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# China Energy Databook

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# Foreword to the 1992 Edition

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The Energy Analysis Program (EAP) at the Lawrence Berkeley Laboratory (LBL) first became involved in Chinese energy issues through a joint China-U.S. symposium on markets and demand for energy held in Nanjing in November of 1988. Discovering common interests, EAP began to collaborate on projects with the Energy Research Institute (ERI) of China's State Planning Commission. In the course of this work it became clear that a major issue in the furtherance of our research was the acquisition of reliable data. In addition to other, more focused activities — evaluating programs of energy conservation undertaken in China and the prospects for making Chinese industries more energy-efficient, preparing historical reviews of energy supply and demand in the People's Republic of China, sponsoring researchers from China to work with experts at LBL on such topics as energy efficiency standards for buildings, adaptation of U.S. energy analysis software to Chinese conditions, and transportation issues — we decided to compile, assess, and organize Chinese energy data. We are hopeful that this volume will not only help us in our work, but help build a broader community of Chinese energy policy studies within the U.S.

In order to select appropriate data from what was available we established several criteria. Our primary interest was to use the data to help understand the historical evolution and likely future of the Chinese energy system. A primary criterion was thus that the data relate to the structure of energy supply and demand in the past and indicate probable developments (e.g., as indicated by patterns of investment). Other standards were accuracy, consistency with other information, and completeness of coverage. This is not to say that all the data presented herein are accurate, consistent, and complete, but where discrepancies and omissions do occur we have tried to note them.

Preparing this volume confronted us with a

number of difficult issues. The most frustrating usually involved the different approaches to sectoral divisions taken in China and the U.S. For instance, fuel used by motor vehicles belonging to industrial enterprises is counted as industrial consumption in China; only fuel use by vehicles belonging to enterprises engaged primarily in transportation is counted as transportation use. The estimated adjustment to count all fuel use by vehicles as transportation energy use is quite large, since a large fraction of motor vehicles belong to industrial enterprises. Similarly, Chinese industrial investment figures are skewed compared to those collected in the U.S. because a large portion of enterprises' investment funds is directed towards providing housing and social services for workers and their families.

Notably absent are data on energy prices, key elements in the analysis of energy issues. Although some price information is available, none is very useful from the perspective of the market-oriented analyst. While it may have been tempting to include here some of the sketchy figures that have been published, we felt that the topic was best excluded until more complete information is made accessible.

Since new energy and other data become available constantly, we plan to issue updates to this volume annually. It is our intention to reissue the entire volume on a bi- or triannual basis. We encourage any comments and corrections users may have, as well as any suggestions for categories of data to be included in future volumes.

MDL and JES  
23 July 1992

# Foreword to the 1996 Edition

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The response to the first edition of the China Energy Databook was overwhelmingly positive, and has encouraged us to issue this revised, updated, and expanded edition. It has been a natural counterpart to the Energy Analysis Program's continuing program of collaborative research with the Energy Research Institute. No other current reference volume dedicated to China's energy system contains a similar variety and quality of material. We believe that this edition is even more valuable than the first, since China's State Statistical Bureau ceased publication of its China Energy Statistical Yearbook with the 1991 edition.

Besides incorporating more recent data, we have revised some of the categories and data that appeared in the old volume. The adjustment for energy consumption in the transportation sector, for instance, has been slightly changed to include some fuel use in the commercial sector, which was previously left out. As another example, natural gas consumption statistics in the first edition greatly overstated electric utility use; we have rectified that error. Some tables have changed as statistical collection and reporting practices change in China. Figures on gross output value by sector stop with 1992, and economic output in subsequent years is covered by various measures of value-added, such as national income and gross domestic product.

Greater availability of reliable information in certain categories has allowed us to expand coverage of certain important areas. We have been able to include a new chapter on energy prices — an especially significant addition because recent liberalizations in energy markets (along with other aspects of economic system reforms that provide energy users with the means and incentives to respond to prices) have given energy prices a much greater role in influencing the behavior of energy suppliers and consumers. Additions include quali-

ty specifications of coal resources and output, more detailed coverage of oil extraction, refining, and international trade, statistics on China's newly completed nuclear power capacity, performance of major grids, interprovincial coal shipments, investments in energy conservation, motor vehicle output structure and fuel economy, expanded data on the energy intensity of major industrial products, ambient levels of key air pollutants by city, and other categories.

A major disruption in energy statistical collection in China in 1993 has resulted in long delays and a greater than usual range of uncertainty in energy consumption statistics for that year. The State Statistical Bureau has not yet publicly released sectoral energy consumption figures for 1993 (and so they are not included herein), and most experts inside and outside China feel that those data are much less reliable than in previous years. Fortunately, there are indications that the situation for 1994 energy consumption data, which should become available soon, will be much improved.

We hope that readers will continue to give us feedback so that the next edition will better meet their needs. As before, we plan to issue further revised editions of the *China Energy Databook* at intervals of two to three years, incorporating new data as they become available. We may also publish companion volumes that provide more detail on certain sectors and regions.

JES  
30 January 1996

## ACKNOWLEDGMENTS

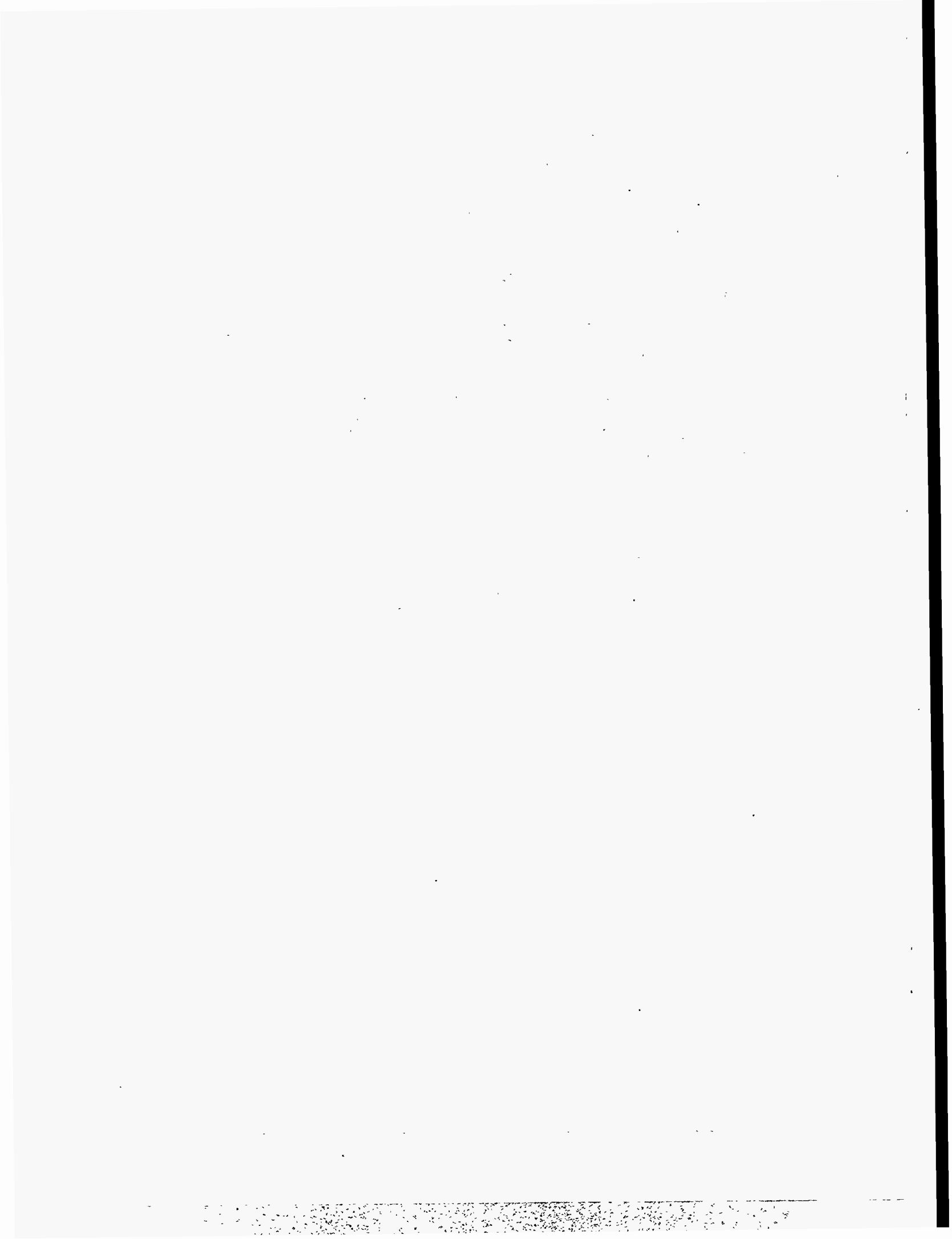
Much of the material in the first as well as current editions of the China Energy Databook would not have been available without the close cooperation of the Energy Research Institute (ERI) of China's State Planning Commission (SPC). All of the Chinese and American coeditors directly involved in the project owe a debt of gratitude to ERI Director Zhou Fengqi and Deputy Director Zhou Dadi, and to the members of the China Energy Database team (who helped assemble material for the first edition): Xie Zhijun, Hu Xiulian, Li Jingjing, Su Xiaojun, Dong Luying, Wang Jiacheng, and Su Zhengming, and ERI interpreter, Han Yinghua. ERI staff members collected data from published sources that are difficult to obtain outside of China and were invaluable in providing information on definitions and coverage of statistical categories, which often differ significantly from those used in the U.S. and internationally. They were assisted in their efforts by members of the Energy Division of the State Statistical Bureau, the Resources Bureau of the SPC, the China National Energy Investment Corporation, the China National Coal Corporation, the Information Research Institute of Water Resources and Electric Power of the Ministry of Electric Power, and the Research Center of the SPC.

We are especially grateful to Wang Qingyi, vice president of the China Energy Research Society, for advice, criticism, and information that makes this reference work better than it otherwise would have been. Other substantive contributions were made to this or the previous edition by Jessie Audette, W. Bart Davis, Roland Hwang, Kazumasa Imada, Nancy Kiang, Nina Kousnetzoff, Feng Liu, Marc Ross, and Lee Schipper.

Ted Gartner, who laid out this volume in QuarkXpress, displayed great fortitude, flexibility, and good humor in carrying this project through to completion. Brian Pon cheerfully prepared the graphics. It has been a great pleasure to work with both of them. Jon Gimpel, Mark Mandel, and Paul Volk of Mana Graphics designed the layout and typeset the first edition.

Finally, we would like to thank all of those who have shown an interest in this volume, and particularly those who provided us with the feedback that has allowed us to improve it.

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## Energy Units and Conversions \*

Fuel	Heat Content (low heat) (GJ)	Multiplier (tonnes of coal equivalent)	Multiplier (barrels of oil equivalent)	Multiplier (million kcal)
<b>Coal</b>				
Standard coal (metric ton)	29.310	1.000	5.147	7.00
Chinese average raw coal (metric ton)	20.934	0.714	3.676	5.00
Chinese average washed coal (metric ton)	26.377	0.900	4.632	6.30
Bituminous coals (metric ton) †	19.92 to 33.11	0.68 to 1.13	3.50 to 5.82	4.76 to 7.91
Brown coals, lignites (metric ton) †	7.91 to 19.92	0.27 to 0.68	1.39 to 3.50	1.89 to 4.76
Utility Coal (metric ton) ¶	18.729	0.639	3.289	4.47
Coke (metric ton)	28.470	0.971	5.000	6.80
Coking Coal Gas (thousand m <sup>3</sup> )	16.75 to 18.00 (avg. 17.24)	0.57 to 0.61 (avg. 0.59)	2.94 to 3.16 (avg. 3.03)	4.00 to 4.30 (avg. 4.12)
<b>Petroleum</b>				
Chinese average crude oil (metric ton) §	41.868	1.429	7.353	10.00
Chinese average crude oil (bbl)	5.694	0.199	1.000	1.36
Fuel Oil (metric ton)	41.868	1.429	7.353	10.00
Gasoline (metric ton)	43.124	1.471	7.574	10.30
Kerosene (metric ton)	43.124	1.471	7.574	10.30
Diesel (metric ton)	42.705	1.457	7.500	10.20
LPG (metric ton)	50.241	1.714	8.823	12.00
Refinery Gas (metric ton)	46.055	1.571	8.088	11.00
<b>Natural Gas</b>				
Chinese average natural gas (thousand m <sup>3</sup> )	38.98	1.33	6.846	9.31
Standard natural gas (thousand m <sup>3</sup> )	37.68	1.29	6.617	9.00
<b>Electricity</b>				
Electricity (thousand kWh) ¥ 1 kW = 1.341 hp	11.841	0.404	2.080	2.83
<b>Biomass</b>				
Fuelwood, air-dried (metric ton) †	14 to 17	0.48 to 0.58	0.084 to 0.102	3.34 to 4.06
Crop residues, air-dried (metric ton) †	12 to 16	0.41 to 0.55	0.072 to 0.097	2.87 to 3.82
Dried dung (metric ton) †	11 to 14	0.38 to 0.48	0.067 to 0.084	2.63 to 3.34
Peat (metric ton) (b)7.5 to 10.5	0.26 to 0.36	0.046 to 0.063	1.79 to 2.51	
Biogas (thousand m <sup>3</sup> ) **	21 to 27	0.71 to 0.93	3.7 to 4.8	5.0 to 6.5

N.B.: Throughout this book tons refers to metric tons (1 metric ton - 1.102 short tons).

\* Unless otherwise noted all conversions are from the China Energy Statistical Yearbook, 1989.

† From Smil, 1988.

¶ Coal used in utility boilers generally has a lower heat content than average coal (Wangi, 1988).

§ This is the same factor used for toe by British Petroleum.

¥ When presenting overall energy production and consumption figures we use a conversion factor of 0.404 kgce/kWh for electricity. This conversion factor is commonly used by Chinese energy researchers, and agrees well with the heat value for net generation.

\*\* Taylor, 1981.

Source: Energy Statistical Yearbook of China, various years; Smil, 1988; Wang, 1988; Energy Statistics Handbook, 1987; British Petroleum, 1995; Taylor, 1981.

# Chapter I—Resources and Reserves

# Resources and Reserves

---

China is richly endowed with conventional energy resources. In this chapter we present two measures of available energy: energy resources (Table I-1), or the estimated amount in place; and energy reserves (Table I-3), or the amount judged to be recoverable given current economic and technological constraints.<sup>1</sup> Estimates are for fossil fuels, uranium, and hydroelectricity only.

## COAL

Estimated total coal resources are well behind those of the former Soviet Union and the United States, owing mainly to a lack of exploration. China's own estimates of total resources are considerably higher than international estimates — 960 Gt compared to 590 Gt. Of the total coal resource base, 12% is anthracite, 29% is coking quality bituminous coal, 46%, various grades of bituminous steam coal, and 13%, lignite (brown coal). Coal bed methane may become an important part of the energy mix in mining areas.

At 115 Gt, China's proved reserves of coal are about half the level of the United States and the former Soviet Union. Northern China, especially Shanxi Province, contains most of China's easily accessible high quality coal. Southern coals are generally higher in sulfur and ash, making them unsuitable for many applications. Consequently large amounts of coal are shipped from north to south, putting a great strain on the transportation system, especially railroads.

## CRUDE OIL

China's oil resources are not large by world standards; the total resource base is estimated at 9.6 Mt, of which up to 3.2 Mt is proved reserves. This ranks China tenth among oil-producing countries, just ahead of Libya.<sup>2</sup> The easily reached oil fields in the North and Northeast have been in production since the early 1960s. Output at China's largest oil field,

Daqing in Heilongjiang, has peaked at about 55 Mt/yr production, but the water cut in production has risen to over 90%. Most exploration has been near currently producing basins, but development of more remote resources, such as in the Tarim and Junggar Basins in Xinjiang, and offshore fields has accelerated in recent years (often in conjunction with foreign partners) in order to meet long-term demand.

The results of onshore and offshore exploration have been disappointing so far. Although some producing fields have been found, exploration in the harsh and remote deserts of Xinjiang in the Northwest has not yet revealed any sources that will allow China to avoid increasing dependence on large amounts of imported oil. Development of those fields and long-distance transport infrastructure will be key to maintaining domestic output in the long term as yields from older fields decline. In the early 1980s some experts predicted that offshore production in 1990 would be tens of millions of tons per year, but by 1994 actual production was 6.5 Mt (just over 4% of total crude oil production). New finds and improvements in drilling techniques mean that the importance of offshore oil will continue to increase, but production is expected to peak in 1997 at 12 Mt/yr.<sup>3</sup>

## NATURAL GAS

Natural gas resources in China are also small by world standards, less than 1% of the estimated world totals. With the exceptions of Sichuan Province (where large gas fields are close to demand centers), offshore (where there has been considerable foreign investment), and in the Shaanxi-Gansu-Ningxia basin in the Northwest, natural gas has been relatively neglected both in exploration and development. Analysis of geologic formations has led to expectations that natural gas resources are much greater than current discoveries indicate. Determining the magnitude and location of natural gas resources is one of the most significant issues pertaining to

China's commercial energy resources.

## URANIUM

With two nuclear power plants already on line and under expansion (the Daya Bay plant near Hong Kong and the Qinshan plant near Shanghai) and several more planned in other locations, uranium resources are likely to play a more important role in China's energy future. China's resources may be enough to meet demand from the 20 to 23 GW of nuclear capacity planned for 2010 and 40 to 50 GW for 2020, but the ability to supply a large number of conventional reactors solely with domestic resources is uncertain.

## HYDROELECTRICITY

Though China has the largest theoretically achievable capacity of hydroelectricity in the world, it is significantly behind the former Soviet Union in terms of potential annual generation. China's technically exploitable hydropower reserves are nonetheless impressive — 370 GW of potentially usable capacity yielding 1,923 TWh/yr (slightly smaller than the figure found in international references)<sup>4</sup> — and hold the promise of meeting a significant portion of future energy demand. The majority of large sites are in Southwest China, which possesses two-thirds of the country's potential generation. Most of the large sites, however, are far from the load centers near the coast, and long-distance transmission lines would have to cross formidable terrain. Small scale (<25 MW) hydropower schemes have supplied otherwise unavailable electricity to many rural communities. Technically exploitable small-scale sites amount to 19% and 13% of the capacity and annual generation totals respectively.

## OTHER RENEWABLE ENERGY SOURCES

China's biomass, solar, wind, tidal, and other renewable energy resources have not been well characterized. Some attempts have been made to estimate sustainable harvests of fuel wood and crop wastes (see Table IV-21).<sup>5</sup> Biogas digesters have been promoted since the 1970s, especially in the

Southwest, with community and industrial digesters operating most successfully. According to some estimates, the potential biogas resource is about 82 Mtce,<sup>6</sup> or about 6% of total energy consumption in 1992 (including biomass).

Solar resources are richest (averaging >200 W/m<sup>2</sup>) in the dry, sparsely populated western and northern regions (Xinjiang, Qinghai, Xizang (Tibet), and Inner Mongolia), and relatively abundant (>170 W/m<sup>2</sup>) in northern and northeastern areas, as well as in Hainan.<sup>7</sup> Wind resources are also ample in these same areas, but more importantly, the densely populated regions along China's coastline have many sites suitable for wind power development. Coastal areas are also home to many promising high-temperature geothermal sites, as is the Himalayan region. Solar, wind, geothermal, and tidal power have already been exploited on a small scale, but the capital-intensive nature of technologies for harnessing renewable energy sources will probably prevent widespread reliance on these alternatives in the near term.

## RELIABILITY OF INTERNATIONAL COMPARISONS

Most energy resource and reserve figures are based on data provided by the countries surveyed. Since data-collection standards and definitions often vary from country to country, it is best to consider comparisons of country data as rough guides only, accurate to one significant figure at best. This is especially true for mineral resource estimates, which are based not on detailed site surveys but on similarities of the geography of unexplored sites to the features of known mineral-bearing structures.

<sup>1</sup> Resources figures generally refer to the sum of the World Energy Conference categories "proved amount in place" and "estimated additional amount in place." Reserves figures refer mainly to the British Petroleum category of "proved reserves."

<sup>2</sup> Ranked by proved reserves. British Petroleum, 1995.

<sup>3</sup> For further information on the current state of petroleum and natural gas resource exploration in China, refer to China OGP, 1994.

<sup>4</sup> Currently slightly less than 12% of harnessable capacity (44.6 GW in 1993) has been exploited. Estimates of economically exploitable capacity are significantly less than technical potential, i.e., 290 GW yielding 1,260 TWh/yr (State Economic and Trade Commission, 1994).

<sup>5</sup> See also Smil, 1988.

<sup>6</sup> Taylor, 1981.

<sup>7</sup> For a more detailed discussion of renewable energy resources, see State Economic and Trade Commission, 1994.



Table I-1. Energy Resources \* for Selected Countries

1. Physical Units							
Country	Subtotal	Coal † (Gt)		Oil †† (Gt)	Natural Gas †† (trillion m3)	Hydro-electricity (TWh/year)	Uranium § (kt U)
		Proved Amount in Place	Estimated Additional Amount				
China	986.3	-	-	9.6	10.0	5,922	51
India	245.4	131.3	114.1	1.1	1.7	2,638	66
Japan	8.5	8.5	-	-	-	718	7
USA	1,570.3	427.8	1,142.5	13.4	23.2	529	2,524
FSU	5,487.0	287.0	5,200.0	24.7	104.9	3,942	686
World	10,163.3	1,931.4	8,231.9	200.4	320.3	34,693	8,535

2. Shares of World Totals							
Country	Subtotal	Coal †		Oil ††	Natural Gas ††	Hydro-electricity	Uranium §
		Proved Amount in Place	Estimated Additional Amount				
China	6%	15%	4%	5%	3%	17%	1%
India	2%	7%	1%	1%	1%	8%	1%
Japan	0.1%	0.4%	-	-	-	2%	0.1%
USA	15%	22%	14%	7%	7%	2%	30%
FSU	54%	15%	63%	12%	33%	11%	8%
World	100%	100%	100%	100%	100%	100%	100%

\* Unless otherwise noted, "resources" here are for end of 1990, and refers to the sum of World Energy Conference category of Proved Amount in Place and Estimated Additional Amount in Place. Proved Amount in Place is defined as "the [amount] that has been carefully measured and has also been assessed as exploitable under present and expected local economic conditions with existing available technology." Estimated Additional Amount in Place "includes estimates of amounts which could exist in unexplored extensions of known deposits or in undiscovered deposits in known fuel-bearing areas as well as amounts inferred through knowledge of favorable geological conditions." All figures are based on data provided by the countries in which the resources are located. Since definitions of resource categories are not uniform among countries, data may not be strictly comparable and comparisons should be made with caution.

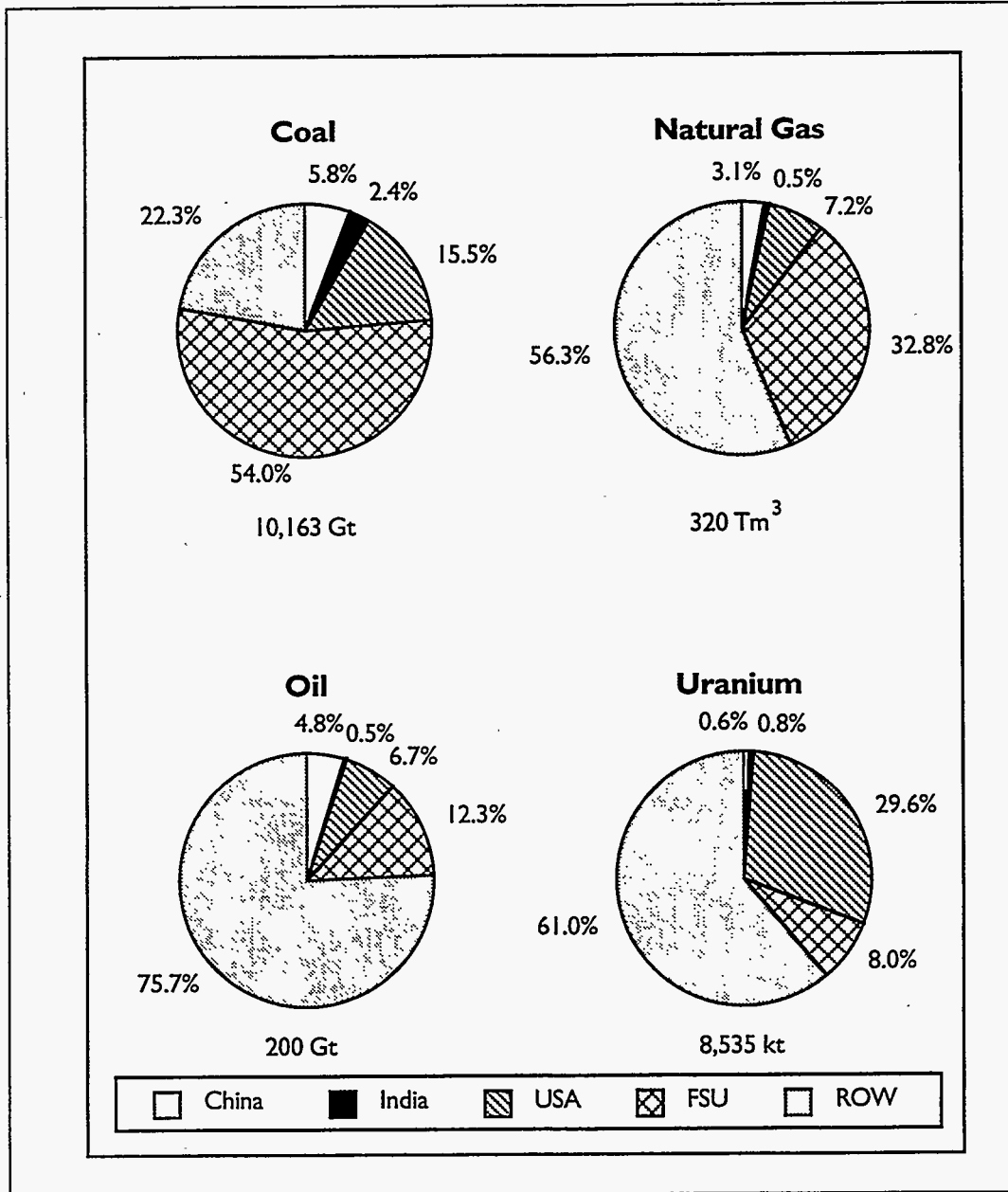
† Chinese figure is for end of 1992. Coal resources figure for China is considerably lower than the one that appeared in earlier versions of the *China Energy Databook* because the definition of resources used by the Chinese government changed to conform more closely with commonly used international standards.

†† Figures are sum of identified reserves and an average value for a range of estimates of undiscovered resources. Figures do not include natural gas liquids. Data from Masters, 1991.

§ 1990. For Japan, and the USA, figures correspond to the sum of the WEC categories of Proved Reserves and Estimated Additional Amounts Recoverable. Proved Reserves refers to "recoverable uranium that occurs in known mineral deposits of such size, grade and configuration that it could be recovered within the stated production cost ranges [under \$130 US/kg] with currently proven mining and processing technology." Estimated Additional Amounts Recoverable refers to expected additional deposits, estimated from extensions of already known deposits. For other countries, figures correspond to Other Known Resources, which includes is not strictly comparable to the sum of Proved Reserves and Estimated Additional Amounts Recoverable. For some countries, ultimate resources may be considerably larger than suggested here.

Source: World Energy Conference, 1992; State Economic and Trade Commission, 1994; Masters, 1991; United Nations, 1994.

Figure I-1. Energy Resources



**Table I-2. China's Coal Resources \* by Type of Coal, End of 1991**

<b>Coal Classification</b>	<b>Total Resource (Gt)</b>	<b>Share of Steam Coal</b>	<b>Share of Total Coal</b>
Steam Coal			
non-caking coal	123.7	18%	13%
long flame coal	121.0	18%	13%
weakly caking coal	16.8	2%	2%
lean coal	53.7	8%	6%
anthracite	115.4	17%	12%
brown coal	123.3	18%	13%
unclassified	133.4	19%	14%
subtotal	687.4	100%	71%
Other Coal (Coking)	276.8	-	29%
Total	964.2	-	100%

\* This is the Chinese category of "reserves confirmed through exploration." About 30% of that category corresponds to the WEC category of "proved amount in place," of which a third can be considered economically recoverable reserves.

Source: China Energy Research Society, 1994

**Table I-3. Energy Reserves \* for Selected Countries**

Country	Coal (Mt)			Crude Oil (Gt)	Natural Gas (trillion m3)	Hydropower † (TWh/year)	Uranium ¶ (t U)
	Subtotal	Bituminous & Anthracite	Subbituminous & Lignite				
China	114,500	62,200	52,300	3.3	1.7	2,168	-
India	69,947	68,047	1,900	0.8	0.7	205	-
Japan	821	804	17	<0.05	<0.05	135	6.6
USA	240,558	106,495	134,063	3.8	4.6	376	356.1
FSU	241,000	104,000	137,000	7.8	56.0	3,831	220.6
World	1,043,864	519,733	524,131	141.0	142.0	14,791	2,083.7

Country	Coal			Crude Oil	Natural Gas	Hydropower †	Uranium ¶
	Subtotal	Bituminous & Anthracite	Subbituminous & Lignite				
China	11%	12%	10%	2.3%	1.2%	15%	-
India	7%	13%	0%	0.6%	0.5%	1%	-
Japan	0%	0%	0%	<0.05%	<0.05%	1%	0%
USA	23%	20%	26%	2.7%	3.2%	3%	17%
FSU	23%	20%	26%	5.5%	39.4%	26%	11%
World	100%	100%	100%	100%	100%	100%	100%

\* Unless otherwise noted, "reserves" here refers to the British Petroleum category of Proved Reserves which are defined as "those quantities which geological and engineering information indicate with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions." Fossil fuel data are for end of 1994, others for end of 1990.

† Corresponds to the WEC category of Exploitable Capability, defined as "the amount of Gross Theoretical capability that can be exploited within the limits of current technology and under present and expected local economic conditions." Gross Theoretical Capability is "the annual energy potentially available in the country if all natural flows were turbinized down to sea level or to the water level of the border of the country...with 100 percent efficiency from the machinery and driving water-works." Includes output from hydropower stations of all sizes.

¶ Corresponds to WEC category of Proved Reserves, or the similar UN category of Reasonably Assured Resources. Proved reserves refers to "recoverable uranium that occurs in known mineral deposits of such size, grade and configuration that it could be recovered within the stated production cost ranges with currently proven mining and processing technology. Estimates of tonnage and grade are based on specific sample data and measurements of the deposits together with knowledge of deposit characteristics."

Source: United Nations, 1994; World Energy Council, 1992; British Petroleum, 1994.

Figure I-2. Energy Reserves

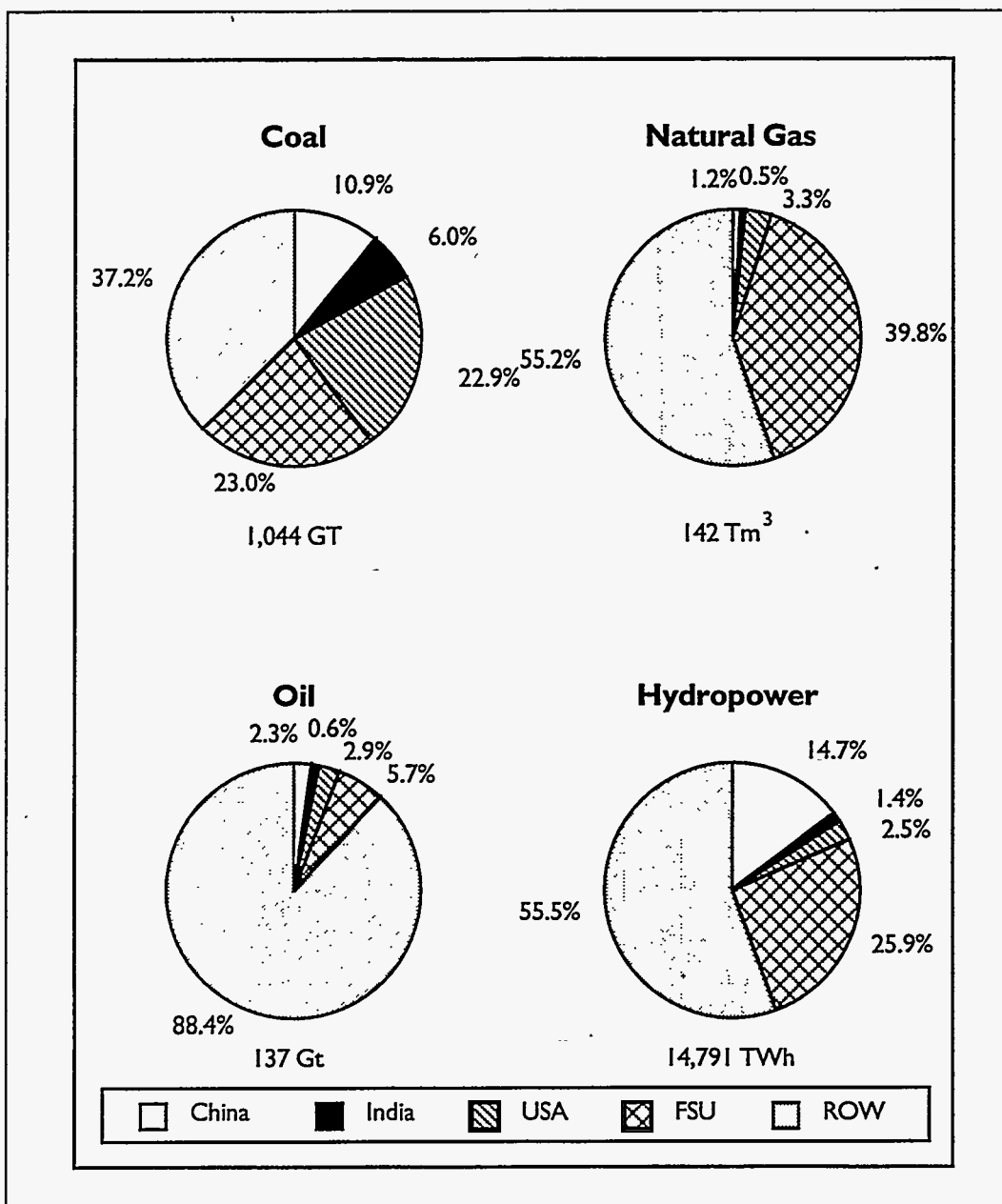


Table I-4. China's Exploitable Hydropower Resources \* by Province, 1980

Region or Province	Potential Installed Capacity (GW)	Potential Annual Generation (TWh/yr)	Share of Total Potential Annual Generation
<i>North</i>	6.9	23.2	1.2%
Hebei†	1.8	4.2	0.2%
Shanxi	2.6	10.7	0.6%
Inner Mongolia	2.4	8.4	0.4%
<i>Northeast</i>	12.0	38.4	2.0%
Liaoning	1.6	5.6	0.3%
Jilin	4.3	11.0	0.6%
Heilongjiang	6.0	21.9	1.1%
<i>East</i>	17.9	68.8	3.6%
Jiangsu‡	0.1	0.3	0.0%
Zhejiang	4.7	14.6	0.8%
Anhui	0.9	2.6	0.1%
Fujian	7.1	32.0	1.7%
Jiangxi	5.1	19.1	1.0%
Shandong	0.1	0.2	0.0%
<i>South-Central</i>	67.4	297.4	15.5%
Henan	2.9	11.2	0.6%
Hubei	33.1	149.4	7.8%
Hunan	10.8	48.9	2.5%
Guangdong	6.4	24.0	1.2%
Guangxi	14.2	63.9	3.3%
<i>Southwest</i>	232.3	1,305.0	67.9%
Sichuan	91.7	515.3	26.8%
Guizhou	12.9	65.2	3.4%
Yunnan	71.2	394.5	20.5%
Xizang	56.6	330.0	17.2%
<i>Northwest</i>	41.9	190.5	9.9%
Shaanxi	5.5	21.7	1.1%
Gansu	9.1	42.4	2.2%
Qinghai	18.0	77.2	4.0%
Ningxia	0.8	3.2	0.2%
Xinjiang	8.5	46.0	2.4%
<i>National Total</i>	378.5	1,923.3	100.0%

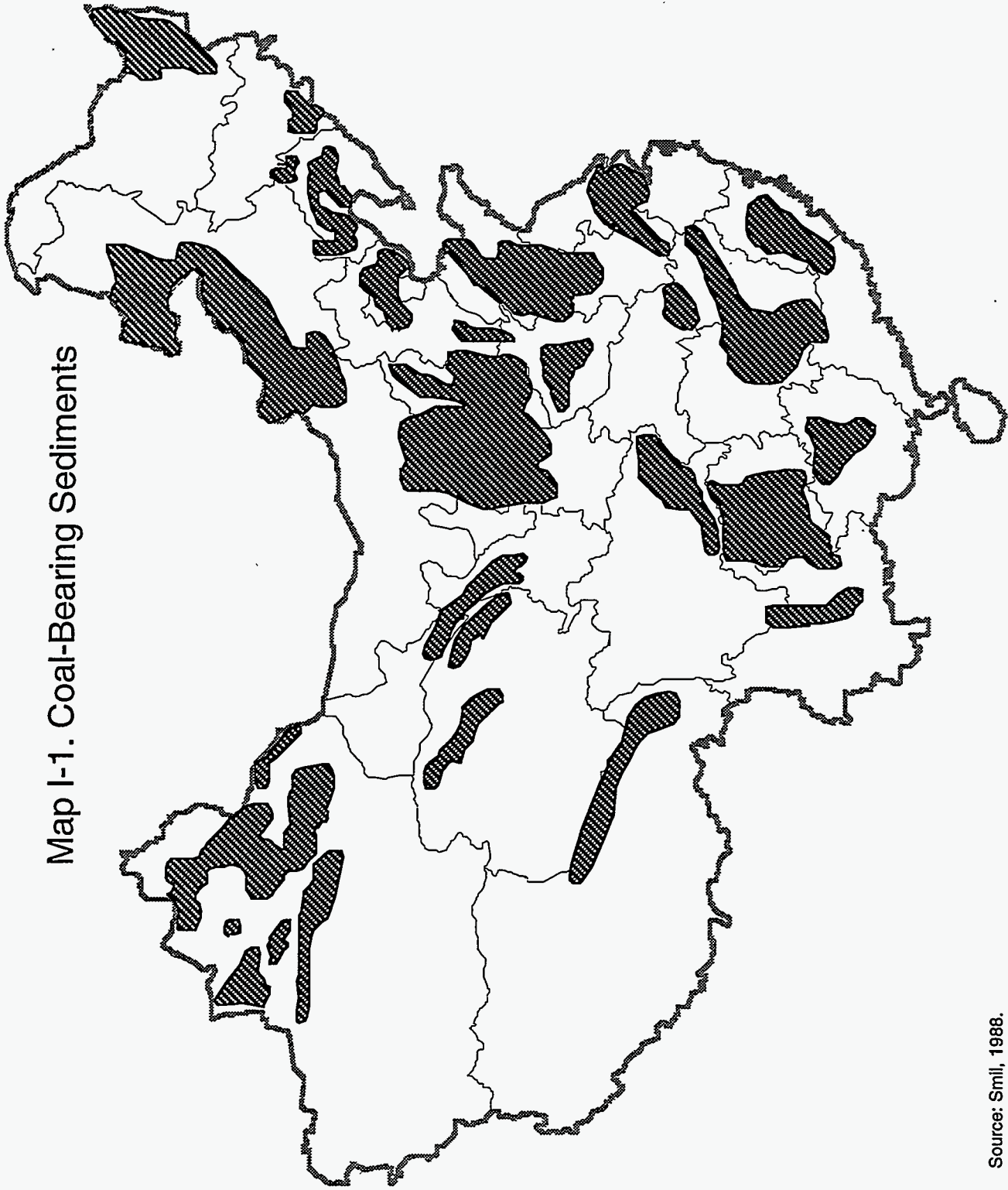
\* Statistics in this table are calculated on the basis of sites that can accommodate power plants of  $\geq 500$  kW of installed capacity. No major revisions have been made to these figures since their publication in the early 1980s.

† Includes Beijing and Tianjin.

‡ Includes Shanghai.

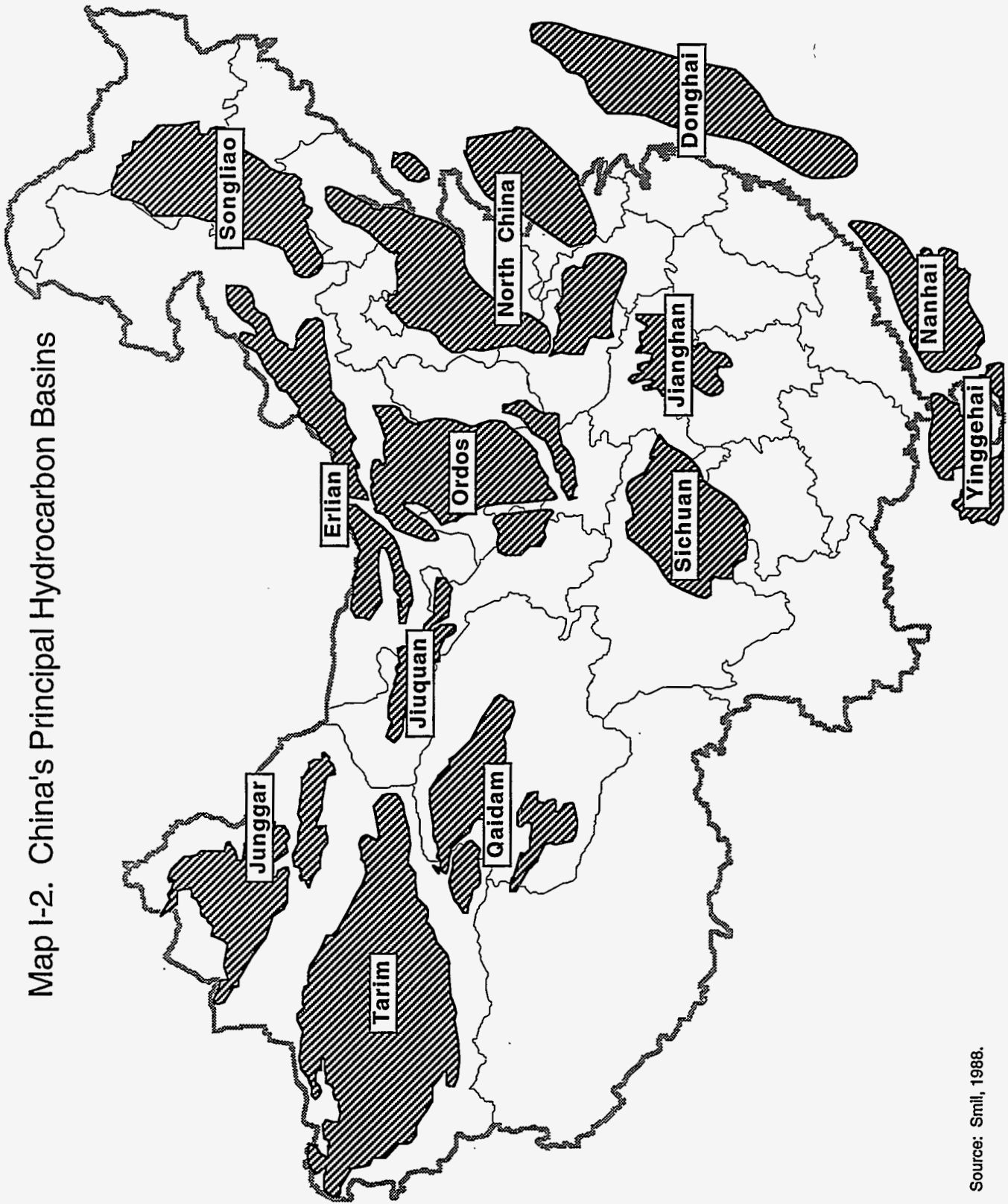
Source: Wang, 1988.

Map I-1. Coal-Bearing Sediments



Source: Smil, 1988.

Map I-2. China's Principal Hydrocarbon Basins



Source: Smil, 1988.



## Chapter II—Energy Production

# Energy Production

---

Since 1949, growth in energy production has been the rule, with major interruptions only in the 1960s. From 1949-1971 total energy production growth averaged 13% (Table II-1). This period encompasses both the Great Leap Forward of the late 1950s, when coal production was reported to have tripled in three years, and the subsequent collapse and stagnation of energy production until the late 1960s. Since then total energy production has fallen only in 1980 and 1981, with annual growth averaging about 6% between 1971 and 1990, and slowing to under 4% between 1991 and 1994.

Although coal clearly is the dominant commercial energy source, petroleum began contributing a significant share in the mid-1960s, peaking at nearly 25% in 1976 and now accounting for 18% of total energy production.<sup>1</sup> There was a spurt of growth in natural gas production in the 1970s, but production fell in the early 1980s and did not surpass its 1979 peak until 1990. Natural gas now accounts for less than 2% of primary energy production, down from a high of 3% in 1979-1980. Hydroelectricity production has grown in all but five years since 1949, and has grown at a faster overall rate since 1971 than any other energy source. Hydroelectricity's share of primary energy production has increased to over 5%.

## COAL AND COAL PRODUCTS

Since the early 1980s the central government has encouraged the development of small, collectively and individually owned coal mines in rural areas to alleviate local shortages. The result has been a remarkable shift in the structure of coal output; between 1980 and 1993, 70% of the growth in output came from the new rural mines, which now account for over two-fifths of output (Table II-3). Output from state-owned mines has actually declined in the past few years. The development of rural mines may soon slow, however, and issues of mine safety and rational use of coal resources (rural mines tend to waste a large fraction of usable resources) will

spur construction of more capital intensive, highly mechanized mines in the near future. Very little coal — about 3% — comes from open-cast mines.<sup>2</sup>

About three quarters of coal mined is bituminous coal, most of the rest is anthracite, with lignite making up the remaining 4% (Table II-4). Nearly two-thirds of the bituminous coal is classified as coking coal (though only a fraction is actually used in coking; Table II-10). Contrary to many impressions, most of the coal from China's larger mines has a relatively low sulfur content, generally well under 1% (Table II-5). There are exceptions, of course, with coal from some mines averaging nearly 5% sulfur. Since relatively little coal is sorted and washed, the ash content of run-of-mine and delivered coal differ little, with a few exceptions ranging between 12% and 30%. Average heat content of Chinese anthracite 26.5 MJ/kg, while the averages of various grades of bituminous coal range from 22.3 to 29.6 MJ/kg.

Most coal is mined in North and Northeast China, with one province, Shanxi, accounting for over one-quarter of total output (Table II-2). (The next largest producer, Henan, accounts for only 8% of national output.) Virtually all of the large state-owned mines are in the North and Northeast (Table II-6). Even in the major coal-producing regions, with the exception of Shanxi, and three or four other provinces, coal consumption outstrips production (Table II-8). As a consequence coal makes up a larger percentage of freight than any other commodity, accounting for 30% of total metric ton-km of freight in 1993 (Table II-29). Its percentage of total tonnage of freight handled is even higher, indicating that, on average, coal is shipped by rail shorter distances than other commodities. Statistics on inter-provincial coal transfers show that, with a few exceptions (Shanxi being the most significant; it supplies coal to all but four of China's 30 provinces) most trade in coal is between neighboring provinces (Table II-30).

The rate of mining deaths in China's coal industry is high by world standards, more than four per Mt of coal mined, compared to about 0.1 in most devel-

oped countries in the early 1990s (Table II-7).<sup>3</sup> In Poland, a country that relies for its primary energy on a similarly large fraction of coal from underground mines, deaths were fewer than 0.4/Mt mined. Even India's rate was far lower at about 0.6 deaths per Mt mined. Death rates are somewhat higher in the smaller, rarely mechanized rural mines (5.1 deaths/Mt in 1993 compared to 3.6 at centrally administered mines) because of greater inattention to safety measures.

Trends in coke production have followed closely those of coal production (Table II-8). Two kinds of coke are produced in China, which we have termed "modern" and "old". The former is coke produced on a large scale with modern industrial equipment, while the latter is made with rather backward technology that produces an inferior product, at the same time consuming up to 30% more coal and emitting several times more pollutants per unit of output.<sup>4</sup> The spike in production during the Great Leap Forward (1957-1960) was due promotion of local steel production and consequently coke. Thousands of inefficient coke ovens were constructed, and millions of tons of coke were turned out for use in local smelters, the output of which was largely useless. Despite government efforts to curb construction and operation of such ovens, since the early 1980s the output of "old" coke has grown faster than that of "modern" coke, as rural enterprises (especially in Shanxi) compete to supply China's expanding steel mills.

Only 18% of raw coal output is washed, and nearly all washed coal is used in coking or for locomotives (Table II-11). Since nearly all washeries are at state-owned mines, that means that the washing rate from those mines is much higher, over 45%. The low overall rate of washing means that most of the coal transported contains relatively large amounts of waste material, taxing an already overburdened transportation system and lowering efficiencies in end uses. Prospects for increasing the percentage of coal washed are hampered by the dearth of water in the most productive coal mining regions and the lack of willingness on the part of consumers to pay a premium for coal of better quality.<sup>5</sup>

Coal gas production, mainly from coking ovens, has increased steadily, doubling since the mid-1980s (Table II-12). Most coal gas is consumed on-site, but an increasing share is delivered to households for cook-

ing as many cities try to improve air quality through switching households from direct burning of coal to gas fuels.

While coal use in the urban residential sector has been declining (see Chapter IV) the manufacture and distribution of coal briquettes — typically 0.75 to 1 kg cylindrical honeycomb briquettes — for household use has been growing rapidly. Indeed, use of such briquettes, which burn more cleanly and efficiently than the raw coal they replace, is responsible in part for reduced direct use of coal in the household sector. Statistics are not regularly published, but briquette production nationwide reportedly rose from 37 Mt in 1990 to slightly over 50 Mt in 1993.<sup>6</sup>

## PETROLEUM AND PETROLEUM PRODUCTS

Crude oil production increased rapidly in the 1960s as pumping began at the giant Daqing field in Heilongjiang and the Shengli field in Shandong, then later at the Liaohe field in Liaoning (Table II-13). The three provinces in which these fields are located — Heilongjiang, Shandong, and Liaoning — together account for 70% of China's oil output. Growth in crude production was strong throughout the 1970s, but predicted new discoveries failed to materialize and growth leveled off in the 1980s. Both the Daqing and Shengli fields appear to have peaked, and with no fields of comparable size likely to come on line in the near future oil fields will be hard pressed to keep output from falling. Of major fields, Huabei, Dagang, and Zhongyuan have already experienced declines. Continued development of potentially rich fields in the remote Northwest and offshore will be required if China is to reduce its growing dependence on imported oil. Growth in offshore oil production has been very rapid, now contributing over 4% of total output compared to 0.2% a decade ago. While the rate of crude oil loss at oil fields has been relatively steady since the late 1980s, oil field self-consumption and electricity use per unit of output have been increasing (Table II-14). This in part reflects the greater effort needed to extract oil from older fields and the growing use of secondary recovery techniques, but it may also be due to increased rates of theft and unofficial diversions, which plague

all segments of the oil industry.

The composition of refined products has shifted significantly since 1980. In particular, the yield of fuel oil has halved from 42 wt% in 1980 to 21 wt% in 1994 owing to continued large investments in refinery upgrading units — particularly fluid catalytic crackers — in the 1980 and 1990s. As a result of this investment program, the total yield of light and middle distillates has risen from 48 wt% in 1980 to 63 wt% in 1993. Output of transport fuels has risen significantly. Historically the highest priced product in a refinery, gasoline had jumped from 14 wt% to 22 wt% of total output by 1994. Diesel yields, however, have barely risen over this period despite rapid growth in demand resulting from low and subsidized ex-refinery prices. Total kerosene production has basically stagnated since 1980, but the ratio of lamp kerosene to jet fuel has nearly reversed. Currently, jet fuel accounts for about three-fourths of total kerosene output, up from only one-fourth in 1980.

Production of non-fuel products has in general risen as well. Output of coke, wax, and asphalt has grown roughly at the same pace as refinery throughput, while production of chemical feedstocks — primarily middle distillates and naphtha — has tripled since 1980 in response to the dramatic increase in ethylene production capacity, especially since 1987. Output of lubricants, however, has barely risen over this period. The unsuitability of low-quality domestic finished lubricants to modern imported equipment and vehicles has led to a sharp rise in imports, yet raising the quality of domestic lubricants has been hampered by limitations of the paraffinic baseoil feedstock.

Refinery throughput has risen steadily since the reorganization of the refinery sector in 1982, but it fell slightly in 1994 as a result of the surge of crude product imports in the last quarter of 1993 and the resultant sharp increase in inventories. Although utilization of refineries has remained at 80% and below in recent years, the government's decision to restrict product imports and favor domestic production has resulted in a resumption of crude oil import growth in 1995 and a rise in capacity utilization to around 85%. With demand inexorably rising, China faces the need for significant refinery expansion in the near term, in addition to revamps and upgrades necessary to adapt domestic refiner-

ies to an expected increasing volume of Middle East higher-sulfur crude imports.

China currently has more than 8,700 km of crude and finished oil pipelines, with an annual throughput of 138 Mt, most of it carried in five crude oil pipelines in the Northeast and North that together account for 21% of total pipeline length (Table II-31). Total oil pipeline turnover in 1993 was 59 Gt-km, of which 54 Gt-km was crude oil. Although this figure is not much more than the 50 Gt-km of oil carried by rail in 1993, the rail volume was composed primarily of finished products. This difference is reflected in average pipeline length; China's 79 crude oil pipelines average 104 km in length, while product pipelines average only 5 km. Although a number of long-distance product pipelines have been proposed, China will remain dependent on rail for long-distance transport of products for the foreseeable future.

## NATURAL GAS

Natural gas production grew rapidly from a very low level during the late 1960s and 1970s, but fell in the 1980s as increased output of associated gas from oil fields was unable to offset production declines at natural gas fields, nearly all of which are in Sichuan (Table II-16). Output from offshore fields near Hainan and from the ShaanGanNing basin in the Northwest will soon boost overall production significantly. Most associated gas comes from a few large oil fields; in 1991 the Daqing, Shengli, Liaohe, Zhongyuan, Xinjiang, and Dagang oil fields produced four-fifths of associated gas. Some gas reportedly is still flared at oil fields because of the expense of transporting it to consumers.

Pipeline transport is limited. Sichuan's provincial pipeline "ring" supplies provincial customers, with pipelines to fertilizer plants in Guizhou, but no other long-distance pipelines are in use. In 1996 a new pipeline from the offshore Hainan gas field to Hong Kong will be inaugurated, and a long-distance pipeline from ShaanGanNing to Beijing is in the design stage.

## ELECTRICITY

Electricity generation has grown faster and more consistently in recent years than production of any other energy source, more than tripling between

1980 and 1994 to 909 TWh (Table II-17). The share of generation from hydropower plants (two-thirds from plants in south-central and southwestern China) has declined significantly since the mid-1980s, from one-quarter to about 19% of total generation. Nearly four-fifths of electricity is from fossil fuel-fired plants, reflecting heavier investment in thermal generation over much of China's history since 1949. Thermal power generation is most heavily concentrated in the eastern and south-central regions, which together account for about half. Recently completed nuclear power plants already contribute more than 1% of China's electricity. Output from geothermal and wind generators is negligible in the national context, but provide otherwise unavailable power to remote communities. Reported in-plant power consumption now accounts for a slightly larger fraction of gross generation than in 1980, but the rate of transmission and distribution losses has declined, so that the ration of delivered electricity to gross generation has remained stable (Table II-18).

Until the mid-1980s, hydropower generation capacity tended to increase at a faster rate than thermal capacity, and in 1984 made up 32% of total capacity, as opposed to 9% in 1950 (Table II-19). Since then there has been a spurt of growth in thermal capacity, and fossil plants had a 75% share of the total 183 GW of generation capacity in 1993. China's two nuclear power plants now account for 1% of installed capacity.

Among large fossil generating units (units over 6 MW, which made up 89% of total thermal installed capacity in 1993) the share of large-capacity and more efficient units has been increasing (Table II-20). The share provided by "high-temperature, high-pressure" units increased from 56% to 84% between 1974 and 1993. Over the same period the capacity of less efficient units has grown slowly. While the capacity of cogeneration units has risen steadily, their share of total thermal capacity shrank from 14% to 10% between 1974 and 1988, but has since risen again to nearly 12%.

National average capacity factors rose the late 1970s, peaked in 1986-1987 mainly through increased utilization of thermal capacity, and have since fallen back to about 0.52 (Table II-21). Not surprisingly, hydroelectric stations have much lower average capacity factors (0.37) than thermal power plants (0.55). Average capacity factors vary by grid, from

well over 0.6 in some coastal areas to under 0.5 in remote inland areas (Table II-22). In general, larger plants, both thermal and hydropower, tend to have larger capacity factors (Tables II-23 and II-25). Many of the smallest thermal units (which have declined as a share of total installed capacity) are used for only several weeks out of any given year. Some capacity, especially at smaller plants, is left idle through lack of fuel or water. Self-generators (i.e. non-utility generators like large factories), which account for slightly under 9% of gross thermal generation, tend to have capacity factors slightly under 0.5 (Table II-24). Small diesel plants have proliferated in the 1980s and 1990s; although they are expensive to operate and have low utilization rates they enabled users to deal with acute power shortages and avoid cutoff blackouts.

The number of large thermal power plants ( $\leq 600$  MW) completed or under construction has roughly doubled since the end of the 1980s. The plants are typically composed of 300 MW and smaller units; China's largest plant, Jianbi, is typical, having three 100 MW and four 300 MW units (Table II-26). Several plants, however, already operate or are installing units up to 600 MW. Of 82 large plants, only one is entirely oil-fired, and eight others use oil in addition to coal. Out of 41 hydropower plants with capacities of 250 MW or more, 13 have yet to come on line (Table II-27). More than half of those already in place have been completed since 1980, and most are smaller than the ones under construction.

China has been very successful in extending grids into most rural areas — currently 92% of villages and 87% of rural households reportedly have electricity available (Table II-28). In remote areas in the Southwest this has been accomplished mainly through the construction of small hydropower projects. Most options for supplying the over 100 million people who remain without electricity are beyond local means, so the continued poor state of central government finances probably means that complete electrification is still many years off.

## RENEWABLE ENERGY RESOURCES

Renewable energy, in the form of biomass, is the primary source of energy for many rural households; wood, crop wastes, and dung are the primary fuels. Estimates on the availability of biomass potential-

ly usable for fuel vary, and those for "sustainable" fuel wood harvest (i.e., the maximum harvest that would not result in a long-term decrease in harvestable fuel wood) are inevitably lower than actual fuel wood use by a significant margin. About 4.5 million household-scale biogas digesters are currently in use, mainly in the Southwest (Table II-32). These typically produce 1 to 1.5 cubic meters of biogas per day for six to eight months per year.<sup>7</sup> Some community and factory digesters also are in operation, producing 300,000 m<sup>3</sup> of gas per year. Some biomass gasifier projects have been demonstrated. With competition for other uses of biomass strong, it is unlikely that biomass fuels will become more than locally important in China's fuel supply mix.

Small hydropower projects have been a key element of rural development plans, and over 14 GW of hydroelectric capacity (one-third of the total) has been so designated. Wind generators have also been used to provide power to remote communities. Most are less than one kW capacity (120,000 of this type were in use as of 1992), although a few demonstration wind farms with units of several tens of kW have also been set up. Total capacity of wind farms was 5 MW in 1992, and total capacity of all wind generator systems in China is currently 30 MW (including a 10 MW wind farm in Dabancheng, Xinjiang).<sup>8</sup> Strong domestic and foreign interest in wind generation foreshadows relatively rapid development of this supply option, with plans calling for 1 GW by 2000. Early in 1995 Sino-US agreements were signed for 30 to 110 MW of windpower projects.

Geothermal resources, the most promising of which are in Xizang (Tibet), Yunnan, and some coastal areas, have been exploited on a small scale. Most projects are less than 300 kW, but one station near Lhasa has an installed capacity of 25 MW. Experimental tidal power stations have been built as well (8.5 MW installed capacity), but the resource base is small and capital costs are higher than for ordinary small hydropower projects. In some areas where temperatures make electricity generation impractical, geothermal sources are used to supply process heat.

Solar energy has long been a focus of China's rural power development, with solar water heaters and large plastic-covered greenhouses (used to extend the growing season) a common feature in rural areas. Passive solar design has been incor-

porated into some new housing, and solar cookers have been distributed in some western areas where fuel is short and sunlight plentiful. China reportedly has the capacity to manufacture several MW of photovoltaic cells per year, but less than 2 MW of PV capacity is currently installed.

<sup>1</sup> Because coal is the dominant energy source, all energy sources in this volume, including raw and processed coal, are converted to standard coal equivalent (29.31 GJ/metric ton of standard coal) for purposes of comparison. Unless otherwise noted, electricity, including primary electricity, is converted at a nominal average gross heat rate of 404 gce (11.8 MJ)/kWh, implying an efficiency of 30%.

<sup>2</sup> Ministry of Energy, 1990.

<sup>3</sup> Ministry of Coal, 1993.

<sup>4</sup> Li, Wang, and Qu, 1991.

<sup>5</sup> Many boilers, for instance, are designed to handle the raw coal that is most widely available in China.

<sup>6</sup> Wang, 1995.

<sup>7</sup> Chen, 1991. Chen states that biogas accounts for 0.5% to 1% of total primary biomass energy consumption.

<sup>8</sup> Wind Energy Weekly, 26 June 1995, p. 4.

Table II-1. Primary Energy Production, 1949-1994

I. Production in Physical Units				
Year	Raw Coal * (Mt)	Crude Oil † (Mt)	Natural Gas (million cubic m)	Hydro-electricity (TWh)
1949	32	0.12	7	0.7
1950	43	0.20	7	0.8
1951	53	0.31	3	0.9
1952	66	0.44	8	1.3
1953	70	0.62	11	1.5
1954	84	0.79	15	2.2
1955	98	0.97	17	2.4
1956	110	1.16	26	3.5
1957	131	1.46	70	4.8
1958	270	2.26	110	4.1
1959	369	3.73	290	4.4
1960	397	5.20	1,040	7.4
1961	278	5.31	1,470	7.4
1962	220	5.75	1,210	9.0
1963	217	6.48	1,020	8.7
1964	215	8.48	1,060	10.6
1965	232	11.31	1,100	10.4
1966	252	14.55	1,340	12.6
1967	206	13.88	1,460	13.1
1968	220	15.99	1,400	11.5
1969	266	21.74	1,960	16.0
1970	354	30.65	2,870	20.5
1971	392	39.41	3,740	25.1
1972	410	45.67	4,840	28.8
1973	417	53.61	5,980	38.9
1974	413	64.85	7,530	41.4
1975	482	77.06	8,850	47.6
1976	483	87.16	10,100	45.6
1977	550	93.64	12,120	47.6
1978	618	104.05	13,730	44.6
1979	635	106.15	14,510	50.1
1980	620	105.95	14,270	58.2
1981	622	101.22	12,740	65.5
1982	666	102.12	11,930	74.4
1983	715	106.07	12,210	86.4
1984	789	114.61	12,430	86.8
1985	872	124.89	12,930	92.4
1986	894	130.69	13,760	94.5
1987	928	134.14	13,890	100.2
1988	980	137.05	14,260	109.2
1989	1,054	137.65	15,050	118.3
1990	1,080	138.31	15,300	126.7
1991	1,087	140.99	15,490	124.7
1992	1,116	142.10	15,790	130.7
1993	1,141	144.92	16,560	146.0
1994	1,212	147.65	16,972	170.4

\* Raw coal includes anthracite, bituminous coal, and brown coal, but not slaty coal. Figures for 1986 and later years includes output from private mines.

† Crude oil includes natural crude and shale oil.

Source: China Energy Annual Review, 1994; China Statistical Yearbook, various years; Energy Research Institute.

Table II-1. Primary Energy Production, 1949-1994 (continued)

2. Production in Mtce					
Year	Raw Coal* (Mtce)	Crude Oil † (Mtce)	Natural Gas (Mtce)	Hydro-electricity ‡ (Mtce)	Total (Mtce)
1949	22.9	0.17	0.01	0.51	23.5
1950	30.7	0.29	0.01	0.58	31.5
1951	37.9	0.44	0.00	0.65	39.0
1952	47.1	0.63	0.01	0.95	48.7
1953	49.8	0.89	0.01	1.04	51.7
1954	59.8	1.13	0.02	2.15	63.1
1955	70.3	1.39	0.02	1.57	73.3
1956	78.8	1.66	0.03	2.19	82.7
1957	93.4	2.09	0.09	2.90	98.5
1958	192.9	3.23	0.15	2.29	198.5
1959	263.6	5.33	0.39	2.42	271.7
1960	283.6	7.43	1.38	4.09	296.5
1961	198.3	7.59	1.96	4.20	212.0
1962	156.8	8.21	1.61	4.94	171.6
1963	155.1	9.26	1.36	4.52	170.2
1964	153.3	12.11	1.41	5.27	172.1
1965	165.6	16.16	1.46	4.96	188.2
1966	180.0	20.79	1.78	5.81	208.4
1967	147.1	19.83	1.94	6.07	175.0
1968	157.1	22.84	1.86	5.34	187.2
1969	190.0	31.06	2.61	7.42	231.1
1970	252.9	43.79	3.82	9.49	310.0
1971	280.0	56.30	4.97	11.67	353.0
1972	292.9	65.24	6.44	13.36	377.9
1973	297.9	76.59	7.95	17.78	400.2
1974	295.0	92.64	10.01	18.63	416.3
1975	344.3	110.09	11.77	21.42	487.6
1976	345.0	124.52	13.43	20.47	503.4
1977	392.9	133.77	16.12	21.23	564.0
1978	441.4	148.65	18.26	19.36	627.7
1979	453.6	151.65	19.30	21.14	645.7
1980	443.0	151.36	18.98	24.04	637.3
1981	444.1	144.60	16.94	26.66	632.3
1982	476.0	145.89	15.87	30.06	667.8
1983	510.4	151.53	16.24	34.56	712.7
1984	563.7	163.73	16.53	34.55	778.6
1985	623.1	178.42	17.20	36.78	855.5
1986	638.6	186.70	18.30	37.61	881.2
1987	662.9	191.63	18.47	39.88	912.9
1988	699.9	195.79	18.97	43.35	958.0
1989	753.0	196.65	20.02	46.97	1,016.6
1990	771.4	197.58	20.35	49.67	1,039.0
1991	776.7	201.42	20.60	48.63	1,047.4
1992	797.2	203.00	21.00	50.45	1,071.6
1993	815.0	207.03	22.02	56.06	1,100.1
1994	865.7	210.93	22.57	65.42	1,164.7

\* Raw coal includes anthracite, bituminous coal, and brown coal, but not slaty coal. Figures for 1986 and later years includes output from private mines.

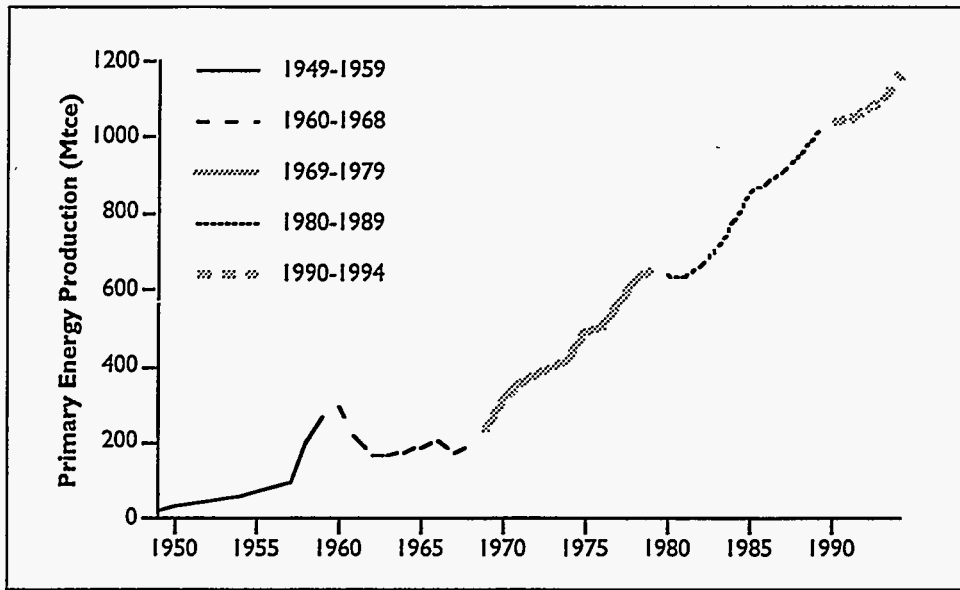
† Crude oil includes natural crude and shale oil.

‡ Converted based on reported average heat rates of gross electricity generation at major Chinese power plants.

Source: China Energy Annual Review, 1994; China Statistical Yearbook, various years; Energy Research Institute.



**Figure II-1. Primary Energy Production by Energy Source in China, Mtce, 1949-1994**



**Figure II-2. Primary Energy Production by Source, 1950-1990**

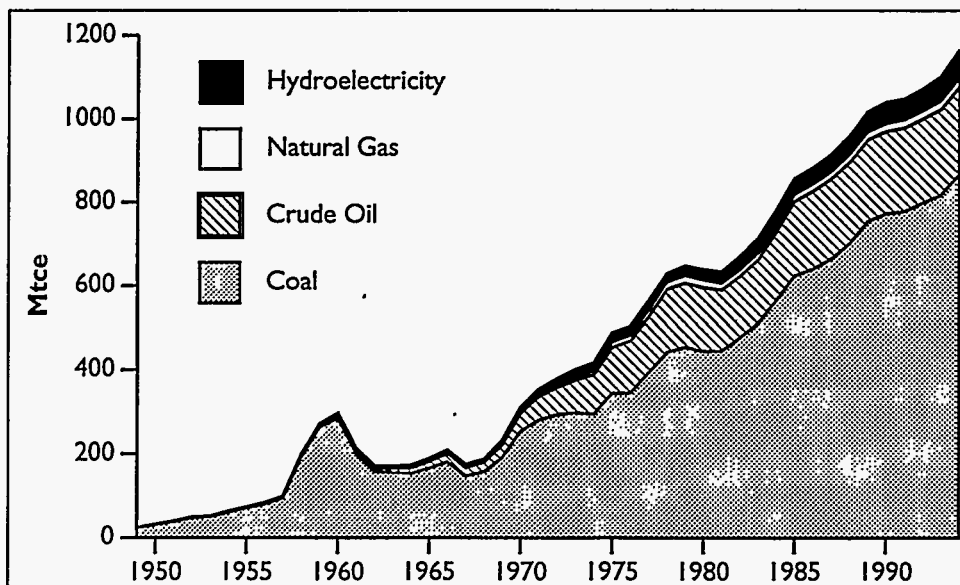


Table II-1. Primary Energy Production, 1949-1994 (continued)

3. Shares of Total				
Year	Raw Coal	Crude Oil	Natural Gas	Hydro-electricity
1949	97.1%	0.7%	0.0%	2.2%
1950	97.2%	0.9%	0.0%	1.8%
1951	97.2%	1.1%	0.0%	1.7%
1952	96.7%	1.3%	0.0%	1.9%
1953	96.3%	1.7%	0.0%	2.0%
1954	94.8%	1.8%	0.0%	3.4%
1955	95.9%	1.9%	0.0%	2.1%
1956	95.3%	2.0%	0.0%	2.6%
1957	94.8%	2.1%	0.1%	2.9%
1958	97.1%	1.6%	0.1%	1.2%
1959	97.0%	2.0%	0.1%	0.9%
1960	95.6%	2.5%	0.5%	1.4%
1961	93.5%	3.6%	0.9%	2.0%
1962	91.4%	4.8%	0.9%	2.9%
1963	91.1%	5.4%	0.8%	2.7%
1964	89.1%	7.0%	0.8%	3.1%
1965	88.0%	8.6%	0.8%	2.6%
1966	86.4%	10.0%	0.9%	2.8%
1967	84.1%	11.3%	1.1%	3.5%
1968	84.0%	12.2%	1.0%	2.9%
1969	82.2%	13.4%	1.1%	3.2%
1970	81.6%	14.1%	1.2%	3.1%
1971	79.3%	16.0%	1.4%	3.3%
1972	77.5%	17.3%	1.7%	3.5%
1973	74.4%	19.1%	2.0%	4.4%
1974	70.9%	22.3%	2.4%	4.5%
1975	70.6%	22.6%	2.4%	4.4%
1976	68.5%	24.7%	2.7%	4.1%
1977	69.7%	23.7%	2.9%	3.8%
1978	70.3%	23.7%	2.9%	3.1%
1979	70.2%	23.5%	3.0%	3.3%
1980	69.5%	23.7%	3.0%	3.8%
1981	70.2%	22.9%	2.7%	4.2%
1982	71.3%	21.8%	2.4%	4.5%
1983	71.6%	21.3%	2.3%	4.8%
1984	72.4%	21.0%	2.1%	4.4%
1985	72.8%	20.9%	2.0%	4.3%
1986	72.5%	21.2%	2.1%	4.3%
1987	72.6%	21.0%	2.0%	4.4%
1988	73.1%	20.4%	2.0%	4.5%
1989	74.1%	19.3%	2.0%	4.6%
1990	74.2%	19.0%	2.0%	4.8%
1991	74.2%	19.2%	2.0%	4.6%
1992	74.4%	18.9%	2.0%	4.7%
1993	74.1%	18.8%	2.0%	5.1%
1994	74.3%	18.1%	1.9%	5.6%

**Average Shares of Total:**

**Coal**

1949-1990	85%
1981-1990	72%
1991-1994	74%

**Petroleum**

1949-1990	13%
1981-1990	21%
1991-1994	19%

**Natural Gas**

1949-1990	1.4%
1981-1990	2.1%
1991-1994	2.0%

**Hydroelectricity**

1949-1990	3.3%
1981-1990	4.5%
1991-1994	5.0%

Source: China Energy Annual Review, 1994; China Statistical Yearbook, various years; Energy Research Institute.

Table II-1. Primary Energy Production, 1949-1994 (continued)

4. Growth Rates (percent over previous year)					
Year	Raw Coal *	Crude Oil †	Natural Gas	Hydro-electricity	Total
1950	34.1%	66.7%	0.0%	14.3%	33.9%
1951	23.7%	55.0%	-57.1%	12.5%	23.7%
1952	24.3%	41.9%	166.7%	44.4%	24.9%
1953	5.7%	40.9%	37.5%	10.0%	6.2%
1954	20.0%	27.4%	36.4%	107.0%	21.9%
1955	17.6%	22.8%	13.3%	-26.9%	16.2%
1956	12.2%	19.6%	52.9%	39.2%	12.9%
1957	18.5%	25.9%	169.2%	32.5%	19.1%
1958	106.5%	54.8%	57.1%	-20.9%	101.6%
1959	36.7%	65.0%	163.6%	5.8%	36.9%
1960	7.6%	39.4%	258.6%	68.8%	9.1%
1961	-30.1%	2.1%	41.3%	2.7%	-28.5%
1962	-20.9%	8.3%	-17.7%	17.6%	-19.1%
1963	-1.1%	12.7%	-15.7%	-8.4%	-0.8%
1964	-1.2%	30.9%	3.9%	16.5%	1.1%
1965	8.0%	33.4%	3.8%	-5.8%	9.4%
1966	8.7%	28.6%	21.8%	17.1%	10.7%
1967	-18.3%	-4.6%	9.0%	4.4%	-16.0%
1968	6.8%	15.2%	-4.1%	-12.0%	7.0%
1969	20.9%	36.0%	40.0%	39.1%	23.5%
1970	33.1%	41.0%	46.4%	27.8%	34.1%
1971	10.7%	28.6%	30.3%	23.0%	13.9%
1972	4.6%	15.9%	29.4%	14.5%	7.1%
1973	1.7%	17.4%	23.6%	33.0%	5.9%
1974	-1.0%	21.0%	25.9%	4.8%	4.0%
1975	16.7%	18.8%	17.5%	15.0%	17.1%
1976	0.2%	13.1%	14.1%	-4.4%	3.3%
1977	13.9%	7.4%	20.0%	3.7%	12.0%
1978	12.4%	11.1%	13.3%	-8.8%	11.3%
1979	2.8%	2.0%	5.7%	9.2%	2.9%
1980	-2.3%	-0.2%	-1.7%	13.7%	-1.3%
1981	0.2%	-4.5%	-10.7%	10.9%	-0.8%
1982	7.2%	0.9%	-6.4%	12.8%	5.6%
1983	7.2%	3.9%	2.3%	15.0%	6.7%
1984	10.5%	8.1%	1.8%	0.0%	9.2%
1985	10.5%	9.0%	4.0%	6.5%	9.9%
1986	2.5%	4.6%	6.4%	2.3%	3.0%
1987	3.8%	2.6%	0.9%	6.0%	3.6%
1988	5.6%	2.2%	2.7%	8.7%	4.9%
1989	7.6%	0.4%	5.5%	8.3%	6.1%
1990	2.4%	0.5%	1.7%	5.8%	2.2%
1991	0.7%	1.9%	1.2%	-2.1%	0.8%
1992	2.6%	0.8%	1.9%	3.7%	2.3%
1993	2.2%	2.0%	4.9%	11.1%	2.7%
1994	6.2%	1.9%	2.5%	16.7%	5.9%

**Average Rates of Growth:**

<b>Coal</b>	
1949-1971	12.1%
1971-1980	4.7%
1981-1990	6.3%
1991-1994	3.7%
<b>Petroleum</b>	
1949-1971	30.1%
1971-1980	9.8%
1981-1990	3.5%
1991-1994	1.6%
<b>Natural Gas</b>	
1949-1971	33.0%
1971-1980	12.8%
1981-1990	2.1%
1991-1994	3.1%
<b>Hydroelectricity</b>	
1949-1971	17.7%
1971-1980	8.1%
1981-1990	7.6%
1991-1994	11.0%
<b>Total</b>	
1949-1971	13.1%
1971-1980	6.0%
1981-1990	5.7%
1991-1994	3.6%

\* Raw coal includes anthracite, bituminous coal, and brown coal, but not slaty coal. Figures for 1986 and later years includes output from private mines.

† Crude oil includes natural crude and shale oil.

Source: China Energy Annual Review, 1994; China Statistical Yearbook, various years; Energy Research Institute.

Table II-1. Primary Energy Production, 1949-1994 (continued)

5. Production in EJ					
Year	Raw Coal * (EJ)	Crude Oil † (EJ)	Natural Gas (EJ)	Hydro-electricity ¶ (EJ)	Total (EJ)
1949	0.67	0.01	0.00	0.01	0.69
1950	0.90	0.01	0.00	0.02	0.92
1951	1.11	0.01	0.00	0.02	1.14
1952	1.38	0.02	0.00	0.03	1.43
1953	1.46	0.03	0.00	0.03	1.52
1954	1.75	0.03	0.00	0.06	1.85
1955	2.06	0.04	0.00	0.05	2.15
1956	2.31	0.05	0.00	0.06	2.42
1957	2.74	0.06	0.00	0.08	2.89
1958	5.65	0.09	0.00	0.07	5.82
1959	7.73	0.16	0.01	0.07	7.96
1960	8.31	0.22	0.04	0.12	8.69
1961	5.81	0.22	0.06	0.12	6.22
1962	4.60	0.24	0.05	0.14	5.03
1963	4.54	0.27	0.04	0.13	4.99
1964	4.49	0.36	0.04	0.15	5.04
1965	4.85	0.47	0.04	0.15	5.51
1966	5.28	0.61	0.05	0.17	6.11
1967	4.31	0.58	0.06	0.18	5.13
1968	4.61	0.67	0.05	0.16	5.49
1969	5.57	0.91	0.08	0.22	6.77
1970	7.41	1.28	0.11	0.28	9.08
1971	8.21	1.65	0.15	0.34	10.35
1972	8.58	1.91	0.19	0.39	11.08
1973	8.73	2.24	0.23	0.52	11.73
1974	8.65	2.72	0.29	0.55	12.20
1975	10.09	3.23	0.34	0.63	14.29
1976	10.11	3.65	0.39	0.60	14.76
1977	11.51	3.92	0.47	0.62	16.53
1978	12.94	4.36	0.54	0.57	18.40
1979	13.29	4.44	0.57	0.62	18.92
1980	12.98	4.44	0.56	0.70	18.68
1981	13.02	4.24	0.50	0.78	18.53
1982	13.95	4.28	0.47	0.88	19.57
1983	14.96	4.44	0.48	1.01	20.89
1984	16.52	4.80	0.48	1.01	22.82
1985	18.26	5.23	0.50	1.08	25.07
1986	18.72	5.47	0.54	1.10	25.83
1987	19.43	5.62	0.54	1.17	26.76
1988	20.51	5.74	0.56	1.27	28.08
1989	22.07	5.76	0.59	1.38	29.80
1990	22.61	5.79	0.60	1.46	30.45
1991	22.77	5.90	0.60	1.43	30.70
1992	23.36	5.95	0.62	1.48	31.41
1993	23.89	6.07	0.65	1.64	32.25
1994	25.37	6.18	0.66	1.92	34.14

\* Raw coal includes anthracite, bituminous coal, and brown coal, but not slaty coal. Figures for 1986 and later years includes output from private mines.

† Crude oil includes natural crude and shale oil.

¶ Converted based on reported average heat rates of gross electricity generation at major Chinese power plants.

Source: China Energy Annual Review, 1994; China Statistical Yearbook, various years; Energy Research Institute.

**Table II-2. Commercial Energy Production by Province and Energy Source, \***  
1986-1993

<b>I. Coal Production by Province (Mt)</b>									
<b>Planning Region</b>	<b>Province</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
<i>North</i>	Beijing	9	9	9	10	10	10	10	11
	Tianjin	-	-	-	-	-	-	-	-
	Hebei	63	63	64	63	62	61	63	64
	Shanxi	222	231	246	275	286	292	297	310
	Inner Mongolia	33	34	37	44	48	49	50	45
<i>Northeast</i>	Liaoning	44	44	46	50	51	52	54	56
	Jilin	21	21	22	24	26	26	25	24
	Heilongjiang	66	68	72	76	83	85	84	73
<i>East</i>	Shanghai	-	-	-	-	-	-	-	-
	Jiangsu	22	22	23	24	24	25	25	25
	Zhejiang	1	1	1	1	1	1	1	2
	Anhui	30	29	31	31	32	31	34	36
	Fujian	7	8	9	9	9	9	9	10
	Jiangxi	19	20	20	21	20	21	21	21
	Shandong	51	53	56	57	60	61	64	68
<i>South-Central</i>	Henan	79	81	82	89	91	90	90	93
	Hubei	8	8	10	10	9	8	9	10
	Hunan	31	34	36	37	34	33	36	42
	Guangdong	9	9	9	10	9	9	10	10
	Guangxi	6	8	10	11	10	10	11	12
	Hainan	-	-	-	-	-	-	-	-
<i>Southwest</i>	Sichuan	57	61	67	71	68	69	71	79
	Guizhou	26	31	32	35	37	37	42	45
	Yunnan	17	19	21	22	22	22	24	24
	Xizang	-	-	-	-	-	-	-	-
<i>Northwest</i>	Shaanxi	29	29	28	31	33	33	34	32
	Gansu	12	13	14	14	16	15	15	18
	Qinghai	3	3	3	3	3	3	3	3
	Ningxia	12	13	13	13	14	14	14	14
	Xinjiang	17	16	18	20	21	21	22	24
<i>National Total</i>		894	928	980	1,054	1,079	1,087	1,118	1,151

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table II-2. Commercial Energy Production by Province and Energy Source, \*  
1986-1993 (continued)

2. Crude Oil Production by Province (Mt)									
Planning Region	Province	1986	1987	1988	1989	1990	1991	1992	1993
North	Beijing	-	-	-	-	-	-	-	-
	Tianjin	4.133	4.530	4.628	4.704	4.695	4.749	4.918	5.170
	Hebei	10.011	7.954	6.305	5.780	5.705	5.377	4.188	5.030
	Shanxi	-	-	-	-	-	-	-	-
	Inner Mongolia	-	-	-	-	-	1.001	1.001	1.010
Northeast	Liaoning	10.210	11.461	12.673	13.450	13.687	13.742	13.878	14.200
	Jilin	2.370	2.865	3.151	3.422	3.567	3.423	3.441	3.380
	Heilongjiang	55.552	55.553	55.703	55.556	55.622	55.623	55.658	55.900
East	Shanghai	-	-	-	-	-	-	-	-
	Jiangsu	0.601	0.658	0.750	0.833	0.880	0.925	0.916	0.950
	Zhejiang	-	-	-	-	-	-	-	-
	Anhui	0.018	0.022	0.025	0.021	0.020	0.030	0.040	0.044
	Fujian	-	-	-	-	-	-	-	-
	Jiangxi	-	-	-	-	-	-	-	-
	Shandong	29.508	31.600	33.303	33.355	33.506	33.552	33.461	32.700
South-Central	Henan	8.808	9.320	9.790	9.532	8.821	8.483	8.101	7.640
	Hubei	1.030	1.010	1.016	0.930	0.830	0.734	0.765	0.810
	Hunan	-	-	-	-	-	-	-	-
	Guangdong	0.258	0.453	0.447	0.353	0.491	1.536	2.857	3.510
	Guangxi	0.043	0.074	0.090	0.105	0.120	0.130	0.032	0.030
	Hainan	-	-	-	-	-	-	-	-
Southwest	Sichuan	0.119	0.119	0.120	0.126	0.162	0.138	0.140	0.170
	Guizhou	-	-	-	-	-	-	-	-
	Yunnan	-	-	-	-	-	-	0.124	0.120
	Xizang	-	-	-	-	-	-	-	-
Northwest	Shaanxi	0.262	0.357	0.431	0.555	0.701	0.851	1.017	1.130
	Gansu	1.563	1.528	1.483	1.469	1.461	1.618	1.981	1.480
	Qinghai	0.350	0.575	0.640	0.725	0.810	1.020	1.055	1.080
	Ningxia	0.348	0.308	0.321	0.287	0.258	0.230	0.208	0.210
	Xinjiang	5.505	5.751	6.170	6.438	6.970	7.830	8.317	10.660
National Total		130.689	134.140	137.046	137.641	138.306	140.992	142.097	145.224

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Table II-2. Commercial Energy Production by Province and Energy Source, \***  
**1986-1993 (continued)**

<b>3. Natural Gas Production by Province (billion cubic meters)</b>									
<b>Planning Region</b>	<b>Province</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
<i>North</i>	Beijing	-	-	-	-	-	-	-	-
	Tianjin	0.473	0.433	0.391	0.376	0.366	0.361	0.412	0.653
	Hebei	0.271	0.237	0.223	0.227	0.294	0.290	0.325	0.315
	Shanxi	-	-	-	0.075	0.060	0.059	0.065	0.058
	Inner Mongolia	-	-	-	-	-	-	-	-
<i>Northeast</i>	Liaoning	1.768	1.807	1.897	1.998	2.042	2.055	2.110	2.078
	Jilin	0.079	0.095	0.097	0.102	0.098	0.126	0.168	0.205
	Heilongjiang	2.301	2.205	2.226	2.249	2.247	2.273	2.287	2.228
<i>East</i>	Shanghai	-	-	-	-	-	-	-	-
	Jiangsu	0.043	0.041	0.040	0.035	0.038	0.033	0.030	0.027
	Zhejiang	-	-	-	-	-	-	-	-
	Anhui	-	-	-	-	-	-	-	-
	Fujian	-	-	-	-	-	-	-	-
	Jiangxi	-	-	-	-	-	-	-	-
	Shandong	1.398	1.483	1.419	1.544	1.439	1.438	1.443	1.369
<i>South-Central</i>	Henan	0.868	1.033	1.329	1.317	1.389	1.302	1.261	1.167
	Hubei	0.033	0.051	0.060	0.070	0.076	0.064	0.082	0.083
	Hunan	-	-	-	-	-	-	-	-
	Guangdong	0.006	-	-	-	-	-	-	-
	Guangxi	-	-	-	-	-	-	-	-
	Hainan	-	-	-	-	-	-	-	-
<i>Southwest</i>	Sichuan	5.891	5.989	6.034	6.458	6.621	7.310	6.710	7.287
	Guizhou	0.024	0.024	0.020	0.022	0.028	0.034	0.044	0.112
	Yunnan	-	-	-	-	-	-	0.044	0.112
	Xizang	-	-	-	-	-	-	-	-
<i>Northwest</i>	Shaanxi	0.006	0.003	0	0.001	0.007	0.027	0.028	0.026
	Gansu	0.018	0.017	0.027	0.028	0.033	0.068	0.043	0.027
	Qinghai	0.004	0.029	0.033	0.038	0.051	0.075	0.052	0.046
	Ningxia	0.010	0.008	0.008	0.008	0.007	0.004	0.009	0.014
	Xinjiang	0.571	0.439	0.460	0.501	0.502	0.554	0.675	0.959
<i>National Total</i>		13.764	13.894	14.264	15.049	15.298	16.073	15.788	16.766

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table II-2. Commercial Energy Production by Province and Energy Source, \*  
1986-1993 (continued)

4. Hydroelectric Power Generation by Province (TWh)									
Planning Region	Province	1986	1987	1988	1989	1990	1991	1992	1993
North	Beijing	0.198	0.217	0.190	0.221	0.210	0.221	0.237	0.159
	Tianjin	0	0	0	0	0.018	0.020	0.019	0.017
	Hebei	0.500	0.409	0.566	0.657	0.703	0.632	0.543	0.940
	Shanxi	0.613	0.468	0.594	0.802	0.715	0.581	0.598	0.697
	Inner Mongolia	0.064	0.073	0.058	0.050	0.070	0.124	0.111	0.113
Northeast	Liaoning	4.694	4.466	2.869	1.661	3.546	4.035	3.243	2.741
	Jilin	6.631	6.772	5.892	3.111	4.582	6.430	3.869	4.991
	Heilongjiang	0.615	0.553	0.510	0.420	0.592	0.582	0.625	0.552
East	Shanghai	-	-	-	-	-	-	-	-
	Jiangsu	0.037	0.064	0.056	0.054	0.053	0.050	0.028	0.056
	Zhejiang	3.891	4.801	5.569	6.363	5.600	5.883	5.845	6.039
	Anhui	0.987	1.172	1.124	1.152	1.334	1.511	0.933	1.107
	Fujian	5.055	5.278	6.724	6.838	7.814	6.272	9.469	8.975
	Jiangxi	2.060	2.354	3.201	3.062	2.777	3.193	3.679	4.262
	Shandong	0.063	0.031	0.025	0.011	0.043	0.079	0.023	0.040
South-Central	Henan	1.332	1.287	1.284	1.692	1.543	1.528	1.481	1.537
	Hubei	14.713	18.208	20.909	25.370	24.188	22.548	22.703	25.571
	Hunan	7.281	8.237	9.036	9.514	10.612	10.763	10.619	12.627
	Guangdong	7.009	7.158	6.996	7.016	7.718	5.917	9.284	10.000
	Guangxi	6.131	6.340	6.056	5.864	6.890	6.372	7.398	10.083
	Hainan	0	0	0.501	0.782	0.781	0.702	0.763	0.658
Southwest	Sichuan	11.199	11.602	13.200	14.684	15.136	15.506	16.830	19.586
	Guizhou	4.264	4.426	4.949	4.115	3.750	4.431	5.207	5.425
	Yunnan	5.023	5.013	4.811	5.913	7.546	9.312	9.126	12.509
	Xizang	0.148	0.204	0.256	0.267	0.323	0.250	0.261	0.380
Northwest	Shaanxi	0.719	0.914	1.034	1.299	1.261	1.652	3.015	4.161
	Gansu	9.247	7.480	7.637	10.515	10.654	9.369	8.710	10.211
	Qinghai	0.142	0.616	3.045	4.412	5.732	4.400	3.450	5.312
	Ningxia	0.975	0.789	0.844	1.231	1.097	0.838	0.840	1.046
	Xinjiang	0.942	1.075	1.214	1.310	1.433	1.467	1.755	2.024
National Total		94.533	100.007	109.150	118.386	126.721	124.668	130.664	151.819

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.



**Table II-2. Commercial Energy Production by Province and Energy Source, \*  
1986-1993 (continued)**

<b>5. Thermal Power Generation by Province (TWh)</b>									
<b>Planning Region</b>	<b>Province</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
<i>North</i>	Beijing	10.232	10.363	10.920	11.716	12.326	12.957	13.994	13.950
	Tianjin	7.840	8.110	9.110	9.660	9.485	9.007	9.788	12.648
	Hebei	28.740	30.851	34.064	35.901	36.194	40.434	45.167	49.878
	Shanxi	21.387	25.872	27.176	29.511	30.701	33.557	37.819	41.085
	Inner Mongolia	11.056	12.577	13.792	15.322	16.884	18.780	22.115	23.410
<i>Northeast</i>	Liaoning	30.076	33.974	38.491	40.211	40.037	40.616	45.663	47.782
	Jilin	9.669	9.758	10.688	12.640	12.864	13.550	16.535	19.502
	Heilongjiang	19.605	21.797	24.170	27.487	28.924	31.052	34.058	36.680
<i>East</i>	Shanghai	26.760	27.630	28.060	27.833	28.410	30.482	34.763	37.331
	Jiangsu	26.343	30.056	34.474	36.584	40.394	44.070	48.087	53.628
	Zhejiang	10.929	12.499	13.461	13.672	15.266	18.349	22.568	24.674
	Anhui	14.283	15.708	16.666	16.133	18.087	20.041	22.686	25.557
	Fujian	3.565	4.572	4.686	6.118	5.851	8.904	8.186	10.552
	Jiangxi	7.210	7.926	8.369	8.909	9.364	9.803	10.684	11.051
	Shandong	29.937	33.149	37.935	41.970	44.594	49.561	56.601	61.049
<i>South-Central</i>	Henan	21.828	24.643	27.376	28.590	30.371	34.121	39.070	42.528
	Hubei	8.657	8.662	9.011	8.002	9.851	12.401	14.017	14.722
	Hunan	7.919	7.903	8.274	8.820	9.528	11.362	13.859	14.396
	Guangdong	11.971	15.862	19.804	22.824	26.680	33.576	36.616	47.277
	Guangxi	2.969	3.920	4.184	5.065	5.672	7.183	7.908	7.367
	Hainan	-	-	0.369	0.459	0.615	0.945	1.216	1.811
<i>Southwest</i>	Sichuan	12.501	14.688	16.560	18.011	19.128	22.452	25.110	27.501
	Guizhou	3.986	4.064	4.361	5.538	6.637	7.172	7.728	9.231
	Yunnan	3.427	4.417	5.419	5.499	5.032	4.773	6.449	7.202
	Xizang	0.112	0.056	0.014	0.008	0.007	0.095	0.095	0.015
<i>Northwest</i>	Shaanxi	11.801	13.456	12.786	13.555	13.713	14.779	15.895	17.437
	Gansu	5.383	5.890	5.873	5.799	6.485	9.436	11.322	12.580
	Qinghai	1.318	1.624	1.545	1.408	1.331	1.581	1.533	1.516
	Ningxia	2.165	3.471	4.166	4.188	4.499	5.473	6.822	7.703
	Xinjiang	3.348	3.765	4.256	4.989	5.546	6.367	6.926	7.562
<i>National Total</i>		355.017	397.263	436.060	466.422	494.476	552.879	623.280	687.625

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Table II-2. Commercial Energy Production by Province and Energy Source, \***  
**1986-1993 (continued)**

<b>6. Total Power Generation by Province (TWh)</b>									
<b>Planning Region</b>	<b>Province</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
<i>North</i>	Beijing	10.43	10.58	11.11	11.94	12.54	13.18	14.23	14.11
	Tianjin	7.84	8.11	9.11	9.66	9.50	9.03	9.81	12.67
	Hebei	29.24	31.26	34.63	36.56	36.90	41.07	45.71	50.82
	Shanxi	22.00	26.34	27.77	30.31	31.42	34.14	38.42	41.78
	Inner Mongolia	11.12	12.65	13.85	15.37	16.95	18.90	22.23	23.52
<i>Northeast</i>	Liaoning	34.77	38.44	41.36	41.87	43.58	44.65	48.91	50.52
	Jilin	16.30	16.53	16.58	15.75	17.45	19.98	20.40	24.49
	Heilongjiang	20.22	22.35	24.68	27.91	29.52	31.63	34.68	37.23
<i>East</i>	Shanghai	26.76	27.63	28.06	27.83	28.41	30.48	34.76	37.33
	Jiangsu	26.38	30.12	34.53	36.64	40.45	44.12	48.12	53.68
	Zhejiang	14.82	17.30	19.03	20.04	20.87	24.23	28.41	30.71
	Anhui	15.27	16.88	17.79	17.29	19.42	21.55	23.62	26.66
	Fujian	8.62	9.85	11.41	12.96	13.67	15.18	17.66	19.53
	Jiangxi	9.27	10.28	11.57	11.97	12.14	13.00	14.36	15.31
	Shandong	30.00	33.18	37.96	41.98	44.64	49.64	56.62	61.09
<i>South-Central</i>	Henan	23.16	25.93	28.66	30.28	31.91	35.65	40.55	44.07
	Hubei	23.37	26.87	29.92	33.37	34.04	34.95	36.72	40.29
	Hunan	15.20	16.14	17.31	18.33	20.14	22.13	24.48	27.02
	Guangdong	18.98	23.02	26.80	29.84	34.40	39.49	45.90	57.28
	Guangxi	9.10	10.26	10.24	10.93	12.56	13.56	15.31	17.45
	Hainan	-	-	0.87	1.24	1.40	1.65	1.98	2.47
<i>Southwest</i>	Sichuan	23.70	26.29	29.76	32.70	34.26	37.96	41.94	47.09
	Guizhou	8.25	8.49	9.31	9.65	10.39	11.60	12.94	14.66
	Yunnan	8.45	9.43	10.23	11.41	12.58	14.09	15.58	19.71
	Xizang	0.26	0.26	0.27	0.28	0.33	0.35	0.36	0.40
<i>Northwest</i>	Shaanxi	12.52	14.37	13.82	14.85	14.97	16.43	18.91	21.60
	Gansu	14.63	13.37	13.51	16.31	17.14	18.81	20.03	22.79
	Qinghai	1.46	2.24	4.59	5.82	7.06	5.98	4.98	6.83
	Ningxia	3.14	4.26	5.01	5.42	5.60	6.31	7.66	8.75
	Xinjiang	4.29	4.84	5.47	6.30	6.98	7.83	8.68	9.59
<i>National Total</i>		449.55	497.27	545.21	584.81	621.20	677.55	753.94	839.44

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Table II-2. Commercial Energy Production by Province and Energy Source, \***  
**1986-1993 (continued)**

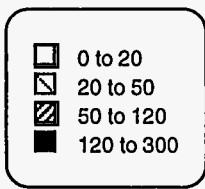
<b>7. Primary Commercial Energy † (Mtce)</b>									
<b>Planning Region</b>	<b>Province</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
North	Beijing	6.6	6.5	6.5	7.3	7.2	7.2	7.2	7.9
	Tianjin	6.5	7.1	7.1	7.2	7.2	7.3	7.6	8.3
	Hebei	59.7	57.1	55.5	54.0	53.1	51.9	51.6	53.7
	Shanxi	158.7	165.1	176.2	196.8	204.6	208.8	212.4	221.7
	Inner Mongolia	23.5	24.4	26.7	31.3	34.3	36.5	37.2	33.6
Northeast	Liaoning	50.6	51.7	54.6	58.1	60.1	61.1	62.5	64.2
	Jilin	21.4	22.0	22.9	23.7	25.6	26.2	24.6	24.3
	Heilongjiang	129.8	131.3	134.0	137.0	142.0	143.5	142.9	135.2
East	Shanghai	-	-	-	-	-	-	-	-
	Jiangsu	16.5	17.0	17.8	18.7	18.5	19.2	19.2	19.3
	Zhejiang	2.6	3.0	3.3	3.6	3.0	3.1	3.1	3.9
	Anhui	22.0	21.1	22.3	22.7	23.4	22.8	24.7	26.2
	Fujian	6.9	7.8	8.9	9.5	9.6	9.0	10.3	10.8
	Jiangxi	14.1	15.0	15.9	16.0	15.4	16.3	16.5	16.7
	Shandong	80.5	85.1	89.2	90.4	92.7	93.5	95.5	97.1
South-Central	Henan	71.0	72.8	75.2	79.3	80.1	78.7	78.1	79.5
	Hubei	13.4	14.9	17.1	19.1	17.5	16.0	16.8	18.7
	Hunan	24.7	27.3	29.1	30.2	28.6	27.9	30.0	35.1
	Guangdong	9.3	9.8	10.1	10.3	10.2	11.0	15.0	16.2
	Guangxi	7.1	8.4	10.0	10.7	10.1	9.9	10.9	12.7
	Hainan	-	-	0.2	0.3	0.3	0.3	0.3	0.3
Southwest	Sichuan	53.2	56.6	61.4	65.6	63.7	65.4	66.6	74.3
	Guizhou	20.0	24.1	24.9	26.7	28.0	28.3	32.2	34.5
	Yunnan	14.2	15.9	16.6	18.0	18.8	19.5	21.1	22.5
	Xizang	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Northwest	Shaanxi	21.1	21.3	20.8	23.8	25.1	25.5	27.0	26.2
	Gansu	14.9	14.4	14.9	16.5	17.9	16.9	17.1	19.1
	Qinghai	2.5	3.1	4.1	5.0	5.7	5.5	5.1	5.8
	Ningxia	9.7	10.0	10.3	10.5	10.8	10.7	10.6	10.7
	Xinjiang	20.8	20.5	22.9	24.8	26.2	27.5	29.2	34.5
<b>National Total</b>		<b>881.7</b>	<b>913.3</b>	<b>958.7</b>	<b>1,017.3</b>	<b>1,039.7</b>	<b>1,049.5</b>	<b>1,075.2</b>	<b>1,113.0</b>

\* Some figures for some years are not the same in all editions of Chinese statistical material. In such cases the most recent figures reported are used

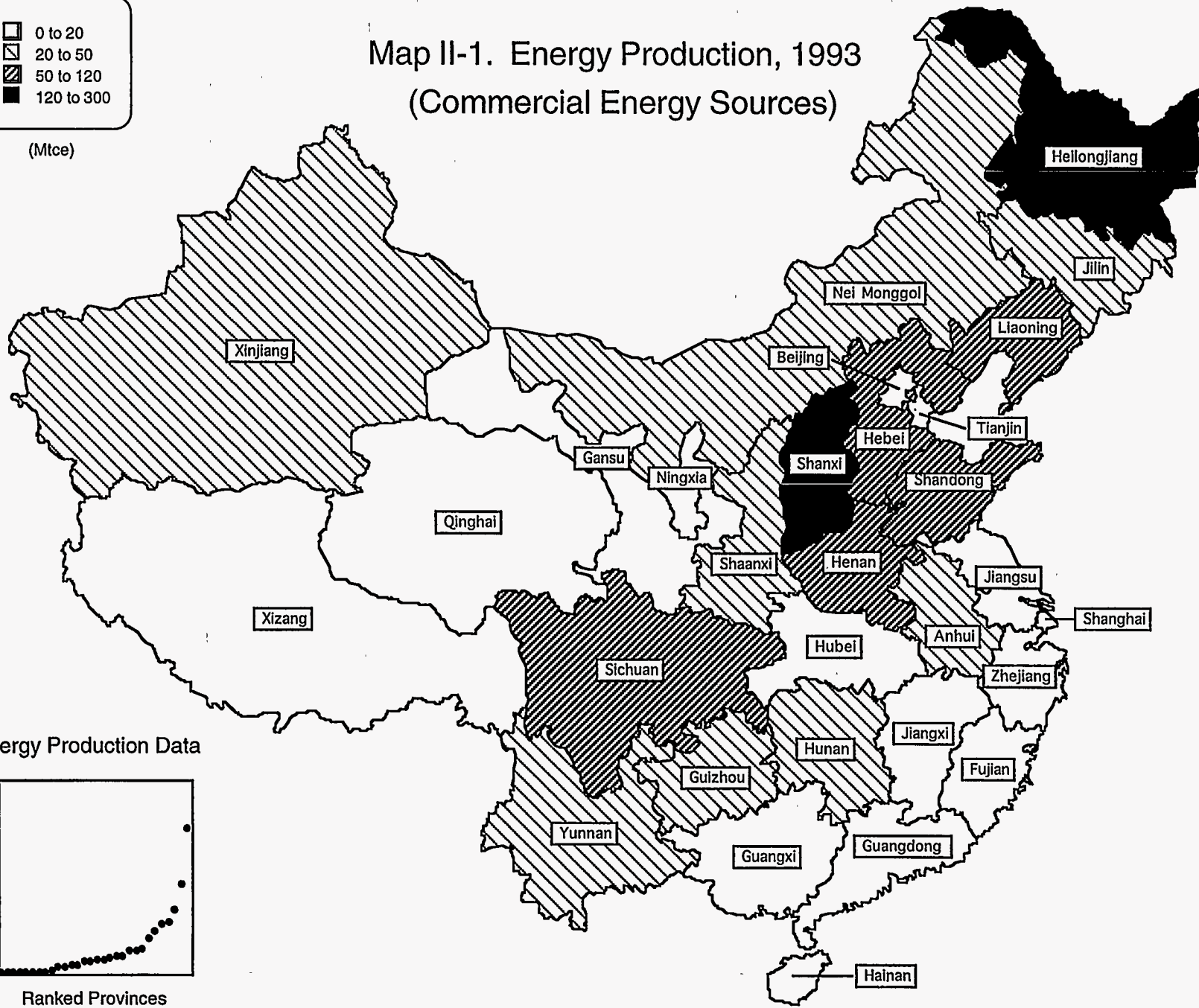
† Primary energy here indicates the sum of coal, oil, natural gas, and hydroelectricity production. Hydroelectricity converted at 0.404 kgce/kWh.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

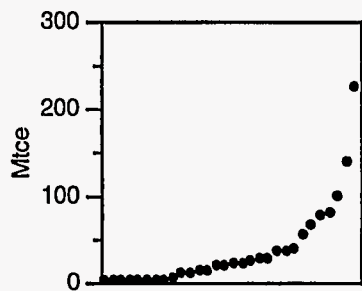
### Map II-1. Energy Production, 1993 (Commercial Energy Sources)



(Mtce)

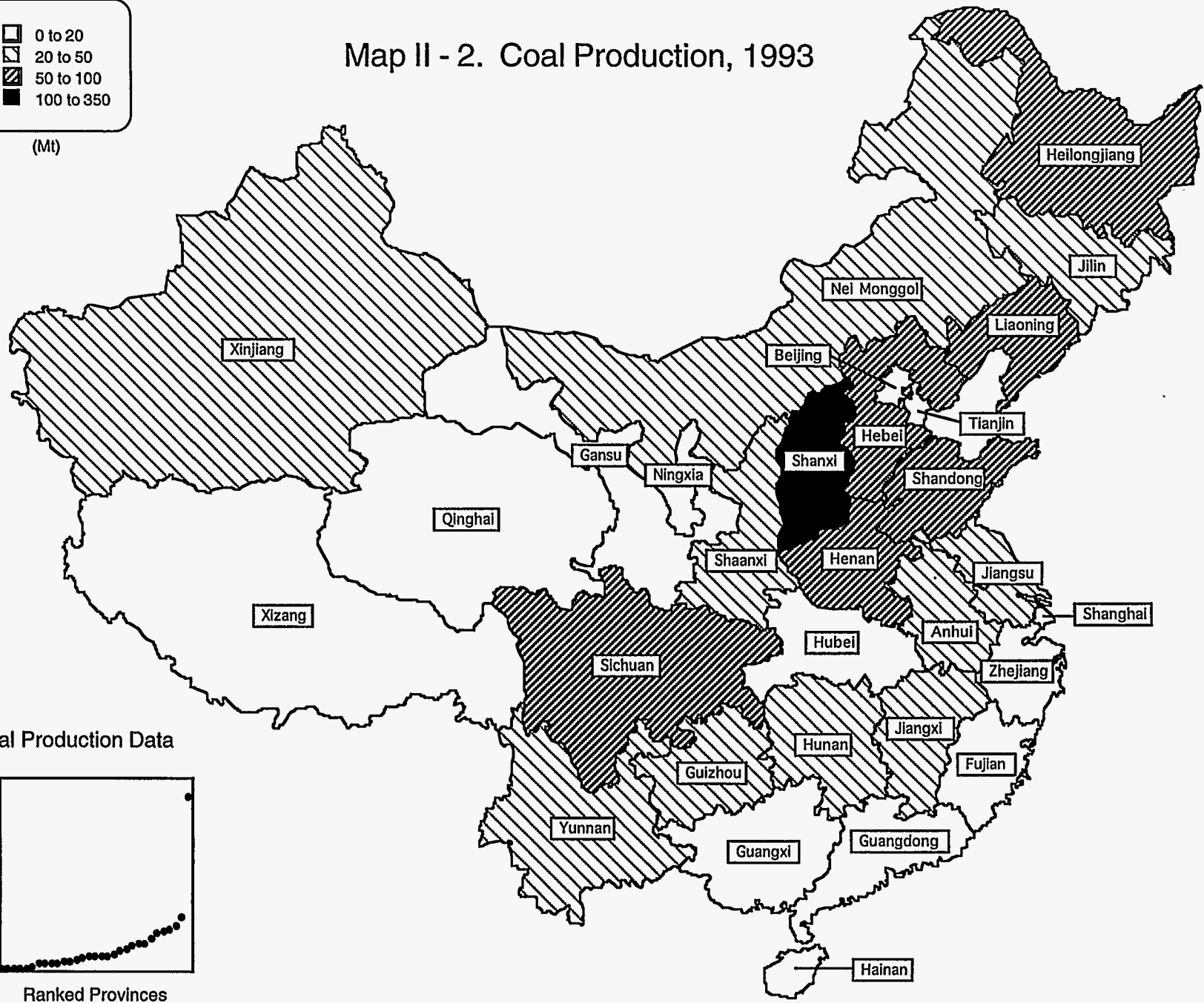
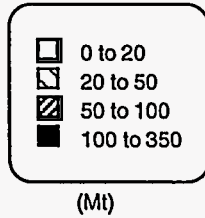


#### Energy Production Data

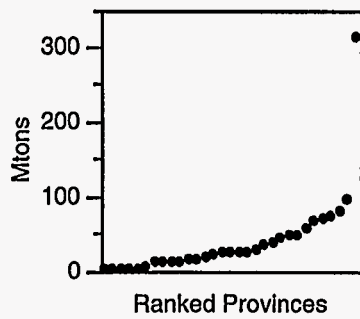


Ranked Provinces

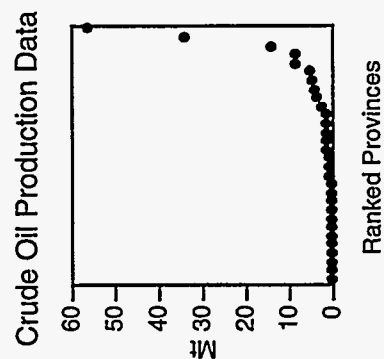
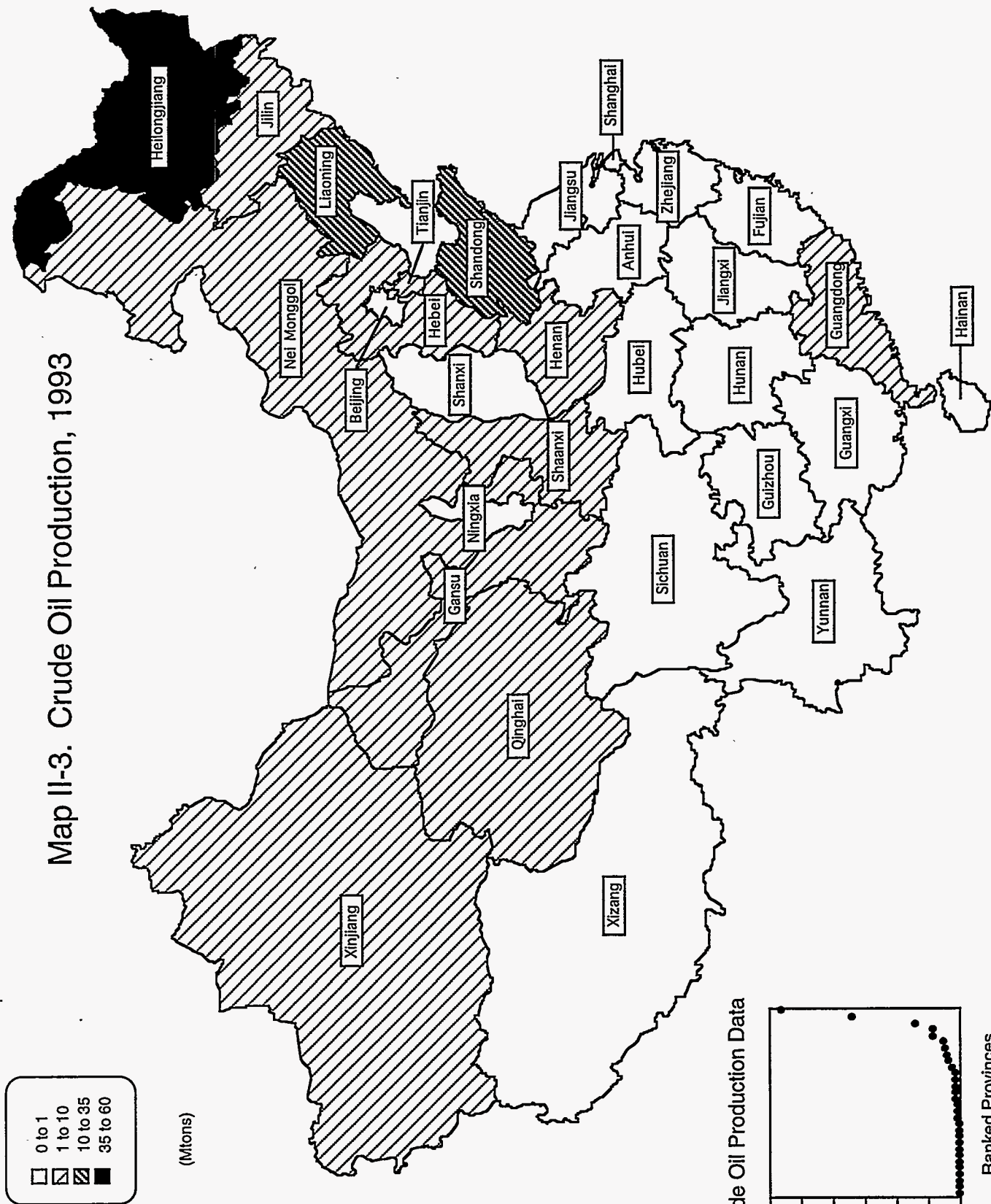
Map II - 2. Coal Production, 1993



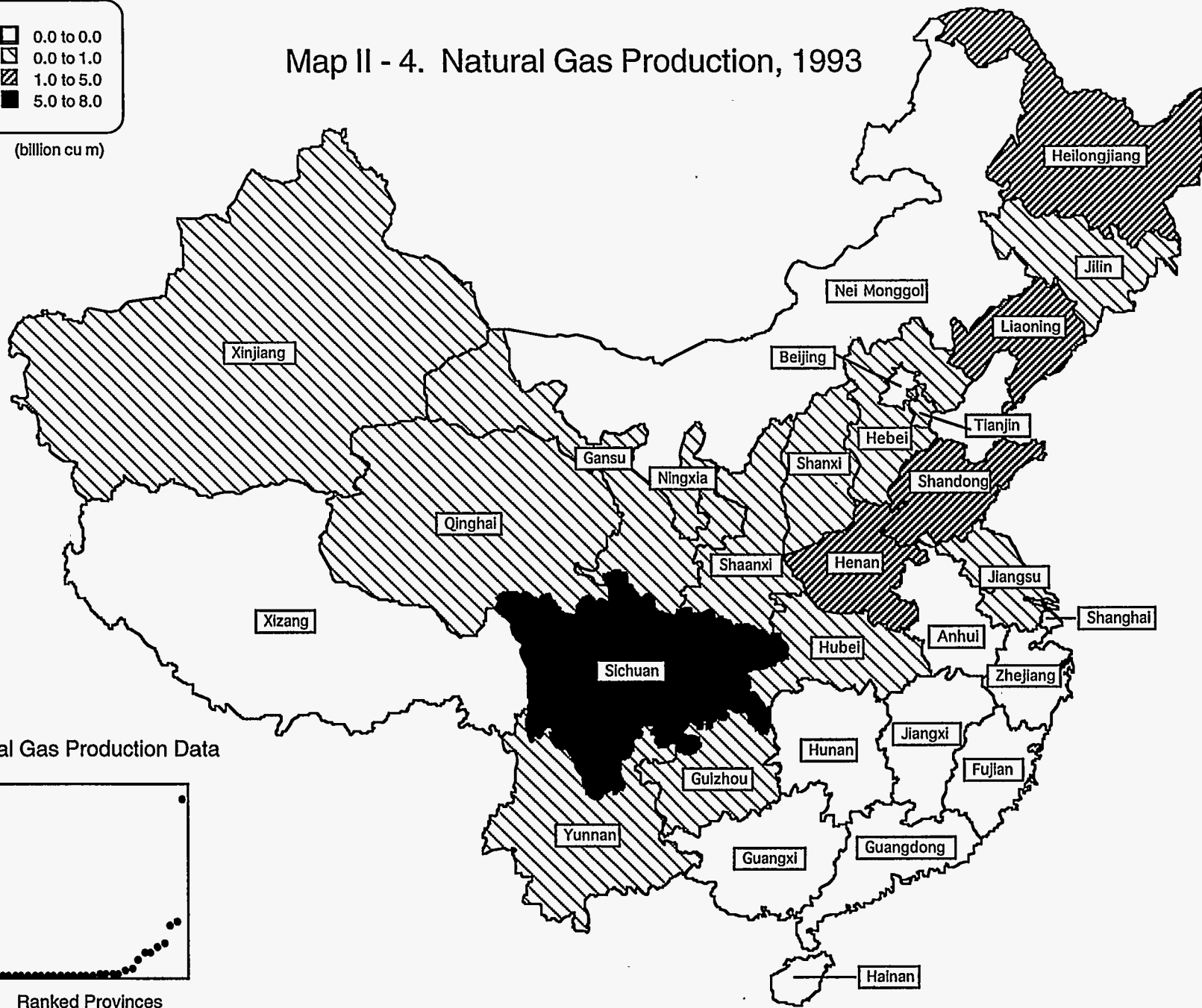
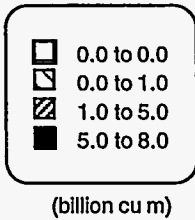
Coal Production Data



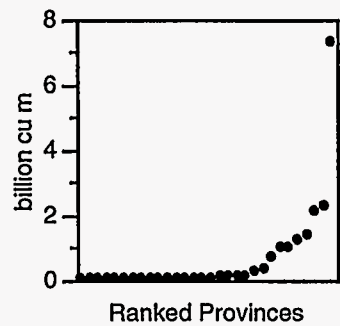
Map II-3. Crude Oil Production, 1993



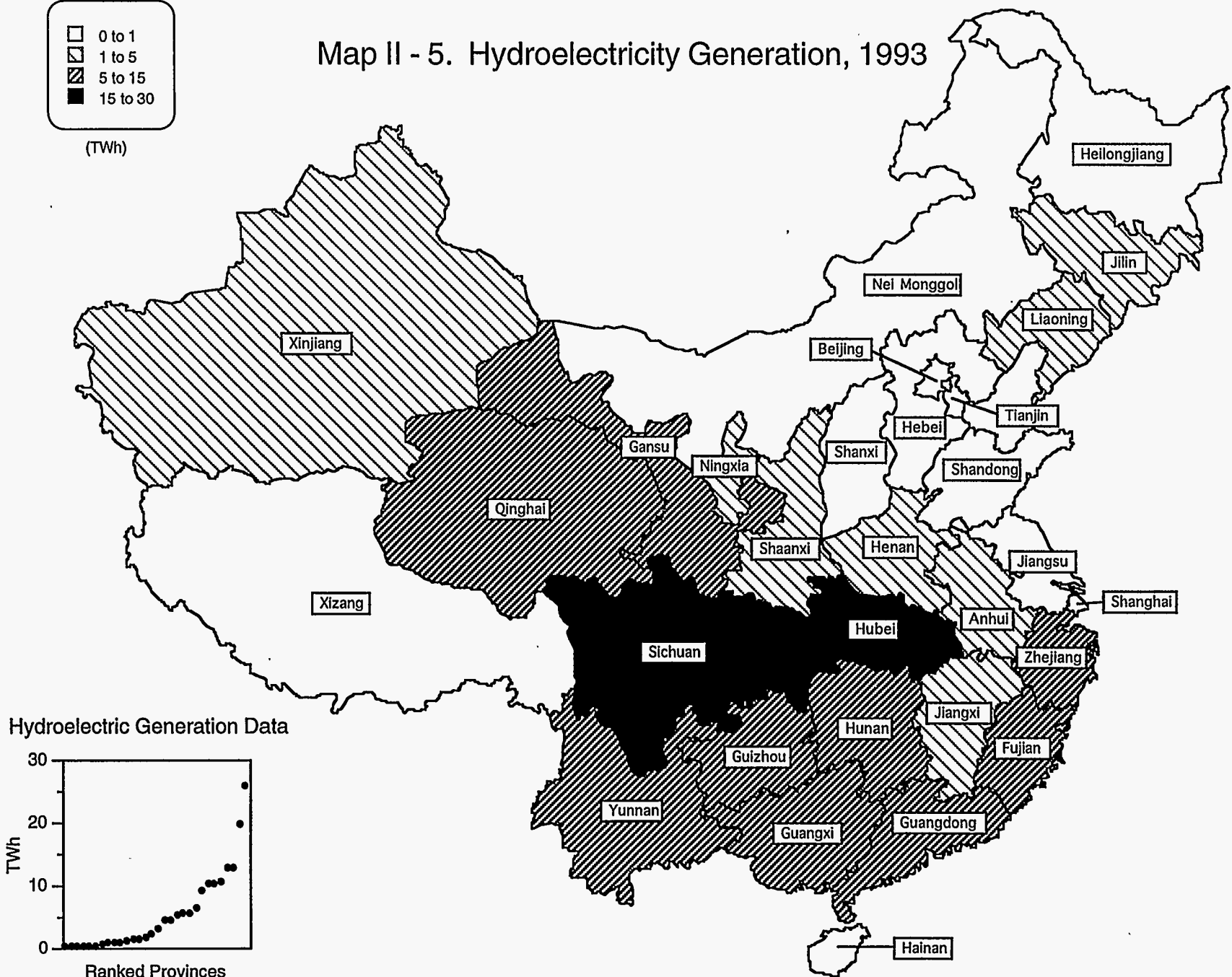
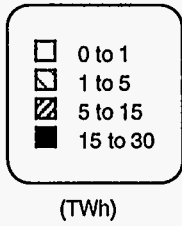
Map II - 4. Natural Gas Production, 1993



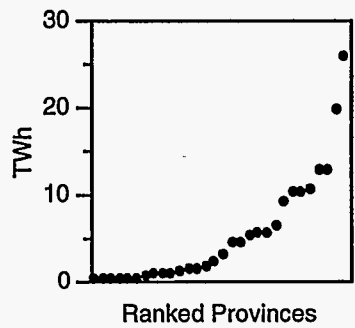
Natural Gas Production Data



Map II - 5. Hydroelectricity Generation, 1993

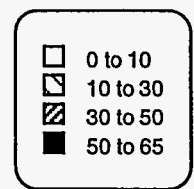


Hydroelectric Generation Data

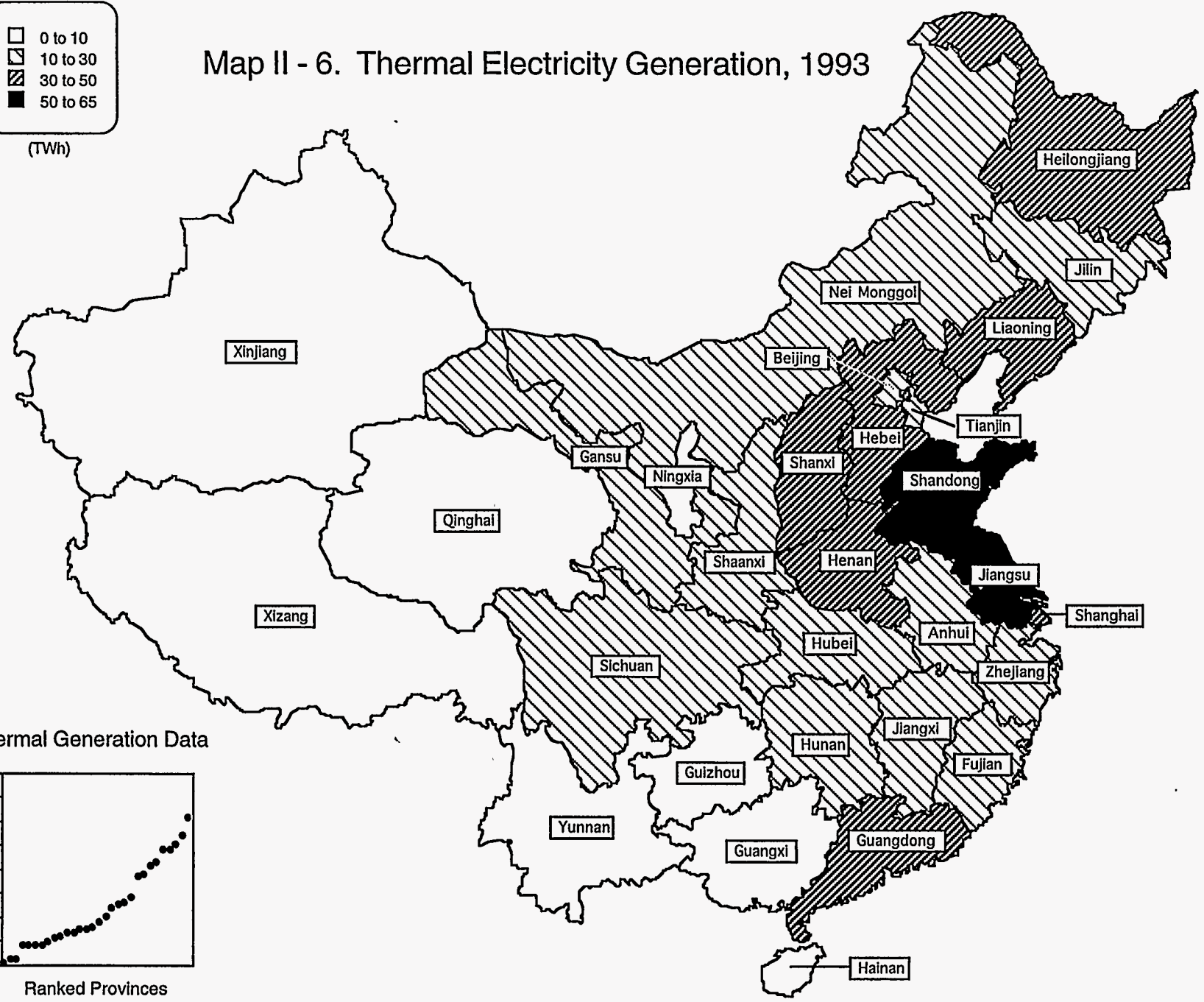




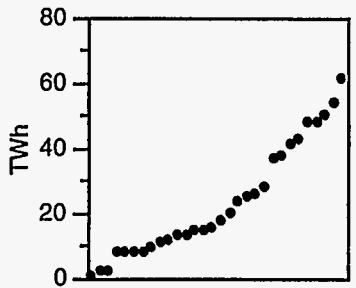
Map II - 6. Thermal Electricity Generation, 1993



(TWh)



Thermal Generation Data



Ranked Provinces

Table II-3. Raw Coal Production by Producer, 1950-1994

I. Production (Mt)									
Year	Centrally Administered State-Owned Mines	Local State-Owned Mines			Subtotal	Township & Village Mines	Private Mines *	Other Mines †	Total
		Provincial Mines	Prefectural Mines	County Mines					
1950	30.2	-	-	-	12.7	0.0	-	-	42.9
1951	37.1	-	-	-	15.9	0.0	-	-	53.1
1952	48.4	-	-	-	18.2	0.0	-	-	66.6
1953	52.2	-	-	-	17.6	0.0	-	-	69.7
1954	62.3	-	-	-	21.4	0.0	-	-	83.7
1955	73.0	-	-	-	25.4	0.0	-	-	98.4
1956	81.5	-	-	-	28.9	0.0	-	-	110.4
1957	94.3	-	-	-	36.5	0.0	-	-	130.8
1958	157.8	-	-	-	78.2	34.0	-	-	270.0
1959	216.4	-	-	-	124.4	28.0	-	-	368.8
1960	240.4	-	-	-	134.9	22.0	-	-	397.2
1961	175.5	-	-	-	102.1	0.0	-	-	277.6
1962	147.6	-	-	-	72.0	0.0	-	-	219.6
1963	151.3	-	-	-	65.8	0.0	-	-	217.1
1964	150.6	-	-	-	64.0	0.0	-	-	214.6
1965	164.3	-	-	-	67.5	0.0	-	-	231.8
1966	180.7	-	-	-	70.8	0.0	-	-	251.5
1967	135.9	-	-	-	61.8	8.0	-	-	205.7
1968	147.3	-	-	-	59.3	13.0	-	-	219.6
1969	178.6	-	-	-	69.4	18.0	-	-	266.0
1970	226.7	-	-	-	96.3	31.0	-	-	354.0
1971	246.6	-	-	-	113.7	32.0	-	-	392.3
1972	249.2	-	-	-	125.3	36.0	-	-	410.5
1973	247.7	-	-	-	127.3	42.0	-	-	417.0
1974	242.8	-	-	-	118.4	52.0	-	-	413.2
1975	280.0	-	-	-	145.3	57.0	-	-	482.2
1976	273.6	-	-	-	144.8	65.0	-	-	483.5
1977	295.3	-	-	-	176.4	79.0	-	-	550.7
1978	341.8	-	-	-	189.0	87.0	-	-	617.9
1979	357.8	69.8	45.2	56.5	171.5	106.3	-	-	635.5
1980	344.4	66.2	42.8	53.1	162.1	113.6	-	-	620.1
1981	335.1	66.9	40.4	52.7	160.0	126.6	-	-	621.6
1982	349.9	70.3	42.5	57.5	170.4	146.1	-	-	666.3
1983	363.1	78.2	44.1	59.1	181.3	170.1	-	-	714.5
1984	394.7	67.0	46.7	64.0	177.7	216.9	-	-	789.2
1985	406.3	62.0	50.9	69.9	182.8	266.7	16.5	-	872.3
1986	413.9	60.5	52.0	68.9	181.4	277.5	20.4	0.8	894.0
1987	420.2	63.1	49.1	68.9	181.1	296.3	28.4	2.1	928.1
1988	434.5	66.4	53.4	74.1	193.9	306.7	38.0	6.8	979.9
1989	458.3	68.5	57.4	79.6	205.5	337.3	43.1	10.1	1,054.2
1990	480.2	66.4	58.7	80.0	205.1	346.4	43.3	4.9	1,079.9
1991	480.6	64.6	59.3	79.7	203.6	359.1	39.9	4.3	1,087.4
1992	482.5	57.7	60.6	84.5	202.8	382.5	44.8	3.7	1,116.4
1993	458.0	55.1	62.9	86.0	204.0	429.9	52.9	4.9	1,149.7
1994	479.5	-	-	-	-	-	-	-	1,212.0

\* Private mines included in data for collective mines prior to 1985.

† Domestic and foreign joint venture mines.

Source: Yearbook of China's Coal Industry, various years; Energy in China, various years; China Energy Statistical Yearbook various years; Zhongguo Nengyuan [China Energy], no. 2, 1995.

Table II-3. Raw Coal Production by Producer, 1950-1994 (continued)

2. Growth Over Previous Year									
Year	Centrally Administered State-Owned Mines	Local State-Owned Mines			Subtotal	Township & Village Mines	Private Mines *	Other Mines †	Total
		Provincial Mines	Prefectural Mines	County Mines					
1950	-	-	-	-	-	-	-	-	-
1951	23.1%	-	-	-	25.1%	-	-	-	23.7%
1952	30.4%	-	-	-	13.9%	-	-	-	25.4%
1953	7.7%	-	-	-	-3.3%	-	-	-	4.7%
1954	19.4%	-	-	-	21.8%	-	-	-	20.0%
1955	17.2%	-	-	-	18.7%	-	-	-	17.6%
1956	11.7%	-	-	-	13.7%	-	-	-	12.2%
1957	15.7%	-	-	-	26.3%	-	-	-	18.5%
1958	67.3%	-	-	-	114.6%	-	-	-	106.5%
1959	37.2%	-	-	-	59.0%	-17.6%	-	-	36.6%
1960	11.1%	-	-	-	8.4%	-21.4%	-	-	7.7%
1961	-27.0%	-	-	-	-24.3%	-100.0%	-	-	-30.1%
1962	-15.9%	-	-	-	-29.5%	-	-	-	-20.9%
1963	2.5%	-	-	-	-8.6%	-	-	-	-1.1%
1964	-0.5%	-	-	-	-2.7%	-	-	-	-1.2%
1965	9.1%	-	-	-	5.5%	-	-	-	8.0%
1966	10.0%	-	-	-	4.8%	-	-	-	8.5%
1967	-24.8%	-	-	-	-12.6%	-	-	-	-18.2%
1968	8.4%	-	-	-	-4.1%	62.5%	-	-	6.8%
1969	21.2%	-	-	-	17.0%	38.5%	-	-	21.1%
1970	27.0%	-	-	-	38.8%	72.2%	-	-	33.1%
1971	8.8%	-	-	-	18.1%	3.2%	-	-	10.8%
1972	1.1%	-	-	-	10.1%	12.5%	-	-	4.6%
1973	-0.6%	-	-	-	1.6%	16.7%	-	-	1.6%
1974	-2.0%	-	-	-	-7.0%	23.8%	-	-	-0.9%
1975	15.3%	-	-	-	22.7%	9.6%	-	-	16.7%
1976	-2.3%	-	-	-	-0.3%	14.0%	-	-	0.3%
1977	7.9%	-	-	-	21.8%	21.5%	-	-	13.9%
1978	15.8%	-	-	-	7.1%	10.1%	-	-	12.2%
1979	4.7%	-	-	-	-9.3%	22.2%	-	-	2.9%
1980	-3.7%	-5.2%	-5.2%	-6.0%	-5.4%	6.9%	-	-	-2.4%
1981	-2.7%	1.1%	-5.6%	-0.9%	-1.3%	11.4%	-	-	0.2%
1982	4.4%	5.1%	5.1%	9.2%	6.5%	15.4%	-	-	7.2%
1983	3.8%	11.2%	3.6%	2.7%	6.4%	16.4%	-	-	7.2%
1984	8.7%	-14.3%	6.0%	8.2%	-2.0%	27.5%	-	-	10.5%
1985	2.9%	-7.5%	9.1%	9.3%	2.9%	23.0%	-	-	10.5%
1986	1.9%	-2.4%	2.1%	-1.4%	-0.8%	4.0%	23.6%	-	2.5%
1987	1.5%	4.3%	-5.5%	0.0%	-0.1%	6.8%	38.8%	149.4%	3.8%
1988	3.4%	5.2%	8.8%	7.5%	7.0%	3.5%	34.1%	226.6%	5.6%
1989	5.5%	3.1%	7.5%	7.5%	6.0%	10.0%	13.2%	48.7%	7.6%
1990	4.8%	-3.0%	2.3%	0.4%	-0.2%	2.7%	0.6%	-51.4%	2.4%
1991	0.1%	-2.8%	1.0%	-0.3%	-0.7%	3.7%	-7.8%	-12.7%	0.7%
1992	0.4%	-10.7%	2.2%	6.1%	-0.4%	6.5%	12.1%	-12.9%	2.7%
1993	-5.1%	-4.6%	3.8%	1.8%	0.6%	12.9%	18.2%	31.0%	3.0%
1994	4.7%	-	-	-	-	-	-	-	5.4%

\* Private mines included in data for collective mines prior to 1985.

† Domestic and foreign joint venture mines.

Source: Yearbook of China's Coal Industry, various years; Energy in China, various years; China Energy Statistical Yearbook various years; Zhongguo Nengyuan (China Energy), 1995 no 2.

