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Energy Policy in Turkey's Development Plans

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Abstract

The five-year development plans which are prepared by Ministry of Development, State Planning Organization (SPO) formerly, are the basic policy documents revealing the growth that Turkey will realize in economic, social and cultural fields in the long term. A country's energy policy is primarily identified in development plans. The elements such as the availability of energy sources, sustainability of resources, methods of production, distribution and consumption efficiency are should be noted. The objectives of this study can be described as revealing the preparations for development plans to be prepared for future periods specifically ones in area of energy policy, attention to existing and potential problems and making recommendations for the sector by offering solutions to the problems identified.

Keywords: Development Plans, Energy Policy, Energy Sources, Energy Production, Energy Consumption.

1. Introduction

A development plan shows resources to be mobilized for growth according to social justice, ways of using those, regulation needs to be done and measures to be taken as whole and interconnected. It evaluates past performance as a road map, identifies targets for the future (such as export, agriculture, industry, services, employment, income distribution), and it allocates resources for them. Globalization and crises also entail uncertainties. Therefore, plans help institutions and economic actors in prospective decision-making processes. It shows a way to achieving a higher level of prosperity in society. On the other hand, energy, which seen as the engine of development is significant for all countries. Each country must develop its own development moves by considering their available energy resources. Energy resources owned by the country create its energy policy as well. In other words, energy policy expresses the rational evaluation of the country's available energy sources (Tuğrul, 2000:37).

A growing population, urbanization, the expansion of technology brought along with mechanization, electronic equipment and transport growth, rising living standards increase the demand level for energy. Also the manufacturing sector always needs abundant and cheap energy. Shortly, bottlenecks in the energy sector directly affect all segments (Bayrak & Esen, 2014:144). In this study, the ten development plans prepared by State Planning Organization (SPO) for the period from 1963 to 2018 are investigated. Energy policies in the development plans are revealed. Suggestions are made along with assessing the recent situation.

2. The First Five-Year Development Plan (1963-1967)

The first five-year development plan was prepared in accordance with the desire and perseverance in arrangement of Turkish nation's economic and social life with regard to full employment of resources and human dignity (SPO, 1963:3). In those days, 69% of the population could not benefit from electricity (SPO, 1963:2). The main objective was to realize the community's welfare and happiness by means of meeting the needs. Providing cheap fuel for people was one of the basic purposes.

It was aimed to develop energy sources during this plan (SPO, 1963:372). Minimizing production cost on the use of energy sources was the main principle (SPO, 1963:372). Energy consumption was to be encouraged (SPO, 1963:375). By the end of this plan, 560 kg of oil equivalent of energy consumption per capita aimed. However, 503 kg of oil equivalent was able to be achieved. (Yiğitgüden, 1999:21). Resources of actual energy production were as follows: 41% from wood, 37% from coal, 20% from animal and plant residues and 2% from hydraulic sources (Yiğitgüden, 1999:21).

3. The Second Five-Year Development Plan (1968–1972)

The basic principle was to meet Turkey's energy needs (SPO, 1968:553). Prominence was to be given to natural gas exploration, and import of natural gas from neighbouring countries was to be emphasized (SPO, 1968:555). Priority in meeting the energy needs was to be given to the development of water resources (SPO, 1968:558). Establishment of nuclear power plants was to be tried (SPO, 1968:559).

Generation, transmission, and distribution facilities were to be developed beyond the demands in meeting the electric energy (SPO, 1968:558). As a result of rapidly growing industrial sector and increased energy demand brought about by the rapid urbanization, energy consumption per capita, which was 526 kilograms of oil equivalent in 1968, raised up to 602 kilograms of oil equivalent in 1972 (Yiğitgüden, 1999:21). Resources of the actual energy consumption were as follows: 30% from coal, 27% from wood, 26% from oil, 15% from animal and plant residues and 2% from hydraulic sources again (Yiğitgüden, 1999:21).

