

Energy Charter Protocol on
Energy Efficiency and Related
Environmental Aspects (PEEREA)

**In-depth Review
of Energy Efficiency
Policies and Programmes
of Turkey**



Energy Charter Secretariat

**IN-DEPTH REVIEW
OF ENERGY EFFICIENCY POLICIES AND
PROGRAMMES OF TURKEY**

**ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY
AND RELATED ENVIRONMENTAL ASPECTS (PEEREA)**



INTRODUCTION

The Energy Charter Treaty was signed in December 1994 and entered into legal force in April 1998. To date the Treaty has been signed or acceded to by fifty-one states¹. The Treaty was developed on the basis of the European Energy Charter of 1991. Whereas the latter document was drawn up as a declaration of political intent to promote East-West energy co-operation, the Energy Charter Treaty is a legally-binding multilateral instrument covering investment protection, liberalisation of trade, freedom of transit, dispute settlement and environmental aspects in the energy sector.

The Energy Charter Conference, the governing and decision-making body for the Energy Charter Treaty, meets on a regular basis - normally twice a year - to discuss policy issues affecting East-West energy co-operation, review implementation of the provisions of the Treaty, and consider possible new instruments and projects on energy issues. All states who have signed or acceded to the Treaty are members of the Conference. Regular meetings of the Conference's subsidiary groups on transit, trade, investment and energy efficiency and environment are held in between Conference meetings.

THE ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY AND RELATED ENVIRONMENTAL ASPECTS

The Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) is a legally-binding instrument that was signed together with the Energy Charter Treaty in December 1994 by the same 51 states that signed the Treaty itself. It requires its Signatories to formulate energy efficiency strategies and policy aims, to establish appropriate regulatory frameworks, and to develop specific programmes for the promotion of efficient energy usage and the reduction of harmful environmental practices in the energy sector.

Implementation of PEEREA is kept under review and discussion by the Energy Charter Working Group on Energy Efficiency and Related Environmental Aspects. A

¹ Albania, Armenia, Austria, Australia, Azerbaijan, Belarus, Belgium, Bosnia and Hercegovina, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, European Communities, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The Former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, Uzbekistan, United Kingdom.

key feature of the Working Group's activities is the development of a series of in-depth reviews of individual states' energy efficiency policies and programmes. Recommendations to the authorities of the states concerned resulting from these in-depth reviews are presented to the Energy Charter Conference for discussion and endorsement.

For further information on PEEREA and the in-depth energy efficiency review series, contact Mr Tudorel Constantinescu at the Energy Charter Secretariat in Brussels (Tel: +322 775 9854).

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EXECUTIVE SUMMARY

Located in southeast Europe and southwest Asia, Turkey has a population of about 67 million and has a surface area of 780,580 km². Agriculture represents 14% of GDP, with 40% of the population working in this sector, industry represents 22% of GDP and services 64%.

The Turkish economy has experienced an average annual growth of 5% for the past 20 years, although in 2000 and 2001 the country suffered a severe financial crisis from which it is only starting to recover. The State, which traditionally played a major role in the economy, is gradually implementing reforms aimed at decreasing its role.

Energy demand has grown constantly since 1973, at a similar rate to that of GDP. Energy intensity has remained constant, which is unusual in OECD countries, where there has been a considerable decline in energy intensity from the 1970s to the 1990s. Energy intensity is higher than the OECD average for GDP measured at market prices, but similar if purchasing power parity is taken into account.

The only indigenous energy resources available in significant quantity in Turkey are hydro and lignite. The country is very dependent on foreign energy imports. In 2002 the degree of dependence was 65% and, according to projections from the Ministry of Energy and Natural Resources (MENR) this figure is going to increase to 83% by 2030. Electricity demand is also expected to experience considerable growth, from 133 TWh in 2002 to 566 TWh in 2020 (according to MENR), the increase being covered by natural gas fired generation.

Some organisations such as the IEA have expressed concerns that official demand growth projections may be overestimated. The Turkish government is revising the figures in order to adapt them to the decline in the production caused by the economic crisis. In any case, it is clear that energy demand in the future is likely to increase considerably. On the other hand, network losses are high compared to the OECD average of 10%. The rate of losses in the distribution network is of crucial concern. Figures from the IEA and the World Bank estimate transmission/distribution losses to be between 18-21% (3.5-4 % for transmission and 16.5-17% for distribution) offering potential for savings.

The expected growth in demand requires massive investment. In the electricity sector alone estimated investments are 3 to 4 million USD (including transmission and distribution) per year. The Turkish government is not in a position to finance the required investments through public funds and encouraging private investment (national or

foreign) is a high priority. The government has encouraged private investment since the 1980s through the use of three different models, BOT, BOO, TOR, but with less success than expected.

The willingness to encourage private investment and to harmonise with EU legislation led the government to bring in two new Laws in 2001, the “Electricity Market Law” and the “Gas Market Law” and to establish a new independent regulator, the “Energy Market Regulatory Authority”. The new Laws aim at establishing stable, transparent and competitive conditions and at finalising cross subsidies, as required in the EU Electricity and Gas Directives. The opening of the electricity and gas markets was announced by the Energy Market Regulatory Authority on 2 September 2002 and 3 November 2002 respectively. A regulation on tariffs was issued on 3 September 2002¹. At the moment there are still cross-subsidies between electricity prices for households and for industry. In pursuance with the provisions of the Electricity and Gas Market Laws, cross-subsidies are to be eliminated. It is a complicated social problem, because electricity prices are high in relation to the income of the population. The process of reforming prices also includes increased transparency.

There are no direct tax incentives to encourage end use energy efficiency, nor any other kind of direct financial incentives. There are general investment incentives that may be applicable to energy efficiency investments. Energy Service Companies (ESCOs) are not active. The main problem seems to be Turkey’s high inflation.

The industrial sector represents around 38% of Total Final Consumption (TFC) and is therefore the main focus of energy efficiency policy. The residential sector with around 34% of TFC is also targeted.

All industrial establishments consuming more than 2000 toe of energy per year must set up an energy management system. These establishments must also do audits in order to determine their energy savings potential. The National Energy Conservation Centre (NECC) has played a major role in providing the appropriate training.

For new buildings and buildings undergoing major renovation mandatory standards became applicable in June 2000. There is also an obligation for these buildings to possess an energy certificate showing their energy consumption. A survey undertaken for public buildings helped to identify the potential for energy efficiency, but only limited measures have so far been undertaken.

¹ The list of secondary legislation issued within the framework of electricity and gas markets’ opening is provided as Annex VI.

Concerning appliances, in the context of harmonization with the EU Energy Labelling Directives, there are new energy labelling requirements for refrigerators and freezers since September 2002. For washing machines, tumble driers, combined washer-driers, household lamps and dishwashers new labelling requirements are planned to be applicable from February 2003 onwards.

Until July 2002, there was a favourable regime for cogeneration and autoproduction, consisting of an obligation upon distribution companies to buy the surplus electricity from these installations at a price corresponding to 80% of the price paid for electricity from the grid. This produced a massive growth of cogeneration (from 4 MWe in 1992 to 3,400 MWe in 2002, representing around 15% of total electricity production). This favourable framework is no longer applicable. Since September 2002 (the date of opening of the electricity market on the basis of the provisions of the Electricity Market Law), there is no longer an obligation to purchase electricity from autoproducers and the price paid is lower than in the past.

There are no special incentives for renewables other than reduced license fees. Promotional schemes may be introduced in the future. In this regard, MENR and the Energy Market Regulatory Authority (EMRA) are currently evaluating information about promotional schemes in the EU countries. Turkey has a vast and unexploited potential for renewables, particularly geothermal, wind and small hydro.

The Ministry of Energy and Natural Resources (MENR) is the main institution responsible for formulating and supervising energy policy. The General Directorate of Electrical Power Resources Survey and Development (EIE), and in particular its Department of Energy Resources Survey which includes the National Energy Conservation Centre (NECC), is the main implementation group within MENR in charge of promoting energy efficiency and renewables.

Other ministries involved in energy policy are the Ministry of Environment, the Ministry of Reconstruction and Resettlements, and the Ministry of Industry and Trade. There are several other institutions such as the Turkish Standards Institute and the Scientific and Technical Research Council of Turkey. There are several industrial associations that play an important role in creating awareness, also on potential energy efficiency improvements and maintaining dialogue with the government.

There is some bilateral international co-operation in energy efficiency, for instance with Japan and Germany, and Turkey has also received funding from international institutions such as the World Bank. Assistance from the EU, extremely limited until

now, is envisaged to increase significantly due to Turkey's new status as official candidate for membership. It is envisaged that Turkey will receive assistance in particular for institution building, consultancy services and equipment procurement.

Energy efficiency is considered an important tool in environmental policy, particularly in relation to emissions reduction. However, emission standards for SO₂ and NO_x in Turkey are less stringent than in the EU. Turkey will soon ratify the UNFCCC.

In the opinion of the review team, Turkey is making progress in developing an energy efficiency policy and implementing PEEREA, but a number of issues need attention. Particular attention seems to be needed in the area of integrating energy efficiency concepts into the market liberalisation policies. Buildings and transport are the end use sectors where more specific attention is needed. The review team made 35 specific recommendations in areas such as energy pricing, institutions, specific policies and instruments and the financing of energy efficiency.

IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES OF TURKEY

1. INTRODUCTION TO THE PEEREA REVIEW

In September 2002, a team of representatives from the Working Group of the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects reviewed the energy efficiency policies and programmes of Turkey.

The role of the in-depth energy efficiency review undertaken on a peer basis by the Working Group is to enhance the level of co-operation amongst the contracting parties (Article 3.1). The in-depth review is also being used to assess progress, promote conscious dialogue and transfer information.

The review team comprised Mr Jean-Christophe Füeg of Switzerland who chaired the review, Mr Alan Christie of the UK, Mr Corneliu Radulescu of Romania and Mr Miroslav Dostal of the Czech Republic. Mr Tudor Constantinescu and Ms Mercedes Marín of the Energy Charter Secretariat supported the review team.

Organisations visited are included in Annex VII.

The review team wishes to express its thanks to everyone in Turkey whom they met. Special thanks go to officials of the Ministry of Energy and Natural Resources, and the National Energy Conservation Centre under the administration of the General Directorate of Electricity Survey Administration (EIE) (EIE/NECC), who undertook all the preparation of the mission, completing the PEEREA questionnaire and providing background papers and other information as requested.

The report is based on material provided by Turkey as well as data and analysis from various other sources, including the International Energy Agency, OECD, the World Bank, UNFCCC, and other related materials.

2. OVERVIEW

Turkey has a population of about 67 million and a surface area of 780,580 km². It is located in southeast Europe and southwest Asia, bordering the Black Sea, between Bulgaria and Georgia, and bordering the Aegean Sea and the Mediterranean Sea, between Greece and Syria. The capital is Ankara, in central Anatolia, with 3.5 million inhabitants.



The Turkish economy is a mixture of modern industry and commerce along with traditional agriculture that still accounts for almost 40% of the employment (in 2000 agriculture accounted for 38% of the labour force, services for 38% and industry for 24%).

In 2001, agriculture accounted for 13.6% of GDP, industry for 28.4% and services for 58%. Only the last one has shown a tendency to increase its share in the last years.

The main industries are textiles, food processing, automotive, mining (coal, copper, boron), steel, petroleum, construction, lumber and paper.

The Turkish economy has experienced an average growth of almost 5% over the past 20 years and the private sector is strong and growing rapidly. However, the State still plays a major role in basic industry, banking, transport and communications. Since the early 1980s, the State has been implementing economic reforms aimed at liberalising the economy. The main components were: reducing government intervention, implementing an exchange rate policy, increasing exports, encouraging foreign capital investment, establishing free trade zones, deregulating financial markets, privatising state economic enterprises and decentralising government activities.

