



Turkish modernizers have long struggled to build an industrial system that would help restore the country's economic power. The import-substitution strategy followed until 1980 was designed to make the country an independent producer of manufactured goods. The result was a striking unfolding of industry, especially between 1950 and 1977, when the sector (including energy and natural resources) grew at an annual average rate of 8.6 percent in real terms, expanding its share of GDP from about 12 percent to about 25 percent. Despite the retrenchment of the early 1980s, the recovery of the industrial sector--which registered an average annual growth rate of 5.9 percent between 1987 and 1992--restored the sector to its pre-1980 proportion of more than 23 percent of GDP in 1993. By the early 1990s, industry was broadly based; the only individual industries accounting for more than 5 percent of industrial output were food processing, petroleum, textiles, and iron and steel.

Under the republic, the Turks have vastly improved their country's infrastructure and have achieved the ability to produce a wide range of products. The country's first factories processed food, such as sugar and flour, and nondurable consumer goods, such as textiles and footwear. Next came intermediate industrial products, including iron and steel, chemicals, cement, and fertilizer. By the end of the 1970s, the country was developing capital goods industries and high-technology products. Production of trucks and buses in cooperation with the West German firm Mercedes-Benz, and of F-16 fighter aircraft with the United States firm General Dynamics, indicated Turkey's industrial ambitions.

The press for rapid industrialization minimized the attention given to efficiency, and excessive protection forestalled competition that would have promoted efficiency; selling in the protected home market was much more attractive than attempting to export. Moreover, the rise of montage industries, which assembled such products as motor vehicles, consumer durables, and electronic goods primarily using imported components, meant that industrial growth required ever more imports. Hence, attempts at import substitution paradoxically tended to aggravate the country's trade balance. The capital-intensive nature of many industrial investments, especially those in the intermediate goods sector, caused employment in industry to grow relatively slowly, contributing to structural unemployment. Dependence on imported petroleum made the country highly vulnerable to increases in oil prices.

By the end of the 1970s, industry had reached a turning point. In the short run, the sector needed to overcome shortages of energy, imported machinery, parts, and processing materials that had caused a decline in industrial output during the last years of the decade. In the longer run, to become more efficient and to enable increased exports, the industrial structure had to be adjusted in accordance with the country's comparative advantages. In effect, industry would have to transfer resources out of uncompetitive industries to favor those that could compete in world markets. The difficult adjustment process started during the early 1980s, and substantial progress was made under the Özal team. Under the new outward-oriented development strategy, as under the old import-substitution policies, industry was to be the leading sector of the economy. Industrial performance--especially in export markets--would determine if that strategy would be successful.

Many of the problems of import substitution had not yet been overcome by the mid-1990s. Much progress had been made in spurring private-sector-led industrialization, particularly in light manufacturing and export promotion, however. Light manufactures and iron and steel accounted for an increasing proportion--and since the 1980s, the majority--of exports. Moreover, foreign investment in the industrial sector, made either directly or through the stock market, had begun to have a positive impact on Turkish industry. However, much of industry was still dominated by the public sector in early 1995, and private-sector companies still depended on crucial inputs from public-sector industries.

### Industrial Policy

In line with the shift to an outward-oriented development strategy, in 1980 Turkey's policy makers began to revamp the country's industrial policy. The new policy set forth four related goals for industry: upgrading the role of market signals in decision making, increasing manufacturing exports, enlarging the private share in manufacturing, and reforming the SEEs to reduce inefficiency. In the early 1990s, a fifth goal was added: privatization of public-sector entities. Policy makers were also concerned with obtaining adequate energy supplies and providing enough work for the growing labor force.

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### Mineral Resources

Turkey's most important minerals are chromite, bauxite, and copper. The country also exploits deposits of other minerals such as iron, manganese, lead, zinc, antimony, asbestos, pyrites, sulfur, mercury, and manganese. Mining contributed slightly under 2 percent of GDP in 1992, but the subsector provides the raw material for such key manufacturing industries as iron and steel, aluminum, cement, and fertilizers. Turkey exports a variety of minerals, the most important of which are blister copper, chrome, and boron products. Minerals accounted for an average of about 2 percent of export earnings in the mid-1990s. The public sector dominates mining, accounting for about 75 percent of sales. Etibank, set up in 1935 to develop Turkey's natural resources, manages most of the state's mineral interests, particularly bauxite, boron minerals, chromite, and copper.

