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Major Utilization of Natural Gas in Turkey

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ABSTRACT

The aim of this paper is the major utilization of natural gas in Turkey. Turkey is rapidly growing in terms of both its economy and population due to its demand for energy. In the new world energy order, gas usage with no doubt will continue to grow well into the 21st century. Natural gas has been available for Turkish consumption for 17 years. Its use expanded sharply after the signing of the first sales and purchase agreement with the former Soviet Union in 1986. Turkish natural gas usage is projected to increase remarkably in coming years, with the prime consumers, expected to be industry and power plants. Energy demand of Turkey is growing by 8% annually, one of the highest rates in the world. In addition, natural gas consumption is the fastest growing primary energy source in Turkey. Gas sales started at 0.5 bcm (billion cubic meters), in 1987 and reached approximately 22 bcm in 2003. Turkey is an important candidate to be the ''energy corridor'' in the transmission of the abundant oil and natural gas resources of the Middle East and Middle Asia countries to the Western market.

INTRODUCTION

Energy is needed for almost every stage of modern life and accessing appropriate energy has gained more attention for both producers and consumers. In addition, the energy consumption level is used as the criteria to indicate the development level of the countries. The level of energy dependency and the quantity of energy consumption in many developed countries are higher than developing countries. However, energy demand is growing sharply in developing countries in order to fulfill the requirement for modern technology. The majority of energy consumption is based on fosil energy sources. To utilize energy from renewable sources is not enough to meet world-wide energy demand. For this reason there is a requirement for management of limited fossil energy sources using international energy policies. National energy policies may also change in the context of global energy policies. Moreover, the impacts of national energy policies on sectors are different. These different effects on national economic

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sectors should be considered by determining and implementing the national energy policies (Sayin *et al.,* 2005).

World primary energy consumption grew by a relatively strong 2.6% in 2002, well ahead of the 10 years growth trend of 1.4% per annum. In terms of primary energy mix, coal increases its share from 24.5% in 2001 to 25.5% in 2002, entirely at the cost of oil, whose share dropped to 37.4% in 2002 (Kilic, 2005). Share of other fuels, natural gas, nuclear and other energy remained more or less the same, at 24.3%, 6.5% and 6.3% in 2002 (Table 1).

In 2003, global energy consumption rose by 2.9%, following a 3.4% jump in 2002 (Fig. 1). Total primary energy supply and consumption are 9.472 Mtoe (Million tons of oil equivalents) by world region in 2003, respectively (RWE, 2004).

World natural gas reserves have risen from 85.90 tcm (trillion cubic meters) at the end of 1982 to 155.63 tcm at the end of 2001 and 155.78 tcm at the end of 2002 (BP, 2003). At end 2002, Europe, Eurasia and the Middle East account for more than 75% of the world's natural gas reserves. Russia, Iran and Qatar together accounted for 54.5% of the total reserves (Table 2).

Table 1. Primary energy mix-world (IEA, 2003)

	2001		2002	
	*Mtoe	%	*Mtoe	%
Oil	3517.1	38.37	3522.5	37.45
Natural gas	2219.5	24.22	2282.0	24.26
Coal	2243.1	24.47	2397.9	25.49
Nuclear	601.0	6.55	610.6	6.49
Others	584.7	6.37	592.1	6.29
Total	9165.4	100.0	9405.1	100.0

*Mtoe: million tons of oil equivalent

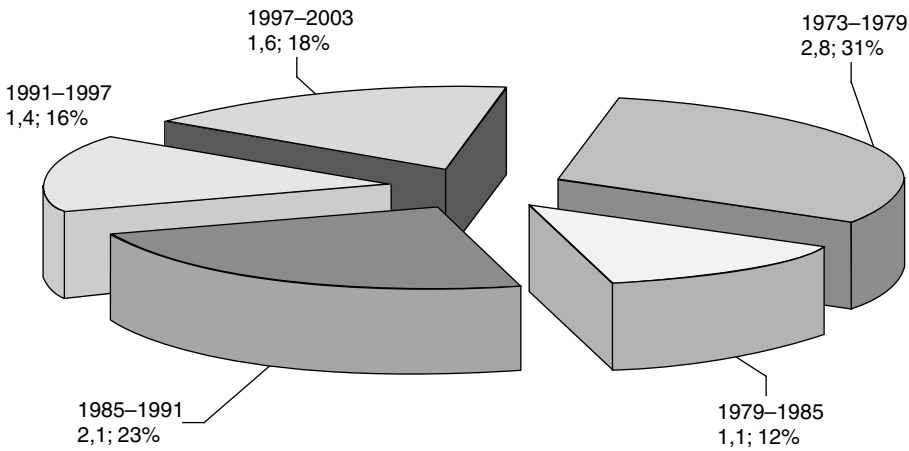

Figure 1. Growth in world energy consumption (BP, 2004)

World consumption of natural gas grew by 2.8% in 2002 on account of a 3.9% increase in US consumption and robust growth in Non-OECD (Organization for Economic Co-operation and Development) Asia Pacific of more than 7%. According to IEA (International Energy Agency) estimates, the share of natural gas in total primary energy consumption is projected to rise up to 3.2% during the first decade of the 21st century. In absolute terms, natural gas consumption is expected to almost double from 2.45 tcm (trillion cubic meters) in 1999 to 4.5 tcm in 2020.

