Overview of Turkey's Coal Necessity, Reserves and Utilization

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ABSTRACT

This article deals with overview of Turkey's coal necessity, reserves and utilization. Turkey is rapidly growing in terms of both its economy and its population. In parallel, its demand for energy, particularly for electricity, is increasing. Turkey possesses fossil fuel resources of hard coal (HC) and lignite (LG) have the greatest importance in energy production and for the national economy. The hard coal and lignite reserves of Turkey are 1.126 and 8.375 millions tons(Mt), respectively. Coal, the major fuel source for turkey utilized mainly for electric power, steel manufacturing and cement production, amounts to 31% of total energy consumption in Turkey. To sum up, providing the total consumption is taken into account in the Middle East, the coal consumption rate of Turkey is approximately 90% of the consumption in this region.

I. INTRODUCTION

Energy is considered to be a prime agent in the wealth generation and also a significant factor in economic development. The importance of energy in economic development has been recognized universally; the historical data attest to a strong relationship between the availability of energy and economic activity (Kaygusuz, 2003).

World primary energy consumption grew relatively strong, by 2.9% in 2003, which is well ahead of the 10 years growth trend of 1.4% per annum. In terms of primary energy mix, coal increases its share from 24.5% in 2001 to 25.5% in 2002, entirely at the cost of oil, whose share dropped to 37.4% in 2002 (Kilic, 2006). Share of other fuels, natural gas, and nuclear and other energy remained more or less the same, at 24.3%, 6.5% and 6.3% in 2002 (Kilic, 2005).

Total recoverable reserves of coal around the world are estimated to be 0.9845 billion tons which is enough to last approximately 220 years at current consumption levels (Table 1). Although coal deposits are widely distributed, 60% of the world's recoverable reserves are located in three countries: the United States, 25%; former

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Table 1. Proved reserves at end 2003 (BP 2004)

Region country	Anthracite and bituminous *Mt	Subbituminous and Lignite Mt	Total Mt	Share of total (%)	R/P ratio
North America	120222	137561	257783	26.2	247
Central and South America	7738	14014	21752	2.2	354
Europe and Eurasia	144874	210496	355370	36.1	300
Africa and Middle East	56881	196	57077	5.8	233
Asia Pacific	189347	103124	292471	29.7	113
Total World	51962	465391	984453	100	220

*Mt: Million tons.

Table 2. Distribution of world coal production according to region country, 2000–2003 (BP, 2004)

Region country	2000 *Mtoe	2001 Mtoe	2002 Mtoe	2003 Mtoe	Change 2003 over 2002 (%)	2003 share of total (%)
North America	608.1	619.4	604.9	589.6	–2.5	23.4
Central and South America	33.8	36.7	33.6	39.2	16.5	1.6
Europe and Eurasia	429.0	438.0	422.9	434.0	2.6	17.2
Middle East	0.6	0.5	0.4	0.6	62.5	***
Africa	130.6	130.0	127.7	137.5	7.7	5.5
Asia Pacific	910.5	984.0	1188.7	1317.7	10.9	52.3
Total World	2112.5	2208.5	2378.4	2518.7	5.9	100.0

*Mtoe: Million tons of oil equivalent.

Soviet Union, 23%; and China, 12%. The rest four countries Australia, India, Germany, and South Africa's reserves amount to an additional 29% (IEO, 2003).

The world's coal production amounted to 2518.7 million tons of oil equivalent (Mtoe) in year 2003. The world's coal production according to region countries is shown in Table 2 (Hesapli, 2004).

The world coal consumption has been in a generally slow growth period since the late 1980s, a trend estimated to continue. The world coal consumption is projected to increase by 1070.3 Mtoe, from 2578.4 Mtoe in year 2003 to 3648.6 Mtoe in year 2025 (EIA, 2003). The distribution of world coal consumption according to region countries, 2000–2003 shows in Table 3.

