The Idea of Renewable Energy: Policy Lessons for Developing Countries—European Union and Turkey

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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 need 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 debate.

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

Introduction

Does anybody ever think about the questions: 'Why is energy 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 in answering such questions because energy has always been an important part of human life ever 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 (!) resources. 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 is increasing day by day. So, 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, such as industrialization or transportation, in which conventional energy sources producing harmful CO_2 are used. Sustainable development is a policy outcome of the recent economic developments that have drawn attention to the limited amounts of natural energy sources. Furthermore, the process of globalization increases inequalities among and within societies which have been deprived of economic and social benefits. And energy lies at the heart of these problems.

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

The concept of Renewable Energy (RE) is now at the heart of environmental and energy debates and was placed on the agenda especially after the crisis of the 1970s. One of the main advantages of RE is that its sources can be found naturally in every part of the world depending on the geographical and geological conditions. And they are environmentally friendly energy sources, which can easily relieve the problem of dependence on external energy sources. On the other hand, RE faces 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. Some policy recommendations will then be deduced. The EU has been chosen as the main participant since it can be seen as the

pioneer in attempts for the development ideal of RE in the contemporary world. In addition to its favourable natural conditions and its location at the crossroads of energy routes, Turkey looks likely to have a high potential in terms of being an important nation in the world with high economic growth rates and population increase. As a candidate nation for membership of the European Union, Turkey should take the issues of environmental and energy very seriously. Unfortunately, the idea of RE is not being discussed adequately in academic and political circles.

Why renewable energy?

After the oil shocks of the 1970s, many countries were faced with immense oil supply problems. During the recession period that followed, they became aware of the threats posed by energy problems such as dependency on external sources and the security of energy supply. Moreover, environmental problems became dominant on the policy agenda in the wake of the growing green movement.

Fossil fuels still account for the major proportion of today's energy supply. As energy demand will continue to grow, more than 90% of the demand will be met by fossil fuels in the future. It is known that fossil fuels have renewable features in some senses. But consumption is higher than output. It is predicted that fossil fuels can meet the world's energy demand for the next three decades only (IEA 2002a). In addition to this, the environmental damage that is created by fossil fuels is another crucial danger for 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. In addition to environmental damage, CC has also created economic and social losses. If the current pace continues, annual weather and climate induced losses will reach almost $150 billion by the next decade (IEA 2002a). It is for these reasons that RE has gained great importance in the energy policy debate.

In a broad sense Renewable Energy Sources (RES) can be considered as constantly self-renewing and also less polluting than conventional energy systems. They contain no CO_2 like fossil fuels and thus do not

contribute to the 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 conditions. In other words, they are indigenous energy sources. The consumer countries do not need to import these sources, which mean they can relieve their dependency problems.

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 mainly used for heating and cooking. On a larger scale, however, they can also be used for electricity generation. The main advantage is the variety of feedstock. Wind energy can be considered as the most important and fastest growing type of RE.

Europe leads the field in the use of wind energy: 12,500 MW by the end of 2000. It is mainly used in electricity generation processes. It can be fed into electricity grids (either individual or large scale applications) or used in stand-alone, off-grid applications (IEA 2002a). Solar thermal systems are utilized extensively in heating and providing hot water 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 also be used in the tourism and health sectors, which may make a great contribution to economic development.

The share of RES in global 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, whereas in non-OECD countries the share of RES is 1043 Mtoe (22.4% TPES). In the member 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).

RE also has many economic and social benefits, such as job creation. Employment can be provided at many levels, e.g. in research, production, distribution or deployment. Today, more than 14 million jobs have been created worldwide by RE activities (IEA 2002a). In the EU, more than 900,000 jobs will be created 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). This is due to the fact that 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 to the problem of energy and electricity scarcity in underdeveloped regions. Once the sources have been investigated, the suitable ones can be selected and provided productively. This will bring a new way of life as well as new economic hopes to these regions. RE technologies such as those for solar, wind and biomass energy may be big 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 with green technology, which can be used efficiently in heating, cooling, lighting or ventilation. After transportation, the building sector is accepted as the biggest energy consuming sector.