Most of the increase in demand is expected to come from developing countries, where the demand is expected to grow from 0.5 tcm (trillion cubic meters) in 1999 to 1.5 tcm in 2020. The use of natural gas in OECD countries is projected to grow by 2.4% annually, (compared with 1.1% for oil). This would account for 49% of the projected increase in total energy consumption of these countries (Fig. 2).

Turkey is located at a strategic place between the Middle and Near East, where rich oil and natural gas reserves prevail, and the Western world, where the main energy

Table 2. Natural gas-growth in reserves, *tcm (IEA, 2003)

	1982	1992	2001	2002
North America	10.67	9.45	7.55	7.15
South and Central America	3.14	5.34	7.16	7.08
Europe and Eurasia	39.96	61.02	61.0	61.04
Middle East	21.78	43.05	55.91	56.06
Africa	5.36	9.82	11.74	11.84
Asia Pacific	4.99	9.66	12.27	12.64
Total world	85.90	138.34	155.63	155.78

*tcm: trillion cubic meters

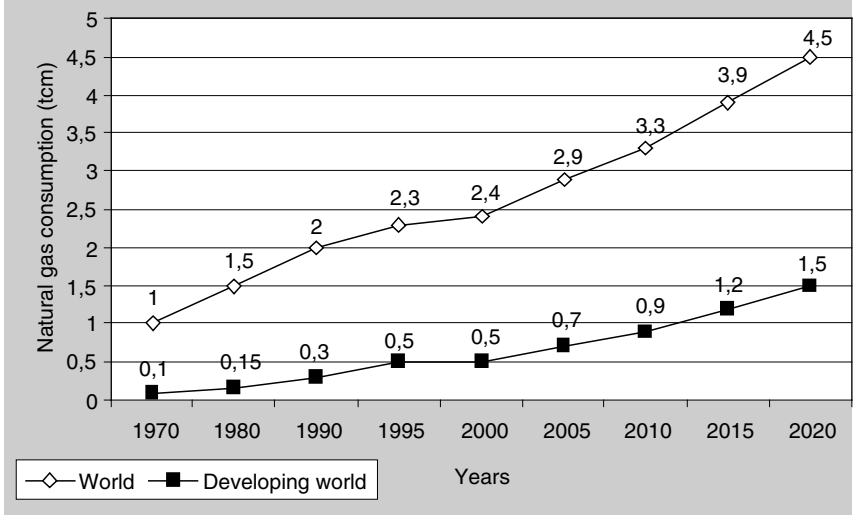

Figure 2. Natural gas consumption 1970–2020 (IEA, 2003)

consumption takes place. Turkey is also situated near the Caspian Sea, where natural gas and oil production are expected to increase substantially. Turkey has made a remarkable contribution to the establishment of cooperation for the stability of the region and stil continues to maintain this policy.

Natural gas accounts today for 25% of world primary energy production (Jean-Baptist and Ducroux, 2002). Natural gas is the fastest growing primary energy source in the world. Because it is cleaner fuel than oil or coal and not as controversial as nuclear power, gas is expected to be the fuel of choice for many countries in the future (Yazici and Demirbas, 2001). Growing demand for natural gas is expected in all regions of the world, as resource availability, cost, and environmental considerations all favor its use. Progress achieved in cost and performance of gas turbines, the present low prices, and the large world reserves, make natural gas a high (Demirbas *et al.,* 2004).

TURKEY'S ENERGY SITUATION

Petroleum, coal and natural gas come into mind first when energy resources mentioned, Turkey has various primary energy resources. Primary energy sources include lignite, hard coal, oil, natural gas, hydroelectricity, geothermal, wood, animal, plant wastes, solar and wind. However, these energy resources seem to be limited (Ogulata, 2002).

Domestic coal, geothermal and hydropower reserves of Turkey are approximately 1% of the world's total (DPT, 2000; Demirbaş, 2001). In this respect, Turkey's domestic energy production has not exceeded 40% of its energy demand.

The main indigenous energy resource is poor quality lignite. Turkey plans to increase hydropower production in the near future. Natural gas is imported, mainly from Russia. The renewable energy sources have some advantages when compared to fossil fuels. Turkey has to adopt new long term energy strategies to reduce the share of fossil fuels in the primary energy consumption (Akdeniz *et al.,* 2002). The amount of primary energy sources of Turkey is shown in Table 3.

