

THE MINING INDUSTRY OF TURKEY¹

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ABSTRACT

Turkey has very diverse mineral deposits due to its extremely complex geology. The country is a major producer of a great many industrial minerals including boron minerals. A wide variety of primary metallic minerals and a significant amount of lignite are also produced in the country. In this study, the mining industry of Turkey has been examined. In this respect, the mineral potential and primary mineral production of the country have been reviewed. Related minerals legislation and institutional structure of the mining sector in Turkey have also been presented beside recent privatization efforts in the sector.

Key words: TURKEY, MINING INDUSTRY, MINERAL RESERVES, MINERAL PRODUCTIONS, MINE LEGISLATION

GENERAL ECONOMIC OUTLOOK OF TURKEY

With approximately 73 million of population and 16th largest economy in the world, being a young, growing and EU candidate country, Turkey's economic policies have shown significant differences before and after 1980. Industrialization strategies based on an import substitution policy had been left and the reforms were designed to transform the structure of the economy in the direction of an open, liberal and market-oriented since 1980's. The main components of the economic reform of Turkey are diminishing government intervention and liberalizing economic sectors, implementing a floating exchange rate policy, loosening import and export regulations, encouraging foreign investments, deregulating financial markets and privatizing public entities.

Today, Turkey is far more integrated into the global economy and the Turkish economy has experienced an average growth rate of almost 5 percent over the past 20 years (Figure 1). The gross national product (GNP) increased by 100% since 2000 to \$400 billion, and the per capita GNP rose to \$5,500 in 2006. The share of industrial product in GNP is 26% and agriculture is approximately 10% (State Planning Organization, 2007).

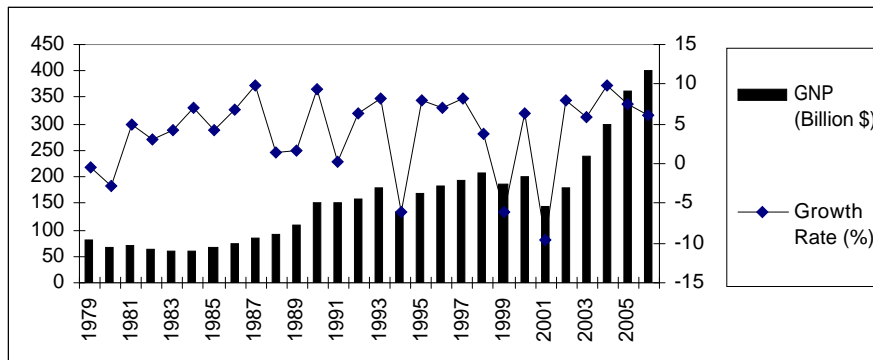


Figure 1. Development of gross national product and growth rate figures of Turkey

The share of the public sector in the Turkish economy has been decreased through the reform process in recent years. More than 80% of gross fixed investment of \$86 billion in the economy in 2005 is realized by

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the private sector while the figure was 60% in 1980 (State Planning Organization, 2007). The other remarkable development of the reform process has been shown in the foreign trade (Figure 2). The rate of increase both in export and import figures in this period has been extremely high (Turkish Treasury, 2007).