Private-sector mining enterprises are generally small, concentrating on lead, zinc, and marble; some operate intermittently depending on market conditions. A 1978 law nationalized all private holdings, but it was only partially implemented before being invalidated by the Constitutional Court. In 1980 the government began to encourage foreign investment, and in 1983 and 1985 mining laws were revised to provide incentives for private investment. Etibank sought to encourage joint ventures with private firms in Turkey and foreign investors. Although some partnerships were struck, mainly for copper production, foreign and private investors in 1995 continued to hesitate to make major investments.

### Manufacturing

Turkey's manufacturing industries are diverse and growing. Public-sector entities dominate manufacturing, accounting for about 40 percent of value added. Private-sector firms are dominated by a number of large conglomerates that have diversified across several industries.

The manufacture of textiles is Turkey's largest industry, very competitive in international markets, and the most important foreign-exchange earner. Domestic cotton and wool provide much of the raw material for the industry, but synthetics production has also expanded. The textile sector contributed 20 percent of total manufacturing output and employed 33 percent of

all workers in the mid-1990s. Textiles are produced by factories controlled by the country's largest SEE, Sumerbank, and a number of private firms. Installed capacity is equivalent to around 33 percent of that of the EU in terms of cotton spinning and around 11 percent of EU woolen yarn and textiles. In 1994 Sumerbank was identified as a likely candidate for privatization.

Textile exports grew rapidly after 1980, but protectionism in industrial countries, including the EC nations and the United States, threatened the sector's growth. Nonetheless, between 1987 and 1992 textile export values expanded at an average annual rate of 19 percent. By 1992 textiles accounted for 35 percent of total exports. Investment in increased capacity in the 1980s resulted in increased exports of finished products and ready-made garments. In 1990 the administration of President George Bush increased the quota for United States textile imports from Turkey by 50 percent to compensate for Turkey's economic problems caused by sanctions on Iraq.

Agroprocessing is one of the most dynamic branches of Turkish industry, supplying both domestic and export markets. Main product lines are sugar, flour, processed meat and milk, and fruits and vegetables. Processed food exports grew at an average rate of 8 percent per year between 1987 and 1992, accounting for 9 percent of total exports.

SEEs are the most important producers of intermediate goods, although private firms are also active. The iron and steel sector has become more competitive in adjacent Middle Eastern markets, where Turkey's location is an advantage. However, competitiveness results largely from heavy subsidies to the state companies. Two-thirds of Turkey's steel is produced by three public-sector steel mills, which remain heavily subsidized. Twenty smaller private plants produce steel from arc furnace operations. Public plants include the old and outmoded mill at Karabük, the Ereğli works completed in 1965, and the plant at Iskenderun, which was built with Soviet aid and opened in 1975. The overstuffed Iskenderun plant, although the largest and most modern, performs poorly. Private plants, often more profitable than state plants, tend to use scrap as a raw material and to export to neighboring countries. In December 1994, the government indicated that 51.7 percent of the Ereğli Iron and Steel Works would be privatized in 1995. This company was cited as one of the most profitable in Turkey, especially after a US\$1.5 billion upgrade designed to raise raw steel capacity by one-third, to about 3 million tons annually.

Capacity use in the iron and steel sector increased rapidly in the 1980s and early 1990s. Total output of crude iron grew from about 3.1 million tons in 1985 to about 4.5 million tons in 1992. Steel ingot output rose from about 7 million tons in 1987 to 10.3 million tons in 1992. The value of exports of iron and steel rose from US\$34 million in 1980 to US\$1.6 billion in 1992. Such exports accounted for around 10 percent of total exports.