Turkey produces various kinds of energy resources. However, as of 2003, total domestic production meets about 28.5% of total energy demand. Furthermore, according to the predictions of the World Energy Council (WEC), this percentage will decrease to 28% in 2010 and 24% in 2020. Therefore, the country will import more energy (Sari and Soytas, 2004; MENR, 2004).

In 2003, total primary energy consumption was 83.80 Mtoe. The largest percentage of consumption, 41%, belonged to oil, followed by a combination of lignite and hard coal at 26.9% and natural gas at 20%. On the other hand, Turkey's primary energy production was 23.81 Mtoe in 2003. The Turkish coal sector, which includes hard coal as well as lignite, accounts for nearly one half of the country's total primary energy production, with lignite being the main domestic energy source at 9.85 Mtoe in 2003. Hydropower production was 2.95 Mtoe, while noncommercial sources, such as wood and animal/plant wastes, constituted 6.3 Mtoe. Other renewables sources, such as solar, geothermal and wind were marginal at 0.4 Mtoe. Turkey's primary energy production and consumption are shown in Figure 3 (MENR, 2004). As shown in the figure, primary consumption has been increasing rapidly.

Table 3. Amount of primary energy sources in Turkey (MENR, 2004)

Sources	Apparent	Probably	Possible	Total
Hard coal (Million tons)	428	456	245	1126
Lignite (Million tons)	7339	626	110	8075
Asphaltite (Million tons)	45	29	8	82
Bituminous schist (Million tons)	555	1086	269	1641
Hydropower (MW)	34.736	-	-	34.736
Oil (million tons)	41.80	-	-	41.8
Natural Gas (Million tons)	8.70	-	-	8.7
Nuclear (tons)				
Uranium	9129	-	-	9129
Thorium	380.000	-	-	380.000
Geothermal (MW)				
Electric	200	-	4300	4500
Thermal	2.250	-	28.850	31.100
Solar (Mteo/year)*				
Electric	-	-	-	8.8
Heat	-	-	-	26.4
Wood	1550	150	25	1725
Dung	175	30	13	218

*Mtoe: Million tons of oil equivalents

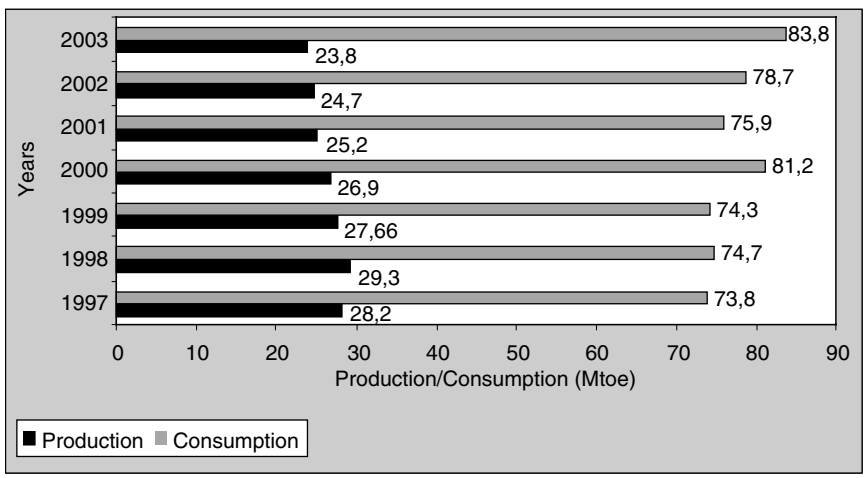

Figure 3. Turkey's primary energy production and consumption during 1997–2003

PRODUCTION NATURAL GAS IN TURKEY

In Turkey, natural gas is produced in 13 fields. These fields are Hamitabat, Umurca, Karacaoglan, Degirmenkoy, Karacali, Kuzey Marmara, Silivri, Camurlu Hayrabolu, Derin Barber, Hayrabolu, Gelindere, Tekirdag Kumrular, and Ardic provinces; the Turkish Petroleum Corporation (TPAO) owns the first 10 fields. The production from the first offshore field in the Marmara Sea, namely, Kuzey Marmara field, began in 1997. The total gas reserve (in place) of Turkey is estimated to be 19.2 bcm (billion cubic meters), and recoverable total gas is 13 bcm. At the end of 2003, cumulative production of natural gas was 6.19 Bcm, with the remaining recoverable gas of 6.81 bcm (WECTNC, 2004). The production of natural gas began in 1976 in Turkey. Domestic natural gas production is very small, and almost all natural gas is imported. In 2003, natural gas production was around 0.561 bcm, while total imports were around 21.374 bcm. Gas production in Turkey met around 2.62% of the domestic consumption requirements in 2003.