Table II-3. Raw Coal Production by Producer, 1950-1994 (continued)

3. Share of Total									
Year	Centrally Administered State-Owned Mines	Local State-Owned Mines <sup>S</sup>			Subtotal	Township & Village Mines	Private Mines *	Other Mines †	Total
		Provincial Mines	Prefectural Mines	County Mines					
1950	30.2	-	-	-	12.7	0.0	-	-	100%
1950	70.3%	-	-	-	29.7%	0.0%	-	-	100%
1951	70.0%	-	-	-	30.0%	0.0%	-	-	100%
1952	72.7%	-	-	-	27.3%	0.0%	-	-	100%
1953	74.8%	-	-	-	25.2%	0.0%	-	-	100%
1954	74.4%	-	-	-	25.6%	0.0%	-	-	100%
1955	74.2%	-	-	-	25.8%	0.0%	-	-	100%
1956	73.9%	-	-	-	26.1%	0.0%	-	-	100%
1957	72.1%	-	-	-	27.9%	0.0%	-	-	100%
1958	58.4%	-	-	-	29.0%	12.6%	-	-	100%
1959	58.7%	-	-	-	33.7%	7.6%	-	-	100%
1960	60.5%	-	-	-	33.9%	5.5%	-	-	100%
1961	63.2%	-	-	-	36.8%	0.0%	-	-	100%
1962	67.2%	-	-	-	32.8%	0.0%	-	-	100%
1963	69.7%	-	-	-	30.3%	0.0%	-	-	100%
1964	70.2%	-	-	-	29.8%	0.0%	-	-	100%
1965	70.9%	-	-	-	29.1%	0.0%	-	-	100%
1966	71.9%	-	-	-	28.1%	0.0%	-	-	100%
1967	66.1%	-	-	-	30.1%	3.9%	-	-	100%
1968	67.1%	-	-	-	27.0%	5.9%	-	-	100%
1969	67.1%	-	-	-	26.1%	6.8%	-	-	100%
1970	64.0%	-	-	-	27.2%	8.8%	-	-	100%
1971	62.9%	-	-	-	29.0%	8.2%	-	-	100%
1972	60.7%	-	-	-	30.5%	8.8%	-	-	100%
1973	59.4%	-	-	-	30.5%	10.1%	-	-	100%
1974	58.8%	-	-	-	28.7%	12.6%	-	-	100%
1975	58.1%	-	-	-	30.1%	11.8%	-	-	100%
1976	56.6%	-	-	-	30.0%	13.4%	-	-	100%
1977	53.6%	-	-	-	32.0%	14.3%	-	-	100%
1978	55.3%	-	-	-	30.6%	14.1%	-	-	100%
1979	56.3%	11.0%	7.1%	8.9%	27.0%	16.7%	-	-	100%
1980	55.5%	10.7%	6.9%	8.6%	26.1%	18.3%	-	-	100%
1981	53.9%	10.8%	6.5%	8.5%	25.7%	20.4%	-	-	100%
1982	52.5%	10.6%	6.4%	8.6%	25.6%	21.9%	-	-	100%
1983	50.8%	10.9%	6.2%	8.3%	25.4%	23.8%	-	-	100%
1984	50.0%	8.5%	5.9%	8.1%	22.5%	27.5%	-	-	100%
1985	46.6%	7.1%	5.8%	8.0%	21.0%	30.6%	1.9%	-	100%
1986	46.3%	6.8%	5.8%	7.7%	20.3%	31.0%	2.3%	0.1%	100%
1987	45.3%	6.8%	5.3%	7.4%	19.5%	31.9%	3.1%	0.2%	100%
1988	44.3%	6.8%	5.5%	7.6%	19.8%	31.3%	3.9%	0.7%	100%
1989	43.5%	6.5%	5.4%	7.6%	19.5%	32.0%	4.1%	1.0%	100%
1990	44.5%	6.2%	5.4%	7.4%	19.0%	32.1%	4.0%	0.5%	100%
1991	44.2%	5.9%	5.5%	7.3%	18.7%	33.0%	3.7%	0.4%	100%
1992	43.2%	5.2%	5.4%	7.6%	18.2%	34.3%	4.0%	0.3%	100%
1993	39.8%	4.8%	5.5%	7.5%	17.7%	37.4%	4.6%	0.4%	100%
1994	39.6%	-	-	-	-	-	-	-	100%

\* Private mines included in data for collective mines prior to 1985.

† Domestic and foreign joint venture mines

Source: Yearbook of China's Coal Industry, various years; Energy in China, various years; China Energy Statistical Yearbook various years; Zhongguo Nengyuan (China Energy), 1995 no 2.

Figure II-3. Raw Coal Production

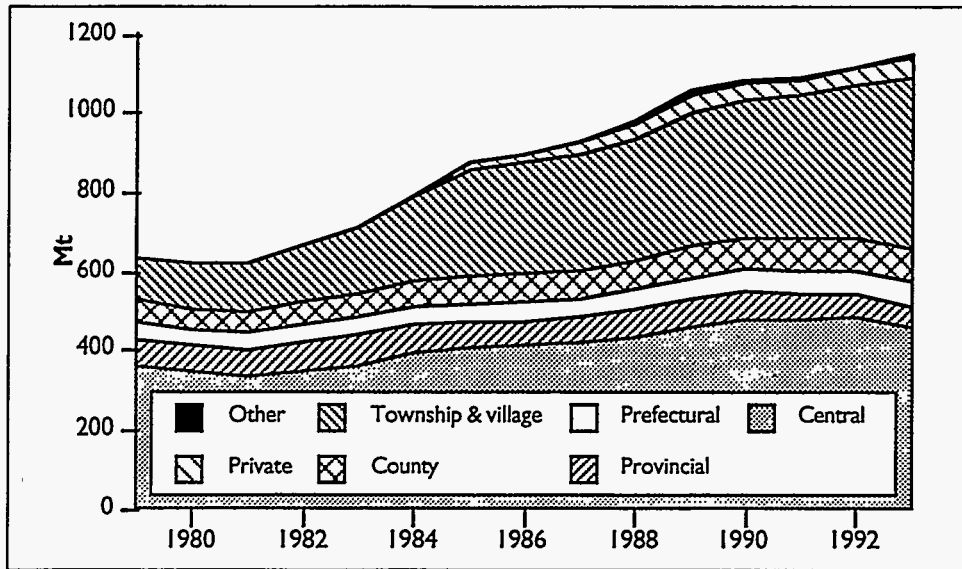


Figure II-4. Raw Coal Production by Producer

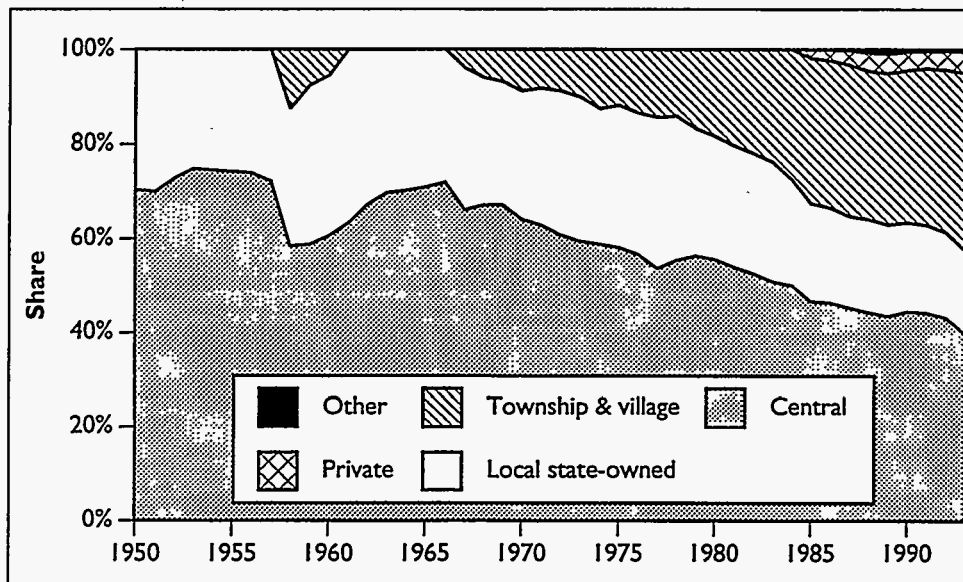
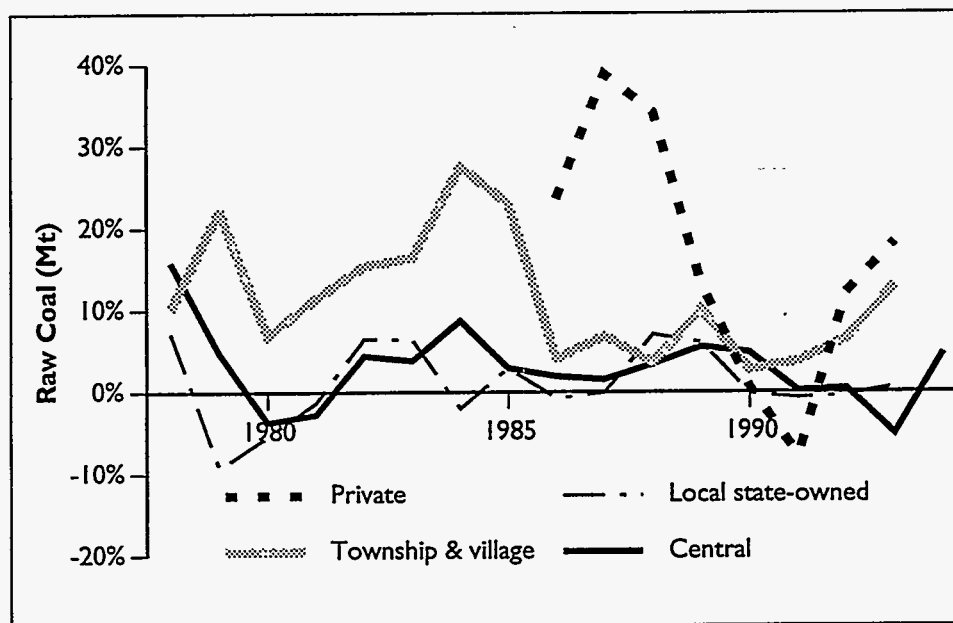


Figure II-5. Annual Growth in Coal Production by Producer



\*Included in the local state-owned category for 1990 and 1991.

Table II-4. Raw Coal Production by Type of Coal (Mt)

Year	Total	Bituminous Coal				All Hard Coal	Lignite and Brown Coal
		Subtotal	Coking Coal	Other Bitum.	Anthracite		
1952	53.96	46.16	11.36	34.80	7.72	53.88	0.08
1957	124.24	101.24	45.86	55.38	20.14	121.38	2.86
1965	231.80	183.38	106.73	76.65	39.59	222.97	8.83
1979	635.54	484.45	249.49	234.96	125.84	610.29	25.25
1980	620.15	466.86	308.33	158.53	128.97	595.83	24.31
1981	621.64	467.14	303.99	163.15	131.11	598.25	23.39
1982	666.33	502.31	331.14	171.17	139.05	641.36	24.97
1983	714.53	535.77	347.84	187.93	151.86	687.63	26.90
1984	789.23	589.40	373.82	215.58	169.72	759.12	30.11
1985	872.28	657.78	391.09	266.69	182.28	840.06	32.22
1986	894.04	677.27	415.71	261.56	184.75	862.02	32.02
1987	927.96	702.42	454.94	247.48	192.34	894.76	33.20
1988	979.88	740.56	462.72	277.84	202.61	943.17	36.70
1989	1,054.14	793.39	499.66	293.73	217.97	1,011.36	42.78
1990	1,079.88	821.53	512.77	308.76	212.85	1,034.38	45.50
1991	1,084.28	825.12	518.26	306.86	214.37	1,039.49	44.79
1992	1,114.55	846.32	527.46	318.86	220.96	1,067.28	47.27
1993*	1,149.00	-	-	-	-	1,055.00	94.00

\* From British Petroleum.

Source: China Energy Statistical Yearbook, 1989; Coal Industry Yearbooks, 1982 and 1990; British Petroleum, 1995.

Figure II-6. Raw Coal Production by Type of Coal

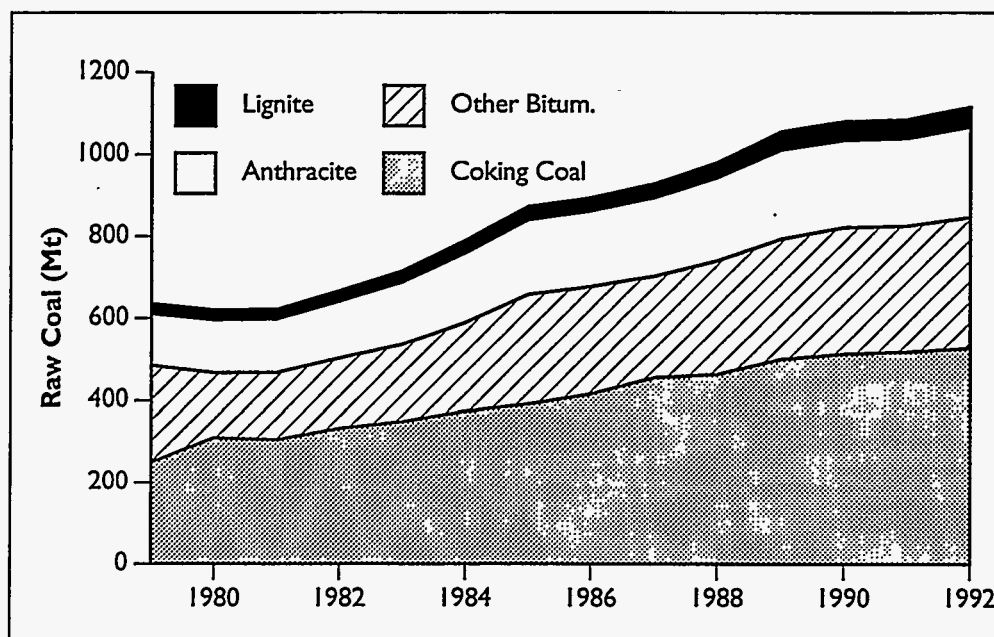


Table II-5. Characteristics of Chinese Steam Coal

I. Steam Coal Output and Characteristics by Mining Authority

Mining Authority	Coal Type	1992 Production (Mt)	1992 Capacity* (Mt/yr)	1991 Average Quality					
				Raw Coal		Commodity Coal			
				ash content, dry weight basis	gangue content	ash content, dry weight basis	gangue content	total water content	total sulfur content, dry weight basis
Datong	weakly caking	30.72	33.80	10.33%	1.96%	7.78%	0.08%	8.10%	0.75%
Pingshuo	gas coal	10.52	11.50	21.31%	0.00%	21.31%	0.00%	7.68%	0.95%
Beijing	anthracite	5.63	4.50	25.18%	8.70%	19.95%	0.10%	5.17%	0.26%
Xinglong	-	-	-	41.80%	-	41.85%	0.50%	6.29%	2.00%
Yangquan	anthracite	16.00	17.35	23.64%	6.96%	18.25%	0.05%	4.48%	1.28%
Jincheng	anthracite	10.85	9.10	19.12%	1.40%	16.46%	0.05%	5.77%	0.34%
Xishan	-	-	-	20.00%	2.45%	20.00%	-	7.02%	1.39%
Fuxin	long flame	11.18	10.14	17.86%	-	20.69%	0.01%	13.32%	0.92%
Tiefa	long flame	10.00	12.15	35.99%	1.78%	30.78%	0.30%	11.67%	0.56%
Shenyang	-	-	-	34.48%	1.76%	17.55%	0.65%	18.00%	0.45%
Shulan	-	-	-	30.22%	0.28%	30.19%	0.29%	19.89%	0.28%
Pingzhuang	brown coal	6.13	5.59	19.74%	2.10%	25.80%	0.06%	24.47%	1.18%
Jalai Nur	brown coal	6.13	4.63	15.54%	0.09%	13.63%	0.08%	32.87%	0.28%
Dayan	-	-	-	19.41%	1.74%	19.22%	0.14%	35.21%	0.41%
Huolin He	brown coal	3.97	10.00	23.51%	1.22%	23.77%	1.22%	32.80%	0.51%
Yiminhe	-	-	-	24.55%	1.07%	23.29%	1.10%	38.67%	0.18%
Zibo	lean coal	4.46	1.23	27.22%	0.03%	25.73%	0.03%	5.34%	2.43%
Longkou	-	-	-	14.80%	0.34%	14.81%	0.34%	24.90%	0.60%
Jiaozuo	anthracite	4.21	3.61	23.35%	6.33%	15.23%	-	8.65%	0.56%
Yima	long flame	8.23	6.00	25.50%	4.22%	25.50%	1.45%	16.80%	1.79%
Zhengzhou	anthr/lean	5.12	4.65	22.27%	2.36%	15.03%	2.50%	4.67%	0.34%
Furong	-	-	-	34.49%	4.41%	32.66%	0.14%	8.29%	3.68%
Songzao	-	-	-	26.90%	0.19%	25.92%	0.04%	6.24%	3.59%
Tongchuan	steam coal	5.94	6.86	28.45%	6.57%	23.46%	0.08%	3.94%	2.53%
Jiaojie	-	-	-	14.85%	4.85%	12.34%	0.11%	9.36%	4.90%
Jingyuan	non-caking	3.45	5.22	15.80%	5.66%	12.41%	0.20%	6.05%	0.44%
Lingwu	-	-	-	22.94%	1.22%	22.94%	1.22%	20.75%	0.00%
Hami	-	-	-	10.29%	-	8.38%	0.54%	14.88%	0.41%
Wuju	-	-	-	15.94%	0.20%	15.94%	0.20%	7.54%	0.98%

• Note that some mines are producing beyond their design capacities.

Source: China Energy Research Society, 1994



Table II-5. Characteristics of Chinese Steam Coal (continued)

**2. Average Commodity Steam Coal Quality and Output, 1992**

coal classification	total water content	water content, dry air basis	ash content, dry weight basis	volatile content, dry, ash-free basis	total sulfur content, dry weight basis	low heat content, as received (MJ/kg)	1992 output (Mt)
brown	30.80%	13.33%	28.62%	48.08%	0.51%	16.90	47.27
long flame	13.50%	7.02%	12.50%	42.26%	1.18%	22.34	87.15
non-caking	11.30%	4.74%	12.21%	32.58%	0.67%	26.79	13.70
weakly caking	9.00%	2.59%	9.40%	31.32%	0.74%	29.60	76.30
lean	5.40%	1.21%	27.83%	16.34%	2.20%	24.39	54.19
anthracite	6.30%	2.32%	20.55%	8.68%	1.07%	26.48	220.96
unclassified	-	-	-	-	-	-	87.07
weighted avg/ total	10.25%	4.12%	20.26%	23.23%	1.10%	25.16	586.64

Source: China Energy Research Society, 1994.

**Table II-6. Major Coal Mining Enterprises:  
Annual Production > 5 Million Tonnes of Raw Coal, 1980 and 1985-1992 \***

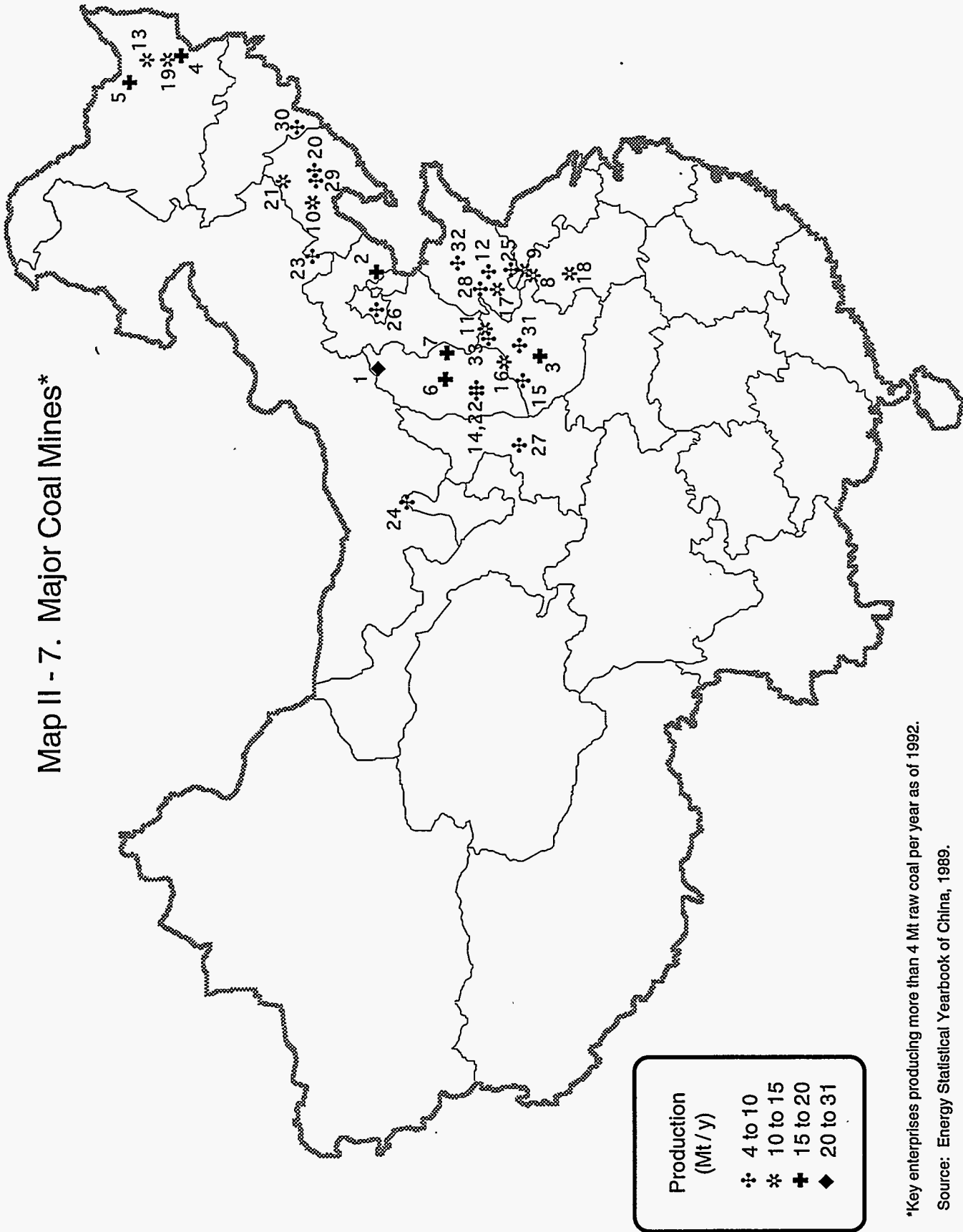
Name of Mine	Province	Annual Production (million tonnes of raw coal)									
		1980	1985	1986	1987	1988	1989	1990	1991	1992	
1	Datong	Shanxi	24.520	30.805	29.184	28.738	29.229	29.990	29.931	30.010	30.720
2	Kailuan	Hebei	19.287	16.663	18.496	18.809	17.524	17.962	17.821	17.250	17.270
3	Pingdingshan	Henan	13.651	15.966	16.683	17.236	17.434	17.613	17.499	17.800	18.180
4	Jixi	Heilongjiang	12.700	12.997	13.486	13.440	13.322	14.607	15.707	20.060	18.060
5	Hegang	Heilongjiang	12.732	14.298	14.477	14.586	14.451	14.750	15.708	17.520	17.400
6	Xishan	Shanxi	9.308	11.772	12.573	13.557	13.111	15.701	15.152	15.740	15.190
7	Yangquan	Shanxi	12.178	13.932	14.298	14.972	15.089	15.681	16.234	15.580	16.000
8	Huaipei	Anhui	13.284	14.247	14.350	14.278	14.096	14.147	14.187	13.630	14.240
9	Xuzhou	Jiangsu	12.558	12.830	12.479	12.639	12.517	12.923	13.165	13.810	13.400
10	Fuxin	Liaoning	11.749	11.500	11.235	11.043	10.945	10.862	11.024	12.770	13.100
11	Fengfeng	Hebei	10.312	11.305	11.356	11.491	11.540	11.575	11.455	11.000	10.780
12	Xinwen	Shandong	5.631	6.667	6.696	6.828	7.519	7.721	7.359	7.440	7.230
13	Shuangyashan	Heilongjiang	5.272	6.741	7.389	8.035	8.290	9.678	10.597	11.260	11.470
14	Lu'an	Shanxi	4.517	6.840	8.026	8.805	10.001	10.104	10.102	10.180	9.120
15	Yima	Henan	6.416	8.304	8.497	8.233	8.252	10.082	10.659	10.300	9.370
16	Jincheng	Shanxi	4.165	6.131	6.786	8.155	10.033	10.042	10.363	10.260	10.850
17	Yanzhou	Shandong	2.333	5.200	6.348	7.437	8.659	9.364	9.687	10.520	10.850
18	Huainan	Anhui	9.043	9.232	9.537	7.910	8.948	9.162	10.053	9.020	10.380
19	Qitaihe	Heilongjiang	3.250	4.834	5.426	6.511	7.119	7.567	7.965	10.210	10.040
20	Fushun	Liaoning	8.079	8.213	8.150	6.904	7.053	7.357	7.584	8.780	9.120
21	Tiefu	Liaoning	2.173	4.555	4.929	5.630	6.709	8.030	8.57	10.260	10.190
22	Fenxi	Shanxi	4.502	6.185	6.731	6.668	6.924	7.083	6.929	6.820	5.690
23	Pingzhuang	Liaoning	-	-	-	-	-	6.330	-	6.540	6.690
24	Shitanjing	Ningxia	5.379	5.780	5.806	5.905	6.216	6.319	7.19	6.600	6.170
25	Zaozhuang	Shandong	7.509	6.613	6.316	6.388	6.161	6.070	5.95	6.240	5.760
26	Beijing		6.202	5.975	5.709	5.890	5.966	6.135	6.022	5.930	5.630
27	Tongchuan	Shaanxi	6.684	7.059	6.997	6.515	5.857	5.855	6.146	6.200	5.940
28	Feicheng	Shandong	3.683	3.071	3.032	3.299	3.546	3.831	3.844	3.810	3.830
29	Shenyang	Liaoning	1.126	4.953	4.816	4.279	4.616	5.159	5.345	5.640	6.240
30	Tonghua	Jilin	4.563	4.006	3.842	4.119	4.172	4.229	4.308	5.500	4.900
31	Zhengzhou	Henan	-	-	-	-	-	5.107	-	5.350	5.120
32	Zibo	Shandong	5.223	4.398	4.268	3.967	4.195	4.424	4.531	3.980	4.460
33	Hebi	Henan	4.683	4.854	4.917	5.135	5.181	5.009	5.048	4.800	4.420
34	Antaibao	Shanxi	0	0	0	0	†	†	†	†	†

\* The listed mines are all key enterprises (large state-run projects).

† The Antaibao mine (in northern Shanxi near Datong) has a capacity of over 15 Mt/yr (steam coal), 12 Mt of which would be washed and 9 Mt of which would be export quality. The mine began production in 1988. Although output data are not available, it is reported that production was about 9 Mt in 1990 and 12 Mt in 1991.

Source: China Energy Statistical Yearbook, various years; Energy in China, various years; Coal Industry Yearbook, 1990; Martin Weil, The China Business Review, 1991; Energy Research Institute.

Map II - 7. Major Coal Mines\*



Production  
(Mt/y)

- ⋈ 4 to 10
- \* 10 to 15
- ⊕ 15 to 20
- ◆ 20 to 31

\*Key enterprises producing more than 4 Mt raw coal per year as of 1992.

Source: Energy Statistical Yearbook of China, 1989.

**Table II-7. Mining Deaths**

<b>Year</b>	<b>Centrally Administered State-Owned Mines</b>	<b>Locally Administered State-Owned Mines</b>	<b>Rural Mines</b>	<b>Other Mines *</b>	<b>Total</b>
<b>1. Deaths from all mining accidents (persons)</b>					
1992	-	-	-	-	4,481
1993	1,634	926	2,476	-	5,036
<b>2. Production (Mt)</b>					
1992	483	203	427	4	1,116
1993	458	204	483	5	1,150
<b>3. Deaths per million tons mined</b>					
1992	-	-	-	-	4.01
1993	3.57	4.54	5.13	-	4.38

\* Domestic and foreign joint venture mines.

Source: China Energy Statistical Yearbook, various years; Zhongguo Nengyuan [China Energy], no. 2, 1993; China Energy Research Society.

Table II-8. Net Coal Production by Province, 1990

Planning Region	Province	Raw Coal Production (Mt)	Coal Consumption (Mt)	Balance * (Mt)
North	Beijing	9.06	23.1	-14.05
	Tianjin	†	17.3	†
	Hebei	64.34	77.6	-13.26
	Shanxi	246.48	72.5	174.03
	Inner Mongolia	37.35	34.0	3.40
Northeast	Liaoning	45.89	79.3	-33.4
	Jilin	22.28	36.2	-13.93
	Heilongjiang	71.72	55.9	15.81
East	Shanghai	†	24.7	†
	Jiangsu	23.32	60.7	-37.4
	Zhejiang	1.43	23.4	-21.96
	Anhui	30.52	31.6	-1.05
	Fujian	8.46	12.1	-3.64
	Jiangxi	20.49	23.2	-2.72
	Shandong	55.59	64.7	-9.13
South-Central	Henan	82.45	62.7	19.71
	Hubei	10.01	33.7	-23.68
	Hunan	35.62	41.1	-5.47
	Guangdong	9.28	22.8	-13.47
	Guangxi	10.35	15.0	-4.61
	Hainan	0.01	†	†
Southwest	Sichuan	67.07	66.8	0.26
	Guizhou	32.10	23.9	8.19
	Yunnan	20.55	21.0	-0.49
	Xizang	0.01	†	†
Northwest	Shaanxi	27.65	25.5	2.12
	Gansu	13.58	17.1	-3.51
	Qinghai	2.68	4.5	-1.78
	Ningxia	13.28	7.3	6.01
	Xinjiang	18.13	16.0	2.17
National Total ¶		979.88	993.5	-13.66
Balance ¥		0.18	0.04	-

- No attempt is made here to account for losses in coal transportation or processing
- † Not available. In the cases of Tianjin and Shanghai it can probably be assumed that coal production is negligible compared to consumption.
- ¶ The difference between national production and consumption is the result not only of losses in transportation and processing, but also reflects net exports of coal and net additions to or withdrawals from stockpiles.
- ¥ Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total.

Source: China Energy Statistical Yearbook, 1991.

Table II-9. Coke Production, 1949-1994—Mt

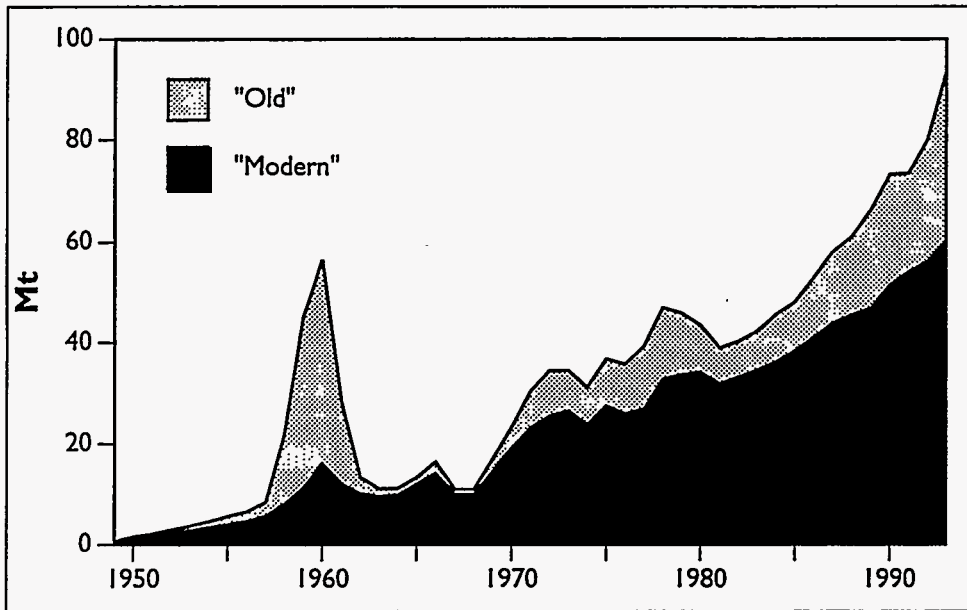
Year	Total	"Modern" *	"Antique" †	"Modern" Coke as % of Total
1949	0.54	0.53	0.01	98.1%
1950	1.50	1.29	0.21	86.0%
1951	2.03	1.69	0.34	83.3%
1952	2.89	2.22	0.67	76.8%
1953	3.55	2.78	0.77	78.3%
1954	4.50	3.34	1.16	74.2%
1955	5.48	3.90	1.58	71.2%
1956	6.37	4.56	1.81	71.6%
1957	8.30	5.55	2.75	66.9%
1958	21.74	8.03	13.71	36.9%
1959	45.04	11.24	33.80	25.0%
1960	56.47	16.10	40.37	28.5%
1961	28.09	12.03	16.06	42.8%
1962	13.42	10.10	3.32	75.3%
1963	11.06	9.55	1.51	86.3%
1964	11.13	9.80	1.33	88.1%
1965	13.33	12.03	1.30	90.2%
1966	16.34	14.19	2.15	86.8%
1967	11.02	10.19	0.83	92.5%
1968	10.98	10.05	0.93	91.5%
1969	16.76	14.50	2.26	86.5%
1970	23.30	19.16	4.14	82.2%
1971	30.23	23.12	7.11	76.5%
1972	34.37	25.36	9.01	73.8%
1973	34.51	26.51	8.00	76.8%
1974	31.04	23.76	7.28	76.5%
1975	36.80	27.39	9.41	74.4%
1976	35.70	25.86	9.84	72.4%
1977	39.29	26.83	12.46	68.3%
1978	46.90	32.69	14.21	69.7%
1979	45.83	33.54	12.29	73.2%
1980	43.43	34.05	9.38	78.4%
1981	38.95	31.72	7.23	81.4%
1982	40.19	33.11	7.08	82.4%
1983	42.20	34.51	7.69	81.8%
1984	45.57	36.15	9.42	79.3%
1985	48.02	38.36	9.66	79.9%
1986	52.76	40.93	11.83	77.6%
1987	57.95	43.75	14.20	75.5%
1988	61.08	45.42	15.66	74.4%
1989	66.24	46.75	19.49	70.6%
1990	73.28	51.30	21.98	70.0%
1991	73.52	53.96	19.56	73.4%
1992	79.84	56.00	23.84	70.1%
1993	93.20	60.11	33.09	64.5%
1994	-	67.29	-	-

\* "Modern" coke is coke produced in industrial coke ovens.

† "Antique" coke is coke produced in clay or dirt kilns (usually by rural enterprises), which are much dirtier and more inefficient than industrial coke ovens.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Zhongguo Nengyuan [China Energy], no. 2, 1995; Energy Research Institute.

Figure II-7. Coke Production



**Table II-10. Coking Coal Used in Coke Production, 1980-1992—Mt**

<b>Year</b>	<b>Coking Coal Production</b>	<b>Used for Coking</b>	<b>Used for Other Purposes</b>	<b>Coke Production</b>	<b>% Coking Coal Used for Coke</b>
1980	308.33	66.82	241.51	43.43	21.7%
1981	303.99	59.09	244.90	38.95	19.4%
1982	331.14	60.77	270.37	40.19	18.4%
1983	347.84	63.94	283.91	42.20	18.4%
1984	373.82	69.63	304.19	45.57	18.6%
1985	391.09	73.04	318.05	48.02	18.7%
1986	415.71	80.57	335.14	52.76	19.4%
1987	454.94	87.66	367.28	57.95	19.3%
1988	462.72	88.79	373.93	61.08	19.2%
1989	499.66	96.31	403.35	66.24	19.3%
1990	512.77	106.98	405.79	73.28	20.9%
1991	518.26	108.61	409.65	73.52	21.0%
1992	527.46	112.82	414.64	79.84	21.4%

Source: China Energy Statistical Yearbook, various years.



Table II-11. Production of Washed Coal, 1949-1993

Year	Raw Coal Input to Coal Washing* (Mt)	Percentage of Total Production Washed	Washed Coal Output (Mt)		
			Washed Coking Coal	Other Washed Coal	Losses and Middlings † (Mt)
1949	-	-	0.68	-	-
1950	-	-	1.94	-	-
1951	-	-	1.58	-	-
1952	-	-	2.77	-	-
1953	5.91	8%	3.87	-	2.04
1954	11.12	13%	5.19	-	5.93
1955	16.40	17%	7.10	-	9.30
1956	18.84	17%	8.51	-	10.33
1957	21.11	16%	9.16	-	11.95
1958	28.52	11%	14.65	-	13.87
1959	44.98	12%	26.13	-	18.85
1960	53.33	13%	41.27	-	12.06
1961	34.05	12%	24.03	-	10.02
1962	30.94	14%	15.71	-	15.23
1963	29.45	14%	14.56	-	14.89
1964	32.91	15%	14.71	-	18.20
1965	40.56	17%	18.47	-	22.09
1966	48.44	19%	20.41	-	28.03
1967	36.31	18%	16.48	-	19.83
1968	24.04	11%	15.74	-	8.30
1969	34.91	13%	21.47	-	13.44
1970	49.31	14%	29.57	-	19.74
1971	78.05	20%	37.43	-	40.62
1972	88.04	21%	39.81	-	48.23
1973	84.23	20%	40.16	-	44.07
1974	79.61	19%	35.99	-	43.62
1975	92.67	19%	44.38	-	48.29
1976	84.00	17%	40.73	-	43.27
1977	89.63	16%	44.44	-	45.19
1978	113.17	18%	53.97	-	59.20
1979	116.12	18%	54.89	-	61.23
1980	114.22	18%	53.82	6.48	53.92
1981	112.54	18%	51.59	6.73	54.22
1982	122.62	18%	53.01	8.20	61.41
1983	126.88	18%	56.29	8.28	62.31
1984	133.99	17%	60.17	10.81	63.01
1985	142.94	16%	66.77	1.60	74.57
1986	152.70	17%	68.54	1.33	82.83
1987	163.28	18%	70.25	2.05	90.98
1988	171.17	17%	74.33	0.99	95.85
1989	181.11	17%	80.37	0.94	99.80
1990	191.14	18%	84.08	1.58	105.48
1991	196.82	18%	81.37	-	115.45
1992	193.13	17%	77.42	-	115.71
1993	209.24	18%	76.15	-	133.09

\* Data are for key enterprises only, and so represent the majority of input, but still less than total input.

† Figures are the differences between input and output. Since input is for key enterprises only and output is more nearly a national total, these figures should be considered lower bounds to coal washing losses. Figures for 1953-1979 include "other washed coal". Note that 1991 figure is not comparable to previous years.

Source: China Energy Statistical Yearbook, various years; Yearbook of China's Coal Industry, various years; China Statistical Yearbook, various years; Energy in China, various years; China Energy Annual Review, 1994.

Figure II-8. Washed Coal Output

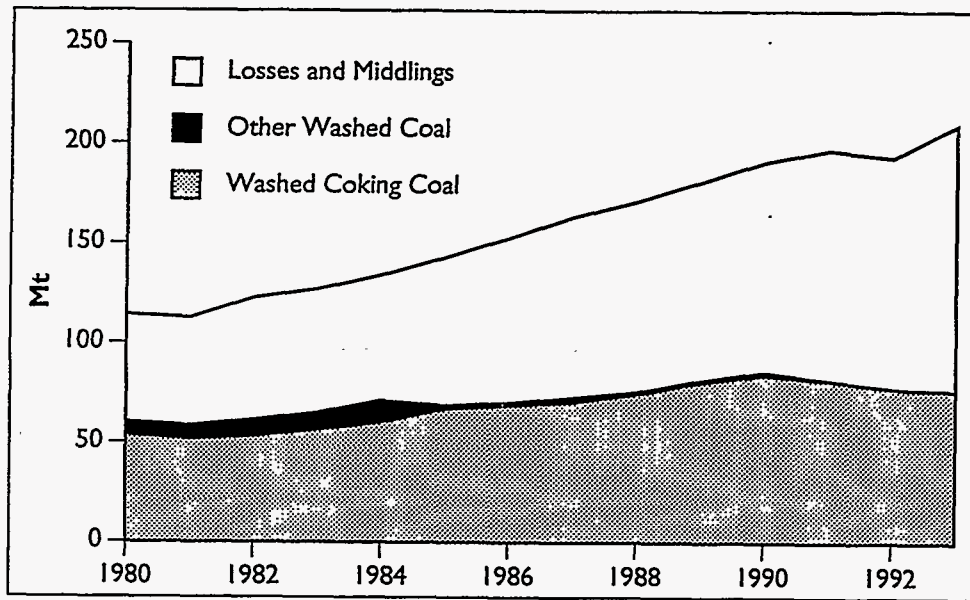


Figure II-9. Washed Coal & Total Raw Coal Production

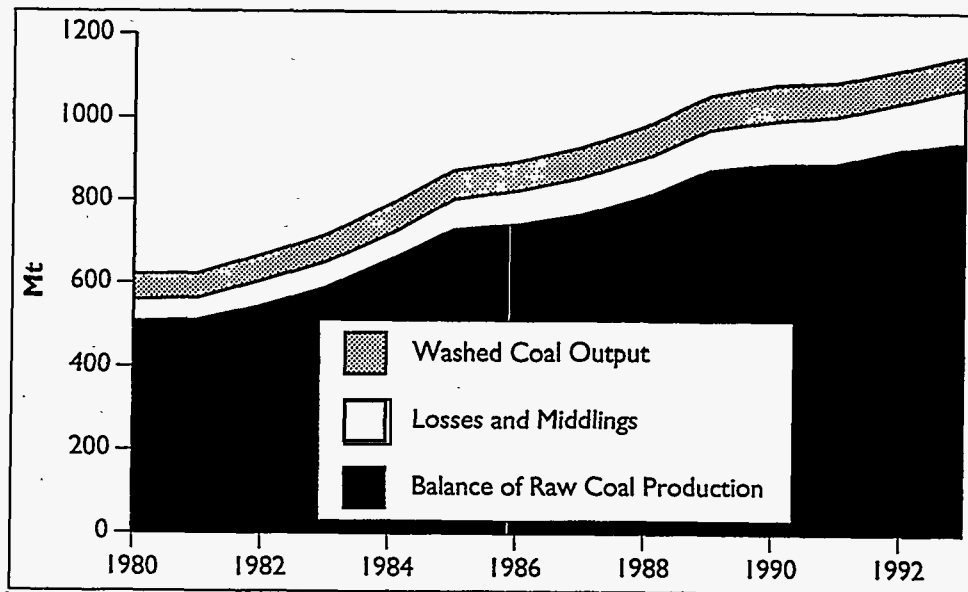


Table II-12. Coal Gas Production, \* 1980-1992

Year	Coal Input to Coal Gasification † (Mt)	Coke Input to Coal Gasification (Mt)	Coal Gas (million cubic meters)			Coal Gas (Mtce) ¶		
			From Coking			From Coking		
			Ovens	Other	Subtotal	Ovens	Other	Subtotal
1980	1.31	0.79	10.65	1.17	11.82	6.28	0.69	6.97
1981	1.37	0.80	10.74	1.30	12.04	6.34	0.77	7.10
1982	1.40	0.82	10.69	1.72	12.41	6.31	1.01	7.32
1983	1.48	0.89	11.89	1.52	13.41	7.02	0.90	7.91
1984	1.62	1.02	12.05	1.56	13.61	7.11	0.92	8.03
1985	1.91	0.99	13.19	1.64	14.83	7.78	0.97	8.75
1986	2.43	0.82	16.36	3.37	19.73	9.65	1.99	11.64
1987	2.24	0.19	15.53	4.21	19.74	9.16	2.48	11.65
1988	2.79	0.39	15.98	4.76	20.74	9.43	2.81	12.24
1989	3.69	0.39	16.72	5.99	22.71	9.86	3.53	13.40
1990	3.60	0.68	17.48	5.83	23.31	10.31	3.44	13.75
1991	3.73	-	-	-	24.00	-	-	14.16
1992	4.67	-	-	-	30.00	-	-	17.70

\* Figures in italics are estimates.

† Includes raw and washed coal. Sum is uncorrected for the different heat values of raw and washed coal.

¶ Coking coal gas is assigned a heat value of 0.59 tce/thousand cubic meters, and other coal gas is assigned a value of 0.58 tce/thousand cubic meters. These are central values for a range of figures for different types of coal gas produced in coking ovens and by other processes.

Source: China Energy Statistical Yearbook, various years; Yearbook of China's Coal Industry, various years; China Statistical Yearbook, various years.

Table II-13. Crude Oil Production by Oilfield, 1950-1994

I. Thousand Barrels per Day *										
Year	Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Jilin	Henan	Changqing
1950	-	-	-	-	-	2	-	-	-	-
1951	-	-	-	-	-	3	-	-	-	-
1952	-	-	-	-	-	2	-	-	-	-
1953	-	-	-	-	-	2	-	-	-	-
1954	-	-	-	-	-	2	-	-	-	-
1955	-	-	-	-	-	2	-	-	-	-
1956	-	-	-	-	-	2	-	-	-	-
1957	-	-	-	-	-	3	-	-	-	-
1958	-	-	-	-	-	14	-	-	-	-
1959	-	-	-	-	-	27	-	-	-	-
1960	16	-	-	-	-	32	-	-	-	-
1961	22	-	-	-	-	38	-	-	-	-
1962	40	1	-	-	-	34	-	-	-	-
1963	53	6	-	-	-	27	-	-	-	-
1964	68	12	-	-	-	61	-	-	-	-
1965	85	15	-	-	-	80	-	-	-	-
1966	108	40	-	-	-	86	2	-	-	-
1967	116	53	-	-	-	52	4	-	-	-
1968	124	65	-	-	-	43	8	-	-	-
1969	257	78	-	-	-	49	10	-	-	-
1970	353	90	3	-	-	29	19	-	-	-
1971	443	130	15	-	-	26	33	-	-	-
1972	459	144	31	-	-	44	38	-	-	-
1973	566	176	44	-	-	39	60	-	-	-
1974	680	240	57	-	-	26	82	-	-	-
1975	845	300	81	-	-	25	87	-	-	-
1976	864	331	60	80	-	16	82	-	-	-
1977	940	364	55	200	-	41	75	-	-	-
1978	1,000	380	77	220	-	55	68	-	-	-
1979	1,010	405	82	240	-	68	62	-	-	-
1980	1,038	401	90	226	-	82	55	-	-	-
1981	1,039	324	100	210	-	81	51	-	-	-
1982	1,039	327	106	227	43	81	58	-	-	-
1983	1,047	367	122	211	61	85	56	-	-	-
1984	1,079	463	154	205	98	91	64	-	-	-
1985	1,106	554	181	207	103	99	64	-	-	-
1986	1,116	593	201	201	127	110	79	-	-	-
1987	1,116	635	228	160	137	115	84	-	-	-
1988	1,119	669	253	123	145	124	85	-	52	-
1989	1,116	670	268	110	140	129	82	68	51	29
1990	1,118	673	273	107	127	137	77	71	51	29
1991	1,117	674	275	101	123	141	76	68	48	31
1992	1,118	672	278	96	116	147	78	69	46	33
1993	1,123	657	285	92	110	153	81	67	43	36
1994	1,125	621	302	93	97	159	85	66	41	39

\* 1 tonne crude oil = 7.33 barrels. Because a different source was used, total production figures for 1950-1985 differ slightly from the figures in Table II-1.

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

I. Thousand Barrels per Day * (continued)											
Qinghai	Yumen	Turpan- Hami	Tarim	Jiangsu	Jiangnan	Jidong	Sichuan	Qing- qian-gui	Offshore†	Others	Total
-	-	-	-	-	-	-	-	-	-	2	4
-	-	-	-	-	-	-	-	-	-	3	6
-	-	-	-	-	-	-	-	-	-	7	9
-	-	-	-	-	-	-	-	-	-	11	12
-	-	-	-	-	-	-	-	-	-	14	16
-	-	-	-	-	-	-	-	-	-	18	19
-	-	-	-	-	-	-	-	-	-	21	23
-	-	-	-	-	-	-	-	-	-	26	29
-	-	-	-	-	-	-	-	-	-	31	45
-	-	-	-	-	-	-	-	-	-	47	74
-	-	-	-	-	-	-	-	-	-	52	100
-	-	-	-	-	-	-	-	-	-	50	110
-	-	-	-	-	-	-	-	-	-	45	120
-	-	-	-	-	-	-	-	-	-	43	130
-	-	-	-	-	-	-	-	-	-	40	180
-	-	-	-	-	-	-	-	-	-	51	230
-	-	-	-	-	-	-	-	-	-	54	290
-	-	-	-	-	-	-	-	-	-	56	280
-	-	-	-	-	-	-	-	-	-	61	301
-	-	-	-	-	-	-	-	-	-	87	480
-	-	-	-	-	-	-	-	-	-	105	600
-	-	-	-	-	-	-	-	-	-	133	780
-	-	-	-	-	-	-	-	-	-	186	902
-	-	-	-	-	-	-	-	-	-	205	1,090
-	-	-	-	-	-	-	-	-	-	230	1,315
-	-	-	-	-	-	-	-	-	-	152	1,490
-	-	-	-	-	-	-	-	-	-	241	1,675
-	-	-	-	-	-	-	-	-	-	199	1,874
-	-	-	-	-	-	-	-	-	-	282	2,082
-	-	-	-	-	-	-	-	-	-	255	2,122
-	-	-	-	-	-	-	-	-	-	228	2,120
-	-	-	-	-	-	-	-	-	-	207	2,012
-	-	-	-	-	-	-	-	-	-	164	2,045
-	-	-	-	-	-	-	-	-	-	171	2,120
-	-	-	-	-	-	-	-	-	-	149	2,302
-	-	-	-	-	-	-	-	-	6	159	2,480
-	-	-	-	-	-	-	-	-	8	191	2,625
-	-	-	-	-	-	-	-	-	14	206	2,694
-	-	-	-	-	-	-	2	-	15	167	2,752
15	11	-	-	16	19	-	2	-	19	20	2,764
16	11	-	-	17	17	7	3	2	29	14	2,778
20	14	-	-	17	15	7	3	2	48	51	2,831
21	22	-	18	17	15	8	3	-	78	12	2,848
22	9	23	32	17	16	9	3	3	93	36	2,910
23	9	28	39	18	17	9	3	2	130	57	2,965

\* 1 tonne crude oil = 7.33 barrels. Because a different source was used, total production figures for 1950-1985 differ slightly from the figures in Table II-1.

† Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

2. Growth over Previous Years

Year	Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Jilin	Henan	Changqing
1951	-	-	-	-	-	44%	-	-	-	-
1952	-	-	-	-	-	-44%	-	-	-	-
1953	-	-	-	-	-	2%	-	-	-	-
1954	-	-	-	-	-	-4%	-	-	-	-
1955	-	-	-	-	-	-5%	-	-	-	-
1956	-	-	-	-	-	1%	-	-	-	-
1957	-	-	-	-	-	86%	-	-	-	-
1958	-	-	-	-	-	326%	-	-	-	-
1959	-	-	-	-	-	92%	-	-	-	-
1960	-	-	-	-	-	19%	-	-	-	-
1961	36%	-	-	-	-	19%	-	-	-	-
1962	85%	-	-	-	-	-10%	-	-	-	-
1963	33%	597%	-	-	-	-20%	-	-	-	-
1964	28%	86%	-	-	-	123%	-	-	-	-
1965	25%	23%	-	-	-	31%	-	-	-	-
1966	27%	172%	-	-	-	8%	-	-	-	-
1967	7%	31%	-	-	-	-40%	100%	-	-	-
1968	7%	24%	-	-	-	-17%	100%	-	-	-
1969	107%	19%	-	-	-	14%	25%	-	-	-
1970	38%	16%	-	-	-	-40%	92%	-	-	-
1971	25%	44%	429%	-	-	-10%	71%	-	-	-
1972	4%	11%	112%	-	-	64%	16%	-	-	-
1973	23%	22%	40%	-	-	-10%	58%	-	-	-
1974	20%	36%	29%	-	-	-33%	37%	-	-	-
1975	24%	25%	43%	-	-	-3%	5%	-	-	-
1976	2%	10%	-26%	-	-	-35%	-5%	-	-	-
1977	9%	10%	-9%	149%	-	150%	-8%	-	-	-
1978	6%	4%	40%	10%	-	33%	-9%	-	-	-
1979	1%	7%	7%	9%	-	25%	-10%	-	-	-
1980	3%	-1%	10%	-6%	-	20%	-11%	-	-	-
1981	0%	-19%	10%	-7%	-	-1%	-7%	-	-	-
1982	0%	1%	6%	8%	-	-1%	14%	-	-	-
1983	1%	12%	15%	-7%	40%	6%	-4%	-	-	-
1984	3%	26%	26%	-3%	61%	6%	14%	-	-	-
1985	3%	20%	17%	1%	6%	10%	1%	-	-	-
1986	1%	7%	11%	-3%	22%	11%	23%	-	-	-
1987	0%	7%	13%	-20%	8%	5%	7%	-	-	-
1988	0%	5%	11%	-23%	6%	7%	1%	-	-	-
1989	0%	0%	6%	-10%	-3%	4%	-3%	-	-1%	-
1990	0%	0%	2%	-2%	-10%	6%	-6%	4%	-1%	2%
1991	0%	0%	1%	-6%	-3%	3%	-1%	-4%	-5%	5%
1992	0%	0%	1%	-4%	-5%	4%	2%	0%	-3%	7%
1993	0%	-2%	3%	-4%	-5%	4%	4%	-2%	-7%	10%
1994	0%	-6%	6%	1%	-12%	4%	5%	-1%	-4%	9%

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

2. Growth over Previous Years (continued)

Qinghai	Yumen	Turpan- Hami	Tarim	Jiangsu	Jiangnan	Jidong	Sichuan	Qing- qian-gui	Offshore *	Others	Total
-	-	-	-	-	-	-	-	-	-	64%	53%
-	-	-	-	-	-	-	-	-	-	147%	43%
-	-	-	-	-	-	-	-	-	-	54%	43%
-	-	-	-	-	-	-	-	-	-	32%	27%
-	-	-	-	-	-	-	-	-	-	26%	22%
-	-	-	-	-	-	-	-	-	-	22%	20%
-	-	-	-	-	-	-	-	-	-	20%	25%
-	-	-	-	-	-	-	-	-	-	18%	53%
-	-	-	-	-	-	-	-	-	-	54%	66%
-	-	-	-	-	-	-	-	-	-	11%	36%
-	-	-	-	-	-	-	-	-	-	-4%	10%
-	-	-	-	-	-	-	-	-	-	-11%	9%
-	-	-	-	-	-	-	-	-	-	-4%	8%
-	-	-	-	-	-	-	-	-	-	-8%	39%
-	-	-	-	-	-	-	-	-	-	28%	27%
-	-	-	-	-	-	-	-	-	-	7%	26%
-	-	-	-	-	-	-	-	-	-	4%	-3%
-	-	-	-	-	-	-	-	-	-	9%	7%
-	-	-	-	-	-	-	-	-	-	43%	60%
-	-	-	-	-	-	-	-	-	-	21%	25%
-	-	-	-	-	-	-	-	-	-	26%	30%
-	-	-	-	-	-	-	-	-	-	40%	16%
-	-	-	-	-	-	-	-	-	-	10%	21%
-	-	-	-	-	-	-	-	-	-	12%	21%
-	-	-	-	-	-	-	-	-	-	-34%	13%
-	-	-	-	-	-	-	-	-	-	58%	12%
-	-	-	-	-	-	-	-	-	-	-17%	12%
-	-	-	-	-	-	-	-	-	-	42%	11%
-	-	-	-	-	-	-	-	-	-	-10%	2%
-	-	-	-	-	-	-	-	-	-	-11%	0%
-	-	-	-	-	-	-	-	-	-	-9%	-5%
-	-	-	-	-	-	-	-	-	-	-21%	2%
-	-	-	-	-	-	-	-	-	-	4%	4%
-	-	-	-	-	-	-	-	-	-	-13%	9%
-	-	-	-	-	-	-	-	-	-	7%	8%
-	-	-	-	-	-	-	-	-	33%	20%	6%
-	-	-	-	-	-	-	-	-	90%	8%	3%
-	-	-	-	-	-	-	-	-	5%	-19%	2%
-	-	-	-	-	-	-	4%	-	26%	-88%	0%
11%	2%	-	-	7%	-11%	-	6%	-	51%	-31%	0%
26%	27%	-	-	1%	-12%	6%	5%	9%	67%	-	2%
3%	56%	-	-	-1%	4%	4%	2%	-	62%	-	1%
3%	-59%	-	80%	1%	6%	11%	8%	-	20%	-	2%
4%	-3%	-	22%	7%	7%	8%	3%	-	40%	-	2%

\* Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

3. Shares of Total Production										
Year	Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Jilin	Henan	Changqing
1950	-	-	-	-	-	58%	-	-	-	-
1951	-	-	-	-	-	55%	-	-	-	-
1952	-	-	-	-	-	21%	-	-	-	-
1953	-	-	-	-	-	15%	-	-	-	-
1954	-	-	-	-	-	12%	-	-	-	-
1955	-	-	-	-	-	9%	-	-	-	-
1956	-	-	-	-	-	8%	-	-	-	-
1957	-	-	-	-	-	11%	-	-	-	-
1958	-	-	-	-	-	31%	-	-	-	-
1959	-	-	-	-	-	36%	-	-	-	-
1960	16%	-	-	-	-	32%	-	-	-	-
1961	20%	-	-	-	-	35%	-	-	-	-
1962	33%	1%	-	-	-	29%	-	-	-	-
1963	41%	5%	-	-	-	21%	-	-	-	-
1964	38%	7%	-	-	-	34%	-	-	-	-
1965	37%	6%	-	-	-	35%	-	-	-	-
1966	37%	14%	-	-	-	30%	1%	-	-	-
1967	41%	19%	-	-	-	18%	1%	-	-	-
1968	41%	22%	-	-	-	14%	3%	-	-	-
1969	53%	16%	-	-	-	10%	2%	-	-	-
1970	59%	15%	0%	-	-	5%	3%	-	-	-
1971	57%	17%	2%	-	-	3%	4%	-	-	-
1972	51%	16%	3%	-	-	5%	4%	-	-	-
1973	52%	16%	4%	-	-	4%	6%	-	-	-
1974	52%	18%	4%	-	-	2%	6%	-	-	-
1975	57%	20%	5%	-	-	2%	6%	-	-	-
1976	52%	20%	4%	5%	-	1%	5%	-	-	-
1977	50%	19%	3%	11%	-	2%	4%	-	-	-
1978	48%	18%	4%	11%	-	3%	3%	-	-	-
1979	48%	19%	4%	11%	-	3%	3%	-	-	-
1980	49%	19%	4%	11%	-	4%	3%	-	-	-
1981	52%	16%	5%	10%	-	4%	3%	-	-	-
1982	51%	16%	5%	11%	2%	4%	3%	-	-	-
1983	49%	17%	6%	10%	3%	4%	3%	-	-	-
1984	47%	20%	7%	9%	4%	4%	3%	-	-	-
1985	45%	22%	7%	8%	4%	4%	3%	-	-	-
1986	43%	23%	8%	8%	5%	4%	3%	-	-	-
1987	41%	24%	8%	6%	5%	4%	3%	-	-	-
1988	41%	24%	9%	4%	5%	4%	3%	-	1.9%	-
1989	40%	24%	10%	4%	5%	5%	3%	2.5%	1.9%	1.0%
1990	40%	24%	10%	4%	5%	5%	3%	2.6%	1.8%	1.1%
1991	39%	24%	10%	4%	4%	5%	3%	2.4%	1.7%	1.1%
1992	39%	24%	10%	3%	4%	5%	3%	2.4%	1.6%	1.2%
1993	39%	23%	10%	3%	4%	5%	3%	2.3%	1.5%	1.2%
1994	38%	21%	10%	3%	3%	5%	3%	2.2%	1.4%	1.3%

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.



Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

3. Shares of Total Production (continued)

Qinghai	Yumen	Turpan-Hami	Tarim	Jiangsu	Jiangnan	Jidong	Sichuan	Qing-qian-gui	Offshore *	Others	Total
-	-	-	-	-	-	-	-	-	-	42%	100%
-	-	-	-	-	-	-	-	-	-	45%	100%
-	-	-	-	-	-	-	-	-	-	79%	100%
-	-	-	-	-	-	-	-	-	-	85%	100%
-	-	-	-	-	-	-	-	-	-	88%	100%
-	-	-	-	-	-	-	-	-	-	91%	100%
-	-	-	-	-	-	-	-	-	-	92%	100%
-	-	-	-	-	-	-	-	-	-	89%	100%
-	-	-	-	-	-	-	-	-	-	69%	100%
-	-	-	-	-	-	-	-	-	-	64%	100%
-	-	-	-	-	-	-	-	-	-	52%	100%
-	-	-	-	-	-	-	-	-	-	46%	100%
-	-	-	-	-	-	-	-	-	-	37%	100%
-	-	-	-	-	-	-	-	-	-	33%	100%
-	-	-	-	-	-	-	-	-	-	22%	100%
-	-	-	-	-	-	-	-	-	-	22%	100%
-	-	-	-	-	-	-	-	-	-	19%	100%
-	-	-	-	-	-	-	-	-	-	20%	100%
-	-	-	-	-	-	-	-	-	-	20%	100%
-	-	-	-	-	-	-	-	-	-	18%	100%
-	-	-	-	-	-	-	-	-	-	18%	100%
-	-	-	-	-	-	-	-	-	-	17%	100%
-	-	-	-	-	-	-	-	-	-	21%	100%
-	-	-	-	-	-	-	-	-	-	19%	100%
-	-	-	-	-	-	-	-	-	-	17%	100%
-	-	-	-	-	-	-	-	-	-	10%	100%
-	-	-	-	-	-	-	-	-	-	14%	100%
-	-	-	-	-	-	-	-	-	-	11%	100%
-	-	-	-	-	-	-	-	-	-	14%	100%
-	-	-	-	-	-	-	-	-	-	12%	100%
-	-	-	-	-	-	-	-	-	-	11%	100%
-	-	-	-	-	-	-	-	-	-	10%	100%
-	-	-	-	-	-	-	-	-	-	8%	100%
-	-	-	-	-	-	-	-	-	-	8%	100%
-	-	-	-	-	-	-	-	-	-	6%	100%
-	-	-	-	-	-	-	-	-	0.2%	6%	100%
-	-	-	-	-	-	-	-	-	0.3%	7%	100%
-	-	-	-	-	-	-	-	-	0.5%	8%	100%
0.5%	0.4%	-	-	0.6%	0.7%	-	0.1%	-	0.5%	6%	100%
0.6%	0.4%	-	-	0.6%	0.6%	0.3%	0.1%	-	0.7%	1%	100%
0.7%	0.5%	-	-	0.6%	0.5%	0.3%	0.1%	0.1%	1.0%	0.5%	100%
0.7%	0.8%	-	0.6%	0.6%	0.5%	0.3%	0.1%	-	1.7%	2%	100%
0.7%	0.3%	0.8%	1.1%	0.6%	0.6%	0.3%	0.1%	0.1%	2.7%	0.4%	100%
0.8%	0.3%	1.0%	1.3%	0.6%	0.6%	0.3%	0.1%	0.1%	3.2%	1%	100%
0.8%	0.3%	1.0%	1.3%	0.6%	0.6%	0.3%	0.1%	0.1%	4.4%	2%	100%

\* Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

4. Million Tonnes *										
Year	Daqing	Shengli	Liaohu	Huabei	Zhongyuan	Xinjiang	Dagang	Jilin	Henan	Changqing
1950	-	-	-	-	-	0.11	-	-	-	-
1951	-	-	-	-	-	0.17	-	-	-	-
1952	-	-	-	-	-	0.09	-	-	-	-
1953	-	-	-	-	-	0.09	-	-	-	-
1954	-	-	-	-	-	0.09	-	-	-	-
1955	-	-	-	-	-	0.09	-	-	-	-
1956	-	-	-	-	-	0.09	-	-	-	-
1957	-	-	-	-	-	0.16	-	-	-	-
1958	-	-	-	-	-	0.70	-	-	-	-
1959	-	-	-	-	-	1.33	-	-	-	-
1960	0.79	-	-	-	-	1.59	-	-	-	-
1961	1.08	-	-	-	-	1.89	-	-	-	-
1962	1.99	0.05	-	-	-	1.70	-	-	-	-
1963	2.65	0.32	-	-	-	1.36	-	-	-	-
1964	3.39	0.59	-	-	-	3.04	-	-	-	-
1965	4.23	0.73	-	-	-	3.97	-	-	-	-
1966	5.38	1.99	-	-	-	4.29	0.10	-	-	-
1967	5.78	2.61	-	-	-	2.57	0.20	-	-	-
1968	6.17	3.24	-	-	-	2.15	0.40	-	-	-
1969	12.78	3.86	-	-	-	2.44	0.50	-	-	-
1970	17.59	4.48	0.14	-	-	1.46	0.96	-	-	-
1971	22.05	6.47	0.74	-	-	1.32	1.63	-	-	-
1972	22.88	7.17	1.56	-	-	2.17	1.89	-	-	-
1973	28.18	8.76	2.19	-	-	1.95	2.99	-	-	-
1974	33.86	11.95	2.82	-	-	1.30	4.10	-	-	-
1975	42.08	14.94	4.03	-	-	1.27	4.32	-	-	-
1976	43.04	16.48	2.99	3.99	-	0.82	4.09	-	-	-
1977	46.81	18.13	2.73	9.96	-	2.05	3.75	-	-	-
1978	49.80	18.92	3.82	10.95	-	2.73	3.41	-	-	-
1979	50.29	20.17	4.09	11.95	-	3.41	3.07	-	-	-
1980	51.68	19.97	4.50	11.23	-	4.09	2.73	-	-	-
1981	51.75	16.11	4.97	10.47	-	4.05	2.55	-	-	-
1982	51.73	16.29	5.29	11.31	2.15	4.01	2.90	-	-	-
1983	52.14	18.29	6.08	10.51	3.02	4.25	2.78	-	-	-
1984	53.72	23.07	7.67	10.23	4.87	4.51	3.17	-	-	-
1985	55.10	27.60	9.00	10.30	5.15	4.95	3.19	-	-	-
1986	55.55	29.51	10.01	10.00	6.30	5.50	3.91	-	-	-
1987	55.55	31.60	11.35	7.95	6.80	5.75	4.17	-	-	-
1988	55.70	33.30	12.58	6.12	7.22	6.15	4.22	-	2.57	-
1989	55.56	33.36	13.35	5.48	6.98	6.40	4.08	3.41	2.55	1.43
1990	55.66	33.51	13.60	5.35	6.30	6.80	3.83	3.55	2.52	1.47
1991	55.62	33.55	13.70	5.01	6.10	7.02	3.81	3.41	2.38	1.54
1992	55.66	33.46	13.85	4.80	5.80	7.30	3.90	3.42	2.30	1.64
1993	55.90	32.70	14.20	4.60	5.50	7.60	4.05	3.35	2.13	1.80
1994	56.01	30.90	15.02	4.64	4.83	7.90	4.25	3.30	2.05	1.96

1 tonne crude oil = 7.33 barrels. Because a different source was used, total production figures for 1950-1985 differ slightly from the figures in Table II-1, Primary Production.

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Table II-13. China's Crude Oil Production by Oilfield, 1950-1994 (continued)

4. Million Tonnes (continued)

Qinghai	Yumen	Turpan-Hami	Tarim	Jiangsu	Jiangnan	Jidong	Sichuan	Qing-qian-gui	Offshore*	Others	Total
-	-	-	-	-	-	-	-	-	-	0.08	0.20
-	-	-	-	-	-	-	-	-	-	0.14	0.30
-	-	-	-	-	-	-	-	-	-	0.34	0.43
-	-	-	-	-	-	-	-	-	-	0.52	0.62
-	-	-	-	-	-	-	-	-	-	0.70	0.79
-	-	-	-	-	-	-	-	-	-	0.88	0.96
-	-	-	-	-	-	-	-	-	-	1.07	1.16
-	-	-	-	-	-	-	-	-	-	1.29	1.45
-	-	-	-	-	-	-	-	-	-	1.52	2.22
-	-	-	-	-	-	-	-	-	-	2.35	3.68
-	-	-	-	-	-	-	-	-	-	2.61	4.99
-	-	-	-	-	-	-	-	-	-	2.51	5.48
-	-	-	-	-	-	-	-	-	-	2.23	5.98
-	-	-	-	-	-	-	-	-	-	2.14	6.47
-	-	-	-	-	-	-	-	-	-	1.97	8.99
-	-	-	-	-	-	-	-	-	-	2.52	11.45
-	-	-	-	-	-	-	-	-	-	2.68	14.44
-	-	-	-	-	-	-	-	-	-	2.78	13.94
-	-	-	-	-	-	-	-	-	-	3.02	14.98
-	-	-	-	-	-	-	-	-	-	4.33	23.90
-	-	-	-	-	-	-	-	-	-	5.25	29.88
-	-	-	-	-	-	-	-	-	-	6.63	38.84
-	-	-	-	-	-	-	-	-	-	9.27	44.94
-	-	-	-	-	-	-	-	-	-	10.20	54.28
-	-	-	-	-	-	-	-	-	-	11.44	65.48
-	-	-	-	-	-	-	-	-	-	7.56	74.20
-	-	-	-	-	-	-	-	-	-	11.98	83.39
-	-	-	-	-	-	-	-	-	-	9.90	93.32
-	-	-	-	-	-	-	-	-	-	14.04	103.67
-	-	-	-	-	-	-	-	-	-	12.68	105.67
-	-	-	-	-	-	-	-	-	-	11.35	105.56
-	-	-	-	-	-	-	-	-	-	10.29	100.19
-	-	-	-	-	-	-	-	-	-	8.15	101.83
-	-	-	-	-	-	-	-	-	-	8.50	105.57
-	-	-	-	-	-	-	-	-	-	7.40	114.64
-	-	-	-	-	-	-	-	-	0.28	7.93	123.49
-	-	-	-	-	-	-	-	-	0.38	9.54	130.69
-	-	-	-	-	-	-	-	-	0.71	10.26	134.14
-	-	-	-	-	-	-	0.12	-	0.75	8.31	137.05
0.73	0.54	-	-	0.80	0.93	-	0.12	-	0.95	0.99	137.65
0.81	0.55	-	-	0.86	0.83	0.35	0.13	0.09	1.43	0.68	138.31
1.02	0.69	-	-	0.87	0.73	0.37	0.14	0.10	2.39	2.54	140.99
1.06	1.08	-	0.89	0.86	0.77	0.39	0.14	-	3.87	0.62	141.80
1.08	0.45	1.15	1.60	0.86	0.81	0.43	0.15	0.14	4.63	1.77	144.92
1.13	0.43	1.41	1.95	0.92	0.87	0.46	0.16	0.12	6.48	2.85	147.65

1 tonne crude oil = 7.33 barrels. Because a different source was used, total production figures for 1950-1985 differ slightly from the figures in Table II-1, Primary Production.

Source: Yearbook of China's Economy, various years; China National Offshore Oil Corporation; China Energy Statistical Yearbook, various years; China, Energy Annual Review, 1994; China National Petroleum Corporation.

Figure II-10. Crude Oil Production Growth Rates, Shengli, Daqing, and Total

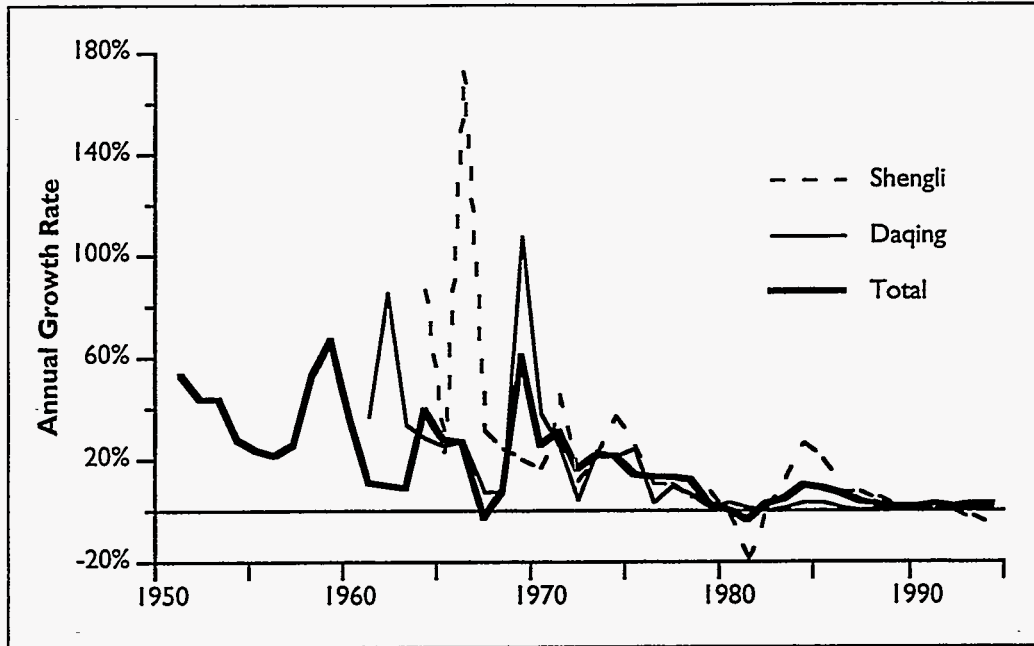


Figure II-11. Crude Oil Production Shares by Field

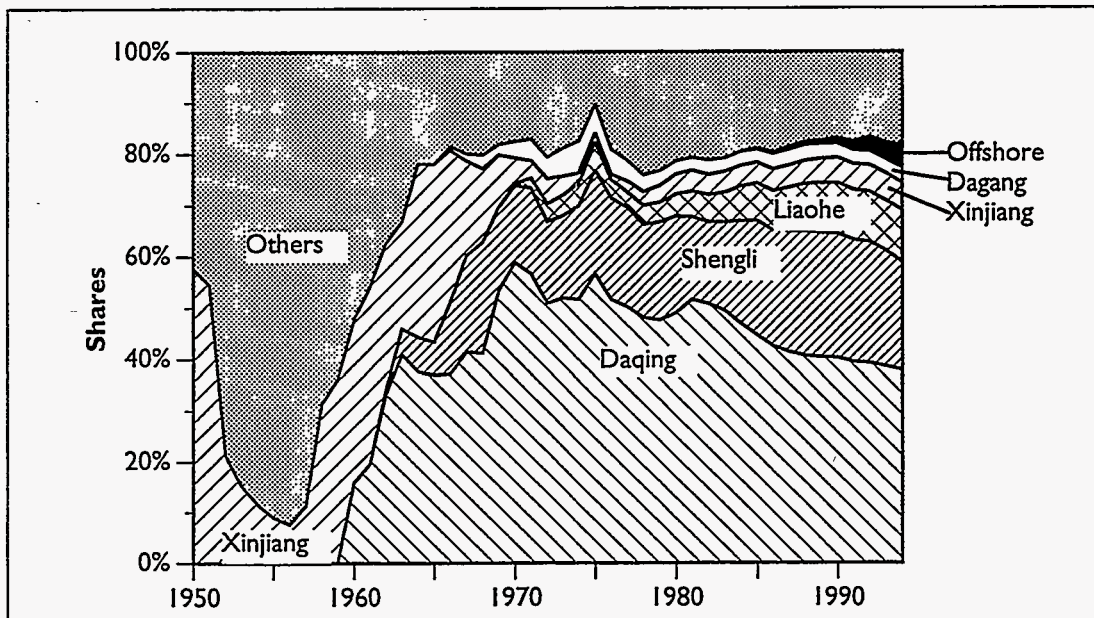


Figure II-12. Crude Oil Production by Field

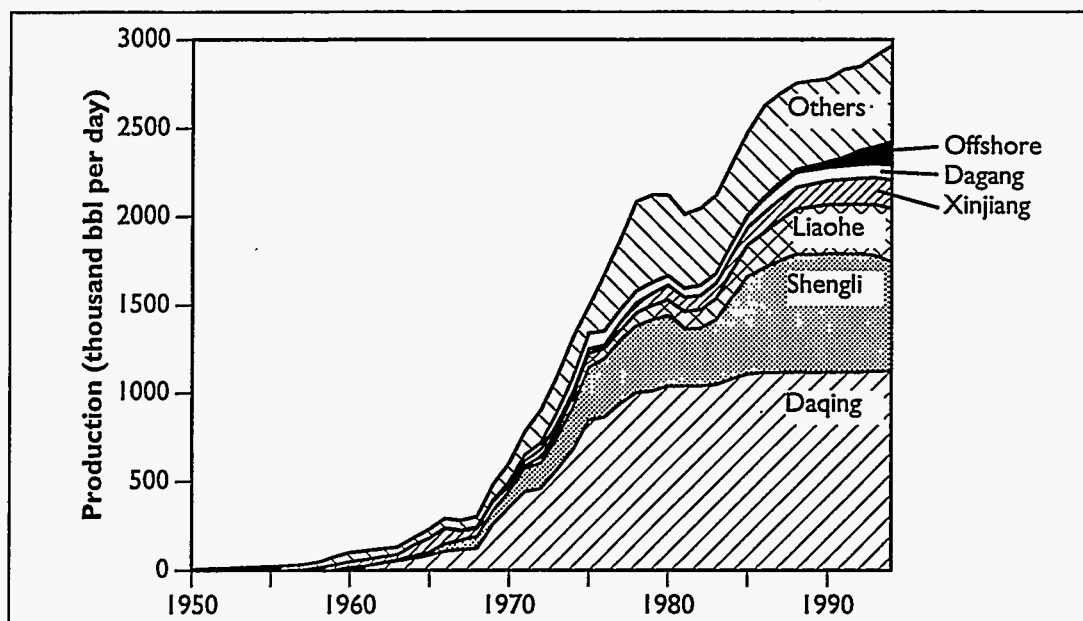


Table II-14. Selected Technical Indicators of Crude Oil Production, 1970-1992

Year	Oilfield Self-Use * (%)	Oilfield Crude Losses (%)	Total (%)	Crude Production (Mt)	Oilfield Use & Loss (Mt)	Electricity Consumption † (kWh/tonne)
1970	1.34%	1.89%	3.23%	29.88	0.97	-
1971	1.01%	2.12%	3.13%	38.84	1.22	-
1972	1.22%	2.90%	4.12%	44.94	1.85	32.70
1973	1.34%	2.55%	3.89%	54.28	2.11	24.60
1974	1.22%	2.64%	3.86%	65.48	2.53	24.70
1975	1.25%	2.93%	4.18%	74.20	3.10	25.73
1976	1.68%	2.58%	4.26%	83.39	3.55	28.80
1977	1.56%	2.65%	4.21%	93.32	3.93	32.55
1978	1.74%	2.37%	4.11%	103.67	4.26	35.01
1979	1.84%	2.49%	4.33%	105.67	4.58	40.82
1980	1.64%	2.27%	3.91%	105.56	4.13	38.84
1981	1.54%	2.30%	3.84%	100.19	3.85	39.82
1982	1.50%	2.29%	3.79%	101.83	3.86	42.96
1983	1.50%	2.30%	3.80%	105.57	4.01	45.08
1984	1.46%	2.03%	3.49%	114.64	4.00	47.24
1985	1.52%	1.65%	3.17%	123.49	3.91	51.58
1986	1.55%	1.57%	3.12%	130.69	4.08	53.39
1987	1.64%	1.55%	3.19%	134.14	4.28	64.50
1988	1.70%	1.90%	3.60%	137.05	4.93	73.27
1989	1.82%	1.76%	3.58%	137.65	4.93	78.75
1990	2.01%	1.80%	3.81%	138.31	5.27	87.97
1991	2.10%	1.80%	3.90%	140.99	5.50	102.62
1992	2.15%	1.80%	3.95%	141.80	5.60	107.05

\* Sometimes referred to as "autoconsumption."

† Electricity consumed per tonne of crude oil produced; does not include refinery consumption.

Source: China Statistical Yearbook, various years; Yearbook of China's Industrial Economy, various years.

Table II-15. Petroleum Products, 1973-1994—Mt

Year	Crude Oil Input	Gasoline	Kerosene/ Jet Fuel	Diesel Oil	Fuel Oil *	LPG	"Refinery Gas"	Chemical Feedstock †	Lubricants
1973	-	5.74	2.41	10.40	-	-	-	-	-
1974	-	6.63	2.61	11.79	-	-	-	-	-
1975	-	7.37	2.90	13.24	-	-	-	-	-
1976	-	8.16	2.94	14.89	-	-	-	-	-
1977	-	8.67	3.17	16.16	-	-	-	-	-
1978	70.69	9.91	3.56	18.26	-	-	-	-	-
1979	71.46	10.70	4.09	18.73	-	-	-	-	-
1980	75.38	10.79	3.99	18.28	31.42	1.23	-	2.79	1.97
1981	74.76	11.12	3.67	17.78	28.18	1.11	2.02	3.43	1.50
1982	75.33	11.14	3.84	17.46	27.99	1.24	1.88	4.19	1.40
1983	80.41	12.64	4.10	19.04	28.97	1.50	1.98	4.63	1.34
1984	82.51	13.50	4.08	19.47	28.57	1.54	2.18	4.88	1.47
1985	85.89	14.72	4.05	20.23	28.36	1.60	2.18	4.92	1.58
1986	92.60	16.85	4.16	22.31	29.58	2.02	2.43	4.65	1.64
1987	97.75	17.37	4.18	23.66	31.31	2.15	2.53	6.69	2.02
1988	102.39	18.93	3.85	24.60	32.19	2.32	2.59	7.05	2.10
1989	106.62	20.68	3.95	25.82	32.38	2.55	2.71	7.58	2.11
1990	109.61	21.57	3.93	26.09	32.68	2.62	2.81	7.85	1.97
1991	116.15	24.04	4.02	28.53	31.00	2.79	-	8.01	2.03
1992	124.00	27.26	4.06	31.71	32.32	3.08	-	8.33	2.19
1993	132.57	31.60	3.93	35.43	30.47	3.69	-	8.15	2.19
1994	132.04	28.41	3.70	34.24	27.92	-	-	-	2.10

\* Includes refinery use.

† Includes middle distillates and naphtha (currently about 60% and 40% respectively).

¶ This is the balance of product subtotal (refinery inputs minus and refinery losses) and reported products.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Sinopec Yearbook, 1991; China Energy Annual Review, 1994; China OGP, 2/15/94; Energy Research Institute.

Table II-15. Petroleum Products, 1973-1994—Mt (continued)

Year	Asphalt	Petroleum Coke	Wax	Solvents	Aromatics	Commercial Feedstocks	Other/ Balance†‡	Refining Losses	Product Subtotal
1981	1.74	-	-	-	-	-	3.52	0.69	74.07
1982	-	-	-	-	-	-	5.59	0.60	74.73
1983	1.77	0.87	0.47	0.34	0.71	0.81	0.52	0.73	79.69
1984	2.09	0.96	0.50	0.43	0.73	0.99	0.45	0.67	81.84
1985	2.38	0.92	0.56	0.43	0.90	1.41	0.51	1.13	84.76
1986	2.57	1.05	0.58	0.48	0.97	1.16	0.69	1.47	91.13
1987	2.65	1.17	0.62	0.50	0.94	1.26	-1.01	1.72	96.03
1988	2.18	1.22	0.67	0.47	1.20	1.76	-0.54	1.81	100.58
1989	2.63	1.29	0.69	0.47	1.13	1.62	-0.79	1.82	104.80
1990	2.73	1.36	0.69	0.51	1.22	1.99	-1.36	2.96	106.65
1991	3.12	1.58	0.67	0.50	-	2.54	4.41	2.91	113.24
1992	3.43	1.65	0.69	0.55	-	2.91	0.66	5.15	118.86
1993	3.27	1.88	0.72	0.48	-	3.29	-	-	-
1994	-	-	-	-	-	-	-	-	-

\* Includes refinery use.

† Includes middle distillates and naphtha (currently about 60% and 40% respectively).

‡ This is the balance of product subtotal (refinery inputs minus and refinery losses) and reported products.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Sinopec Yearbook, 1991; China Energy Annual Review, 1994; China OGP, 2/15/94; Energy Research Institute.



Figure II-13. Petroleum Refinery Output

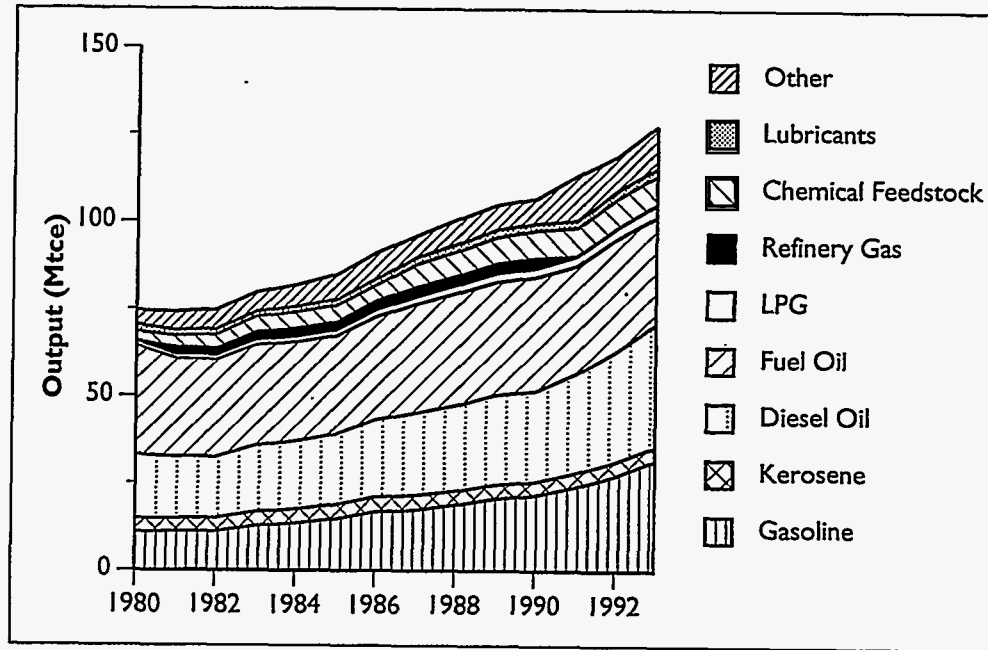


Table II-16. Natural Gas Production by Source, 1949-1994

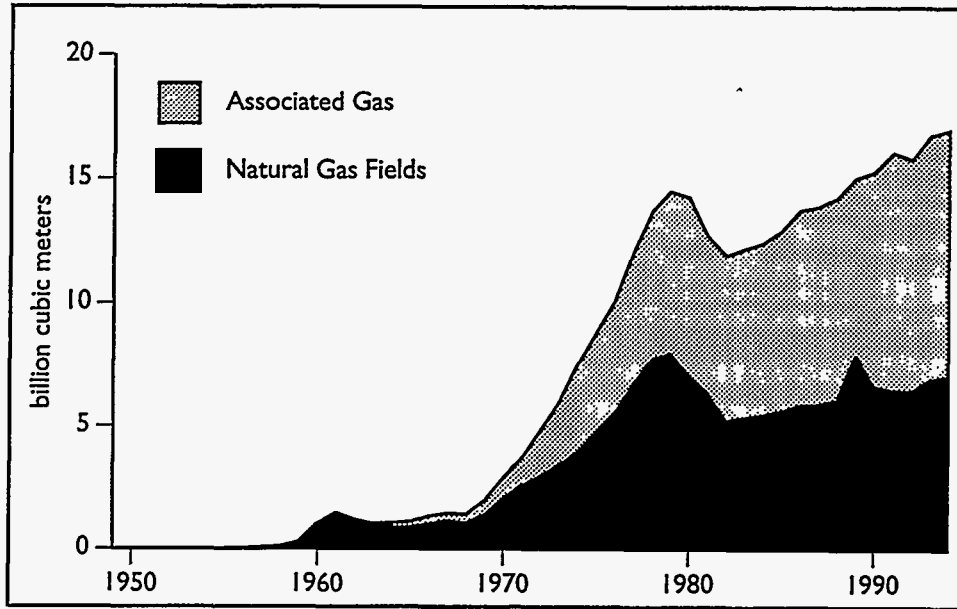
Year	Natural Gas Production (billion cubic meters)			Natural Gas from NG Fields as % of Total
	Total	Natural Gas Fields *	Associated Gas †	
1949	0.007	0.006	0.001	86%
1950	0.007	0.006	0.001	86%
1951	0.003	0.002	0.001	67%
1952	0.008	0.006	0.002	75%
1953	0.011	0.008	0.003	73%
1954	0.015	0.011	0.004	73%
1955	0.017	0.012	0.005	71%
1956	0.026	0.021	0.005	81%
1957	0.070	0.063	0.007	90%
1958	0.110	0.085	0.025	77%
1959	0.290	0.252	0.038	87%
1960	1.040	1.015	0.025	98%
1961	1.470	1.438	0.032	98%
1962	1.210	1.152	0.058	95%
1963	1.020	0.944	0.076	93%
1964	1.060	0.913	0.147	86%
1965	1.100	0.898	0.202	82%
1966	1.340	1.034	0.306	77%
1967	1.460	1.159	0.301	79%
1968	1.400	1.055	0.345	75%
1969	1.960	1.396	0.564	71%
1970	2.870	2.028	0.842	71%
1971	3.740	2.594	1.146	69%
1972	4.840	2.977	1.863	62%
1973	5.980	3.446	2.534	58%
1974	7.530	3.975	3.555	53%
1975	8.850	4.767	4.083	54%
1976	10.100	5.558	4.542	55%
1977	12.120	6.746	5.374	56%
1978	13.730	7.770	5.960	57%
1979	14.510	7.980	6.530	55%
1980	14.270	7.050	7.220	49%
1981	12.740	6.370	6.370	50%
1982	11.930	5.250	6.680	44%
1983	12.210	5.380	6.830	44%
1984	12.430	5.480	6.950	44%
1985	12.930	5.640	7.290	44%
1986	13.760	5.890	7.870	43%
1987	13.894	5.904	7.990	42%
1988	14.264	6.097	8.167	43%
1989	15.049	7.930	7.119	53%
1990	15.298	6.655	8.643	44%
1991	16.073	6.480	9.593	40%
1992	15.788	-	-	-
1993	16.765	-	-	-
1994	16.972	7.067	9.906	42%

\* Virtually all of this is from natural gas fields in Sichuan

† Most other natural gas production comes from six large oil fields. In 1991 the Daqing, Shengli, Liaohe, Zhongyuan, Xinjiang, and Dagang oilfields produced 2.32, 1.31, 1.75, 1.20, 0.83, and 0.40 billion cubic meters respectively, a total of 7.81 billion cubic meters, or four fifths of associated gas production.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; *Zhongguo Nengyuan* [China Energy], 1995, no.2; China National Petroleum Corporation.

Figure II-14. Natural Gas Production



\*For 1989 and 1990 only aggregate data were available, so production breakdown was estimated using 1988 production shares.

Table II-17. Gross Electricity Generation, 1949-1994

Year	Total		Hydroelectric		Percentage Share of Total
	Generation (TWh)	Growth Rate (% over previous year)	Generation (TWh)	Growth Rate (% over previous year)	
1949	4.3	-	0.7	-	16.3%
1950	4.6	7.0%	0.8	14.3%	17.4%
1951	5.7	23.9%	0.9	12.5%	15.8%
1952	7.3	28.1%	1.3	44.4%	17.8%
1953	9.2	26.0%	1.5	15.4%	16.3%
1954	11.0	19.6%	2.2	46.7%	20.0%
1955	12.3	11.8%	2.4	9.1%	19.5%
1956	16.6	35.0%	3.5	45.8%	21.1%
1957	19.3	16.3%	4.8	37.1%	24.9%
1958	27.5	42.5%	4.1	-14.6%	14.9%
1959	42.3	53.8%	4.4	7.3%	10.4%
1960	59.4	40.4%	7.4	68.2%	12.5%
1961	48.0	-19.2%	7.4	0.0%	15.4%
1962	45.8	-4.6%	9.0	21.6%	19.7%
1963	49.0	7.0%	8.7	-3.3%	17.8%
1964	56.0	14.3%	10.6	21.8%	18.9%
1965	67.6	20.7%	10.4	-1.9%	15.4%
1966	82.5	22.0%	12.6	21.2%	15.3%
1967	77.4	-6.2%	13.1	4.0%	16.9%
1968	71.6	-7.5%	11.5	-12.2%	16.1%
1969	94.0	31.3%	16.0	39.1%	17.0%
1970	115.9	23.3%	20.5	28.1%	17.7%
1971	138.4	19.4%	25.1	22.4%	18.1%
1972	152.4	10.1%	28.8	14.7%	18.9%
1973	166.8	9.4%	38.9	35.1%	23.3%
1974	168.8	1.2%	41.4	6.4%	24.5%
1975	195.8	16.0%	47.6	15.0%	24.3%
1976	203.1	3.7%	45.6	-4.2%	22.5%
1977	223.4	10.0%	47.6	4.4%	21.3%
1978	256.6	14.9%	44.6	-6.3%	17.4%
1979	282.0	9.9%	50.1	12.3%	17.8%
1980	300.6	6.6%	58.2	16.2%	19.4%
1981	309.3	2.9%	65.5	12.5%	21.2%
1982	327.7	5.9%	74.4	13.6%	22.7%
1983	351.4	7.2%	86.4	16.1%	24.6%
1984	377.0	7.3%	86.8	0.5%	23.0%
1985	410.7	8.9%	92.4	6.5%	22.5%
1986	449.6	9.5%	94.5	2.3%	21.0%
1987	497.3	10.6%	100.0	5.8%	20.1%
1988	545.2	9.6%	109.2	9.2%	20.0%
1989	584.8	7.3%	118.3	8.3%	20.2%
1990	621.2	6.2%	126.7	7.1%	20.4%
1991	677.5	9.1%	124.7	-1.6%	18.4%
1992	753.9	11.3%	130.7	4.8%	17.3%
1993	839.5	11.4%	151.8	16.1%	18.1%
1994	909.0	8.3%	170.4	12.2%	18.7%

N.B.: The figures for total and fossil gross generation for 1988 and 1989 are each 0.1 TWh higher than in previous versions of the *Databook* because they were revised to conform with State Statistical Bureau data rather than former Ministry of Energy data.

Source: Energy in China, various years; China Statistical Yearbook, various years; China Energy Annual Review, 1994; China Energy Research Society, 1994; State Statistical Bureau.

Table II-17. Gross Electricity Generation, 1949-1994 (continued)

Year	Fossil Fuel			Nuclear		
	Generation (TWh)	Growth Rate (% over previous year)	Percentage Share of Total	Generation (TWh)	Growth Rate (% over previous year)	Percentage Share of Total
1949	3.6	-	83.7%	-	-	-
1950	3.8	5.6%	82.6%	-	-	-
1951	4.8	26.3%	84.2%	-	-	-
1952	6.0	25.0%	82.2%	-	-	-
1953	7.7	28.3%	83.7%	-	-	-
1954	8.8	14.3%	80.0%	-	-	-
1955	9.9	12.5%	80.5%	-	-	-
1956	13.1	32.3%	78.9%	-	-	-
1957	14.5	10.7%	75.1%	-	-	-
1958	23.4	61.4%	85.1%	-	-	-
1959	37.9	62.0%	89.6%	-	-	-
1960	52.0	37.2%	87.5%	-	-	-
1962	1952	40.6%	-21.9%	-	-	-
1962	36.8	-9.4%	80.3%	-	-	-
1963	40.3	9.5%	82.2%	-	-	-
1964	45.4	12.7%	81.1%	-	-	-
1965	57.2	26.0%	84.6%	-	-	-
1966	69.9	22.2%	84.7%	-	-	-
1967	64.3	-8.0%	83.1%	-	-	-
1968	60.1	-6.5%	83.9%	-	-	-
1969	78.0	29.8%	83.0%	-	-	-
1970	95.4	22.3%	82.3%	-	-	-
1971	113.3	18.8%	81.9%	-	-	-
1972	123.6	9.1%	81.1%	-	-	-
1973	127.9	3.5%	76.7%	-	-	-
1974	127.4	-0.4%	75.5%	-	-	-
1975	148.2	16.3%	75.7%	-	-	-
1976	157.5	6.3%	77.5%	-	-	-
1977	175.8	11.6%	78.7%	-	-	-
1978	212.0	20.6%	82.6%	-	-	-
1979	231.9	9.4%	82.2%	-	-	-
1980	242.4	4.5%	80.6%	-	-	-
1981	243.8	0.6%	78.8%	-	-	-
1982	253.3	3.9%	77.3%	-	-	-
1983	265.0	4.6%	75.4%	-	-	-
1984	290.2	9.5%	77.0%	-	-	-
1985	318.3	9.7%	77.5%	-	-	-
1986	355.1	11.6%	79.0%	-	-	-
1987	397.3	11.9%	79.9%	-	-	-
1988	436.0	9.7%	80.0%	-	-	-
1989	466.5	7.0%	79.8%	-	-	-
1990	494.5	6.0%	79.6%	-	-	-
1991	552.8	11.8%	81.6%	-	-	-
1992	623.2	12.7%	82.7%	-	-	-
1993	686.1	10.1%	81.7%	1.6	-	0.2%
1994	724.8	5.6%	79.7%	13.9	769%	1.5%

N.B.: The figures for total and fossil gross generation for 1988 and 1989 are each 0.1 TWh higher than in previous versions of the *Databook* because they were revised to conform with State Statistical Bureau data rather than former Ministry of Energy data.

Source Energy in China, various years; China Statistical Yearbook, various years; China Energy Annual Review, 1994; China Energy Research Society, 1994; State Statistical Bureau.

Figure II-15. Electricity Generation

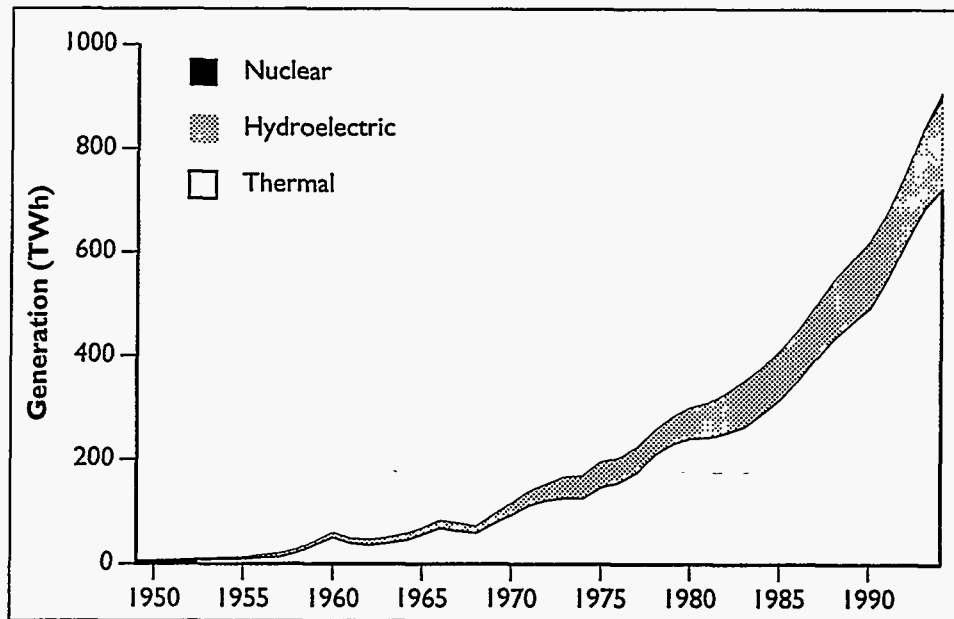


Table II-18. Electricity Generation and Consumption, \* 1980-1993 (TWh)

Year	Gross Generation	Power Sector Consumption†	Net Generation	Net Imports	T & D Losses ¶	Total End Use
1980	300.6	19.4	281.2	0.00	25.1	256.1
1981	309.3	19.8	289.5	0.30	26.0	263.8
1982	327.7	20.7	307.0	0.33	26.5	280.8
1983	351.4	21.8	329.6	0.43	28.1	301.9
1984	377.0	23.7	353.3	0.80	29.3	324.9
1985	410.7	26.4	384.3	1.07	31.4	354.0
1986	449.5	29.4	420.1	1.17	34.2	387.0
1987	497.3	33.1	464.2	1.25	39.4	426.1
1988	545.2	36.5	508.7	1.47	41.6	468.6
1989	584.7	39.8	544.9	1.72	43.7	502.9
1990	621.3	42.9	578.4	1.84	46.6	533.6
1991	677.6	47.0	630.6	2.85	51.4	582.0
1992	753.9	52.8	701.1	4.72	58.1	647.7
1993	839.5	58.4	781.1	4.39	66.5	714.5

\* Figures in italics are estimates.

† Power sector consumption, which is composed of in-plant consumption and other power sector use (see Table IV-14, Power Sector Electricity Consumption)

¶ Transmission and distribution losses; includes only losses from grids that have >500 kW of installed generation capacity and does not include losses from end user grids (mainly industry). Inclusion of line loss from end user distribution lines would approximately double line loss figures (MOE, 1991). A 1988 Ministry of Energy survey of line losses found losses from main transmission lines ( $\geq 220$  kV) to be 2-4%, 3-6% from urban networks ( $\leq 110$  kV), 7-10% from rural grids ( $\leq 10$  kV), and 3-6% from industrial end user grids. The approximate share of total line losses was found to be: main transmission lines, 24%, urban and rural grids, 26%, heavy industry user grids, 25%, light industry user grids, 8%, rural industry user grids, 5%, rural household and other distribution grids, 12%. Totals are slightly different than in Table IV-33, End Use Electricity Consumption by Sector, due to different methods of calculation. Whereas the totals in Table IV-33 are derived by subtracting power sector use and transmission and distribution losses from gross generation, the totals in this table are the sum of reported sectoral end use minus power sector consumption.

Source: China Energy Statistical Yearbook, various years; Energy in China, various years; National Rural Energy Planning, 1990; Joint Survey Group, MOE, 1991; China Energy Annual Review, 1994.

Table II-19. Electricity Generation Capacity and Growth Rates, 1949-1994

I. Capacity (GW)				
Year	Hydro	Fossil	Nuclear	Total
1949	0.16	1.69	-	1.85
1950	0.17	1.70	-	1.87
1951	0.18	1.70	-	1.88
1952	0.19	1.77	-	1.96
1953	0.33	2.02	-	2.35
1954	0.41	2.19	-	2.60
1955	0.50	2.50	-	3.00
1956	0.90	2.93	-	3.83
1957	1.02	3.61	-	4.63
1958	1.22	5.07	-	6.29
1959	1.62	7.92	-	9.54
1960	1.94	9.98	-	11.92
1961	2.33	10.53	-	12.86
1962	2.38	10.66	-	13.04
1963	2.43	10.90	-	13.33
1964	2.68	11.38	-	14.06
1965	3.02	12.06	-	15.08
1966	3.64	13.38	-	17.02
1967	3.84	14.15	-	17.99
1968	4.39	14.77	-	19.16
1969	5.05	15.99	-	21.04
1970	6.23	17.54	-	23.77
1971	7.80	18.48	-	26.28
1972	8.70	20.80	-	29.50
1973	10.30	23.62	-	33.92
1974	11.82	26.29	-	38.11
1975	13.43	29.98	-	43.41
1976	14.65	32.50	-	47.15
1977	15.76	35.69	-	51.45
1978	17.28	39.84	-	57.12
1979	19.11	43.91	-	63.02
1980	20.32	45.55	-	65.87
1981	21.93	47.20	-	69.13
1982	22.96	49.40	-	72.36
1983	24.16	52.28	-	76.44
1984	25.60	54.52	-	80.12
1985	26.42	60.63	-	87.05
1986	27.54	66.28	-	93.82
1987	30.19	72.70	-	102.90
1988	32.70	82.80	-	115.50
1989	34.58	92.06	-	126.64
1990	36.05	101.84	-	137.89
1991	37.88	113.59	-	151.47
1992	40.68	125.85	-	166.53
1993	44.59	137.12	1.20	182.91
1994	-	-	2.10	199.00

Source: Energy in China, various years; China Statistical Yearbook, various years; China Energy Research Society, 1994; Ministry of Electric Power Industry.



Table II-19. Electricity Generation Capacity and Growth Rates, 1949-1994 (continued)

2. Growth Over Previous Year				
Year	Hydro	Fossil	Nuclear	Total
1949	-	-	-	-
1950	6.3%	0.6%	-	1.1%
1951	5.9%	0.0%	-	0.5%
1952	5.6%	4.1%	-	4.3%
1953	73.7%	14.1%	-	19.9%
1954	24.2%	8.4%	-	10.6%
1955	22.0%	14.2%	-	15.4%
1956	80.0%	17.2%	-	27.7%
1957	13.3%	23.2%	-	20.9%
1958	19.6%	40.4%	-	35.9%
1959	32.8%	56.2%	-	51.7%
1960	19.8%	26.0%	-	24.9%
1961	20.1%	5.5%	-	7.9%
1962	2.1%	1.2%	-	1.4%
1963	2.1%	2.3%	-	2.2%
1964	10.3%	4.4%	-	5.5%
1965	12.7%	6.0%	-	7.3%
1966	20.5%	10.9%	-	12.9%
1967	5.5%	5.8%	-	5.7%
1968	14.3%	4.4%	-	6.5%
1969	15.0%	8.3%	-	9.8%
1970	23.4%	9.7%	-	13.0%
1971	25.2%	5.4%	-	10.6%
1972	11.5%	12.6%	-	12.3%
1973	18.4%	13.6%	-	15.0%
1974	14.8%	11.3%	-	12.4%
1975	13.6%	14.0%	-	13.9%
1976	9.1%	8.4%	-	8.6%
1977	7.6%	9.8%	-	9.1%
1978	9.6%	11.6%	-	11.0%
1979	10.6%	10.2%	-	10.3%
1980	6.3%	3.7%	-	4.5%
1981	7.9%	3.6%	-	4.9%
1982	4.7%	4.7%	-	4.7%
1983	5.2%	5.8%	-	5.6%
1984	6.0%	4.3%	-	4.8%
1985	3.2%	11.2%	-	8.6%
1986	4.2%	9.3%	-	7.8%
1987	9.6%	9.7%	-	9.7%
1988	8.3%	13.9%	-	12.2%
1989	5.8%	11.2%	-	9.6%
1990	4.2%	10.6%	-	8.9%
1991	5.1%	11.5%	-	9.9%
1992	7.4%	10.8%	-	9.9%
1993	9.6%	9.0%	-	9.8%
1994	-	-	75.0%	8.8%

Source: Energy in China, various years; China Statistical Yearbook, various years; China Energy Research Society, 1994; Ministry of Electric Power Industry.

Table II-19. Electricity Generation Capacity and Growth Rates, 1949-1994 (continued)

3. Shares of Total			
Year	Hydro	Fossil	Nuclear
1949	8.6%	91.4%	-
1950	9.1%	90.9%	-
1951	9.6%	90.4%	-
1952	9.7%	90.3%	-
1953	14.0%	86.0%	-
1954	15.8%	84.2%	-
1955	16.7%	83.3%	-
1956	23.5%	76.5%	-
1957	22.0%	78.0%	-
1958	19.4%	80.6%	-
1959	17.0%	83.0%	-
1960	16.3%	83.7%	-
1961	18.1%	81.9%	-
1962	18.3%	81.7%	-
1963	18.2%	81.8%	-
1964	19.1%	80.9%	-
1965	20.0%	80.0%	-
1966	21.4%	78.6%	-
1967	21.3%	78.7%	-
1968	22.9%	77.1%	-
1969	24.0%	76.0%	-
1970	26.2%	73.8%	-
1971	29.7%	70.3%	-
1972	29.5%	70.5%	-
1973	30.4%	69.6%	-
1974	31.0%	69.0%	-
1975	30.9%	69.1%	-
1976	31.1%	68.9%	-
1977	30.6%	69.4%	-
1978	30.3%	69.7%	-
1979	30.3%	69.7%	-
1980	30.8%	69.2%	-
1981	31.7%	68.3%	-
1982	31.7%	68.3%	-
1983	31.6%	68.4%	-
1984	32.0%	68.0%	-
1985	30.4%	69.6%	-
1986	29.4%	70.6%	-
1987	29.3%	70.7%	-
1988	28.3%	71.7%	-
1989	27.3%	72.7%	-
1990	26.1%	73.9%	-
1991	25.0%	75.0%	-
1992	24.4%	75.6%	-
1993	24.4%	75.0%	0.7%
1994	-	-	1.1%

Source: Energy in China, various years; China Statistical Yearbook, various years; China Energy Research Society, 1994; Ministry of Electric Power Industry.

Figure II-16. Electricity Generation Capacity

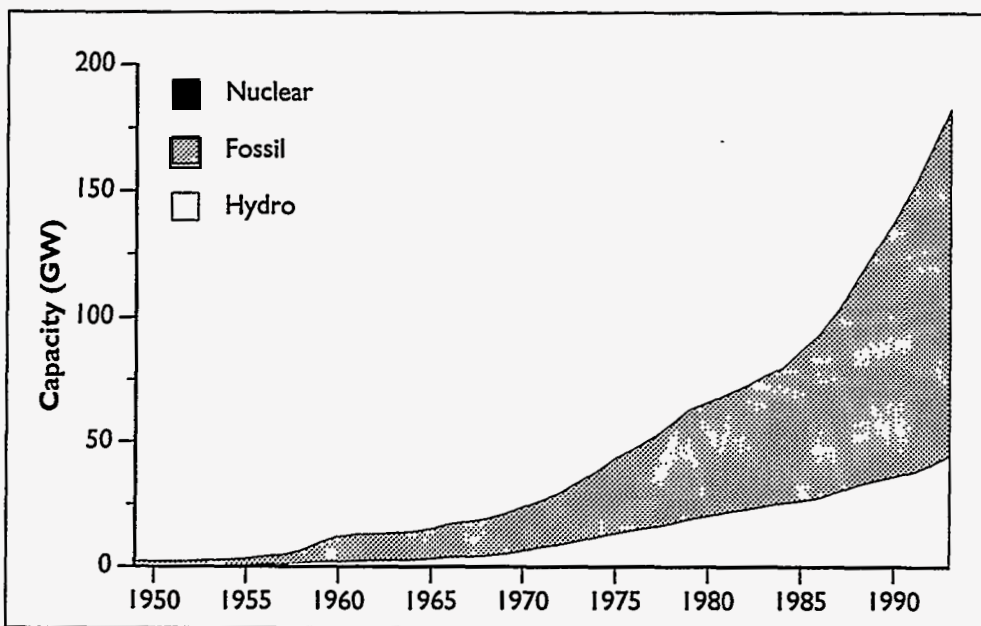


Table II-20. Installed Thermal Generation Capacity, by Type of Turbine, \* 1974-1993

Year	High Efficiency Units † (GW)	Low Efficiency Units ¶			Gas Turbines (GW)	Diesel ¥ (GW)	Total (GW)	of total: Cogeneration § (GW)
		Med. Temp./ Med. Press. (GW)	Low Temp./ Low Press. (GW)	Subtotal (GW)				
1974	12.97	-	-	-	0.19	-	23.23	3.33
1975	15.84	-	-	-	0.21	-	26.47	3.53
1976	17.89	-	-	-	0.21	-	28.72	3.57
1977	20.22	-	-	-	0.28	-	31.42	3.73
1978	23.83	-	-	-	0.28	-	35.36	3.99
1979	26.94	11.47	-	11.47	0.29	-	38.70	4.15
1980	28.48	11.45	0.27	11.72	0.30	-	40.50	4.43
1981	29.62	11.60	0.26	11.86	0.30	-	41.78	4.54
1982	31.41	11.74	0.26	12.00	0.30	-	43.71	4.68
1983	34.49	11.88	0.22	12.10	0.29	-	46.88	4.91
1984	36.75	11.92	0.22	12.14	0.27	-	49.16	5.14
1985	41.99	12.16	0.21	12.37	0.47	-	54.83	5.35
1986	46.41	12.65	0.21	12.86	0.52	0.21	60.00	5.92
1987	51.64	13.13	0.21	13.34	0.62	0.21	65.81	6.23
1988	59.41	13.38	0.23	13.61	0.91	0.28	74.21	7.59
1989	66.56	14.91	0.22	15.13	0.85	0.36	82.91	8.31
1990	73.79	15.78	0.22	16.00	1.25	0.53	91.57	9.99
1991	82.50	16.73	0.27	17.00	1.49	0.91	101.90	12.12
1992	93.03	17.91	0.28	18.19	1.76	1.37	114.34	13.40
1993	103.22	19.16	0.29	19.45	2.03	2.18	126.88	14.65

\* Includes only thermal power generation units over 6 MW capacity.

† "High-efficiency" units are those which are designed to operate under high temperature and pressure.

¶ According to a 1988 source, large, domestically manufactured high-efficiency generating units consume 375-400 g of coal per kWh (43-46% gross generation efficiency), large imported units consume about 335 g/kWh (51% efficiency), while low-efficiency units can consume 550 g/kWh (31% efficiency) (Wang, 1988).

¥ Before 1985, total does not include diesel generators. Totals for 1974-1978 are greater than sums of categories for which there are figures. These figures differ from those in Table II-19, which include units with less than 6 MW capacity.

§ In 1985 the total installed cogeneration capacity was 6.5 GW (including units with capacities under 6 MW) and in 1987 the total was 6.68 GW.

Source: China Energy Statistical Yearbook, various years; Wang, 1988; Electric Power Industry in China, 1990; Electric Power Industry in China, various years; Energy Research Institute.

**Table II-21. National Average Capacity Factors for Electric Power Generation, \*  
1978-1994**

Year	Total			Hydro		
	Installed Capacity (GW)	Gross Generation (TWh)	Capacity Factor	Installed Capacity (GW)	Gross Generation (TWh)	Capacity Factor
1978	57.12	256.6	0.51	17.28	44.6	0.29
1979	63.01	282.0	0.51	19.10	50.1	0.30
1980	65.87	300.6	0.52	20.32	58.2	0.33
1981	69.00	309.3	0.51	21.93	65.5	0.34
1982	72.36	327.7	0.52	22.96	74.4	0.37
1983	76.44	351.4	0.52	24.16	86.4	0.41
1984	80.12	377.0	0.54	25.60	86.8	0.39
1985	87.05	410.7	0.54	26.41	92.4	0.40
1986	93.82	449.6	0.55	27.54	94.5	0.39
1987	102.90	497.3	0.55	30.19	100.2	0.38
1988	115.50	545.1	0.54	32.70	109.2	0.38
1989	126.64	584.7	0.53	34.58	118.4	0.39
1990	137.89	621.2	0.51	36.05	126.7	0.40
1991	151.47	677.5	0.51	37.88	124.7	0.38
1992	166.53	753.9	0.52	40.68	130.7	0.37
1993	182.91	815.9	0.51	44.59	146.0	0.37
1994	199.00	909.0	0.52	-	170.4	-

- These figures represent an average for all generation capacity. Capacity factors (CF) for different units may vary substantially from these values.

Source: China Energy Statistical Yearbook, various years; Energy in China, various years; Electric Power Industry in China, various years.

**Table II-21. National Average Capacity Factors for Electric Power Generation, \***  
**1978-1994 (continued)**

Year	Fossil			Nuclear		
	Installed Capacity (GW)	Gross Generation (TWh)	Capacity Factor	Installed Capacity (GW)	Gross Generation (TWh)	Capacity Factor
1978	39.84	212.0	0.61	-	-	-
1979	43.91	231.9	0.60	-	-	-
1980	45.55	242.4	0.61	-	-	-
1981	47.07	243.8	0.59	-	-	-
1982	49.40	253.3	0.58	-	-	-
1983	52.28	265.0	0.58	-	-	-
1984	54.52	290.2	0.61	-	-	-
1985	60.64	318.3	0.60	-	-	-
1986	66.28	355.1	0.61	-	-	-
1987	72.71	397.1	0.62	-	-	-
1988	82.80	435.9	0.60	-	-	-
1989	92.11	466.3	0.58	-	-	-
1990	101.84	494.5	0.55	-	-	-
1991	113.59	552.8	0.56	-	-	-
1992	125.85	623.2	0.56	-	-	-
1993	137.12	666.8	0.55	1.2	1.6	0.15
1994	-	724.0	-	2.1	13.9	0.76

\* These figures represent an average for all generation capacity. Capacity factors (CF) for different units may vary substantially from these values.

Source: China Energy Statistical Yearbook, various years; Energy in China, various years; Electric Power Industry in China, various years.

Table II-22. Installed Capacity and Performance of Large Power Networks, 1991

Network	Installed Capacity (MW)	Average Utilization (hours)	Implied Average Capacity Factor	Load Factor (%)
North China	18,835.8	5,532	0.63	90.2%
Northeast China	23,012.5	4,763	0.54	85.5%
East China	23,757.3	5,243	0.60	90.1%
Central China	22,003.5	4,905	0.56	90.8%
Northwest China	9,405.6	5,041	0.58	83.4%
Shandong Province	9,064.0	5,879	0.67	87.0%
Fujian Province	3,238.0	4,253	0.49	82.6%
Sichuan Province	7,005.9	4,874	0.56	85.0%
Guangdong Province	8,936.9	5,723	0.65	85.9%
Guangxi Province	1,746.5	4,513	0.52	84.4%
Yunnan Province	2,935.5	4,234	0.48	81.8%
Guizhou Province	2,198.3	4,969	0.57	86.6%
Total/Average	132,139.8	5,126	0.59	-
National Total	151,473.0	-	-	-

Map II-8. China's Regional Power Networks



Source: Electric Power Industry in China, 1992.

Table II-23. Thermal Power Generation and Capacity by Plant Size, 1978-1993

Year	Power Plants ≥ 6 MW			Power Plants < 6 MW		
	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor
1978	-	35.36	-	-	4.48	-
1979	222.35	38.70	0.66	9.55	5.21	0.21
1980	234.29	40.50	0.66	8.11	5.05	0.18
1981	236.76	41.78	0.65	7.04	5.42	0.15
1982	246.90	43.71	0.64	6.40	5.69	0.13
1983	258.88	46.88	0.63	6.12	5.40	0.13
1984	283.96	49.16	0.66	6.25	5.36	0.13
1985	310.20	54.83	0.65	8.10	5.80	0.16
1986	347.82	60.01	0.66	7.27	6.27	0.13
1987	389.96	65.82	0.68	7.13	6.68	0.12
1988	427.28	73.02	0.67	8.61	9.78	0.10
1989	457.50	85.11	0.61	8.70	6.95	0.14
1990	486.80	94.56	0.59	8.17	7.28	0.13
1991	544.52	105.97	0.59	8.13	7.62	0.12
1992	612.32	117.82	0.59	10.40	8.04	0.15
1993	-	122.69	-	-	15.32	-

Year	Power Plants ≥ 500 kW			Power Plants < 500 kW		
	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor
1980	241.06	43.63	0.63	1.34	1.92	0.08
1981	242.12	44.95	0.61	1.69	2.25	0.09
1982	252.20	46.94	0.61	1.10	2.60	0.05
1983	264.01	50.69	0.59	0.99	1.59	0.07
1984	289.14	52.34	0.63	1.06	2.18	0.06
1985	316.43	58.09	0.62	1.87	2.54	0.08
1986	352.18	63.40	0.63	2.92	2.87	0.12
1987	394.70	69.57	0.65	2.40	3.14	0.09
1988	432.37	78.69	0.63	3.53	4.11	0.10
1989	462.97	87.52	0.60	3.33	4.54	0.08
1990	491.92	97.08	0.58	3.05	4.76	0.07
1991	550.25	108.60	0.58	2.40	4.99	0.05
1992	619.05	120.52	0.59	3.68	5.33	0.08
1993	679.38	132.91	0.58	6.43	5.10	0.14

Source: China Annual Energy Review, 1994; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Electric Power Industry in China, various years; Energy Research Institute.



**Table II-24. Generation by Self-Producers, \***  
**1980-1993**

<b>Year</b>	<b>Gross Generation (TWh)</b>	<b>Installed Capacity (GW)</b>	<b>Capacity Factor</b>
1980	15.51	3.86	0.46
1981	15.05	4.17	0.41
1982	17.99	4.89	0.42
1983	20.53	5.55	0.42
1984	23.53	5.96	0.45
1985	26.11	6.36	0.47
1986	31.69	7.62	0.47
1987	35.19	8.81	0.46
1988	39.10	9.72	0.46
1989	44.03	10.50	0.48
1990	47.16	11.19	0.48
1991	50.33	12.52	0.46
1992	59.96	14.57	0.47
1993	-	15.50	-

- Thermal generation units operated by non-utility generators, for instance large factories.

Source: China Energy Statistical Yearbook, various years; Electric Power Industry in China, various years.

**Table II-25. Hydropower Generation and Capacity by Plant Size, 1980-1992**

**I. Hydropower Generation for plants with installed capacities  $\geq 500$  kW and  $< 500$  kW.**

Year	Total * Gross Hydro Generation (TWh)	Power Plants $\geq 500$ kW			Power Plants $< 500$ kW		
		Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor
1980	58.2	53.95	16.87	0.36	4.25	3.45	0.14
1981	65.5	61.36	18.41	0.38	4.14	3.52	0.13
1982	74.4	69.65	19.45	0.41	4.75	3.51	0.15
1983	86.4	81.30	20.67	0.45	5.10	3.49	0.17
1984	86.8	81.87	21.93	0.43	4.93	3.67	0.15
1985	92.4	86.71	22.72	0.44	5.69	3.69	0.18
1986	94.5	89.13	23.93	0.42	5.37	3.61	0.17
1987	100.2	93.74	26.45	0.40	6.46	3.74	0.20
1988	109.2	102.30	28.82	0.40	6.90	3.87	0.20
1989	118.4	111.09	30.42	0.42	7.31	4.17	0.20
1990	126.4	117.95	31.75	0.42	8.45	4.23	0.23
1991	124.9	117.54	33.65	0.40	7.31	4.23	0.20
1992	131.5	123.51	36.69	0.38	7.96	4.22	0.22

**2. Hydropower Plant Capacity and Generation by Size, 1983**

Plant Size (MW)	Number	Installed Capacity (GW)	Gross Generation (TWh)	Capacity Factor	Shares of:	
					Installed Capacity (percent)	Annual Generation (percent)
Total	4,546	33.65	117.54	0.40	100%	100%
>250	25	15.93	60.84	0.44	47%	52%
25-250	95	7.62	25.63	0.38	23%	22%
<25	4,426	10.10	31.07	0.35	30%	26%
of which:						
12-25 MW	125	1.84	6.14	0.38	5%	5%
0.5-12 MW	4,095	7.53	24.81	0.38	22%	21%

\* The totals in Table II-23.2 and II-23.3 are different probably because many small hydropower stations were taken out of service in the early 1980s (e.g., due to poor maintenance or silting of reservoirs). The figures also come from different sources, which may be the cause of the discrepancy.

Source: China Energy Statistical Yearbook, various years; Wang, 1988; Energy in China, various years; Electric Power Industry in China, various years; Water Resources Development in China, various years; Energy Research Institute.

Table II-25. Hydropower Generation and Capacity by Plant Size, 1980-1992 (continued)

3. Small Hydropower Generation & Installed Capacity, 1987					
Installed Capacity, Individual Station (kW)	Number of Stations	1987		1993	
		Total Installed Capacity (GW)	Output (TWh)	Total Installed Capacity (GW)	Output (TWh)
500 - 25,000	4,567	7.355	22.40	-	-
100 - 500	13,417	2.490	4.36	-	-
100	45,265	1.155	2.04	-	-
Total	63,249	11.000	28.80	15.050	47.00

Source: China Energy Statistical Yearbook, various years; Wang, Energy in China, 1988; Energy in China, various years; Electric Power Industry in China, various years; Water Resources Development in China, various years; Energy Research Institute.

Table II-26. Principal Thermal Power Plants >600.MW, 1991

Name of Power Plant	Location (Province)	Plant Capacity (MW)		Configuration *	Fuel
		Design	Existing in 12/31/91		
Jianbi	Jiangsu	1,625	1,625	3x100, 4x300	coal
Harbin No.3	Heilongjiang	1,600	400	2x200, 2x600	coal
Douhe	Hebei	1,550	1,550	2x125, 4x200, 2x250	coal
Qinghe	Liaoning	1,300	1,300	5x100, 4x200	coal, oil
Shentou	Shanxi	1,300	1,300	6x200	coal
Xuzhou	Jiangsu	1,300	1,300	4x125, 4x200	coal
Xingtai	Hebei	1,290	1,290	6x200	coal
Jiaozuo	Henan	1,224	1,024	6x200	coal
Beilungang	Zhejiang	1,200	†	2x600	coal
Changshu	Jiangsu	1,200	†	4x300	coal
Datong No.2	Shanxi	1,200	1,200	6x200	coal
Fulanji No. 2	Heilongjiang	1,200	1,200	6x200	coal
Hanchuan	Hubei	1,200	600	4x300	coal
Hualu	Shandong	1,200	600	4x300	coal
Jinzhou	Liaoning	1,200	1,200	6x200	coal
Pingwei	Anhui	1,200	600	2x600	coal
Shajiao A	Guangdong	1,200	400	3x200, 2x300	coal
Shalingzi	Hebei	1,200	300	4x300	coal
Shidongkou	Shanghai	1,200	1,200	4x300	coal
Shidongkou No 2	Shanghai	1,200	†	2x600	coal
Tieling	Liaoning	1,200	†	4x300	coal
Tongliao	Inner Mongolia	1,200	800	4x200	coal
Weihe	Shaanxi	1,200	300	4x300	coal
Xibaipo	Hebei	1,200	†	4x300	coal
Yaomeng	Henan	1,200	1,200	4x300	coal
Zhouxian	Shandong	1,200	1,200	4x300	coal
Huangpu	Guangdong	1,100	1,100	4x125, 2x300	coal, oil
Wangting	Jiangsu	1,100	1,100	3x300	coal, oil
Liaoning	Liaoning	1,050	1,050	13x50, 2x200	coal, oil
Qinling	Shaanxi	1,050	1,050	2x125, 4x200	coal
Zhenhai	Zhejiang	1,050	1,050	2x125, 4x200	coal, oil
Zhangze	Shanxi	1,040	1,040	2x100, 4x210	coal
Shentou No.2	Shanxi	1,000	†	2x500	coal
Huaibei	Anhui	950	750	2x125, 3x200	coal
Wujing	Shanghai	950	750	1x100, 1x125, 2x300	coal
Huangtai	Shandong	925	925	2x100, 2x300	coal
Yuanbaoshan	Inner Mongolia	900	900	1x300, 1x600	coal
Jilin	Jilin	850	650	2x100, 2x200	coal, oil
Matou	Hebei	850	850	2x100, 3x200	coal
Junliancheng	Tianjin	840	640	3x200	coal, oil

\* In some cases reported configurations do not match plan capacities because units under 100 MW are not reported, except for Liaoning Power Plant.

† No units commissioned.

¶ Cogeneration plant.

Source: Electric Power Industry in China, 1992.

Table II-26. Principal Thermal Power Plants >600 MW, 1991  
(continued)

Name of Power Plant	Location (Province)	Plant Capacity (MW)		Configuration *	Fuel
		Design	Existing in 12/31/91		
Mudanjiang	Heilongjiang	820	820	4x100, 2x210	coal
Shuangyashan	Heilongjiang	820	610	2x200, 2x210	coal
Minhang	Shanghai	818	818	2x110, 4x125	coal
Jinagyuang	Gansu	800	600	4x200	coal
Taizhou	Zhejiang	750	750	6x125	coal
Shiheng	Shandong	735	735	2x300	coal
Baoshan	Shanghai	700	700	2x350	coal, blast furnace gas
Dalian	Liaoning	700	700	-	coal
Fuzhou	Fujian	700	700	2x350	coal
Ligang	Jiangsu	700	†	2x350	coal
Luohuang	Sichuan	700	700	350x2	coal
Nantong	Jiangsu	700	700	2x350	coal
Shajiao B	Guangdong	700	700	2x350	coal
Shang'an	Hebei	700	700	2x350	coal
Yueyang	Hunan	700	700	2x350	coal
Chongqing	Sichuan	696	696	2x200	coal
Changshan	Jilin	693	693	2x200	coal
Qingshan	Hubei	674	674	2x100, 1x200	coal, oil
Huangdao	Shandong	670	670	2x125, 2x210	coal
Jiangyou	Sichuan	660	660	2x330	coal
Qingzhen	Guizhou	658	658	2x200	coal
Jiujiang	Jiangxi	650	450	2x125, 2x200	coal
Dagang No. 1	Tianjin	640	640	2x320	oil
Dagang No. 2	Tianjin	640	640	2x321	coal
Shiliquan	Shandong	625	625	5x125	coal
Shaoguan	Guangdong	624	624	2x200	coal
Daba	Ningxia	600	300	2x300	coal
Daqing	Heilongjiang	600	200	3x200	coal
Fengzhen	Inner Mongolia	600	400	3x200	coal
Gaojing	Beijing	600	600	6x100	coal
Huainan	Anhui	600	600	2x120, 2x125	coal
Jingmen	Hubei	600	600	2x100, 2x200	coal
Jinzhusan	Hunan	600	600	4x125	coal
Longkou	Shandong	600	600	2x100, 2x200	coal
Luohe	Anhui	600	600	2x300	coal
Nanjing	Jiangsu	600	†	2x300	coal
Shenzhen	Guangdong	600	†	2x300	coal
Shijingshan¶	Beijing	600	600	3x200	coal
Weifang	Shandong	600	†	2x300	coal
Xindian	Shandong	600	600	2x100, 2x200	oil
Yangluo	Hubei	600	†	2x300	coal
Zhujiang	Guangdong	600	†	2x300	coal

\* In some cases reported configurations do not match plan capacities because units under 100 MW are not reported, except for Liaoning Power Plant.

† No units commissioned.

¶ Cogeneration plant.

Source: Electric Power Industry in China, 1992.

Table II-27. Capacity Factors for Principal Hydropower Plants ≥250 MW, 1991

Name of Power Plant	Location Province	River	Commissioned	Installed Capacity 12/21/91 MW	Annual Generation (TWh)
Ertan	Sichuan	Yalongjiang	*	3,300	17.00
Gezhouba	Hubei	Changjiang (Yangtze R.)	1981-1989	2,715	14.10
Lijiaxia	Qinghai	Huanghe (Yellow R.)	*	2,000	5.90
Baishan	Jilin	Songhuajiang	1983-1991	1,500	2.04
Shuikou	Fujian	Minjiang	*	1,400	4.95
Longyangxia	Qinghai	Huanghe (Yellow R.)	1987-1989	1,280	5.98
Liujiacia	Gansu	Huanghe (Yellow R.)	1969-1974	1,225	5.58
Geheyuan	Hubei	Qingjiang	*	1,200	3.04
Guangzhou Pumped Storage	Guangdong	Liuxihe tributary	*	1,200	2.83 gen/
Tiansheng-qiao I	Guizhou, Guangxi	Nanpanjiang	*	1,200	5.38
Wuqiangxi	Hunan	Yuanshui	*	1,200	5.37
Yantan	Guangxi	Hongshuihe	*	1,100	5.37
Ankang	Shaanxi	Hanjiang	1990	1,000	2.86
Manwan	Yunnan	Lancangjiang	*	1,000	5.48
Danjiangkou	Hubei	Hanjiang	1968-1974	900	3.83
Tiansheng-qiao II	Guizhou, Guangxi	Nanpanjiang	*	880/1,320	4.92/8.20
Lubuge	Yunnan, Guizhou	Huangnihe	1989-1991	750	2.75
Gongzui	Sichuan	Daduhe	1972-1978	700	4.12
Xin'anjiang	Zhejiang	Xin'anjiang	1960-1965	662.5	1.86
Baozhusi	Sichuan	Bailongjiang	*	640	2.28
Fengman	Jilin	Songhuajiang	1943-1959	639	1.96
Shuifeng†	Liaoning	Yalujiang	1941-1958	630	3.93
Wujiangdu	Guizhou	Wujiang	1979-1983	630	3.34
Tongjiezi	Sichuan	Daduhe	*	600	3.21
Dongfeng	Guizhou	Wujiang	*	510	2.42
Dongjiang	Hunan	Laishui	1987-1989	500	1.32
Wan'an	Jiangxi	Ganjiang	1990	500	1.05
Zhaxi	Hunan	Zishui	1962-1964	447.5	2.20
Dahua	Guangxi	Hongshuihe	1983-1985	400	2.05
Fengtán	Hunan	Youshui	1978-1980	400	2.04
Yunfeng†	Jilin	Yalujiang	1965-1984	400	1.75
Yan'guoxia	Gansu	Huanghe (Yellow R.)	1961-1990	396	2.15
Laohushao†	Jilin	Yalujiang	1986-	390	1.20
Panjiakou‡	Hebei	Luanhe	1981-	390	0.56
Bikou	Gansu	Bailongjiang	1976-1977	300	1.46
Jinshuitan	Zhejiang	Qujiang	1987-1989	300	0.49
Shaxikou	Fujian	Shaxi	1987-1990	300	0.96
Fuchunjiang	Zhejiang	Qiantangjiang	1968-1977	297.2	0.93
Xinfengjiang	Guangdong	Xinfengjiang	1960-1969	292.5	1.17
Qingtongxia	Ningxia	Huanghe (Yellow R.)	1967-1978	272	1.04
Sanmenxia	Henan	Huanghe (Yellow R.)	1973-1975	250	1.31

\* Under construction.

† The output of hydropower plants on the Yalu River are shared equally by China and North Korea. Their entire capacity and output are included here in calculating the average capacity factor.

‡ Includes 150 MW conventional and 240 MW pumped storage capacity.

Source: Electric Power Industry in China, 1992.

**Table II-28. Coverage of Rural Electric Grids, \***  
**Selected Years**

	<b>Northeast</b>	<b>North</b>	<b>Northwest</b>	<b>East</b>	<b>South-Central*</b>	<b>Southwest</b>	<b>National Average</b>	
<b>Percent of Townships with Electricity</b>								
1979		98%	88%	70%	90%	93%	83%	87%
1983		98%	94%	77%	95%	91%	85%	90%
1984		99%	94%	77%	95%	90%	86%	90%
1990		-	-	-	-	-	-	96%
<b>Percent of Villages with Electricity</b>								
1979		95%	78%	48%	61%	64%	47%	63%
1983		97%	87%	56%	77%	71%	59%	73%
1984		96%	86%	60%	78%	74%	69%	75%
1990		-	-	-	-	-	-	88%
1993		-	-	-	-	-	-	92%
<b>Percent of Rural Households with Electricity</b>								
1991		-	-	-	-	-	-	80%
1993		-	-	-	-	-	-	87%

\* The decrease in coverage in some areas may reflect a change in organizational structure in rural areas, e.g., some townships were reclassified as municipalities.

Source: Wang, 1988; *Jingji Ribao* [Economic Daily], 5 August 1991; *Electric Power Industry in China, 1992*; *Redian Jishu* [Cogeneration Technology], 1994, no. 1.

**Table II-29. Railway and Pipeline Transportation of Coal and Oil, \*  
Selected Years**

Year	Coal (Gt-km)	Coke (Gt-km)	Oil (Gt-km)	Subtotal: Energy Products (Gt-km)	Total Railway Freight (Gt-km)	Energy Products as % of Total Freight	Oil and Gas Pipelines (Gt-km)
1965	79.29	3.17	17.16	99.62	269.64	36.9%	-
1970	95.00	4.07	35.02	134.09	349.14	38.4%	-
1975	110.20	4.95	41.24	156.39	424.61	36.8%	26.2
1978	148.13	6.62	35.64	190.39	533.35	35.7%	43.0
1979	164.68	7.28	33.07	205.03	558.87	36.7%	47.6
1980	176.67	6.87	30.07	213.61	570.73	37.4%	49.1
1981	183.17	6.92	28.68	218.77	570.13	38.4%	49.9
1982	199.76	6.49	28.85	235.10	610.90	38.5%	50.1
1983	213.15	7.30	29.96	250.41	663.45	37.7%	53.4
1984	233.55	7.68	31.26	272.49	723.48	37.7%	57.2
1985	259.59	9.59	34.07	303.25	811.16	37.4%	60.3
1986	277.00	10.38	37.53	324.91	875.01	37.1%	61.2
1987	285.74	12.61	39.69	338.04	945.57	35.7%	62.5
1988	299.51	15.36	39.12	353.99	986.02	35.9%	65.0
1989	316.18	17.28	39.99	373.45	1,037.30	36.0%	62.9
1990	344.64	19.46	42.00	406.10	1,060.12	38.3%	62.7
1991	341.42	18.06	43.77	403.25	1,094.81	36.8%	62.1
1992	357.71	19.40	46.18	423.29	1,154.85	36.7%	61.7
1993	358.86	24.65	49.90	433.41	1,192.34	36.3%	60.8

\* In terms of tonnage handled, coal, coke, and oil accounted for 41.7%, 2%, and 4.5%, for a total of 48% in 1993.

Source: Statistical Yearbook of China, various years; China Transportation Yearbook various years.

