

ENERGY SECTOR OUTLOOK IN TURKEY

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Abstract

Turkey has been one of the countries (among OECD countries) which realized the fastest growth in demand in the last 10-year period. Dependence on imports of oil and natural gas in Turkey is high. In Turkey, the ratio of energy use in industry and in other industries generally above the average of the world. In addition, the ratio of energy use in transport and areas out of energy is below the overall average of the world. The need for investment in the energy sector in Turkey until 2023 is expected to exceed U.S. \$ 120-130 billion. In addition, the new power plant investments of Turkey is expected to be for an annual average of U.S. \$ 5 billion in each year. Financing needs of the energy sector in Turkey are expected to occur through the privatization auctions and investments in new power plants. Consequently, the companies operating in the energy sector are expected to increase the demand of loans from Turkish Banking Sector.

Keywords: Energy, Renewable Energy, Primary Energy Sources, Secondary Energy Sources

JEL Classification: Q210, Q310, G21

TÜRKİYE'DE ENERJİ SEKTÖRÜNÜN GÖRÜNÜMÜ

Özet

OECD (Ekonomik İşbirliği ve Kalkınma Örgütü) ülkeleri içinde Türkiye, son 10 yıllık dönemde enerji talep artışının en hızlı gerçekleştiği ülkelerden biri olmuştur. Türkiye'de enerji piyasasında doğal gaz ve petrol ithalatına bağımlılık yüksek düzeydedir. Türkiye'de, enerji kullanım oranı sanayide ve diğer sektörlerde dünya genel ortalamasının üzerindedir. Ulaştırma ve enerji dışı alanlarda ise dünya genel ortalamasının daha altındadır. Türkiye'de enerji sektörünün 2023 yılına kadar ki toplam yatırım ihtiyacının 120-130 milyar ABD Dolarını aşacağı tahmin edilirken; yeni santral yatırımları için, Türkiye'de her yıl yıllık ortalama 5 milyar ABD Dolarlık yatırım ihtiyacının doğacağı öngörülmektedir. Türkiye'de 2023 yılına kadar enerji sektörünün finansman ihtiyacının yapılacak özelleştirme ihaleleri ve yeni santral yatırımları vasıtasıyla

ortaya çıkacağı tahmin edilmektedir. Dolayısıyla söz konusu finansman ihtiyacının karşılanması amacıyla, enerji sektöründe faaliyet gösteren firmaların Türk Bankacılık Sektörüne ve yurtdışı finans sektörüne yönelik kısa ve orta-uzun vadeli kredi taleplerinde artış olması beklenecektir.

Anahtar Kelime: Enerji, Yenilebilir Enerji, Birincil Enerji Kaynakları, İkincil Enerji Kaynakları

JEL Kodu: Q210, Q310, G21

1. Introduction

As the fields of use of the electrical energy which is the most basic and significant input of all economic activities increase, consumption of electrical energy has become one of the most important indicators of economic and social development. Due to urbanization and industrialization which are results of the rapid increase in the population of Turkey caused the demand in electrical energy to scale up regularly. In Turkey, the electrical energy sector is constantly growing and liberalizing. Based on the increase of demand, the scale of the required investments and the financing needs reached approximately 5 billion Dollars per annum. In order for the said investments to be made by the private sector without causing additional burden on the public financing, the electrical energy sector should be open to competition, the monitoring and auditing activities of the public should be conducted efficiently and security of supply should be controlled and the acceleration of the facilities under public ownership should be prioritized and the investment environment should be improved. It is estimated that the total amount of energy investments required in Turkey might exceed 120-130 billion American Dollars until 2023. The efforts for making the investments required in this frame to be implemented by the private sector as much as reasonably possible continue. Until 2023, the financing of energy sector shall be provided by means of the privatization tenders to be announced as well as the new power plant investments. It is estimated that Turkey shall require approximately 5 billion American Dollars per each year as new power plant plants. The objective of this study is to review and evaluate the structural, economic and financial structure of the energy sector in Turkey in line with the developments and expectations in the Global Energy Industry.

2. Concept of Energy and Energy Resources

Energy is scientifically defined as the capacity or ability to make work (Satman, 2006, p.1); the energy inputs are the most significant inputs of the daily life and energy and industrial products are among the most vital inputs of production (Pamir, 2005, p.67). Energy is among the basic milestones of economic and social welfare as the vital inputs to be used in production processes and as the required means of service to promote the levels of social welfares of the societies

(Şahin, 1994, p.15). In other words, energy is a basic necessity for a system to operate or for the living things to survive. The word Energy consists of the combination of two Works in Greek namely, “en (internal)” and “ergon (work)” and technically, it means the capacity to do work, namely the activity of an object against a force resisting itself (Şen, 2002, p.18).

In terms of whether the qualities of the energy resources can be changed or not, they may be distinguished as the primary and the secondary energy resources (See. Figure 1). The primary energy sources are the sources of energy which may be used without any changes made to their form in the nature (Başol, 1994, p.114). Energy reserves such as oil, natural gas and coal running short can be defined as absolute scarceness whereas failing to access them due to political, socio-economic and technical-technological reasons can be defined as comparative scarceness. The countries which meet most of the energy needs by imports are the countries suffering from comparative shortage of energy (Frondele and Schimidh, 2008, p.4). The secondary energy sources are the energy sources obtained after processing the primary energy sources from certain operations (Başol, 1994, p.114). Energy resources are classified as renewable and non-renewable energy based on whether the energy can be re-used or not. Renewable energy is the type of energy deemed as practically infinite and which can be constantly re-used. For instance, the solar energy comes from the sun and it can be converted into electricity or heat energy. Wind energy, geothermal energy from earth, biomass obtained from the plants and hydro-renewable energy resources obtained from the water. Renewable energy can be defined as the energy which can be replaced as soon as possible (Satman, 2006, p.11). Sustainable energy can be defined as providing the energy for the current needs without damaging the future generations' capacity for meeting their needs. In order for the sustainability of the energy supply to increase, Technologies which increase efficiency should be used to increase the use of renewable energy (Ediger, 2009, p.15).