TURKEY'S NATURAL GAS PROJECTS

In order to verity energy supply resources on 14th of February 1986, Turkey's first contractual agreement for natural gas intake was signed with the former USSR (Current Russian Federation) (BOTAS, 2003). Supplies from Algeria and Nigeria are imported in form of LNG (liquified natural gas). At first, Turkey began to top up its long term contracts with spot deliveries. In order to secure gas supplies, Turkey Pipeline Company (BOTAS) signed eight natural gas purchase agreements with six different countries for 67.8 bcm (billon cubic meters) per tear of natural gas or LNG imports (Table 4). These break down into 4 bcm per year of LNG from Algeria, 1.2 bcm of LNG from Russia via the West, 16 bcm of natural gas from Russia through the Black Sea, 10 bcm of natural gas from Iran, 16 bcm of natural gas from Turkmenistan and 6.6 bcm of natural gas from Azerbaijan, (Demirbaş 2002). Projects with Egypt and Iraq are also under consideration.

Table 4. Natural gas import contracts in Turkey (BOTAS, 2004)

	Max Capacity (*bcm/Year)	Term (Year)	Start	Finish
Russian Fed. (West)	6.0	25	1987	2011
Algeria (LNG)	4.0	20	1994	2014
Russian Fed. (Turusgaz)	8.0	23	1998	2020
Nigeria (LNG)	1.2	22	1999	2021
Iran	10.0	25	Dec. 2001	2026
Russian Fed. (Blue Stream)	16.0	25	Feb. 2003	2027
Turkmenistan	16.0	30	2006	2035
Azerbaijan	6.6	15	2006	2020
Total	67.8			

*bcm: billion cubic meters

Turkey has several projects about natural gas's usage in Turkey, and its transport to Europe. These projects are (BOTAS, 2003):

- Extension of domestic transmission system,
- Blue stream,
- Iran-Turkey natural gas pipeline,
- Azerbaijan Baku-Tbilisi-Erzurum (Turkey),
- Turkmenistan-Turkey-Europe natural gas pipeline,
- Egypt-Turkey natural gas pipeline,
- Iraq-Turkey natural gas pipeline,
- Turkey-Greece natural gas pipeline,
- Underground storage.

Turkey has several studies dealing with natural gas; both transporting it to Europe and its usage in Turkey. Projects are being done considering natural gas consumption all over Turkey (Fig. 4). The Eastern Anatolia Gas Pipeline brings gas into Turkey from Iran and is the main natural gas pipeline in eastern Turkey. The pipeline presently extends as far west as Ankara. The 842 km (kilometers) Russia-Turkey Natural Gas Pipeline runs from Russia through Ukraine, Romania, and Bulgaria into Turkey. The $3.3 billion Blue Stream Pipeline, which will transport 16 bcm per year of natural gas 1200 km from Russia to Turkey, was completed in October 2002. The pipeline starts at Izobilnoye near Krasnodar in southern Russia and runs overland on the Black Sea coast 370 km to Dzhubga. Construction of the deep-sea portion of the Blue Stream Pipeline began in June 2002. The undersea portion consists of twin pipelines running 375 km under the Black Sea from Dzhubga, Russia, to the Turkish port of Samsun. This undersea portion reaches a depth of 2150 m (meters), making it the world's deepest pipeline. From Samsun, the pipeline then runs overland to provide gas to Ankara. The Blue Stream Pipeline was jointly built by Russia's Gazprom and Italy's ENI, with each having a 50% share; the project was undertaken because of Turkey's 1997 agreement with Russia to buy 565 bcf (billion cubic feet) per year of natural gas. The schedule for the pipeline calls for 70.6 bcf of natural gas deliveries to Turkey in 2002, while from 2003 to 2009, Russia will increase deliveries through the pipeline by 70.6 bcf per year until final capacity of 565 bcf per year is reached in 2009 (Kilic, 2005).

In March 2002, Turkey signed a $300 million deal with Greece to extend an Iranian natural gas pipeline to Greece. The pipeline will go 125 miles inside Turkey and cross the Dardanelles Straits into Greece. This will extend the pipeline from Karacabey in western Turkey to the city of Komotini in north-eastern Greece. The pipeline is expected to carry 17.5 bcf of gas per year, and could be completed by 2005.

Georgia, Azerbaijan, Kazakhstan and Turkmenistan have backed a plan to transport natural gas from Turkmenistan and Kazakhstan with a pipeline running under the Caspian Sea to Baku. This proposed $2.7 billion Trans-Caspian Gas Pipeline would be 1700 km long and carry 16 billion cubic meters of natural gas per year. The projected route of the pipeline is from Turkmen bushy, Turkmenistan, via Baku, Azerbaijan, and Tbilisi, Georgia, to Erzurum in Turkey, where it would link up to the Turkish natural gas pipeline system.