**Figure II-17 Railway Transport of Energy Products**

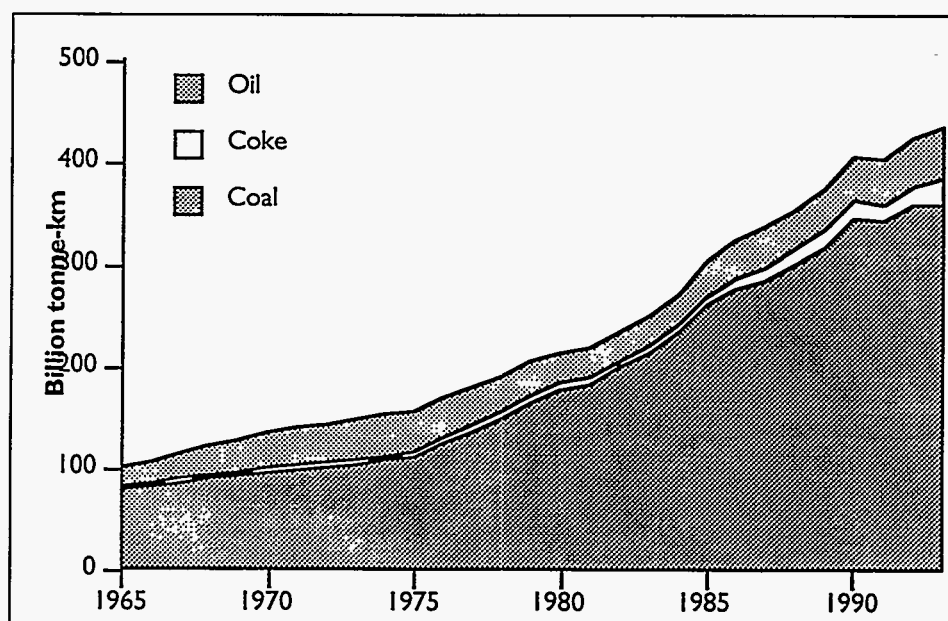




Table II-30. Interprovincial Coal Transfers via Railway, 1993 — Mt

Origin	Destination														
	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Liaoning	Jilin	Heilongjiang	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Jiangxi	Shandong
Beijing	3.09	1.59	0.93	-	-	0.29	-	0.06	-	0.06	-	-	-	-	0.62
Tianjin	-	0.07	0.18	-	-	-	-	-	-	-	-	-	-	-	-
Hebei	2.98	2.41	24.18	-	0.41	3.30	0.09	0.01	0.03	1.03	0.31	0.04	-	-	1.19
Shanxi	14.39	20.18	79.91	19.76	2.09	14.24	1.97	0.32	0.62	13.47	2.00	3.28	1.13	1.18	21.96
Inner Mongolia	0.05	2.88	4.53	0.01	13.57	3.73	1.48	6.92	-	-	-	-	-	-	-
Liaoning	-	-	0.01	-	0.77	28.76	1.04	0.28	-	-	-	-	-	-	-
Jilin	-	-	-	-	0.23	3.44	13.12	0.49	-	-	-	-	-	-	-
Heilongjiang	-	-	-	-	0.72	8.34	13.76	36.57	-	-	-	-	-	-	-
Shanghai	-	-	-	-	-	-	-	-	-	-	0.85	-	0.21	-	-
Jiangsu	-	-	-	-	-	-	-	-	0.27	12.45	1.43	0.32	0.10	0.06	1.20
Zhejiang	-	-	-	-	-	-	-	-	-	-	0.45	-	-	0.00	-
Anhui	-	-	-	-	-	-	-	-	0.47	6.08	1.96	17.53	0.71	0.54	-
Fujian	-	-	-	-	-	-	-	-	-	-	0.41	-	4.28	-	-
Jiangxi	-	-	-	-	-	-	-	-	-	0.04	1.03	0.11	0.38	6.46	-
Shandong	-	0.06	0.41	-	-	-	-	-	0.20	3.74	1.56	1.08	0.17	0.50	24.58
Henan	-	0.03	0.28	-	-	0.60	0.01	-	0.17	6.40	0.68	1.56	0.02	1.39	1.12
Hubei	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-
Hunan	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-
Guangdong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guangxi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hainan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sichuan	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-
Guizhou	-	-	-	-	-	-	-	-	-	-	0.02	-	0.01	0.21	-
Yunnan	-	-	-	-	-	-	-	-	-	-	0.03	-	0.01	-	-
Shaanxi	-	-	-	-	-	-	-	-	-	4.37	0.09	0.10	-	0.01	-
Gansu	-	-	-	-	-	-	-	-	-	0.06	-	-	-	-	-
Qinghai	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ningxia	0.11	0.59	0.03	-	0.33	0.84	0.01	-	-	-	-	-	-	-	-
Xinjiang	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	20.63	27.79	110.47	19.77	18.12	64.53	31.49	44.64	1.76	47.70	10.82	24.02	7.05	10.48	50.67
Balance	0.01	-0.02	0.01	0.00	0.00	0.99	0.01	-0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00

Source: China Transportation Yearbook, 1994.

Table II-30. Interprovincial Coal Transfers via Railway, 1993 — Mt (continued)

Origin	Destination														Total	Balance
	Henan	Hubei	Hunan	Guangdong	Guangxi	Hainan	Sichuan	Guizhou	Yunnan	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang		
Beijing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.65	0.01
Tianjin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	0.00
Hebei	-	0.82	0.09	-	-	-	-	-	-	-	-	-	-	-	36.89	0.00
Shanxi	5.95	8.11	2.56	1.04	1.23	-	-	0.01	-	1.77	0.02	0.12	0.16	-	217.46	-0.01
Inner Mongolia	-	-	-	-	-	-	-	-	-	-	0.02	0.00	0.47	-	33.65	-0.01
Liaoning	-	0.49	-	-	-	-	-	-	-	-	-	-	-	-	30.86	-0.49
Jilin	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	17.28	-0.10
Heilongjiang	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60.39	1.00
Shanghai	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.06	0.00
Jiangsu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.83	0.00
Zhejiang	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.45	0.00
Anhui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.28	-0.01
Fujian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.69	0.00
Jiangxi	-	0.03	0.17	0.30	0.04	-	-	-	-	-	-	-	-	-	8.55	-0.01
Shandong	-	0.28	0.38	-	-	-	-	-	-	-	-	-	-	-	32.96	0.00
Henan	16.54	21.02	2.15	1.47	1.09	-	-	-	-	0.38	-	-	-	-	54.89	-0.02
Hubei	-	0.10	0.03	0.11	0.04	-	-	-	-	-	-	-	-	-	0.33	0.01
Hunan	-	0.11	7.79	1.77	1.23	-	-	-	-	-	-	-	-	-	10.94	0.01
Guangdong	-	-	-	5.98	0.00	-	-	-	-	-	-	-	-	-	5.96	-0.02
Guangxi	-	-	-	0.79	3.98	-	-	-	-	-	-	-	-	-	4.77	0.00
Hainan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sichuan	-	2.54	0.11	0.10	0.06	-	21.52	-	0.12	0.17	-	-	-	-	24.74	0.01
Guizhou	-	0.48	0.52	2.08	1.54	-	1.04	6.45	0.80	-	-	-	-	-	13.14	-0.01
Yunnan	-	-	0.08	0.05	0.24	-	0.21	-	5.89	-	-	-	-	-	6.52	0.01
Shaanxi	0.02	1.26	-	-	-	-	-	-	-	10.34	0.01	-	-	-	16.21	0.01
Gansu	-	0.04	-	-	-	-	-	-	-	0.02	4.78	0.81	-	0.01	5.73	0.01
Qinghai	-	-	-	-	-	-	-	-	-	-	-	0.97	-	-	0.97	0.00
Ningxia	-	-	-	-	-	-	0.03	-	-	0.45	3.27	0.18	4.79	0.02	10.66	0.01
Xinjiang	-	-	-	-	-	-	-	-	-	-	2.31	-	-	1.76	4.08	0.01
Total	22.51	34.80	13.87	13.69	9.47	0.00	22.80	6.46	6.80	13.13	10.42	2.08	5.42	1.79	653.20	0.02
Balance	0.00	-0.58	-0.01	0.00	0.02	0.00	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	0.01	-

Source: China Transportation Yearbook, 1994.

Table II-31. Indices of Five Major Pipelines, 1993

Pipeline	Route	Diameter (mm)	Length (km)	Capacity (Mt/yr)	Year Completed	Throughput (Mt)	Turnover (Mt-km)	Fuel Oil Consumption Total (kt)	Fuel Oil Consumption Unit (t/Mt-km)	Electricity Consumption Total (GWh)	Electricity Consumption Unit (kWh/t-km)
Qingtie*	Daqing-Tieling	2x720	515.9/523.8	45.00	1971/1974	43.44	22,372	30.64	1.37	659	29.5
Tieqin	Tieling-Qihuangdao	720	454.3	20.00	1973	17.24	7,721	21.25	2.75	184	23.8
Tieda	Tieling-Dalian	720	436.4	23.00	1975	18.98	8,318	23.74	2.85	200	24.1
Luning	Linyi-Yizheng	720	665.0	20.00	1978	10.19	6,826	50.74	7.43	147	21.5
Donghuang	Dongying-Huangdao	720	246.3	16.00	1986	10.62	2,624	21.91	8.35	55	21.0
Sum/Average	-	-	1,802.0	124.00	-	100.48	47,862	148.28	3.10	1,245	26.0
National Total†	-	-	8,741.0	270.42	-	138.36	59,192	-	-	-	-
% of National Total	-	-	21%	46%	-	73%	81%	-	-	-	-

\* Two parallel pipelines.

† Includes 79 crude oil and 88 finished oil pipelines. Excludes China's 190 natural gas and 21 other gas pipelines (total length 7,510 km and 195 km respectively).

Source: China Transportation Yearbook, 1994.

**Table II-32. National Renewable Energy Production Capacities, End of 1992**

<b>Technology</b>	<b>Total Capacity</b>
Solar water heaters	2 million m <sup>2</sup>
Solar heated houses	500 thousand m <sup>2</sup>
Greenhouses (plastic sheeting covered)	400 thousand ha
Solar dryers	13 thousand m <sup>2</sup>
Solar cookers	120 thousand units
Photovoltaic cells (operational)	1.8 MWe
Small-scale wind generators	120 thousand units
Wind farms (six farms)	5 MWe
Wind pumps	1,700 units
Agricultural household biogas digesters (6-10 m <sup>3</sup> )	4.5 million units
Large-scale biogas digesters	300 thousand m <sup>3</sup>
Biomass gasifiers	300 units
Geothermal power stations	25 MWe
Directly used geothermal heat	89.5 PJ/yr
Tidal power stations	8.5 MWe
Small-scale hydropower stations	14.41 GW

Source: China Energy Development Report, 1994.

## Chapter III—Energy Industry Investment

# Energy Industry Investment

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Investment is perhaps the most important indicator of the priorities of Chinese energy policy and planning. Capital in China is scarce and meted out carefully, so for any sector to capture a large share of investment clearly indicates its importance to Chinese planners. The energy sector has been the largest single civilian recipient of industrial capital in China, accounting for nearly 20% of total investment in state-owned units in 1993 (Table III-1) and 12% of total investment in units of all types of ownership (state-, collective-, and individual-owned; Table III-2).<sup>1</sup> This actually represents a steep decline from the peak in 1990, when the respective percentages were 29% and 19%; much of the state's resources have been directed to other mining and manufacturing industries, and to other sectors, especially transportation, construction, and utilities (other than electricity).<sup>2</sup>

In the early 1980s, oil and natural gas extraction and refining accounted for the largest share (between 38% and 40% in 1981-1985) of total investment in the state-owned energy sector, with the electricity subsector taking the next largest and the coal subsector the smallest share (Table III-3).<sup>3</sup> In response to a worsening electricity shortage causing slack industrial capacity (a condition that persists to this day), investment in electricity generation and distribution has taken an increasing share, from 32% in the early 1980s to over 50% in 1993. Growth in investment has been slowest in the coal subsector, the backbone of China's energy supply.

Chinese investment data are often difficult to interpret because of inconsistencies in coverage, inadequate coverage of rapidly expanding non-state enterprises, inclusion of investments in "nonproductive" facilities like worker housing and services, and the difference between reported and actual investment. As described in the Technical Note at the end of this section, there are some significant problems with the information presented in this section. Awareness of these shortcomings, however, should make the data more useful in gauging past and future trends in energy production and the

importance of the energy industry in China's economy.

## COAL

In the 1980s the central government adopted a policy of relying on rural collective and private mines to fill growing demand for coal, and they provided most of the increase in production. State coal industry investment consequently leveled off in the late 1980s (Table III-3). Underinvestment, partly due to very low controlled coal prices, contributed to coal shortages that began in the late 1980s and at the time prevented many power plants and factories from operating at full capacity. Since 1990 investment in state-owned coal mines has picked up again, growing at an average annual rate of 11% (still much slower than the 17% for the energy supply industry as a whole). Most of the new funds have been in the form of capital construction investments, i.e., opening up of new mines (Tables III-4). As is the case for other segments of the energy supply sector, the ratio of nonproductive to productive investments has declined overall since the mid-1980s (Table III-5). At present stockpiles of coal are quite large, rural coal mines are ubiquitous, and a basically free market for coal exists, so that most customers are able to purchase what they need (although rail transport capacity remains in shortage).

Rural mines are generally very small and poorly equipped, often requiring no more than a few farmers with hand tools, rope, and baskets. Unit investment in such mines is therefore much lower than that for larger ones. In the late 1980s rural mines used 10 to 70 yuan of investment per annual ton of capacity, whereas the large, mechanized state-run mines needed 140 to 240 yuan per annual ton of capacity, and that relationship has probably changed little since.<sup>4</sup> The inclusion of investment data on rural collective and private mines would certainly increase the investment figures presented here to an uncertain degree, but probably by no more than 20%.<sup>5</sup>

Investment in coal washing has been consistently

overlooked, even though the many benefits—including reduced burden on the overloaded transportation system, increased end-use efficiency, and reduced emissions—are well known. Coal products investment is an order of magnitude higher than a decade ago, reflecting the attention focused on improving urban fuel supplies with coal briquettes and town gas.

## **OIL AND NATURAL GAS**

Rising investment in crude oil extraction has outpaced modest gains in production capacity in recent years (Tables III-3 and III-11). This is in part due to the rising cost of production from older fields in the North and Northeast (resulting in substantial losses for the sector under the pre-May 1994 regime of fixed low prices); to increased use of secondary recovery techniques; and to the higher expense associated with prospecting in remote and offshore areas.

Oil refining (including most oil-based petrochemical investment under the China National Petrochemical Corporation, or Sinopec) accounts for most of the rest of investment in this sector, and its share increased (Tables III-3 and III-5). This trend has reflected the rapid buildup of large ethylene facilities after 1986 as well as a surge of investment in refinery capacity and secondary processing units in order to meet growing demand for light and middle distillates.

Available statistics show the neglect previously accorded natural gas development, with investment actually decreasing in real terms in the late 1980s. Recently, however, new gas fields have been discovered and exploitation begun, most importantly in the offshore fields near Hainan, from which a pipeline to Hong Kong was recently completed (with gas deliveries expected to start in January 1996). Exploration in the Northwest's ShaanGanNing region has also uncovered substantial gas resources, large-scale production from which is expected before the end of the century.

## **ELECTRICITY**

As mentioned above, the capital-intensive electricity subsector currently accounts for half of total energy industry investment and three fifths of capital construction investment (Table III-3 and III-4).

Funding for thermal capacity has consistently outstripped that for hydropower plants (Table III-5). Thermal power plants can be built more quickly and in a wider variety of locations than hydropower plants, providing planners with more flexibility in meeting urgent demand for supply expansion. Much of the investment has been in plants of smaller capacities (25 MW or less), which are easier for local authorities to build but which offer lower efficiencies and less effective emissions controls. While increments of thermal power generation have been completed fairly consistently over the years, many hydropower stations, begun in the 1980s, began coming on line in the early 1990s at a rate of five to seven GW per year, compared to less than one GW per year throughout the 1980s (Table III-11). Investment in nuclear power generation has been substantial, with unit investment for currently operating plants reportedly substantially higher than for conventional plants. Investment funding for electricity distribution has been at about the same level as that for hydropower generation.

Unless otherwise noted, the electricity generation and supply subsector includes the production and supply of heat and steam. This is generally a distinction of small significance, e.g., in 1990 just over 1% of capital construction investment in electric power was for steam and hot water.

## **ENERGY CONSERVATION**

The Chinese government has paid special attention to investments in energy conservation, establishing a corporation to administer program of grants and low-interest loans in the early 1980s. From 1981 to 1990 total investment in energy conservation amounted to 30 billion yuan, and another 10 billion yuan was spent between 1991 and 1993 (Table III-8). Overall, about half of the investments have been designated capital construction, and half technical updating (which latter channel is also used for most environmental protection and waste management projects; Tables III-7 to 8). Most funding initially came from the central government in the form of grants, which were later converted to loans. At present, local governments and enterprises account for the largest share of investment funds (Table III-9).

Targeted technologies included cogeneration, recovery and use of waste heat and gas, overhauling small and inefficient power plants and fertilizer plants, and improvements to steel manufacturing technologies. Conservation investment has been small compared to supply investment, ranging from nearly 12% of combined energy supply and conservation investment in 1983 to just over 7% in 1992 (Table III-8), but its impact on China's economy has been significant, probably accounting for more than 10% of observed reductions in industrial energy intensity (energy consumed per unit of economic output) in the 1980s.<sup>6</sup> Efficiency improvements resulting from these programs should include not just the demonstration projects that received funding, but the other facilities that were upgraded by managers who were persuaded through the demonstrations to adopt similar technologies. Analysis of investments suggests that the cost of energy savings was generally below the cost of new energy supply, which in 1990 was over 1,000 yuan per annual ton of delivered coal, including transportation capacity (Tables III-9 and III-10).<sup>7</sup>

There has been considerable interest in residential energy conservation, particularly the improvement of biomass combustion in rural households through the introduction of improved stoves.<sup>8</sup> Efforts have also been made to consolidate boilers for apartment buildings, replacing separate boilers for each building with a single larger boiler, and to substitute coal briquettes for raw coal used in cooking and heating. These improvements are intended in large measure to address environmental problems, e.g., biomass stoves should reduce stress on rural ecosystems resulting from overharvesting of fuel wood and other biomass, and consolidation of residential boilers and popularization of briquettes should help improve urban air quality.

## SOURCES OF INVESTMENT FUNDS

Statistics for capital construction investment show that by 1990 direct government investment<sup>9</sup> in the energy industry decreased slightly in real terms (Table III-12). It decreased substantially as a share of total investment, from well more than half (all segments of the energy supply industry) in the early 1980s, to less than a fifth in 1990 (petroleum and electricity). This reflects the trend towards encourag-

ing local financial responsibility for projects, as the central government's budget has shrunk a portion of GDP.

For the coal industry, bank loans and self-raised funds accounted for an increasing share, and coal substitution funds<sup>10</sup> also played an important role. Direct investment, however, continued to be the single largest source of capital for state-owned coal mines. The oil and natural gas industry has come to rely to a remarkable degree on foreign capital<sup>11</sup> (peaking at 52% of capital construction investment in 1988), replacing direct government investment as the primary source. Direct government investment in the electric power industry dropped precipitously as well, forcing it to rely more on self-raised funds (including bond issues and out-of-plan bank loans), loans, foreign and other sources (e.g., special taxes levied by local governments and utilities). The bulk of oil substitution funds were used by utilities to pay for the conversion of oil-fired boilers to coal.

## TECHNICAL NOTE: INVESTMENT CATEGORIES

Official statistics on total investment, referred to as "fixed assets investment" (*guding zichan touzi*), are the sum of three investment categories, "capital construction" (*jiben jianshe*), "technical updating and transformation" (*gengxin gaizao*), and "other fixed assets investment" (*qita guding zichan touzi*). Capital construction and technical updating and transformation investments are further characterized as "productive" or "nonproductive" (*shengchanxing* and *feishengchanxing*). Data on investment are generally available only for state-owned and urban collective enterprises; rural enterprise statistics tend to be less complete and less accurate.

## CAPITAL CONSTRUCTION INVESTMENT

Capital construction generally refers to construction of new facilities as well as purchases and installation of equipment which result in net additions to productive capacity. At present, capital construction funds are administered mainly through the State Planning Commission system, which extends down to the county level. Capital con-



struction accounts for the majority of investment in state-owned units (currently about 60%; Table III-1). Time series data for energy industry capital construction investment are available for a much longer period than for total investment (41 years as opposed to 13 years), so it is a convenient proxy for total energy industry investment. Since the 1980s the share of energy industry investment from capital construction funds has been similar to the share for all industry from capital construction, providing some support for this.

### **TECHNICAL UPDATING INVESTMENT**

Investment in this category covers mainly the repair and renovation of existing plant; according to the strict definition, projects are not intended to expand capacity, but often do in practice (especially for projects involving only local government support). Technical updating investments currently are approved and administered through the State Economic and Trade Commission's network, which, like the planning commission system, extends down to the county level. About one-third of investment in state-owned units is for technical updating and transformation, although the share for the energy industry was consistently lower in the 1980s.

### **OTHER INVESTMENT**

While not a large category compared to the two above, the category of "oil field maintenance and development projects" accounts for more than half of all "other" investment. This is reflected in the larger contribution of "other" investment to energy industry investment compared to all investment. Most of the balance is made up of miscellaneous small purchases of fixed assets (valued at 20,000-50,000 yuan). The energy industry also uses some other funds in this category, but the total must be inferred from other breakdowns of energy industry investment.

### **"PRODUCTIVE" AND "NONPRODUCTIVE" INVESTMENT**

Because work units in China are responsible for worker welfare, they invest a substantial amount

in services not related to production, e.g., housing, education, and health care of work unit personnel and their dependents. To reflect this, investment funds are categorized as either "productive" or "non-productive". The former category refers to investments in factories, mines, railways, bridges harbors, farmland, and water conservancy facilities, while the latter refers to the construction of schools, hospitals, stores, and living quarters and the purchase of machinery and equipment. The share of "nonproductive" investment in the energy industry has decreased in recent years.<sup>12</sup>

### **OWNERSHIP: STATE, COLLECTIVE, PRIVATE AND OTHER UNITS**

Until recently, the State Statistical Bureau divided industrial enterprises into four ownership categories: state-owned, collective-owned, private, and other.<sup>13</sup> State-owned units are those whose means of production and income are owned by any organ or division of the central government or any level of local government. Collective-owned units are those whose means of production and income are owned by collectives in cities (*chengshi*), counties (*xian*), and townships (*zhen*), as well as village (*xiang*) and rural (*cun*) enterprises. Individual-owned enterprises are owned by individuals in urban and rural areas, including enterprises belonging to individuals who have pooled capital and management but have received an individual-enterprise license. Other enterprises include: those belonging to joint ventures belonging to state-owned units and collectives, state-owned units and individual investors, or collectives and individual investors; foreign joint ventures; enterprises owned by overseas Chinese; other wholly foreign-owned enterprises; and any other enterprises not fitting into the above categories.

Breakdowns of investment funds by energy industry subsector are generally available only for state-owned units, although urban collective-owned units are sometimes also included (specific coverage is noted in footnotes to the various tables). Some investment data cover village level enterprises and above, excluding rural level and below. The latter category includes rural enterprises, rural joint ventures, and rural individual industry. Investment in state-owned units accounted for between 61% and 67% of all investment between 1983 and 1993, while

urban collectives received between 3% and 6% over the same period. The most important category of investment missing is probably investment in rural mines and small hydroelectric plants owned by rural collectives and individuals.

## INVESTMENT TARGETS AND ACTUAL INVESTMENT

Most investment figures are based on budget price at time of project approval. The amount of money ultimately spent on a project may differ significantly from these figures, which are often the only ones available. Most data in this section are for budgeted amounts, although a few tables contain data on actual investment. Given this limitation, as well as those described above, the figures in this section should not be taken as accurate guides to total investment levels, although we believe they provide a reasonable guide to the relative size of investment in different sectors.

<sup>1</sup> "Unit" refers to a Chinese "work unit" (*danwei*), which could be an industrial enterprise, a school, a government agency, etc. Since industrial enterprises are a type of work unit, the terms "enterprise" and "unit" are for all practical purposes interchangeable in the context of this volume.

Hereafter "total investment" will refer only to investment in state-owned enterprises, unless otherwise noted. State-owned enterprises are those owned by all levels of government down to the county level, and at least nominally subject to central control through ministry and commission branches. Excluded are units under township- and village-level governments, collectives, privately owned enterprises, and domestic and foreign joint ventures. Some sources refer to state-owned units as those "owned by the people" (*quanmin suoyouzh*).

<sup>2</sup> China Statistical Yearbook, various years.

<sup>3</sup> Statistics on capital construction — the largest category of state investment funds, usually used to construct new facilities — show similar patterns (Table III-3). Until 1993, however, a larger share of technical updating funds, generally used for expanding existing facilities, was used in the coal industry than in power generation and distribution (Tables III-3 and III-5; see Technical Note).

<sup>4</sup> Lu, 1988; Levine and Liu, 1990.

<sup>5</sup> Investment in state-owned and urban collective coal mines was 76 billion yuan (constant 1980 yuan, subsequent figures the same) between 1981 and 1990. Multiplying the net increase in rural mine output over that period (a conservative estimate of capacity increase) by a central estimate of rural mine cost (40 yuan/t capacity) gives a total investment in rural mines of 11 bil-

lion yuan, or 13% of the resulting total investment.

<sup>6</sup> Sinton and Levine, 1994.

<sup>7</sup> Liu *et al.*, 1994.

<sup>8</sup> Gu *et al.*, 1991.

<sup>9</sup> Direct government investment includes grants from the central government, loans that replace grants, and funds invested by local governments at the direction of the central government.

<sup>10</sup> "Coal substitution" (*mei dai you*) funds are capital construction funds and loans intended to reduce dependence on relatively scarce petroleum. After it became clear that the large oil production increases predicted in the 1970s were not going to materialize, this fund was established to convert oil-using utility and industrial boilers and other equipment, which had been overbuilt based on those predictions, to coal.

<sup>11</sup> Foreign capital includes not only funds from abroad, but equipment, materials, and technology. It does not include foreign equipment and materials purchased with Chinese foreign exchange reserves charged to the import accounts China previously had with Eastern Europe's former centrally planned countries.

<sup>12</sup> This is the outcome of declining portions of investment in all segments of the energy supply industry allocated to "nonproductive" investment, and an increase in the share of capital flowing to the electric power industry, which has in the past spent the least on "nonproductive" projects.

<sup>13</sup> The statistical categories have changed — through refinement of the "private" and "other" categories — with the publication of the 1994 China Statistical Yearbook. Ownership categories now include: state-owned; collective; private; individual; associated (a mixture of two or more of the preceding), equity participation (registered joint stock companies); foreign-funded (joint and cooperative ventures); Hong Kong, Macao, and Taiwan (joint and cooperative ventures, and wholly owned enterprises); and other.

**Table III-1. Investment by State: Total and Capital Construction  
Compared to Energy Industry Investment, \* 1953-1993**

<b>I. Billion Current Yuan</b>					
<b>Year</b>	<b>Total Investment</b>	<b>Total Energy Industry Investment †</b>	<b>Total Capital Construction Investment</b>	<b>Industry Capital Construction Investment ¶</b>	<b>Energy Industry Capital Construction Investment ¶</b>
1953	9.16	-	9.04	2.83	0.70
1954	10.27	-	9.91	3.84	1.02
1955	10.52	-	10.04	4.30	1.36
1956	16.08	-	15.53	6.82	1.97
1957	15.12	-	14.33	7.24	2.25
1958	27.91	-	26.90	17.30	4.13
1959	36.80	-	34.97	20.89	5.78
1960	41.66	-	38.87	22.96	6.34
1961	15.61	-	12.74	7.68	2.75
1962	8.73	-	7.13	4.01	1.57
1963	11.67	-	9.82	4.92	1.65
1964	16.59	-	14.41	7.21	2.17
1965	21.69	-	17.96	8.90	2.56
1966	25.48	-	20.94	9.50	2.70
1967	18.77	-	14.02	10.20	2.90
1968	15.16	-	11.31	10.80	3.10
1969	24.69	-	20.08	11.50	3.30
1970	36.81	-	31.26	12.20	3.50
1971	41.73	-	34.08	14.80	5.00
1972	41.28	-	32.80	17.40	5.70
1973	43.81	-	33.81	20.00	6.40
1974	46.32	-	34.77	22.60	6.80
1975	54.49	-	40.93	23.10	7.15
1976	52.39	-	37.64	20.87	6.99
1977	54.83	-	38.24	21.74	7.87
1978	66.87	-	50.10	27.32	11.47
1979	69.94	-	52.35	25.69	11.10
1980	74.59	-	55.89	27.56	11.57
1981	66.75	14.19	44.29	21.60	9.46
1982	84.53	17.41	55.55	26.06	10.22
1983	95.20	21.34	59.41	28.23	12.76
1984	118.52	27.90	74.32	34.16	16.60
1985	168.05	36.83	107.44	44.65	20.53
1986	197.85	44.77	117.61	53.16	26.71
1987	229.80	55.00	134.31	68.28	34.01
1988	276.28	65.27	157.43	79.61	41.01
1989	253.55	70.56	155.17	82.25	44.64
1990	291.86	84.67	170.38	95.26	55.83
1991	362.28	95.68	211.58	114.72	64.61
1992	527.36	116.41	301.27	145.83	80.36
1993	765.80	149.77	461.55	200.45	109.73

\* Figures are for state-owned units unless otherwise noted. State investment was 67% of all investment in 1983 and 61% in 1993. Total investment refers to the State Statistical Bureau's category of "fixed assets investment," which is the sum of "capital construction," "technical updating and transformation," and "other" investments. Capital construction investments are intended primarily for building new production capacity, while technical updating and transformation funds are for repair and retrofitting of existing capacity. Most of the "other" investment in the energy sector is for further development of existing oilfields. All investment figures include some funds intended for "nonproductive" uses, e.g., worker housing, schools, etc. The magnitude of this "nonproductive" investment can be gauged from its share of capital construction investment, detailed in Table III-5, Energy Industry Capital Construction Investment by Subsector and Purpose. Please refer to general notes at the beginning of this section regarding coverage and significance of these figures.

† Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 and later years, which are for state-owned units only.

¶ For 1966-1970 and 1971-1974 only total capital construction investment figures are available (54.151 billion current yuan and 74.96 billion current yuan respectively). Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals as control sums and reported investment in 1965 and 1975 as the endpoints. "Industry capital construction investment" is part of "total capital construction investment," and "energy industry capital construction investment" is part of "industry capital construction investment."

Source: Yearbook of China's Economy, various years; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, \* 1953-1993 (continued)

2. Billion 1980 Yuan §					
Year	Total Investment	Total Energy Industry Investment †	Total Capital Construction Investment	Industry Capital Construction Investment ¶	Energy Industry Capital Construction Investment ¶
1953	7.03	-	6.94	2.18	0.54
1954	8.42	-	8.12	3.14	0.84
1955	8.91	-	8.50	3.64	1.15
1956	14.90	-	14.38	6.32	1.83
1957	12.89	-	12.22	6.17	1.92
1958	23.92	-	23.06	14.83	3.54
1959	31.39	-	29.83	17.81	4.93
1960	35.78	-	33.38	19.72	5.45
1961	12.81	-	10.46	6.30	2.25
1962	6.91	-	5.64	3.17	1.24
1963	9.33	-	7.85	3.93	1.32
1964	13.21	-	11.48	5.74	1.73
1965	18.39	-	15.23	7.54	2.17
1966	22.56	-	18.54	8.41	2.39
1967	16.80	-	12.55	9.13	2.60
1968	13.88	-	10.35	9.89	2.84
1969	23.46	-	19.08	10.93	3.14
1970	36.09	-	30.64	11.96	3.43
1971	41.10	-	33.57	14.58	4.92
1972	40.99	-	32.56	17.28	5.66
1973	43.67	-	33.70	19.93	6.38
1974	46.18	-	34.66	22.53	6.78
1975	55.00	-	41.32	23.32	7.21
1976	53.04	-	38.11	21.13	7.07
1977	55.80	-	38.91	22.12	8.01
1978	67.68	-	50.71	27.65	11.61
1979	69.88	-	52.30	25.66	11.09
1980	74.59	-	55.89	27.56	11.57
1981	66.55	14.15	44.16	21.54	9.44
1982	84.40	17.38	55.47	26.02	10.21
1983	95.22	21.35	59.43	28.24	12.76
1984	115.64	27.23	72.51	33.33	16.19
1985	155.97	34.19	99.71	41.44	19.05
1986	178.21	40.32	105.93	47.89	24.06
1987	196.15	46.94	114.64	58.28	29.03
1988	217.86	51.47	124.15	62.78	32.34
1989	183.98	51.20	112.60	59.68	32.39
1990	210.95	61.20	123.14	68.85	40.35
1991	253.45	66.93	148.02	80.26	45.20
1992	351.87	77.67	201.02	97.30	53.62
1993	474.83	92.86	286.18	124.28	68.04

\* Figures are for state-owned units unless otherwise noted. State investment was 67% of all investment in 1983 and 61% in 1993. Total investment refers to the State Statistical Bureau's category of "fixed assets investment," which is the sum of "capital construction," "technical updating and transformation," and "other" investments. Capital construction investments are intended primarily for building new production capacity, while technical updating and transformation funds are for repair and retrofitting of existing capacity. Most of the "other" investment in the energy sector is for further development of existing oilfields. All investment figures include some funds intended for "nonproductive" uses, e.g., worker housing, schools, etc. The magnitude of this "nonproductive" investment can be gauged from its share of capital construction investment, detailed in Table III-5, Energy Industry Capital Construction Investment by Subsector and Purpose. Please refer to general notes at the beginning of this section regarding coverage and significance of these figures.

† Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 and later years, which are for state-owned units only.

¶ For 1966-1970 and 1971-1974 only total capital construction investment figures are available (54.151 billion current yuan and 74.96 billion current yuan respectively). Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals as control sums and reported investment in 1965 and 1975 as the endpoints. "Industry capital construction investment" is part of "total capital construction investment," and "energy industry capital construction investment" is part of "industry capital construction investment."

§ Investment figures are deflated using the industrial final sector deflators given in Table X-6.

Source: Yearbook of China's Economy, various years; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, \* 1953-1993 (continued)

3. Annual Increase					
Year	Total Investment	Total Energy Industry Investment †	Total Capital Construction Investment	Industry Capital Construction Investment ¶	Energy Industry Capital Construction Investment ¶
1953	-	-	-	-	-
1954	20%	-	17%	45%	56%
1955	6%	-	5%	16%	37%
1956	67%	-	69%	74%	59%
1957	-13%	-	-15%	-2%	5%
1958	86%	-	89%	140%	84%
1959	31%	-	29%	20%	39%
1960	14%	-	12%	11%	10%
1961	-64%	-	-69%	-68%	-59%
1962	-46%	-	-46%	-50%	-45%
1963	35%	-	39%	24%	6%
1964	42%	-	46%	46%	31%
1965	39%	-	33%	31%	26%
1966	23%	-	22%	11%	10%
1967	-26%	-	-32%	9%	9%
1968	-17%	-	-18%	8%	9%
1969	69%	-	84%	11%	10%
1970	54%	-	61%	9%	9%
1971	14%	-	10%	22%	44%
1972	0%	-	-3%	19%	15%
1973	7%	-	3%	15%	13%
1974	6%	-	3%	13%	6%
1975	19%	-	19%	4%	6%
1976	-4%	-	-8%	-9%	-2%
1977	5%	-	2%	5%	13%
1978	21%	-	30%	25%	45%
1979	3%	-	3%	-7%	-4%
1980	7%	-	7%	7%	4%
1981	-11%	-	-21%	-22%	-18%
1982	27%	23%	26%	21%	8%
1983	13%	23%	7%	9%	25%
1984	21%	28%	22%	18%	27%
1985	35%	26%	38%	24%	18%
1986	14%	18%	6%	16%	26%
1987	10%	16%	8%	22%	21%
1988	11%	10%	8%	8%	11%
1989	-16%	-1%	-9%	-5%	0%
1990	15%	20%	9%	15%	25%
1991	20%	9%	20%	17%	12%
1992	39%	16%	36%	21%	19%
1993	35%	20%	42%	28%	27%

\* Figures are for state-owned units unless otherwise noted. State investment was 67% of all investment in 1983 and 61% in 1993. Total investment refers to the State Statistical Bureau's category of "fixed assets investment," which is the sum of "capital construction," "technical updating and transformation," and "other" investments. Capital construction investments are intended primarily for building new production capacity, while technical updating and transformation funds are for repair and retrofitting of existing capacity. Most of the "other" investment in the energy sector is for further development of existing oilfields. All investment figures include some funds intended for "nonproductive" uses, e.g., worker housing, schools, etc. The magnitude of this "nonproductive" investment can be gauged from its share of capital construction investment, detailed in Table III-5, Energy Industry Capital Construction Investment by Subsector and Purpose. Please refer to general notes at the beginning of this section regarding coverage and significance of these figures.

† Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 and later years, which are for state-owned units only.

¶ For 1966-1970 and 1971-1974 only total capital construction investment figures are available (54.151 billion current yuan and 74.96 billion current yuan respectively). Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals as control sums and reported investment in 1965 and 1975 as the endpoints. "Industry capital construction investment" is part of "total capital construction investment," and "energy industry capital construction investment" is part of "industry capital construction investment."

Source: Yearbook of China's Economy, various years; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, \* 1953-1993 (continued)

4. Shares, Billion Current Yuan					
Year	Total Investment	Total Energy Industry Investment †	Total Capital Construction Investment	Industry Capital Construction Investment ¶	Energy Industry Capital Construction Investment ¶¶
1953	100%	-	99%	31%	8%
1954	100%	-	96%	37%	10%
1955	100%	-	95%	41%	13%
1956	100%	-	97%	42%	12%
1957	100%	-	95%	48%	15%
1958	100%	-	96%	62%	15%
1959	100%	-	95%	57%	16%
1960	100%	-	93%	55%	15%
1961	100%	-	82%	49%	18%
1962	100%	-	82%	46%	18%
1963	100%	-	84%	42%	14%
1964	100%	-	87%	43%	13%
1965	100%	-	83%	41%	12%
1966	100%	-	82%	37%	11%
1967	100%	-	75%	54%	15%
1968	100%	-	75%	71%	20%
1969	100%	-	81%	47%	13%
1970	100%	-	85%	33%	10%
1971	100%	-	82%	35%	12%
1972	100%	-	79%	42%	14%
1973	100%	-	77%	46%	15%
1974	100%	-	75%	49%	15%
1975	100%	-	75%	42%	13%
1976	100%	-	72%	40%	13%
1977	100%	-	70%	40%	14%
1978	100%	-	75%	41%	17%
1979	100%	-	75%	37%	16%
1980	100%	-	75%	37%	16%
1981	100%	21%	66%	32%	14%
1982	100%	21%	66%	31%	12%
1983	100%	22%	62%	30%	13%
1984	100%	24%	63%	29%	14%
1985	100%	22%	64%	27%	12%
1986	100%	23%	59%	27%	13%
1987	100%	24%	58%	30%	15%
1988	100%	24%	57%	29%	15%
1989	100%	28%	61%	32%	18%
1990	100%	29%	58%	33%	19%
1991	100%	26%	58%	32%	18%
1992	100%	22%	57%	28%	15%
1993	100%	20%	60%	26%	14%

\*\* Figures are for state-owned units unless otherwise noted. State investment was 67% of all investment in 1983 and 61% in 1993. Total investment refers to the State Statistical Bureau's category of "fixed assets investment," which is the sum of "capital construction," "technical updating and transformation," and "other" investments. Capital construction investments are intended primarily for building new production capacity, while technical updating and transformation funds are for repair and retrofitting of existing capacity. Most of the "other" investment in the energy sector is for further development of existing oilfields. All investment figures include some funds intended for "nonproductive" uses, e.g., worker housing, schools, etc. The magnitude of this "nonproductive" investment can be gauged from its share of capital construction investment, detailed in Table III-5, Energy Industry Capital Construction Investment by Subsector and Purpose. Please refer to general notes at the beginning of this section regarding coverage and significance of these figures.

† Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 and later years, which are for state-owned units only.

¶ For 1966-1970 and 1971-1974 only total capital construction investment figures are available (54.151 billion current yuan and 74.96 billion current yuan respectively). Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals as control sums and reported investment in 1965 and 1975 as the endpoints. "Industry capital construction investment" is part of "total capital construction investment," and "energy industry capital construction investment" is part of "industry capital construction investment."

Source: Yearbook of China's Economy, various years; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Figure III-1. Capital Construction Investment

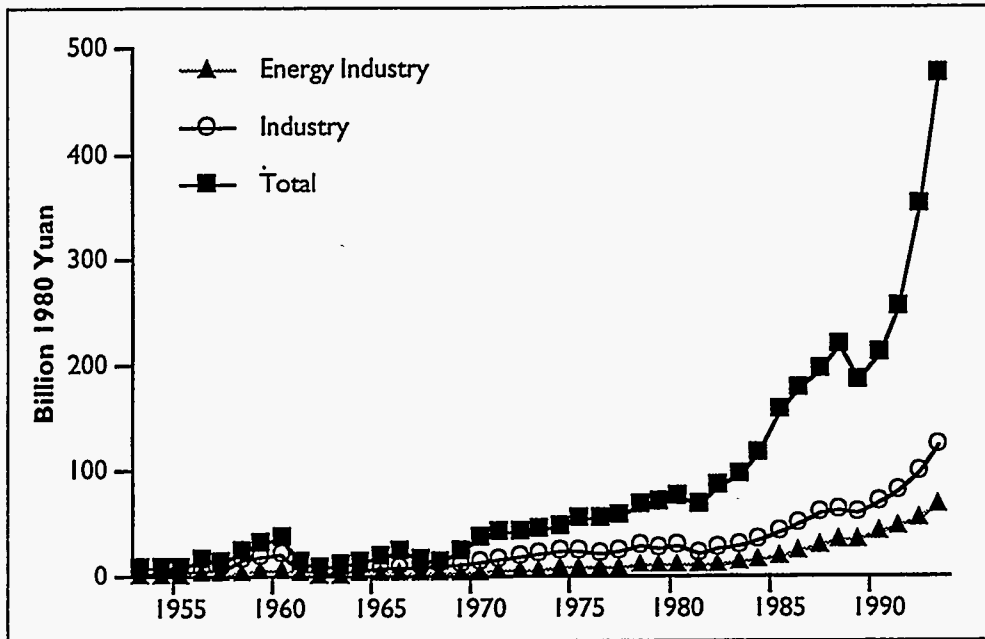


Figure III-2. Structure of Capital Construction Investment

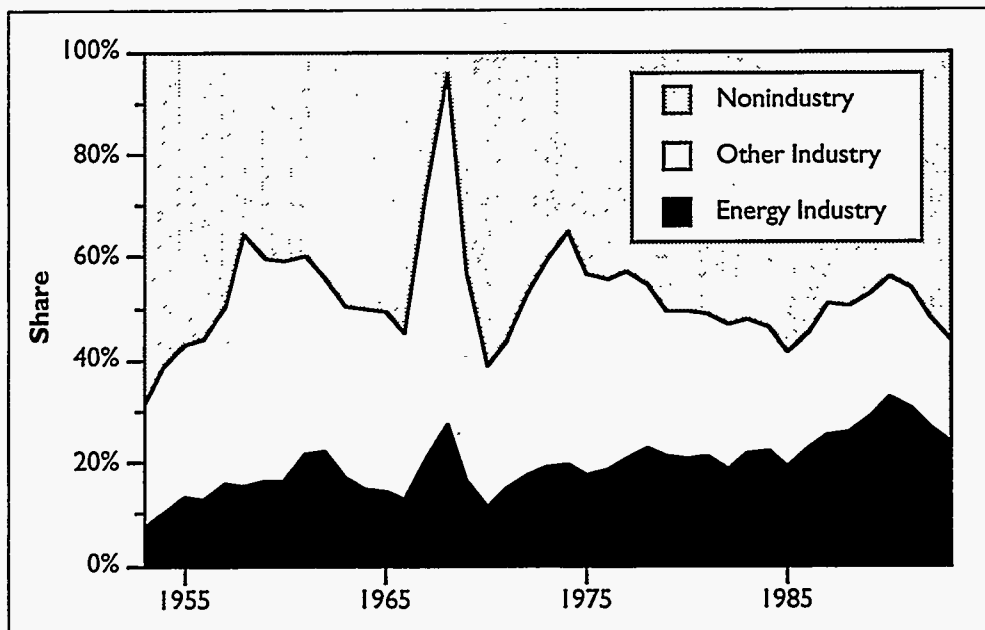


Table III-2. Total Investment by Ownership of Enterprise, \* 1983-1993

I. Billion Current Yuan										
Year	State-Owned	Collective-Owned Units			Individual Investment			Joint Venture & Other	Total Energy Industry	
	Units	Urban	Rural	Subtotal	Urban	Rural	Subtotal		Total Investment †	Industry †
1983	95.196	4.565	11.068	15.633	1.672	30.505	32.177	-	143.006	21.34
1984	118.518	6.386	17.483	23.869	2.989	37.911	40.900	-	183.287	27.90
1985	168.051	12.823	19.923	32.746	5.679	47.843	53.522	-	254.319	36.83
1986	197.850	14.639	24.535	39.174	7.456	57.482	64.938	-	301.962	44.77
1987	229.799	18.130	36.571	54.701	10.051	69.535	79.586	-	364.086	55.00
1988	276.276	25.497	45.674	71.171	15.685	86.523	102.208	-	449.655	65.27
1989	253.548	18.563	38.436	56.999	14.023	89.203	103.226	-	413.773	70.56
1990	291.864	16.338	36.610	52.948	12.470	87.647	100.117	-	444.929	84.67
1991	362.811	20.383	49.398	69.781	14.032	104.256	118.288	-	550.880	95.68
1992	527.364	36.449	99.486	135.935	21.647	100.552	122.199	-	785.498	116.41
1993	765.797	60.015	163.119	223.134	33.850	113.773	147.623	109.232	1245.786	149.77

2. Shares of Total										
Year	State-Owned	Collective-Owned Units			Individual Investment			Joint Venture & Other	Total Energy Industry	
	Units	Urban	Rural	Subtotal	Urban	Rural	Subtotal		Total Investment †	Industry †
1983	66.6%	3.2%	7.7%	10.9%	1.2%	21.3%	22.5%	-	100.0%	14.9%
1984	64.7%	3.5%	9.5%	13.0%	1.6%	20.7%	22.3%	-	100.0%	15.2%
1985	66.1%	5.0%	7.8%	12.9%	2.2%	18.8%	21.0%	-	100.0%	14.5%
1986	65.5%	4.8%	8.1%	13.0%	2.5%	19.0%	21.5%	-	100.0%	14.8%
1987	63.1%	5.0%	10.0%	15.0%	2.8%	19.1%	21.9%	-	100.0%	15.1%
1988	61.4%	5.7%	10.2%	15.8%	3.5%	19.2%	22.7%	-	100.0%	14.5%
1989	61.3%	4.5%	9.3%	13.8%	3.4%	21.6%	24.9%	-	100.0%	17.1%
1990	65.6%	3.7%	8.2%	11.9%	2.8%	19.7%	22.5%	-	100.0%	19.0%
1991	65.9%	3.7%	9.0%	12.7%	2.5%	18.9%	21.5%	-	100.0%	17.4%
1992	67.1%	4.6%	12.7%	17.3%	2.8%	12.8%	15.6%	-	100.0%	14.8%
1993	61.5%	4.8%	13.1%	17.9%	2.7%	9.1%	11.8%	8.8%	100.0%	12.0%

\* Unlike most of the tables in this chapter, which only refer to investment in state-owned units, this table has data on collective and individual investment as well. Breakdowns of investment in units owned by collectives and individuals are not available. The most important investment category not well-characterized by available data is probably investment in collective- and individually-owned rural coal mines.

† For state- and urban collective-owned units.

Source: China Statistical yearbook, various years.



Table III-3. Total Energy Industry Investment by Subsector, \* 1981-1993

1. Billion Current Yuan							
Year	Coal Extraction	Coking, Coal Gas and Coal Products	Oil and Natural Gas Extraction	Oil Refining	Electricity Generation and Supply	Energy Industry Subtotal ¶	Total Industry Investment ¶
1981	3.633	0.359	4.686	0.737	4.755	14.170	38.043
1982	4.865	0.114	6.199	0.700	5.515	17.393	46.743
1983	6.208	0.145	7.424	0.649	6.888	21.314	54.662
1984	8.188	0.374	9.460	0.987	8.841	27.850	65.352
1985	8.799	1.072	13.029	1.209	12.166	36.275	91.365
1986	9.310	1.632	13.782	1.627	17.795	44.146	115.982
1987	9.938	1.720	16.623	2.635	23.113	54.029	140.715
1988	10.796	1.996	19.690	4.211	27.311	64.004	170.909
1989	12.230	1.993	23.294	3.474	29.572	70.563	159.701
1990	14.633	3.284	24.926	4.243	36.604	83.690	180.988
1991	16.869	3.577	27.469	6.030	41.018	94.963	211.320
1992	18.495	3.994	32.687	6.699	53.621	115.496	275.947
1993	21.864	4.507	35.930	12.603	74.863	149.767	357.157

2. Billion 1980 Yuan †							
Year	Coal Extraction	Coking, Coal Gas and Coal Products	Oil and Natural Gas Extraction	Oil Refining	Electricity Generation and Supply	Energy Industry Subtotal ¶	Total Industry Investment ¶
1981	3.622	0.358	4.672	0.735	4.741	14.128	37.931
1982	4.858	0.114	6.190	0.699	5.507	17.367	46.673
1983	6.210	0.145	7.426	0.649	6.890	21.319	54.676
1984	7.989	0.365	9.230	0.963	8.626	27.173	63.763
1985	8.166	0.995	12.092	1.122	11.291	33.667	84.796
1986	8.386	1.470	12.414	1.465	16.028	39.763	104.468
1987	8.483	1.468	14.189	2.249	19.729	46.118	120.111
1988	8.513	1.574	15.527	3.321	21.537	50.472	134.774
1989	8.875	1.446	16.903	2.521	21.458	51.203	115.885
1990	10.576	2.374	18.015	3.067	26.456	60.487	130.810
1991	11.801	2.502	19.217	4.219	28.696	66.435	147.838
1992	12.341	2.665	21.810	4.470	35.778	77.063	184.122
1993	13.557	2.795	22.278	7.814	46.418	92.862	221.453

\* Estimates in italics. Figures before 1989 include investment in state- and urban collective-owned units only. 1989 and later figures are for state-owned units only. Sum of sectoral figures is slightly less than total figure because only one item in the "Other Investment" category (oilfield maintenance and development projects, amounting to about 13.5 billion yuan per year) was available. Investment includes capital construction, technical updating and transformation, and other investment, the former representing the majority of investment. Please see notes at the beginning of this section.

† Deflated using the implicit deflators for the industrial sector in Table X-6.

¶ All years include investment in state-owned units only.

Source: China Statistical Yearbook, various years; China Energy Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years; Energy Research Institute.

**Table III-3. Total Energy Industry Investment by Subsector, \***  
1981-1993 (continued)

<b>3. Shares of Energy Industry Investment</b>							
<b>Year</b>	<b>Coal Extraction</b>	<b>Coking Coal Gas and Coal Products</b>	<b>Oil and Natural Gas Extraction</b>	<b>Oil Refining</b>	<b>Electricity Generation and Supply</b>	<b>Energy Industry Subtotal ¶</b>	<b>Energy Industry as Percent of Total Industry</b>
1981	26%	3%	33%	5%	34%	100%	37%
1982	28%	1%	36%	4%	32%	100%	37%
1983	29%	1%	35%	3%	32%	100%	39%
1984	29%	1%	34%	4%	32%	100%	43%
1985	24%	3%	36%	3%	34%	100%	40%
1986	21%	4%	31%	4%	40%	100%	38%
1987	18%	3%	31%	5%	43%	100%	38%
1988	17%	3%	31%	7%	43%	100%	37%
1989	17%	3%	33%	5%	42%	100%	44%
1990	17%	4%	30%	5%	44%	100%	46%
1991	18%	4%	29%	6%	43%	100%	45%
1992	16%	3%	28%	6%	46%	100%	42%
1993	15%	3%	24%	8%	50%	100%	42%

\* Estimates in italics. Figures before 1989 include investment in state- and urban collective-owned units only. 1989 and later figures are for state-owned units only. Sum of sectoral figures is slightly less than total figure because only one item in the "Other Investment" category (oilfield maintenance and development projects, amounting to about 13.5 billion yuan per year) was available. Investment includes capital construction, technical updating and transformation, and other investment, the former representing the majority of investment. Please see notes at the beginning of this section.

Source: China Statistical Yearbook, various years; China Energy Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years; Energy Research Institute.

Figure III-3. Total Energy Industry Investment by Subsector

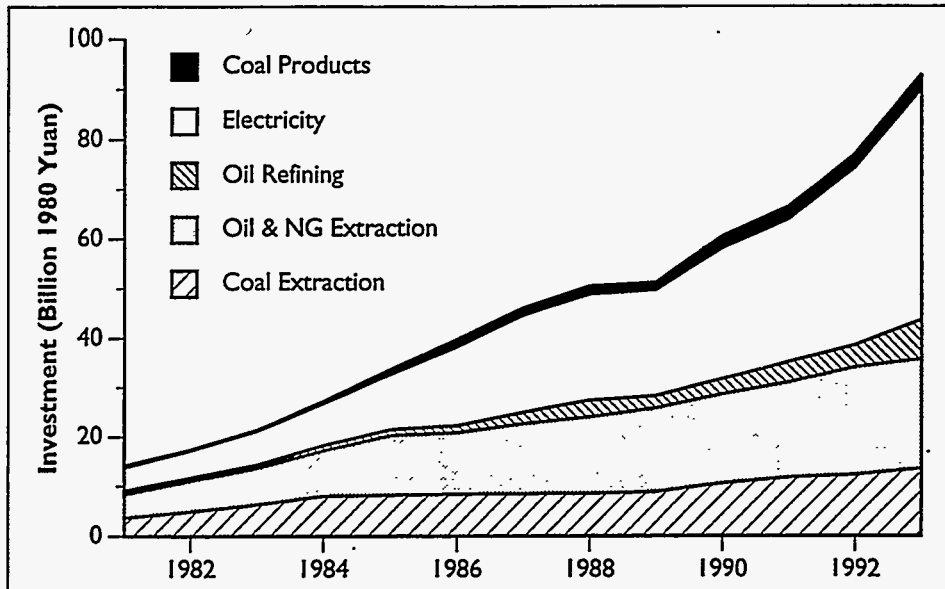


Figure III-4. Shares of Total Energy Industry Investment

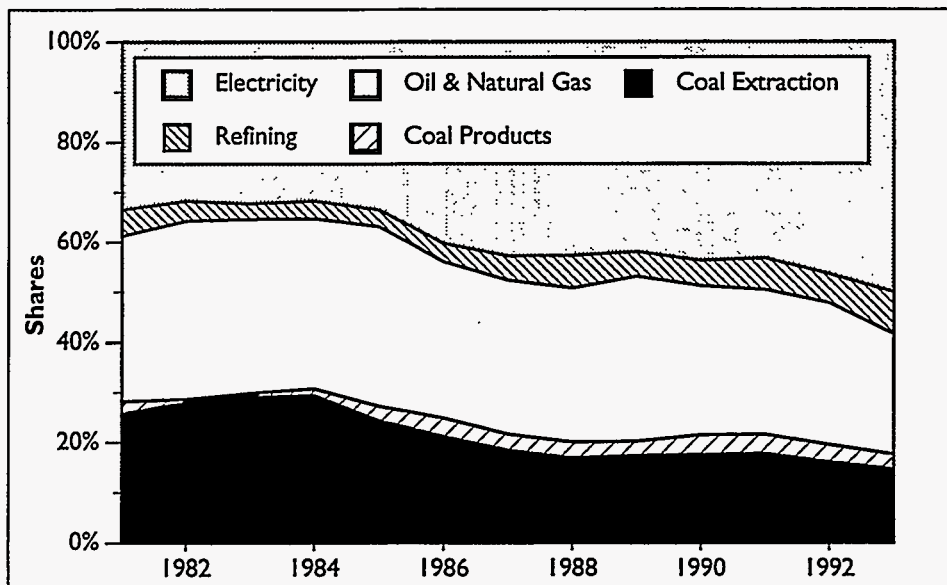


Table III-4. Energy Industry Capital Construction Investment by Subsector,\* 1953-1994

I. Billion Current Yuan					
Year	Coal	Coke & Coal Products	Oil and Natural Gas †	Electric Power ¶	Total §
1953	0.36	0.01	0.07	0.26	0.70
1954	0.46	0.03	0.14	0.39	1.02
1955	0.60	0.05	0.18	0.54	1.36
1956	0.81	0.02	0.43	0.72	1.97
1957	0.75	0.05	0.38	1.07	2.25
1958	1.62	0.06	0.40	2.05	4.13
1959	2.17	0.33	0.52	2.76	5.78
1960	2.45	0.06	0.87	2.96	6.34
1961	1.56	0.02	0.40	0.76	2.75
1962	0.89	0.01	0.32	0.36	1.57
1963	0.82	0.01	0.43	0.39	1.65
1964	0.92	0.01	0.59	0.65	2.17
1965	0.77	0.001	0.62	1.17	2.56
1966	0.80	0.01	0.70	1.20	2.70
1967	0.90	0.01	0.70	1.30	2.90
1968	0.90	0.02	0.80	1.40	3.10
1969	1.00	0.03	0.80	1.40	3.30
1970	1.00	0.03	0.90	1.50	3.50
1971	1.30	0.03	1.20	1.90	5.00
1972	1.60	0.03	1.50	2.30	5.70
1973	2.00	0.03	1.80	2.60	6.40
1974	2.30	0.03	2.20	3.00	6.80
1975	1.87	0.06	2.16	3.07	7.15
1976	1.65	0.03	1.91	3.40	6.99
1977	2.26	0.06	2.08	3.47	7.87
1978	3.18	0.09	3.11	5.09	11.47
1979	3.19	0.11	2.71	5.10	11.10
1980	3.35	0.07	3.34	4.81	11.57
1981	2.32	0.34	2.80	4.01	9.46
1982	2.99	0.09	2.53	4.62	10.22
1983	4.01	0.11	2.90	5.75	12.76
1984	5.51	0.32	3.06	7.70	16.60
1985	5.51	0.76	3.32	10.79	20.37
1986	5.77	0.92	3.86	15.97	26.52
1987	5.96	1.10	5.86	20.86	33.78
1988	6.35	1.19	8.65	24.97	41.15
1989	7.05	1.45	9.35	26.79	44.64
1990	9.88	2.42	10.07	33.46	55.83
1991	11.66	2.59	12.59	37.78	64.62
1992	12.69	2.91	15.80	48.97	80.36
1993	15.31	3.40	23.07	67.51	109.28

\* For state-owned units only. Official statistics for energy investment for 1966-1970 and 1971-1974 are not available for individual years. Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals for each period as control sums and reported investment in 1965 and 1975 as the endpoints. Investment figures are deflated using the implicit deflators for the industrial sector in Table X-6.

† Includes investments in refining.

¶ Does not include investment in steam and hot water supply for years before 1988.

§ Totals for 1985-1990 differ from official data because, for consistency with previous years, we exclude electricity sector investment in steam and hot water supply (which in 1989 amounted to 322 million yuan).

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Table III-4. Energy Industry Capital Construction Investment by Subsector,\*  
1953-1994 (continued)**

2. Constant 1980 Yuan					
Year	Coal	Coke & Coal Products	Oil and Natural Gas †	Electric Power ‡	Total §
1953	0.27	0.01	0.05	0.20	0.54
1954	0.37	0.02	0.12	0.32	0.84
1955	0.50	0.04	0.15	0.45	1.15
1956	0.75	0.02	0.39	0.67	1.83
1957	0.64	0.04	0.33	0.91	1.92
1958	1.39	0.05	0.34	1.76	3.54
1959	1.85	0.28	0.44	2.35	4.93
1960	2.11	0.05	0.75	2.55	5.45
1961	1.28	0.01	0.33	0.63	2.25
1962	0.70	0.01	0.25	0.28	1.24
1963	0.66	0.01	0.34	0.31	1.32
1964	0.73	0.00	0.47	0.52	1.73
1965	0.65	0.00	0.53	0.99	2.17
1966	0.71	0.01	0.62	1.06	2.40
1967	0.81	0.01	0.63	1.16	2.61
1968	0.82	0.02	0.73	1.28	2.86
1969	0.95	0.02	0.76	1.33	3.06
1970	0.98	0.03	0.88	1.47	3.36
1971	1.28	0.03	1.18	1.87	4.36
1972	1.59	0.03	1.49	2.28	5.39
1973	1.99	0.03	1.79	2.59	6.41
1974	2.29	0.03	2.19	2.99	7.51
1975	1.88	0.06	2.18	3.09	7.21
1976	1.67	0.03	1.93	3.44	7.07
1977	2.30	0.06	2.11	3.53	8.01
1978	3.22	0.09	3.15	5.15	11.61
1979	3.18	0.11	2.70	5.09	11.09
1980	3.35	0.07	3.34	4.81	11.57
1981	2.31	0.34	2.79	4.00	9.44
1982	2.98	0.08	2.53	4.62	10.21
1983	4.01	0.11	2.90	5.75	12.76
1984	5.38	0.31	2.99	7.51	16.19
1985	5.11	0.70	3.08	10.01	18.91
1986	5.20	0.83	3.48	14.39	23.89
1987	5.09	0.94	5.00	17.81	28.84
1988	5.01	0.93	6.82	19.69	32.45
1989	5.12	1.05	6.79	19.44	32.39
1990	7.14	1.75	7.28	24.18	40.35
1991	8.16	1.81	8.81	26.43	45.20
1992	8.46	1.94	10.54	32.67	53.62
1993	9.49	2.11	14.30	41.86	67.76

\* For state-owned units only. Official statistics for energy investment for 1966-1970 and 1971-1974 are not available for individual years. Here we have approximated the division of investment funds among the years in these two periods by linear extrapolation, using the investment totals for each period as control sums and reported investment in 1965 and 1975 as the endpoints. Investment figures are deflated using the implicit deflators for the industrial sector in Table X-6.

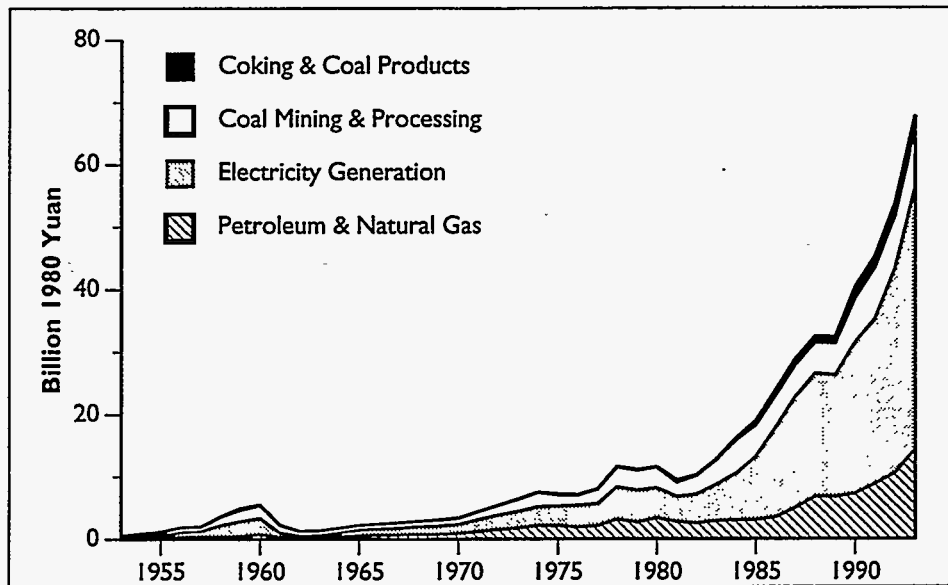
† Includes investments in refining.

‡ Does not include investment in steam and hot water supply for years before 1988.

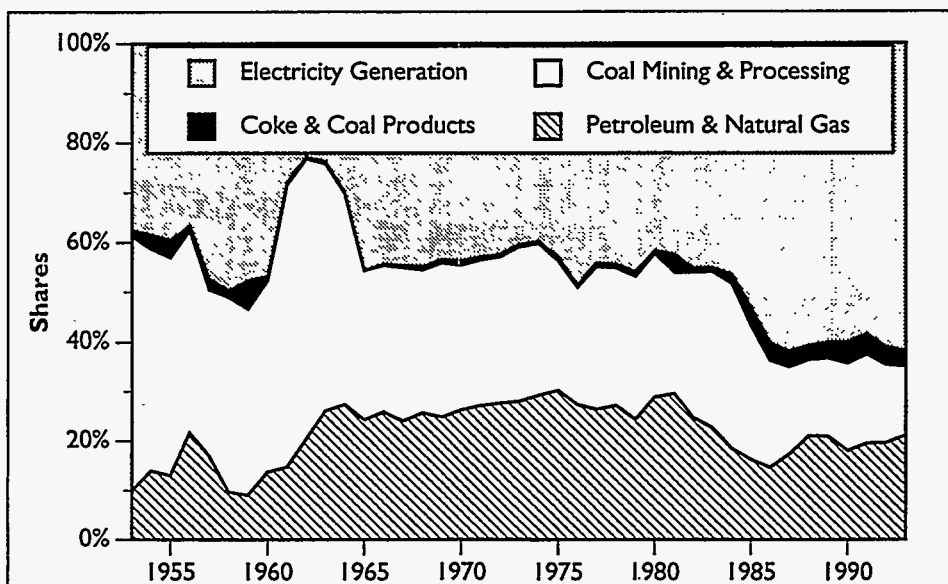
§ Totals for 1985-1990 differ from official data because, for consistency with previous years, we exclude electricity sector investment in steam and hot water supply (which in 1989 amounted to 322 million yuan).

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Figure III-5. Capital Construction Investment in the Energy Industry by Subsector**



**Figure III-6. Subsectoral Shares of Energy Industry Capital Construction Investment**



**Table III-5. Energy Industry Capital Construction Investment  
by Subsector and Purpose, \* 1985-1992**

**Ia. Total Energy Industry Capital Construction Investment, Billion 1980 Yuan †**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Coal	5.11	5.20	5.09	5.01	5.11	7.14	8.43	9.17
Coke, Coal Gas & Products	0.70	0.83	0.94	0.94	1.05	1.75	1.87	2.10
Oil & Natural Gas	3.08	3.48	5.00	6.83	6.78	7.28	9.10	11.42
Electric Power	10.16	14.55	18.00	19.58	19.43	24.18	27.30	35.39
Total	19.05	24.06	29.03	32.35	32.38	40.35	46.70	58.08
of which:								
productive ¶¶	16.00	21.33	26.01	29.29	29.60	37.33	42.72	53.31
nonproductive ¶¶	3.05	2.73	3.02	3.06	2.77	3.02	3.98	4.77

**Ib. Subsectoral Shares of Energy Industry Capital Construction Investment**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Coal	27%	22%	18%	15%	16%	18%	18%	16%
Coke, Coal Gas & Products	4%	3%	3%	3%	3%	4%	4%	4%
Oil & Natural Gas	16%	14%	17%	21%	21%	18%	19%	20%
Electric Power	53%	61%	62%	61%	60%	60%	58%	61%
Total	100%	100%	100%	100%	100%	100%	100%	100%
of which:								
productive ¶¶	84%	89%	90%	91%	91%	93%	91%	92%
nonproductive ¶¶	16%	11%	10%	9%	9%	7%	9%	8%

\* Figures refer to investment in capital construction of state-and urban collective-owned units only, and consequently differ slightly from those in the previous table, which are for state-owned units only.

† Deflated using the implicit deflators for industry sector national income presented in Table X-6.

¶ Productive investment is for the purpose of increasing or maintaining production capacity. Nonproductive investment refers to construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

**Table III-5. Energy Industry Capital Construction Investment  
by Subsector and Purpose, \* 1985-1992 (continued)**

**2a. Coal Industry Capital Construction Investment, Billion 1980 Yuan †**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Extraction	5.02	5.10	4.87	4.88	5.02	-	-	-
Preparation	0.10	0.10	0.22	0.13	0.09	-	-	-
Total	5.11	5.20	5.09	5.01	5.11	7.14	8.43	9.17
of which:								
productive ¶¶	3.90	4.17	4.15	4.16	4.32	6.08	7.10	7.59
nonproductive ¶¶	1.21	1.03	0.94	0.85	0.80	1.07	1.33	1.58

**2b. Shares of Coal Industry Capital Construction Investment**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Extraction	98.1%	98.1%	95.8%	97.5%	98.2%	-	-	-
Preparation	1.9%	1.9%	4.2%	2.5%	1.8%	-	-	-
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
of which:								
productive ¶¶	76.3%	80.2%	81.5%	83.1%	84.4%	85.1%	84.2%	82.7%
nonproductive ¶¶	23.7%	19.8%	18.5%	16.9%	15.6%	14.9%	15.8%	17.3%

\* Figures refer to investment in capital construction of state-and urban collective-owned units only, and consequently differ slightly from those in the previous table, which are for state-owned units only.

† Deflated using the implicit deflators for industry sector national income presented in Table X-6.

¶ Productive investment is for the purpose of increasing or maintaining production capacity. Nonproductive investment refers to construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



**Table III-5. Energy Industry Capital Construction Investment  
by Subsector and Purpose, \*1985-1992 (continued)**

**3a. Coke, Coal Gas, and Coal Products Industry Capital Construction Investment, Billion 1980 Yuan †**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Coke production	0.08	0.22	0.25	0.24	0.34	-	-	-
Coal gas production	0.46	0.35	0.43	0.40	0.47	-	-	-
Coal gas supply	0.15	0.24	0.25	0.28	0.23	-	-	-
Coal products production	0.01	0.01	0.01	0.01	0.02	-	-	-
Total	0.70	0.83	0.94	0.94	1.05	1.75	1.87	2.10
of which:								
productive ¶¶	0.54	0.66	0.78	0.81	0.95	1.60	1.70	1.80
nonproductive ¶¶	0.16	0.17	0.16	0.13	0.10	0.15	0.17	0.30

**3b. Shares of Coke, Coal Gas, and Coal Products Industry Capital Construction Investment**

Sector/Purpose	1985	1986	1987	1988	1989	1990	1991	1992
Coke production	11.9%	27.1%	26.5%	25.5%	32.1%	-	-	-
Coal gas production	64.9%	42.2%	45.7%	43.0%	44.8%	-	-	-
Coal gas supply	21.8%	29.3%	26.4%	30.3%	21.7%	-	-	-
Coal products production	1.3%	1.4%	1.4%	1.2%	1.4%	-	-	-
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
of which:								
productive ¶¶	77.4%	80.0%	83.2%	86.3%	90.6%	91.5%	90.9%	85.8%
nonproductive ¶¶	22.6%	20.0%	16.8%	13.7%	9.4%	8.5%	9.1%	14.2%

• Figures refer to investment in capital construction of state and urban collective-owned units only, and consequently differ slightly from those in the previous table, which are for state-owned units only.

† Deflated using the implicit deflators for industry sector national income presented in Table X-6.

¶ Productive investment is for the purpose of increasing or maintaining production capacity. Nonproductive investment refers to construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

**Table III-5. Energy Industry Capital Construction Investment  
by Subsector and Purpose, \* 1985-1992 (continued)**

<b>4a. Oil &amp; Natural Gas Industry Capital Construction Investment, Billion 1980 Yuan †</b>								
<b>Sector/Purpose</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>
Crude oil extraction	2.05	2.54	3.47	4.69	5.09	-	-	-
Natural gas extraction	0.46	0.14	0.13	0.13	0.13	-	-	-
Crude oil refining	0.57	0.80	1.39	2.00	1.56	1.81	2.72	3.06
Shale oil production	-	-	-	0.01	-	-	-	-
<b>Total</b>	<b>3.08</b>	<b>3.48</b>	<b>5.00</b>	<b>6.83</b>	<b>6.78</b>	<b>7.28</b>	<b>9.10</b>	<b>11.42</b>
<i>of which:</i>								
productive ¶¶	2.07	2.57	3.87	5.73	5.69	6.26	7.70	10.01
nonproductive ¶¶	1.00	0.91	1.13	1.10	1.10	1.01	1.40	1.41

<b>4b. Oil &amp; Natural Gas Industry Capital Construction Investment, Shares</b>								
<b>Sector/Purpose</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>
Crude oil extraction	66.6%	73.0%	69.4%	68.7%	75.1%	-	-	-
Natural gas extraction	15.0%	4.1%	2.7%	1.9%	1.9%	-	-	-
Crude oil refining	18.4%	22.9%	27.9%	29.3%	23.0%	24.9%	29.8%	26.8%
Shale oil production	-	-	-	0.2%	-	-	-	-
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>
<i>of which:</i>								
productive ¶¶	67.4%	73.9%	77.5%	83.9%	83.8%	86.1%	84.6%	87.7%
nonproductive ¶¶	32.6%	26.1%	22.5%	16.1%	16.2%	13.9%	15.4%	12.3%

\* Figures refer to investment in capital construction of state-and urban collective-owned units only, and consequently differ slightly from those in the previous table, which are for state-owned units only.

† Deflated using the implicit deflators for industry sector national income presented in Table X-6.

¶ Productive investment is for the purpose of increasing or maintaining production capacity. Nonproductive investment refers to construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

**Table III-5. Energy Industry Capital Construction Investment  
by Subsector and Purpose, \* 1985-1992 (continued)**

**5a. Power Industry Capital Construction Investment, Billion 1980 Yuan †**

Sector/Purpose	1985	1986	1987	1988	1989	1990 §	1991	1992
Extraction	5.02	5.10	4.87	4.88	5.02	-	-	-
Thermal Power Generation	4.64	7.68	9.10	11.53	11.10	-	-	-
Hydropower Generation	2.89	3.30	3.66	3.91	3.91	-	-	-
Nuclear Power Generation	0.14	0.16	0.79	-	0.71	-	-	-
Other Power Generation §	0.05	0.06	0.17	0.06	0.05	20.30	-	-
Power Distribution	2.29	3.19	4.09	3.77	3.44	3.56	-	-
Steam and Hot Water Production and Supply	-	-	-	-	-	-	-	-
	0.15	0.17	0.19	0.31	0.23	0.32	-	-
<b>Total</b>	<b>10.16</b>	<b>14.55</b>	<b>18.00</b>	<b>19.58</b>	<b>19.43</b>	<b>24.18</b>	<b>27.30</b>	<b>35.39</b>
<i>of which:</i>								
productive ¶	9.48	13.93	17.21	18.59	18.65	23.39	26.22	33.91
nonproductive ¶	0.68	0.63	0.79	0.99	0.78	0.79	1.08	1.48

**5b. Shares of Power Industry Capital Construction Investment**

Sector/Purpose	1985	1986	1987	1988	1989	1990 §	1991	1992
Thermal Power Generation	45.7%	52.8%	50.6%	58.9%	57.1%	-	-	-
Hydropower Generation	28.4%	22.6%	20.3%	19.9%	20.1%	-	-	-
Nuclear Power Generation	1.4%	1.1%	4.4%	-	3.6%	-	-	-
Other Power Generation §	0.5%	0.4%	1.0%	0.3%	0.2%	84.0%	-	-
Power Distribution	22.5%	21.9%	22.7%	19.3%	17.7%	14.7%	-	-
Steam and Hot Water Production and Supply	-	-	-	-	-	-	-	-
	1.5%	1.1%	1.1%	1.6%	1.2%	1.3%	-	-
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>
<i>of which:</i>								
productive ¶	93.3%	95.7%	95.6%	95.0%	96.0%	96.7%	96.0%	95.8%
nonproductive ¶	6.7%	4.3%	4.4%	5.0%	4.0%	3.3%	4.0%	4.2%

\* Figures refer to investment in capital construction of state-and urban collective-owned units only, and consequently differ slightly from those in the previous table, which are for state-owned units only.

† Deflated using the implicit deflators for industry sector national income presented in Table X-6.

¶ Productive investment is for the purpose of increasing or maintaining production capacity. Nonproductive investment refers to construction of schools, hospitals, housing and other workforce social welfare facilities.

§ For 1990 "other power generation" includes all generation.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

**Table III-6. Energy Industry Technical Updating and Transformation Investment  
by Subsector and Purpose, \* 1981-1993**

**I. Total Energy Industry Technical Updating & Transformation Investment, Billion Current Yuan**

Sector/Purpose	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Coal subtotal	1.29	1.35	1.60	1.74	2.43	2.75	3.02	3.47	4.31	4.75	5.21	5.81	6.56
extraction	1.28	1.34	1.58	1.72	2.42	2.73	3.00	3.45	4.27	-	-	-	-
processing	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.04	-	-	-	-
Coke, Coal													
Gas & Products	0.02	0.03	0.04	0.05	0.30	0.63	0.52	0.71	0.54	0.86	0.99	1.09	1.11
Oil & Natural													
Gas subtotal	2.61	1.95	2.86	1.28	1.49	1.71	2.15	4.28	3.92	3.71	4.22	3.31	8.44
extraction	2.37	1.64	2.52	0.79	0.92	1.03	1.18	2.76	2.60	1.97	1.95	0.84	4.82
refining	0.24	0.31	0.34	0.48	0.58	0.68	0.96	1.52	1.32	1.73	2.27	2.46	3.62
Electric													
Power subtotal	0.74	0.89	1.14	1.14	1.38	1.82	2.25	2.88	2.79	3.19	3.24	4.65	7.35
generation	0.35	0.44	0.53	0.53	0.67	0.89	1.04	1.41	1.43	1.85	-	-	-
distribution	0.39	0.45	0.62	0.61	0.68	0.89	1.13	1.38	1.30	1.28	-	-	-
steam & hot water	-	-	-	-	0.03	0.04	0.09	0.09	0.06	0.06	-	-	-
Total ¶	4.66	4.22	5.63	4.21	5.59	6.91	7.93	11.34	11.56	12.51	13.66	14.86	23.45

**2. Total Energy Industry Technical Updating & Transformation Investment, Billion 1980 Yuan †**

Sector/Purpose	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Coal subtotal	1.29	1.34	1.60	1.70	2.25	2.47	2.57	2.74	3.13	3.43	3.65	3.88	4.07
extraction	1.27	1.33	1.58	1.68	2.25	2.46	2.56	2.72	3.10	-	-	-	-
processing	0.01	0.01	0.01	0.02	0.00	0.01	0.02	0.02	0.03	-	-	-	-
Coke, Coal													
Gas & Products	0.02	0.03	0.04	0.05	0.27	0.57	0.45	0.56	0.39	0.62	0.69	0.72	-0.69
Oil & Natural													
Gas subtotal	2.60	1.95	2.86	1.24	1.38	1.54	1.83	3.38	2.84	2.68	2.95	2.21	5.23
extraction	2.36	1.64	2.52	0.77	0.85	0.93	1.01	2.18	1.88	1.43	1.36	0.56	2.99
refining	0.24	0.31	0.34	0.47	0.53	0.61	0.82	1.20	0.96	1.25	1.59	1.64	2.24
Electric													
Power subtotal	0.74	0.89	1.14	1.11	1.28	1.64	1.92	2.27	2.02	2.31	2.27	3.10	4.56
generation	0.35	0.44	0.53	0.52	0.62	0.80	0.89	1.11	1.04	1.34	-	-	-
distribution	0.39	0.45	0.62	0.60	0.63	0.80	0.96	1.09	0.94	0.93	-	-	-
steam & hot water	-	-	-	-	0.03	0.04	0.07	0.07	0.04	0.04	-	-	-
Total ¶	4.65	4.21	5.64	4.11	5.19	6.22	6.77	8.94	8.39	9.04	9.56	9.91	14.54

\* Figures refer to investment in state-and urban collective-owned units only.

† Deflated using the implicit deflators for industrial sector national income presented in Table X-6.

¶ From 1984 onward about 85% of technical updating and transformation investment was for "productive" purposes, i.e. directly related to production. The balance went for "nonproductive" purposes, such as construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

**Table III-6. Energy Industry Technical Updating and Transformation Investment by Subsector and Purpose \* 1981-1993 (continued)**

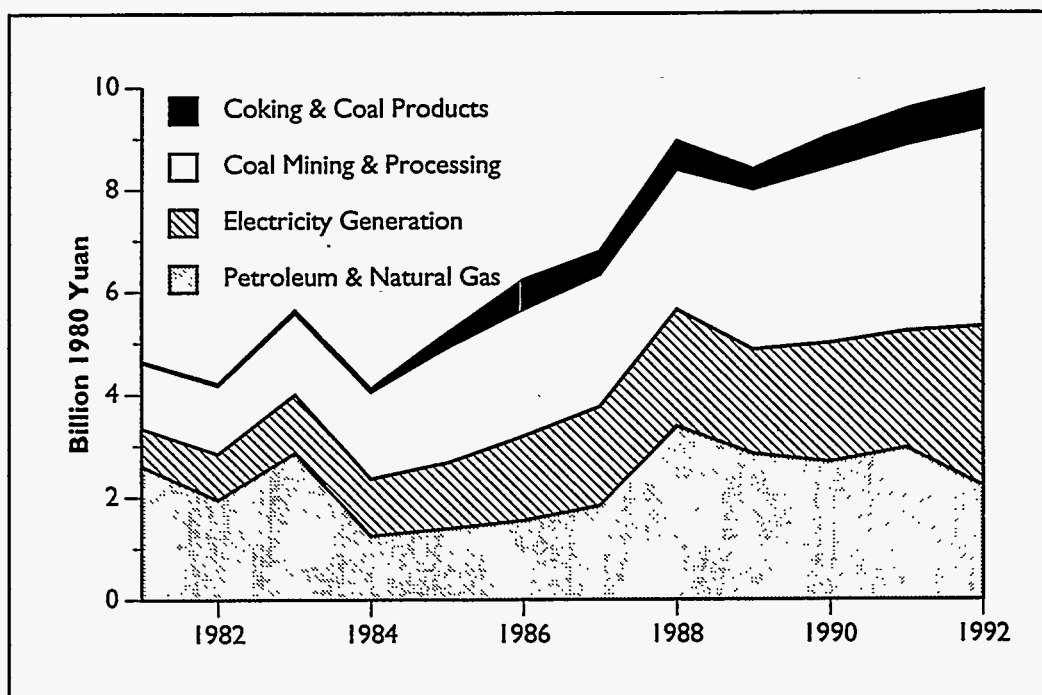
<b>3. Total Energy Industry Technical Updating &amp; Transformation Investment, Shares</b>													
<b>Sector/Purpose</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Coal subtotal	28%	32%	28%	41%	43%	40%	38%	31%	37%	38%	38%	39%	28%
extraction	27%	32%	28%	41%	43%	40%	38%	30%	37%	-	-	-	-
processing	0.3%	0.2%	0.2%	0.5%	0.1%	0.2%	0.2%	0.2%	0.3%	-	-	-	-
Coke, Coal													
Gas & Products	0.4%	0.7%	0.7%	1.3%	5.3%	9.1%	6.6%	6.2%	4.7%	6.9%	7.2%	7.3%	4.7%
Oil & Natural													
Gas subtotal	56%	46%	51%	30%	27%	25%	27%	38%	34%	30%	31%	22%	36%
extraction	51%	39%	45%	19%	16%	15%	15%	24%	22%	16%	14%	6%	21%
refining	5%	7%	6%	11%	10%	10%	12%	13%	11%	14%	17%	17%	15%
Electric													
Power subtotal	16%	21%	20%	27%	25%	26%	28%	25%	24%	26%	24%	31%	31%
generation	8%	10%	9%	13%	12%	13%	13%	12%	12%	15%	-	-	-
distribution	8%	11%	11%	15%	12%	13%	14%	12%	11%	10%	-	-	-
steam & hot water	-	-	-	-	0.5%	0.6%	1.1%	0.8%	0.5%	0.5%	-	-	-
Total †	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

\* Figures refer to investment in state-and urban collective-owned units only.

† From 1984 onward about 85% of technical updating and transformation investment was for "productive" purposes, i.e. directly related to production. The balance went for "nonproductive" purposes, such as construction of schools, hospitals, housing and other workforce social welfare facilities.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Figure III-7. Capital Technical Updating and Transformation Investment in Energy Industries



**Table III-7. Total Technical Updating and Transformation Investment by Investment Category, \* 1981-1992—Billion 1980 Yuan**

Technical Updating and Transformation Investment							
Year	Energy Conservation	Waste Management †	Environmental Protection	Residential	Other	Subtotal	Total Investment
				Energy Conservation			
1981	0.895	0.336	0.135	-	18.106	19.472	66.553
1982	1.196	0.411	0.225	-	23.167	24.999	84.403
1983	1.327	0.437	0.144	-	27.212	29.120	95.224
1984	1.693	0.596	0.205	0.081	27.601	30.176	115.636
1985	1.612	0.843	-	0.094	39.136	41.685	155.969
1986	2.049	1.061	-	-	53.564	56.674	178.208
1987	2.211	1.223	-	-	61.317	64.751	196.151
1988	2.409	1.324	-	-	73.508	77.241	217.864
1989	1.832	1.088	-	-	54.317	57.237	183.983
1990	1.972	1.067	-	-	56.964	60.002	210.946
1991	2.343	1.368	-	-	67.873	71.584	253.449
1992	2.761	1.557	-	-	93.172	97.490	351.873

\* Includes only funds actually invested in state-owned units, not investment targets. Includes investment in all sectors. About half of investment in this category goes for expansion or replacement of existing production capacity, and most of the rest is devoted to product development (increasing variety and improving quality) and "nonproductive" construction (e.g. housing, schools, and hospitals). Technical updating and transformation figures (including subcategory figures) are deflated using the industrial sector national income deflators (see Table X-6).

† Referred to in Chinese sources as "zhili sanfei," or management of the "three wastes," i.e., waste water; waste gases, including soot, "industrial dust" and sulfur dioxide; and waste residue (presumably solid waste).

Source: Rational Resource Utilization Handbook, 1991; China Statistical Yearbook, various years; Energy Research Institute.

Table III-8. Energy Supply and Conservation Investments, 1981-1992 \*

I. Investment in Billion Current Yuan				
Year	Energy Supply Investment	Energy Conservation Capital Construction Investment †	Energy Conservation Technical Updating Investment	Total Energy Conservation Investment
1981	14.170	0.593	0.898	1.491
1982	17.393	0.889	1.198	2.087
1983	21.314	1.481	1.327	2.808
1984	27.850	1.481	1.735	3.216
1985	36.275	1.481	1.737	3.218
1986	44.146	1.652	2.275	3.927
1987	54.029	2.088	2.590	4.678
1988	64.004	2.439	3.055	5.494
1989	70.563	2.461	2.525	4.986
1990	83.690	2.669	2.728	5.397
1991	94.963	4.922	3.349	8.271
1992	115.496	4.922	4.138	9.060

2. Investment in Billion Constant 1980 Yuan				
Year	Energy Supply Investment	Energy Conservation Capital Construction Investment †	Energy Conservation Technical Updating Investment	Total Energy Conservation Investment
1981	14.128	0.591	0.895	1.486
1982	17.367	0.887	1.196	2.084
1983	21.319	1.482	1.327	2.809
1984	27.173	1.445	1.693	3.138
1985	33.667	1.375	1.612	2.987
1986	39.763	1.488	2.049	3.537
1987	46.118	1.782	2.211	3.993
1988	50.472	1.923	2.409	4.332
1989	51.203	1.786	1.832	3.618
1990	60.492	1.929	1.972	3.901
1991	66.440	3.443	2.343	5.786
1992	77.068	3.284	2.761	6.045

\* Estimates in italics.

† For 1983-1985 and 1991-1992 only the sums of investment were available. For those periods totals were divided equally among the three years.

Source: China Statistical Yearbook, various years; Rational Resource Utilization Handbook, 1991 ; State Energy Conservation Investment Corporation; Energy Research Institute.



Table III-8. Energy Supply and Conservation Investments, 1981-1992 \* (continued)

3. Shares of Total Energy Investment				
Year	Energy Supply Investment	Energy Conservation Capital Construction Investment †	Energy Conservation Technical Updating Investment	Total Energy Conservation Investment
1981	90.48%	3.78%	5.73%	9.52%
1982	89.29%	4.56%	6.15%	10.71%
1983	88.36%	6.14%	5.50%	11.64%
1984	89.65%	4.77%	5.58%	10.35%
1985	91.85%	3.75%	4.40%	8.15%
1986	91.83%	3.44%	4.73%	8.17%
1987	92.03%	3.56%	4.41%	7.97%
1988	92.09%	3.51%	4.40%	7.91%
1989	93.40%	3.26%	3.34%	6.60%
1990	93.94%	3.00%	3.06%	6.06%
1991	91.99%	4.77%	3.24%	8.01%
1992	92.73%	3.95%	3.32%	7.27%

\* Estimates in italics.

† For 1983-1985 and 1991-1992 only the sums of investment were available. For those periods totals were divided equally among the three years.

Source: China Statistical Yearbook, various years; Rational Resource Utilization Handbook, 1991; State Energy Conservation Investment Corporation; Energy Research Institute.

**Table III-9. Energy Conservation Investments, 1981-1993**

	unit	1981-1990	1991-1993
<i>Capital Construction Projects</i>			
Total Investment	billion yuan	17.235	14
national allocations and loans*	billion yuan	9.753	6
local and enterprise funds	billion yuan	7.482	8
Energy savings capacity, Mtce/yr.	Mtce/yr	25.04	20
Unit investment, yuan/(tce/yr)	yuan/(tce/yr)	688	700
<i>Technical Updating and Transformation Projects</i>			
Total Investment	billion yuan	9.953	3
national allocations and loans*	billion yuan	5.219	1.6
local and enterprise funds	billion yuan	4.734	1.4
Energy savings capacity	Mtce/yr	30.79	10
Unit investment	yuan/(tce/yr)	324	300

\* Between 1980 and 1990 national conservation technical updating investment comprised 1.397 billion in allocations and 3.822 billion in loans. In 1987 all allocations were converted to low interest loans.

Source: Wang, et al., 1995.

**Table III-10. Completed Energy Conservation Capital Construction Projects, 1981-1990**

<b>Project</b>	<b>Total Capacity</b>	<b>Investment, (billion yuan)</b>	<b>Energy Savings (Mtce/yr)</b>	<b>Unit Cost (yuan/(tce/yr))</b>
Cogeneration	5,230 MW	9.95	7.83	1,270
Recovery of Waste Gases	9.32 Mm <sup>3</sup> /day	1.74	3.57	487
District Heating	39.8 Mm <sup>2</sup>	-	-	-
Replacement of Small Thermal Power Sets with Large	1,5590 MW	0.67	0.93	720
Renovation of small Ammonia Plants	1.29 Mt/yr	0.67	1.8	372
Coal Washing and Matching	53.69 Mt/yr	0.52	2.75	189
Continuous Casting	3.29 Mt/yr	0.38	0.21	476
Scrap Steel Processing	1.88 Mt/yr	0.19	1.61	354
Coal Briquette Production	12.26 Mt/yr	0.3	2.3	130
Waste Heat Power Generation	150 MW	0.14	0.34	412
Steel Conservation	70 kt/yr	0.33	0.12	2,750
Other	-	1.58	1.69	935
Total	-	17.24	25.04	688

Source: Rational Resources Utilization Handbook, 1991.

Table III-11. Newly Increased Production Capacity of State-Owned Enterprises, 1981-1993

Year	Coal Mining (Mt/yr)	Coal Washing (Mt/yr)	Coking (Mt/yr)	Petroleum Extraction (Mt/yr)	Refinery Capacity		Natural Gas Extraction (bcm/yr)	Generating Capacity		
					Distillation (Mt/yr)	Cracking (Mt/yr)		Thermal (MW)	Hydro & Other (MW)	Total (MW)
1981	13.73	2.25	-	5.189	-	-	0.622	1,523.4	1,116.7	2,640.1
1982	8.20	2.55	-	6.365	-	-	0.627	2,053.0	889.5	2,942.5
1983	18.52	7.75	-	8.108	-	-	0.475	3,416.9	1,074.2	4,491.1
1984	24.35	5.00	-	13.970	-	-	0.547	2,687.9	1,091.3	3,779.2
1985	16.47	6.66	-	17.372	-	-	1.080	5,870.7	505.7	6,376.4
1986	21.05	13.30	-	15.485	-	-	0.537	5,409.9	1,228.1	6,638.0
1987	21.06	11.70	-	16.400	-	-	0.440	6,070.5	2,673.5	8,744.0
1988	33.02	4.45	-	15.810	-	-	1.350	2,337.8	8,832.4	11,170.2
1989	28.45	19.60	-	16.499	-	-	0.531	8,961.0	1,648.1	10,609.1
1990	23.36	11.81	-	13.244	-	-	0.707	7,725.6	1,429.9	9,155.5
1991	33.40	-	-	13.087	-	-	0.72	-	-	11,373.0
1992	27.92	-	-	14.521	-	-	1.07	-	-	13,789.0
1993	-	-	-	-	-	-	-	-	-	-

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table III-11. Newly Increased Production Capacity of State-Owned Enterprises, 1981-1993  
(continued)

Year	Coal Mining (Mt/yr)	Coal Washing (Mt/yr)	Coking (Mt/yr)	Petroleum Extraction * (Mt/yr)	Refinery Capacity		Natural Gas Extraction (bcm/yr)	Generating Capacity			
					Distillation (Mt/yr)	Cracking (Mt/yr)		Thermal (MW)	Hydro & Other (MW)	Co-generation & Other (MW)	Total † (MW)
1981	3.32	1.01	-	3.580	0.308	0.053	-	185.7	78.0	81.8	345.5
1982	4.28	3.37	-	3.195	0.153	0.144	-	39.2	80.1	52.2	171.5
1983	4.48	0.90	-	2.690	0.550	0.000	-	70.1	86.9	53.2	210.2
1984	5.31	0.60	-	0.160	0.850	0.401	-	121.8	37.8	63.5	223.1
1985	4.16	1.12	0.263	0.099	0.900	0.313	-	78.9	41.9	44.5	165.3
1986	4.10	1.93	0.332	0.045	0.784	0.241	-	368.7	46.1	71.9	486.7
1987	3.45	1.21	1.018	0.857	1.060	0.480	-	329.8	53.2	51.5	570.0
1988	2.74	0.27	1.132	1.637	0.850	0.961	-	420.0	61.0	113.0	622.0
1989	2.95	3.56	0.804	0.610	1.153	1.048	-	265.6	50.4	107.5	444.5
1990	3.41	1.43	1.141	0.911	3.334	2.135	-	760.8	152.5	139.1	1,094.7
1991	1.64	-	0.742	0.039	-	-	-	166.1	512.8	137.5	823.9
1992	2.73	-	-	-	-	-	-	87.3	679.9	100.4	867.6
1993	3.61	-	-	1.231	-	-	-	260.1	701.8	45.3	1,007.2

\* For 1987-1991 there is an unexplained discrepancy between total new generating capacity and the sum of the categories.

† Includes increased capacity from oilfield conservation and development funds.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; Energy Research Institute.

Table III-12. Capital Construction Investment by Source of Funds, \* 1981-1990

Ia. Former Ministry of Coal, Billion 1980 Yuan †							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	1.66	0.08	0.43	-	0.32	-	2.50
1982	1.95	0.09	0.67	-	0.51	-	3.23
1983	3.07	0.06	0.60	0.31	0.31	0.002	4.35
1984	4.14	0.21	0.35	0.46	0.51	0.04	5.72
1985	3.38	0.85	0.03	0.58	0.59	0.06	5.50
1986	3.68	0.71	0.03	0.56	0.52	0.07	5.58
1987	3.35	1.00	0.07	0.46	0.40	0.17	5.45
1988	2.89	0.88	0.11	0.38	0.51	0.08	4.86
1989	2.61	1.24	0.31	0.44	1.02	0.55	6.17
1990	3.27	2.46	0.62	0.92	1.44	0.18	8.89

Ib. Former Ministry of Coal, Shares							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	66.6%	3.0%	17.4%	-	13.0%	-	100.0%
1982	60.5%	2.9%	20.9%	-	15.8%	-	100.0%
1983	70.5%	1.3%	13.8%	7.2%	7.2%	0.04%	100.0%
1984	72.4%	3.7%	6.2%	8.1%	8.9%	0.7%	100.0%
1985	61.6%	15.5%	0.6%	10.6%	10.7%	1.0%	100.0%
1986	66.0%	12.7%	0.6%	10.1%	9.3%	1.2%	100.0%
1987	61.6%	18.3%	1.2%	8.5%	7.4%	3.1%	100.0%
1988	59.5%	18.0%	2.3%	7.9%	10.6%	1.7%	100.0%
1989	42.3%	20.1%	5.0%	7.1%	16.6%	9.0%	100.0%
1990	36.8%	27.6%	6.9%	10.3%	16.2%	2.1%	100.0%

\* Data up to 1988 include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (which were consolidated in 1988 into the former Ministry of Energy, which was subsequently disbanded in 1993), so some totals are lower than in other tables. Data for 1989 and 1990 are for all state-owned units.

† Deflated with the national income deflators for the industrial sector in Table X-6.

¶ 1988 and later figures for direct government investment include loans which were originally allocated as direct government investment.

§ 1981 and 1982 figures for self-raised funds include "other" investment.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table III-12. Capital Construction Investment by Source of Funds, \* 1981-1990 (continued)

2a. Former Ministry of Petroleum, Billion 1980 Yuan †							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	2.30	0.11	0.10	-	0.38	-	2.89
1982	2.25	0.03	0.35	-	0.32	-	2.95
1983	2.50	0.04	0.05	-	0.39	0.00	2.98
1984	2.19	0.06	0.14	-	0.36	0.00	2.76
1985	2.11	0.03	0.61	0.001	0.45	0.00	3.20
1986	2.11	0.01	1.19	0.003	0.46	0.00	3.77
1987	2.13	0.05	1.10	0.001	0.50	0.03	3.81
1988	1.46	0.60	2.50	0.004	0.20	0.05	4.81
1989	0.66	1.81	2.93	0.113	0.70	0.57	6.79
1990	0.94	2.79	2.08	0.111	0.86	0.50	7.28

2b. Former Ministry of Petroleum, Shares							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	79.6%	3.6%	3.6%	-	13.2%	-	100.0%
1982	76.2%	0.9%	11.9%	-	10.9%	-	100.0%
1983	83.9%	1.3%	1.7%	-	13.0%	0.002%	100.0%
1984	79.4%	2.3%	5.1%	-	13.1%	0.1%	100.0%
1985	66.0%	0.9%	19.0%	0.0%	14.1%	0.01%	100.0%
1986	55.9%	0.2%	31.6%	0.1%	12.1%	0.1%	100.0%
1987	56.0%	1.3%	28.8%	0.02%	13.1%	0.7%	100.0%
1988	30.3%	12.4%	52.0%	0.1%	4.2%	1.0%	100.0%
1989	9.7%	26.7%	43.2%	1.7%	10.3%	8.4%	100.0%
1990	12.9%	38.3%	28.6%	1.5%	11.8%	6.8%	100.0%

\* Data up to 1988 include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (which were consolidated in 1988 into the former Ministry of Energy, which was subsequently disbanded in 1993), so some totals are lower than in other tables. Data for 1989 and 1990 are for all state-owned units.

† Deflated with the national income deflators for the industrial sector in Table X-6.

¶ 1988 and later figures for direct government investment include loans which were originally allocated as direct government investment.

§ 1981 and 1982 figures for self-raised funds include "other" investment.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table III-12. Capital Construction Investment by Source of Funds, \* 1981-1990 (continued)

3.a. Former Ministry of Electric Power, Billion 1980 Yuan †							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	2.05	1.12	0.12	-	0.47	-	3.75
1982	1.83	1.80	0.08	-	0.82	-	4.53
1983	2.89	1.68	0.25	0.50	0.41	0.02	5.75
1984	3.95	1.48	0.55	0.61	0.74	0.10	7.43
1985	4.00	2.72	0.64	0.81	1.65	0.15	9.95
1986	4.94	3.18	1.56	1.31	1.77	0.66	13.43
1987	3.88	4.03	0.86	1.31	3.20	2.19	15.48
1988	2.75	4.12	0.57	1.74	4.44	2.81	16.43
1989	2.03	4.48	2.23	1.50	5.86	3.34	19.44
1990	2.63	6.14	3.14	1.83	6.13	4.30	24.18

3.b. Former Ministry of Electric Power Shares							
Year	Direct Government Expenditures ¶	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds §	Other Sources §	Total
1981	54.6%	29.8%	3.2%	-	12.4%	-	100.0%
1982	40.4%	39.7%	1.7%	-	18.1%	-	100.0%
1983	50.3%	29.2%	4.3%	8.7%	7.1%	0.4%	100.0%
1984	53.1%	19.9%	7.4%	8.2%	10.0%	1.3%	100.0%
1985	40.2%	27.3%	6.4%	8.1%	16.5%	1.5%	100.0%
1986	36.8%	23.7%	11.6%	9.8%	13.2%	5.0%	100.0%
1987	25.1%	26.0%	5.6%	8.4%	20.7%	14.2%	100.0%
1988	16.7%	25.1%	3.5%	10.6%	27.0%	17.1%	100.0%
1989	10.4%	23.0%	11.5%	7.7%	30.2%	17.2%	100.0%
1990	10.9%	25.4%	13.0%	7.6%	25.3%	17.8%	100.0%

\* Data up to 1988 include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (which were consolidated in 1988 into the former Ministry of Energy, which was subsequently disbanded in 1993), so some totals are lower than in other tables. Data for 1989 and 1990 are for all state-owned units.

† Deflated with the national income deflators for the industrial sector in Table X-6.

¶ 1988 and later figures for direct government investment include loans which were originally allocated as direct government investment.

§ 1981 and 1982 figures for self-raised funds include "other" investment.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



## Chapter IV—Energy Consumption

# Energy Consumption

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China's energy consumption patterns have recently undergone some changes that may foreshadow larger alterations in the future. Coal still dominates both the primary and end use consumption mixes. Its share is declining, however, as oil imports grow to meet demand that stagnant domestic oil production cannot, and as an increasing fraction of coal goes for thermal power generation. Use of electricity is rising faster than for any other energy source, and only lack of supply is preventing it from growing faster. Natural gas use has leveled off, primarily because supplies are limited, but recent large finds both offshore and onshore promise to raise consumption significantly in the near term.

The dominance of industry in the sectoral end use mix remains unchanged, and has in fact strengthened. Direct coal use in industry has been giving way to indirect coal use, as the share of electricity rises. Remarkably, household energy use has dropped in recent years, since the decline in coal use (due to increased efficiency of coal use and fuel switching) has more than offset accelerating growth in electricity use. Commercial sector energy use is rising fastest, and now consumes more than China's huge agricultural sector. Transportation energy use is going up nearly as quickly, as vehicle fleets swell; the sector now uses nearly as much oil as industry.

## PRIMARY ENERGY

### PRIMARY ENERGY CONSUMPTION

China recently became the world's second largest consumer of energy, surpassing in 1994 the Russian Federation. Primary modern energy use in 1993 was about 1,113 Mtce (Table IV-1), more than two-thirds higher than a decade previously. Coal dominates the primary mix, followed by oil, primary electricity, and natural gas. Biomass fuel consumption in 1992 is estimated to have been about 250 Mtce (with wood and crop wastes each account-

ing for half of the total, aside from a small fraction of dung), marking a slight decline from levels of several years ago (Table IV-2).

Coal is still by far the dominant fuel in the primary consumption mix, accounting for 73%. Total coal use, however, actually declined slightly in 1993, and was the main factor in slow overall growth in energy use. Oil contributes one-fifth of the primary consumption mix. It been the fastest growing primary energy source recently, accounting for 40% of the increase in total primary consumption between 1990 and 1993. Nearly all this increase represents use of imported oil, since domestic production has remained flat. Primary electricity and natural gas together account for 7% of primary consumption, as has been the case since the mid-1970s. Growth of both these energy sources has been uneven, since energy sector investment has emphasized thermal power plants and oil. Energy consumption in China generally has followed production closely. The shares that each primary energy source contribute to consumption are almost identical to the production shares. The exception to this is oil, of which there were substantial net exports in the 1970s and 1980s, and of which China is now a net importer.

Per capita energy consumption has climbed steadily at a rate not quite half that of economic expansion, from 612 kgce per person in 1980 to 939 kgce per person in 1993. Over a period in which the population more than doubled (1952-1993), commercial energy consumption increased by a factor of 24. Growth in per capita primary energy use has slowed considerably in recent years, increasing by just over 2% in 1993 compared with an average rate of nearly 6% in the 1980s. Because the population continues to expand, per capita energy use is now growing more slowly than total energy use; total consumption grew at an average annual rate of 4% between 1990 and 1993, but per capita use rose by 3% per year.

Most of the large energy-consuming provinces are found along the coast and in the Northeast, although Sichuan and inland provinces in the South

Central region with large populations are also large consumers (Table IV-4). The highest per capita rates of energy use (for all forms) are found in China's three directly administered cities, Beijing, Tianjin, and Shanghai (Table IV-5). At 2.0 to 2.5 tce/person-yr, per capita rates of energy use are more than twice the national average of under 0.9 tce/person-yr. Most other areas with high per capita rates of energy use are in the northern half of the country, mainly due to coal use for winter space heating.

### **PRIMARY ENERGY INTENSITY**

One of post-Mao China's most remarkable phenomena has been the sustained economic and industrial expansion characterized by slower growth in energy use than in output. The energy intensity (energy consumption per unit of economic output) of the Chinese economy has decreased steadily since 1977, falling by nearly half since then, a trend unparalleled in any other large developing country (Table IV-3). If the energy intensity of China's economy were the same now as in the late 1970s, the country would need to consume twice as much energy as it does currently. As a group, the sparsely populated northwestern provinces have the highest energy intensities, as do the centers of heavy industry and energy production in the North and Northeast (Table IV-6). In the South, two of the poorest provinces (Guangxi and Guizhou) and one of the richest (Guangdong) also exhibit high intensities.

Analysis has shown that structural change, i.e., shifts in the relative output shares among the major sectors, have contributed very little to this decline.<sup>1</sup> The driving forces behind this trend are to be found within sectors, primarily improvements in technical efficiency (specific energy consumption) and shifts towards more expensive products.<sup>2</sup> Government-sponsored programs and organizations for energy conservation investments, technical assistance, and energy management have probably played a significant role in achieving this overall improvement in the energy efficiency of the nation's economy.<sup>3</sup>

### **END-USE ENERGY CONSUMPTION BY SECTOR**

Energy end-use in 1992 was over 990 Mtce (Table IV-7).<sup>4</sup> Despite significant changes in patterns of use among individual energy sources, the overall sectoral structure of energy consumption changed relatively little between 1980 and 1992. All sectors saw monotonic increases in levels of energy use, excepting the agriculture and residential sectors, both of which experienced declines in 1992.

Industry's share of total end-use, which has fluctuated near 65.5% for years, rose to 67% in 1992, but this may be just a short-term rise. Transportation accounts for only a marginally larger share than a decade ago, as coal use falls and oil use rises. Shares of the agricultural and residential sectors have been dropping slowly and steadily since the early 1980s. For agriculture this is the result of declining shares in use of all energy forms, but for the residential sector this is the result of switching from solid fuels to electricity for many tasks.

Average growth in energy end use (4.9% between 1980 and 1992) has been dominated by industry, the largest consumer. The average was dragged down mainly by slower growth in households, the second largest energy-consuming sector. This trend contradicts the prevailing impression that increasing energy use in the residential sector is a driving force behind China's rising energy demand (see below). Growth was fastest in what was until recently the smallest consumer, the commercial sector, followed by the transportation sector. While important, the magnitude of demand increases in these two sectors is dwarfed by that in industry.

### **INDUSTRY**

Industrial sector<sup>5</sup> end uses—664 Mtce in 1992, excluding utility use—continue to be dominated by solid fuels (Table IV-8). Coal and coke together have consistently accounted for over half of end use since 1980, although that share has declined gradually since the mid-1980s. The shares of electricity and delivered heat have grown most rapidly, while those for oil and natural gas has fallen off, the latter particularly rapidly so that it now accounts for less than 3% of industrial end use.

Despite years of exhortations from policy makers to emphasize development of light industry in order to reduce industrial energy intensity, heavy indus-

try<sup>6</sup> has consistently taken four-fifths of total industrial end-use. In 1992 chemicals and ferrous metals manufacturing each accounted for 15.8% of total end use, and building materials manufacturing for a further 14.4%. While the shares of some energy-intensive sectors, e.g., building materials<sup>7</sup> and machine building, have fallen, those of others, e.g., ferrous and nonferrous metals, have risen. Structural change in industry has meant shifts among energy-intensive sectors more than shifts between heavy and light sectors.

Heavy industry's share of coal use is significantly smaller than its share of total industrial end use. Known underreporting of coal use in rural industry means that reported total coal use and heavy industry's share of coal use are lower than actual.<sup>8</sup> The largest coal-consuming sector by far is the building materials manufacturing industry, with over 27% of coal end use in 1992. Heavy industry's share has declined slightly relative to light industry since 1985. The sources of this shift seem to be increases in consumption of certain chemical industries classified as "light," pharmaceuticals, textiles, and declines in building materials and metals. Heavy industry accounts for most oil and nearly all coke consumption in the industrial sector.

Fuel oil dominates industrial oil use, but despite years of work, nearly 4 Mt/yr of crude oil were still burned directly in 1992, half at oil fields and refineries. Natural gas use is concentrated in oil fields and chemical plants. The chemicals industry is by far the largest consumer of both delivered heat and electricity. Light industry approaches half the consumption levels of heavy industry only for coal, kerosene, and delivered heat; for all other energy sources light industry consumes a much smaller portion.

Industrial sector electricity use nearly doubled between 1985 and 1992. Heavy industry's share of electricity use was about 77% in 1992, down one percentage point from 1985 with little fluctuation in the intervening period. The chemicals industry was the largest single electricity consumer in 1992, using 15.4%, followed by ferrous metals manufacturing with 12.4% of the total.

Despite growing demand for fertilizers and petrochemical products, feedstock uses of energy have grown more slowly than overall energy use, falling from 8% of primary energy use to under 7%

in the early 1990s (Table IV-11). Recent rapid construction of petrochemical processing facilities is reversing this trend.

Industrial energy use is concentrated in China's north and east, dominated by Liaoning, Hebei (including Beijing and Tianjin), Shandong, and Jiangsu, all of which used over 40 Mtce in 1990 (Table IV-10). The only inland province in that category, Sichuan, has a population of over 110 million.

## **ELECTRIC UTILITIES**

Electricity generation is taking an increasingly large share of primary energy. From a low of 16.5% in 1985, utility fuel inputs have risen to 22.3% of primary energy consumption (1993), doubling in quantity over that time (Table IV-12). Coal's dominance of the fuel mix has strengthened; 231 of the 249 Mtce burned in 1993 came from coal. Policies to convert oil-fired utility boilers to coal, and to eliminate firing of utility boilers with crude oil succeeded in reversing the increase in oil use by the end of the 1980s. Reported utility oil use was 12 Mt in 1983, compared to over 20 in 1980. Unreported oil burning, particularly of smuggled diesel in small generators in coastal provinces, is probably on the rise, and actual oil use for generation is larger than official reports suggest.<sup>9</sup> Natural gas use appears to have fallen off after peaking in 1990 or 1991.

The efficiency of delivering electricity has begun to improve again, after leveling off in the late 1980s (Table IV-13). In 1993 heat rates for gross and net generation stood at 384 gce and 417 gce per kWh respectively (corresponding to gross and net generation efficiencies of 27.5% and just over 25%, respectively). Rising average size of power plants and improvements in transmission and distribution lie behind this trend, although power shortages induce utilities and self-generators to keep inefficient units in service. Bureaucratic barriers and difficulties in raising investment for larger plants have created an environment in which continued construction of smaller scale (e.g., 10 MW) and therefore relatively inefficient power plants is attractive to many local authorities. (See, for example, Wirthshafter and Shih, 1990.) Also, efficiencies on China's many small rural grids can be quite low, as line loss rates tend to be quite high, sometimes well over 20%

(Sathaye, 1992). In-plant electricity consumption has been rising slowly as a percentage of gross generation (Table IV-14).

## TRANSPORTATION

Not surprisingly, most of the transportation sector's energy comes from petroleum products — 76% in 1992.<sup>10</sup> In the early 1980s steam locomotives still dominated railways, and coal's share of sectoral energy uses exceeded one-third. With the phasing out of steam locomotives in favor of diesel and electric ones, and with the increasing dependence on road transport, coal's share has fallen to less than half of its previous levels. Transportation end use doubled between 1980 and 1992 to 79 Mtce, due almost entirely to increased gasoline and diesel use. The quintupling of electricity use (and doubling of its share of end use) reflects the influence of railway electrification projects.

Studies of energy use by mode for the 1980s show that in the latter half of the decade railroad energy use dropped from nearly one-half of the total to about one third, whereas road vehicle energy use rose from about one third to nearly half (Table IV-16). Locomotive coal use dropped more slowly than oil and electricity use rose, but the net effect was a gradual decline in total end use, implying significant efficiency gains. Aircraft fuel use kept pace with overall growth.<sup>11</sup>

## AGRICULTURE

Between 1980 and 1992 agricultural sector energy consumption grew more slowly than in any other sector — at an annual rate of 3.1% compared to the average of 5.2% (Table IV-17). The main change in the agricultural energy end use mix has been the replacement of electricity for coal and oil products. Whereas electricity use has risen quickly, as in other sectors, diesel consumption has been slow to rise, and coal use has fallen off quickly after reaching a high in 1988.

## HOUSEHOLDS

In few sectors are changes in energy end use mix more profound than in the household sector. After growing faster than any other sector until the late 1980s, total energy use actually dropped in 1992 (Table IV-18). Like agriculture, total coal use in the sector peaked in 1988. As a share of total end use, coal has fallen from 90% to 72% of end use in a dozen years. These drops are due in part to penetration of coal briquettes and more efficient stoves, to the spread of electrical heating and cooking appliances, and increasing availability of gas.

Trends in electricity use have been exactly the opposite, with total use growing from 10.5 TWh in 1980 to 64.0 TWh in 1992 and the share rising from 5% to 18%. While the household sector may not have a large impact on overall consumption growth rates, it has become very important in terms of the electricity supply.

Urban households still account for more than half of energy use in the sector, but the share consumed by rural households has risen slowly since coal use has dropped off earlier and more quickly in urban areas (Table IV-19). Earlier appliance penetration in urban households resulted in a widening of the gap between total urban and rural electricity use in the 1980s. That gap has begun to narrow in recent years, however, as rural appliance use rises as well. Location is the main variable affecting energy use; households in China's heating zone (the northern regions where space heating is permitted) use considerably more coal than those in other parts of the country, and per capital electricity use is highest in wealthier coastal areas, around Beijing, and in the Northeast (Table IV-20).

Biomass fuels are still the major sources of energy for China's large rural population. Estimated biomass use in rural homes<sup>12</sup> in 1990 was over 260 Mtce, nearly 60% greater than consumption of commercial energy in all households (Table IV-21). Official estimates for years after 1990 show declines in biomass use. While estimates of biomass consumption are subject to significant uncertainty, such a trend would be in line with evidence that many rural households are switching from biomass to coal (as a result of wider availability of coal from rural mines) and with the widespread penetration of more efficient biomass stoves.

Gas fuels for cooking (about half being LPG) have become a much more substantial presence in Chinese homes, with nearly 60% residents of cities now having access (Table IV-22). Gas fuel consumption has been rising at a rate about as fast as electricity, as cities nationwide push to improve the efficiency and cleanliness of household cooking fuel use. LPG demand growth, concentrated in the coastal area south of the Yangtze River, has made China a net importer. Such fuels are still virtually unavailable in rural areas, however, and less than 100 million people of a population of 1.2 billion now use gas. Much-publicized district heating schemes have resulted in a large increase in delivered heat, but this source still accounts for less than 3% of total end use.

### **COMMERCIAL SECTOR**

End use in this sector is dominated by buildings. Coal still makes up close to half of end use in the commercial sector, but coal use is already falling off after reaching a peak in 1991, possibly as a result of improvements in space heating systems (Table IV-23). Electricity, which now accounts for one-third of end use, is rapidly edging coal out as lighting, air conditioning, and other uses expand. Oil product and other energy use has fluctuated in both absolute and percentage terms.

### **CONSUMPTION BY TYPE OF ENERGY: END USE AND CONVERSIONS**

In 1992 the fraction of end use from directly burned coal and coke dropped to 51%, its lowest level since such figures have been reported (Table IV-24).<sup>13</sup> Direct coal use has grown at half the rate of electricity use, as slightly more than half of marginal coal use since 1980 has gone to utilities rather than end users. Use of electricity and delivered heat have risen faster than for other energy sources; at 7% to 8% per year they have kept pace with long-term economic growth rates. The share of oil in the end use mix is approaching levels last seen in the 1970s and early 1980s, i.e., 16% and over. This reflects mainly rising transportation sector demand. End use of natural gas appears to have stagnated. Supplies have been slow to expand, and are generally allocated

away from domestic use to fertilizer production and electricity generation.

China's estimated stock of 400 thousand industrial boilers use fully one-third of China's coal, about 350 Mt in 1990 (Table IV-25). Utility boilers take another quarter, followed by industrial kilns with 16% and coke ovens and metallurgical industry furnaces with 10%. Of the remainder, the largest share is used in household stoves (about 90 Mt), and the rest for town gas manufacture, steam locomotives, and other uses.

An industrial sector category, kilns, also take the largest single share of oil end-use—over 22%, slightly more than that used in motor vehicles.<sup>14</sup> Utility and industrial boilers take a further 15%, and the remaining significant oil-using sectors are mainly various means of transport. Aggregated miscellaneous uses account for one-fifth of end use.

Electricity end uses are dominated by pumps, fans, and compressors, responsible for 21%, 10%, and 9% respectively. Building and appliance uses (lighting, refrigeration, and air conditioning) combined take at least 13%, not counting household electronics, electric rice cookers, fans, and other equipment. Various industrial uses—furnaces, cement mills, gas separators, and arc welders—account for most of the rest, aside from slightly over 2% for irrigation pumps and less than 1% for electrified railways.

### **COAL AND COAL PRODUCTS**

Direct coal end use dropped slightly from 606 Mt to 603 Mt between 1991 and 1992 as a result of declining coal consumption in non-industrial sectors, though total use continued to rise because of increasing transformation inputs (Table IV-26). End use of coal in industry resumed its climb after the general slowdown of economic activity in 1989 and 1990. Industry's share of direct coal use, at slightly over one-third, has exhibited a weak downward trend in the 1990s. Transportation coal end use is falling as steam locomotives are gradually retired in favor of diesel and electric locomotives. Probably the most important factor behind the drop in residential coal use since 1988 is the spread of cleaner burning and more efficient briquettes (which replace raw coal and homemade coal bricks) to most urban and some suburban areas. Other factors include increas-

ing availability of LPG and town gas, and widespread use of electric cooking appliances, especially rice cookers.

Coal inputs to thermal power generation have been growing by over 20 Mt per year (i.e., by more than total coal use in the transportation or agricultural sectors) since the late 1980s. In the same period, the rate of addition to thermal power generation capacity has been in excess of 10 GW per year. While total coal use did not quite double between 1980 and 1992, the amount burned in power plants tripled.

When coal inputs to thermal electric utilities are attributed to end use sectors, industry's share of total coal use rises to over half, since industry is also the largest user of electricity. Its share is, in fact, several percentage points higher than a decade ago. Coal use, whether directly burned or used indirectly through electricity demand, continues to be dominated by industrial uses.

Coal gas use has risen considerably, more than doubling over the past decade (Table IV-27). By far the greatest part is used in industry, though household use has been growing at a faster rate recently. Most of the increased use represents utilization of previously exhausted gas, e.g., from coke ovens.

## **OIL**

Most oil is consumed in end use sectors (109 Mt in 1992), accounting for 84% of total use, up five percentage points from 1980 (Table IV-28). Total end use has nearly doubled over the same period. Oil inputs at power plants, on the other hand, have remained about the same, and its share of total use consequently has been halved. While anecdotal evidence suggests that diesel is increasingly being consumed for power generation, the available statistics show large fluctuations, possibly indicating sensitivity to the unstable price and import environments (Table IV-31).<sup>15</sup> Direct burning of crude oil in end uses continues, with no clear long-term trend in total use (Table IV-30)

Among end use sectors, increasing consumption is most evident in transportation. Transportation now accounts for almost one-third of oil use, up about 10 percentage points from a decade ago. Its share of diesel use, however, has fallen slightly from

its high in 1987. Industrial end uses are still predominant at 40% of total oil consumption, but the share is slowly falling. The share of diesel use has remained steady at about one-quarter in recent years. Agricultural consumption of oil products (almost all diesel) has leveled off at 7 Mt per year. This may reflect rural oil shortages as much as stagnating demand. Residential sector oil use, while rising quickly, still represents only a small fraction of total use. The commercial sector only uses about 3% of all oil products, but now accounts for 11% of diesel consumption. Whether this reflects growth in diesel vehicle use or diesel generators attributed to this sector is unknown.

While inputs to conversions have fallen off from 25% to 17% of total oil use since 1980, the actual quantity has changed little, with only small and temporary shifts in the fuel mix (Table IV-29). End uses are increasingly dominated by gasoline and diesel, with fuel oil use rising slowly and direct use of crude oil falling. Kerosene consumption has remained flat, as lighting use declines and jet fuel consumption climbs. Fuel oil consumption continues to increase, but at a somewhat slower pace than overall oil use.

## **NATURAL GAS**

Natural gas consumption is small by the standards of developed countries—not quite 16 billion cubic meters in 1992—and has grown rather slowly (IV-32). Consumption will increase substantially in the near future as new pipelines make output from newly developed offshore fields available. End use data on natural gas are incomplete, with sectoral divisions often hiding different end uses. Some available data indicate that currently up to two-thirds of natural gas is used to generate electricity, but this is certainly erroneous; a more realistic figure is in the neighborhood of 5%. Residential deliveries account for another 11% to 14%. The balance goes mainly for fertilizer production (about one-third) and self-use at oil and natural gas fields.

## **ELECTRICITY**

Consumption of electricity use has grown faster

than that of any other energy source, rising from 234 TWh in 1980 to 637 TWh in 1993 (Table IV-33). As with other energy sources, industry takes the lion's share—over 71% in 1993. Still, industry's share has been declining steadily (as has that of agriculture, though relatively more quickly) as consumption in other sectors has ballooned. Residential electricity use has shot up dramatically, from 11 TWh in 1980 to 73 TWh in 1993. Rapid penetration of previously unavailable electrical appliances and electronic devices, particularly in urban areas, lies behind this trend (see Chapter V). Commercial sector electricity use, now over 6% of the total, has also risen quickly because of construction of new hotels and office buildings, as well as upgrading of older buildings.

Although consumption is growing at a higher rate than any other form of energy, electricity use would have grown faster were it not for chronic supply shortages, which some Chinese sources estimate at 20% of demand. Official Chinese plans call for meeting this large reservoir of latent demand through massive investment in power generation and supply networks in the coming years.

<sup>1</sup> Even within manufacturing, the shares of energy-intensive industries have changed only slowly (Sinton and Levine, 1994).

<sup>2</sup> Anecdotal evidence suggests that overreporting of output and changes in price regimes accompanying the economic system reforms are also important contributors, but would not fundamentally change the conclusions.

<sup>3</sup> Levine and Liu, 1991; Liu *et al.*, 1994.

<sup>4</sup> Electricity converted at the nominal gross heat rate of delivered electricity of 404 gce/kWh. All the following aggregate statistics are treated this way also, and exclude utility sector energy use (except for Tables IV-9 and IV-10). Note that due to rounding and slight differences in accounting, totals in Table IV-7 and in the breakout by energy sources (Table IV-24) are slightly different.

<sup>5</sup> Chinese energy accounts include the utility sector among industrial energy statistics. Utility sector figures here include only energy used for plant operation, not inputs to power and heat generation, which are distributed among end use sectors by using the nominal gross heat rate of power generation to convert electricity to standard coal.

<sup>6</sup> Including utility sector energy use, i.e., that energy used for running plants and auxiliary activities, not inputs to generation.

<sup>7</sup> The case for a decline in building materials industry energy consumption is not entirely without problems, since some uncertainty remains regarding rural enterprise energy use. While official statistics show energy consumption in the building mate-

rials sector of not quite 110 Mtce in 1991, actual consumption was probably between 140 and 150 Mtce, and 1993 consumption was about 170 Mtce. Much of this unreported consumption is of coal from rural mines that probably also is not covered in national statistics (Wang, 1995).

<sup>8</sup> In addition to the large amount of unreported coal use in the building materials industry, rural coking plants, mainly in Shanxi, use on the order of 50 Mt/yr of coal for inputs, much of which goes unreported (Wang, 1995).

<sup>9</sup> In 1994, for instance, an estimated 2 to 3 Mt (40 to 60 kbd) of diesel was smuggled into China, with an unknown percentage of that going for power generation.

<sup>10</sup> Official Chinese statistics cover only dedicated transportation enterprises, excluding fuel use by the majority of road vehicles, which are owned by industrial and agricultural sector enterprises. Sectoral statistics in this volume are adjusted to include estimated unreported transportation energy use, resulting in figures somewhat greater than officially reported data.

<sup>11</sup> Exclusion from earlier data of significant coal and electricity use by pipelines and ships prevent comparisons for those modes.

<sup>12</sup> Biomass use in rural industry and in agriculture is negligible by comparison. Most fossil fuel and electricity use in rural areas is for agriculture and industry.

<sup>13</sup> Converting electricity at its heat value (3.6 MJ/kWh) the corresponding percentage would be 62%.

<sup>14</sup> At present motor vehicles are probably the largest oil-consuming segment of the economy.

<sup>15</sup> Statistics on diesel use for power generation are incomplete, especially for the high demand areas along the eastern and south-eastern coast, introducing significant uncertainty to these national total.



# Overall Consumption

**Table IV-1. Primary Energy Consumption, 1952-1993**

<b>I. Consumption in Physical Units</b>				
<b>Year</b>	<b>Raw Coal * (Mt)</b>	<b>Crude Oil * (Mt)</b>	<b>Natural Gas † (million cubic m)</b>	<b>Hydroelectricity ‡ (TWh)</b>
1952	62.47	1.10	8	1.3
1953	71.49	1.44	8	1.5
1954	81.59	1.89	9	2.2
1955	90.70	2.39	15	2.4
1956	114.28	2.97	20	3.5
1957	124.69	3.10	60	4.8
1958	233.23	4.82	75	4.1
1959	317.26	6.78	250	4.4
1960	397.01	8.68	1,023	7.4
1961	260.76	7.80	1,444	7.4
1962	206.69	7.65	1,158	9.0
1963	193.89	7.84	947	8.7
1964	205.00	9.35	910	10.6
1965	228.84	13.57	895	10.4
1966	244.80	14.42	1,023	12.6
1967	217.60	13.96	1,158	13.1
1968	215.98	15.56	1,053	11.5
1969	260.81	21.87	1,398	16.0
1970	331.84	30.05	2,023	20.5
1971	382.61	38.60	3,737	25.1
1972	404.63	44.75	4,850	28.8
1973	409.93	50.81	5,970	38.8
1974	405.60	58.12	7,511	41.3
1975	457.13	66.93	8,573	47.5
1976	468.30	76.93	10,105	45.5
1977	515.14	82.78	12,121	47.5
1978	565.64	90.83	13,752	44.5
1979	585.16	89.28	14,534	50.0
1980	610.10	87.57	14,060	58.1
1981	605.84	83.06	12,450	65.4
1982	641.26	82.10	11,900	74.2
1983	687.13	83.83	12,130	86.2
1984	749.68	86.55	12,620	86.6
1985	816.03	91.69	12,930	92.1
1986	860.15	97.28	13,760	94.2
1987	927.99	103.12	13,890	99.7
1988	993.54	110.93	14,360	108.8
1989	1,034.27	115.84	15,030	117.9
1990	1,052.94	114.69	15,585	126.3
1991	1,105.68	124.23	15,606	124.3
1992	1,156.96	133.73	15,596	130.2
1993	1,139.12	153.34	16,807	151.2

\* Consumption figures for 1952 and for 1990 and later years are not available in physical units and are derived from percentage share data; other figures are reported directly.

† 1952-1979 consumption figures for natural gas are not available in physical units and are derived from percentage share data; other figures are reported directly.

‡ Figures are for net hydro generation (gross generation minus in-plant use). In-plant use for 1953-1956 and 1958-1964 is calculated at the reported 1952 in-plant consumption rate of 0.22% (see Table IV-14), which is high but may be more realistic than the historically low 0.14% reported in 1957. Reported in-plant consumption rates are for key plants only and are probably lower than the national averages, which are unavailable. Direct reports of primary electricity consumption are not available.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years. China Energy Annual Review, 1994.

Table IV-1. Primary Energy Consumption, 1952-1993 (continued)

2. Consumption in Mtce					
Year	Raw Coal * (Mtce)	Crude Oil * (Mtce)	Natural Gas (Mtce) †	Hydro-electricity (Mtce) ¶	Total (Mtce)
1952	44.62	1.58	0.01	0.52	46.73
1953	51.07	2.06	0.01	0.60	53.74
1954	58.28	2.70	0.01	0.89	61.88
1955	64.79	3.41	0.02	0.97	69.19
1956	81.63	4.24	0.03	1.41	87.31
1957	89.07	4.43	0.08	1.94	95.51
1958	166.60	6.89	0.10	1.65	175.23
1959	226.62	9.69	0.33	1.77	238.41
1960	283.58	12.40	1.36	2.98	300.33
1961	186.26	11.14	1.92	2.98	202.31
1962	147.64	10.93	1.54	3.63	163.74
1963	138.50	11.20	1.26	3.51	154.46
1964	146.43	13.36	1.21	4.27	165.27
1965	163.46	19.39	1.19	4.19	188.23
1966	174.86	20.60	1.36	5.08	201.90
1967	155.43	19.94	1.54	5.28	182.20
1968	154.27	22.23	1.40	4.64	182.54
1969	186.30	31.24	1.86	6.45	225.85
1970	237.03	42.93	2.69	8.27	290.92
1971	273.30	55.14	4.97	10.12	343.54
1972	289.03	63.93	6.45	11.62	371.02
1973	292.81	72.59	7.94	15.69	389.03
1974	289.72	83.03	9.99	16.70	399.44
1975	326.53	95.62	11.40	19.20	452.75
1976	334.51	109.90	13.44	18.39	476.24
1977	367.96	118.26	16.12	19.19	521.54
1978	404.04	129.76	18.29	17.98	570.07
1979	417.98	127.55	19.33	20.20	585.06
1980	435.79	125.10	18.70	23.99	603.59
1981	432.75	118.66	16.56	26.61	594.57
1982	458.05	117.29	15.83	29.99	621.16
1983	490.82	119.76	16.13	34.48	661.19
1984	535.50	123.65	16.78	34.46	710.39
1985	582.89	130.99	17.20	36.67	767.75
1986	614.41	138.97	18.30	37.51	809.19
1987	662.86	147.32	18.47	39.68	868.33
1988	709.69	158.47	19.10	43.21	930.46
1989	738.78	165.49	19.99	46.82	971.08
1990	752.12	163.85	20.73	49.52	986.21
1991	789.79	177.47	20.76	48.48	1,036.49
1992	826.42	191.05	20.74	50.26	1,088.47
1993	813.67	219.07	22.35	58.05	1,113.14

\* Consumption figures for 1952 and for 1990 and later years are not available in physical units and are derived from percentage share data; other figures are reported directly.

† 1952-1979 consumption figures for natural gas are not available in physical units and are derived from percentage share data; other figures are reported directly.

¶ Figures are for net hydro generation (gross generation minus in-plant use). In-plant use for 1953-1956 and 1958-1964 is calculated at the reported 1952 in-plant consumption rate of 0.22% (see Table IV-14), which is high but may be more realistic than the historically low 0.14% reported in 1957. Reported in-plant consumption rates are for key plants only and are probably lower than the national averages, which are unavailable. Direct reports of primary electricity consumption are not available.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years. China Energy Annual Review, 1994.

Figure IV-1. Total Primary Energy Consumption, by Fuel Source

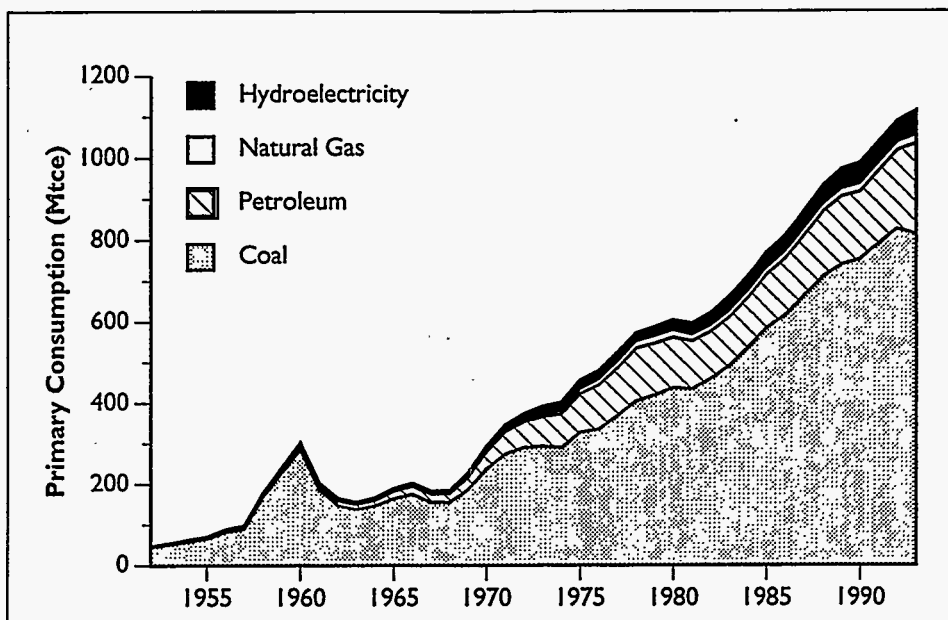


Figure IV-2. Shares of Primary Energy Consumption, by Fuel Source

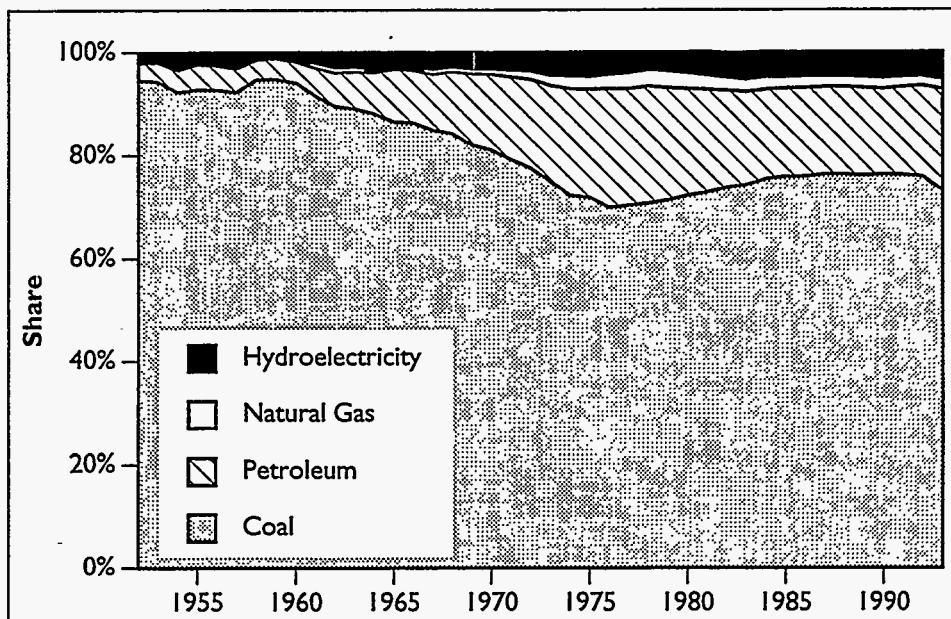


Table IV-1. Primary Energy Consumption, 1952-1993 (continued)

3. Shares of Total				
Year	Raw Coal * (%)	Crude Oil † (%)	Natural Gas ‡ (%)	Hydro- electricity (%)
1952	95.5%	3.4%	0.02%	1.1%
1953	95.0%	3.8%	0.02%	1.1%
1954	94.2%	4.4%	0.02%	1.4%
1955	93.6%	4.9%	0.03%	1.4%
1956	93.5%	4.9%	0.03%	1.6%
1957	93.3%	4.6%	0.08%	2.0%
1958	95.1%	3.9%	0.06%	0.9%
1959	95.1%	4.1%	0.14%	0.7%
1960	94.4%	4.1%	0.45%	1.0%
1961	92.1%	5.5%	0.9%	1.5%
1962	90.2%	6.7%	0.9%	2.2%
1963	89.7%	7.3%	0.8%	2.3%
1964	88.6%	8.1%	0.7%	2.6%
1965	86.8%	10.3%	0.6%	2.2%
1966	86.6%	10.2%	0.7%	2.5%
1967	85.3%	10.9%	0.8%	2.9%
1968	84.5%	12.2%	0.8%	2.5%
1969	82.5%	13.8%	0.8%	2.9%
1970	81.5%	14.8%	0.9%	2.8%
1971	79.6%	16.1%	1.4%	2.9%
1972	77.9%	17.2%	1.7%	3.1%
1973	75.3%	18.7%	2.0%	4.0%
1974	72.5%	20.8%	2.5%	4.2%
1975	72.1%	21.1%	2.5%	4.2%
1976	70.2%	23.1%	2.8%	3.9%
1977	70.6%	22.7%	3.1%	3.7%
1978	70.9%	22.8%	3.2%	3.2%
1979	71.4%	21.8%	3.3%	3.5%
1980	72.2%	20.7%	3.1%	4.0%
1981	72.8%	20.0%	2.8%	4.5%
1982	73.7%	18.9%	2.5%	4.8%
1983	74.2%	18.1%	2.4%	5.2%
1984	75.4%	17.4%	2.4%	4.9%
1985	75.9%	17.1%	2.2%	4.8%
1986	75.9%	17.2%	2.3%	4.6%
1987	76.3%	17.0%	2.1%	4.6%
1988	76.3%	17.0%	2.1%	4.6%
1989	76.1%	17.0%	2.1%	4.8%
1990	76.3%	16.6%	2.1%	5.0%
1991	76.2%	17.1%	2.0%	4.7%
1992	75.9%	17.6%	1.9%	4.6%
1993	73.1%	19.7%	2.0%	5.2%

\* Consumption figures for 1952 and for 1990 and later years are not available in physical units and are derived from percentage share data; other figures are reported directly.

