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[Global Climate Change & South Korea] [loose] [3]

2017-1095-F

bg226

RESTRICTION CODES

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- P1 National Security Classified Information [(a)(1) of the PRA]
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- P3 Release would violate a Federal statute [(a)(3) of the PRA]
- P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
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- b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

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CURRICULUM VITAE

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CAREER :

Jun. 1970 Passed the 8th National Qualifying Examination for Senior
Government OfficialsAug. 1974 Director, Policy Coordinate Division, Economic Planning
Board(EPB)Jun. 1984 Director, Bureau of International Trade Promotion, Ministry
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Dec. 1984 Director, Bureau of Industry Policy, MTI

Feb. 1986 Director, Bureau of Machinery Industry, MTI

Jan. 1989 Director General, Bureau of Small and Medium Enterprise,
MTI

Apr. 1990 Director General, Bureau of Industrial Policy, MTI

Dec. 1992 Director General, Bureau of Electronics and Information
Industry, MTI

May 1993 Secretary to the President for Economic Affairs

May 1994 Assistant Minister for Planning and Management, Ministry
of Trade, Industry & Energy(MOTIE)

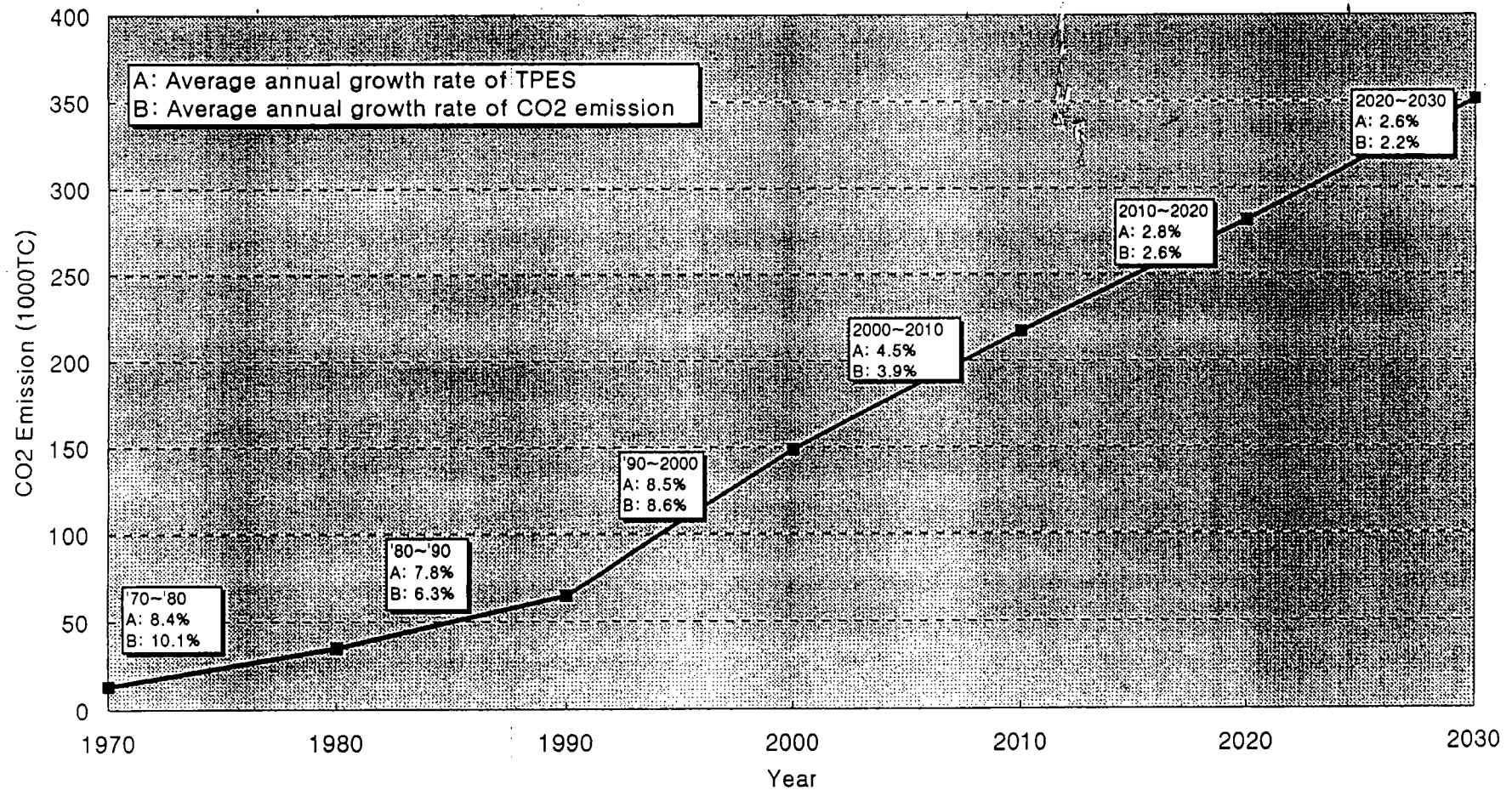
Dec. 1994 Assistant Minister for International Trade, MOTIE

Dec. 1996 Commissioner of the Korean Industrial Property Office

Mar. 1997 Vice Minister, MOTIE

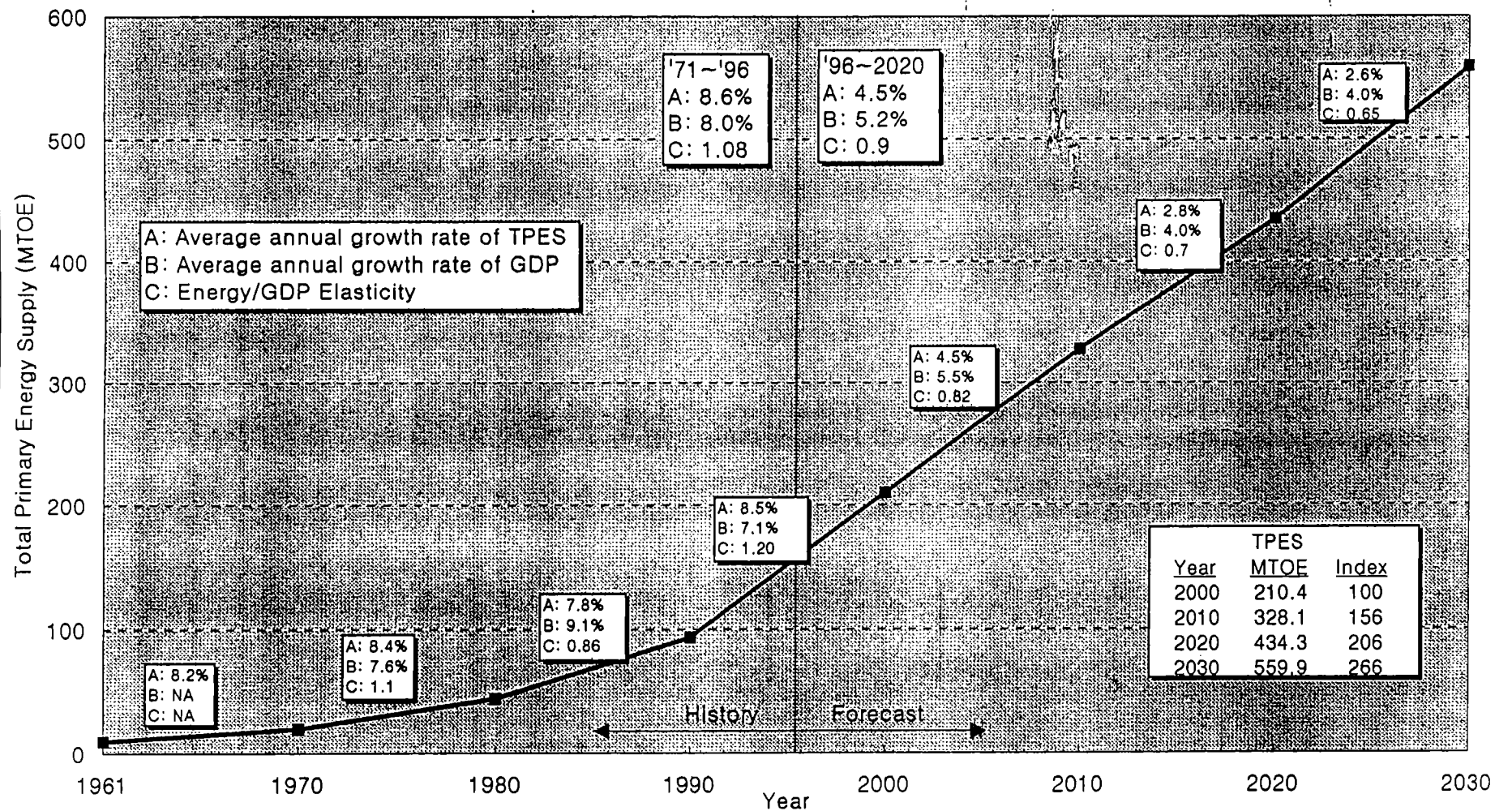
Mar. 1998 Minister of State for Trade

Long-Term Forecast of CO2 Emission in Korea



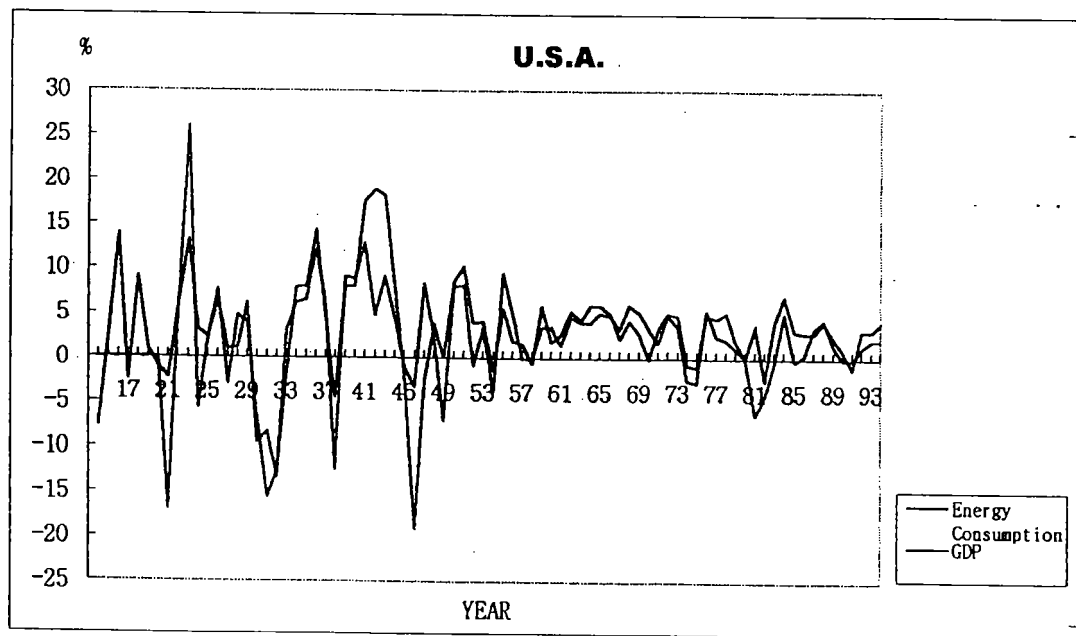
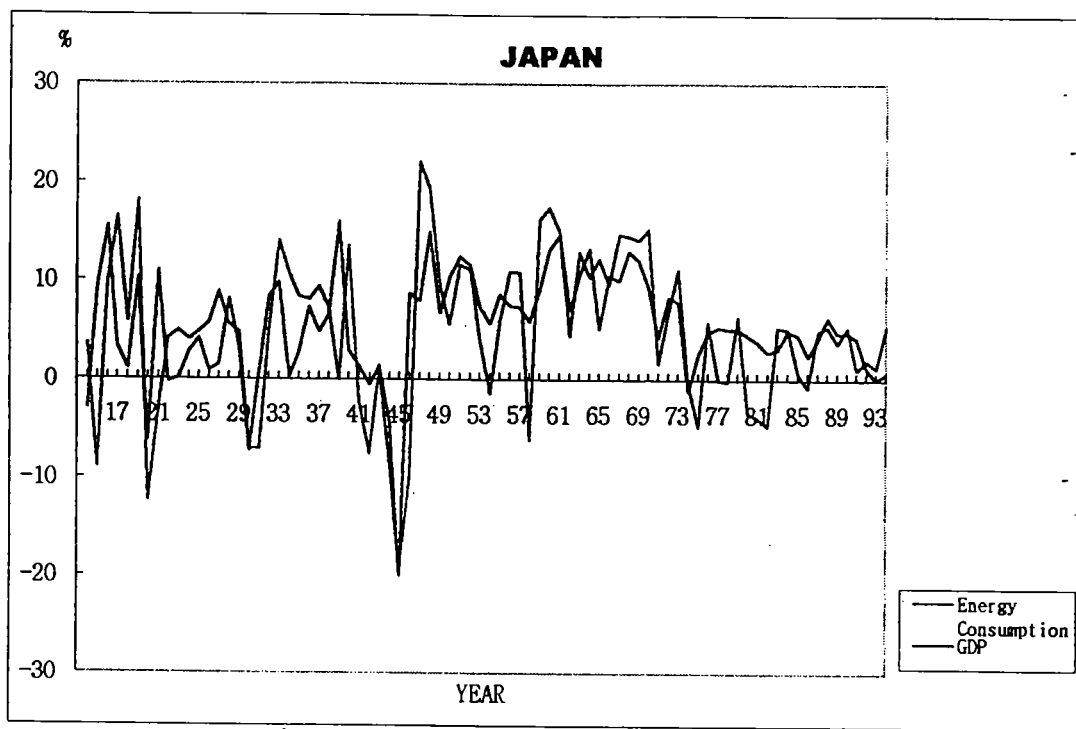
Source: Report from Korea Energy Economics Institute

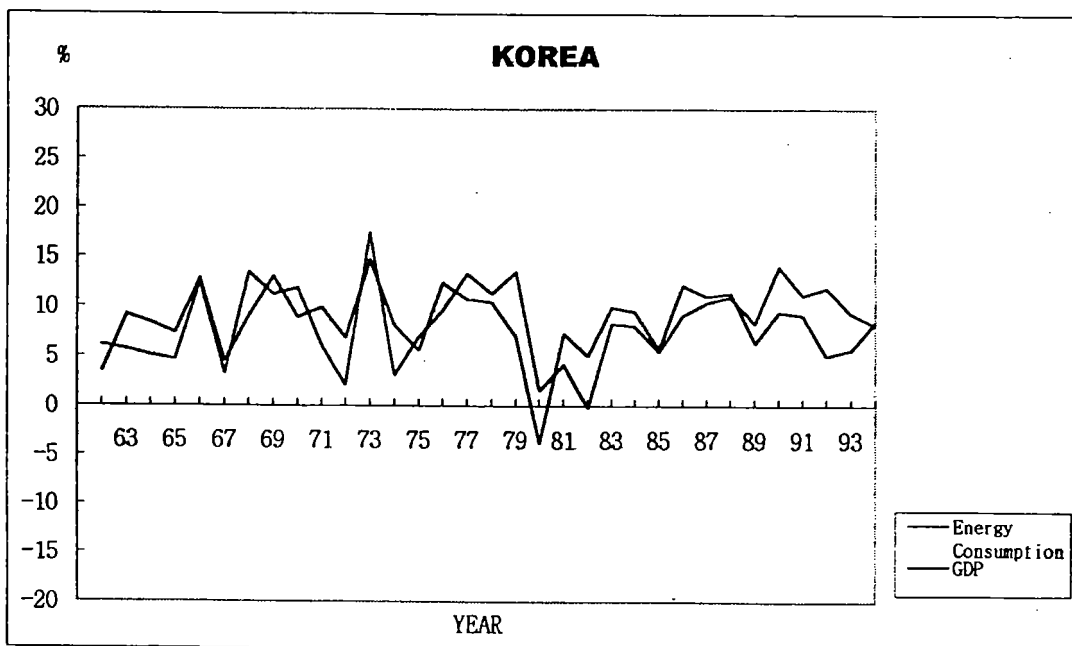
Long-Term Energy Consumption Forecast in Korea