Coal is one of the major fuel source used for electric power generation. More than half of the world's total coal production currently provides around 37% of the world's electricity. In addition to electric production, coal can be utilized in various important fields such as steel and cement manufacture, and industrial process heating. In the

Table 3. Distribution of world coal consumption according to region country, 2000–2003 (BP, 2004)

Region country	2000 *Mtoe	2001 Mtoe	2002 Mtoe	2003 Mtoe	Change 2003 over 2002 (%)	2003 share of total (%)
North America	604.6	588.9	597.7	612.7	2.5	23.8
Central and South America	20.6	19.4	17.5	17.7	1.0	0.7
Europe and Eurasia	520.6	522.8	513.1	535.9	4.4	20.8
Middle East	7.3	8.0	8.4	8.6	3.0	0.3
Africa	89.5	89.2	91.9	97.2	5.7	3.8
Asia Pacific	898.7	982.8	1183.7	1306.2	10.3	50.7
TOTAL WORLD	2141.2	2211.0	2412.3	2578.4	6.9	100.0

*Mtoe: Million tons of oil equivalent.

developing world, the use of coal in the household, for heating and cooking, is also important (WCI, 2004). According to WCI 2004 data, thermal coal has grown by about 7% per annum over the last 20 years.

Coal is generally the only alternative when low-cost, cleaner energy sources are inadequate to meet increasing energy demand. Developing countries utilize about 55% of the world's total coal today. This percentage is expected to increase to 65% over the next 15 years. In 2050, coal will account for more than 20% of the world's primary energy (Balat and Ayar, 2004).

Turkey produced 48.18 million short tons and consumed 63.54 million short tons in 2003. Coal consumption amounted for 31% of total energy consumption in Turkey (MENR, 2004).

II. ENERGY PRODUCTION AND CONSUMPTION IN TURKEY

Turkey's natural energy resources are quite diversified; hard coal, lignite, asphaltite, oil, natural gas, hydro, geothermal, wood, animal and plant wastes, solar and secondary energy resources, such as coke and briquettes are produced and consumed (Demirbas, 2001).

Turkey produces its energy by using various kinds of resources. However, as of 2003, total domestic production meets about 28.5% of total energy demand. Furthermore, according to the predictions of the World Energy Council (WEC), this percentage will decrease to 28% in 2010 and 24% in 2020. Therefore, the country will import more energy.

In 2003, total primary energy consumption was 83.80 Mtoe. The largest percentage of consumption, 41%, belonged to oil, followed by a combination of lignite and hard coal at 26.9% and natural gas at 20%. On the other hand, Turkey's primary energy production was 23.81 Mtoe in 2003. The Turkish coal sector, which includes hard coal as well as lignite, accounts for nearly one half of the country's total primary energy production, with lignite being the main domestic energy source at 9.85 Mtoe in 2003.

Table 4. Turkey's coal reserves (MENR, 2004)

Reserves	Proven	Probable	Possible	Total	
	*Mt	Mt	Mt	Mt	%
Hard coal (HC)	*428	456	245	1.129	10.33
Lignite (LG)					
Elbistan region	3.357	-	-	3.357	30.72
Other	3.982	626	110	4.718	43.17
Total	7.339	626	110	**8.075	73.89
Asphaltite	45	29	8	82	0.75
Bituminous shale	555	1.086	-	1.641	15.01
Total	8.367	2.197	363	10.927	100.0

*: Available reserves are included

**: It reaches 8.375 *Mt (Million tons) by adding identified and potential sources of 300 Mt.

Hydropower production was 2.95 Mtoe, while noncommercial sources, such as wood and animal/plant wastes, constituted 6.3 Mtoe. Other renewables sources, such as solar, geothermal and wind were marginal at 0.4 Mtoe (MENR, 2004).

III. TURKISH COAL RESERVES AND THEIR CHARACTERISTICS

The geological history of the principal geosynclines situated in between the old blocks begins with depressions in the middle Paleozoic, which have remained under sea continuously or intermittently until recent geological times. Consequently, sedimentary formations cover nearly seven tenths of Anatolia, whereas the metamorphic, igneous, and ultra basic rocks and effusive lavas coming through their weak zones account for only three tenths of the country. Although the effusive lavas extend over large areas, they are mostly napes covering sedimentary rocks. The above-described geology of Turkey has resulted in the formation of very large mineral reserves. Turkey's major minerals include borates, chromites, magnesite, glass, ceramics, cement raw materials, marble, granite, perlite, pumice, bentonite, celestite, sodium sulfate, salt, and LG and HC among fossil fuels (Karayazici, 2002).