† 1952-1979 consumption figures for natural gas are not available in physical units and are derived from percentage share data; other figures are reported directly.

‡ Figures are for net hydro generation (gross generation minus in-plant use). In-plant use for 1953-1956 and 1958-1964 is calculated at the reported 1952 in-plant consumption rate of 0.22% (see Table IV-14), which is high but may be more realistic than the historically low 0.14% reported in 1957. Reported in-plant consumption rates are for key plants only and are probably lower than the national averages, which are unavailable. Direct reports of primary electricity consumption are not available.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years. China Energy Annual Review, 1994.

Table IV-1. Primary Energy Consumption, 1952-1993 (continued)

4. Growth Rates (percent increase over previous year)					
Year	Raw Coal * (%)	Crude Oil * (%)	Natural Gas † (%)	Hydro-electricity ‡ (%)	Total (%)
1953	14.4%	30.3%	0.0%	15.4%	15.0%
1954	14.1%	31.3%	24.7%	46.7%	15.2%
1955	11.2%	26.5%	60.4%	9.1%	11.8%
1956	26.0%	24.3%	32.0%	45.8%	26.2%
1957	9.1%	4.4%	203.0%	37.3%	9.4%
1958	87.0%	55.5%	25.0%	-14.7%	83.5%
1959	36.0%	40.7%	232.0%	7.3%	36.1%
1960	25.1%	28.0%	309.6%	68.2%	26.0%
1961	-34.3%	-10.1%	41.2%	0.0%	-32.6%
1962	-20.7%	-1.9%	-19.8%	21.6%	-19.1%
1963	-6.2%	2.5%	-18.2%	-3.3%	-5.7%
1964	5.7%	19.3%	-3.9%	21.8%	7.0%
1965	11.6%	45.1%	-1.7%	-1.9%	13.9%
1966	7.0%	6.3%	14.3%	21.2%	7.3%
1967	-11.1%	-3.2%	13.2%	4.0%	-9.8%
1968	-0.7%	11.5%	-9.1%	-12.2%	0.2%
1969	20.8%	40.6%	32.8%	39.1%	23.7%
1970	27.2%	37.4%	44.6%	28.2%	28.8%
1971	15.3%	28.5%	84.8%	22.4%	18.1%
1972	5.8%	15.9%	29.8%	14.7%	8.0%
1973	1.3%	13.5%	23.1%	35.1%	4.9%
1974	-1.1%	14.4%	25.8%	6.4%	2.7%
1975	12.7%	15.2%	14.1%	15.0%	13.3%
1976	2.4%	14.9%	17.9%	-4.2%	5.2%
1977	10.0%	7.6%	19.9%	4.4%	9.5%
1978	9.8%	9.7%	13.5%	-6.3%	9.3%
1979	3.5%	-1.7%	5.7%	12.3%	2.6%
1980	4.3%	-1.9%	-3.3%	13.7%	3.0%
1981	-0.7%	-5.2%	-11.5%	10.9%	-1.5%
1982	5.8%	-1.2%	-4.4%	12.7%	4.5%
1983	7.2%	2.1%	1.9%	15.0%	6.4%
1984	9.1%	3.2%	4.0%	-0.1%	7.4%
1985	8.9%	5.9%	2.5%	6.4%	8.1%
1986	5.4%	6.1%	6.4%	2.3%	5.4%
1987	7.9%	6.0%	0.9%	5.8%	7.3%
1988	7.1%	7.6%	3.4%	8.9%	7.2%
1989	4.1%	4.4%	4.7%	8.4%	4.4%
1990	1.8%	-1.0%	3.7%	5.8%	1.6%
1991	5.0%	8.3%	0.1%	-2.1%	5.1%
1992	4.6%	7.7%	-0.1%	3.7%	5.0%
1993	-1.5%	14.7%	7.8%	15.5%	2.3%

**Average Rates of Growth:**

**Coal**

1952-1970	9.7%
1971-1980	5.3%
1981-1990	6.3%
1990-1993	2.0%

**Petroleum**

1952-1970	20.1%
1971-1980	9.5%
1981-1990	3.7%
1990-1993	7.5%

**Natural Gas**

1952-1970	36.5%
1971-1980	15.9%
1981-1990	2.5%
1990-1993	1.9%

**Hydroelectricity**

1952-1970	13.7%
1971-1980	8.4%
1981-1990	7.1%
1990-1993	4.1%

**Total**

1952-1970	10.7%
1971-1980	6.4%
1981-1990	5.8%
1990-1993	3.1%

\* Consumption figures for 1952 and for 1990 and later years are not available in physical units and are derived from percentage share data; other figures are reported directly.

† 1952-1979 consumption figures for natural gas are not available in physical units and are derived from percentage share data; other figures are reported directly.

‡ Figures are for net hydro generation (gross generation minus in-plant use). In-plant use for 1953-1956 and 1958-1964 is calculated at the reported 1952 in-plant consumption rate of 0.22% (see Table IV-14), which is high but may be more realistic than the historically low 0.14% reported in 1957. Reported in-plant consumption rates are for key plants only and are probably lower than the national averages, which are unavailable. Direct reports of primary electricity consumption are not available.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years. China Energy Annual Review, 1994.

Table IV-1. Primary Energy Consumption, 1952-1993 (continued)

5. Per Capita Consumption in Physical Units						
Year	Population (millions)	Raw Coal * (kg/cap)	Crude Oil * (kg/cap)	Natural Gas † (cubic m/cap)	Hydro-electricity ‡ (kWh/cap)	Total (kgce/cap)
1952	574.82	109	1.9	0.01	2.3	81
1953	587.96	122	2.4	0.01	2.5	91
1954	602.66	135	3.1	0.02	3.6	103
1955	614.65	148	3.9	0.02	3.9	113
1956	628.28	182	4.7	0.03	5.6	139
1957	646.53	193	4.8	0.09	7.4	148
1958	659.94	353	7.3	0.11	6.2	266
1959	672.07	472	10	0.37	6.5	355
1960	662.07	600	13	1.5	11	454
1961	658.59	396	12	2.2	11	307
1962	672.95	307	11	1.7	13	243
1963	691.72	280	11	1.4	13	223
1964	704.99	291	13	1.3	15	234
1965	725.38	315	19	1.2	14	259
1966	745.42	328	19	1.4	17	271
1967	763.68	285	18	1.5	17	239
1968	785.34	275	20	1.3	15	232
1969	806.71	323	27	1.7	20	280
1970	829.92	400	36	2.4	25	351
1971	852.29	449	45	4.4	29	403
1972	871.77	464	51	5.6	33	426
1973	892.11	460	57	6.7	44	436
1974	908.59	446	64	8.3	45	440
1975	924.20	495	72	9.3	51	490
1976	937.17	500	82	10.8	49	508
1977	949.74	542	87	12.8	50	549
1978	962.59	588	94	14.3	46	592
1979	975.42	600	92	14.9	51	600
1980	987.05	618	89	14.2	59	612
1981	1,000.72	605	83	12.4	65	594
1982	1,016.54	631	81	11.7	73	611
1983	1,030.08	667	81	11.8	84	642
1984	1,043.57	718	83	12.1	83	681
1985	1,058.51	771	87	12.2	87	725
1986	1,075.07	800	90	12.8	88	753
1987	1,093.00	849	94	12.7	91	794
1988	1,110.26	895	100	12.9	98	838
1989	1,127.04	918	103	13.3	105	862
1990	1,143.33	921	100	13.6	110	863
1991	1,158.23	955	107	13.5	107	895
1992	1,171.71	987	114	13.3	111	929
1993	1,185.17	961	129	14.2	128	939

Average Per Capita Rates of Growth:	
<b>Coal</b>	
1952-1970	7.5%
1971-1980	1.6%
1981-1990	4.8%
1990-1993	1.1%
<b>Petroleum</b>	
1952-1970	17.7%
1971-1980	7.8%
1981-1990	2.1%
1990-1993	6.6%
<b>Natural Gas</b>	
1952-1970	33.7%
1971-1980	21.7%
1981-1990	1.0%
1990-1993	1.0%
<b>Hydroelectricity</b>	
1952-1970	14.2%
1971-1980	8.0%
1981-1990	6.0%
1990-1993	3.7%
<b>Total</b>	
1952-1970	8.4%
1971-1980	4.7%
1981-1990	4.2%
1990-1993	2.2%

\* Consumption figures for 1952 and for 1990 and later years are not available in physical units and are derived from percentage share data; other figures are reported directly.

† 1952-1979 consumption figures for natural gas are not available in physical units and are derived from percentage share data; other figures are reported directly.

‡ Figures are for net hydro generation (gross generation minus in-plant use). In-plant use for 1953-1956 and 1958-1964 is calculated at the reported 1952 in-plant consumption rate of 0.22% (see Table IV-14), which is high but may be more realistic than the historically low 0.14% reported in 1957. Reported in-plant consumption rates are for key plants only and are probably lower than the national averages, which are unavailable. Direct reports of primary electricity consumption are not available.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years. China Energy Annual Review, 1994.

**Table IV-2. Primary Energy Consumption: Commercial and Biomass Energy, 1979 and 1987; 1990 and 1992**

	Fossil Fuels *				Subtotal	Biomass Fuels †				Total
	Coal	Oil	Natural Gas	Hydro-electricity		Crop Stalk	Dung Cake	Firewood	Subtotal	
<i>Energy Consumption (Mtce)</i>										
1979	418	128	19	20	585	114	6	104	224	809
1987	663	147	18	40	869	130	3	133	266	1,135
1990	752	164	21	50	987	132	-	131	263	1,250
1992	826	191	21	50	1,092	136	-	110	246	1,338
<i>Percent of Commercial Energy Consumption</i>					<i>Percent of Biomass Energy Consumption</i>					
1979	71%	22%	3%	3%	100%	51%	3%	46%	100%	100%
1987	76%	17%	2%	5%	100%	49%	1%	50%	100%	100%
1990	76%	17%	2%	5%	100%	50%	-	50%	100%	100%
1992	76%	17%	2%	5%	100%	55%	-	45%	100%	100%
<i>Percent of Total Energy Consumption</i>										
1979	52%	16%	2%	2%	72%	14%	1%	13%	28%	100%
1987	58%	13%	2%	4%	77%	11%	0%	12%	23%	100%
1990	60%	13%	2%	4%	79%	11%	0%	11%	21%	100%
1992	62%	14%	2%	4%	82%	10%	0%	8%	18%	100%

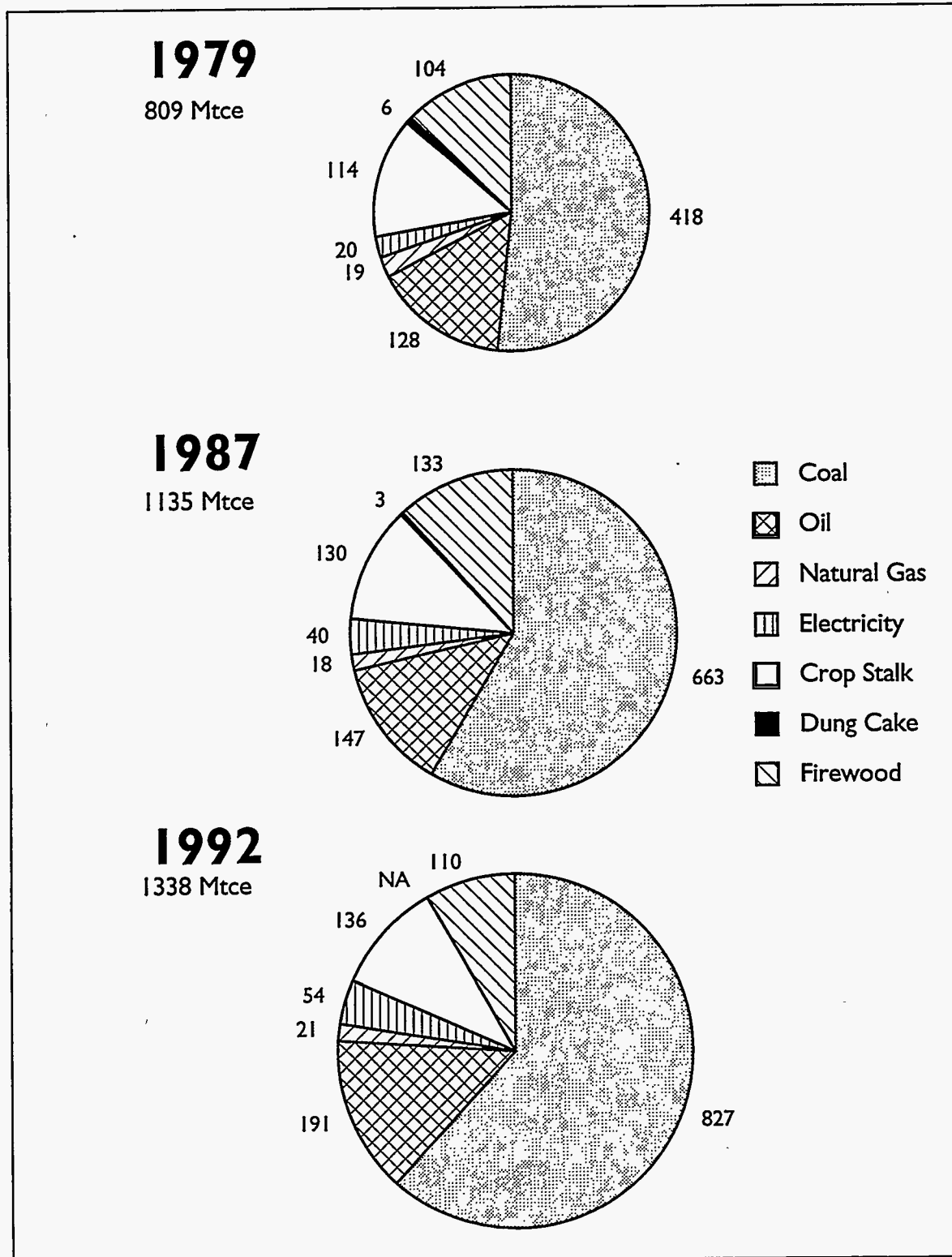
\* Fossil fuels are counted in their primary forms. Hydropower is converted as 1 kWh = 0.404 kgce.

† Biomass figures are for rural household consumption. Since sources vary, official estimates of biomass use for various years may not be comparable.

Sources: China Energy Statistical Yearbook, various years; National Rural Energy Planning, 1990; China Energy Annual Review, 1994; Energy in China, 1992



Figure IV-3. Primary Energy Consumption:  
Commercial and Biomass Energy



**Table IV-3. Actual Primary Energy Consumption and Projected Energy Consumption at Frozen 1977 Intensity, 1952-1993 \***

Year	National Income (billion 1980 yuan)	Energy Consumption (Mtce)	Energy Intensity (Mtce/billion 1980 yuan NI)	Consumption at 1977 Intensity	Difference
1952	100	47	0.47	-	-
1953	108	54	0.50	-	-
1954	112	63	0.56	-	-
1955	120	70	0.58	-	-
1956	133	88	0.66	-	-
1957	138	96	0.70	-	-
1958	156	176	1.13	-	-
1959	155	239	1.55	-	-
1960	145	301	2.08	-	-
1961	113	204	1.80	-	-
1962	111	165	1.49	-	-
1963	123	155	1.26	-	-
1964	142	166	1.17	-	-
1965	162	189	1.17	-	-
1966	184	203	1.10	-	-
1967	176	183	1.04	-	-
1968	167	183	1.10	-	-
1969	188	227	1.21	-	-
1970	221	292	1.32	-	-
1971	235	345	1.47	-	-
1972	240	373	1.55	-	-
1973	260	391	1.51	-	-
1974	264	401	1.52	-	-
1975	284	455	1.60	-	-
1976	277	478	1.73	-	-
1977	294	524	1.78	524	0
1978	326	571	1.75	581	9
1979	349	586	1.68	620	35
1980	369	604	1.64	656	53
1981	387	595	1.54	688	94
1982	418	621	1.48	745	124
1983	460	661	1.44	819	158
1984	523	710	1.36	931	220
1985	593	768	1.29	1,056	288
1986	639	809	1.27	1,138	328
1987	704	868	1.23	1,254	385
1988	784	930	1.19	1,395	465
1989	812	971	1.20	1,446	475
1990	854	986	1.15	1,520	534
1991	928	1,036	1.12	1,652	616
1992	1,075	1,088	1.01	1,914	825
1993	1,242	1,113	0.90	2,211	1,098

\* Energy intensity is here defined as total primary energy consumption (in Mtce) per unit of GDP. Projections of primary energy consumption at 1977 intensity for 1978-1989 are obtained by multiplying actual GDP for those years by 1977 intensity.

Source: China Statistical Yearbook, various years; China Energy Annual Review, 1994.

Figure IV-4. Energy Intensity of the Chinese Economy

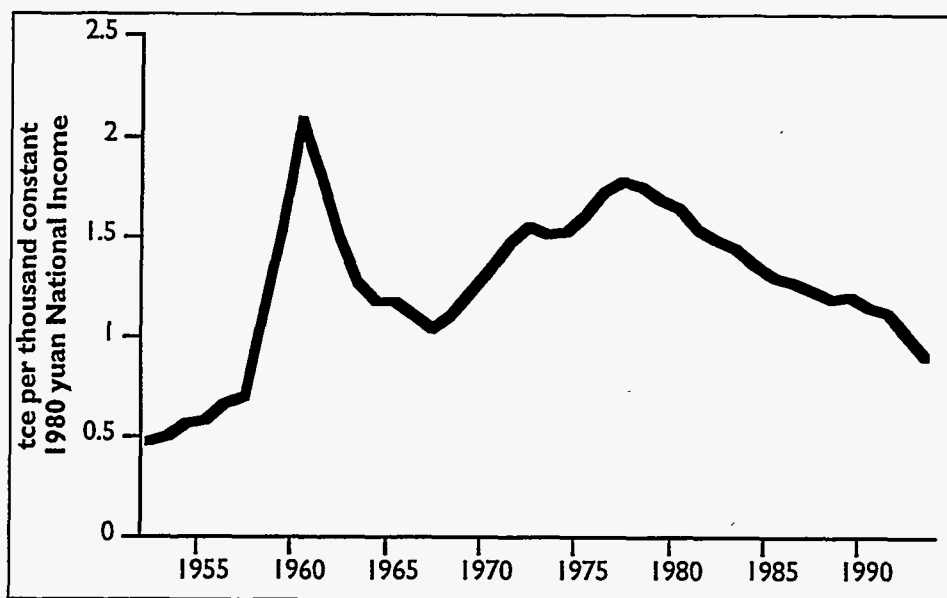


Figure IV-5. Primary Commercial Energy Consumption: Actual Use and Use Predicted by 1977 Energy Intensity

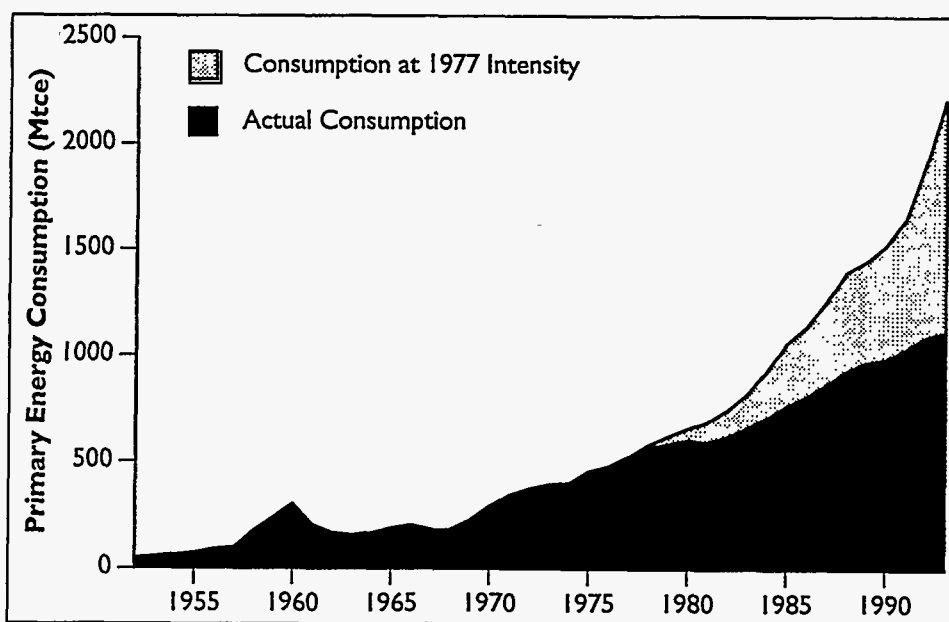


Table IV-4. Primary Commercial Energy Consumption by Province and Energy Source, 1990

Planning Region	Province	Total Primary Energy Consumption * (Mtce)	Coal Consumption (Mtons)	Oil Consumption † (Mtons)	Electricity Consumption ‡ (TWh)
North	Beijing	27.1	24.1	5.5	17.4
	Tianjin	20.7	17.9	4.4	12.4
	Hebei	61.2	78.8	3.8	35.4
	Shanxi	47.1	76.6	1.4	25.5
	Inner Mongolia	24.2	39.5	1.0	12.2
Northeast	Liaoning	78.6	82.5	12.2	46.2
	Jilin	35.2	40.1	3.7	19.1
	Heilongjiang	52.9	65.2	7.5	29.6
East	Shanghai	31.8	27.4	8.0	26.5
	Jiangsu	55.1	62.2	7.0	41.2
	Zhejiang	25.8	24.9	3.2	23.0
	Anhui	27.6	34.3	2.3	18.6
	Fujian	14.5	13.1	1.2	13.7
	Jiangxi	17.3	22.7	1.3	12.8
	Shandong	68.3	72.6	10.4	44.9
South-Central	Henan	52.1	61.0	3.3	33.8
	Hubei	40.0	33.4	5.4	28.1
	Hunan	38.2	39.6	2.7	22.6
	Guangdong	40.7	29.9	10.5	35.9
	Guangxi	13.1	15.6	1.0	12.6
	Hainan	1.2	0.7	0.2	1.4
Southwest	Sichuan	63.5	66.5	1.8	35.0
	Guizhou	21.3	27.1	0.8	10.3
	Yunnan	19.6	21.9	1.0	12.5
	Xizang	-	-	-	-
Northwest	Shaanxi	22.4	27.3	1.3	17.0
	Gansu	21.8	18.6	2.5	17.8
	Qinghai	5.1	4.7	0.5	4.2
	Ningxia	7.1	8.9	0.5	5.5
	Xinjiang	20.7	18.4	3.4	7.0
National Total		987.0	1,055.2	114.9	623.0
Balance¶		32.9	-0.3	7.1	0.8

\* Includes coal, oil, natural gas, and hydroelectricity.

† Includes crude oil and petroleum products.

‡ Includes electricity from both hydro and thermal generation

¶ Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total

Source: China Energy Statistical Yearbook, 1991.

**Table IV-5. Per Capita Primary Commercial Energy Consumption by Province and Energy Source, 1990**

Planning Region	Province	1990 Population (millions)	Per Capita Primary Energy Consumption * (tce/yr)	Per Capita Coal Consumption (t/yr)	Per Capita Oil Consumption † (t/yr)	Per Capita Electricity Consumption ‡ (MWh/yr)
North	Beijing	10.86	2.50	2.22	0.50	1.60
	Tianjin	8.84	2.35	2.02	0.49	1.40
	Hebei	61.59	0.99	1.28	0.06	0.57
	Shanxi	28.99	1.63	2.64	0.05	0.88
	Inner Mongolia	21.63	1.12	1.83	0.04	0.56
Northeast	Liaoning	39.67	1.98	2.08	0.31	1.16
	Jilin	24.83	1.42	1.61	0.15	0.77
	Heilongjiang	35.43	1.49	1.84	0.21	0.84
East	Shanghai	13.37	2.38	2.05	0.60	1.98
	Jiangsu	67.67	0.81	0.92	0.10	0.61
	Zhejiang	41.68	0.62	0.60	0.08	0.55
	Anhui	56.75	0.49	0.60	0.04	0.33
	Fujian	30.37	0.48	0.43	0.04	0.45
	Jiangxi	38.10	0.45	0.60	0.03	0.34
	Shandong	84.93	0.80	0.85	0.12	0.53
South-Central	Henan	86.49	0.60	0.71	0.04	0.39
	Hubei	54.39	0.74	0.61	0.10	0.52
	Hunan	61.28	0.62	0.65	0.04	0.37
	Guangdong	63.46	0.64	0.47	0.17	0.57
	Guangxi	42.61	0.31	0.37	0.02	0.30
	Hainan	6.63	0.18	0.11	0.04	0.21
Southwest	Sichuan	108.04	0.59	0.62	0.02	0.32
	Guizhou	32.68	0.65	0.83	0.03	0.32
	Yunnan	37.31	0.53	0.59	0.03	0.34
	Xizang	2.22	-	-	-	-
Northwest	Shaanxi	33.16	0.68	0.82	0.04	0.51
	Gansu	22.55	0.96	0.82	0.11	0.79
	Qinghai	4.48	1.14	1.05	0.11	0.94
	Ningxia	4.70	1.50	1.89	0.10	1.17
	Xinjiang	15.29	1.35	1.20	0.22	0.46
<b>National Total</b>		<b>1,143.33</b>	<b>0.86</b>	<b>0.92</b>	<b>0.10</b>	<b>0.54</b>

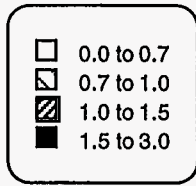
\* Includes coal, oil, natural gas, and hydroelectricity.

† Includes crude oil and petroleum products.

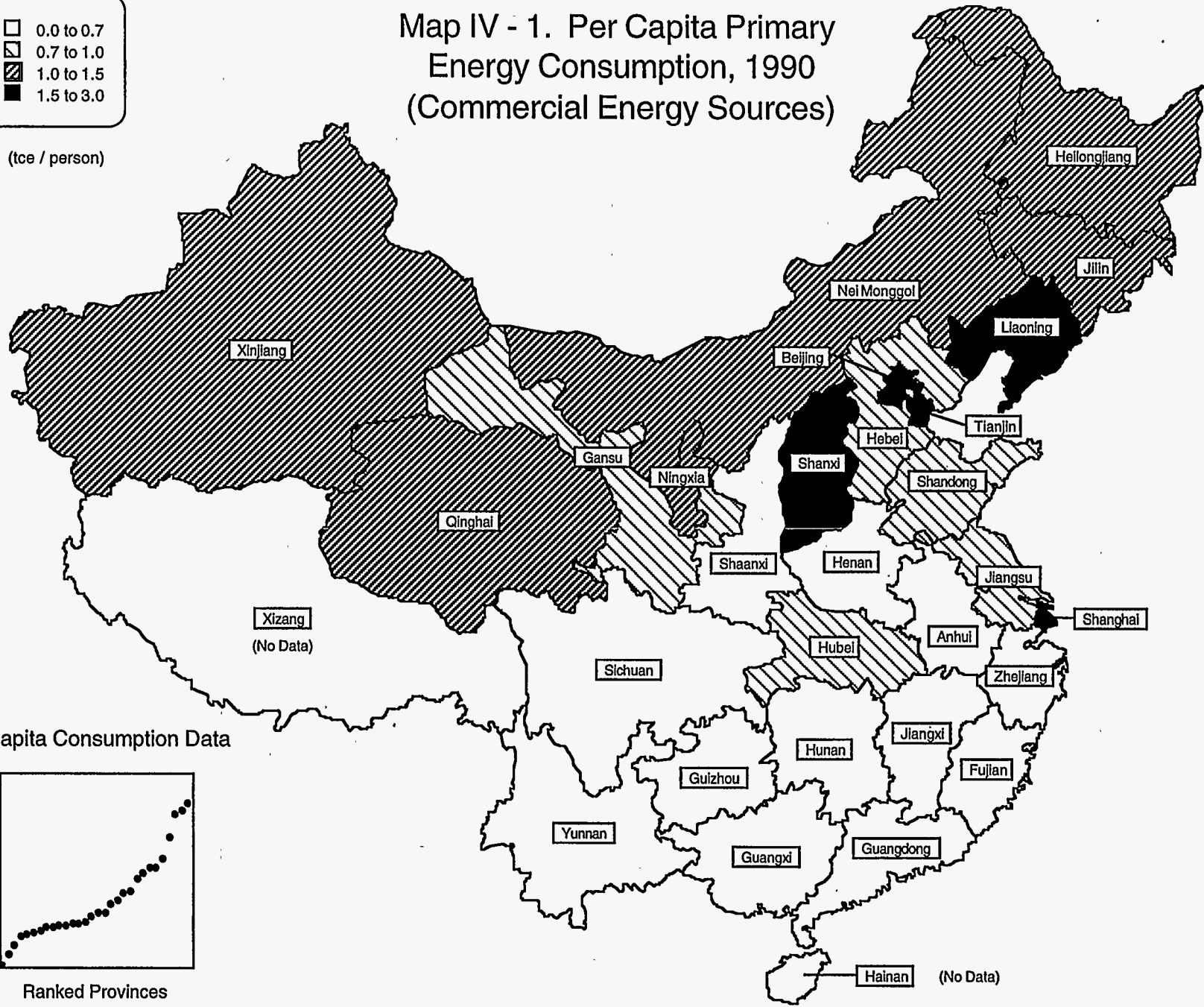
‡ Includes electricity from both hydro and thermal generation.

Source: China Energy Statistical Yearbook, 1991; China Statistical Yearbook, 1991.

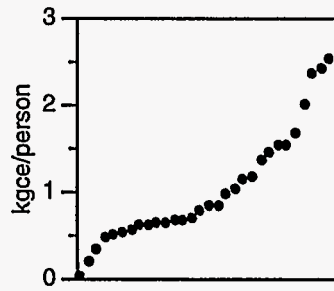
Map IV - 1. Per Capita Primary Energy Consumption, 1990  
(Commercial Energy Sources)



(tce / person)

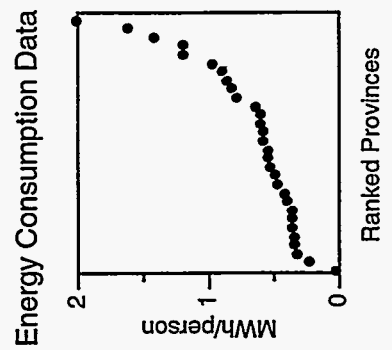
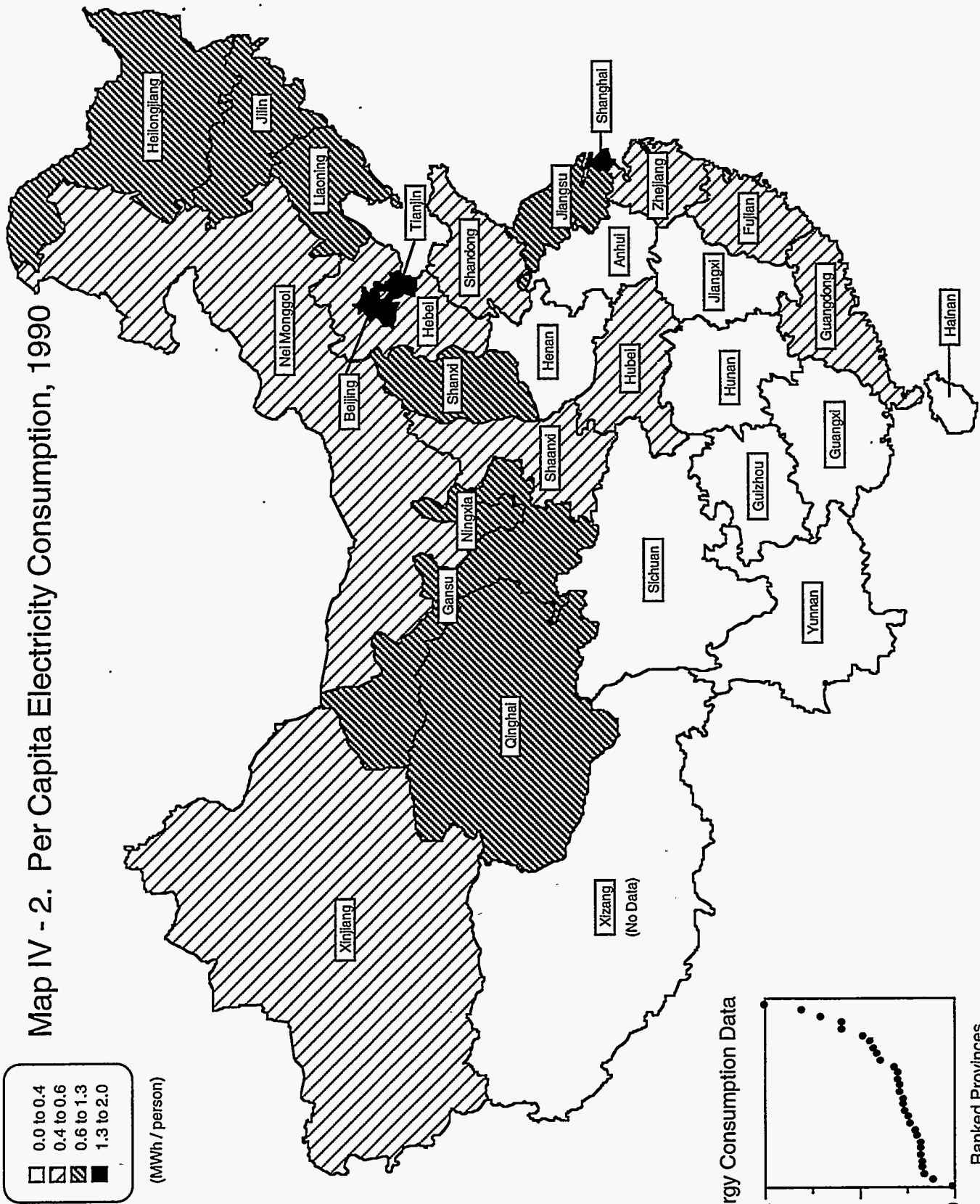


Per Capita Consumption Data



Ranked Provinces

Map IV - 2. Per Capita Electricity Consumption, 1990



**Table IV-6. Energy Intensity by Province, 1990**  
**Primary Energy Consumption per Unit of National Income**

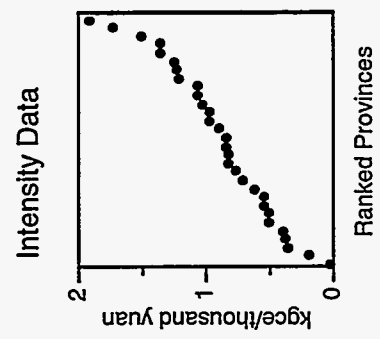
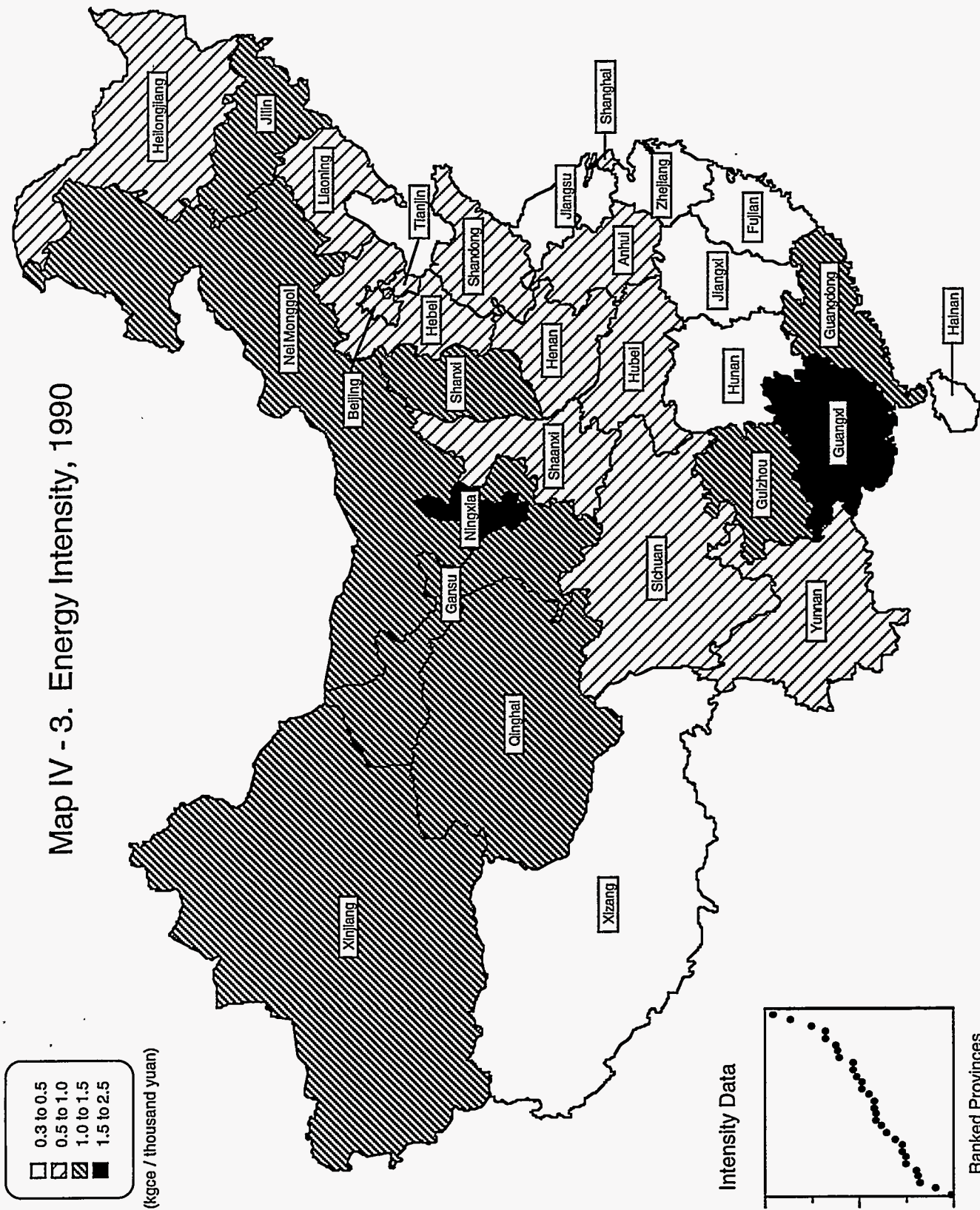
<b>Planning Region</b>	<b>Province</b>	<b>Primary Energy Consumption (Mtce)</b>	<b>National Income (billion current yuan)</b>	<b>NI Energy Intensity (kgce/thousand current yuan)</b>
<i>North</i>	Beijing	27.1	36.7	0.74
	Tianjin	20.7	25.6	0.81
	Hebei	61.2	70.2	0.87
	Shanxi	47.1	31.6	1.49
	Inner Mongolia	24.2	23.3	1.04
<i>Northeast</i>	Liaoning	78.6	78.4	1.00
	Jilin	35.2	33.7	1.04
	Heilongjiang	52.9	56.4	0.94
<i>East</i>	Shanghai	31.8	61.7	0.52
	Jiangsu	55.1	113.8	0.48
	Zhejiang	25.8	72.7	0.36
	Anhui	27.6	51.9	0.53
	Fujian	14.5	38.9	0.37
	Jianxi	17.3	35.4	0.49
	Shandong	68.3	114.4	0.60
<i>South-Central</i>	Henan	52.1	75.4	0.79
	Hubei	40.0	66.1	0.68
	Hunan	38.2	59.1	0.34
	Guangdong	40.7	113.2	1.21
	Guangxi	13.1	33.6	1.70
	Hainan	1.2	7.7	0.16
<i>Southwest</i>	Sichuan	63.5	79.9	0.79
	Guizhou	21.3	17.9	1.19
	Yunnan	19.6	24.0	0.82
	Xizang	-	1.6	-
<i>Northwest</i>	Shaanxi	22.4	24.0	0.94
	Gansu	21.8	16.4	1.33
	Qinghai	5.1	4.2	1.23
	Ningxia	7.1	3.7	1.90
	Xinjiang	20.7	15.4	1.34
<i>National Total/Average</i>		987.0	1,438.4	0.69
<i>Balance *</i>		32.9	51.5	0.64

- Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total. Per capita figures in the balance row are calculated from the sums of provincial figures (i.e. national totals minus their respective balances).

Source: Chana Energy Statistical Yearbook, 1991; China Statistical Yearbook, 1992.



Map IV - 3. Energy Intensity, 1990



# Sectoral Consumption

**Table IV-7. End-Use Energy Consumption by Sector, \* 1980-1994**

**I. Mtce**

Year	Industrial †	Agricultural	Transportation	Residential	Commercial	Sum	Total	Balance
1980	378.59	31.0	39.6	91.8	19.6	560.6	566.7	6.1
1981	366.58	31.1	39.7	96.4	20	553.8	559.9	6.1
1982	385.56	31.7	41.7	99.2	21	579.2	585	5.8
1983	412.52	32.6	44.1	104.5	23	616.7	623.2	6.5
1984	442.65	34.6	47.5	112.9	25.1	662.7	669.3	6.6
1985	471.57	36.3	52.4	127.3	27.6	715.1	722.9	7.8
1986	500.17	37.8	56.6	130.9	28.8	754.3	760.4	6.1
1987	539.44	40	59.8	138.1	31.1	808.3	814.6	6.2
1988	576.01	41.9	63.9	148.8	35.3	866	874	8.1
1989	605.13	42.4	66.6	149	37.3	900.5	908.9	8.4
1990	612.14	43.2	67.4	150.3	40.4	913.4	921.7	8.3
1991	641.43	45.4	73.2	152.3	43.5	955.8	963.9	8.1
1992	685.86	44.7	79.2	146.7	46.7	1,003.2	1,013.1	9.9
1993	-	-	-	-	-	-	-	-
1994	777.0	46.3	83.4	150.8	61.7	1,119.1	1,131.7	12.6

**2. Shares of Total**

Year	Industrial †	Agricultural	Transportation	Residential	Commercial	Sum	Total	Balance
1980	66.8%	5.5%	7.0%	16.2%	3.5%	98.9%	100.0%	1.1%
1981	65.5%	5.6%	7.1%	17.2%	3.6%	98.9%	100.0%	1.1%
1982	65.9%	5.4%	7.1%	17.0%	3.6%	99.0%	100.0%	1.0%
1983	66.2%	5.2%	7.1%	16.8%	3.7%	99.0%	100.0%	1.0%
1984	66.1%	5.2%	7.1%	16.9%	3.7%	99.0%	100.0%	1.0%
1985	65.2%	5.0%	7.3%	17.6%	3.8%	98.9%	100.0%	1.1%
1986	65.8%	5.0%	7.4%	17.2%	3.8%	99.2%	100.0%	0.8%
1987	66.2%	4.9%	7.3%	17.0%	3.8%	99.2%	100.0%	0.8%
1988	65.9%	4.8%	7.3%	17.0%	4.0%	99.1%	100.0%	0.9%
1989	66.6%	4.7%	7.3%	16.4%	4.1%	99.1%	100.0%	0.9%
1990	66.4%	4.7%	7.3%	16.3%	4.4%	99.1%	100.0%	0.9%
1991	66.5%	4.7%	7.6%	15.8%	4.5%	99.2%	100.0%	0.8%
1992	67.7%	4.4%	7.8%	14.5%	4.6%	99.0%	100.0%	1.0%
1993	-	-	-	-	-	-	-	-
1994	68.7%	4.1%	7.4%	13.3%	5.5%	98.9%	100.0%	1.1%

\* Figures given here differ from official data. We obtained these figures by summing sectoral consumption of individual energy sources using as presented in other tables. Adjustments, conversions, and rounding have led to discrepancies between sectoral sums and total end use data.

† Industrial sector includes construction, excludes utility sector energy use.

‡ Energy use for transportation is adjusted from official Chinese data (see transportation sector consumption table) Energy use in other sectors is adjusted accordingly.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-6. Commercial Energy End Use by Sector

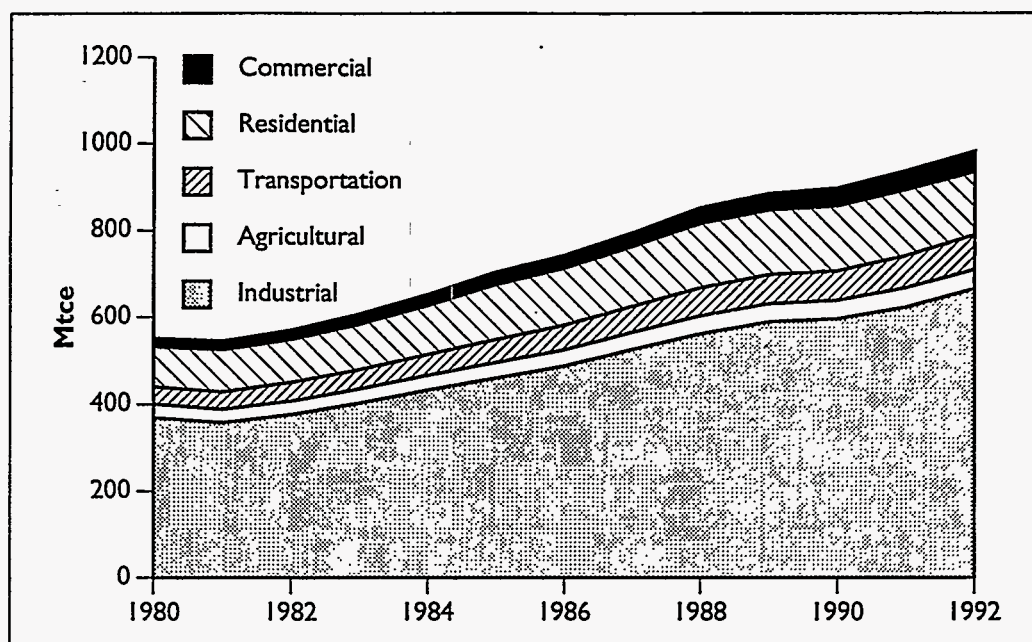


Figure IV-7. Sectoral Shares of Commercial Energy End Use

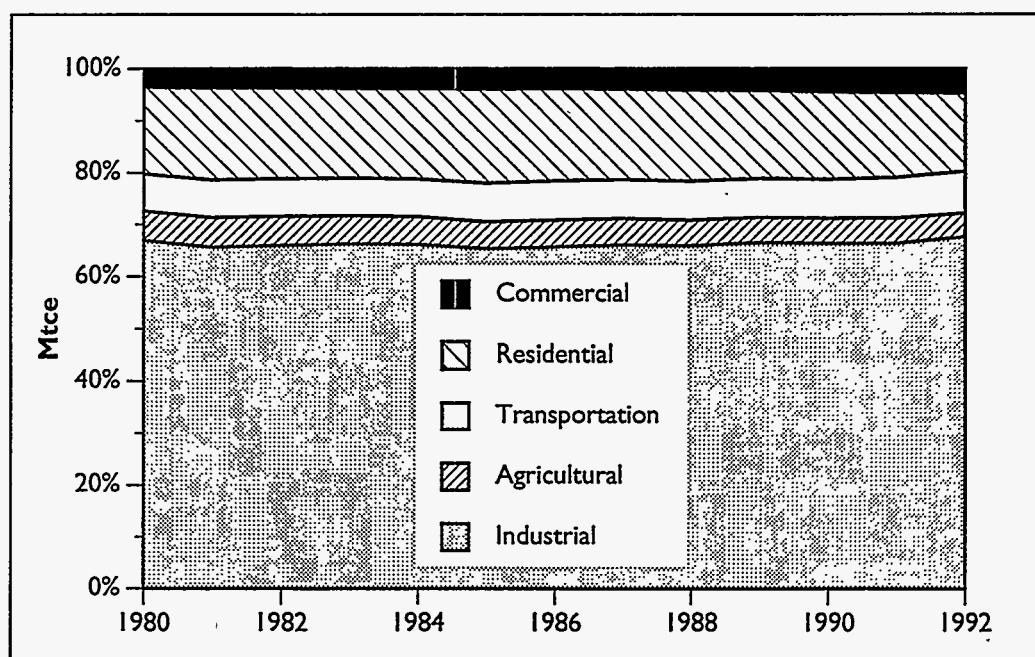


Table IV-8. Industrial End-Use Energy Consumption by Fuel \* 1980-1992

I. Mtce								
Year	Coal †	Coke	Electricity	Liquids ¶	Natural Gas	Coal Gas	Delivered Heat & Other ¥	Total
1980	158.08	43.72	84.13	51.95	18.27	5.58	16.86	378.59
1981	155.31	39.89	85.69	48.29	16.09	5.72	15.59	366.58
1982	167.90	40.63	91.79	48.75	15.43	5.72	15.34	385.56
1983	184.08	41.10	99.10	49.03	15.80	6.39	17.02	412.52
1984	201.62	44.96	106.22	51.13	15.99	6.42	16.31	442.65
1985	215.38	47.29	112.58	55.26	15.77	7.20	18.09	471.57
1986	225.14	51.95	124.28	58.68	16.45	9.38	14.30	500.17
1987	244.06	56.31	136.22	62.66	16.80	8.34	15.04	539.44
1988	259.50	59.32	148.80	66.11	16.93	9.68	15.66	576.01
1989	266.88	62.78	157.57	70.42	16.82	10.72	19.93	605.13
1990	256.59	68.09	164.63	68.81	17.14	10.90	25.98	612.14
1991	264.19	71.17	176.82	73.53	18.43	-	37.28	641.43
1992	277.80	77.02	195.50	75.75	17.99	-	41.80	685.86

2. Shares								
Year	Coal †	Coke	Electricity	Liquids ¶	Natural Gas	Coal Gas	Delivered Heat & Other ¥	Total
1980	41.8%	11.5%	22.2%	13.7%	4.8%	1.5%	4.5%	100.0%
1981	42.4%	10.9%	23.4%	13.2%	4.4%	1.6%	4.3%	100.0%
1982	43.5%	10.5%	23.8%	12.6%	4.0%	1.5%	4.0%	100.0%
1983	44.6%	10.0%	24.0%	11.9%	3.8%	1.5%	4.1%	100.0%
1984	45.5%	10.2%	24.0%	11.6%	3.6%	1.5%	3.7%	100.0%
1985	45.7%	10.0%	23.9%	11.7%	3.3%	1.5%	3.8%	100.0%
1986	45.0%	10.4%	24.8%	11.7%	3.3%	1.9%	2.9%	100.0%
1987	45.2%	10.4%	25.3%	11.6%	3.1%	1.5%	2.8%	100.0%
1988	45.1%	10.3%	25.8%	11.5%	2.9%	1.7%	2.7%	100.0%
1989	44.1%	10.4%	26.0%	11.6%	2.8%	1.8%	3.3%	100.0%
1990	41.9%	11.1%	26.9%	11.2%	2.8%	1.8%	4.2%	100.0%
1991	41.2%	11.1%	27.6%	11.5%	2.9%	-	5.8%	100.0%
1992	40.5%	11.2%	28.5%	11.0%	2.6%	-	6.1%	100.0%

\* Includes construction, which is broken out as a separate sector in Chinese statistics. Excludes utility sector energy use.

† Coal includes uncorrected total of raw coal, washed coal, and middlings (conversion factor: 0.714 kgce/kg).

¶ Liquids include crude oil, fuel oil, kerosene, diesel, and LPG. Diesel use is adjusted to exclude estimated transportation use by industrial enterprises (see transportation energy consumption table for details).

¥ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors. Other products include refinery gas, LPG, coal gas (for years not covered in the coal gas column), and others.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-8. Industrial Energy End Use by Energy Source

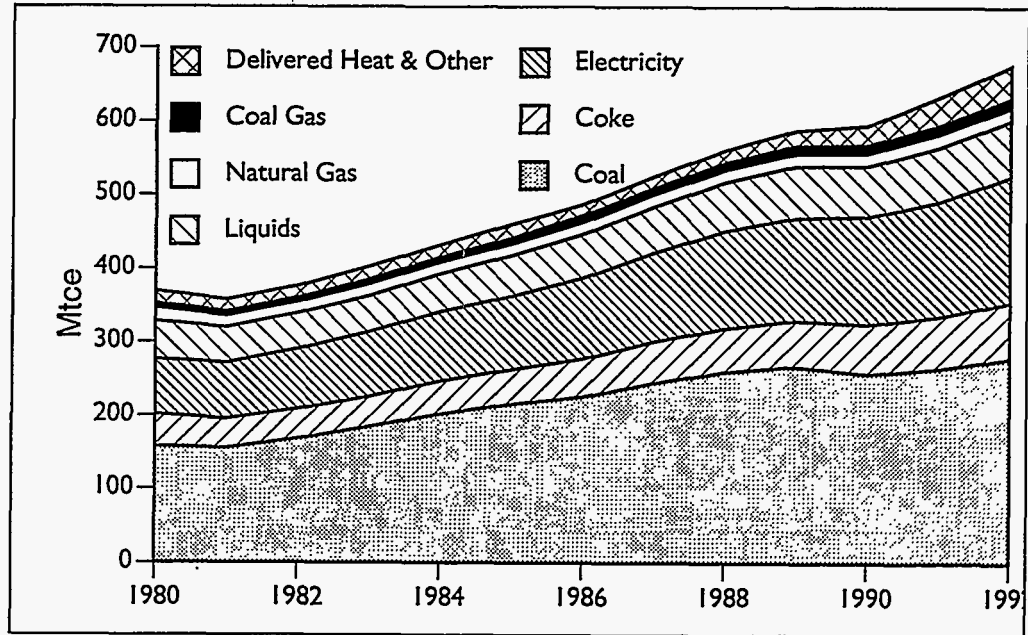


Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992

I. 1980 Industrial Sector Energy Consumption\*

Subsector †	Total Coal §§ (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Natural Gas (bcm)	Coal Gas (bcm)	Other coking Products (Mt)	Other oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End-Use (Mtce)
<b>Industry Total</b>	<b>216.43</b>	<b>42.58</b>	<b>4.30</b>	<b>14.82</b>	<b>0.16</b>	<b>3.85</b>	<b>0.76</b>	<b>12.80</b>	<b>9.41</b>	<b>2.33</b>	<b>11.19</b>	<b>243.89</b>	<b>222.90</b>	<b>369.58</b>
Light Industry ¥	53.09	0.91	0.82	2.82	0.03	0.43	0.04	0.86	0.55	0.00	0.00	79.30	38.59	64.48
Heavy Industry ¥	141.98	41.59	3.48	12.00	0.13	2.93	0.73	11.94	8.86	0.00	11.19	164.25	178.17	284.22
<b>Extraction Industries</b>	<b>14.82</b>	<b>0.19</b>	<b>1.50</b>	<b>2.15</b>	<b>0.03</b>	<b>0.57</b>	<b>0.26</b>	<b>6.30</b>	<b>1.55</b>	<b>0.00</b>	<b>0.00</b>	<b>25.43</b>	<b>26.67</b>	<b>38.23</b>
Coal Mining & Processing ¶¶	1.52	0.13	0.00	0.00	0.02	0.08	0.00	0.00	1.55	0.00	0.00	3.02	17.37	9.37
Oil & NG Extraction ¶¶	0.63	0.05	1.50	2.09	0.01	0.34	0.26	6.30	0.00	0.00	0.00	22.41	8.57	19.19
Other Extraction	12.67	0.01	0.00	0.06	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.73	9.67
<b>Manufacturing Industries</b>	<b>201.62</b>	<b>42.39</b>	<b>2.39</b>	<b>11.07</b>	<b>0.11</b>	<b>3.28</b>	<b>0.50</b>	<b>6.28</b>	<b>7.78</b>	<b>2.33</b>	<b>0.00</b>	<b>218.47</b>	<b>196.23</b>	<b>312.14</b>
Food, Beverage, & Tobacco	14.02	0.06	0.10	0.24	0.00	0.08	0.00	0.31	0.00	0.00	0.00	5.38	7.04	14.10
Spinning & Weaving§	13.95	0.10	0.19	0.54	0.01	0.09	0.04	0.31	0.47	0.00	0.00	59.57	12.17	18.93
Paper & Paper Products	7.24	0.01	0.12	0.46	0.00	0.03	0.00	0.02	0.00	0.00	0.00	6.82	5.63	8.58
Electricity, Steam & Hot Water **	0.59	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14	19.56	8.41
Chemicals ††	41.18	8.31	0.91	3.38	0.01	1.32	0.46	4.17	0.32	0.00	0.00	73.07	49.00	74.38
Building Materials ¥¥	45.60	0.58	0.16	1.47	0.01	0.23	0.00	0.07	0.00	0.00	0.00	8.08	11.21	40.70
Ferrous Metals Smelting & Rolling	17.83	30.03	0.74	3.56	0.01	0.27	0.00	0.96	6.46	0.00	0.00	30.71	45.99	73.11
Machinery, Electrical & Electronics	21.17	2.29	0.17	1.39	0.07	0.54	0.00	0.44	0.53	0.00	0.00	24.36	20.39	30.41
Other Manufacturing	40.05	1.00	0.00	0.04	0.00	0.74	0.00	0.00	0.00	2.33	0.00	8.33	25.24	43.52
Balance ¶¶¶	0.00	0.00	0.40	1.60	0.02	0.00	0.00	0.22	0.08	0.00	11.19	0.00	0.00	19.21

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and the construction sector. Gross output value for 1980 is unavailable.

† State Statistical Bureau definitions of subsectors changed in 1985 so earlier figures are not strictly comparable to later ones. The Energy Research Institute has reconstructed pre-1985 figures for the subsectors as they are now defined. Some of the currently defined subsectors were contained within the original 1980-1984 subsectors and could not be separated easily. The differences between totals and subtotals are due in part to this, to differences between Energy Research Institute and State Statistical Bureau data, and to differences in conversion factors. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

¥ Light and heavy industry subtotals are independent of subsectoral divisions.

¶ The coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

§ The textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

\*\* Figures for the utilities sector (normally not counted as an industrial sector in energy accounts of other countries) do not include power generation inputs.

†† Gross output value for the chemicals industry includes rubber products.

¥¥ Gross output for the building materials industry includes raw materials mining.

¶¶ Total minus extraction and manufacturing subtotals.

¶¶¶ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

2. 1981 Industrial Sector Energy Consumption *																
Subsector†	Total Coal §§ (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Natural Gas (bcm)	Coal Gas (bcm)	Other coking Products (Mt)	Other oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End-Use (Mtce)	GOV (billion 1980 yuan)	
<i>Industry Total</i>	214.52	38.85	3.86	13.22	0.14	3.77	0.63	11.18	9.64	2.09	10.96	252.93	227.25	360.79	517.77	
Light Industry ¥	54.74	0.93	0.79	2.77	0.03	0.48	0.04	0.81	0.56	0.00	0.00	82.24	43.19	67.56	266.29	
Heavy Industry ¥	134.42	37.82	3.07	10.46	0.10	2.75	0.59	10.37	9.08	0.00	10.96	170.33	177.54	269.49	251.48	
<i>Mining</i>	14.07	0.18	1.29	1.80	0.02	0.55	0.22	5.08	1.76	0.00	0.00	26.37	27.20	35.51	-	
Coal Mining ¶	10.98	0.11	0.00	0.02	0.02	0.08	0.00	0.00	1.76	0.00	0.00	3.13	17.72	16.39	15.73	
Oil & NG Mining ¶¶	0.53	0.06	1.28	1.71	0.01	0.31	0.22	5.08	0.00	0.00	0.00	23.23	8.68	16.61	28.21	
Other Mining	2.56	0.01	0.01	0.07	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.80	2.50	-	
<i>Manufacturing</i>	203.01	38.67	2.22	9.79	0.09	2.45	0.41	5.89	7.80	2.09	0.00	226.56	176.11	297.47	-	
Food & Beverage	14.51	0.08	0.14	0.20	0.00	0.08	0.00	0.26	0.00	0.00	0.00	5.58	8.09	14.85	69.00	
Textiles §	14.80	0.10	0.19	0.56	0.01	0.13	0.04	0.32	0.48	0.00	0.00	61.78	14.28	20.58	57.10	
Paper	6.68	0.01	0.12	0.39	0.00	0.02	0.00	0.02	0.00	0.00	0.00	7.07	5.80	8.14	6.90	
Electricity **	0.60	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22	20.58	8.83	19.49	
Chemicals ††	37.84	8.49	0.83	3.21	0.01	1.26	0.37	4.06	0.33	0.00	0.00	75.77	48.55	71.31	59.14	
Building Materials ¥¥	45.09	0.48	0.13	1.40	0.01	0.22	0.00	0.06	0.00	0.00	0.00	8.38	11.42	40.17	19.51	
Ferrous Metals	17.46	26.68	0.70	2.99	0.01	0.26	0.00	0.75	6.46	0.00	0.00	31.85	45.06	68.09	45.67	
Machinery	18.71	1.88	0.12	1.01	0.05	0.46	0.00	0.42	0.53	0.00	0.00	25.25	20.14	27.40	108.00	
Other Manufacturing	47.34	0.95	0.00	0.04	0.00	0.03	0.00	0.00	0.00	2.09	0.00	8.65	2.19	38.10	-	
Balance ¶¶¶	-2.56	0.00	0.35	1.63	0.02	0.77	0.00	0.21	0.08	0.00	10.96	0.00	23.94	27.81	89.02	

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and the construction sector.

† State Statistical Bureau definitions of subsectors changed in 1985 so earlier figures are not strictly comparable to later ones. The Energy Research Institute has reconstructed pre-1985 figures for the subsectors as they are now defined. Some of the currently defined subsectors were contained within the original 1980-1984 subsectors and could not be separated easily. The differences between totals and subtotals are due in part to this, to differences between Energy Research Institute and State Statistical Bureau data, and to differences in conversion factors. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

¥ Light and heavy industry subtotals are independent of subsectoral divisions.

¶ The coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

§ The textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

\*\* Figures for the utilities sector (normally not counted as an industrial sector in energy accounts of other countries) do not include power generation inputs.

†† Gross output value for the chemicals industry includes rubber products.

¥¥ Gross output for the building materials industry includes raw materials mining.

¶¶ Total minus extraction and manufacturing subtotals.

§§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

Subsector †	3. 1982 Industrial Sector Energy Consumption *													Total End-Use (Mtce)	GOV (billion 1980 yuan)
	Total Coal §§ (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Natural Gas (bcm)	Coal Gas (bcm)	Other coking Products (Mt)	Other oil Products (Mt)	Heat (PJ)	Electricity (TWh)		
<i>Industry Total</i>	231.47	39.55	3.63	12.97	0.15	3.70	0.71	11.44	9.65	2.16	11.42	257.83	242.91	380.50	557.75
Light Industry ¥	58.39	1.05	0.73	2.70	0.04	0.51	0.05	0.79	0.50	0.00	0.00	83.83	46.50	71.50	281.49
Heavy Industry ¥	146.44	38.39	2.90	10.26	0.12	2.91	0.66	9.90	9.15	0.00	11.42	173.64	187.53	282.71	276.26
<i>Extraction Industries</i>	14.54	0.21	1.22	1.65	0.03	0.51	0.24	4.87	1.56	0.00	0.00	26.88	28.68	35.77	-
Coal Mining & Processing ¶	11.49	0.13	0.00	0.01	0.02	0.08	0.00	0.00	1.56	0.00	0.00	3.19	18.77	17.09	16.63
Oil & NG Extraction ¶¶	0.66	0.07	1.21	1.64	0.01	0.27	0.24	4.87	0.00	0.00	0.00	23.69	9.10	16.39	28.80
Other Extraction	2.39	0.01	0.00	0.01	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.81	2.29	-
<i>Manufacturing Industries</i>	216.93	39.34	2.41	11.32	0.13	2.92	0.47	6.57	8.09	2.16	0.00	230.95	205.35	324.43	-
Food, Beverage, & Tobacco	15.76	0.09	0.08	0.19	0.00	0.11	0.00	0.22	0.00	0.00	0.00	5.69	8.70	15.89	75.60
Spinning & Weaving §	15.45	0.12	0.21	0.54	0.01	0.09	0.05	0.29	0.45	0.00	0.00	62.97	15.52	21.51	55.27
Paper & Paper Products	7.29	0.01	0.06	0.35	0.00	0.02	0.00	0.07	0.00	0.00	0.00	7.21	6.20	8.67	7.40
Electricity, Steam & Hot Water **	0.63	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.27	21.38	9.19	20.71
Chemicals ††	40.52	8.38	0.71	3.17	0.01	1.41	0.42	3.83	0.21	0.00	0.00	77.24	51.27	73.97	65.90
Building Materials ¥¥	51.78	0.53	0.10	1.45	0.01	0.28	0.00	0.06	0.00	0.00	0.00	8.55	13.31	45.88	22.26
Ferrous Metals Smelting & Rolling	17.73	27.11	0.78	2.92	0.01	0.26	0.00	0.69	6.72	0.00	0.00	32.47	46.84	69.54	48.52
Machinery, Electrical & Electronics	20.36	2.01	0.10	1.02	0.07	0.45	0.00	0.45	0.66	0.00	0.00	25.74	21.25	29.30	122.50
Other Manufacturing	47.41	1.06	0.39	1.67	0.03	0.30	0.00	0.96	0.05	2.16	0.00	8.81	20.88	50.50	-
Balance ¶¶¶	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	11.42	0.00	8.88	20.30	94.16

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and the construction sector.

† State Statistical Bureau definitions of subsectors changed in 1985 so earlier figures are not strictly comparable to later ones. The Energy Research Institute has reconstructed pre-1985 figures for the subsectors as they are now defined. Some of the currently defined subsectors were contained within the original 1980-1984 subsectors and could not be separated easily. The differences between totals and subtotals are due in part to this, to differences between Energy Research Institute and State Statistical Bureau data, and to differences in conversion factors. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

¥ Light and heavy industry subtotals are independent of subsectoral divisions.

¶ The coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

§ The textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

\*\* Figures for the utilities sector (normally not counted as an industrial sector in energy accounts of other countries) do not include power generation inputs.

†† Gross output value for the chemicals industry includes rubber products.

¥¥ Gross output for the building materials industry includes raw materials mining.

¶¶ Total minus extraction and manufacturing subtotals.

¶¶¶ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

4. 1983 Industrial Sector Energy Consumption *															
Subsector†	Total Coal §§ (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Natural Gas (bcm)	Coal Gas (bcm)	Other coking Products (Mt)	Other oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End-Use (Mtce)	GOV (billion 1980 yuan)
<i>Industry Total</i>	253.82	41.18	3.19	13.05	0.16	3.95	0.84	10.86	10.77	2.26	11.58	263.69	261.85	406.22	616.44
Light Industry ¥	62.73	1.09	0.54	2.78	0.04	0.52	0.07	0.79	0.64	0.00	0.00	85.74	51.66	76.76	305.97
Heavy Industry ¥	155.38	39.97	2.65	10.27	0.01	2.91	0.77	10.07	10.13	0.00	11.58	177.58	200.45	296.70	310.47
<i>Mining</i>	14.93	0.23	1.28	1.52	0.03	0.53	0.28	4.90	1.63	0.00	0.00	27.49	30.63	36.95	
Coal Mining ¶¶	11.92	0.16	0.00	0.00	0.02	0.10	0.00	0.00	1.63	0.00	0.00	3.26	20.11	18.02	17.83
Oil & NG Mining ¶¶	0.59	0.06	1.28	1.50	0.01	0.27	0.28	4.90	0.00	0.00	0.00	24.23	9.70	16.61	31.01
Other Mining	2.42	0.01	0.00	0.01	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.82	2.32	
<i>Manufacturing</i>	241.31	40.95	1.91	11.54	0.14	3.43	0.56	5.96	9.14	2.26	0.00	236.20	252.11	362.91	
Food & Beverage	17.13	0.09	0.05	0.18	0.00	0.11	0.00	0.20	0.00	0.00	0.00	5.82	10.07	17.33	79.43
Textiles §	16.28	0.14	0.13	0.64	0.01	0.09	0.07	0.35	0.53	0.00	0.00	64.41	16.68	22.84	60.51
Paper	7.92	0.01	0.04	0.34	0.00	0.02	0.00	0.03	0.00	0.00	0.00	7.37	6.80	9.28	8.14
Electricity **	0.67	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.32	22.47	9.65	22.02
Chemicals ††	44.12	7.86	0.69	3.12	0.01	1.39	0.49	3.86	0.45	0.00	0.00	78.99	53.87	77.32	74.10
Building Materials ¥¥	55.51	0.60	0.07	1.48	0.01	0.29	0.00	0.08	0.00	0.00	0.00	8.74	14.59	49.18	25.54
Ferrous Metals	18.50	28.88	0.53	3.13	0.01	0.27	0.00	0.69	7.50	0.00	0.00	33.20	50.73	73.78	52.37
Machinery	20.72	2.20	0.08	0.98	0.08	0.45	0.00	0.54	0.55	0.00	0.00	26.33	22.77	30.34	144.05
Other Manufacturing	60.47	1.16	0.32	1.68	0.03	0.82	0.00	0.21	0.11	2.26	0.00	9.02	54.13	73.19	
Balance ¶¶¶	-2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.58	0.00	-20.89	6.37	101.44

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and the construction sector.

† State Statistical Bureau definitions of subsectors changed in 1985 so earlier figures are not strictly comparable to later ones. The Energy Research Institute has reconstructed pre-1985 figures for the subsectors as they are now defined. Some of the currently defined subsectors were contained within the original 1980-1984 subsectors and could not be separated easily. The differences between totals and subtotals are due in part to this, to differences between Energy Research Institute and State Statistical Bureau data, and to differences in conversion factors. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

¥ Light and heavy industry subtotals are independent of subsectoral divisions.

¶ The coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

§ The textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

\*\* Figures for the utilities sector (normally not counted as an industrial sector in energy accounts of other countries) do not include power generation inputs.

†† Gross output-value for the chemicals industry includes rubber products.

¥¥ Gross output for the building materials industry includes raw materials mining.

¶¶ Total minus extraction and manufacturing subtotals.

¶¶¶ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

Subsector†	Total Coal §§ (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Natural Gas (bcm)	Coal Gas (bcm)	Other coking Products (Mt)	Other oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End-Use (Mtce)	GOV (billion 1980 yuan)
<b>5. 1984 Industrial Sector Energy Consumption*</b>															
<i>Industry Total</i>	278.42	43.82	3.01	13.20	0.17	4.20	0.86	10.96	10.83	2.45	12.63	279.72	280.82	436.76	702.99
<i>Light Industry ¥</i>	67.11	1.14	0.46	2.90	0.04	0.61	0.08	0.78	0.76	0.00	0.00	90.94	55.23	81.81	348.42
<i>Heavy Industry ¥</i>	167.94	42.52	2.55	10.29	0.14	3.06	0.78	10.18	10.07	0.00	12.63	188.37	215.44	316.49	354.57
<i>Mining</i>	16.39	0.25	1.34	1.46	0.03	0.56	0.26	4.87	1.64	0.00	0.00	29.16	32.91	38.97	-
Coal Mining ¶	13.09	0.19	0.00	0.00	0.02	0.11	0.00	0.00	1.64	0.00	0.00	3.46	21.28	19.38	19.42
Oil & NG Mining ¶	0.80	0.06	1.34	1.44	0.01	0.32	0.26	4.87	0.00	0.00	0.00	25.70	10.78	17.24	33.41
Other Mining	2.50	0.01	0.00	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.85	2.35	-
<i>Manufacturing</i>	262.03	43.57	1.67	11.74	0.14	3.64	0.60	6.09	9.19	2.45	0.00	250.55	247.91	379.75	-
Food & Beverage	18.27	0.10	0.04	0.17	0.00	0.14	0.00	0.20	0.00	0.00	0.00	6.17	11.07	18.59	86.58
Textiles §	17.10	0.14	0.10	0.61	0.01	0.12	0.08	0.31	0.66	0.00	0.00	68.32	17.24	23.76	66.75
Paper	8.69	0.00	0.04	0.34	0.00	0.02	0.00	0.02	0.00	0.00	0.00	7.82	7.15	9.95	9.22
Electricity **	0.74	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.46	24.21	10.44	23.56
Chemicals ††	46.97	7.93	0.62	3.12	0.01	1.39	0.52	4.07	0.40	0.00	0.00	83.80	56.07	80.68	83.00
Building Materials ¥¥	59.48	0.70	0.06	1.52	0.01	0.30	0.00	0.06	0.00	0.00	0.00	9.27	16.96	53.11	28.73
Ferrous Metals	21.09	31.00	0.46	3.15	0.01	0.31	0.00	0.67	7.44	0.00	0.00	35.22	54.07	79.05	57.94
Machinery	22.37	2.42	0.07	1.01	0.08	0.50	0.00	0.51	0.59	0.00	0.00	27.93	25.54	33.00	175.70
Other Manufacturing	67.33	1.24	0.29	1.83	0.03	0.87	0.00	0.25	0.10	2.45	0.00	9.56	35.60	71.17	-
Balance ¶¶	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.63	0.00	0.00	18.04	118.68

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and the construction sector.

† State Statistical Bureau definitions of subsectors changed in 1985 so earlier figures are not strictly comparable to later ones. The Energy Research Institute has reconstructed pre-1985 figures for the subsectors as they are now defined. Some of the currently defined subsectors were contained within the original 1980-1984 subsectors and could not be separated easily. The differences between totals and subtotals are due in part to this, to differences between Energy Research Institute and State Statistical Bureau data, and to differences in conversion factors. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

¥ Light and heavy industry subtotals are independent of subsectoral divisions.

¶ The coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

§ The textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

\*\* Figures for the utilities sector (normally not counted as an industrial sector in energy accounts of other countries) do not include power generation inputs.

†† Gross output value for the chemicals industry includes rubber products.

¥¥ Gross output for the building materials industry includes raw materials mining.

¶¶ Total minus extraction and manufacturing subtotals.

§§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy EndUse by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

6. 1985 Industrial Sector Energy Consumption *											
Subsector	Total Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	297.147	-	-	46.159	2.549	13.636	0.192	5.321	0.598	2.123	10.470
Light Industry †	82.037	-	-	1.269	0.269	2.134	0.051	1.169	0.024	0.195	0.890
Heavy Industry †	215.110	-	-	44.890	2.280	11.502	0.141	4.152	0.574	1.928	9.580
<i>Mining Subtotal</i>	23.287	-	-	0.717	1.402	0.505	0.027	0.836	0.008	0.059	3.510
Coal Mining	16.214	-	-	0.150	-	-	0.018	0.159	-	-	0.020
Oil & NG Mining	0.833	-	-	0.049	1.402	0.379	0.004	0.281	0.008	0.059	3.220
Other Mining	6.240	-	-	0.518	0.000	0.126	0.005	0.396	-	0.000	0.270
<i>Manufacturing Subtotal</i>	273.860	-	-	45.442	1.147	13.131	0.165	4.485	0.590	2.064	6.960
Food & Beverage	23.814	-	-	0.123	0.019	0.152	0.005	0.324	0.008	-	0.030
Textiles	18.169	-	-	0.071	0.059	0.294	0.008	0.240	0.005	-	0.030
Paper	11.580	-	-	0.009	0.027	0.308	0.001	0.056	-	-	0.030
Electricity ‡	0.815	-	-	0.031	-	-	0.001	0.213	0.003	-	0.390
Oil Refining ‡	0.343	-	-	0.041	0.011	1.464	0.002	0.038	0.400	1.613	0.530
Coal & Gas	1.590	-	-	0.023	-	0.254	-	0.009	-	-	-
Chemicals	47.079	-	-	7.219	0.302	3.348	0.015	1.500	0.145	0.256	4.100
Pharmaceuticals	3.684	-	-	0.003	0.013	0.145	0.001	0.008	-	-	0.040
Chemical Fibers	2.304	-	-	0.100	0.025	0.234	0.002	0.010	0.008	0.195	0.180
Building Materials	85.951	-	-	0.935	0.160	2.502	0.017	0.591	0.003	-	0.180
Ferrous Metals	22.010	-	-	32.372	0.202	2.675	0.004	0.173	0.005	-	0.470
Nonferrous Metals	6.321	-	-	0.731	0.196	0.303	0.002	0.067	-	-	0.000
Machinery	26.300	-	-	2.601	0.084	0.944	0.089	0.798	0.007	-	0.590
Other Manufacturing	23.900	-	-	1.183	0.049	0.508	0.018	0.458	0.002	-	0.390
Balance ¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only, not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

6. 1985 Industrial Sector Energy Consumption * (continued)											
Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<i>Industry Total</i>	10.900	1.240	2.825	15.738	316.649	297.910	468.662	14.910	15.562	499.134	895.723
Light Industry†	0.120	0.230	-	-	97.478	65.570	96.126	0.018	-	96.144	439.537
Heavy Industry†	10.780	1.010	2.825	15.738	219.171	232.340	372.535	14.892	15.562	402.989	456.186
<i>Mining Subtotal</i>	0.130	-	-	-	4.910	43.290	43.797	8.441	3.235	55.473	37.947
Coal Mining	-	-	-	0.515	21.500	20.790	8.408	-	29.198	21.815	-
Oil & NG Mining	-	-	-	-	4.136	8.520	11.555	0.033	3.235	14.823	16.132
Other Mining	-	-	-	-	0.259	13.270	11.453	-	-	11.453	-
<i>Manufacturing Subtotal</i>	10.770	1.240	-	-	311.739	254.620	399.556	6.469	12.327	418.352	689.665
Food & Beverage	0.000	0.010	-	-	11.814	10.860	22.647	-	-	22.647	99.469
Textiles	0.110	0.090	-	-	35.991	18.570	22.636	-	-	22.636	121.506
Paper	-	0.010	-	-	8.594	8.090	12.408	-	-	12.408	16.468
Electricity ‡	-	-	-	2.650	28.380	12.991	-	12.116	25.107	27.364	-
Oil Refining ‡	-	-	-	-	23.584	4.020	8.691	0.919	0.211	9.821	21.132
Coal & Gas	1.500	0.270	-	-	3.232	0.860	3.022	3.263	-	6.285	2.416
Chemicals	0.520	0.050	-	-	89.669	51.350	77.878	0.228	-	78.106	56.507
Pharmaceuticals	-	-	-	-	10.402	2.320	4.169	-	-	4.169	14.271
Chemical Fibers	-	-	-	-	26.041	3.340	4.803	0.026	-	4.829	10.330
Building Materials	0.110	0.100	-	-	9.820	22.160	76.600	-	-	76.600	49.308
Ferrous Metals	8.010	0.040	-	-	45.258	36.320	72.942	2.029	-	74.971	43.891
Nonferrous Metals	0.070	0.030	-	-	9.758	17.390	13.409	0.000	-	13.409	19.160
Machinery	0.320	0.550	-	-	29.980	32.030	39.199	0.004	-	39.203	207.843
Other Manufacturing	0.130	0.090	-	-	4.946	18.930	28.155	-	-	28.155	-
Balance ¶	0.000	0.000	2.825	15.738	0.000	0.000	25.315	0.000	0.000	25.315	168.111

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only, not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992(continued)

7. 1986 Industrial Sector Energy Consumption \*

Subsector	Raw Coal (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	289.504	5.873	15.881	51.282	3.179	14.761	0.205	5.751	0.811	2.302	10.700
Light Industry †	83.241	1.040	2.572	1.752	0.231	2.510	0.056	1.286	0.101	0.252	0.800
Heavy Industry †	206.263	4.833	13.309	49.530	2.948	12.251	0.149	4.465	0.710	2.050	9.900
<i>Mining Subtotal</i>	21.328	0.658	1.412	0.624	1.521	0.480	0.026	1.017	0.019	0.040	3.170
Coal Mining	14.139	0.619	1.098	0.185	-	-	0.017	0.172	-	-	-
Oil & NG Mining	0.853	-	-	0.005	1.521	0.379	0.005	0.406	0.018	0.040	3.010
Other Mining	6.336	0.039	0.314	0.434	0.000	0.101	0.004	0.439	0.001	-	0.160
<i>Manufacturing Subtotal</i>	268.176	5.215	14.469	50.658	1.658	14.281	0.179	4.734	0.792	2.262	7.530
Food & Beverage	23.102	0.742	0.987	0.173	0.016	0.133	0.003	0.290	0.008	-	0.040
Textiles	18.121	0.160	0.606	0.090	0.021	0.252	-	0.258	0.005	-	0.030
Paper	11.879	0.066	0.271	0.012	0.028	0.275	0.005	0.064	-	-	0.030
Electricity ¥	0.833	0.066	0.008	0.025	-	-	-	0.166	-	-	0.290
Oil Refining ¥	0.433	0.001	0.006	0.047	0.074	1.683	0.001	0.048	0.454	1.805	1.070
Coal & Gas	1.307	0.254	0.163	0.045	-	0.285	0.001	0.013	0.010	-	-
Chemicals	45.748	1.610	2.374	6.903	0.893	3.647	0.021	1.455	0.186	0.205	4.280
Pharmaceuticals	3.945	0.022	0.107	0.002	0.005	0.131	0.001	0.014	0.015	-	0.040
Chemical Fibers	2.356	0.013	0.116	0.115	0.047	0.083	0.001	0.011	-	0.252	0.300
Building Materials	87.701	0.441	3.460	1.205	0.147	2.882	0.028	0.770	0.006	-	0.200
Ferrous Metals	20.686	0.777	3.046	36.816	0.138	3.133	0.005	0.208	0.002	-	0.660
Nonferrous Metals	6.013	0.468	0.166	0.807	0.223	0.401	0.004	0.089	0.001	-	0.030
Machinery	24.084	0.528	2.442	3.148	0.042	0.944	0.079	0.824	0.020	-	0.480
Other Manufacturing	21.968	0.067	0.717	1.270	0.024	0.432	0.030	0.524	0.085	-	0.080
Balance ¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

¥ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only, not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

**7. 1986 Industrial Sector Energy Consumption \* (continued)**

Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<i>Industry Total</i>	13.050	2.760	2.131	11.720	337.102	331.670	501.823	16.877	16.642	535.342	986.696
Light Industry †	0.110	0.280	-	-	111.226	72.380	104.646	0.031	-	104.677	490.348
Heavy Industry †	12.940	2.480	2.131	11.720	225.877	259.290	397.177	16.846	16.642	430.665	496.348
<i>Mining Subtotal</i>	-	0.020	-	-	5.249	49.910	46.723	9.531	3.366	59.620	39.676
Coal Mining	-	0.020	-	-	1.093	23.800	21.759	9.486	-	31.245	22.523
Oil & NG Mining	-	-	-	-	4.136	9.840	12.121	0.045	3.366	15.532	17.153
Other Mining	-	-	-	-	0.020	16.270	12.843	-	-	12.843	-
<i>Manufacturing Subtotal</i>	13.050	2.740	-	-	331.853	281.760	436.226	7.346	13.276	456.848	758.399
Food & Beverage	-	0.010	-	-	7.187	14.190	24.882	-	-	24.882	109.049
Textiles	0.020	0.080	-	-	51.475	19.930	24.154	-	-	24.154	131.377
Paper	-	0.010	-	-	9.883	9.010	13.309	-	-	13.309	18.877
Electricity ¥	-	-	-	-	8.912	30.800	14.018	-	13.218	27.236	29.311
Oil Refining ¥	-	-	-	-	27.067	4.900	10.753	1.061	0.058	11.872	23.368
Coal & Gas	1.560	0.040	-	-	4.215	1.200	3.354	3.942	-	7.296	2.600
Chemicals	0.580	0.080	-	-	96.098	55.490	83.564	0.276	-	83.840	62.007
Pharmaceuticals	-	-	-	-	10.478	2.540	4.564	-	-	4.564	17.035
Chemical Fibers	-	-	-	-	26.518	4.290	5.419	0.031	-	5.450	12.059
Building Materials	0.090	0.090	-	-	6.149	25.680	83.753	-	-	83.753	58.279
Ferrous Metals	10.490	1.040	-	-	35.991	39.240	83.575	2.013	-	85.588	50.326
Nonferrous Metals	0.050	0.020	-	-	9.615	19.060	14.742	-	-	14.742	21.465
Machinery	0.230	1.330	-	-	35.146	34.460	42.192	0.023	-	42.215	222.646
Other Manufacturing	0.030	0.040	-	-	3.119	20.970	27.947	-	-	27.947	-
Balance§	0.000	0.000	2.131	11.720	0.000	0.000	18.874	0.000	0.000	18.874	188.621

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

¥ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992(continued)

8. 1987 Industrial Sector Energy Consumption \*

Subsector	Raw Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	310.688	7.998	19.800	55.835	2.751	15.747	0.229	5.840	0.811	2.411	11.050
Light Industry †	96.111	1.212	2.719	1.882	0.242	3.175	0.068	1.251	0.173	0.145	0.530
Heavy Industry †	214.577	6.786	17.081	53.953	2.509	12.572	0.161	4.589	0.638	2.266	10.520
<i>Mining Subtotal</i>	22.581	1.063	1.871	0.644	1.139	0.757	0.036	1.026	0.020	0.075	3.430
Coal Mining	15.088	0.939	1.390	0.242	-	-	0.022	0.182	-	-	0.050
Oil & NG Mining	0.761	-	0.008	0.003	1.135	0.705	0.010	0.412	0.020	0.075	3.240
Other Mining	6.732	0.124	0.473	0.399	0.004	0.052	0.004	0.432	-	-	0.140
<i>Manufacturing Subtotal</i>	288.107	6.935	17.929	55.191	1.612	14.990	0.193	4.814	0.791	2.336	-7.620
Food & Beverage	25.465	0.822	1.469	0.226	0.020	0.132	0.004	0.284	-	-	0.040
Textiles	19.659	0.194	0.521	0.078	0.011	0.234	0.008	0.224	0.004	-	0.030
Paper	12.432	0.097	0.294	0.014	0.014	0.206	0.003	0.061	-	-	0.020
Electricity ‡	0.997	0.001	0.161	0.024	-	-	0.002	0.245	-	-	0.070
Oil Refining ‡	0.543	-	0.004	0.047	0.065	2.045	0.002	0.060	0.397	1.981	1.110
Coal & Gas	1.378	0.266	0.030	0.114	-	0.349	0.001	0.015	0.004	-	0.060
Chemicals	52.320	2.597	3.371	7.653	0.893	3.679	0.023	1.528	0.169	0.206	4.430
Pharmaceuticals	4.789	0.015	0.098	0.017	0.008	0.153	0.002	0.017	0.049	-	0.040
Chemical Fibers	2.546	0.026	0.048	0.146	0.060	0.103	0.001	0.018	0.106	0.145	0.390
Building Materials	93.535	0.658	4.493	1.298	0.153	2.913	0.028	0.751	0.040	0.004	0.210
Ferrous Metals	20.089	1.253	3.781	39.828	0.108	3.157	0.004	0.218	0.001	-	0.720
Nonferrous Metals	6.041	0.178	0.159	0.852	0.221	0.432	0.003	0.090	0.001	-	0.030
Machinery	24.656	0.571	2.994	3.248	0.043	0.950	0.081	0.761	0.005	-	0.420
Other Manufacturing	23.657	0.257	0.506	1.646	0.016	0.637	0.031	0.542	0.015	-	0.050
Balance¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(Table continues on following page.)

- \* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.
- † Light and heavy industry subtotals are independent of subsectoral divisions.
- ‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.
- ¶ Total minus extraction and manufacturing subtotals.
- § Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

## 8. 1987 Industrial Sector Energy Consumption \* (continued)

Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<i>Industry Total</i>	11.350	2.720	2.065	13.221	371.863	364.460	543.730	18.282	17.526	579.538	1,147.250
Light Industry †	0.370	0.090	-	-	123.694	81.560	118.899	0.096	-	118.995	570.360
Heavy Industry †	10.980	2.630	2.065	13.221	248.169	282.900	424.830	18.186	17.526	460.542	576.890
<i>Mining Subtotal</i>	-	-	-	-	5.572	54.460	50.532	10.471	3.159	64.162	40.900
Coal Mining	-	-	-	-	0.825	25.260	23.702	10.390	-	34.092	23.340
Oil & NG Mining	-	-	-	-	4.216	10.920	12.794	0.081	3.159	16.034	17.560
Other Mining	-	-	-	-	0.531	18.280	14.036	-	-	14.036	-
<i>Manufacturing Subtotal</i>	11.350	2.720	-	-	366.291	310.000	472.245	7.811	14.367	494.423	888.140
Food & Beverage	0.010	0.010	-	-	16.253	16.220	28.202	-	-	28.202	123.760
Textiles	0.320	0.060	-	-	41.338	21.240	25.514	-	-	25.514	147.130
Paper	0.010	0.010	-	-	16.389	10.260	14.317	-	-	14.317	22.820
Electricity ‡	-	-	-	-	1.288	34.880	15.464	-	14.340	29.804	32.410
Oil Refining ‡	-	-	-	-	31.084	5.190	11.819	1.364	0.027	13.210	26.130
Coal & Gas	1.610	0.030	-	-	5.083	1.240	3.592	4.083	-	7.675	3.090
Chemicals	0.840	0.050	-	-	97.352	63.160	94.372	0.458	-	94.830	73.880
Pharmaceuticals	0.010	-	-	-	7.369	3.170	5.437	-	-	5.437	21.630
Chemical Fibers	0.020	-	-	-	39.217	5.010	6.401	0.040	-	6.441	15.340
Building Materials	0.220	0.100	-	-	4.663	29.340	90.757	-	-	90.757	68.870
Ferrous Metals	7.800	1.130	-	-	57.064	42.520	87.647	1.810	-	89.457	55.590
Nonferrous Metals	0.090	0.030	-	-	10.896	20.730	15.321	-	-	15.321	23.720
Machinery	0.400	1.260	-	-	34.559	33.960	42.890	0.056	-	42.946	273.770
Other Manufacturing	0.020	0.040	-	-	3.736	23.080	30.513	-	-	30.513	-
Balance§	0.000	0.000	2.065	13.221	0.000	0.000	20.953	0.000	0.000	20.953	218.210

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

§ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

**9. 1988 Industrial Sector Energy Consumption \***

Subsector	Raw Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	330.437	8.328	22.154	58.790	3.658	16.306	0.227	5.634	0.902	2.398	11.110
Light Industry †	101.453	1.510	2.417	1.838	0.285	2.789	0.076	1.435	0.105	0.166	0.830
Heavy Industry †	228.984	6.818	19.737	56.952	3.373	13.517	0.151	4.199	0.797	2.232	10.280
<i>Mining Subtotal</i>	23.100	1.084	4.229	0.830	1.370	0.753	0.027	1.147	0.024	0.056	3.620
Coal Mining	14.306	1.003	3.897	0.341	0.001	0.001	0.018	0.229	-	-	0.060
Oil & NG Mining	0.928	-	0.004	0.004	1.369	0.674	0.003	0.488	0.024	0.056	3.400
Other Mining	7.866	0.081	0.328	0.485	-	0.078	0.006	0.430	0.000	0.000	0.160
<i>Manufacturing Subtotal</i>	307.337	7.244	17.925	57.960	2.288	15.553	0.200	4.487	0.878	2.342	7.490
Food & Beverage	27.496	1.028	1.062	0.199	0.010	0.113	0.009	0.299	0.001	-	0.040
Textiles	21.117	0.177	0.605	0.112	0.022	0.175	0.012	0.336	0.002	-	0.030
Paper	13.091	0.085	0.286	0.030	0.012	0.183	0.003	0.070	-	-	0.020
Electricity ‡	1.700	0.026	0.151	0.026	-	0.033	0.001	0.224	-	-	0.140
Oil Refining ‡	0.639	-	0.008	0.009	0.173	2.108	0.001	0.190	0.627	1.975	0.970
Coal & Gas	1.697	0.013	0.041	0.113	-	0.020	-	0.014	0.001	0.000	0.010
Chemicals	56.060	2.798	3.967	8.128	1.367	3.954	0.025	0.652	0.139	0.219	4.560
Pharmaceuticals	4.860	0.046	0.105	0.010	0.002	0.211	0.002	0.020	-	-	0.040
Chemical Fibers	2.561	0.022	0.013	0.152	0.041	0.248	0.002	0.023	0.089	0.138	0.350
Building Materials	98.935	0.614	5.299	1.436	0.284	3.035	0.025	0.810	0.013	0.008	0.220
Ferrous Metals	21.654	1.587	2.814	41.378	0.257	3.397	0.005	0.245	0.001	-	0.700
Nonferrous Metals	6.746	0.012	0.179	1.045	0.001	0.443	0.004	0.088	0.001	0.002	0.040
Machinery	25.996	0.385	2.855	3.657	0.102	0.942	0.081	1.015	0.003	-	0.350
Other Manufacturing	24.785	0.451	0.540	1.665	0.017	0.691	0.030	0.501	0.001	0.000	0.020
Balance¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<b>9. 1988 Industrial Sector Energy Consumption * (continued)</b>											
<i>Industry Total</i>	12.420	3.910	2.273	14.719	381.195	398.510	582.831	18.229	18.885	619.945	1,383.080
Light Industry †	0.120	0.260	0.000	0.000	106.148	93.050	126.852	0.043	-	126.895	694.280
Heavy Industry †	12.300	3.650	2.273	14.719	275.047	305.460	455.979	18.186	18.885	493.050	688.800
<i>Mining Subtotal</i>	0.130	-	-	-	7.201	60.460	56.490	9.892	3.633	70.015	44.150
Coal Mining	-	-	-	-	2.002	27.050	26.390	9.797	-	36.187	25.810
Oil & NG Mining	-	-	-	-	4.406	12.260	14.038	0.095	3.633	17.766	18.340
Other Mining	0.130	-	-	-	0.793	21.150	16.062	-	-	16.062	-
<i>Manufacturing Subtotal</i>	12.290	3.910	-	-	373.994	338.050	503.041	8.337	15.252	526.630	1,066.930
Food & Beverage	0.000	0.010	-	-	12.769	18.040	30.062	-	-	30.062	145.460
Textiles	0.030	0.070	-	-	40.353	23.49	27.465	-	-	27.465	167.440
Paper	0.010	0.010	-	-	17.859	11.060	15.129	-	-	15.129	28.170
Electricity ‡	-	-	-	-	20.220	38.980	18.301	0.004	15.247	33.552	35.790
Oil Refining ‡	-	-	-	-	31.129	5.710	12.697	1.495	0.005	14.197	29.260
Coal & Gas	2.010	0.040	-	-	4.465	1.300	3.306	4.604	-	7.910	3.730
Chemicals	0.610	0.110	-	-	88.526	67.860	99.699	0.394	-	100.093	89.420
Pharmaceuticals	-	-	-	-	8.248	3.510	5.666	-	-	5.666	28.120
Chemical Fibers	-	-	-	-	37.540	5.070	6.441	-0.043	-	6.484	18.840
Building Materials	0.130	0.170	-	-	5.467	31.900	96.895	-	-	96.895	83.910
Ferrous Metals	9.370	1.520	-	-	62.579	46.000	92.995	1.730	-	94.725	61.240
Nonferrous Metals	-	0.070	-	-	7.929	23.590	16.636	-	-	16.636	26.100
Machinery	0.110	1.840	-	-	32.535	34.840	44.759	0.067	-	44.826	349.450
Other Manufacturing	0.020	0.070	-	-	4.193	26.700	32.989	-	-	32.989	-
Balance ¶	0.000	0.000	2.273	14.719	0.000	0.000	23.301	0.000	0.000	23.301	272.000

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued)

10. 1989 Industrial Sector Energy Consumption \*

Subsector	Raw Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	341.248	9.687	20.669	62.186	4.393	17.581	0.219	5.719	0.797	2.570	10.490
Light Industry †	100.954	2.042	3.239	2.217	0.327	2.533	0.061	1.529	0.121	0.141	0.850
Heavy Industry †	240.294	7.645	17.430	59.969	4.066	15.048	0.158	4.190	0.676	2.429	9.640
<i>Mining Subtotal</i>	24.435	1.381	3.535	1.028	1.565	0.705	0.028	1.255	0.033	0.084	3.090
Coal Mining	15.878	1.307	3.529	0.398	-	0.001	0.019	0.263	-	-	0.080
Oil & NG Mining	0.921	-	-	0.007	1.565	0.618	0.002	0.566	0.032	0.084	2.980
Other Mining	7.636	0.074	0.006	0.623	-	0.086	0.007	0.426	0.001	0.000	0.030
<i>Manufacturing Subtotal</i>	316.813	8.306	17.134	61.158	2.828	16.876	0.191	4.464	0.764	2.486	7.400
Food & Beverage	28.287	1.273	1.394	0.209	0.025	0.105	0.005	0.378	0.002	-	0.030
Textiles	21.800	0.190	0.752	0.116	0.020	0.178	0.009	0.362	0.022	-	0.020
Paper	14.084	0.088	0.349	0.027	0.014	0.189	0.002	0.079	-	-	0.020
Electricity ¥	1.980	0.009	0.279	0.026	-	0.142	0.001	0.240	0.029	0.085	0.060
Oil Refining ¥	0.347	0.002	-	0.022	0.492	3.072	0.002	0.148	0.429	1.861	0.870
Coal & Gas	1.922	0.118	0.001	0.108	-	0.027	0.001	0.018	0.001	-	0.010
Chemicals	60.448	3.179	2.809	8.926	1.756	4.191	0.030	0.490	0.145	0.389	4.640
Pharmaceuticals	5.228	0.040	0.220	0.006	0.005	0.126	0.001	0.027	0.001	-	0.030
Chemical Fibers	2.593	0.027	0.064	0.176	0.037	0.268	0.002	0.025	0.081	0.141	0.310
Building Materials	100.721	0.679	5.051	1.768	0.231	3.170	0.025	0.756	0.010	0.007	0.240
Ferrous Metals	21.628	1.733	2.204	43.406	0.168	3.550	0.005	0.278	0.001	-	0.720
Nonferrous Metals	6.027	0.013	0.678	1.156	0.015	0.617	0.005	0.103	0.001	0.001	0.040
Machinery	24.948	0.592	2.676	3.691	0.047	0.822	0.073	0.903	0.019	-	0.350
Other Manufacturing	26.800	0.363	0.657	1.521	0.018	0.419	0.030	0.657	0.023	0.002	0.060
Balance ¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption.

† Light and heavy industry subtotals are independent of subsectoral divisions.

¥ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) do not include power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

## 10. 1989 Industrial Sector Energy Consumption \* (continued)

Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<i>Industry Total</i>	13.140	4.940	2.402	15.636	428.481	423.320	609.861	19.715	19.946	649.522	1,506.262
Light Industry †	0.150	0.240	-	-	127.566	95.150	129.389	0.054	-	129.443	752.456
Heavy Industry †	12.990	4.700	2.402	15.636	300.915	328.170	480.472	19.661	19.946	520.079	753.806
<i>Mining Subtotal</i>	0.130	-	-	-	8.358	64.470	58.656	10.298	3.459	72.413	48.622
Coal Mining	0.010	-	-	-	1.931	28.680	28.249	10.172	-	38.421	29.835
Oil & NG Mining	-	-	-	-	3.947	13.080	14.161	0.126	3.459	17.746	18.787
Other Mining	0.120	-	-	-	2.480	22.710	16.246	-	-	16.246	-
<i>Manufacturing Subtotal</i>	13.010	4.940	-	-	420.123	358.850	526.465	9.417	16.487	552.369	1,150.911
Food & Beverage	-	0.010	-	-	14.515	18.220	31.388	-	-	31.388	152.834
Textiles	0.030	0.070	-	-	48.473	24.340	28.733	-	-	28.733	178.451
Paper	0.010	0.010	-	-	21.313	11.440	16.173	-	-	16.173	31.611
Electricity ‡	-	-	-	-	7.188	43.320	20.228	-	16.487	36.715	38.694
Oil Refining ‡	-	-	-	-	32.397	6.440	13.949	1.779	-	15.728	31.670
Coal & Gas	1.530	0.110	-	-	3.593	1.390	3.304	5.289	-	8.593	4.574
Chemicals	0.610	0.270	-	-	116.037	70.710	106.009	0.355	-	106.364	97.875
Pharmaceuticals	0.010	0.020	-	-	10.533	3.880	6.138	-	-	6.138	29.208
Chemical Fibers	-	-	-	-	39.396	5.500	6.730	0.054	-	6.784	21.500
Building Materials	0.100	0.180	-	-	6.199	32.700	98.720	0.020	-	98.740	93.626
Ferrous Metals	10.420	1.890	-	-	65.163	51.580	97.863	1.843	-	99.706	65.418
Nonferrous Metals	0.190	0.400	-	-	8.591	25.510	18.069	0.004	-	18.073	28.981
Machinery	0.090	1.930	-	-	35.920	36.490	44.477	0.073	-	44.550	376.469
Other Manufacturing §	0.020	0.050	-	-	10.805	27.330	34.686	-	-	34.686	-
Balance ¶	0.000	0.000	2.402	15.636	0.000	0.000	24.740	0.000	0.000	24.740	306.729

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

§ Total minus extraction and manufacturing subtotals.

¶ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

II. 1990 Industrial Sector Energy Consumption *											
Subsector	Raw Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	331.157	7.210	19.371	67.404	3.334	17.665	0.206	6.012	0.779	2.467	10.850
Light Industry †	100.149	0.811	2.754	2.049	0.256	2.337	0.057	1.458	0.132	0.190	0.870
Heavy Industry †	231.008	6.399	16.617	65.355	3.078	15.328	0.149	4.554	0.647	2.277	9.980
<i>Mining Subtotal</i>	23.673	1.403	3.190	1.041	1.381	0.902	0.036	1.457	0.034	0.101	3.130
Coal Mining	16.281	1.341	2.925	0.379	-	0.001	0.027	0.277	-	-	0.070
Oil & NG Mining	1.000	-	0.007	0.004	1.380	0.816	0.004	0.633	0.034	0.101	2.940
Other Mining	6.392	0.062	0.258	0.658	0.001	0.085	0.005	0.547	0.000	0.000	0.120
<i>Manufacturing Subtotal</i>	307.484	5.807	16.181	66.363	1.953	16.763	0.170	4.555	0.745	2.366	7.720
Food & Beverage	28.270	0.536	1.632	0.226	0.018	0.112	0.003	0.341	0.001	-	0.030
Textiles	21.535	0.119	0.763	0.107	0.024	0.195	0.007	0.286	0.029	-	0.020
Paper	13.244	0.041	0.452	0.025	0.012	0.164	0.002	0.080	-	-	0.020
Electricity ¶	2.629	0.004	0.089	0.012	0.001	0.041	0.001	0.355	-	-	0.020
Oil Refining ¶	0.488	-	0.009	0.011	0.289	3.071	0.001	0.131	0.384	1.817	0.990
Coal & Gas	2.245	0.181	0.106	0.082	-	0.028	-	0.031	0.001	-	0.010
Chemicals	59.035	1.869	2.027	9.462	1.131	4.208	0.020	0.655	0.181	0.350	4.850
Pharmaceuticals	4.812	0.018	0.479	0.031	0.005	0.117	0.002	0.032	0.001	-	0.030
Chemical Fibers	2.535	0.002	0.023	0.146	0.054	0.293	0.003	0.023	0.085	0.189	0.350
Building Materials	93.651	0.592	4.785	1.822	0.188	3.114	0.022	0.794	0.010	0.007	0.260
Ferrous Metals	19.424	1.463	2.235	48.097	0.165	3.614	0.004	0.307	0.001	-	0.690
Nonferrous Metals	6.742	0.091	0.435	1.120	0.001	0.615	0.003	0.099	0.001	0.001	0.030
Machinery	24.142	0.793	2.158	3.754	0.052	0.772	0.073	0.788	0.025	-	0.370
Other Manufacturing	28.732	0.098	0.988	1.468	0.013	0.419	0.029	0.633	0.026	0.002	0.050
Balance¶¶	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(Table continues on following page.)

- \* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.
- † Light and heavy industry subtotals are independent of subsectoral divisions.
- ¶ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.
- ¶¶ Total minus extraction and manufacturing subtotals.
- § Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

II. 1990 Industrial Sector Energy Consumption * (continued)											
Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)	Gross Output Value (billion 1980 yuan)
<i>Industry Total</i>	13.590	4.790	2.678	15.451	514.167	443.870	614.630	22.638	20.748	658.016	1,570.197
Light Industry †	0.200	0.330	-	-	155.304	99.580	129.422	0.044	-	129.466	795.597
Heavy Industry †	13.390	4.460	2.678	15.451	358.863	344.290	485.208	22.594	20.748	528.550	774.600
<i>Mining Subtotal</i>	0.110	-	-	-	9.086	67.510	59.477	13.605	3.290	76.372	49.940
Coal Mining	-	-	-	-	1.501	29.960	28.523	12.981	-	41.504	30.488
Oil & NG Mining	-	-	-	-	3.403	14.460	14.859	0.624	3.290	18.773	19.452
Other Mining	0.110	-	-	-	4.182	23.090	16.096	0.000	0.000	16.096	-
<i>Manufacturing Subtotal</i>	13.480	4.790	-	-	505.081	376.360	530.401	9.033	17.458	556.892	1,196.108
Food & Beverage	-	0.010	-	-	22.615	18.230	31.126	-	-	31.126	160.635
Textiles	0.030	0.070	-	-	54.157	24.660	28.705	-	-	28.705	185.530
Paper	-	0.010	-	-	29.519	11.980	16.037	-	-	16.037	32.903
Electricity ‡	-	-	-	-	13.499	45.310	21.279	-	17.396	38.675	41.581
Oil Refining ‡	-	-	-	-	43.704	7.150	14.360	2.186	0.009	16.555	32.908
Coal & Gas	1.870	0.470	-	-	3.695	1.590	4.174	3.755	0.053	7.982	5.305
Chemicals	0.600	0.280	-	-	144.531	73.510	105.241	0.591	-	105.832	107.062
Pharmaceuticals	0.010	-	-	-	12.396	4.230	6.258	-	-	6.258	33.546
Chemical Fibers	-	-	-	-	38.109	5.920	6.926	0.031	-	6.957	25.724
Building Materials	0.160	0.180	-	-	4.749	33.080	93.487	0.043	-	93.530	90.536
Ferrous Metals	10.680	1.510	-	-	78.061	55.570	102.642	2.332	-	104.974	68.544
Nonferrous Metals	-	0.420	-	-	9.067	26.990	18.862	-	-	18.862	29.891
Machinery	0.100	1.760	-	-	38.227	36.600	43.502	0.095	-	43.597	381.943
Other Manufacturing	0.030	0.080	-	-	12.752	31.540	37.803	-	-	37.803	-
Balance ¶	0.000	0.000	2.678	15.451	0.000	0.000	24.751	0.000	0.000	24.751	324.149

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

12. 1991 Industrial Sector Energy Consumption *											
Subsector	Total Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	376.798	-	-	69.711	3.494	18.736	0.230	6.246	-	-	12.920
Light Industry †	108.190	-	-	2.088	0.284	1.836	0.079	1.573	-	-	0.950
Heavy Industry †	268.608	-	-	67.623	3.210	16.900	0.151	4.673	-	-	11.970
<i>Mining Subtotal</i>	30.859	-	-	1.148	1.591	1.054	0.026	1.329	-	-	4.170
Coal Mining	22.708	-	-	0.379	-	0.001	0.018	0.283	-	-	0.090
Oil & NG Mining	1.441	-	-	0.005	1.591	0.958	0.004	0.581	-	-	4.000
Other Mining	6.710	-	-	0.764	-	0.095	0.004	0.466	-	-	0.080
<i>Manufacturing Subtotal</i>	345.938	-	-	68.563	1.903	17.682	0.204	4.917	-	-	8.750
Food & Beverage	31.254	-	-	0.262	0.017	0.196	0.004	0.336	-	-	0.030
Textiles	22.579	-	-	0.113	0.018	0.211	0.008	0.340	-	-	0.020
Paper	14.197	-	-	0.026	0.012	0.161	0.002	0.074	-	-	0.020
Electricity ¥	3.266	-	-	0.009	0.001	0.050	0.001	0.423	-	-	0.130
Oil Refining ¥	0.663	-	-	0.010	0.302	3.343	0.002	0.149	-	-	0.850
Coal & Gas	2.169	-	-	0.076	0.003	0.031	-	0.024	-	-	0.010
Chemicals	66.693	-	-	9.512	1.167	4.349	0.040	0.582	-	-	5.550
Pharmaceuticals	6.080	-	-	0.006	0.002	0.115	0.003	0.032	-	-	0.040
Chemical Fibers	2.925	-	-	0.171	0.061	0.306	0.002	0.024	-	-	0.390
Building Materials	102.576	-	-	1.822	0.169	3.396	0.022	0.912	-	-	0.300
Ferrous Metals	25.062	-	-	50.071	0.088	3.622	0.004	0.333	-	-	0.800
Nonferrous Metals	7.815	-	-	1.239	0.010	0.657	0.004	0.134	-	-	0.040
Machinery	27.248	-	-	3.676	0.041	0.792	0.080	0.932	-	-	0.520
Other Manufacturing	33.412	-	-	1.570	0.012	0.453	0.032	0.621	-	-	0.050
Balance ¶	0.000	-	-	0.000	0.000	0.000	0.000	0.000	-	-	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

¥ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

12. 1991 Industrial Sector Energy Consumption * (continued)										
Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use ** (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)
<i>Industry Total</i>	-	-	-	-	-	477.270	588.062	-	-	703.589
Light Industry †	-	-	-	-	-	109.950	130.429	-	-	138.118
Heavy Industry †	-	-	-	-	-	367.320	457.634	-	-	565.471
<i>Mining Subtotal</i>	-	-	-	-	-	73.660	64.216	-	-	82.389
Coal Mining	-	-	-	-	-	31.800	29.995	-	-	45.363
Oil & NG Mining	-	-	-	-	-	15.830	17.243	-	-	19.988
Other Mining	-	-	-	-	-	26.030	16.978	-	-	17.038
<i>Manufacturing Subtotal</i>	-	-	-	-	-	403.610	523.846	-	-	596.185
Food & Beverage	-	-	-	-	-	19.980	31.490	-	-	33.023
Textiles	-	-	-	-	-	26.030	27.616	-	-	30.575
Paper	-	-	-	-	-	12.710	15.685	-	-	17.156
Electricity ‡	-	-	-	-	-	50.450	23.587	-	-	42.038
Oil Refining ‡	-	-	-	-	-	8.030	10.287	-	-	18.060
Coal & Gas	-	-	-	-	-	1.780	2.439	-	-	9.248
Chemicals	-	-	-	-	-	77.660	104.423	-	-	114.251
Pharmaceuticals	-	-	-	-	-	5.190	6.718	-	-	7.256
Chemical Fibers	-	-	-	-	-	6.560	5.986	-	-	8.301
Building Materials	-	-	-	-	-	36.220	96.526	-	-	100.966
Ferrous Metals	-	-	-	-	-	58.590	97.066	-	-	111.033
Nonferrous Metals	-	-	-	-	-	29.060	19.733	-	-	20.281
Machinery	-	-	-	-	-	37.300	41.460	-	-	44.445
Other Manufacturing	-	-	-	-	-	34.050	40.830	-	-	39.553
Balance ¶						0.000	0.000			25.015

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

\*\* Incomplete. Does not include LPG, refinery gases, coke oven gas, other coal gas, other coking and oil products, and heat.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1992 (continued)

13. 1992 Industrial Sector Energy Consumption \*

Subsector	Total Coal§ (Mt)	Washed Lump Coal (Mt)	Other Washed Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Fuel Oil (Mt)	Kerosene (Mt)	Diesel Oil (Mt)	LPG (Mt)	Refinery Gas (Mt)	Natural Gas (bcm)
<i>Industry Total</i>	389.234	-	-	75.337	3.644	18.687	0.248	6.752	-	-	12.670
Light Industry †	117.854	-	-	2.586	0.260	1.808	0.083	1.732	-	-	0.840
Heavy Industry †	271.380	-	-	72.751	3.565	16.879	0.165	5.020	-	-	11.830
<i>Mining Subtotal</i>	30.448	-	-	1.265	1.754	1.131	0.027	1.411	-	-	4.810
Coal Mining	22.077	-	-	0.391	-	-	0.019	0.310	-	-	0.010
Oil & NG Mining	1.447	-	-	0.004	1.735	1.029	0.004	0.626	-	-	4.680
Other Mining	6.924	-	-	0.870	0.019	0.102	0.004	0.476	-	-	0.120
<i>Manufacturing Subtotal</i>	358.786	-	-	74.072	1.890	17.556	0.221	5.341	-	-	7.860
Food & Beverage	32.254	-	-	0.315	0.009	0.247	0.005	0.352	-	-	0.030
Textiles	23.473	-	-	0.114	0.014	0.193	0.007	0.334	-	-	0.020
Paper	14.965	-	-	0.032	0.008	0.141	0.003	0.086	-	-	0.020
Electricity ‡	3.920	-	-	0.011	0.001	0.050	-	0.527	-	-	0.090
Oil Refining ‡	0.908	-	-	0.014	0.327	4.109	0.002	0.158	-	-	0.650
Coal & Gas	2.648	-	-	0.092	0.000	0.034	0.001	0.027	-	-	0.040
Chemicals	70.236	-	-	10.192	1.169	3.699	0.050	0.712	-	-	5.470
Pharmaceuticals	6.562	-	-	0.005	0.001	0.146	0.003	0.035	-	-	0.040
Chemical Fibers	3.265	-	-	0.198	0.064	0.283	0.002	0.028	-	-	0.380
Building Materials	107.127	-	-	2.183	0.141	3.195	0.026	0.840	-	-	0.230
Ferrous Metals	26.625	-	-	53.980	0.019	3.601	0.004	0.365	-	-	0.430
Nonferrous Metals	9.598	-	-	1.328	0.018	0.676	0.005	0.158	-	-	-
Machinery	28.491	-	-	4.039	0.043	0.782	0.079	1.004	-	-	0.440
Other Manufacturing	28.715	-	-	1.569	0.077	0.400	0.034	0.717	-	-	0.020
Balance¶	0.000	-	-	0.000	0.000	0.000	0.000	0.000	-	-	0.000

(Table continues on following page.)

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-9. Industrial Sector Energy End Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued)

13. 1992 Industrial Sector Energy Consumption * (continued)										
Subsector	Coke Oven Gas (bcm)	Other Coal Gas (bcm)	Other Coking Products (Mt)	Other Oil Products (Mt)	Heat (PJ)	Electricity (TWh)	Total End Use (Mtce)	Conversion Losses (Mtce)	Other Losses (Mtce)	Total Energy Use (Mtce)
<i>Industry Total</i>	-	-	-	-	-	528.440	623.658	-	-	751.628
Light Industry †	-	-	-	-	-	120.820	142.223	-	-	152.963
Heavy Industry †	-	-	-	-	-	407.620	481.694	-	-	598.664
<i>Mining Subtotal</i>	-	-	-	-	-	79.960	67.895	-	-	83.237
Coal Mining	-	-	-	-	-	34.600	30.620	-	-	43.442
Oil & NG Mining	-	-	-	-	-	17.080	19.027	-	-	21.559
Other Mining	-	-	-	-	-	28.280	18.248	-	-	18.236
<i>Manufacturing Subtotal</i>	-	-	-	-	-	448.480	555.762	-	-	641.744
Food & Beverage	-	-	-	-	-	21.840	33.094	-	-	35.010
Textiles	-	-	-	-	-	28.010	29.013	-	-	32.609
Paper	-	-	-	-	-	13.970	16.734	-	-	18.729
Electricity ‡	-	-	-	-	-	59.360	27.752	-	-	49.034
Oil Refining ‡	-	-	-	-	-	10.320	12.266	-	-	22.045
Coal & Gas	-	-	-	-	-	2.110	2.975	-	-	9.761
Chemicals	-	-	-	-	-	81.420	108.305	-	-	119.038
Pharmaceuticals	-	-	-	-	-	5.690	7.310	-	-	7.884
Chemical Fibers	-	-	-	-	-	7.090	6.433	-	-	9.260
Building Materials	-	-	-	-	-	41.720	101.830	-	-	108.007
Ferrous Metals	-	-	-	-	-	65.740	104.293	-	-	118.687
Nonferrous Metals	-	-	-	-	-	31.870	22.251	-	-	22.750
Machinery	-	-	-	-	-	41.740	44.480	-	-	48.109
Other Manufacturing	-	-	-	-	-	37.600	39.029	-	-	40.823
Balance¶	-	-	-	-	-	0.000	0.000	-	-	26.647

\* End-use figures differ from official sources, and from certain other tables in this book due to adjustments, e.g., exclusion of gasoline consumption and estimated transportation uses of diesel. Does not include construction.

† Light and heavy industry subtotals are independent of subsectoral divisions.

‡ Figures for the utilities and refining sectors (normally not counted as industrial end-users in energy accounts of other countries) include self-use only not power generation and refining inputs.

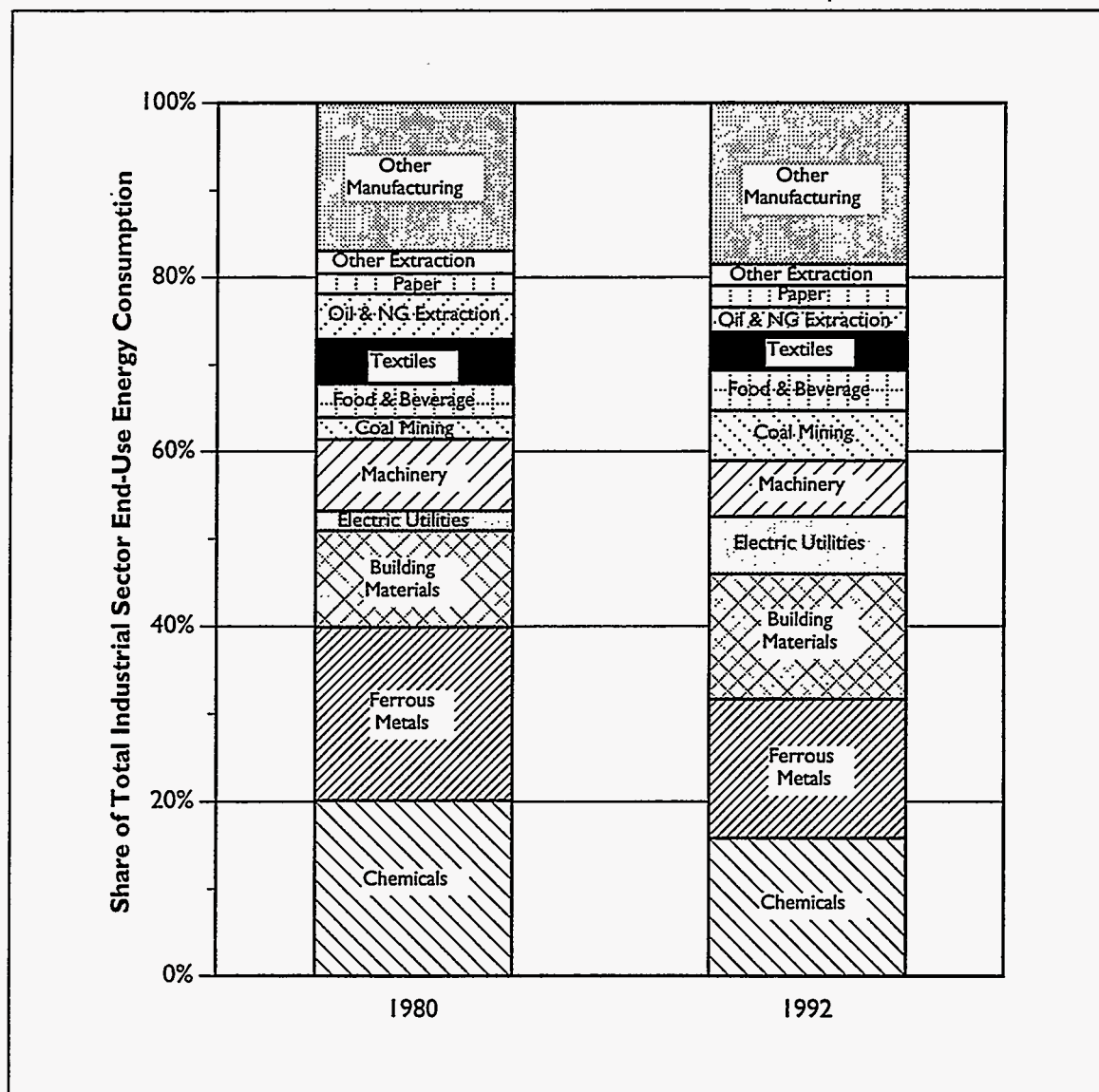
¶ Total minus extraction and manufacturing subtotals.

§ Unadjusted sum of raw and washed coal.

\*\* Incomplete. Does not include LPG, refinery gases, coke oven gas, other coal gas, other coking and oil products, and heat.

Source: Energy Research Institute; China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-9. Subsectoral Shares of Industrial Sector, End-Use Energy Consumption



**Table IV-10. Industrial Sector \* Commercial Energy Consumption by Province and Energy Source, 1990**

Planning Region	Province	Coal † (Mt)	Oil Products † (Mt)	Electricity †† (TWh)	Total Energy ‡ (Mtce)
North	Beijing	16.21	4.0460	12.240	16.86
	Tianjin	12.18	3.1926	9.778	13.56
	Hebei	60.35	1.8635	27.006	41.70
	Shanxi	64.91	0.6057	21.033	34.85
	Inner Mongolia	29.33	0.4853	9.528	15.61
Northeast	Liaoning	65.85	9.9006	38.556	58.78
	Jilin	28.05	2.8625	15.059	22.82
	Heilongjiang	48.60	5.1699	21.764	31.80
East	Shanghai	24.80	5.6312	22.097	24.45
	Jiangsu	52.86	4.9279	32.017	41.65
	Zhejiang	21.45	1.5681	17.901	18.97
	Anhui	28.63	1.4301	14.558	20.70
	Fujian	10.36	0.2845	9.771	9.71
	Jiangxi	18.53	0.6296	9.905	12.64
	Shandong	57.53	7.1751	35.325	48.54
	South-Central	Henan	43.83	1.1595	26.950
Hubei	26.63	3.3306	22.384	29.83	
Hunan	29.78	1.5771	18.055	27.52	
Guangdong	25.88	6.7096	26.666	28.54	
Guangxi	13.87	0.3596	9.630	10.00	
Hainan	0.53	0.0489	0.818	0.52	
Southwest	Sichuan	44.53	0.5523	27.382	42.17
	Guizhou	17.12	0.1627	8.340	12.20
	Yunnan	16.36	0.2109	9.714	13.46
	Xizang	-	-	0.035	-
Northwest	Shaanxi	19.85	0.6895	12.607	14.29
	Gansu	11.58	1.9711	14.267	14.41
	Qinghai	3.46	0.3594	3.780	3.72
	Ningxia	7.04	0.2997	4.608	5.17
	Xinjiang	10.76	2.1428	4.906	11.54
National Total		810.91	73.2160	487.330	675.78
Balance **		0.05	3.8697	0.650	16.52

\* Excludes enterprises below the village level. Chinese statistics for the industrial sector include the electric power subsector and the coke, coal gas, and other coal products subsector.

† Includes fossil fuels used in electricity generation, coking, coal gas production, and production of other coal products.

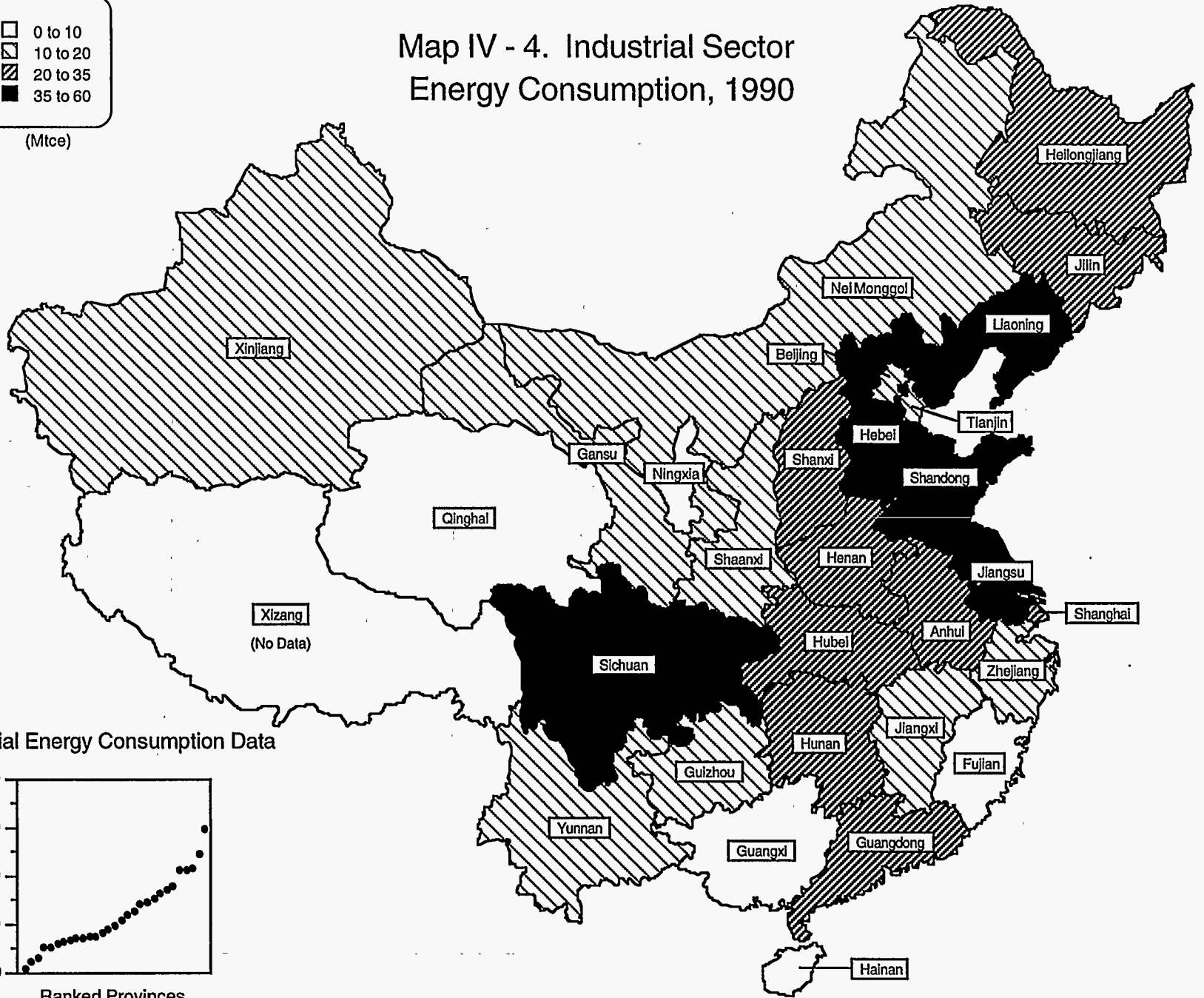
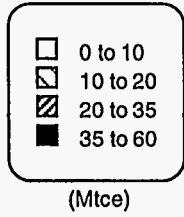
†† Includes electricity from both hydro and thermal generation. Includes electric power subsector and coal products subsector consumption of electricity.

‡ Total energy consumption in industry figures are as reported in the China Energy Statistical Yearbook and the China Statistical Yearbook, and include inputs to secondary conversions (e.g. electricity generation). The total end use cannot be reliably calculated from these totals, nor from the fuel subtotals reported in the Energy Statistical Yearbook because of double counting due to: inclusion of power generation in the coal subtotal; inclusion of consumption of thermal electricity in the electricity consumption subtotal; and exclusion of natural gas consumption.

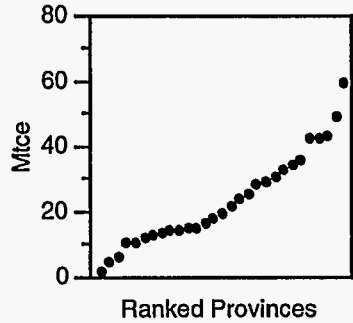
\*\* Because of differences in the coverage of statistics and conversions to standard coal, the sums of local statistics do not equal the national total.

Source: China Energy Statistical Yearbook, 1991.

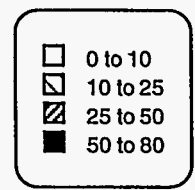
Map IV - 4. Industrial Sector Energy Consumption, 1990



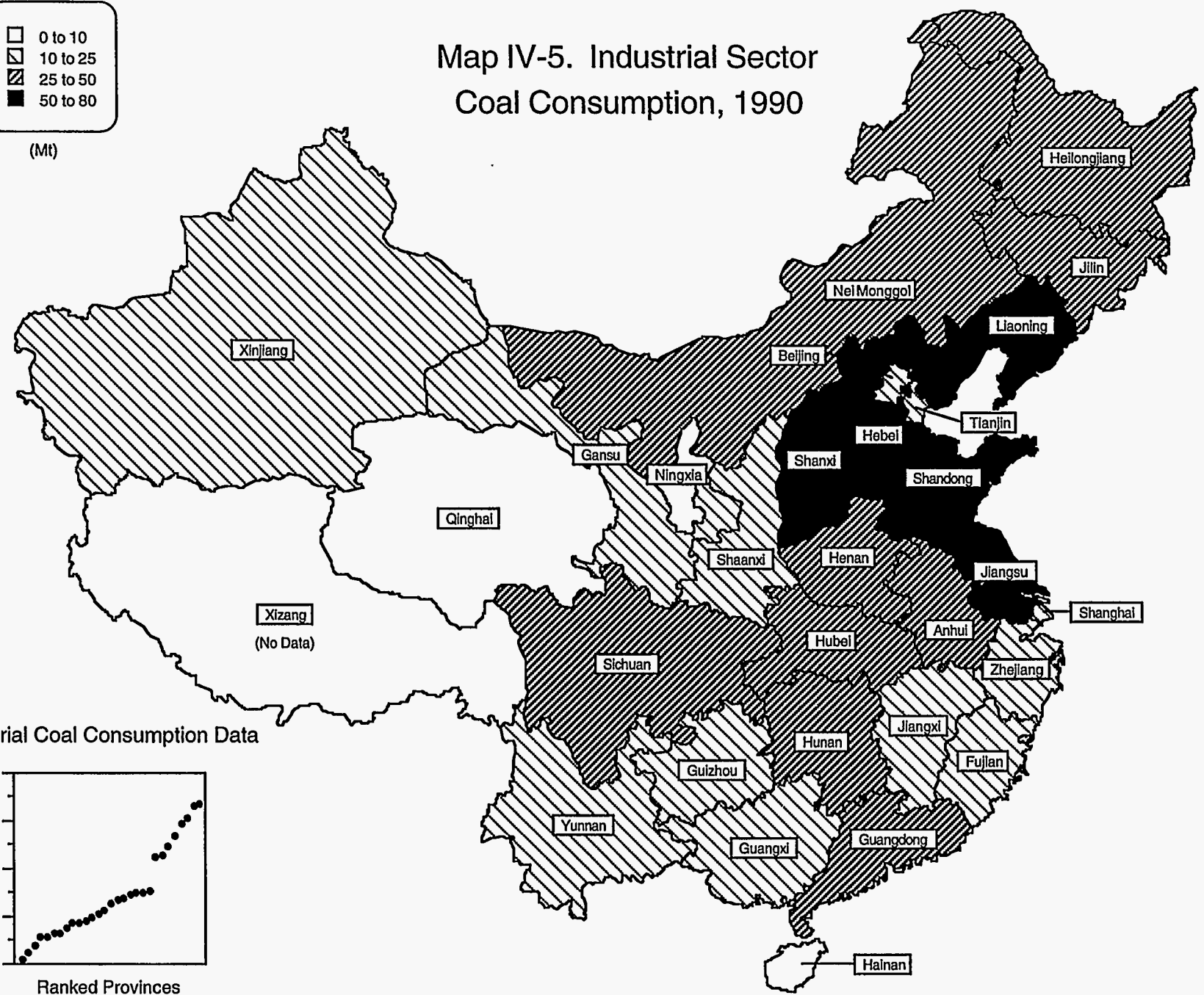
Industrial Energy Consumption Data



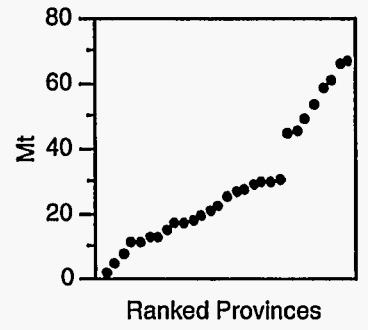
Map IV-5. Industrial Sector Coal Consumption, 1990



(Mt)



Industrial Coal Consumption Data







Map IV - 7. Industrial Sector Electricity Consumption, 1990

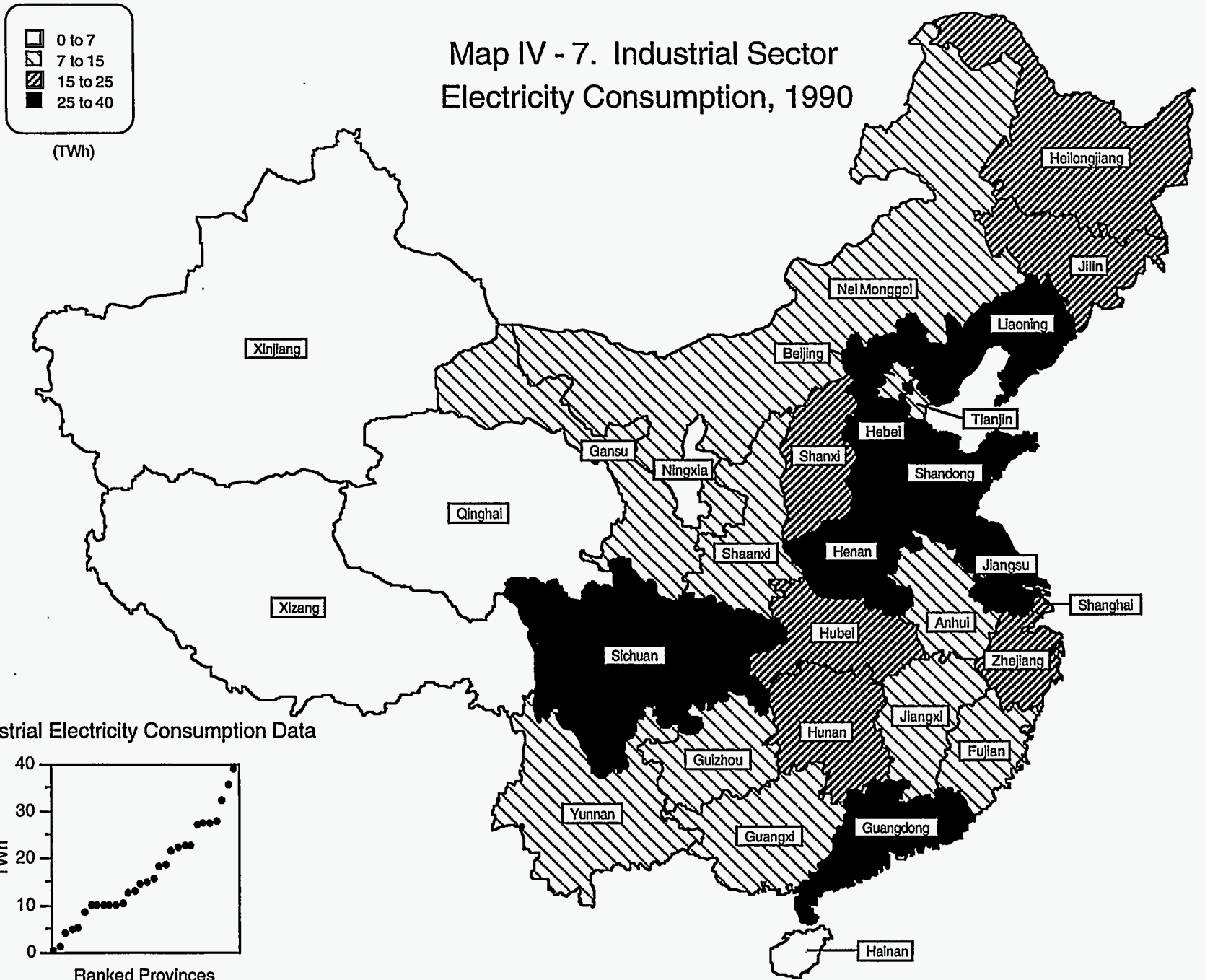


Table IV-11. Energy Used as Feedstocks, 1980-1991—Mtce

Year	Coal	Coke	Crude Oil *	Heavy Oil *	Natural Gas	Subtotal	Other Coking Products †	Other Petroleum Products † ¶	Total Feedstocks
1980	17.76	6.49	0.88	1.33	4.62	31.08	2.26	16.00	49.34
1981	13.82	6.85	0.70	1.38	4.80	27.55	2.03	15.68	45.25
1982	12.46	6.76	0.72	1.50	4.52	25.96	2.09	16.33	44.38
1983	15.23	6.57	0.80	1.86	4.20	28.66	2.20	16.56	47.41
1984	16.17	6.22	0.56	3.64	5.45	32.04	2.37	18.06	52.47
1985	12.10	5.47	0.94	1.60	7.20	27.31	2.74	22.51	52.56
1986	-	-	-	-	-	-	2.07	16.76	-
1987	-	-	-	-	-	-	2.00	18.91	-
1988	-	-	-	-	-	-	2.20	21.05	-
1989	25.40	5.38	2.45	3.52	7.12	43.87	2.33	22.36	67.39
1990	24.34	5.48	1.53	3.83	7.28	42.46	2.60	22.09	66.50
1991	22.71	5.10	1.84	3.82	7.24	40.71	3.05	-	66.61

\* Some crude oil and heavy oil feedstocks are used in ethylene production.