Source: Report from Korea Energy Economics Institute

Comparison of Historic GDP and Energy Consumption growth rate







United States Energy Information Administration

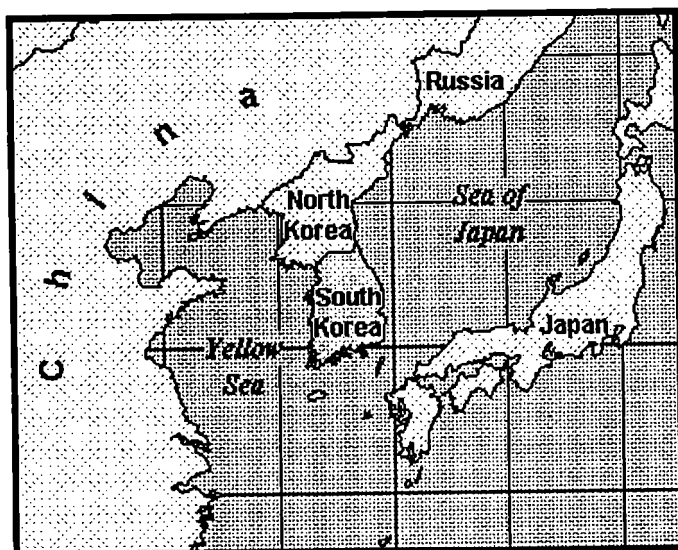
OIL NATURAL GAS COAL ELECTRICITY
ENVIRONMENT PROFILE

November 1997

South Korea

The Republic of Korea (South Korea) has a growing economy which depends on imports for 95 percent of its energy needs. The military threat from North Korea, across the Demilitarized Zone, is a constant concern. The United States is a major ally and trading partner.

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BACKGROUND

Under the leadership of Kim Young Sam (whose term of office expires in February 1998 and is ineligible to run for re-election), South Korea is implementing financial reforms and liberalizing its economy under the banner of "segyehwa" (globalization and internationalization). In September 1997, Kim Young Sam resigned the presidency of South Korea's ruling New Korea Party. Kim has been succeeded by Lee Hoi Chang, the party's candidate in the December 18, 1997 presidential election. Running against Lee are Kim Dai Jung of the leading opposition party (National Congress for New Politics) and Rhee In Je (a former governor who quit the ruling party to form his own party).

Although South Korea is considered one of the world's big emerging markets, its economic growth has slowed from nearly 9 percent in 1995 to a projected 5.5 percent in 1997. The restructuring of large companies and financial institutions has led to labor actions, declarations of bankruptcy by some of the largest conglomerates in the economy, and government aid for ailing financial institutions. The country's currency value and stock market have also been affected by a financial crisis wreaking havoc on economies throughout southeast Asia. Priorities include restoring the country's economic health and global competitiveness, while continuing to reform the corporate and bureaucratic structure. On a positive note, the country's trade balance has improved over the past 6 months, and the current account deficit is now projected to be only about half the size of the 1996 deficit.

South Korea became the 29th member of the Organization for Economic Cooperation and Development (OECD) in December 1996, and is also a member of the World Trade Organization (WTO) and APEC (Asia Pacific Economic Cooperation). In its financial liberalization plan submitted to the OECD, South Korea promises to fully open its stock market to foreign investors by 2000 (the current limit of 23 percent foreign is expected to be raised to 26 percent in late 1997). Foreign investment in local conglomerates (known as "chaebols") and long-term corporate bonds of small companies is also planned. The United States and Japan already are major investors in South Korea.

The United States is South Korea's most important trading partner, providing 22 percent of South Korea's imports and purchasing 17 percent of its exports in 1996 (more than any other country). However, this relationship has become strained over barriers to U.S. automobile exports. In October 1997, U.S. Trade Representative Charlene Barshefsky formally designated South Korea as a "priority"

1997, U.S. Trade Representative Charlene Barshefsky formally designated South Korea as a "priority" foreign country subject to review. This opens up the possibility of future sanctions under U.S. trade law.

South Korea exists under nearly constant tensions with North Korea, particularly in the Demilitarized Zone along the 38th parallel -- the most heavily armed border in the world. Technically, the two countries have been at war since the 1950s, as South Korea never signed the 1953 armistice ending hostilities (neither did the United States). Under a 1954 Mutual Defense Treaty, the United States maintains about 37,000 troops in South Korea to assist its defense against external aggression. An attempt to hold four-way talks among North Korea, South Korea, China, and the United States floundered in September 1997 on North Korea's insistence that the agenda include a discussion of the withdrawal of U.S. troops from South Korea.

South Korea's relations with North Korea are highly limited by ongoing tensions, and consist primarily of security-related initiatives. For example, South Korea agreed to provide two light-water nuclear reactors to North Korea as part of an October 1994 U.S.-North Korea bilateral agreement in which North Korea agreed to freeze and eventually dismantle its graphite technology nuclear program (which could have a dual use in a nuclear weapons program). Employees of South Korea's state power company are now working in North Korea on the first phase of the construction project. South Korea has also donated food supplies in response to international appeals to help North Korea cope with a major famine threatening its population. South Korea lifted its ban on direct trade and investment in North Korea in 1994, and as of September 1997 had authorized 26 companies to do business or invest in North Korea. In October 1997, South Korea signed an aviation agreement that will allow commercial flights over North Korea beginning in February 1998.

OIL

Oil supplies the largest share of South Korea's total energy requirements (about two-thirds of primary energy consumption in 1995), and demand has been rising rapidly with industrial expansion and rising incomes. The growth in gasoline demand has been particularly strong (20 percent annually since 1984) due to increased car ownership. Car ownership rose from 2.1 million cars in 1990 to more than 6 million, and is expected to hit 11 million by 2000.

With no domestic reserves, South Korea must import all of its crude oil. As a security measure, the country plans to diversify its sources of supply in order to reduce its dependence on the Middle East (from 78 percent currently to 65 percent within 10 years). One example is LG-Caltex Corp.'s announcement in December 1996 of a long-term contract to import 30,000 barrels per day of Alaskan North Slope oil from BP. South Korea is also building a strategic petroleum reserve in anticipation of joining the International Energy Agency (IEA). Strategic stocks are currently equivalent to a 60-day supply (the IEA requires a 90-day supply).

An important aspect of the country's long-term strategy is to increase oil imports from overseas projects in which South Korean firms are participating (to a targeted 10 percent of imports by 2010). At the end of 1996, South Korean companies were participating in 37 oil fields in 16 countries. In March 1997, crude oil production capacity at these fields was estimated at 43,500 barrels per day. State-run Korea Petroleum Development Corp. (PEDCO) is currently participating in 19 oil exploration projects in 13 countries, including 5 fields (in Yemen, Egypt, Argentina, Peru, and the North Sea) which together produce 18,000 barrels per day. Major refiners and trading houses are also actively involved in development of overseas petroleum reserves.

Five major refining companies produce petroleum products primarily for use within South Korea. However, exports of petroleum products have increased in 1997 as the companies have completed refinery expansions. In the first 7 months of 1997, exports exceeded 500,000 barrels per day, including large volumes to China and Taiwan. This surge is largely attributable to a rapid expansion of the country's refining capacity, which has doubled since January 1996 (to an estimated 2.4 million barrels per day). In July 1997, Ssangyong Oil Refining Company (35-percent owned by Saudi Aramco) signed the country's first term contract to sell gasoline to an oil-producing country (an agreement to export 1.8 million barrels to Saudi Aramco over a 6-month period).

In January 1997, South Korea began implementing the deregulation of petroleum product prices and

liberalization of import and export markets. Government price ceilings on petroleum products were lifted (refiners were required to give the government advance notice of price increases for the first 6 months), and non-refiners (up to 50 percent foreign ownership) were permitted to import and export crude oil and petroleum products without the need for a government license. Beginning January 1, 1999, any company will be able to enter any level of the oil business by simply registering with the government.

In September 1997, South Korea dedicated a 593-mile oil product pipeline and a large oil products storage terminal (1.97 million barrels capacity) in Songnam. The pipeline serves the terminal as well as cities throughout the southern part of the country. The first phase, serving cities in the Seoul area, has been open since 1992.

NATURAL GAS

South Korea relies on imported liquefied natural gas (LNG) to meet its growing demand for natural gas, which currently supplies about 7.5 percent of its total energy needs. This share is projected to increase to 10 percent of consumption in 2010. According to the International Energy Agency, the power sector accounted for about half of total natural gas consumption in 1994, followed by the residential sector (at 32 percent) and the industrial and commercial sectors (at about 9 percent each).

Korea Gas Corp. estimates LNG demand will more than double by 2001 (to 20.7 million metric tons compared with 9.5 million metric tons in 1996), and continue increasing (to 25 million metric tons in 2006 and 29.3 million metric tons in 2010). To meet these higher demand levels, South Korea is increasing the capacity at its existing terminals (Pyongtaek and Incheon) and planning a third LNG receiving terminal at a location not yet determined. It is also investing in storage facilities and entering into additional long-term supply agreements.

South Korea currently gets most of its LNG from Indonesia (55 percent) and Malaysia (34 percent), with smaller volumes from Brunei and Australia. As with oil, South Korea is trying to diversify its LNG supply sources as a security measure. Long term agreements have recently been signed with Oman and Qatar, which are expected to supply 40 percent of South Korea's LNG in 2001 (as the Indonesian and Malaysian shares fall to 32 percent and 12 percent, respectively). The Oman project is noteworthy in that it is the first in which South Korea has taken an equity position (with the purchase of a 12 percent stake by Korea LNG, a new company formed by five South Korean companies -- including Korea Gas). Formal signing of a long-term agreement with Brunei is expected by the end of 1997. Future supplies are also planned from new LNG projects in Yemen and Canada's British Colombia. Longer term options include the possibility of a pipeline to ship natural gas from Russia (Irkutsk in East Siberia), via China.

During 1997, Korea Gas Corp. conducted its fourth round of bidding for seven LNG carriers needed to transport LNG from Oman and Indonesia for up to 25 years. The company is also investing in infrastructure to deliver the gas to domestic markets. It plans to complete a national transmission loop with extensions to remote cities by 1999. Distribution and sale of natural gas is handled by 10 private companies, each of which has exclusive rights to operate within a defined area.

COAL

Coal supplies about 18 percent of South Korea's total energy requirements. Most of these requirements are met by imports, since the only indigenous coal resources consist of a low-quality anthracite used in home heating and small boilers. Bituminous coal supplies (steam coal for power plants and industrial boilers and metallurgical coal for steelmaking) are imported mainly from Australia. State power company KEPCO has invested in several Australian coal mines, and plans to increase coal imports from China, Indonesia, and possibly the western United States. The company is particularly interested in new sources of low-sulfur coal needed to meet new government emissions guidelines for 1999.

ELECTRIC POWER

South Korea uses a combination of thermal, nuclear, and hydroelectric capacity to meet its demand for electric power. Thermal capacity (coal, oil, and LNG) generates nearly 62 percent of the total, nuclear nearly 36 percent, and hydro less than 3 percent. Currently, nuclear power is generated by 12 units at four plants (Kori, Ulchin, Wolsong, and Yonggwang), with total net generating capacity of nearly 10

gigawatts (including 650 megawatts from a new unit of the Wolsong plant dedicated in September 1997). In addition, industrial companies (steel plants, refineries, chemical makers, etc.) have installed about 3 gigawatts of self-generation capacity which is not connected to KEPCO's grid.

South Korea's Ministry of Trade, Industry, and Energy projects the country will need to more than double its electric generating capacity (to 67.51 gigawatts) by 2010 to meet anticipated electricity demand increases of 11-12 percent annually. To reduce the country's large energy trade deficit, the plan calls for reducing the relative share of LNG generation while increasing the relative importance of the country's nuclear, coal, and hydroelectric power. The country plans to complete four more nuclear plants totaling 3.2 gigawatts by 2000, and another 2 nuclear plants totaling 1.9 gigawatts by 2003 (two more nuclear plants are in the planning stage).

Plans include a gradually increasing role for independent power producers (IPPs), which ultimately could provide 6 gigawatts or more of power. In 1996, South Korea awarded two 450-megawatt LNG-fired plants and two 500-megawatt coal-fired plants to South Korean companies on a build, own, and operate (BOO) basis. The second round, currently underway, is seeking bidders for two 450-megawatt LNG-fired plants. Foreign ownership of IPPs may not exceed 50 percent and a foreign firm may not represent the majority interest in the project.

The potential market share for U.S. fossil-fired and nuclear generation technology and flue gas desulfurization technology is estimated to exceed \$1 billion over the next 14 years.

In October 1997, South Korea's Securities and Exchange Commission approved a request by the Korea Development Bank to purchase a 6.92 percent stake in KEPCO, which would reduce the government's share to 68.63 percent. Subsequently, KEPCO announced plans to buy back shares equivalent to 0.87 percent equity over a 3-month period to support the bearish domestic stock market. Currently, individual investors are allowed to hold up to 1 percent each, but the Ministry of Finance and Economy has announced plans to increase the individual share limit to 3 percent.

ENVIRONMENT

As South Korea's economy has developed, environmental concerns have become increasingly important. The Ministry of Environment, established in 1990, presented a long-term master plan ("Vision") in 1995. The long-term plan emphasizes a sound national environment and codification of environmental standards to be met by 2005.

In addition to an over-arching basic law, South Korea has enacted specific legislation covering air, water, waste, noise, and other forms of pollution. Regulation and enforcement is delegated to various ministries and regional bodies.

Energy-related environmental initiatives include measures affecting gasoline consumption and electric power production. Unleaded gasoline was introduced in 1987 and phased out by 1993, and gasoline specifications on aromatics, benzene compounds, and oxygen content are being tightened. Long-term plans for the electric power sector include the adoption of flue gas desulfurization, high-efficiency dust collection technologies, and clean coal technology. The electric power plan also includes a demand side management program designed to reduce peak demand and the associated need for additional power plants.

South Korea's economy has significant room for conserving energy. For example, a February 1997 report by the Bank of Korea indicated Korean manufacturing companies use significantly more energy than Japanese companies for each \$1 million worth of goods produced (110 tons of oil equivalent versus only 60 tons in Japan, based on data for 1990). Basic material companies (including steel, petrochemicals, and cement makers) used nearly twice as much energy per \$1 million worth of output (240 tons of oil equivalent versus 130 tons in Japan), according to the Bank.