The demand for cement also increased in the late 1980s and early 1990s as a result of an upswing in domestic construction stimulated by infrastructure and housing projects. The cement industry consists of a large SEE, the Turkish Cement Corporation, and a number of smaller companies. Until 1970 the country imported most of its cement, but it has since become self-sufficient. Total output increased from 22.7 million tons in 1987 to 28.5 million tons in 1992. Exports of cement, especially to the Middle East, grew rapidly in the early 1980s because of the construction boom in that region.

The chemical industry, one of the country's largest in terms of value, is concentrated in a few large state enterprises, including the Petrochemical Corporation (Petrokimya Anonimsirketi-Petkim) and Etibank, and some 600 private enterprises. Chemicals produced in Turkey include boron products, caustic soda, chlorine, industrial chemicals, and sodium phosphates. The high quality of the country's minerals gives it a comparative advantage in several products. Chemical exports increased during the second half of the 1980s but fell sharply in the early 1990s, mainly because of increasing competition and lower prices elsewhere. In the late 1980s, petrochemical production, dominated by Petkim, started with a complex at Yarmica, near Kocaeli, followed by a second at Aliaga, near Izmir. The complex includes twelve plants, seven subplants, a thermal power station, and a water supply dam. These plants supply small private-sector plants, which in turn manufacture finished products. The sector's goal is to make the country self-sufficient in petrochemicals rather than to export. In 1992 Turkey produced about 144,000 tons of polyvinyl chloride, about 238,000 tons of polyethylene, about 85,000 tons of benzene, and about 32,000 tons of carbon black.

Turkey's automobile industry, established in the mid-1960s, was gradually exposed to imports after 1980. Although the sector recovered from low production levels after 1983, domestic producers remain weak. Industry observers believe that Turkey's automobile makers are too numerous and too inefficient, but market prospects appear fairly favorable because of the low per capita ownership of cars. Car output rose from about 55,000 units in 1985 to about 300,000 units in 1993. Including trucks, buses, and tractors, Turkey produced about 345,000 units in 1992. Some 60,000 vehicles were imported in that year, a figure that should increase in the near future if Turkey gains entrance into the European customs union. Turkish producers benefit from a 20 percent tariff on foreign imports.

The Turkish automobile industry in 1995 consisted of three producers, each affiliated with a foreign manufacturer: Tofas, which assembles Fiat passenger cars; Oyak-Renault, which assembles Renaults; and General Motors, builder of Opel Vectras. Toyota in partnership with local conglomerate Sabancı Holding completed a plant in 1994 designed to produce 100,000 cars per year, and a Hyundai factory that would produce 100,000 units is scheduled to open in 1996.

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## Energy

Turkey is relatively well endowed with energy and mineral resources. The extensive mountainous terrain provides numerous hydroelectric sites, although most are far from the main population and consumption centers. The country also has substantial exploitable lignite resources and small reserves of hard coal, petroleum, and natural gas. Commercially exploitable deposits of many minerals have been located, but the territory has been surveyed only partially. Exploitation of these natural resources has occurred relatively slowly.

The combined demands of industrialization and urbanization nearly tripled energy consumption in the 1960s and 1970s. An inappropriate pricing policy, especially the subsidy of petroleum that led to unduly cheap products, was one cause of shifts in the sources of energy that exacerbated shortages. In 1960 more than half of the primary energy consumed came from noncommercial sources, mainly firewood but also manure and other agricultural wastes. These noncommercial sources, plus domestic coal and lignite, accounted for more than 80 percent of all primary energy consumed; oil supplied only 18 percent. By 1980, in contrast, oil supplied about 47 percent of the primary energy consumed, coal and lignite about 21 percent, hydroelectric power 8 percent, and noncommercial sources such as firewood and animal wastes only 23 percent. By 1992, 43.5 percent of final energy came from petroleum, 31.1 percent from lignite and hard coal, 4.1 percent from hydroelectric power, 6.9 percent from natural gas, and 14.4 percent from other energy sources, including solid fuels, geothermal, solar power, and wind power.