† Industrial sector consumption of unspecified petroleum and coking products, which we here assume is used as feedstocks. Conversion factors for these two are, respectively, 1.43 tce/ton for petroleum products and 0.97 tce/ton for coking products.

¶ Includes feedstocks used in ethylene production (which are mainly gasoil and about one-third naphtha), naphtha used in fertilizer production, and probably lube oil base stock and other non-energy uses.

Source: China Energy Statistical Yearbook, various years; Energy Research Institute.

Table IV-12. Thermal Electric Utility Fuel Use, 1980-1993

I. Physical units										
Year	Coal *	Crude Oil †	Fuel Oil †	Gasoline †	Diesel Oil †	LPG	Refinery Gas ¶	Natural Gas	Coal Gas	Other Coking Products
	(Mt)	(Mt)	(Mt)	(Mt)	(Mt)	(Mt)	(Mt)	(bcm)	(bcm)	(Mt)
1980	126.48	5.74	14.19	-	0.72	-	-	0.24	0.89	-
1981	126.99	5.41	13.50	-	1.21	-	-	0.24	0.86	-
1982	134.27	4.80	13.21	-	0.73	-	-	0.21	0.91	-
1983	143.11	3.96	13.56	-	0.55	-	-	0.20	0.98	-
1984	159.35	3.35	13.55	-	0.70	-	-	0.20	1.02	-
1985	164.41	2.80	10.42	-	1.04	<0.005	<0.005	0.27	0.93	-
1986	180.12	2.46	10.46	<0.005	0.59	<0.005	0.03	0.47	1.47	<0.005
1987	202.89	2.59	10.19	<0.005	0.92	<0.005	0.04	0.76	1.27	<0.005
1988	228.34	2.34	10.73	<0.005	1.96	0.01	0.09	0.57	0.86	0.06
1989	251.51	1.63	10.47	<0.005	2.24	0.02	0.09	1.03	0.72	0.03
1990	272.04	1.25	9.77	<0.005	1.25	0.01	0.07	0.73	0.80	<0.005
1991	301.20	12.71	-	-	-	-	-	0.64	-	-
1992	334.60	13.00	-	-	-	-	-	-	-	-
1993	362.04	12.03	-	-	-	-	-	-	-	-

2. Mtce											
Year	Coal *	Crude Oil †	Fuel Oil †	Gasoline †	Diesel Oil †	Liquefied LPG	Refinery Gas ¶	Natural Gas	Coal Gas	Other Coking Products	Total
1980	80.82	8.20	20.27	-	1.06	-	-	0.32	0.53	-	111.21
1981	81.15	7.73	19.29	-	1.77	-	-	0.32	0.51	-	110.77
1982	85.80	6.86	18.87	-	1.07	-	-	0.28	0.54	-	113.41
1983	91.45	5.65	19.36	-	0.80	-	-	0.27	0.58	-	118.11
1984	101.83	4.79	19.35	-	1.03	-	-	0.27	0.60	-	127.87
1985	105.06	3.99	14.89	-	1.52	<0.005	<0.005	0.36	0.55	-	126.37
1986	115.10	3.51	14.94	<0.005	0.87	<0.005	0.05	0.63	0.87	<0.005	135.96
1987	129.65	3.70	14.55	<0.005	1.36	0.00	0.07	1.01	0.75	<0.005	151.09
1988	145.91	3.35	15.32	<0.005	2.88	0.01	0.15	0.76	0.51	0.06	168.95
1989	160.71	2.33	14.96	0.00	3.29	0.04	0.14	1.37	0.43	0.03	183.31
1990	173.84	1.78	13.96	0.00	1.83	0.02	0.10	0.97	0.47	0.00	192.98
1991	192.47	18.15	-	-	-	-	-	0.85	-	-	211.47
1992	213.81	18.57	-	-	-	-	-	-	-	-	232.38
1993	231.34	17.19	-	-	-	-	-	-	-	-	248.53

\* Figures are uncorrected sums of consumption of raw and washed coal. Coal is converted as utility coal (0.639 tce/tonne utility coal). In official statistics, 1980-1984 values for power generation include coal used for heating. The figures above are calculated assuming that the amount of coal used for heating in 1980-1984 was proportional to the average ratio of coal used for heating to coal used for power generation in 1985-1988 (9.2%).

† In official statistics, 1980-1984 values for power generation consumption of liquid fossil fuels include that used for heating. The figures above are calculated assuming that the amount of fuel used for heating in 1980-1984 was proportional to the average ratio of fuel used for heating to fuel used for power generation in 1985-1988. The average ratios are: crude oil: 1.6%; fuel oil: 24%; diesel oil: 1.9%. 1991-1993 crude oil figures are estimated totals for oil products use.

¶ Refinery gas (*lianhang ganqi*) is a byproduct of oil refining.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; China Energy Annual Review, 1994.

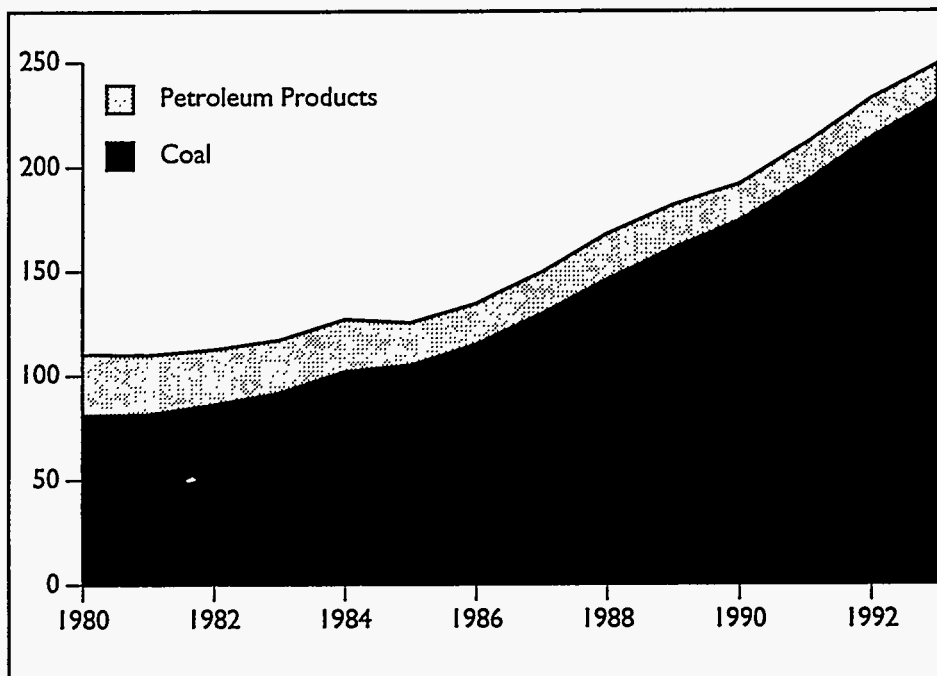
Table IV-12. Thermal Electric Utility Fuel Use, 1980-1993—Mtce (continued)

3. Estimated net heat rates						
Year	Thermal Gross Generation (TWh)	kgce per gross kWh ¥	Rate of in-plant electricity consumption	Net Thermal Generation (TWh)	Ratio of Gross to Net	kgce per net kWh ¥
1980	242.4	0.459	7.65%	223.86	1.083	0.497
1981	243.8	0.454	7.76%	224.88	1.084	0.493
1982	253.3	0.448	7.71%	233.77	1.084	0.485
1983	265.0	0.446	7.78%	244.38	1.084	0.483
1984	290.2	0.441	7.70%	267.85	1.083	0.477
1985	318.3	0.397	7.78%	293.54	1.084	0.431
1986	355.1	0.383	7.83%	327.30	1.085	0.415
1987	397.1	0.380	7.88%	365.81	1.086	0.413
1988	435.9	0.388	7.94%	401.29	1.086	0.421
1989	466.4	0.393	8.12%	428.55	1.088	0.428
1990	494.5	0.390	8.22%	453.83	1.090	0.425
1991	552.8	0.383	8.13%	507.86	1.088	0.416
1992	623.2	0.373	8.08%	572.85	1.088	0.406
1993	666.8	0.373	8.08%	612.94	1.088	0.405

¥ Calculated from data in this table; differs from official data on heat rates.  
 Figures in italics are estimates.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; China Energy Annual Review, 1994.

Figure IV-10. Fuel Use in Electricity Generation



**Table IV-13. Average Heat Rates of Thermal Power Plants \***

<b>Year</b>	<b>Gross Generation Efficiency</b>	<b>Net Generation Efficiency</b>	<b>Coal Consumption of Gross Generation (gce/kWh)</b>	<b>Coal Consumption of Net Generation (gce/kWh)</b>
1965	0.257	0.237	477	518
1966	0.266	0.247	461	498
1967	0.265	0.245	463	502
1968	0.265	0.244	464	503
1969	0.265	0.244	464	503
1970	0.265	0.245	463	502
1971	0.264	0.243	465	505
1972	0.265	0.244	464	504
1973	0.269	0.248	457	496
1974	0.273	0.252	450	488
1975	0.273	0.251	450	489
1976	0.274	0.252	449	487
1977	0.275	0.254	446	484
1978	0.283	0.261	434	471
1979	0.291	0.269	422	457
1980	0.297	0.274	413	448
1981	0.302	0.278	407	442
1982	0.304	0.280	404	438
1983	0.307	0.283	400	434
1984	0.309	0.284	398	432
1985	0.309	0.285	398	431
1986	0.309	0.284	398	432
1987	0.309	0.284	398	432
1988	0.309	0.285	397	431
1989	0.309	0.284	397	432
1990	0.313	0.288	392	427
1991	0.315	0.288	390	427
1992	0.318	0.292	386	420
1993	0.320	0.295	384	417

\* For power plants with  $\geq 6$  MW of installed capacity, which in the 1980s accounted for about 89% of installed capacity and 97% of gross thermal electricity generation.

Source: China Energy Statistical Yearbook, various years; Energy Research Institute; China Energy Annual Review, 1994.

Table IV-14. Power Sector Electricity Consumption, Selected Years, 1952-1993

Year	Overall		Hydro		Thermal	
	Percent of Gross Generation *	Consumption (TWh) †	Percent of Gross Generation *	Consumption (TWh) †	Percent of Gross Generation*	Consumption (TWh) †
1952	6.17%	0.45	0.22%	0.003	7.42%	0.45
1957	5.99%	1.16	0.14%	0.01	7.17%	1.04
1965	6.98%	4.72	0.21%	0.02	7.98%	4.56
1966	6.55%	5.40	0.18%	0.02	7.50%	5.24
1967	6.70%	5.19	0.18%	0.02	7.72%	4.96
1968	6.75%	4.83	0.22%	0.03	7.71%	4.63
1969	6.65%	6.25	0.21%	0.03	7.80%	6.08
1970	6.54%	7.58	0.17%	0.03	7.78%	7.42
1971	6.68%	9.25	0.17%	0.04	7.89%	8.94
1972	6.68%	10.18	0.17%	0.05	7.88%	9.74
1973	6.26%	10.44	0.15%	0.06	7.83%	10.01
1974	6.19%	10.45	0.16%	0.07	7.87%	10.03
1975	6.23%	12.20	0.15%	0.07	7.91%	11.72
1976	6.34%	12.88	0.17%	0.08	7.88%	12.41
1977	6.41%	14.32	0.19%	0.09	7.83%	13.77
1978	6.61%	16.96	0.21%	0.09	7.71%	16.35
1979	6.54%	18.44	0.20%	0.10	7.63%	17.69
1980	6.44%	19.36	0.19%	0.11	7.65%	18.54
1981	6.40%	19.80	0.20%	0.13	7.76%	18.92
1982	6.32%	20.71	0.21%	0.16	7.71%	19.53
1983	6.21%	21.82	0.23%	0.20	7.78%	20.62
1984	6.28%	23.68	0.25%	0.22	7.70%	22.35
1985	6.42%	26.37	0.28%	0.26	7.78%	24.76
1986	6.54%	29.40	0.28%	0.26	7.83%	27.80
1987	6.66%	33.12	0.31%	0.31	7.88%	31.29
1988	6.69%	36.47	0.34%	0.37	7.94%	34.61
1989	6.81%	39.82	0.30%	0.36	8.12%	37.86
1990	6.90%	42.87	0.30%	0.38	8.22%	40.68
1991	6.94%	47.03	0.32%	0.40	8.13%	44.92
1992	7.00%	52.77	0.37%	0.49	8.08%	50.22
1993	6.96%	58.43	0.41%	0.62	8.08%	55.57

\* Figures for years before 1971 are for plants with installed capacities  $\geq 500$  kW, while those for 1971 and later years are for plants with installed capacities  $\geq 6$  MW.

† Power plant consumption is calculated as the product of gross generation and rate of power plant electricity consumption. Data for power plant consumption is for plants 6 MW and over. Thermal power plants under 6 MW accounted for about 10% of installed thermal capacity and less than 5% of gross thermal generation from the late 1970s through the 1980s (see Table II-23). In 1983 hydropower plants with installed capacities  $< 12$  MW accounted for about 22% of installed hydro capacity and 8% of gross hydro generation. Since the shares of electricity generated by thermal and hydro plants were about 80% and 20% respectively through the 1980s, the losses accounted for here apply to more than 90% of total generation. If loss rates at all of the smaller plants were assumed to be about 10%, then the overall rate of power plant consumption for power plant consumption would increase by less than one percentage point.

Source: China Energy Statistical Yearbook, various years; China Energy Annual Review, 1994.

Table IV-15. Transportation Energy Consumption, \* 1980-1992

I. Mtce						
Year	Coal †	Gasoline ¶	Diesel ¥	Electricity	Other **	Total End-Use
1980	13.81	14.68	7.59	1.07	2.42	39.57
1981	14.89	13.82	7.26	1.18	2.55	39.70
1982	15.52	14.60	7.53	1.21	2.87	41.72
1983	15.65	16.10	8.12	1.45	2.82	44.14
1984	16.28	17.64	8.64	1.67	3.24	47.46
1985	16.47	20.53	9.58	2.56	3.28	52.42
1986	16.39	22.05	11.63	2.70	3.85	56.62
1987	16.00	23.88	12.87	3.10	3.91	59.76
1988	16.13	26.31	13.71	3.62	4.09	63.86
1989	16.31	27.25	14.44	3.99	4.65	66.63
1990	15.43	27.92	14.46	4.28	5.35	67.44
1991	14.46	32.48	15.49	4.73	6.04	73.21
1992	13.39	36.89	16.79	5.50	6.63	79.20

2. Shares					
Year	Coal †	Gasoline ¶	Diesel ¥	Electricity	Other Fuels **
1980	35%	37%	19%	3%	6%
1981	38%	35%	18%	3%	6%
1982	37%	35%	18%	3%	7%
1983	35%	36%	18%	3%	6%
1984	34%	37%	18%	4%	7%
1985	31%	39%	18%	5%	6%
1986	29%	39%	21%	5%	7%
1987	27%	40%	22%	5%	7%
1988	25%	41%	21%	6%	6%
1989	24%	41%	22%	6%	7%
1990	23%	41%	21%	6%	8%
1991	20%	44%	21%	6%	8%
1992	17%	47%	21%	7%	8%

\* The figures presented here differ from official data. Units in non-transportation sectors, especially industry, operate significant numbers of motor vehicles, the fuel consumption of which is reported in the official data for those sectors, not as transportation fuel use. Energy use in post and communication services is reported in the transportation category.

† Coal includes raw and washed coal and small amounts of coke and middlings.

¶ Gasoline includes national total use; non-transportation consumption of gasoline is considered insignificant, so all gasoline consumption is treated as transportation.

¥ Transportation sector consumption of diesel oil includes reported transportation use plus 20% of agricultural use, 10% of industrial use, and 12% of commercial and other use. Data in the Statistical Yearbook of China indicates that trucks and transportation tractors accounted for 20% to 30% of total agricultural sector machine power in the 1980s. For the time period covered in this table we believe that taking 20% of reported agricultural diesel use as transportation sector use is a reasonable adjustment. We estimate that 10% of the national truck fleet (with payload over 4 tons) is diesel fueled, and that 90% of the diesel truck fleet is owned by industrial work units. China Statistical Yearbooks show that less than 10% of China's truck fleet is owned by transportation companies. Using an average diesel use per vehicle-km of 35 liters/100 vehicle-km (from the Energy Statistical Yearbook of China; probably an average for 8-ton trucks, the most common size in China) and an estimated average vehicle travel of 10,000 km/year, we estimate that 10% of reported industrial diesel use was for transportation in 1988. This percentage was applied to data for other years as well.

¶ Other fuels include kerosene, crude oil, fuel oil, and natural gas.

\*\* Other fuels include kerosene, crude oil, fuel oil, and natural gas.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



Figure IV-11. Transportation Sector Energy Consumption

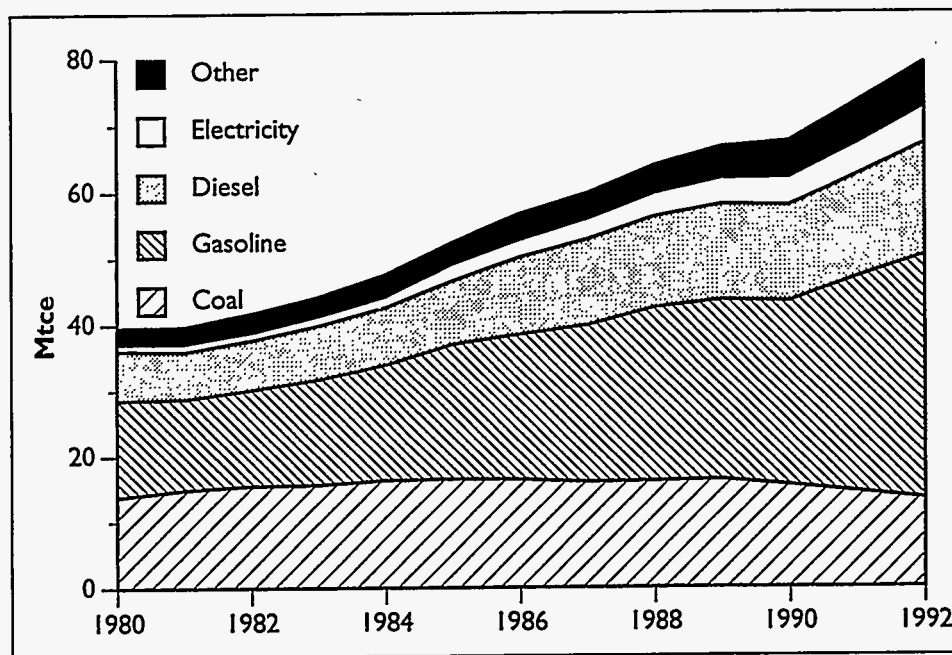


Table IV-16. Transportation End-Use Consumption Shares by Mode, 1985 and 1990 \*

Sector	Consumption			Total (Mtce)	Percent of Total Consumption
	Coal (Mt)	Oil (Mt)	Electricity (billion kWh)		
Rail	-	-	-	23.3	47.6%
<i>of which:</i>					
Steam Locomotives †	26.0	-	-	18.6	38.0%
Diesel Locomotives	-	2.1	-	3.0	6.2%
Electric Locomotives	-	-	4.2	1.7	3.5%
Road ¶	-	12.0	-	17.5	35.8%
Water ¥	-	4.3	-	6.2	12.8%
Air §	-	0.7	-	1.0	2.0%
Pipeline **	-	0.6	-	0.9	1.8%
Total	26.0	19.6	4.2	48.9	100.0%

Sector	Consumption			Total (Mtce)	Percent of Total Consumption
	Coal (Mt)	Oil (Mt)	Electricity (billion kWh)		
Rail	-	-	-	21.7	30.0%
<i>of which:</i>					
Steam Locomotives †	20.63	-	-	14.7	20.4%
Diesel Locomotives-	-	2.87	-	4.2	5.8%
Electric Locomotives	-	-	6.82	2.8	3.8%
Road ¶	2.58	21.87	1.60	34.4	47.6%
Water ¥	4.70	5.89	2.96	13.2	18.2%
Air §	0.01	1.00	0.01	1.5	2.0%
Pipeline **	0.25	0.41	2.16	1.6	2.3%
Total	28.2	32.0	13.6	72.4	100.0%

\* Figures in this table are slightly different than in other tables because sources are different. Figures include both passenger and freight transportation by vehicles and vessels of all types of ownership, not just dedicated transportation units.

† Coal is converted as standard coal, although the real value is probably higher since high-quality lump coal is used by steam locomotives.

¶ Includes fuel consumption for national stock of trucks and passenger vehicles (estimated at 3.21 million in 1985 by the source below). Figure is for total gasoline and diesel use; we use the conversion factor for diesel here.

¥ Includes diesel oil and residual oil; converted as diesel oil.

§ Kerosene and gasoline.

\*\* Assumed to be crude oil.

Source: Yang, 1988; Yang, 1991.

Figure IV-12. Energy Use by Different Transport Modes

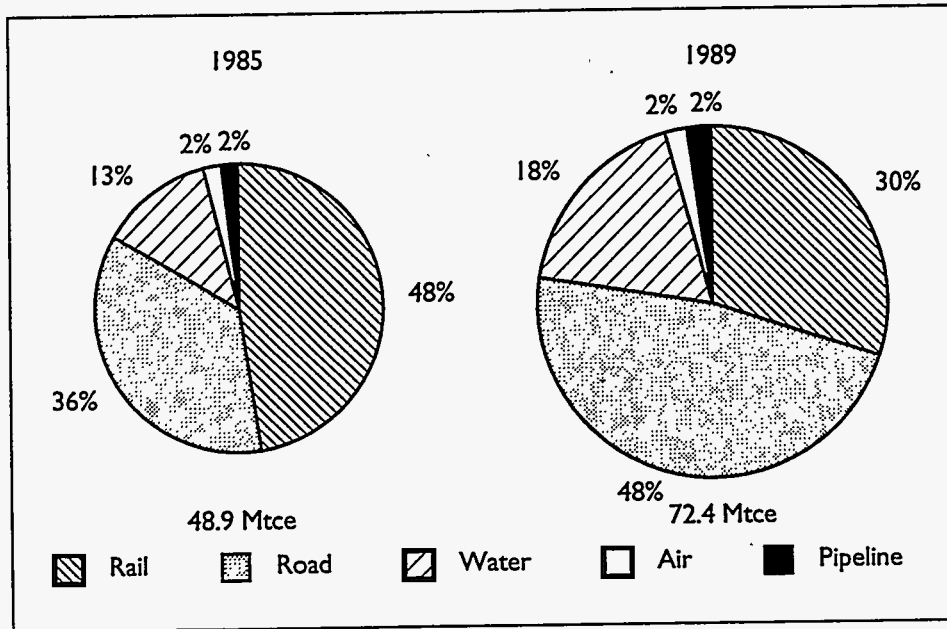


Table IV-17. Agricultural Energy Consumption \* 1980-1992 (Commercial Fuels Only)

1. Mtce					
Year	Coal †	Electricity	Diesel ¶	Other Fuels ¥	Total
1980	11.17	10.91	8.75	0.18	31.01
1981	11.30	11.38	8.23	0.19	31.10
1982	12.33	11.57	7.64	0.16	31.70
1983	13.18	11.57	7.77	0.06	32.58
1984	14.64	11.65	8.23	0.08	34.60
1985	15.97	12.82	7.35	0.11	36.25
1986	16.88	13.01	7.84	0.06	37.79
1987	16.79	14.53	8.52	0.11	39.95
1988	17.55	15.31	8.96	0.12	41.94
1989	16.10	16.58	9.63	0.13	42.44
1990	15.55	17.24	10.28	0.09	43.16
1991	15.51	19.38	10.41	0.09	45.40
1992	13.14	21.10	10.32	0.12	44.68

2. Shares				
Year	Coal †	Electricity	Diesel ¶	Other
1980	36%	35%	28%	0.6%
1981	36%	37%	26%	0.6%
1982	39%	36%	24%	0.5%
1983	40%	36%	24%	0.2%
1984	42%	34%	24%	0.2%
1985	44%	35%	20%	0.3%
1986	45%	34%	21%	0.2%
1987	42%	36%	21%	0.3%
1988	42%	37%	21%	0.3%
1989	38%	39%	23%	0.3%
1990	36%	40%	24%	0.2%
1991	34%	43%	23%	0.2%
1992	29%	47%	23%	0.3%

\* Agricultural sector energy use statistics may include a small amount of "sideline" industry consumption. Industrial sector consumption figures, however, generally include all known rural industry consumption at the village level and above, so the correction probably would be small.

† Coal includes raw coal plus small amounts of coke and middlings. Coal is used for processes such as curing tobacco and drying other agricultural products.

¶ Diesel use is adjusted to exclude estimated transportation use (see Table IV-15).

¥ Other fuels include crude oil, fuel oil, and kerosene.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-13. Agricultural Energy Consumption

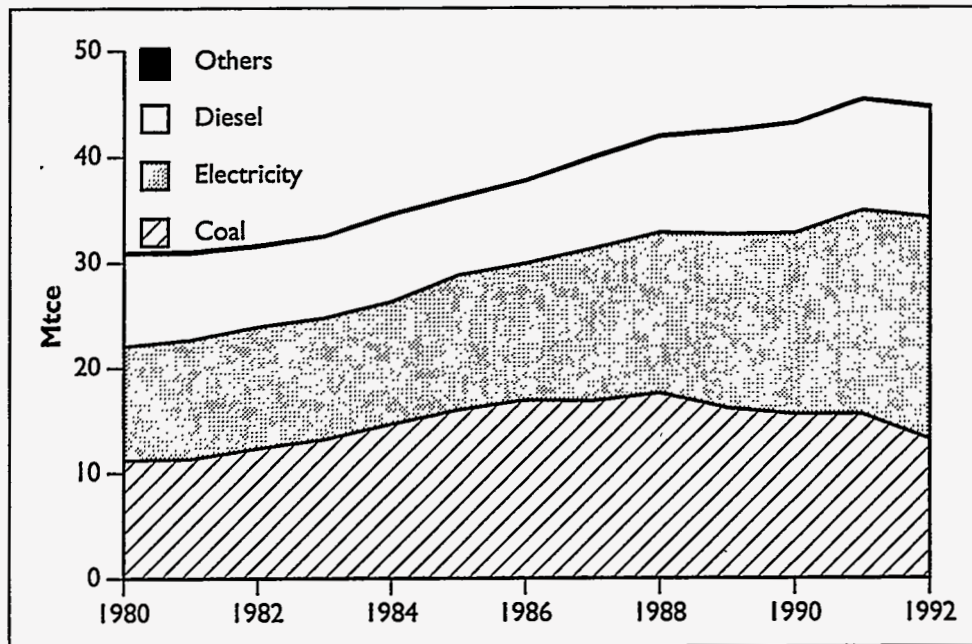


Table IV-18. Residential Energy Consumption, 1980-1992 (Commercial Energy Only)

1. Physical Units							
Year	Coal * (Mt)	Electricity † (TWh)	District Heating ‡ (TJ)	Kerosene (Mt)	LPG (Mt)	Natural Gas (billion m3)	Town Gas ¥ (billion m3)
1980	115.7	10.5	46	1.0	0.4	0.2	1.4
1981	120.9	11.8	47	1.2	0.5	0.2	1.4
1982	124.6	12.5	48	1.0	0.5	0.2	1.5
1983	130.6	13.7	49	1.2	0.6	0.1	1.5
1984	139.8	15.9	52	1.5	0.6	0.5	1.6
1985	156.2	22.3	57	1.2	0.9	0.4	1.3
1986	158.2	24.8	66	1.3	1.1	0.7	1.4
1987	164.9	28.7	78	1.3	1.2	0.8	1.7
1988	175.3	34.3	77	1.2	1.3	1.5	1.7
1989	170.4	39.5	84	1.3	1.5	1.7	2.7
1990	167.0	48.1	90	1.0	1.6	1.9	2.9
1991	164.5	54.4	98	0.9	2.0	1.8	3.6
1992	147.8	64.0	114	0.9	2.4	2.2	5.2

2. Mtce								
Year	Coal *	Electricity †	District Heating ‡	Kerosene	LPG	Natural Gas	Town Gas ¥	Total
1980	82.7	4.3	1.6	1.5	0.7	0.3	0.8	91.8
1981	86.4	4.8	1.6	1.7	0.8	0.3	0.9	96.4
1982	89.0	5.1	1.6	1.5	0.8	0.3	0.9	99.2
1983	93.3	5.5	1.7	1.8	1.0	0.2	0.9	104.5
1984	99.9	6.4	1.8	2.2	1.0	0.6	1.0	112.9
1985	111.6	9.0	1.9	1.8	1.6	0.6	0.8	127.3
1986	113.0	10.0	2.3	2.0	2.0	0.9	0.9	130.9
1987	117.8	11.6	2.7	1.9	2.1	1.0	1.0	138.1
1988	125.2	13.9	2.6	1.8	2.3	2.0	1.1	148.8
1989	121.7	16.0	2.9	1.9	2.6	2.2	1.7	149.0
1990	119.3	19.4	3.1	1.5	2.7	2.5	1.8	150.3
1991	117.5	22.0	3.3	1.4	3.5	2.4	2.2	152.3
1992	105.6	25.9	3.9	1.3	4.1	2.9	3.2	146.7

\* Unadjusted total of raw, washed, and screened coal, and small amounts of coke and middlings. This includes only direct use of coal in households and in small boilers. Coal used in large boilers (with capacities of several tens of tons of steam per hour) for district heating systems, in cogeneration systems which supply residences, and in generation of residential electricity is not included in this category. The electricity and district heating categories are composed mainly of coal used to generate the electricity and steam consumed in residences.

† Assuming a conversion efficiency in thermal power plants of 0.404 kgce/kWh. Figures for 1980-1984 include only electricity generated by plants with installed capacity of  $\geq 500$  kW.

‡ Calculated as the amount of coal used in boilers, not heat delivered. This may result in double counting if heat is from cogeneration systems, but the correction is probably small because cogeneration accounts for less than 10% of installed electricity generation capacity nationally.

¥ Composed mainly of coke-oven gas and other coal gas (0.614 tce/1000 m<sup>3</sup>). Also includes a very small amount of refinery gas (1.571 tce/tonne) for 1985-1988.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

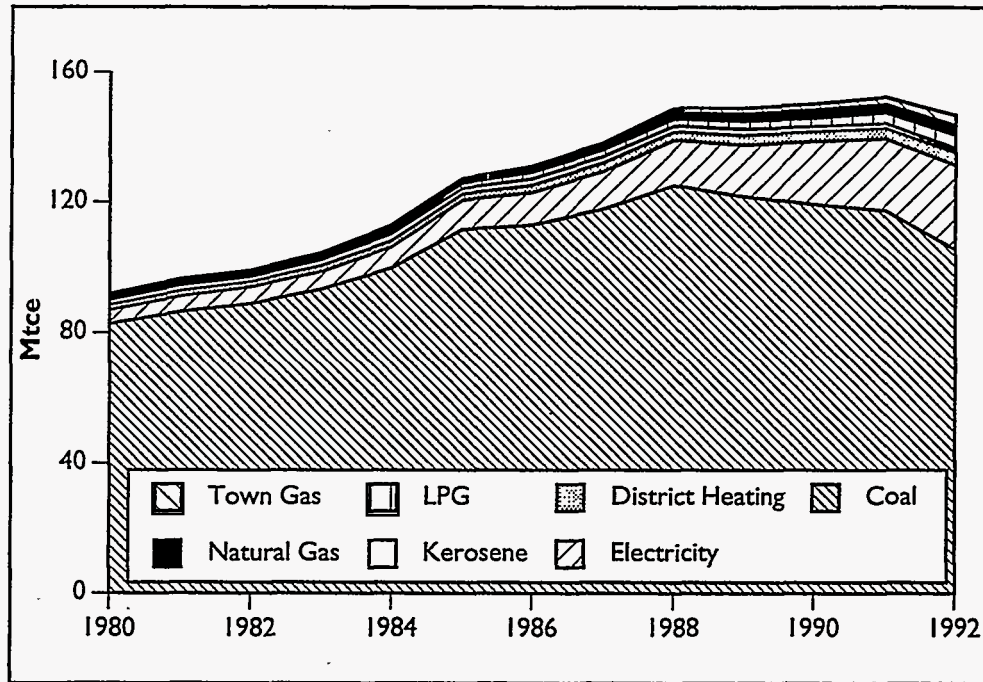
Table IV-18. Residential Energy Consumption, 1980-1992  
(Commercial Energy Only) (continued)

3. Shares								
Year	Coal *	Electricity †	District Heating ‡	Kerosene	LPG	Natural Gas	Town Gas ¥	Total
1980	90.1%	4.6%	1.7%	1.6%	0.8%	0.3%	0.9%	100%
1981	89.6%	4.9%	1.7%	1.8%	0.8%	0.3%	0.9%	100%
1982	89.7%	5.1%	1.7%	1.5%	0.8%	0.3%	0.9%	100%
1983	89.3%	5.3%	1.6%	1.8%	1.0%	0.2%	0.9%	100%
1984	88.5%	5.7%	1.6%	1.9%	0.9%	0.5%	0.9%	100%
1985	87.7%	7.1%	1.5%	1.4%	1.2%	0.4%	0.6%	100%
1986	86.3%	7.6%	1.7%	1.5%	1.5%	0.7%	0.7%	100%
1987	85.3%	8.4%	1.9%	1.4%	1.5%	0.7%	0.8%	100%
1988	84.1%	9.3%	1.8%	1.2%	1.5%	1.4%	0.7%	100%
1989	81.7%	10.7%	1.9%	1.3%	1.8%	1.5%	1.1%	100%
1990	79.4%	12.9%	2.0%	1.0%	1.8%	1.6%	1.2%	100%
1991	77.2%	14.4%	2.2%	0.9%	2.3%	1.6%	1.5%	100%
1992	72.0%	17.6%	2.7%	0.9%	2.8%	1.9%	2.2%	100%

- \* Unadjusted total of raw, washed, and screened coal, and small amounts of coke and middlings. This includes only direct use of coal in households and in small boilers. Coal used in large boilers (with capacities of several tens of tons of steam per hour) for district heating systems, in cogeneration systems which supply residences, and in generation of residential electricity is not included in this category. The electricity and district heating categories are composed mainly of coal used to generate the electricity and steam consumed in residences.
- † Assuming a conversion efficiency in thermal power plants of 0.404 kgce/kWh. Figures for 1980-1984 include only electricity generated by plants with installed capacity of  $\geq 500$  kW.
- ‡ Calculated as the amount of coal used in boilers, not heat delivered. This may result in double counting if heat is from cogeneration systems, but the correction is probably small because cogeneration accounts for less than 10% of installed electricity generation capacity nationally.
- ¥ Composed mainly of coke-oven gas and other coal gas (0.614 tce/1000 m<sup>3</sup>). Also includes a very small amount of refinery gas (1.571 tce/tonne) for 1985-1988.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

**Figure IV-14. Residential Energy Consumption  
(Commercial Energy)**





**Table IV-19. Urban and Rural Residential Energy Consumption  
(Commercial Energy Only)**

<b>I. Coal Consumption *</b>					
<b>Year</b>	<b>Mt</b>			<b>Shares</b>	
	<b>Urban</b>	<b>Rural</b>	<b>Total</b>	<b>Urban</b>	<b>Rural</b>
1985	87.45	68.80	156.24	56%	44%
1986	87.18	67.64	154.82	56%	44%
1987	88.45	72.98	161.43	55%	45%
1988	90.82	79.55	170.37	53%	47%
1989	89.88	80.55	170.43	53%	47%
1990	88.94	78.06	167.00	53%	47%
1991	85.66	78.87	164.52	52%	48%
1992	72.48	75.33	147.81	49%	51%

<b>2. Electricity Consumption</b>					
<b>Year</b>	<b>TWh</b>			<b>Shares</b>	
	<b>Urban</b>	<b>Rural</b>	<b>Total</b>	<b>Urban</b>	<b>Rural</b>
1985	12.25	10.00	22.25	55%	45%
1986	14.43	10.36	24.79	58%	42%
1987	16.23	12.42	28.65	57%	43%
1988	19.44	14.89	34.33	57%	43%
1989	22.51	17.01	39.52	57%	43%
1990	27.22	20.86	48.08	57%	43%
1991	31.97	22.39	54.36	59%	41%
1992	35.98	28.02	64.00	56%	44%

<b>3. Total Energy Consumption †</b>					
<b>Year</b>	<b>Mtce</b>			<b>Shares</b>	
	<b>Urban</b>	<b>Rural</b>	<b>Total</b>	<b>Urban</b>	<b>Rural</b>
1985	75.49	57.70	133.18	57%	43%
1986	78.56	57.27	135.83	58%	42%
1987	81.17	62.06	143.23	57%	43%
1988	86.48	68.86	155.34	56%	44%
1989	86.37	69.47	155.83	55%	45%
1990	88.95	69.04	158.00	56%	44%
1991	89.64	70.29	159.93	56%	44%
1992	84.50	71.86	156.36	54%	46%

\* Unadjusted sum of raw and washed coal.

† Figures are unadjusted and so differ from those in the previous table.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

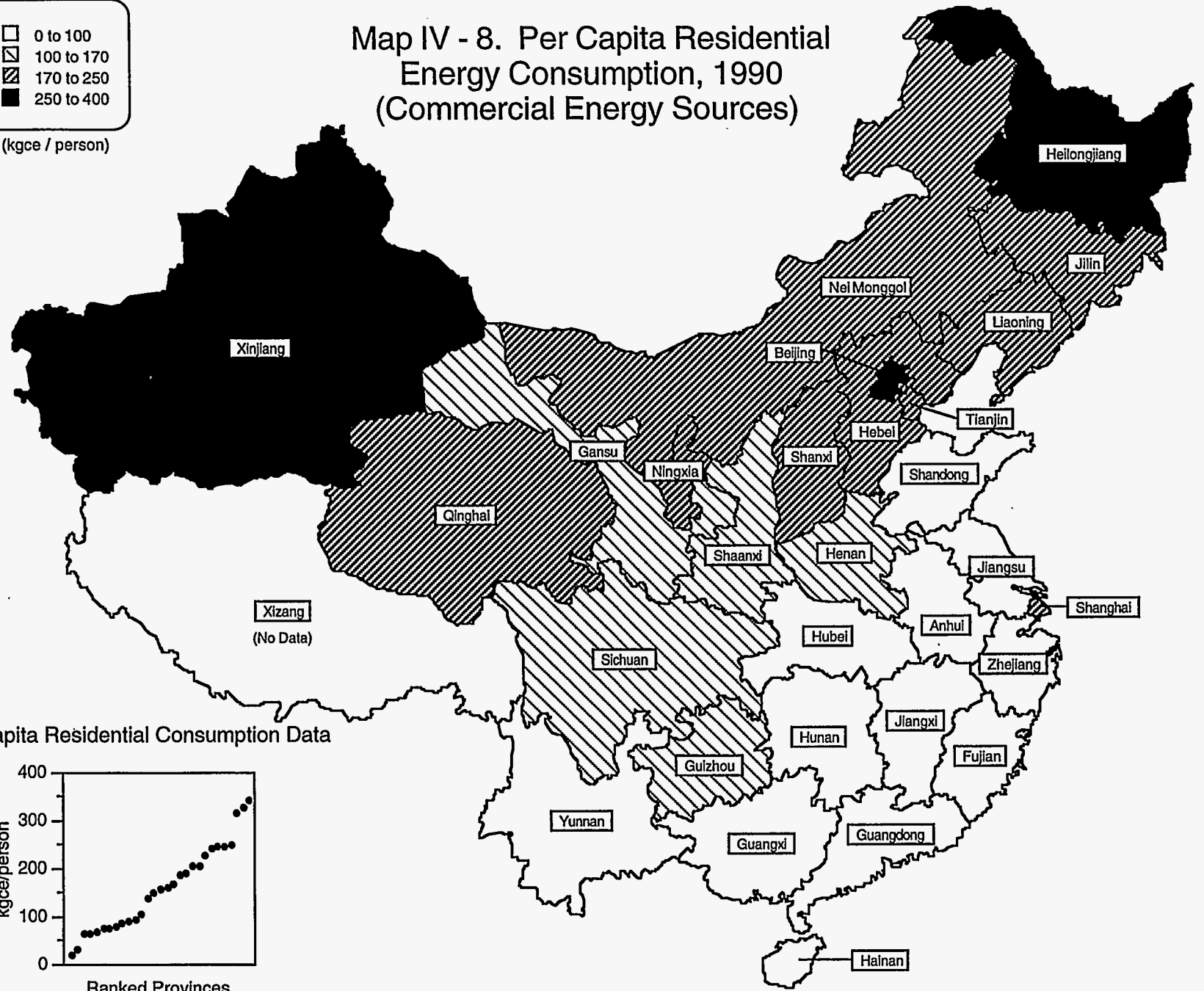
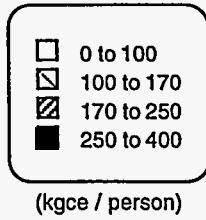
**Table IV-20. Residential Sector Commercial Energy Consumption  
by Province and Energy Source, 1990**

Planning Region	Province	Total				Per Capita		
		End-of-Year Population (millions)	Coal (Mt)	Electricity (TWh)	Total Energy (Mtce)	Coal (kg)	Electricity (kWh)	Total Energy (kgce)
North	Beijing	10.86	4.003	0.950	3.687	369	87	339
	Tianjin	8.84	2.123	0.803	2.123	240	91	240
	Hebei	61.59	15.305	2.239	12.248	249	36	199
	Shanxi	28.99	8.407	1.226	6.930	290	42	239
	Inner Mongolia	21.63	5.858	0.879	4.372	271	41	202
Northeast	Liaoning	39.67	9.007	3.303	9.541	227	83	241
	Jilin	24.83	6.330	1.788	6.085	255	72	245
	Heilongjiang	35.43	10.787	3.347	11.048	304	94	312
East	Shanghai	13.37	2.145	1.444	2.493	160	108	186
	Jiangsu	67.67	5.871	2.610	5.612	87	39	83
	Zhejiang	41.68	2.028	2.572	2.594	49	62	62
	Anhui	56.75	3.511	1.538	3.293	62	27	58
	Fujian	30.37	1.960	1.848	2.183	65	61	72
	Jiangxi	38.10	3.039	0.847	2.240	80	22	59
	Shandong	84.93	6.754	3.755	7.258	80	44	85
South-Central	Henan	86.49	14.395	2.045	11.659	166	24	135
	Hubei	54.39	4.517	1.560	4.012	83	29	74
	Hunan	61.28	6.604	1.468	5.452	108	24	89
	Guangdong	63.46	3.480	3.917	4.526	55	62	71
	Guangxi	42.61	0.603	1.745	1.068	14	41	25
	Hainan	6.63	0.042	0.080	0.092	6	12	14
Southwest	Sichuan	108.04	20.210	3.785	16.646	187	35	154
	Guizhou	32.68	6.967	0.728	5.401	213	22	165
	Yunnan	37.31	4.815	1.012	3.716	129	27	100
	Xizang	2.22		0.080		0	36	0
Northwest	Shaanxi	33.16	6.014	0.832	4.765	181	25	144
	Gansu	22.55	4.238	0.920	3.530	188	41	157
	Qinghai	4.48	1.242	0.120	0.992	277	27	221
	Ningxia	4.70	1.059	0.216	0.855	225	46	182
	Xinjiang	15.29	5.684	0.422	4.933	372	28	323
<i>National Total</i>		1,143.33	166.997	48.080	157.995	146	42	138
<i>Balance *</i>		3.33	0.000	0.001	8.641	-	-	-

\* Because of differences in the coverage of provincial and national statistics and conversions to standard coal, the sums of provincial statistics do not equal national totals.

Source: China Energy Statistical Yearbook, 1991; China Statistical Yearbook, 1991.

Map IV - 8. Per Capita Residential Energy Consumption, 1990  
(Commercial Energy Sources)



Per Capita Residential Consumption Data

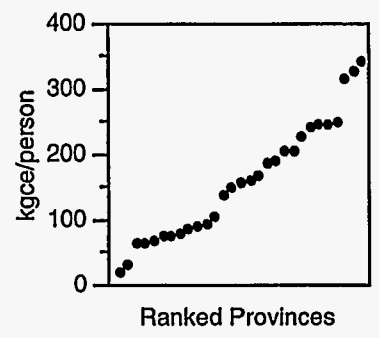


Table IV-21. Rural Energy: Available Energy Sources and Household Consumption, 1979, 1987, 1990 and 1992—Mtce

Energy Source	1979			1987		
	Available Energy *	Household Consumption	Balance	Available Energy *	Household Consumption	Balance
Crop Stalk	183.60	113.69	69.91	268.31	130.32	137.99
Dung Cake	129.43	6.32	123.11	91.05	3.24	87.81
Firewood	66.79	103.77	-36.98	76.93	132.63	-55.70
Biomass Subtotal	379.82	223.78	156.04	436.29	266.19	170.10
Electricity	4.79	3.10	1.69	12.12	4.98	7.14
Coal	71.70	32.58	39.12	211.49	59.58	151.91
Oil Products ‡	-	1.51	-	-	1.89	-
Commercial Subtotal	76.49	37.19	40.81	223.61	66.45	159.05
Total	456.31	260.97	195.34	659.90	332.64	327.26
Energy Source	1990			1992		
	Economic Activity † Consumption	Household Consumption	Total Energy Consumption	Economic Activity † Consumption	Household Consumption	Total Energy Consumption
Crop Stalk	-	131.60	131.60	-	135.50	135.50
Firewood ¶	-	131.43	131.43	16.82	93.47	110.29
Biomass Subtotal	-	263.03	263.03	16.82	228.97	245.79
Electricity	31.66	2.12	33.78	42.00	11.20	53.20
Coal	149.81	64.29	214.10	159.56	78.89	238.45
Oil Products ‡	26.49	1.22	27.71	30.98	1.41	32.39
Commercial Subtotal	207.96	67.63	275.59	232.54	91.50	324.04
Total	207.96	330.66	538.62	249.36	320.47	569.83

\* As estimated by the National Rural Energy Planning Group. Available crop stalk (0.48 tce/tonne) is an estimated fraction of annual crop production, and available firewood (0.57 tce/tonne) is estimated sustainable output. Available electricity is all generation from small hydropower stations (rural grids), and available coal is the output of rural mines.

† Agriculture, transportation, rural industry, and services.

¶ The drop in reported wood use between 1990 and 1992 probably represents a change in the manner of collection of statistics, not an actual decline in wood consumption of the magnitude implied here. While anecdotal evidence indicates switching from biomass fuels to coal in many areas, the extent of switching is probably smaller than that obtained by comparing these two series—which are from different sources. In terms of accuracy, the 1990 figure for wood use is probably more accurate than the one for 1992.

‡ Household oil use is kerosene and LPG. In practice, penetration of LPG into rural areas is very low.

Source: National Rural Energy Planning, 1990; Energy in China, 1992; China Energy Annual Review, 1994; Energy Research Institute.

Table IV-22. Urban Gas Use, 1957-1993

Year	Total Number of Cities	Number of Cities in which Gas Available	Population Using Gas (Million Persons)			Total	Households Using Gas (Million Households) ¶	Total Urban Population (millions)	Percentage of Total Urban Population Using Gas †	Percentage of Nonagricultural Urban Population Using Gas ¥
			LPG	coal gas	natural gas					
1957	-	-	-	-	-	-	-	-	1.5%	
1965	-	-	-	-	-	-	-	-	3.0%	
1978	-	-	-	-	-	-	-	-	13.9%	
1980	-	-	-	-	-	-	-	-	16.8%	
1981	225	64	-	-	16.72	-	-	8.3%	-	
1984	-	-	-	-	-	-	-	-	21.1%	
1985	324	133	15.34	9.11	2.81	27.26	212.28	12.8%	22.4%	
1986	-	-	-	-	-	-	233.15	-	28.5%	
1987	371	-	23.99	11.77	6.34	42.09	262.31	16.0%	32.6%	
1988	424	247	27.64	13.57	7.48	48.70	298.22	16.3%	34.9%	
1989	441	259	31.56	14.98	8.96	55.50	317.66	17.5%	37.9%	
1990	467	-	-	-	-	-	20.27	335.43	-	42.2%
1991	479	416	-	-	-	-	20.95	346.02	-	47.1%
1992	517	-	47.96	21.81	11.19	80.97	21.81	383.91	21.1%	52.4%
1993	570	-	-	-	-	-	22.84	-	-	57.0%

\* Piped coal and natural gas, and LPG. The percentages here are calculated from statistics on population and household statistics and some differ from officially reported percentages.

† Total population registered as living in urban areas, excluding population in outlying counties. Calculated, except 1981 figure.

¥ Nonagricultural population in urban areas, excluding population in outlying counties. Reported.

¶ Average urban household size has been declining, from 3.89 in 1985 to 3.31 in 1993.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; China Urban Statistical Yearbook, various years; China Social Statistical Materials, various years; China Urban Economic and Social Yearbook, various years; Energy Research Institute.

Table IV-23. Commercial Sector Energy Consumption, \* 1980-1992

1. Mtce						
Year	Coal & Coke †	Electricity	Liquids ‡	Natural Gas	Delivered Heat & Other ¥	Total
1980	11.10	3.46	4.24	0.05	0.79	19.64
1981	11.71	3.75	3.69	0.06	0.80	20.02
1982	12.61	4.12	3.50	0.04	0.78	21.04
1983	13.84	4.18	3.73	0.03	1.19	22.97
1984	15.66	5.22	3.29	0.07	0.85	25.09
1985	16.60	6.45	3.92	0.05	0.55	27.57
1986	17.62	6.79	3.64	0.05	0.68	28.78
1987	18.37	8.01	3.80	0.13	0.80	31.11
1988	20.36	9.20	4.88	0.05	0.84	35.34
1989	20.85	10.07	5.50	0.10	0.78	37.30
1990	21.80	11.26	5.22	0.12	1.96	40.36
1991	21.85	13.29	6.28	0.10	1.96	43.49
1992	21.25	15.26	7.93	0.09	2.20	46.73

2. Shares						
Year	Coal & Coke †	Electricity	Liquids ‡	Natural Gas	Delivered Heat & Other ¥	Total
1980	56.5%	17.6%	21.6%	0.3%	4.0%	100.0%
1981	58.5%	18.7%	18.5%	0.3%	4.0%	100.0%
1982	59.9%	19.6%	16.6%	0.2%	3.7%	100.0%
1983	60.3%	18.2%	16.3%	0.1%	5.2%	100.0%
1984	62.4%	20.8%	13.1%	0.3%	3.4%	100.0%
1985	60.2%	23.4%	14.2%	0.2%	2.0%	100.0%
1986	61.2%	23.6%	12.7%	0.2%	2.4%	100.0%
1987	59.0%	25.7%	12.2%	0.4%	2.6%	100.0%
1988	57.6%	26.0%	13.8%	0.1%	2.4%	100.0%
1989	55.9%	27.0%	14.8%	0.3%	2.1%	100.0%
1990	54.0%	27.9%	12.9%	0.3%	4.9%	100.0%
1991	50.3%	30.6%	14.4%	0.2%	4.5%	100.0%
1992	45.5%	32.7%	17.0%	0.2%	4.7%	100.0%

\* This table covers energy use in both the "commerce" and "non-productive" sectors, as defined by the Chinese State Statistical Bureau.

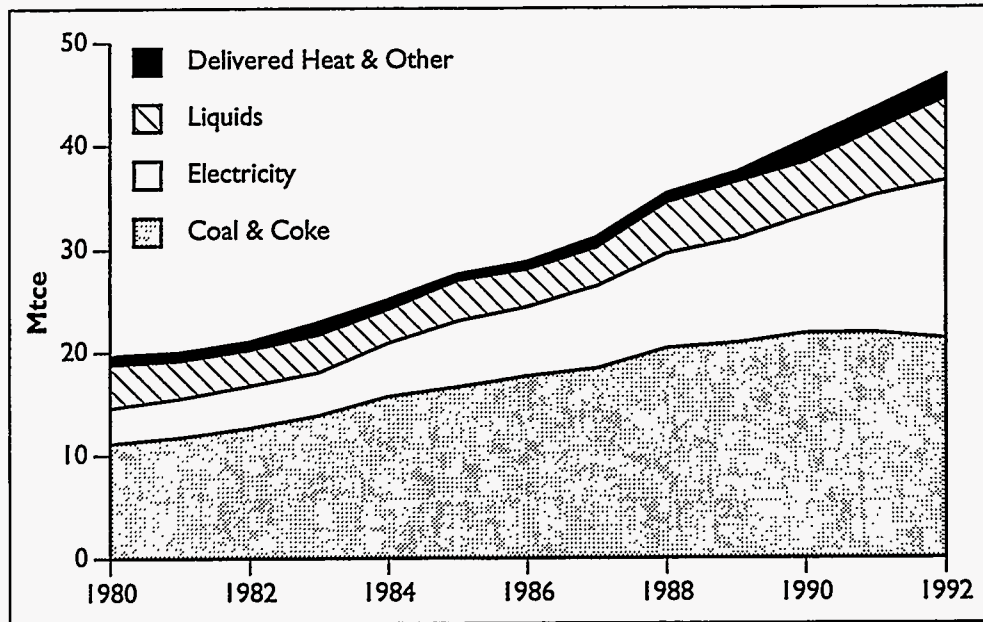
† Includes raw and processed coal and small amounts of coke and middlings.

‡ Includes kerosene, diesel, fuel oil, and crude oil.

¥ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors. Also includes various fuels such as LPG, refinery gas, and coal gas.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-15. Commercial Sector  
Energy Consumption by Fuel



# Energy Source **Consumption**



Table IV-24. End-Use Energy Consumption by Source (Commercial Energy Only)

1a. Mtce (electricity converted at heat rate of thermal power generation)

Year	Coal & Coke *	Petroleum Products *	Natural Gas *	Coal Gas †	Electricity ‡	Delivered Heat §	Other ¶	Total Energy End-Use
1980	319.1	91.9	18.7	6.4	103.8	10.5	16.2	566.7
1981	318.1	86.4	16.6	6.6	106.8	10.9	14.6	559.9
1982	336.6	87.3	15.8	6.6	113.7	11.1	13.9	585.0
1983	360.8	90.4	16.1	7.3	121.8	11.4	15.4	623.20
1984	391.4	95.4	16.8	7.4	131.2	12.1	15.1	669.30
1985	421.9	102.5	16.2	8.2	143.4	13.0	17.7	722.9
1986	440.1	111.0	17.5	10.4	156.8	14.1	10.5	760.4
1987	468.4	118.8	18.3	9.6	173.4	15.8	10.3	814.6
1988	496.5	127.1	18.7	11.0	190.8	16.1	13.9	874.0
1989	502.7	134.3	19.8	12.6	204.2	17.9	17.3	908.9
1990	494.4	134.6	20.2	12.9	216.8	21.1	21.7	921.7
1991	501.2	147.1	20.8	13.0	236.2	-	45.6	963.9
1992	505.2	157.4	20.9	13.0	263.2	-	53.4	1,013.1
1993	-	-	-	-	-	-	-	-
1994**	548.8	177.2	21.5	23.7	288.3	37.4	34.7	1,131.7

2a. Shares

Year	Coal & Coke *	Petroleum Products *	Natural Gas *	Coal Gas †	Electricity ‡	Delivered Heat §	Other ¶	Total Energy End-Use
1980	56.3%	16.2%	3.3%	1.1%	18.3%	1.9%	2.9%	100.0%
1981	56.8%	15.4%	3.0%	1.2%	19.1%	2.0%	2.6%	100.0%
1982	57.5%	14.9%	2.7%	1.1%	19.4%	1.9%	2.4%	100.0%
1983	57.9%	14.5%	2.6%	1.2%	19.6%	1.8%	2.5%	100.0%
1984	58.5%	14.2%	2.5%	1.1%	19.6%	1.8%	2.3%	100.0%
1985	58.4%	14.2%	2.2%	1.1%	19.8%	1.8%	2.4%	100.0%
1986	57.9%	14.6%	2.3%	1.4%	20.6%	1.9%	1.4%	100.0%
1987	57.5%	14.6%	2.2%	1.2%	21.3%	1.9%	1.3%	100.0%
1988	56.8%	14.5%	2.1%	1.3%	21.8%	1.8%	1.6%	100.0%
1989	55.3%	14.8%	2.2%	1.4%	22.5%	2.0%	1.9%	100.0%
1990	53.6%	14.6%	2.2%	1.4%	23.5%	2.3%	2.4%	100.0%
1991	52.0%	15.3%	2.2%	1.3%	24.5%	-	4.7%	100.0%
1992	49.9%	15.5%	2.1%	1.3%	26.0%	-	5.3%	100.0%
1993	-	-	-	-	-	-	-	-
1994**	48.5%	15.7%	1.9%	2.1%	25.5%	3.3%	3.1%	100.0%

N.B. Figures given here differ from official data. Utility sector consumption is excluded. Figures in italics are estimates. Excludes over 250 Mtce annual.

\* Includes feedstocks.

\*\* 1994 figures are preliminary and subject to revision.

† 1991 and 1992 figures are lower bounds.

‡ Converted at 0.404 kgce/kWh.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.

¶ Includes refinery gas, LPG, various petroleum and coking products, and delivered heat for years in which the last is not reported.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-24. End-Use Energy Consumption by Source(Commercial Energy Only) (continued)

3. Mtce (electricity converted at heat value)								
Year	Coal & Coke *	Petroleum Products *	Natural Gas *	Coal Gas †	Electricity ‡	Delivered Heat §	Other ¶	Total Energy End-Use
1980	319.1	91.9	18.7	6.4	31.6	10.5	16.2	494.5
1981	318.1	86.4	16.6	6.6	32.5	10.9	14.6	485.7
1982	336.6	87.3	15.8	6.6	34.6	11.1	13.9	505.9
1983	360.8	90.4	16.1	7.3	37.1	11.4	15.4	538.5
1984	391.4	95.4	16.8	7.4	39.9	12.1	15.1	578.1
1985	421.9	102.5	16.2	8.2	43.7	13.0	17.7	623.1
1986	440.1	111.0	17.5	10.4	47.7	14.1	10.5	651.4
1987	468.4	118.8	18.3	9.6	52.8	15.8	10.3	694.0
1988	496.5	127.1	18.7	11.0	58.1	16.1	13.9	741.3
1989	502.7	134.3	19.8	12.6	62.2	17.9	17.3	766.9
1990	494.4	134.6	20.2	12.9	66.0	21.1	21.7	770.9
1991	501.2	147.1	20.8	13.0	71.9	-	45.6	799.6
1992	505.2	157.4	20.9	13.0	80.1	-	53.4	830.0
1993	-	-	-	-	-	-	-	-
1994	548.8	177.2	21.5	23.7	98.7	37.4	34.7	942.2

4. Shares								
Year	Coal & Coke *	Petroleum Products *	Natural Gas *	Coal Gas †	Electricity ‡	Delivered Heat §	Other ¶	Total Energy End-Use
1980	64.5%	18.6%	3.8%	1.3%	6.4%	2.1%	3.3%	100.0%
1981	65.5%	17.8%	3.4%	1.4%	6.7%	2.3%	3.0%	100.0%
1982	66.5%	17.2%	3.1%	1.3%	6.8%	2.2%	2.7%	100.0%
1983	67.0%	16.8%	3.0%	1.3%	6.9%	2.1%	2.9%	100.0%
1984	67.7%	16.5%	2.9%	1.3%	6.9%	2.1%	2.6%	100.0%
1985	67.7%	16.5%	2.6%	1.3%	7.0%	2.1%	2.8%	100.0%
1986	67.6%	17.0%	2.7%	1.6%	7.3%	2.2%	1.6%	100.0%
1987	67.5%	17.1%	2.6%	1.4%	7.6%	2.3%	1.5%	100.0%
1988	67.0%	17.1%	2.5%	1.5%	7.8%	2.2%	1.9%	100.0%
1989	65.6%	17.5%	2.6%	1.6%	8.1%	2.3%	2.3%	100.0%
1990	64.1%	17.5%	2.6%	1.7%	8.6%	2.7%	2.8%	100.0%
1991	62.7%	18.4%	2.6%	1.6%	9.0%	-	5.7%	100.0%
1992	60.9%	19.0%	2.5%	1.6%	9.7%	-	6.4%	100.0%
1993	-	-	-	-	-	-	-	-
1994	58.3%	18.8%	2.3%	2.5%	10.5%	-	3.7%	100.0%

N.B. Figures given here differ from official data. Figures in italics are estimates.

\* Includes feedstocks.

† 1991 and 1992 figures are lower bounds.

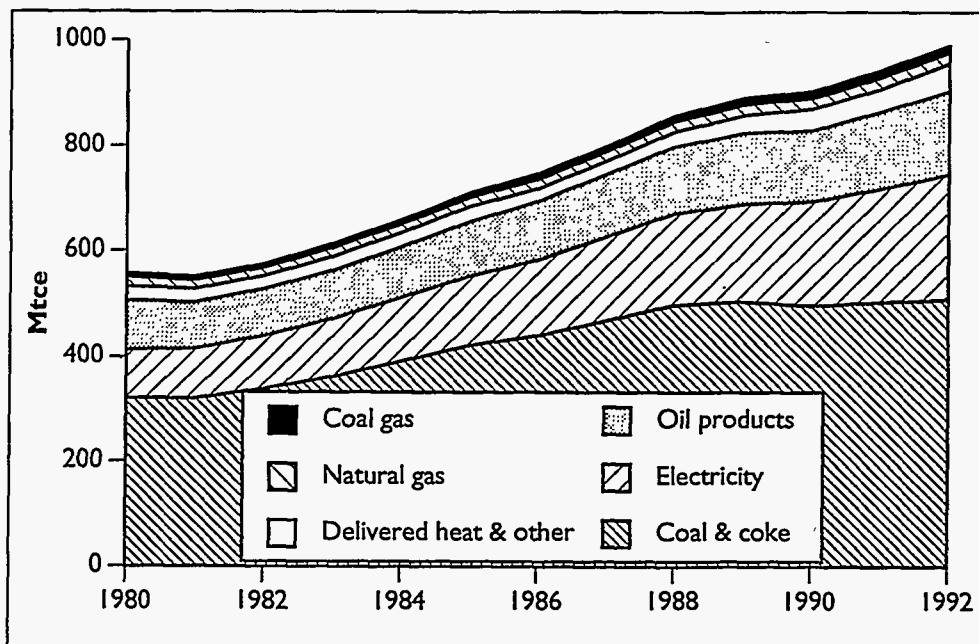
‡ Converted at 0.123 kgce/kWh.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.

¶ Includes refinery gas, LPG, various petroleum and coking products, and delivered heat for years in which the latter is not reported.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Figure IV-16. End-Use Energy Consumption by Energy Source



**Table IV-25 Estimated Energy Consumption by End Use, 1990**

<b>1. Coal</b>		
	<b>Mt</b>	<b>Share</b>
Utility boilers	272.0	25.8%
Industrial boilers	350.0	33.2%
Producer and coal gas ovens	45.0	4.3%
Coke ovens and metallurgical furnaces	107.0	10.1%
Industrial kilns	164.2	15.6%
Household stoves	90.0	8.5%
Steam locomotives	14.0	1.3%
Other	13.0	1.2%
<b>Total *</b>	<b>1,055.2</b>	<b>100.0%</b>

<b>2. Oil</b>		
	<b>Mt</b>	<b>Share</b>
Utility boilers	12.34	12.1%
Industrial boilers	3.56	3.5%
Kilns	23.00	22.6%
Producer ovens	0.40	0.4%
Motor vehicles	22.30	21.9%
Water vessels	9.27	9.1%
Locomotives	2.51	2.5%
Tractors	3.80	3.7%
Airplanes	0.41	0.4%
Other diesel engines	3.00	3.0%
Other gasoline generator sets	0.90	0.9%
Other	20.18	19.8%
<b>Total *</b>	<b>101.67</b>	<b>9.6%</b>

<b>3. Electricity</b>		
	<b>TWh</b>	<b>Share</b>
Medium and small motors	32.50	5.2%
Fans	65.00	10.4%
Pumps	130.00	20.9%
Compressors	58.50	9.4%
Industrial electrical furnaces	32.50	5.2%
Arc welders	3.25	0.5%
Gas separators	18.69	3.0%
Refrigeration and air conditioning	34.27	5.5%
Caustic soda electric furnaces	9.35	1.5%
Ferrous metals electric arc furnaces	15.58	2.5%
Electric locomotives	3.80	0.6%
Agricultural irrigation equipment	14.33	2.3%
Lighting and household appliances	47.97	7.7%
Cement mills	22.90	3.7%
Transmission and distribution losses	43.46	7.0%
Other	90.94	14.6%
<b>Total *</b>	<b>623.04</b>	<b>100.0%</b>

\* These totals differ from those in other tables because of differences in sources and adjustments. The electricity total, for instance, includes line losses and nearly 89 TWh consumed by electric utilities.

Source: Energy Research Institute.

Figure IV-17. Estimated Energy Consumption by End Use, 1990

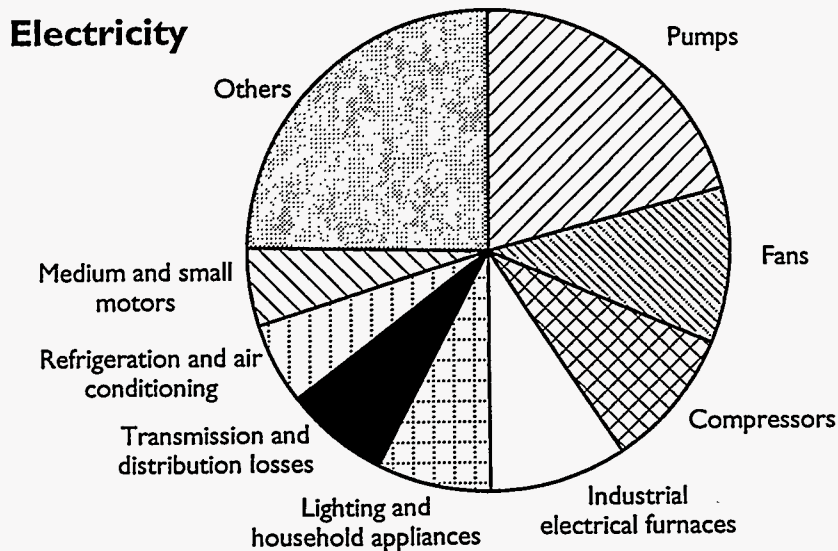
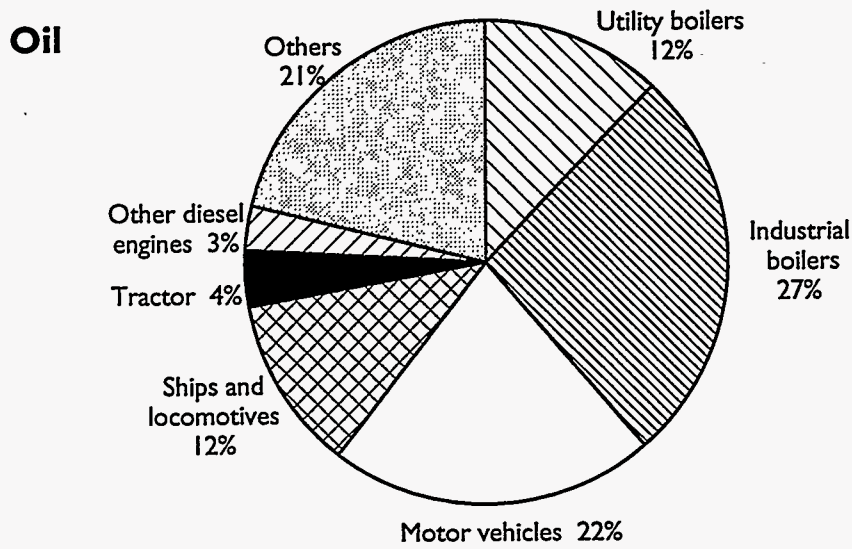
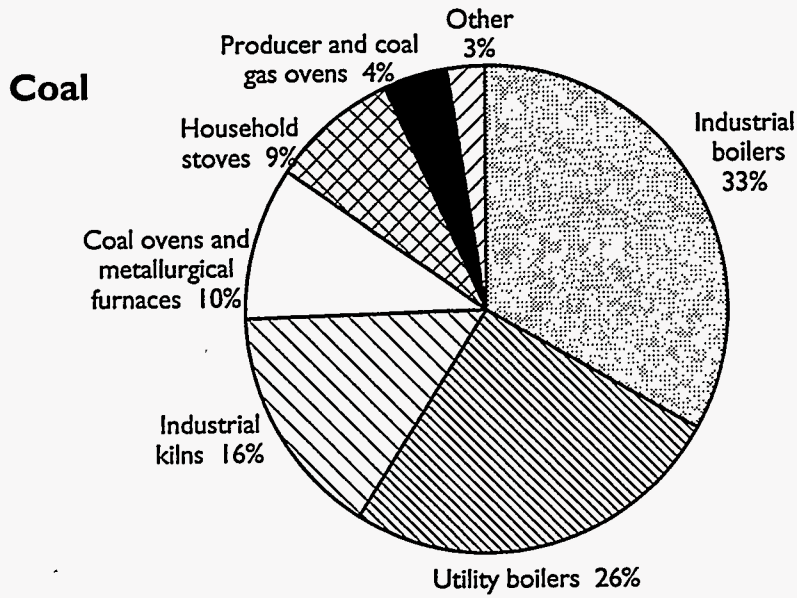


Table IV-26. Coal End Use and Inputs to Conversions, 1980-1993

I. Mt Raw Coal *														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
<u>End Use Sectors</u>														
Industry †	221.4	217.5	235.2	257.8	282.4	301.7	315.3	341.8	363.4	373.8	359.4	370.0	389.1	-
Agriculture	15.5	15.7	17.1	18.4	20.2	22.1	23.0	22.9	23.8	21.8	21.0	21.2	17.7	-
Transportation	19.3	20.9	21.7	21.9	22.8	23.1	23.0	22.4	22.6	22.8	21.6	20.2	18.8	-
Commercial	4.6	5.2	5.7	6.4	7.3	7.4	7.8	8.3	9.3	10.2	10.6	10.0	9.6	-
Other ¶	10.9	11.1	11.9	13.0	14.5	15.8	16.7	17.3	19.1	18.8	19.8	20.4	19.8	-
Residential	115.7	120.9	124.6	130.6	139.8	156.2	158.2	164.9	175.3	170.4	167.0	164.5	147.8	-
Subtotal:	387.4	391.3	416.2	448.1	487.1	526.2	544.0	577.5	613.5	617.9	599.3	606.4	602.7	-
<u>Inputs to Conversions</u>														
Power Generation	127.1	127.6	134.9	143.8	160.1	165.2	181.1	204.1	230.3	253.9	274.8	304.5	338.5	362.0
Heat ¥	-	-	-	-	-	14.6	16.2	18.9	21.2	23.9	30.0	34.4	38.5	41.9
Coking §	66.8	59.1	60.8	63.9	69.6	73.0	80.6	87.7	88.8	96.3	107.0	108.6	112.8	-
Coal Gas	1.3	1.4	1.4	1.5	1.6	1.9	2.4	2.2	2.8	3.7	3.6	3.7	4.7	-
Coal Washing Losses	27.4	26.5	28.0	29.9	31.3	35.0	35.9	37.5	37.1	38.7	40.6	46.7	43.6	-
Subtotal:	222.6	214.5	225.1	239.1	262.6	289.8	316.2	350.5	380.1	416.4	455.9	497.9	538.1	-
Total	610.1	605.8	641.3	687.1	749.7	816.0	860.2	928.0	993.5	1,034.3	1,055.2	1,104.3	1,140.8	-

\* Figures are uncorrected sums of consumption of raw and washed coal.

† Figures include feedstocks. Industry category includes industry and construction, but excludes power generation, heating, coking and coal gas production, and differs from official statistics. Probably understates actual consumption due to underreporting of rural industry coal use.

¶ This is reported in official data as "nonproductive" sector use of coal, e.g., government, education, financial services, etc. See Appendix for sector definitions.

¥ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors. 1980-1984 heating use of coal was included in electricity generation use of coal.

§ Coking inputs may be underreported by as much as 50% due to incomplete statistics from rural coking plants.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-26. Coal End Use and Inputs to Conversions, 1980-1993 (continued)

2. Mtce *														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
<u>End Use Sectors</u>														
Industry †	158.1	155.3	167.9	184.1	201.6	215.4	225.1	244.1	259.5	266.9	256.6	264.2	277.8	-
Agriculture	11.1	11.2	12.2	13.1	14.4	15.8	16.4	16.3	17.0	15.6	15.0	15.2	12.6	-
Transportation	13.8	14.9	15.5	15.6	16.3	16.5	16.4	16.0	16.1	16.3	15.4	14.5	13.4	-
Commercial	3.3	3.7	4.0	4.5	5.2	5.3	5.6	5.9	6.7	7.3	7.6	7.1	6.8	-
Other ¶	7.8	7.9	8.5	9.3	10.4	11.3	11.9	12.4	13.6	13.4	14.1	14.6	14.2	-
Residential	82.6	86.3	88.9	93.3	99.8	111.6	113.0	117.7	125.1	121.7	119.2	117.5	105.5	-
Subtotal:	276.6	279.4	297.2	319.9	347.8	375.7	388.4	412.4	438.0	441.2	427.9	433.0	430.4	-
<u>Inputs to Conversions</u>														
Power Generation	90.7	91.1	96.3	102.7	114.3	118.0	129.3	145.7	164.4	181.2	196.2	217.4	241.7	258.5
Heat §	-	-	-	-	-	10.4	11.6	13.5	15.1	17.0	21.4	24.6	27.5	29.9
Coking ¥	47.7	42.2	43.4	45.6	49.7	52.1	57.5	62.6	63.4	68.8	76.4	77.5	80.6	-
Coal Gas	0.9	1.0	1.0	1.1	1.2	1.4	1.7	1.6	2.0	2.6	2.6	2.7	3.3	-
Coal Washing Losses	19.6	18.9	20.0	21.3	22.3	25.0	25.6	26.8	26.5	27.6	29.0	33.4	31.1	-
Subtotal:	159.0	153.2	160.7	170.7	187.5	206.9	225.8	250.2	271.4	297.3	325.5	355.5	384.2	-
Total	435.6	432.6	457.9	490.6	535.3	582.6	614.1	662.6	709.4	738.5	753.4	788.5	814.6	-

\* Figures are uncorrected sums of consumption of raw and washed coal. Converted at 0.714 tce/t coal.

† Figures include feedstocks. Industry category includes industry and construction, but excludes power generation, heating, coking and coal gas production, and differs from official statistics. Probably understates actual consumption due to underreporting of rural industry coal use.

¶ This is reported in official data as "nonproductive" sector use of coal, e.g., government, education, financial services, etc. See Appendix for sector definitions.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors. 1980-1984 heating use of coal was included in electricity generation use of coal.

¥ Coking inputs may be underreported by as much as 50% due to incomplete statistics from rural coking plants.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-26. Coal End Use and Inputs to Conversions, 1980-1993 (continued)

3. Shares														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
<b>End Use Sectors</b>														
Industry †	36.3%	35.9%	36.7%	37.5%	37.7%	37.0%	36.7%	36.8%	36.6%	36.1%	34.1%	33.5%	34.1%	
Agriculture	2.5%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.5%	2.4%	2.1%	2.0%	1.9%	1.5%	
Transportation	3.2%	3.4%	3.4%	3.2%	3.0%	2.8%	2.7%	2.4%	2.3%	2.2%	2.0%	1.8%	1.6%	
Commercial	0.7%	0.9%	0.9%	0.9%	1.0%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	0.9%	0.8%	
Other ¶	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.8%	1.9%	1.9%	1.7%	
Residential	19.0%	20.0%	19.4%	19.0%	18.7%	19.1%	18.4%	17.8%	17.6%	16.5%	15.8%	14.9%	13.0%	
Subtotal:	63.5%	64.6%	64.9%	65.2%	65.0%	64.5%	63.2%	62.2%	61.7%	59.7%	56.8%	54.9%	52.8%	
<b>Inputs to Conversions</b>														
Power Generation	20.8%	21.1%	21.0%	20.9%	21.4%	20.2%	21.0%	22.0%	23.2%	24.5%	26.0%	27.6%	29.7%	
Heat §	-	-	-	-	-	1.8%	1.9%	2.0%	2.1%	2.3%	2.8%	3.1%	3.4%	
Coking ¥	11.0%	9.8%	9.5%	9.3%	9.3%	9.0%	9.4%	9.4%	8.9%	9.3%	10.1%	9.8%	9.9%	
Coal Gas	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.2%	0.3%	0.4%	0.3%	0.3%	0.4%	
Coal Washing Losses	4.5%	4.4%	4.4%	4.3%	4.2%	4.3%	4.2%	4.0%	3.7%	3.7%	3.8%	4.2%	3.8%	
Subtotal:	36.5%	35.4%	35.1%	34.8%	35.0%	35.5%	36.8%	37.8%	38.3%	40.3%	43.2%	45.1%	47.2%	
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

† Figures include feedstocks. Industry category includes industry and construction, but excludes power generation, heating, coking and coal gas production, and differs from official statistics. Probably understates actual consumption due to underreporting of rural industry coal use.

¶ This is reported in official data as "nonproductive" sector use of coal, e.g., government, education, financial services, etc. See Appendix for sector definitions.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors. 1980-1984 heating use of coal was included in electricity generation use of coal.

¥ Coking inputs may be underreported by as much as 50% due to incomplete statistics from rural coking plants.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



Figure IV-18. Coal Consumption by Sector

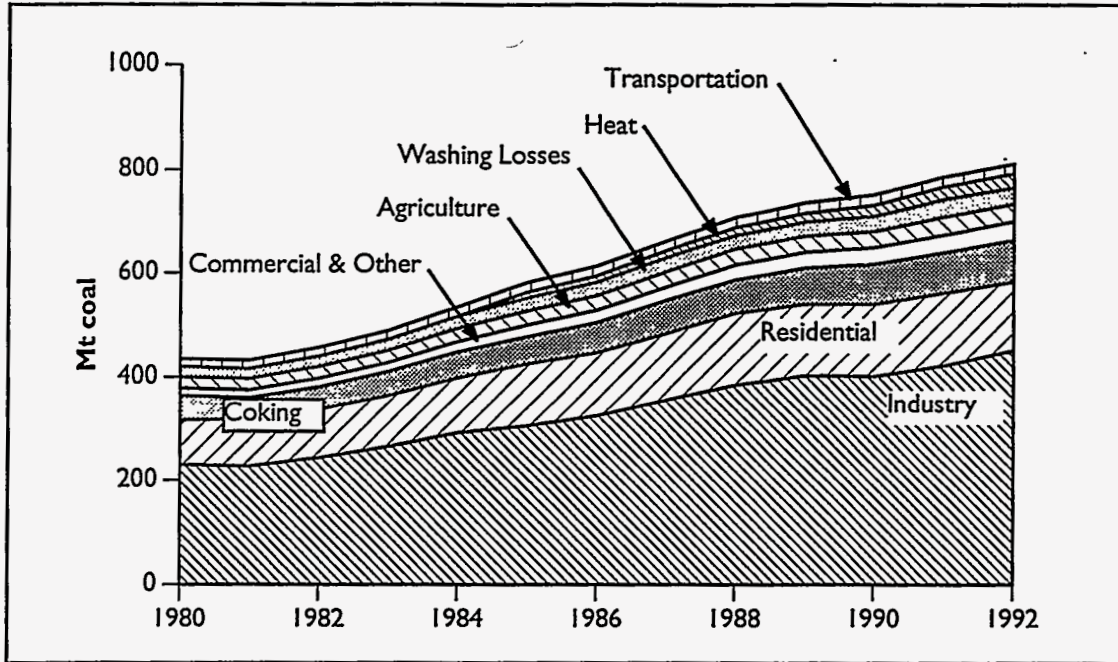
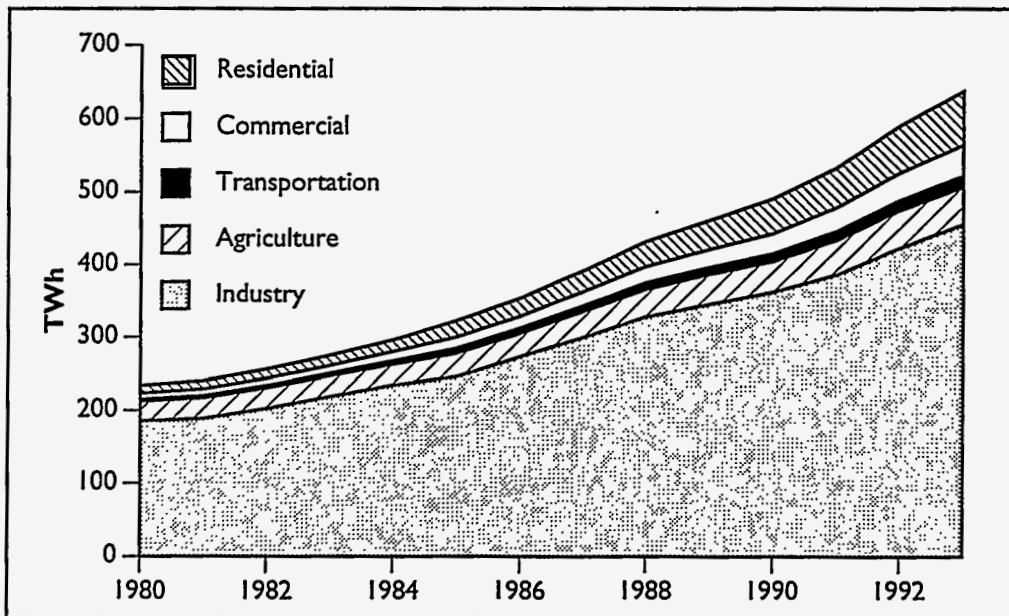


Figure IV-19. Coal Consumption by Sector:  
Coal Inputs to Electricity Generation Attributed to Electricity End-Use Sectors \*



\* Shares of coal used in electricity generation have been assigned according to sectoral shares of end-use electricity consumption (Table IV-34).

Table IV-27. Coal Gas End Use and Inputs to Conversions, 1980-1992

I. Billion Cubic Meters													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	9.41	9.64	9.65	10.77	10.83	12.14	15.81	14.07	16.33	18.08	18.38	19.78	-
Commercial & Other	-	-	-	-	-	0.29	0.40	0.42	0.48	0.44	0.47	0.26	-
Residential	1.37	1.43	1.48	1.49	1.63	1.33	1.39	1.70	1.72	2.72	2.87	3.64	5.16
Subtotal:	10.78	11.07	11.13	12.26	12.46	13.76	17.60	16.19	18.53	21.24	21.72	23.68	-
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	0.89	0.86	0.91	0.98	1.02	0.93	1.47	1.17	0.86	0.72	0.80	1.78	-
Heat Supply	-	-	-	-	-	-	0.05	0.23	0.13	0.69	1.01	1.12	-
Subtotal:	0.89	0.86	0.91	0.98	1.02	0.93	1.52	1.40	0.99	1.41	1.81	2.90	-
Total	11.67	11.93	12.04	13.24	13.48	14.69	19.12	17.59	19.52	22.65	23.53	26.58	-
2. Mtce													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	5.58	5.72	5.72	6.39	6.42	7.20	9.37	8.34	9.68	10.72	10.90	11.73	-
Commercial & Other	-	-	-	-	-	0.17	0.24	0.25	0.28	0.26	0.28	0.15	-
Residential	0.81	0.85	0.88	0.88	0.97	0.79	0.82	1.01	1.02	1.61	1.70	2.16	3.06
Subtotal:	6.39	6.56	6.60	7.27	7.39	8.16	10.44	9.60	10.99	12.59	12.88	14.04	-
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	0.53	0.51	0.54	0.58	0.60	0.55	0.87	0.69	0.51	0.43	0.47	1.06	-
Heat Supply	-	-	-	-	-	-	0.03	0.14	0.07	0.41	0.60	0.66	-
Subtotal:	0.53	0.51	0.54	0.58	0.60	0.55	0.90	0.83	0.58	0.84	1.07	1.72	-
Total	6.92	7.07	7.14	7.85	7.99	8.71	11.34	10.43	11.57	13.43	13.95	15.76	-

Source: China Energy Statistical Yearbook, various years; China Urban Statistical Yearbook, various years; Energy Research Institute.

Table IV-27. Coal Gas Consumption by End Use and Inputs to Conversions, 1980-1992 (continued)

3. Shares													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	81%	81%	80%	81%	80%	83%	83%	80%	84%	80%	78%	74%	-
Commercial & Other	-	-	-	-	-	2%	2%	2%	2%	2%	2%	1%	-
Residential	12%	12%	12%	11%	12%	9%	7%	10%	9%	12%	12%	14%	-
Subtotal:	92%	93%	92%	93%	92%	94%	92%	92%	95%	94%	92%	89%	-
<u>Inputs to Conversions:</u>													
Thermal Power													
Generation	8%	7%	8%	7%	8%	6%	8%	7%	4%	3%	3%	7%	-
Heat Supply	-	-	-	-	-	-	0%	1%	1%	3%	4%	4%	-
Subtotal:	8%	7%	8%	7%	8%	6%	8%	8%	5%	6%	8%	11%	-

Source: China Energy Statistical Yearbook, various years; China Urban Statistical Yearbook, various years; Energy Research Institute.

Table IV-28. Total Oil Product End Use and Inputs to Conversions,\* 1980-1992

I. Mt													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry †	35.67	33.18	33.49	33.65	35.11	37.59	39.92	42.59	44.97	47.70	46.95	50.32	51.75
Agriculture	6.12	5.78	5.34	5.37	5.69	5.11	5.41	5.91	6.22	6.70	7.11	7.21	7.17
Transportation	16.78	16.06	17.01	18.38	20.08	22.63	25.46	27.61	29.78	31.02	31.02	36.78	41.09
Commercial & Other ¶	2.89	2.52	2.38	2.55	2.24	2.71	2.53	2.60	3.40	3.85	3.70	4.41	5.51
Residential	1.42	1.61	1.49	1.85	2.09	2.12	2.49	2.52	2.52	2.82	2.63	3.00	3.33
<i>of which:</i>													
urban residential	-	-	-	-	-	0.98	1.27	1.36	1.45	1.64	1.74	-	-
rural residential	-	-	-	-	-	1.15	1.24	1.19	1.10	1.19	0.93	-	-
End-Use Subtotal	62.88	59.15	59.72	61.80	65.22	70.16	75.81	81.24	86.89	92.08	91.41	101.72	108.85
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	16.26	15.79	15.20	14.52	13.82	13.67	13.66	13.66	14.57	17.60	15.84	15.48	14.09
Heat §	¥	¥	¥	¥	¥	2.86	3.22	2.84	3.23	3.39	3.56	3.37	2.72
Refinery Losses	0.82	0.69	0.60	0.73	0.67	1.13	1.47	1.72	1.81	1.82	2.96	2.91	5.15
Gasification	0.37	0.37	0.38	0.38	0.40	0.35	0.38	0.37	0.38	0.42	0.40	0.45	0.48
Conversion Inputs Subtotal		17.44	16.85	16.18	15.62	14.89	18.00	18.73	18.59	19.98	23.23	22.76	22.21
22.44													
Total Use	80.32	76.00	75.91	77.42	80.11	88.15	94.55	99.83	106.87	115.31	114.17	123.93	131.29

\* Sectoral use of diesel oil has been adjusted so the above figures differ from those reported officially. Transportation sector use of diesel fuel has been estimated as reported transportation sector use plus 20% of reported agricultural use, 10% of reported industrial use, and 12% of commercial and other use. Figures for those sectors have been adjusted accordingly.

† Includes construction sector, which is listed separately in official Chinese statistics. Excludes electric utilities.

¶ According to Sinopec, kerosene production is approximately 75% jet fuel and 25% lamp kerosene. Given the small reported use in the transportation sector (less than 10% in 1980 to nearly 20% in 1988), most of the consumption in the "other" category (2.169 Mt (3.188 Mtce) in 1980, declining to 1.425 Mt (2.095 Mtce) in 1988) is probably for military aircraft.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.

¥ Crude, fuel, and diesel oil used for heating is included in the total for electricity generation for 1980-1984.

Source: China Energy Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years.

Table IV-28. Total Oil Product by End Use and Inputs to Conversions, \* 1980-1992 (continued)

2. Shares													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry †	45%	44%	44%	44%	44%	43%	43%	43%	42%	42%	41%	41%	40%
Agriculture	8%	8%	7%	7%	7%	6%	6%	6%	6%	6%	6%	6%	6%
Transportation	21%	21%	23%	24%	25%	26%	27%	28%	28%	27%	28%	30%	31%
Commercial & Other ¶	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	5%
Residential	2%	2%	2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
of which:													
urban residential	-	-	-	-	-	1%	2%	2%	2%	2%	2%	-	-
rural residential	-	-	-	-	-	1%	1%	1%	1%	1%	1%	-	-
End-Use Subtotal	79%	79%	79%	81%	82%	80%	81%	82%	82%	81%	81%	83%	84%
<u>Inputs to Conversions</u>													
Thermal Power Generation	20%	20%	19%	18%	17%	15%	14%	13%	13%	14%	13%	12%	10%
Heat §	¥	¥	¥	¥	¥	3%	3%	3%	3%	3%	3%	3%	2%
Refinery Losses	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	3%	2%	4%
Gasification	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.3%	0.4%	0.3%	0.4%	0.4%
Conversion Inputs Subtotal	21%	21%	21%	19%	18%	20%	19%	18%	18%	19%	19%	17%	16%
Total Use	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

\* Sectoral use of diesel oil has been adjusted so the above figures differ from those reported officially. Transportation sector use of diesel fuel has been estimated as reported transportation sector use plus 20% of reported agricultural use, 10% of reported industrial use, and 12% of commercial and other use. Figures for those sectors have been adjusted accordingly.

† Includes construction sector, which is listed separately in official Chinese statistics. Excludes electric utilities.

¶ According to Sinopec, kerosene production is approximately 75% jet fuel and 25% lamp kerosene. Given the small reported use in the transportation sector (less than 10% in 1980 to nearly 20% in 1988), most of the consumption in the "other" category (2.169 Mt (3.188 Mtce) in 1980, declining to 1.425 Mt (2.095 Mtce) in 1988) is probably for military aircraft.

§ This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.

¥ Crude, fuel, and diesel oil used for heating is included in the total for electricity generation for 1980-1984.

Table IV-29. Total Oil Product End Use and Inputs to Conversions  
by Petroleum Product, 1980-1992

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<b>I. Mt</b>													
<u>End Use Sectors</u>													
Crude Oil	5.00	4.60	4.29	3.80	3.84	3.50	4.07	4.02	4.53	5.11	4.02	4.01	3.41
Fuel Oil	16.18	14.62	14.52	14.63	14.85	15.39	16.72	18.09	18.52	20.10	20.43	20.45	21.38
Gasoline	9.99	9.40	9.93	10.95	12.00	13.96	15.00	16.24	17.90	18.54	19.00	22.10	25.10
Diesel Oil	15.91	15.24	15.15	15.92	16.83	18.27	20.57	22.21	23.79	25.24	25.93	28.17	30.78
Kerosene	3.66	3.47	3.41	3.68	3.84	3.85	3.86	3.82	3.58	3.61	3.51	3.85	4.18
LPG	1.19	1.08	1.20	1.45	1.47	1.55	2.00	2.07	2.29	2.44	2.50	-	-
Refinery Gas *	-	-	-	-	-	2.13	2.33	2.44	2.43	2.58	2.50	-	-
Other Oil Products †	11.19	10.96	11.42	11.58	12.63	12.03	11.72	13.22	14.72	15.64	15.45	-	-
End-Use Subtotal	63.11	59.38	59.91	62.01	65.45	70.68	76.27	82.11	87.75	93.24	93.34	101.83	108.98
<u>Inputs to Conversions §</u>													
Crude Oil ¶	6.56	6.10	5.40	4.68	4.02	4.54	4.59	4.55	4.28	3.68	4.42	4.00	6.24
Fuel Oil	14.56	13.87	13.59	13.93	13.95	12.96	13.36	13.12	13.86	13.81	13.25	14.639	12.835
Diesel Oil	0.72	1.21	0.73	0.55	0.70	1.09	0.60	0.92	1.96	2.24	1.27	0.80	2.90
LPG	-	-	-	-	-	-	<0.01	0.01	0.02	0.05	0.03	-	-
Refinery Gas *	-	-	-	-	-	-	0.04	0.07	0.16	0.12	0.30	-	-
Other Oil Products †	-	-	-	-	-	-	0.06	0.01	0.26	0.19	<0.01	-	-
Conversion Inputs													
Subtotal	21.84	21.18	19.72	19.16	18.67	18.58	18.65	18.67	20.54	20.08	19.26	19.44	21.98
Total Use	84.95	80.55	79.62	81.17	84.11	89.27	94.92	100.78	108.29	113.32	112.59	121.27	130.95

\* Refinery gas (*lianchang ganqi*) is a byproduct of oil refining composed primarily of C1 and C2 fractions. Most is consumed within refineries as refinery fuel.

† Lubricants, asphalt, coke, paraffin wax, solvents, aromatics, and petrochemical feedstocks account for all but about 2 Mt of products in this category. The balance may be intermediate unfinished products.

¶ Includes refinery losses of crude oil.

§ Primarily thermal power generation.

Source: China Energy Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years; China Statistical Yearbook, various years.

Table IV-29. Total Oil Product End Use and Inputs to Conversions  
by Petroleum Product, 1980-1992 (continued)

2. Shares	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Crude Oil	5.9%	5.7%	5.4%	4.7%	4.6%	3.9%	4.3%	4.0%	4.2%	4.5%	3.6%	3.3%	2.6%
Fuel Oil	19.0%	18.2%	18.2%	18.0%	17.6%	17.2%	17.6%	18.0%	17.1%	17.7%	18.1%	16.9%	16.3%
Gasoline	11.8%	11.7%	12.5%	13.5%	14.3%	15.6%	15.8%	16.1%	16.5%	16.4%	16.9%	18.2%	19.2%
Diesel Oil	18.7%	18.9%	19.0%	19.6%	20.0%	20.5%	21.7%	22.0%	22.0%	22.3%	23.0%	23.2%	23.5%
Kerosene	4.3%	4.3%	4.3%	4.5%	4.6%	4.3%	4.1%	3.8%	3.3%	3.2%	3.1%	3.2%	3.2%
LPG	1.4%	1.3%	1.5%	1.8%	1.7%	1.7%	2.1%	2.1%	2.1%	2.2%	2.2%	-	-
Refinery Gas*	-	-	-	-	-	2.4%	2.4%	2.4%	2.2%	2.3%	2.2%	-	-
Other Oil Products†	13.2%	13.6%	14.3%	14.3%	15.0%	13.5%	12.3%	13.1%	13.6%	13.8%	13.7%	-	-
End-Use Subtotal	74.3%	73.7%	75.2%	76.4%	77.8%	79.2%	80.3%	81.5%	81.0%	82.3%	82.9%	84.0%	83.2%
<u>Inputs to Conversions §</u>													
Crude Oil¶	7.7%	7.6%	6.8%	5.8%	4.8%	5.1%	4.8%	4.5%	4.0%	3.2%	3.9%	3.3%	4.8%
Fuel Oil	17.1%	17.2%	17.1%	17.2%	16.6%	14.5%	14.1%	13.0%	12.8%	12.2%	11.8%	12.1%	9.8%
Diesel Oil	0.9%	1.5%	0.9%	0.7%	0.8%	1.2%	0.6%	0.9%	1.8%	2.0%	1.1%	0.7%	2.2%
LPG	-	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	-	-
Refinery Gas*	-	-	-	-	-	-	0.0%	0.1%	0.1%	0.1%	0.3%	-	-
Other Oil Products†	-	-	-	-	-	-	0.1%	0.0%	0.2%	0.2%	-	-	-
Conversion Inputs Subtotal	25.7%	26.3%	24.8%	23.6%	22.2%	20.8%	19.7%	18.5%	19.0%	17.7%	17.1%	16.0%	16.8%
Total Use	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

\* Refinery gas (*lianchang ganqi*) is a byproduct of oil refining composed primarily of C1 and C2 fractions. Most is consumed within refineries as refinery fuel.

† Lubricants, asphalt, coke, paraffin wax, solvents, aromatics, and petrochemical feedstocks account for all but about 2 Mt of products in this category. The balance may be intermediate unfinished products.

¶ Includes refinery losses of crude oil.

§ Primarily thermal power generation.

Source: China Energy Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years; China Statistical Yearbook, various years.

Table IV-30. Crude Oil End Use and Inputs to Conversions, \* 1980-1992

I. Mt													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	4.59	4.18	3.96	3.61	3.51	3.29	3.74	3.74	4.30	4.90	3.89	3.52	2.84
Agriculture	0.08	0.07	0.05	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Transportation	0.27	0.29	0.27	0.19	0.32	0.20	0.32	0.23	0.22	0.18	0.12	0.49	0.56
Commercial & Other	0.06	0.06	0.01	0.01	0.00	0.01	0.00	0.04	0.00	0.02	0.01	0.00	0.00
Subtotal:	5.00	4.60	4.29	3.80	3.84	3.50	4.07	4.02	4.53	5.11	4.02	4.01	3.41
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	5.74	5.41	4.80	3.96	3.35	2.80	2.46	2.59	2.34	1.63	1.25	1.09	1.09
Heat Supply	†	†	†	†	†	0.61	0.65	0.24	0.13	0.23	0.21	†	†
Refinery Losses	0.82	0.69	0.60	0.73	0.67	1.13	1.47	1.72	1.81	1.82	2.96	2.91	5.15
Subtotal:	6.56	6.10	5.40	4.68	4.02	4.54	4.59	4.55	4.28	3.68	4.42	4.00	6.24
Total	11.55	10.70	9.69	8.48	7.86	8.04	8.66	8.57	8.81	8.79	8.44	8.01	9.65

\* Figures are based on end-use data in comprehensive energy balance tables in the Energy Statistical Yearbook of China and in some cases differ from data in other official tables of petroleum use.

† Crude oil used for heat is included in the total for electricity generation.

Source: China Energy Statistical Yearbook of China, various years; China Statistical Yearbook, various years; *Guoji Shiyou Jingji* (International Oil Economy), no. 2, 1994;



Table IV-30. Crude Oil End Use and Inputs to Conversions, \* 1988-1992 (continued)

2. Shares	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Secotrs</u>													
Industry	39.7%	39.1%	40.8%	42.5%	44.7%	40.9%	43.2%	43.7%	48.8%	55.8%	46.1%	43.9%	29.5%
Agriculture	0.7%	0.6%	0.5%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
Transportation	2.3%	2.7%	2.8%	2.2%	4.1%	2.5%	3.7%	2.7%	2.5%	2.1%	1.5%	6.1%	5.8%
Commercial & Other	0.5%	0.5%	0.1%	0.1%	0.0%	0.1%	0.0%	0.4%	0.0%	0.2%	0.1%	0.0%	0.0%
Subtotal:	43.3%	43.0%	44.2%	44.8%	48.8%	43.6%	47.0%	46.9%	51.4%	58.1%	47.7%	50.1%	35.3%
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	49.7%	50.6%	49.6%	46.7%	42.7%	34.8%	28.4%	30.2%	26.6%	18.5%	14.8%	13.6%	11.3%
Heat Supply	†	†	†	†	†	7.6%	7.6%	2.8%	1.4%	2.6%	2.5%	†	†
Refinery Losses	7.1%	6.5%	6.2%	8.6%	8.5%	14.0%	17.0%	20.1%	20.5%	20.7%	35.1%	36.3%	53.4%
Subtotal:	56.7%	57.0%	55.8%	55.2%	51.2%	56.4%	53.0%	53.1%	48.6%	41.9%	52.3%	49.9%	64.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

\* Figures are based on end-use data in comprehensive energy balance tables in the Energy Statistical Yearbook of China and in some cases differ from data in other official tables of petroleum use.

† Crude oil used for heat is included in the total for electricity generation.

Source: China Energy Statistical Yearbook of China, various years; China Statistical Yearbook, various years; *Guoji Shiyou Jingji* (International Oil Economy), no. 2, 1994;

Table IV-31. Diesel Oil End Use and Inputs to Conversions, \* 1980-1992

I. Mt													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	4.15	4.05	4.29	4.41	4.74	5.91	6.53	6.65	6.35	6.47	6.87	7.61	8.28
Agriculture	5.99	5.64	5.23	5.32	5.64	5.03	5.37	5.84	6.14	6.61	7.05	7.15	7.08
Transportation	5.20	4.97	5.16	5.56	5.92	6.56	7.97	8.82	9.39	9.89	9.91	10.61	11.50
Commercial & Other	0.56	0.59	0.47	0.63	0.53	0.75	0.68	0.88	1.85	2.26	2.11	2.80	3.90
Residential	-	-	-	-	-	0.02	0.02	0.03	0.06	0.01	0.00	0.00	0.02
<i>of which:</i>													
urban residential	-	-	-	-	-	<0.01	0.02	0.01	0.03	<0.01	<0.01	<0.01	0.01
rural residential	-	-	-	-	-	0.01	-	0.02	0.03	0.01	<0.01	<0.01	0.01
Subtotal	15.91	15.24	15.15	15.92	16.83	18.27	20.57	22.21	23.79	25.24	25.93	28.17	30.78
<u>Inputs to Conversions</u>													
Thermal Power													
Generation	0.72	1.21	0.73	0.55	0.70	1.04	0.59	0.92	1.96	2.24	1.25	0.80	2.90
Heat Supply	†	†	†	†	†	0.05	0.01	<0.01	<0.01	<0.01	0.02	-	-
Subtotal	0.72	1.21	0.73	0.55	0.70	1.09	0.60	0.92	1.96	2.24	1.27	0.80	2.90
Total	16.63	16.45	15.87	16.47	17.53	19.36	21.17	23.14	25.75	27.48	27.20	28.97	33.68

\* Sectoral use has been adjusted and the above figures differ from those reported officially. Transportation sector use of diesel fuel has been estimated as reported transportation sector use plus 20% of reported agricultural use, 10% of reported industrial use, and 12% of commercial use. Figures for agricultural and industrial sector consumption have been adjusted accordingly. Figures are based on end-use data in comprehensive energy balance tables and differ from data in other official tables of petroleum use. Figures in italics are estimates.

† Diesel oil used for heating is included in the totals for electricity generation.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-31. Diesel Oil End Use and Inputs to Conversion<sup>2</sup>, \* 1980-1992 (continued)

2. Shares													
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>End Use Sectors</u>													
Industry	25.0%	24.6%	27.0%	26.8%	27.0%	30.5%	30.8%	28.7%	24.7%	23.5%	25.2%	26.3%	24.6%
Agriculture	36.0%	34.3%	33.0%	32.3%	32.2%	26.0%	25.4%	25.2%	23.8%	24.0%	25.9%	24.7%	21.0%
Transportation	31.3%	30.2%	32.5%	33.8%	33.8%	33.9%	37.6%	38.1%	36.5%	36.0%	36.4%	36.6%	34.1%
Commercial & Other	3.4%	3.6%	2.9%	3.8%	3.0%	3.9%	3.2%	3.8%	7.2%	8.2%	7.7%	9.7%	11.6%
Residential	-	-	-	-	-	0.1%	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	0.1%
of which													
urban residential	-	-	-	-	-	<0.01%	0.10%	0.03%	0.11%	<0.01%	<0.01%	<0.01%	0.02%
rural residential	-	-	-	-	-	0.07%	-	0.09%	0.12%	0.04%	<0.01%	<0.01%	0.04%
Subtotal	95.7%	92.7%	95.4%	96.7%	96.0%	94.4%	97.2%	96.0%	92.4%	91.9%	95.3%	97.2%	91.4%
<u>Inputs to Conversions</u>													
<u>Thermal Power</u>													
Generation	4.3%	7.3%	4.6%	3.3%	4.0%	5.4%	2.8%	4.0%	7.6%	8.1%	4.6%	2.8%	8.6%
Heat Supply	†	†	†	†	†	0.26%	0.06%	<0.01%	<0.01%	<0.01%	0.09%	-	-
Subtotal	4.3%	7.3%	4.6%	3.3%	4.0%	5.6%	2.8%	4.0%	7.6%	8.1%	4.7%	2.8%	8.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

\* Sectoral use has been adjusted and the above figures differ from those reported officially. Transportation sector use of diesel fuel has been estimated as reported transportation sector use plus 20% of reported agricultural use, 10% of reported industrial use, and 12% of commercial use. Figures for agricultural and industrial sector consumption have been adjusted accordingly. Figures are based on end-use data in comprehensive energy balance tables and differ from data in other official tables of petroleum use. Figures in italics are estimates.

† Diesel oil used for heating is included in the totals for electricity generation.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.

Table IV-32. Natural Gas End Use and Inputs to Conversions, 1980-1992

1. Billion Cubic Meters								
End Use Sectors	1985	1986	1987	1988	1989	1990	1991	1992
Oil & Natural Gas Extraction *	3.42	3.35	3.91	4.00	3.85	3.59	4.00	4.68
Chemical Industry †	4.14	4.28	4.43	4.56	4.73	4.85	5.55	5.47
Transportation	0.08	0.10	0.05	0.11	0.07	0.19	0.12	0.11
Commercial & Other	0.05	0.05	0.13	0.06	0.10	0.12	0.10	0.09
Residential	0.43	0.65	0.77	1.53	1.68	1.86	1.81	2.15
Other ‡	4.03	4.75	4.46	3.82	4.48	4.60	4.05	3.20
<b>Total</b>	<b>12.54</b>	<b>13.47</b>	<b>13.82</b>	<b>14.22</b>	<b>14.97</b>	<b>15.23</b>	<b>15.76</b>	<b>15.79</b>
<u>Inputs to Conversions</u>								
Power Generation ¶	0.66	0.76	0.83	0.71	1.09	0.75	0.77	-
Heat Supply	0.02	0.03	0.03	0.01	0.03	0.26	0.03	-
2. Mtce								
End Use Sectors	1985	1986	1987	1988	1989	1990	1991	1992
Oil & Natural Gas Extraction*	4.55	4.46	5.20	5.32	5.12	4.77	5.32	6.22
Chemical Industry†	5.51	5.69	5.89	6.06	6.29	6.45	7.38	7.28
Transportation	0.11	0.13	0.07	0.15	0.09	0.25	0.16	0.15
Commercial & Other	0.07	0.07	0.17	0.08	0.13	0.16	0.13	0.12
Residential	0.57	0.86	1.02	2.03	2.23	2.47	2.41	2.86
Other ‡	5.36	6.32	5.93	5.08	5.96	6.12	5.39	4.26
<b>Total</b>	<b>16.68</b>	<b>17.92</b>	<b>18.38</b>	<b>18.91</b>	<b>19.91</b>	<b>20.26</b>	<b>20.96</b>	<b>21.00</b>
<u>Inputs to Conversions</u>								
Power Generation ¶	0.88	1.01	1.10	0.94	1.45	1.00	1.02	-
Heat Supply	0.03	0.04	0.04	0.01	0.04	0.35	0.04	-
3. Shares								
End Use Sectors	1985	1986	1987	1988	1989	1990	1991	1992
Oil & Natural Gas Extraction *	27%	25%	28%	28%	26%	24%	25%	30%
Chemical Industry †	33%	32%	32%	32%	32%	32%	35%	35%
Transportation	1%	1%	0%	1%	0%	1%	1%	1%
Commercial & Other	0%	0%	1%	0%	1%	1%	1%	1%
Residential	3%	5%	6%	11%	11%	12%	11%	14%
Other ‡	32%	35%	32%	27%	30%	30%	26%	20%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<u>Inputs to Conversions</u>								
Power Generation ¶	5%	6%	6%	5%	7%	5%	5%	-
Heat Supply	0.2%	0.2%	0.2%	0.1%	0.2%	1.7%	0.2%	-

\* Oil and natural gas fields are known to use natural gas for multiple uses, including production, fertilizer manufacture, power generation, and residential fuel. At typical fields, actual production use and field losses account for about 6% of reported consumption. The remainder is marketed directly or as products.

† The largest end use in this category is probably fertilizer feedstock.

‡ This category, representing a wide range of industrial subsectors, probably contains mainly power generation and heat supply (including cogeneration) use of natural gas. Also includes losses, e.g. total reported losses of 0.32 bcm in 1990, of which 0.14 bcm were reported to be transportation losses.

¶ Former Ministry of Energy statistics for power generation use of natural gas (found in various editions of Energy of China, for instance, and the China Energy Annual Review, 1994) considerably overstate consumption in this category, often by a factor of ten or more. Includes all utility uses.

Source: Energy Statistical Yearbook of China, various years; China Statistical Yearbook, various years; China Energy Research Society; Energy Research Institute

Table IV-33. Electricity End Use by Sector, 1980-1993

I. TWh						
Year	Industry*	Agriculture	Trans- portation†	Commercial‡	Residential	Total
1980	208.25	27.00	2.65	8.56	10.52	256.98
1981	212.11	28.16	2.91	9.29	11.80	264.27
1982	227.20	28.64	2.99	10.19	12.50	281.52
1983	245.30	28.64	3.58	10.34	13.73	301.59
1984	262.91	28.84	4.14	12.92	15.91	324.72
1985	278.66	31.74	6.34	15.97	22.25	354.96
1986	307.62	32.19	6.69	16.80	24.79	388.09
1987	337.18	35.96	7.67	19.82	28.65	429.28
1988	368.31	37.89	8.95	22.78	34.33	472.26
1989	390.02	41.05	9.87	24.92	39.52	505.38
1990	407.51	42.68	10.59	27.86	48.08	536.72
1991	437.67	47.98	11.72	32.90	54.36	584.63
1992	483.91	52.24	13.61	37.78	64.00	651.54
1993	521.38	51.67	14.76	42.65	72.99	703.45
1994	589.87	53.06	16.40	56.61	86.70	802.64

Year	Industry*	Agriculture	Trans- portation†	Commercial‡	Residential	Total
1980	81.0%	10.5%	1.0%	3.3%	4.1%	100%
1981	80.3%	10.7%	1.1%	3.5%	4.5%	100%
1982	80.7%	10.2%	1.1%	3.6%	4.4%	100%
1983	81.3%	9.5%	1.2%	3.4%	4.6%	100%
1984	81.0%	8.9%	1.3%	4.0%	4.9%	100%
1985	78.5%	8.9%	1.8%	4.5%	6.3%	100%
1986	79.3%	8.3%	1.7%	4.3%	6.4%	100%
1987	78.5%	8.4%	1.8%	4.6%	6.7%	100%
1988	78.0%	8.0%	1.9%	4.8%	7.3%	100%
1989	77.2%	8.1%	2.0%	4.9%	7.8%	100%
1990	75.9%	8.0%	2.0%	5.2%	9.0%	100%
1991	74.9%	8.2%	2.0%	5.6%	9.3%	100%
1992	74.3%	8.0%	2.1%	5.8%	9.8%	100%
1993	74.1%	7.3%	2.1%	6.1%	10.4%	100%
1994	73.5%	6.6%	2.0%	7.1%	10.8%	100%

\* Includes construction sector and excludes power sector consumption, which is composed of in-plant consumption and other power sector use (see Table IV-14).

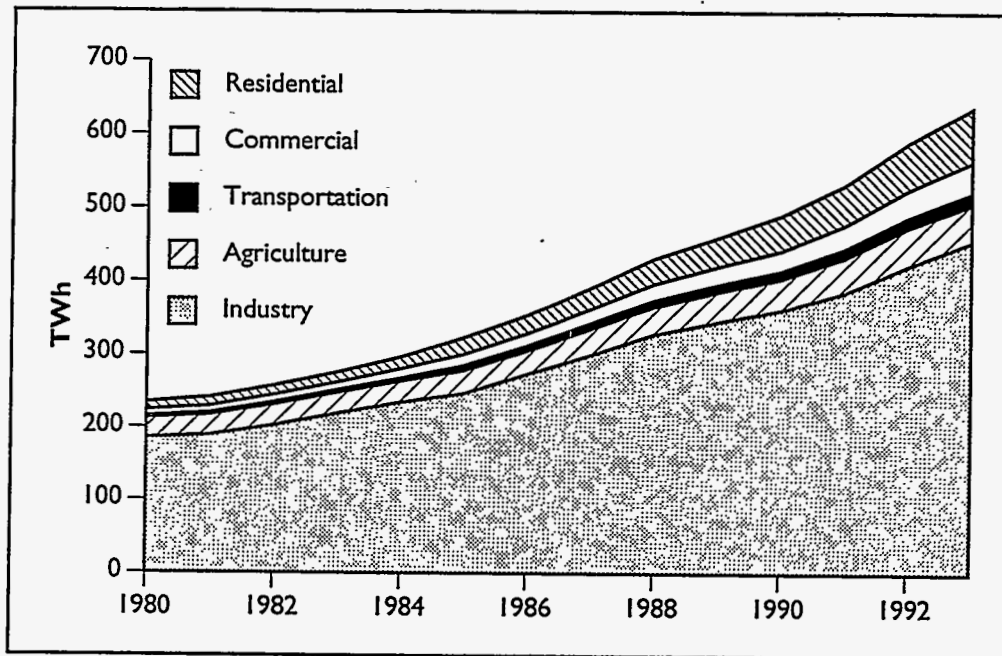
† Does not include that used for transportation by units in other sectors.

‡ Includes electricity consumption for "nonproductive" sectors. Note change in definition of residential electricity consumption in 1985 to include that formerly counted in other sectors, primarily industry.

Figures in italics are estimated.

Source: China Energy Statistical Yearbook, various years; Energy in China, various years; China Statistical Yearbook, various years; Ministry of Coal.

Figure IV-20. Electricity End Use by Sector



# Chapter V—Energy Consuming Equipment and Activities

# Equipment and Activities

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Statistics on stocks of energy-using equipment, output of energy-intensive products, and transportation turnover all point towards continued and strong growth in energy demand. Rising outputs of major industrial products, paralleling rates of economic growth, suggest that industry's dominance of energy use will continue. Climbing appliance and motor vehicle stocks indicate that there will be no deceleration of energy demand from the household and transportation sectors. Technical efficiency gains, then, will be key to slowing growth in overall energy use.

Reductions in the energy intensity of China's economy have continued in the 1990s, allowing rapid economic growth to continue. Intensity reductions apparently have not come from any significant shifts in the balance between economic sectors, implying big gains in production efficiency. The picture that emerges from physical energy intensity indicators (energy consumed per unit of physical output), however, does not bear this out completely. Although there have been significant drops for some product categories, e.g., steel and petrochemicals, others show ambiguous or rising tendencies, e.g., aluminum and synthetic ammonia. Careful sectoral and regional analysis is needed to sort out the root causes of past improvements in the overall energy efficiency of China's economy, and to design practical strategies to achieve further efficiency gains.

## TRANSPORTATION EQUIPMENT AND MODES

In the early 1980s, freight carriage was split almost evenly between rail and water, with a very small portion carried by truck and a still more insignificant fraction carried by air (Table V-1). Air freight remains relatively rare, though it has grown a faster rate than any other mode, and water and rail still dominate the mix. Freight carried on roads, however, has grown faster than any other mode save air, and has come to account for over 13% of China's total

freight carriage, or 400 out of three trillion t-km in 1993. Pipeline transport has actually dropped, peaking in 1989.

The increasing importance of motor vehicles is even more apparent in passenger traffic statistics (Table V-2). Whereas in 1980 rail accounted for nearly twice as many passenger-km as road traffic, by 1992 roads had just edged out rail, taking 47% of the 1993 total of 786 billion passenger-km. Air travel expanded by a factor of ten in those twelve years, and now accounts for 6% of passenger travel. As for freight, growth in road travel is second only to growth in air travel.

Motor vehicle output has leapt upward since the mid-1980s, when annual production was in the neighborhood of 400,000 units per year (Table V-4). By 1993 vehicle output was nearly 1.3 million, with large future increases expected. Passenger vehicle production has been increasing relative to trucks, all-terrain vehicles, and others. From only 2% a decade ago, output of sedans has grown to 18% of motor vehicle output. Buses are mainly smaller vehicles, carrying up to about 20 passengers. Most trucks are light- and medium-duty vehicles; less than 5% are large-capacity diesel vehicles. Tractor production, formerly twice the level of motor vehicle output, (mainly small two-wheeled tractors, often used for transport in rural areas) hit a plateau in the late 1980s and has begun to decline. Imported kits account for the largest share of domestically assembled sedans, and significant shares of small buses and light trucks are also assembled from imports.

Vehicle stocks reflect changing output patterns, having become more oriented towards passenger carriage (Table V-3). In the early 1980s the ratio of trucks to passenger vehicles (including buses) was about four to one, but by 1992 it was two to one, with 4.4 million trucks and 2.3 million passenger vehicles. The stock of motorcycles (nearly all privately owned, unlike other motor vehicles) rose more than tenfold in the same period to nearly 6.5 million. Tractor stocks grew very quickly in the late 1980s, but growth has since leveled off



Statistics from China's dedicated transportation enterprises<sup>1</sup> show a steady overall decline in vehicle miles per gallon for both trucks and buses, whether fueled by gasoline or diesel (Table V-5). The statistics on ton-km per gallon, however, indicate improvement for freight vehicles, as average vehicle size grows, while buses seem to be more inefficient than before, perhaps due to lower passenger loadings than in the past. Design values for fuel economy of newer vehicles is significantly improved over older vehicles, though fuel use under actual driving conditions is thought to be 20% to 30% higher than design values.<sup>2</sup>

China's steam locomotives are rapidly being phased out, replaced by cleaner and more efficient diesel and electric locomotives (Table V-6). By 1993 the combined capacity of electric locomotives was over 7 GW, compared to less than 2 GW in 1986 (Table IV-12). Some of the locomotives discarded by the central railway system end up at local railways. The total number of units has been rising every year as construction of China's overburdened railways continues.

The average efficiency of steam locomotives (energy used per t-km) has deteriorated as the fleet ages and resources are put into maintaining diesel and electric locomotives instead (Table V-7). These latter two types of locomotives saw significant improvements in efficiency through the 1980s, but have leveled off in the 1990s. Water transport efficiencies have fluctuated, with diesel units tending towards overall improvements.

## HOUSEHOLDS APPLIANCES

Statistics on stocks of household durable goods show waves of penetration of various classes of electrical appliances beginning in the late 1970s (Table V-8). Electric fans (260 million in 1992) were first, followed by television sets (228 million), clothes washers (117 million), and refrigerators (39 million). Air conditioners are becoming more numerous, but statistics on total stocks are not yet available. Trends in output for air conditioners resemble those for the other appliances (and imports—both official and unofficial—are substantial), suggesting that stocks will be similar to those of the other appliances (i.e.

several tens of millions) by the end of the decade. In terms of combined capacity of electrical appliances, between 1986 and 1993, urban and rural stocks grew by 12% and 14% annually to 29 GW and 18 GW respectively (Table V-12).

By 1993 most urban households had at least one fan and one TV, most likely a color TV (Table V-9). Most also had clothes washers, two-thirds had electric cooking utensils (typically electric rice cookers), and slightly more than half owned refrigerators. Air conditioners and freezers were still relatively rare, with 2.3 and 1.6 per hundred households respectively. In most urban households appliance operation is limited by the relatively low capacity of residential wiring (generally about 1.5 kW), but many utilities will rewire apartments for a fee, allowing ownership of, for instance, multiple air conditioners.

Electrical appliances are much less commonplace in rural households, about 70% of which had television sets and electric fans in 1993 (Table V-10). There were only 14 clothes washers and 3.6 refrigerators per hundred households. Limits on the power rural households can draw are even more severe than for urban households, and a significant minority (about 13%) of rural dwellers are still without electricity.

## AGRICULTURAL MACHINERY

Agricultural machinery has doubled in terms of power since 1980 (Table V-11). The largest increments among the various categories have been in small, two-wheeled diesel tractors (often used for transportation) and trucks. The former grew by a factor of six and the latter by a factor of four, together accounting for about two-thirds of the increase. Over the same period, however, agricultural sector oil use rose by only one-fifth, possibly indicating worsening rural oil shortages, large amounts of unreported consumption, or both. On the other hand, a "wholesale ex-retail" market in oil products has arisen in recent years, and consumption is likely not to be counted in the rural sector. Nearly half the 64 GW total capacity of the sector's electrical equipment is in the form of irrigation pumps, and utilization rates are low, under 10% (Table V-12).

## INDUSTRIAL EQUIPMENT AND PRODUCTS

Despite continuing improvements, Chinese-made equipment still has a long way to go before reaching the efficiency levels of equipment available internationally. The average Chinese industrial boiler has an efficiency of 65%, at least 15 percentage points less efficient than what is used in developed countries (Table V-13). This is due in part to boiler design, materials, and manufacturing quality, typically small unit size, and in part to the generally poor quality of coal (unsorted, unwashed, and often of thermal quality outside boiler design parameters) used to fire most boilers. Fans and pumps by themselves are about 75% efficient. While this is about 10 percentage points that what is available elsewhere, system efficiencies (including components other than fans and pumps) are much lower, about half of the 70% or more of efficient international systems. While the efficiencies of China's larger advanced motors approach international levels, smaller ones (1.1 kW) are significantly less efficient.

Output of representative energy-intensive products has increased across the board since 1980 (Table V-14). Building materials, paper, and petrochemicals have kept pace with or exceeded the economy's 9-10% average growth rates, while those of iron and steel have been slightly less. Growth in output of other chemicals, especially ammonia for synthetic fertilizers, have grown much more slowly.

The Chinese government began collecting detailed information on physical energy intensity (energy per unit of physical output, or specific energy consumption) at state-owned enterprises in the early 1980s.<sup>3</sup> Reductions in energy intensity in certain categories have been marked, whereas in some no consistent pattern is visible, and in others increasing electrification has caused intensity to rise (Table V-15). Prospects for further improvements in technical efficiency are good, since many cost-effective opportunities remain. Furthermore, rising energy prices (particularly electricity rates; see Chapter VI) and the growing sensitivity of enterprises to costs continue to raise awareness of the desirability of raising energy efficiency.

Energy inputs per unit of steel, including both fuel and electricity, have declined significantly, at an average rate of over 2% per year. This is true for

primary producers and scrap metal processors. On the other hand, China still uses considerably more energy than the steel industries in other countries, including Russia and India. Trends for nonferrous metals have not been so clear, fluctuating over the decade. The electricity intensity of aluminum smelting declined overall, for instance, while alumina production required nearly one-fourth more energy per unit of output in 1992 compared to 1980.

Statistics for cement, bricks, and flat glass demonstrate that fuel intensity for building materials manufacture has declined while electricity use has risen. For cement, small rural plants actually use less energy per unit of output (since many state-owned plants use fuel-intensive wet process kilns), but turn out a product of lower quality. Average energy intensities are much greater than in Japan, but comparable to or lower than the US and Russia. Small brick manufacturers use nearly one and one-half times as much energy to produce the same amount of output, although intensity for both rural plants and the sector as a whole have been declining steadily.

Intensities of chemical manufacturing processes have shown mixed trends. Some have dropped significantly, especially those for petrochemicals, as unit size has increased, facilities are modernized, and feedstock mixes shift. Ethylene intensities, for example, fell by 3% per year in the later 1980s (although levels are still about twice those of Japan), and polypropylene intensities even more. The energy intensity of ammonia production actually increased overall between 1980 and 1992, while it fell by 1.4% and 2.8% per year for medium and small plants respectively, partly as the result of vigorous efforts by the government to improve efficiency in the industry. Calcium carbide and phosphorous intensities declined, while those for carbon black and sulfuric acid rose. Sulfuric acid manufacture is actually an exothermic process which in other countries is used to generate electricity, but in China electricity demand for this process has been rising.

Electricity intensities of light industrial sectors, represented here by paper and cotton spinning, have generally increased, as demand for higher quality products and installation of environmental controls makes manufacturing processes more complex.

Between 1986 and 1993 installed capacity of electricity-using equipment (including utility sector equipment) grew from about 250 GW to 429 GW

(Table V-12). The fastest growing sector was households, more than doubling from 20 GW to 47 GW. The largest increment was in industry, with over 60% of capacity. Industry also has the highest utilization rate (as implied by electricity consumption statistics), i.e., 0.27, with the highest rates for industries with continuous processes like oil refining, chemicals, and metals. The lowest utilization rate, 0.09, is in agriculture, in which half of electricity using capacity is devoted to irrigation pumps.

<sup>1</sup> These represent only a fraction of China's vehicle stock, as most are owned by entities in other sectors, e.g., factories, commercial enterprises, farms, or individuals.

<sup>2</sup> Jiang, 1995.

<sup>3</sup> For those industrial sectors dominated by large state-owned enterprises, e.g., ferrous metals and refining, such statistics are reasonably good proxies for industry-wide averages. For other sectors, e.g., building materials, in which half of output or more comes from non-state enterprises, official data may be a poor guide to conditions typical of many enterprises.

Table V-1. Freight Movements by Mode, 1949-1993—Billion Tonne-km

Year	Railroad			Highway *	River	Ocean	Pipeline	Air	Total
	Central	Local	Total						
1949	18.40	-	18.40	0.81	6.31	-	-	0.02	25.55
1950	39.41	-	39.41	0.94	5.13	-	-	<0.005	45.48
1951	51.56	-	51.56	1.15	8.65	1.7	-	<0.005	63.06
1952	60.16	-	60.16	1.45	11.78	2.8	-	<0.005	76.19
1953	78.14	-	78.14	2.33	14.46	4.1	-	<0.005	99.03
1954	93.24	-	93.24	2.91	20.47	3.7	-	0.01	120.33
1955	98.15	-	98.15	3.41	23.40	7.0	-	0.01	131.97
1956	120.35	-	120.35	4.44	27.69	6.6	-	0.01	159.09
1957	134.59	-	134.59	4.80	33.86	7.7	-	0.01	180.96
1958	185.53	-	185.53	7.75	44.22	7.5	-	0.01	245.01
1959	247.63	-	247.63	10.67	59.30	9.6	-	0.02	327.22
1960	276.69	-	276.69	13.25	64.98	11.8	-	0.03	366.75
1961	200.77	-	200.77	7.61	42.58	11.7	-	0.02	262.68
1962	171.91	0.20	172.11	6.21	33.96	11.3	0.0	0.02	223.60
1963	181.46	0.14	181.60	6.43	33.70	13.1	0.0	0.02	234.85
1964	212.45	0.15	212.60	7.42	36.93	18.1	0.0	0.02	275.07
1965	269.65	0.23	269.88	9.51	43.32	23.7	0.0	0.03	346.44
1966	301.63	0.27	301.89	11.64	48.60	28.0	0.0	0.03	390.16
1967	226.58	0.30	226.88	10.15	41.57	26.4	0.0	0.04	305.04
1968	223.53	0.35	223.88	8.44	43.07	35.5	0.0	0.03	310.92
1969	277.93	0.40	278.33	11.03	49.53	36.5	0.0	0.03	375.42
1970	349.14	0.46	349.60	13.81	51.23	41.9	0.0	0.04	456.58
1971	375.95	0.64	376.59	15.38	56.87	70.7	0.9	0.03	520.47
1972	390.51	0.81	391.32	16.43	60.88	90.1	5.7	0.03	564.46
1973	407.48	0.74	408.22	17.57	67.22	127.7	8.7	0.03	629.44
1974	380.58	0.71	381.29	17.48	69.18	147.1	16.3	0.04	631.39
1975	424.62	0.95	425.57	20.27	81.77	175.7	26.2	0.06	729.57
1976	386.07	0.88	386.95	20.96	85.52	161.2	35.7	0.07	690.40
1977	455.73	1.15	456.88	25.13	102.07	174.1	38.7	0.08	796.96
1978	533.35	1.17	534.52	27.41	129.22	248.7	43.0	0.10	982.95
1979	558.80	1.00	559.80	74.50	139.32	317.1	47.6	0.12	1,138.44
1980	570.75	0.96	571.70	76.40	152.08	353.2	49.1	0.14	1,202.62
1981	570.13	1.07	571.20	78.00	150.69	364.3	49.9	0.17	1,214.26
1982	610.92	1.08	612.00	94.90	170.81	376.9	50.1	0.20	1,304.91
1983	663.39	1.21	664.60	108.40	181.06	397.7	52.4	0.23	1,404.39
1984	723.51	1.29	724.80	153.60	196.10	437.4	57.2	0.31	1,569.41
1985	811.19	1.41	812.60	169.30	237.10	532.9	60.3	0.42	1,812.62
1986	875.03	1.47	876.50	211.80	270.00	594.8	61.2	0.48	2,014.78
1987	945.62	1.58	947.20	266.00	288.90	657.6	62.5	0.65	2,222.85
1988	986.06	1.74	987.80	322.00	310.40	696.6	65.0	0.73	2,382.53
1989	1,037.30	2.12	1,039.42	337.47	349.76	768.9	62.9	0.69	2,559.14
1990	1,060.12	2.12	1,062.24	335.81	†	1,159.19	62.7	0.82	2,620.76
1991	1,094.81	2.39	1,097.20	342.80	396.54	899.0	62.1	1.01	2,798.65
1992	1,154.85	2.70	1,157.56	375.54	422.22	903.4	61.7	1.34	2,921.76
1993	1,192.34	3.12	1,195.46	407.05	472.68	913.4	60.8	1.66	3,042.66

\* Data on highway transport for 1949-1978 include freight carried by transportation work units only. Subsequent data also include freight carried by vehicles belonging to other types of work units, e.g., industrial and agricultural. Data for 1984 and later years further include freight carried by private motor vehicles.

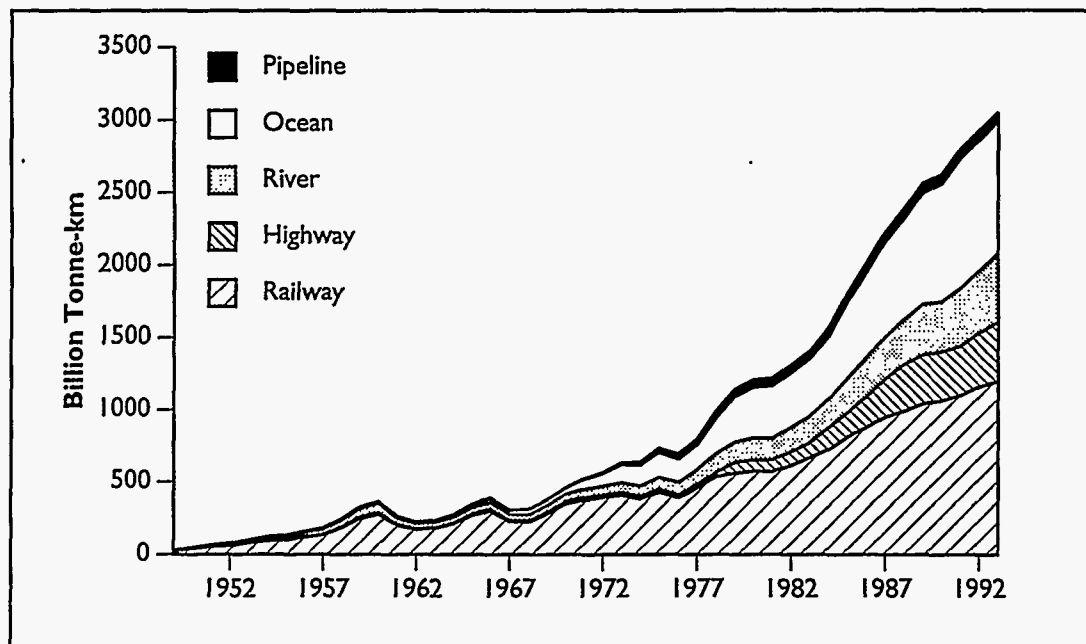
† River shipping is contained in 1990 figure for ocean shipping.

Source: China Statistical Yearbook, various years.

**Table V-1. Freight Movements by Mode, 1949-1993 (continued)**

Average Annual Rates of Growth							
	Rail	Highway	River	Ocean	Pipeline	Air	Total
1949-1971	14.3%	12.9%	10.0%	17.4%	-	3.0%	14.0%
1971-1980	4.7%	19.5%	11.5%	19.6%	55.9%	18.7%	9.8%
1981-1990	7.1%	17.6%	9.6%	9.3%	2.6%	19.1%	8.9%
1990-1993	4.0%	6.6%	11.1%	3.9%	-1.0%	26.5%	5.1%

**Figure V-1. Freight Movements by Mode**



Source: Statistical Yearbook of China, various years.

Table V-2. Passenger Travel by Mode, 1949-1993—Billion Passenger-km

Year	Railroad			Highway	Water	Air	Total
	Central	Local	Total				
1949	13.00	-	13.00	0.80	1.52	0.19	15.50
1950	21.24	-	21.24	1.28	1.47	0.01	24.00
1951	23.05	-	23.05	1.72	2.17	0.02	26.96
1952	20.06	-	20.06	2.26	2.45	0.02	24.79
1953	28.17	-	28.17	3.38	3.41	0.03	34.99
1954	29.47	-	29.47	4.13	3.44	0.05	37.09
1955	26.74	-	26.74	5.03	3.52	0.06	35.35
1956	34.38	-	34.38	7.82	4.23	0.10	46.53
1957	36.13	-	36.13	8.81	4.64	0.08	49.66
1958	40.92	-	40.92	11.61	4.58	0.12	57.23
1959	51.72	-	51.72	13.97	5.34	0.14	71.17
1960	67.40	-	67.40	14.60	6.19	0.16	88.35
1961	89.56	-	89.56	12.88	7.95	0.14	110.53
1962	85.73	0.17	85.90	14.15	8.39	0.12	108.56
1963	53.12	0.09	53.21	13.43	5.88	0.14	72.66
1964	48.52	0.09	48.62	14.63	5.13	0.20	68.58
1965	47.78	0.12	47.90	16.82	4.47	0.25	69.44
1966	50.36	0.13	50.49	20.75	6.43	0.22	77.89
1967	59.38	0.15	59.54	20.00	6.60	0.24	86.38
1968	67.88	0.17	68.06	18.58	6.78	0.21	93.63
1969	77.01	0.20	77.21	22.22	7.47	0.17	107.07
1970	71.59	0.23	71.82	24.01	7.10	0.18	103.11
1971	76.01	0.24	76.25	26.81	7.34	0.30	110.70
1972	84.90	0.29	85.19	30.25	7.71	0.42	123.57
1973	89.99	0.27	90.26	33.33	8.36	0.57	132.52
1974	92.28	0.27	92.55	35.49	8.69	0.93	137.66
1975	95.26	0.15	95.41	37.45	9.06	1.54	143.46
1976	95.47	0.24	95.71	40.25	9.43	1.57	146.96
1977	102.02	0.26	102.27	44.81	9.75	1.83	158.67
1978	109.08	0.24	109.32	52.10	10.06	2.79	174.27
1979	121.37	0.24	121.62	60.33	11.40	3.50	196.85
1980	138.04	0.26	138.30	72.95	12.91	3.96	228.11
1981	146.99	0.28	147.26	83.90	13.78	5.02	249.96
1982	157.20	0.28	157.48	96.39	14.45	5.95	274.28
1983	177.34	0.31	177.65	110.56	15.39	5.90	309.50
1984	204.32	0.32	204.64	133.69	15.39	8.35	362.07
1985	241.25	0.36	241.61	172.49	17.87	11.70	443.66
1986	258.31	0.36	258.67	198.17	18.21	14.60	489.65
1987	284.00	0.31	284.31	219.04	19.59	18.20	541.14
1988	325.73	0.30	326.03	252.82	20.39	21.70	620.94
1989	303.44	0.30	303.74	266.21	18.83	18.68	607.46
1990	261.01	0.25	261.26	262.03	16.49	23.05	562.83
1991	282.48	0.33	282.81	287.17	17.72	30.13	617.84
1992	314.83	0.39	315.22	319.26	19.84	40.61	694.94
1993	347.94	0.39	348.33	370.07	19.65	47.76	785.81

Source: China Statistical Yearbook, various years.