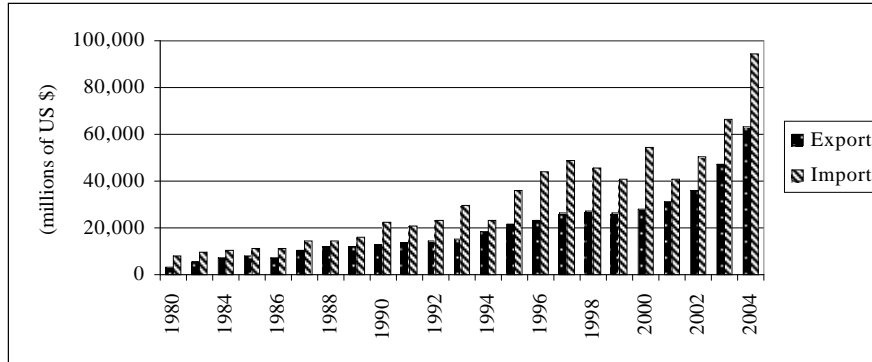


Figure 2. Development of foreign trade of Turkey in the reform period

MINING INDUSTRY OF TURKEY – GENERAL ASSESSMENT

Turkey is a lucky country with her very diverse mineral resources and produces around 60 different metals and minerals (Table 1). The country has worldwide reserves of barite, boron, clays, emery, feldspar, limestone, magnesite, marble, perlite, pumice, strontium, thorium, trona and zeolite and a leading producer of antimony, boron minerals, chromite, feldspar, magnesite, marble, meerschaum, perlite, pumice, sepiolite and strontium (USGS, 2007; MENR, 2007; Eti Mine Works General Management, 2007).

Table 1 Turkey's share in the world mineral reserves and productions (2005, tons)

Mineral	World Reserve Base	Turkey's Reserve	Turkey's Share(%)	World Mine Production	Turkey's Production	Turkey's Share(%)
Antimony	3,900,000	106,306	2.7	137,000	28,377	20.7
Asbestos	Large	29,646,379		2,400,000	0	0.0
Asphaltite		74,370,000			18,135	
Barite	740,000,000	35,001,304	4.7	7,870,000	157,179	2.0
Bauxite	32,000,000,000	87,375,000	0.3	169,000,000	475,349	0.3
Bentonite	Extremely Large	250,543,000		11,700,000	501,142	4.3
Bituminous Shale		1,641,381,000			1,088,637	
Boron	1,176,000,000	851,000,000	72.4	4,910,000	3,478,784	70.9
Chromium	12,000,000,000	25,931,373	0.2	19,300,000	1,620,386	8.4
Copper	940,000,000	2,279,210	0.2	15,000,000	60,000	0.4
Diatomite	Large	44,224,029		2,020,000	44,122	2.2
Feldspar	Large	239,305,500		12,900,000	4,560,226	35.4
Gold	90,000	340	0.4	2,470	4.3	0.2
Hard coal	478,771,000,000	1,126,548,000	0.2		2,000,000	
Iron ore	180,000,000,000	149,925,000	0.1	1,540,000,000	4,598,230	0.3
Kaolin	Extremely Large	89,063,770		44,700,000	908,862	2.0
Lead	140,000,000	860,387	0.6	3,270,000	366,305 (ore)	
Lignite	430,293,000,000	9,300,000,000	2.2		53,500,000	
Marble+natural stone		33,000,000,000			8,800,000	
Magnesite	3,600,000,000	111,368,020	3.1	4,210,000	571,142	13.6
Manganese	5,200,000,000	4,560,000	0.1	10,500,000	52,273	0.5
Perlite	7,700,000,000			1,950,000	333,400	17.1
Phosphate	50,000,000,000	70,500,000	0.1	147,000,000	900	0.0
Pumice	Large	1,479,556,876		16,600,000	1,860,037	11.2
Scheelite		36,719			0	
Silver	570,000	6,062	1.1	19,300	95	0.5
Strontium	12,000,000	665,082	5.5	494,000	30,100	6.1
Thorium	1,400,000	380,000	27.1		0	
Trona	40,000,000,000	842,000,000	2.1	42,000,000	0	0.0
Zeolite		345,148,875			249,572	
Zinc	460,000,000	2,294,479	0.5	9,800,000	157,936 (ore)	

Due to its highly varied geology, Turkey has also several other minerals and metals. Gold and base metal exploration and development have been on the increase recent years. Iron and steel industry in Turkey is fairly developed. Turkey produces large amount of chromite, some smaller gold, base metal, bauxite and limited amount of antimony. The important mining exports of Turkey are marble, boron minerals, copper, chromite, magnesite, zinc ores and feldspar. Recent explorations have also showed increased amount of reserves of metallic minerals and coal.

Best known for its industrial minerals, Turkey has enormous amount of marble and natural stone reserves. The country has also significant lignite deposits spreading all over the country. Richness classification of mineral reserves of Turkey is given in Table 2 (State Planning Organization, 2006).