COUNTRY OVERVIEW

President: Kim Young-Sam (since February 1993; next election December 18, 1997)

Independence: August 15, 1948

Population (7/97E): 45.9 million

Location/Size: Eastern Asia/98,480 square kilometers (38,000 square miles), about the size of Indiana

Major Cities: Seoul (capital), Pusan, Taegu, Incheon, Kwangju

Language: Korean (English widely taught in high schools)

Ethnic Groups: Korean, with small Chinese minority

Religions: Christianity, 48.6%; Buddhism, 47.4%; Confucianism, 3%; Other, 1%

Defense (8/96): Army, 548,000; Navy, 60,000; Air Force, 52,000 (*plus 35,910 U.S. troops*)

ECONOMIC OVERVIEW

Currency: Won (W)

Exchange Rate (10/31/97): US\$1 = W965

Gross Domestic Product (GDP, Market Exchange Rate, 1996): \$485 billion

Real GDP Growth Rate (1996): 7.1%

Inflation Rate (consumer prices) (1996): 4.9%

Unemployment Rate (9/97): 2.2%

External Debt (1996): \$104.7 billion

Total Reserves, Non-Gold (9/97): \$30.4 billion

Current Account Balance (1996): -\$21.8 billion

Trade Balance (1996): -\$15.5 billion (-\$3.9 billion with U.S.)

Exports (1996): \$128.4 billion (\$22.7 billion to U.S.)

Imports (1996): \$143.8 billion (\$26.6 billion from U.S.)

Major Exports: Manufactures, textiles, ships, automobiles, steel, computers, footwear

Major Imports: Crude oil, food, machinery and transportation equipment, chemicals and chemical products, base metals and articles.

Top Trading Partners: United States, Japan, China, Germany

ENERGY OVERVIEW

Trade, Industry, and Energy Minister: Yim Chang-yol

Oil Consumption (1996E): 2.16 million barrels per day (b/d)

Crude Oil Refining Capacity (1/1/97): 2.2 million b/d

Natural Gas Consumption (1996E): 457 billion cubic feet (bcf)

Recoverable Coal Reserves (12/31/93): 202 million short tons

Coal Production (1996E): 5.5 million short tons

Coal Consumption (1996E): 57.6 million short tons

Coal Imports (1996E): 52.7 million short tons

Electric Generation Capacity (1/1/96): 32.2 gigawatts

Electricity Generation (1996E): 194.2 billion kilowatthours (Kwh)

ENVIRONMENT OVERVIEW

Minister of Environment: Yun Yo-Chun

Total Energy Consumption (1995E): 6.28 quadrillion Btu

Energy Consumption per Capita (1995E): 140.1 million Btu (versus 345.9 million Btu for the United States)

Energy-Related Carbon Emissions (1995E): 101.45 million metric tons (1.7% of world carbon emissions)

Carbon Emissions Per Capita (1995E): 2.3 metric tons (vs. 5.4 metric tons in the United States)

Major Environmental Issues: Air pollution in large cities; water pollution from the discharge of sewage and industrial effluents; drift net fishing.

ENERGY INDUSTRY

State Energy Companies: Korea Petroleum Development Co.; Daehan Oil Pipeline Corporation (DOPCO); Korea Electric Power Company (KEPCO); Korea Gas Corp.

Major Oil Companies (Private): SK Corp. (formerly Yukong); LG-Caltex (formerly Honam); Ssangyong Oil; Hanwha Oil, Hyundai Oil

Major Refineries (1/1/97 Capacity): Ulsan (759,500 b/d); Onsan (500,000 b/d); Yocheon (361,000 b/d); Daesan (310,000 b/d); Incheon (261,000 b/d)

Major Ports: Pusan, Incheon, Kunsan, Mokpo, Ulsan

Liquefied Natural Gas (LNG) Regasification Terminals: Pyongtaek, Incheon

For more information on South Korea, see these other sources on the EIA web site:

[International Energy Annual 1995](#) - Annual international energy data through 1995

[Latest EIA Detailed Annual Data \(1994\)](#)

[WORLD ENERGY Database](#) for the International Energy Annual (requires Microsoft Access)

Links to other sites:

[1997 CIA World Factbook - South Korea](#)

[U.S. International Trade Administration, Country Commercial Guide - South Korea](#)

[U.S. Department of Energy's Office of Fossil Energy's International section - South Korea](#)

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United States Energy Information Administration

February 1998

East Asia: The Energy Situation

The following provides information on the potential energy impact of the East Asian economic crisis, which began in the summer of 1997 and accelerated as the year went by. For the purposes of this report, "East Asia" will be defined to include: China and its Special Administrative Region of Hong Kong (listed separately in this report), Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Sources for this report include: Bangkok Post, Business Day (Bangkok), Business Times (Singapore), Chemical Week, Coal Week International, Dow Jones, Financial Times, Global Power Report, the Mining Journal, Oil and Gas Journal, Petroleum Intelligence Weekly, Platt's Oilgram News, Singapore Times, South China Morning Post, and WEFA.

BACKGROUND

The economic crisis in East Asia remains a serious concern as of February 1998. To date, the International Monetary Fund (IMF) has arranged more than \$100 billion in funding for South Korea, Indonesia, and Thailand, the three countries most affected economically over the past several months. The IMF has prescribed a variety of measures for these economies, including cuts in energy subsidies, deregulation, and privatization of energy industries. Indonesia, for instance, has agreed to phase out subsidies on fuel and electricity as part of its IMF loan package. Thailand's government has put oil and gas privatization on a "fast track."

East Asian economies will not be affected equally in 1998 by the economic crisis which began during the summer of 1997. China, for instance, is expected to see only a slight slowdown in economic growth -- to around 8.4% -- in 1998 (see Table 1). Singapore's economic growth, on the other hand, could slow from more than 7% in 1997 to less than 3% in 1998. Indonesia, Thailand, and South Korea have been the most seriously affected countries in this crisis to date, and could see a contraction of their economies in 1998 (down from 7%-8% average 1990-1996 growth).



East Asia's economic crisis has contributed to a decline in world oil prices in recent months. Since October 1997, oil prices have fallen nearly \$5 per barrel as a result of several factors, including the East Asian economic situation, increased world oil production, resumption of Iraqi oil exports, and warmer-than-normal winter weather in the United States and Europe. Oil market analysts currently are estimating that the Asian economic crisis will cause world oil demand growth in 1998 to slow, but are sharply divided as to the severity of the impact. Prior to the Asian crisis, world oil demand had been expected to increase 1.5-2.0 million barrels per day (bbl/d) in 1998. The Energy Information Administration now estimates the demand growth to be lower by about 300,000-400,000 bbl/d (estimates by other analysts range from as little as 200,000 bbl/d to as much as 800,000 bbl/d).

ENERGY OVERVIEW

In 1996, the East Asian countries included here collectively consumed 79 quadrillion British thermal units (Btu) of energy - 21% of the world's total - and their energy consumption generated over 1.4 billion metric tons of carbon emissions - 24% of the world's total. Oil is the dominant fuel for each of these countries, with the exception of China (which relies primarily on domestic coal supplies for about

countries, with the exception of China (which relies primarily on domestic coal supplies for about three-quarters of its energy needs). As a group, these selected East Asian countries consumed over 21% of the world's oil, 7% of the world's natural gas, and nearly 35% of the world's coal. The high percentage for coal is mainly due to the inclusion of China, which alone accounted for 29% of the world's total coal consumption in 1996.

The economic crisis in East Asia is expected to have a significant effect on the growth of world energy demand because East Asia is one of the few areas of the world where energy consumption has been rising rapidly. During the 1990-96 period, total energy demand for these 10 countries grew at an average rate of 5.5 % per year, compared to the world average of 1.5% per year. Without these 10 East Asian countries, world energy demand would have increased by an average of only 0.5% per year. The average annual increase in energy consumption for these 10 countries as a group exceeded their combined average annual economic growth rate. This also true for each individual country except China, Hong Kong, and Singapore. As the economies of these countries slow or shrink due to the economic crisis, energy demand growth can be expected to slow as well. The economic slowdown could lower the growth in energy consumption in 1998 to 2%, a reduction of about 2 -3 quadrillion Btu from previously projected levels.

The rapid growth in energy consumption in East Asia in recent years has been accompanied by a rapid growth in associated carbon emissions. During the 1990-96 period, total energy-related carbon emissions for these 10 countries grew at an average rate of 4.5 % per year, compared to the world average of 0.6% per year. Excluding East Asia, carbon emissions in the rest of the world declined by 0.5% annually during this period (the modest growth in carbon emissions in western industrialized countries was outweighed by the decline in carbon emissions resulting from a severe decline in Eastern Bloc economies). The slowdown in Asian economic growth, and by extension the growth of energy consumption and associated carbon emissions, could slow the growth in regional carbon emissions to about 2% in 1998.

OIL

Oil demand growth in East Asia has fueled world oil demand growth over the past few years. However, East Asian oil demand growth, which averaged 5.6% annually between 1990 and 1996, is expected to slow down in 1998. Oil consumption could fall both because of the region's overall economic slowdown, and because currency depreciation vis-a-vis the U.S. dollar raises the price in local currency for oil (which is traded in U.S. dollars). As a result, demand growth in the region is likely to be 300,000-400,000 bbl/d lower than forecast before the economic slowdown began.

Most of this decline is expected to come from Indonesia, Thailand, and South Korea, with smaller demand reductions in China and Japan, the two largest oil consumers in the region. China, which has been relatively less affected by East Asia's economic crisis, should see oil demand growth of 7%-8% in 1998, compared to 9% in 1997. Japanese demand is expected to show no growth in 1998, compared with modest 2% growth in 1997. Malaysia and Indonesia, the two net oil exporters in the region (see Table 2), may see a more complicated mix of effects than other countries in the region. On January 16, 1998, the Philippine government announced it would allow oil companies to raise oil prices by an average 8.2% to compensate for the fall of the peso since July 1997. As of January 12, 1998, oil product prices in Thailand had been adjusted 20 times since the country announced a "managed float" of its currency (the Baht) on July 2, 1997.

Petrochemicals/Petroleum Refining

East Asia's economic crisis could adversely affect the world petrochemical industry. U.S., Japanese, and European chemical companies have heavy investments in Asia, particularly in hard-hit Thailand, Indonesia, and South Korea. Furthermore, around one-third of U.S. chemical exports go to the Asia-Pacific region. U.S. chemical exports to these countries reportedly are falling, while negotiations on joint ventures and new manufacturing projects have slowed. Asian chemical companies are liquidating inventories, causing prices of polypropylene and other products to fall. Prior to the economic crisis, forecasters were expecting a moderately good year for petrochemicals in 1998, with a slowdown in 1999 and 2000. Now, analysts believe that the slowdown is likely to begin in 1998. As of early January 1998, Thailand was reassessing two petrochemical projects worth \$179 million; however, plans for bigger petrochemical projects in Thailand remain alive.

Asia's oil refining sector was already highly competitive prior to the financial crisis, and responses in this sector have been mixed. Refiners in Singapore, Thailand, Japan, and South Korea have cut planned runs for the first quarter of 1998 by as much as 200,000 bbl/d total. Thailand is increasing product exports in the face of a sharp decline in domestic demand, and Indonesia plans to delay construction of the country's first private oil refinery. Meanwhile, Taiwan is proceeding with plans for a naphtha cracker and oil refinery complex.

NATURAL GAS

Natural gas demand growth in East Asia may be curtailed in the short- to medium-term, but in the long-term, regional gas demand is likely to grow strongly. For the time being, however, East Asian countries are scaling back their plans in this area. South Korean liquefied natural gas (LNG) imports in 1998, for instance, are expected to be 18% (1.3 million tons) less than previously planned volumes. Much of this decline will result from reduced electricity consumption caused by the economic slowdown as well as by an unusually mild South Korean winter. As a result, Korea Electric Power Corporation (Kepco), which accounts for half of South Korea's LNG consumption, plans to cut back on LNG purchases in 1998. South Korea's state gas company (Kogas) already has canceled 15 cargoes, totaling 600,000 tons, for 1998 from Indonesia's state oil and gas company Pertamina. Pertamina already is seeing mounting LNG inventories at its storage facilities in Indonesia, and may be compelled to cut production in the near future if export outlets cannot be found.

Regional governments are cutting back on previous ambitious LNG import plans. In November 1997, Thailand postponed by four years a 2.2-million-metric-ton-per-year LNG purchase agreement with Oman's state-owned LNG company, previously scheduled to come into effect in 2003. Thailand also has delayed purchase of LNG from Indonesia's Natuna field from 2003 to 2007. In December 1997, Moody's Investor Services downgraded the credit rating on Qatar's Ras Laffan LNG Company due to its exposure in South Korean markets, although South Korea still intends to honor its LNG purchase agreements from Qatar.

Billions of dollars of new investment in regional LNG production capacity could be slowed or put on hold given fears that declining LNG demand will leave the projects without a market. One example is the 7.5-million-ton-per-year North West Shelf project, situated offshore northwestern Australia, which had planned to nearly double production (to 14.5 million tons per year) by 2003. This \$6.5 billion expansion project had been predicated, however, on rising LNG demand in Japan, and there is now talk of slowing down the previously planned expansion. Other projects which aimed to supply East Asian gas markets but have now been put in doubt include: a Phillips Petroleum expansion plan for an LNG plant in Alaska; a new 3-million-ton-per-year plant to be built in western Canada by 2000; the Malaysia Tiga plant; Australia's offshore Gorgon project; and a plan to build a third gas trunk line from Unocal's Erawan field in the Gulf of Thailand to Ratchaburi, west of Bangkok.

Not all gas projects have been postponed or canceled. Enron, for example, is planning to pursue a variety of energy infrastructure projects in Thailand, including gas pipelines and power plants. Texaco recently began a \$25 million drilling program to confirm gas reserves in the Gulf of Thailand. And Nova Corp. of Calgary is negotiating involvement in a gas transmission system in Thailand. South Korea continues -- at a slower pace -- with its plans to lay the infrastructure for future increases in gas consumption. Gas pipeline plans in general appear relatively less affected by East Asia's economic crisis than more expensive LNG projects.

COAL

Short-term coal demand prospects in East Asia have been adversely affected by the region's economic crisis, as general industry, electric power producers, and cement makers scale back production. To hedge against currency turmoil, Asian coal importers also are likely to reduce long-term coal contracts and instead make more spot purchases.

During the first half of 1997, U.S. coal exports to East Asia totalled 6.8 million short tons (mmst), representing 16.7% of total U.S. coal exports. This coal went mainly to utilities in Japan, and to a lesser extent to South Korea and Taiwan. In 1998, U.S. coal exports to East Asia may decline. One positive sign for U.S. coal exporters is that Japan (the main customer) has -- so far -- been less adversely affected

sign for U.S. coal exporters is that Japan (the main customer) has -- so far -- been less adversely affected than many other countries in the region. On the other hand, Indonesian coal exports could become more competitive with U.S. coal in Asia due to the devaluation of Indonesia's currency (the Rupiah), which makes Indonesian exports less expensive. U.S. coal companies are scheduled to begin price negotiations with Japanese customers in late February for the fiscal year beginning in April.

ELECTRICITY

East Asian governments are delaying infrastructure projects, including electric power plants, due to a shortage of funds. Indonesia has placed several projects on hold for the time being, although it also signed a deal (in late December 1997) for a \$1.6 billion power plant to be built on Java. In the long-term it is expected that East Asia's electricity demand will grow strongly.