Table V-2. Passenger Travel by Mode, 1949-1993 (continued)

Average Rates of Growth					
	Rail	Highway	Water	Air	Total
1949-1971	8.4%	17.3%	7.4%	2.1%	9.3%
1971-1980	6.8%	11.8%	6.5%	33.4%	8.4%
1981-1990	6.6%	13.5%	2.0%	18.5%	9.4%
1990-1993	10.1%	12.2%	6.0%	27.5%	11.8%

Figure V-2. Passenger Travel by Mode

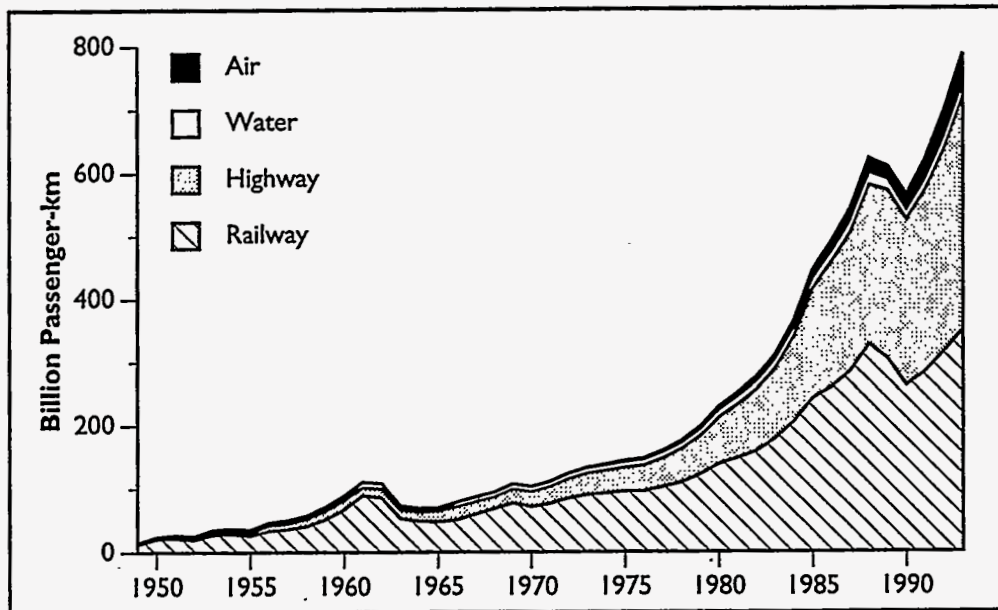


Table V-3. Stock of Civilian Motor Vehicles, 1970-1993 — Thousands

Year	Trucks			Passenger Vehicles			Specialty Vehicles§	Motorcycles			Four-Wheeled	Tractors Two-Wheeled	Tractor Subtotal	Other Vehicles	Total Vehicles
	Large Trucks*	Small Trucks†	Subtotal	Buses¶	Small Vehicles	Passenger Subtotal		Two-Wheeled	Three-Wheeled	Motorcycle Subtotal					
1970	305.2	15.2	320.4	31.1	44.2	75.3	-	-	-	-	-	-	-	-	395.7
1971	356.3	20.1	376.4	35.7	48.1	83.8	-	-	-	-	-	-	-	-	460.2
1972	418.0	19.4	437.4	40.9	59.3	100.2	-	-	-	-	-	-	-	-	537.6
1973	483.9	20.8	504.7	47.9	71.6	119.5	-	-	-	-	-	-	-	-	624.2
1974	561.7	24.4	586.1	52.5	90.3	142.8	-	-	-	-	-	-	-	-	728.9
1975	652.5	27.8	680.3	60.3	112.8	173.1	-	-	-	-	-	-	-	-	853.4
1976	754.2	31.2	785.4	68.9	134.2	203.1	-	-	-	-	-	-	-	-	988.5
1977	854.2	29.4	883.6	77.3	149.1	226.4	-	-	-	-	-	-	-	-	1,110.0
1978	966.8	34.9	1,001.7	87.9	171.1	259.0	-	-	-	126.0	-	-	-	-	1,260.7
1979	1,107.2	36.5	1,143.7	99.6	197.2	296.8	-	-	-	-	-	-	-	-	1,440.5
1980	1,257.6	41.4	1,299.0	113.0	237.8	350.8	-	-	-	244.7	-	-	-	-	1,649.8
1981	1,374.1	66.8	1,440.9	130.4	275.3	405.7	-	-	-	-	-	-	-	-	1,846.6
1982	1,480.6	86.9	1,567.5	145.6	296.2	441.8	148.1	-	-	320.0	-	-	-	-	2,009.3
1983	1,576.7	117.7	1,694.4	161.3	316.5	477.8	154.1	-	-	405.6	-	-	-	-	2,172.2
1984	1,695.6	188.1	1,883.7	182.3	380.5	562.8	157.7	-	-	598.9	-	-	-	-	2,446.5
1985	-	-	2,232.0	-	-	794.5	-	-	-	946.0	-	-	-	1,783.5	3,026.5
1986	-	-	2,465.7	-	-	966.1	187.7	-	-	1,483.2	-	-	-	2,288.2	3,431.8
1987	2,105.8	706.3	2,812.1	273.6	841.0	1,114.6	154.0	1,358.5	1,119.2	2,477.6	1,429.2	2,318.2	3,747.4	304.6	10,305.7
1988	2,280.5	898.0	3,178.5	299.4	1,004.4	1,303.8	161.6	2,136.0	887.9	3,023.9	1,403.4	2,512.7	3,916.1	318.2	11,583.8
1989	2,419.0	1,044.7	3,463.7	311.9	1,152.4	1,464.3	185.2	2,670.0	923.3	3,593.3	1,580.9	2,523.2	4,104.1	374.7	12,810.6
1990	2,495.8	1,189.0	3,684.8	333.0	1,288.9	1,621.9	206.9	3,105.8	1,107.0	4,212.8	1,977.7	2,648.1	4,625.8	410.5	14,352.2
1991	2,607.7	1,378.5	3,986.2	350.5	1,501.9	1,852.4	212.6	3,795.8	1,255.7	5,051.5	2,237.3	2,708.0	4,945.3	518.7	16,048.0
1992	2,754.4	1,660.1	4,414.5	380.6	1,881.0	2,261.6	241.3	4,989.3	1,485.6	6,474.9	2,778.5	2,592.3	5,370.8	687.2	18,763.1
1993	-	-	5,010.0	-	-	2,859.8	-	-	-	-	-	-	-	905.9	-

\* Large trucks have an average payload of about 5 tonnes.

† Small trucks have an average payload of about 1.7 tonnes.

¶ Buses have an average of 40 seats.

§ Small passenger vehicles have an average of 8 seats.

§ Includes the categories of "specialized motor vehicles" and "special purpose motor vehicles".

Sources: China Energy Statistical Yearbook, various years; Statistical Yearbook of China, various years.



Figure V-3. Civilian Motor Vehicles

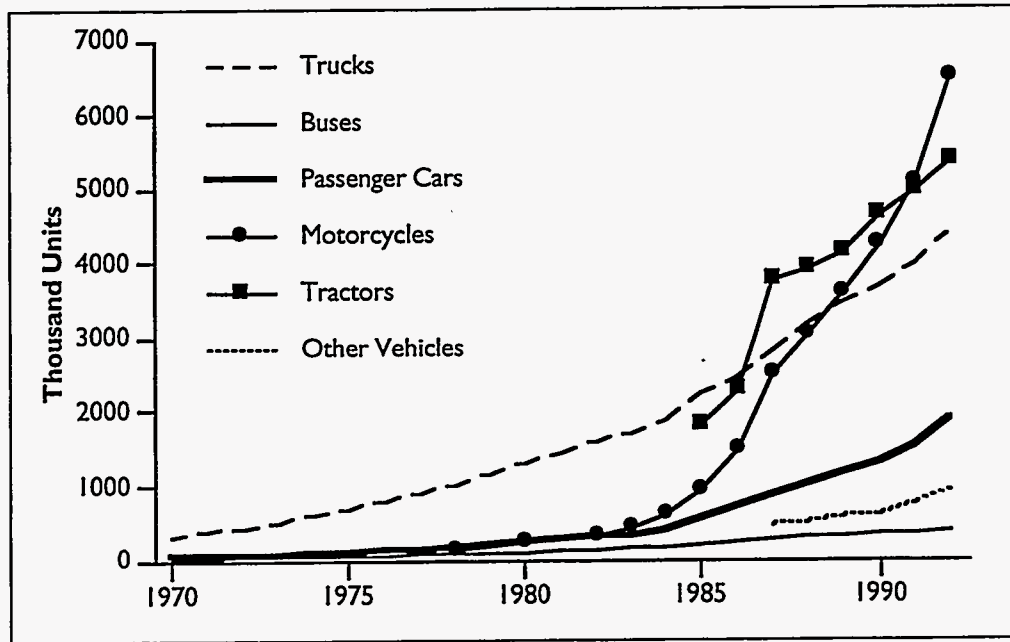


Table V-4. Motor Vehicle Production, 1978-1994

I. Output time series*, Thousands									
Year	Motor Vehicles	of which:					Motorcycles	Large & Medium Tractors †	Small Tractors
		buses	sedans	ATVs	trucks ‡	other			
1978	149.1	-	2.6	12.9	96.1	-	-	113.5	324.2
1979	185.7	-	4.2	17.2	-	-	-	125.6	317.5
1980	222.3	-	5.4	20.4	135.5	-	-	97.9	217.9
1981	175.6	-	3.4	15.5	-	-	-	52.8	198.9
1982	196.3	-	4.0	15.3	-	-	-	40.3	298.3
1983	239.8	6.2	6.0	18.2	137.1	72.2	-	37.0	497.7
1984	316.4	7.0	6.0	16.6	181.8	105.0	-	39.7	688.6
1985	437.2	11.9	5.2	20.7	269.0	130.3	-	45.0	822.5
1986	369.8	9.2	12.3	21.9	229.1	97.3	-	28.6	774.5
1987	471.8	20.5	20.9	27.4	298.4	104.7	-	37.1	1,106.0
1988	644.7	50.9	36.8	36.0	403.3	117.7	-	47.2	1,335.7
1989	583.5	47.6	28.8	48.3	363.4	95.3	-	39.8	1,118.1
1990	514.0	23.1	42.4	44.3	289.7	114.4	-	39.4	1,101.4
1991	714.2	42.8	81.1	53.4	382.5	154.5	-	52.7	1,347.8
1992	1,066.7	84.6	162.7	61.7	476.7	281.0	-	57.0	1,390.7
1993	1,298.5	-	230.0	-	597.9	-	-	37.7	961.4
1994	1,402.4	-	380.0	-	-	-	5,124.8	50.7	1,287.7

\* These are mainly State Statistical Bureau figures, which in general are slightly larger than other statistics, e.g., the China Automotive Industry Corporation. Data in subtable 2.

† Tractors with power  $\geq 14.72$  kW.

Source: China Statistical Yearbook, various years; China Automotive Industry Yearbook, 1993; China News Service, 6/29/95; State Statistical Bureau.

**Table V-4. Motor Vehicle Production, 1978-1994 (continued)**

<b>2. Output structure, 1992— units</b>			
<b>Vehicle type</b>	<b>Domestically Manufactured</b>	<b>Imported Kits</b>	<b>Total</b>
Trucks	441,107	19,167	460,274
heavy	9,747	729	10,476
medium	178,728	0	178,728
light	194,114	18,238	212,352
mini	58,518	200	58,718
ATVs	63,373	0	63,373
heavy	874	0	874
medium	752	0	752
light	61,747	0	61,747
passenger	55,378	0	55,378
Dump Trucks	38,093	485	38,578
Tow Trucks	757	1	758
Buses	75,986	8,565	84,551
jointed	230	0	230
large	1,964	82	2,046
medium	5,625	110	5,735
small	60,848	8,373	69,221
mini	7,269	0	7,269
Sedans	67,716	95,009	162,725
mini	2,716	35,608	38,324
Passenger Vans	40,669	0	40,669
light	17,389	0	17,389
mini	23,280	0	23,280
Cargo Vans	11,372	0	11,372
heavy	4	0	4
medium	209	0	209
light	10,108	0	10,108
mini	1,051	0	1,051
Other Vehicles	259	0	259
Automotive Chassis	199,162	0	199,162
truck	105,080	0	105,080
ATV	11,428	0	11,428
passenger	81,270	0	81,270
other	1,384	0	1,384
<b>Total</b>	<b>938,494</b>	<b>123,227</b>	<b>1,061,721</b>

Source: China Statistical Yearbook, various years; China Automotive Industry Yearbook, 1993; China News Service, 6/29/95.

Table V-5. Motor Vehicle Fuel Economy, 1970-1990

I. Truck and Bus Averages \*

Trucks

	Gasoline				Diesel			
	l/100 t-km	t-mpg	liters/100 km	mpg	l/100 t-km	t-mpg	liters/100 km	mpg
1970	9.4	25	32.4	7.31	6.3	38	24.9	9.51
1971	9.2	26	32.2	7.35	6.2	38	25.2	9.40
1972	9.1	26	33.0	7.18	6.1	39	26.3	9.00
1973	9.1	26	33.3	7.11	6.0	39	26.3	9.00
1974	9.3	25	34.2	6.92	6.3	38	26.5	8.94
1975	9.3	25	34.1	6.94	6.9	34	27.4	8.64
1976	9.0	26	34.1	6.94	5.8	41	28.4	8.34
1977	8.6	28	33.9	6.99	6.5	36	22.6	10.48
1978	8.5	28	33.7	7.03	6.0	39	26.7	8.87
1979	8.7	27	33.4	7.09	6.1	39	27.1	8.74
1980	8.7	27	33.4	7.09	6.2	38	27.8	8.52
1981	8.5	28	34.0	6.97	6.0	39	28.4	8.34
1982	8.2	29	33.8	7.01	5.9	40	28.9	8.19
1983	8.0	30	34.6	6.84	5.8	41	29.6	8.00
1984	7.9	30	35.3	6.71	5.7	42	31.0	7.64
1985	7.7	31	36.0	6.58	5.8	41	32.7	7.24
1986	7.6	31	36.4	6.51	5.1	46	34.0	6.97
1987	7.6	31	37.3	6.35	5.1	46	34.8	6.81
1988	7.2	33	37.3	6.35	4.8	49	35.4	6.69
1989	7.1	33	-	-	4.7	50	-	-
1990	7.1	33	-	-	4.8	49	-	-

Buses

	Gasoline				Diesel			
	l/100 t-km	t-mpg	liters/100 km	mpg	l/100 t-km	t-mpg	liters/100 km	mpg
1970	-	-	28.3	8.37	-	-	24.6	9.63
1971	-	-	28.0	8.46	-	-	24.7	9.59
1972	-	-	28.5	8.31	-	-	21.0	11.28
1973	-	-	28.7	8.25	-	-	22.5	10.53
1974	-	-	29.7	7.97	-	-	25.0	9.47
1975	-	-	29.9	7.92	-	-	24.8	9.55
1976	-	-	30.4	7.79	-	-	25.8	9.18
1977	-	-	29.7	7.97	-	-	26.7	8.87
1978	-	-	28.6	8.28	-	-	26.8	8.84
1979	-	-	28.3	8.37	-	-	25.1	9.43
1980	-	-	28.5	8.31	-	-	29.1	8.14
1981	-	-	23.6	10.03	-	-	24.4	9.71
1982	-	-	29.0	8.17	-	-	25.7	9.21
1983	-	-	29.2	8.11	-	-	26.6	8.90
1984	-	-	29.2	8.11	-	-	24.7	9.59
1985	8.0	30	30.0	7.89	6.1	39	26.9	8.80
1986	8.1	29	29.9	7.92	6.4	37	27.4	8.64
1987	8.2	29	30.3	7.82	6.2	38	25.0	9.47
1988	8.2	29	30.9	7.66	6.4	37	25.2	9.40
1989	8.1	29	-	-	6.5	36	-	-
1990	8.7	27	-	-	7.2	33	-	-

\* Includes only vehicles belonging to local, state-owned transportation enterprises.

Source: China Energy Yearbook, various years; Energy Conservation in China, 1993; Energy of China, no. 2, 1994.

Table V-5. Motor Vehicle Fuel Economy, 1970-1990 (continued)

2. By Vehicle							
Vehicle	Capacity	Power (hp)	Compression Ratio	Max. Speed (km/hr)	Gasoline Type	Fuel Economy * liters/100 km	mpg
Older vehicles							
Jiefang CA10B	4 t	-	6.0	-	66 (MON)	29.0	8.2
Jiefang CA15 ¶	5 t	115	-	80	-	26.5	8.9
Dongfeng EQ140 ¶	5 t	135	7.0	90	70 (MON)	26.5	8.9
Nanjing NJ130	2.5 t	-	6.2	-	66 (MON)	20.0	11.8
Beijing BJ130	2 t	-	7.2	-	70 (MON)	15.0	15.8
Yuejin NJ131 ¶	3 t	88	-	90	[diesel]	16.5	14.4
Huanghe JN 162 ¶	10 t	210	-	83	[diesel]	26.5	8.9
Beijing BJ212	[jeep]	-	7.2	-	70 (MON)	13.0	18.2
Shanghai SH760	[sedan]	-	7.7	-	80 (MON)	14.0	16.9
JT661 ¶	40 †	95	-	75	-	28.0	8.5
JT662 ¶	45 †	135	-	85	-	27.0	8.8
JT680 ¶	60 †	160	-	71	[diesel]	25.0	9.5
New vehicles							
Jiefang CA141	5.t	-	7.4	-	90 (RON)	26.5	8.9
Dongfeng EQ142	6.t	-	7.4	-	90 (RON)	26.5	8.9
Nanjing NJ131	3.t	-	7.5	-	90 (RON)	17.0	13.9
Beijing BJ134	2.t	-	7.2	-	90 (RON)	13.5	17.5
Beijing BJ 313	[jeep]	-	8.2	-	90 (RON)	11.0	21.5
Shanghai Santana	[sedan]	-	8.5	-	90 (RON)	10.3	23.0

\* These are design values for vehicle km. Actual fuel economy tends to be significantly lower, e.g., the Santana uses 12-13 l/100 km in urban driving, rather than the 10.3 l/100 km intended for urban settings.

† Number of passengers

¶ 1985 figures.

Source: China Energy Yearbook, various years; Energy Conservation in China, 1993; Energy of China, no. 2, 1994.

Table V-6. Stock of Railway Locomotives by Engine Type, Various Years 1952-1993

I. Central Railway Locomotives							
Year	Steam		Diesel		Electric		Total Units
	Quantity (units)	Haulage/Unit (tonnes)	Quantity (units)	Haulage/Unit (tonnes)	Quantity (units)	Haulage/Unit (tonnes)	
1952	4,180	-	0	-	0	-	4,180
1955	4,218	-	0	-	0	-	4,218
1960	6,039	-	12	-	2	-	6,053
1965	6,142	-	66	-	30	-	6,238
1970	6,878	-	566	-	60	-	7,504
1971	7,076	-	701	-	85	-	7,862
1972	7,272	-	887	-	94	-	8,253
1973	7,522	-	1,064	-	140	-	8,726
1974	7,715	-	1,253	-	170	-	9,138
1975	7,824	-	1,352	-	191	-	9,367
1976	7,836	-	1,478	-	191	-	9,505
1977	7,830	-	1,617	-	199	-	9,646
1978	7,828	-	1,805	-	221	-	9,854
1979	7,899	-	2,014	-	236	-	10,149
1980	7,801	-	2,190	-	287	-	10,278
1981	7,718	-	2,325	-	317	-	10,360
1982	7,613	-	2,508	-	350	-	10,471
1983	7,530	-	2,734	-	407	-	10,671
1984	7,551	2,156	3,102	2,018	484	2,248	11,137
1985	7,674	2,192	3,511	2,216	587	2,378	11,772
1986	7,542	2,212	4,017	2,379	707	2,483	12,266
1987	7,381	2,207	4,400	2,460	948	2,577	12,729
1988	7,130	2,191	4,836	2,489	1,197	2,597	13,163
1989	6,686	-	5,250	-	1,430	-	13,366
1990	6,279	-	5,680	-	1,633	-	13,592
1991	5,986	2,104	6,111	2,591	1,809	2,639	13,906
1992	5,498	2,102	6,582	2,603	2,003	2,693	14,083
1993	5,109	2,052	7,092	2,618	2,196	2,759	14,397

2. Local Railway Locomotives			
Year	Steam (units)	Diesel (tonnes)	Total Units
1978	211	114	325
1979	-	-	-
1980	279	126	405
1981	-	-	-
1982	-	-	-
1983	-	-	-
1984	-	-	-
1985	239	129	368
1986	250	124	374
1987	247	122	369
1988	233	128	361
1989	233	122	355
1990	253	125	378
1991	264	125	389
1992	259	125	384
1993	261	123	384

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years; China Transportation Yearbook, 1994.

Figure V-4. Locomotive Stock

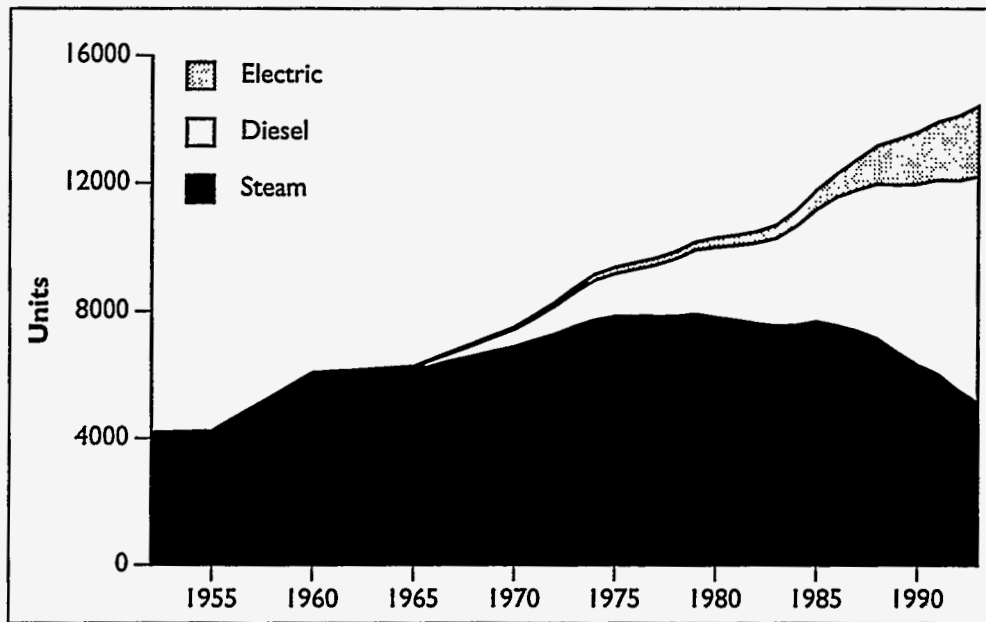


Table V-7. Rail and Water Transport Energy Intensities, \* 1980-1993

I. Rail Transport														
Steam Locomotives (kgce/1000 t-km)														
Railway Admin.	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Harbin	-	-	-	-	23.17	23.09	22.50	22.77	23.07	23.30	23.65	-	-	-
Shenyang	-	-	-	-	17.02	17.10	17.41	17.63	17.90	19.07	21.87	-	-	-
Beijing	-	-	-	-	14.56	14.10	15.12	16.59	17.23	17.78	18.72	-	-	-
Hohot	-	-	-	-	18.40	18.35	18.54	18.50	19.12	19.04	19.52	-	-	-
Zhengzhou	-	-	-	-	14.24	13.97	13.90	13.73	14.16	15.42	14.85	-	-	-
Jinan	-	-	-	-	13.76	15.06	15.44	14.78	14.29	15.63	16.32	-	-	-
Shanghai	-	-	-	-	15.68	16.85	17.49	18.50	19.47	19.50	19.71	-	-	-
Guangzhou	-	-	-	-	14.13	14.11	14.14	15.78	19.98	21.68	22.43	-	-	-
Yingzhou	-	-	-	-	14.19	13.79	13.68	13.28	12.78	13.14	13.74	-	-	-
Chengdu	-	-	-	-	18.94	19.78	21.54	19.78	19.50	19.30	19.15	-	-	-
Lanzhou	-	-	-	-	26.38	26.30	26.42	26.53	27.33	28.35	28.42	-	-	-
Urumqi	-	-	-	-	17.50	17.44	21.07	-	-	-	-	-	-	-
average	-	-	-	-	17.33	17.49	18.10	17.99	18.62	19.29	19.85	-	-	-
reported avg. of key enterprises	16.38	16.66	16.71	16.56	16.56	16.77	17.12	17.54	17.99	19.03	19.79	19.98	19.66	20.06
Diesel Locomotives (kg diesel/1000 t-km)														
Railway Admin.	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Harbin	-	-	-	-	4.01	4.14	3.84	3.61	3.24	3.09	2.98	-	-	-
Shenyang	-	-	-	-	3.30	3.14	2.73	2.56	2.42	2.26	2.24	-	-	-
Beijing	-	-	-	-	2.63	2.58	2.54	2.41	2.42	2.41	2.40	-	-	-
Hohot	-	-	-	-	-	-	-	3.53	2.83	2.58	2.54	-	-	-
Zhengzhou	-	-	-	-	2.54	2.28	2.17	2.12	2.12	2.06	2.11	-	-	-
Jinan	-	-	-	-	2.27	2.02	2.00	1.99	1.98	1.97	2.00	-	-	-
Shanghai	-	-	-	-	2.63	2.11	1.98	1.96	1.96	1.97	2.00	-	-	-
Guangzhou	-	-	-	-	3.00	2.91	2.78	2.52	2.35	2.18	2.23	-	-	-
Yingzhou	-	-	-	-	4.55	3.94	3.83	3.73	3.74	3.32	3.05	-	-	-
Chengdu	-	-	-	-	4.67	4.58	4.53	4.58	4.61	4.62	4.64	-	-	-
Lanzhou	-	-	-	-	6.61	5.59	4.57	4.35	4.32	4.28	4.15	-	-	-
Urumqi	-	-	-	-	3.87	3.69	3.51	3.30	3.24	3.24	3.23	-	-	-
average	-	-	-	-	3.64	3.36	3.13	3.06	2.94	3.09	3.05	-	-	-
reported avg. of key enterprises	3.5	3.41	3.29	3.24	3.14	2.88	2.68	2.59	2.52	2.44	2.44	2.43	2.44	2.44

\* Water transport includes only dedicated shipping enterprises, excluding the large number of vessels operated privately and by non-transportation enterprises.

Source: China Energy Statistical Yearbook, various years; China Transportation Yearbook, 1994; *Zhongguo Nengyuan* [Energy of China], no. 3, 1994.



Table V-7. Rail and Water Transport Energy Intensities, \* 1980-1993 (continued)

Electric Engines (kWh/1000 t-km)														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
average	12.8	12.21	12.06	12.48	12.72	12.15	11.40	11.25	11.26	11.02	11.10	11.26	11.24	11.12
Water Transport (ocean and coastal shipping units)														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990			
kg diesel/1000 t-naut mi	8.67	9.26	9.04	8.72	8.35	8.55	8.58	8.05	7.99	8.2	8.2			
kg resid oil/1000 t-naut mi	56.42	57.26	55.48	54.07	54.22	60.54	61.36	70.56	-	-	-			

\* Water transport includes only dedicated shipping enterprises, excluding the large number of vessels operated privately and by non-transportation enterprises.

Source: China Energy Statistical Yearbook, various years; China Transportation Yearbook, 1994; *Zhongguo Nengyuan* [Energy of China], no. 3, 1994.

**Table V-8. Stock and Output of Major Appliances, 1978-1994**

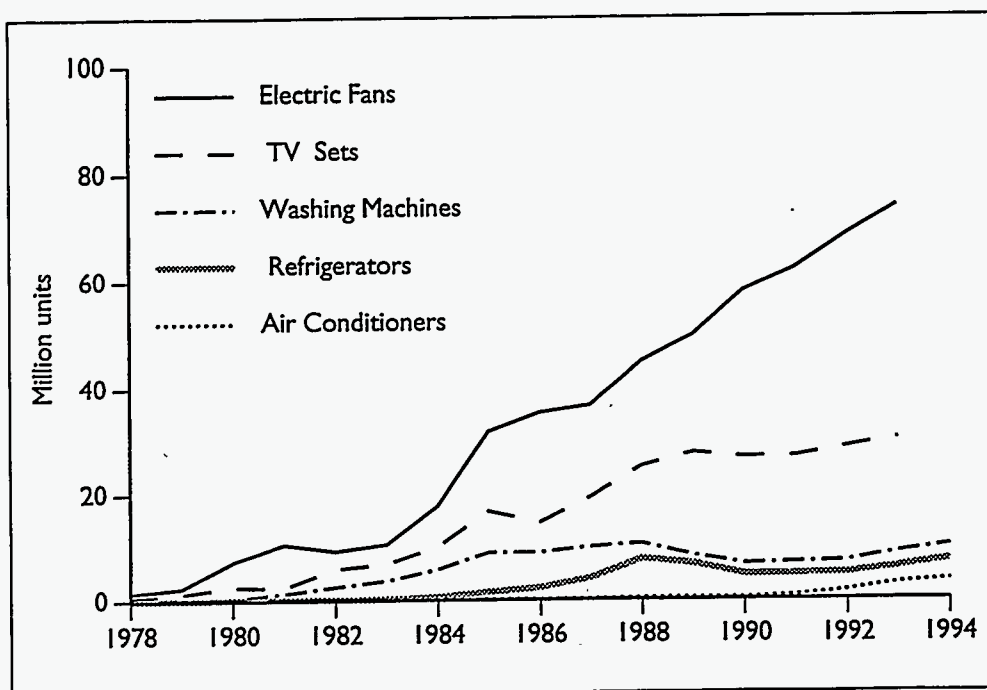
<b>1. Stock, millions</b>				
<b>Year</b>	<b>Electric Fans</b>	<b>TV Sets</b>	<b>Electric Clothes Washers</b>	<b>Refrigerators</b>
1978	9.20	3.04	0.01	0.09
1979	10.50	4.85	0.03	0.13
1980	13.65	9.02	0.26	0.19
1981	17.92	15.62	1.50	0.25
1982	25.91	27.61	5.90	0.44
1983	33.57	36.11	12.52	1.05
1984	43.40	47.63	19.28	1.82
1985	63.60	69.65	30.30	4.10
1986	86.05	92.14	43.33	7.27
1987	111.88	116.01	57.62	11.81
1988	145.46	143.44	74.64	19.27
1989	173.33	165.93	87.01	25.54
1990	201.27	185.46	96.28	29.96
1991	229.89	206.71	106.15	34.66
1992	257.74	228.43	117.09	39.41

<b>2. Output, millions</b>					
<b>Year</b>	<b>Electric Fans</b>	<b>TV Sets</b>	<b>Washing Machines</b>	<b>Refrigerators</b>	<b>Room Air Conditioners</b>
1978	1.4	0.5	<0.01	0.03	<0.01
1979	2.3	1.3	0.02	0.03	0.01
1980	7.2	2.5	0.25	0.05	0.01
1981	10.5	2.4	1.28	0.06	0.01
1982	9.2	5.9	2.53	0.10	0.02
1983	10.5	6.8	3.66	0.19	0.03
1984	17.7	10.0	5.78	0.55	0.06
1985	31.8	16.7	8.87	1.45	0.12
1986	35.3	14.6	8.93	2.25	0.10
1987	36.6	19.3	9.90	4.01	0.13
1988	45.0	25.1	10.47	7.58	0.26
1989	49.9	27.7	8.25	6.71	0.37
1990	58.0	26.8	6.63	4.63	0.24
1991	62.2	26.9	6.87	4.70	0.63
1992	68.4	28.7	7.08	4.86	1.58
1993	73.9	30.3	8.76	5.97	2.92
1994 *	-	-	10.10	7.30	3.60

\* First 11 months

Source: China Statistical Yearbook, various years; ACEEE.

Figure V-5. Appliance Output



**Table V-9. Urban Household Survey Data, \* 1981-1993**

	1981	1982	1983	1984	1985	1986
Surveyed Households	8,715	9,020	9,060	12,500	24,338	31,126
People per Household	4.24	4.14	4.06	4.04	3.89	3.82
Average Annual Income (yuan/yr) †	2,122	2,216	2,326	2,667	2,913	3,476
Annual Cost of Living (yuan/yr) †	1,937	1,950	2,054	2,260	2,619	3,052
of which cost of fuels & utilities (yuan/yr)	56	57	59	62	71	80
Floor Area per Person (m2)	5.27	5.61	5.9	6.32	7.46	8.04
Coal Use per Household (kg/yr)	1,018	950	931	1,029	1,053	1,022
Appliances per 100 Households:						
Fans	43	53	64	66	74	90
B & W TV Sets	57	72	81	82	67	65
Color TV Sets	0.6	1	3	5	17	27
Clothes Washers ¥	6	16	29	40	48	60
Refrigerators	0.2	0.7	2	3	7	13
Freezers	-	-	-	-	-	-
Room Air Conditioners	-	-	-	-	0.1	-
Electric Cooking Utensils ¥	-	-	-	-	19.0	-

	1987	1988	1989	1990	1991	1992	1993
Surveyed Households	32,855	34,945	35,235	35,660	36,730	36,290	35,390
People per Household	3.74	3.63	3.55	3.50	3.43	3.37	3.31
Average Annual Income (yuan/yr) †	3,786	4,327	4,927	5,330	5,876	6,846	8,550
Annual Cost of Living (yuan/yr) †	3,308	4,007	4,299	4,476	4,986	5,634	6,987
of which cost of fuels & utilities (yuan/yr)	84	100	122	140	-	193	252
Floor Area per Person (m2)	8.47	8.79	-	9.59	-	10.39	10.60
Coal Use per Household (kg/yr)	884	1,019	772	721	707	694	682
Appliances per 100 Households:							
Fans	104	118	129	136	143	146	152
B & W TV Sets	65	59	56	52	44	38	36
Color TV Sets	35	44	51	59	68	75	80
Clothes Washers ¥	67	73	76	78	81	83	86
Refrigerators	20	28	36	42	49	53	57
Freezers	-	-	-	-	-	1.1	1.6
Room Air Conditioners	-	-	-	0.3	-	1.2	2.3
Electric Cooking Utensils ¥	-	-	-	46.2	-	58.5	66.7

\* Surveys were conducted among a large number of cities. Data may not be statistically representative of all urban areas in China

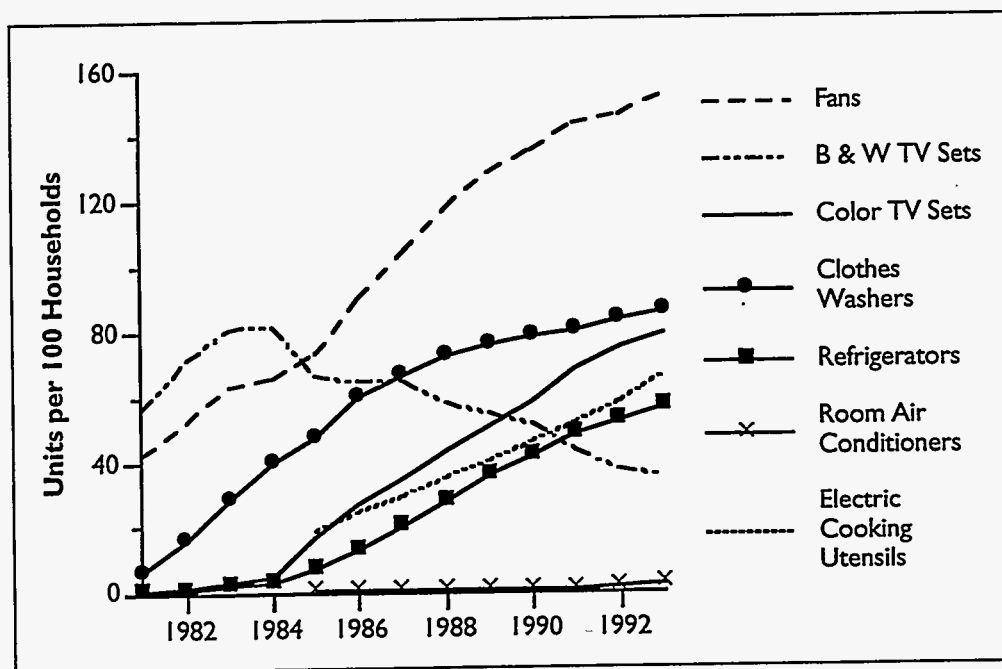
† Current yuan per household.

‡ Chinese clothes washers are mainly small capacity, single- or double-tube, manual and semi-automatic washers.

¥ For instance electric rice cookers.

Source: China Statistical Yearbook, various years.

Figure V-6. Urban Appliance Ownership



**Table V-10. Rural Household Survey Data, \* Various Years 1978-1993**

	1978	1980	1985	1986	1987
Surveyed Households	6,095	15,914	66,642	66,836	66,912
People per Household	5.74	5.54	5.12	5.07	5.01
Average Annual Income (yuan/yr) †	767	1,060	2,036	2,148	2,317
Annual Cost of Living (yuan/yr) †	666	-	1,625	1,810	1,995
of which cost of fuels (yuan/yr)	48	-	93	94	97
Floor Area per Person (m2)	8.1	9.4	14.7	15.3	16.0
<i>Appliances per 100 Households:</i>					
Fans	-	-	10	14	20
B & W TV Sets ¶	-	0.4	11	17	22
Color TV Sets	-	-	1	2	2
Clothes Washers	-	-	2	3	5
Refrigerators	-	-	0.1	0.2	0.3

	1988	1989	1990	1991	1992	1993
Surveyed Households	67,186	66,906	66,960	67,410	67,490	67,570
People per Household	4.94	4.86	4.84	4.71	4.67	4.59
Average Annual Income (yuan/yr) †	2,692	2,923	3,294	3,337	3,661	4,230
Annual Cost of Living (yuan/yr) †	2,355	2,602	2,806	2,919	3,078	3,533
of which cost of fuels (yuan/yr)	107	114	117	-	-	-
Floor Area per Person (m2)	16.1	17.2	17.8	-	18.9	20.8
<i>Appliances per 100 Households:</i>						
Fans	28	34	41	53	60	72
B & W TV Sets ¶	29	34	40	48	52	58
Color TV Sets	3	4	5	6	8	11
Clothes Washers	7	8	9	11	12	14
Refrigerators	0.6	0.9	1.2	1.6	2.2	3.1

\* Surveys were conducted in a wide variety of areas. Data may not be statistically representative of all rural areas in China

† Current yuan per household

¶ 1980 figure is total of color and black and white television sets.

Source: China Statistical Yearbook, various year.

Figure V-7. Rural Appliance Ownership

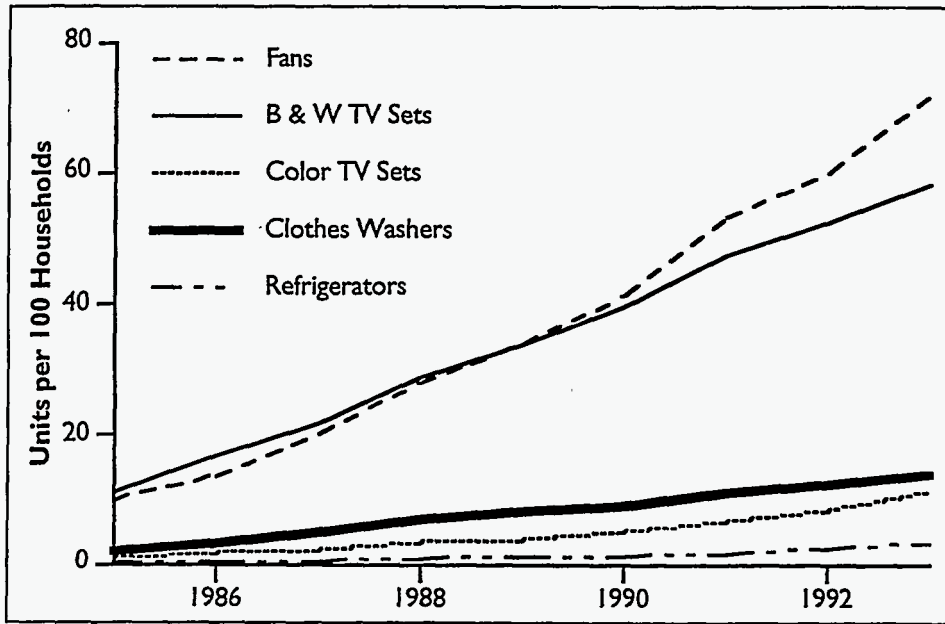


Table V-11. Stock of Agricultural Machinery \*, 1980-1993—GW

Year	Large & Medium Tractors	Small & Walking Tractors	Boat Tractors †	Rice Trans-planters	Drainage and Irrigation Motors				Trucks	Motorized Fishing Boats	Motor-Driven Sprayers	Balance/Other ¶	Total
					diesel	electric	other	subtotal					
1980 *	24.02	16.38	0.58	0.21	27.57	20.35	7.74	55.66	9.09	2.62	0.54	40.40	149.50
1981 *	25.59	17.85	0.62	0.16	27.12	20.81	7.99	55.92	11.75	2.97	0.59	43.51	158.97
1982 *	26.49	20.16	0.55	0.12	26.92	29.75	0.52	57.19	14.08	3.27	0.62	45.95	168.45
1983 *	27.46	24.25	0.48	0.07	27.41	30.66	0.46	58.53	19.11	3.31	0.67	48.84	182.73
1984 *	27.57	29.27	0.39	0.05	26.54	31.59	0.44	58.57	24.97	3.40	0.64	52.82	197.68
1985 *	27.82	34.14	0.32	0.03	26.03	31.95	0.36	58.35	31.18	3.72	0.57	55.90	212.03
1986	28.07	40.03	0.30	0.03	26.90	32.91	0.63	60.44	35.81	4.24	0.53	60.05	229.50
1987	28.76	47.13	0.28	0.03	28.18	33.97	0.43	62.58	39.66	4.86	0.53	64.53	248.36
1988	28.96	53.19	0.29	0.04	29.98	35.17	0.53	65.68	43.25	5.45	0.60	68.29	265.75
1989	28.14	58.48	0.25	0.04	32.07	36.07	0.39	68.53	46.34	6.09	0.61	72.20	280.67
1990	27.46	62.31	0.26	0.05	33.49	37.49	0.32	71.29	46.21	6.96	0.75	71.79	287.08
1991	26.82	65.29	-	-	-	-	-	-	46.91	7.33	0.96	146.58	293.89
1992	26.30	67.20	-	-	-	-	-	-	48.52	7.86	1.09	152.12	303.08
1993	25.31	70.43	-	-	-	-	-	-	52.46	8.05	1.14	160.78	318.17

\* Values in these rows (except for irrigation motor subtotals, boats, and totals, which are given in watts in the China Energy Statistical Yearbook) were calculated using a factor of 1 kW = 1.341 hp, derived from figures for an overlapping year given in horsepower in the China Statistical Yearbook and in watts in the Energy Statistical Yearbooks.

† "Boat tractors" are used in rice cultivation.

¶ "Other" includes pumps, sprinkler machines, combine harvesters, motor-driven harvesters, motor-driven threshers, seed selecting machines, grain drying machines, rice and wheat mills, cotton-ginning mills, oil presses, fodder grinders and forage grass harvesters. This column also includes discrepancies in reported values for categories and totals.

Sources: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years.



**Table V-12. Total Stock of Electricity-Consuming Equipment  
by Subsector, 1986-1993**

<b>I. Capacity of Electrical Equipment (GW)</b>							
	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1992</b>	<b>1993</b>
<b>Agriculture and Associated Sectors</b>	43.91	47.72	51.29	54.33	56.64	63.26	64.30
irrigation	20.01	23.02	24.62	25.86	25.78	29.81	29.28
agricultural sidelines	-	-	-	-	-	16.88	15.27
Agriculture	27.65	31.48	35.51	38.44	40.23	45.03	45.52
Forestry	0.41	0.43	0.43	0.48	0.56	0.82	0.76
Livestock	0.66	0.57	0.60	0.69	0.82	0.98	1.01
Fisheries	0.49	0.53	0.59	0.72	0.87	1.09	1.04
Water conservancy	10.29	9.47	9.17	8.91	9.22	9.78	9.94
Other	4.41	5.23	4.97	5.08	4.95	5.56	6.03
<b>Total Industry †</b>	145.67	160.48	173.47	191.88	221.31	247.83	266.54
Light Industry	42.30	45.99	49.53	55.75	57.53	65.29	69.32
Heavy Industry	98.83	109.34	118.40	130.25	157.98	175.46	188.60
Other •	4.54	5.14	5.54	5.88	5.80	7.08	8.63
rural industry	-	-	-	-	-	26.34	28.83
<b>Extraction</b>							
Coal	9.43	10.75	11.50	11.63	12.27	13.25	13.66
Petroleum & NG	3.89	4.10	4.51	5.40	5.62	6.73	6.95
Ferrous Metals	1.64	1.94	1.94	2.19	2.29	2.39	2.58
Nonferrous Metals	2.36	2.54	2.41	2.50	2.87	3.12	3.40
Construction Materials & Other Nonmetal	1.55	1.56	1.85	1.85	2.08	2.37	2.51
Salt	0.33	0.33	0.35	0.34	0.38	0.46	0.48
Other Mineral	0.08	0.12	0.11	0.11	0.12	0.12	0.19
Timber & Bamboo	0.35	0.36	0.36	0.38	0.39	0.48	0.46
Water Supply	2.20	2.30	2.57	2.91	3.22	3.77	4.09
Extraction Subtotal	21.83	24.01	25.59	27.31	29.23	32.69	34.32
<b>Manufacturing</b>							
Food, Beverage & Tobacco	10.88	11.75	12.01	13.38	13.15	14.57	15.26
Spinning & Weaving	8.06	8.53	9.51	11.06	11.19	12.22	12.67
Paper & Paper Production	3.44	3.64	4.05	4.57	4.52	5.27	5.64
Electricity, Steam & Hot Water ‡	0.42	0.96	1.23	2.67	24.67	25.82	27.62
Petroleum Refining	1.90	2.11	2.35	1.97	2.21	2.79	2.74
Coking, Coal Gas & Coal Products	0.80	0.85	0.89	1.07	1.13	1.39	1.75
Chemicals	17.55	17.78	19.99	22.37	22.52	25.92	28.33
Pharmaceuticals	1.17	1.27	1.44	1.67	1.93	2.25	2.46
Synthetic Fibers	1.44	1.48	1.90	1.86	2.49	2.31	2.42
Rubber & Plastics	3.17	3.91	4.50	5.10	5.10	6.11	6.68
Construction Materials and Nonmetal							
Mineral Products	12.83	14.52	15.22	16.89	17.63	19.93	22.63
Ferrous Metals Smelting & Rolling	12.24	13.25	14.49	17.00	19.08	22.18	24.00
Nonferrous Metals Smelting & Rolling	4.97	5.85	6.46	7.53	8.31	9.40	10.06
Metal Products	8.37	8.62	8.87	9.18	9.03	10.06	10.49
Machinery	14.08	16.47	17.05	17.70	17.70	18.71	19.37
Transportation, Electrical & Electronic Equipment	7.24	8.25	8.97	9.67	10.63	11.80	12.27
Other Industrial	10.76	12.08	13.42	15.02	14.96	17.28	19.21
Manufacturing Subtotal †	119.30	131.33	142.35	158.71	186.26	208.02	223.59
<b>Transportation and telecommunications</b>	6.12	7.20	8.34	9.11	9.78	12.11	13.88
Transportation	5.50	6.49	7.58	8.37	8.88	10.90	12.48
pipelines	0.55	0.65	0.67	0.71	0.71	0.70	0.74
electric railways	1.93	2.61	3.67	4.16	4.20	6.66	7.15
Posts and telecommunications	0.62	0.69	0.75	0.74	0.90	1.21	1.40
<b>Other Production Sectors ¶</b>	18.46	20.36	23.97	24.55	26.62	33.17	38.41
<b>Households</b>	19.96	25.21	28.90	28.73	33.06	42.21	46.70
urban	12.70	16.76	19.13	18.04	19.91	25.67	28.75
rural	7.26	8.44	9.76	10.69	13.15	16.54	17.95
<b>Total of All Sectors ¥</b>	234.11	260.95	285.96	308.59	347.41	398.58	429.83

• Includes SSB categories of Geological Survey and Exploration, and Construction.

† Electricity sector capacity figures before 1990 do not include equipment such as substation transformers. If adjusted to the pre-1990 category definition, 1993 capacity would be 9.67 GW. Electricity use is divided almost evenly between in-plant use and line losses.

¶ Includes commercial food service, public utilities, real estate, public health, sports, education, broadcasting, research, government, and other organizations.

¥ Figures are slightly smaller than those reported by the State Statistical Bureau.

Source: China Energy Statistical Yearbook, various years; *Zhongguo Dianli* [China Electric Power], October 1994.

**Table V-12. Total Stock of Electricity-Consuming Equipment  
by Subsector, 1986-1993 (continued)**

	Electricity Use † (TWh)		Utilization Rate §	
	1992	1993	1992	1993
<b>2. Electricity Use and Utilization Rates</b>				
Agriculture and Associated Sectors	50.520	51.690	0.09	0.09
irrigation	24.227	23.827	0.09	0.09
agricultural sidelines	13.015	13.272	0.09	0.10
Agriculture	34.803	35.682	0.09	0.09
Forestry	0.583	0.660	0.08	0.10
Livestock	1.125	1.174	0.13	0.13
Fisheries	0.933	0.974	0.10	0.11
Water conservancy	7.224	6.528	0.08	0.07
Other	5.852	6.672	0.12	0.13
Total Industry †	581.603	637.605	0.27	0.27
Light Industry	118.222	126.965	0.21	0.21
Heavy Industry	456.473	501.819	0.30	0.30
Other*	6.908	8.821	0.11	0.12
rural industry	44.411	51.385	0.19	0.20
<i>Extraction:</i>				
Coal	33.901	34.662	0.29	0.29
Petroleum & NG	18.007	19.522	0.31	0.32
Ferrous Metals	6.857	7.401	0.33	0.33
Nonferrous Metals	7.561	7.691	0.28	0.26
Construction Materials & Other Nonmetal	3.822	4.387	0.18	0.20
Salt	0.982	0.24	0.24	
Other Mineral	0.185	0.206	0.18	0.12
Timber & Bamboo	1.173	1.141	0.28	0.28
Water Supply	9.513	10.472	0.29	0.29
Extraction Subtotal	82.001	86.484	0.29	0.29
<i>Manufacturing</i>				
Food, Beverage & Tobacco	20.140	21.105	0.16	0.16
Spinning & Weaving	27.887	29.604	0.26	0.27
Paper & Paper Production	13.794	14.225	0.30	0.29
Electricity, Steam & Hot Water †	111.631	125.122	0.49	0.52
Petroleum Refining	8.161	8.826	0.33	0.37
Coking, Coal Gas & Coal Products	2.000	2.233	0.16	0.15
Chemicals	81.621	82.868	0.36	0.33
Pharmaceuticals	5.495	5.700	0.28	0.26
Synthetic Fibers	7.421	8.158	0.37	0.38
Rubber & Plastics	10.121	11.038	0.19	0.19
Construction Materials and Nonmetal				
Ferrous Metals Smelting & Rolling	63.234	74.171	0.33	0.35
Nonferrous Metals Smelting & Rolling	29.817	33.708	0.36	0.38
Metal Products	11.259	13.171	0.13	0.14
Machinery	22.811	24.837	0.14	0.15
Transportation, Electrical & Electronic				
Equipment	14.319	16.682	0.14	0.16
Other Industrial	21.427	24.266	0.14	0.14
Manufacturing Subtotal †	492.386	542.300	0.27	0.28
Transportation and telecommunications	13.295	15.127	0.13	0.12
Transportation	11.710	13.154	0.12	0.12
pipelines	1.785	1.789	0.29	0.28
electric railways	5.517	6.361	0.09	0.10
Posts and telecommunications	1.585	1.973	0.15	0.16
Other Production Sectors ¶	36.767	42.756	0.13	0.13
Households	63.276	72.929	0.17	0.18
urban	35.866	31.263	0.16	0.12
rural	27.410	41.666	0.19	0.27
Total of All Sectors ¥	745.461	820.107	0.21	0.22

\* Includes SSB categories of Geological Survey and Exploration, and Construction.

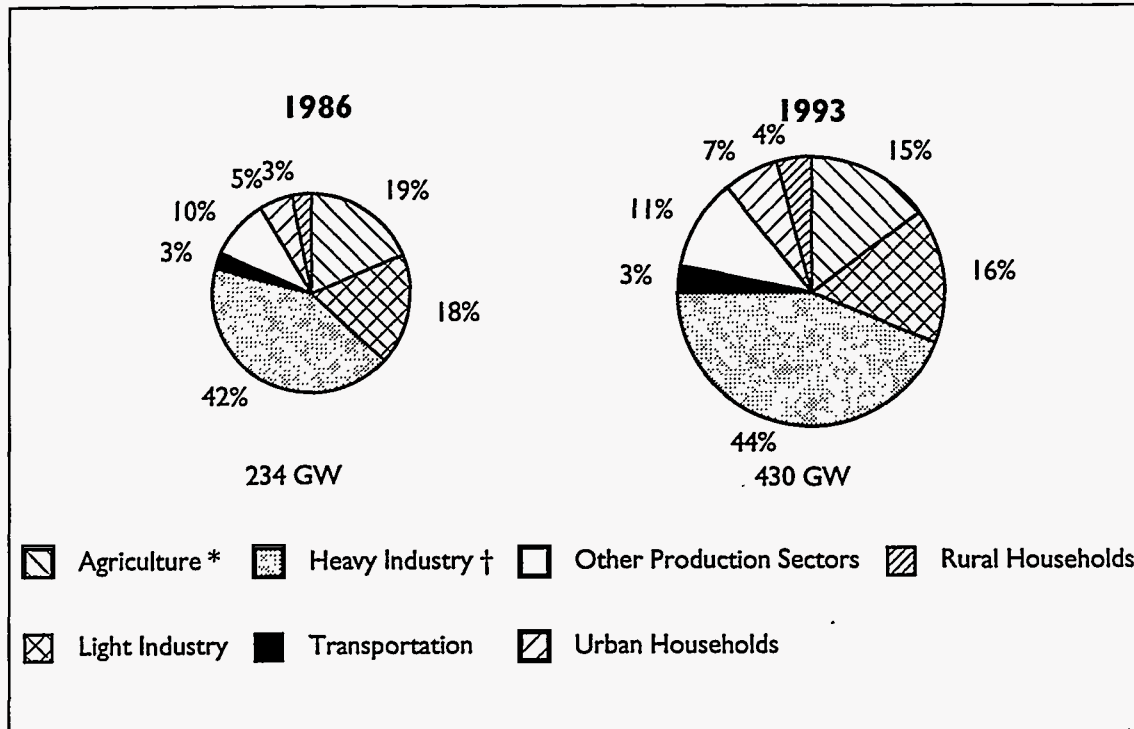
† Electricity sector capacity figures before 1990 do not include equipment such as substation transformers. If adjusted to the pre-1990 category definition, 1993 capacity would be 9.67 GW. Electricity use is divided almost evenly between in-plant use and line losses.

¶ Includes commercial food service, public utilities, real estate, public health, sports, education, broadcasting, research, government, and other organizations.

¥ Figures are slightly smaller than those reported by the State Statistical Bureau.

Source: China Energy Statistical Yearbook, various years; *Zhongguo Dianli* [China Electric Power], October 1994.

Figure V-8. Capacity of Electricity-Consuming Equipment



\* Includes SSB categories of Agriculture, Forestry, Animal Husbandry, Fishery and Water Conservation.  
 † Includes SSB categories of Geological Survey and Exploration, and Construction.

**Table V-13. Energy Efficiencies of Some Major Equipment Types, 1990**

<b>Equipment</b>	<b>Share of Total Energy Use</b>	<b>Remark</b>	<b>National Average</b>	<b>Advanced International</b>
Industrial Boilers *	30% of total coal use	-	65%	>80%
Fans and Pumps	30% of total	equipment system	75% 30-40%	>85% >70%
Electric Motors †	60% of industrial sector electricity use	1.1 kW 22 kW 75 kW	75% 92% 93%	86% 94% 95%

\* Industrial boiler figures represent operating efficiencies.

† Motor figures represent rated efficiencies. Chinese motor figures are for Y-series motors, international figures are averages for US high-efficiency motors.

Source: Wang, 1995.

Table V-14. Output of Major Energy-Intensive Industrial Raw Materials  
1980-1990—Million Tonnes

Year	Paper & Paperboard	Pig Iron	Crude Steel	Rolled Steel Products	Cement	Plate Glass (M cases)	Soda Ash	Caustic Soda	Sulfuric Acid	Synthetic Ammonia	Ethylene
1980	5.35	38.02	37.12	27.16	79.86	24.66	1.61	1.92	7.64	14.97	0.49
1981	5.40	34.17	35.60	26.70	82.90	27.01	1.65	1.92	7.81	14.83	0.51
1982	5.89	35.51	37.16	29.02	95.20	31.54	1.74	2.07	8.18	15.46	0.56
1983	6.61	37.38	40.02	30.72	108.25	36.47	1.79	2.12	8.70	16.77	0.65
1984	7.56	40.01	43.47	33.72	123.02	41.90	1.88	2.22	8.17	18.37	0.65
1985	9.11	43.84	46.79	36.93	145.95	49.42	2.01	2.35	6.76	17.18	0.65
1986	9.99	50.64	52.20	40.58	166.06	52.02	2.15	2.52	7.63	16.76	0.69
1987	11.41	55.03	56.28	43.86	186.25	58.03	2.36	2.74	9.83	19.41	0.94
1988	12.70	57.04	59.43	46.89	210.14	72.93	2.61	3.01	11.11	19.86	1.23
1989	13.33	58.20	61.59	48.59	210.29	84.42	3.04	3.21	11.53	20.68	1.40
1990	13.72	62.38	66.35	51.53	209.71	80.67	3.80	3.35	11.97	21.29	1.57
1991	14.79	67.65	71.00	56.38	252.61	87.12	3.94	3.54	13.33	22.02	1.76
1992	17.25	75.89	80.94	66.97	308.22	93.59	4.55	3.80	14.09	22.98	2.00
1993	19.14	87.39	89.56	77.16	367.88	110.86	5.35	3.95	13.37	21.93	2.03
1994	17.33	96.42	91.53	80.04	400.05	115.41	5.68	4.21	14.95	24.17	2.19
annual average growth rate	8.8%	6.9%	6.7%	8.0%	12.2%	11.7%	9.4%	5.8%	4.9%	3.5%	11.3%

Source: China Statistical Yearbook, various years; Statistical Yearbook of China's Industrial Economy, various years; State Statistical Bureau; Statistical Information and Consultancy Service Center, 1994.

Table V-15. Physical Energy Intensity of Selected Industrial Products,\* 1980-1993

Product	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 #
Raw coal production, raw coal use †	kg/t	39.1	41.9	41.2	41.3	44.4	41.1	39.4	40.3	39.5	41.4	37.3	-	-	-
Raw coal production, electricity use †	kVWh/t	34.3	35.7	35.9	36.4	36.7	37.3	39.1	39.6	40.9	39.0	40.2	47.0	50.5	53.0
Crude oil production, electricity use	kVWh/t	38.8	39.8	43.0	45.1	47.2	51.6	59.4	64.5	73.3	78.8	88.0	102.6	107.5	114.6
Crude oil production, total energy use	kgce/t	-	-	-	-	-	143.0	-	-	141.5	144.9	148.9	128.9	139.6	146.4
Oil refining, electricity use	kVWh/t	39.4	39.8	39.5	34.6	40.7	41.9	42.3	41.7	44.3	45.6	49.3	50.3	50.7	52.4
Oil refining, fuel oil use	kg/t	29.2	26.1	22.6	19.2	18.6	18.7	19.7	20.0	20.5	20.4	21.0	19.9	19.6	20.7
Oil refining, total energy use	GJ/t	-	-	-	-	-	-	-	-	-	-	-	3.62	3.68	3.68
Steel, all enterprises, total energy use	GJ/t	59.8	56.7	55.9	53.8	52.3	51.2	50.0	49.1	48.3	48.0	47.2	46.9	46.1	-
Steel, key enterprises, total energy use	GJ/t	-	-	-	-	-	38.0	41.6	41.4	35.3	35.6	35.2	35.3	34.8	31.2
Steel, local "backbone" enterprises, total energy use	GJ/t	-	-	-	-	-	50.4	52.2	49.2	46.0	44.2	42.1	40.7	39.4	-
Electric arc furnaces, key enterprises	kVWh/t	647	651	643	625	619	626	607	590	594	601	595	590	593	597
Aluminum, 8 large plants, total energy use	GJ/t	336.5	336.5	331.2	323.3	307.5	303.4	315.1	304.8	332.4	340.9	337.9	-	-	-
Alumina, total energy use	GJ/t	44.5	44.5	45.9	46.7	48.0	47.5	46.1	45.8	47.6	58.4	56.2	56.5	55.1	57.0
Electrolytic aluminum, total energy use	GJ/t	218.5	214.0	216.8	207.5	208.6	203.1	200.4	198.4	216.5	205.0	202.7	197.3	193.5	196.0
Electrolytic aluminum, DC use	MVWh/t	15.4	15.7	16.1	15.6	15.5	15.0	15.3	15.4	15.3	15.0	14.9	14.9	14.8	14.7
Cement clinker, fuel use	GJ/t	6.05	6.08	6.09	6.04	6.03	5.89	5.81	5.67	5.60	5.52	5.43	5.38	5.23	-
Cement, electricity use	kVWh/t	96.7	98.6	100.0	100.9	102.4	103.9	105.6	106.2	107.3	108.7	109.9	110.5	110.3	-
Cement, large & med. plants, total energy use	GJ/t	6.12	6.04	6.06	5.99	6.19	6.10	6.08	5.93	5.86	5.87	5.89	5.35	5.22	5.32
Cement, small plants, total energy use	GJ/t	-	-	-	-	-	-	-	5.87	5.73	5.62	5.64	-	-	-
Cement, rural plants, total energy use	GJ/t	5.86	-	-	-	-	5.42	5.13	5.22	5.13	4.84	4.84	-	-	-
Bricks, total energy use	GJ/million	375.8	-	-	345.9	322.4	279.9	290.5	273.5	231.5	259.1	249.1	-	-	-
Bricks, rural plants, total energy use	GJ/million	439.7	-	-	-	-	363.4	360.5	354.7	337.1	334.1	331.2	-	-	-
Flat glass, fuel use (per 50 kg case)	GJ/case	0.904	0.899	0.895	0.882	0.876	0.902	0.910	0.957	0.925	0.850	0.838	0.795	0.718	-
Flat glass, electricity use	kVWh/case	3.63	3.80	3.71	3.49	3.65	5.29	5.43	5.26	6.97	7.06	7.39	-	-	-
Flat glass, total energy use	GJ/case	0.952	0.943	0.940	0.924	0.935	0.964	0.969	1.036	1.011	0.921	0.924	1.016	0.925	0.936

\* Unless otherwise noted, data refer to key state-owned enterprises

# First nine months, except indicators for aluminum manufacturing.

† Coal production intensity figures include only centrally-run mines; local mines, including provincial mines, are excluded.

‡ Sinopec plants only.

¶ Cotton spinning electricity intensity is much lower than in China than in other countries because production processes are less automated..

§ Average for Eastern Europe and the Former Soviet Union.

\*\* Date unknown

†† Chinese and Japanese figures for ethylene energy intensity do not include feedstocks as other statistics do. Estimated feedstock needs are 43 GJ/t, and the range of current intensities, including feedstocks, for ethylene production in China is 73-90 GJ/t.

‡‡ Late 1980s.

## Generation figures in brackets.

Source: Handbook of Comprehensive Resource Utilization, 1991; China Energy Statistical Yearbook, various years; China Iron and Steel Statistics, 1993; Yearbook of China's Industrial Economy, various years; Sinopec Yearbook, 1991; Energy of China, no. 9, 1993 and no.2, 1994; China Nonferrous Metals Industry Yearbook, 1994; Energy Conservation in China, 1993; Levine et al., 1995; China Energy Research Society, 1993; Kahane, 1986; Azimi and Lowitt, 1988; Venkateswaren and Lowitt, 1988; Federation of Japanese Aluminum Industry, 1990; Cooper and Schipper, 1991; OTA, 1993; Energy Research Institute.

Table V-15. Physical Energy Intensities of Selected Industrial Products, \* 1980-1993 (continued)

Product	average annual growth rates				FSU	India	Japan	USA	OECD
	80-92	85-92	80-90	other					
Raw coal production, raw coal use†	-	-	-0.5%	-	-	-	-	-	-
Raw coal production, electricity use†	3.3%	3.4%	1.6%	-	55.5 (89)	-	85.9 (90)	-	-
Crude oil production, electricity use	8.9%	10.3%	8.5%	-	-	-	-	-	-
Crude oil production, total energy use	-	-1.5%	-	-	-	-	-	-	-
Oil refining, electricity use	2.1%	2.6%	2.3%	-	-	-	-	-	-
Oil refining, fuel oil use	-3.3%	0.8%	-3.3%	-	-	-	-	-	-
Oil refining, total energy use	-	-	-	0.8% (91-93)	6.0 (90)§	-	2.1 (90)	4.4 (90)	2.7-3.5 (92)
Steel, all enterprises, total energy use	-2.1%	-1.2%	-2.3%	-	23.7 (90)	38.7 (91)	18.4 (90)	22.2 (90)	18-21 (92)
Steel, key enterprises, total energy use	-	-1.0%	-	-	-	-	-	-	-
Steel, local "backbone" enterprises, total energy use	-	-	-3.0%	-	-	-	-	-	-
Electric arc furnaces, key enterprises	-0.7%	-0.8%	-0.8%	-	-	-	428 (84)	590 (83)	-
Aluminum, 8 large plants, total energy use	-	-	0.04%	-	-	-	-	-	-
Alumina, total energy use	1.8%	2.5%	2.4%	-	-	-	-	37.5 (80)	-
Electrolytic aluminum, total energy use	-1.0%	-0.4%	-0.7%	-	-	-	-	187.5 (80)	-
Electrolytic aluminum, DC use	-0.3%	-0.1%	-0.3%	-	-	-	16.1 (86)	13.4-14.7 ¥¥	-
Cement clinker, fuel use	-1.2%	-1.3%	-1.1%	-	6.8 (85)	-	2.9 (90)	4.7 (85)	-
Cement, electricity use	1.1%	0.9%	1.3%	-	112 (85)	-	102.2 (90)	138.2 (85)	-
Cement, large & med. plants, total energy use	-1.3%	-1.9%	-0.4%	-	7.3 (90)	-	3.3 (90)	5.7 (88)	-
Cement, small plants, total energy use	-	-	-	-1.3% (87-90)	-	-	-	-	-
Cement, rural plants, total energy use	-	-	-1.9%	-	-	-	-	-	-
Bricks, total energy use	-	-	-4.0%	-	-	-	-	-	-
Bricks, rural plants, total energy use	-	-	-2.8%	-	-	-	-	-	-
Flat glass, fuel use (per 50 kg case)	-1.9%	-1.8%	-0.8%	-	-	-	-	-	0.4 (90)
Flat glass, electricity use	-	-	7.4%	-	-	-	-	-	-
Flat glass, total energy use	-0.2%	0.8%	-0.3%	-	-	-	-	0.793 (85)	-

\* Unless otherwise noted, data refer to key state-owned enterprises

# First nine months, except indicators for aluminum manufacturing.

† Coal production intensity figures include only centrally-run mines; local mines, including provincial mines, are excluded.

‡ Sinopec plants only.

¶ Cotton spinning electricity intensity is much lower than in China than in other countries because production processes are less automated

§ Average for Eastern Europe and the Former Soviet Union.

\*\* Date unknown.

†† Chinese and Japanese figures for ethylene energy intensity do not include feedstocks as other statistics do. Estimated feedstock needs are 43 GJ/t, and the range of current intensities, including feedstocks, for ethylene production in China is 73-90 GJ/t.

¥¥ Late 1980s.

## Generation figures in brackets.

Source: Handbook of Comprehensive Resource Utilization, 1991; China Energy Statistical Yearbook, various years; China Iron and Steel Statistics, 1993; Yearbook of China's Industrial Economy, various years; Sinopec Yearbook, 1991; Energy of China, no. 9, 1993 and no.2, 1994; China Nonferrous Metals Industry Yearbook, 1994; Energy Conservation in China, 1993; Levine et al., 1995; China Energy Research Society, 1993; Kahane, 1986; Azimi and Lowitt, 1988; Venkateswaren and Lowitt, 1988; Federation of Japanese Aluminum Industry, 1990; Cooper and Schlipper, 1991; OTA, 1993; Energy Research Institute.

Table V-15. Physical Energy Intensities of Selected Industrial Products, \* 1980-1993 (continued)

Product	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 #
Ethylene, large-scale equipment, electricity use	kWh/t	-	-	-	-	-	541	278	370	208	208	198	-	-	-
Ethylene ††, large-scale equipment, total energy use ¥	GJ/t	-	-	-	-	56.7	52.4	-	51.2	51.9	51.3	46.9	-	-	-
Ethylene, use of feedstock oil for cracking	t/t	-	-	-	-	-	4.15	3.88	3.97	3.73	3.63	3.60	-	-	-
Polypropylene, total energy use ¥	GJ/t	-	-	-	-	26.2	25.9	21.8	19.0	19.8	17.7	17.7	-	-	-
Ammonia, large plants, total energy use	GJ/t	41.9	42.1	41.6	41.1	40.4	40.1	41.2	41.9	41.6	40.1	39.4	44.9	45.0	44.3
large plants, natural gas use	m3/t	-	-	-	-	-	1,043	1,049	1,030	1,013	1,066	1,053	-	-	-
Ammonia, medium plants, total energy use	GJ/t	71.5	68.9	68.7	68.4	66.9	66.5	65.5	65.0	64.8	64.3	63.8	60.7	60.3	60.4
medium plants, coke & coal use	GJ/t	38.9	38.7	38.5	38.1	37.5	37.6	37.0	39.5	38.0	35.0	36.2	38.0	37.8	-
Ammonia, small plants, total energy use	GJ/t	88.5	86.1	80.6	75.1	70.4	69.1	68.2	71.3	70.8	68.6	66.3	64.9	63.2	64.3
Ammonia, electricity use	MWh/t	1.44	1.45	1.43	1.41	1.35	1.39	1.42	1.26	1.42	1.38	1.39	1.36	1.33	-
Caustic soda, total energy use	GJ/t	-	50.1	50.3	49.5	-	46.3	46.2	44.1	45.1	44.1	44.2	51.1	50.6	-
Caustic soda, electrolytic/membrane, DC use	MWh/t	2.45	2.47	2.45	2.40	2.39	2.36	2.36	2.34	2.35	2.34	2.41	2.43	2.40	-
Caustic soda, electrolytic/mercury, DC use	MWh/t	3.08	3.27	3.20	3.18	3.21	3.31	3.26	3.24	3.22	3.29	3.45	3.35	3.37	-
Calcium carbide, electricity use	MWh/t	3.53	3.56	3.52	3.48	3.45	3.47	3.46	3.44	3.45	3.50	3.43	3.46	3.47	-
Calcium carbide, total energy use	GJ/t	75.3	75.0	74.4	74.2	73.6	73.3	-	70.9	65.9	60.3	64.8	64.7	64.0	64.4
Sulfuric acid, electricity use/generation###	kWh/t	90	92	88	91	97	88	97	100	103	99	105	-	-	-
Carbon black, total energy use	GJ/t	103	-	-	-	-	101	121	100	100	107	102	108	107	108
Yellow phosphorous, total energy use	GJ/t	259	262	244	250	232	258	258	258	255	218	252	248	245	223
Wood pulp, electricity use	MWh/t	1.51	1.52	1.43	1.47	1.47	1.52	1.55	1.54	1.59	1.56	1.57	-	-	-
Wood pulp, total energy use	GJ/t	-	-	-	-	-	-	-	20.8	18.8	18.2	19.9	-	-	-
Paper and paperboard, total energy use	GJ/t	-	-	-	-	-	-	-	27.3	29.0	27.0	25.5	33.7	32.5	34.0
Cotton spinning, electricity use ¶	MWh/t	1.83	1.89	1.86	1.89	1.94	1.98	1.91	1.95	1.97	20.42	2.13	2.13	2.13	-

\* Unless otherwise noted, data refer to key state-owned enterprises

# First nine months, except indicators for aluminum manufacturing.

† Coal production intensity figures include only centrally-run mines; local mines, including provincial mines, are excluded.

¥ Sinopec plants only.

¶ Cotton spinning electricity intensity is much lower than in China than in other countries because production processes are less automated

§ Average for Eastern Europe and the Former Soviet Union.

\*\* Date unknown.

†† Chinese and Japanese figures for ethylene energy intensity do not include feedstocks as other statistics do. Estimated feedstock needs are 43 GJ/t, and the range of current intensities, including feedstocks, for ethylene production in China is 73-90 GJ/t.

¥¥ Late 1980s.

### Generation figures in brackets.

Source: Handbook of Comprehensive Resource Utilization, 1991; China Energy Statistical Yearbook, various years; China Iron and Steel Statistics, 1993; Yearbook of China's Industrial Economy, various years; Sinopec Yearbook, 1991; Energy of China, no. 9, 1993 and no.2, 1994; China Nonferrous Metals Industry Yearbook, 1994; Energy Conservation in China, 1993; Levine et al., 1995; China Energy Research Society, 1993; Kahane, 1986; Azimi and Lowitt, 1988; Venkateswaren and Lowitt, 1988; Federation of Japanese Aluminum Industry, 1990; Cooper and Schlipper, 1991; OTA, 1993; Energy Research Institute.



Table V-15. Physical Energy Intensities of Selected Industrial Products, \*1980-1993 (continued)

Product	average annual growth rates				FSU	India	Japan	USA	OECD
	80-92	85-92	80-90	other					
Ethylene, large-scale equipment, electricity use	-	-	-	-18.2% (85-90)	-	-	-	-	-
Ethylene ††, large-scale equipment, total energy use¥	-	-	-	-3.1% (84-90)	-	-	20.5-22.2 (89)	61.4 (88)	58-72 (90)
Ethylene, use of feedstock oil for cracking	-	-	-	-2.8% (85-90)	-	-	-	-	-
Polypropylene, total energy use ¥	-	-	-	-6.3% (84-90)	-	-	-	-	-
Ammonia, large plants, total energy use	0.6%	1.6%	-0.6%	-	-	-	-	-	27-45 (90)
large plants, natural gas use	-	-	-	0.9% (85-90)	-	-	-	752 (90)	-
Ammonia, medium plants, total energy use	-1.4%	-1.3%	-1.1%	-	-	-	-	-	-
medium plants, coke & coal use	-0.2%	0.2%	-0.7%	-	-	-	-	-	-
Ammonia, small plants, total energy use	-2.8%	-0.9%	-2.8%	-	-	-	-	-	-
Ammonia, electricity use	-0.6%	-0.2%	-0.4%	-	-	-	-	-	-
Caustic soda, total energy use	-	1.4%	-	-	-	-	-	41.85 (90)	-
Caustic soda, electrolytic/membrane, DC use	-0.2%	0.4%	-0.1%	-	-	-	-	2.30 (90)	-
Caustic soda, electrolytic/mercury, DC use	0.7%	0.2%	1.1%	-	-	-	-	-	-
Calcium carbide, electricity use	-0.1%	0.0%	-0.3%	-	-	-	-	-	-
Calcium carbide, total energy use	-1.3%	-1.8%	-1.5%	-	-	-	-	-	-
Sulfuric acid, electricity use/generation##	-	-	1.6%	-	-	-	-	[300] (90)	-
Carbon black, total energy use	0.3%	1.0%	0.0%	-	-	-	-	-	-
Yellow phosphorous, total energy use	-0.4%	-0.6%	-0.3%	-	-	-	-	-	-
Wood pulp, electricity use	-	-	0.4%	-	-	-	-	-	-
Wood pulp, total energy use	-	-	-	-1.5% (87-90)	26.1 (87)	-	-	-	-
Paper and paperboard, total energy use	-	-	-	3.5% (87-92)	-	31-55**	22 (92)	22 (92)	-
Cotton spinning, electricity use ††	1.3%	1.0%	1.5%	-	4.88 (80)	-	3.46 (90)	-	-

\* Unless otherwise noted, data refer to key state-owned enterprises

# First nine months, except indicators for aluminum manufacturing.

† Coal production intensity figures include only centrally-run mines; local mines, including provincial mines, are excluded.

¥ Sinopec plants only.

†† Cotton spinning electricity intensity is much lower than in China than in other countries because production processes are less automated

§ Average for Eastern Europe and the Former Soviet Union.

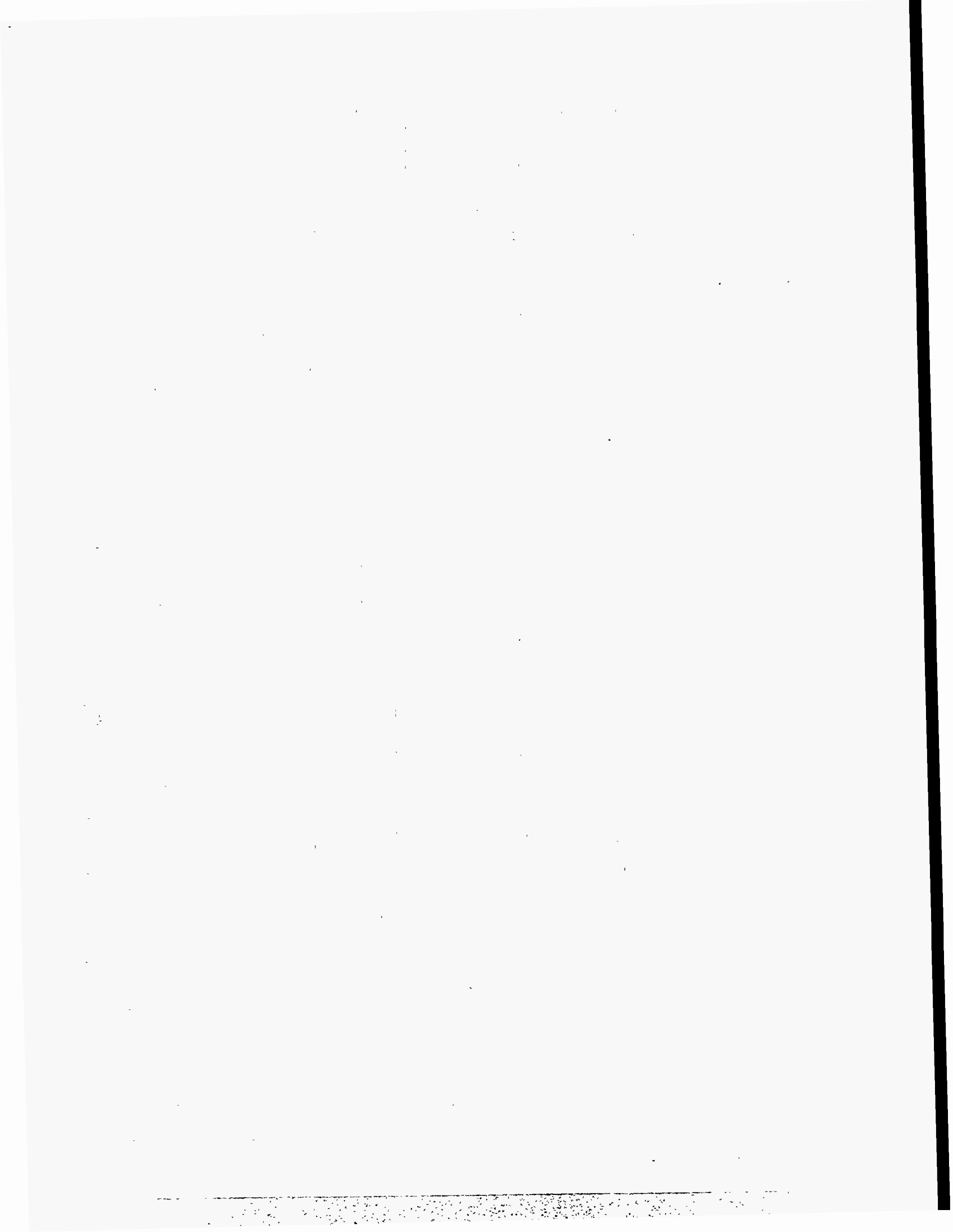
\*\* Date unknown.

†† Chinese and Japanese figures for ethylene energy intensity do not include feedstocks as other statistics do. Estimated feedstock needs are 43 GJ/t, and the range of current intensities, including feedstocks, for ethylene production in China is 73-90 GJ/t.

¥¥ Late 1980s.

## Generation figures in brackets.

Source: Handbook of Comprehensive Resource Utilization, 1991; China Energy Statistical Yearbook, various years; China Iron and Steel Statistics, 1993; Yearbook of China's Industrial Economy, various years; Sinopec Yearbook, 1991; Energy of China, no. 9, 1993 and no.2, 1994; China Nonferrous Metals Industry Yearbook, 1994; Energy Conservation in China, 1993; Levine et al., 1995; China Energy Research Society, 1993; Kahane, 1986; Azimi and Lowitt, 1988; Venkateswaren and Lowitt, 1988; Federation of Japanese Aluminum Industry, 1990; Cooper and Schlipper, 1991; OTA, 1993; Energy Research Institute.



## Chapter VI—Energy Prices

# Energy Prices

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One oft-cited key to stimulating efficient use of energy is freeing of energy prices. Statistics on coal, oil, and electricity prices show that much progress has been made in this area, especially over the past several years. Energy pricing reform began in the 1980s, when a portion of energy products were allowed to be sold at prices higher than the in-plan prices, resulting in a multi-track pricing system. At first the higher prices were constrained to be within a certain range, usually a specified percentage of the in-plan price, and later they were allowed to float freely.

Since 1990s the commitment of the central government to carrying through pricing reform has appeared to strengthen. Coal prices have basically been freed since 1993; since then they have risen and leveled off, and show significant regional variation. Oil prices, on the other hand, remain relatively tightly controlled, after partial decontrol starting in 1992. Electricity prices have risen several times over in many areas, and are expected to continue increasing. In early 1994 six major grids adopted a scheme whereby electricity from new power plants would be priced to recover costs and a set rate of return. Some municipalities have already instituted peak pricing.<sup>1</sup>

## COAL

Average mine-mouth coal prices from state-owned mines rose only incrementally during the 1980s, but by 1992 were 55 to 60 yuan/t, double the levels prevailing four or five years earlier (Table VI-1). Price reforms since then have allowed coal prices to float even higher.

A 1992 price buildup of coal (sorted bituminous coal) shipped from Datong in Shanxi to Shanghai and Guangzhou shows that, for distant customers, the mine mouth coal price is a fraction of the delivered price (Table VI-2). Starting from a low in-plan mine mouth price of 20 yuan/t, additional costs include 31 yuan for rail shipment to the coastal port of Qinhuangdao, railway fees of 6 yuan,

port charges of 56 yuan, ocean shipping charges (to Shanghai) of 7 to 13 yuan, and Shanghai port charges of 24 to 25 yuan, for a final cost of 143 to 151 yuan per ton. All such charges have increased in the past three years, and a value-added tax of 17% has been applied (since January 1, 1994) as well.

A cross section of average coal prices in various cities from 1992 to 1994 shows the fast rise in coal prices as they were allowed to float, and the equally rapid leveling off as supply met (and even exceeded) demand (Table VI-3). In some cases 1994 prices were lower, even after addition of the new value-added tax. In general, coal prices are lower near areas of coal supply than in the eastern and southern coastal provinces.

A more detailed look at coal shows prices at northern China's major coastal coal terminal, Qinhuangdao, peaking in the spring of 1994, after which prices came down slightly (Table VI-4). As in other areas of China represented in the table, with the notable exception of Wuhan, anthracite is considerably cheaper than bituminous coal. Areas with no local coal resources, e.g., Shanghai and Guangzhou, exhibited wide swings in bituminous coal prices in 1994, falling from levels in excess of 300 yuan (\$34)/t down to 200 to 230 yuan (\$23 to \$26)/t, and then back up over 300 yuan/t again.

A cross-section of December 1994 coal prices shows a very wide range in local markets (Table VI-5). Bituminous coal sold for 310 yuan (\$36)/t in Guangzhou, but for only 120 yuan (\$14)/t in Xi'an, Shaanxi Province. Anthracite prices were highest in Wuhan, Hubei Province at 320 yuan (\$37)/t, and lowest in Zhengzhou, in neighboring Henan Province, at 120 yuan (\$14)/t.

## OIL

Controls over oil product prices have been tightened in China over the past year. Ex-refinery prices (from all refineries) for various grades of leaded gasoline ran from \$273 to \$314/t in 1994, and slightly more for unleaded varieties (Table VI-6). Diesel

was sold for between \$217 and \$267/t depending on the grade, and jet fuel for between \$241 and \$254/t. Lighting kerosene was slightly cheaper at \$233/t, and the price of centrally allocated LPG for the household sector was set at \$95/t.

Oil product prices are somewhat more uniform across regional markets than coal prices, in part because the former are still much more highly regulated than the latter. Unlike coal, oil products are generally more expensive inland than in the coastal provinces, though with many exceptions (table VI-5). December 1994 retail gasoline (90 RON) prices varied between 2,550 yuan (\$293)/t in Chongqing, Sichuan Province to 3,000 yuan (\$345)/t in Wuhan, Hubei Province. Diesel prices varied even less, from 2,000 yuan (\$230)/t in Qingdao, Shandong Province to 2,350 yuan (\$270)/t in Changchun, Jilin Province. Retail prices for oil products to rural agricultural customers were significantly higher than in the urban markets, i.e., 2,800 to 3,150 yuan (\$322 to \$345)/t for various grades of gasoline and 2,500 yuan (\$287)/t for diesel. Heavy oil sold for half the price or less of the lighter distillates, from 850 yuan (\$98)/t in Tianjin and Changchun to 1,400 yuan (\$161)/t in Wuhan. Although China instituted central price controls on crude oil and oil products in May 1994, prices in areas that are significantly dependent on imported oil (e.g., Guangdong) are now largely determined by prices in the Singapore market.

## ELECTRICITY

Wholesale electricity prices, like other energy prices, have continued to rise, and are not expected to level off in the near future. In the early 1990s price increases began slowly, with the national average rising from 118 to 145 yuan/MWh, and then took off in 1993, jumping to 194 yuan/MWh (Table VI-7). Price variations among the regional grids are significant. The lowest prices are found in the southwestern provinces (Guangxi and Guizhou) where hydropower is plentiful, and the highest in the eastern and southeastern coastal provinces.

Some typical retail electricity prices show the disparity between regions (Jinan, the capital of Shandong Province in the north and Shenzhen, Guangdong Province in the southeast) and between sectors (Table VI-8). In 1994 the price to industrial customers in Jinan was between 0.17 and 0.22 yuan

(2.0¢ and 2.5¢)/kWh and in Shenzhen was 0.60 yuan (6.9¢)/kWh. Rates to commercial customers were highest, at 0.35 yuan (4.0¢)/kWh and 0.70 yuan (8.0¢)/kWh in Jinan and Shenzhen respectively. According to anecdotal evidence, the highest electricity prices are generally paid by rural users, both household and industrial users, which are charged over 1.00 yuan (12¢)/kWh in some areas.

Rates to industrial customers vary by line voltage, with the per unit charge inversely related to line voltage (Table VI-9). In 1993 customers connected to 380V and 220 V distribution lines, for instance, were charged 500 to 550 yuan (\$57 to \$63)/kVA per month, while those connected to 110 kV lines were charged 150 to 180 yuan (\$17 to \$21)/kVA per month.

China's largest caustic soda manufacturer, a plant in Tianjin, was paying an average of 0.258 yuan/kWh for its delivered power in August 1993 (Table VI-10). Of that total 0.045 yuan was the electricity cost, and 0.174 the demand charge. The remaining 0.039 yuan was composed of various surcharges, including items for local street lighting, and financing for the Three Gorges Dam project (which is assessed nationally).

A breakdown of 1993 charges to various customers in the Beijing-Tianjin grid shows that residential customers (0.22 yuan/kWh) were being charged less for electricity than commercial and small industrial users (0.268 to 0.307 yuan/kWh; Table VI-11). Large industrial users paid significantly less (0.183 yuan/kWh), with energy intensive industries receiving a further break (0.173 yuan/kWh). Agricultural users (0.218 yuan/kWh) paid slightly less than residential customers, with the exception of irrigators in designated poor rural counties (0.06 yuan/kWh). The grid had in place a peak pricing scheme for industrial and commercial users. Peak prices were 40% higher than non-peak prices, while electricity prices in periods of low demand were 35% lower.

<sup>1</sup> For a further discussion of energy price reform see Wang, 1995.

**Table VI-1. Average Minemouth Sales Price of Raw and Washed Coal, Major State-Owned Mines (yuan/t)**

	<b>Average price of raw and washed coal</b>	<b>Datong Bureau</b>	<b>Kailuan Bureau</b>	<b>Huaibei Bureau</b>
1953	11.00	-	-	-
1957	11.46	-	-	-
1965	17.68	-	-	-
1975	16.48	-	-	-
1980	21.33	-	-	-
1982	21.58	-	-	-
1984	22.73	-	-	-
1985	26.05	-	-	-
1986	26.51	27.93	26.84	-
1987	26.28	28.32	-	27.04
1988	27.72	-	-	-
1990	43.85	-	-	-
1991	47.89	49.14	53.10	55.45
1992	54.73	58.04	61.65	58.28

Source: Energy Research Institute.

**Table VI-2. Cost Buildup for Datong Lump Coal Shipped to Shanghai and Guangzhou, March 1992**

<b>Cost Item</b>	<b>Charge (yuan/metric ton)</b>
A. <i>Minemouth coal cost</i>	77.93
B. <i>Shipping &amp; Handling Costs</i>	
1. Minemouth to railhead loading	20.25
2. Rail shipping cost, Datong to Qinhuangdao	31.19
3. Railroad charges:	
Shipping charge	0.95
Maintenance charge	2.65
Water resource charge	1.00
Car routing charge	0.78
Interest	0.22
Stamp tax	0.01
Subtotal	5.58
4. Ocean shipping cost, Qinhuangdao to Shanghai (depending on ship type)	6.51 - 13.21
5. Qinhuangdao port charges:	
Transshipment charge	5.33
Loading charge	23.15
Unloading charge	2.05
Terminal charge	2.05
Port service charge	2.05
Storage charge	0.05
Dust abatement fee	0.30
Port construction fee	1.50
Thawing fee	0.70
Crane charge	16.30
Loan repayment	0.60
Subtotal	55.58
6. Subtotal shipping costs at port of Qinhuangdao	119.11 - 125.81
<i>to Shanghai</i>	
7. Port of Shanghai port service charge	6.50
8. Port of Shanghai comprehensive charges*	17.23 - 18.28
9. Subtotal shipping costs at port of Shanghai	142.84 - 150.59
<i>to Guangzhou</i>	
10. Ocean shipping cost, Qinhuangdao to Guangzhou	37.51
11. Port of Guangzhou port service charge	6.50
12. Port of Guangzhou comprehensive charges*	21.68 - 22.43
13. Subtotal shipping costs at port of Guangzhou	184.8 - 192.25
C. <i>Final Coal Costs at Destination</i>	
1. Port of Shanghai	220.77 - 228.52
2. Port of Guangzhou	262.73 - 270.18

\* Comprehensive port charges include bank interest, profit, management fees, and normal depreciation.

Source: Wang, 1995.

**Table VI-3. Average Retail Price of Coal in Various Cities — yuan/t**

City	Province	November 1992	August 1993	June 1994
Datong	Shanxi	114	224	236
Dalian	Liaoning	185	250	255
Shanghai		190	230	230
Nanjing	Jiangsu	195	230	262
Zhangjiagang	Jiangsu	215	285	310
Ningbo	Zhejiang	191	251	258
Hangzhou	Zhejiang	-	275	285
Wuhan	Hubei	153	163	200
Xiamen	Fujian	235	260	340
Guangzhou	Guangdong	228	308	280

N.B.:

1. Market prices are posted prices of local Fuels Corporations.
2. Coal types: Dalian price is for Fuxin bituminous coal, Wuhan price is for Luo'an bituminous coal, others are generally for Datong mixed coal.
3. June 1994 coal prices include value-added tax of 17%.

Source: Energy Research Institute; China Energy Research Society, 1995.



Table VI-4. Coal Prices, Local Markets — yuan/t

Year	Month	Qinhuangdao, Hebei		Shijiusuo, Shandong		Shanghai		Guangzhou, Guangdong		Nanjing, Jiangsu		Changsha, Hunan		Wuhan, Hubei	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A
1989	Nov	-	-	-	-	250	225	-	-	-	-	106	105	198	-
1990	Feb	-	-	-	-	250	225	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	230	195	-	-	-	-	-	-
	Jul	-	-	-	-	195	170	-	-	-	-	-	-	-	-
	Nov	-	-	-	-	185	160	-	-	-	-	-	-	-	-
1991	Nov	139-140	100-105	-	-	150-152	115-120	-	-	-	-	-	-	-	-
1992	May	-	-	-	-	-	-	240	204	-	-	-	-	-	-
	Jun	172	-	139	124	180	156	228	175	185	170	-	-	128	125
	Jul	-	-	-	-	176	149	-	-	-	-	-	-	-	-
	Jul	167	-	135	124	190	166	228	175	220	300	-	-	128	124
	Sep	170	-	148	145	190	166	228	190	195	170	-	-	153	145
	Oct	167	-	148	145	190	166	228	190	195	170	-	-	153	145
	Nov	166	-	158	147	190	160	228	190	195	170	-	-	153	145
1993	Mar	177	-	158	147	-	-	238	-	230	170	-	-	163	164
	Mar	185	-	158	147	205	181	243	215	230	170	-	-	163	164
	May	189	-	157	146	218	185	253	230	230	190	-	-	163	164
	May	190	-	157	146	215	185	258	230	230	180	-	-	163	164
	Jun	193	-	154	145	215	185	268	238	240	195	-	-	163	164
	Jul	203	-	154	145	230	205	308	270	230	190	-	-	163	164
	Nov	202	-	178	155	240	215	318	275	240	190	-	-	159	156
	Nov	153-160	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	153-161	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	152-160	-	-	-	-	-	-	328	292	-	-	-	-	-
1994	Jan	157-169	-	-	-	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	240	-	285	-	-	-	-	-	-	-
	Mar	-	-	-	-	240	190	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	290	-	300	-	-	-	-	-	-	-
	Mar	-	-	-	-	258	215	-	-	-	-	-	-	-	-
	Mar	163-204	-	-	-	-	-	-	-	-	-	-	-	-	-
	May	-	-	-	-	303	248	314	290	-	-	-	-	213	268
	May	-	-	-	-	245	205	-	-	-	-	-	-	-	-
	May	163-195	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun	190-195	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun	190-195	165-171	-	-	300	248	310	271	-	-	-	-	213	268
	Jul	185-194	161-166	-	-	315	-	340	282	-	-	-	-	-	-
	Jul	185-193	163-166	-	-	-	-	-	-	262	210	-	-	-	-
	Aug	-	-	-	-	225	197	-	-	245	-	-	-	-	-
	Aug	189-197	163-165	-	-	236-238	-	256-260	-	-	-	-	-	-	-
	Aug	181-184	161-165	-	-	231-233	-	230-233	-	-	-	-	-	188	320
	Aug	185-187	161-165	-	-	-	-	-	-	-	-	-	-	-	-
Sep	189-192	-	-	-	222-225	-	257-260	-	245	-	-	-	-	-	
Sep	185-187	163-165	-	-	-	-	-	-	-	-	-	-	-	-	
Nov	187-189	166-170	-	-	315	-	-	-	-	-	-	-	-	-	

N.B. Ranges of prices represent highest and lowest negotiated prices.

B = bituminous coal

A = anthracite

Source: Energy Research Institute.

Table VI-5. Average Retail Prices of Coal and Oil Products in Major Cities, December 1994 — yuan/t

City	bituminous	anthracite	70 gasoline	90 gasoline	93 gasoline	CA40 lubricant	0 diesel	-10 diesel	QC40 lube	CA30lube	CA40 lube	heavy oil	46 machine oil	kerosene
Beijing	-	-	-	-	-	-	2,280	-	-	-	-	-	-	-
Tianjin	220	-	-	2,800	-	-	2,156	1,950	-	-	-	850	-	-
Shenyang, Liaoning	255	230	2,490	2,630	-	-	2,150	2,250	-	-	-	920	-	-
Changchun, Jilin	180	170	2,750	2,850	-	-	2,350	-	-	-	-	850	-	-
Harbin, Heilongjiang	151	-	-	-	-	-	-	-	-	-	-	-	-	-
Taiyuan, Shanxi	195	200	2,780	2,930	-	-	-	2,250	-	-	-	900	-	-
Xi'an, Shaanxi	120	265	2,800	2,940	-	-	2,300	2,000	-	-	-	950	-	-
Zhengzhou, Henan	150	120	2,750	2,888	-	-	2,300	2,461	-	-	-	1,100	-	-
Qingdao, Shandong	222	202	2,180	2,280	-	-	2,000	2,100	-	-	-	868	-	-
Wuxi, Jiangsu	265	235	-	-	-	-	-	-	-	-	-	-	-	-
Shanghai	300	248	-	2,878	-	-	2,308	2,100	-	-	-	925	-	-
Hangzhou, Zhejiang	296	266	2,500	2,600	-	-	2,162	2,360	-	-	-	-	-	-
Wuhan, Hubei	188	320	2,900	3,000	-	-	-	-	-	-	-	1,400	-	-
Guangzhou, Guangdong	310	271	-	2,570	-	-	2,270	-	-	-	-	1,138	-	-
Chongqing, Sichuan	-	-	2,500	2,550	-	-	-	-	-	-	-	-	-	-
Chengdu, Sichuan	199	159	2,400	2,640	-	-	2,050	-	-	-	-	-	-	-
Jishui County, Jiangxi (price to agricultural users)														
wholesale	-	-	2,524	-	-	-	2,302	-	-	-	4,600	-	-	2,329
retail	-	-	2,800	-	-	-	2,508	-	-	-	5,800	-	-	2,580
Chongqing, Sichuan (price to agricultural users)														
wholesale	-	-	2,420	2,630	2,780	3,900	2,150	-	4,050	4,100	-	-	4,020	-
retail	-	-	2,800	3,000	3,150	4,500	2,500	-	4,700	4,750	-	-	6,250	-

Source: Energy Research Institute.

**Table VI-6. Ex-Refinery Oil Products Prices, 1994 — \$US/t**

<b>Product</b>	<b>Grade</b>	<b>Price</b>
Gasoline	# 70	\$272.60
	# 90	\$287.50
	# 93	\$299.40
	# 97	\$314.20
	# 90 no lead	\$299.40
	# 93 no lead	\$322.60
	# 95 no lead	\$328.60
Diesel	# +10	\$217.30
	# +5	\$222.00
	# 0	\$226.20
	# -10	\$241.10
	# -50	\$267.30
Jet fuel	# 1	\$241.40
	# 2	\$246.40
	# 3	\$253.60
	# 4	\$242.90
Kerosene (lighting)		\$232.70
LPG		\$95.20

Source: Energy Research Institute.

**Table VI-7. Average Wholesale Electricity Prices by Region — yuan/Mwh**

<b>Regional Grid</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
East China	135.53	146.37	172.02	233.54
North China	116.65	131.38	147.34	217.40
North-East China	106.40	132.63	140.44	202.14
Middle China	115.93	125.18	143.74	188.09
North-west China	96.88	107.81	119.92	154.52
Shandong	104.30	115.03	122.51	183.14
Sichuan	110.43	119.38	135.19	154.84
Yunnan	108.14	116.49	121.81	165.72
Guizhou	106.17	125.49	133.76	147.34
Guangxi	151.75	172.26	177.34	118.31
Fujian	127.05	129.59	149.49	217.68
Guangdong	136.66	138.79	146.55	-
National Average	118.08	132.32	145.43	194.32

N.B. This table represents sales price to the grid by generators.

Source: Energy Research Institute.

**Table VI-8. Retail Electricity Price by Sector, 1994 — yuan/kwh**

<b>Customer Type</b>	<b>Shenzhen, Guangdong</b>	<b>Jinan, Shandong</b>
Industry	0.60	0.17-0.22
Agriculture	-	0.22
Commercial	0.70	0.35
Residential	0.50	0.22

Source: Energy Research Institute.

**Table VI-9. Electricity Supply Surcharges for Transmission and Distribution,\* 1993**

<b>Customer Line Voltage</b>	<b>Electricity Supply Surcharge (yuan/kVA)</b>
380 V & 220 V	500-550
10 kV	440-450
35 kV	300-330
63 kV	200-220
110 kV	150-180

- Charged to customers and used for transmission and distribution network ( $\leq 110$  kV) construction projects.

Source: China Energy Research Society, 1995.

**Table VI-10. Electricity Purchase Price, Tianjin Soda Plant, August 1993**

<b>Cost Item</b>	<b>yuan/kWh</b>
Basic electricity cost	0.045
Demand charge	0.174
Surcharge	0.009
Street lighting charge	0.002
Electric power construction fund	0.020
Three Gorges Project fund	0.003
Coal purchase fee*	0.005
<b>Total</b>	<b>0.258</b>

N.B. Tianjin Soda Plant is China's largest manufacturer of caustic soda, with output in 1992 of 610 kt, or nearly 54% of the national total. It supplies 44% of its own electricity needs with a 20 MW power plant, at a cost of generation of 75.6 yuan/MWh.

\* In order to fulfill generation targets some utilities need to buy additional coal at higher prices, and pass the extra expense through to customers.

Source: China Energy Research Society, 1995.

Table VI-11. Anhui Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.260	0.250 -	-	-	-
Nonresidential illumination	0.364	0.355	-	-	-
Nonindustrial & common industrial †	0.293	0.286	0.276	-	-
Large-scale industrial †	-	0.211	0.201	15.00	10.00
preferential price ¶	-	0.201	0.191	15.00	10.00
Agricultural production	0.240	0.232	0.220	-	-
Irrigation in poor counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.187	-	0.205	-
Nonresidential illumination	0.281	-	0.299	-
Industrial & nonindustrial	0.215	0.207	0.223	0.215
Agricultural production	0.194	0.181	0.194	0.181
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

- Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer
- † Fertilizer manufacturers are subject to preferential rates: 87% of ordinary industry list rates for small and medium plants, and 82% of large-scale industrial list rates for large fertilizer manufacturers.
- ¶ For manufacturers of calcium carbide, electrolytic process caustic soda, yellow phosphorous, and synthetic ammonia.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-12. Beijing-Tianjin-Tangshan Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
			(yuan/kW/month)	(yuan/kVA/month)	
Residential	0.220	0.210	0.210	-	-
Nonresidential illumination	0.307	0.297	0.297	-	-
Nonindustrial & common industrial †	0.268	0.261	0.252	-	-
Large-scale industrial †	-	0.183	0.174	15.00	10.00
preferential price ¶	-	0.173	0.164	15.00	10.00
Agricultural	0.218	0.211	0.200	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	Wholesale Schedule 1		Wholesale Schedule 2		Wholesale Schedule 3	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential Use	0.161	0.161	0.158	0.158	0.180	0.180
Nonresidential illumination	0.242	0.242	0.236	0.236	0.235	0.265
Industrial & nonindustrial	0.202	0.195	0.196	0.196	0.215	-
Agricultural production	0.181	0.168	0.174	0.174	0.195	-
Irrigation in poor counties	0.035	0.130	0.035	0.035	-	-

Period	3. Peak Pricing Schedule (yuan/kWh)							
	Large-scale Industrial preferential price ¶				Nonindustrial & Common Industrial			
	1-10 kW		≥35 kW		1-10 kW		≥35 kW	
Peak	0.256	0.244	0.242	0.230	<1 kV	0.375	0.366	0.353
Non-peak	0.183	0.174	0.173	0.164	<1 kV	0.268	0.261	0.252
Low demand	0.119	0.113	0.113	0.107	<1 kV	0.174	0.170	0.164

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: 88% of ordinary industry list rates for small and medium plants, and 84% of large-scale industrial list rates for large plants.

¶ Preferential price is for manufacturers of caustic soda (electrolytic process), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium carbide.

¥ The three wholesale schedules apply respectively to (1) counties with line losses <6%, (2) counties with line losses ≥6%, and (3) suburban counties.

Source: Editorial Board of the China Price Yearbook, 1994; Wang et al., 1995.

Table VI-13. Fujian Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.247	0.240	-	-	-
Nonindustrial & common industrial †	0.140	0.136	0.131	-	-
Large-scale industrial †	-	0.088	0.083	12.00	8.00
preferential price 1 ¶	-	0.078	0.073	12.00	8.00
preferential price 2 ¶	-	0.068	0.063	12.00	8.00
Agricultural	0.106	0.103	0.097	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.153	-	0.169	-
Nonresidential illumination	0.174	0.174	0.193	0.193
Industrial	0.095	0.092	0.103	0.100
Agricultural production	0.072	0.065	0.072	0.065
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 October.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: large-scale industry list rates for small and medium plants, and 54% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide. In addition, certain pesticide, calcium carbide, and aluminum manufacturers were allowed to continue paying the low rates that they were subject to before implementation of the new schedule.

Source: Editorial Board of the China Price Yearbook, 1994.



Table VI-14. Gansu Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)	(yuan/kVA/month)	(yuan/kVA/month)
Residential	0.220	0.210	0.210	-	-
Nonresidential illumination	0.294	0.287	0.287	-	-
Nonindustrial & common industrial †	0.232	0.228	0.222	-	-
Large-scale industrial †	-	0.164	0.160	13.50	9.00
preferential price 1 ¶	-	0.125	0.120	13.50	9.00
preferential price 2 ¶	-	0.115	0.110	13.50	9.00
Agricultural	0.157	0.152	0.144	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)
Residential	0.157	0.157	0.176	0.176
Nonresidential illumination	0.206	0.206	0.225	0.225
Industrial	0.153	0.150	0.164	0.161
Agricultural production	0.107	0.099	0.107	0.099
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

- Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.
- † Manufacturers of fertilizers are temporarily subject to preferential rates: 87% of ordinary industry list rates for small and medium plants, and 82% of large-scale industrial list rates for large plants.
- ¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-15. Guangxi Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
				(yuan/kW/month)	(yuan/kVA/month)
Residential	0.250	0.245	-	-	-
Nonresidential illumination	0.273	0.267	-	-	-
Nonindustrial & common industrial †	0.173	0.169	0.136	-	-
Large-scale industrial †	-	0.123	0.116	12.00	8.00
preferential price 1 ¶	-	0.113	0.106	12.00	8.00
preferential price 2 ¶	-	0.103	0.096	12.00	8.00
Agricultural	0.133	0.129	0.122	-	-
Irrigation in poor rural counties		0.060	0.058	0.055	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.175	0.175	0.194	0.194
Nonresidential illumination	0.201	0.201	0.220	0.220
Industrial	0.124	0.120	0.132	0.128
Agricultural production	0.102	0.093	0.102	0.093
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 October.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to unspecified preferential rates.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-16. Guizhou Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)	(yuan/kW/month)	(yuan/kVA/month)
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.304	0.296	-	-	-
Nonindustrial & common industrial †	0.209	0.204	0.197	-	-
Large-scale industrial †	-	0.148	0.140	12.00	8.00
preferential price 1 ¶	-	0.138	0.130	12.00	8.00
preferential price 2 ¶	-	0.128	0.120	12.00	8.00
Agricultural	0.164	0.159	0.151	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.154	-	0.173	-
Nonresidential illumination	0.224	0.244	0.243	0.243
Industrial	0.148	0.142	0.156	0.150
Agricultural production	0.125	0.116	0.125	0.116
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 July, except residential rates, which went into effect on 1 December.

- \* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.
- † Fertilizer manufacturers are subject to preferential rates: 72% of ordinary industry list rates for small and medium plants, and 60% of large-scale industrial list rates for large plants.
- ¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace).

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-17. Hebei Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum demand	transformer capacity
				(yuan/kW/month)	(yuan/kVA/month)
Residential	0.220	0.210	0.210	-	-
Nonresidential illumination	0.335	0.324	0.324	-	-
Nonindustrial & common industrial †	0.305	0.297	0.587	-	-
Large-scale industrial †	-	0.222	0.211	15.00	10.00
preferential price ¶	-	0.212	0.201	15.00	10.00
Agricultural	0.245	0.237	0.225	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
	Residential	0.164	0.164	0.179
Nonresidential illumination	0.262	0.262	0.276	0.276
Industrial	0.226	0.215	0.231	0.223
Agricultural production	0.201	0.188	0.201	0.188
Irrigation in poor rural counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer

† Manufacturers of fertilizers are temporarily subject to preferential rates: 80% of ordinary industry list rates for small and medium plants, and 73% of large-scale industrial list rates for large plants.

¶ Preferential price is for manufacturers of caustic soda (electrolytic process), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-18. Henan Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum demand (yuan/kW/month)	transformer capacity (yuan/kVA/month)
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.299	0.292	-	-	-
Nonindustrial & common industrial †	0.204	0.199	0.192	-	-
Large-scale industrial †	-	0.139	0.132	13.50	9.00
preferential price 1 ¶	-	0.129	0.122	13.50	9.00
preferential price 2 ¶	-	0.119	0.112	13.50	9.00
Agricultural	0.159	0.153	0.145	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.157	-	0.176	-
Nonresidential illumination	0.223	0.223	0.242	0.242
Industrial	0.146	0.141	0.154	0.149
Agricultural production	0.122	0.113	0.122	0.113
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 October.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: 95% of ordinary industry list rates for small and medium plants, and 93% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-19. Hubei Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
			(yuan/kW/month)	(yuan/kVA/month)	
Residential	0.250	0.245	0.254	-	-
Nonresidential illumination	0.341	0.332	0.332	-	-
Nonindustrial & common industrial †	0.252	0.246	0.238	-	-
Large-scale industrial †	-	0.173	0.164	15.00	10.00
preferential price 1 ¶	-	0.163	0.154	15.00	10.00
preferential price 2 ¶	-	0.153	0.144	15.00	10.00
Agricultural	0.204	0.197	0.187	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.176	0.176	0.195	0.195
Nonresidential illumination	0.257	0.257	0.276	0.276
Industrial	0.179	0.172	0.187	0.180
Agricultural production	0.157	0.145	0.157	0.145
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: 74% of ordinary industry list rates for small and medium plants, and 62% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-20. Hunan Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
			(yuan/kW/month)	(yuan/kVA/month)	
Residential	0.250	0.245	-	-	-
Nonresidential illumination	0.356	0.347	-	-	-
Nonindustrial & common industrial †	0.269	0.263	0.253	-	-
Large-scale industrial †	-	0.191	0.181	15.00	10.00
preferential price 1 ¶	-	0.181	0.171	15.00	10.00
preferential price 2 ¶	-	0.171	0.161	15.00	10.00
Agricultural	0.147	0.139	0.129	-	-
Irrigation in poor rural counties	0.110	0.108	0.105	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.187	-	-	-
Nonresidential illumination	0.267	-	-	-
Industrial & nonindustrial	0.189	0.182	-	-
Agricultural production	0.105	0.093	-	-
Irrigation in poor counties	0.078	0.073	-	-

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 January, except residential rates, which went into effect 1 April.

- Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.
- † Ammonium bicarbonate, phosphorus fertilizer, and ammonium chloride manufacturers are temporarily subject to preferential rates: 93.2% of ordinary industry list rates for small and medium plants, and 90.5% of large-scale industrial list rates for large fertilizer manufacturers.
- ¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorus (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Table VI-21. Inner Mongolia Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum demand (yuan/kW/month)	transformer capacity (yuan/kVA/month)
	Residential	0.220	0.210	0.210	-
Nonresidential illumination	0.268	0.260	0.260	-	-
Nonindustrial & common industrial	0.200	0.196	0.188	-	-
Large-scale industrial	-	0.140	0.133	13.50	9.00
preferential price 1 †	-	0.130	0.123	13.50	9.00
preferential price 2 †	-	0.120	0.123	13.50	9.00
Agricultural	0.158	0.153	0.145	-	-
Irrigation in poor rural counties	0.094	0.092	0.089	-	-

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum demand (yuan/kW/month)	transformer capacity (yuan/kVA/month)
	Residential	0.220	0.210	0.210	-
Nonresidential illumination	0.335	0.327	0.327	-	-
Nonindustrial & common industrial	0.277	0.272	0.266	-	-
Large-scale industrial	-	0.172	0.168	15.00	10.00
Agricultural	0.193	0.187	0.177	-	-
Irrigation in poor rural counties	0.086	0.084	0.081	-	-

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.



Table VI-21. Inner Mongolia Grid Basic Electricity Rates, Effective 1993 (continued)

**3. Wholesale Prices, Western Mongolia Grid (yuan/kWh)**

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.156	0.156	0.172	0.172
Nonresidential illumination	0.201	0.201	0.217	0.217
Industrial	0.144	0.139	0.152	0.147
Agricultural production	0.122	0.112	0.122	0.112
Irrigation in poor counties	0.069	0.064	0.069	0.064

**4. Wholesale Prices, Eastern Mongolia Grid (yuan/kWh)**

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.150	0.155	0.169	0.169
Nonresidential illumination	0.255	0.255	0.274	0.274
Industrial	0.201	0.196	0.212	0.207
Agricultural production	0.160	0.148	0.060	0.148
Irrigation in poor counties	0.058	0.053	0.058	0.053

Table VI-22. Jiangsu Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.260	0.250	-	-	-
Nonresidential illumination	0.379	0.369	-	-	-
Nonindustrial & common industrial †	0.302	0.295	0.284	-	-
Large-scale industrial †	-	0.213	0.202	15.00	10.00
preferential price ††	-	0.203	0.192	15.00	10.00
Agricultural production	0.250	0.242	0.229	-	-
Irrigation in poor counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.185	-	0.203	-
Nonresidential illumination	0.290	-	0.308	-
Industrial & nonindustrial	0.224	0.216	0.232	0.224
Agricultural production	0.204	0.190	0.204	0.190
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Fertilizer manufacturers are subject to preferential rates: 89% of ordinary industry list rates for small and medium plants, and 85% of large-scale industrial list rates for large-scale fertilizer manufacturers.

†† For manufacturers of calcium carbide, electrolytic process caustic soda, yellow phosphorous, and synthetic ammonia.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-23. Jiangxi Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.324	0.316	-	-	-
Nonindustrial & common industrial †	0.233	0.228	0.220	-	-
Large-scale industrial †	-	0.159	0.150	15.00	10.00
preferential price 1 ¶	-	0.149	0.140	15.00	10.00
preferential price 2 ¶	-	0.139	0.130	15.00	10.00
Agricultural	0.188	0.182	0.172	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.176	-	-	-
Nonresidential illumination	0.235	0.235	-	-
Industrial	0.162	0.156	-	-
Agricultural production	0.137	0.127	-	-
Irrigation in poor counties	0.035	0.030	-	-

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 October.

- Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.
- † Manufacturers of fertilizers are temporarily subject to preferential rates: 91% of ordinary industry list rates for small and medium plants, and 87% of large-scale industrial list rates for large plants.
- ¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-24. Ningxia Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
			(yuan/kW/month)	(yuan/kVA/month)	
Residential	0.220	0.210	-	-	-
Nonresidential illumination	0.325	0.317	0.317	-	-
Nonindustrial & common industrial †	0.234	0.229	0.221	-	-
Large-scale industrial †	-	0.173	0.164	13.50	9.00
preferential price 1 ¶	-	0.163	0.154	13.50	9.00
preferential price 2 ¶	-	0.153	0.144	13.50	9.00
Agricultural	0.188	0.182	0.172	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
	Residential	0.152	-	0.171
Nonresidential illumination	0.244	0.244	0.263	0.263
Industrial	0.168	0.162	0.176	0.170
Agricultural production	0.144	0.133	0.144	0.133
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 September.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: 89% of ordinary industry list rates for small and medium plants, and 86% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-25. Northeast\* Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge †	
	<1 kV	1-10 kV	≥35 kV	maximum demand (yuan/kW/month)	transformer capacity (yuan/kVA/month)
	Residential	0.220	0.210	0.210	-
Nonresidential illumination	0.312	0.306	0.306	-	-
Nonindustrial & common industrial ¶	0.281	0.274	0.264	-	-
Large-scale industrial ¶¶	-	0.198	0.187	15.00	10.00
preferential price §	-	0.188	0.177	15.00	10.00
Agricultural	0.227	0.220	0.208	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.160	0.160	0.174	0.174
Nonresidential illumination	0.235	0.235	0.249	0.249
Industrial & nonindustrial	0.195	0.188	0.222	0.214
Agricultural production	0.172	0.162	0.172	0.162

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* This region includes Liaoning, Jilin, and Heilongjiang Provinces.

† Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

¶ Manufacturers of fertilizers are temporarily subject to preferential rates: 86% of ordinary industry list rates for small and medium plants, and 80% of large-scale industrial list rates for large plants.

§ Preferential price is for manufacturers of caustic soda (electrolytic process), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-26. Qinghai Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.210	0.205	-	-	-
Nonresidential illumination	0.229	0.224	-	-	-
Nonindustrial & common industrial	0.120	0.117	0.113	-	-
Large-scale industrial	-	0.075	0.071	12.00	8.00
preferential price 1 †	-	0.065	0.061	12.00	8.00
preferential price 2 †	-	0.055	0.051	12.00	8.00
Agricultural	0.090	0.087	0.083	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.147	-	0.166	-
Nonresidential illumination	0.164	-	0.183	-
Industrial	0.083	0.080	0.091	0.088
Agricultural production	0.061	0.054	0.061	0.054
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 January, except residential rates, which went into effect 1 April.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-27. Shaanxi Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.210	0.210	-	-
Nonresidential illumination	0.347	0.338	0.338	-	-
Nonindustrial & common industrial †	0.257	0.251	0.242	-	-
Large-scale industrial †	-	0.174	0.165	15.00	10.00
preferential price 1 ¶	-	0.164	0.155	15.00	10.00
preferential price 2 ¶	-	0.154	0.145	15.00	10.00
Agricultural	0.207	0.200	0.190	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.157	0.157	0.177	0.177
Nonresidential illumination	0.263	0.263	0.282	0.282
Industrial	0.187	0.180	0.195	0.188
Agricultural production	0.166	0.154	0.166	0.154
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

- Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.
- † Manufacturers of fertilizers are temporarily subject to preferential rates: 49% of ordinary industry list rates for small and medium plants, and 26% of large-scale industrial list rates for large plants.
- ¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-28. Shandong Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.210	0.210	-	-
Nonresidential illumination	0.287	0.280	0.280	-	-
Nonindustrial & common industrial †	0.210	0.206	0.201	-	-
Large-scale industrial †	-	0.148	0.142	13.50	9.00
preferential price ¶	-	0.138	0.132	13.50	9.00
Agricultural	0.149	0.144	0.137	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices	
	1-10 kW	≥35 kW
Residential	0.150	0.150
Nonresidential illumination	0.211	0.211
Industrial & nonindustrial	0.152	0.152
Agricultural production	0.112	0.103

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of fertilizers are temporarily subject to preferential rates: 90% of ordinary industry list rates for small and medium plants, and 92% of large-scale industrial list rates for large plants.

¶ Preferential price is for manufacturers of caustic soda (electrolytic process), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.



Table VI-29. Shanghai Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)	(yuan/kW/month)	(yuan/kVA/month)
Residential	0.270	0.260	0.260	-	-
Nonresidential illumination	0.387	0.377	0.377	-	-
Nonindustrial & common industrial †	0.305	0.298	0.287	-	-
Large-scale industrial †	-	0.214	0.203	15.00	10.00
preferential price ¶¶	-	0.204	0.193	15.00	10.00
Agricultural production	0.246	0.238	0.225	-	-

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Fertilizer manufacturers are subject to preferential rates: 83% of ordinary industry list rates for small- and medium-scale plants, and 76% of large-scale industrial list rates for large-scale fertilizer manufacturers.

¶ For manufacturers of calcium carbide, electrolytic process caustic soda, yellow phosphorous, and synthetic ammonia.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-30. Sichuan Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.210	-	-	-
Nonresidential illumination	0.288	0.281	-	-	-
Nonindustrial & common industrial †	0.189	0.185	0.178	-	-
Large-scale industrial †	-	0.124	0.118	13.50	9.00
preferential price 1 ¶	-	0.114	0.108	13.50	9.00
preferential price 2 ¶	-	0.104	0.098	13.50	9.00
Agricultural	0.148	0.143	0.136	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.152	-	0.171	-
Nonresidential illumination	0.211	-	0.230	-
Industrial & nonindustrial	0.134	0.126	0.142	0.137
Agricultural production	0.110	0.101	0.110	0.101
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund, and a surcharge to Sichuan customers of 0.0013 yuan/kWh for small hydropower project development. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Manufacturers of ammonia, phosphorus, potassium, calcium, and blended fertilizers are temporarily subject to preferential rates: 66% of ordinary industry list rates for small and medium plants, and 49% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace). Preferential price 2 is for manufacturers of calcium carbide.

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-31. Xinjiang Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.317	0.309	-	-	-
Nonindustrial & common industrial †	0.222	0.217	0.209	-	-
Large-scale industrial †	-	0.156	0.148	12.00	8.00
preferential price 1 ¶	-	0.146	0.138	12.00	8.00
preferential price 2 ¶	-	0.136	0.128	12.00	8.00
Agricultural	0.180	0.175	0.166	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.157	0.157	0.177	0.177
Nonresidential illumination	0.239	0.239	0.258	0.258
Industrial	0.160	0.098	0.168	0.098
Agricultural production	0.137	0.127	0.137	0.127
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 December.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Fertilizer manufacturers are subject to preferential rates: 91% of ordinary industry list rates for small and medium plants, and 87.2% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace).

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-32. Yunnan Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kWh)	(yuan/kWh)	(yuan/kWh)	(yuan/kW/month)	(yuan/kVA/month)
Residential	0.220	0.215	-	-	-
Nonresidential illumination	0.311	0.303	-	-	-
Nonindustrial & common industrial †	0.232	0.226	0.218	-	-
Large-scale industrial †	-	0.166	0.158	12.00	8.00
preferential price 1 ¶	-	0.156	0.148	12.00	8.00
preferential price 2 ¶	-	0.146	0.138	12.00	8.00
Agricultural	0.188	0.182	0.173	-	-
Irrigation in poor rural counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.157	-	0.177	-
Nonresidential illumination	0.235	0.235	0.254	0.254
Industrial	0.163	0.157	0.171	0.165
Agricultural production	0.141	0.131	0.141	0.131
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 October.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Fertilizer manufacturers are subject to preferential rates: 65% of ordinary industry list rates for small and medium plants, and 52% of large-scale industrial list rates for large plants.

¶ Preferential price 1 is for manufacturers of caustic soda (electrolytic process), ferrous alloys (electric furnace), yellow phosphorous (electrolytic process), synthetic ammonia, and calcium, phosphorus, and magnesium fertilizers (electric furnace).

Source: Editorial Board of the China Price Yearbook, 1994.

Table VI-33. Zhejiang Grid Basic Electricity Rates, Effective 1993

Customer Type	Electricity Price (yuan/kWh)			Basic Electricity Charge *	
	<1 kV	1-10 kV	≥35 kV	maximum	transformer
				demand	capacity
	(yuan/kW/month)	(yuan/kVA/month)			
Residential	0.250	0.245	-	-	-
Nonresidential illumination	0.344	0.332	-	-	-
Nonindustrial & common industrial †	0.311	0.304	0.293	-	-
Large-scale industrial †	-	0.217	0.205	15.00	10.00
preferential price ¶	-	0.207	0.195	15.00	10.00
Agricultural production	0.254	0.246	0.233	-	-
Irrigation in poor counties	0.060	0.058	0.055	-	-

2. Wholesale Prices (yuan/kWh)

Customer Type	County-level wholesale prices		Below County-level wholesale prices	
	1-10 kW	≥35 kW	1-10 kW	≥35 kW
Residential	0.192	-	0.206	-
Nonresidential illumination	0.247	-	0.288	-
Industrial & nonindustrial	0.237	0.228	0.245	0.236
Agricultural production	0.217	0.202	0.217	0.202
Irrigation in poor counties	0.035	0.030	0.035	0.030

N.B. Electricity rates are subject to a wide variety of taxes, surcharges, and additional tariffs depending on location and customer type. This rate schedule excludes surcharges to all customers nationally of 0.02 yuan/kWh for a utility construction fund and 0.003 yuan/kWh for the Three Gorges Project fund. Retail rates paid by customers may be significantly higher and vary among cities and counties in the same province. All rates went into effect on 1 April, except residential rates, which went into effect on 1 July.

\* Either maximum demand or transformer capacity is selected as the method of calculating base charges for each customer.

† Fertilizer manufacturers are subject to preferential rates: 86% of ordinary industry list rates for small and medium plants, and 80% of large-scale industrial list rates for large fertilizer manufacturers.

¶ For manufacturers of calcium carbide, electrolytic process caustic soda, yellow phosphorous, and synthetic ammonia.

Source: Editorial Board of the China Price Yearbook, 1994.

## Chapter VII—Imports and Exports

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# Imports and Exports

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For much of its history, the People's Republic of China has been very much self-reliant for its needs, including energy and energy-intensive industrial products like metals and chemicals. In the 1980s, however, the country began to participate in world markets for these products on a large scale. At one point many believed that China would become one of the world's major petroleum suppliers. That situation has reversed, and while China is exporting more coal than ever before, it is poised to become one of Asia's largest oil importers. Flows in and out of China of energy-intensive products have varied a great deal, and it is not clear that increased international trade in such products has had a significant impact on overall energy consumption and intensity.

## ENERGY

China has exported petroleum — mainly crude oil — since the mid-1960s (Table VII-1). Petroleum exports have accounted for a substantial share of domestic production (between 16% and 30% over the past decade), but are not large by world standards (about 1.3% of the volume of petroleum traded internationally in 1994).<sup>1</sup> Imports of petroleum were generally less than 1 Mt until the late 1980s, and by 1993 imports of crude oil and petroleum distillates (mainly diesel oil) shot up to 15.7 Mt and 17.3 Mt respectively, making China a net petroleum importer for the first time since 1970, which was itself an atypical year. Imports dropped in 1994, to a total of 25 Mt, but the future is likely to see steady increases in imports, and little growth in exports; by 2010 China may need to import as much as 150 Mt/yr, or the equivalent of total current domestic production.

In general, China shifted its trade policy in oil significantly after the oil price collapse of 1986. Crude exports have seen a continuous decline as a greater proportion is diverted to domestic refiner-

ies, while imports have grown significantly (to 14% of total refinery runs in 1994). Similarly, restrictions on product imports were eased in 1986, resulting in a rapid increase in product (primarily diesel) imports, while product exports have declined in most years since then.

Earnings from petroleum exports have been substantial, but have declined in importance relative to other exports since 1985, when 26% of gross export earnings came from energy products, nearly all oil (Table VII-2). By 1993 energy products accounted for only 4% of export earnings. While earnings from oil have declined overall from levels of the 1980s, those from coal have risen steadily.

China trades in petroleum products with over 90 countries. China trades in petroleum byproducts, e.g., waxes, with most of these countries, imports distillates from a smaller number, imports crude oil from fewer still, and exports oil in significant amounts (over 1 kt/yr) to slightly more than a dozen (Table VII-3).<sup>2</sup> In 1994 about two-thirds of China's exported crude went to Japan, as did 8% of exported distillates and half of other petroleum products (Tables VII-4 and VII-5). The next largest buyers of Chinese crude are the United States, the two Koreas, and Singapore. Singapore also buys half of China's petroleum product exports, with Hong Kong, Japan, and Thailand the other largest customers. For its crude imports China is highly dependent on Indonesia's low-sulfur oil, with most of the rest coming from Oman and Yemen. All but a tenth of distillate imports come from Singapore, South Korea, the former Soviet Union, the United States, and Japan.

China has been an exporter of coal since 1950 (Table VII-1). While coal imports have remained between 1 Mt and 2.5 Mt per year since the 1960s, exports quadrupled between 1980 and 1993 as newly built coal washing, rail, and port facilities made more of China's high quality coal available for export. Japan is by far the most important buyer

of Chinese coal, followed by South Korea, Taiwan, Hong Kong, and North Korea (Table VII-3). Many of the loans Japan has extended to China have been for improvement of railroads and ports important for the overseas transport of Shanxi coal.<sup>3</sup> About half of China's coal imports come from Vietnam, with most of the rest from North Korea; Australia, and New Zealand.

A small amount of electricity (0.5% of China's total supply in 1993) comes from Hong Kong and the former Soviet Union (Table VII-3). China itself sells an even smaller amount to Macau. China has built several hydroelectric projects jointly with North Korea along their mutual border, and purchases by the Chinese of part of North Korea's share of generation could be considered imports, but the magnitude of this trade is small and unreported.

## ENERGY-INTENSIVE PRODUCTS

China's exports of energy-intensive industrial products have varied greatly from year to year, with no clear pattern emerging across all categories (Table VII-6). Exports of building materials (cement and flat glass) peaked in the early 1990s, falling as domestic demand has grown and international market prices weakened. Crude and finished steel exports show a similar trend, as domestic demand continues to rise. Exports of petroleum byproducts and nonferrous metals show overall growth that continues to the present. Expressed as a percentage of domestic output, exports are most significant for paraffin, petroleum coke, and flat glass (36%, 23%, and 23% respectively in 1993).

Imports of most products increased in the first half of the 1980s, only to decrease in the latter half (Table VII-7). This trend led some analysts to emphasize the role of imports of embedded energy in reducing the overall energy intensity of China's economy. More recently net imports of some energy-intensive commodities (e.g., metals and petrochemicals) have risen, while those of others have fallen off (e.g., inorganic chemicals and paper) or fluctuated (e.g., some nonferrous metals and fertilizers).

The impact of international trade in such products on China's energy intensity and total energy consumption deserves reexamination. Although net imports currently are significant with respect to domestic production mainly for nonferrous metals and petrochemicals, the future may be rather different. Domestic petrochemicals manufacturing capacity is expanding rapidly, so it is likely that imports of intermediate chemicals will soon be replaced by oil imports. Fertilizer imports, which have fallen recently, may increase in the near future; demands on China's shrinking and increasingly less fertile farmland are becoming heavier, while investment in fertilizer plant capacity has stagnated because of the low controlled price of domestic product. China's steelmaking capacity also may not be able to keep pace with the rapid rate of building and infrastructure construction.

<sup>1</sup> British Petroleum, 1995.

<sup>2</sup> Distillates include gasoline, naphtha, kerosene, diesel, fuel oil, lube oil, and other distillates. Byproducts include waxes, LPG, asphalt, petroleum coke, etc.

<sup>3</sup> OECF, 1991.



Table VII-1. Energy Exports and Imports, 1950-1994

I. Physical Units									
Year	Exports					Imports			
	Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Petroleum Products * (Mt)	Electricity (GWh)	Coal (Mt)	Crude Oil (Mt)	Petroleum Products † (Mt)	Electricity (GWh)
1950	1.96	0.00	-	-	-	0.04	0.04	-	-
1951	0.25	0.00	-	-	-	<0.01	0.06	-	-
1952	0.29	0.00	-	-	-	<0.01	0.10	-	-
1953	0.95	0.00	-	-	-	<0.01	0.11	-	-
1954	1.51	0.04	-	-	-	<0.01	0.15	-	-
1955	1.63	0.00	-	-	-	0.02	0.38	-	-
1956	2.03	0.11	-	-	-	0.24	0.40	-	-
1957	1.88	0.16	-	-	-	0.07	0.38	-	-
1958	2.00	0.04	-	-	-	0.57	0.66	-	-
1959	1.99	0.05	-	-	-	1.25	0.65	-	-
1960	2.12	0.05	-	-	-	1.24	0.59	-	-
1961	2.32	0.04	-	0.001	-	1.42	0.06	-	-
1962	2.60	0.05	0.06	0.03	-	1.41	0.10	-	-
1963	2.60	0.09	0.07	0.01	-	1.20	0.12	-	-
1964	2.97	0.12	0.09	0.04	-	1.30	0.12	-	-
1965	3.36	0.12	0.20	0.10	-	1.99	0.13	-	-
1966	3.97	0.11	0.20	0.20	-	1.60	0.17	-	-
1967	3.49	0.07	0.16	0.14	-	1.13	0.06	-	-
1968	2.13	0.07	0.13	0.11	-	1.08	0.09	-	-
1969	1.46	0.06	0.11	0.14	-	0.96	0.20	-	-
1970	2.27	0.27	0.19	0.19	-	1.23	0.47	-	-
1971	2.87	0.39	0.26	0.37	-	1.22	0.07	-	-
1972	2.82	0.36	0.64	0.89	-	1.35	0.17	-	-
1973	2.82	0.45	1.83	1.16	-	1.56	0.18	-	-
1974	2.87	0.44	5.07	1.48	-	1.84	0.90	-	-
1975	3.00	0.43	9.88	2.10	-	2.59	1.76	-	-
1976	2.27	0.25	8.50	1.95	-	2.06	0.80	-	-
1977	2.63	0.20	9.11	1.96	-	2.04	0.48	-	-
1978	3.12	0.30	11.31	2.07	-	2.44	0.69	-	-
1979	4.63	0.30	13.43	3.03	-	2.15	0.26	-	-
1980	6.32	0.27	13.31	4.20	-	1.99	0.37	-	-
1981	6.57	0.25	13.86	4.67	-	1.93	0.07	-	300
1982	6.44	0.47	14.68	4.91	-	2.19	0.64	-	330
1983	6.56	0.35	14.82	4.91	-	2.14	0.37	-	430
1984	7.04	0.35	22.01	5.70	30	2.43	0.25	-	800
1985	7.77	0.37	30.30	6.21	40	2.31	0.72	0.07	1,100
1986	9.82	0.46	28.50	5.46	40	2.47	1.07	1.97	1,210
1987	13.53	0.61	27.23	4.94	40	1.94	1.72	1.98	1,290
1988	15.65	1.03	26.05	4.79	40	1.69	0.86	3.07	1,510
1989	15.34	1.66	24.39	4.74	50	2.29	3.26	5.35	1,642
1990	17.29	1.30	23.99	5.26	85	1.98	2.92	3.17	1,925
1991	20.10	1.08	22.60	4.81	260	1.37	5.97	4.61	3,110
1992	19.70	1.35	21.51	5.39	260	1.23	11.36	7.78	4,980
1993	19.81	2.61	19.43	3.72	117	1.43	15.67	17.29	4,506
1994	24.25 ¶	-	18.49	3.79	-	-	12.35	12.77	-

\* Composed mainly of gasoline, gasoil (diesel), fuel oil, naphtha, aviation kerosene, and lubricant base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t).

† Diesel is the largest component of product imports. Smuggling of diesel and gasoline has grown in recent years, and official statistics understate actual imports.

¶ Ministry of Coal, 1/10/95

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91; China Statistical Information and Consultancy Service Center, 1992; China Energy Annual Review, 1994; China Statistical Yearbook, 1994; Chinese customs statistics. Earlier data are from MOFERT, and the following are customs statistics: exports of coal (1984 and later), coke (1984 and later), crude oil (1981 and later), oil products (1981 and later), and electricity (1989 and later); imports of coal (1984 and later), crude oil (1988 and later), oil products (1985 and later), and electricity (1989 and later); and as noted.