4. The Third Five-Year Development Plan (1973–1977)

Overall energy consumption was expected to increase rapidly as a requirement of rapid industrialization (SPO, 1972:569). Electrical power production was predicted to be increased in average of 13% annually in this term. This goal had not been achieved in 1973 and 1974 (Baykan, 1977:3). Closing the energy deficit was to be possible through new investments. Significant delays were continuing, especially in energy investments (Baykan, 1977:4). It was indicated in the plan that the energy sources known were insufficient to meet the energy demand estimated for the perspective term (SPO, 1972:570). Improvement of thermal power potential and usage of water resources were to be accelerated especially for meeting electrical power needs (SPO, 1972:578). It was taken into consideration that the energy purchase should not be dependent on a single source. The interconnected system was to be provided to be finalized (SPO, 1972:571).

Three principals had been taken into consideration while electric energy master plan was being prepared (SPO, 1972:570):

- 1) First of all, the equity capital was to be utilized. Energy investment policy based on domestic resources needed to be followed in order to recover the energy production from being dependent on foreign countries and not to increase the negative effect of oil imports on the balance of payments. Oil consumption in Turkey continued to increase despite the world oil crisis began in 1973 (Yiğitgüden, 1999:21).
- 2) Distorted balance of Thermal / hydraulic power sources against hydraulic was to be re-equilibrated. Nuclear and geothermal resources were to be also utilized (SPO, 1972:565). Nuclear energy was to be in operation for long-term production of electric energy. Among the principles of the third five-year development plan, nuclear technology was also located along with nuclear energy (Yavuz, 2000:31). Prototype nuclear power plant was to be started for preparatory educational purposes . Priority was given to the hydraulic plants, and the capacity was increased by 2.7 times within this period (Yiğitgüden, 1999:32).
- 3) Continuity, reliability and affordability of energy were to be provided. When the master plan evaluated, it was understood that the development of power generation and fulfilling the demand part were noted but the other part, energy saving, not accredited enough. The reasons for this were frequent power cuts and voltage dips that adversely affected the manufacturing industry (Baykan, 1977:4).
Energy crisis experienced in the world also affected Turkey. The supply/demand balance was distorted, and mandatory blackouts were been applied (Yiğitgüden, 1999:32). The average annual per capita energy consumption, which was 643 kilograms of oil equivalent in 1973, raised up to 776 kilograms of oil equivalent in 1977 (Yiğitgüden, 1999:21).

5. The Fourth Five-Year Development Plan (1979–1983)

Since energy that economy needed was not able to be met adequately and on time in previous development plan, energy sector created bottleneck situation throughout the national economy (SPO, 1978:394). The majority of the problems which the sector facing with was associated with inadequate investments. Since there were significant delays in financing, planned investments were not able to meet on time (SPO, 1978:20). Utilizing the equity capital was essential for meeting energy demand (SPO, 1978:240). Lignite coal and hydraulic were still the most important energy sources (SPO, 1978:394). Water and coal resources were poorly developed (SPO, 1978:20). Energy demand was constantly been kept under pressure. Increase in domestic oil production was not achieved despite the rapidly rising demand for oil (SPO, 1978:395).

By the end of 1977, half of the energy demand had been met from national resources. Known reserves of national energy sources were to be developed, and exploration of new reserves was to be accelerated (SPO, 1978:407). Research and development efforts were to be made especially for the use of solar energy (SPO, 1978:401). Production and distribution were to be adapted to technological development (SPO, 1978:401). Lignite deposits were to be operated by public authority (SPO, 1978:407). Largest contribution for the closure of the country's energy deficit was predicted to come from lignite (SPO, 1978:401). Efforts were to be intensified for transition to nuclear energy (SPO, 1978:240), and relevant organizations in the development of nuclear technologies were to continue to work in co-ordination (SPO, 1978:407). Priority was on domestic production for all investment goods used in the production of energy. Necessary measures were to be taken for efficient and rational use of energy consumption at every stage (SPO, 1978:407). The annual per capita energy consumption was 743 kilograms of oil equivalent at the end of the term (Yiğitgüden, 1999:21). In the 1980s, there was a significant increase in capacity because of commissioning the new thermal and hydroelectric power plants (Yiğitgüden, 1999:32).