3. The Outlook of the Energy Sector on a Global Aspect

3.1. Supply and Demand Outlook

Figure 2 shows the distribution of global energy supply and demand based on the types of energy and the sectors based on the distribution and demand. Based on the data obtained from the International Energy Agency – IEA, as of 2010, the total global energy supply is 12.717 million TEP (Ton Equivalent Petrol); 32% of it is crude oil, 27% is coal, 22% is natural gas, 10% is bio-fuels and wastes 6% is nuclear, 2% is hydro and 1% is renewable energy resources. The demand of 8.677 million (TEP) consists of 41% crude oil, 18% electricity, 15% natural gas, 13% bio-fuels and wastes, 10% coal and 3% from the renewable energy sources (International Energy Agency, 2012, p.6). The supply amounting to 4.040 million TEP between total supply and total

demand is directed towards the supply, cycle and energy production. Furthermore, based on Figure 2, of the global total consumption as of 2010, 28% was used in industry, 27% was used in transportation and 36% is used in other sectors (International Energy Agency, 2012, p.28).

Figure 1. The Distribution of Global Energy Supply and Demand based on the types of energy-2010

TOTAL SUPPLY	Million Tons of Oil Equivalent	SHARE (%)	TOTAL DEMAND	Million Tons of Oil Epuivalent	SHARE (%)
Crude Petrol	4.120	32	Crude Petrol	3.575	41
Coal/bag	3.472	27	Electricity	1.536	18
Natural gas	2.721	22	Natural gas	1.319	15
Biofuel and wastes	1.272	10	Biofuel and wastes	1.102	13
Nuclear	725	6	Coal/Bag	850	10
Hydro	292	2	Renewable	295	3
Renewable	114	1	FINAL CONSUMPTION	8.677	100
TOTAL	12.717	100			

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SECTORAL CONSUMPTION	MTEP (Million Ton Petrol Equivalen)	SHARE (%)
Industry	2.423	28
Transportation	2.370	27
Other	3.087	36
Out of energy	797	9
TOPLAM	8.677	100

Source: International Energy Agency, 2012, p.6-28.

The global primary energy consumption increased in 2011 at 2,5%. 0,8% decrease in the consumption in OECD countries was the third decline during the last period of four years. The consumption of non-OECD member countries increased by 5,3% at a 10 years average. Petrol (oil) continued becoming among the leading type of energy at 33,1% in consumption of global energy. However, oil continues losing market share consecutively for the last 12 years (BP, 2012, p.2).

Based on IEA's forecasts; the primary global energy demand which was 12,13 billion TEP in 2012 is expected to reach by 2035; assuming that the current energy policies helped, at an increase of 51%, it will increase to 18,3 billion TEP, based on the policy of new policies which induce efficiency, at an increase of 40%, to 16,96 billion TEP, based on 450 ppm scenario¹ (450

¹ 450 ppm Scenario is 450 particules green house gas goal within one million particles in the atmosphere. The term particule is used for all small particles either solid or liquid which form due to friction, division, erosion, condensation and failure of full combustion.

particles green house gas goal within one million particles in the atmosphere), at an increase of 23%, it is expected to reach 14,85 billion TEP (Yıldız, 2013, p.3).

Figure 2.Scenarios of Global Energy Demand for 2035

SCENARIOS OF GLOBAL ENERGY DEMAND FOR 2035 BASED ON DATA OBTAINED FROM IEA		
CURRENT POLICIES	NEW POLICIES	450 SCENARIO
<ul style="list-style-type: none"> • %30 Coal • %27 Petrol • %23 Natural gas • %14 Renewable • %6 Nuclear 	<ul style="list-style-type: none"> • %24 Coal • %28 Petrol • %23 Natural gas • %18 Renewable • %7 Nuclear 	<ul style="list-style-type: none"> • %16 Coal • %25 Petrol • %21 Natural gas • %27 Renewable • %11 Nuclear

Source: International Energy Agency, 2012, p.48.

The share of the fossil fuels which make up 81% of the global primary energy sources in 2035 will diminish to 80% based on the scenario that the current energy policies continue and it will diminish to 75% based on the new policies scenario.

As it can be seen on Figure 3, based on IEA projections; the share of coal in 2035 in demand for energy, assuming that the current policies will continue, 30%, and based on the new policies scenario of 24% and 450 ppm, it is 16%. Yet, the ratios of petrol and natural gas do not show too big differences in all three scenarios.

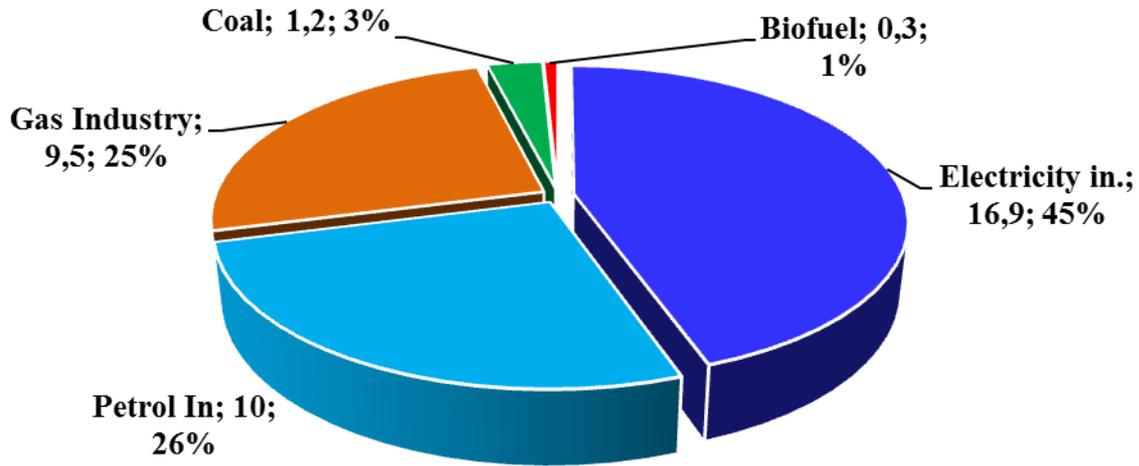
Furthermore, when an evaluation is made based on Figure 3; it can be seen that the nuclear energy will not lose its value and the share of renewable energy in 2035 will be 14% based on the current policies scenario, based on the new policies scenario, 18% and based on 450 ppm., it shall be realized as 27%. Based on all of these scenarios, although the shares of the fossil fuels (petrol, natural gas, coal) comparatively decrease, by quantity they increase (Yıldız, 2013, p.4).