During the 1970s, the demand for electricity began to exceed supply, and by the late 1970s the power gap began to constrain industry. After 1977 rotating blackouts affecting industrial, commercial, and residential consumers were necessary to meet demand. By 1979 the shortage of foreign exchange had so restricted imports of crude oil that fuel for cars, trucks, and tractors had to be rationed. In the mid-1980s, in an attempt to deal with the energy shortage the Özal administration launched the build, operate, and transfer (BOT) system, under which foreign investors would provide the capital and technology to build plants, operate them for a number of years with guaranteed revenues, and finally transfer the units to the government when the investment had been fully returned. The Atatürk Dam was a major project designed to increase electricity output. Its first two power units came on line in 1992.

Although Turkey's energy resources remained underdeveloped in early 1995, the country had relatively good energy production potential. One estimate places the economically feasible hydroelectric potential at around 29,500 megawatts, which would allow annual production to reach roughly 100,000 gigawatt-hours in years with normal rainfall. Lignite is the second most important potential source of energy, with proven and probable deposits put around 6.4 billion tons. However, Turkish lignite, containing high amounts of water and sulfur, is hard to burn and pollutes the air. Turkey's proven and estimated petroleum stocks are equivalent to

about three years' consumption. Proven reserves are estimated at about 16 million tons, and enhanced oil-recovery techniques may allow extraction of another 30 million tons. Proven reserves of natural gas total about 12.4 billion cubic meters, and reserves of hard coal about 1 billion tons. Turkey's geothermal resources are considerable, but they have not yet been systematically explored.

Imports of petroleum averaged more than 15 million tons per year in the early 1980s and increased to about 23 million tons in the early 1990s. Most of Turkey's oil fields are located in southeastern Anatolia near the borders with Iran, Iraq, and Syria (see fig. 10). Because of the country's fractured substrata, deposits are often contained in small pockets, which makes exploration and extraction difficult. In 1985 exploration proved that Turkey has oil deposits at very deep levels, but it was not known how large the deposits might be. Shell Oil determined that oil at Paleozoic levels would be recoverable, and other investigations proved significant deposits in central Anatolia under the salt flats in the plain north of Konya. In 1991 British Petroleum began exploring for oil in offshore areas of the Black Sea. It is also suspected that the Aegean shelf contains considerable petroleum deposits, but as long as relations with Greece remain strained, conflicting claims to the Aegean seabed limit prospects for exploration. To speed up the exploration process, the Turkish government in 1983 eased regulations on such activities by foreign oil companies, allowing them to export 35 percent of production from fields they discovered in Anatolia and 45 percent from offshore fields. Although several foreign concerns started exploration after the liberalization package went into effect, up to the mid-1990s no major finds had been reported.

The state-owned oil company, Turkish Petroleum Corporation (TPAO), Shell Oil, and Mobil control most petroleum output, which had climbed gradually to a peak of 3.6 million tons in 1969 but declined to about 2.1 million tons in 1985 as deposits were depleted (see table 8, Appendix A.). By the early 1990s, output had increased once again to nearly 4.4 million tons. The main petroleum project during the 1980s was an attempt at secondary recovery at the Bati Raman fields in southeastern Anatolia, which were expected to produce roughly 1.5 million tons a year over a twenty-year period.

TPAO stepped up oil exploration efforts at home and abroad in the hope of raising output. But prospects for new domestic finds were endangered by the escalating conflict with Kurdish rebels in southeastern Turkey. Western operators in the area were nervous after a sharp increase in the number of attacks on oil installations. Mobil suspended operations at its 3,200-bpd Selmo field and other small sites after Kurdish attacks on its staff. In the early 1990s, talks were underway on a possible transfer of the Selmo operation to TPAO. Shell Oil's rig near the 25,000-bpd Batman refinery was also hit, although operations there continued. TPAO reported no attacks. Total Turkish production in 1993 of about 78,600 bpd--down from about 84,500 bpd in 1991--met 17 percent of the country's 458,000-bpd needs. The state firm in 1993 pumped about 60,550 bpd, Shell Oil about 14,500 bpd, Mobil about 3,230 bpd, and Aladdin Middle East about 330 bpd. On several aging fields, rising water content has halved productivity. TPAO drilled sixty exploration wells in 1993, only one of which hit oil. In 1994 it planned to drill eighty-one, stepping up work outside the affected southeast. Meanwhile, Mobil was doing seismic work in central and southern Turkey, and Shell Oil and United States Arco were both exploring in the southeast.