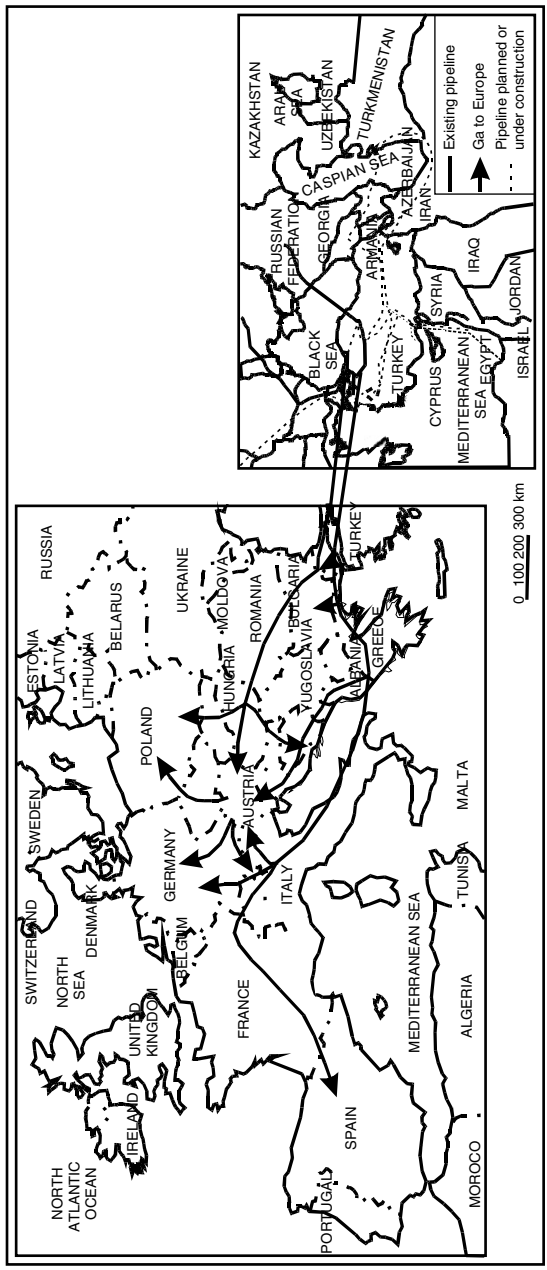

Figure 4. Turkey's present and planned natural gas pipelines

It is very well known that the Bakü-Tbilisi-Ceyhan Crude Oil Pipeline which is of great importance for Turkey and the countries in the region, is now in the construction phase. Turkey's gas interconnection projects are following the same road towards a promising future that will turn the country an energy bridge between the continents.

Another important project which will connect the Central Asian natural gas resources to Turkish natural gas grid is the Shah Deniz Pipeline Project. A natural Gas Sales and Purchase Agreement was signed in 2001 to transport Azerbaijan natural gas to Turkey. Gas deliveries are going to start in 2006. This project is considered as the first step of Caspian-Europe natural gas supplies.

The other planned projects pending due to some constraints beyond our control are Turkmenistan, Egyptian and Iraq gas projects.

Turkey and Iraq have reached a consensus for the construction of a natural gas pipeline from Iraq to the south-western region of Turkey which might bring a large amount of natural gas to Turkey from gas fields to be developed by Iraq. Implementation of this project is dependent on eventual lifting of the United Nations embargo on Iraq. Also, in February 2000, Turkey and Egypt signed a protocol concerning oil and gas issues that among other things declared their intention for constructing a gas pipeline under the Mediterranean Sea that would transport about 140 bcf per year of natural gas from Egypt to Turkey.

One alternative was on off-shore interconnection to Italy. Another one would be Greece to follow a route along the Adriatic Sea. As a result of this foresight, the Italian Gas Company EDİSON-GAS, BOTAS and DEPA signed an agreement. With the finalization of the pre-feasibility report, the application is made for feasibility funding from the European Union TEN Programme. And EU accepted to give grant for the feasibility of Italy interconnection on the 15th of July 2003. Consequently, the Inter connector Turkey-Greece Project became the Inter connector Turkey-Greece-Italy.

UTILIZATION OF NATURAL GAS IN TURKEY

Natural gas use by sector

Turkey, as a growing gas market, can be divided into 4 main sectors, namely,

(a) power generation
(b) fertilizer
(c) residential
(d) industrial
(Ozturk and Hesapli, 2003).

Turkey's natural gas consumption has started with 0.5 bcm in 1987 and rapidly reached 22.10 bcm, by increasing 44.2 times in 2004. According to this, natural gas rate in primary energy resources increases as well. This rate was 3% in 1990, 6.2% in 1995 and 19.40% in 2004. Natural gas consumption in industry has increased from year to year and this increase tends to proceed (Table 5). As can be seen from this table, in 2004 power generation had the biggest portion with 59.82%, followed by residential with 20.18%, industry with 17.60%, and fertilizer with 2.35%.