This strong expansion was interrupted by sharp declines in output in 1994 and again in 1999. At the end of 1999, an economic programme aiming at disinflation and structural adjustments was launched in order to redress the unsustainable macroeconomic conditions, but it was unsuccessful. As a result, Turkey was hit by a severe financial crisis in late November 2000 and again in February 2001, and this resulted in a significant rundown of its international reserves (according to officials from MENR losses amounted to more than 60 billion dollars).

Ministry of Energy and Natural Resources officials also reported that other factors had a negative impact on the economy of Turkey:

- ❑ The Gulf crisis in 1990, which cost the country more than 15 billion dollars;
- ❑ The 1999 earthquake, losses from which were estimated to be nearly 50 billion dollars.

At the time of writing (September-October 2002) the economy has started showing signs of recovery.

Turkey applied for EU membership on 14 April 1987. It was declared a candidate for accession to the EU at the Helsinki Summit of December 1999. Turkey, like other candidates, will now benefit from a pre-accession strategy and will have the opportunity to participate in Community programmes and agencies. Because it was not declared an official candidate until December 1999, Turkey has until now received very little financial assistance from the EU for capacity building and restructuring compared with other accession countries.

In line with the EU Accession Partnership, in the period 2000-2006 Turkey will receive 890 million Euros in grants from MEDA II Funds and 1,470 million Euros in loans from the European Investment Bank in the framework of Euromed. For 2001-2003 Turkey will receive 150 million Euros as special co-operation grant and 450 million Euro credit from the new European Investment Bank Credit Mechanism. Finally, Turkey can expect to receive around 650 million Euros from a total 8.5 billion Euros allocated to all candidate countries.

Turkey presented the EU with its National Programme for the Adoption of the Community Acquis on 19 March 2001.

In the Copenhagen Summit of December 2002 it was decided that the negotiations for accession with Turkey would start right after the European Council of December 2004 subject to compliance with the necessary political criteria. Meanwhile a revised accession partnership will be submitted, in parallel to the deepening and extension of the customs union and a significant increase of the pre-accession financial assistance.

Total final energy demand has grown in line with the GDP growth and the overall energy intensity of the economy has remained almost constant between 1990 and 2000 as indicated in table 1.

TABLE 1

	1990	1995	1996	1997	1998	1999	2000
Total Final Consumption (Mtoe)	42.34	50.85	55.56	58.41	57.71	59.25	61.13
GDP Bill USD	150.43	176.19	188.53	202.73	208.99	198.51	213.40
Energy intensity (TPES/GDP)	0.37	0.37	0.37	0.37	0.37	0.4	0.38

NB: GDP figures in this table are based on 1990 prices and the 1990 USD exchange rate
Source: MENR

It is worth noting that energy intensity has remained constant not only since 1990, which is the case also for many industrialised countries, but also since 1973 (when according to IEA figures it was 0.35). Between 1973 and 2000 energy intensity in Turkey experienced an increase of 5.7%, in contrast with the EU, where energy intensity between 1973 and 2000 experienced a reduction of 30.4%.

The energy intensity is significantly higher than the OECD average, but a different picture emerges if the purchasing power parity is taken into account (in this case it is lower than the OECD average, but it is the same as the EU average). The electricity use per capita is much lower:

TABLE 2

	TPES/Pop	TPES/GDP	TPES/GDP (PPP)	Elec/pop (kWk per capita)
OECD	4.68	0.20	0.22	7841
Turkey	1.07	0.37	0.18	1473
EU	3.86	0.15	0.18	n.a.

NB: GDP figures in this table are based on 1995 prices and using 1995 US exchange rate (hence the difference with the table above)
Source: IEA, data for 1999

Turkey is very dependent on foreign energy resources, mainly oil and gas. Lignite and hydro are the only significant indigenous energy resources. In 2002, 65% of energy consumption will be met from imports and this figure is projected to increase significantly over the next few decades. The following forecast was provided by the Ministry of Energy and Natural Resources:

TABLE 3: DEPENDENCE ON FOREIGN ENERGY RESOURCES, IMPORT SHARE IN TPES

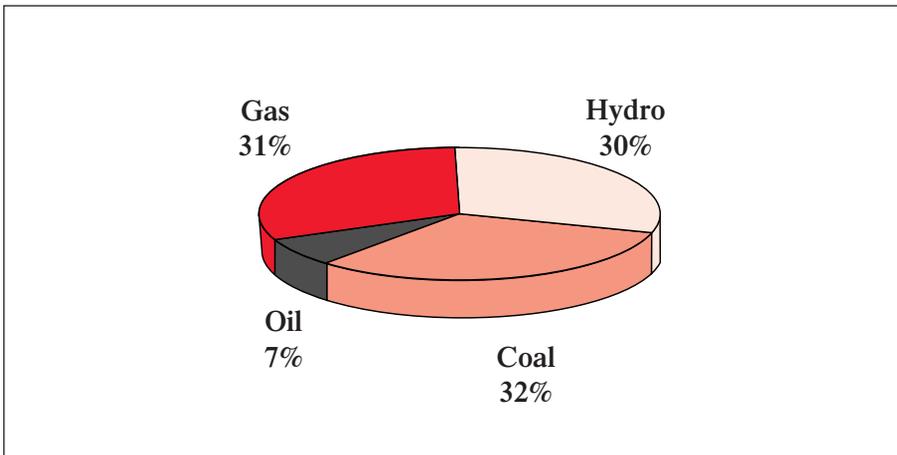
2002	2010	2020	2030
67%	73%	78%	83%

Source: MENR

Some organisations such as the IEA expressed concern that the official demand projections are overestimated. In this context, MENR undertook a further study financed by the World Bank but this produced estimates that were higher than those foreseen earlier. MENR is currently revising its mid and long term forecasts taking into account GDP and population growth. In any case, it seems clear that energy demand will continue to show a considerable increase in the future.

According to the IEA, Turkey’s electricity generation structure in 1999 was as follows:

FIGURE 1: 1999 ELECTRICITY GENERATION FUEL SHARE



Source: IEA

The government expects a considerable growth in electricity demand in the coming years and plans for a very large increase in the generation capacity over the next 20 years.

TABLE 4: ELECTRICITY CONSUMPTION FORECAST (FIGURES SUPPLIED BY MENR)

2002	2010	2020
133 TWh	286 TWh	566 TWh

The largest growth is planned for natural gas fired generation. There are several plants currently under construction or in the planning stages.

TABLE 5: INSTALLED ELECTRICITY CAPACITY (MWE)

Fuel Type	2000	2010	2020
Coal	6,690	15,180	33,120
Natural gas	4,240	20,633	39,262
Fuel oil and diesel	980	1,848	1,848
Nuclear	0	0	4,000
Hydro and RES	11,180	20,960	38,110
Total	24,270	58,651	116,240

Source: data for 2000 is from IEA/OECD Electricity Statistics (2002). Numbers do not add up to the total because there is a further 1,190 MWe liquid/natural gas dual firing generation.

Data for 2010 and 2020 corresponds to forecasts from MENR

For three decades the Turkish Government has had plans to introduce commercial nuclear power in the country. Concerning the construction of the first nuclear power plant in Mersin-Akkuyu, the Government, on the basis of the outcome of the evaluation of the bids, has deferred its decision on commissioning the first nuclear power plant due to economic and technological reasons.

Nevertheless, the nuclear option is still maintained in the future electricity generation plans and forecasts. MENR foresees 4,000 MWe of installed capacity by 2020.

In 2000 Turkey faced electricity shortages for a period of three months due mainly to successive drought years. The rate of losses in the distribution network is of crucial concern. Most of the demand is in the West and North West, while a considerable share of the generating capacity (based on the domestic resources such as hydro and lignite) is in the East and South East. Estimations of transmission and distribution losses are high compared with the OECD average of 10%. IEA estimates transmission losses at 3% and distribution losses at 15% and the World Bank estimate of losses was 21% (3.5-4 % for transmission and 16.5-17% for distribution). The equipment is outmoded and the grid is reaching its capacity limit. It is in urgent need of investment.

Most of the gas is imported. Natural gas demand in Turkey is projected to increase considerably, especially for industrial use and in the power sector. Within the framework of delays experienced in delivery of natural gas from several countries on the basis of sale and purchasing contracts already signed as well as in the light of recent economic recession, the natural gas company, BOTAŞ, has revised the demand growth projections accordingly. The delivery of Azeri gas is planned to start in the year 2006 instead of 2005, starting with 2 bcm per annum; the Blue Stream gas

pipeline is planned to be completed in February 2003 the delivery of Turkmenistan gas (16 bcm) will start after 2005. Accordingly, the previous demand forecasts for 2005 have been revised as 32.2 bcm instead of 40.4 bcm. As regards the 2010 and 2020 demand projections there are no major changes, i.e., 55.1 bcm for 2010 and 82.7 bcm for 2020.

The increased imports of natural gas necessitate new pipelines. In 1997, the Russian Federation and Turkey signed a deal under which Russia will construct a new gas export pipeline to Turkey, the Blue Stream pipeline. It will run from Izobilnoye from Southern Russia to Dzhubga on the Black Sea and under the Black Sea to the Turkish port of Samsun and on to Ankara. The gas flow through the Blue Stream is planned to start in February 2003.

In December 2001, natural gas delivery from Iran to Turkey has started.

The Greek public gas company DEPA and Turkish state owned oil and gas transportation company BOTAŞ signed a Memorandum of Understanding in March 2002 for the start of engineering and environmental studies in their countries for the Interconnector Turkey-Greece (part of the comprehensive South European Gas Ring Project). As a result, natural gas could be transported to Europe via Italy. Turkey is also negotiating with Bulgaria, Romania, Hungary and Austria for another pipeline project passing through these countries and reaching Austria in order to supply a part of European natural gas demand.

In October 1998 Turkey signed a framework agreement with Turkmenistan for the transportation of 30 bcma natural gas, of which 16 bcma would be for the usage of Turkey and the rest for Europe. Egypt is also a possible supply source by a pipeline crossing the Mediterranean Sea.

3. MAIN ENERGY POLICY HIGHLIGHTS

The most important target for the Turkish government is to meet energy demand in a secure, timely, economic and environmentally friendly manner. The main instruments to achieve this are:

- Upgrading energy supply security;
- Diversifying energy sources;
- Optimising assessment and use of indigenous energy sources;
- Promoting energy efficiency;
- Decreasing energy intensity;
- Harmonise with the EU *acquis*;
- Apply the preventive principle in environment policy.

The expected growth in energy demand requires massive investments. In the electricity sector alone there is an estimated investment need of 3 to 4 billion USD (including transmission and distribution) each year up to 2020. The projected growth in gas demand requires heavy investments in new pipeline infrastructure.

The Turkish Government is not in a position to finance all this investment itself and seeks to rely extensively on funding from the private sector. In this regard, motivating private/foreign investment has been adopted as the basic strategy. The Government has encouraged foreign investment since the 1980s. In the past, three different models were used: “Build-Operate-Transfer” (BOT), “Build-Own-Operate” (BOO) and “Transfer of Operating Rights” (TOOR).

Progress was attained with these models, but far below the expectations of the Turkish government, mainly due to the impossibility of appealing to international arbitration in case of investor dispute. The Turkish government had adopted a radical approach and amended the Constitution to remove this obstacle, as well as to allow for privatisation of the energy sector.

The status of BOT, BOO and TOOR projects in the new electricity market established within the framework of the provisions of the Electricity Market Law to which the government provided treasury guarantees is of crucial concern. In the light of complying with the provisions of the Electricity Market Law as well as of the general principles of the Economic Stabilisation Programme being implemented by the IMF Agreement, the Turkish Government ceased offering sovereign guarantees.

The Electricity Market Law defines existing contracts as those concession and implementation agreements which were signed before the enactment of the Law and sets out the main principles in dealing and executing these contracts provisionally.

In this respect, those BOT, BOO and TOOR projects for which contracts had not been signed were cancelled last year. For those projects whose contracts have been signed but which have not yet been built or initiated, the Government shall decide how to proceed. The process is now under evaluation. Consultations between the Undersecretariat of Treasury and the MENR have still not been concluded.

