of member states should be prepared in a coherent way.

Turkey is a dependent country in terms of energy with around 70% imported sources. But, instead of promoting new domestic energy sources, Turkey has decided to focus on securing the energy supply. For the last 10 years, a liberalization process has been chosen as a policy tool in terms of restructuring the energy market. On the other hand, due to her geographical position, Turkey has great potential in terms of RE sources. But public and political support is missing. The other unwanted situation is that although Turkey consumes less energy than EU countries, she has a huge population and high economic development. But she cannot use it efficiently. The management of energy demand should be strictly taken into consideration immediately. But, firstly, a definite energy policy vision is required.

The issue of energy is such a strategic issue that it cannot work within a single process. Technological learning and education can be considered as two main tools to overcome the environmental problems and especially the economic and cognitive barriers which prevent the development of RES. The participation of many groups such as universities, institutions, research centers, the private sector and even international institutions should be provided in the process of preparation of strategic policies within the whole world. RE looks like an important factor to the solution of energy problem in the world. But, it is obvious that it cannot be a complete alternative to the conventional energy sources.

Global economic competition will never end. That means our future is very much dependent on energy. The political, economic, social or even environmental problems

related to energy will exist also. In other words, economic and social development attempts in a sustainable manner and a well protected environment also require more energy demand like the industrialization process. For that reason, energy issues will be crucial for the future.

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