In Turkey, terrestrial Tertiary reserves with coal bearing potential cover approximately 110.000 km^2. This area has been examined by the Turkish General Directorate of Mineral Research and Exploration, and an area of 41723 km^2 that appeared to be the most promising for coal mining has been geologically mapped (in scales of 1/25.000 and 1/10.000) and checked by drill holes with a total length of more than 1.212.000 m. Drill-hole intervals lies between 50 and 2650 m. After detailed studies, the extent of the coal-bearing formations was determined to be about 1473,9 km^2. The thickness of coal seams lies between 0,05 and 87 m, with a maximum depth of coal seam from surface being 828 m (Tuncalı and Ocakoğlu, 1995; Gokmen *et al.,* 1993).

Turkey's coal reserves in 2004 are shown in Table 4. As it can be seen in this table, Turkey has mainly both HC and LG reserves. The HC is abundant in and around Zonguldak which has more than 428 Mt of proven reserves. In addition, it is estimated

Table 5. Distribution of Turkey's lignite reserves by region (MENR, 2004)

Regions	Total reserve (Mt)	% of total
The Marmara	825	9.85
Black Sea	215	2.57
Central Anatolia	1.325	15.82
Southeast Anatolia	53	0.63
Aegean	2.014	24.05
East Anatolia	3.580	42.75
Mediterranean	363	4.33
Total	8.375	100.0

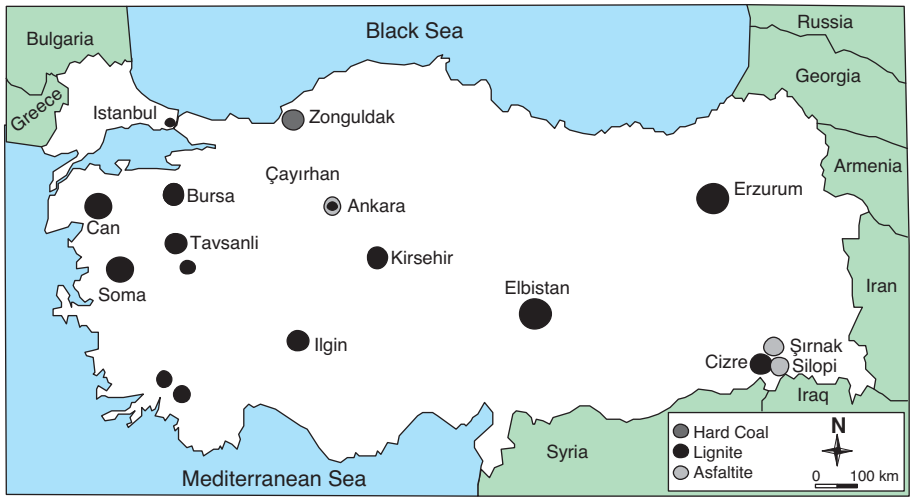


Figure 1. Coal deposits in Turkey

that approximately 20 Mt reserves may be found in the Toros Mountains and in the Diyarbakir province (WECTNC, 2004). The map describing the coal reserves of Turkey is presented in Figure 1.

Rich LG deposits are spread all over the country. The most important reserves are in the Afsin-Elbistan, Mugla, Soma, Tuncbilek, Seyitomer, Beypazari, and Sivas regions. Total LG reserves are estimated to be about 8.375 Mt as of 2004. Table 5 and Figure 1 illustrate the distribution of the Turkish LG reserves by region (MENR, 2004).

Turkey's asphaltite reserves are located in the Southeast Anatolia region, in Sirnak and Silopi Basin, which has 82 Mt of total reserves, about 55% of which is economically feasible (Sari and Soytas, 2004).

The main bituminous shale reserves of Turkey are in the Beypazari, Goynuk, Seyitomer, Ulukisla, and Bolu regions, while total reserves are estimated to be 1.641 Mt.