Driven mainly by the need for investment and partly also by the harmonisation process with the EU, the Government aims to establish a competitive electricity and gas market, overseen by an independent regulator, and has enacted the following laws:

- ❑ March 2001: Electricity Market Law;
- ❑ April 2001: Natural Gas Market Law;
- ❑ November 2001: Establishment of the Energy Market Regulatory Authority.

The main objectives of the reform in the electricity and gas sectors can be summarised as follows:

Main common objectives

- ❑ Introduce a new legal framework for the sectors, where private investors will prevail;
- ❑ Organisation of a new independent Energy Market Regulatory Authority (EMRA) that will regulate both the electricity and the gas sectors. This Authority was created on 2 March 2001;
- ❑ Liberalisation of the electricity and gas sectors in accordance with the EU electricity and gas Directives;
- ❑ Unbundling of generation, transmission and distribution;
- ❑ Providing non-discriminatory third party access;
- ❑ Decreasing the liabilities of the state resulting from investment as well as take or pay obligations in natural gas agreements;
- ❑ Ensuring the necessary measures to protect consumers and the environment.

Main elements introduced in the electricity sector

The transmission tariffs will have to be proposed by the transmission company (TEİAŞ) and they must be non-discriminatory. They can cover transmission surcharges and investment needs of the transmission system. Prices will have to be based on revenue requirements. Until now the tariffs were not transparent and the companies underestimated costs and suffered losses - which were then covered by the Treasury. This will no longer be allowed under the new Electricity Market Law:

- ❑ Introduction of a Transmission System Operator to ensure transparent and non-discriminatory access to the transmission system;
- ❑ Separation of accounts between different market activities (generation, transmission and distribution) as well as separation of licensing;
- ❑ Price transparency;
- ❑ Elimination of cross subsidies;
- ❑ Privatisation of generation and distribution companies;
- ❑ Market participants can sign bilateral private contracts;
- ❑ Introduction of the concept of eligible customers (those directly connected to the transmission line and those with an annual consumption of more than 9 GWh of electricity). This limit can be lowered by the Board of EMRA.

The Turkish generation and transmission company has been split into separate state economic enterprises:

- ❑ Turkish Electricity Transmission Company (TEİAŞ) and Turkish Electricity Distribution Company (TEDAŞ): responsible for operating the national transmission and distribution grid respectively;
- ❑ Electricity Generation Company (EÜAİ): responsible for operating state-owned power facilities;
- ❑ Turkish Electricity Trade Company (TETTAŞ): which is involved in purchasing electricity from producers and selling it to distribution companies.

As a result of the new structure introduced by the Electricity Market Law, the three models used until now, BOT, BOO and TOOR will no longer apply. The Law sets out the main principles for the provisional execution of those contracts that had already been signed before the enactment of the Law, but those that had still not been signed were cancelled. As for those that had been signed, but not built nor initiated, the Government shall decide whether they should proceed or not. In this regard, consultations between EMRA, the MENR and the Treasury have not yet been concluded.

Main elements introduced in the gas sector

- ❑ Abolishment of the monopoly position of BOTAŞ;
- ❑ Establishment of a bilateral contracts mechanism for gas sales and purchase;
- ❑ Introduction of the concept of eligible customers. These are consumers with an annual consumption over 1 million cubic metres, gas fired power generators, cogeneration producers and companies producing natural gas for their production facilities.

In order to finalise the monopoly position of BOTAŞ, the company will do the following:

- ❑ It will competitively tender and release import contracts to new private entrants until its import share falls below 20% by 2009;
- ❑ It will auction at least 10% of its gas purchase obligations/rights per year (starting at the date of the enactment of the Law);
- ❑ It will be restructured as trade, transmission and storage companies after 2009.

As far as the oil sector is concerned, privatisation has been encouraged for decades. The first Petroleum Law dates from 1954, with several reforms introduced since then, the most important one in 1989/90. As in other sectors, success liberalising has been

more limited than had been expected by the government. The 1954 Petroleum Law left broad authority to the government to intervene. Since 1989-1990, through implementation of the Automatic Price Setting Mechanism, the intervention authority of the government on pricing of petroleum production prices has been abolished. In May 2002 a new draft Petroleum Market Law was sent to the Parliament, with the aim of establishing a more transparent and stable regulatory framework and increasing competition in the downstream sector through licensing mechanisms for all types of operations.

A pipeline to carry oil from Baku in Azerbaijan through Georgia and then across Turkey to Ceyhan started being constructed in June 2002. It is expected to be finished by the end of 2004 and to become operational by 2005. The Baku-Tbilisi-Ceyhan pipeline will be owned and operated by the private consortium that is building it. The remaining crude oil transport and pipelines are owned by the state, through BOTAŞ.

4. ENERGY PRICING AND TAXATION

The Turkish Government considers pricing to be a very crucial element of its energy policy. The main aim of the strategy is to reach cost reflective pricing.

Petroleum prices were formally liberalised in 1989, but the Government had reserved the authority to intervene in determining the prices of oil products. The government used this authority for subsidising LPG prices for six months in the year 2000, as a consequence of the economic problems due to the 1999 earthquake. After the establishment of the automatic price setting mechanism in 1998, the authority for intervening to determine oil products prices has been abolished. The prices of oil products are set freely by the refineries within the price corridor of $\pm 3\%$, which is established with respect to the CIF MED product prices in the last seven days. There are two kinds of taxes on sales of petroleum products to end-users (VAT 18% and a Special Consumption Tax introduced in August 2002). The previous applications of the Petroleum Price Stabilisation Fund and Petroleum Consumption Tax were abolished with the introduction of the Special Consumption Tax, aimed at keeping consumer prices stable in the event of high fluctuation of prices. The Petroleum Market Law that has been submitted to Parliament will further liberalise oil prices.

The electricity market has been opened (20%) on 2 September 2002 and the gas market (80%) on 3 November 2002. According to the new electricity and gas market laws, cross subsidies are not allowed. A transition period may nevertheless be required.

As far as electricity prices are concerned, there are some limited cross subsidies between industry and households. According to IEA figures, in the fourth quarter of 2001, households paid 8.4 USD cents/kWh while industry paid 7.2 USD cents/kWh for their electricity. Raising the prices for households is difficult, because the prices are high in relation to income levels, especially in some regions in the east of the country. In a few of these regions non-payment is a problem (up to 60%).

With regard to the granting of subsidies to low income groups, the quantity and procedures are determined by decision of the Council of Ministers in pursuance with the provisions of the Electricity Market Law, without intervention in market functioning or distorting prices. TEDAŞ (the Electricity Distribution Company) is in charge of supplying electricity to the various categories of end-users (households, commercial, industrial). At present there are about 23 million customers supplied by TEDAŞ. Customers of the same category pay the same tariff throughout the country (i.e. tariffs are homogenous in all regions). In order to comply with the provisions of the Electricity Market Law, TEDAŞ is currently engaged in the preparation of a cost-based regional tariff.

According to the Electricity Market Law, the tariffs are to be calculated by the distribution companies, and will be subject to approval by the Energy Market Regulatory Authority (EMRA). On September 26, 2002 a Regulation on Tariffs was issued by the Energy Market Regulatory Authority (EMRA).

The production of indigenous hard coal (found only in one location in Turkey - Zonguldak) is subsidised, but the production of lignite, is not which is much more abundant.

At the time of this review there are no tax incentives to encourage directly energy efficiency projects. There are general investment incentives for “productive investment” that can be applicable to energy efficiency projects if they qualify as “productive investment” as well. There is only preferential taxation for unleaded gasoline. There is a certain incentive to encourage energy efficiency in electricity through the application of a consumption threshold above which the price rises. This threshold does not exist for natural gas.

There is a 5% municipal electricity tax for households and 1% for industry and services that is used to finance infrastructure works (in particular those related to energy efficiency).

There is 18% VAT for all consumers.

5. END-USE SECTORS

TABLE 6: CONTRIBUTION TO GDP BY SECTOR

	2000	2001
Agriculture	13.4%	13.6%
Industry	28.4%	28.4%
Services	17.6%	17.4%
Construction	5.0%	5.1%
Trade	22.4%	21.9%
Transport	13.2%	13.6%

Source: MENR

The *industrial* sector represents about 38% of total final consumption (TFC) and it has been the main focus of energy efficiency policies. The residential sector, which represents about 34% of the TFC, is also being targeted.

Almost half of the industrial production of Turkey is finished consumer goods. The most important industries in this group are food and beverage, and textile and clothing. Textile and clothing accounts for about 6-7% of the GDP. This industry has experienced a considerable growth in the last decade, with a 12.2% annual growth rate (while the Turkish economy has increased about 5% per year on average).

Intermediate goods also have a high share of industrial production in Turkey, the chemical industry being the most important followed by metals and non-ferrous metals. The national industry suffered a severe crisis in 2001. A new upswing period has started at the end of 2002. The industry has a large potential for development, mainly driven by the growing demand for petrochemical products in the country.

Amongst investment goods, land transport vehicles, machinery and equipment and metal products are the most important industries. The metal products industry experienced a decline in production between 1998-2001, but an improvement of the situation is expected. Concerning the automotive industry, after having signed license agreements and receiving know-how from foreign companies, Turkey now succeeds in satisfying local demand and even in exporting cars and trucks. Exports of machinery are on an upward trend despite the economic crisis.

In 2000, the iron and steel sector was the biggest energy consumer amongst the industrial sectors, followed by chemicals and petrochemicals. Industrial energy demand is expected to increase considerably in the future, from 23,180 ktoes in 2002 to 202,881

ktoes in 2030 (according to MENR projections). In 2002, industrial consumption represents about 38% of TFC but this figure is expected to be 60% by 2030.

The industrial sector consumes a high share (80%) of the total hard coal consumption (both, indigenous and imported), using very little lignite, which is mainly used for power generation.

The *household and service sector* represents (in 2002) 34% of TFC. In 2030 this share is expected to decrease to 21%, but the demand in this sector is also expected to increase considerably in absolute terms, from 20,616 ktoes in 2002 to 69,184 ktoes in 2030. According to statistics from the State Institute for Statistics (SSI), energy consumption per heated area in Turkey is around 0.05 toe/m². In 2000, there were a total of 7,838,675 buildings in the country, 86% residential buildings and the rest service buildings. The total heated area was 393,932,765 m².

Different fuels are used for heating in the household sector, such as hard coal (both indigenous and good quality imported), natural gas and oil. The Government is encouraging fuel switching from coal to natural gas for heating in the regions where it is available (so far only the Central and North Western parts of Turkey) and this has reduced pollution in Ankara, Istanbul, Izmir, Bursa and Eskişehir considerably. Further investments in the gas distribution system are to be realised related with the extension of the distribution network which is programmed to include 60 provinces nationwide. There are also some geothermal district heating schemes (mainly in the Aegean and Central Anatolian parts of the country), and a large potential for further extension.

In 2001, the *transport* sector accounted for about almost 21% of final energy consumption. The share of consumption of petroleum products by sub-sector was 87% for road transport, 1% for rail, 2% for sea and 9% for air. Road has been the dominant means of transport for a few decades. There are about 67 cars per 1000 inhabitants. The shares of rail and sea transport have remained almost unchanged since the early 1990s, as has the share of air transport (although this has been subject to fluctuations and increased considerably between 1990 and 1995, stabilising thereafter).

Between 1996 and 2000, about 96% of road passenger transportation has occurred on highways and a considerable increase has been observed in freight transport (annual increase of 7.6%). The draft Law on highway transportation establishes an institutionalisation of domestic transport activities, developing an insurance system for freight and passenger transport. Highways are subject to extensive economic

and financial feasibility studies that take alternative transportation modes into account.

The respective shares of different transport modes are outlined in Annex IV. A remarkable increase can be observed in the share of airlines transport between 1991 and 1995. Road transport is the dominant mode of transport (over 90%), although the share of sea transport for freight has increased considerably for the period 1995-1999.

Demand in the transport and agriculture sectors is also forecast to increase considerably, with a significant impact in the demand for oil, which is expected to increase 3 times for the transport sector alone.