Reports indicate that South Korean power consumption could fall more than 20% in 1998, particularly in the industrial sector, where many companies are reducing production or closing down. Thailand has cut its power demand forecasts through 2011 substantially, which could result in postponed expansion plans and power purchase agreements. Malaysia's \$6 billion, 2.4 gigawatt Bakun hydroelectric project has been on hold since September 1997, although Malaysia's government says it remains committed to the project.

Table 1. Selected Asian Countries At a Glance

	Population, 1997E (Millions)	Gross Domestic Product (GDP), 1997E	Real GDP Growth Rate			Energy Consumption				Carbon Emissions	
			1990-96 Average	1998 Forecast		1996		Average Annual Increase, 1990-96		1996 (Million Metric Tons)	Average Annual Increase, 1990-96 (%)
				Pre- Crisis (6/97)	Revised (1/98)	Total (Quad rillion Btu)	Oil Share (%)	Total (%)	Oil (%)		
China	1226.3	818.3	11.6	9.2	8.4	37.040	19.9	5.4	7.5	804.8	4.4
Hong Kong	6.5	108.1	4.9	5.1	3.4	0.609	67.7	4.0	7.4	11.3	1.0
Indonesia	209.8	187.0	7.1	7.6	-2.1	3.513	50.4	8.3	4.4	60.9	7.8
Japan	125.7	3324.9	1.8	3.2	0.8	21.370	55.8	2.8	2.2	290.7	1.0
Malaysia	20.5	74.8	8.7	8.3	2.0	1.664	51.6	9.3	7.7	25.7	6.6
Philippines	76.1	54.4	2.7	6.0	3.0	0.977	73.4	5.0	6.3	15.0	4.9
Singapore	3.4	64.5	8.1	7.3	2.5	1.216	95.3	7.2	6.4	21.6	4.4
South Korea	45.9	411.2	7.4	6.0	-2.0	7.158	63.0	11.7	13.2	112.5	10.8
Taiwan	21.7	248.4	6.2	6.1	5.1	3.112	53.5	7.3	6.5	51.2	8.2
Thailand	59.5	138.8	8.2	7.4	-3.5	2.333	61.2	10.9	9.0	43.5	11.2
TOTAL	1795.4	5430.3	3.7	4.9	1.8	78.992	40.3	5.5	5.6	1437.2	4.5

Sources: U.S. Census Bureau; U.S. Energy Information Administration; and WEFA, *Asian Monthly Monitor* (6/97), *Asia Economic Outlook* (11/97), and "Update on the Financial Crisis in Asia" (1/12/98).

Table 2. Energy Highlights for Selected Asian Countries -- 1996

	Petroleum (1,000 barrels/day)			Natural Gas (billion cubic feet)		Coal (Million Short Tons)		Electric Generating Capacity (Million Kilowatts)		
	Refining Capacity (1/1/98)	Consumption	Net Imports*	Consumption	Net Imports*	Consumption	Net Imports*	Total (1/1/96)	Nuclear (12/31/96)	
									Installed	Planned
China	2,967	3,548	416.7	662.9	-7.8	1,500.1	-49.7	204	2.1	9.2
Hong Kong	—	195	195.0	7.8	7.8	7.5	7.5	10	0.0	0.0
Indonesia	930	845	-779.5	1,136.8	-1,245.9	13.5	-39.8	20	0.0	0.0
Japan	4,966	5,867	5,785.6	2,390.1	2,311.3	144.2	136.9	205	42.4	12.6
Malaysia	371	415	-301.0	627.9	-667.5	2.4	2.3	11	0.0	0.0
Philippines	323	340	337.0	0.4	0.0	3.6	1.6	8	0.0	0.0
Singapore	1,157	527	523.0	53.0	53.0	0.1	0.1	5	0.0	0.0
South Korea	2,540	2,159	2,156.3	457.3	457.3	57.6	52.1	32	9.1	7.7
Taiwan	770	789	784.8	158.2	124.7	32.9	32.7	24	4.9	2.5
Thailand	704	683	586.1	428.4	0.0	23.9	2.8	18	0.0	0.0
TOTAL	11,761	15,368	9,704.2	5,922.6	1,032.9	1,785.7	146.4	537	58.5	32.0**

*Calculated as consumption minus production. A negative number indicates the country is a net exporter.

**Includes 10.8 million kilowatts capacity under construction as of 12/31/96.

Sources: Oil and Gas Journal, 12/22/97; U.S. Energy Information Administration.

For additional information on the outlook for world oil markets in 1998, see:

[Short-Term Energy Outlook - International Analysis](#)

[Short-Term Energy Outlook - International Petroleum Supply and Demand Table](#)

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Printed By: Stephen P. O'Dowd

ACTION EAP-01

INFO	LOG-00	ACDA-08	ACDE-00	AID-00	AMAD-01	CEA-01	CIAE-00
	COME-00	CTME-00	DODE-00	DOEE-00	ITCE-00	EB-00	EXME-00
	FBIE-00	UTED-00	TEDE-00	INR-00	ITC-01	ADS-00	NSAE-00
	OES-01	OMB-01	OPIC-01	SSO-00	SS-00	STR-00	TRSE-00
	EPAE-00	DRL-04	G-00	NFAT-00	SAS-00	/019W	
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TO SECSTATE WASHDC IMMEDIATE 1625

INFO WHITE HOUSE WASHDC IMMEDIATE

AMEMBASSY BEIJING IMMEDIATE

UNCLAS SEOUL 003626

DEPT FOR EAP/K - TDELARE/STHORNTON/ESAGURTON

WHITE HOUSE PASS TO CEA FOR YELLEN/ALDY

WHITE HOUSE PASS TO OSTP

E.O. 12958: N/A

TAGS: ORTA, SENV, ECON, KS

SUBJECT: PROPOSED SEOUL SCHEDULE FOR CEA CHAIR AND
GLOBAL CLIMATE CHANGE DELEGATION

REF: (A)SEOUL 03608, (B)SECSTATE 112282

1. Embassy Seoul welcomes the visit to Seoul of Dr. Janet L. Yellen, Chair of the Council of Economic Advisors, and members of the Global Climate Change Delegation. We look forward to a productive visit. Reftel A provides country clearance and hotel information. EST Couns S. Ahmed Meer will meet Dr. Yellen and Mr. Aldy upon arrival. We have prepared a tentative schedule for the visit. We still have not received ROKG confirmation for much of the schedule. We welcome any changes or additions scheduled by Dr. Yellen. Please note the proposal to have a senior Korean economics editor interview Dr. Yellen on the morning of July 2.

2. Tentative schedule is as follows:

June 30, 12:30 PM:

Arrive Kimpo Airport by CA 123 from Beijing
(Met by EST Counselor Meer)

2:00 PM: Modified Country Team Briefing at Embassy
(Sandwiches and drinks supplied for visitors)

4:00 PM: Depart Embassy for Ministry of Foreign
Affairs and Trade

4:15 PM: State Minister for Trade Dr. Han Duck-Soo
(To be confirmed)

5:15 PM: Mr. Han Jung-ki, Assistant Minister for
Economic Policy Coordination and Chairman of the Prime
Minister's Task Force for Climate Change (To be
confirmed)

6:15 PM: Arrive at Hyatt Hotel

7:30 PM: Dinner to be arranged.

Printed By: Stephen P. O'Dowd

July 1 9:30 AM: Mr. Seo Sa-Hyeon, Deputy Minister for Energy Policy, Ministry of Commerce, Industry, and Energy (To be confirmed)

10:30 AM: Mr. Choi Jae Wook, Minister for Environmental Affairs (To be confirmed)

11:30 AM: Depart for Korean Energy Economic Institute (KEEI)

12 NOON: Lunch with KEEI President Dr. Lee Hoe-Sup (To be confirmed)

1:30 PM: Discussions at KEEI

2:30 PM: Leave KEEI

4:00 PM: Kang Bong-Kyun, Blue House Senior Secretary for Economic Affairs (To be confirmed)

4:45 PM: Depart for Korea Development Institute (KDI)

5:15 PM: Discussions at KDI (To be confirmed)

7:30 PM: (Dinner to be arranged)

July 2 8:30 AM: Press interview with senior Korean economics editor to be arranged by USIS

9:30 AM: Depart for Ministry of Finance and Economy

10:15 AM: Meeting with Mr. Lee Kyu-Sung, Minister of Finance and Economy (To be confirmed)

11:15 AM: Depart Ministry of Finance and Economy for light lunch and to Kimpo Airport for 2:20 PM departure via UA 818.

BOSWORTH

Korea mtg @ Treas

Message

- 1) target won't constrain growth
- 2) gains from trade
- 3) design of target can reduce risk (succinct version of 1-pager)
→ 1 pg of proposal

Open question

2 back-up proposals

- 1) if not Korea, where else
- 2) if not Janet, who else

✱ Follow-up w/ Todd, David S., Janet re Korea trip
get State country-specific priority papers

Jack Pitzke

contact State/Korea people

Korea mtg @ Treas 6/18

Robin - 100% overlap

EPA invite

- co-central perspective

1 page on Frankel proposal

1 page on co-control lens prospectus

Coordinate efforts to calc BAU (?) - EPA

OECD obligations

Existing portfolio of govt. projects

AID - contracted study on Korea.

Jeff Seabright

Country Studies

Ma hal Macro

Sinks

EPA could propose tech support to assess s.h.h.s

Provide Target

1 page (Frankel)

1 page - gains from trade

1 page - EPA proposal on co-control (joint studies and analysis)

give Abe a call $\rightarrow$ ^{generation} ^{efficiency} ^{power plants} (DOE) $\rightarrow$ fossil fuel office

Developing Country Targets mtg 6/11

to Randy - carbon cycle flow diagram

Teams/Efforts to communicate w/ CDCs

UNCTAD

World Bank - they might validate our claims of gains from trade (regional banks too)

G-8 working group

7/17 mtg (Melinda Kimble will lead delegation) - UK

broad representation in delegation (Treas, DOE)

Institutions for talking w/ finance ministries

Bank Fund mtgs

Country Studies Program (CSP) - econ modeling w/shops in CDCs

OECD

CEA relationship w/ Japan, China

Hosting analysts from other countries

- Kennedy School program in July (what's on curriculum)

- International Visitors program

interagency teams to other countries - Korea, others

CSP - emissions inventories

action plans

analytic support

Countries to focus on: Korea

Mexico

Chile

Argentina

China - Jorgenson

Mikhail Mavro

SGM

send team in July

★ interagency group to develop a plan for Korea → Finance & Environment ministries

Korea

MC curve

uncertainty around BAU (risk)

ancillary benefits

background a economy

industrial mix (steel, auto, etc.)

housing stock

energy mix

portfolio of ongoing projections

- national communication

models - other models

- EPA

- SGM - Korean modeler

- CEA

energy subsidies

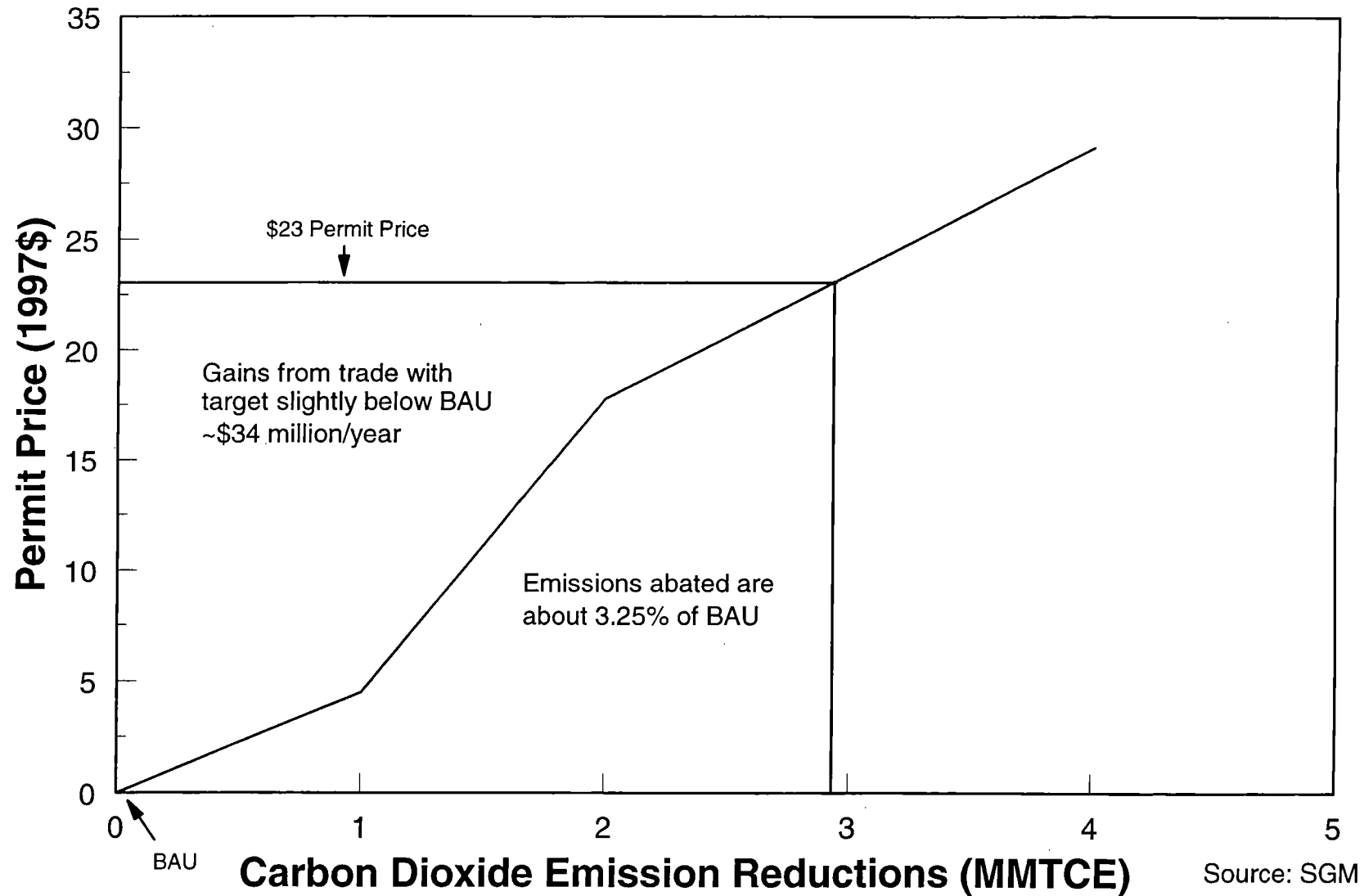
meeting Monday - W. Leach etc.