Table 2. Richness classification of mineral reserves of Turkey

Very rich	Chromite, Mercury, Thorium, Lantan, Fluorite, Feldspar, Gypsum, Bentonite, Boron, Magnesite, Marble, Perlite, Limestone-Marl, Dolomite, Emery, Salt, Barite, Zeolite, Pumice, Meerschaum
Rich	Gold, Silver, Scheelite, Antimony, Aluminium, Lignite, Silica, Asbestos, Sodium sulphate, Strontium, Huntite, Sepiolite, Calcite, Disten, Diatomite, Alunite, Olivine, Vermiculite, Phlogobite, Natural Stones, Pyrophyllite, Sand-Gravel, Pyrite, Glaconite, Trass, Quarsite
Normal	Copper, Lead, Zinc, Cadmium, Iron, Manganese, Cobalt, Nickel, Molybdenum, Titanium, Titan, Arsenic, Uranium, Hard coal, Petroleum, Natural gas, Sulphur, Clay, Kaolin, Graphite, Phosphate, Vollastone, Mica, Ornament Stones, Talc, Slate
None	Platinum, Tin, Vanadium, Potash, Zircon, Rutile, Sillimanite-Andaluzite, Corondon, Potassium nitrate, Lithium, Diamond, Brome-Iodine, Colombium

The mining industry in Turkey is very dynamic especially in recent years. Over 100,000 people are employed in the mining and mineral processing sectors in Turkey. Approximately 1.4 percent (\$5.2 billion) of Turkey’s GNP of 2005 was contributed by the mining and mineral processing industries. Although it shows some variability in recent years, the growth rate of mining industry has accelerated especially in the last few years (Figure 3). The growth of the sector in 2004 was 2.6 percent and 12.9 percent in 2005 (State Planning Organization, 2007).

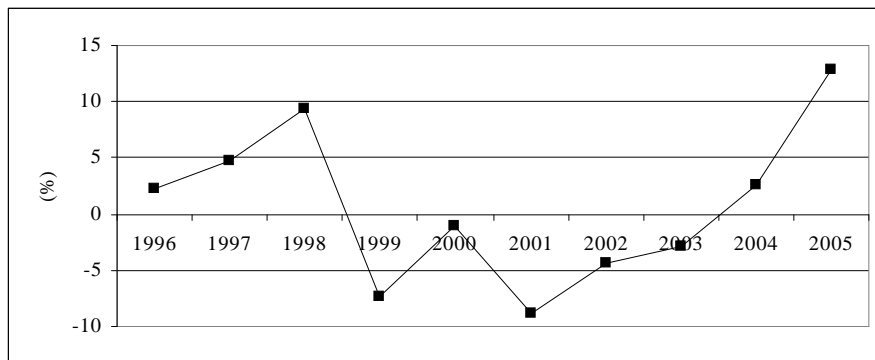


Figure 3. Mining industry growth rate (% change at 1987 prices)

The gross fixed investment of mining sector in 2005 was realized as approximately \$1.3 billion and 80% of that was of private sector share. Mineral foreign trade has also some striking developments in the last 5 years and both export and import figures have increased markedly (Figure 4). In 2006, 2.4 percent of total exports and 2 percent of total imports were provided by minerals and mineral products (State Planning Organization, 2007; The General Secretariat of Istanbul Mineral and Metals Exporters’ Association, 2007).

Mine Legislation and Institutional Structure in Turkey

According to the Turkish Constitution “Natural wealth and resources shall be placed under the control of, and put at the disposal of the state. The right to explore and exploit resources belongs to the state. The state may delegate this right to individuals or public corporations for specific periods.”