6. ENERGY EFFICIENCY POLICIES AND PROGRAMMES

INDUSTRY

There is no general energy conservation law in Turkey, but there is a 1995 Regulation on the rational use of energy aiming at increasing efficiency in industrial energy use. As industry consumes almost 40% of TFC, this sector has been given priority in energy efficiency policies and programmes.

According to this 1995 Regulation, all establishments consuming over 2000 toe of energy per year must set up an energy management system. This affects some 600 industrial establishments, out of 10,000, and they represent 70% of the total industrial consumption in the country.

Training

The Law also states that the National Energy Conservation Centre (NECC in EIE) shall establish short-term courses in order to train energy managers. These courses have been organised for various sectors (iron and steel, arc furnaces, paper, cement, textile, fertilizer, food ceramic, non-ferrous metal and car industry) since 1997. They cost about 400 USD/person and to date nearly 500 people have received training. Other organisations in Izmir, Istanbul and Eskişehir, have been licensed by NECC in an attempt to extend the courses to the entire country. The courses are obligatory for industries under the obligation to establish an energy management system, but other industries have also participated on a voluntary basis. Energy management has also been included in the curriculum of some of the technical universities. The training (together with the training undertaken within the Energy Conservation Project with JICA mentioned below) is expected to lead to a 10% improvement in energy efficiency in industry by 2020.

Training Bus programme

The Programme, which started in 1993, lets NECC teams travel to factories with a mobile teaching unit, the training bus. The buses are designed as a classroom and have the necessary technical equipment to enable energy efficiency lectures to be given.

Energy Conservation Project with JICA

In March 2000, a project agreement was signed between EIE/NECC and the Japan International Co-operation Agency (JICA). The project aims at solving potential problems associated with infrastructural deficiencies in promoting energy savings and establishing a common basis in the industrial sector. It encompasses efficiency courses with practical applications, including training, technology and information transfer, as well as donations for the acquisition of the necessary equipment. A training centre, which contains a model factory with equipment such as a boiler, a furnace, an air pressure system and a fan and a pump system, was established. The plant began operation on 21 October 2001. It is expected that within 5 years most energy managers will be trained and an efficiency increase of 10% will be achieved throughout Turkish industry by 2020 (complementing and strengthening the training programme of NECC). The project is not only directed to Turkish industry, but it is open also to neighbouring countries. NECC aims to act as an international/regional centre. The first international energy managers course was held in co-operation with the United Nations Asian Pacific Countries Economic and Social Commission (UN-ESCAP) on 4-14 June 2002 for participants from Central and West Asian Countries. The centre will act as an international centre where courses will be organised for the participants from the Black Sea, Balkan, Middle East, Asia and Mediterranean countries in the near future.

Since the beginning of the project, JICA has hired 5 long and 12 short-term specialists and trained in Japan 8 Turkish lecturers on energy saving.

The Energy Conservation training facility

This is one of the most important outputs from the project. It was inaugurated on 22 October 2001. Seven main training units were established within the facility:

- ❑ The steam boiler unit;
- ❑ The testing unit of steam trap;
- ❑ The compressor training unit;
- ❑ The fan training unit;
- ❑ The pump training unit;
- ❑ The lighting training unit.

In all the training units many measuring parameters such as pressure, heat, amount of leaking, flue gas composition and energy consumption are recorded, and the results are analysed in order to find solutions for energy efficiency improvement.

The co-operation between JICA and NECC of EIE constitutes a good example of international co-operation for energy efficiency policy in Turkey.

Audits

The 1995 Regulation also establishes that industries to which the regulation is applicable (consuming over 2000 toe per year) have to make energy audits in order to identify energy savings potential and monetary savings for the plant. The results must be reported to the NECC.

The NECC has its own auditing team, and has been carrying out audits since 1990 under the Energy Bus Programme. It has furthermore certified two more companies to carry out energy audits. As of today, about 70 audits have been conducted.

However, there are some difficulties with the implementation by industrial companies of the results of the audits. Sometimes implementation of the resulting energy conservation measures take place with a long delay. There is not a good monitoring system to overcome this problem yet, but the NECC maintains a close relation with industrial establishments on an informal basis.

Other activities

The NECC has various activities for raising awareness on energy efficiency in industry:

- ❑ It prepares publications that are mailed free of charge to Turkish industry, as along with video cassettes and posters;
- ❑ It has prepared a technical manual for energy managers;
- ❑ It organises national and international conferences, seminars and workshops;
- ❑ It grants Energy Conservation awards to companies.

Monitoring of energy efficiency policies in Turkey is weak, because there is a lack of expertise. In this regard, Turkey has a keen interest in benefiting from international co-operation in this field, particularly, taking part in the related EU programmes.

Project competition awards in the Energy Efficiency industry

This is one of the main components of the promotional activity carried out by the EIE/NECC. The competition is organised every year under the “Energy Conservation Week”, taking place in the second week of January and organised by the Ministry of Energy and Natural Resources and EIE/NECC. There are two prize categories: “the most successful conservation practice” and “the most efficient product”.

In 2002, the project award was “Energy Efficiency in the Industrial Sector”. 10 industrial organisations participated under “the most successful conservation practice” with

45 different project applications. Industrial sectors that took part in the competition were cement, glass, cooking and heating devices, iron and steel, car, sewing cotton, alcoholic beverages, construction materials and automotive.

The total conservation potential realisable with the implementation of the 45 projects amounted to 69.44 ktoe with a total costs of 12.6 million USD. The total investment costs of the projects were nearly 21 million USD with an average payback period of 1.65 years.

The following table contains the list of participants. Awards were given to Erdemir T.A.Ş iron and steel factory (first place) Oyak Renault automotive factory (second place) and Arçelik A.Ş. cooking and heating devices factory (third place). The encouragement award was given to Türk Ytong Sanayii A.Ş. building materials factory.

TABLE 7

NAME OF THE INSTITUTION	N° OF APPLICATIONS	CONSERVATION			INVESTMENT	PAYBACK
		TOE	%	\$/YEAR	\$	MONTH
Akçansa Çim. Sanayi ve Ticaret A.Ş. Büyükçekmece Çimento Fabrikası (Cement Factory)	1	4,756	2.4	795,190	350,789	5.29
Anadolu Cam Sanayi A.Ş. Topkapı Fabrikası (Glass Factory)	8	1,220	2.6	812,287	87,855	1.30
Arçelik A.Ş. Pişirici ve Isıtıcı Cihazlar İşletmesi (Cooking and Heating Devices Enterprise)	1	152.12	3.2	59,677	117,132	23.55
Erdemir T.A.Ş. Ereğli Demir Çelik Fabrikaları A.Ş. (Iron/Steel Factory)	1	52,106	3.2	8,501,680	14,957,689	21.11
Ford Otomotiv Sanayi A.Ş. İnönü Fabrikası (Automotive Factory)	1	323	5.3	63,034	268,956	51.20
Ford Otomotiv Sanayi A.Ş. Kocaeli Fabrikası (Automotive Factory)	3	7,217,53	83.9	1,471,745	4,250,667	35.47
Kordsa A.Ş. İplik Tesisleri (Sewing Cotton Factory)	1	518.40	2.6	108,000		0

NAME OF THE INSTITUTION	N° OF APPLICATIONS	CONSERVATION			INVESTMENT	PAYBACK
		TOE	%	\$/YEAR	\$	MONTH
Oyak Renault Otomobil Fabrikaları A.Ş. (Automobile Factory)	24	2,079,33	9.9	476,266	335,785	8.46
TEKEL Alkollü İçkiler Sanayii Müessesesi Müdürlüğü Nevşehir İçki Fabrikası (Alcoholic Beverages Factory)	2	136.43	2.8	26,500	10,000	4.53
Türk Ytong Sanayii A.Ş. Pendik Fabrikası (Construction Materials Factory)	3	934.90	28.1	285,198	361,550	15.21
Total	45	69,443,71		12,599,577	20,840,423	19.85

BUILDINGS

The building sector accounts for 34% of the TFC and 43% of the electricity consumption. On the basis of a survey carried out nationwide by the State Institute for Statistics (SIS) in 1998 it was found that only 10% of residential buildings had good roof insulation and only 12% had double-glazing. About 86% of the housing units were heated with stoves, while the other 14% had central heating systems. EIE collected data for public buildings. This survey showed that 40% had roof insulation and 48% double-glazing, and only 17% of their heating systems were equipped with automatic control devices. With this data it is estimated that the potential for energy conservation in the residential sector is 50%, while the potential for public buildings is 30%². Hence, together with the industrial sector, the building sector is a priority for energy efficiency policy. There are a number of legislative measures aimed at this sector:

National insulation standards for new buildings (TS 825) were issued in June 1999. These standards set thermal insulation standards for new and existing buildings where renovation with 15% ratio or more is carried out. Their mandatory application started in June 2000. TS 825 defines rules for the calculation methods of heating energy

² This data has been obtained from the "National Report of Turkey" prepared for the World Summit of Sustainable Development in Johannesburg (WSSD), August 2002.

requirements in buildings and is in compliance with international standards. It divides Turkey into four climatic zones (depending on average temperature) and limits heat loss from the building envelope. Heat loss limits have been reduced by half compared with the old standards.

The TS 825 standard was complemented by the Regulation on Heat Insulation in Buildings, issued on 8 May 2000. It sets limits for annual heating energy requirements of buildings, which are different depending on the climatic zone (defined in the TS 825 standard). Inspections related to heat insulation must be conducted in all phases of the construction by the municipalities in the urban areas or by the governors in other areas. This regulation also introduces an obligation for new buildings to possess an energy certificate (“identity certificate of heat requirement”) that shows its energy consumption per m² and per m³. The certificate should be included in the file of the building administrator, and a certified copy should be displayed at the entrance of the building.

It is expected that the annual energy consumption of new buildings will be reduced from 200-250 kWh/m² to 100-120 kWh/m². According to IZODER, the Turkish Association of Insulation Companies, only 2.4% (as of the second half of 2002) of existing dwellings are subject to the TS 825 standard.

Double-glazing for new buildings is now compulsory, and 70% of new buildings have it. There are some obstacles to encouraging this practice further:

- ❑ Consumers have other priorities than insulation due to their low income level and severe impediments of the economic crisis;
- ❑ Not all buildings in big cities are licensed or registered;
- ❑ In apartment buildings with central heating, the costs of heating are shared by everyone living in the building giving no incentive to promote energy efficiency.

The monitoring of the implementation of insulation regulations is done in two ways:

- ❑ For public buildings constructed under the control of the Ministry of Reconstruction and Resettlements, controlling and monitoring is carried out by the provincial directorates under the supervision of the governor;
- ❑ For private buildings this function is carried out by the “Building Inspection Agencies” under the control and inspection of the municipalities (developed after the 1999 earthquake when monitoring became stricter). These agencies are authorised by the Ministry of Reconstruction and Resettlements. They use building control firms to carry out the inspections.

The main sources of heating in the residential sector are biomass (6,38 Mtoe), petroleum products (3,68 Mtoe), gas (2,69 Mtoe), electricity (2,05 Mtoe) and coal (1,68 Mtoe). The Government is encouraging switching to natural gas where this is available. The distribution of natural gas is undertaken through municipalities, which generally own the gas distribution companies.

In 1997, a Circular was issued on measures to be taken by governmental institutions to reduce energy consumption. Measures to be undertaken include:

- ❑ Monitor energy consumption;
- ❑ Create awareness among the personnel on how to limit energy consumption;
- ❑ Use low consumption office equipment;
- ❑ Use daylight as much as possible and automatic switch-off of lighting during non-office hours;
- ❑ Avoid electric heating;
- ❑ Limit the use of air conditioning;
- ❑ Decorative lighting is to be paid by the municipalities that use it.

In October 2000 another Circular was issued in order to initiate an action nationwide to decrease electricity consumption following the period of potential constraints on electricity supply due to the drought season. Between October 2000 and May 2001 a number of measures such as reducing the number of lamps in public buildings, adjusting the working hours to daylight and decreasing the level of street lighting were applied.