} CEA

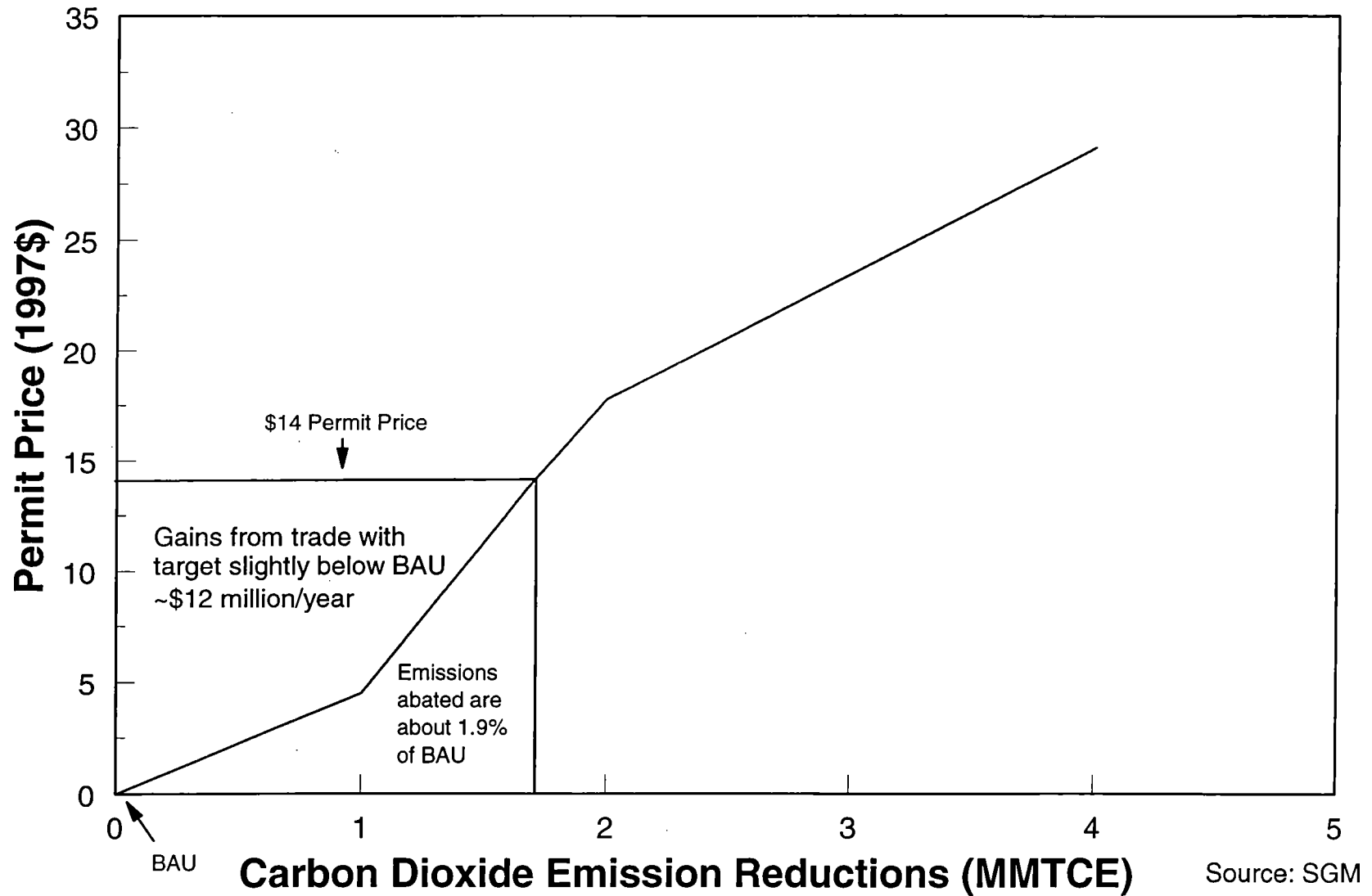
- EPA (AI)

- Treas (Ray)

Korea's 2010 Marginal Abatement Cost Curves



Korea's 2010 Marginal Abatement Cost Curves

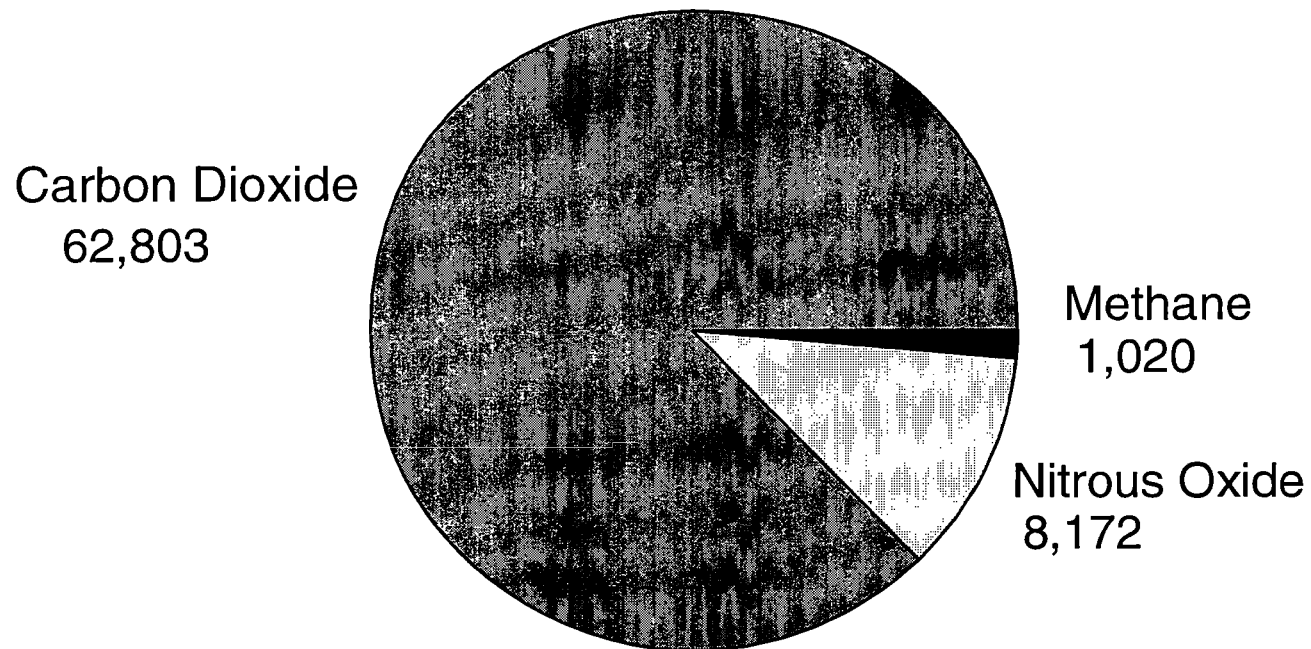


	Energy (Quad Btu)	Carbon (MMTCE)	GDP (Mn 1987\$)	E/GDP (Btu/1987\$)	C/GDP (T/mn1987\$)
1980	1.73679731952	35.049592897	74472	23321.48	470.6412194762
1981	1.81919203909	36.967416791	79282	22945.84	466.2775509107
1982	1.81790122186	38.419069794	83755	21704.99	458.70777618
1983	1.96417595203	38.774234703	93649	20973.81	414.0378936565
1984	2.15443896943	41.559275072	101884	21146.00	407.9077683623
1985	2.2579904197	44.465241376	109231	20671.70	407.0752934271
1986	2.49727843208	47.14509003	121979	20473.02	386.5016931565
1987	2.74042957257	47.682247643	136317	20103.36	349.7894440416
1988	3.05463705828	53.530071223	151726	20132.59	352.807503152
1989	3.29270906371	56.00852381	161500	20388.29	346.8020050135
1990	3.67940599355	60.915447933	177116	20773.99	343.9296728322
1991	4.18919563825	70.139356038	193417	21658.88	362.6328401236
1992	4.65241604973	73.635441709	203418	22871.21	361.9907860131
1993	5.38529146857	96.313164964	214455	25111.52	449.1066422494
1994	5.90062024326	94.656240448	232854	25340.43	406.5046786736
1995	6.53194381629	102.30044005	253664	25750.38	403.2911254639
1996	7.15820087481	112.5005764	271740	26342.09	414.0007963629
Mexico					
1996	5.62355816503	86.317997736	162435	34620.36	531.4002384685
Argentina					
1996	2.59800802672	35.080117206	134604	19301.12	260.6171971544
Turkey					
1996	2.66605433313	42.79780472	121464	21949.34	352.3497062506
Taiwan					
1996	3.11178526468	51.239438236	181816	17115.02	281.8202921424
Japan					
1996	21.3744897672	290.69300445	3136421	6814.93	92.6830308974

Comparison	
Korea =1	Korea = 1
1	1
1.31426	1.283573
0.73271	0.629509
0.833242	0.851085
0.649721	0.680724
0.258709	0.223872

Emissions Breakdown, Korea 1990

Table 3-1

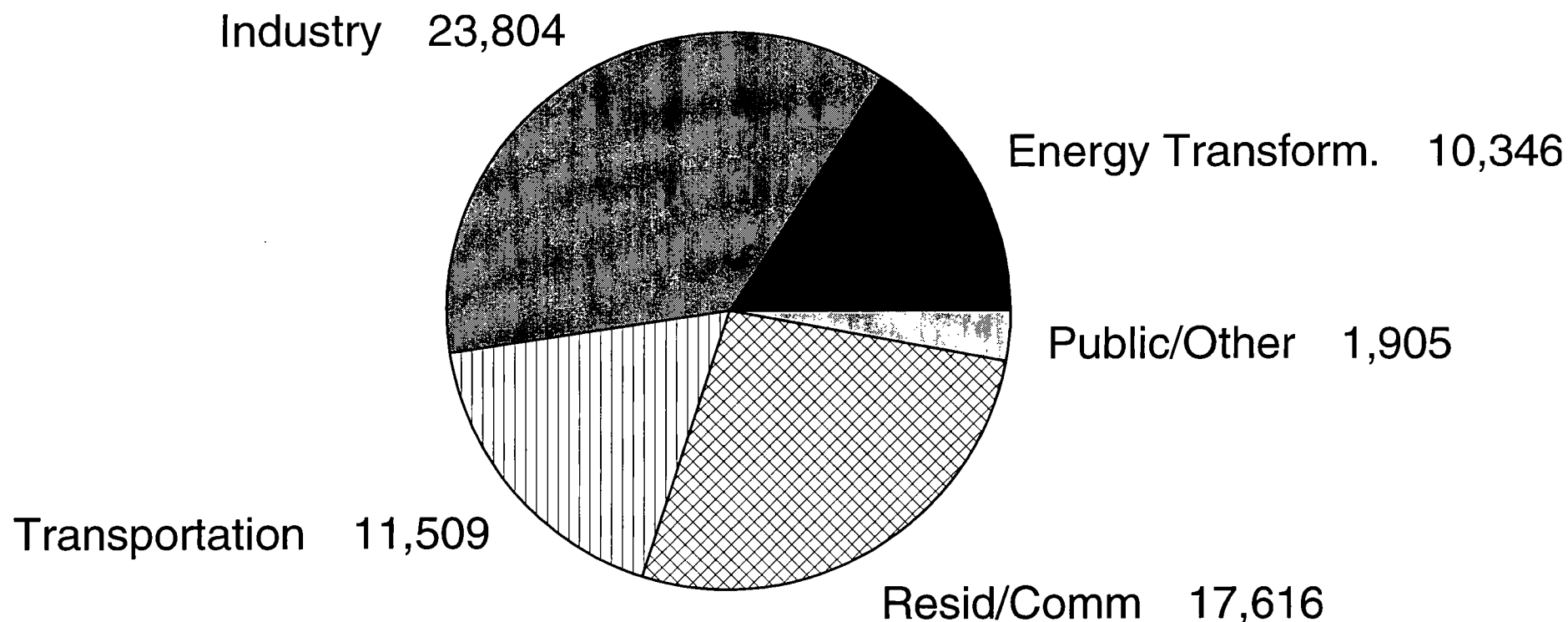


Notes: Units are MMTCE. 26,235 Gg of Carbon Dioxide, ~10% of emissions are eliminated using Managed Forests. Also, this chart does not include emissions of synthetic gases.

Carbon Dioxide Emissions, Korea 1990

Fuel Combustion Breakdown by function

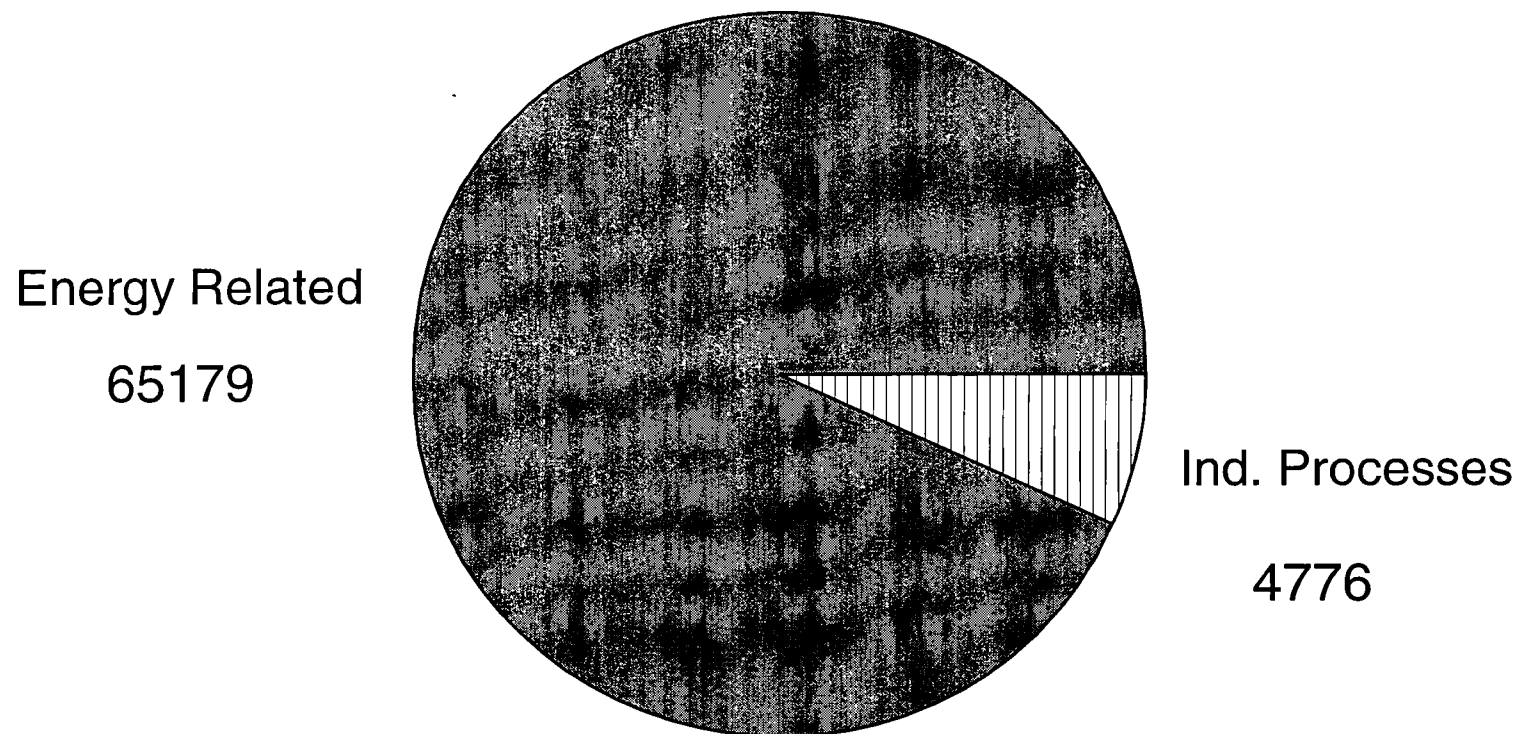
Table 3-1



Note: Units are MMTCE. This graph does not include emissions of synthetic gases.