Table 5. The sectoral natural gas' demand in Turkey, 1990–2004 (BOTAS, 2005)

	Electricity Quantity		Industry Quantity		Resident Quantity		Fertilizer Quantity		Total Quantity
	*bcm	%	*bcm	%	*bcm	%	*bcm	%	*bcm
1990	2.59	76.85	0.22	6.52	0.05	1.48	0.50	14.83	3.37
1991	2.90	70.21	0.54	13.07	0.19	4.60	0.48	11.62	4.13
1992	2.63	58.18	0.86	19.02	0.37	8.18	0.65	14.38	4.52
1993	2.59	52.32	1.01	20.40	0.55	11.11	0.79	15.95	4.95
1994	3.03	57.71	0.95	18.09	0.65	12.38	0.61	11.61	5.25
1995	3.85	56.70	1.19	17.52	1.01	14.87	0.73	10.75	6.79
1996	4.17	52.78	1.37	17.34	1.52	19.24	0.83	10.50	7.90
1997	5.01	51.54	1.89	19.44	2.04	20.98	0.76	7.81	9.72
1998	5.49	53.45	2.04	19.86	2.25	21.90	0.49	4.77	10.27
1999	7.95	64.21	1.85	14.94	2.43	19.62	0.14	1.13	12.38
2000	9.73	66.82	1.91	13.11	2.80	19.23	0.11	0.75	14.56
2001	10.99	68.55	2.06	12.85	2.85	17.77	0.12	0.74	16.03
2002	11.63	66.91	2.27	13.06	2.97	17.08	0.49	2.81	17.38
2003	13.51	64.55	3.01	14.38	3.94	18.82	0.47	2.24	20.93
2004	13.22	59.82	3.89	17.60	4.46	20.18	0.52	2.35	22.10

*bcm: billion cubic meters

Natural gas use by cities

There are no restrictions on private or foreign involvement in the distribution of natural gas in cities. Private sector companies, including municipal companies, are allowed to perform distribution activities. In this regard, under Decree 397, the Council of Minister authorized private companies to be established to operate the city distribution network. The distribution of natural gas in 6 cities has been undertaken as follows (Ozturk and Hesapli, 2003): (a) in Ankara (Turkey's capital city) by EGO (Company of Greater Ankara Municipality) since 1988, (b) in Istanbul (the biggest city in Turkey by population) by IGDAS (Company of Greater Istanbul Municipality) since 1992, (c) in Bursa by BOTAS since 1992, (d) in Eskisehir by BOTAS since 1996, (e) in Izmit by IZGAZ (Company of Greater Izmit Municipality) since 1996 and (f) in Adapazarı by BOTAS since 2002. Natural gas city distribution systems of 17 cities have been tendered by EMRA and all of them under construction. 60 cities will be using natural gas by the year 2005. The distribution of natural gas use by 5 cities is given in Table 6.

The principles of the regulations related to the city distribution companies established are designated by the Ministry of Energy and Natural Resources (MENR). Under Decree 397, BOTAS is authorized to sell gas directly to the industrial establishments that consume more than 1 million m^3 per year and can also transfer this right to other companies (BOTAS, 2002).

Table 6. Distribution of natural gas uses by city in Turkey between 2000–2004 in m^3

Years	Type of sector	İstanbul (IGDAS)	Ankara (EGO)	Bursa (BOTAS)	Eskişehir (BOTAS)	İzmit (IZGAZ)	Total
	Resident	1.488.466.357	879.738.597	195.119.095	96.793.018	44.156.971	2.704.274.038
2000	Industry	391.408.143		43.982.292		20.718.732	456.109.167
	Subtotal	1.879.874.500	879.738.597	239.101.387	96.793.018	64.875.703	3.160.383.205
	Resident	1.568.272.868	871.987.318	203.020.096	84.621.617	47.468.937	2.775.370.836
2001	Industry	391.641.365		52.219.621	74.234.419	38.638.552	556.733.957
	Subtotal	1.959.914.233	871.987.318	256.299.438	155.856.036	86.107.489	3.330.164.514
	Resident	1.585.406.217	1.017.914.900	190.368.337	105.667.582	54.592.385	2.953.949.421
2002	Industry	456.043.665		67.679.788	48.342.892	35.851.561	607.917.906
	Subtotal	2.041.449.882	1.017.914.900	258.048.125	154.010.474	90.443.946	3.561.867.327
	Resident	1.852.609.421	1.242.106.000	266.137.192	83.658.067	64.449.898	3.508.960.578
2003	Industry	466.382.556		86.575.877	34.940.202	37.082.388	624.981.023
	Subtotal	2.318.991.977	1.242.106.000	352.713.069	118.598.269	101.532.286	4.133.941.601
	Resident	2.407.128.571	1.417.288.700	260.381.359	109.042.215	86.891.545	4.280.732.390
2004	Industry	618.748.146		104.210.457	37.997.423	43.937.812	804.893.838
	Subtotal	3.025.876.717	1.417.288.700	364.591.816	147.039.638	130.829.357	5.085.626.228