On 20 September 2001, a seminar was organised in Ankara for the technical personnel responsible for energy conservation activities in public organisations.

An agreement was signed between the Turkish and the German Government for the project “Efficient Utilisation of Energy in the Building sector in Turkey”. The project will be carried out in co-operation with the German Technical Co-operation Agency (GTZ), EIE and the municipality of Erzurum (located in the Eastern Anatolian region). It aims to establish an energy efficiency unit in this municipality and will include training programmes, energy efficiency policy studies for cities and preparation of standards and regulations for energy efficiency. The project also aims at reduction of environmental pollution at city level. The project is planned to last for 3 years.

The project was initiated in November 2002. Two separate project teams were established in Erzurum and at the EIE. At present, activities are underway to prepare the

plan of operation in order to specify the detailed time schedule for implementing the envisaged activities. A workshop will be organised in April with participation of entities from both the private and the public sectors.

Pilot demonstration projects will be carried out in Erzurum in order to provide the necessary input for developing the related legal arrangements for heat insulation and efficient use of energy.

The EU Energy Labelling Directives for refrigerators and freezers, washing machines and dishwashers have been implemented into Turkish legislation. For refrigerators and freezers, application started on 24 September 2002 and for washing machines and dishwashers it is planned to start on 20 February 2003.

The Turkish households appliance sector is represented in CECED (European Household Appliance Organisation) and CEN (European Normalisation Committee) and EU energy and environmental standards are applied to these domestic products. ARCELIK, the biggest appliance manufacturer in Turkey, reported that energy consumption in household appliances had decreased by around 40% over the last 15 years. And, as in the EU, Turkish household appliances do not use ozone-depleting substances such as CFC gases.

Turkish companies are also working to phase out inefficient motors in appliances.

TRANSPORT

The Eighth Five Year Development Plan (2001-2005) specifies that a Master Plan on Transportation shall be developed in order to restore balance among the different transport modes and to establish a transport infrastructure in harmony with the needs of the national economy and social life.

Studies on institutional structure and legal frameworks for restructuring and privatisation will be undertaken taking public service obligations into account. It is planned to formulate policies for greenhouse gas emissions reduction within the transport sector, as well as to elaborate emission inventories. Studies will be undertaken within the framework of a decision from the European Council of Transport Ministers to reflect externalities on the costs within the planning and projection stages.

A project has been implemented to restructure and liberalise the railway sector (in harmony with EU policy). The main objective is to strengthen the role of the railway sector in the Turkish transportation system by increasing service efficiency and modernising its infrastructure.

As for maritime transport, the operational rights of seven public harbours have been transferred to the private sector. The general policy aim is to improve, modernise and increase the capacity of the national harbours within the framework of the Nationwide Harbour Development Master Plan.

About 94% of air transportation is concentrated on eight airports. The priority in investment will be assigned to increasing their capacity and service standards rather than building new airports. Cargo transportation is also targeted for improvement. In recent years the Turkish motor vehicle industry has made changes in technical specifications of motor vehicles in accordance with EU standards and regulations. Eight vehicle production companies have received “ISO 14000” and Environmental Management System Certificates³.

The Ministry of Transport has undertaken an analysis of ways to improve public transport mode. Municipalities such as Istanbul, Ankara, Izmir, Adana, Bursa and Konya have been active undertaking measures to encourage utilisation of public transport and increase efficiency.

Examples of energy efficiency activities in city transport

Istanbul municipality and IETT (Istanbul Electricity, Tram and Light Rail Company)

The total number of private vehicles in the metropolitan area of Istanbul amounts to one million, while the number of public vehicles (belonging to IETT) amounts to 2377. IETT has put into effect measures to control the exhaust gas emissions of its vehicles in compliance with Turkish standards. The following measures have been undertaken:

- ❑ In order to motivate the utilisation of natural gas fired buses, the “environmentally friendly green buses project” was initiated in 1993. The number of buses equipped with gas combustion engines reached 100 and there are ongoing activities to increase this number to 236;
- ❑ Parking garages were put into service in 1996 and 1997 in order to achieve fuel savings by avoiding having to drive the buses to the remote IETT station;
- ❑ The criteria for purchasing new buses rely on EURO2 and EURO3 standards. At present 550 buses in Istanbul comply with EURO 2 standards;
- ❑ In order to motivate passengers to use public transportation, a number of projects such as “Intelligent Station Project” and “Bus tracking” have been put into operation. The following issues are envisaged:
 - The rotation of IETT will be well coordinated;
 - Intensity of passengers will be equally distributed;
 - Easier control mechanism will be employed;
 - The passenger intensity in stations will be reported via implementation of automatic ticketing system;
 - Statistical and real time reports of traffic circulation will be recorded;
 - Busses will be monitored and supervised in order to inform about accidents and malfunctioning;
- ❑ At present there is a 42 km long railway system (subway, light rail and light tram) with a transportation capacity of 120,000 passengers per day. It is envisaged to integrate a new railway system of 250 km and to increase the transportation capacity to 2.5 million passengers per day in the next 10 years.

³ This data has been obtained from the “National Report of Turkey” prepared for the World Summit of Sustainable Development in Johannesburg (WSSD), August 2002.

Fuel consumption and fuel quality in the transport sector

Consumption of unleaded gasoline has been increasing gradually, partly reflecting the increasing number of vehicles equipped with catalytic converters. In 2001 the consumption of unleaded gasoline amounted to 46% of total gasoline consumption. It is forecasted that all cars will be equipped with catalytic converters by 2012.

The Government promotes the use of unleaded gasoline through a preferential pricing policy. Unleaded gasoline is priced lower than super gasoline (95 octane leaded gasoline).

The goal is to shift entirely to unleaded gasoline. In order to attain this objective, the refineries of Izmir are being upgraded via construction of hydro cracking and isomerisation units harmonised with EU standards. The Kirikkale refinery complies with EU regulations for after 2005 on petroleum quality for both leaded and unleaded gasoline.

Unleaded gasoline is in compliance with pre-2000 regulations, but the sulphur content needs to be reduced to comply with EU standards. Standards for maximum sulphur content in diesel oil are also being tightened in order to comply with EU regulations by the year 2007. New desulphurisation units are planned to be operational in three major refineries by 2007 in order to comply with EU standards.

Since January 2002, no regular gasoline is sold in the market and all imported and domestically produced new automobiles are equipped with catalytic converters and Euro/95 standards are in place.

COGENERATION

Cogeneration in Turkey has developed fast due to favourable legislation and Governmental support. In 1992 there was only 4 MWe of capacity installed while there is now around 3,400 MWe and its share of electricity production is around 15%. Almost all the plants are installed in the industrial sector.

Until July 2002, a favourable legal framework for cogeneration was in force (regulating autoproduction in general). According to a Decree adopted in 1985, the power generation company, EÜAŞ, or the transmission/distribution company (TEDAŞ) purchased electricity from any autoproducer at a price equal to 80% of their sale price to industrial consumers.

As of 3 September, 2002 (the date of implementation of the new electricity market in pursuance with the provisions of the Electricity Market Law), there is no longer any

obligation to purchase electricity from autoproducers without any limit and the price paid is lower compared to the past. The following table illustrates the sharp decline in electricity prices for cogeneration plants between 1999 and the second half of 2002:

TABLE 8

	1999	October 2002
Electricity price paid to autoproducers for their surplus electricity	4.4 USD cents/kWh	2.95 US cents/kWh
Gas price for industry	14 USD cents/m ³	17 USD cents/m ³

In the same period gas prices have increased, and the Turkish Society of Cogeneration and Autoproducers reports that the price they received for electricity in the second half of 2002 did not cover the costs.

Due to the economic crisis, in 2001 Turkey experienced for the first time an overcapacity of electricity production, which, according to the Turkish Society of Cogeneration and Autoproducers, makes TEÜAŞ and TEDAŞ very reluctant to purchase electricity from autoproducers.

According to the Electricity Market Law, autoproducers selling up to 20% of their generation are subject to autoproduction licenses and not to electricity production licensing. If they sell more than 20% of their electricity they are not considered to be autoproducers and then they need a production license.

In accordance with the provisions of the Electricity Market Law, “Autoproducers and/or autoproducer groups can sell, within a competitive environment, a certain percentage of electric energy which it has generated (not exceeding 20%) in a calendar year to be determined by the Board. The Board, under exceptional circumstances, can increase this percentage by 50%. Obtaining a generation license is required in case the amount of electric energy sold in a calendar year exceeds this percentage”. As of 3 August 2002, a License Regulation determining the working procedures for autoproducers was published in compliance with the Electricity Market Law.

RENEWABLES

The only existing incentive is a reduced license fee for capacities under 5 MWe. The license fee is reduced to 1% of the normal value, but given the small fee for a license, the impact is limited. However MENR is currently evaluating information about promotional schemes in EU countries and it is likely that there will be some supportive scheme, compatible with EU legislation, in the future.

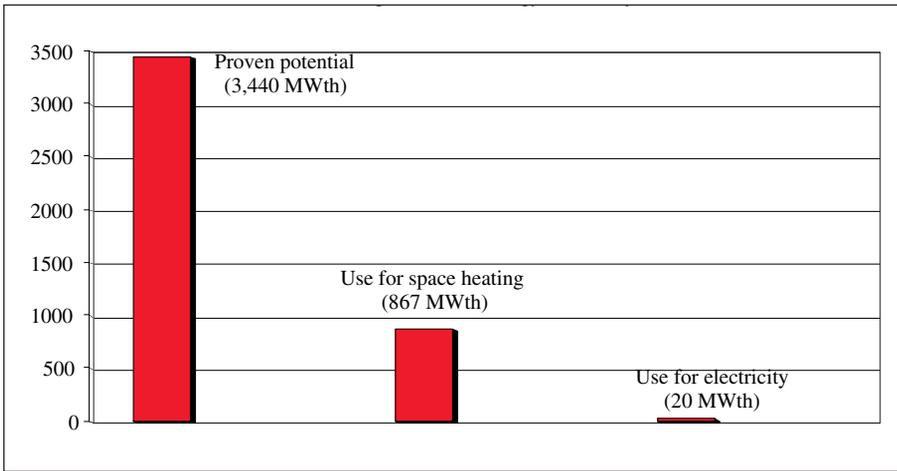
The Government is working with the World Bank to support small hydro and wind energy projects in the new liberalised market. The problem is that these technologies will not be able to compete in a liberalised market and so some selected projects will receive direct financial support. Between 20% and 30% of the investment will be supported through long-term debt by previously selected Turkish commercial or development banks.

The potential for hydro is far from being fully exploited and the Government expects to increase it from an installed capacity of 12,177 MWe in 2002, to more than 35,000 by 2020. Hydro production is subject to fluctuation and is dependent on seasonal rainfall. In 1998 it represented a share of 38% of power production, whilst in 1999 its share had fallen to 30%.

Turkey has good geothermal potential. There are around 1000 hot springs and mineral waters and 95% of the known geothermal fields are suitable for space heating purposes. At least ten fields can be used for electricity generation. To date, there are 24,200 dwellings in ten cities heated by geothermal energy. The installed capacity of geothermal central heating systems is equivalent to about 52,550 dwellings.

Turkey has an estimated geothermal power production potential of 35 GW. The first geothermal power plant with an installed capacity of 20 MW is operational in the Denizli-Kizildere field. There are plans to generate 500 MW from Germencik, Kizildere, Canakkale and several of other fields by the year 2010, and 1,000 MW by 2020. Turkey has been in the forefront of use and development of geothermal energy for thermal applications in recent years. The installed capacity of thermal plants amounted to 820 MWth in 2000, with an annual energy use of 15,756 TJ. Most of the development has occurred in space heating, with 51,600 residences heated by geothermal energy (493 MWth), as well as 45.4 ha of geothermal greenhouses and 327 MWth for spas. The forecast for 2010 is 3,500 MWth for heating (500,000 residences equivalent); while for 2020 8300 MWth (1.25 million residences equivalent) of heating applications are planned.