Carbon Dioxide Emissions Breakdown by sector, Korea 1990

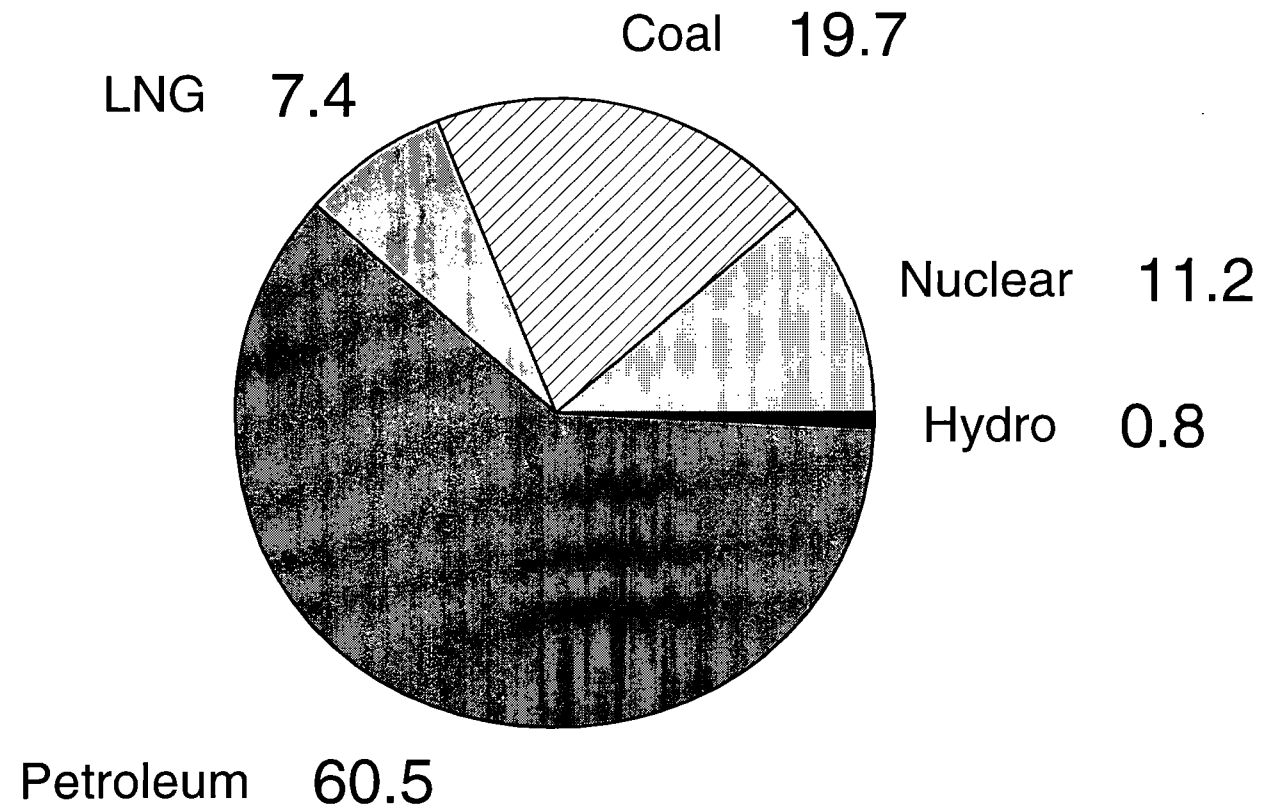
Table 3-1



Note: This chart does not include synthetic gases.
Units are MMTCE

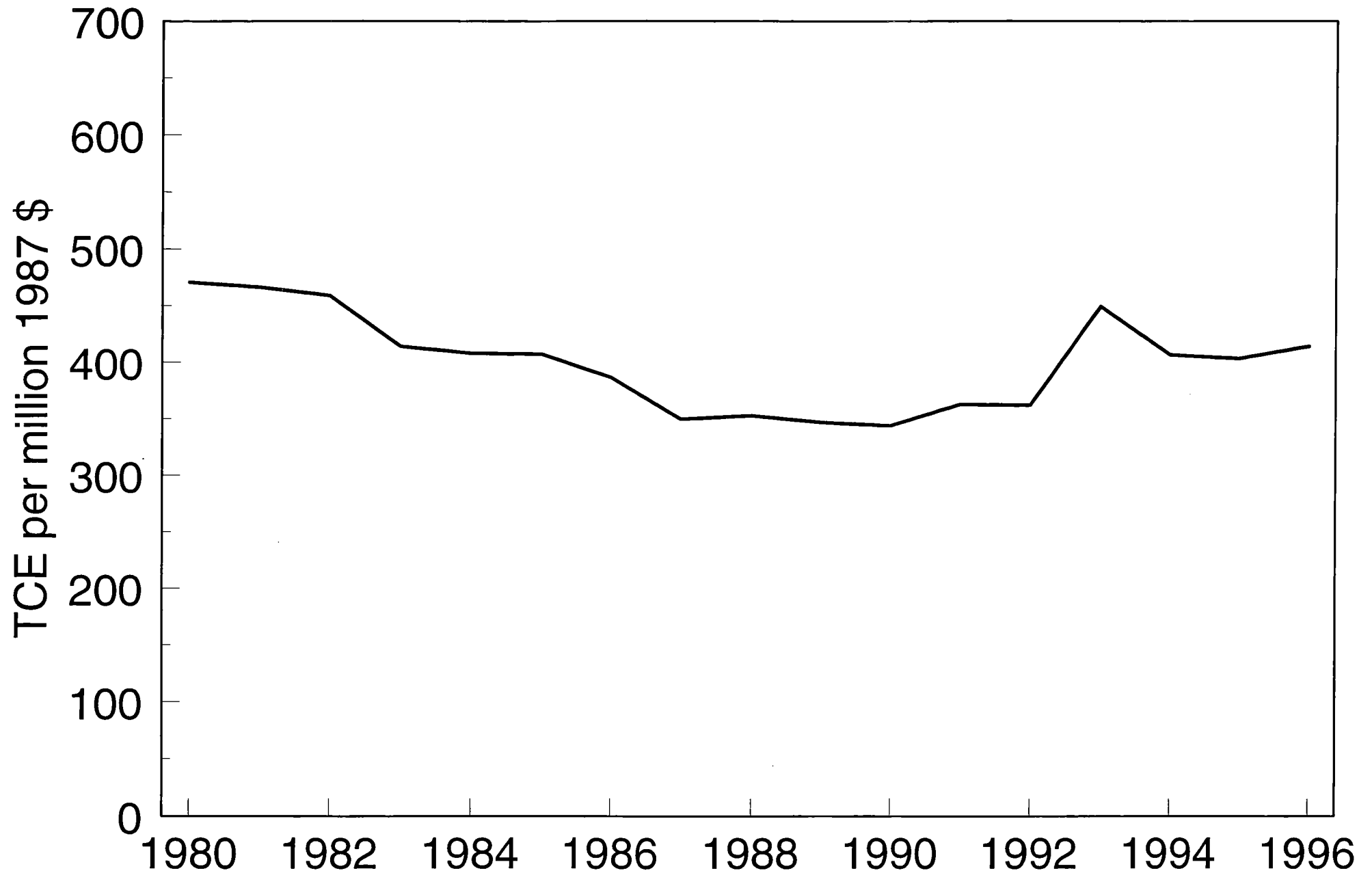
Share of Primary Energy Consumption, by Fuel Source Korea, 1996

Table 2-6



Note: This chart does not include synthetic gases.
Units are percentage of primary energy consumption supplied.

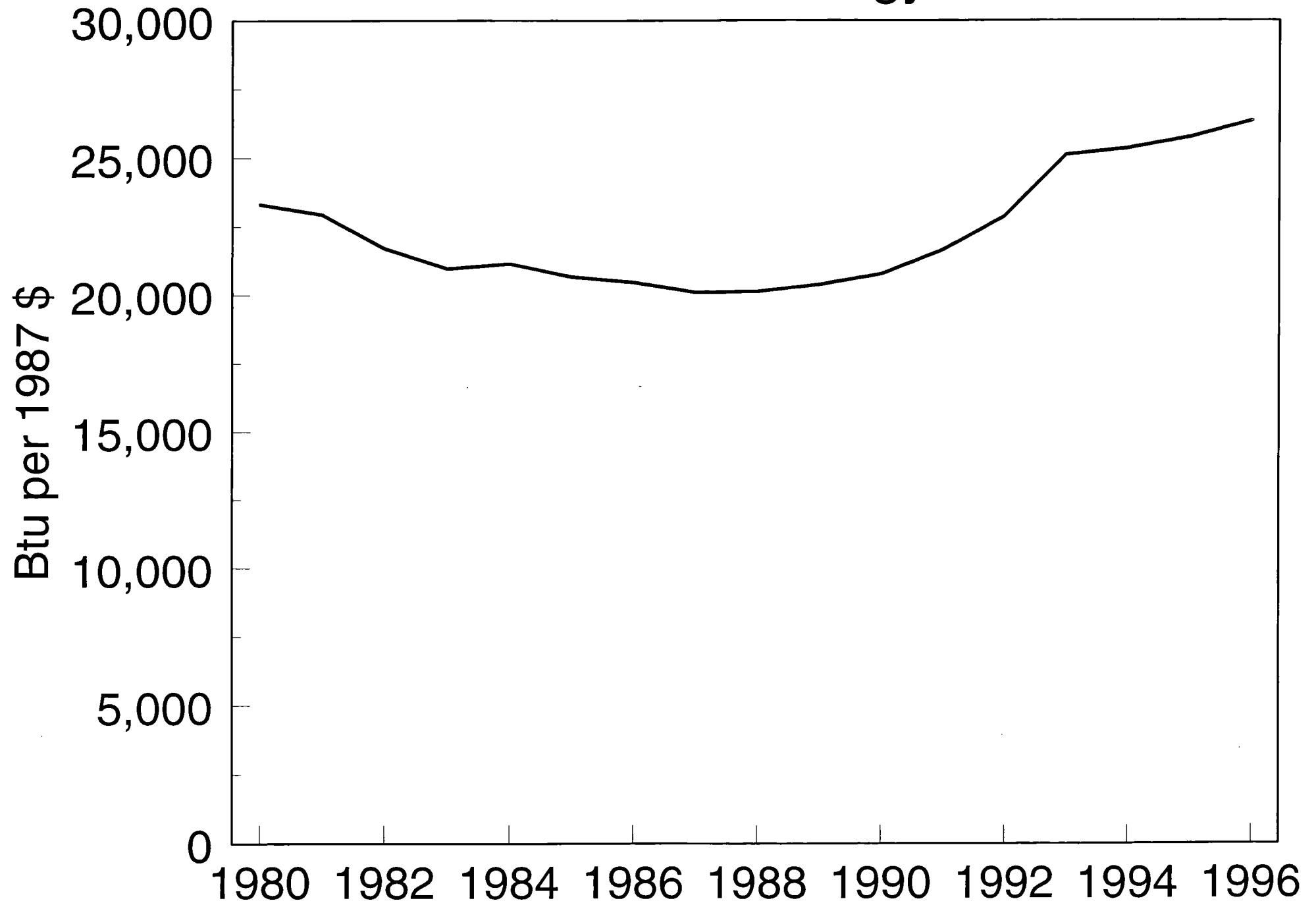
South Korea CO₂/GDP



Note: Data represent carbon dioxide emissions from fossil fuel combustion measured in carbon equivalent.

Source: Energy Information Administration 1997c.

South Korea Energy/GDP

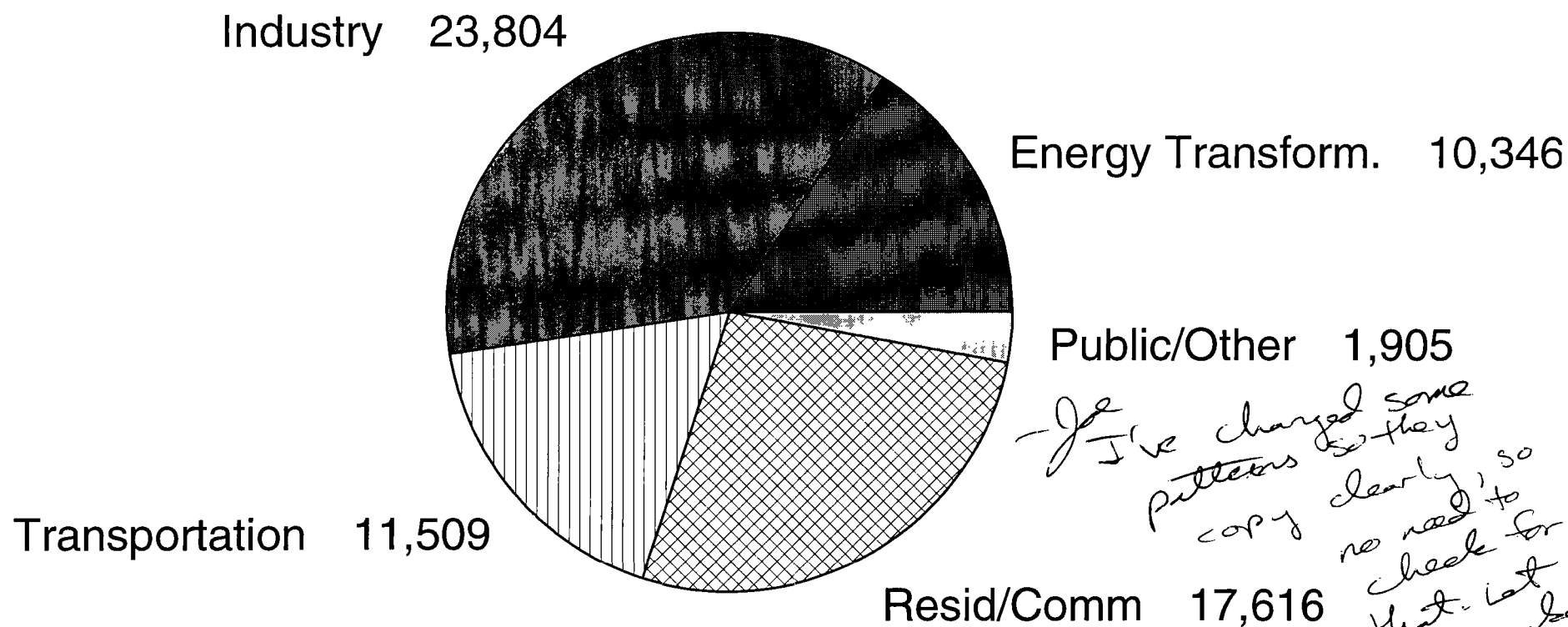


Source: Energy Information Administration 1997c.