People are dependent on conventional energy sources, which have been used for so many centuries. But the idea of RE as a policy issue has emerged only in the past 30 or 40 years. That is to say that there is *less experience* with this type of energy. And for that reason RES face explicit (economic and cognitive) problems. From an economic perspective, investment in RES is still not cost-efficient since market mechanisms such as pricing and tax systems are not favourable for RE. Besides, the possible contributions of RE to people's lives are not well known to the public.

Intermittency is another disadvantage. Wind power especially is criticized because of noise and visual pollution, the danger to bird life and the problem of 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, the power generated and supplied by RES is not feasible for huge industrial activities in terms of security of supply and thus for a national energy concept based solely on RE. RES must indeed be accepted as a credible complement to conventional energy sources. Our future will depend very much on energy. We need to find new solutions.

The importance of renewable energy for the EU

In order to cope with the problem of dependence on imported energy sources and environmental problems like CC, the promotion of RES is crucial for the EU. The *White Paper* (COM/97/599), launched in 1997, is the main policy attempt to promote the use of RES (EU 1997, 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, predominantly among the small and medium sized enterprises 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 at 71% by 2020 if no measures are taken and dependency will obviously be on conventional energy sources like oil and gas. The role of RES arises in that sense: as indigenous sources of energy they reduce the level of energy imports with positive implications for trade and security. The second important subject is the environment. In order to fulfil the Kyoto commitments for 2010, promoting the use of environmental energy sources is a must. The target for the contribution of renewable energy sources to the European Union's gross inland energy consumption has been set at 12% for 2010 (6% in 2001) (EU 1997).

The second point of RES for the EU is the contribution it makes to social and economic conditions by creating job opportunities. In Germany for example, approximately 40,000 new jobs were created in the first 12 years after the approval of the 'Electricity Feed-in Law' in 1990. Moreover, according to the US Department of Energy, in 2002 alone some 25,000 new jobs were created in the photovoltaic (PV) industry (Aitken 2004). In addition to job creation, RE is also 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 four countries: Germany, Denmark, Spain and the 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 40% of gross energy consumption in the EU 15. In this context, RE access to the electricity networks at fair prices is therefore a critical step in its development (EU 1997).

The scope of RES includes hydropower, 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 leading countries in the use of biomass. The economic benefits of hydropower are proven but its main disadvantage lies in its geographical limitations. Due to maintenance problems all hydropower cannot be used. It has been stated that wind energy is the fastest growing technology, 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 firms (EU 1997). The White Paper specifies the following objectives for 2010: 40 GW wind energy (2.5 GW in 1995), 135 Mtoe biomass (44.8 Mtoe in 1995) and 100 million m^2 solar thermal collectors (6.5 million m^2 in 1995).

In order to figure out the targets, the EU has put many programmes on the agenda like TERES (best practice scenario) and SAFIRE (energy simulation model). Moreover, programmes like JOULE-THERMIE, INCO and FAIR made a great contribution to the development of the RE industry in every sector. The 5th and 6th Framework Programmes gave special emphasis to the technological developments of RES and the ALTENER programme was the first programme to adopt specific financial instruments for RE promotion (EU 1997). ALTENER II is designed 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.

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' (EU 2001). The target for this liberalization process, which is an important policy tool for the EU energy sector, 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 institutional deficiencies are to be removed in order to achieve a single energy market (EU 2001).

This directive sets the framework that facilitates the increase in electricity from RE within the EU. According to Jensen, it 'constitutes an important milestone in shaping the regulatory framework for RES-E generation in the EU' (Jensen 2003). The target share of RE in total electricity consumption is 22% by 2010. It is believed that this target can be achieved when all members have established their own national policies according to the Directive. All 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 domestic and international policies. The institutional, political and even cultural differences between the member states show their impact on all national implementation procedures. There are many official papers, directives and other documents regarding energy policy. But EU officials are not happy with the results of the efforts made so far. The problem will become even more serious after the admission of the 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 its member states to establish national energy goals and policies: '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 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 reaching a future ideal of sustainable societies with welfare and social cohesion in a well protected environment. On the other hand, the EU has not succeeded in establishing 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 promoting the use of RE and in environmental issues generally; developing countries can learn from these experiences.