Table 6. Distribution of Turkey's lignite reserves according to the LHVs (SPO, 2004)

	LHV	Reserve	
kcal/kg	kJ/kg	Mt	% of total
<1.000	<4187	265	3.16
1.000–2.000	4187–8374	5492	65.58
2.000–3000	8374–12561	2038	24.34
3.000–4.000	12561–16748	429	5.12
>4.000	>16748	151	1.80
Total		8375	100

Table 7. Chemical characteristics of Turkish lignites used in thermal power plants in Turkey

Chemical characteristics	*Lower and upper limits	**Weighted averages
LHV (kJ/kg)	1050–3300	1600
Moisture (%)	18–58	41
Ash (%)	15–50	28
Fixed carbon (%)	11–34	24
Volatile matter (%)	10–35	22
Total sulfur (%)	0.5–6	2

*Figures are rounded to one significant figure.
**Weighted average is based on the lignite consumption rate (tons/h) in the thermal power plants.

The General Directorate of Mineral Research and Exploitation (MTA) completed bituminous shale explorations since a substantial portion of Turkey's bituminous shale potential has already been determined (SPO, 2004).

There are a large variety of LG reserves in Turkey. They differ in their contents of moisture, flash, sulfur, calorific value, etc. The large quantity of LG with low quality is abundant. Only 14% of Turkey's coal reserves have moisture content below 20%. The average rate of moisture content is 40% in all LG reserves. Reserves bearing low ash contents are not abundant. About 69% of Turkey's LG reserves consist of the LGs with a LHV of 8374 kJ/kg, as seen in Table 6. Better quality LG of over 12561 kJ/kg only accounts for approximately 7%. The sulfur rate ranges from 1% to 6% (Kural, 1999). The chemical characteristics of Turkish lignites are given in Table 7.

Air pollution from energy utilization in Turkey is due to the combustion of lignite. Coal combustion produces several types of emissions that adversely affect the environment, particularly ground-level air quality. Concern for the environment contributed and will contribute to policies that are related to the consumption of coal and other fossil fuels. The main emissions from coal combustion are sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulates (PM), and carbon dioxide (CO_2) (EIA, 2002).

The rapid growth of electric consumption and the increasing use of domestic lignite, in particular SO_2 emissions have increased rapidly in recent years in Turkey. A total of 2.1 Mt of SO_2 was formed depending on energy consumption in 2001. The major source of SO_2 emission is the power sector, contributing more than 50% of the total emission (SIS, 2003).

At the present time, coal is responsible for 30–40% of world's CO_2 emissions. Turkey has the lowest energy related CO_2 emissions per capita among the International Energy Agency (IEA) countries (Demirbas, 2003). Energy-related CO_2 emissions from coal and its products decreased between 1995 and 2003, while those from natural gas increased over the same period. Coal was the largest source of CO_2 emissions, accounting for 49.1% of Turkey's total emissions in 2003, followed by oil at 44.4% and natural gas at 11.8 (WECTNC, 2004).

IV. UTILIZATION OF COAL IN TURKEY

In Turkey, coal is a major fuel source. Hard coal production has continued to decline since the mid 1980s due to various technical problems encountered in the hard coal mining, while lignite production has begun to increase over the same period. An historical summary and projections of coal production and consumption in Turkey are shown in Table 8, where hard coal and lignite are included (WECTNC, 2004). As can be seen in this table, hard coal production decreased from 2.248 thousand tons (kt) in 1995 to 2.011 kt in 2003, a decline of 237 kt. Within the same interval, lignite production decreased from 52.758 kt to 46.168 kt in a decline 6.59 kt.

Hard coal consumption increased from 8.548 Mt in 1995 to 17.487 Mt in 2003, with an annual average growth rate of 9.35%. In 2003, 9.031 Mt of hard coal was used by the industrial sector, including the iron and steel industry. Within the same interval, lignite consumption declined from 64.049 kt to 46.168 kt in a rate of 4.25%.

In Turkey, the electricity is produced by total 32 thermal power plants with a total installed power capacity of 20 418.8 MW. While 15 of these plants are coal-fired power plants which have a share of 47% in total installed power capacity, the share of natural gas fired thermal power plants is 49% in total and natural gas use in thermal power plants show an increasing trend in recent years (Table 9). The remaining thermal power plants having a share of 4% in total utilize diesel and fuel oil.