Table VII-1. Energy Exports and Imports, 1950-1994 (continued)

Year	Exports					Imports			
	Coal *	Coke	Crude Oil	Petroleum Products †	Electricity ‡	Coal *	Crude Oil	Petroleum Products †	Electricity ‡
1950	1.96	0.00	-	-	-	0.04	0.06	-	-
1951	0.25	0.00	-	-	-	<0.01	0.09	-	-
1952	0.29	0.00	-	-	-	<0.01	0.14	-	-
1953	0.95	0.00	-	-	-	<0.01	0.16	-	-
1954	1.51	0.03	-	-	-	<0.01	0.22	-	-
1955	1.63	0.00	-	-	-	0.02	0.54	-	-
1956	2.03	0.11	-	-	-	0.24	0.57	-	-
1957	1.88	0.15	-	-	-	0.07	0.54	-	-
1958	2.00	0.03	-	-	-	0.57	0.95	-	-
1959	1.99	0.05	-	-	-	1.25	0.94	-	-
1960	2.12	0.04	-	-	-	1.24	0.85	-	-
1961	2.32	0.04	-	0.001	-	1.42	0.08	-	-
1962	2.60	0.05	0.09	0.04	-	1.41	0.15	-	-
1963	2.60	0.09	0.11	0.01	-	1.20	0.17	-	-
1964	2.97	0.12	0.13	0.05	-	1.30	0.18	-	-
1965	3.36	0.12	0.28	0.15	-	1.99	0.18	-	-
1966	3.97	0.11	0.28	0.29	-	1.60	0.24	-	-
1967	3.49	0.07	0.23	0.20	-	1.13	0.08	-	-
1968	2.13	0.06	0.19	0.16	-	1.08	0.13	-	-
1969	1.46	0.06	0.15	0.21	-	0.96	0.28	-	-
1970	2.27	0.26	0.27	0.28	-	1.23	0.68	-	-
1971	2.87	0.38	0.38	0.55	-	1.22	0.11	-	-
1972	2.82	0.35	0.91	1.31	-	1.35	0.24	-	-
1973	2.82	0.44	2.62	1.71	-	1.56	0.25	-	-
1974	2.87	0.42	7.25	2.17	-	1.84	1.28	-	-
1975	3.00	0.42	14.13	3.09	-	2.59	2.51	-	-
1976	2.27	0.24	12.15	2.86	-	2.06	1.14	-	-
1977	2.63	0.20	13.02	2.89	-	2.04	0.68	-	-
1978	3.12	0.29	16.18	3.05	-	2.44	0.99	-	-
1979	4.63	0.29	19.21	4.46	-	2.15	0.37	-	-
1980	6.32	0.26	19.03	6.18	-	1.99	0.52	-	-
1981	6.57	0.24	19.82	6.86	-	1.93	0.10	-	0.121
1982	6.44	0.46	20.99	7.22	-	2.19	0.92	-	0.133
1983	6.56	0.34	21.19	7.22	-	2.14	0.53	-	0.174
1984	7.04	0.34	31.47	8.38	0.012	2.43	0.35	-	0.323
1985	7.77	0.36	43.33	9.13	0.016	2.31	1.02	0.10	0.444
1986	9.82	0.45	40.75	8.02	0.016	2.47	1.54	2.87	0.489
1987	13.53	0.59	38.93	7.26	0.016	1.94	2.45	2.89	0.521
1988	15.65	1.00	37.24	7.05	0.016	1.69	1.22	4.48	0.610
1989	15.34	1.61	34.87	6.96	0.020	2.29	4.67	7.80	0.663
1990	17.29	1.26	34.30	7.74	0.034	1.98	4.18	4.62	0.778
1991	20.10	1.05	32.32	7.08	0.105	1.37	8.54	6.73	1.256
1992	19.70	1.31	30.76	7.92	0.105	1.23	16.24	11.36	2.012
1993	19.81	2.53	27.79	5.46	0.047	1.43	22.41	25.25	1.820
1994	24.25 §	-	26.44	5.58	-	-	17.65	18.64	-

\* Exported coal is of high quality and is here assumed to be equivalent to standard coal (29.3 GJ/t, low heat).

† Composed mainly of gasoline, gasoil (diesel), fuel oil, naphtha, aviation kerosene, and lubricant base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t). Diesel is the largest component of product imports. Smuggling of diesel and gasoline has grown in recent years, and official statistics understate actual imports.

‡ Converted at 0.404 kgce/kWh.

§ Ministry of Coal, 1/10/95.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91; China Statistical Information and Consultancy Service Center, 1992; China Energy Annual Review, 1994; China Statistical Yearbook, 1994; Chinese customs statistics. Earlier data are from MOFERT, and the following are customs statistics: exports of coal (1984 and later), coke (1984 and later), crude oil (1981 and later), oil products (1981 and later), and electricity (1989 and later); imports of coal (1984 and later), crude oil (1988 and later), oil products (1985 and later), and electricity (1989 and later); and as noted.

Table VII-1. Energy Exports and Imports, 1950-1994 (continued)

3. Net Exports, Mtce										
Year	Coal and Coke *			Petroleum & Products †			Electricity ‡			Overall Net Exports
	Exports	Imports	Net Exports	Exports	Imports	Net Exports	Exports	Imports	Net Exports	
1950	1.96	0.04	1.92	-	0.06	-0.06	-	-	-	1.86
1951	0.25	<0.01	0.25	-	0.09	-0.09	-	-	-	0.16
1952	0.29	<0.01	0.29	-	0.14	-0.14	-	-	-	0.15
1953	0.95	<0.01	0.95	-	0.16	-0.16	-	-	-	0.79
1954	1.54	<0.01	1.54	-	0.22	-0.22	-	-	-	1.33
1955	1.63	0.02	1.61	-	0.54	-0.54	-	-	-	1.07
1956	2.14	0.24	1.90	-	0.57	-0.57	-	-	-	1.33
1957	2.03	0.07	1.96	-	0.54	-0.54	-	-	-	1.42
1958	2.03	0.57	1.47	-	0.95	-0.95	-	-	-	0.52
1959	2.04	1.25	0.79	-	0.94	-0.94	-	-	-	-0.15
1960	2.16	1.24	0.92	-	0.85	-0.85	-	-	-	0.07
1961	2.36	1.42	0.93	0.001	0.08	-0.08	-	-	-	0.85
1962	2.65	1.41	1.24	0.13	0.15	-0.02	-	-	-	1.22
1963	2.69	1.20	1.48	0.12	0.17	-0.05	-	-	-	1.43
1964	3.09	1.30	1.79	0.18	0.18	0.00	-	-	-	1.80
1965	3.48	1.99	1.49	0.43	0.18	0.25	-	-	-	1.74
1966	4.08	1.60	2.48	0.57	0.24	0.33	-	-	-	2.82
1967	3.56	1.13	2.43	0.43	0.08	0.35	-	-	-	2.78
1968	2.19	1.08	1.12	0.34	0.13	0.21	-	-	-	1.33
1969	1.52	0.96	0.55	0.36	0.28	0.08	-	-	-	0.64
1970	2.53	1.23	1.30	0.56	0.68	-0.12	-	-	-	1.18
1971	3.25	1.22	2.03	0.92	0.11	0.82	-	-	-	2.85
1972	3.17	1.35	1.81	2.22	0.24	1.98	-	-	-	3.79
1973	3.26	1.56	1.69	4.33	0.25	4.08	-	-	-	5.77
1974	3.29	1.84	1.45	9.42	1.28	8.14	-	-	-	9.59
1975	3.42	2.59	0.82	17.21	2.51	14.70	-	-	-	15.52
1976	2.51	2.06	0.45	15.01	1.14	13.87	-	-	-	14.31
1977	2.83	2.04	0.78	15.91	0.68	15.23	-	-	-	16.01
1978	3.41	2.44	0.97	19.23	0.99	18.24	-	-	-	19.21
1979	4.92	2.15	2.77	23.67	0.37	23.30	-	-	-	26.07
1980	658	1.99	4.59	25.21	0.52	24.69	-	-	-	29.28
1981	0.81	1.93	4.88	26.68	0.10	26.58	-	0.12	-0.12	31.34
1982	0.90	2.19	4.72	28.21	0.92	27.29	-	0.13	-0.13	31.87
1983	0.89	2.14	4.75	28.41	0.53	27.88	-	0.17	-0.17	32.46
1984	7.38	2.43	4.95	39.85	0.35	39.50	0.01	0.32	-0.31	44.14
1985	8.13	2.31	5.82	52.46	1.02	51.44	0.02	0.44	-0.43	56.83
1986	10.27	2.47	7.80	48.77	4.41	44.36	0.02	0.49	-0.47	51.69
1987	14.12	1.94	12.18	46.20	5.35	40.85	0.02	0.52	-0.51	52.53
1988	16.65	1.69	14.96	44.29	5.70	38.59	0.02	0.61	-0.59	52.96
1989	16.95	2.29	14.66	41.84	12.47	29.37	-	0.66	-0.64	43.38
1990	18.55	1.98	16.57	42.04	8.80	33.24	0.03	0.78	-0.74	49.06
1991	21.15	1.37	19.78	39.39	15.27	24.13	0.11	1.26	-1.15	42.76
1992	21.01	1.23	19.78	38.68	27.60	11.08	0.11	2.01	-1.91	28.95
1993	22.34	1.43	20.91	33.25	47.66	-14.41	0.05	1.82	-1.77	4.73
1994	-	-	-	32.02	36.30	-4.28	-	-	-	-

\* Exported coal is of high quality and is here assumed to be equivalent to standard coal (29.3 GJ/t, low heat).

† Composed mainly of gasoline, gasoil (diesel), fuel oil, naphtha, aviation kerosene, and lubricant base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t). Diesel is the largest component of product imports. Smuggling of diesel and gasoline has grown in recent years, and official statistics understate actual imports.

‡ Converted at 0.404 kgce/kWh.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91; China Statistical Information and Consultancy Service Center, 1992; China Energy Annual Review, 1994; China Statistical Yearbook, 1994; Chinese customs statistics. Earlier data are from MOFERT, except the following are customs statistics: exports of coal (1984 and later), coke (1984 and later), crude oil (1981 and later), oil products (1981 and later), and electricity (1989 and later); imports of coal (1984 and later), crude oil (1988 and later), oil products (1985 and later), and electricity (1989 and later); and as noted.

Table VII-1. Net Energy Exports, 1950-1994 (continued)

Annual Average Rates of Growth:	
<b>Petroleum</b>	
1950-1970	-3.6%
1970-1985	50.0%
1985-1992	-19.7%
1992-1993	-230.0%
<b>Coal</b>	
1950-1979	1.3%
1970-1985	10.5%
1985-1993	17.3%
<b>Total</b>	
1950-1970	-2.3%
1970-1985	29.4%
1985-1993	-26.7%

Figure VII-1. Net Energy Exports

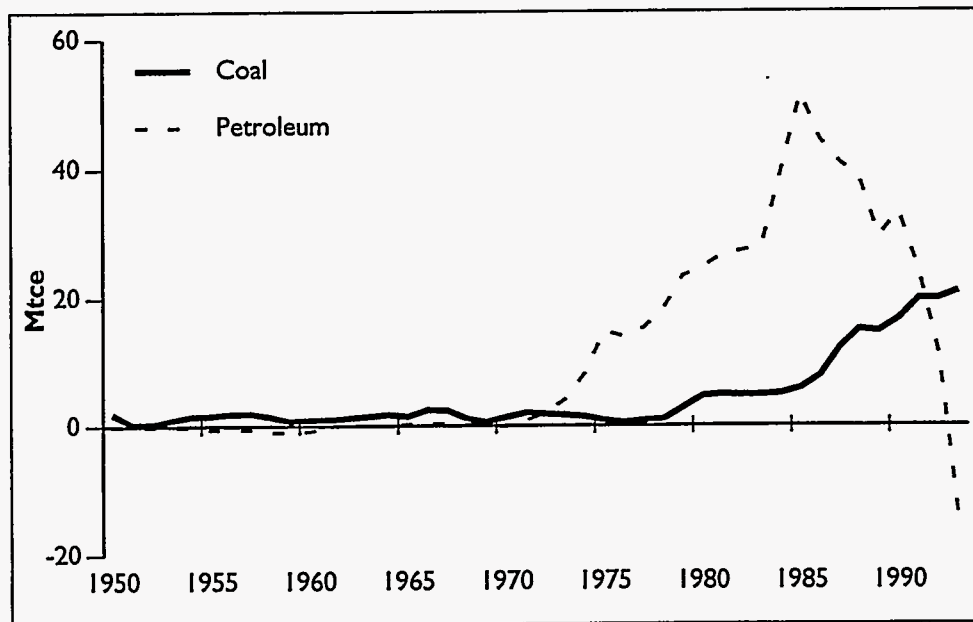


Table VII- 2. Energy Exports and Imports by Destination and Origin, \* 1993

Country	Coal & Coal Products (t)		Crude Oil (t)		Petroleum Distillates † (t)		Other Petroleum Products & Byproducts ‡ (t)		Electricity (MWh)	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Angola	-	-	-	1,224,482	-	-	-	-	-	-
Argentina	-	-	-	201,035	-	23,863	53	-	-	-
Australia	11	403,742	-	402,967	90	5,351	3,309	6,018	-	-
Austria	-	-	-	-	-	1	-	-	-	-
Bahrain	-	-	-	-	1	-	101	-	-	-
Bangladesh	5,513	-	-	-	312	5,499	3,449	-	-	-
Belgium	247,743	-	-	-	-	1,434	19,802	99	-	-
Brazil	451,797	-	-	-	-	2	-	29	-	-
Bulgaria	16,000	-	-	-	-	24,554	-	-	-	-
Burma (Myanmar)	133	6,370	-	-	5,302	7	32,662	-	-	-
Belarus	-	-	-	-	-	1,000	-	-	-	-
Canada	5,000	-	-	-	-	120,508	-	155	-	-
Chile	-	-	-	-	-	-	290	-	-	-
Columbia	-	-	-	-	-	-	9,800	-	-	-
Costa Rica	-	-	-	-	-	-	263	-	-	-
Cuba	-	-	-	-	-	-	600	-	-	-
Cyprus	-	-	-	-	-	-	70	-	-	-
Denmark	-	-	-	-	-	62	35	-	-	-
Ecuador	-	-	-	-	75	-	2,359	-	-	-
El Salvador	-	-	-	-	-	-	2,003	-	-	-
Egypt	15,000	-	-	-	-	1,871	27,273	32	-	-
Estonia	-	-	-	-	-	4,966	-	-	-	-
Finland	-	-	-	-	-	-	333	-	-	-
FSU	1,540	7,142	-	13,923	270	1,265,021	11,124	1,453	-	33,171
France	651,248	-	-	-	42	2,226	1	69	-	-
Gabon	-	-	-	126,740	-	-	-	-	-	-
Gambia	3	-	-	-	-	-	-	-	-	-
Germany	464,417	-	-	1	113	2,608	7,259	195	-	-
Ghana	-	-	-	-	-	-	102	-	-	-
Greece	-	-	-	-	-	-	-	850	-	-
Greenland	-	-	-	-	-	599	-	-	-	-
Guinea	-	-	-	70,208	-	-	-	-	-	-
Honduras	-	-	-	-	-	-	480	-	-	-
Hong Kong	1,971,312	3	-	-	456,754	383,866	33,279	47,373	-	4,472,990
Hungary	-	-	-	-	-	4,000	8,000	-	-	-
India	137,327	-	-	-	-	68,371	135,232	28	-	-
Indonesia	159,426	3	369,128	4,017,944	2,688	89,684	8,651	21,334	-	-
Iran	55,000	-	-	67,860	67	415	10,073	64	-	-
Iraq	-	-	-	-	-	23	-	7	-	-
Israel	60,020	-	117,438	-	-	-	-	-	-	-
Italy	185,714	-	-	-	-	72,200	1,756	74	-	-
Jamaica	-	-	-	-	1	-	223	-	-	-
Japan	6,730,486	1,351	12,695,794	-	413,734	932,324	546,307	102,675	-	-
Jordan	410	-	-	-	-	-	116	-	-	-
Kazakhstan	14,229	-	-	-	3,110	3,669	40	-	-	-
Kenya	-	-	-	-	198	-	752	-	-	-
Korea (DPRK)	1,751,415	154,926	1,032,954	19,022	78,265	16,508	12,666	5,158	-	-
Korea (RK)	5,424,083	18	1,605,140	1,941	545,981	2,188,273	26,493	92,469	-	-
Kuwait	-	-	-	-	-	5,375	41	1,636	-	-

\* Customs statistics indicate proximate destination only, not final destination. Thus figures for fossil fuels may not reflect the actual balance of trade with some trading, e.g., with Hong Kong, from where many Chinese goods are transhipped to other destinations.

† Includes gasoline, naphtha, other light distillates, kerosene and other middle distillates, diesel, fuel oil, lube oil and grease, and other heavy distillates.

‡ Includes waxes, petroleum jelly, liquefied petroleum gases, asphalt, bitumen, coke, and other byproducts

§ Other petroleum product exports are mainly small amounts of paraffin. Other coal and petroleum product imports are mainly from overseas branches of Chinese companies.

Source: China's Customs Statistics Yearbook, 1993.

Table VII- 2. Energy Exports and Imports by Destination and Origin\*, 1993 (continued)

Country	Coal & Coal Products (t)		Crude Oil (t)		Petroleum Distillates † (t)		Other Petroleum Products & Byproducts ‡ (t)		Electricity (MWh)	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Laos	-	-	-	-	14	162	206	-	-	-
Lebanon	-	-	-	-	55	-	359	-	-	-
Libya	-	-	-	708,352	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	7	-	-	-	-
Macao	3	-	-	-	17,206	528	3,249	-	117,445	-
Malaysia	121,221	-	-	513,131	8,516	25,381	5,003	3	-	-
Maunūus	-	-	-	-	7	-	330	-	-	-
Mexico	35,000	-	-	-	-	200,422	11,643	27	-	-
Mongolia (Outer)	211	-	-	-	271	4	1,241	20	-	-
Morocco	-	-	-	-	-	-	1,602	-	-	-
Mozambique	-	-	-	-	-	-	1,510	-	-	-
Nepal	-	-	-	-	1	-	545	-	-	-
Netherlands	377,708	-	-	-	1	59,210	1,142	401	-	-
New Zealand	140	122,763	-	-	13	21,051	3,114	903	-	-
Nigeria	45,003	-	-	-	-	-	-	-	-	-
Norway	45,472	-	-	-	-	251	1,177	-	-	-
Oman	-	-	-	4,088,791	-	6,780	-	-	-	-
Pakistan	434	-	-	196,249	620	8,601	5,627	2,584	-	-
Panama	-	-	-	-	-	-	665	11,115	-	-
Papua New Guinea	-	-	-	775,991	-	-	-	-	-	-
Peru	179,800	-	-	-	-	-	315	10	-	-
Philippines	190,142	-	109,402	1,000	49,194	111,007	19,896	238,099	-	-
Poland	-	4	-	-	-	-	791	-	-	-
Qatar	-	-	-	-	-	15,567	-	10,785	-	-
Romania	88,957	-	-	-	-	209,926	1,901	-	-	-
Saudi Arabia	-	-	-	214,794	11	63,418	35	50,142	-	-
Singapore	32,582	14	727,548	315,858	1,998,157	9,396,443	10,011	378,773	-	-
Slovak Republic	-	-	-	-	-	-	2,362	-	-	-
South Africa	-	40,700	-	-	-	88	36,097	117	-	-
Spain	-	-	-	-	-	20	8,223	3,725	-	-
Sri Lanka	-	-	-	-	-	24,344	727	-	-	-
Sweden	60,052	-	-	-	-	5	140	148	-	-
Switzerland	-	-	-	-	-	58	-	5	-	-
Syria	-	-	-	-	-	-	53	-	-	-
Taiwan	2,229,163	47	-	-	1,752	45,147	18,146	2,751	-	-
Tanzania	-	-	-	-	-	-	320	-	-	-
Thailand	213,749	-	-	-	79,412	48,546	14,038	19,495	-	-
Tunisia	-	-	-	-	-	20,000	-	-	-	-
Turkey	136,756	-	-	-	-	-	43	-	-	-
Uganda	-	-	-	-	-	-	-	-	-	-
UAE	-	-	-	571,823	13	358	190	-	-	-
United Kingdom	398,410	3	-	188,618	21	24,217	788	1,881	-	-
United States	75,569	145	2,777,088	6,072	52,352	1,606,522	32,928	9,724	-	-
Vietnam	25	692,516	-	288,975	27	54,299	847	-	-	-
Rep. Yemen	-	-	-	1,655,428	350	-	488	1,855	-	-
Other §	-	199	-	-	5	127,805	1,890	3,778	-	-
Total	22,578,224	1,429,947	19,434,492	15,671,205	3,715,002	17,294,447	1,092,637	1,016,059	117,445	4,506,161

\* Customs statistics indicate proximate destination only, not final destination. Thus figures for fossil fuels may not reflect the actual balance of trade with some trading, e.g., with Hong Kong, from where many Chinese goods are transhipped to other destinations.

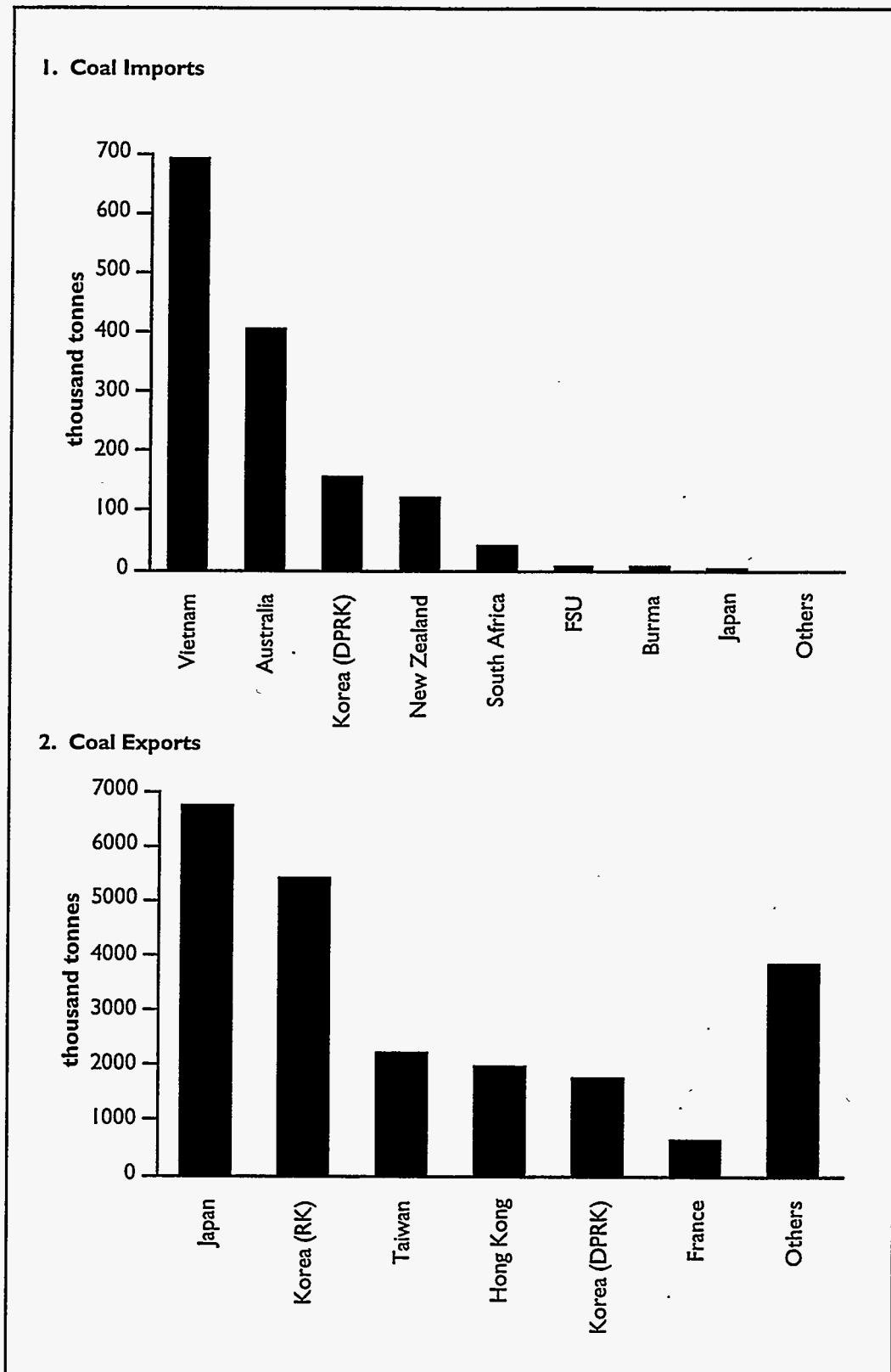
† Includes gasoline, naphtha, other light distillates, kerosene and other middle distillates, diesel, fuel oil, lube oil and grease, and other heavy distillates.

‡ Includes waxes, petroleum jelly, liquefied petroleum gases, asphalt, bitumen, coke, and other byproducts

§ Other petroleum product exports are mainly small amounts of paraffin. Other coal and petroleum product imports are mainly from overseas branches of Chinese companies.

Source: China's Customs Statistics Yearbook, 1993.

Figure VII-2. Coal Imports and Exports by Country, 1993



**Table VII-3. Gross Energy Exports Earnings and Total Export Earnings  
Selected Years 1953-1970, and 1975-1993 — Billion Current US Dollars**

Year	Total Gross Export Earnings	Coal & Coke Subtotal	Oil & Oil Products Subtotal	Gross Energy Export Earnings *	Percentage of Total Gross Export Earnings †
1953	1.022	-	-	0.008	0.8%
1957	1.597	-	-	0.018	1.1%
1965	2.228	-	-	0.068	3.1%
1966	2.366	-	-	0.068	2.9%
1970	2.260	-	-	0.063	2.8%
1975	7.264	-	-	1.093	15.0%
1976	6.855	-	-	0.942	13.7%
1977	7.590	-	-	1.068	14.1%
1978	9.745	-	-	1.345	13.8%
1979	13.660	-	2.231	2.654	19.4%
1980	18.270	-	4.119	4.588	25.1%
1981	22.015	-	4.496	5.054	23.0%
1982	22.321	0.380	4.897	5.317	23.8%
1983	22.226	0.327	4.475	4.666	21.0%
1984	26.139	0.322	5.680	6.002	23.0%
1985	27.350	0.349	6.687	7.035	25.7%
1986	30.942	0.455	3.150	3.605	11.7%
1987	39.437	0.536	3.905	4.441	11.3%
1988	47.516	0.594	3.239	3.832	8.1%
1989	52.380	0.680	3.456	4.136	7.9%
1990	62.091	0.754	4.279	5.034	8.1%
1991	71.843	0.829	3.780	4.609	6.4%
1992	84.940	0.840	3.640	4.479	5.3%
1993	91.763	0.874	3.038	3.912	4.3%

\* 1985-1991 figures include gas and electricity. 1982 and 1983 figures are not equal to the sum of coal and oil subtotals because figures for those years are from different sources. 1991, 1992 figures from China Statistical Yearbook.

† Percentages for 1979-1985 may be in error because of different sources for total exports and energy exports in those years.

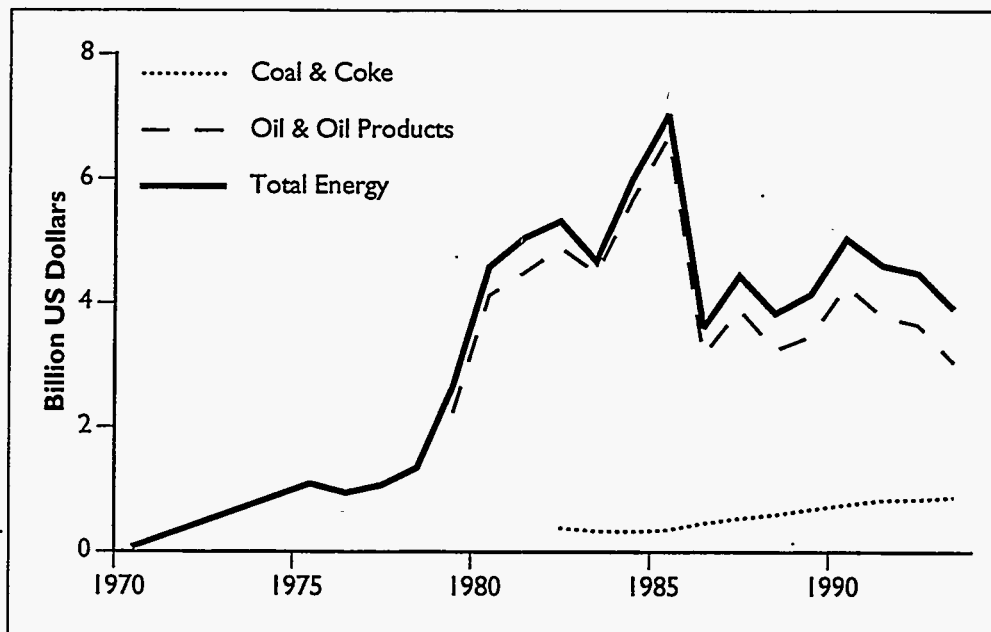
Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990 customs statistics; Far Eastern Economic Review. Earlier data are from MOFERT and the following are from customs statistics: gross export earnings (1979 and later), coal exports (1985 and later), oil exports (1979 and later), and gross energy exports (1985 and later).



Table VII-3. Export Earnings, 1975-1993 (continued)

Annual Average Rates of Growth		
<b>Energy</b>		
1975-1985	-	20.5%
1985-1993	-	-11.1%
<b>Total</b>		
1975-1985	-	14.2%
1985-1993	-	16.3%

Figure VII-3. Gross Export Earnings



**Table VII-4. Crude Oil Imports and Exports, 1993 and 1994**

<b>1. Crude Oil Exports by Destination (t)</b>		
	<b>1993</b>	<b>1994</b>
Japan	12,695,794	11,904,814
United States	2,777,088	3,059,690
Korea (RK)	1,605,140	1,609,796
Korea (DPRK)	1,032,954	832,785
Singapore	727,548	618,969
Israel	117,438	412,970
Indonesia	369,128	51,905
Philippines	109,402	-
<b>Total</b>	<b>19,434,492</b>	<b>18,490,929</b>
<b>2. Crude Oil Imports by Origin (t)</b>		
	<b>1993</b>	<b>1994</b>
Indonesia	4,017,944	4,724,534
Oman	4,088,791	3,367,376
Yemen	1,655,428	1,258,220
Papua New Guinea	775,991	801,811
Libya	708,352	-
Vietnam	288,975	610,418
Angola	1,224,482	372,145
Malaysia	513,131	286,542
Pakistan	196,249	250,676
Saudi Arabia	214,794	146,449
Argentina	201,035	-
United Kingdom	188,618	-
Gabon	126,740	124,032
Iran	67,860	69,119
Australia	402,967	66,980
UAE	571,823	65,528
Singapore	315,858	65,207
Guinea	70,208	-
Korea (DPRK)	19,022	-
FSU	13,923	57,072
Canada	-	34,513
Thailand	-	26,881
Korea (RK)	1,941	6,986
Algeria	-	6,462
Hong Kong	-	2,860
Unites States	6,072	2,069
Philippines	1,000	-
Others	1	30
<b>Total</b>	<b>15,671,205</b>	<b>12,345,910</b>

Source: China Customs Statistics.

Figure VII-4. Crude Oil Imports and Exports by Country, 1994

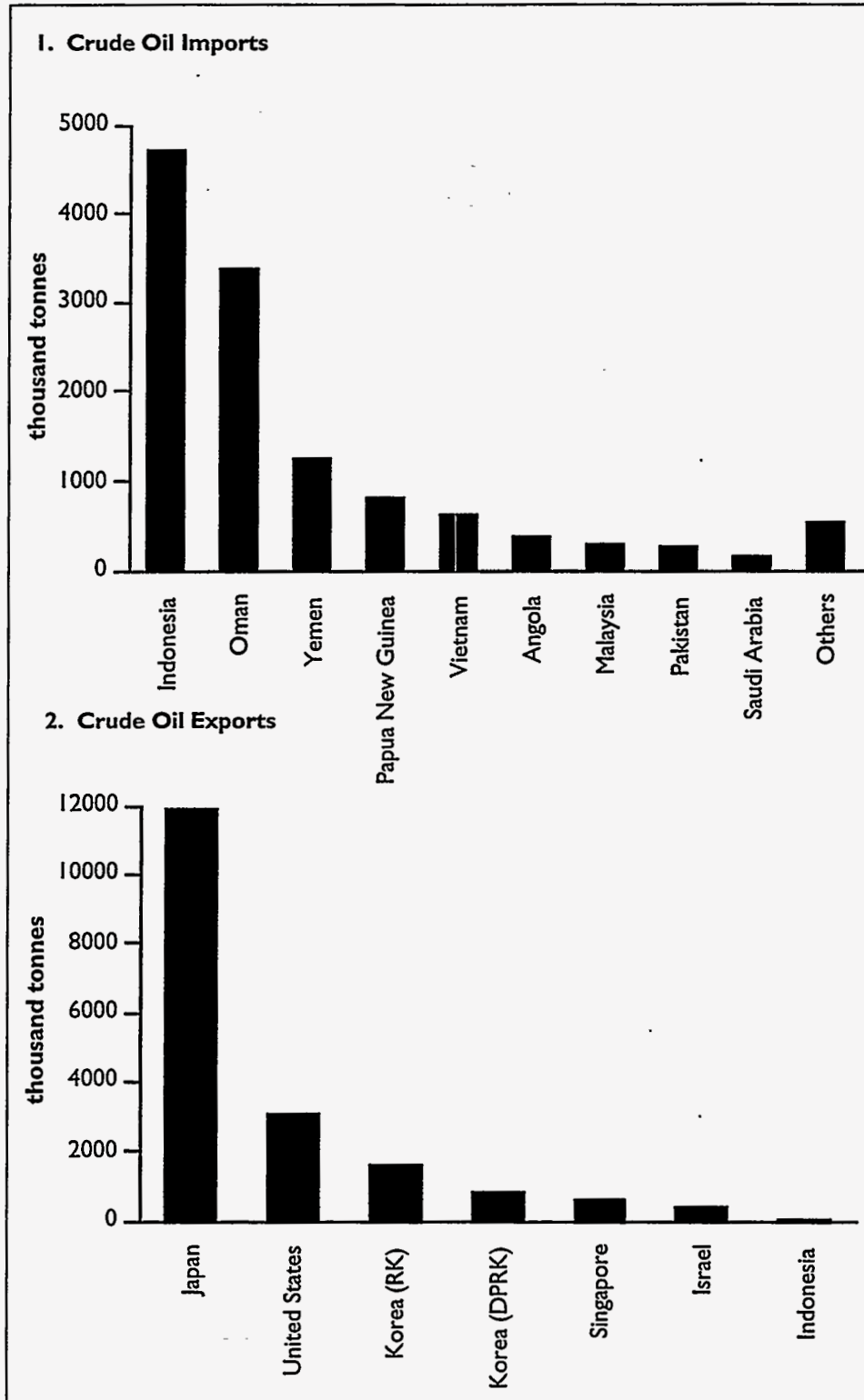


Table VII-5. Oil Product \* Imports and Export, 1993 and 1994

1. Oil Products Exports by Destination (t)			2. Oil Products Imports by Origin (t)		
	1993	1994		1993	1994
Singapore	1,998,157	1,903,907	Singapore	9,396,443	7,880,349
Korea (RK)	545,981	870,087	Korea (RK)	2,188,273	1,452,049
Hong Kong	456,754	447,033	FSU	1,265,021	1,222,665
Japan	413,734	292,118	United States	1,606,522	721,622
Thailand	79,412	114,721	Japan	932,324	576,467
Korea (DPRK)	78,265	67,996	Philippines	111,007	224,085
United States	52,352	-	Hong Kong	383,866	146,302
Philippines	49,194	46,136	Italy	72,200	123,989
Vietnam	-	20,234	Canada	120,508	-
Macao	17,206	-	Indonesia	89,684	65,787
Kazakhstan	3,110	8,141	Netherlands	59,210	-
Malaysia	8,516	6,342	Iran	-	49,123
Indonesia	2,688	6,211	Sweden	-	47,067
Burma	5,302	5,561	Taiwan	45,147	38,320
Taiwan	1,752	1,183	Romania	209,926	29,901
Bangladesh	-	663	Estonia	4,966	23,691
Pakistan	620	-	Bulgaria	24,554	-
Mongolia	-	497	Sri Lanka	24,344	-
Others	1,959	1,738	Argentina	23,863	-
Total	3,715,002	3,792,568	New Zealand	21,051	-
			Saudi Arabia	63,418	17,410
			Korea (DPRK)	16,508	-
			Qatar	15,567	-
			United Kingdom	24,217	14,724
			Mexico	200,422	12,337
			Thailand	48,546	11,289
			India	68,371	10,413
			Pakistan	8,601	-
			Tunisia	20,000	8,501
			Kuwait	5,375	7,777
			UAE	-	7,643
			Oman	6,780	-
			Australia	5,351	6,672
			Vietnam	54,299	5,935
			Bangladesh	5,499	-
			Belorussia	1,000	5,001
			Liberia	-	4,067
			Hungary	4,000	-
			Malaysia	25,381	3,800
			Kazakhstan	3,669	-
			Spain	-	3,486
			Germany	2,608	2,858
			Trinidad & Tobago	-	1,950
			Egypt	1,871	-
			France	2,226	1,650
			Belgium	1,434	1,288
			Others	130,395	39,333
			Total	17,294,447	12,767,551

\* Includes gasoline, naphtha, other light distillates, kerosene and other middle distillates, diesel, fuel oil, lube oil and grease, and other heavy distillates.

Source: China Customs Statistics.

Figure VII-5. Oil Product Imports and Exports by Country, 1994

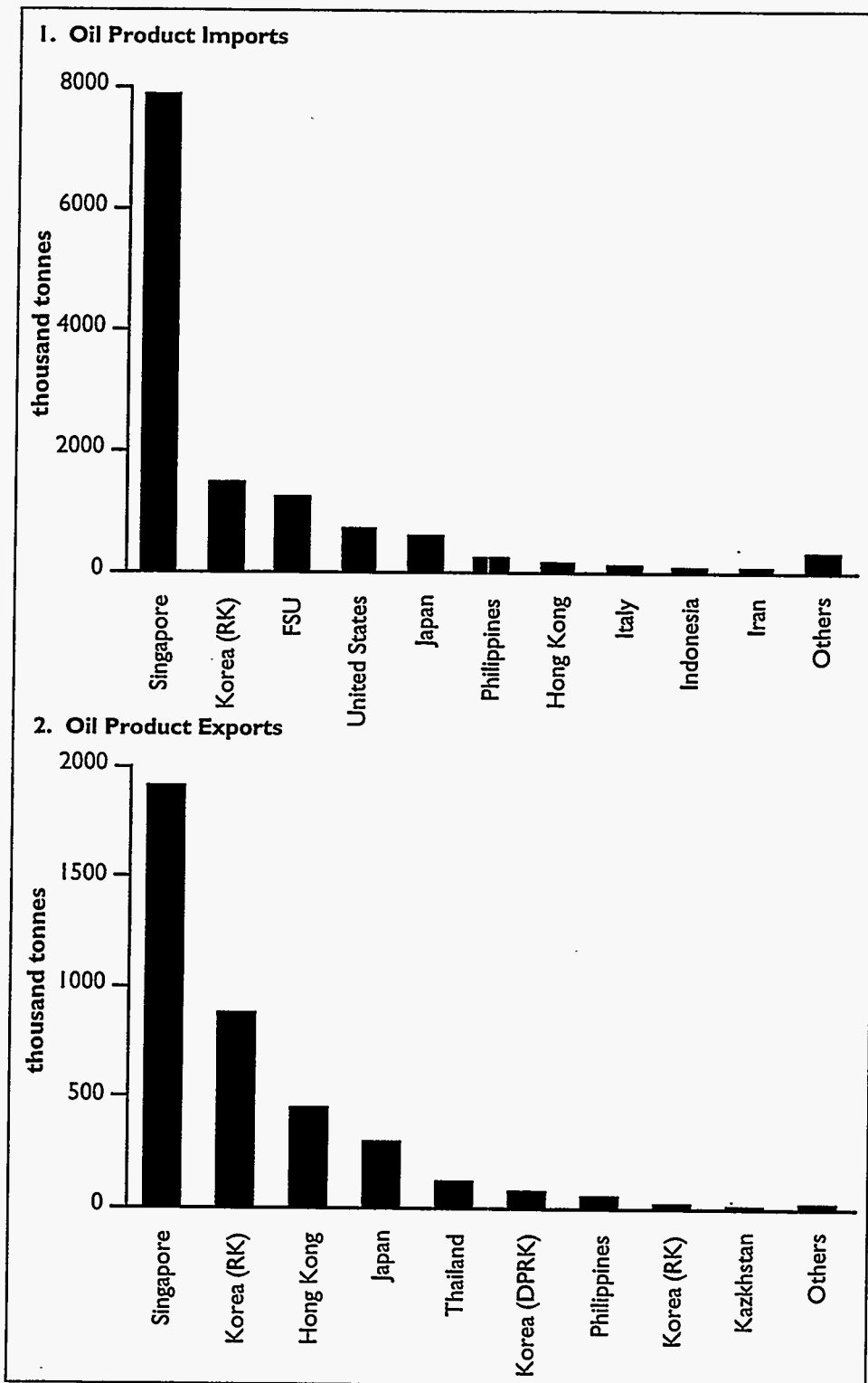


Table VII-6. Exports of Energy-Intensive Products, 1981-1993

1. Physical Units												
Year	Paraffin (kt)	Petroleum Coke (kt)	Cement (Mt)	Flat Glass (million m2)	Paper and Paperboard (kt)	Crude Steel (Mt)	Rolled Steel & Wire * (Mt)	Cast Iron Pipe (kt)	Copper Products (kt)	Aluminum Products (kt)	Zinc and Alloys (kt)	Tin and Alloys (kt)
1981	69	167	0.82	3.72	215	0.360	0.704	41.2	8.12	11.59	17.47	5.614
1982	89	139	0.70	2.73	220	0.220	0.990	34.3	6.60	9.72	10.18	3.068
1983	111	133	0.38	2.14	263	0.010	0.625	31.3	9.49	10.55	2.05	3.64
1984	84	177	0.17	2.31	212	-	0.296	36.6	7.72	5.95	1.45	2.64
1985	102	175	0.14	2.25	185	0.007	0.222	22.0	4.21	5.69	2.37	7.25
1986	101	141	0.19	3.62	258	<0.001	0.313	26.5	9.17	6.14	56.77	7.42
1987	129	63	0.17	7.27	321	<0.001	0.517	27.8	22.30	20.16	95.34	15.89
1988	137	54	0.15	13.71	260	0.012	0.971	37.9	44.25	28.96	13.84	10.72
1989	134	119	0.44	33.54	220	0.022	0.969	42.4	16.48	6.30	20.11	9.87
1990	185	163	6.83	32.86	248	0.513	2.159	31.8	25.23	17.76	16.71	10.14
1991	181	183	10.74	41.94	233	0.819	2.371	29.5	33.66	27.30	6.28	15.69
1992	270	240	6.45	35.21	180	0.340	2.085	35.7	42.59	32.37	84.86	30.27
1993	260	439	2.45	25.36	170	0.110	1.135	35.2	43.30	30.28	205.57	40.70
2. Percent of Domestic Output												
Year	Paraffin	Petroleum Coke	Cement	Flat Glass	Paper and Paperboard	Crude Steel	Rolled Steel & Wire *	Cast Iron Pipe	Copper Products	Aluminum Products	Zinc and Alloys	Tin and Alloys
1981	-	-	1.0%	14%	4%	0.10%	2.6%	-	3.5%	7.6%	-	-
1982	-	-	0.7%	9%	4%	0.06%	3.4%	-	2.5%	3.8%	-	-
1983	24%	15%	0.4%	6%	4%	<0.01%	2.0%	-	3.6%	3.8%	-	-
1984	17%	18%	0.1%	6%	3%	-	0.9%	-	2.4%	2.0%	-	-
1985	18%	19%	0.1%	5%	2%	<0.01%	0.6%	-	1.1%	1.8%	-	-
1986	18%	14%	0.1%	7%	3%	<0.01%	0.8%	-	2.1%	1.8%	-	-
1987	21%	5%	0.1%	13%	3%	<0.01%	1.2%	-	5.0%	5.4%	-	-
1988	21%	4%	0.1%	19%	2%	<0.01%	2.1%	-	10.0%	7.0%	-	-
1989	19%	9%	0.2%	40%	2%	<0.01%	2.0%	-	3.7%	1.5%	-	-
1990	27%	12%	3.3%	41%	2%	0.08%	4.2%	-	5.6%	4.5%	-	-
1991	27%	12%	4.3%	48%	2%	0.12%	4.2%	-	7.1%	5.4%	-	-
1992	39%	15%	2.1%	38%	1%	0.04%	3.1%	-	6.9%	4.9%	-	-
1993	36%	23%	0.7%	23%	1%	0.01%	1.5%	-	6.0%	3.9%	-	-

\* Includes iron and steel wire.

Source: China Energy Statistical Yearbook, various years; China Statistical Yearbook, various years (customs statistics); Yearbook of China's Industrial Economy, various years; Yearbook of China's Nonferrous Metals Industry, various years; Yearbook of China's Iron and Steel Industry, various years; Sinopec Yearbook, 1991; China OGP, 2/15/94.

Table VII-7. Imports of Energy-Intensive Products, 1981-1993

Year	Rolled Steel & Wire * (kt)	Copper and Alloys (kt)	Aluminum and Alloys (kt)	Zinc and Alloys (kt)	Caustic Soda (kt)	Soda Ash (kt)	Chemical Fertilizer (effective component)		Primary Polyethylene (Mt)	Primary Polypropylene (Mt)
							urea (Mt)	subtotal(Mt)		
1981	3.54	53.7	57.8	12.4	51.7	204	2.60	5.55	0.12	0.10
1982	3.77	110.9	169.6	108.1	66.6	247	3.26	6.06	0.42	0.20
1983	9.66	485.9	283.8	228.7	247.0	609	4.25	8.00	0.43	0.20
1984	12.32	254.0	252.7	230.2	227.4	852	4.40	9.23	0.70	0.27
1985	20.10	355.7	487.9	268.6	224.5	1,057	3.82	7.61	0.74	0.41
1986	18.47	171.1	266.2	116.9	283.2	1,221	3.01	5.10	0.68	0.35
1987	12.45	75.5	184.1	68.2	304.9	853	5.56	10.90	0.67	0.29
1988	9.15	84.4	75.4	62.0	231.9	823	8.49	14.71	1.02	0.56
1989	9.52	70.1	175.5	19.2	187.9	969	7.94	13.93	0.53	0.26
1990	4.23	40.3	71.8	4.1	40.5	211	8.13	16.27	0.36	0.22
1991	3.58	114.0	43.9	11.7	3.6	54.2	7.01	18.18	0.65	0.56
1992	7.09	379.0	229.6	42.2	10.2	59.4	7.48	18.59	1.42	0.62
1993	30.22	363.5	165.7	40.1	5.8	60.8	3.61	10.21	1.04	0.58

Year	Primary Polystyrene (Mt)	Primary Polyvinyl Chloride (Mt)	Synthetic Fiber, Staple (kt)	Regenerated Synthetic Fiber, Staple (kt)	Synthetic Fiber, Continuous (kt)	Regenerated Synthetic Fiber, Continuous (kt)	Paper Pulp (kt)	Newsprint (kt)	Sedans (units)	Trucks (units)
1982	0.04	0.02	239	50	98	29	475	69	1,101	7,730
1983	0.02	0.04	134	41	50	28	731	35	5,806	8,445
1984	0.06	0.03	270	40	174	17	640	58	21,651	28,047
1985	0.13	0.06	490	46	300	19	547	269	105,775	111,481
1986	0.15	0.09	301	80	200	19	523	111	48,276	64,570
1987	0.08	0.08	241	112	86	22	683	142	30,536	19,216
1988	0.23	0.10	451	88	112	23	795	102	48,276	64,570
1989	0.19	0.08	392	113	128	11	476	101	30,536	19,216
1990	0.14	0.08	376	115	116	2	342	16	34,063	15,392
1991	0.27	0.14	502	118	118	1	1,291	21	54,409	18,578
1992	0.65	0.33	520	65	264	-	600	60	27,558	41,521
1993	0.74	0.42	520	29	364	-	520	118	71,132	72,564

\* Includes iron and steel wire.

Source: China Energy Statistical Yearbook, various years [customs statistics]; China Statistical Yearbook, various years [customs statistics].

## Chapter VIII— Energy and Environment



# Energy and Environment

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Obtaining, processing, transporting, and using energy are the major sources of environmental degradation in any country. In China the problems of energy use are particularly complex, spanning the range from indoor air pollution generated by inefficient combustion of traditional biomass fuels to incipient issues of nuclear waste disposal.<sup>1</sup> China's efforts at dealing with environmental challenges have been remarkable by the standards of developing countries, but the government must continue to strengthen laws, regulations, and especially implementation if the country is to avoid widespread deterioration in environmental quality.

## CARBON DIOXIDE

China is currently the third largest contributor of anthropogenic carbon dioxide emissions. Its 694 Mt of carbon dioxide (carbon weight) accounted for 11% of worldwide emissions in 1991 (Tables VIII-1 and IX-25). Fossil fuel combustion was the source of 95% of carbon dioxide emissions, with coal alone accounting for 80%. A growing share of emissions is liberated from limestone in the manufacture of cement, output of which has doubled over the past five years.

The structure of emissions by energy source is similar to that of primary energy consumption, although coal's contribution to total carbon dioxide emissions is relatively larger because its carbon emissions factor is substantially higher than for oil or natural gas. With continued growth of its coal-dominated energy system, China will in all likelihood become the world's largest emitter of carbon dioxide early in the next century, contributing the single largest increment to global greenhouse gas emissions.

## SULFUR DIOXIDE AND PARTICULATE EMISSIONS

Sulfur dioxide and particulates are considered

by many environmental experts in China to be the ambient air pollutants of gravest concern. Most efforts at controlling air pollution have so far been aimed at these two pollutants. China's National Environmental Protection Agency collects data on emissions, focusing on those from industrial enterprises, and estimates national totals.<sup>2</sup>

## SULFUR DIOXIDE

Over the past 20 years a fairly constant fraction of China's coal has been washed, and stack removal of sulfur dioxide has been virtually unheard of; trends in sulfur dioxide emissions should therefore be expected to follow coal use rather closely. Sulfur dioxide emissions from industry declined between 1980 and 1986, contrary to the 30% rise in coal use. Since then, however, reported sulfur dioxide emissions have climbed, falling briefly only in 1990, a year in which growth in coal use leveled off (Table VIII-2).

Sulfur dioxide emissions densities are highest in the northern half of China, where coal is used to heat homes and other buildings for several months out of the year, and in the industrial centers of northern and eastern China (Table VIII-3). Although it is not the region with the highest sulfur dioxide emissions density, the Southwest suffers more than any other region from acid precipitation (see below). Southern coals are typically high in sulfur, resulting in serious emissions problems where local industry has no access to higher quality coal from the north.

Most coal in developed countries is burned in central power plants, simplifying the task of controlling sulfur emissions. Because of the pervasiveness of direct use of coal in China, however, power plants account for only one-third of sulfur emissions (Table VIII-4). The next largest emitters — the building materials, chemicals, and metals subsectors — all contributed 7% or less of national emissions each. These and other industrial sources

tend to be widely scattered, as are residential users, which are responsible for about 20% of emissions. As long as this situation persists, the effectiveness of reducing sulfur dioxide through stack emissions controls will be limited. More far-reaching solution would include increasing the amount of delivered coal that is sorted and washed, and improving the efficiency of end-use equipment (like boilers) so that less fuel is needed for the same amount of useful energy.

## **PARTICULATES**

Particulate emissions show a trend similar to that for sulfur dioxide, generally falling until the early 1990s, then rising (Table VIII-2). Since industrial coal consumption increased steadily over this period, the decline could be explained by improvements in and wider penetration of relatively simple emissions controls, especially for particulates from noncombustion processes, such as grinding and sorting. A large share of environmental protection funds are believed to have been used to control particulates, by far the easiest of the airborne pollutant streams to abate. The subsequent rise in emissions may reflect the increasing expense of further degrees of control.

The geographical distribution of particulate emissions generally follows that of sulfur dioxide as well, with densities highest in those regions with both a hard winter (where heating of buildings is permitted) and a high concentration of industry (Table VIII-3). Shanghai tops the list, by virtue of its small area and big industrial base. Beijing and Tianjin follow, both large municipalities in the heating zone (over 40% of combustion-related particulate emissions come from nonindustrial sources) with a great many factories. Of the provinces, Liaoning and Shandong, also northern centers of industry, have the highest emissions densities, followed by Jiangsu, where three-quarters of combustion-related particulates come from industry.

The single largest contributor of particulate emissions is the building materials industry, which is reportedly responsible for 24% of total national emissions (Table VIII-4). Cement kilns and mills alone account for 18%. Power plants follow with 21%, then ferrous metals with 8%, and the remaining industrial sectors are all relatively small contributors. Nonindustrial users, mainly households, still account for over one-quarter of estimated emissions. Particulate removal technology is already

fairly well developed in China, and although equipment quality remains a significant problem the major barrier to increasing rates of recovery in the industrial sector is weak enforcement of existing emissions regulations, especially in rural areas. In the household sector emissions reductions will depend on fuel switching — from raw coal to coal briquettes, and from coal to gas fuels.

## **AMBIENT POLLUTION IN URBAN AREAS**

Air pollution in Chinese cities is extremely serious by world standards. Beijing, Shenyang, Xi'an, Shanghai, and Guangzhou are among the world's ten worst cities for air pollution. Along with other damages, this contributes to a very high rate of deaths from acute and chronic respiratory illnesses, which are responsible for 17% of deaths in urban areas.<sup>3</sup> By contrast, in the United States less than 7% of all deaths are attributable to respiratory illnesses. Concern is greatest for particulates and sulfur dioxide, which together are responsible for the worst of China's air pollution-related illnesses. Estimates of annual economic losses these illness in urban areas run into the billions of yuan.

## **TOTAL SUSPENDED PARTICULATES (TSP)**

To date most efforts at reducing emissions in China have focused on particulates, control of which is relatively inexpensive. The results are evident in steadily declining levels of suspended particulate material and particulate deposition velocities (Tables VIII-5 and VIII-6). Programs to replace raw coal with briquettes in household and other uses have resulted in significant reductions in particulate, sulfur, and carbon monoxide emissions in many residential areas.

Annual average TSP levels of several dozen cities are used to calculate China's national average, which fell from over 700  $\mu\text{g}/\text{m}^3$  in the early 1980s to under 400  $\mu\text{g}/\text{m}^3$  by 1990 (Table VIII-5). Despite some dramatic improvements, however, levels of suspended particulates in many of China's major cities are consistently higher than standards intended to protect human health. Concentrations are generally higher in the northern latitudes, where coal is used to heat building in the winter, but aver-

ages in some southern cities exceed those in some northern cities. Whereas China's Class II<sup>4</sup> daily average standard is 300  $\mu\text{g}/\text{m}^3$ , as late as 1993 some cities registered *annual* average levels over 500  $\mu\text{g}/\text{m}^3$ , or even 1,000  $\mu\text{g}/\text{m}^3$  (i.e., higher than the standard for maximum level of TSP exposure at any time).

Annual variation is considerable, often due to weather; some cities in northwestern Shaanxi Province, for instance, experience year-to-year fluctuations in annual average TSP levels of a factor of two or three. Annual averages tend to hide a great deal of variation in the daily averages that make them up. In Hebei, where city annual averages were between 202 and 517  $\mu\text{g}/\text{m}^3$ , low daily averages were in the tens of  $\mu\text{g}/\text{m}^3$ , while high daily averages were in a few cases over 1,500  $\mu\text{g}/\text{m}^3$ .

### **PARTICLE DEPOSITION VELOCITY**

While particle deposition velocities cannot easily be related to health effects, it may be related to total emissions of particulates, especially in areas where anthropogenic processes are the dominant sources of particulate matter. For most cities and for the country as a whole the trend has been clearly downward, with averages for both southern and northern cities in the early 1990s at 11 and 25  $\text{t}/\text{km}^2\text{-month}$  respectively, or about half the levels of a decade previously (Tables VIII-5 and VIII-10). Some cities experienced little improvement, and some even a worsening, as in Shaanxi and Gansu Provinces. Cities in coastal areas appear to have enjoyed the greatest reductions in particulate deposition.

### **SULFUR DIOXIDE**

Improvements in ambient sulfur dioxide have been much less impressive than for particulates, since until recently few efforts have been made to control emissions. By the early 1990s, national annual average levels of sulfur dioxide in Chinese cities had fallen somewhat to between 90 and 100  $\mu\text{g}/\text{m}^3$ , still significantly higher than the relevant Class II standard for annual average levels of 60  $\mu\text{g}/\text{m}^3$  (Table VIII-5). The worst cities, mainly in the North and Southwest, experience levels four to five times the

standard (Table VIII-7). Cities in several provinces, e.g., Heilongjiang, Anhui, and Hainan, experience ambient concentrations well under the standard.

In most cities, sulfur dioxide levels since the mid-1980s have fluctuated, with many cities experiencing sudden rises after several years of continuous declines. As with particulate concentrations, high and low daily averages of sulfur dioxide vary a great deal. While annual averages for Hebei cities ranged from 29 to 186  $\mu\text{g}/\text{m}^3$  in 1993, low and high daily averages extended from 3 to 1,435  $\mu\text{g}/\text{m}^3$  (compared to the Class II standard for daily average levels of 150  $\mu\text{g}/\text{m}^3$ ).

China's environmental regulatory system is beginning to carry out some programs that could eventually lead to significant improvements in ambient sulfur dioxide levels. Sulfur dioxide emissions fees, for example, are being tested in nine cities in Guizhou and Sichuan. Under the system all enterprises within these cities are to begin paying fees, at a rate of 0.2 yuan per kg of sulfur dioxide (or less than 20% of the cost of emissions control). About a dozen Chinese cities have also begun trial implementation of sulfur dioxide emissions trading schemes.

### **NITROGEN OXIDES**

Nitrogen oxide levels are usually most closely related to motor vehicle fuel consumption, which has been increasing overall. Effective controls on nitrogen oxide emissions have been almost entirely lacking to date, and this is reflected in the overall rise<sup>5</sup> in average ambient nitrogen oxide levels over the past decade (Table VIII-5). Episodes of photochemical smog are becoming more widespread, and nitrogen oxide concentrations are likely to continue increasing.

Annual average levels are still about half the daily average standard of 100  $\mu\text{g}/\text{m}^3$ , with only a few cities (e.g., Guangzhou and Dalian) in exceedence (Table VIII-8). Concentrations do not seem to vary a great deal by region; cities with the highest levels are scattered about the country. While the highest daily averages in most cities exceed the standard by a small margin, if at all, some cities experience levels several times the standard.

## CARBON MONOXIDE

Data on ambient carbon monoxide are available for only a few cities, all but one of which (Guangzhou) are in the North and Northeast (Table VIII-9). No clear trends are apparent. Annual averages are generally below the Class II daily average standard of 4 mg/m<sup>3</sup>, although Tianjin, Harbin, and Guangzhou have at various times approached or exceeded it.

Ambient monitoring of carbon monoxide is probably not the most useful way to identify areas in which it is a problem, since most harm typically comes from acute exposures in enclosed spaces. Rapid additions to China's vehicle fleet, most with minimal emissions controls, and increasing congestion of urban streets have meant rising levels of carbon monoxide along streets. Monitoring of levels of these areas, where people spend significant portions of their day, is needed to better assess exposure levels.

## ACID PRECIPITATION

According to the National Environmental Protection Agency, about half of the cities monitored experienced an annual average pH of below 5.6, the natural average (Table VIII-5). Most of those cities are in the South. Guizhou is the worst affected province, with cities receiving rain that has on average a pH value under 4 (Table VIII-11). The Chinese government has officially recognized the seriousness of the problem, and recent efforts to reduce sulfur dioxide emissions are motivated more by the desire to control acid precipitation than anything else.

Formerly confined to southwestern China, acid precipitation can now be found in most locations south of the Yangtze River and in some to the north. There is obvious economic and ecological damage in the most seriously affected areas. Recently a group of experts reported to the Chinese government that between 1985 and 1993 the area affected by acid rain increased from 1.75 to 2.8 million square kilometers, or nearly one-third of total land area. In spite of heavy sulfur emissions, northern China remains relatively less affected by acid precipitation because the airborne dust for which the region is famous is alkaline, neutralizing acidity.

## INDOOR AIR QUALITY

Despite significant improvements in indoor air quality in many urban residences, owing to replacement of solid fuels by gas, electricity, and central heating, and to installation of kitchen fans, indoor air pollution remains one of China's worst environmental problems. The magnitude of the health problem from indoor fuel use in China is roughly comparable that posed by smoking, rates of which are notoriously high. The incidence of disease from indoor air pollution falls mainly on women and children, however, while the main impact of cigarettes is on the men who smoke them.

Levels of particulates, sulfur dioxide, carbon monoxide, and carcinogenic compounds are high because most households still burn solid fuels directly for cooking and heating. Studies of indoor pollution in common household settings suggest that a large portion of China's population is regularly exposed to levels of these pollutants an order of magnitude higher than any standard (Table VIII-12).<sup>6</sup> The continued widespread and inefficient use of biomass fuels and raw coal in residences with poor ventilation contributes to the continuing status of respiratory illness as the leading cause of death. While chronic respiratory problems may be the most widespread of health impacts, acute effects are well known also; every year deaths from carbon monoxide poisoning occur in northern China, where coal is used to heat brick beds in tightly weatherproofed dwellings. Concerns about indoor air pollution in developed countries, by comparison, are relatively mild and focus on pollutants such as nitrogen oxides from gas stove use, formaldehyde, ozone, and radon, as well as cigarette smoke.

<sup>1</sup> For a wider ranging discussion of environmental problems in China related to energy use see Sinton and Levine, 1995.

<sup>2</sup> Independent estimates of total emissions generally result in figures somewhat higher than those reported by Chinese sources, which cover rural industry and household fuel use incompletely. One recent paper estimate 1990 emissions of sulfur dioxide and particulates from combustion to be 18.6 Mt and 15 Mt, compared to the official figures of 14.94 and 13.24 (Liu and Spofford, 1994). Nitrogen oxide emissions for that year were estimated to be 6.6 Mt.

<sup>3</sup> Rates are higher in rural areas (about 27% of deaths from respiratory illnesses). Most airborne pollutant exposure occurs indoors, where levels are usually higher than outdoors.

<sup>4</sup> Class II standards apply to residential areas and are usually similar to the United States' primary National Ambient Air Quality Standards (Table VII-A).

<sup>5</sup> While there is significant variation from year to year, fitting a line to the data shows a mild upward trend.

<sup>6</sup> For further information on indoor air pollutant levels in China see Sinton *et al.*, 1995.

Table VIII-A. Ambient Air Pollution Standards \*

Chinese Ambient Air Pollution Standards *					U.S. National Ambient Air Quality Standards					
standard type	annual average	daily average	1-hour average	max. at any time	standard type	annual mean §	daily average	8-hour average	3-hour average	1-hour average
TSP † ( $\mu\text{g}/\text{m}^3$ )										
Class I	-	150	-	300	primary	75	260	-	-	-
Class II	-	300	-	1000	secondary	60	150	-	-	-
Class III	-	500	-	1500						
PM10 †† ( $\mu\text{g}/\text{m}^3$ )										
Class I	-	50	-	150	primary	50	150	-	-	-
Class II	-	150	-	500	secondary	-	-	-	-	-
Class III	-	250	-	700						
SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )										
Class I	20	50	-	150	primary	80	365	-	-	-
Class II	60	150	-	500	secondary	-	-	-	1,300	-
Class III	100	250	-	700						
CO ( $\mu\text{g}/\text{m}^3$ )										
Class I	-	4	-	10	primary	-	-	10,000	-	40,000
Class II	-	4	-	10	secondary	-	-	-	-	-
Class III	-	6	-	20						
NO <sub>x</sub> ( $\mu\text{g}/\text{m}^3$ )										
Class I	-	50	-	100	primary	-	100	-	-	-
Class II	-	100	-	150	secondary	-	-	-	-	-
Class III	-	150	-	300						
O <sub>3</sub> ( $\mu\text{g}/\text{m}^3$ )										
Class I	-	-	120	-	primary	-	-	-	-	235
Class II	-	-	160	-	secondary	-	-	-	-	-
Class III	-	-	200	-						
Particulate Deposition Velocity (tonnes/km <sup>2</sup> -month) ‡										
Liaoning	8	-	-	-						
Zhengzhou, Henan	18	-	-	-						

\* Class I standards apply to scenic, tourist, and other sensitive areas. Class II air quality standards are intended to protect human health and apply to residential areas. Class III standards are interim targets for heavily polluted areas.

† Total suspended particulate matter.

†† Particulates with diameter  $\leq 10 \mu\text{m}$ .

§ US annual standards for TSP and PM10 refer to geometric means and for SO<sub>2</sub> to arithmetic means.

‡ Provincial standards.

Source: State Council Environmental Protection Leadership Group; 1982; China Environmental Science Press, 1986; China Environmental Yearbook, 1991.

**Table VIII-1. Carbon Dioxide Emissions by Source, 1950-1991**

1. Million Tonnes of Carbon								
Year	Fossil Fuels				Cement	Gas Flaring	Total Emissions	Per Capita Emissions (t C)
	Solid	Liquid	Gas	Subtotal				
1950	21.4	0.2	0.0	21.6	0.1	0.0	21.7	0.04
1951	27.6	0.3	0.0	27.9	0.2	0.0	28.1	0.05
1952	34.6	0.4	0.0	35.0	0.4	0.0	35.4	0.06
1953	36.0	0.5	0.0	36.5	0.5	0.0	37.0	0.06
1954	43.0	0.9	0.0	43.9	0.6	0.0	44.5	0.08
1955	50.6	1.5	0.0	52.1	0.6	0.0	52.7	0.09
1956	56.6	2.2	0.0	58.8	0.9	0.0	59.7	0.10
1957	67.3	2.5	0.0	69.8	0.9	0.0	70.7	0.11
1958	140.3	3.4	0.1	143.8	1.3	0.0	145.0	0.23
1959	192.0	5.2	0.2	197.4	1.7	0.0	199.0	0.31
1960	206.6	6.3	0.5	213.4	1.8	0.0	215.3	0.33
1961	144.3	6.1	0.8	151.2	1.1	0.0	152.2	0.24
1962	113.7	5.9	0.6	120.2	1.1	0.0	121.4	0.19
1963	112.1	6.4	0.5	119.0	1.4	0.0	120.4	0.18
1964	110.9	7.6	0.6	119.1	1.4	0.0	120.4	0.17
1965	119.6	9.6	0.6	129.8	1.5	0.0	131.2	0.18
1966	129.7	12.2	0.7	142.6	1.5	0.0	144.1	0.20
1967	105.9	11.6	0.8	118.3	1.1	0.0	119.4	0.16
1968	114.0	13.3	0.7	128.0	1.2	0.0	129.2	0.17
1969	138.4	18.2	1.0	157.6	1.4	0.0	159.0	0.20
1970	183.9	24.9	1.5	210.3	1.4	0.0	211.6	0.26
1971	203.3	31.8	2.0	237.1	3.1	0.2	240.5	0.29
1972	212.8	36.8	2.5	252.1	3.1	0.3	255.5	0.30
1973	216.4	42.4	3.1	261.9	3.4	0.3	265.7	0.30
1974	214.3	48.9	3.9	267.1	3.4	0.4	271.0	0.30
1975	250.3	54.7	4.6	309.6	4.1	0.5	314.3	0.34
1976	251.4	64.3	5.3	321.0	6.7	0.5	328.2	0.35
1977	282.3	69.4	6.3	358.0	7.6	0.6	366.2	0.39
1978	317.2	73.4	7.2	397.8	8.9	0.7	407.4	0.43
1979	325.4	72.4	7.6	405.4	10.1	0.8	416.2	0.43
1980	316.6	70.7	7.5	394.8	10.9	0.8	406.4	0.42
1981	317.5	66.3	6.7	390.5	11.4	0.7	402.6	0.41
1982	345.1	66.8	6.3	418.2	12.8	0.7	431.5	0.43
1983	365.0	68.4	6.4	439.8	14.7	0.7	455.2	0.45
1984	400.9	70.0	6.6	477.5	16.5	0.9	494.9	0.48
1985	437.0	73.5	6.8	517.3	19.4	0.0	536.7	0.52
1986	456.8	78.4	7.2	542.4	22.0	0.0	564.4	0.54
1987	487.3	83.5	7.3	578.1	24.4	0.0	602.5	0.56
1988	520.8	89.3	7.5	617.6	28.5	0.0	646.1	0.59
1989	528.0	93.1	7.9	629.0	28.1	0.0	657.1	0.59
1990	533.0	92.1	8.0	633.1	27.6	0.0	660.7	0.58
1991	552.4	99.7	8.4	660.5	33.7	0.0	694.2	0.60

Source: Marland, Andres, and Boden, 1994.

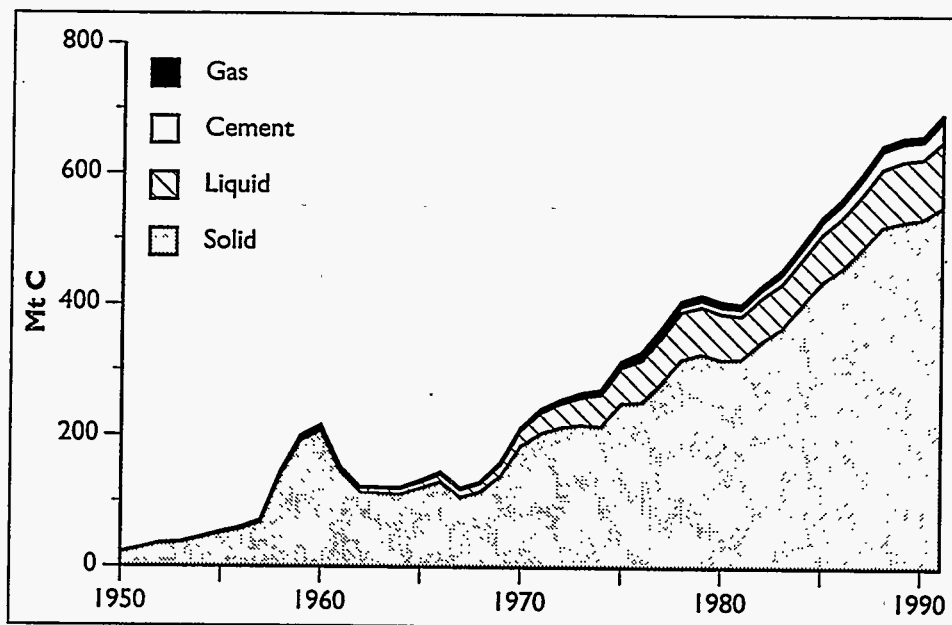
Table VIII-1. Carbon Dioxide Emissions by Source, 1950-1991(continued)

Year	Fossil Fuels			Subtotal	Cement	Gas Flaring	Total Emissions
	Solid	Liquid	Gas				
1950	99%	1%	0%	100%	0.5%	0%	100%
1951	98%	1%	0%	99%	1%	0%	100%
1952	98%	1%	0%	99%	1%	0%	100%
1953	97%	1%	0%	99%	1%	0%	100%
1954	97%	2%	0%	99%	1%	0%	100%
1955	96%	3%	0%	99%	1%	0%	100%
1956	95%	4%	0%	98%	2%	0%	100%
1957	95%	4%	0%	99%	1%	0%	100%
1958	97%	2%	0%	99%	1%	0%	100%
1959	96%	3%	0%	99%	1%	0%	100%
1960	96%	3%	0%	99%	1%	0%	100%
1961	95%	4%	1%	99%	1%	0%	100%
1962	94%	5%	0%	99%	1%	0%	100%
1963	93%	5%	0%	99%	1%	0%	100%
1964	92%	6%	0%	99%	1%	0%	100%
1965	91%	7%	0%	99%	1%	0%	100%
1966	90%	8%	0%	99%	1%	0%	100%
1967	89%	10%	1%	99%	1%	0%	100%
1968	88%	10%	1%	99%	1%	0%	100%
1969	87%	11%	1%	99%	1%	0%	100%
1970	87%	12%	1%	99%	1%	0%	100%
1971	85%	13%	1%	99%	1%	0.1%	100%
1972	83%	14%	1%	99%	1%	0.1%	100%
1973	81%	16%	1%	99%	1%	0.2%	100%
1974	79%	18%	1%	99%	1%	0.2%	100%
1975	80%	17%	1%	99%	1%	0.2%	100%
1976	77%	20%	2%	98%	2%	0.2%	100%
1977	77%	19%	2%	98%	2%	0.2%	100%
1978	78%	18%	2%	98%	2%	0.2%	100%
1979	78%	17%	2%	97%	2%	0.2%	100%
1980	78%	17%	2%	97%	3%	0.2%	100%
1981	79%	16%	2%	97%	3%	0.2%	100%
1982	80%	15%	1%	97%	3%	0.2%	100%
1983	80%	15%	1%	97%	3%	0.2%	100%
1984	81%	14%	1%	96%	3%	0.2%	100%
1985	81%	14%	1%	96%	4%	0%	100%
1986	81%	14%	1%	96%	4%	0%	100%
1987	81%	14%	1%	96%	4%	0%	100%
1988	81%	14%	1%	96%	4%	0%	100%
1989	80%	14%	1%	96%	4%	0%	100%
1990	81%	14%	1%	96%	4%	0%	100%
1991	80%	14%	1%	95%	5%	0%	100%

Source: Marland, Andres, and Boden, 1994.



Figure VIII-1 Carbon Dioxide Emissions



**Table VIII-2. National Total Sulfur Dioxide and Particulate Emissions, 1980 and 1985-1993 \***

Year	Sulfur Dioxide			Particulates from Combustion		Particulates from Indust. Processes § (noncombustion)
	total	portion from industry *	non-combustion†	total	portion from industry	
1980	16.00	-	-	14.85	-	-
1985	13.24	-	-	12.95	-	13.05
1986	12.50	-	-	13.84	-	11.70
1987	14.12	-	-	14.45	-	10.04
1988	15.23	-	-	14.36	-	11.26
1989	15.64	-	-	13.98	-	8.40
1990	14.95	-	-	13.24	-	7.81
1991	16.22	11.65	-	13.14	8.45	5.79
1992	16.85	13.23	1.98	14.14	8.70	5.76
1993	17.95	12.92	2.18	14.16	8.80	6.17

\* From all emissions sources on industrial enterprise premises. Includes electric utilities.

† Obtained from direct measurements, mass balances, or empirical equations.

‡ Literally "smoke dust" (*yanchen*).

§ Solid particulate matter (*fenchen*) released in the course of production processes (e.g., grinding and sorting). Calculated as emissions gas volume times particulate density at outlet times duration of operation. Enterprises are required to report emissions regardless of whether they meet emissions standards.

Source: China Environmental Yearbook, various years.

Figure VIII-2. Sulfur Dioxide and Particulate Emissions

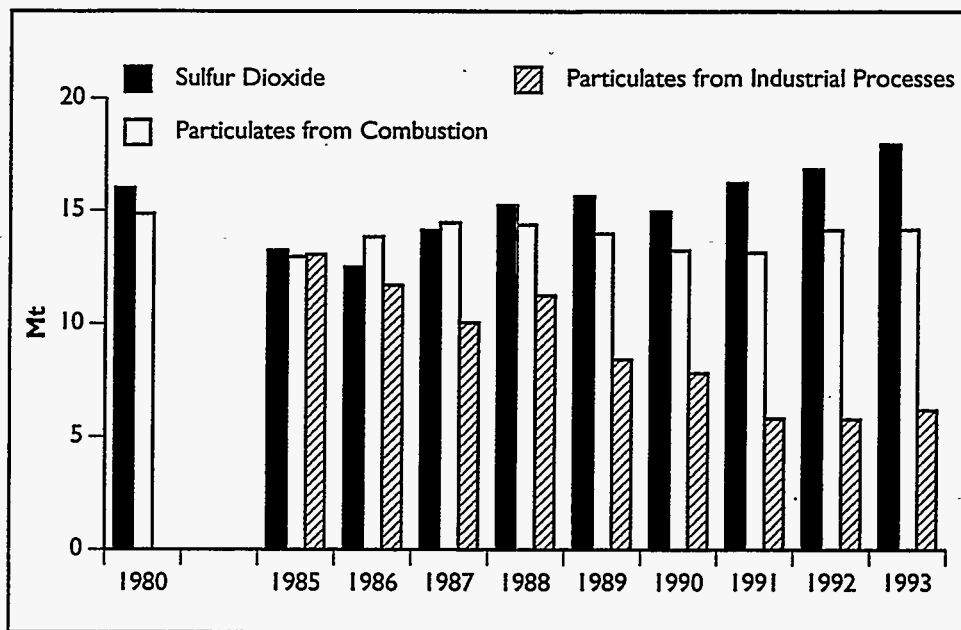


Table VIII-3. Sulfur Dioxide and Particulate Emissions by Region, \* 1993

Planning Region	Province	Sulfur Dioxide			Particulates from Combustion		Particulates from Industrial Processes § (noncombustion) (kt)	Provincial Area (thousand km <sup>2</sup> )	Sulfur Dioxide Emissions Density (t/km <sup>2</sup> -yr)	Particulate Emissions Density (t/km <sup>2</sup> -yr)
		total (kt)	portion from industry* (kt)	non-combustion† (kt)	total (kt)	portion from industry (kt)				
North	Beijing	366	204	18	261	109	64	17	21.80	19.40
	Tianjin	238	176	6	173	73	37	11	21.03	18.61
	Hebei	1,021	860	131	693	460	407	188	5.43	5.85
	Shanxi	1,329	615	102	837	332	219	156	8.51	6.76
	Inner Mongolia	658	434	105	736	387	174	1,200	0.55	0.76
Northeast	Liaoning	1,081	823	199	1,069	653	597	146	7.42	11.43
	Jilin	286	188	42	686	642	112	138	2.07	5.78
	Heilongjiang	322	219	16	1,279	467	186	473	0.68	3.09
East	Shanghai	441	357	22	189	148	66	6	71.16	41.14
	Jiangsu	1,200	914	127	757	581	284	103	11.70	10.15
	Zhejiang	536	417	50	289	184	219	102	5.27	4.99
	Anhui	444	341	87	641	243	198	140	3.18	6.01
	Fujian	184	154	14	80	72	151	122	1.51	1.90
	Jiangxi	343	247	35	338	282	271	167	2.05	3.65
	Shandong	2,280	1,376	160	1,348	525	336	153	14.89	11.00
South-Central	Henan	519	409	45	613	439	290	167	3.11	5.41
	Hubei	488	383	117	439	230	260	188	2.60	3.72
	Hunan	528	515	112	275	270	305	210	2.51	2.76
	Guangdong	543	508	86	264	243	532	178	3.05	4.47
	Guangxi	655	522	58	337	249	188	231	2.84	2.28
	Hainan	25	24	3	17	12	12	34	0.72	0.85
Southwest	Sichuan	1,784	1,194	198	1,015	1,238	512	567	3.15	2.69
	Guizhou	737	585	108	347	236	156	176	4.18	2.85
	Yunnan	316	259	68	257	181	127	392	0.80	0.98
	Xizang	1.9	1.7	0.0	0.1	0.1	15	1,183	0.002	0.012
Northwest	Shaanxi	668	560	43	523	383	136	205	3.26	3.22
	Gansu	389	338	187	207	149	141	455	0.86	0.76
	Qinghai	24	17	21	90	42	27	779	0.03	0.15
	Ningxia	238	164	7	136	109	59	66	3.61	2.95
	Xinjiang	305	135	26	267	164	86	1,635	0.19	0.22
National Total/Average		17,948	12,925	2,179	14,163	8,804	6,166	9,586	1.87	2.12
Balance		305	125	7	267	-136	86	1,635	-	-

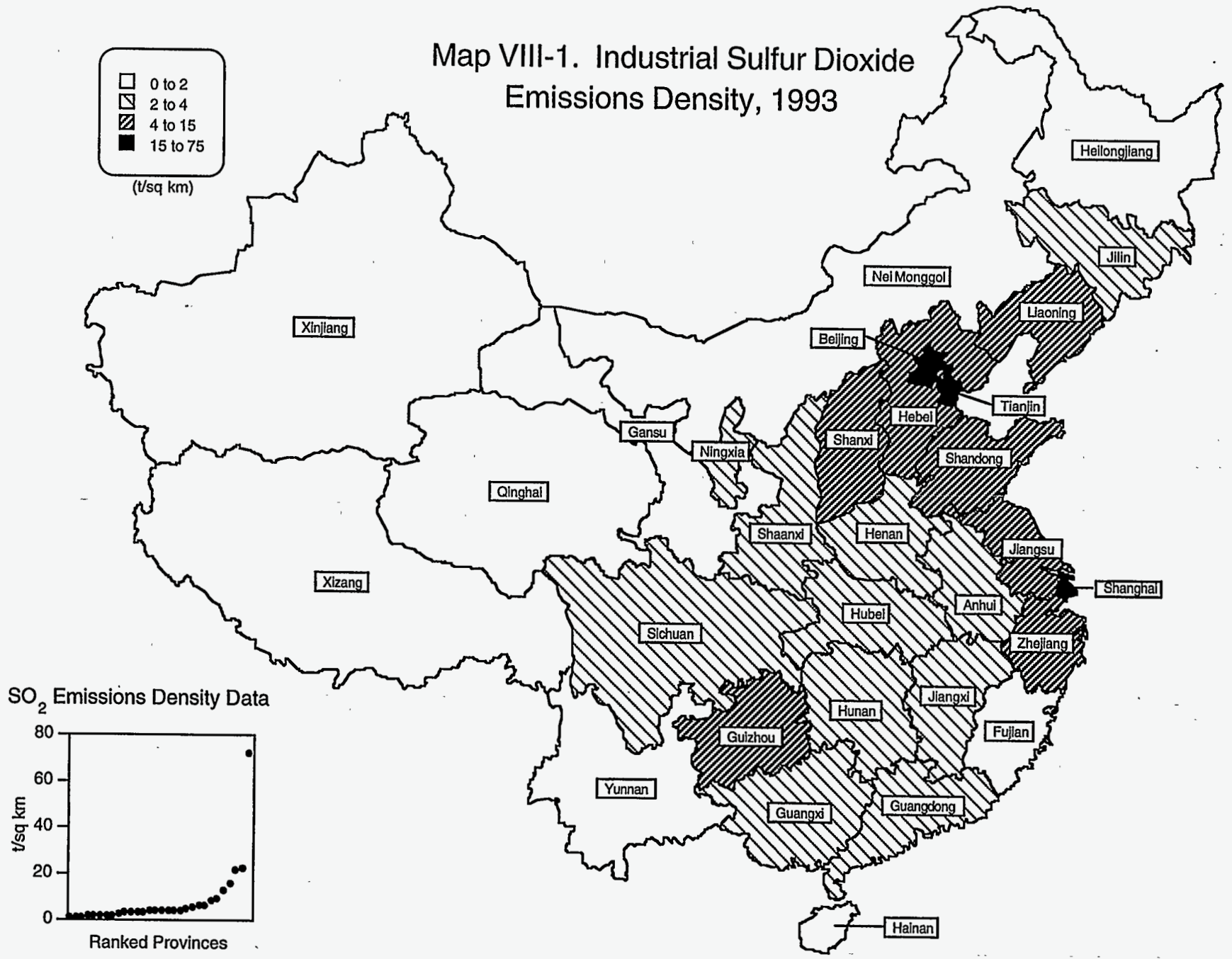
\* From all emissions sources.

† Obtained from direct measurements, mass balances, or empirical equations.

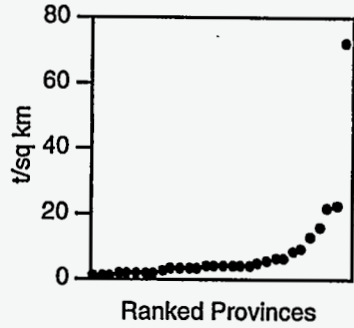
‡ Literally "smoke dust" (*yanchen*).§ Solid particulate matter (*fenchen*) released in the course of production processes (e.g., grinding and sorting). Calculated as emissions gas volume times particulate density at outlet times duration of operation. Enterprises are required to report emissions regardless of whether they meet emissions standards.

Source: China Environmental Yearbook, 1994.

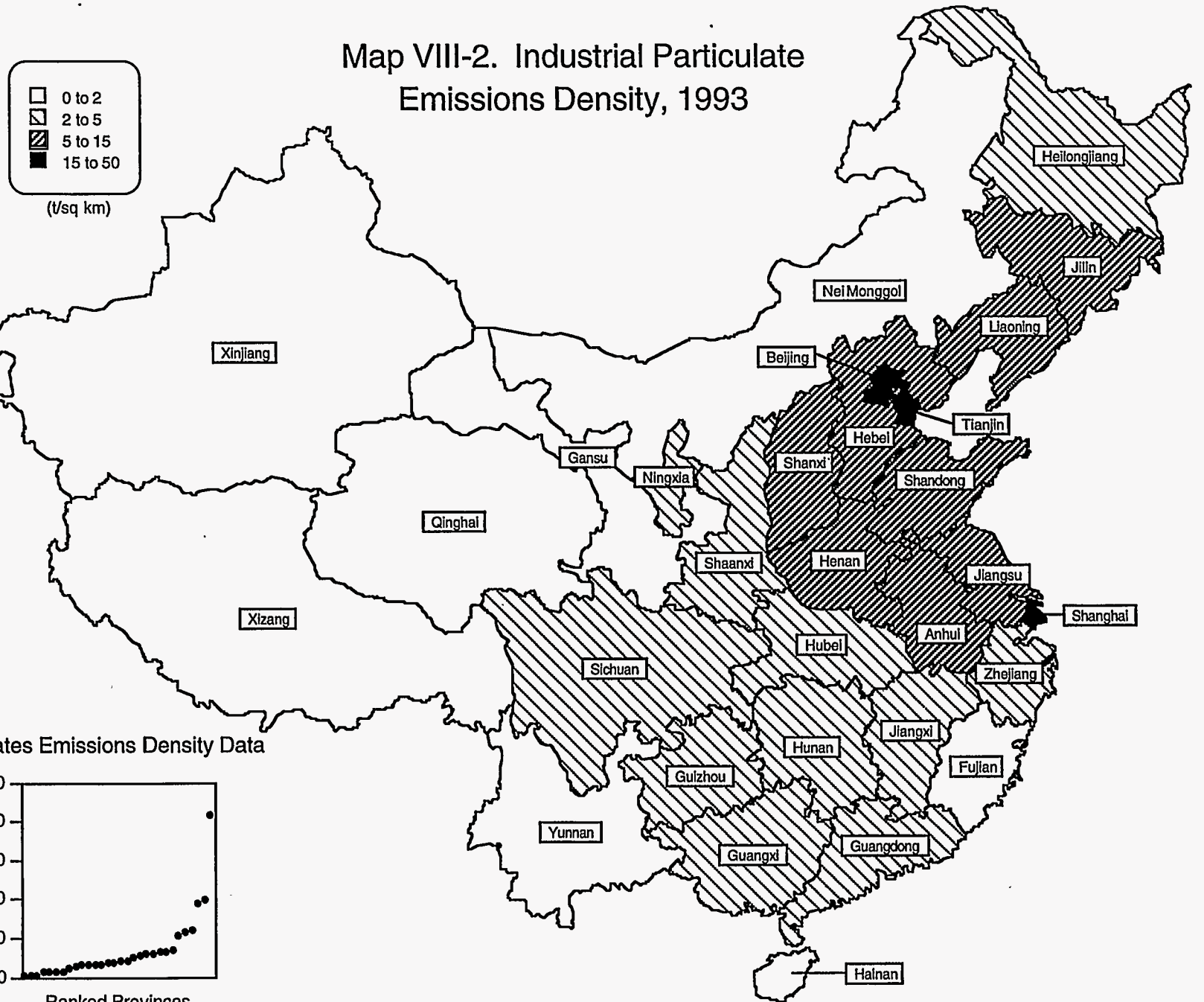
Map VIII-1. Industrial Sulfur Dioxide Emissions Density, 1993



SO<sub>2</sub> Emissions Density Data



Map VIII-2. Industrial Particulate Emissions Density, 1993



Particulates Emissions Density Data

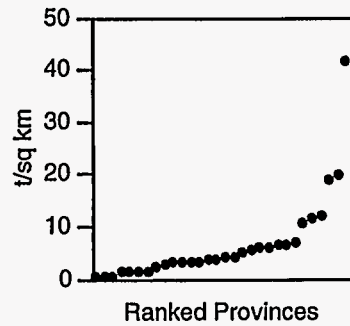


Table VIII-4. Sulfur Dioxide and Particulate Emissions by Industrial Sector, 1991-1993

Sector	1991			1992			1993		
	total	combustion	non-combustion	total	combustion	non-combustion	total	combustion	non-combustion
Mining	460	-	-	1,262	1,182	80	464	365	98
Food & beverage	640	-	-	568	560	8	561	555	7
Textiles	420	-	-	416	412	3	401	396	5
Leather goods	20	-	-	19	19	0	20	20	0
Paper	270	-	-	282	268	14	282	268	14
Printing	10	-	-	12	11	1	9	9	0
Electric utilities	5,280	-	-	5,758	5,598	160	6,283	6,029	254
Oil refining	70	-	-	77	61	16	74	62	11
Coking & coal products	80	-	-	98	45	53	102	55	47
Chemicals	1,080	-	-	1,096	830	265	1,090	837	253
Pharmaceuticals	110	-	-	137	124	13	122	113	9
Chemical fibers	90	-	-	116	115	2	113	112	2
Rubber products	70	-	-	78	77	2	79	78	1
Plastic products	20	-	-	26	26	0	30	30	1
Building materials	1,080	-	-	1,274	714	560	1,275	676	599
of which:									
cement	560	-	-	428	116	312	667	181	486
Ferrous metals	70	-	-	731	409	322	790	415	375
Nonferrous metals	540	-	-	527	109	418	580	105	475
Metals fabrication	50	-	-	50	42	8	40	38	2
Machinery & electronics	400	-	-	443	429	15	411	388	22
Other	240	-	-	254	209	45	197	193	4
Total	11,650	-	-	13,226	11,242	1,984	12,925	10,746	2,179
Balance	650	-	-	0	0	0	0	0	0

Source: China Environmental Yearbook, various years.

Table VIII-4. Sulfur Dioxide and Particulate Emissions by Industrial Sector, 1991-1993 (continued)

Sector	1991			1992			1993		
	total	combustion	non-combustion	total	combustion	non-combustion	total	combustion	non-combustion
Mining	600	420	180	1,241	1,052	190	573	370	203
Food & beverage	600	550	50	497	460	37	926	869	57
Textiles	270	250	20	248	234	14	232	225	7
Leather goods	20	20	-	15	14	0	15	14	1
Paper	260	230	30	226	197	28	327	287	39
Printing	10	10	-	19	19	0	5	5	0
Electric utilities	4,220	4,180	40	3,966	3,883	83	4,241	4,193	48
Oil refining	40	30	10	36	26	10	43	31	12
Coking & coal products	120	70	50	135	83	52	155	102	52
Chemicals	870	630	240	866	571	294	861	589	272
Pharmaceuticals	70	70	-	72	66	6	73	68	5
Chemical fibers	50	50	-	92	59	33	62	56	6
Rubber products	40	40	-	46	41	4	37	37	1
Plastic products	10	10	-	13	12	0	15	13	2
Building materials	4,600	740	3,860	4,596	812	3,784	4,868	879	3,989
of which:									
cement	3,150	260	2,890	2,412	273	2,139	3,747	393	3,354
Ferrous metals	1,460	440	1,020	1,440	516	924	1,551	432	1,119
Nonferrous metals	210	100	110	181	90	91	281	103	179
Metals fabrication	60	50	10	51	44	7	41	34	7
Machinery & electronics	390	310	80	382	290	92	356	282	75
Other	330	260	70	349	235	114	307	214	93
Total	14,240	8,450	5,790	14,467	8,704	5,763	14,970	8,804	6,166
Balance	10	-10	20	0	0	0	0	0	0

Source: China Environmental Yearbook, various years.



Figure VIII-3. Pollutant Emissions by Sector

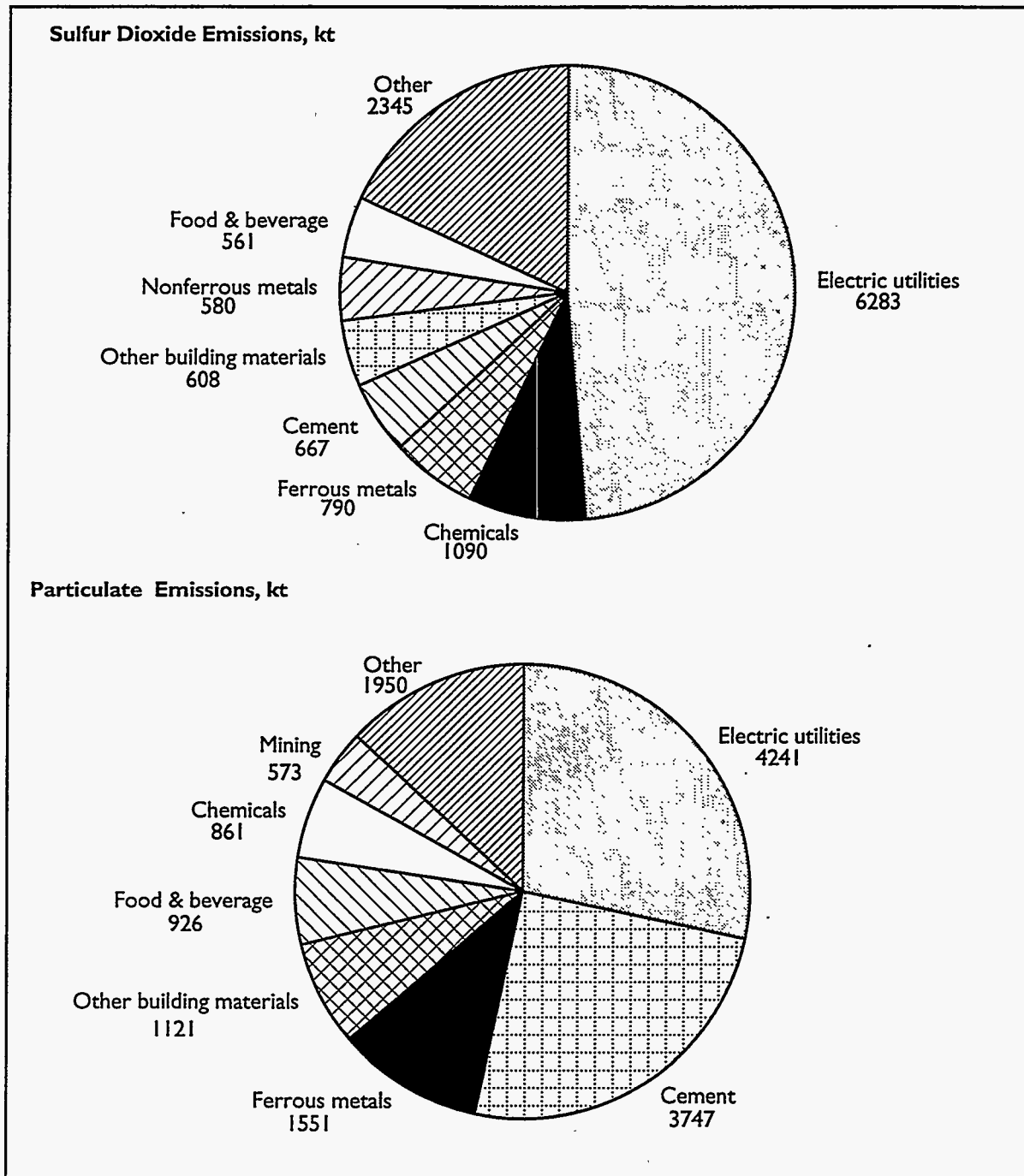


Table VII-5. Ambient Air Quality in Chinese Cities, 1980-1993 (Annual Averages)

1. Total Suspended Particulates ( $\mu\text{g}/\text{m}^3$ )							
year	major cities average	lowest city	highest city	southern cities average	northern cities average	number of cities	remarks
1980	610	-	-	340	875	-	
1981	703	160	2,770	410	930	-	
1982	729	220	1,910	470	950	-	
1983	600	164	1,358	330	870	-	
1984	660	190	2,158	450	870	-	
1985	590	224	1,767	444	740	-	
1986	570	196	1,575	391	715	-	
1987	590	154	1,357	370	805	-	
1988	580	220	1,597	440	674	-	
1989	432	117	1,043	318	526	-	
1990	379	64	844	268	475	-	
1991	-	80	1,433	225	425	65	
1992	-	90	663	243	403	67	51 exceeded Class II standard
1993	-	108	815	251	407	74	38 exceeded Class II standard

2. Sulfur Dioxide ( $\mu\text{g}/\text{m}^3$ )							
	major cities average	lowest city	highest city	southern cities average	northern cities average	number of cities	remarks
1980	110	-	-	100	130	-	
1981	115	20	450	110	120	-	
1982	115	20	520	110	120	-	
1983	94	25	324	80	110	-	
1984	92	7	363	93	90	-	
1985	105	8	504	100	110	-	
1986	106	16	434	108	105	-	
1987	117	35	434	104	130	-	
1988	94	12	435	99	89	-	
1989	105	2	394	120	93	-	
1990	-	3	422	115	81	-	
1991	-	4	351	88	92	70	
1992	-	7	463	90	97	72	12 exceeded Class II standard
1993	-	8	415	96	100	77	15 exceeded Class II standard

Source: China Environmental Yearbook, various years.

Table VII-5. Ambient Air Quality in Chinese Cities, 1980-1993 (Annual Averages)  
(continued)

3. Nitrogen Oxides ( $\mu\text{g}/\text{m}^3$ )						
	major cities average	lowest city	highest city	southern cities average	northern cities average	number of cities
1980	43	-	-	35	50	-
1981	50	10	90	40	60	-
1982	45	10	110	40	50	-
1983	46	6	94	36	55	-
1984	42	10	95	37	46	-
1985	50	13	94	41	59	-
1986	48	14	108	41	55	-
1987	56	17	199	43	69	-
1988	45	9	110	42	48	-
1989	47	10	140	43	51	-
1990	43	7	130	38	47	-
1991	-	11	164	38	54	70
1992	-	11	129	40	56	72
1993	-	10	147	40	59	77

4. Particulate Deposition Velocity (tonnes/km <sup>2</sup> *month)						
	major cities average	lowest city	highest city	southern cities average	northern cities average	number of cities
1980	35.00	-	-	20.00	50.00	-
1981	35.35	10.79	103.75	18.76	50.67	-
1982	32.08	10.83	99.73	16.69	48.76	-
1983	32.00	5.10	113.90	16.00	48.00	-
1984	27.20	4.48	87.61	16.10	38.00	-
1985	27.65	7.53	76.50	16.50	38.81	-
1986	25.02	5.96	68.57	13.22	32.58	-
1987	24.41	7.53	73.97	14.09	32.79	-
1988	25.00	7.04	131.25	13.50	35.00	-
1989	22.37	3.77	61.92	15.27	27.70	-
1990	19.15	3.71	56.70	10.60	26.05	-
1991	-	3.22	51.17	11.15	25.32	61
1992	-	3.80	55.80	-	-	66
1993	-	4.00	83.50	-	-	73

5. Acidity of Precipitation (pH)							
	major cities average	lowest city	highest city	southern cities average	northern cities average	number of cities	remarks
1992	-	3.85	7.43	-	-	58	52% below pH 5.6
1993	-	3.94	7.63	-	-	73	49.3% below pH 5.6

Source: China Environmental Yearbook, various years.

Figure VIII-4. Ambient Air Pollutant Levels in China's Major Cities (Annual Averages) Compared to Chinese Quality Class II Air Quality Standards

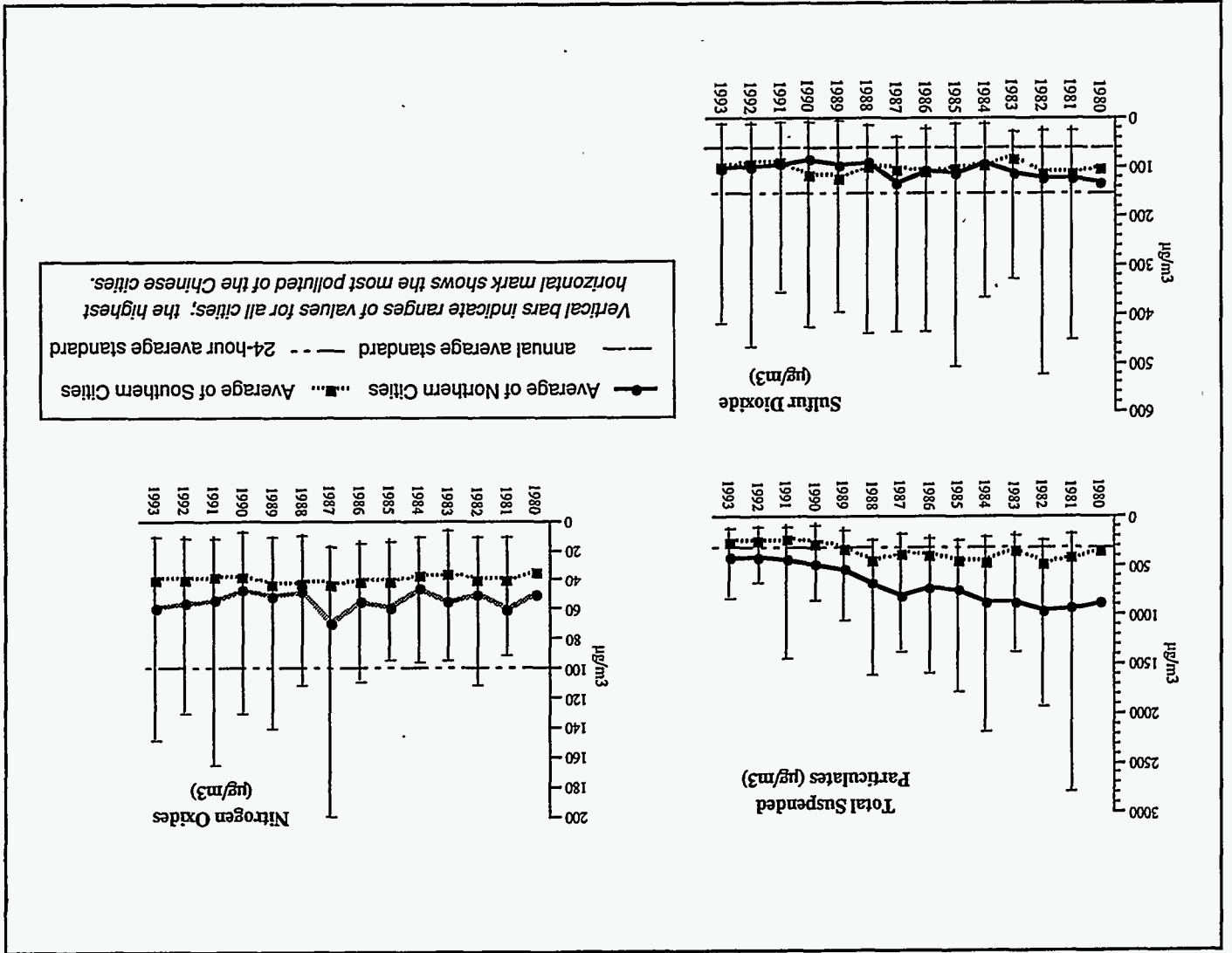


Table VIII-6. Ambient Air Quality in Selected Chinese Cities: Total Suspended Particulates, 1986-1993

Annual Averages, ug/m3													
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993*			
										avg	min*	max*	
North	Beijing		-	-	399	-	-	307	340	-	-	-	
	Tianjin		540	470	410	360	290	247 [250]	269 [250]	320	-	-	
	Hebei	Baoding		-	-	-	-	-	-	354 [388]	318	115	761
		Cangzhou		-	-	-	-	-	-	323	428	80	1,532
		Chengde		-	-	-	-	-	-	370	308	78	789
		Handan		-	-	-	-	-	-	507	517	204	911
		Langfang		-	-	-	-	-	-	108	202	68	909
		Qinhuangdao		-	-	-	435	-	300	447	376	35	1,593
		Shijiazhuang		-	-	-	617	-	308	419 [389]	338	150	778
		Tangshan		-	-	-	800	-	407	372 [380]	360	11	970
		Xingtai		-	-	-	-	-	-	417	426	35	1,139
		Zhangjiakou		-	-	-	-	-	-	252	348	45	1,550
	Shanxi	Changzhi		421	359	440	420	388	359	379	-	-	-
		Datong		676	674	854	566	493	457 [508]	483 [548]	-	-	-
		Jincheng		889	846	681	448	514	352	448	-	-	-
		Taiyuan		860	920	1,041	760 [783]	574	627	641 [638]	570	-	-
		Yangquan		872	808	1,153	600	555	552	452	-	-	-
		Yuci		454	380	602	513	391	401	395	-	-	-
		Yuncheng		1,180	760	562	262 [286]	423	269 [372]	437 [457]	-	-	-
		province avg		842	766	878	595	488	465	503	-	-	-
		Inner Mongolia	Baotou		204	281	357	665	810	-	525 [790]	-	-
		Chifeng		834	838	851	505	841	-	-	-	-	-
		Hohhot		1,333	1,501	1,304	660	402	331	-	-	-	-
	Wuhai		840	588	721	693	380	-	-	-	-	-	
Northeast	Liaoning	Anshan		-	-	520	540	506	322	-	-	-	
		Dalian†		149 420	139 430	137 440	143 400	159 330	139	134 [133]	-	-	-
		Shenyang		534	646	593	460	455	358 [360]	398	-	-	-
	Jilin	Changchun		-	-	550	474	469	301 [374]	312 [388]	378	-	-
		Jilin		-	-	-	840 [792]	710	647	663	-	-	-
		Siping		-	-	-	347	404	-	242	-	-	-
	Heilongjiang	Tumen		-	-	-	656	-	296	269	-	-	-
		Daqing		-	-	130	117 [120]	-	109	161	-	-	-
		Harbin		-	-	540	480 [450]	490	373 [433]	345 [391]	386	-	-
		Hegang		-	-	490	513 [440]	-	306	475	-	-	-
East	Shanghai		-	190	-	317	358	327 [284]	337	250	-	-	
	Jiangsu	Nanjing ††		469	423	627	273	302	176 [202]	241 [224/221§]	-	-	
		Suzhou		-	-	-	315	-	307	268 [288]	-	-	
		Xuzhou		-	-	-	443	-	286	474 [492]	-	-	
		Zhenjiang		-	-	-	-	-	209	268 [489]	-	-	
	Zhejiang	Hangzhou		166	154	199	159	169	306	234	-	-	
		Huzhou (Wuxing)		-	521	397	338	219	261	-	-	-	
		Jiaxing		453	471	344	350 [345]	406	323	-	-	-	
		Jinhua		270	228	239	198	158	146	-	-	-	
		Ningbo		272	321	334	152	147	192	-	-	-	
		Shaoxing		258	306	353	169	187	174	-	-	-	
		Wenzhou		304	330	353	280	233	207	309	-	-	
		Anhui	Anqing		240	240	220	154 [160]	130	193 [210]	198 [209]	170	-
	Bengbu		260	340	320	240	260	223	204	152	-	487	
	Hefei		450	360	-	158 [240]	140	260 [129]	153 [167]	141	-	496	
	Huabei		700	600	940	550	450	475	426	419	-	1,107	
	Huainan		550	580	660	330	260	310	420	387	-	1,886	
	Huangshan		-	-	-	-	-	501	120	120	-	870	
	Ma'anshan		510	370	420	520	340	316	258	227	-	1,025	
	Tongling		580	250	340	280	250	240	361	350	-	865	
	Wuhu		980	950	440	260	260	441	420	166	-	326	
	Fujian	Fuzhou		-	-	-	216	-	187	264	-	-	-
		Sanming		-	-	-	245	-	251	351	-	-	-
		Xiamen		-	-	-	283	-	99 [95]	90 [91]	-	-	-
		Jiangxi	Ganzhou		348	563	687	428	163	95	103	90	-
	Jingdezhen		510	565	540	505	287	205	212	140	-	-	
	Jujiang		308	298	427	286	216	216	215	250	-	-	
	Nanchang		414	377	437	274	188	137 [136]	191	200	-	-	
	Pingxiang		558	818	971	759	603	313	262	290	-	-	
	Xinyu		369	200	263	250	244	305	-	390	-	-	
	province avg		-	-	442	-	-	181	-	187	-	-	
	Shandong	Jinan		-	-	-	590	-	624	642	-	-	-
Qingdao			600	428	469	369	377	-	177	-	-	-	
Zibo			-	-	-	564	-	465	407	-	-	-	

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

‡ Nanjing 1981-1984 figures are for "floating dust" (ptaochenzhi).

§ Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.

Table VIII-6. Ambient Air Quality in Selected Chinese Cities: Total Suspended Particulates, 1986-1993 (continued)

Annual Averages, ug/m <sup>3</sup>												
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993*		
										avg	min*	max*
South-Central	Henan	Anyang	-	-	-	360	-	528	447	-	-	-
		Luoyang	-	-	-	686	-	-	-	-	-	-
		Pingdingshan	-	-	-	537	-	411	433	-	-	-
		Zhengzhou	640	688	680	608 [680]	515	440	421	-	-	-
		province avg	792	671	765	-	-	-	-	-	-	-
	Hubei	Wuhan	349	333	358	320	212 [280]	217 [280]	264	-	-	-
		Xiangfan	-	-	686	407	358	250 [336]	272	-	-	-
		Yichang	-	-	410	141	130	274 [263]	307	-	-	-
	Hunan	Changsha	-	-	-	449	-	206	222	-	-	-
		Hengyang	-	-	-	292	-	189	202	-	-	-
	Guangdong	Guangzhou	230	230	290	277	270	260	297 [277]	280	-	-
		Shantou	-	-	-	230	170	220	210	-	-	-
		Shenzhen	-	-	200	198	119	161	206 [147]	153	-	-
		Zhuhai	-	-	390	190	100	185	109	-	-	-
		province avg	-	-	-	-	-	214	243	205	-	-
	Guangxi	Beihai	-	-	-	-	-	94	198	254	-	-
		Bose	-	-	-	-	-	104 [125]	141 [149]	124	-	-
		Guilin	441	450	260	170 [190]	210	184 [200]	159 [157]	210	-	-
		Nanning	-	-	-	182 [276]	198	181 [191]	188 [192]	210	-	-
		Liuzhou	-	-	314	219	203	237	238	230	-	-
Hainan	Wuzhou	290	240	370	340	160	192	104	253	-	-	
	Haikou	-	-	-	-	-	80	99	115	33	211	
	Sanya	-	-	-	-	-	100	-	113	10	445	
Southwest	Sichuan	Chengdu	360	330	420	320	320	341 [350]	372 [398]	290	-	-
		Chongqing	660	620	600	428 [430]	490	376 [400]	351 [380]	260/300§	-	-
		Dachuan (Daxian)	-	-	-	-	-	1,080	1,480	1,014	-	-
		Nanchong	-	-	-	916	-	362 [440]	284 [310]	250	-	-
		Xichang	-	-	-	-	-	350	240	279	-	-
	Guizhou	Yibin	-	-	-	412	-	248 [270]	272 [295]	260	-	-
		province avg	-	-	-	-	-	400	400	330	-	-
		Guiyang	574	465	470	418 [385]	407	331 [333]	392 [516]	-	-	-
		Zunyi	-	-	-	1,228	586	569	1,382	-	-	-
		Duyun	-	-	-	370	160	236	263	-	-	-
	Yunnan	Anshun	-	-	-	244	178	167	184	-	-	-
		Liupanshui	-	-	-	280	352	324 [321]	415 [422]	-	-	-
		province avg	799	745	539	552	365	284	453	-	-	-
		Geju	-	-	-	144	150	106	134	-	-	-
		Kunming	-	-	-	438	420	337	331	-	-	-
Northwest	Shaanxi	Baoji	-	-	-	482	-	721	428	-	-	
		Hanzhong	-	-	-	588	-	374	345	-	-	
		Xi'an	-	-	-	300	-	523	504	131	-	-
		Yan'an	-	-	-	1,043	-	1,433	509	-	-	
	Gansu	Jiayuguan	-	-	-	280 [290]	360	431	368	-	-	
		Lanzhou	-	-	-	670 [710]	950	-	539	-	-	
	Qinghai	Xining	-	-	866	570 [685]	598	335 [336]	415 [414]	-	-	
		Guyuan	-	-	-	318	809	428	423	-	-	
	Xinjiang	Shizuishan	-	-	-	168 [185]	177	130 [135]	188 [219]	-	-	
		Yinchuan	-	-	-	390 [392]	581	461	481 [470]	-	-	
Urumqi	615	457	530	507 [518]	707	433	424	-	-			

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

‡ Nanjing 1981-1984 figures are for "floating dust" (piaochenzhi).

§ Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.

Table VIII-7. Ambient Air Quality in Selected Chinese Cities: Sulfur Dioxide, 1986-1993

Annual Averages, ug/m3													
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *			
										avg	min*	max*	
North	Beijing		-	-	-	99		122	117	-	-	-	
	Tianjin		190	170	190	125 [130]	100	142 [140]	199 [180]	140	-	-	
	Hebei	Baoding		-	-	-	-	-	-	138 [158]	150	10	949
		Cangzhou		-	-	-	-	-	-	15	29	4	127
		Chengde		-	-	-	-	-	-	230	186	3	1,435
		Handan		-	-	-	-	-	-	97	153	10	635
		Langfang		-	-	-	-	-	-	20	51	3	227
		Qinhuangdao		-	-	-	55	-	45	41	48	7	294
		Shijiazhuang		-	-	-	269	-	162	121 [154]	158	13	874
		Tangshan		-	-	-	122	-	86	97 [98]	133	9	709
		Xingtai		-	-	-	-	-	-	64	59	7	337
		Zhangjiakou		-	-	-	-	-	-	74	76	5	602
		Shanxi	Changzhi		62	31	42	37	42	39	38	-	-
	Datong			157	129	182	258	184	134 [155]	179	150	-	-
	Jincheng			56	75	45	45	41	33	56	-	-	-
	Taiyuan			261	226	247	394 [409]	265	277 [274]	303 [284]	256	-	-
	Yangquan			113	148	123	145	146	144	203	-	-	-
	Yuci			184	162	165	298	189	205	251	-	-	-
	Yuncheng			86	174	111	96 [98]	90	89 [94]	132 [137]	-	-	-
	province avg			139	148	155	187	131	128	152	-	-	-
	Inner Mongolia	Baotou		120	177	146	126	140	142	119	-	-	-
		Chifeng		90	151	112	75	59	-	-	-	-	-
		Hohhot		83	106	78	92 [88]	40	35	-	-	-	-
Wuhai			167	111	103	151	143	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	
Northeast	Liaoning	Anshan		-	-	100	80	104	125	-	-	-	
		Dalian†		66[60]	69[60]	88[60]	84[54]	94[38]	75 [74]	79 [82]	-	-	-
		Shenyang		159	143	100	146	117	137 [120]	131	-	-	-
	Jilin	Changchun		-	-	-	54 [53]	56	61 [52]	61 [62]	63	-	-
		Jilin		-	-	-	67 [98]	110	75	89	-	-	-
		Siping		-	-	-	88	35	-	36	-	-	-
	Heilongjiang	Tumen		-	-	-	23	-	28	41	-	-	-
		Daqing		-	-	7	8	-	15 [30]	10	-	-	-
		Harbin		-	-	48	40 [45]	-	27 [33]	29 [32]	30	-	-
		Hegang		-	-	16	15 [11]	-	13	11	-	-	-
East	Shanghai	Nanjing		88	80	83	98	95	99 [52]	98	50	-	-
		Jiangsu		-	-	-	77	74	50 [62]	73 [65/40†]	-	-	-
		Suzhou		-	-	-	77	-	65	64 [69]	-	-	-
		Xuzhou		-	-	-	71 [70]	-	81	76 [83]	-	-	-
		Zhenjiang		-	-	-	-	-	37	39 [86]	-	-	-
	Zhejiang	Hangzhou		107	104	105	97	123	122 [119]	107	-	-	-
		Huzhou (Wuxing)		90	74	81	71	68	68	-	-	-	-
		Jiaxing		43	64	58	50	65	65	-	-	-	-
		Jinhua		46	61	60	52	39	36	-	-	-	-
		Ningbo		52	63	59	30	34	43	-	-	-	-
		Shaoxing		37	51	59	71	64	58	-	-	-	-
		Wenzhou		81	103	83	51	50	61 [60]	38	-	-	-
		Anhui		40	30	30	26 [30]	20	21 [22]	21 [26]	25	-	96
	Fujian	Bengbu		30	40	40	20	40	49	37	23	-	81
		Hefei		60	40	-	55 [50]	48	46 [32]	41 [40]	44	-	104
		Huabei		20	20	30	20	20	21	20	22	-	66
		Huainan		50	50	30	20	30	31	36	42	-	327
		Huangshan		-	-	-	-	-	24	17	20	-	63
		Ma'anshan		20	20	10	10	20	18	20	22	-	208
		Tongling		80	40	70	90	90	95	126	87	-	516
		Wuhu		60	70	40	30	20	34	52	48	-	388
	Jiangxi	Fuzhou		-	-	-	86	-	82	72	-	-	-
		Sanming		-	-	-	48	-	25	38	-	-	-
		Xiamen		-	-	-	67	-	8 [7]	7 [5]	-	-	-
		Ganzhou		99	100	84	57	43	44	40	38	-	-
		Jingdezhen		111	61	59	72	45	50	54	84	-	-
	Shandong	Jiujiang		53	40	51	86	89	82	99	114	-	-
		Nanchang		45	60	64	72	43	41 [40]	65	67	-	-
		Pingxiang		101	25	50	54	36	65	67	54	-	-
		Xinyu		47	24	21	19	19	18	-	41	-	-
province avg			-	-	68	-	-	40	-	55	-	-	
Jinan			-	-	-	117	-	135	-	226	-	-	
Qingdao			260	278	274	263 [266]	229	204	-	207	-	-	
Zibo			-	-	-	147	-	121	-	142	-	-	

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical

‡ Annual averages for urban/suburban areas

Source: China Environmental Yearbook, various years.

Table VIII-7. Ambient Air Quality in Selected Chinese Cities: Sulfur Dioxide, 1986-1993  
(continued)

Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *		
										avg	min*	max*
South-Central	Henan	Anyang	-	-	-	50	-	79	94	-	-	-
		Luoyang	-	-	-	105	-	-	110	-	-	-
			Pingdingshan	-	-	-	38	-	43	34	-	-
			Zhengzhou	74	79	86	65 [80]	67	86	90	-	-
			province avg	57	57	59	-	-	-	-	-	-
		Hubei	Wuhan	54	48	43	48	44	40 [44]	40 [44]	-	-
			Xiangfan	-	-	44	37	42	40 [41]	38	-	-
			Yichang	-	-	192	177	246	165 [227]	128	-	-
		Hunan	Changsha	-	-	-	186	-	173	180	-	-
			Hengyang	-	-	-	88	-	62	68	-	-
		Guangdong	Guangzhou	90	80	90	100	91	70 [71]	60 [59]	47	-
			Shantou	-	-	-	10	12	36	35	-	-
			Shenzhen	-	-	20	10 [16]	9	16 [15]	16 [15]	7	-
			Zhuhai	<10	10	10	20	10	12	17	-	-
		Guangxi	Beihai	-	-	-	-	-	14	34	18	-
			Bose	-	-	-	-	-	45 [55]	46 [86]	28	-
			Guilin	93	106	124	138 [144]	107	85 [100]	70 [72]	76	-
			Nanning	114	68	60	62	56	50 [54]	86 [85]	78	-
			Luzhou	263	226	291	211	204	172	216	212	-
			Wuzhou	84	116	53	190	130	109	134	142	-
	Hainan	Haikou	-	-	-	2	-	4	-	6	2	24
		Sanya	-	-	-	-	-	10	-	10	10	10
Southwest	Sichuan	Chengdu	70	80	70	82	70	66 [70]	75 [82]	60	-	
		Chongqing	460	430	360	338 [340]	340	351 [380]	351 [380]	270/140 ¶	-	
			Dachuan (Daxian)	-	-	-	-	-	80	100	67	-
			Nanchong	-	-	-	346	-	239 [290]	242 [300]	200	-
			Xichang	-	-	-	-	-	40	30	33	-
			Yibin	-	-	-	348	-	305 [420]	287 [380]	290	-
			province avg	-	-	-	-	-	170	170	140	-
		Guizhou	Guiyang	465	439	374	372 [330]	353	341	463 [475]	-	-
			Zunyi	-	-	-	231	131	183	304	-	-
			Duyun	-	-	-	147	220	230	456	-	-
			Anshun	-	-	-	371	228	290	402	-	-
			Liupanshui	-	-	-	60 [59]	67	46	55 [54]	-	-
			province avg	219	236	214	204	206	188	272	-	-
	Yunnan	Gejiu	-	-	-	145	114	41	31	-	-	
		Kunming	-	-	-	55	520	45	50	-	-	
	Xizang	Lhasa	-	-	-	-	-	-	2	-	-	
Northwest	Shaanxi	Baoji	-	-	-	29	-	54	39	-	-	
		Hanzhong	-	-	-	58	-	50	61	-	-	
			Xi'an	-	-	-	51	-	68	58	-	-
			Yan'an	-	-	-	41	-	60	44	-	-
		Gansu	Lanzhou	-	-	-	62	84	102	79	-	-
			Tianshui	-	-	-	59	46	-	-	-	-
		Qinghai	Xining	-	-	47	46 [47]	66	51	46	-	-
		Ningxia	Guyuan	-	-	-	40	32	-	28	-	-
			Shizuishan	-	-	-	75 [192]	106	104	209 [165]	-	-
			Yinchuan	-	-	-	19	53	56	68 [70]	-	-
		Xinjiang	Urumqi	120	128	158	201 [207]	222	207	301	-	-

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical

¶ Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.



Table VIII-8. Ambient Air Quality in Selected Chinese Cities: Nitrogen Oxides, 1986-1993

Annual Averages, ug/m3														
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *				
										avg	min*	max*		
North	Beijing		-	-	-	83	-	97	102	-	-	-		
	Tianjin		60	60	70	52 [40]	40	48	51	-	-	-		
	Hebei	Baoding		-	-	-	-	-	-	39	44	5	109	
		Cangzhou		-	-	-	-	-	-	-	22	5	72	
		Chengde		-	-	-	-	-	-	-	32	2	77	
		Handan		-	-	-	-	-	-	-	56	2	129	
		Langfang		-	-	-	-	-	-	-	37	8	86	
		Qinhuangdao		-	-	-	38	-	37	35	36	4	107	
		Shijiazhuang		-	-	-	61	-	43	48 [53]	60	20	140	
		Tangshan		-	-	-	57	-	43	-	59	19	230	
		Xingtai		-	-	-	-	-	-	-	82	10	390	
		Zhangjiakou		-	-	-	-	-	-	-	38	4	107	
		Shanxi	Changzhi		-	-	-	50	48	34	51	-	-	-
			Datong		-	-	-	44	45	49 [58]	36 [42]	-	-	-
			Jincheng		-	-	-	40	35	45	41	-	-	-
	Taiyuan			-	-	-	65 [68]	69	80	92	-	-	-	
	Yangquan			-	-	-	43	64	81	81	-	-	-	
	Yuci			-	-	-	20 [36]	34	48	49	-	-	-	
	Inner Mongolia	Yuncheng province avg		-	-	-	44	48	51	50 [54]	-	-	-	
		Baotou		40	78	64	52	52	71	80	-	-	-	
		Chifeng		51	34	45	42	32	-	-	-	-	-	
		Hohhot		101	49	57	22	22	32	-	-	-	-	
		Wuhai		48	26	31	30	34	-	-	-	-	-	
Northeast	Liaoning	Anshan				58	70	80	84	-	-	-		
		Dalian†	67[60]	76[60]	78[60]	89[65]	89[71]	101 [102]	102 [103]	-	-	-		
		Shenyang	69	62	61	60	81	91	76	-	-	-		
	Jilin	Changchun				56 [50]	32	29 [35]	71 [74]	71	-	-	-	
		Jilin				57	-	59	57	-	-	-	-	
		Siping				-	-	-	45	-	-	-	-	
	Heilongjiang	Turnen				35	-	30	40	-	-	-	-	
		Daqing				23	-	27	28	-	-	-	-	
		Harbin				56 [61]	-	40	55	-	-	-	-	
		Hegang				36	-	21	27	-	-	-	-	
East	Shanghai				59	-	63	70	-	-	-	-		
	Jiangsu	Changzhou				-	-	-	57	-	-	-	-	
		Huaiyin				-	-	-	50	-	-	-	-	
		Lianyungang				-	-	-	34	-	-	-	-	
		Nanjing				-	-	-	50 [48/32 ¶]	-	-	-	-	
		Nantong				-	-	-	24	26 [31]	-	-	-	
		Suzhou				50	-	48	46 [48]	-	-	-	-	
		Wuxi				-	-	-	65	-	-	-	-	
		Xuzhou				62	-	67	59 [63]	-	-	-	-	
		Yancheng				-	-	-	32	-	-	-	-	
		Yangzhou				-	-	-	50	-	-	-	-	
		Zhenjiang				-	-	-	13	18 [60]	-	-	-	
	province avg				-	-	-	52	-	-	-	-		
	Zhejiang	Hangzhou	65	60	59	49	62	54	66	-	-	-	-	
		Huzhou (Wuxing)	33	34	38	33	33	-	-	-	-	-	-	
		Jiaxing	46	32	26	39	37	-	-	-	-	-	-	
		Jinhua	25	20	14	21	18	-	-	-	-	-	-	
		Ningbo	25	24	19	12	23	-	-	-	-	-	-	
		Shaoxing	37	42	32	25	20	-	-	-	-	-	-	
		Wenzhou	41	40	37	31	29	37	40	-	-	-	-	
	Anhui	Anqing	40	40	30	33 [30]	20	37 [40]	38 [41]	33	-	-	90	
		Bengbu	40	60	40	50	50	73	56	44	-	-	127	
		Hefei	70	40	-	58 [60]	-	36	36 [37]	34	-	-	140	
Huaiabei		40	40	30	30	20	116	35	41	-	-	116		
Huainan		40	50	50	40	50	44	44	43	-	-	163		
Huangshan		-	-	-	-	-	24	7	8	-	-	18		
Ma'anshan		30	40	30	40	20	19	30	28	-	-	128		
Tongling		30	30	20	30	30	31	29	29	-	-	82		
Wuhu	20	30	20	50	40	29	17	30	-	-	82			

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

¶ Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.

Table VIII-8. Ambient Air Quality in Selected Chinese Cities: Nitrogen Oxides, 1986-1993  
(continued)

Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *		
										avg	min*	max*
<i>East (continued)</i>												
	Fujian	Fuzhou	-	-	-	36	-	32	28	-	-	-
		Sanming	-	-	-	44	-	32	38	-	-	-
		Xiamen	-	-	-	10	-	11	14	-	-	-
	Jiangxi	Ganzhou	25	22	24	19	25	16	17	12	-	-
		Jingdezhen	47	41	37	34	62	52	46	40	-	-
		Jiujiang	27	28	24	19	17	28	24	23	-	-
		Nanchang	36	27	23	34	28	25	22	30	-	-
		Pingxiang	39	47	44	44	37	40	51	43	-	-
		Xinyu	36	21	21	39	27	20	-	22	-	-
		province avg	-	-	-	-	-	-	-	25	-	-
	Shandong	Jinan	-	-	-	41	-	52	74	-	-	-
		Qingdao	59	49	57	50 [51]	49	41	51	-	-	-
		Zibo	-	-	-	28	-	25	35	-	-	-
<i>South-Central</i>												
	Henan	Anyang	-	-	-	38	-	60	61	-	-	-
		Luoyang	-	-	-	58	-	-	66	-	-	-
		Pingdingshan	-	-	-	37	-	36	32	-	-	-
		Zhengzhou	45	58	119	140 [150]	90	114	129	-	-	-
		province avg	38	47	49	-	-	-	-	-	-	-
	Hubei	Wuhan	52	54	58	59	56	49	56	-	-	-
		Xiangfan	-	-	-	38	-	31	34	-	-	-
		Yichang	-	-	-	30	-	32	35	-	-	-
	Hunan	Changsha	-	-	-	50	-	37	36	-	-	-
		Hengyang	-	-	-	38	-	25	28	-	-	-
		Huaihua	-	-	-	-	-	11	20	-	-	-
	Guangdong	Guangzhou	100	110	110	133	147	103 [111]	107	116	-	-
		Shantou	-	-	-	23	-	33	35	-	-	-
		Shenzhen	-	-	60	50 [71]	85	69 [108]	73 [118]	-	-	-
		Zhuhai	20	20	40	40	45	48	-	-	-	-
		province avg	-	-	-	-	40	40	44	44	-	-
	Guangxi	Beihai	-	-	-	-	-	21	26	36	-	-
		Bose	-	-	-	-	-	38 [46]	26	15	-	-
		Guilin	20	24	18	24	27	23 [25]	26 [24]	24	-	-
		Nanning	16	18	21	14 [13]	12	11 [12]	11 [12]	10	-	-
		Liuzhou	56	53	60	35	46	39	49	44	-	-
		Wuzhou	24	31	30	30	30	25	28	32	-	-
	Hainan	Haikou	-	-	-	19	-	12 [11]	19	14	5	36
		Sanya	-	-	-	-	-	14	-	18	5	50
<i>Southwest</i>												
	Sichuan	Chengdu	50	60	50	58	50	56 [60]	65 [72]	70	-	-
		Chongqing	80	80	70	58 [60]	60	59 [70]	65 [80]	60	-	-
		Dachuan (Daxian)	-	-	-	-	-	80	20	76	-	-
		Nanchong	-	-	-	41	-	58 [60]	36 [40]	40	-	-
		Xichang	-	-	-	-	-	20	33	29	-	-
		Yibin	-	-	-	63	-	41 [50]	47 [60]	50	-	-
		province avg	-	-	-	-	-	-	-	40	-	-
	Guizhou	Guiyang	47	44	34	33 [29]	-	34	52	-	-	-
		Liupanshui	-	-	-	23	-	30	29	-	-	-
		province avg	30	33	30	34	-	-	-	-	-	-
	Yunnan	Gejiu	-	-	-	15	18	13	16	-	-	-
		Kunming	-	-	-	52	44	38	32	-	-	-
	Xizang	Lhasa	-	-	-	-	-	-	11	-	-	-
<i>Northwest</i>												
	Shaanxi	Baoji	-	-	-	34	-	61	40	-	-	-
		Hanzhong	-	-	-	19	-	23	29	-	-	-
		Xi'an	-	-	-	48	-	51	51	-	-	-
		Yan'an	-	-	-	44	-	34	38	-	-	-
	Gansu	Jiayuguan	-	-	-	12 [20]	-	15	18	-	-	-
		Lanzhou	-	-	-	88 [182]	-	-	72	-	-	-
	Qinghai	Xining	-	-	-	61	-	42	42	-	-	-
	Ningxia	Guyuan	-	-	-	21	18	-	-	-	-	-
		Shizuishan	-	-	-	24 [27]	31	38	99	-	-	-
		Yinchuan	-	-	-	27 [25]	26	25	30	-	-	-
	Xinjiang	Urumqi	62	74	100	136 [143]	139	164	152	-	-	-

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

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† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

‡ Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.

Table VIII-9. Ambient Air Quality in Selected Chinese Cities: Carbon Monoxide, 1981-1993.

Annual Averages, mg/m <sup>3</sup>																
Region	Province	City	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	
North	Tianjin		-	2.25	3.00	2.84	6.82	3.11	3.83	3.61	3.33	2.21	-	2.49	-	
Northeast	Liaoning	Shenyang	3.03	1.72	1.11	2.72	2.00	2.46	1.78	1.67	1.92	2.20	-	-	-	
		Dalian*	-	-	2.59	4.32	2.36	2.12	1.95	2.37	1.96	1.99	2.04	1.90	-	
		Anshan	-	-	-	-	-	-	-	-	-	-	2.00	-	-	-
		Fushun	-	-	-	-	-	-	-	-	-	-	2.10	-	-	-
		Benxi	-	-	-	-	-	-	-	-	-	-	2.40	-	-	-
		Dandong	-	-	-	-	-	-	-	-	-	-	2.30	-	-	-
		Jinzhou	-	-	-	-	-	-	-	-	-	-	2.40	-	-	-
		Yingkou	-	-	-	-	-	-	-	-	-	-	0.70	-	-	-
		Fuxin	-	-	-	-	-	-	-	-	-	-	1.10	-	-	-
		Liaoyang	-	-	-	-	-	-	-	-	-	-	1.80	-	-	-
		Tieling	-	-	-	-	-	-	-	-	-	-	0.20	-	-	-
		Chaoyang	-	-	-	-	-	-	-	-	-	-	0.80	-	-	-
		province avg	-	-	-	-	-	-	-	-	-	-	1.70	-	-	-
			Jilin	Changchun	-	-	-	-	-	-	-	-	1.49	1.84	2.58	1.84
	Heilongjiang	Harbin	-	-	-	-	-	-	-	-	3.76	-	-	-	-	
East	Shandong	Qingdao	-	-	-	-	-	1.70	1.70	2.30	2.20	2.60	-	-	-	
South-Central	Guangdong	Guangzhou	-	2.75	-	-	2.90	2.70	2.61	3.10	2.33	3.16	2.91	-	2.77	
		Zhuhai	-	-	-	-	-	-	-	-	-	0.58	0.48	-	-	-

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred.

\* Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

Source: China Environmental Yearbook, various years.

Table VIII-10. Particulate Deposition for Selected Cities, 1986-1993

Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *			
										avg	min*	max*	
North	Beijing		-	-	20.00	17.80	-	19.10	17.71	-	-	-	
	Tianjin		30.60	24.38	19.51	18.93 [18.23]	18.13	16.77	14.25	-	-	-	
	Hebei	Baoding		-	-	-	-	-	-	17.59	23.58	6.60	81.63
		Cangzhou		-	-	-	-	-	-	-	22.16	8.01	91.00
		Chengde		-	-	-	-	-	-	-	23.38	4.24	55.91
		Handan		-	-	-	-	-	-	-	36.27	12.14	59.40
		Langfang		-	-	-	-	-	-	-	11.57	3.11	21.74
		Qinhuangdao		-	-	-	32.07	-	18.58	19.27	19.62	3.00	88.16
		Shijiazhuang		-	-	-	48.02	-	42.25	37.41	36.06	6.48	164.12
		Tangshan		-	-	-	36.37	-	34.96	30.19	43.64	7.67	168.00
		Xingtai		-	-	-	-	-	-	-	41.82	6.02	110.77
		Zhangjiakou		-	-	-	-	-	-	-	50.01	11.20	271.00
	Shanxi	Datong		-	-	-	-	-	32.15	43.87	-	-	-
		Taiyuan		42.44	54.93	64.87	28.79	33.4	30.21	26.60	-	-	-
		Yuncheng		-	-	-	16.70	-	23.73	15.66	-	-	-
	Inner Mongolia	Baotou		50.28	71.23	75.13	54.61	68.39	-	-	-	-	-
		Chifeng		31.53	35.28	16.30	20.66	-	-	-	-	-	-
		Hohhot		28.06	32.82	44.22	22.70	-	14.38	-	-	-	-
		Wuhai		89.47	69.56	93.17	48.96	-	-	-	-	-	-
	Northeast	Liaoning	Anshan	-	-	-	48.10	50.30	51.17	51.08	-	-	-
Dalian			28.99	27.59	24.72	23.70	22.40	21.96	23.22	-	-	-	
Jilin		Shenyang	41.01	53.63	48.03	41.17	33.50	31.83 [31.74]	31.88	-	-	-	
		Changchun	-	-	46.03	45.62 [45.16]	42.30	45.64 [43.52]	44.67 [44.11]	31.16	-	-	-
		Jilin	-	-	-	27.30	-	31.84	35.41	-	-	-	-
Heilongjiang		Siping	-	-	-	-	-	-	16.84	-	-	-	-
		Tumen	-	-	-	18.01	-	10.01	14.91	-	-	-	-
		Daqing	-	-	-	16.55	-	13.87	17.09	-	-	-	-
		Harbin	-	-	-	44.20	-	40.61	37.38	-	-	-	-
		Hegang	-	-	-	36.00	-	-	35.01	-	-	-	-
East	Shanghai		-	25.00	-	24.20	-	15.98 [21.80]	13.83	-	-	-	
	Jiangsu	Nanjing	-	-	-	-	-	12.64 [12.73]	14.19 [12.91/10.93†]	-	-	-	-
		Suzhou	-	-	-	10.30	-	9.05	10.55 [11.44]	-	-	-	-
		Xuzhou	-	-	-	16.40	-	16.60	21.39 [21.10]	-	-	-	-
		Zhenjiang	-	-	-	-	-	7.43	7.5 [17.54]	-	-	-	-
	Zhejiang	Hangzhou	13.78	13.01	11.28	13.14 [12.59]	12.32	11.94	12.78	-	-	-	-
		Huzhou	9.57	12.41	14.67	10.91	7.37	-	-	-	-	-	-
		Jiaxing	17.10	18.72	15.79	11.99	12.39	-	-	-	-	-	-
		Jinhua	10.70	4.58	8.98	9.96	6.34	-	-	-	-	-	-
		Ningbo	10.85	10.16	7.30	6.53	7.01	-	-	-	-	-	-
		Shaoxing	11.37	9.65	13.43	14.89	17.13	-	-	-	-	-	-
		Wenzhou	10.97	9.16	9.15	8.22	5.46	4.68	5.84	-	-	-	-
	Anhui	Anqing	14.61	11.69	13.12	12.93	-	-	-	-	-	-	-
		Bengbu	-	-	13.48	-	-	-	-	-	-	-	-
		Hefei	10.43	14.85	-	20.05 [19.29]	12.76	-	-	-	-	-	-
		Huaibei	11.85	11.54	13.25	12.85	11.65	-	-	-	-	-	-
		Huainan	-	13.45	-	17.32	-	-	-	-	-	-	-
		Ma'anshan	34.61	29.75	26.21	-	25.12	-	-	-	-	-	-
		Tongling	10.31	7.20	9.15	-	-	-	-	-	-	-	-
	Fujian	Wuhu	15.20	27.50	-	25.64	22.64	-	-	-	-	-	-
		Fuzhou	-	-	-	12.87	-	9.95	8.55	-	-	-	-
		Sanming	-	-	-	61.92	-	49.75	55.75	-	-	-	-
		Xiamen	-	-	-	13.01	-	8.42	7.47	-	-	-	-
	Jiangxi	Ganzhou	6.86	5.82	9.12	8.00	6.83	5.35 [5.53]	6.68	-	-	-	-
		Jingdezhen	14.29	25.50	9.09	22.12	13.32	11.00	11.19	-	-	-	-
		Jiujiang	15.53	19.25	20.91	29.40	20.20	14.13	12.19	-	-	-	-
		Nanchang	14.27	11.05	10.17	13.83	9.697	9.43 [9.92]	10.35	-	-	-	-
		Pingxiang	7.93	8.74	10.84	11.64	8.34	30.25	11.13	-	-	-	-
	Shandong	Xinyu	14.73	11.35	11.44	7.96	13.27	15.82	-	-	-	-	-
		Jinan	-	-	-	31.64	-	27.49	29.80	-	-	-	-
		Qingdao	25.80	21.10	22.10	20.80	19.56	17.88	16.64	-	-	-	-
		Zibo	-	-	-	22.41	-	19.29	18.41	-	-	-	-

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

Source: China Environmental Yearbook, various years.