FIGURE 2: USE OF GOETHERMAL ENERGY IN TURKEY



Source: EIE/NECC

The main solar energy utilisation in Turkey is for domestic hot water, with a total installed capacity (collector area) of 8.2 million m². Photovoltaics currently have an extremely limited use, there are only a few state organisations using it for remote electricity demand, such as telecommunication stations, fire observation stations, light-houses and highway emergency systems. Installed capacity is estimated to be 300 kWp. There are only two grid connected systems, one of 4.8 kWp installed capacity, and another of 1.2 kWp (this one for demonstration and research purposes).

Turkey has good wind energy potential, EIE/NECC estimate the current technical and economic potential to be 88,000 MWe and 10,000 MWe respectively. However, so far there is only 18.9 MWe of installed capacity (mainly grid connected systems). There are however about 3,400 MWe wind power projects submitted by private developers to the MENR under the autoproducer or BOT model.

FINANCING ENERGY EFFICIENCY

There are no financial incentives directly related to energy efficiency investments in Turkey. There is an “Investment Encouraging Programme” which encourages investments, especially in less developed regions, and a regime of aid to small and medium size enterprises (SME). The aim of this programme is to encourage productive investment. Energy saving activities are not covered specifically (for example installing double glazing) but other activities, such as the production of environmental products

or highly efficient technologies would be covered. If the investment qualifies, it receives the following advantages:

- ❑ Exemption from customs duties and fund levies;
- ❑ Investment allowance;
- ❑ Value added tax exemption for imported and locally produced machinery and equipment;
- ❑ Exemption from certain taxes, duties and fees;
- ❑ Credit allocation from the budget.

These schemes are directed towards private companies but municipalities can obtain credits or other advantages through the Bank of the Provinces, which supports proactive work in provinces and municipalities. The Bank of the Provinces is also responsible for providing loans for investment in district heating systems since 1998.

The Ministry of Environment also provided loans to municipalities for the construction of geothermal district heating systems (to two towns and one province for the construction of central heating systems servicing a total of 5200 dwellings). The Ministry of Environment had also at its disposal the Environmental Prevention Fund (5,000 billion Turkish Lira in 2001⁴), but this fund had other priorities and was not targeted specifically for financing specific energy efficiency projects. In the past some geothermal projects were financed⁵.

ESCOs are not active in Turkey. The high rate of inflation is the main obstacle

ORGANISATION OF ENERGY EFFICIENCY ACTIVITIES

The Ministry of Energy and Natural Resources (MENR) is responsible for formulating and supervising general energy policies.

The General Directorate of Electrical Power Resources Survey and Development Administration (EIE)

This institution is part of the MENR, and it was founded in 1935. Rational use of energy, energy conservation, new and renewable energy sources have been within its scope of activities since 1981. The Department of Energy Resources Surveys was entrusted in 1992 by the MENR as the *National Energy Conservation Centre (NECC)*. Today it is the main implementing group within the MENR in charge of developing

⁴ In September 2002 1 Euro=1,600,000 TL

⁵ Within the framework of effective implementation of the economic stabilisation programme, the government has decided to abolish all funds including the Environmental Prevention Fund.

renewables and promoting energy efficiency. It implements energy efficiency policy and it advises the government on energy efficiency issues. It has a staff of 45 people.

In August 2001, The Secretariat of the *National Energy Conservation Board (ECCB)* was transferred to EIE/NECC by the MENR. The ECCB meets every month and prepares plans for activities directed to increasing awareness in energy conservation, such as the Energy Saving Week.

The Ministry of Environment

The main functional responsibility of the Ministry of Environment is to formulate and supervise environmental policies. It has responsibility for some energy efficiency matters, such as the Climate Change Programme (which considers increasing energy efficiency one of the main means to achieve greenhouse gas emission reductions), emission limits from combustion plants, implementation of EU Directives such as the Directive on Integrated Prevention Pollution Control (IPPC), CO₂ monitoring, regulations for fuels for vehicles, etc. Whilst MENR has responsibility for implementation in the energy efficiency sector, the Ministry of Environment provides opinions and is informed.

The Ministry of Reconstruction and Resettlements

This is the main organisation responsible for preparation of regulations on building insulation and monitoring their implementation in Turkey. The General Directorate for Construction Affairs is responsible for assessment and determination of the requirements of public organisations regarding building and other facilities, preparation of the architectural and engineering projects, tendering, controlling and technical acceptance of construction and repair activities of public buildings. The Department of Installations prepares projects, designs installation systems for public buildings and identifies and sets the necessary equipment.

The Department of Reconstruction and Projects under the administration of the Ministry of Reconstruction and Resettlements prepares physical plans and sets the basic principles for planning and implementation in order to ensure a uniform practice among local authorities. Physical planning and implementation at local level is the task of the municipalities. The regional administrations of the Ministry of Reconstruction and Resettlements are in charge of the preparation of the territorial plans. Any investment decision must be in accordance to the Plan.

The Ministry of Industry and Trade is responsible for preparing and implementing regulations and standards on energy efficiency of electrical appliances.

The Ministry of Transportation is responsible for planning and monitoring in the transport sector.

The Scientific and Technical Research Council of Turkey (TUBITAK) was founded in 1963 to develop, promote, plan and coordinate research and development activities in the field of positive sciences. The Energy Systems and Environmental Research Institute (ESERI), within TUBITAK, is a research institute in the fields of energy and environment in Turkey. Within its main areas of research in advanced energy technologies are energy conservation in industries and buildings, energy conservation systems such as fuel cell technologies, absorption cooling systems, photovoltaics and combustion and biomass gasification. TUBITAK is authorised to organise energy management courses and energy audits for industries.

The Technology Development Foundation of Turkey (TTGV) was established in 1991 through a loan agreement with the World Bank to strengthen and contribute to boosting Turkish industrial competitiveness in international markets and develop technological infrastructure. Its main activities are:

- ❑ Technology Development Project (TDP) Financing. Up to date TTGV has supported hundreds of projects run by private sector firms;
- ❑ Phase-out ozone-depleting substances;
- ❑ Technoparks.

Universities, such as for instance through the Energy Institute in the Istanbul Technical University, are engaged in energy management courses and other training programmes.

The State Planning Organisation (SPO)

It prepares the National Development Plan (which deals with all the sectors of the economy, not only energy), defines priorities and allocates budgets. The eighth five-year development plan (2001-2005) gives high priority to energy efficiency.

The Turkish Standard Institute (TSI) and the State Institute of Statistics (SSI)

The TSI prepares national standards and the SSI is responsible for collecting statistical information.

There are several industrial associations that play an important role in creating awareness and maintaining a dialogue with the government. Examples are the “Turkish

Glass Works”, the “Natural Gas Heating Systems Association”, the “Association of Insulation Companies”, the “Turkish Society of Cogeneration and Autoproducers” and the “Society of Geothermal Energy”.

To date, Turkey has received very little financial assistance from the EU. Within the framework of the Financial Co-operation Programme with reference to harmonisation with EU legislation, it is envisaged that it will receive assistance for institutional building, consultancy services and equipment procurement. A new project proposal aiming at strengthening the EIE/NECC for preparation and implementation of a “national energy conservation plan” in compliance with the principles and strategies enshrined in the Green Paper and the EU Energy Efficiency Action Plan, has been adopted under the EU Commission under the Pre-accession Financial Co-operation Programme between the EU and Turkey. The main aim is to enable the centre to function more effectively and to have access to the needed consultancy services.

ENERGY EFFICIENCY AND THE ENVIRONMENT

Energy efficiency is integrated in environmental policy in two ways:

- ❑ Through the development of sustainability indicators; and
- ❑ Increasing energy efficiency in order to decrease greenhouse gas emissions.

In the Eighth Five Year Development Plan (2001-2005), increasing energy efficiency is mentioned as one of the main priorities of energy policy. It states “Energy consumption and consequently energy supply at minimum amount and cost shall be the main objective, within the approach of a sustainable development that shall support economic and social development and that shall have a minimum destructive impact on the environment”. The main objectives linking energy and environment are:

- ❑ The 2001-2006 National Environmental Action Plan (NEAP) will be revised and updated and be based on a legal framework. Sustainable development indicators shall be developed to better monitor the impact of the NEAP;
- ❑ Emission factors shall be specified for all sectors and an emissions inventory shall be drawn up. The aim is that the specification of emission factors will help setting targets for CO₂ emissions;
- ❑ Environmentally friendly technologies shall be given priority in the formulation of industrial policies and new industrial investments;
- ❑ Efforts shall continue to take part in the Framework Convention on Climate Change (UNFCCC) in line with the principle of common but differentiated responsibilities and considering the requirements of the increasing population.

Turkey was included in both Annex I and Annex II of UNFCCC. Annex I includes both OECD countries and countries in transition. Under the Kyoto Protocol, countries included in Annex I have greenhouse emissions targets. Annex II includes OECD countries, which are required to provide new and additional financial resources and take steps to promote, facilitate and finance the transfer of environmentally sound technologies and know-how to other countries.

Given the difference in development and industrialisation level between Turkey and other OECD countries, the Turkish government was not able to agree to becoming party to the convention, since it considered that it would not be able to fulfil its responsibilities.

In order to come to an agreement, Turkey proposed the deletion of its name from Annex II, while remaining in Annex I, with an accompanying footnote indicating that Turkey should enjoy “common but differentiated responsibilities”. This proposal was accepted in COP-7 and the UNFCCC is now in the agenda of the Turkish Grand National Assembly for ratification.

Following the ratification of the UNFCCC, Turkey may be able (subsequent to additional steps) to benefit from the flexibility mechanisms joint implementation (JI) or emissions trading, or other international financing mechanisms, such as the Global Environmental Facility (GEF) or the Prototype Carbon Fund (PCF).

Turkey has set limits for SO₂, NO_x and dust but there are no taxes on emissions. Emission limits are less strict than EU levels; current limits are shown in Annex II. All new coal-fired power plants should be equipped with flue gas desulphurisation.

ASSESSMENT OF PROGRESS

Turkey is one of the OECD countries characterised by the highest increase in energy demand in the last decade. Therefore, the energy policy is dominated by concerns related to security of supply. It is in this context of growing energy demand and import dependency that improving energy efficiency became increasingly important, and it is recognised as such in the Eighth Five Year Development Plan (2001-2005). However, the Government while assigning a much higher priority to meeting the demand growth by increasing supply, has not assigned due consideration to adopting measures on the demand side. This is reflected by their difficulty in decoupling energy consumption growth from GDP in the last three decades.

The Turkish Government understood that increasing energy supply and power generation capacities would not be financially possible without attracting and mobilising foreign and domestic private capital. It also had the political will to adapt to the EU *Acquis Communautaire*, and has made substantial progress in the process of opening the energy market to national and foreign investors. The process of liberalisation started with a set of legislative measures, but the challenge of implementation is just ahead.

In the process of energy market liberalisation, as the Government reduces its direct role in the supply side of the energy sector by increasingly calling upon private investors, increasing attention should be paid to demand-side management. Given the country's high energy intensity by OECD standards and - more importantly - no trend towards improved energy efficiency indicators over the past three decades, the Government may need to pursue a determined and pro-active energy efficiency policy, at least for a transition period. Such a policy should be based not only on obligations, but should also include incentives.

Exploiting fully the opportunities for energy efficiency within the new market conditions is of paramount importance. On the supply side, while the Government will limit its functions in a liberalised market, given the relative low level of efficiency compared to other OECD countries, the review team felt that the Government needs to continue using the existing instruments for improving energy efficiency. This might lead to a shift of activities within the Government's energy administration from supply to demand side issues.

Energy Efficiency Institutions

There are a number of institutions active in energy efficiency policies and programmes, and this is laudable. These institutions could however be more proactive in proposing and encouraging the Government to adopt more progressive policies and programmes.