The rate of coal in energy consumed in Turkey for electricity generation is projected to be 30% and 27% in 2010 and 2020, respectively, with imported coal shares of 6% and 10% over the period, respectively (WECTNC, 2004; SPO, 2004).

Turkey imports significant amounts of hard coal, mainly from Australia, the United States, South Africa and the former Soviet Union. This coal is used largely to supply Ankara, capital city of Turkey, and three other large municipalities, in all of which to use hard coal rather lignite as a source of heat and power has been preferred in order to prevent pollution resulting from lignite (Demirbas, 2001).

Total coal import reached from 5.951 Mtoe in 1995 to 16.166 Mtoe in 2003, with an average growth rate of 6.1% annually. In 2003, Turkey has bought steam coal 40.4 billion dollars per short tons and metallurgical coal 44.8 billion dollars per short tons from the United States (IEO, 2004).

Table 8. Turkey's HC and lignite LG production-consumption balance between 1995 and 2020 in thousand tons (MENR, 2004)

	History						Projections					
	1995		1999		2003		2005		2010		2020	
	HC	LG	HC	LG	HC	LG	HC	LG	HC	LG	HC	LG
Production	2.248	52.758	1.990	65.019	2.011	46.168	4.800	100.691	4.800	160.542	4.800	184.555
Import	5.941	10	8.864	9	16.166		24.226		47.037		142.235	
Supply	8.548	52.405	11.362	64.049	17.487	46.051	29.026	100.691	51.837	160.542	147.035	184.555
Conversion sector	5.508	39.985	5.871	53.903	7.750	34.945	13.621	84.854	21.713	144.530	53.501	167.993
Power plants	1.246	39.815	1.729	53.739	3.668	34.788	5.033	84.553	10.040	144.100	28.540	167.113
Coke plants	4.182		4.086		4.032		8.448		11.573		24.861	
Other	80	170	56	164	50	157	100	301	100	430	100	880
Total final consumption	3.040	12.420	5.491	10.146	9.737	11.106	15.405	15.837	30.124	16.012	93.534	16.562
Industry	1.803	6.013	4.879	5.239	9.031	7.010	12.424	7.776	26.605	7.826	83.667	8.126
Transport	4		6									
Residential	1.233	6.407	606	4.907	984	4.163	2.981	8.061	3.519	8.186	9.857	8.436

Table 9. Distribution of Turkey's total installed power capacity by fossil fuel type (Energy Statistic, 2003; EÜAŞ 2004)

Fuel	Installed capacity MW	Share (%)
Lignite	8081	40
Hard coal	1510	7
Natural gas	9952.6	49
Diesel oil	192.2	1
Fuel oil	680	3
Total	20418.8	100

V. OVERVIEW OF CURRENT STATE OF COAL GENERATION SECTOR IN TURKEY

The Turkish energy policy is mainly concentrated on assurance of energy supply in a reliable manner and sufficiently in time, under economic and clean conditions and in a way to support and orientate the target growth and social developments.

Given the energy consumption requirements and insufficient domestic supply of energy, the Turkish government has planned to increase investments in the energy sector. According to the government projections, a total of 86.9 billion dollars investment is required in energy production sector by 2020. About 21.7 billion dollars out of this amount is foreseen by the year 2005 (Sari and Soytas, 2004).

Modern life requires energy. The level of energy consumption is considered one criterion by which a country's level of development is measured. The levels of energy dependency and energy consumption in many developed countries are higher than those of developing countries. However, energy demand is growing sharply in developing countries that are adopting modern technologies. In these countries, most of the energy consumption is based on fossil energy sources (Sayın *et al.,* 2005). Because of the growing economy, industry, and population, the rate of electric energy consumption has risen in Turkey as well (Figure 2). Electric energy consumption per person has increased by about 600% in the last 30 years and reached to a level of 1476 kWh; however, this rate is still under global average (SPO, 2000; Energy Statistics, 2003).