It is expected that the global primary energy demand of 5,6 billion TEP in OECD countries in 2010 will increase by 3,5% in 2030 and reach 5,8 billion TEP. In the non-OECD member countries, the global primary energy demand which is 6,4 billions in 2010 will increase by 69% and in 2030, it is predicted to reach 10,9 billion TEP (Yıldız, 2013, p.5).

3.2. Outlook of the Investments

Based on IEA data, it is forecasted that 37,9 trillion dollars of investment will be made into the energy industry between 2011-2035 on a global scale. As it can be seen in Graph 1, it is planned that the distribution of these investments will be as follows; 16,9 trillion American Dollars (58% production, 11% transmitting and 31% distribution), 10 trillion American Dollars in petrol industry (87% search and production, %3 transportation and 10% refining), 9,5 trillion American Dollars in gas industry (71% search and production, 23% transmitting and distribution and 6% liquefied natural gas) and 1,2 trillion American Dollars (94% mining and 6% transportation) (Ministry of Energy and Natural Resources, 2012, p.10).

Graph 1. Energy Investments based on the Global Resources (Trillion American Dollars)



Source: Ministry of Energy and Natural Resources, 2012, s.10.

3.3. The Outlook of Turkey from Global Energy Market

Turkey takes the twenty first place among the countries of the world in the consumption of primary oil (See. Figure 4); twenty sixth in petrol consumption, twenty first in natural gas consumption, fourteenth in coal consumption, twentieth in electricity consumption and it is the seventeenth among the countries with the greatest coal reserves and thirteenth among the countries which consume the most coal and twentieth in electricity production and twelfth in geothermal energy capacity, twenty seventh in solar energy capacity and sixteenth in wind energy capacity (Ministry of Energy and Natural Resources, 2012, p.44-55).

Figure 3. The status of Turkey in terms of the Global Energy Sources

Global Primary Energy Consumption			Global Electricity Production			Global Renewable Energy Capacity		
RANK	NATION	RATE(%)	RANK	NATION	RATE(%)	RANK	NATION	RATE(%)
1	China	20,3	1	USA	20,3	1	USA	28,4
2	USA	19,0	2	China	19,7	2	Philippines	18,0
3	Russia	5,8	3	Japan	5,4	3	Indonesia	10,9
4	India	4,4	4	Russia	4,9	4	Mexico	8,8
6	Germany	2,7	7	German	2,9	5	Italy	7,9
21	TURKEY	0,9	20	TURKEY	1,0	14	TURKEY	0,7
Others		46,9	Others		45,8	Others		25,3

Global Electricity Production from Renewable Energy			Global Natural Gas Production			Global Natural Gas Consumption		
RANK	NATION	RATE(%)	RANK	NATION	RATE(%)	RANK	NATION	RATE(%)
1	China	18,4	1	Russia	20,0	1	USA	21,7
2	USA	10,5	2	USA	19,2	2	Russia	13,0
3	Brazil	10,3	3	Canada	4,3	3	Iran	4,3
4	Canada	8,7	6	Norway	3,1	4	China	3,4
7	Norway	2,8	22	England	1,7	9	Germany	2,6
12	TURKEY	1,5		TURKEY	0,02	24	TURKEY	1,2
Others		47,8	Others		48,9	Others		53,8

Source: Ministry of Energy and Natural Resources, 2012, s.44-55.

Among OECD nations Turkey in the period covering the last 10 years become the nation which increased energy claim in highest level; in the world since the year 2002 up to now in electricity and natural gas constitutes the second highest claim speed after China. As per Ministry of Energy and Natural Resources projections; that inclination is anticipated to sustain in medium and long term (Yıldız, 2013, p.5).

4. Energy Sector Composition in Turkey

4.1. Structural Composition

In Turkey in the energy market dependency on oil and natural gas import is considerably high; even in the negligible volume natural gas and electricity export is carried out. Natural gas export significantly made toward Greece and Bulgaria. In Turkey industries which consume energy when compared with the requirement all around the world; in Turkey energy consumption rate in industry and in the other sectors exceeds the overall world average and the non-transportation and non-energy industries found below world average.

4.1.1. Energy Supply and Demand Structure

In Turkey energy supply and demand distribution based on energy types and industries which process energy are indicated in Figure 5. Based on information derived from Ministry of Energy and Natural Resources; by the year 2010 aggregate energy supply in Turkey corresponds to 109 million TEP in that volume 32% is originated from natural gas, 30% is originated from coal, 27% is originated from oil, 5% is originated from other solid fuels, 4% hydro and 2% is originated from renewable energy sources.

In aggregate 83 million TEP claim; 33% is composed of raw oil, 23% is composed of coal, 18% is composed of electricity, 16% is composed of natural gas, 6% is composed of other type of solid fuels and 4% is composed of renewable energy resources (Ministry of Energy and Natural Resources, 2012, s.11-14). Remaining between aggregate supply and demand 26 million TEP supply volume is oriented to cycle and energy production. Furthermore, in pursuant to Figure 5, in the year 2010, 37% of the final consumption in Turkey while processed in industry, %18 is processed in transportation and 41% used in the alternative industries, 4% consumed in non-energy industries (Ministry of Energy and Natural Resources, 2012, pp.11-14).

Figure 4. Distribution of Energy Supply and Demand Based On Energy Forms in Turkey-2010

TOTAL SUPPLY	THOUSAND TONS OF OIL EQUIVALENT	RATIO (%)
NATURAL GAS	34.907	32
COAL	33.071	30
PETROL	29.221	27
OTHER SOLID FUELS	5.018	5
HYDRAULIC	4.454	4
RENEWABLE	2.661	2
TOTAL	109.332	100

TOTAL DEMAND	THOUSAND TONS OF OIL EQUIVALENT	RATIO (%)
PETROL	27.667	33
COAL	19.195	23
ELECTRICITY	14.791	18
NATURAL GAS	14.020	16
OTHER SOLID FUELS	4.643	6
RENEWABLE	3.056	4
FINAL CONSUMPTION	83.372	100

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SECTORAL CONSUMPTION	TH.TON EQ. PETROL	RATIO (%)
INDUSTRY	30.628	37
TRANSPORTATION	15.328	18
OTHER	33.956	41
OTHER THAN ENERGY	3.460	4
TOTAL	83.372	100

Source: Ministry of Energy and Natural Resources, 2012, pp.11-14.