Renewable energy and Turkey

Like the EU, Turkey is dependent on energy imports. More than half of its energy supplies are imported from different countries, with oil having the largest share (58.2% in 2001). Natural gas imports started in 1987, accounting for 28.3% of total energy imports of that year. Turkey can only produce 7.7% of its oil consumption domestically. It is estimated that its energy demand will double over the next 10 years (TUBITAK 2003a).

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

Due to the country's geographical advantages, RES have a great potential, especially solar, wind, hydro and geothermal energy. But the efforts made in this direction have not proceeded very far. Only 35% of total hydropower (128 billion kWh), none of 10 billion kWh wind energy and only 5% of geothermal energy are currently being harnessed.

RE sources constitute the second largest domestic energy source 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 (TUBITAK 2003b). The first wind energy plant, however, was established in 1998.

In the 'National Programme' prepared within the scope of the *acquis communautaire* for EU membership, energy has a special chapter and the promotion of RE is set as a short-term target. The main aim is to issue 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' No. 646 was passed, where social participation (i.e. NGOs, universities, etc.) remains somewhat weak.

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 investment while providing R&D incentives and carrying out technological developments. Local applications are also given special emphasis. The priority aims are generally the same as those of other RE efforts: sustaining energy security in the future, decreasing the dependency on external energy sources and reaching the international Kyoto targets (TBMM 2004).

Some regulations were established in order to support RE investment. There are two important regulations in the Electricity Market Law (EPDK 2004):

- Legal entities applying for licences for the construction of renewable energy facilities are required to pay only 1% of the total licence fee. No licence fee is charged for the following years.
- Renewables based generation facilities are exempt from paying the annual licence fees for the first eight years following the completion date specified in the licence.

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

Turkey has two joint programmes with the EU, MEDA and INOGATE, which focus on the structuring of legislative and executive bodies in the energy sector. Turkey really does 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 and thus not able to support RE efforts. 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 age, which can be described as an era of economic competition among the world's countries. As industrial competition continues, so too does the dependency on energy sources, going up on a day by day basis. After the oil crisis of the 1970s, the notions of secure energy supply and possible energy scarcity problems in the future began to be discussed on a global scale. 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 a prevailing concept. It affects many different aspects of our lives, including industrial activities, transportation, electricity, environment, etc. For this reason, energy policies cannot be discussed as 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 rest on two main pillars: demand and supply. The former is related to a great extent on the economic and social way of life of a country; demand management policies are very crucial in this context. The latter is related to international, economic and social politics and also to the extent to which 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 the high level of industrialization that is causing increased use of energy is set to continue. It is obvious that dependency on energy sources is a problem that will always exist. There are two main policies to cope with this dependency problem and to secure energy supply: diversification of energy sources and investment in new sources such as Renewable Energy.

Diversification is very important because it is obvious that full energy self-sufficiency is impossible (a country cannot meet its entire energy demand from its own domestic sources) and there is no one single energy option that can meet all demands. RE has become a crucial factor in terms of securing energy supply and providing new energy sources. But it is well known that it is impossible to substitute all conventional energy

sources with renewables as things stand now. The policies of RE should therefore be accepted as a *complementary* factor regarding energy efforts.

The development of RES is definitely a policy issue which can only be promoted with full political and public support. The countries depend on conventional energy sources because they have used them for more than five centuries. But the promotion of RE as a substitute for conventional sources has been discussed politically only in the past 30 or 40 years.

At first, developing countries should establish their own definite energy vision in line with their economic and social visions, including clear and flexible targets. Configuring the future pathways will result in coordinated and adequate policy processes. The targets related to RE should then be determined according to this overall energy vision. This should provide stability in the domestic energy market and facilitate investment in RE. Flexibility allows the vision to be adapted to unforeseen events and situations. But, as we noted above, it is impossible for a country to be fully developed in all kinds of RES. Countries should therefore determine the most reliable RES for 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 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' (Funtowicz & Ravetz 1993). In other words, the learning process, guided by technological improvements, provides more reliable information from which politicians and the public can learn more about RE.