Turkey has been undergoing privatization of the state enterprises, price liberalization, and integration into the European and global economy. These economic changes introduced in the 1980s were responsible for economic growth of about 40% was achieved between 1990 and 2000 (Central Bank of Turkey, 2004). Turkey's population has reached 72 million and remains one of the fastest growing populations in the OECD countries. Millions of people are moving from Turkey's rural to its urban, industrial, and tourism areas. As a result of this population movement, Turkey must ensure that economic growth is sustainable, accompanied by environmental and social progress (Ocak *et al.,* 2004).

Table 10 presents the distribution of the electric energy production according to the energy sources for the world and for Turkey in 2001. As can be seen from the table, fossil fuel-fired thermal power plants are used to meet most of the increased electric energy demand. Nearly two-thirds (64.2%) of the world's electric energy production

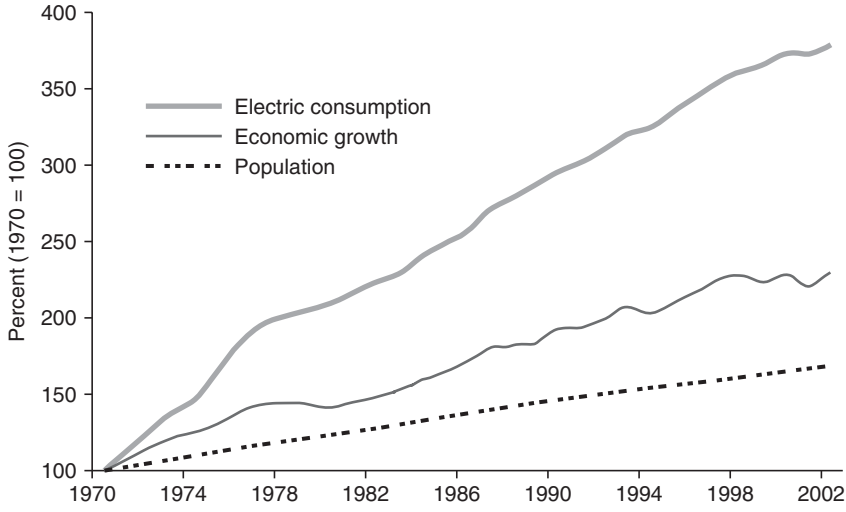


Figure 2. Economic growth and increase in population and electric energy consumption between 1970 and 2002 (Energy Statistics, 2003; SIS, 2004)

Table 10. The electric energy generation according to the production method (adopted from IEA, 2004)

	Fossil-fueled power station (%)				Nuclear power station	Hydro-electric power station	
	Coal	Oil	Gas	Total	(%)	(%)	Others (%)
World	38.5	7.5	18.2	64.2	17.1	17.0	1.7
OECD	37.7	5.9	16.7	60.2	24.0	13.5	2.2
Non-OECD	39.9	10.1	20.6	70.7	6.1	22.6	0.7
EU	26.6	5.8	17.5	50.0	33.3	13.6	3.2
Turkey	31.3	8.5	40.4	80.2	0.0	19.6	0.2

(15 546 411GWh) was met from the fossil fuel-fired thermal power plants. On the other hand, in Turkey, 80.2% came from the fossil-fueled power stations. This rate is much higher than those of the world, OECD, non-OECD, and the EU.

Figure 3 depicts the changes in the distribution of the fossil fuels in Turkey between 1970 and 2004. A noticeable increase in the consumption of the fossil fuel sources was observed as a result of the increased energy demand in 1990s. In recent years, imported natural gas has played a greater role in power generation. This trend toward natural gas is driven by both economic and environmental concerns. Among the fossil fuels, coal has always had a prominent place. Almost one-fourth (23%) of Turkey's total electric production (149 882GWh) was obtained from coal in 2004. More than three-fifth of the coal was lignite; the remaining was from hard coal (MENR, 2004). Lignite is a vital