6. The Fifth Five-Year Development Plan (1985–1989)

It was predicted that the share of lignite production, which was 30% at the beginning of the fifth plan term, was to be about 38 percent, the hydraulic energy share was to increase to 20 percent, and the share of crude oil was to decrease (SPO, 1984:104). The biggest share of energy sector investments was to be allocated on production facilities. Therefore, lignite based thermal power plants were given priority in short-term and hydraulic sources in long-term (SPO, 1984:41). Providing support from energy for economic development, giving weight to the production and use of domestic resources were among most important goals of the development plan of this term (SPO, 1984:103). Focusing on energy investments was to be continued, the private sector and foreign capital enterprises, especially for benefiting from renewable energy sources (such as solar, geothermal, wind) were to be supported (SPO, 1984:105). Natural gas explorations were to be accelerated, it was to be tried to supply natural gas from neighbour countries (SPO, 1984:105). The central heating system was to be used (SPO, 1984:106). Prominence was to be given to take advantage of small hydropower plants (SPO, 1984:406). The annual per capita energy consumption raised up to 917 kilograms of oil equivalent in fifth development plan term (Yiğitgüden, 1999:21). During this period, the largest share of overall energy consumption was on natural gas, oil, coal and hydraulic sources, respectively.

7. The Sixth Five-Year Development Plan (1990–1994)

Benefiting from all domestic and imported sources of energy noted to be essential (SPO, 1989:257). Use of natural gas was to be generalized during this term. Despite the given importance to the development of domestic resources, due to the limited and low quality of these resources, big share of imported resources in consumption of still continued (SPO, 1989:257). A balanced diversification of supply was to be applied in terms of sources and space available (SPO, 1989:258). Initiatives increasing the share of the private sector were to be encouraged, and privatization was to be continued accordingly (SPO, 1989:259). A greater contribution was to be supplied from renewable energy, especially from hydraulic sources. The capacity utilization rate of the power plants was to be increased, and measures decreasing the cost of electricity generation, transmission and distribution were to be taken (SPO, 1989:351). Studies were to start during this plan term for transition to nuclear energy technology (SPO, 1989:258). The annual per capita energy consumption was 1017 kilograms of oil equivalent in 1995 (Yiğitgüden, 1999:21).

8. The Seventh Five-Year Development Plan (1996–2000)

The last forty years, electricity consumption had increased by about 11%. The share of domestic oil in total oil supply was 20% (SPO, 1995:136). Initiative for the joint oil production had been continued in Azerbaijan and Central Asia Turkish States. Priority had been given to hydraulic power plants to generate electricity. The amount of energy per capita became 1140 kilograms of oil equivalent in 1997 (Yiğitgüden, 1999:21).

Overall energy production in 1998 had been met by coal 48%, oil 12%, hydraulic 12%, natural gas 2%. The share of non-commercial energy sources and renewable energy sources in total was 26% (Yiğitgüden, 1999:24). The major entry in consumption of sector, which based on imports 49%, was created with a 40% share of oil (SPO, 1995:136). Establishment of a system including competition became harder because of the power plant projects performed which have conditions of guarantee including energy purchase and guarantee for price (SPO, 1995:137). Mining investments towards the production of energy resources were to be focused on.

Use of renewable energy sources were to be expanded. The share of imported sources in consumption was to continue to increase (SPO, 1995:138). Studies which ensure maximum benefit from geothermal sources were to be finished (SPO, 1995:143). The importance given to the distribution and network investment was to be continued in line with the objectives of reducing network losses and improving (SPO, 1995:138). The contribution predicted to come from privatization and private sector did not turn to reality this term. Reduction of public investment and problems with the existing environmental legislation affected investments in the sector adversely.