The primary energy demand of Turkey was 115 million TEP in 2011 approximately which consists of 31% coal, 32% natural gas, 27% petrol, 4% hydraulic energy and 6% renewable and other energy resources. It is expected that the primary energy demand will increase to 218 million TEP in 2023 by an increase of 90%; it is assumed that the share of coal will be 37%, natural gas 23%, petrol 26%, hydraulic energy 4%, nuclear energy 4% and the shares of other energy resources will be 6% (Yıldız, 2013, p.6).

4.1.2. Natural Gas Market

Based on the data from EPDK (Energy Market Regulatory Authority), a significant part of 760 million Sm³ natural gas production in 2011 realized by the companies holding the wholesale licenses were performed by TPAO (Turkish Petroleum Corporation) and Thrace Basin Natural Gas Corporation. In 2011, the natural gas production in Turkey increased by 11,4% compared to

the previous year and compared to 2006, it has decreased by 19,8% (EPDK, Natural Gas Market, 2012, p.30).

The natural gas the use of which started around 1970's and in line with the advantages it provided based on the demand of energy has become more widespread in time and in more areas and since the current amount and potential is very limited in Turkey due to the reserves and amounts of production, it made obligatory for Turkey to import natural gas. In order to increase the flexibility and the security of supply by diversifying the resources of supply, under the procurement agreement signed by BOTAŞ (Petroleum Pipeline Corporation) in 1988, in 1994 from Algeria, under the agreement signed in 1995, procurement of LNG (Liquefied Natural Gas) started from Nigeria in 1999 (EPDK, Natural Gas Markets, 2012, p.34).

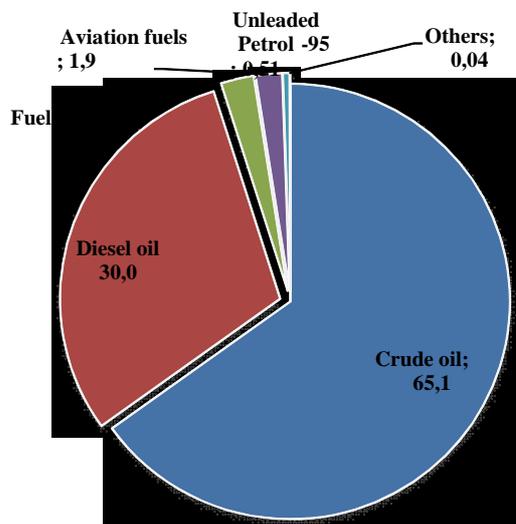
The use of natural gas in Turkey in 2011 is as follows, 20,8% in industry, 25,7% in houses and 53,5% in electricity production. Moreover, in the same year, 58% of the natural gas of Turkey is imported from Russia, 19% is imported from Iran, 9% is imported from Azerbaijan and 9% is imported from Algeria and the rest is imported from the other countries (Ministry of Energy and Natural Resources, 2012, pp.28-29).

The natural gas import figures in Turkey increased by 15% in 2011 compared to the previous year and reached to 43,9 million Sm³ and the rate of increase reached 65% in comparison to 2005 (EPDK, Natural Gas Market, 2012, p.33).

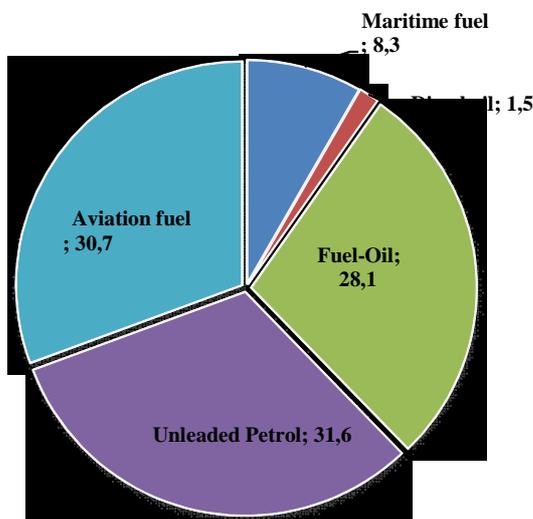
4.1.3. Oil (Petrol) Market

Although in many sectors and areas of use, oil is being replaced by other sources of energy, based on the high rate of use in transportation, it continues to become essential. As of 2011, when we observe the distribution of the oil consumption over the sectors in the globe; it can be seen that it is distributed as follows; 42% motorway transportation, 6% airway transportation, 4% seaway transportation, 2% railways and domestic sea transportation, 10% in petrochemicals, 7% in electricity production, 11% home, commercial, agricultural fields and 18% in industry (EPDK, Petrol Market, 2012, p.4).

Graphic 2. Distribution of Petrol and Petrol Products (%) – 2011



Graphic 3. Distribution of Export of Petrol and Petrol Products (%) – 2011



Source: Ministry of Energy and Natural Resources, 2012, p.26.

As we observe the distribution of the import of the petrol and petrol products in Turkey as seen in Graph 2; it can be seen that the predominant part of the imports comes from 65,1% crude oil and 30% diesel fuel and 2,4% from fuel-oil. Based on graphic 3 on the export of the Petrol and petrol products, the predominant part of the export is; 31,6% from gas, 30,7% aviation fuel and 28,1% from fuel-oil.

As of 2011, on the basis of amounts in Turkey, the production of petrol and petrol products in Turkey was 2,3 million tons, fuel oil sales 19,3 million tons, petrol import 27,7 million tons and petrol export as 7,7 million tons. Fuel oil sales; 76% diesel oil, 14% LPG and 10% gasoline (Ministry of Energy and Natural Resources, 2012, p.26).

The Petrol and natural gas exploration investments in Turkey increased 15 times compared to the end of 2002. The domestic exploration investments which were at 42 million American Dollars in 2002 are planned as 610 Million Dollars in 2012. The drilling length amount which was 47.000 in 2002 was assumed as 247.550 in 2012 and as of the end of October, it was realized as 148.428 meters.