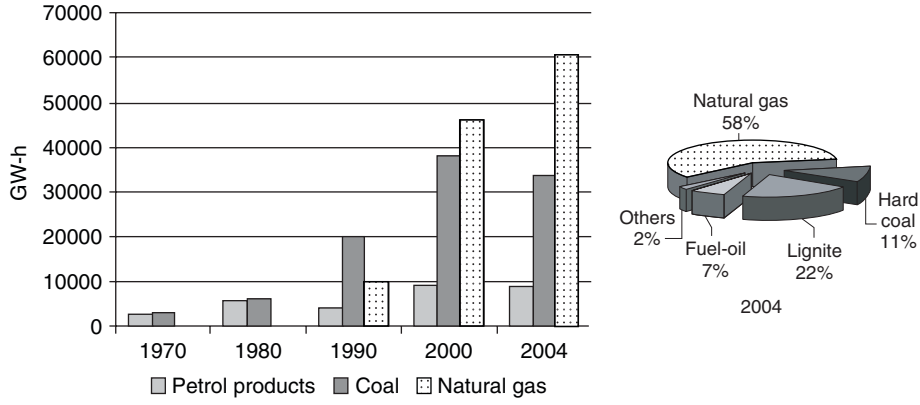


Figure 3. The distribution of the fossil fuels used in thermal power plants in Turkey (Energy Statistics, 2003; EÜAŞ, 2004)

source in the production of electric energy because of Turkey's abundance of lignite reserves.

Hard coal, lignite, and asphaltite are produced and consumed in Turkey. The Turkish HC Enterprise (TTK), the State Economic Enterprise (SEE), is the only hard coal producer. The Turkish lignite Enterprise (TKI) produces some of the lignite resources and all asphaltite resources in the country (Sari and Soytas, 2004).

In 1957 The Turkish lignite Enterprise (TKI) was established affiliated to Ministry of Energy and Natural Resources (MENR). In 1983, as a result of TKI's division The Turkish Hard Coal Enterprise (TTK) separated from TKI. In 1984 some enterprises affiliated to TKI were transferred to EUAS and private sector (Figure 4).

TTK and TKI set the prices of hard coal and lignite for their customers, but these prices are subject to approval by the MENR. These prices do not allow TTK, the Turkish Hard Coal Enterprise, to recover its costs. As a result, the company incurs heavy losses, which are borne by the government. In contrast, TKI, the Turkish Coal Enterprise, does not benefit from direct subsidies any more. Since 1995, the company has been able to cover its costs and gain profit.

The government is considering to privatize TTK and TKI in the long term along with the framework of long-standing privatization programmer. The government also had plans to transfer the operating rights of the most profitable lignite mines to the private sector, especially those owned by TEAS, which deliver coal to mine mouth power plants. Four mines were to be privatized in 1997, and the transfer of operating rights (TOOR) of up to 20 individual mines was to occur in the medium term. However, privatization has actually occurred in only one case, the Cayirhan power plant, through a TOOR procedure. Following difficulties in concluding TOOR contracts with the private sector, the end of the TOOR programmer in the power industry and the possibility for outright privatization opened by constitutional amendments, no further transfers of individual coal mines can be expected.