At the same time, as pointed out above, in the context of market liberalisation a shift of personnel within the energy administration could strengthen the departments dealing with energy efficiency policy formulation and implementation. The development and use of energy efficiency institutions at local level may also be considered an important option.

Sectoral programmes

The industrial sector is the main energy consumer (40% of TFC) and has been given priority. Programmes have very much focused on raising awareness and training of energy managers. However, little use has been made of some other instruments, for example, to date, there have been no voluntary agreements.

In the building sector standards have been developed and made stricter. It is unclear to what extent these standards are complied with, although progress has been achieved in developing a monitoring system. New standards often apply to new buildings only, and these are a minority. When secondary legislation is implemented the new standards will also apply to refurbishment of old buildings. It appears that there is a need to develop incentives to undertake refurbishment. Regarding public buildings it appears that good auditing initiatives have not been followed by concrete implementation measures.

Most programmes lack specific targets. Also, an effective assessment and monitoring system needs to be developed and the Government should take urgent action to address these shortcomings. Foreign assistance mainly from EU instruments/programmes in terms of training and institution building would be beneficial, since there is a lack of expertise in the area.

The review team has not identified specific policies and programmes to encourage energy efficiency in the transport sector except for limited applications in big municipalities for developing public transportation. For public transport in urban areas it seems that the potential is especially high.

Cogeneration has achieved an impressive penetration in recent years (mainly in the industrial sector), due to a favourable environment that provided the necessary incentives. Unfortunately, the situation is changing with the liberalisation of the energy market in pursuance with the provisions of the Electricity Market Law.

As for renewables, there is a large potential that remains to be exploited, notably for hydro, geothermal and wind. Promotional measures in the past were limited to research and development. Promotional measures to encourage development of these technologies need to be developed in a transparent manner, so as not to distort the liberalised market.

Energy pricing and taxation

Reaching cost reflective pricing is one of the Government's priorities. The new Electricity and Gas Market Laws constitute the legal framework in this respect. Accordingly, no cross-subsidies are allowed and electricity tariffs on regional bases are to be developed. Although mandatory insulation standards exists and current electricity and gas prices in the residential sector are high relative to the low income per capita, further incentives should be considered for undertaking effective energy efficiency measures due to the lack of appropriate financing instruments directly to end-use consumers. In central heated buildings there is no individual metering available and therefore there are limited incentives for energy efficiency. Implementation of individual metering for space heating in apartment buildings for the purpose of motivating/improving energy efficiency needs amendment to the existing legislation, i.e., "The Law on Individual Flat Ownership".

The tariff for the use of the transmission and distribution network is not fully transparent and does not fully reflect costs on a regional basis. This is an important issue because the grid is very inefficient and needs upgrading. A new Regulation on tariffs has been issued on 26 September 2002 by the Energy Market Regulatory Body. In order to comply with the provisions of the Electricity Market Law, TEDAŞ is currently preparing a cost-based regional tariff. In some regions there are non-payment problems. It is recognised that subsidising energy prices is not the solution in the long term, and in the future low-income customers will be provided direct assistance. As regards providing financial assistance to low-income customers, the quantity and procedures are to be determined by decision of the Council of Ministers within the provisions of the Electricity Market Law, with no intervention on the functioning of the market or price distortion.

There are no effective tax incentives to encourage energy efficiency in Turkey. Indeed, existing energy taxes are designed with the purpose of collecting revenue and environmental protection does not appear to play a significant role.

Financing of energy efficiency

As a consequence of the prevailing financial climate in Turkey, there are almost no financial incentives for energy efficiency per se. Only investments qualified as "productive" get a favourable treatment. There are general investment incentives that can be applicable to energy efficiency investment, but these are mainly targeted at encouraging productive investment, particularly in less-developed regions and financing SMEs. Currently, the Government does not treat energy efficiency projects as a special

category of investments. Also, innovative schemes such as third party financing or energy service companies (ESCOs) are not being developed. A number of ESCOs tried to enter the market in the past, but unsuccessfully. It appears that the high rate of inflation is the biggest problem.

Energy efficiency and the environment

Energy related environmental policies are clearly focused on supply side issues and enforcement provisions of pollution standards need to be strengthened.

Whilst energy efficiency improvements and protection of the environment are inter-linked, the limited financial support of the Ministry of Environment, particularly the Environmental Protection Fund (planned to be abolished) was inadequate in supporting energy efficiency projects. Ratification of the UNFCCC and the Kyoto Protocol and use of flexible mechanisms may lead to a change in this attitude, also concerning the use of domestic resources.

RECOMMENDATIONS

General

The Government should, in parallel with securing sufficient energy supplies, increase the attention it gives to the demand side in order to provide for a decoupling between the growth of energy demand and GDP; more attention should be paid to improving energy efficiency as this will help to ameliorate security of supply.

The Government should consider revising its energy demand projections taking into account in a more aggressive manner the potential for energy efficiency increase and the impact of liberalisation of the energy market.

The Government should seek to mobilise the forces of society (for example, voluntary organisations, NGOs, Vakifs ⁶, etc) to promote energy efficiency.

Energy efficiency legislation, policies and programmes

The Government should aim to enact its draft energy efficiency law as soon as possible, taking into account ongoing efforts and experience gained in the fields of energy efficiency and harmonisation with EU legislation and regulations. Also, the law should seek to enhance coordination between the various ministries and institutions in the area of energy efficiency and related environmental aspects.

⁶ Vakifs are community-based charity-type organisations that dispense various social services and seem to enjoy widespread support and respect in the population.

The Government's strategy for improving energy efficiency throughout all sectors of the economy should wherever possible include specific targets. Measurement of performance against targets will enable the Government to gauge the cost and effectiveness of its policies.

Energy efficiency policies should be monitored and evaluated both from the perspective of the economic gain and their environmental impact.

Environmental considerations should play a continuously growing role when the government examines various supply alternatives, notably relating to choice of fuel and the use of renewables.

Energy prices and markets

Price differentiation favouring energy efficiency improvement should be promoted by the Government for all energy carriers (e. g. thresholds for gas consumption should be introduced following the example of the electricity tariffs).

In pursuance with the provisions of the Electricity and Gas Market Laws, every effort should be made to eliminate, as quickly as possible, any remaining cross subsidies.

Before the market becomes fully competitive, the Government should ensure that the generators do not overestimate production costs. In particular, in the course of licensing and privatisation of energy companies, the government should ensure that overhead costs are not overvalued and that privatised companies are not able to reap abusive margins on their generation costs.

The Government is encouraged to continue its efforts to implement incentives and penalties that aim to eliminate non-payment of energy bills. Difficult social situations should be addressed through targeted social aid.

The Energy Markets Regulator should ensure transmission tariff transparency according to the provisions of the electricity market law. This should enable transmission inefficiencies to be identified and addressed.

Institutions and intermediate organisations

Building on the positive steps taken so far, the Government should strengthen the role and improve the legal status, standing and organisation of the National Energy Conservation Centre.

The Government should consider strengthening the role and capabilities of municipalities in promoting energy efficiency among end users.

Governmental bodies should be encouraged to play a more proactive role in implementing new proposals and translating their technical expertise into concrete measures and legislative acts.

The Government should support the establishment of local energy efficiency centres/agencies to promote energy efficiency improvements and increase awareness at local and regional level.

The Government should be cognisant of the fact that in the process of market liberalisation it is likely that there will be a need to refocus its responsibilities from the supply side to the energy conservation and environmental protection activities.

Specific programmes and instruments

The Government should make use of voluntary agreements, notably in industry.

The Government should take specific measures to encourage energy efficiency improvements in the residential sectors; such measures may include preferential interest loans, direct financing or tax reductions for final consumers. The energy efficiency industry should be encouraged to play a greater role in realising this objective.

Following up on the surveys and monitoring of energy use in public buildings, binding measures for improving energy efficiency should be implemented.

Energy efficiency should become a guiding principle in the development of transport policy.

The Government should consider extending the obligation on large industries to have an energy manager onto small and medium size enterprises, large public and governmental buildings.

The Government should expand energy-auditing policy beyond the current group of companies to include smaller companies and buildings.

The Government should introduce energy efficiency benchmarking in all economic sectors, including factories, buildings and commercial.

The Government should further strengthen its existing information, awareness and training programmes.

Individual metering should be introduced as much as possible, both for energy supply and consumption; the Government should consider initiating a special programme and funding for this purpose.

Renewable energy sources and cogeneration

The Government should ensure that during and after the transition to a liberalised market the development of renewable energy technologies and cogeneration is properly maintained.

For new thermal power plants the Government should encourage investors to consider cogeneration as a favoured option if it is technically and economically feasible. Whenever appropriate, investors should be encouraged to explore sites that have an existing heat demand.

The Government should promote geothermal energy for district heating and electricity generation and, where appropriate, ensure that the expansion of geothermal grid can benefit at reasonable cost from the infrastructure work that will be undertaken during the installation of the gas distribution system.

Financing energy efficiency

In order to enhance state financing of energy efficiency, the Government should consider including energy efficiency investments as a stand-alone category deserving investment incentive certificates.

The Government should analyse the merits of establishing an energy efficiency financing scheme, which may be facilitated by the future reduction in energy prices that is expected to result from liberalisation of the energy markets.

The Government should encourage the use of innovative energy efficiency financing schemes like third party financing and facilitate the operation of energy service companies.

The Government should consider allocating a proportion of the environmental levies, fines and penalties that it collects to finance improvements in energy efficiency on both supply and demand side.

Data collection and statistics

Governmental efforts to collect data and develop indicators relevant to energy efficiency should be pursued. These data should be increasingly be used to formulating, refining and implementing energy policy.

Environmental policies

The Government's initiatives for tackling Climate Change issues are commendable and welcome. Following the ratification process of the UNFCCC, the Government should also consider additional steps to make use of flexible mechanisms.

ANNEX I: SELECTED END-USE DATA TABLES

Total Final Consumption of Energy (TFC) by end-use sector (Mtoe)

	1990	1996	1997	1998	1999	2000
Residential	16.087	19.373	20.672	20.298	20.228	20.441
Industry	14.543	20.050	21.790	21.555	20.894	23.711
Transport	8.723	11.778	11.338	10.760	13.322	12.117
Agriculture	1.956	2.714	2.823	2.827	2.923	2.962
Non-Energy	1.031	1.643	1.788	2.272	1.881	1.901
Total (TFC)	42.340	55.557	58.412	57.712	59.249	61.131
TFC/GDP (toe/1000US\$)	0.281	0.294	0.288	0.276	0.298	0.286

Source: MENR

Final Consumption of the Residential Sector by Energy Source (Mtoe)

	1990	1996	1997	1998	1999	2000
Total	16.087	19.373	20.672	20.298	20.228	20.441
a. Electricity	1.435	2.679	3.077	3.317	3.563	3.927
b. Heat	1.093	1.378	1.499	1.602	1.676	1.727
c. Oil products	3.011	3.783	3.709	3.543	3.587	3.705
d. Gas	0.064	1.716	2.238	2.422	2.617	2.481
e. Coal	3.256	2.657	3.003	2.290	1.909	1.978
f. Combust. Renew. & Waste	7.208	7.045	7.024	6.983	6.715	6.457
g. Others	0.020	0.113	0.121	0.141	0.160	0.165

Source: MENR

Final Consumption of the Industrial Sector by Energy Source (2000, Mtoe)

	Mining	Manufacturing							Construction	Total
		Iron and steel	Chem. and petroch.	Non-ferr. metals	Food and tobac.	Paper pulp and print	Non-metal mineral	Other		
Coal	-	2.199	0.049	0.136				8.831		11.215
Petroleum products	-	0.506	2.277	0.265				3.134		6.182
Gas	-	0.005	0.248	0.234				1.715	-	2.202
Geothermal. Solar etc.	-	-	-	-	-	-	-	0.097	-	0.097
Combust. Renew. & Waste	-	-	-	-	-	-	-	-	-	-
Electricity		0.722	0.549	0.235				2.509		4.015
Heat	-	-	-	-	-	-	-	-	-	-
Total		3.432	3.123	0.870				16.286		23.711

Source: MENR

ANNEX II: EMISSION STANDARDS

Emission Standards for Combustion Plants (Furnaces) in Turkey

COMBUSTION PLANTS	Dust Emissions mg/Nm ³		NOx Emissions mg/Nm ³		SO ₂ Emissions mg/Nm ³			
	OLD PLANTS	NEW PLANTS	OLD PLANTS	NEW PLANTS	<300 MWth		>300 MWth	
					Remaining Operating Hours >20000	New Plants	Remaining Operating Hours 20000-50000	Remaining Operating Hours >50000 and New Plants
Solid Fuel Fired Plants	(*) 250	(*) 150	1000	800	(**) 3200	(**) 2000	(**) 3200	(**) 1000
Liquid Fuel Fired Plants	110	110	1000	800	(**) 3200	(**) 1700	(**) 1700	(**) 800
Gas-Fired Plants ****	10	10	500	500	(***) 60	(***) 60	60	60

- * In case of lignite having an original ash content of over 18%, this limit can be increased by 200% with the permission of Ministry of Environment.
- ** If these limits are exceeded, SO₂ emission degree has to be reduced to 10% in the plants with a thermal capacity of up to 300 MWth and to 5% for those with a thermal capacity higher than 300 MWth.
- *** This limit is 100 mg/Nm³ for the plants having a fuel thermal capacity below 100 MWth.
- **** In the regulation, there are no separate limit values for Natural Gas combined Cycle Plants (Gas Turbines). However it was agreed with Ministry of Environment that those values specified for Gas-Fired plants could be used for Gas Turbines. But oxygen percentage in the flue gas shall be taken as 15%, instead of 3% specified for Gas-Fired Plants.