TPAO (Turkish Petroleum Corporation) continues its foreign activities in Azerbaijan, Iraq, Libya, Kazakhstan, Afghanistan Colombia and TRNC so as to support Turkey's supply of crude oil and natural gas. In this scope, in Turkey, as of October 31, 2012, 52 oil exploration and

production companies are present and these companies operate with 385 exploration and 83 operating licenses (Yıldız, 2013, pp.20-21).

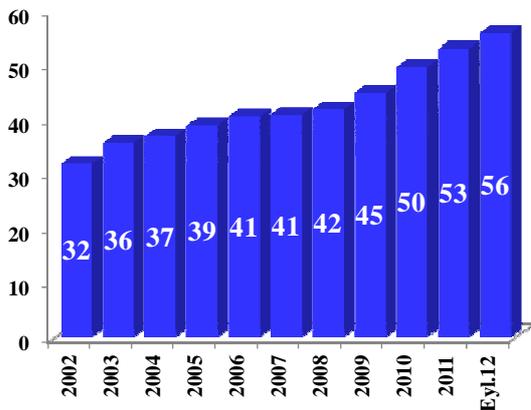
4.1.4. Electricity Market

As it can be seen in Graph 4, the installed electricity in Turkey increased the level in 2011 from 53.000 MW to 56.000 MW as of September 2012. It can be seen in Graph 5 that the electrical energy production in Turkey increased from 211 billion kWh in 2010 to 229 billion kWh in 2011 and as of September 2012, it was realized as 182 billion kWh.

As of September 2012, the distribution of installed electrical power among primary energy sources is as follows; 33,4% hydraulic, 30,7% natural gas, 22,5% coal, 3,8% wind, 2,1% fuel-oil, 0,3% renewable energy, 0,2% geothermal and 6,9% other sources of energy. In the same time, the distribution of electrical energy production based on primary sources of energy is as follows; 41,4% natural gas, 27,2% coal, 25,9% hydraulic, 2,4%wind, 1,6% fuel-oil, 0,3%renewable and other sources are 0,9% (Yıldız, 2013, pp.10-11).

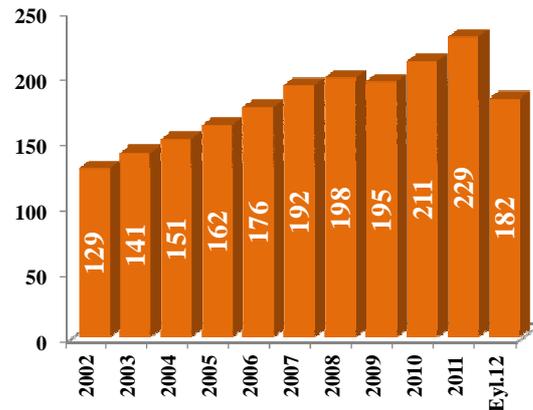
As of 2011, the production of electricity was conducted by the following institutions; 32% EUAŞ (Electricity Production A.Ş.), 27% production companies, 20% build-operate-transfer, 8% EÜAŞ affiliates, 6% build-operate-transfer, 5% auto-producers and 2% by operating right transfers (EPDK, Electricity Market, 2012, p.12).

Graph 4.Total Installed Power of Electrical Energy in Turkey (Thousand MW-MegaWatts)



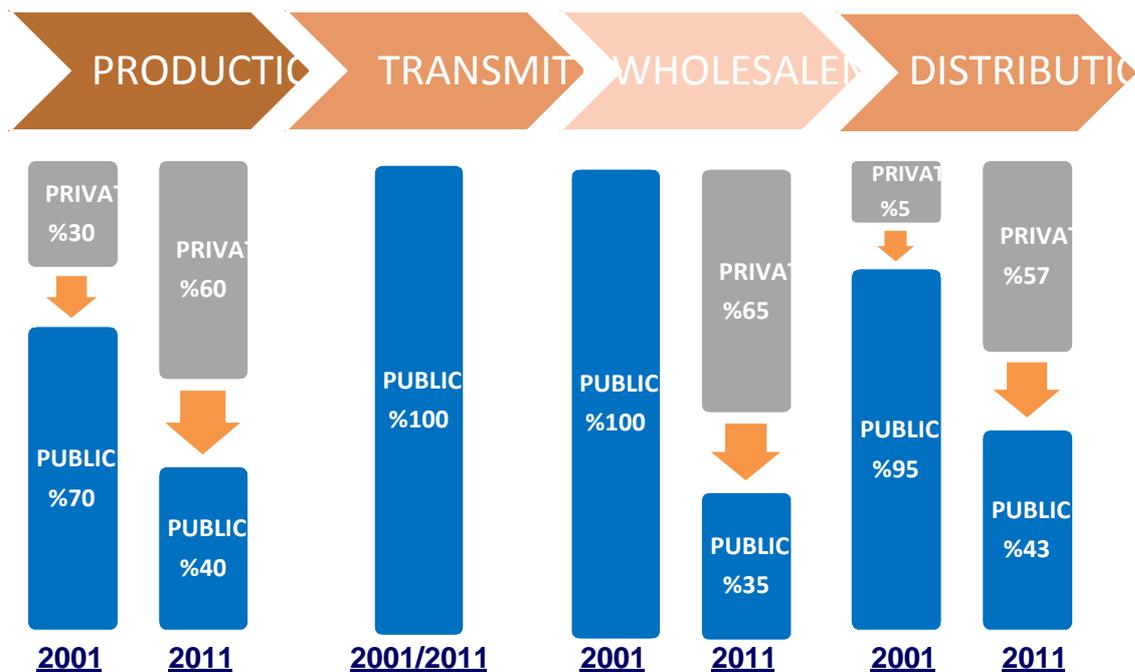
Source: Yıldız, 2013, p.10-11.

Graph 5.Electrical energy production in Turkey (Billion kWh-kilowatt hours)



Source: Yıldız, 2013, p.10-11.

Figure 5. Distribution among Public and Private Sector based on the field of activity in Turkey within Electrical Energy Industry (%)



Source: TEIAS, 2011, p.17.