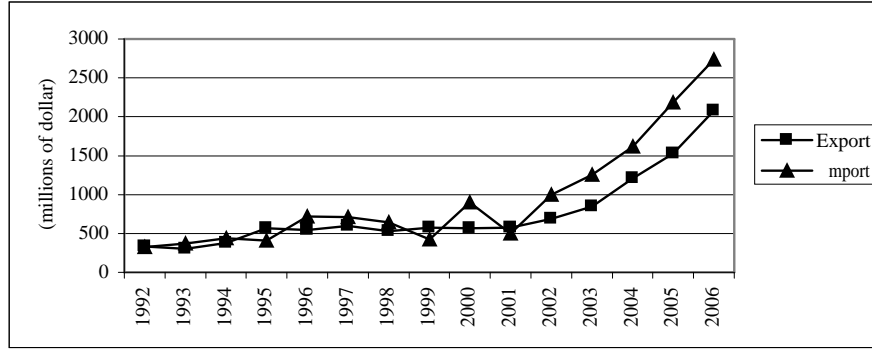


Figure 4. Mining sector foreign trade by years

The regulatory framework in Turkey is the Mining Law No. 3213. The Mining Law constitutes the basic rules in the sector. According to the regulations the mining rights are granted in 2 phases. The first phase, exploration period, is maximum for 5 years including extension period and an exploration license is required to obtain from the state. The second phase is the operation license which has a duration of minimum ten years extendable up to sixty years. The royalty is 2-4 percent of the gross revenue in the mine and is paid to the Treasury by the license holder. The “Right of Discovery” is 1 percent of the gross revenue and is paid to the right’s owner by the license holder annually.

The Mining Law No. 3213 has been amended significantly in 2004 to ease the licensing procedures and to diminish the unnecessary bureaucratic controls. With the amendments, environmental obligations and licence fees have been changed extensively to attract foreign investments.

The policy maker and leading body in Turkish mining industry is Ministry of Energy and Natural Resources (MENR). Turkey has also several important state owned establishments (Table 3). Two bodies, MTA and BOREN, are the research institutes of mining industry in Turkey, the former is an 80 years old research and exploration entity while the latter is an only 2 years old. The other 4 establishments are state owned producers. One of those, TK , is the main lignite producer of Turkey with its 30.4 million tons of lignite production in 2006. EUAS, in fact an electricity production company, is the other significant lignite producer with 21.1 million tons in 2006. Lastly, TTK is the state owned hard coal producer and Eti Mine is the only boron producer of Turkey.

Table 3. Public establishments in Turkey’s mining industry

Establishment	Main functions
Ministry of Energy and Natural Resources (MENR)	Policy making, monitoring and controlling
General Directorate of Mining Affairs (M GEM)	Licensing, monitoring and controlling
General Directorate of Minerals Research and Exploration (MTA)	Research and exploration
National Boron Research Institute (BOREN)	Research and development on boron minerals
Mining Departments of Universities	16 mining departments
Turkish Coal Enterprises (TK)	State owned lignite producer (55% of total production)
Electricity Generation Co Inc. (EUAS)	State owned electricity and lignite producer (38% of tot.prod.)
Turkish Hard Coal Management (TTK)	State owned hard coal producer (100% of total production)
Eti Mine Works General Management	State owned boron producer (100% of total production)

Privatization in the Industry

The public weighted structure of the Turkish mining industry has been changed significantly in recent years by comprehensive privatization activities and the government has reduced its share in the industry as a part of the reform agenda. In this context, one of Turkey’s largest integrated mining and beneficiation company, Eti Holdings, has divided into several smaller subsidiary units and privatized then as separate mining activities such as copper, chromite, aluminium and silver mining. In this way, approximately the whole mining production other than boron minerals and a part of coal has been done by private sector companies today.

MINING INDUSTRY OF TURKEY – SUBSECTOR ASSESSMENTS

Much of Turkey's mineral production is from a large number of small mines. There are 38,320 licensed mines in Turkey and 7,220 of the mines are in operation. Turkey's total mining production in 2005 was realized as approximately 250 million tons (Table 4) and about 50 percent of this figure was cement raw material production (General Directorate of Mining Affairs, 2007).