9. The Eighth Five-Year Development Plan (2001–2005)

Dams' level reached the critical points in hydraulic stations, and this became a severe problem (SPO, 2000:145). The main elements of liberalization work in electricity and natural gas sectors were isolation of public gradually from its investor role, except for distribution, and privatization of plants owned. Additionally, it was ensuring the security of supply and strengthening the regulatory position of public by necessary investments being made by private sector in a competitive market. Within the scope of the liberalization, the public institutions operating in the electricity sector was being restructured while urban natural gas distribution was also expanded by private sector. 50% of the natural gas consumed was used for electric production, 30% for industry and 20% for households (SPO, 2000:152). Almost half of the foreign trade deficit came from energy imports (Alemdaroğlu, 2007:36). By 2006, 47% of Turkey's energy production provided from natural gas, 26% from coal, 23% from hydro, 4% from other sources (Alemdaroğlu, 2007:53). In eighth plan term, these sectors had been opened to competition by legislation. Energy Market Regulatory Authority (EMRA) had been established in order to regulate the market.

10. The Ninth Five-Year Development Plan (2007–2013)

The share of natural gas in energy consumption, which was about 28% in 2005, was expected to rise up to 34% and the share of petroleum products, which was 37%, was predicted to decline 31%. On the other hand, the ninth plan period's electricity demand was projected to increase annually by 8.1 percent, parallel to the developments in predominantly industrial production and services sector (SPO, 2006:58). Construction of sufficient facilities for oil and gas storage was to be provided. Expanding of urban natural gas distribution was to be continued (SPO, 2006:69). Nuclear energy was to be included in electricity generation sources for a healthy diversification of electricity supply (SPO, 2006:59). Increasing the share of indigenous and renewable energy sources to the maximum extent was the target (SPO, 2006:69). Construction of transit natural gas pipelines was to be finished, and the necessary measures were to be taken to be effective in exporting gas to Europe (SPO, 2006:69-70).

11. The Tenth Five-Year Development Plan (2014–2018)

Turkey's high dependence on oil and gas resources, which met largely from abroad, has continued. The share of natural gas in electricity generation in particular, has maintained its heavy weight. Additionally, the high dependency to a few countries in this source has been seen as a risk factor in terms of supply security (Ministry of Development, 2013:14). Due to approximately one quarter of total imports are energy imports, price and supply developments in the global energy market in the future will continue to affect Turkey both in terms of growth dynamics and current account deficit. Creating alternative policies to reduce dependence on foreign energy will create a positive effect on growth and current account deficit.

In this case, mainly lignite for supply size, more benefiting from local resources, the use of nuclear energy for electric production and raising the share of renewable energy sources in energy production are significant (Ministry of Development, 2013:15).

The scope of the privatization of state electricity generation and distribution assets, great progress has been achieved especially in the distribution area (Ministry of Development, 2013:102). The privatization of distribution assets will totally be completed (Ministry of Development, 2013:104). There has been partial progress in the privatization in production.

Domestic coal mines have been opened to the private sector for the purpose of electricity generation. By the end of 2012, the private sector's share in electric power installed has raised up to 62% (Ministry of Development, 2013:102). An agreement has signed with Russia for the construction of Akkuyu Nuclear Power Plant (NPP), which has a power of 4.800 MW. Also an agreement has been signed with Japan for the construction of another NPP in Sinop, which has a power of 4.480 MW (Ministry of Development, 2013:103). Turkey's dependence to external sources on energy supply has continued significantly. In order to reduce that dependency, local sources should be benefited as the best way possible. Therefore, the share of indigenous and renewable energy sources in the production system will be upgraded to the maximum extent (Ministry of Development, 2013:104). The rehabilitation of hydropower plants will be completed (Ministry of Development, 2013:104). Natural gas transmission and distribution network will be expanded countrywide and natural gas will be delivered to all demand points. High voltage electric power transmission projects conducted with neighbouring countries will be finished. The formation of the energy market will be completed (Ministry of Development, 2013:105).