Carbon Dioxide Emissions, Korea 1990

Fuel Combustion Breakdown by function

Table 3-1

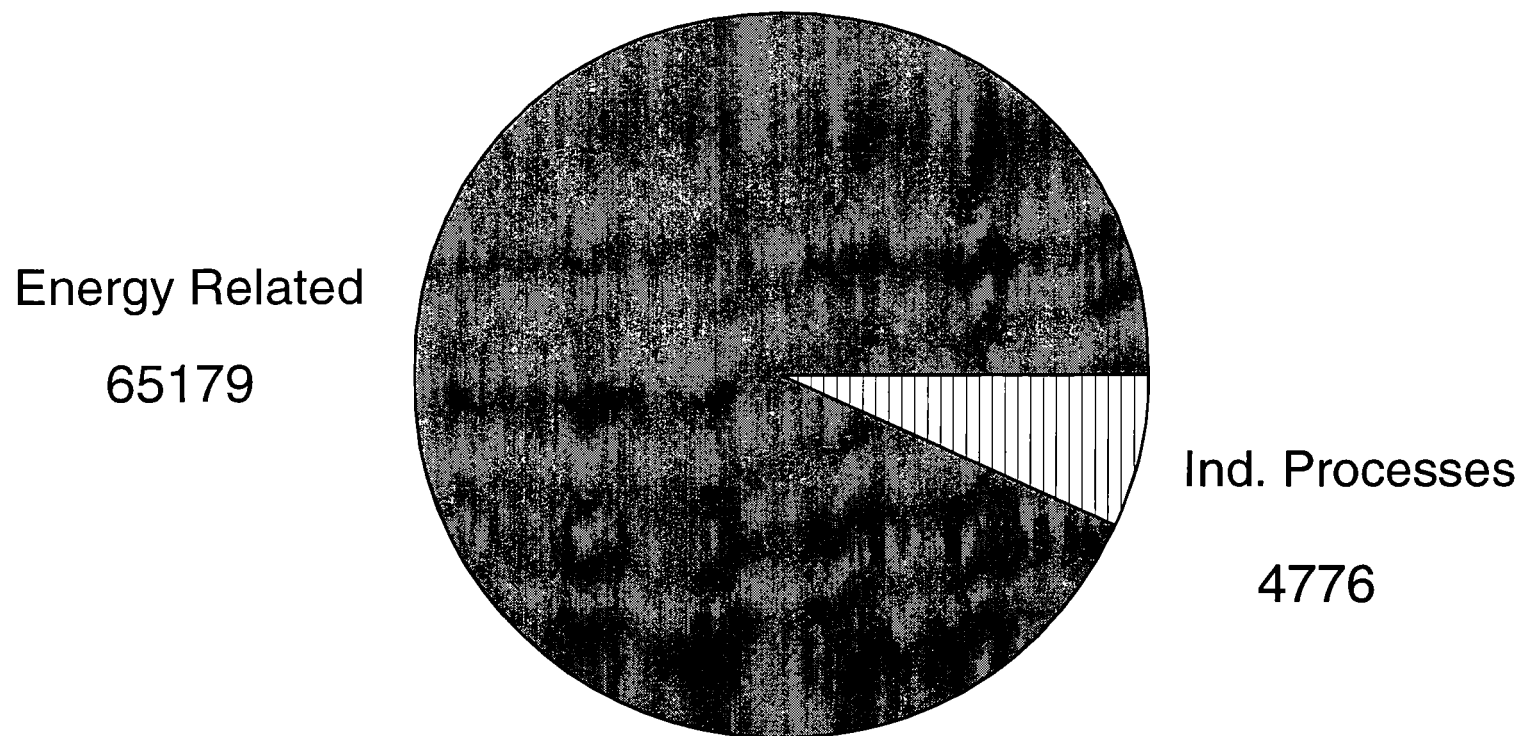


- Joe
I've changed some
patterns so they
copy clearly, so
no need to
check for
that. Let
me know about
other changes
tomorrow.
- Matt

Note: Units are MMTCE. This graph does not include emissions of synthetic gases.

Carbon Dioxide Emissions Breakdown by sector, Korea 1990

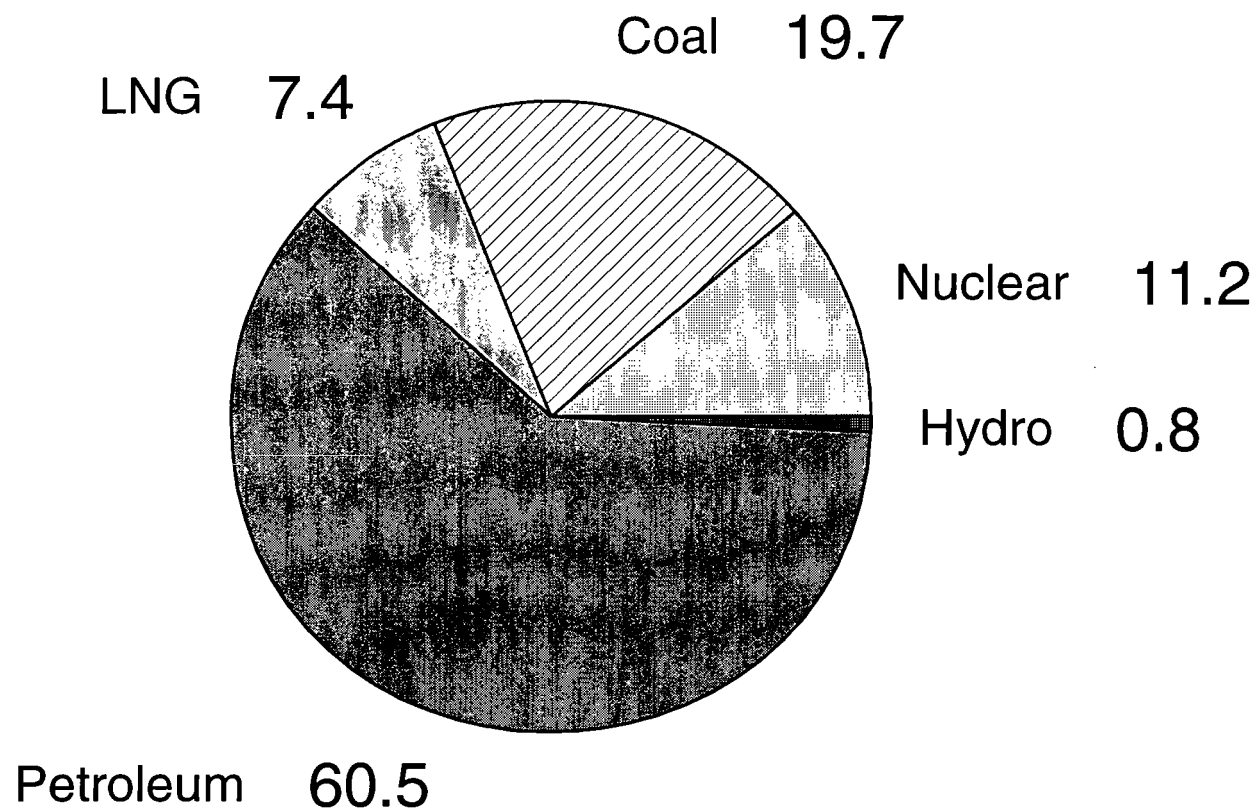
Table 3-1



Note: This chart does not include synthetic gases.
Units are MMTCE

Share of Primary Energy Consumption, by Fuel Source Korea, 1996

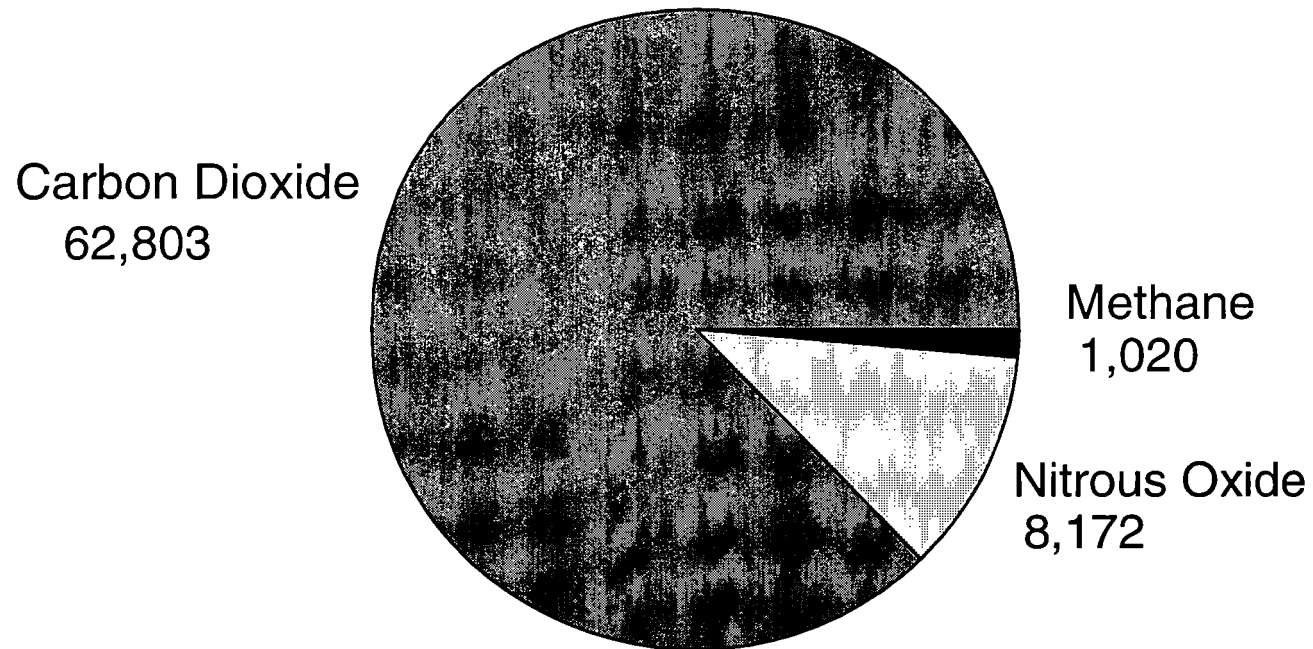
Table 2-6



Note: This chart does not include synthetic gases.
Units are percentage of primary energy consumption supplied.

Emissions Breakdown, Korea 1990

Table 3-1



Notes: Units are MMTCE. 26,235 Gg of Carbon Dioxide, ~10% of emissions are eliminated using Managed Forests. Also, this chart does not include emissions of synthetic gases.

Summary, Korea National Communication

Energy Consumption

- Korea gets 97.8% of its primary energy from abroad, in that it imports all its fuel since it's stopped mining domestic coal.
- Its econ growth rate in 1995 was 8.9% and energy consump growth rate was 9.6%
- It gets 87.3% of its energy from fossil fuel generation, just slightly less than US.
- Since 1980, Korea has increased the use of LNG and Nuclear power in the place of coal, which is attributed to govt efforts to encourage LNG (infrastructure construction) and Nuclear (building plants) and to discourage coal (shutting down mines). Oil has provided ~60% since 1980.
- There's been a rapid increase in the consumption of industry and transport, such that Industry uses 51.4% of the energy used in Korea, equal to 68 TOE in 1996; transportation sector uses 22.6%, which is largely composed of increasing personal car usage; residential/Comm uses 24%, which includes a rapid increase in household electricity demands due to the proliferation of appliances and a switch in the residential sector from coal to natural gas.

GHG Emissions and Removals Inventory

- Base year is 1990, and they follow IPCC guidelines
- Major source is Korea's Yearbook of Energy Statistics, which has data on consumption by sector but not industry specific.
- CO₂ accounts for 88% of GWP of emissions.
- The growth rates (1990-95) of CO₂ emissions are fastest in electricity generation=17% and transportation=14%. Fossil fuel combustion amounts to 37% of total CO₂ emissions.

Projections

2 in industry

- Predict gradual increases in energy demand and emissions, with CO₂ reaching 217 MTC in 2010, equal to 3.9 MTC per capita. 1995, these were 101.1 and 2.3

Mitigation

- Korea has set policies by sector: See the chart for a summary of them. The major organizations are the National Committee for Energy Conservation and the Ministry of Trade, Industry, and Energy.
- **Industrial Policy:** The govt audits some 350 countries annually and provides tax incentives for capital investment which improves energy efficiency.
- **Residential and Commercial:** Large and very Large buildings are required to submit plans to reduce energy consumption. Labelling of appliances and minimum efficiency requirements on appliances have also been instated.
- **Transport Sector:** Car efficiency targets, carpool encouragement, and progressive taxation of emissions are being used.
- Korea has also emphasized R&D over the next ten years, setting as goals a 10% reduction

in energy consumption by 2006 and supplying 2% of the energy consumed with renewable resources.

- Energy produced with renewables has increased at 23% annual rate since 1993. Incineration and photovoltaic are receiving considerable government support.
- Pricing: The government is gradually removing price controls on energy to reach world prices by 2000, and is taxing fossil fuel usage.
- Funding: Korea has a Special Energy Fund, which funds industry conversion to more efficient processes. The SEF is funded by import surcharges and taxes on energy sales.
- Korea is very proud of its nuclear electricity generation facilities. By 2010, it expects 45.5% of electricity supply to be from nuclear plants, 33% of total power.
- Coal is being phased out, down from providing 16.5% of total energy consumption in 1988 to 1.5% in 1998.
- **Forestry:** The govt subsidizes almost completely the costs of converting cropland to forests and upgrading the species in forests.
- **Agriculture:** Trying to use techniques which lower emissions of methane from rice and animals.
- **Waste:** The government is controlling production of waste through packaging regulation and progressive pricing, encouraging incineration over landfills, and providing financial incentives for recycling.
- **Cars:** The government is completing a subway in Seoul and building others in Pusan, Taegu, and Incheon. Light rail systems are being built, and emissions testing on cars is in place. Taxes on gasoline are discouraging car usage.

4. Power Generation

Power generation in Korea has increased tremendously over the past two decades. At the same time, it has undergone structural changes to meet increasing demand for electricity resulting from economic and income growth. Power generation rose from 37,238 GWh in 1980 to 205,493 GWh in 1996. Meanwhile, nuclear and LNG power generation surged replacing oil-fired plants which played a major role in the 1980s.

Note: Shares in the parentheses.

Source: Yearbook of Energy Statistics, each year, KEEL.

	1980	1985	1990	1994	1995	1996	AAGR (%)	
							81-90	91-96
Total Power Generation (GWh)	37,238	58,007	107,669	164,992	184,660	205,493	11.2	11.3
- Nuclear	3,477 (9.3)	16,745 (28.9)	52,887 (49.1)	58,651 (35.5)	67,029 (36.3)	73,924 (36.0)	31.3	5.7
- Coal	2,481 (6.7)	17,639 (30.4)	19,961 (18.5)	41,835 (25.4)	48,813 (26.4)	56,881 (27.6)	23.2	19.1
- LNG	-	-	9,604 (8.9)	20,046 (12.1)	21,296 (11.5)	27,050 (13.2)		18.8
- Petroleum	29,297 (78.7)	19,964 (34.5)	18,856 (17.6)	40,313 (24.5)	42,045 (22.8)	42,436 (20.7)	-4.3	14.5
- Hydro	1,984 (5.3)	3,659 (6.3)	6,361 (5.9)	4,098 (2.5)	5,478 (3.0)	5,201 (2.5)	12.4	-3.2
Generation Facilities (MW)	9,390	16,136	21,021	28,749	32,183	35,715	8.4	9.2
Transmission and Distribution Loss (%)	6.6	5.89	5.62	5.59	5.46	5.40	-	-

< Table 2-13 > Major Indicators in Power Generation Sector

Since 1978, when the first nuclear power plant began its commercial operation, nuclear power generation has increased more than 21.1% per annum. Between 1981 and 1990, the growth rate was 31.3%, accounting for more than half of the total electricity consumed in 1987.