TPAO's joint venture in Kazakhstan, which holds seven concessions, should help to increase the company's oil reserves. In addition, preliminary tests in 1993 near Aktyubinsk and Atyrau were promising. It is expected to be several years, however, before the oil or gas reaches

Turkey, given the need to work out export routes or an exchange agreement with Russia. Turkish sources are cofinancing the venture with the Kazakh state oil company. The project is TPAO's first major overseas enterprise, although its subsidiary, the Turkish Petroleum International Corporation, holds concessions in Australia, Pakistan, and Egypt.

Five refineries with a total capacity of about 713,000 bpd meet most of the country's need for petroleum products. Until early 1995, about 85 percent of refinery capacity was in public hands in four refineries located at Aliaga near Izmir, Kocaeli, Kırıkkale, and Batman. A fifth refinery, jointly owned by Mobil, Shell Oil, British Petroleum, and a Turkish company, is located at Mersin.

In early 1995, Turkey's privatization program appeared to be back on track after a period of wrangling over the legality of the sale of the state refinery company TÜPRAS and the retail company Petrol Ofisi. The sale of part or all of each company is scheduled to take place before the end of 1995.

Petrol Ofisi's 4,000 stations control 56 percent of a domestic gasoline market that since 1987 has grown by an average of 5.5 percent a year to 94,000 bpd. Full privatization is expected by the end of 1995.

A TPAO pipeline extends for nearly 500 kilometers from the oil fields near Batman to Dörtyol on the Mediterranean coast. The corporation also owns and operates the Turkish section of the pipeline from Iraq's Kirkuk fields to a port facility near Dörtyol. This pipeline was enlarged in 1984 to carry 1.1 million bpd, a share of which Turkey purchased at preferential rates. A second, smaller-capacity Kirkuk-Dörtyol pipeline was built in the late 1980s, which increased capacity to 1.5 million bpd. Oil flows through the two pipelines ceased after the UN embargo on Iraq was imposed in 1990. The pipeline cannot be used for domestic oil because according to international law the oil in the pipeline at the time of the embargo must be stored, awaiting UN disposition.

Apart from the country's own oil prospects in the Black Sea, Turkish officials see their nation as a strategic hub bringing oil from Azerbaijan and Kazakhstan to the Mediterranean and connecting Turkmenistan and possibly Iran to the European gas network. Turkish officials have pushed their own brand of pipeline diplomacy, encouraging the nations of Central Asia and the Caucasus--as well as Iran--to cooperate so that they can start exporting their prime resources to the outside world via Turkey.

The Turks are convinced that at least some of the projects eventually will come to fruition, beginning with a projected pipeline to bring Azerbaijani crude to the eastern Mediterranean. In the early 1990s, the governments of Turkey and Azerbaijan officially approved plans for such a line. But a series of obstacles remained to be overcome, including rival pipeline projects that would bypass Turkey, border disputes that would render key intervening areas dangerous, and even a degree of antagonism toward Turkey on the part of some neighboring states. The most immediate challenge was the effort to bring oil from Kazakhstan's Tengiz field to the Russian Black Sea port of Novorossiysk, which would mean an upsurge in tanker traffic not only in the Black Sea, but also in the Bosphorus and Dardanelles. Turkey has opposed this project vehemently but is constrained by international conventions that guarantee passage between the Black and the Mediterranean seas. In some places, the straits are only 800 meters wide, and the Bosphorus bisects Turkey's largest city, Istanbul. The threat to one of the nation's greatest attractions has turned Turkish officials into ardent environmentalists.

Natural gas became important in the 1980s. Gas tapped in Thrace (Trakya, European Turkey) was piped to the Istanbul region and used to produce electricity, thereby reducing the need for energy imports from Bulgaria. In 1986 Turkey began construction of a pipeline to carry Soviet natural gas from the Bulgarian border to Ankara; the line was completed in the late 1980s. In 1990 government officials announced that they also desired to purchase natural gas from Algeria, a move that would help balance Turkey's large purchases from the Soviet Union.