The global electricity markets consist of basic components such as production, transmitting, supply and distribution. Due to the restrictions of electricity such as it cannot be stored like the other commercial products and it has to be consumed as it is produced, the basic components should be well considered in designing and operating the energy markets. It is widely adopted in the global energy sectors that the electricity market models from which the users may benefit most efficiently and which can be turned into opportunities for the users. In the world, especially in the European energy industry; in order to create more reliable and functional electrical markets, the activities for separately structuring and privatizing the production, transmitting, distributing, trade etc. companies have accelerated. However since the investments require great capitals and based on the difficulties in nationalization, there is still the tendency that the transmitting services are still provided by the public and they are mostly monopoly.

As of 2011, 54% of the installed electricity power was produced by private sector and 46% was produced by the public as it can be seen in Figure 5, 60% of the electricity production is performed by the private sector whereas 40% was produced by the public. As the entire transmitting activities were performed by the public; 57% of the distribution activities were performed by the private sector and 43% were performed by the public (TEİAŞ, 2011, p.32).

In 2002, the installed electricity of Turkey in 2002 at 31.846 MW increased to 55.633 MW as of September 2012 with an increase of 75% and as of the end of October, it has reached to 55.785 MW. In 2011, 3.387 MW of extra capacity was added to the installed electrical power in the

commissioned power plants. Moreover, the number of electricity production plants in Turkey in 2002 which was 300 reached to 643 at the end of 2011 and as of end of October 2012, it reached to 743 and in 2012, the capacity increase was 2.874 MW (TEİAŞ, 2012, p.12).

The commissioning of the new additional capacity and the operation of a well regulated and efficient electricity market, and maintaining the return of the investments and proper and fair competition depends on critical factors such as precautions based on security of supply and providing opportunities of sales or incentives and an environment of trust on economy, politics and regulatory frame, providing transparency and predictability, access to required machinery-equipment, substructure, qualified man power and efficient finance resources (Deloitte, 2010, p.11).

4.1.5. Production of Electricity from Renewable Energy Resources

The installed power of renewable energy resources which was 12.277 MW in 2002 increased by 65% and as of October 2012, it reached to 21.114 MW; the electricity production from renewable resources increased as of 2011 at 71% compared to 2002 and reached 58,2 billion kWh. In 2012, the total installed power of electricity producing plants is 2.014 MW and 378 MW consists of electricity, 1.610 MW consists of hydraulic and 26 MW consists of electricity production plants from garbage gas.

In 2002, the hydraulic installed power of 12.241 MW increased by 49% and as of October 2012, it reached to 18.747 MW. 37% of 140 billion kWh/year in the economic categories is at the stage of commissioning and 21% is being constructed (including the projects constructed by the private enterprise).

As of the end of September 2012, 302 new wind projects were given licenses with 8.953 MW of installed power. In 2002, the wind energy installed power at 18,9 MW reached 2.106 MW as of October 2012. As of the end of 2002, the installed geothermal power at 17,5 MW increased to 114,2 MW as of October 2012. In Turkey, geothermal energy is directly used in the fields of central heating, green house heating and thermal tourism and they are used in 19 settlement areas for residential heating, in 19 fields for green houses and in 350 thermal facilities, for treatment and thermal tourism purposes (Yıldız, 2013, pp.15-16).

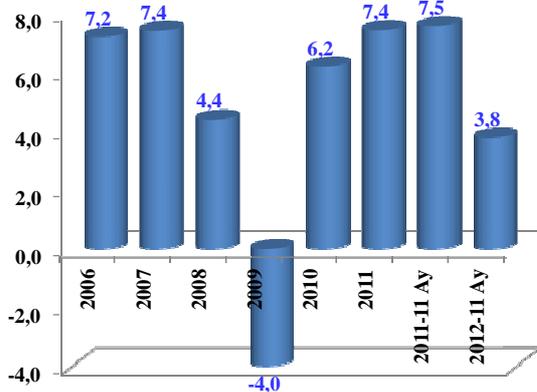
On January 8, 2011, the amendment under 6095 which was enacted on law no. 5346 so as to determine the additional incentives to be given to the domestic producers and to regulate such price incentives provided for the plants producing renewable energy. In this scope, based on the type of the renewable energy producing plant; the price support provided for hydro electrical production plant and wind energy based production plant, the rate is 7,3, for geothermal energy

based production plant, the rate is 10,5, for biomass based production plant (including the garbage gas too) and solar energy based plant, 13,3 (USD cents/kWh). Moreover, for the production made abroad, there is a incentive mechanisms and if Turkish equipment were used in the plants producing electricity from renewable energy sources, the additional price support is between 0,4 and 3,5 Dollar Cents (Official Gazette, 2012).

4.2. Economic Outlook

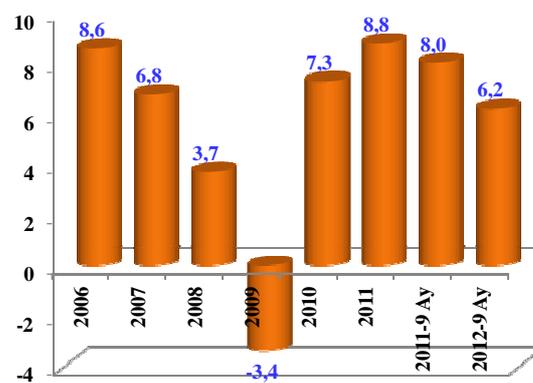
The production of energy sector increased by 7,4% in 2011 compared to the same period of the previous year and during the first 11 months of 2012, it grew by 3,8% compared to the same period of the previous year (See Graph 6). When the development of electricity, gas and water sector GDP (Gross Domestic Product) is reviewed; it can be seen that the added value of the sector increased by 8,8% in 2011 compared to the same period of the previous year and it can also be seen that, in 2012, it increased by 6,2% compared to the same period of the previous year during the first 9 months (See Graph 7).

Graph 6. The development of Energy Production Index in Turkey (%)



Source: Turkish Statistical Institute, 2013.

Graph 7. The development of Electricity, Gas and Water GDP (%)



Source: Turkish Statistical Institute, 2013.