TURKEY'S NATURAL GAS SUPPLY AND DEMAND FORECASTS

Although it is expected that the natural gas production will remain the same in future years, again consumption of natural gas will increase by large amounts. Predictions show that natural gas production in Turkey will decrease from 0.20 bcm in 2004 to 0.15 and 0.12 bcm in 2010 and 2020, respectively, as can be seen from Table 7 (SPO, 2003).

Besides this, total natural gas consumption is projected to reach around 55.1 and 82.8 bcm in 2010 and 2020, respectively, up from around 22.1 bcm in 2004. Considering production and consumption of natural gas, it seems that Turkey's total natural gas importation will grow rapidly and reach approximately 55.25 bcm and 82.9 bcm in 2010 and 2020, respectively. About 68% of the total natural gas supply will be consumed by the power sector, while 61% of the final consumption of natural gas will occur in the industrial sector, with the remainder consumed by the residential/commercial sector (WECTNC, 2004), (Table 8).

Table 9 allows the balance between the total gas demand and the contracted quantities with the various suppliers. Within the framework of delays experienced in delivery of natural gas from several countries on the basis of sale and purchase contracts already signed as well as in the light of the recent economic recession, BOTAS revised the supply/demand figures till 2006.

Table 7. Natural gas production program of Turkey in million cubic meters (SPO, 2003)

Year	*TPAO	Others	Total
2000	639	29	668
2001	312	26	338
2002	378	26	404
2003	561	26	587
2004	177	26	203
2005	159	25	184
2006	153	25	178
2007	153	25	178
2008	143	15	158
2009	125	25	150
2010	125	25	150
2011	115	35	150
2012	115	25	140
2013	96	44	140
2014	96	26	122
2015	96	26	122
2016	96	26	122
2017	96	26	122
2018	96	26	122
2019	96	26	122
2020	96	26	122

*TPAO: Turkish Petroleum Corporation

Table 8. Turkish natural gas demand (*bcm/year)

Year	Power sector	Fertiliser production	Industry	Heating/ Residential	Total Demand
2005	19.4	0.5	6.9	5.3	32.1
2010	25.6	0.3	17.1	12.1	55.1
2015	34.8	0.3	18.5	13.7	67.3
2020	48.3	0.3	19.8	14.4	82.8

*bcm: billion cubic meters

Table 9. Natural gas supply to Turkey (bcm/year)

Year	Russian Fed.	Russian Fed. (a)	Russian Fed. (b)	Algerian LNG	Nigerian LNG	Iran	Azerb. (c)	Turkm. (d)	Total Supply
2005	6.0	8.0	6.0	4.4	1.3	6.7	0.0	0.0	32.2
2006	6.0	8.0	8.0	4.4	1.3	8.6	0.0	0.0	36.3
2007	6.0	8.0	10.0	4.4	1.3	9.5	2.0	0.0	41.2
2008	6.0	8.0	12.0	4.4	1.3	9.5	3.0	0.0	44.2
2009	6.0	8.0	14.0	4.4	1.3	9.5	5.0	0.0	48.2
2010	6.0	8.0	16.0	4.4	1.3	9.5	6.6	9.2	61.0
2015	0.0	8.0	16.0	0.0	1.3	9.5	6.6	14.2	56.0
2020	0.0	8.0	16.0	0.0	1.3	9.5	6.6	16.0	57.8

(a): Additional
(b): Blue Stream
(c): Azerbaijan
(d): Turkmenistan

STRATEGICAL IMPORTANCE OF INTERNATIONAL GAS PIPELINES FOR TURKEY

Turkey's strategic location makes it a natural ''Energy Bridge'' between the major natural gas production areas in the Middle East and Caspian Sea regions on the one hand and consumer markets in Europe on the other. Furthermore, one of the pillars of Turkey's energy strategy is to become an energy corridor between the energy-rich countries of the Caspian, Central Asian and Middle Eastern regions and the European markets. The ongoing deregulation process of the Turkish energy market will give Turkey a pivotal role in the energy fields particularly in the gas sector and make her a major consumer and transit country in the region (Kilic, 2005).

Ideal geographical location of Turkey as a gateway to the West, her stability, her solid links with Europe and United States, her ever deepening relations with the countries of the region, are her many assets calling her to have a prominent role in the politics field (Demirbas *et al.,* 2004).