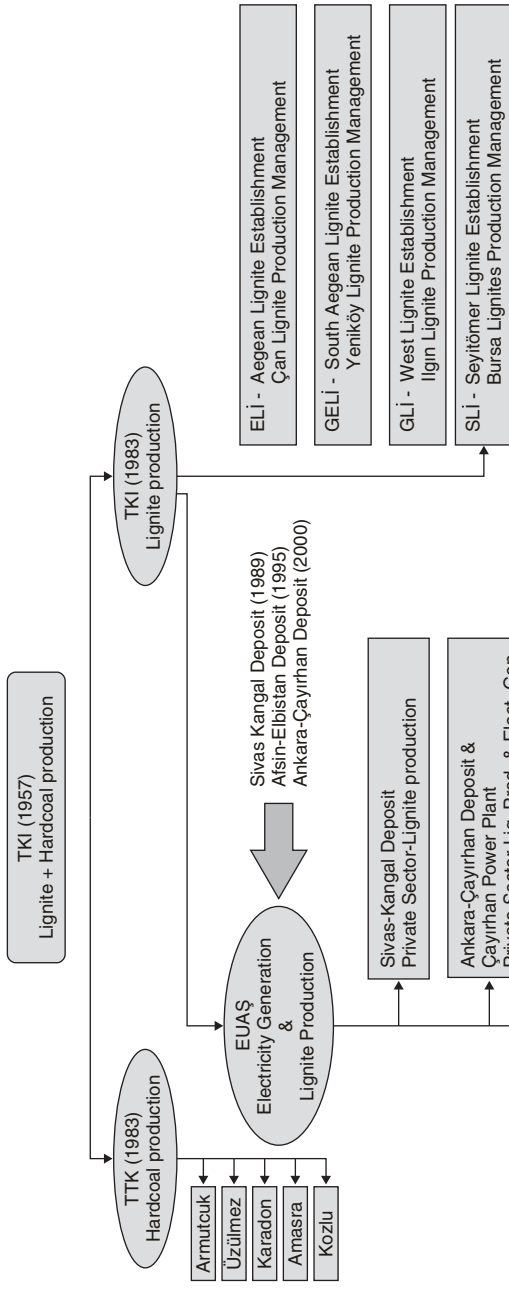


Figure 4. Brief history of restructuring of coal secto

VI. CONCLUSIONS

Obtaining energy cleanly, cheaply and securely which is one of the most important parameters of the development of societies is an issue on the agenda of almost all the countries. Countries evolve international law regulations owing to environmental pollution. In addition to this; they carry on research and development (R&D) studies on cheapest and cleanest energy kinds. Moreover they make commercial, political and even military efforts in order to obtain energy continuously.

World primary energy demand grew at nearly 3% during 2003, while coal demand grew at 4%, reinforcing coal's continuing essential position in world energy supply. Total recoverable reserves of coal around the world are estimated to be 0.9845 billion tons which is enough to last approximately 220 years at current consumption levels. About 80% of coal is used for electricity generation, while iron and steel production accounts for two-thirds of the remaining coal use.

It is obvious that explored oil and natural gas reserves in the world are run out of within this century. Yet, current coal reserves are sufficient enough to be in use in next 220 years with estimated consumption rate. As a consequence, with growing energy demand, the importance of coal is again put into action in the near future.

Another point we must consider is that instability in oil prices (loss of King Fahd of Saudi Arabia, badly affected oil prices per barrel and the prices were over 60 USD/barrel and this is an example to show instability) affects the developing countries that are especially dependent to import oil. Naturally, for those countries instability in oil prices lead to instability in energy prices. This instability in prices is distracted the attention of the countries to alternative energy resources. One of the alternative resources to oil is coal and Turkey is one of the countries possessing rich coal reserves to be used for energy production in the near future.

Turkey's natural energy resources are quite diversified; hard coal, lignite, asphaltite, oil, natural gas, hydro, geothermal, wood, animal and plant wastes, solar and secondary energy resources, such as coke and briquettes are produced and consumed. Among these, the hard coal and lignite have the greatest importance in energy production and for the national economy.

Turkey is an energy-importing country producing 30 Mtoe but consuming 80 Mtoe. The energy import ratio of Turkey is 65–70% and the majority of this import is based on petroleum and natural gas. Furthermore, while world energy demand increases by 1.8% annually, Turkey's energy demand increases by about 8%.

Turkey has mainly HC and LG reserves with 1.126 Mt and 8.375 Mt as of 2004, respectively. Rich LG reserves are spread all over the country. Turkey's coal reserves constitute 0.6% of the world reserves.

A large portion of Turkey's coal reserves is low-grade. About 69% of Turkey's lignite reserves consist of LG with a lower heating value of 8.374 kJ/kg, while better quality LG of over 12.561 kJ/kg only accounts for approximately 7%. The hard coal has a calorific value between 5650–7250 kcal/kg (23655–30354 kJ/kg).

Undoubtedly, oil and natural gas reserves are insufficient to meet Turkey's energy demand. Therefore these energy sources are imported to a large extent. It is expensive to import these kinds of energy sources, they lack import guarantees and do not contribute any added value to the country's economy, which bring about unfavorable

effects. Thus, it becomes important for Turkey to tend towards domestic sources with regard to economy and energy strategies. As a consequence, use of coal, which is one of the domestic resources of Turkey, gains great importance.

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