Considering that the economic growth of Turkey decelerated during the first 9 month by 2,6% compared to the same period of the previous year; as it can be understood from both graphs, the growth of energy sector has decelerated in line with the growth of Turkish economy however the rate of growth of the sector was realized at a rate greater than that of the economy (TUIK, 2013)

Table 1. Comparison of Energy Import and Current Accounts Deficit of Turkey (\$ Billions)

PERIOD	TOTAL IMPORT	ENERGY IMPORT	FOREIGN TRADE DEFICIT	CURRENT ACCOUNTS DEFICIT
2002	52	9	-15	-1
2003	69	12	-22	-8
2004	98	15	-34	-14
2005	117	21	-43	-22
2006	140	29	-54	-32
2007	170	34	-63	-38
2008	202	48	-70	-42
2009	141	30	-39	-13
2010	186	38	-72	-47
2011	241	55	-106	-77
2012-10	196	50	-70	-41

Source: Turkish Statistical Institute, 2013; Turkish Central Bank, 2013.

The dependence of Turkey to imports in energy can be clearly seen from the import data. As it can be seen in table 1, the energy import of Turkey in 2011 is approximately 55 billion dollars and the rate received from the total amount of import is 23%. 34 billion American Dollars of 55 billion American Dollars of the energy import (62%) consists of import of oil and oil products and 21 billion American Dollars (38%) consists of energy imports (Ministry of Energy and Natural Resources, 2012, p.15).

4.3. Financial Outlook

The financing of the energy sector in Turkey by way of bank credits can be executed by way of providing short, mid and long term credits from Turkish Banking Industry and obtaining short and long term credits from abroad. The data relating to the use of such credits can be reviewed from BDDK (Banking Regulatory Board) and TCMB (Turkish Central Bank).

4.3.1. Financing by way of Credits

As it can be seen in Table 2e, the amount of total cash credits including TOA (including liquidated receivables) obtained from Turkish Banking Industry increased by 14,5% in November 2012 compared to the same period of the previous year and reached to 34.693 million (TL) and the non-cash credits increased by 8,8% and reached to 20.646 million (TL) and as a result of this, the total credits increased by 12,3% and reached to 55.338 million (TL).

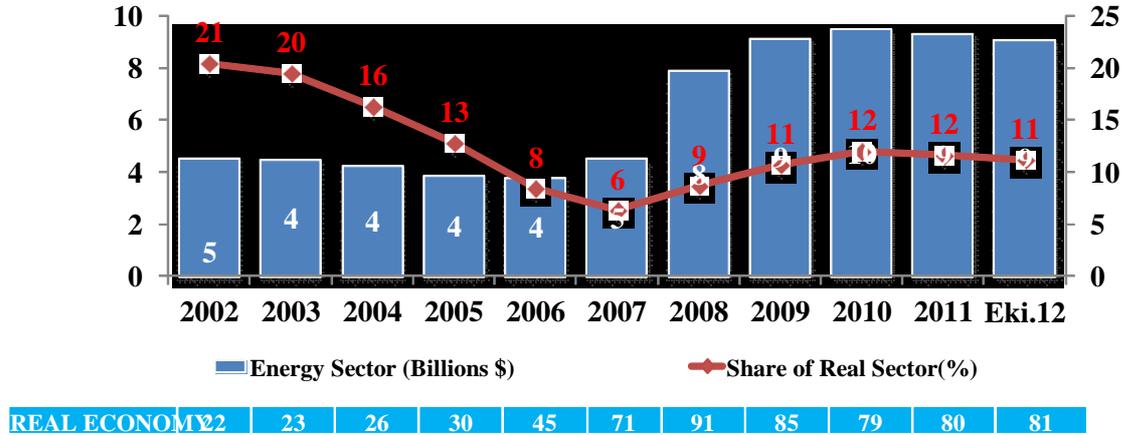
Table 2. Energy Sector Credits of Turkish Banking Industry

ENERGY INDUSTRY (MILLDN TL)				SHARE IN BANKING INDUSTRY			SHARE%	SHARE (%)
PERIOD	CASH CREDITS	NON-CASH CREDITS	TOTAL CREDITS	T. CASH CREDITS	TOA	NON CASH CREDITS	TOTAL CREDITS	TOA/ TOTAL CASH CREDITS
2002	1.221	3.209	4.429	2,0	0,2	5,6	3,8	1,5
2003	1.939	3.664	5.603	2,6	0,3	4,9	3,7	1,2
2004	1.682	3.841	5.523	2,1	0,2	4,1	3,2	0,7
2005	2.323	4.905	7.227	1,9	0,3	4,4	3,1	0,8
2006	4.508	4.507	9.015	2,8	0,4	3,4	3,1	0,5
2007	5.892	5.388	11.280	2,9	1,0	3,6	3,2	1,3
2008	5.892	5.388	11.280	2,9	1,0	3,6	3,2	1,3
2009	14.362	11.916	26.279	5,1	1,0	5,7	5,4	1,0
2010	22.023	15.933	37.957	5,8	0,8	6,3	6,0	0,4
2011	31.114	20.054	51.169	6,4	0,8	6,3	6,3	0,3
Nov.11	30.312	18.966	49.278	6,3	0,8	6,0	6,2	0,3
Nov.12	34.693	20.646	55.338	6,4	0,8	5,8	6,2	0,4

Source: BDDK, 2013.

Based on the same table, when the ratio of credits that the Banking Sector obtains from all credits reach to 6,4% where the energy sector is excluded from the individual credits; the rate of conversion of total credits in cash into TOA was realized at the low rate of 0,4% (BDDK, 2013).