Such expansion of nuclear power generation capacity reduced the share of thermal power generation capacity. The share of oil-fired thermal power generation has plummeted from

Note: 1) non-CO emissions are those from residential and commercial sectors in 1989

Category	CO ₂	CH ₄	N ₂ O	NO _x	CO	NMVOCS
Net Emissions	230,278	1,362	12	851	1,056	152
1. Energy-Related Emissions	238,990	264	11	851	1,056	152
A. Fuel Combustion	238,990	17	11	851	1,056	152
1. Energy Transformation	37,934	0.3	2	193	7	N.A.
2. Industry	87,282	1	2	135	25	N.A.
3. Transport	42,198	6	2	401	600	152
4. Residential and Commercial ¹⁾	64,592	7	3	105	364	N.A.
5. Public and Other ²⁾	6,985	0.5	4	16	39	N.A.
6. Biomass Burning	-	2	0.02	0.6	20	N.A.
B. Fugitive Fuel Emissions	-	246	-	-	-	-
1. Coal Mining	-	230	-	-	-	-
2. Oil and Gas Systems	-	16	-	-	-	-
2. Industrial Processes	17,512	5	-	-	-	-
A. Cement Industry	14,841	-	-	-	-	-
B. Limestone and Dolomite Use	2,459	-	-	-	-	-
C. Soda Ash Use	212	-	-	-	-	-
D. Chemical Industry	-	5	-	-	-	-
3. Agriculture	-	599	1	-	-	-
A. Rice Fields	-	414	-	-	-	-
B. Enteric Fermentation	-	144	-	-	-	-
C. Animal Excrement	-	41	-	-	-	-
D. Nitrogen Fertilizers	-	-	1	-	-	-
4. Waste Management	11	495	-	-	-	-
A. Waste Incineration	11	-	-	-	-	-
B. Landfills	-	200	-	-	-	-
C. Household Wastewater	-	21	-	-	-	-
D. Industry Wastewater	-	274	-	-	-	-
5. Total	256,513	-	-	-	-	-
6. Removals (Managed Forest)	-26,235	-	-	-	-	-
7. International Bunkering	7,140	-	-	-	-	-

< Table 3-1 > Greenhouse Gas Emissions/Removals in Korea (1990) (unit : Gg)

2) non-CO₂ emissions are those from public and other sectors in 1989

[Figure 4-1] Energy Demand Projection

3. CO₂ Emissions

The projected CO₂ emissions are shown in < Table 4-3 >. CO₂ emissions in Korea are expected to grow from 101.1 million TC in 1995 to 148.5 million TC in 2000 to 187.4 million TC in 2005, and to 217.0 million TC in 2010 as energy demand for economic growth increases. The annual average growth rate of CO₂ emissions from 1996 to 2010 is projected at 5.2%.

	1985	1990	1995	2000	2005	2010	AAGR(%)	
							86-95	96-10
CO ₂ emissions	44.0	65.2	101.1	148.5	187.4	217.0	8.7	5.2
Per capita CO ₂ emissions	1.1	1.5	2.3	3.2	3.9	4.4	7.7	4.5
CO ₂ /GDP	0.39	0.36	0.39	0.42	0.40	0.36	-0.1	-0.7

< Table 4-3 > CO₂ Emissions Projection
capita TC, TC/ 90 million Won)

(unit: million TC, per

[Figure 4-2] CO₂ Emissions Projections

2. Energy Consumption by Source

In addition to rapid energy consumption growth, Korea has experienced significant changes in energy consumption structure since 1980. These changes can be summarized as the emergence of clean energy such as nuclear power and LNG, the decline of domestic coal, and the stable growth of petroleum. As a result, the shares of nuclear and LNG in total energy consumption jumped while that of coal plummeted. Petroleum consumption has maintained its share of around 60% in total primary energy.

Oil consumption increased from 182.105 million Bbl in 1980 to 721.063 million Bbl in 1996, which is twice the 1990 level. This increase was partly the result of the substitution of oil for coal. The expansion of petro-chemical facilities especially accelerated oil consumption in the 1990s.

Note : Share in parentheses. Source: Yearbook of Energy Statistics, 1997, KEEL.

The share of coal in primary energy consumption, 30.1% in 1980, rapidly decreased to

	1980	1985	1990	1994	1995	1996	AAGR (%)	
							81-90	91-96
Petroleum (kBBL)	182,105 (61.1)	189,191 (48.2)	356,349 (53.8)	621,498 (62.9)	677,209 (62.5)	721,063 (60.5)	6.9	12.4
Coal (kTon)	25,862 (30.1)	40,533 (39.1)	43,405 (26.2)	42,660 (19.4)	44,352 (18.7)	50,277 (19.7)	5.3	2.4
LNG (kTon)	- (0.0)	- (0.0)	2,329 (3.2)	5,860 (5.6)	7,087 (6.1)	9,361 (7.4)	-	26.1
Hydro Power (GWh)	1,984 (1.1)	3,659 (1.6)	6,361 (1.7)	4,098 (0.7)	5,478 (0.9)	5,201 (0.8)	12.4	-3.2
Nuclear Power (GWh)	3,477 (2.0)	16,745 (7.4)	52,887 (14.2)	58,651 (10.7)	67,029 (11.1)	73,924 (11.2)	31.3	5.7
Misc. (kTOE)	2,492 (5.7)	2,031 (3.6)	797 (0.9)	742 (0.7)	1,051 (0.7)	1,161 (0.7)	-10.8	6.5
Total (kTOE)	43,911 (100.0)	56,296 (100.0)	93,192 (100.0)	137,235 (100.0)	150,437 (100.0)	165,209 (100.0)	7.8	10.0

< Table 2-6 > Trend in Primary Energy Consumption

26.2% in 1990 and fell to 19.7% in 1996, although coal consumption grew 2.4% between 1991 and 1996. In fact, domestic anthracite consumption declined dramatically due to the

Sector	Policies and Measures
Energy Energy Conservation - Industrial Sector - Residential Commercial Sector - Transportation Sector Interfuel Substitution Energy Technology Development Demand Side Management	Target Energy-Intensity Level by Productive-Year Energy Conservation Plan for Energy-Intensive Industries Cogeneration Housing Insulation, Energy Efficiency Grading System, Mi Efficiency Standards, District Heating Fuel Efficiency Labelling Program, Fuel Economy Targets Nuclear Power Generation, LNG, NRSE Ten-Year Energy Technology R&D Plan Energy Pricing System, Long-term Plan for DSM
Forestry Sector Forestry Protection Carbon Pool Expansion	Forest Planning, Designation of Reserve and Protected Forests Afforestation, Reforestation with Superior Species
Agriculture & Animal Husbandry Sector Methane Gas Mitigation	Agricultural practices effective in methane mitigation of rice paddies Guidance to farmers for methane mitigation of rice paddies fermenting enteric fermentation and promoting effective manure management.
Waste Sector Waste Reduction Waste Recycling	Volume-based Waste Fee System, Discouragement of Disposable Product Usage, Separation/Collection System Waste Fine System, Deposit System

Summary of Greenhouse Gas Mitigation Policies and Measures



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May 29, 1998

To: Jason Singer, Treasury
Mark Patrick, State
Dayna Hutchings, Ex-Im

From: Todd Schneider
Assistant to U.S. Executive Director

Subject: Korea Completes Review

The Board met today to discuss Korea's 1998 Article IV consultation, and to complete the second quarterly review under the Stand-By Arrangement. The staff report and selected issues paper were quite comprehensive, and highlighted the extremely difficult issues that Korea must address in the next six to twelve months. Many of these conundrums -- such as how to strengthen the banking system and promote corporate restructuring while simultaneously minimizing the deleterious effects on the real economy and employment -- were recognized as having no easy solutions. Many Directors called for things like diligence, consistency, tough mindedness, etc, but offered no new solutions.

Principle issues raised by Directors were as follows:

- Progress in the first quarter in terms of implementing the measures outlined in the program and regaining macro stability was praised by virtually everyone. In the same breath, most Directors noted that the lagged effects of the financial crisis were now manifest in the real economy, and more pain was ahead.
- On monetary policy, most Directors agreed with staff that performance had been satisfactory. From January through April, the numbers indicated a tight level of symmetry between the won and interest rates. Only in May was there some divergence, as the won came under pressure and interest rates were raised only slightly. Continued vigilance was called for, but it was also recognized that, if the won can remain relatively stable with lower rates, then lower rates should be the order of the day to ease pressure on the real economy. Any further easing, however, will be undertaken with caution, and with an eye toward potential exogenous shocks.
- With regard to fiscal policy, many Directors expressed concern that the current 1.7% of GDP projected deficit is too contractionary. Given the downside risk for growth and the social costs likely to result from further rapid

rises in unemployment, it was felt that a more expansionary fiscal position was warranted -- with a greater share of expenditures dedicated to the social safety net. Staff noted that they remain flexible on the fiscal policy stance, and that the authorities are in fact looking at increased social sector spending via carefully selected public works, expanding unemployment insurance, and expanding care for the elderly.

- Several Directors noted the need to continue to liberalize the capital account and allow the faster development of domestic money markets. The Chilean Director suggested that Korea was the casebook example of a warped capital account liberalization -- with the lopsided opening of short-term external borrowing combined with an insufficient array of permitted financial instruments being the main cause behind the over-leveraging of Korean firms on short-term bank debt.
- Bank restructuring was highlighted by virtually everyone, but there wasn't much to say. Directors noted the upcoming deadlines for rehabilitation plans (June 30th for commercial banks) and privatizations (November 15 for Korea First and Seoul Bank). The general warning to the Koreans was not to fall into the "business as usual" habit of bailing out the banks if their rehab plans were not viable. In short, everyone will be looking for some tough, and transparent action. In this context, many Directors also noted the existence of "emergency loans" to major conglomerates by the commercial banks. While not technically a violation of the program, as such lending is not directed by the government but is made by banks in the interests of protecting their own portfolios, Directors queried staff about the full extent of such loans and how they reflect on banks' reform efforts. Staff will provide the Board with a note on the emergency loans, but they noted that these loans -- which account for 15-20% of new lending since January 1 -- constitute a "stopgap measure" only. It's clear that the banks are going to have to work out with their corporate clients a means to restructure existing debt, and this is likely going to culminate around the end of June, when banks are required to submit their rehabilitation plans. The rescue loans are thus a holding operation until a debt workout can be established.
- A number of other Directors also voiced some concern regarding government-sponsored import financing schemes for SMEs. Staff responded that they share this concern, and that was why they put particular emphasis on having commercial principles applied to KDB and KEXIM (which, by the way, on-lend most of the funds to commercial banks to be lent to SMEs instead of lending it themselves). What staff have found, however, is that for the banking system as a whole, there needs to be far more training for loan officers to base loans on commercial criteria. Expertise is seriously lacking in this area, and this has hampered the development of medium and long-term risk analysis as well -- perpetuating banks tendency to lend short-term.

South Korea

Current Energy Structure and Notes on the Future

In 1996, South Korea emitted some 112.5 mmt of energy-related carbon, slightly more than 1.8 percent of the global energy sector total for that year. Its industrialized economy demanded some 6.53 quads of energy during 1995 -- almost equal to the energy consumed by Brazil and more than fellow OECD member country, Mexico.

Manufacturing industries emitted 31.6% of Korea's carbon emissions in 1995, followed by electricity generation (22%) and transport (21.9%). Oil accounts for almost two thirds of South Korea's total primary energy requirements, fueling industrial expansion and meeting demand for gasoline which has grown at 20% per year since 1984 (with car ownership almost tripling from 1990 to 1997.) In 1995, natural gas supplied 6% of SK's total energy needs; demand for natural gas is expected to grow to 10% of energy consumed by 2010. After oil, however, coal (mostly imported) is the most important fuel in SK, supplying 18.6% of total energy requirements. Together, thermal plants using fossil fuels supply 60 % of total electricity generated. Nuclear plants generate 36.5%, and hydro 3% of the remaining electricity. The government of SK projects that by 2010, the county will need to more than double its electricity capacity (to 67.51 gigawatts) to meet anticipated demand increases of 11-12% annually. Plans for the sector call for reducing the role of expensive natural gas/oil imports, while increasing the importance of coal, nuclear and hydro-generation.

	Korea						
	Energy (Quad Btu	Carbon (MMTCE	GDP (Mn 1987\$)	E/GDP (Btu/1987	C/GDP (T/mn1987\$)		
1980	1.73679731952	35.049592897	74472	23321.48	470.6412194762		
1981	1.81919203909	36.967416791	79282	22945.84	466.2775509107		
1982	1.81790122186	38.419069794	83755	21704.99	458.70777618		
1983	1.96417595203	38.774234703	93649	20973.81	414.0378936565		
1984	2.15443896943	41.559275072	101884	21146.00	407.9077683623		
1985	2.2579904197	44.465241376	109231	20671.70	407.0752934271		
1986	2.49727843208	47.14509003	121979	20473.02	386.5016931565		
1987	2.74042957257	47.682247643	136317	20103.36	349.7894440416		
1988	3.05463705828	53.530071223	151726	20132.59	352.807503152		
1989	3.29270906371	56.00852381	161500	20388.29	346.8020050135		
1990	3.67940599355	60.915447933	177116	20773.99	343.9296728322		
1991	4.18919563825	70.139356038	193417	21658.88	362.6328401236		
1992	4.65241604973	73.635441709	203418	22871.21	361.9907860131		
1993	5.38529146857	96.313164964	214455	25111.52	449.1066422494	E/GDP	C/GDP
1994	5.90062024326	94.656240448	232854	25340.43	406.5046786736		Comparison
1995	6.53194381629	102.30044005	253664	25750.38	403.2911254639	US=1	US=1
1996	7.15820087481	112.5005764	271740	26342.09	414.0007963629		
	United States						
1996	93.3556	1466.3178803	5600800	16668.26	261.8050779028	1	1
	Mexico						
1996	5.62355816503	86.317997736	162435	34620.36	531.4002384685	2.077023	2.029755
	Argentina						
1996	2.59800802672	35.080117206	134604	19301.12	260.6171971544	1.157956	0.995463
	Turkey						
1996	2.66605433313	42.79780472	121464	21949.34	352.3497062506	1.316834	1.345847
	Taiwan						
1996	3.11178526468	51.239438236	181816	17115.02	281.8202921424	1.026803	1.076451
	Japan						
1996	21.3744897672	290.69300445	3136421	6814.93	92.6830308974	0.408857	0.354015
	Korea						
1996				26342.09	414.0007963629	1.580374	1.581332
	UK						
1996	10.0527471624	154.52120764	803346	12513.60	192.3470181406	0.750744	0.734696
	Australia						
1996	4.08122286608	79.132883478	271692	15021.51	291.259527252	0.901204	1.112505
	France						

1996	9.86950962623	101.49558264	1056967	9337.58	96.0253088686	0.560201	0.366782
	Germany						
1996	14.4441150231	237.84860047	1520634	9498.75	156.4141012681	0.56987	0.597445
	Canada						
1996	12.2017752699	141.34757442	484359	25191.59	291.823986786	1.511351	1.114661
	China						
1996	37.04	804.82	590385.00	62739.26	1363.205292422	3.763995	5.206947
	Brazil						
1996	7.23803507813	71.224084734	341929.248	21168.22	208.3006503552	1.269972	0.795633
	Singapore						
1996	1.21579328311	21.616863552	42686	28482.25	506.4157698588	1.708771	1.934324
	Poland						
1996	3.7717272973	85.439317988	65974	57169.90	1295.045290384	3.429866	4.946601
	Czech						
1996	2.31	47.035013612	32671	70837.61	1439.656380646	4.24985	5.498963
	Hungary						
1996	1.10658086646	17.750335808	22235	49767.52	798.3060853668	2.985766	3.049238

Brazil 1.028
 1996 Growth rate real GDP
 1995 GDP 332616