12. Conclusions and Recommendations

In this study, the ten development plans covering the period from 1963 to 2018 are investigated. Turkey's energy policy set out in the development plans can be summarized follows:

- 1) To meet the energy needs of the country in a manner which is quality, environmentally reliable, economic, on time and adequate amount (Yiğitgüden, 1999:46).
- 2) To meet the energy production from indigenous and renewable sources as much as possible,
- 3) To diversify supply sources of energy imports,
- 4) To be efficient and economical in the entire process from production to consumption of the energy,
- 5) To create fully competitive market conditions and functioning by improving the legal regulation in energy market,
- 6) To promote development and use of renewable energy sources.

The recommendations developed for the energy sector in the light of Turkey's development plans include:

- 1) Turkey is not rich in terms of energy sources. An energy source that may be a stand-alone solution to future energy problems of Turkey is not in question. Different energy sources in different parts of the country should be found for solution.
- 2) This sector is 74% dependent on imports (Yazar, 2010:10). It is one of the mainly sectors having the highest dependence rate on foreign resources (Alemdaroğlu, 2007:35). Increasing investment in each year is mandatory for the energy which is essential for the sustainable development of the country and increasing prosperity. The duration of energy projects mentioned are long and financing costs are high. These investments include advanced technologies. Domestic and foreign private capital towards the energy sector should be encouraged.
- 3) Loss or leakage in the distribution systems should be prevented, which is over 20%. Transmission and distribution losses should be improved, and illegal consumption should be avoided. Therefore, it is possible to achieve a more efficient and saving incentive structure.
- 4) During all the planned periods, consumption rate has increased steadily while energy production growth rate gradually has decreased. In other words, national energy sources have poorly developed during those periods. The production cost of the energy is high because of the sector's having a capital intensive structure. Energy consumption should be kept at the lowest level possible. The goal should not be to increase the energy consumption per capita, but it should be to achieve maximum production yield with a unit of energy consumption.

- 5) As a result of the fact that the presence of high-quality fossil fuels such as oil and natural gas are diminishing, energy sources should be developed. To achieve this aim, innovations in the energy sector should be followed. New applications should be take place and renewable energy sources should be expanded.
- 6) For both the private and the public parts of the energy sector, an open competitive market should be created. Accordingly, legislation and regulations should be carried out as soon as possible.
- 7) There are a variety of alternative production sources for electricity production such as thermal, hydro, nuclear, renewable. It is a significant deficiency for Turkey to benefit very little from renewable energy sources except other than hydraulics (Çalışkan, 2009:298). Demand should be taken into account while generating electricity, and the generation with lowest loss and cost should be focused on.
- 8) Thanks to measures to be taken in respect of energy efficiency, less use of energy should be provided in industry, buildings and transport sectors. For this, the A-class energy efficiency activities should be conducted as legal obligations in lighting, insulation, exhaust emissions and about electrical devices.
- 9) Use of new technologies should be introduced in current power generation plants. Thus, efficiency can be increased. The production capacity can also be increased.
- 10) In the 2000s, Kazakhstan, Azerbaijan, Turkmenistan and Uzbekistan has become to the fore as leading producing countries which host significant energy reserves (Yazar, 2011:6). Pipelines which carry oil and natural gas from those countries to Turkey have been put into service. Parallel to this fact, collaborations in energy with almost all countries should be developed.

Lastly, energy is a significant factor in determining all policies in the national and international levels. From this point, Turkey should be the leading country in renewable energy technologies. Existing resources should be developed by rehabilitating, research for new sources should be accelerated and the use of energy potential to the highest degree should be provided.

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