Table 4. Mining Sector Production of Turkey in 2005 (tons)

Subsector	Production (tons)
Energy raw materials (asphaltite, bituminous shale, lignite and hard coal)	55,612,693
Metallic minerals	11,522,890
Natural stones (diabase, marble, onyx, travertine, andesite, basalt, granite, sandstone, serpentine)	8,800,000
Cement raw materials (limestone, marl, clay, pyrophyllite, trass, schist)	122,116,677
Industrial minerals	51,689,002
Total	249,741,262

Energy raw materials

Turkey has limited oil, natural gas and hard coal reserves and production. Lignite is the most important energy resource of Turkey with approximately 9.3 billion tons of reserves. The lignite reserves are extended all over the country but generally poor in calorific value (Anaç, 2003). The annual lignite production is around 55.5 million tons in 2005 and is provided mainly by two state owned companies; Turkish Coal Enterprises (TKİİ) with 29.5 million tons and Electricity Generation Co. with 20 million tons. A very big part of the production is utilized for power generation purpose. However, the rising amount of natural gas import has impeded the development of the lignite production in recent years (Tamzok, 2005).

Metallic Minerals

The chromite production of Turkey has increased significantly in recent years. The 2005 production figure is 1.6 million tons. With their high grade, chromite reserves in Turkey are worldwide scale. Turkey's total chromite reserves are estimated as 26 million tons of over 20% grade. In the chromite sector, too many small private companies are dominated the production. Public entities, Eti Krom and Eti Elektrometalurji, has privatized recently and there are no public productions in the sector any more.

The only state owned copper entity, Eti Bakır, has also privatized recently. However, the copper production has come to a standstill despite global high copper demand. Iron ore in Turkey is consumed domestically and far from meeting the home demand.

Turkey has approximately 340 tons of gold reserve and world's famous gold companies' interest in this subsector has been high during the last decade. The gold production has been approximately 10 tons in 2006. Although, there are only two gold mines (Bergama – Ovacık and Uşak – Kılıçada) are in operation today, too many gold feasibility studies and exploration programs are underway in Turkey.

Industrial Minerals

Turkey has a total boron reserve of 851 million tons on the basis of B₂O₃ content and has about 72% of the world boron reserves (Eti Mine Works General Management, 2007). The country is also one of the biggest producers in the world. Therefore the operation of boron has primary importance among the other mining operations in Turkey. Borate mineral deposits are found mainly in Eskisehir, Kütahya and Balıkesir provinces. A state owned company, Eti Mine Works General Management, is the only boron producer in Turkey. The important boron minerals in Turkey are tincal, colemanite and ulexite. Approximately 40% of the boron production is exported as lumpy ore or concentrate. The remaining production is refined as borax decahydrate, borax pentahydrate, boric acid, ground colemanite and sodium perborate.

Trona is the other worldwide scale industrial mineral of Turkey. Trona reserves of Turkey are nearly 842

million tons but still unexploited. The majority of trona reserves (600 million tons) belong to an international mining giant, Rio Tinto, and 200 million tons belongs to Eti Mine Works General Management. Magnesite is one of the important minerals of Turkey. The magnesite reserves of Turkey are approximately 111 million tons and production in 2005 is 571,000 tons. The mineral deposit at Eskişehir, containing thorium and fluorite is one of the most important mineral sources of Turkey.

Turkey has very diverse and large amounts of marble reserves. The total base reserves are about 13 billion m³. The important Turkish marble reserves are found in Afyon, Bilecik, Burdur, Denizli, Muğla, Elazığ, Balıkesir and Eskişehir. Turkey is also one of the world's most important natural stone producers. Turkey's natural stone and marble production has increased tremendously in the last few years and Turkey has become one of the most important natural stone producers in the world. Production and exports of marble and natural stones have increased substantially in recent years, reaching a value of \$1 billion.

The other important industrial mineral reserves of Turkey are perlite, feldspar, dolomite, barite, rock salt, strontium and zeolite.

CONCLUSION

Although Turkey has a very wide variety of minerals, the mineral wealth has only been partially explored and known reserves have been developed to the limited extent. This situation may be an advantage for the country because the country's mineral potential could be an important contributor to the wealth of the nation due to the better technologies in the future.

The main strategy of mining industry should be to encourage exploration and exploitation activities in the sector to provide necessary low cost and high quality raw materials demanded by domestic industrial sectors and to increase the competitiveness of the economy.

However, it is impossible to execute mining activities by ignoring the environmental sensibilities in the era that we are living in. Using environmental friendly technology and methods, taking necessary precautions directed to protect and renew the environment should be the minimum necessities in all the mining processes in the sector.

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