When we talk about the transportation of hydrocarbons and look to a world map, we will easily notice Turkey on the way to supply the World energy markets with the generous energy wealth of the Caspian Region and the Middle East. Indeed, 73% of World's proven oil reserves and 72% of World's proven gas reserves are located in the

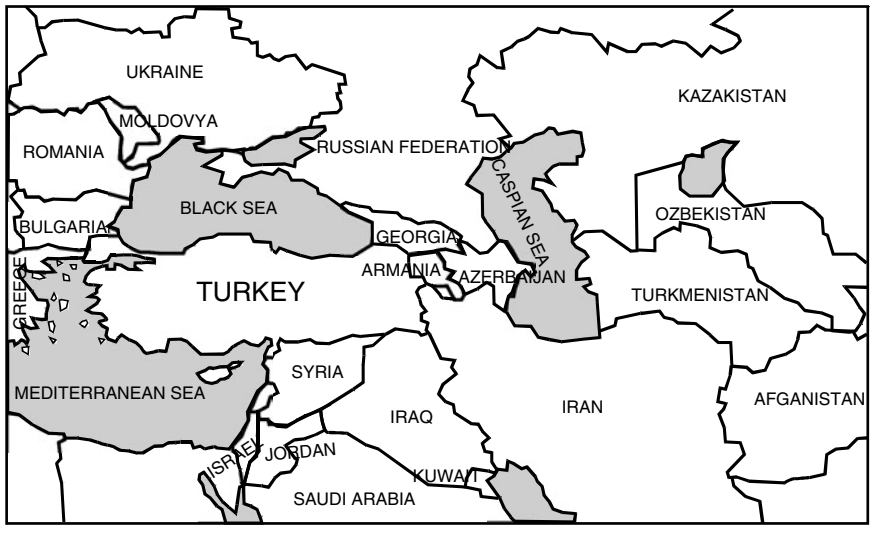

Figure 5. Place of Turkey in the region

surrounding regions of Turkey Middle East, Caspian Region and Russia. This makes Turkey a pivotal bridge between energy-rich regions and Europe which spends approximately 300 billion USD per year for imported energy sources. This is why nowadays Turkey is widely called as 'The Energy Bridge between The East and The West'. To amplify this idea, some of ongoing projects are going to be projected briefly below (Fig. 5).

Turkey is aiming to be the ''Energy Corridor'' of the 21st century, Turkey will be in charge of oil and natural gas pipelines construction and the duty of being the ''Energy Bridge'' between Middle Eastern and Central Asia countries and the Western world in the future. Therefore, the world's biggest natural gas investments are expected to be made in Turkey in the next 20 years (BOTAS, 2003).

Turkey is one of the most perspective and capacious markets in the whole European and West Asian region. According to the available estimations, the Turkish market's natural gas demand will considerably increase in the coming years. The average annual rate of growth will be several times more than the analogues West European index.

CONCLUSIONS

Energy is an indispensable resource for human life. Oil, coal and natural gas are the most important energy resources. However, Turkey expects a very large growth in energy demand, especially for electricity and natural gas. A dynamic economy together with population growth; industrialization, rapid urbanization, source diversification and environmental concerns have been responsible for the increased use of natural gas in Turkey.

Turkey is no exception to this world energy trend. Although gas usage in Turkey just dates back to the last decade, the striking point is that Turkey is simply ranked within the top fastest growing gas markets in the world. By the end of the year 2000,

the share of natural gas in the total primary energy consumption was realised as 16.2 per cent. This share represented a 14.6 bcm consumption in volumetric terms for the same year. With increasing demand, the share of natural gas in the total primary energy consumption is expected to reach a level of 32 per cent in the year 2010 with the volume of 55.25 bcm.

Currently, the length of the existing gas transmission lines of BOTAŞ is about 4.200 km. In line with the strong expected demand growth, BOTAŞ is extending the transmission grid and contracting further gas in increasing amounts. With the completion of currently ongoing and planned pipeline constructions, the length of the internal natural gas transportation system will reach approximately 6.300 km and by the end of the year 2004 approximately 60 cities will have access to natural gas.

The natural gas projects of Turkey is involved in and the liberalization process of the energy market, which gives special importance to energy security, make Turkey a crucial partner for Europe with regards to energy supply diversification. In other words, the objective to energy supply following Norway, Russia and Algeria overlaps EU's energy security policy and opens a new area for cooperation between Turkey and the EU.

In December 2004 Turkey and The Russian Federation signed a protocol in Ankara concerning gas issues that among other things declared their intention for constructing a gas pipeline to transport from Russia Federation to Turkey.

By the way, Turkey is an important candidate to be the ''energy corridor'' in the transmission of the abundant oil and natural gas resources of the Middle East and Middle Asia countries to the Western market. Results of the studies performed by various research institutions and energy companies, as well as the EU itself; are giving the signals of significant amounts of oil and gas to be transported via Turkey to the European Countries in the near future.

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