Source: Air Quality Protection Regulation, Published in Official Gazette on November 2, 1986. No:19269

These limits are considerably less strict than those in application in the EU (Under Directive 2001/80/EC on the “limitations of emissions of certain pollutants into the air from large combustion plants”. This Directive applies to combustion plants with a net rated thermal input equal or greater than 50 MW. We include some of the limits established in this Directive for comparative purposes (notice that the list is not exhaustive).

SO₂ emission limits mg/Nm³

Gaseous fuels: 35 (EU), 60 (Turkey)

Liquid: 200 (EU), 1700 or 800 -depending on number of operating hours (Turkey).

This limit is for plants >300 MWth

Solid: 200 for plants >300 MWth (EU), Turkey 3,200 or 1,000 depending on number of operating hours.

Similar differences can be observed for dust and NO_x emissions.

ANNEX III: ENERGY PRICES

Energy Prices End Use Sectors, 2000 (USD per Unit) (Incl. % VAT)

	Un-leaded gasoline Premium (litre)	Light fuel oil (1000 litres)	Diesel (litre)	Heavy fuel oil (tons)	Nat Gas (10 ⁷ kcal GCV*)	Steam Coal (tons)	Electricity (kWh)
Industry				206.4	175.24	32.38	0.08
Households		695.98			259.65	51.85	0.08
Electricity generation					168.76	14.44	-
Transportation	0.93		0.70				

* Gross calorific value

Source: MENR

ANNEX IV: SHARE OF PASSENGER AND FREIGHT TRANSPORTATION

Years	Passenger Transportation				
	Transportation Mode				
	Highway (%)	Railway (%)	Seaway (%)	Airway (%)	Passenger-km (billion)
1991	94.9	4.4	0.06	0.6	138
1995	94.8	3.5	0.04	1.6	163.7
1998	95	3.2	0.03	1.7	195.6
1999	94.8	3.3	0.02	1.8	184.8
2000	95.2	3	0.02	1.8	195.1
2001	95.2	3.2	0.02	1.6	176.7

Years	Passenger Transportation				
	Transportation Mode				
	Highway (%)	Railway (%)	Seaway (%)	Airway (%)	Tonnes-km (billion)
1991	85	11.1	3.8	0.1	72.9
1995	95.5	7.1	0.2	0.2	121.7
1998	95	5.3	0.2	0.2	161
1999	90	5	5	0.2	168
2000	90	5.5	4.4	0.2	179.7
2001	90.5	4.5	4.8	0.2	167.4

ANNEX V: SECONDARY LEGISLATION ISSUED IN ELECTRICITY AND GAS MARKETS

ELECTRICITY MARKET:

- ❑ Electricity Market Licensing Regulation (04.08.2002; OJ No: 24836)
- ❑ Electricity Market Tariffs Regulation (11.08.2002; OJ No: 24843)
 - Communiqué Regarding Determination of Transmission and Distribution Connection Charges
 - Communiqué Regarding Regulation of Distribution System Revenue
 - Communiqué Regarding Regulation of Retail Service Revenue and Retail Prices
 - Communiqué Regarding Regulation of Transmission System Operation Revenue
 - Communiqué Regarding Regulation of Transmission System Revenue
- ❑ Electricity Market Import and Export Regulation (04.09.2002; OJ No: 24866)
- ❑ Electricity Market Eligible Customers Regulation (04.09.2002; OJ No: 24866)
- ❑ Electricity Market Customer Services Regulation (25.09.2002; OJ No: 24887)
- ❑ Electricity Market Regulation on Modifications in the Contracts of Legal Undertakings Carrying Out More Than One Market Activity and on the Transfer of the Transmission Activity and Relinquished Activities (28.11.2002; OJ No: 24950)

GAS MARKET:

- ❑ Natural Gas Market Distribution and Customer Services Regulation (03.11.2002; OJ No: 24925)
- ❑ Natural Gas Market Facilities Regulation (04.08.2002; OJ No: 24918)
- ❑ Natural Gas Market Transmission System Operation Regulation (26.10.2002; OJ No: 24918)
- ❑ Natural Gas Market Tariffs Regulation (26.09.2002; OJ No: 24888)
- ❑ Natural Gas Market Certificate Regulation (25.09.2002; OJ No: 24887)
- ❑ Natural Gas Market Internal Installation Regulation (18.09.2002; OJ No: 24880)
- ❑ Natural Gas Market Licensing Regulation (07.09.2002; OJ No: 24869)

ANNEX VI: ORGANISATIONS VISITED BY THE REVIEW TEAM

1. Ministry of Energy and Natural Resources (MENR) (Enerji ve Tabii Kaynaklar Bakanlığı)
2. Energy Market Regulatory Authority (EMRA) (Enerji Piyasası Düzenleme Kurumu)
3. General Directorate of Energy Affairs (EİGM) (Enerji İşleri Genel Müdürlüğü)
4. Research-Planning-Coordination Board of MENR (MENR/ RPCB) (Araştırma, Planlama Koordinasyon Kurulu)
5. General Directorate of Electrical Power Resources Survey & Development Administration (EIE) (Elektrik İşleri Genel Müdürlüğü)
6. Turkish Electricity Distribution Comp. (TEDAŞ) (Türkiye Elektrik Dağıtım A.Ş. Genel Müdürlüğü)
7. Turkish Electricity Transmission Comp. (TEİAŞ) (Türkiye Elektrik İletim A.Ş. Genel Müdürlüğü)
8. Electricity Production Company (TEÜAŞ) (Elektrik Üretim A.Ş. Genel Müdürlüğü)
9. Turkish Electricity Trade Company (TETTAŞ) (Türkiye Elektrik Ticaret ve Taahhüt A.Ş. Genel Müdürlüğü)
10. General Directorate of Petroleum Affairs (PİGM) (Petrol İşleri Genel Müdürlüğü)
11. Turkish Pipelines Corporation (BOTAŞ) (Boru Hatları İle Petrol Taşıma A.Ş.)
12. State Statistical Institute (DİE) (Devlet İstatistik Enstitüsü)
13. Turkish Standards Institute (TSE) (Türk Standartları Enstitüsü)
14. General Directorate of Mineral Exploration & Research (MTA) (Maden Tetkik ve Arama Genel Müdürlüğü)
15. Ministry of Environment (Çevre Bakanlığı)
16. General Directorate of State Meteorological Organization (DMİ) (Devlet Meteoroloji İşleri Genel Müdürlüğü)
17. State Planning Organization (SPO) (Devlet Planlama Teşkilatı)
18. The Undersecretary of Treasury (Hazine Müsteşarlığı)
19. The Ministry of Reconstruction and Resettlements (Related Directorates) (Bayındırlık ve İskan Bakanlığı)
20. Association of Insulation Companies (IZODER) (Isı-Ses-Su İzolasyoncuları Derneği)
21. Company for Household Appliances (ARÇELİK)
22. Turkish Glass Company (ŞİŞECAM)
23. Association of Iron & Steel Sector (Demir-Çelik Üreticileri Derneği)

24. Union of Cement Producers (Türkiye Çimento Müstahsilleri Birliđi)
25. Society of HVAC and Sanitary Engineers (Tesisat Mühendisleri Derneđi)
26. Dep. of Environment of Municipality of İstanbul (İstanbul Büyükşehir Belediyesi Çevre Dairesi Başkanlıđı)
27. İstanbul Technical University (İTÜ) (İstanbul Teknik Üniversitesi)
28. Union of Natural Gas Equipment Producers (DOSİDER) (Dođal Gaz Cihazları Sanayi ve İşadamları Derneđi)
29. General Directorate of Incentives-Ministry of Trade and Industry (Teşvikler Genel Müdürlüğü-Sanayi ve Ticaret Bakanlığı)
30. General Directorate of Industry-Ministry of Trade and Industry (Sanayi Genel Müdürlüğü-Sanayi ve Ticaret Bakanlığı)
31. General Directorate of Consumers-Ministry of Trade and Industry (Tüketiciler Genel Müdürlüğü-Sanayi ve Ticaret Bakanlığı)
32. Scientific and Technical Service Company (Bilimsel ve Teknik Hizmetler Ltd. Şirketi)
33. Turkish Society of Cogeneration and Autoproducers (COGEN) (Kojenerasyon Derneđi)
34. Geothermal Energy Society of Turkey (Türkiye Jeotermal Derneđi)
35. The Scientific and Technical Research Council of Turkey (TUBİTAK) (Türkiye Bilim ve Teknik Araştırma Kurumu)
36. The Marmara Research Center (TUBİTAK/MAM) (Marmara Araştırma Merkezi-TUBİTAK)
37. TTGV (Turkish Foundation for Technology Development) (Türkiye Teknoloji Geliştirme Vakfı)

GLOSSARY

BOTAS	Turkish Pipelines Corporation
BOO, BOT	Built-own-operate, Built-own-transfer
CEDED	European Household Appliance Organisation
CEN	European Normalisation Committee
CFC	Chlorofluorocarbons
CO ₂	Carbon dioxide
DEPA	Greek Gas Company
ESCOs	Energy Service Companies
EU	European Union
GCV	Gross Calorific Value
GDP	Gross Domestic Product
GEF	Global Environmental Facility
IEA	International Energy Agency
IETT	Istanbul Electricity, Tram and Light Rail Company
IMF	International Monetary Fund
JI	Joint Implementation
JICA	Japan International Co-operation Agency
KWh	Kilo Watt hour
m ³	cubic meter
MWe	Megawatt electricity
NO _x	Nitrogen oxide
OECD	Organisation for Economic Co-operation and Development
PCF	Prototype Carbon Fund
PEEREA	Protocol on Energy Efficiency and Related Environmental Aspects
PPP	Purchasing Power Parity
SO ₂	Sulphur dioxide
SSI	State Institute for Statistics
TFC	Total Final Consumption
TOE	Tonne of Oil Equivalent
TPES	Total Primary Energy Supply
TWh	Terra Watt hour
UN-ESCAP	United Nations Asian-Pacific Countries Economic and Social Commission
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
VAT	Value Added Tax



Energy Charter Secretariat
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Boulevard de la Woluwe, 56
B-1200 Brussels
Belgium

Tel. +32-(0)2 775 98 00

Fax +32-(0)2 775 98 01

E-mail info@encharter.org

<http://www.encharter.org>



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