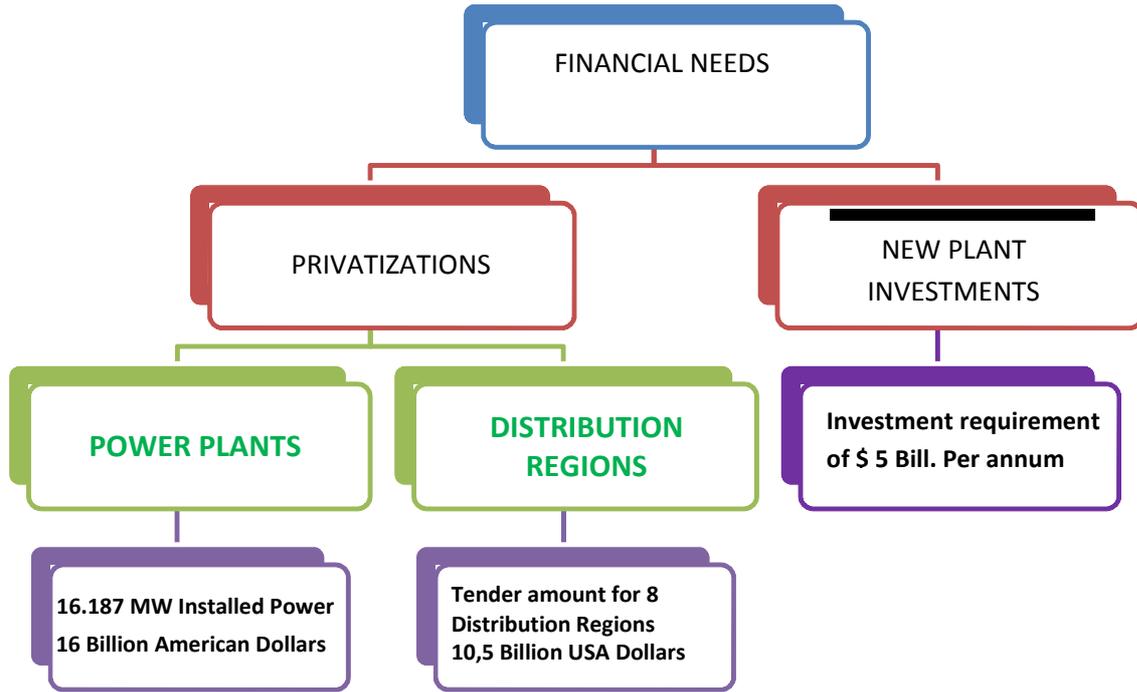
When the progress of the long term credits provided from abroad by the energy sector is reviewed (See. Graph 10); it can be seen that the long term foreign credits of the sector has reached 9 billion American Dollars as of October 2012 and its share within the credits obtained by the real economy is 11%.

Graphic 8. The long term Credits provided from abroad by the energy sector

Source: TCMB, 2013.

4.3.2. Potential Financing Needs

It is assumed that the total investment requirement of the energy industry until 2023 will exceed 120-130 billion dollars until 2023. Activities required so as to arrange the regulations let the private sector make the needed investments are being taken in this frame. The activities performed caused the share of private sector in installed electrical power to reach 56% in 2012 whereas it was 32% in 2002. As of 2012, the share of the private sector in the production of electrical energy reached 61% (Yıldız, 2013, p.28).

Figure 6. Potential Financing Needs of the Energy Industry

Source: Yıldız, 2013, p.28.

As it can be seen in figure 6, the financing needs of the energy sector will be provided by virtue of the privatization tenders to be announced until 2023 and the new power plant investments. It is expected that the financing needs from the privatization will arise from the privatization of the production power plants under the supervision of EÜAŞ and the privatization of 8 electricity distribution companies. It is assumed that Turkey will require 5 billion American Dollars of investment each year for new power plant investments. (Ministry of Energy and Natural Resources, 2012, p.69).

5. Expectations Relating to the Energy Industry

The mid and long term expectations and forecasts relating to the energy sector consists of the expectations and forecasts towards the 2023 Vision of Electricity Industry in 2023, on a global aspect, it consists of the forecasts of International Energy Agency towards the year 2035.

5.1. The Expectations relating to Turkey

With respect to the security of supply in Turkey; it is targeted to use the recognized lignite and pit coal resources for the production of electrical energy until 2023. It is also targeted to commission to 2 nuclear plants until 2023 and to start the construction of a 3rd nuclear plant. Regarding the renewable energy resources of Turkey; it targeted that until 2023, the ratio of the

renewable energy sources among energy supply will increase to 30%, the entire hydro electrical electricity potential which may be used technically and economically may be used in the production of electrical energy until 2023 and the installed power of electrical energy will increase to 20.000 MW until 2023 and the entire geothermal potential of 600 MW will be commissioned until 2023. Moreover, in 2023, it is targeted to increase the installed electrical energy capacity of Turkey to 100 bin MW and to increase the total production of electrical energy to 500 billion kWh.

It is targeted that until 2015, the amount of production of foreign crude oil and natural gas will increase to double the amount of the production in 2008 and as of 2009, the current natural gas storage capacity of 2,1 billion m³ shall double until 2015 (Yıldız, 2013, p.40-41).

As a result; with the privatization of the energy production plants; it is estimated that the share of the private energy sector will increase to %75 and 37% of it and the entire coal resources will be gained to the economy. Until 2023, it is planned that the share of the renewable energy sources will increase to 30% and the share of the natural gas will decrease to 30% and the share of the coal will be 30% and the share of energy will be 10% (Ministry of Energy and Natural Resources, 2012, pp.69-70).

5.2. Expectations on a Global Scale

- Based on the report compiled by International Energy Agency for the Global Energy Outlook in 2011, the summary findings targeted at the global energy sector are as follows (TUSIAD, 2012, pp.1-10):
- It is forecasted that the primary energy demand between 2009 and 2035 will increase by 40% and although the constant demand in natural gas increases significantly, oil will continue becoming the most important source of energy.
- It is estimated that more than half of the additions to global power capacity might be renewable and nuclear energy sources until 2035.
- In 2009, against subsidies of 409 Billion American Dollars supplied against the fossil fuels, it is expected that the renewable subsidies around 66 billion American Dollars by 2035 is expected to increase to approximately 250 Billion American Dollars in 2035.
- It is estimated that the Middle East and Northern Africa Regions shall provide a significant ratio of oil production until 2035 and the companies engaged in production in other regions shall go for resources more costly and more difficult to reach.

- It is estimated that the amount required for energy investments until 2035 is approximately 38 trillion American Dollars cumulatively consisting of 1,5 trillion American Dollars per annum; the electricity production industry requires 45% of this.
- The share of Asia in the export of fossil fuel increases and it is expected that this shall cause market and income diversification in Russia.
- It is estimated that the capacity of electrical production shall decrease by 15% between 2010 and 2035 since a greater number of nuclear reactors were deactivated and since the rate of newly built reactors is less.

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