One of the crucial points that is missing in the developing countries such as 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 older generations did not grow up with an awareness of the importance of health and a green world. (For example, the first wind turbines were installed in Denmark in the 1920s. In Turkey, energy was first given consideration after the 1960s in the First Five Year Development Plan

and the first wind turbine was established in 1998). For this historical reason, awareness related to RE subjects has always remained weak either publicly or politically. Education can make a great contribution in this context. To teach the importance of environment and energy use in schools and universities will create more sensitive and idealist generations.

The developed countries are always regarded as pioneers or models in terms of dealing with complex issues. International organizations such as the United Nations, World Bank or OECD, which are governed by developed countries, are shaping the world's economic and political conditions, like energy or environmental policies. They consume more than the developing and underdeveloped countries although they have smaller populations. Therefore, 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 the use of demand management policies. In other words, providing efficient use of energy is as important as providing new energy sources in order to solve the dependency problem. This applies especially to developing countries, because this policy is less expensive and easier to establish both socially and politically. Related laws and national campaigns would be very useful in raising public awareness.

Liberalization would appear to be the main policy tool for the current energy market. Every nation should establish its own liberalization process in accordance with its own goals, sources and conditions in general. And obviously these policies should also be in line with other countries' liberalization policies. Opening up totally free market options will not be a good policy. The role of the state should be downgraded gradually, but it cannot be eliminated 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 example, determining basic market prices and optimum electricity tariffs in a liberalized energy market is a very difficult if not impossible task. It requires strong state intervention, which is not compatible with the idea of liberalization. And without basic regulations in tariffs and services, citizens cannot get an energy service in an 'ideal sense'.

Social participation in the policy process should be provided. The presence of public figures, NGOs, academics or experts, will make the acceptance of laws and visions easier within society. A better partnership or network between government, private business and society is thus substantial.

The RE ideal is very important for the future of the world. All relevant players, countries and international institutions should therefore fulfil their tasks. 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 the necessary policies and visions not only in energy but also in economic, social and cultural aspects. Energy is the milestone of all development issues.

Conclusion

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

The implementation of new energy sources will be the most crucial effort that can be made for decreasing dependency on external sources of energy and providing energy supply security. RES deserve special emphasis in this context because they are domestic energy sources that can be found in every country depending on its geographical and geological conditions. Furthermore, they can make a great contribution to environmentally friendly activities as also to economic and social development by providing job opportunities and local application possibilities. On the other hand, RES are still not cost-efficient in terms of investment and suffer from a lack of political and public support, which has impeded their development.

The EU can be considered as the pioneer institution in promoting RE sources, environmental and energy policy issues. The successful implementation of energy policies, however, remains a major problem. The

relationship between energy, environmental, economic and social policies and also the policies of member states should be better coordinated.

Turkey is a very fast growing country, both economically and socially. It is also dependent on energy imports for about 70% of its energy needs. But instead of promoting new domestic energy sources, Turkey has decided to focus on securing energy supply. For the past 10 years, a liberalization process has been chosen as a policy tool for restructuring the energy market. On the other hand, its geographical position gives Turkey great potential in terms of RE sources. But public and political support is lacking. Another drawback is that although Turkey consumes less energy than the EU countries despite its huge population and high economic development levels, it cannot use its energy efficiently. The management of energy demand should thus be given strict consideration immediately. But a definite energy policy vision is required before this process can begin.

The issue of energy is such a strategic issue that it cannot be dealt with in 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 preventing the development of RES. The participation of many groups such as universities, institutions, research centres, the private sector and even international institutions is essential in preparing global strategic policies. RES appear to be an important factor in solving global energy problems, but it is obvious that they cannot be a complete alternative to conventional energy sources.

Global economic competition will never end. This means our future will be very much dependent on energy. The political, economic, social or even environmental problems related to energy will also continue to exist. In other words, attempts to achieve economic and social development in a sustainable manner and in a well protected environment will also result in a higher energy demand. This is why energy issues will be of crucial importance for the future.

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