Policy makers in the early 1970s had targeted lignite as the most abundant domestic source of hydrocarbons, and production grew rapidly from an average of about 7.9 million tons for the 1970-75 period to more than 31 million tons in 1985. Mines operated by the state-owned Turkish Lignite Company are responsible for about two-thirds of output; private firms produce the remainder. Production of hard coal is entirely controlled by the government-owned Turkish Coal Company, which suffers from poor management and outmoded technology. Coal production is also hampered by the great depth of the country's deposits. Hard coal output fell from around 6.5 million tons in 1976 to about 3.8 million tons in 1983, and unit costs exceeded those of coal imports. As a result of these trends, Turkey is beginning to import coal for use in power plants. In 1992 Turkey produced about 12 million tons of coal and imported a net of about 4.2 million tons.

The Turkish Electricity Authority (Türkiye Elektrik Kurumu--TEK) is responsible for most electric power generation and distribution. In Adana the Cukurova Electrical Company produces some electricity privately. In Kepez, a city in Antalya Province, another private company produces electricity. Upgrading of the national distribution grid began in the 1980s, and by 1985 about 70 percent of Turkey's villages were receiving electricity. The Fifth Five-Year Plan (1984-89) called for the completion of village electrification by 1989; by the mid-1990s no village was without electricity.

Demand for electricity has increased rapidly, in large part because of the growth of industry, which consumed more than 56 percent of electricity in 1992. By 1985 thermal plants produced 53 percent of total installed capacity; hydroelectric plants produced the remainder. During the early 1980s, shortages of electricity had to be covered with imports from Bulgaria and the Soviet Union. In 1984 Turkey and the Soviet Union agreed to build a second transmission line that would allow future increases in Soviet electricity deliveries. Although in the 1990s electricity imports meet less than 1 percent of Turkey's needs, the Turks want to be independent of supplies from unreliable neighbors.

Sources for generating such electricity varied. By 1992 electricity generated by coal accounted for 36 percent of total installed capacity, with hydroelectric plants accounting for 40 percent. The rest was generated using petroleum products.

Turkey's chronic energy shortages make development of hydroelectric power imperative. In 1994 the General Directorate of State Hydraulic Works was building or planning to build about 300 hydroelectric plants. The centerpiece of Turkey's ambitious hydroelectric program, the Southeast Anatolia Project, which includes dams on the Tigris and Euphrates rivers, will increase Turkey's irrigable land about 25 percent and its electricity-generating capacity about 45 percent. As of early 1987, the first two of the three large dams in the program (the Keban Dam and the Karakaya Dam, both on the Euphrates, northeast of Malatya) had been built, and the third, the Atatürk Dam, was under construction, completed in 1994. The World Bank

refused to help finance the construction of the Atatürk Dam because Turkey had not reached an agreement on sharing the water of the Euphrates River with Syria and Iraq; Turkey, however, arranged independent financing.

Turkish officials had long discussed the possibility that nuclear power might help the country address its energy problems. During the 1980s, the military government drew up a nuclear energy program and established the Nuclear Power Plants Division of the Turkish Electricity Authority to make feasibility studies and to build nuclear plants. Given Turkey's desire to diversify its energy sources, nuclear power was expected to remain on the agenda. By early 1995, however, no electricity had been generated from nuclear power.

Although Turkey has made a good start at addressing its energy problems, some analysts feel that more attention needs to be paid to conservation and pricing policies to limit the growth of demand. Industry is the major consumer of energy, and industrial consumption is expected to grow rapidly if left unchecked. The most energy-intensive sectors of industry, such as iron and steel, food processing, textiles, mining and nonferrous metals, chemicals, cement, and bricks and ceramics, probably could reduce demand significantly if required to do so. However, the government needs to audit major energy users to discover which could cut back consumption. In addition, a shift in relative energy prices to reflect long-run costs might induce industrial restructuring that would take Turkey's energy endowment into account. Moreover, energy policy makers need to improve management of firewood and agricultural wastes, which continue to play an important role in the rural energy economy.

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