Table VIII-10. Particulate Deposition for Selected Cities, 1986-1993 (continued)

Annual Averages, tonnes per square km per month												
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993 *		
										avg	min*	max*
South-Central	Henan	Anyang	-	-	-	21.26	-	16.42	19.91	-	-	-
		Luoyang	-	-	-	14.15	-	-	-	-	-	-
			Pingdingshan	-	-	-	26.23	-	-	-	-	-
			Zhengzhou	40.74	34.49	26.23	27.54	23.95	20.61	21.39	-	-
			province avg	32.45	26.14	24.54	-	-	-	-	-	-
		Hubei	Wuhan	22.76	17.85	22.72	17.62	16.24	17.68	16.91	-	-
			Xiangfan	-	-	-	7.61	-	7.44	8.42	-	-
			Yichang	-	-	-	16.72	-	13.86	15.76	-	-
		Hunan	Changsha	-	-	-	-	-	9.77	12.60	-	-
			Hengyang	-	-	-	16.48	-	13.41	14.94	-	-
		Guangdong	Guangzhou	13.75	14.19	13.65	10.04	9.59	8.53 [8.76]	9.87 [10.00]	-	-
			Shantou	-	-	-	5.50	4.32	8.06	7.42	-	-
			Shenzhen	-	-	-	-	-	7.93	9.32	-	-
			Zhuhai	-	-	-	-	3.33	3.59	5.14	-	-
			province avg	-	-	-	-	8.57	8.43	9.40	9.05	-
		Guangxi	Beihai	-	-	-	-	-	9.10	6.38	8.35	-
			Bose	-	-	-	-	-	3.22 [5.4]	5.18 [5.37]	5.35	-
			Guilin	10.29	16.12	15.71	11.58	9.17	11.09 [35.4]	14.20 [14.25]	10.31	-
			Hechi	-	-	-	-	-	-	-	-	-
			Nanning	9.84	9.32	9.84	9.16 [8.53]	11.44	11.22 [42.1]	11.99 [14.16]	11.44	-
		Wuzhou	8.12	9.11	10.02	9.99	7.32	21.00	8.34	7.59	-	
	Hainan	Haikou	-	-	-	5.24	-	4.04 [4.12]	4.22	4.60	1.86	
		Sanya	-	-	-	-	-	6.20	-	9.68	1.89	
Southwest	Sichuan	Chengdu	12.29	9.29	11.75	13.32	-	11.37	12.35	-	-	
		Chongqing	-	-	-	19.90	-	22.41	17.81	14.4/7.9†	-	
		Nanchong	-	-	-	3.77	-	10.85	10.30	-	-	
		Yibin	-	-	-	-	-	7.69	8.65	-	-	
	Guizhou	Guiyang	-	17.20	15.90	21.94	-	-	17.32	-	-	
		Liupanshui	-	-	-	9.73	-	4.61	8.84	-	-	
		province avg	14.30	14.60	11.20	10.80	-	-	-	-	-	
	Yunnan	Gejiu	-	-	-	6.25	6.22	4.95	4.11	-	-	
		Kunming	-	-	-	10.88	13.48	9.49	9.05	-	-	
	Xizang	Lhasa	-	-	-	-	-	-	-	-	-	
Northwest	Shaanxi	Baoji	-	-	-	24.04	-	22.10	27.56	-	-	
		Hanzhong	-	-	-	6.78	-	7.38	9.90	-	-	
		Xi'an	-	-	-	18.12	-	20.24	20.04	-	-	
		Yan'an	-	-	-	15.28	-	19.15	25.97	-	-	
	Gansu	Jiayuguan	-	-	-	16.49	-	31.01	23.01	-	-	
		Lanzhou	-	-	-	23.57	-	28.57	30.82	-	-	
	Qinghai	Xining	-	-	-	36.37	-	23.54	25.14	-	-	
	Ningxia	Shizuishan	-	-	-	-	-	-	-	-	-	
		Yinchuan	-	-	-	25.38	-	26.97	35.84	-	-	
	Xinjiang	Urumqi	31.17	18.27	23.35	23.54 [24.72]	25.78	-	-	-	-	

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. In some cases figures reported by national and local authorities differ. In such cases the figures from local government reports appear in square brackets.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Between 1986 and 1990 results of air quality monitoring in Dalian were reported for both automatic and chemical analysis. For those years the data are reported as automatic | chemical.

Source: China Environmental Yearbook, various years.

Table VIII-11. Acidity of Precipitation — Annual Average pH

Annual Averages, tonnes per square km per month												
Region	Province	City	1986	1987	1988	1989	1990	1991	1992	1993		
										avg	min*	max*
East	Shandong		-	-	-	-	-	-	5.17-7.24	-	-	-
South-Central	Hubei	Wuhan	-	-	-	5.39	5.25	-	-	-	-	-
	Guangdong	province avg	-	-	-	-	-	-	4.61	4.96	-	-
	Guangxi	Beihai	-	-	-	-	-	-	-	6.35	4.36	8.23
		Bose	-	-	-	-	-	-	-	4.77	3.20	7.68
		Guilin	-	-	-	-	-	-	-	5.01	3.57	7.25
		Hechi	-	-	-	-	-	-	-	5.21	4.07	7.69
		Nanning	-	-	-	-	-	-	-	5.13	3.12	6.87
		Liuzhou	-	-	-	-	-	-	-	4.38	3.45	6.94
		Qinzhou	-	-	-	-	-	-	-	5.35	3.07	7.97
		Wuzhou	-	-	-	-	-	-	-	4.76	3.04	6.90
		Yulin	-	-	-	-	-	-	-	5.92	4.57	7.01
Southwest	Sichuan	Chengdu	-	-	-	-	-	4.70	4.82	5.08	-	-
		Chongqing	-	-	-	-	-	4.36 [4.45]	4.23	4.61/4.18†	-	-
		Zigong	-	-	-	-	-	4.82	4.69	4.54	-	-
		Panzhihua	-	-	-	-	-	5.17	4.88	4.97	-	-
		Luzhou	-	-	-	-	-	4.09	4.48	4.72	-	-
		Neijiang	-	-	-	-	-	4.60	4.88	4.85	-	-
		Leshan	-	-	-	-	-	4.39	4.52	5.17	-	-
		Mianyang	-	-	-	-	-	4.31	4.34	4.18	-	-
		Deyang	-	-	-	-	-	-	-	6.58	-	-
		Guangyuan	-	-	-	-	-	-	4.46	6.27	-	-
		Suining	-	-	-	-	-	-	4.71	4.74	-	-
		Yibin	-	-	-	-	-	4.28	4.36	4.26	-	-
		Nanchong	-	-	-	-	-	4.39	4.11	4.15	-	-
		Dachuan (Daxian)	-	-	-	-	-	4.75	3.74	4.81	-	-
		Wanxian	-	-	-	-	-	4.79	4.21	5.19	-	-
		Fuling	-	-	-	-	-	-	3.92	4.83	-	-
		Ya'an	-	-	-	-	-	-	4.73	4.88	-	-
		Xichang	-	-	-	-	-	4.95	-	6.19	-	-
		Emeishan	-	-	-	-	-	4.41	-	4.38	-	-
		19-city avg	-	-	-	-	-	-	-	4.67	-	-
	Guizhou	Anshun	-	-	-	4.60	5.40	4.60	4.30	3.90	-	-
		Duyun	-	-	-	4.20	4.60	4.60	5.20	3.40	-	-
		Guiyang	4.20	5.76	4.30	4.98	4.80	4.40	5.30	3.20	-	-
		Liupanshui	-	-	-	6.40	6.30	6.60	6.80	-	-	-
		Zunyi	-	-	-	4.20	4.20	4.10	4.40	3.70	-	-
	province avg	5.05	5.41	5.20	4.91	5.40	4.90	5.20	-	-	-	
	Yunnan	Gejiu	-	-	-	-	4.42	-	-	-	-	-
		Kunming	-	-	-	-	6.41	-	-	-	-	-

N.B. Province averages are averages of major urban areas. On occasion conflicting data are presented for a single year. In such cases, the data from the more recent source and from tables comparing several cities are preferred. The normal pH value of precipitation is about 5.6.

\* All 1993 data are from local reports. Minima and maxima are daily averages.

† Annual averages for urban/suburban areas.

Source: China Environmental Yearbook, various years.

**Table VIII-12. Indoor Air Pollution in Chinese Residences: Range of Pollutant Levels \*  
Reported in Research Articles**

<b>Pollutant</b>	<b>Unit</b>	<b>Urban Fuel Type</b>	<b>Rural Households</b>	<b>Households</b>
Total Suspended Particulates	(mg/m <sup>3</sup> )	coal	0.21-2.8	0.01-20
		gas	0.15-0.51	0.19
		biomass	-	0.17-2.6
PM10 †	(mg/m <sup>3</sup> )	coal	0.16-2.7	0.12-26
		gas	0.14-0.45	-
		biomass	-	0.83-22
Carbon Monoxide	(mg/m <sup>3</sup> )	coal	0.58-97	0.70-87
		gas	0.22-36	2.4
		biomass	-	0.5-16
Sulfur Dioxide	(mg/m <sup>3</sup> )	coal	0.01-5.8	0.01-23
		gas	0.01-1.3	0.02-0.07
		biomass	-	0.01-9.1
Nitrogen Oxides	(mg/m <sup>3</sup> )	coal	0.01-1.8	0.01-1.7
		gas	0.01-0.88	0.03-0.05
		biomass	-	0.01-32
Benzo(a)pyrene ¶¶	(ng/m <sup>3</sup> )	coal	0.3-190	5.3-19,000
		gas	4.7-93	-
		biomass	-	3.7-3,100

\* Arithmetic means for individual households over single monitoring periods.

† Suspended particulate matter (PM) with diameter  $\leq 10 \mu\text{m}$ , i.e., the fraction of total suspended particulates most closely associated with serious health impacts.

¶¶ Benzo(a)pyrene is a proxy for a class of combustion products, polycyclic aromatic hydrocarbons (PAHs), many of which are known carcinogens.

Source: Sinton et al., 1995.

## Chapter IX—International Comparisons



# International Comparisons

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China is the second largest consumer of commercial energy and produces large shares of the world's output of industrial products. (By 1994 China had surpassed the Russian Federation as the second largest energy user (BP, 1995). In the 1992 data presented here China is rated third.) In the magnitude of its activity, therefore, China resembles already developed countries. In terms of per capita consumption and in terms of patterns of energy use and other activities, however, China more closely resembles other developing nations and formerly centrally planned economies.

Most of the comparisons in this section include China, India, Japan, the United States, and the former Soviet Union. India was chosen because it is a large developing country, with a population second only to China's but with a smaller resource base. Japan and the United States were chosen as representative developed countries. Japan has an economy that has grown rapidly until very recently, is energy-efficient by world standards, and is almost completely reliant on imported energy. The United States is more self-sufficient in energy, since it has a total resource base on par with China, but has the highest total and per capita rates of energy consumption in the world.<sup>1</sup> The former Soviet Union was chosen as the only other country of similar size with a formerly centrally planned economy. Moreover, in its early stages of development, the economy of the People's Republic of China was consciously modeled after that of the Soviet Union, with its characteristic emphasis on the development of heavy industry at the expense of other sectors.

## PRIMARY ENERGY PRODUCTION

China produced 1,037 Mtce, or 9% of the world's primary energy in 1992 (Table IX-1).<sup>2</sup> This was significantly less than that produced in the United States and the Russian Federation<sup>3</sup>, with about 2,292 and 1,604 Mtce respectively, and several times that in India and Japan, with 270 Mtce and 107 Mtce

respectively. In terms of structure of primary energy production China is closest to India; about three-quarters of primary commercial energy in both countries is from coal, but China has a slightly larger share of oil, and correspondingly smaller shares of natural gas and primary electricity. The United States and the Russian Federation differ from China in their much larger shares of primary production from oil and natural gas. About one-third of energy production in the United States is coal. Because Japan's fossil fuel resources are insignificant, its primary energy production structure is the farthest from China's; 90% comes from primary electricity, and about two-thirds of that from nuclear power plants.

## PRIMARY ENERGY CONSUMPTION

China's share of the world's primary commercial energy consumption in 1992 was 9% also (Table IX-2). This is a much larger share than two decades previously (4% in 1970). India's share has risen as well, approaching 3%. Statistics from the former Soviet Union are difficult to interpret, but energy use is thought to have dropped since its breakup. In 1992 the Russian Federation accounted for 10% of world energy use. Japan's share has been growing, reaching 5.4% in 1992. Energy use in the United States has leveled off, as has its share, now 25%. Per capita consumption has increased recently in the three entirely Asian countries, and apparently started to drop slightly in the United States, where per capita consumption is 13 times that in China.

Absolute amounts of coal consumed increased between 1970 and 1992 in all the countries examined here, but it has become relatively more important for the developing countries (Table IX-3). China and India's shares of world coal consumption more than doubled over the period, to 26% and 5% respectively. Japan and the United States still consume the same shares as in 1970, but that of the former Soviet Union dropped from 19% to 12%.

## PRIMARY ENERGY INTENSITY

While direct comparisons of the energy intensities (primary energy consumption per unit of gross domestic product) of different national economies are problematic, intensity trends can highlight the relative directions of structural and technological change.<sup>4</sup> Energy intensities in developed countries, represented by Japan and the United States, have declined fairly steadily since 1970, although very slowly since the mid-1980s (Table IX-4). Intensities in developing countries typically rise until a fairly advanced stage of industrialization is reached, but after the mid-1970s China became an exception to this trend. A combination of improvements in the physical energy intensity of production, growth in the contributions of less energy-intensive sectors to GDP, improvements in the quality and variety of products, changes in output pricing structures resulting from economic reform (i.e., hidden inflation), monetization of previously hidden economic activity, and other factors have led to the dramatic decline observed in energy intensity. Energy intensity in India is still rising, which is more typical of developing countries.

## END-USE CONSUMPTION

Sectoral data on energy end-use consumption from different countries are difficult to compare. Data collection conventions and completeness of coverage vary between countries, so that categories are not necessarily compatible. Data come from many different sources, including research papers that estimate sectoral consumption on the basis of surveys. The data and comparisons in this section, therefore, are not meant to be very accurate, but are intended to provide a rough picture of end-use structures.

## SECTORAL END USE

China stands out in that industry's share of end-use commercial energy consumption (67% in 1992) is larger by far than that in any other country, including the former Soviet Union (47%; Table IX-5). China's transportation sector also takes a smaller share than in any of the other countries, 9% as

opposed to 19% in the former Soviet Union, which has the next smallest transportation share, and 36% in the United States, which has the largest. At 20% the share of China's residential sector share is smaller than that of any other country but India (14%). Adding biomass to the picture changes it in one significant respect — the combined household and commercial sector energy use share rises to 35% for China, higher than in all other countries but India, where these sectors have a 53% share.

The economic structure of the various countries bears some similarities to their sectoral energy consumption patterns, but there are notable exceptions. In Japan, the United States, and the former Soviet Union the industrial sector accounts for between one-third and 45% of both energy use (including biomass) and GDP (Table IX-25). In China, industry's share of both energy use and GDP is significantly higher, 55% and 48% respectively. India seems to be an exception to the pattern, with industry accounting for one-third of energy consumption, but providing just over one-quarter of output. This is probably due to the fact that agriculture is much more important in India (with 31% of output) than in any of the other countries, and may also result partly from high energy intensities in industry (from which China also suffers).

China's industrial sector is similar to India's in the dominance of solid fuels (65% and 73% in 1992 respectively; Table IX-6). The developed countries rely much more heavily on oil and gas. The contribution of electricity to Japan's industrial end-use consumption is particularly high at 24%. Delivered heat is particularly important in the former Soviet Union, accounting for over one-third of industrial end use.

Coal makes significant contributions to the transportation sectors in China and India as well (18% and 17% respectively) since steam locomotives are still common, though they are being phased out in both countries (Table IX-7). Oil products dominate in all countries, though the former Soviet Union exhibits a high rate of natural gas use because of its extensive pipelines.

China's residential and commercial sector again reflects the importance of coal in China's energy system. Among the countries examined only the former Soviet Union obtains a similarly high share (over 20% in 1992) of sectoral end use from coal

(Table IX-8). Biomass energy is most important in India (86% of end use) and China (66%), while it accounts for only a small portion of residential end use in the only developed country for which the information was available (the United States, with 4%). In the former Soviet Union, delivered heat accounted for a large portion of end use in this sector (37%) just as in industry.

### **ENERGY SOURCE END USE**

Coal is more important in China's commercial energy end-use structure than in any other country (Table IX-9). Only India, with 43% of end use from direct use of coal in 1992, comes close to China's 62%. Oil products and natural gas together account for the largest shares in other countries. China is the only nation of the five in which electricity has a share of end use smaller than 10%.

For all the countries included in the comparison, end-use energy consumption data show that a large amount of primary energy is used in electricity generation. Electric utilities typically account for the largest share of coal use (up to 87% in the United States), and they take over 20% of all oil used in Japan and the former Soviet Union (Tables IX-10 and IX-11). Of the five countries, Japan converts the smallest share of its coal into electricity, 28% in 1992 compared to China's 35%, the next lowest. The former Soviet Union's residential and commercial sector takes a larger share (24%) than in any other country. China's is next with 14% of coal used in the residential and commercial sector; all other countries have shares under 2%. Japan has the highest portion of coal used in industry (72%, mainly used in steel making). China is next with 46% of coal used in industry, and the United States last with 12%. If coal inputs to utilities are allocated among sectors according to their shares of electricity consumption, then in all cases industry accounts for over half of coal use. The only exception is the United States; industry would account for 43% of coal use, compared to 54% in the residential and commercial sector.

China's petroleum end-use structure is most similar to that of Japan, with the industry and transportation sectors taking about one third each, and utilities and buildings (residential and commercial

sectors) taking the next largest shares in order (Table IX-11). The consumption structure in China also resembles that in the former Soviet Union, except in the latter slightly less is used in industry and correspondingly more by utilities. In the United States and India only very small portions of oil are used to generate electricity, and transportation accounts for about two-thirds and one-half respectively.

The dominance of the industrial sector in China relative to other countries is again evident in the pattern of electricity consumption; the sector uses 72% of all electricity (Table IX-12). The industrial sector also takes the single largest share of electricity consumption in the other four countries, ranging from 35% in the United States to 55% in the former Soviet Union. In Japan and the United States the residential and commercial shares are the next most significant, and are several times larger than in China. Agricultural use is most important in India, where the sector takes 28% of electricity use. In the former Soviet Union and China agriculture only accounts for 10% and 9% respectively.

### **ENERGY-INTENSIVE INDUSTRIAL PRODUCTS**

Statistics on production of various energy-intensive industrial products (including crude steel, cement, primary aluminum, ethylene, ammonia production, caustic soda, soda ash, sulfuric acid, and wood pulp) show that production of all of these in both China and India increased between 1979 and 1992 (Tables IX-13 to IX-21). China's share of worldwide production also clearly increased for each product, and the country now turns out more than a quarter of the world's cement and ammonia, and over one-tenth of its steel, caustic soda, soda ash, and sulfuric acid.

Production of some of these products in Japan, the United States, and the former Soviet Union has declined in absolute terms, and for most of the products shares of world production have stagnated or fallen. These statistics confirm in a general way the impression that the centers of production of energy-intensive products are increasingly moving from developed to developing countries.

## TRANSPORTATION STRUCTURE

China has the smallest total and per capita rates of travel among the countries compared, about one-half and one-third of the figures for India in the two categories respectively (Table IX-22). Another feature that distinguishes passenger travel in China is that rail and water transport are more important than in any of the other countries (although water transport only accounts for 3% of passenger traffic in China, it is not even 1% in the other countries). In China 45% of passenger-km traveled were by rail in 1992, and the former Soviet Union and Japan were next at about one-third. The share of road transportation in China is relatively small and the same as in the former Soviet Union, 46% compared to a range of 65% to 82% for the other countries.

In terms of freight traffic, water and rail are most important in China; 45% of freight turnover is by water, and 40% by rail (Table IX-23). Water transport is similarly important only in Japan, where 45% of freight turnover is by water, but 51% by road. Rail transport is almost as important in the United States as in China, but, as with Japan, most of the balance goes by road. The country with the largest share of freight carriage going by rail is the former Soviet Union, at 57%. India is next with 46%. Only the United States and the former Soviet Union move large shares of freight by pipeline. China's per capita freight traffic is again small (about half that in Japan and less than one-tenth that in the United States), though not as small as India's in this case.

## CARBON DIOXIDE EMISSIONS

The world's three largest emitters of anthropogenic carbon dioxide are the United States, the former Soviet Union, and China (Table IX-24). Respectively they contributed 22%, 16%, and 11% of total global emissions of 6.2 Gt carbon in 1991. The United States and the former Soviet Union have been the major contributors for the past 40 years, together accounting for over 40% until 1990. China's emissions, on the other hand, were similar to those from Japan until the mid-1970s (except for a spike in the late 1950s during the Great Leap Forward). Since 1970 China has been a larger contributor than Japan, with its share doubling in 15 years.

In terms of per capita emissions the picture is

somewhat different. Per capita emissions from the United States are by far the highest, fluctuating between 4.2 and 6.0 t carbon per person between 1950 and 1991. The former Soviet Union ranks next among the five countries, with per capita emission rising steadily to 3.9 t per person in 1988 before beginning to slide. Japan's per capita emissions leveled off in the early 1970s near 2.2 t per person, but have recently been edging upwards again. The fact that per capita emissions in China are 0.6 t, while China's total emissions are twice Japan's (since China has nearly ten times Japan's populations; Table IX-26) underscores the importance of population in analyzing greenhouse gas issues, and the difficulty of agreeing on a basis for putting in place international controls on greenhouse gas emissions.

<sup>1</sup> Per capita consumption is actually higher in one country, the United Arab Emirates, the value for which is nearly twice that of the United States. Per capita energy consumption in Canada is marginally lower than in the US.

<sup>2</sup> Unlike other Chapters in this volume, in this Chapter electricity is converted at its energy value, i.e., 3.6 MJ/kWh, rather than at the amount of energy needed to replace it in an average thermal power plant (11.8 MJ/kWh for China). The aggregate energy figures for China are therefore somewhat lower than in other chapters. We chose 1992 as the year for comparison in this chapter because it is the most recent year for which relatively complete sets of data exist in all categories for the various countries.

<sup>3</sup> The Russian Federation accounts for the majority of energy production, consumption, and economic activity in the former Soviet Union.

<sup>4</sup> Energy intensity indices for the various countries are based on deflated (constant price) GDP series.

**Table IX-1. Total Primary Energy Production by Energy Source for Selected Countries, 1989-1992**

I. Mtce									
Country	Year	Solid*	Liquids †	Natural Gas	Primary Electricity ‡	Total Production	Stock Changes	Imports	Exports
China §	1989	752.2	196.6	20.0	14.5	983.3	23.2	16.8	54.8
	1990	770.6	197.5	20.3	15.6	1,004.0	32.0	12.8	56.0
	1991	775.9	201.4	21.3	15.4	1,014.0	8.6	19.5	55.5
	1992	796.6	203.0	20.0	16.3	1,036.8	0.4	32.4	58.5
India	1989	168.8	49.0	10.8	10.3	237.8	1.1	40.4	0.3
	1990	172.2	48.8	13.2	9.4	245.4	1.2	44.6	0.6
	1991	193.0	45.7	15.0	11.1	264.7	7.1	50.6	0.6
	1992	202.8	40.7	15.6	11.0	270.1	4.2	58.2	0.6
Japan	1989	9.0	1.0	2.8	81.6	94.4	10.2	485.0	10.0
	1990	7.3	0.8	2.9	89.1	100.0	2.1	507.0	11.4
	1991	7.1	1.1	3.0	94.4	105.6	1.6	520.6	7.4
	1992	6.7	1.2	3.0	96.1	107.1	-0.5	529.9	9.5
USA	1989	734.8	623.7	642.5	247.5	2,248.6	-25.4	610.0	125.7
	1990	771.9	607.7	661.0	268.3	2,308.9	50.0	608.7	129.7
	1991	746.6	616.8	656.0	281.4	2,300.8	-1.7	597.2	143.4
	1992	746.7	602.9	661.2	280.6	2,291.5	-5.7	631.9	139.0
Russian Federation	1992	225.0	570.4	742.5	65.7	1,603.5	-	60.6	480.7
World	1989	3,340.3	4,465.2	2,495.2	1,004.6	11,305.4	42.8	3,467.1	3,390.3
	1990	3,260.9	4,561.1	2,562.2	1,049.4	11,433.6	143.7	3,555.8	3,533.5
	1991	3,167.0	4,530.3	2,611.3	1,086.5	11,395.0	33.2	3,572.2	3,521.7
	1992	3,199.8	4,540.2	2,655.0	1,089.7	11,486.7	40.5	4,098.7	3,999.7

\* Hard coal, lignite, peat, and oil shale.

† Crude oil and natural gas liquids.

‡ Conversion factors for hydro-, nuclear, and geothermal electricity are 0.123, 0.372, and 1.228 kgce/kwh respectively.

§ Because of the different conversion factors used for primary electricity, the energy production figures for China in this table are lower than those found elsewhere in this volume.

Source: United Nations, 1994.

**Table IX-1. Total Primary Energy Production by Energy Source for Selected Countries, 1989-1992 (continued)**

<b>2. Energy Source Shares of Country Energy Production</b>						
Country	Year	Solid *	Liquids †	Natural Gas	Primary Electricity ‡	Total
China §	1989	76.5%	20.0%	2.0%	1.5%	100.0%
	1990	76.8%	19.7%	2.0%	1.6%	100.0%
	1991	76.5%	19.9%	2.1%	1.5%	100.0%
	1992	76.8%	19.6%	1.9%	1.6%	100.0%
India	1989	71.0%	20.6%	4.5%	4.3%	100.0%
	1990	70.2%	19.9%	5.4%	3.8%	100.0%
	1991	72.9%	17.3%	5.7%	4.2%	100.0%
	1992	75.1%	15.1%	5.8%	4.1%	100.0%
Japan	1989	9.5%	1.1%	3.0%	86.4%	100.0%
	1990	7.3%	0.8%	2.9%	89.1%	100.0%
	1991	6.7%	1.0%	2.8%	89.4%	100.0%
	1992	6.3%	1.1%	2.8%	89.7%	100.0%
USA	1989	32.7%	27.7%	28.6%	11.0%	100.0%
	1990	33.4%	26.3%	28.6%	11.6%	100.0%
	1991	32.4%	26.8%	28.5%	12.2%	100.0%
	1992	32.6%	26.3%	28.9%	12.2%	100.0%
Russian Federation	1992	14.0%	35.6%	46.3%	4.1%	100.0%
World	1989	29.5%	39.5%	22.1%	8.9%	100.0%
	1990	28.5%	39.9%	22.4%	9.2%	100.0%
	1991	27.8%	39.8%	22.9%	9.5%	100.0%
	1992	27.9%	39.5%	23.1%	9.5%	100.0%

<b>3. Country Shares of World Energy Source Production</b>						
Country	Year	Solid*	Liquids†	Natural Gas	Primary Electricity ‡	Total
China§	1989	22.5%	4.4%	0.8%	1.4%	8.7%
	1990	23.6%	4.3%	0.8%	1.5%	8.8%
	1991	24.5%	4.4%	0.8%	1.4%	8.9%
	1992	24.9%	4.5%	0.8%	1.5%	9.0%
India	1989	5.1%	1.1%	0.4%	1.0%	2.1%
	1990	5.3%	1.1%	0.5%	0.9%	2.1%
	1991	6.1%	1.0%	0.6%	1.0%	2.3%
	1992	6.3%	0.9%	0.6%	1.0%	2.4%
Japan	1989	0.3%	0.0%	0.1%	8.1%	0.8%
	1990	0.2%	0.0%	0.1%	8.5%	0.9%
	1991	0.2%	0.0%	0.1%	8.7%	0.9%
	1992	0.2%	0.0%	0.1%	8.8%	0.9%
USA	1989	22.0%	14.0%	25.7%	24.6%	19.9%
	1990	23.7%	13.3%	25.8%	25.6%	20.2%
	1991	23.6%	13.6%	25.1%	25.9%	20.2%
	1992	23.3%	13.3%	24.9%	25.8%	19.9%
Russian Federation	1992	7.0%	12.6%	28.0%	6.0%	14.0%
World	1989	100.0%	100.0%	100.0%	100.0%	100.0%
	1990	100.0%	100.0%	100.0%	100.0%	100.0%
	1991	100.0%	100.0%	100.0%	100.0%	100.0%
	1992	100.0%	100.0%	100.0%	100.0%	100.0%

\* Hard coal, lignite, peat, and oil shale.

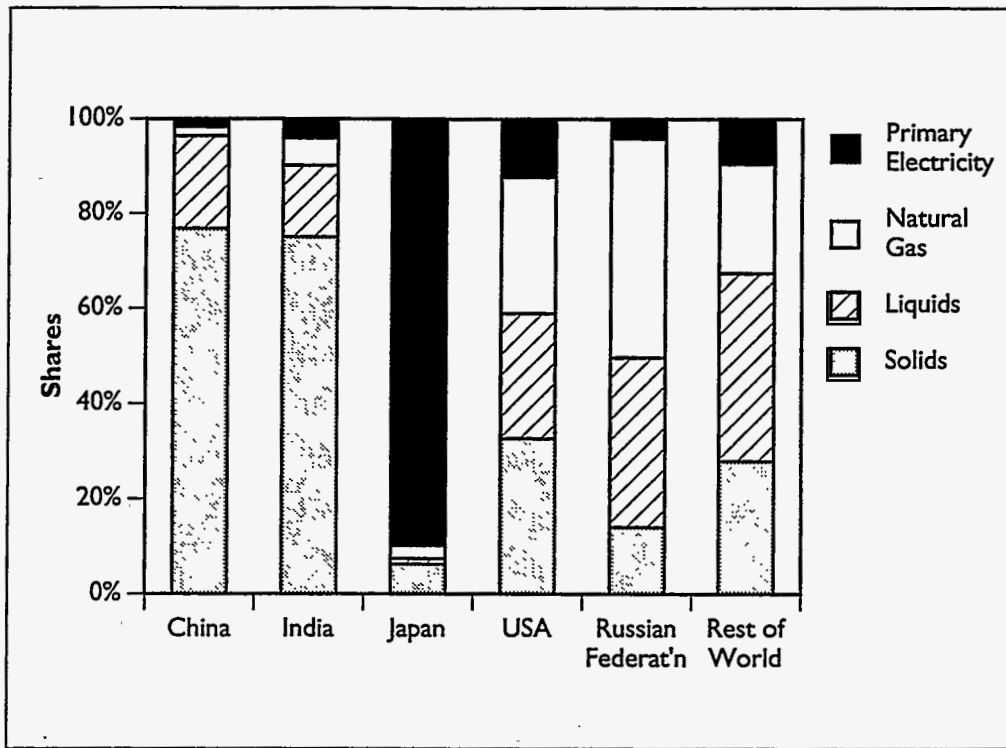
† Crude oil and natural gas liquids.

‡ Conversion factors for hydro-, nuclear, and geothermal electricity are 0.123, 0.372, and 1.228 kgce/kwh respectively.

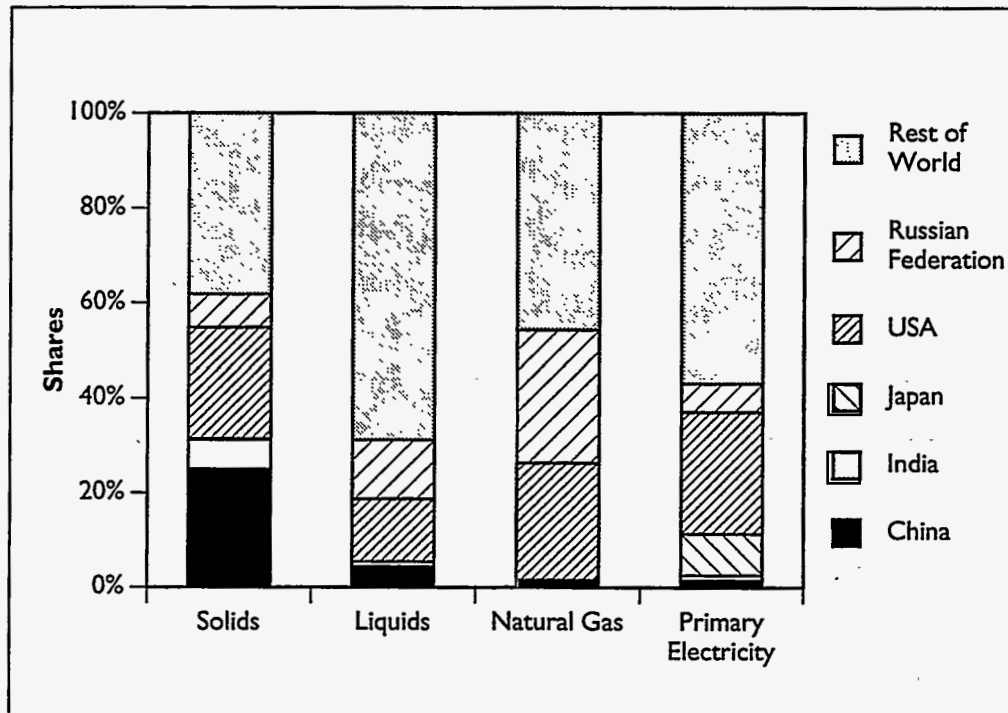
§ Because of the different conversion factors used for primary electricity, the energy production figures for China in this table are lower than those found elsewhere in this volume.

Source: United Nations, 1994.

**Figure IX-1. Shares of Primary Energy Production by Energy Source, Selected Countries, 1992**



**Figure IX-2. Shares of World Primary Energy Source Production by Country, 1992**



**Table IX-2. World Primary Commercial Energy Consumption  
by Region or Nation, 1989-1992**

I. Mtce							
Country	Year	Solid *	Liquid †	Natural Gas	Primary Electricity ‡	Total	per capita consumption (kgce/person)
China	1989	720.8	131.5	20.0	14.8	887.0	795
	1990	727.6	129.7	20.3	15.8	893.4	788
	1991	754.1	141.8	21.3	15.7	933.0	811
	1992	777.9	156.9	21.0	16.9	972.7	833
India	1989	172.9	64.9	10.8	9.5	258.2	311
	1990	179.4	65.3	13.2	11.3	269.2	318
	1991	193.5	69.9	15.0	11.2	289.6	336
	1992	205.6	75.4	15.6	11.3	307.8	350
Japan	1989	113.3	276.6	64.3	81.6	535.8	4,354
	1990	114.8	291.6	68.7	89.1	564.2	4,567
	1991	119.7	296.7	73.8	94.4	584.6	4,714
	1992	118.4	299.8	75.0	96.1	589.4	4,735
USA	1989	671.2	1,080.9	701.9	248.9	2,702.9	10,920
	1990	668.1	1,054.5	695.7	268.6	2,686.9	10,749
	1991	662.0	1,038.7	719.9	284.1	2,704.7	10,711
	1992	665.5	1,051.2	738.9	284.1	2,739.6	10,737
Russian Federation	1992	226.2	280.8	525.5	63.7	1,096.2	7,357
World	1989	3,361.2	3,998.0	2,491.7	1,003.9	10,854.9	2,044
	1990	3,238.4	4,000.4	2,538.9	1,048.8	10,826.5	2,044
	1991	3,184.3	4,039.9	2,613.6	1,086.5	10,924.2	2,022
	1992	3,212.6	3,982.1	2,664.3	1,088.6	10,947.7	1,993

\* Hard coal, lignite, peat, and oil shale.

† Crude oil and natural gas liquids.

‡ Conversion factor for electricity is 0.123 kgce/kwh.

§ Because of the different conversion factor used for primary electricity, the energy consumption figures for China in this table are lower than those found elsewhere in this volume.

Source: United Nations, 1994.



**Table IX-2. World Primary Commercial Energy Consumption  
by Region or Nation, 1989-1992 (continued)**

<b>2. Energy Source Shares of Country Primary Consumption</b>						
<b>Country</b>	<b>Year</b>	<b>Solid *</b>	<b>Liquids †</b>	<b>Natural Gas</b>	<b>Primary Electricity ‡</b>	<b>Total</b>
China	1989	81.3%	14.8%	2.3%	1.7%	100.0%
	1990	81.4%	14.5%	2.3%	1.8%	100.0%
	1991	80.8%	15.2%	2.3%	1.7%	100.0%
	1992	80.0%	16.1%	2.2%	1.7%	100.0%
India	1989	67.0%	25.1%	4.2%	3.7%	100.0%
	1990	66.6%	24.3%	4.9%	4.2%	100.0%
	1991	66.8%	24.1%	5.2%	3.9%	100.0%
	1992	66.8%	24.5%	5.1%	3.7%	100.0%
Japan	1989	21.1%	51.6%	12.0%	15.2%	100.0%
	1990	20.3%	51.7%	12.2%	15.8%	100.0%
	1991	20.5%	50.8%	12.6%	16.1%	100.0%
	1992	20.1%	50.9%	12.7%	16.3%	100.0%
USA	1989	24.8%	40.0%	26.0%	9.2%	100.0%
	1990	24.9%	39.2%	25.9%	10.0%	100.0%
	1991	24.5%	38.4%	26.6%	10.5%	100.0%
	1992	24.3%	38.4%	27.0%	10.4%	100.0%
Russian Federation	1992	20.6%	25.6%	47.9%	5.8%	100.0%
World	1989	31.0%	36.8%	23.0%	9.2%	100.0%
	1990	29.9%	37.0%	23.5%	9.7%	100.0%
	1991	29.1%	37.0%	23.9%	9.9%	100.0%
	1992	29.3%	36.4%	24.3%	9.9%	100.0%

<b>3. Country Shares of World Primary Consumption</b>						
<b>Country</b>	<b>Year</b>	<b>Solid *</b>	<b>Liquids †</b>	<b>Natural Gas</b>	<b>Primary Electricity ‡</b>	<b>Total</b>
China	1989	21.4%	3.3%	0.8%	1.5%	8.2%
	1990	22.5%	3.2%	0.8%	1.5%	8.3%
	1991	23.7%	3.5%	0.8%	1.4%	8.5%
	1992	24.2%	3.9%	0.8%	1.6%	8.9%
India	1989	5.1%	1.6%	0.4%	0.9%	2.4%
	1990	5.5%	1.6%	0.5%	1.1%	2.5%
	1991	6.1%	1.7%	0.6%	1.0%	2.7%
	1992	6.4%	1.9%	0.6%	1.0%	2.8%
Japan	1989	3.4%	6.9%	2.6%	8.1%	4.9%
	1990	3.5%	7.3%	2.7%	8.5%	5.2%
	1991	3.8%	7.3%	2.8%	8.7%	5.4%
	1992	3.7%	7.5%	2.8%	8.8%	5.4%
USA	1989	20.0%	27.0%	28.2%	24.8%	24.9%
	1990	20.6%	26.4%	27.4%	25.6%	24.8%
	1991	20.8%	25.7%	27.5%	26.1%	24.8%
	1992	20.7%	26.4%	27.7%	26.1%	25.0%
Russian Federation	1992	6.7%	7.0%	21.1%	6.3%	10.1%
World	1989	100.0%	100.0%	100.0%	100.0%	100.0%
	1990	100.0%	100.0%	100.0%	100.0%	100.0%
	1991	100.0%	100.0%	100.0%	100.0%	100.0%
	1992	100.0%	100.0%	100.0%	100.0%	100.0%

\* Hard coal, lignite, peat, and oil shale.

† Crude oil and natural gas liquids.

‡ Conversion factor for electricity is 0.123 kgce/kwh.

§ Because of the different conversion factor used for primary electricity, the energy consumption figures for China in this table are lower than those found elsewhere in this volume.

Source: United Nations, 1994.

Figure IX-3. Shares of Primary Commercial Energy Consumption by Energy Source, 1992

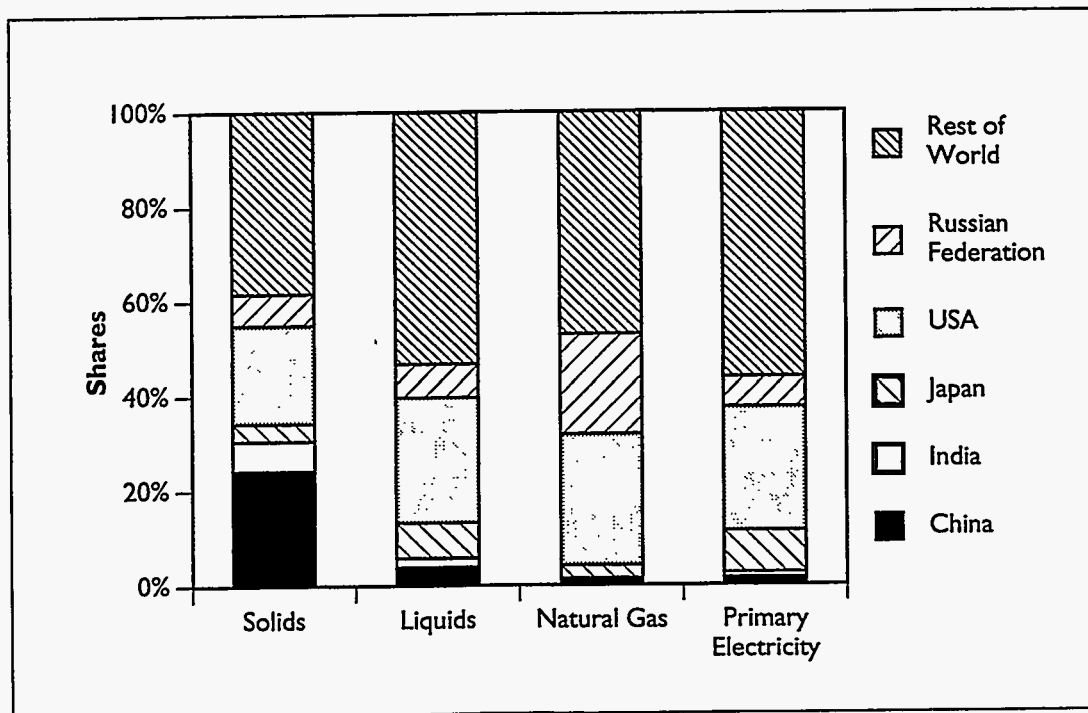
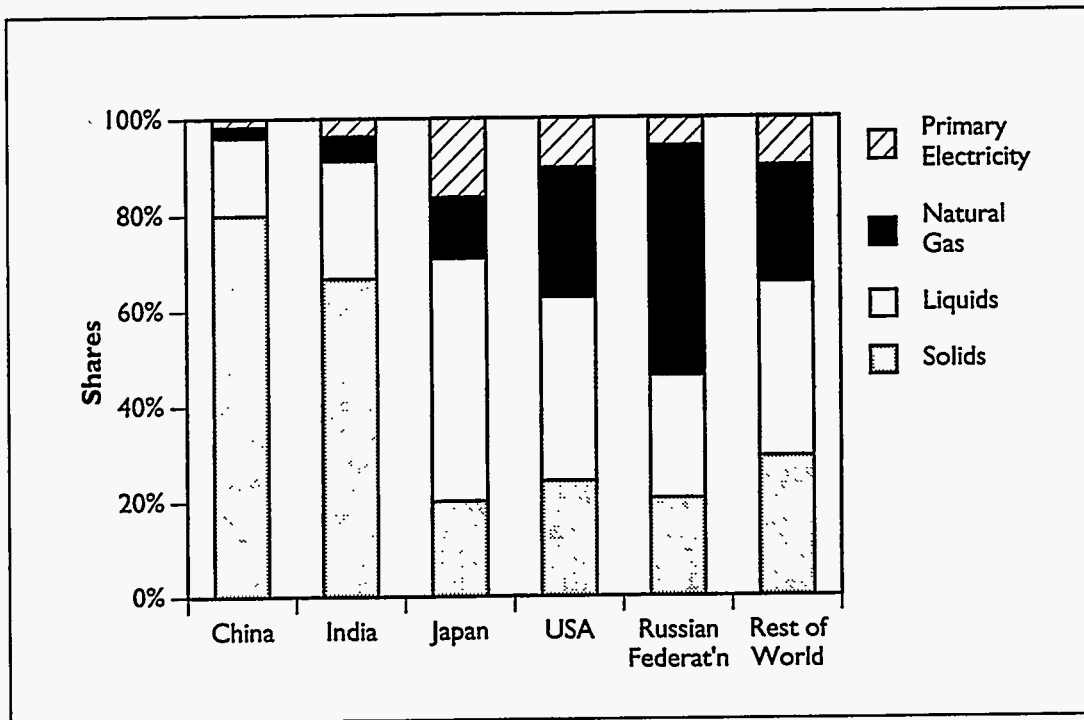
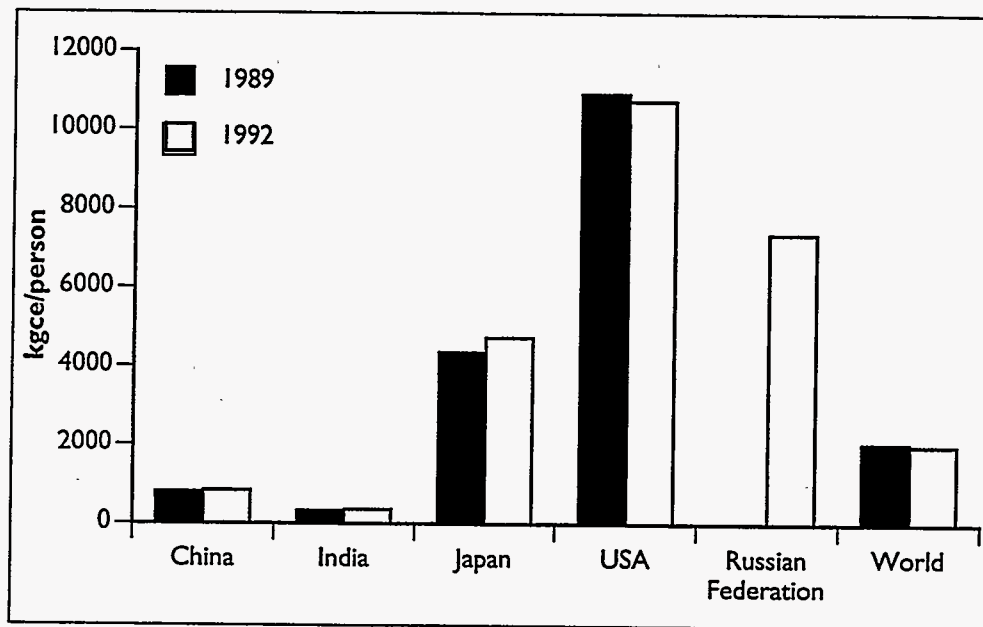


Figure IX-4. Per Capita Primary Commercial Energy Consumption



**Table IX-3. World Primary Coal Consumption, Selected Years**

<b>1. Mtce</b>				
<b>Country</b>	<b>1970</b>	<b>1985</b>	<b>1990</b>	<b>1992</b>
China	237	583	752	826
India*	53	109	146	160
Japan	86	105	109	111
USA	471	629	688	679
FSU	420	461	440	379
Rest of World	887	1,073	1,065	993
Total†	2,154	2,961	3,199	3,150

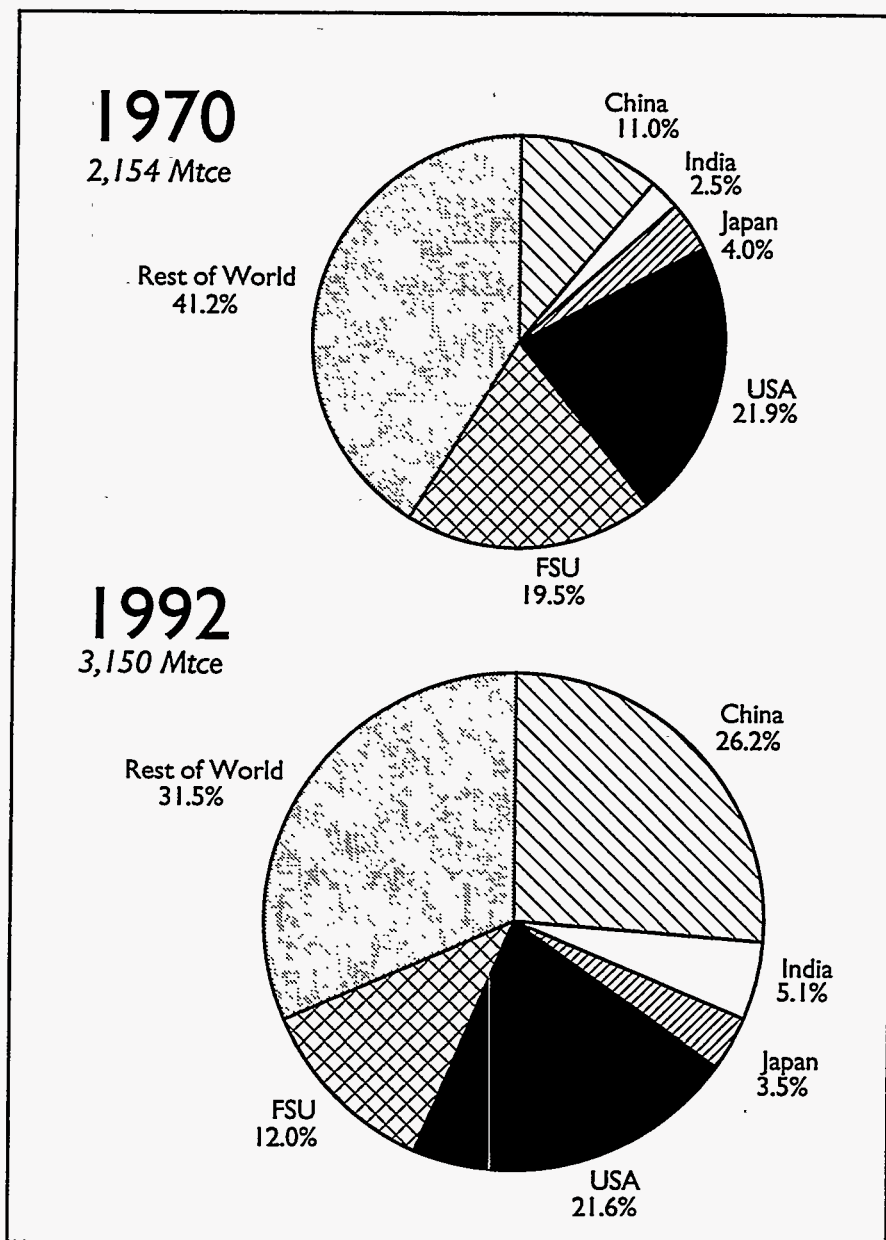
<b>2. Shares</b>				
<b>Country</b>	<b>1970</b>	<b>1985</b>	<b>1990</b>	<b>1992</b>
China	11%	20%	24%	26%
India*	2%	4%	5%	5%
Japan	4%	4%	3%	4%
USA	22%	21%	21%	22%
FSU	19%	16%	14%	12%
Rest of World	41%	36%	33%	32%
Total†	100%	100%	100%	100%

\* The figure in the 1992 column represents actual 1991 consumption.

† World total is adjusted to reflect difference between British Petroleum and State Statistical Bureau figures for China's primary coal consumption.

Source: China — other tables in this volume; Others — British Petroleum, 1994.

Figure IX-5. Coal Consumption Shares, Selected Countries



**Table IX-4. Intensity Trends:  
Primary Commercial Energy Consumption per Unit GDP, 1970-1993 \***

I. China					
Year	Primary Energy Consumption (million tce)	GDP (billion 1980 yuan)	Intensity (tce per thousand 1980 yuan)	Intensity Indices	
				1970 = 1	1977 = 1
1970	291	262	1.11	1.00	0.74
1971	344	280	1.23	1.10	0.82
1972	371	289	1.29	1.16	0.86
1973	389	313	1.24	1.12	0.83
1974	399	316	1.26	1.14	0.85
1975	453	342	1.32	1.19	0.89
1976	476	324	1.47	1.33	0.99
1977	522	349	1.49	1.35	1.00
1978	570	393	1.45	1.31	0.97
1979	585	420	1.39	1.25	0.93
1980	603	447	1.35	1.21	0.90
1981	594	469	1.27	1.14	0.85
1982	621	508	1.22	1.10	0.82
1983	662	558	1.19	1.07	0.79
1984	711	640	1.11	1.00	0.74
1985	768	722	1.06	0.96	0.71
1986	810	783	1.03	0.93	0.69
1987	869	870	1.00	0.90	0.67
1988	931	968	0.96	0.87	0.64
1989	971	1,010	0.96	0.87	0.64
1990	986	1,050	0.94	0.85	0.63
1991	1,036	1,134	0.91	0.82	0.61
1992	1,088	1,288	0.85	0.76	0.57
1993	1,113	1,460	0.76	0.69	0.51

\* No comparable series of data for the Former Soviet Union was available, which is therefore not included.

Source: China — China Statistical Yearbook, various years; China Energy Annual Review, 1994; India — LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1995; USA — Energy Information Administration, 1994; US Department of Commerce, 1994

**Table IX-4. Intensity Trends:  
Primary Commercial Energy Consumption per Unit GDP, 1970-1993 \* (continued)**

2. India					
Year	Primary Energy Consumption (million tce)	GDP (billion 1980 rupees)	Intensity (tce per thousand 1980 rupees)	Intensity Indices	
				1970 = 1	1977 = 1
1970	92	904	0.101	1.00	0.88
1971	96	913	0.105	1.03	0.91
1972	99	911	0.109	1.07	0.95
1973	104	952	0.109	1.08	0.95
1974	111	963	0.115	1.13	1.00
1975	118	1,050	0.113	1.11	0.98
1976	127	1,063	0.119	1.18	1.04
1977	131	1,142	0.115	1.13	1.00
1978	137	1,205	0.114	1.12	0.99
1979	142	1,142	0.124	1.22	1.08
1980	148	1,222	0.121	1.19	1.05
1981	163	1,298	0.125	1.24	1.09
1982	169	1,338	0.126	1.24	1.10
1983	180	1,448	0.124	1.23	1.08
1984	189	1,505	0.126	1.24	1.09
1985	206	1,582	0.130	1.28	1.13
1986	219	1,644	0.133	1.31	1.16
1987	232	1,704	0.136	1.34	1.19
1988	257	1,874	0.137	1.35	1.19
1989	272	1,986	0.137	1.35	1.19
1990	284	2,090	0.136	1.34	1.18
1991	296	2,119	0.140	1.38	1.22
1992	-	-	-	-	-
1993	-	-	-	-	-

\* No comparable series of data for the Former Soviet Union was available, which is therefore not included.

Source: China — China Statistical Yearbook, various years; China Energy Annual Review, 1994; India — LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1995; USA — Energy Information Administration, 1994; US Department of Commerce, 1994

**Table IX-4. Intensity Trends:  
Primary Commercial Energy Consumption per Unit GDP, 1970-1993 \* (continued)**

<b>3. Japan</b>					
<b>Year</b>	<b>Primary Energy Consumption (million tce)</b>	<b>GDP (billion 1985 yen)</b>	<b>Intensity (tce per million 1985 yen)</b>	<b>Intensity Indices</b>	
				<b>1970 = 1</b>	<b>1977 = 1</b>
1970	424	173,500	2.44	1.00	1.10
1971	431	182,196	2.36	0.97	1.07
1972	463	198,123	2.34	0.96	1.05
1973	512	207,678	2.47	1.01	1.11
1974	506	207,884	2.43	1.00	1.10
1975	489	215,810	2.27	0.93	1.02
1976	518	224,499	2.31	0.94	1.04
1977	521	234,975	2.22	0.91	1.00
1978	533	246,866	2.16	0.88	0.97
1979	552	260,390	2.12	0.87	0.96
1980	543	268,945	2.02	0.83	0.91
1981	526	277,743	1.89	0.77	0.85
1982	515	287,103	1.79	0.73	0.81
1983	538	295,339	1.82	0.75	0.82
1984	551	308,538	1.79	0.73	0.81
1985	562	322,868	1.74	0.71	0.78
1986	557	332,044	1.68	0.69	0.76
1987	585	347,389	1.68	0.69	0.76
1988	617	368,415	1.67	0.69	0.76
1989	639	384,251	1.66	0.68	0.75
1990	666	404,667	1.65	0.67	0.74
1991	685	418,991	1.63	0.67	0.74
1992	691	420,824	1.64	0.67	0.74
1993	693	420,866	1.65	0.67	0.74

• No comparable series of data for the Former Soviet Union was available, which is therefore not included.

Source: China — China Statistical Yearbook, various years; China Energy Annual Review, 1994; India — LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1995; USA — Energy Information Administration, 1994; US Department of Commerce, 1994



**Table IX-4. Intensity Trends:  
Primary Commercial Energy Consumption per Unit GDP, 1970-1993 \* (continued)**

<b>4. United States</b>					
<b>Year</b>	<b>Primary Energy Consumption (million tce)</b>	<b>GDP (billion 1980 dollars)</b>	<b>Intensity (tce per thousand 1980 dollars)</b>	<b>Intensity Indices</b>	
				<b>1970 = 1</b>	<b>1977 = 1</b>
1970	2393	1,865	1.28	1.00	1.07
1971	2445	1,911	1.28	1.00	1.07
1972	2567	2,011	1.28	0.99	1.06
1973	2676	2,114	1.27	0.99	1.06
1974	2613	2,102	1.24	0.97	1.04
1975	2541	2,082	1.22	0.95	1.02
1976	2678	2,184	1.23	0.96	1.02
1977	2748	2,292	1.20	0.93	1.00
1978	2813	2,423	1.16	0.90	0.97
1979	2842	2,483	1.14	0.89	0.95
1980	2736	2,477	1.10	0.86	0.92
1981	2665	2,513	1.06	0.83	0.88
1982	2552	2,454	1.04	0.81	0.87
1983	2540	2,545	1.00	0.78	0.83
1984	2671	2,718	0.98	0.77	0.82
1985	2665	2,814	0.95	0.74	0.79
1986	2676	2,903	0.92	0.72	0.77
1987	2770	3,022	0.92	0.71	0.76
1988	2890	3,158	0.91	0.71	0.76
1989	2930	3,238	0.90	0.71	0.75
1990	2927	3,278	0.89	0.70	0.74
1991	2922	3,254	0.90	0.70	0.75
1992	2959	3,337	0.89	0.69	0.74
1993	3024	3,437	0.88	0.69	0.73

\* No comparable series of data for the Former Soviet Union was available, which is therefore not included.

Source: China — China Statistical Yearbook, various years; China Energy Annual Review, 1994; India —LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1995; USA — Energy Information Administration, 1994; US Department of Commerce, 1994

Figure IX-6. Energy Intensity Trends,  
Selected Countries

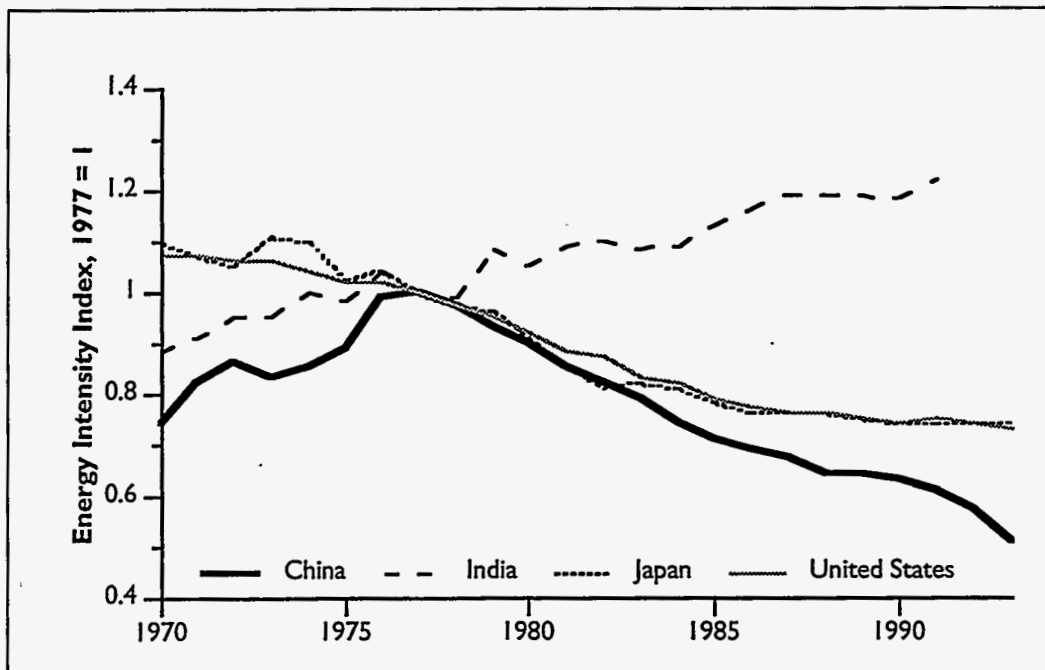
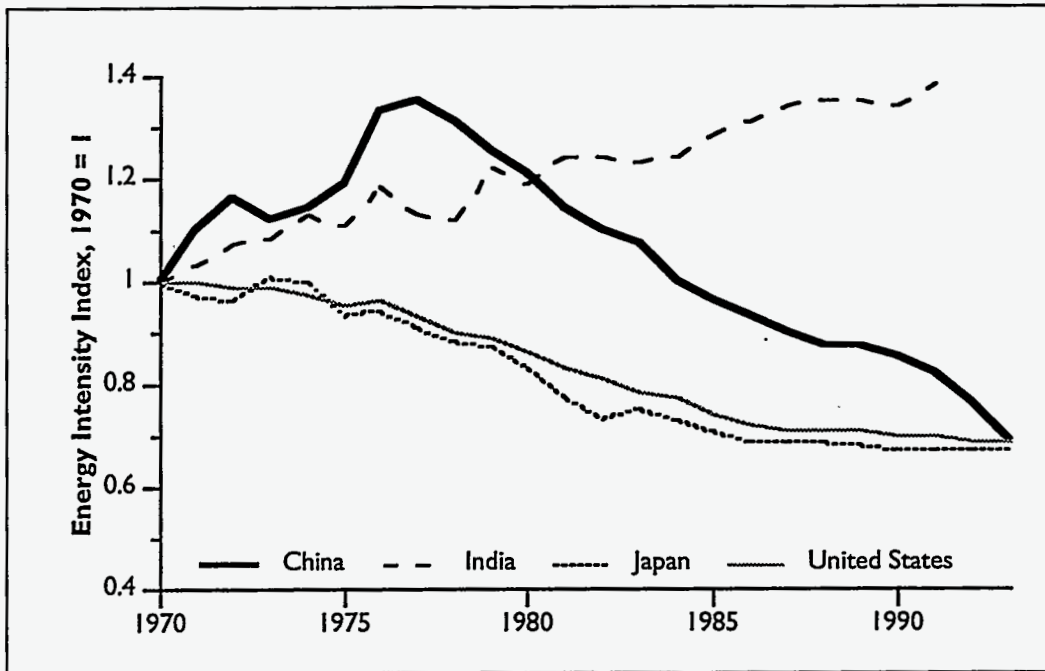


Table IX-5. Total Energy Consumption by Sector for Selected Countries, 1992

1. Commercial Energy Only, Mtce						
Country	Industry	Agriculture	Transportation	Residential & Commercial	Total	
China	545	30	75	165	815	
India	96	8	43	25	172	
Japan	210	17	114	123	464	
USA	844	-	809	580	2,233	
FSU *	648	80	269	416	1,414	

2. Commercial Energy Only, Shares						
Country	Industry	Agriculture	Transportation	Residential & Commercial	Total	
China	67%	4%	9%	20%	100%	
India	56%	5%	25%	14%	100%	
Japan	45%	4%	24%	27%	100%	
USA	38%	-	36%	26%	100%	
FSU *	46%	6%	19%	29%	100%	

3. Commercial and Biomass Energy, Mtce †						
Country	Industry	Agriculture	Transportation	Residential & Commercial	Total	
China	664	45	79	422	1,210	
India	109	9	45	180	342	
Japan	210	17	114	123	464	
USA	844	-	809	684	2,338	
FSU *	608	81	269	348	1,305	

4. Commercial and Biomass Energy, Shares †						
Country	Industry	Agriculture	Transportation	Residential & Commercial	Total	
China	54.9%	3.7%	6.5%	34.9%	100.0%	
India	31.7%	2.5%	13.1%	52.7%	100.0%	
Japan	45.3%	3.7%	24.5%	26.6%	100.0%	
USA	36.1%	-	34.6%	29.3%	100.0%	
FSU *	46.6%	6.2%	20.6%	26.6%	100.0%	

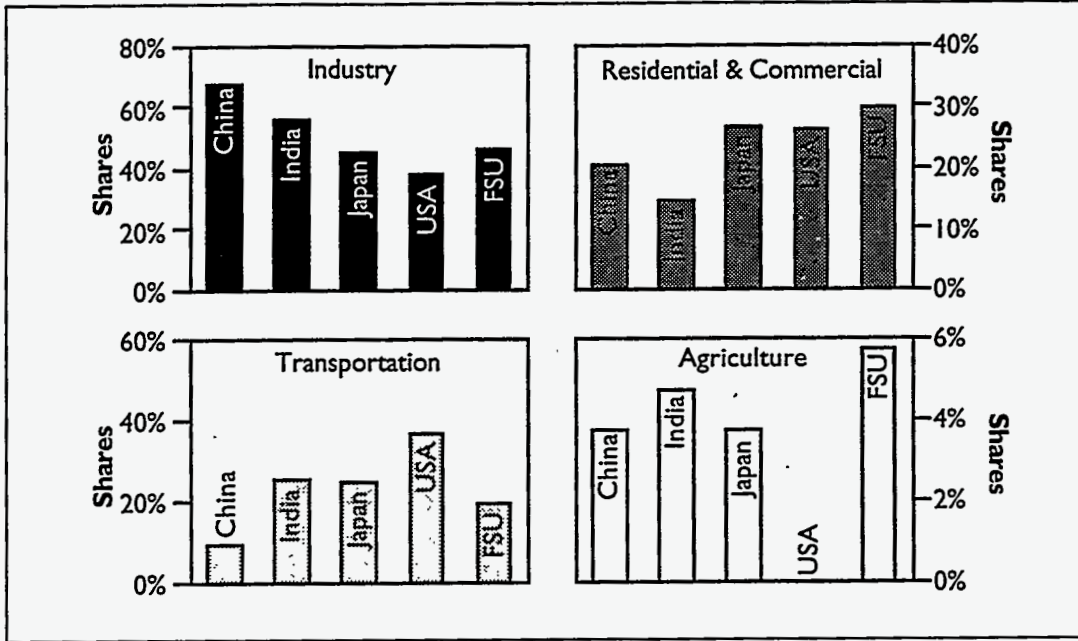
N.B. Electricity is converted at its end-use value (1 kWh = 0.123 kgce).

\* Residential sector use includes municipal sector use for the Former Soviet Union.

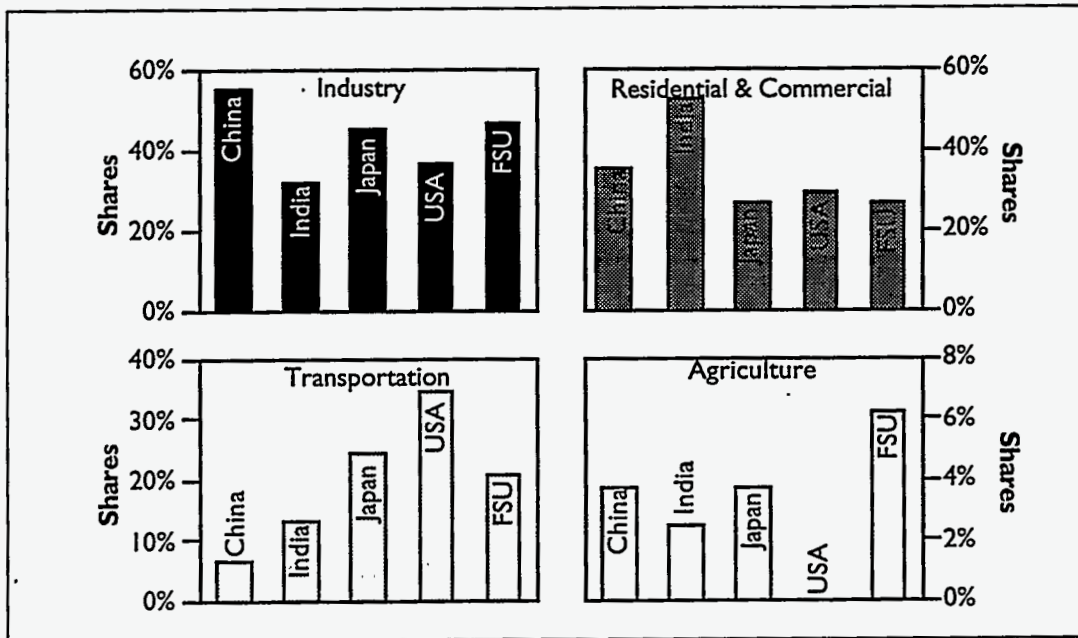
† Biomass figures for India and the USA are for 1988. No biomass data available for Japan and the FSU.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995.

**Figure IX-7. Sectoral Shares of Energy End Use, Commercial Energy Only, 1992**



**Figure IX-8. Sectoral Shares of Energy End Use, Commercial and Biomass Energy \***



\* Biomass consumption figures for India and the USA are for 1988.

**Table IX-6. Industrial \* Energy Consumption by Source, 1992**

<b>1. Mtce</b>						
<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>	<b>Electricity</b>	<b>Heat ¶</b>	<b>Total</b>
China	354.8	75.8	18.0	52.0	44.5	545.0
India	71.0	14.4	0.9	10.8	-	97.0
Japan	55.1	96.6	8.1	50.7	0.4	210.9
USA	90.4	311.2	323.1	119.6	-	844.3
FSU†	122.0	83.4	114.0	101.0	228.1	648.5

<b>2. Shares</b>						
<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>	<b>Electricity</b>	<b>Heat ¶</b>	<b>Total</b>
China	65.1%	13.9%	3.3%	9.5%	8.2%	100.0%
India	73.1%	14.9%	0.9%	11.1%	-	100.0%
Japan	26.1%	45.8%	3.9%	24.0%	<0.1%	100.0%
USA	10.7%	36.9%	38.3%	14.2%	-	100.0%
FSU†	18.8%	12.9%	17.6%	15.6%	35.2%	100.0%

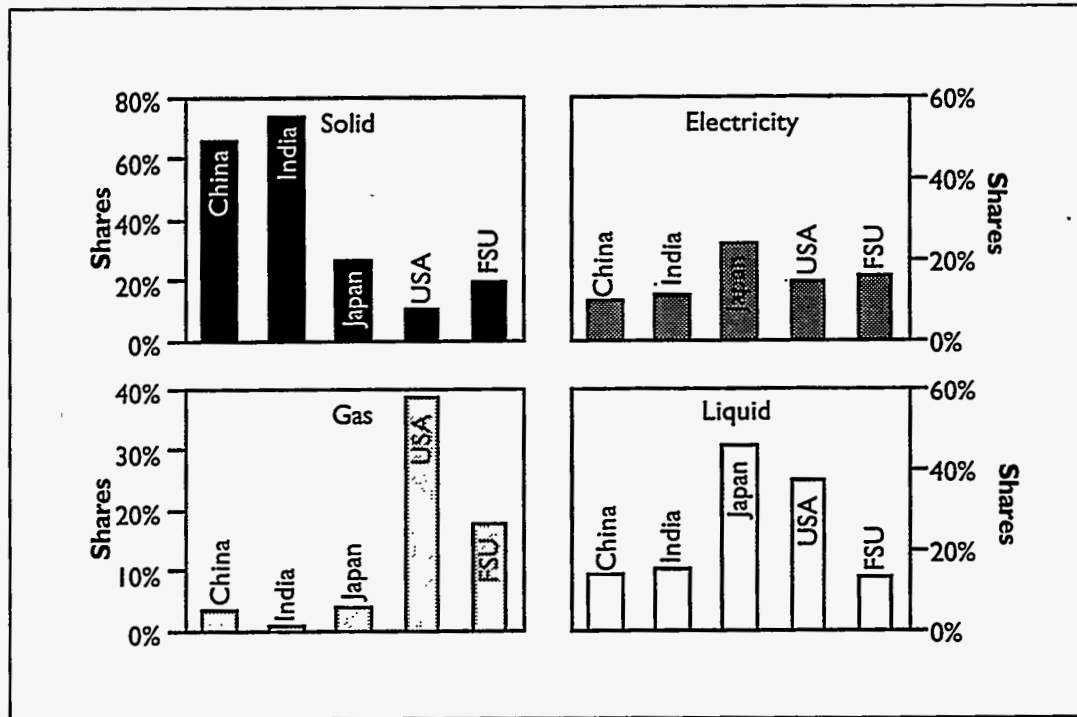
\* Industrial sector includes construction for the China and the FSU.

† 1990 data.

¶ Heat includes the energy value in end use of process steam and other heat sources. Figure for China includes about 12 Mtce of coal gas and other miscellaneous fuels.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL 1995.

**Figure IX-9. Shares of Total Industrial Sector  
Energy End Use by Energy Source, 1992**



**Table IX-7. Transportation Energy Consumption by Source, 1992**

**I. Mtce**

<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas *</b>	<b>Electricity</b>	<b>Total</b>
China	13.4	60.2	0.2	1.7	75.4
India	2.9	39.2	-	0.6	42.7
Japan	-	111.0	-	2.5	113.5
USA	-	785.6	21.3	1.4	809.0
FSU†	7.3	170.9	73.9	16.5	268.6

**2. Shares**

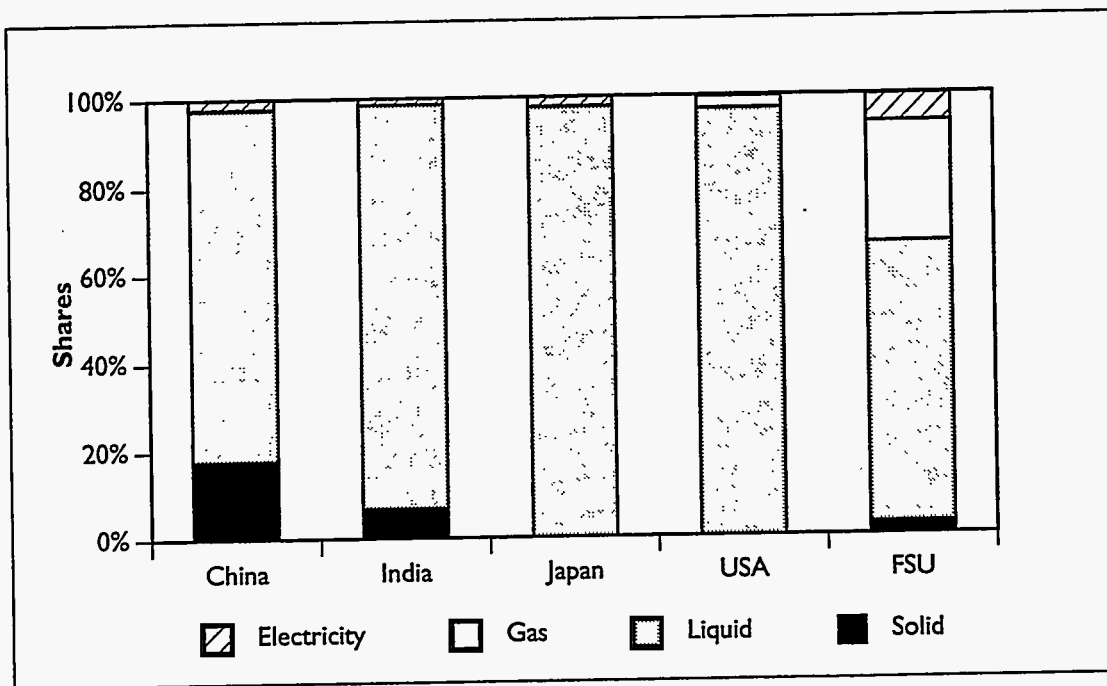
<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas *</b>	<b>Electricity</b>	<b>Total</b>
China	17.8%	79.8%	0.2%	2.2%	100.0%
India	6.8%	91.8%	-	1.4%	100.0%
Japan	-	97.8%	-	2.2%	100.0%
USA	-	97.1%	2.6%	0.2%	100.0%
FSU†	2.7%	63.6%	27.5%	6.1%	100.0%

\* Mainly pipeline use.

† 1990 data. Coal figure includes heat consumption

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995

**Figure IX-10. Energy Use in Transportation,  
Selected Countries, 1992**





**Table IX-8. Residential and Commercial End Use Energy Consumption by Source, 1992**

<b>1. Mtce</b>							
<b>Country</b>	<b>Coal</b>	<b>Liquid</b>	<b>Gas</b>	<b>Heat ¶</b>	<b>Electricity</b>	<b>Biomass</b>	<b>Total</b>
China	105.6	5.4	6.0	3.9	7.9	245.8	374.5
India*	2.2	17.2	0.1	-	7.0	161.0	187.6
Japan	1.0	54.9	17.6	-	49.5	-	123.1
USA	5.0	76.7	278.4	-	219.7	23.2	603.2
FSU†	93.7	44.0	78.4	154.6	45.8	-	416.4

<b>2. Shares</b>							
<b>Country</b>	<b>Coal</b>	<b>Liquid</b>	<b>Gas</b>	<b>Heat ¶</b>	<b>Electricity</b>	<b>Biomass</b>	<b>Total</b>
China	28%	1%	2%	1%	2%	66%	100%
India*	1.2%	9%	0.1%	-	4%	86%	100%
Japan	1%	45%	14%	-	40%	-	100%
USA	1%	13%	46%	-	36%	4%	100%
FSU†	22%	11%	19%	37%	11%	-	100%

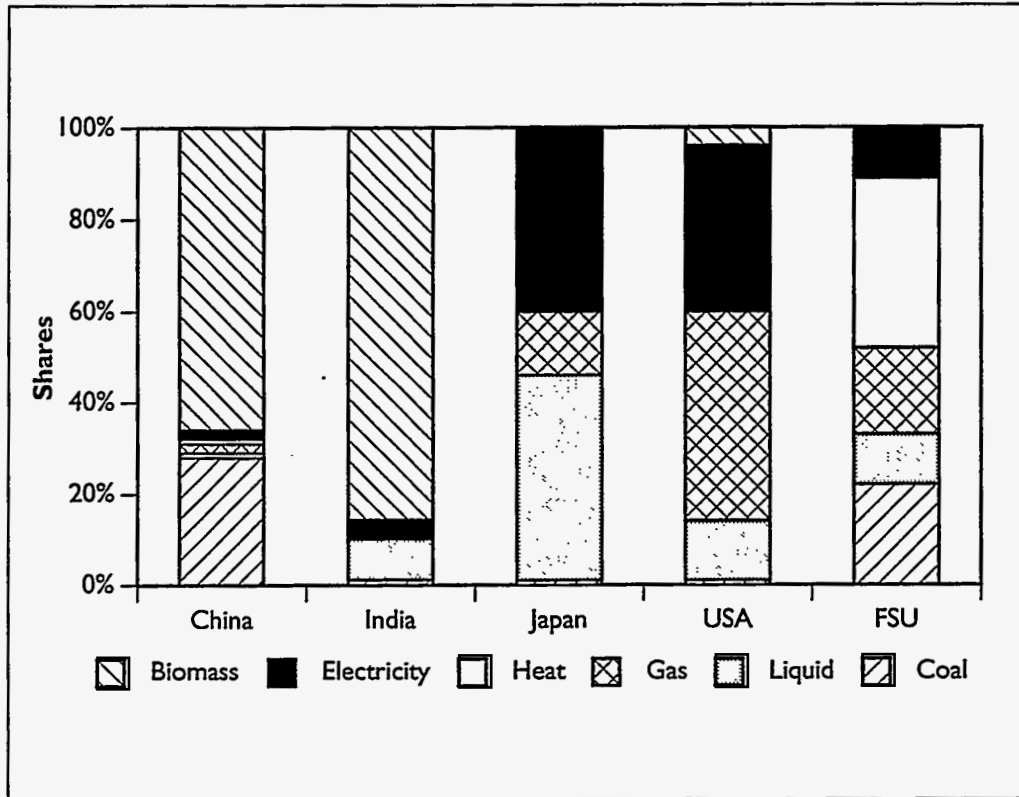
\* India's coal consumption figure is for 1989.

† 1990 data.

¶ Heat includes the energy value in end use of process steam and other heat sources.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995.

**Figure IX-11. Residential and Commercial Energy Use  
Selected Countries, 1992**



**Table IX-9. End Use Energy Consumption by Source, 1992**

<b>I. Mtce</b>						
<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>	<b>Delivered Electricity</b>	<b>Heat ¶</b>	<b>Total</b>
China	508	158	34	73	52	825
India	74	71	1	25	-	171
Japan	56	279	26	103	0	464
USA*	95	1,174	602	339	-	2,233
FSU †	219	341	269	182	403	1,414

<b>2. Shares</b>						
<b>Country</b>	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>	<b>Delivered Electricity</b>	<b>Heat ¶</b>	<b>Total</b>
China	61.6%	19.2%	4.1%	8.8%	6.3%	100.0%
India	43.1%	41.4%	0.7%	14.9%	-	100.0%
Japan	12.1%	60.1%	5.6%	22.2%	<0.1%	100.0%
USA	4.3%	52.5%	26.9%	15.2%	-	100.0%
FSU †	15.5%	24.1%	19.0%	12.9%	28.5%	100.0%

\* Total is slightly larger than sum of categories because of a small amount of unallocated energy use in the transport sector.

† 1990 data.

¶ Heat includes the energy value in end use of process and other steam, mainly from cogenerators and district heating providers. Figure for China includes about 30 Mtce of coal gas and other fuels.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995; British Petroleum, 1994.

**Figure IX-12. Shares of End Use Energy Consumption by Energy Source, Selected Countries, 1992**

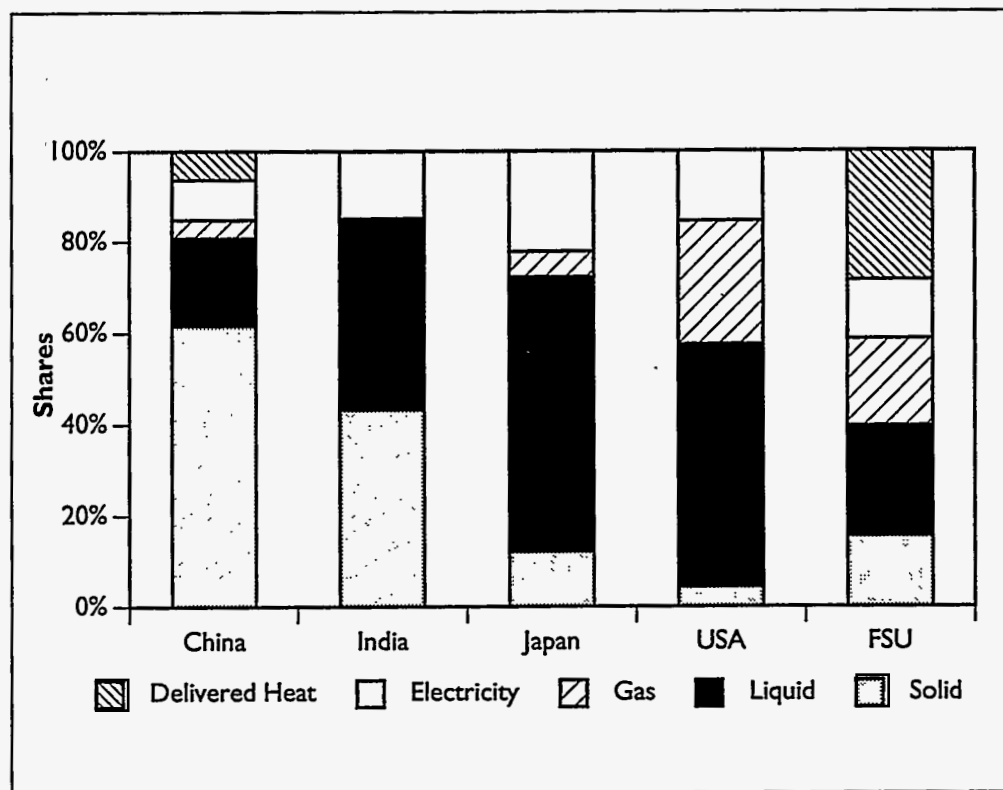


Table IX-10. Solid Fuel Consumption by Sector, 1992

**1. Mtce**

Country	Utilities	Industry ¶	Residential & Commercial	Other §	Total
China	272.5	358.3	112.4	40.2	783.4
India *	88.9	71.0	2.2	3.2	165.2
Japan	32.4	84.8	0.1	-	117.2
USA	545.9	74.5	4.3	-	624.8
FSU †	156.3	122.0	88.5	8.7	375.6

**2. Shares**

Country	Utilities	Industry ¶	Residential & Commercial	Other §	Total
China	34.8%	45.7%	14.3%	5.1%	100.0%
India*	53.8%	42.9%	1.3%	1.9%	100.0%
Japan	27.6%	72.3%	0.0%	-	100.0%
USA	87.4%	11.9%	0.7%	-	100.0%
FSU †	41.6%	32.5%	23.6%	2.3%	100.0%

**3. Utility coal consumption allocated to end-use sectors ¥, Mtce**

Country	Industry ¶	Commercial	Residential & Other §	Total
China	553.5	159.4	70.6	783.4
India*	108.5	26.6	30.1	165.2
Japan	100.4	15.9	1.0	117.2
USA	266.7	339.6	18.4	624.8
FSU †	208.7	127.8	39.1	375.6

**4. Utility coal consumption allocated to end-use sectors, ¥ Shares**

Country	Industry ¶	Commercial	Residential & Other §	Total
China	70.6%	20.3%	9.0%	100.0%
India*	65.7%	16.1%	18.2%	100.0%
Japan	85.6%	13.6%	0.8%	100.0%
USA	42.7%	54.4%	2.9%	100.0%
FSU †	55.6%	34.0%	10.4%	100.0%

\* India's residential coal use is for 1989.

† 1990 data.

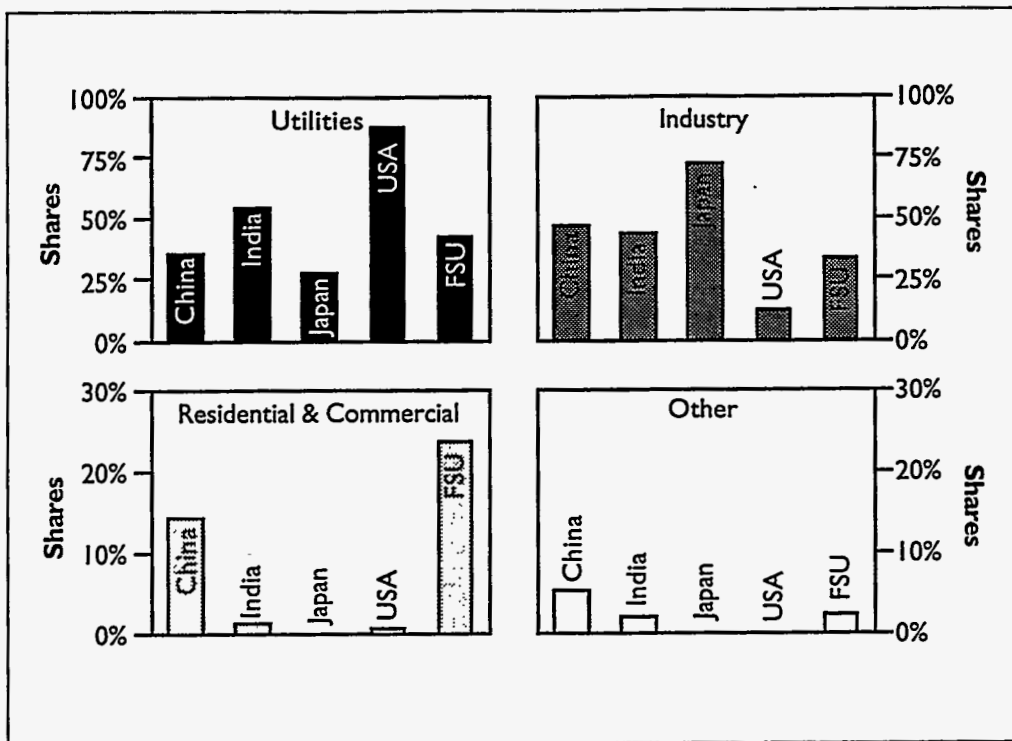
¶ Industrial coal includes coal used for making coke, or coke. China's industrial coal use includes feedstock. All washing losses excluded.

§ "Other" includes transportation and agricultural use.

¥ Utility sector coal use is allocated among end use sectors according to electricity end use shares.

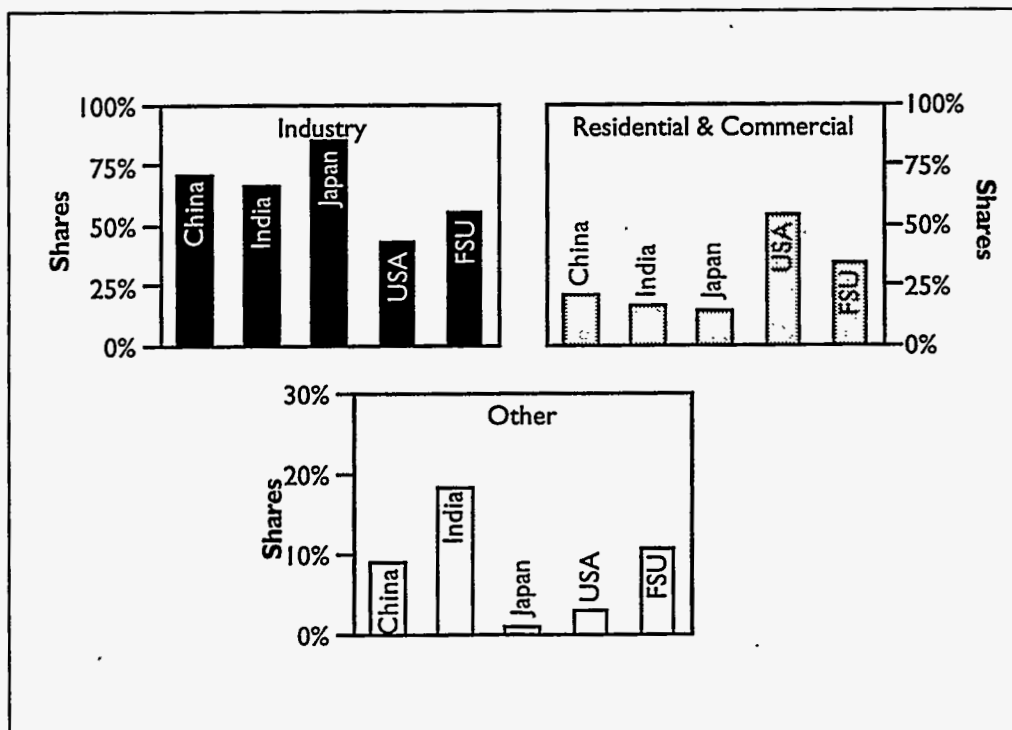
Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995; British Petroleum, 1994.

**Figure IX-13. Sectoral Shares of Coal Consumption, \* 1992**



\*Coal consumed in other sectors (transportation and agriculture) is not shown here. See Table IX-10.

**Figure IX-14. Sectoral Shares of Coal Consumption, 1992: Power Generation Coal Consumption Allocated to End-Use Sectors\***



\*See Table IX-10 for details.

**Table IX-11. Petroleum Products Consumption by Sector, 1992**

**1. Mtce**

<b>Country</b>	<b>Utilities</b>	<b>Industry †</b>	<b>Transportation</b>	<b>Residential &amp; Commercial</b>	<b>Agriculture</b>	<b>Total</b>
China	23.5	46.4	58.8	14.0	10.5	153.3
India	3.7	14.1	38.4	16.0	0.9	73.1
Japan	77.4	96.6	111.0	54.9	16.5	356.4
USA	34.2	311.2	785.6	76.7	-	1,207.8
FSU*	99.4	83.1	170.9	44.0	42.6	440.0

**2. Shares**

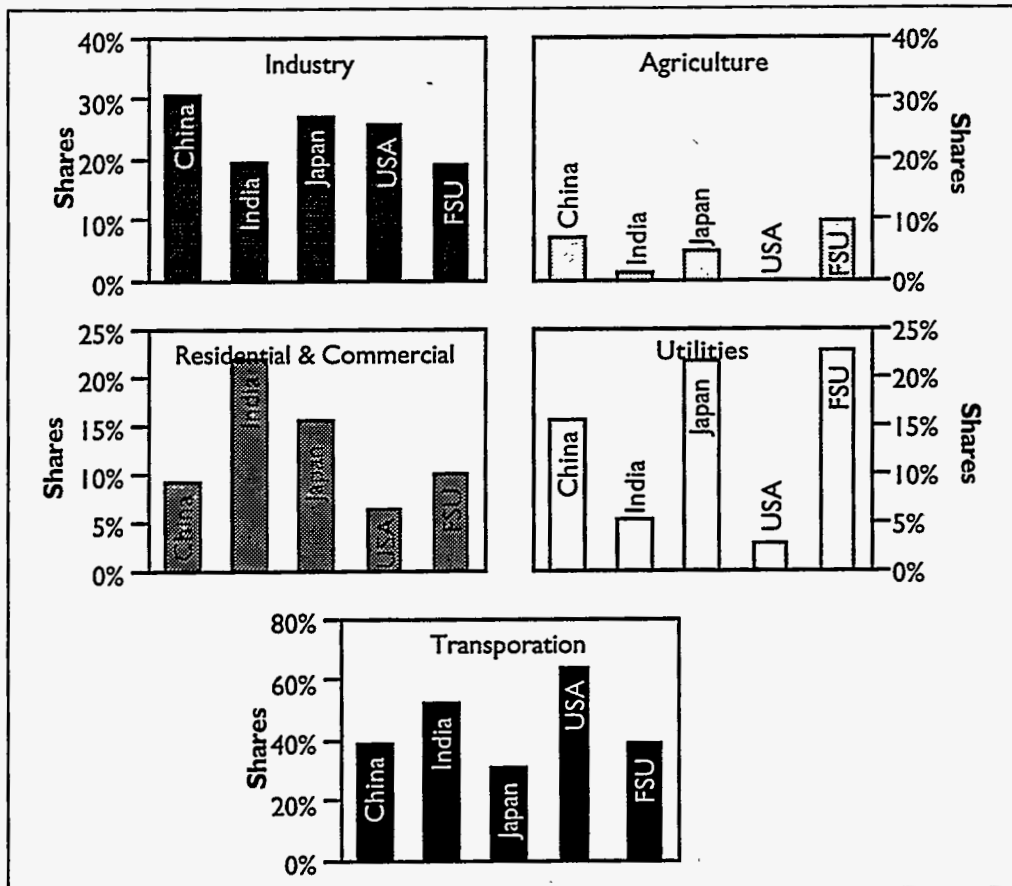
<b>Country</b>	<b>Utilities</b>	<b>Industry †</b>	<b>Transportation</b>	<b>Residential &amp; Commercial</b>	<b>Agriculture</b>	<b>Total</b>
China	15.4%	30.3%	38.4%	9.2%	6.8%	100.0%
India	5.1%	19.3%	52.5%	21.9%	1.2%	100.0%
Japan	21.7%	27.1%	31.1%	15.4%	4.6%	100.0%
USA	2.8%	25.8%	65.0%	6.4%	-	100.0%
FSU*	22.6%	18.9%	38.8%	10.0%	9.7%	100.0%

\* 1990 data. The FSU's residential and commercial sector includes unallocated other energy use.

† Excludes feedstocks. Data for China and FSU include construction.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database, International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995

Figure IX-15. Sectoral Shares of Petroleum Consumption Selected Countries, 1992





**Table IX-12. End Use Electricity Consumption by Sector, 1992**

<b>1. TWh</b>						
<b>Country</b>	<b>Industry †</b>	<b>Residential</b>	<b>Commercial &amp; Other</b>	<b>Transportation</b>	<b>Agriculture</b>	<b>Total</b>
China	422.73	64.00	37.78	13.61	52.24	590.36
India	87.77	35.58	21.35	4.74	58.12	207.57
Japan	378.01	204.67	180.81	20.70	3.30	787.49
USA	973.00	936.00	761.00	93.00	-	2,763.00
FSU*	821.94	110.28	262.50	134.17	153.61	1,482.50

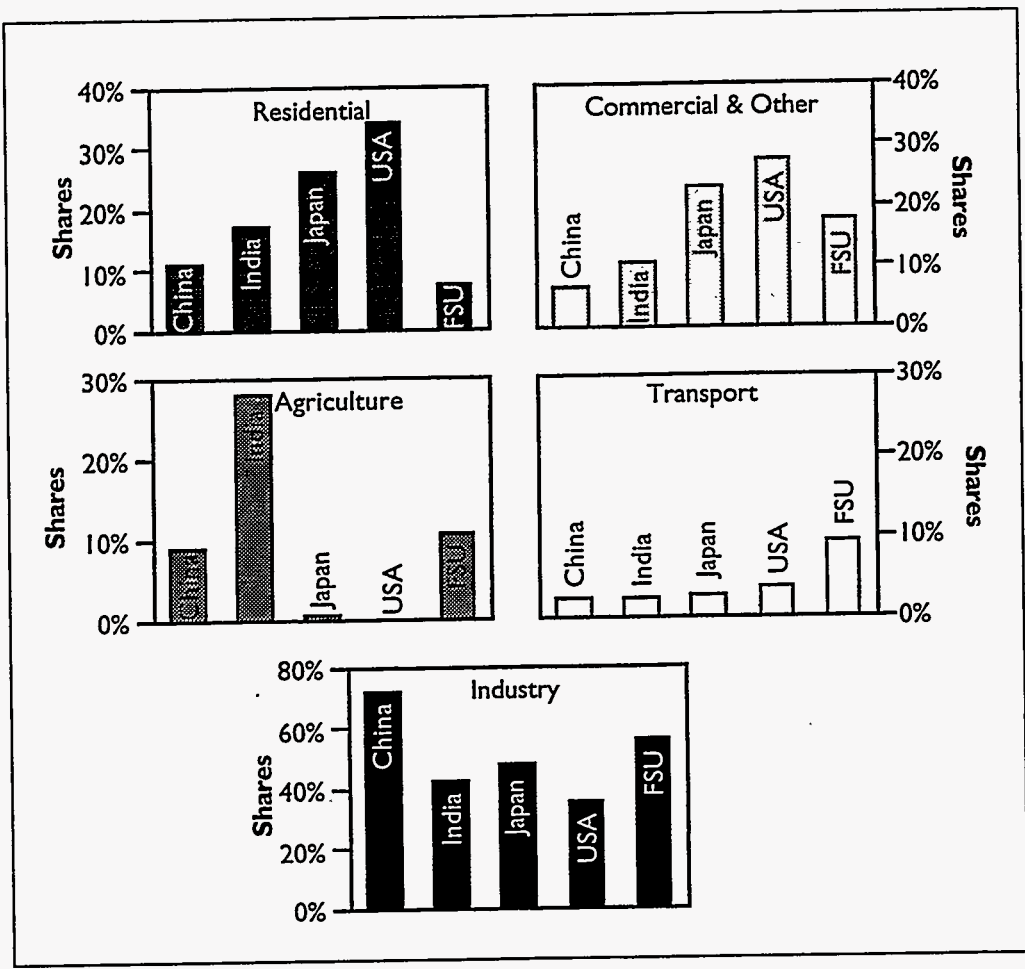
<b>2. Shares</b>						
<b>Country</b>	<b>Industry †</b>	<b>Residential</b>	<b>Commercial &amp; Other</b>	<b>Transportation</b>	<b>Agriculture</b>	<b>Total</b>
China	71.6%	10.8%	6.4%	2.3%	8.8%	100.0%
India	42.3%	17.1%	10.3%	2.3%	28.0%	100.0%
Japan	48.0%	26.0%	23.0%	2.6%	0.4%	100.0%
USA	35.2%	33.9%	27.5%	3.4%	-	100.0%
FSU*	55.4%	7.4%	17.7%	9.1%	10.4%	100.0%

\* 1990 data.

† China and FSU include construction.

Source: China — other tables in this volume; India — Tata Energy Research Institute, 1994; LDC Energy Database International Energy Studies Group, EAP, LBNL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — Energy Information Administration, 1994; FSU — International Energy Studies Group, EAP, LBNL, 1995.

Figure IX-16. Sectoral Shares of Electricity Consumption Selected Countries, 1992



**Table IX-13. Crude Steel Production, Selected Countries, 1979-1992**

**I. Mt**

<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total *</b>
1979	34.48	9.93	110.62	123.69	127.25	405.97	702.51
1980	37.12	9.36	110.17	101.46	147.94	406.04	695.89
1981	35.60	10.62	100.54	109.61	148.45	404.82	683.84
1982	37.16	10.83	98.52	67.66	147.17	361.34	618.96
1983	40.02	10.05	96.30	76.76	152.51	375.65	650.84
1984	43.47	10.26	104.68	83.94	154.24	396.59	695.23
1985	46.79	10.96	104.39	80.07	154.67	396.88	702.98
1986	52.20	11.33	97.56	74.03	160.55	395.67	697.01
1987	56.28	11.98	97.87	80.88	161.89	408.90	717.07
1988	59.43	12.68	104.96	90.63	163.04	430.74	757.12
1989	61.59	12.54	107.16	87.72	160.10	429.11	759.76
1990	66.35	12.66	109.55	89.73	154.44	432.73	745.04
1991	71.00	-	108.91	79.74	72.77	332.42	687.28
1992	80.94	-	97.52	84.32	-	262.78	699.83

**2. Shares**

<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>
1979	4.9%	1.4%	15.7%	17.6%	18.1%	57.8%
1980	5.3%	1.3%	15.8%	14.6%	21.3%	58.3%
1981	5.2%	1.6%	14.7%	16.0%	21.7%	59.2%
1982	6.0%	1.8%	15.9%	10.9%	23.8%	58.4%
1983	6.1%	1.5%	14.8%	11.8%	23.4%	57.7%
1984	6.3%	1.5%	15.1%	12.1%	22.2%	57.0%
1985	6.7%	1.6%	14.8%	11.4%	22.0%	56.5%
1986	7.5%	1.6%	14.0%	10.6%	23.0%	56.8%
1987	7.8%	1.7%	13.6%	11.3%	22.6%	57.0%
1988	7.8%	1.7%	13.9%	12.0%	21.5%	56.9%
1989	8.1%	1.7%	14.1%	11.5%	21.1%	56.5%
1990	8.9%	1.7%	14.7%	12.0%	20.7%	58.1%
1991	10.3%	-	15.8%	11.6%	10.6%	48.4%
1992	11.6%	-	13.9%	12.0%	-	37.5%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-14. Cement Production, Selected Countries, 1979-1992**

<b>1. Mt</b>							
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total *</b>
1979	73.90	18.27	87.80	76.65	123.02	379.64	865.09
1980	79.86	17.80	87.96	68.24	125.05	378.91	872.06
1981	82.90	20.91	84.83	65.05	127.17	380.86	878.70
1982	95.20	22.65	80.69	57.48	123.68	379.69	880.01
1983	108.25	25.26	80.89	63.93	128.16	406.48	906.95
1984	123.02	29.54	78.86	70.45	129.87	431.74	933.90
1985	145.95	31.97	72.85	70.28	130.77	451.82	949.97
1986	166.06	34.98	71.26	71.11	135.12	478.54	995.88
1987	186.25	37.14	71.55	67.38	137.40	499.72	1043.52
1988	210.14	41.14	77.55	71.54	139.50	539.87	1110.41
1989	210.30	44.20	79.72	71.31	140.44	545.97	1146.18
1990	209.71	46.17	84.45	70.94	137.32	548.59	1153.85
1991	244.66	51.66	89.56	65.05	77.46	528.39	1109.59
1992	308.22	51.66	88.25	70.85	-	518.98	1189.18

<b>2. Shares</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>
1979	8.5%	2.1%	10.1%	8.9%	14.2%	43.9%
1980	9.2%	2.0%	10.1%	7.8%	14.3%	43.4%
1981	9.4%	2.4%	9.7%	7.4%	14.5%	43.3%
1982	10.8%	2.6%	9.2%	6.5%	14.1%	43.1%
1983	11.9%	2.8%	8.9%	7.0%	14.1%	44.8%
1984	13.2%	3.2%	8.4%	7.5%	13.9%	46.2%
1985	15.4%	3.4%	7.7%	7.4%	13.8%	47.6%
1986	16.7%	3.5%	7.2%	7.1%	13.6%	48.1%
1987	17.8%	3.6%	6.9%	6.5%	13.2%	47.9%
1988	18.9%	3.7%	7.0%	6.4%	12.6%	48.6%
1989	18.3%	3.9%	7.0%	6.2%	12.3%	47.6%
1990	18.2%	4.0%	7.3%	6.1%	11.9%	47.5%
1991	22.0%	4.7%	8.1%	5.9%	7.0%	47.6%
1992	25.9%	4.3%	7.4%	6.0%	-	43.6%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-15. Primary Aluminum Production, Selected Countries, 1979-1992**

<b>I. Mt</b>							
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total *</b>
1979	0.36	0.21	1.01	4.56	1.75	7.89	14.58
1980	0.35	0.18	1.10	4.65	1.76	8.04	15.32
1981	0.35	0.21	0.78	4.49	1.80	7.63	14.92
1982	0.40	0.22	0.36	3.27	1.85	6.10	13.26
1983	0.43	0.20	0.26	3.35	2.00	6.24	13.73
1984	0.40	0.27	0.29	4.10	2.10	7.16	15.56
1985	0.41	0.26	0.23	3.50	2.20	6.60	15.28
1986	0.41	0.23	0.15	3.04	2.30	6.13	15.26
1987	0.62	0.25	0.05	3.34	2.40	6.66	16.36
1988	0.72	0.29	0.05	3.94	2.40	7.40	17.27
1989	0.76	0.43	0.05	4.03	2.40	7.67	18.03
1990	0.85	0.43	0.05	4.05	2.20	7.58	17.87
1991	0.86	0.51	0.05	4.12	-	5.54	16.09
1992	1.08	0.50	0.04	4.04	-	5.66	16.37

<b>2. Shares</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>
1979	2.5%	1.5%	7.0%	31.3%	12.0%	54.1%
1980	2.3%	1.2%	7.2%	30.4%	11.5%	52.5%
1981	2.3%	1.4%	5.2%	30.1%	12.1%	51.1%
1982	3.0%	1.6%	2.7%	24.7%	14.0%	46.0%
1983	3.1%	1.5%	1.9%	24.4%	14.6%	45.5%
1984	2.6%	1.7%	1.9%	26.3%	13.5%	46.0%
1985	2.7%	1.7%	1.5%	22.9%	14.4%	43.2%
1986	2.7%	1.5%	1.0%	19.9%	15.1%	40.2%
1987	3.8%	1.5%	0.3%	20.4%	14.7%	40.7%
1988	4.2%	1.7%	0.3%	22.8%	13.9%	42.9%
1989	4.2%	2.4%	0.3%	22.4%	13.3%	42.5%
1990	4.8%	2.4%	0.3%	22.7%	12.3%	42.4%
1991	5.3%	3.2%	0.3%	25.6%	-	34.4%
1992	6.6%	3.1%	0.2%	24.7%	-	34.6%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-16. Ethylene Production, Selected Countries, 1979-1992**

**1. Mt**

Year	China	India	Japan	USA	FSU	Subtotal	World Total *
1979	0.43	0.10	4.78	13.24	-	18.56	35.32
1980	0.49	-	4.18	13.00	1.77	19.44	34.20
1981	0.50	-	3.65	13.34	2.09	19.60	34.14
1982	0.57	-	3.59	11.11	2.13	17.40	31.90
1983	0.65	0.08	3.69	13.01	2.27	19.70	34.58
1984	0.65	0.09	4.39	14.24	2.54	21.90	37.54
1985	0.65	0.09	4.23	13.54	2.67	21.17	37.15
1986	0.70	0.18	4.29	14.90	2.80	22.87	39.37
1987	0.94	0.15	4.58	15.85	2.98	24.51	42.46
1988	1.23	0.19	5.06	16.88	3.17	26.53	45.70
1989	1.40	0.20	5.60	15.87	3.14	26.21	44.90
1990	1.57	0.19	5.81	16.54	3.07	27.18	46.15
1991	1.76	0.19	6.14	18.12	-	26.21	46.01
1992	2.00	-	6.10	18.56	-	26.66	49.53

**2. Shares**

Year	China	India	Japan	USA	FSU	Subtotal
1979	1.2%	0.3%	13.5%	37.5%	-	52.6%
1980	1.4%	-	12.2%	38.0%	5.2%	56.8%
1981	1.5%	-	10.7%	39.1%	6.1%	57.4%
1982	1.8%	-	11.3%	34.8%	6.7%	54.6%
1983	1.9%	0.2%	10.7%	37.6%	6.6%	57.0%
1984	1.7%	0.2%	11.7%	37.9%	6.8%	58.3%
1985	1.8%	0.2%	11.4%	36.4%	7.2%	57.0%
1986	1.8%	0.5%	10.9%	37.9%	7.1%	58.1%
1987	2.2%	0.4%	10.8%	37.3%	7.0%	57.7%
1988	2.7%	0.4%	11.1%	36.9%	6.9%	58.1%
1989	3.1%	0.4%	12.5%	35.3%	7.0%	58.4%
1990	3.4%	0.4%	12.6%	35.8%	6.7%	58.9%
1991	3.8%	0.4%	13.3%	39.4%	-	57.0%
1992	4.0%	-	12.3%	37.5%	-	53.8%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-17. Ammonia Production, Selected Countries, 1979-1992**

<b>I. Mt</b>							
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total</b>
1979	13.48	-	0.12	13.99	-	27.59	71.76
1980	14.97	-	0.13	14.74	-	29.84	75.05
1981	14.83	-	-	11.76	17.89	44.49	73.14
1982	15.46	-	-	10.22	17.76	43.44	70.70
1983	16.77	-	-	12.44	20.55	49.76	80.04
1984	18.37	-	-	12.09	21.49	51.96	84.96
1985	17.19	-	-	14.26	22.17	53.62	86.87
1986	16.73	-	1.80	13.14	23.82	55.49	86.47
1987	19.41	-	1.79	14.60	24.23	60.04	92.97
1988	19.86	-	1.82	15.26	24.43	61.36	95.34
1989	20.68	-	1.83	14.94	23.62	61.07	95.51
1990	21.29	-	1.83	15.42	-	38.54	81.58
1991	22.02	-	1.86	15.57	-	39.45	71.37
1992	22.98	-	1.79	16.60	-	41.37	74.70

<b>2. Shares</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>USSR</b>	<b>Subtotal</b>
1979	18.8%	-	0.2%	19.5%	-	38.4%
1980	20.0%	-	0.2%	19.6%	-	39.8%
1981	20.3%	-	-	16.1%	24.5%	60.8%
1982	21.9%	-	-	14.5%	25.1%	61.4%
1983	21.0%	-	-	15.5%	25.7%	62.2%
1984	21.6%	-	-	14.2%	25.3%	61.2%
1985	19.8%	-	-	16.4%	25.5%	61.7%
1986	19.3%	-	2.1%	15.2%	27.5%	64.2%
1987	20.9%	-	1.9%	15.7%	26.1%	64.6%
1988	20.8%	-	1.9%	16.0%	25.6%	64.4%
1989	21.7%	-	1.9%	15.6%	24.7%	63.9%
1990	26.1%	-	2.2%	18.9%	-	47.2%
1991	30.9%	-	2.6%	21.8%	-	55.3%
1992	30.8%	-	2.4%	22.2%	-	55.4%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-18. Caustic Soda Production, Selected Countries, 1979-1992**

<b>I. Mt</b>							
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total *</b>
1979	1.83	0.57	2.93	11.57	2.68	19.57	31.95
1980	1.92	0.55	3.06	10.54	2.76	18.83	31.41
1981	1.92	0.61	2.79	9.63	2.76	17.71	30.45
1982	2.07	0.60	2.71	8.51	2.78	16.67	29.17
1983	2.12	0.61	2.78	9.11	2.85	17.47	30.83
1984	2.22	0.70	2.99	9.90	2.97	18.78	32.95
1985	2.35	0.72	2.98	9.81	3.06	18.91	33.20
1986	2.52	0.73	2.98	9.64	3.23	19.11	33.71
1987	2.74	0.95	3.13	10.48	3.28	20.58	35.21
1988	3.01	0.91	3.40	9.56	3.32	20.20	35.39
1989	3.21	0.91	3.56	10.60	3.19	21.47	36.27
1990	3.35	0.96	3.80	11.12	2.97	22.20	36.40
1991	3.54	1.02	3.79	11.11	2.04	21.50	32.99
1992	3.80	-	3.75	11.29	-	18.84	35.90

<b>2. Shares</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>
1979	5.7%	1.8%	9.2%	36.2%	8.4%	61.3%
1980	6.1%	1.7%	9.8%	33.6%	8.8%	60.0%
1981	6.3%	2.0%	9.1%	31.6%	9.1%	58.2%
1982	7.1%	2.0%	9.3%	29.2%	9.5%	57.1%
1983	6.9%	2.0%	9.0%	29.5%	9.3%	56.7%
1984	6.7%	2.1%	9.1%	30.0%	9.0%	57.0%
1985	7.1%	2.2%	9.0%	29.5%	9.2%	57.0%
1986	7.5%	2.2%	8.9%	28.6%	9.6%	56.7%
1987	7.8%	2.7%	8.9%	29.8%	9.3%	58.5%
1988	8.5%	2.6%	9.6%	27.0%	9.4%	57.1%
1989	8.9%	2.5%	9.8%	29.2%	8.8%	59.2%
1990	9.2%	2.6%	10.4%	30.5%	8.2%	61.0%
1991	10.7%	3.1%	11.5%	33.7%	6.2%	65.2%
1992	10.6%	-	10.4%	31.4%	-	52.5%

\* In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.



**Table IX-19. Soda Ash Production, Selected Countries, 1979-1992**

**I. Mt**

Year	China	India	Japan	USA *	FSU	Subtotal	World Total †
1979	1.49	0.54	1.35	7.49	4.78	15.65	25.57
1980	1.61	0.50	1.35	7.51	4.78	15.75	25.90
1981	1.65	0.64	1.17	7.51	4.68	15.66	25.67
1982	1.74	0.60	1.16	7.09	4.76	15.35	24.89
1983	1.79	0.74	1.10	7.68	5.10	16.42	26.56
1984	1.88	0.83	1.03	7.72	5.12	16.57	27.43
1985	2.01	0.83	1.05	7.72	5.03	16.64	27.38
1986	2.15	0.87	1.02	7.65	5.15	16.83	27.73
1987	2.36	0.97	1.09	8.07	5.16	17.65	28.65
1988	2.61	1.10	1.08	8.74	5.10	18.62	29.82
1989	3.64	1.35	1.10	9.00	4.92	20.01	30.85
1990	3.80	1.39	1.13	9.16	4.47	19.95	30.59
1991	3.94	1.50	1.10	9.01	3.05	18.60	27.36
1992	4.55	-	1.05	9.38	-	14.98	28.59

**2. Shares**

Year	China	India	Japan	USA *	FSU	Subtotal
1979	5.8%	2.1%	5.3%	29.3%	18.7%	61.2%
1980	6.2%	1.9%	5.2%	29.0%	18.5%	60.8%
1981	6.4%	2.5%	4.6%	29.3%	18.2%	61.0%
1982	7.0%	2.4%	4.6%	28.5%	19.1%	61.7%
1983	6.8%	2.8%	4.1%	28.9%	19.2%	61.8%
1984	7.1%	3.1%	3.9%	29.1%	19.3%	62.4%
1985	7.3%	3.0%	3.8%	28.1%	18.3%	60.6%
1986	7.8%	3.2%	3.7%	28.0%	18.8%	61.5%
1987	8.5%	3.5%	3.9%	29.1%	18.6%	63.7%
1988	8.7%	3.7%	3.6%	29.3%	17.1%	62.5%
1989	11.8%	4.4%	3.6%	29.2%	15.9%	64.9%
1990	12.4%	4.5%	3.7%	29.9%	14.6%	65.2%
1991	14.4%	5.5%	4.0%	32.9%	11.1%	68.0%
1992	15.9%	-	3.7%	32.8%	-	52.4%

\* Includes natural sodium carbonate.

† In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-20. Sulphuric Acid Production, Selected Countries, 1979-1992**

**I. Mt**

Year	China	India	Japan	USA	FSU	Subtotal	World Total *
1979	7.00	2.23	6.58	39.19	22.36	77.36	130.77
1980	7.64	2.22	6.78	40.05	23.03	79.72	133.81
1981	7.81	2.28	6.57	36.95	24.10	77.71	130.49
1982	8.18	2.39	6.53	30.14	23.80	71.04	121.97
1983	8.70	2.24	6.66	33.98	24.71	76.29	129.47
1984	8.17	2.68	6.46	37.91	25.34	80.57	137.23
1985	6.76	2.63	6.58	35.96	26.04	77.97	132.56
1986	7.63	2.88	6.56	32.65	27.85	77.57	131.42
1987	9.83	3.16	6.54	35.61	28.53	83.68	134.94
1988	11.11	3.42	6.77	38.62	29.37	89.29	142.97
1989	11.53	3.29	6.89	39.28	28.28	89.27	141.18
1990	11.97	3.27	6.89	40.22	27.27	89.62	135.92
1991	13.33	3.89	7.06	39.43	11.60	75.31	124.85
1992	14.09	-	7.10	40.70	-	61.89	126.80

**2. Shares**

Year	China	India	Japan	USA	FSU	Subtotal
1979	5.4%	1.7%	5.0%	30.0%	17.1%	59.2%
1980	5.7%	1.7%	5.1%	29.9%	17.2%	59.6%
1981	6.0%	1.7%	5.0%	28.3%	18.5%	59.5%
1982	6.7%	2.0%	5.4%	24.7%	19.5%	58.2%
1983	6.7%	1.7%	5.1%	26.2%	19.1%	58.9%
1984	6.0%	2.0%	4.7%	27.6%	18.5%	58.7%
1985	5.1%	2.0%	5.0%	27.1%	19.6%	58.8%
1986	5.8%	2.2%	5.0%	24.8%	21.2%	59.0%
1987	7.3%	2.3%	4.8%	26.4%	21.1%	62.0%
1988	7.8%	2.4%	4.7%	27.0%	20.5%	62.5%
1989	8.2%	2.3%	4.9%	27.8%	20.0%	63.2%
1990	8.8%	2.4%	5.1%	29.6%	20.1%	65.9%
1991	10.7%	3.1%	5.7%	31.6%	9.3%	60.3%
1992	11.1%	-	5.6%	32.1%	-	48.8%

- In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total.

Source: United Nations, 1994b.

**Table IX-21. Wood Pulp Production, \* Selected Countries 1979-1992**

<b>I. Mt</b>							
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>	<b>World Total †</b>
1979	3.63	1.26	9.99	45.92	9.09	69.89	129.30
1980	3.81	1.53	9.59	46.94	9.18	71.04	132.17
1981	3.81	2.04	8.61	47.87	9.42	71.75	132.20
1982	3.81	2.11	8.63	45.29	9.58	69.41	126.16
1983	4.27	2.41	8.86	47.96	10.16	73.66	134.44
1984	4.76	1.40	9.14	50.70	10.46	76.47	142.87
1985	8.71	1.47	9.29	49.36	10.73	79.56	144.65
1986	9.57	1.49	9.25	52.20	10.84	83.35	151.00
1987	12.38	1.60	9.74	54.37	10.85	88.94	160.11
1988	13.58	1.60	10.42	55.83	10.95	92.38	166.38
1989	13.07	1.64	10.99	56.58	11.68	93.96	170.10
1990	13.18	1.64	11.34	57.57	10.75	94.47	168.57
1991	13.97	1.64	11.73	59.14	-	86.48	158.63
1992	14.44	1.87	11.20	59.47	-	86.97	158.75

<b>2. Shares</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Subtotal</b>
1979	2.8%	1.0%	7.7%	35.5%	7.0%	54.1%
1980	2.9%	1.2%	7.3%	35.5%	6.9%	53.8%
1981	2.9%	1.5%	6.5%	36.2%	7.1%	54.3%
1982	3.0%	1.7%	6.8%	35.9%	7.6%	55.0%
1983	3.2%	1.8%	6.6%	35.7%	7.6%	54.8%
1984	3.3%	1.0%	6.4%	35.5%	7.3%	53.5%
1985	6.0%	1.0%	6.4%	34.1%	7.4%	55.0%
1986	6.3%	1.0%	6.1%	34.6%	7.2%	55.2%
1987	7.7%	1.0%	6.1%	34.0%	6.8%	55.5%
1988	8.2%	1.0%	6.3%	33.6%	6.6%	55.5%
1989	7.7%	1.0%	6.5%	33.3%	6.9%	55.2%
1990	7.8%	1.0%	6.7%	34.2%	6.4%	56.0%
1991	8.8%	1.0%	7.4%	37.3%	-	54.5%
1992	9.1%	1.2%	7.1%	37.5%	-	54.8%

\* Includes wood pulp from all pulping processes and pulp of fibers other than wood.

† In most cases "world total" is the sum of available country data only and so may be less than the actual world total. Since the major producing countries have been covered, however, this category should be a good approximation of the actual total. Some figures include FAO production estimates.

Source: United Nations, 1994b.

**Table IX-22. Structure of Passenger Travel for Selected Countries, 1992**

<b>1. Billion passenger-km</b>					
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Total</b>
China	315.2	319.3	19.8	40.6	694.9
India*	268.9	900.1	-	8.6	1,177.6
Japan	402.3	869.3	6.1	56.7	1,334.3
USA	22.5	2,714.4	-	590.5	3,327.4
FSU	254.4	345.7	4.2	150.4	755.0

<b>2. Shares</b>					
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Total</b>
China	45.4%	45.9%	2.8%	5.8%	100.0%
India*	22.8%	76.4%	-	0.7%	100.0%
Japan	30.1%	65.2%	0.5%	4.2%	100.0%
USA	0.7%	81.6%	-	17.7%	100.0%
FSU	33.7%	45.8%	0.6%	19.9%	100.0%

<b>3. Passenger-km per capita</b>					
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Total</b>
China	269	272	17	35	593
India*	331	1,109	-	11	1,450
Japan	3,232	6,985	49	455	10,722
USA	88	10,645	-	2,316	13,049
FSU	1,707	2,320	28	1,009	5,067

\* 1989 data. Air travel figure is estimated

Source: China — Transportation Statistical Yearbook of China 1994; India — LDC Energy Database, International Energy Studies Group, EAP, LBL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — US Department of Commerce, 1994.

Figure IX-17. Passenger Traffic, Selected Countries, 1992

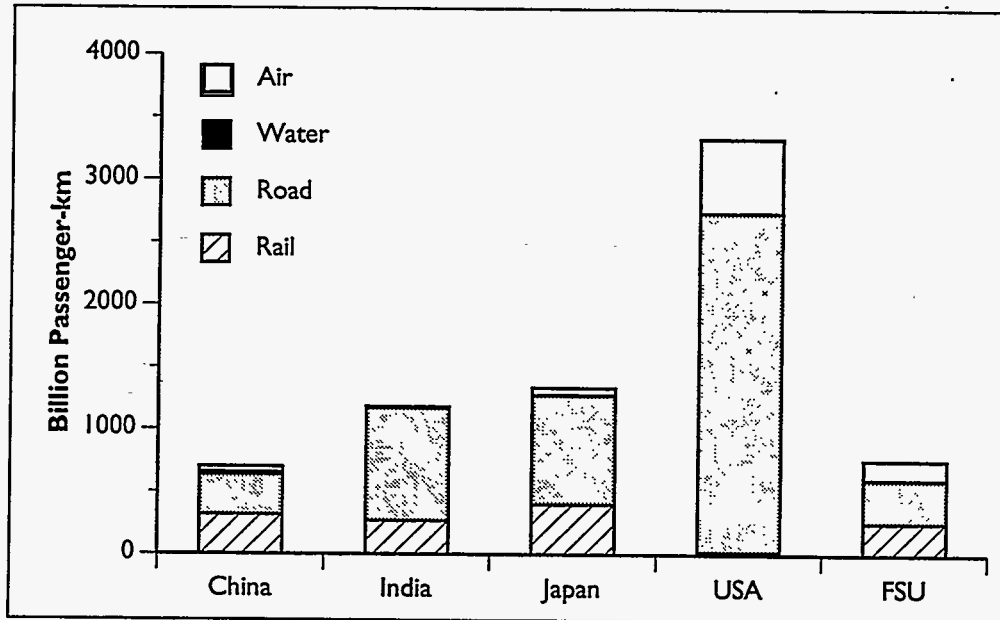
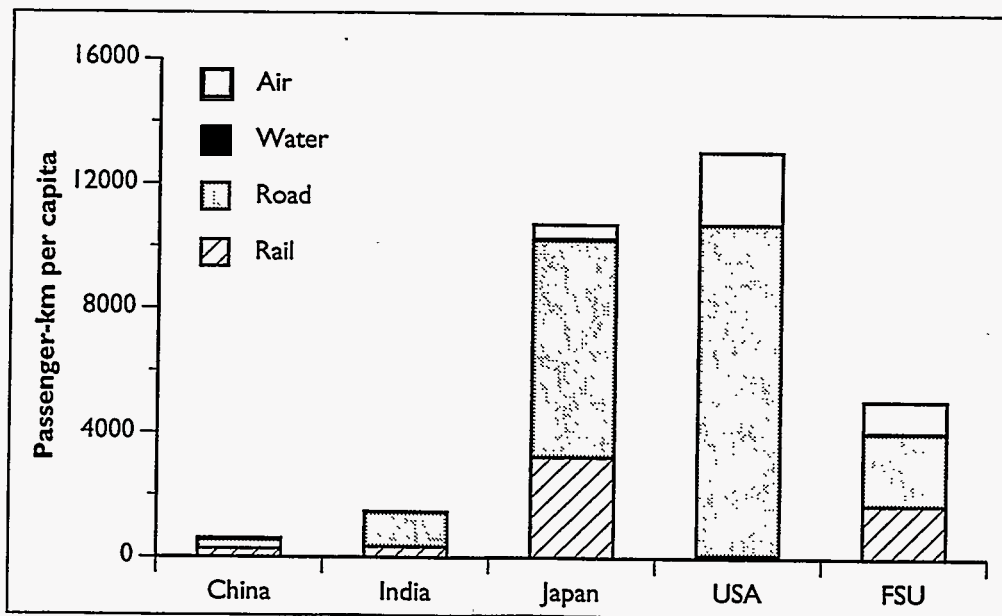


Figure IX-18. Per Capita Passenger Travel by Mode, 1992



**Table IX-23. Structure of Freight Transportation, Selected Countries, 1992**

<b>1. Billion tonne-km</b>						
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Pipeline</b>	<b>Total</b>
China	1,157.5	375.5	1,325.6	1.3	61.7	2,921.6
India*	232.3	272.7	-	-	-	505.0
Japan	26.7	281.6	248.0	0.8	-	557.1
USA	1,781.2	1,311.3	730.5	17.7	918.7	4,759.4
FSU	2,326.0	64.8	660.0	2.5	1,051.1	4,104.4

<b>2. Shares</b>						
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Pipeline</b>	<b>Total</b>
China	39.6%	12.9%	45.4%	0.05%	2.1%	100.0%
India*	46.0%	54.0%	-	-	-	100.0%
Japan	4.8%	50.5%	44.5%	0.1%	-	100.0%
USA	37.4%	27.6%	15.3%	0.4%	19.3%	100.0%
FSU	56.7%	1.6%	16.1%	0.06%	25.6%	100.0%

<b>3. Tonne-km per capita</b>						
<b>Country</b>	<b>Rail</b>	<b>Road</b>	<b>Water</b>	<b>Air</b>	<b>Pipeline</b>	<b>Total</b>
China	988	320	1131	1	53	2,493
India*	286	336	-	-	-	622
Japan	215	2,271	2,000	7	-	4,493
USA	6,985	5,142	2,865	69	3,603	18,664
FSU	15,610	435	4,429	17	7,055	27,546

\* 1989 data

Source: China — Transportation Statistical Yearbook of China 1994; India — LDC Energy Database, International Energy Studies Group, EAP, LBL, 1995; Japan — Energy Economics Institute of Japan, 1994; USA — US Department of Commerce, 1994.

Figure IX-19. Freight Traffic, Selected Countries, 1992

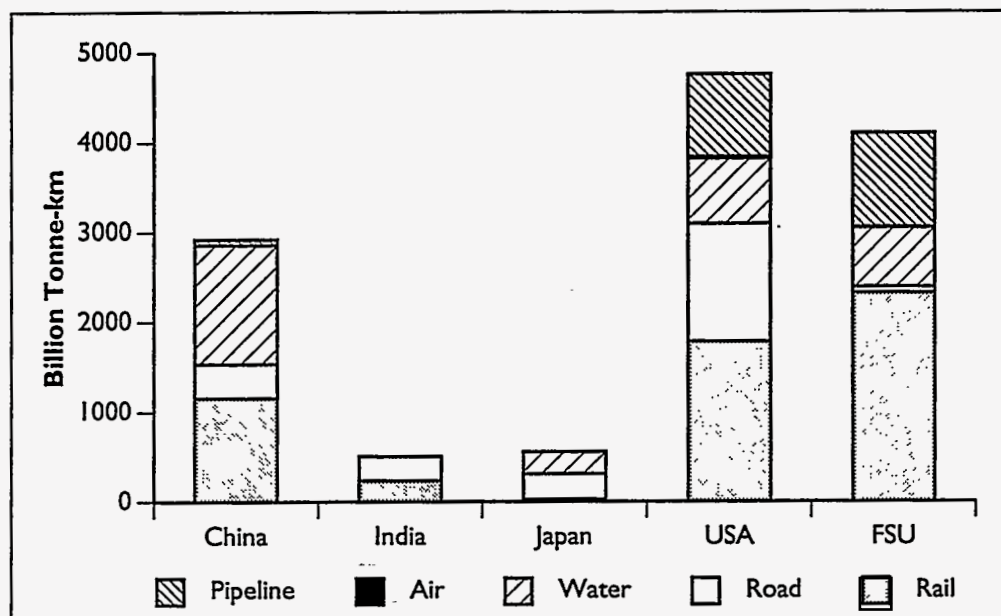
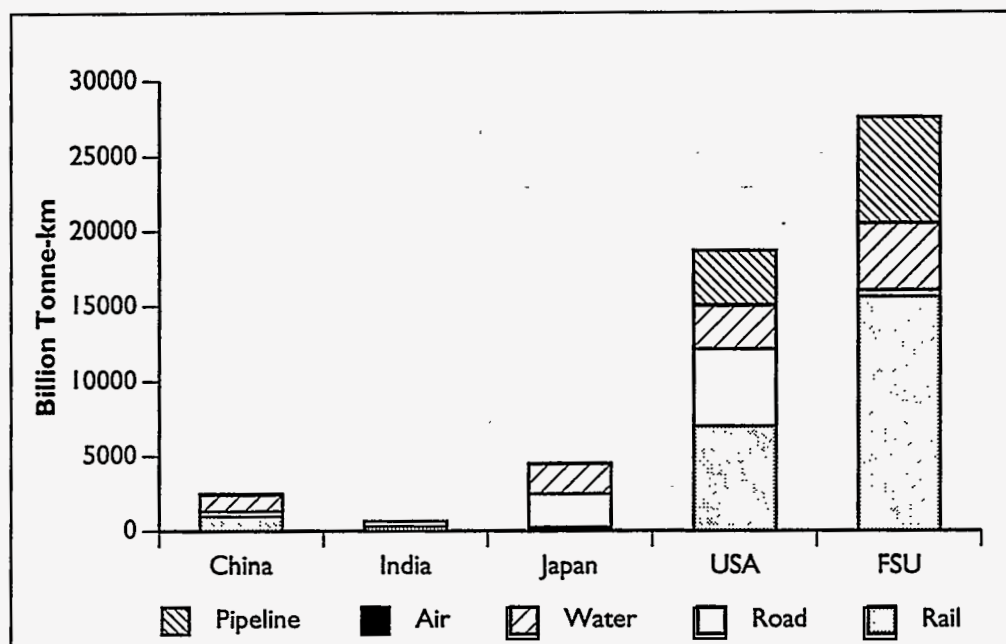


Figure IX-20. Per Capita Freight Traffic by Mode, 1992



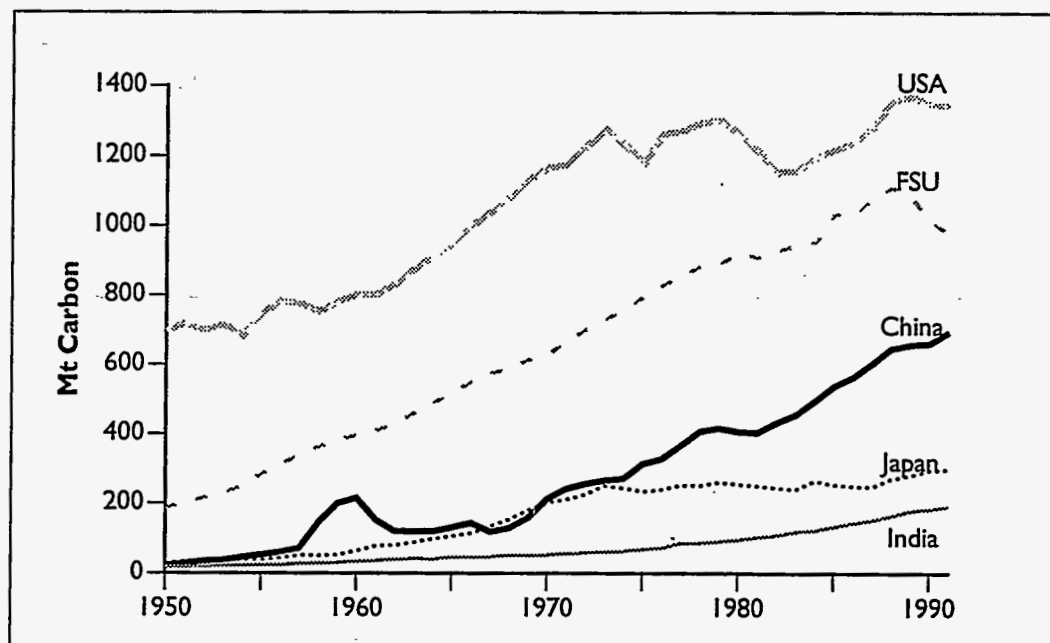
**Table IX-24. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1991**

<b>I. Mt of Carbon</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Global Total</b>
1950	22	18	28	696	186	1,638
1951	28	19	34	717	201	1,775
1952	35	20	36	698	216	1,803
1953	37	21	40	715	228	1,848
1954	45	22	39	681	249	1,871
1955	53	24	39	746	283	2,050
1956	60	24	44	782	310	2,185
1957	71	27	52	775	339	2,278
1958	145	29	50	751	362	2,338
1959	199	30	53	781	380	2,471
1960	215	33	64	800	396	2,586
1961	152	36	78	802	409	2,602
1962	121	40	80	832	429	2,708
1963	120	42	89	876	460	2,855
1964	120	41	99	913	489	3,016
1965	131	46	106	948	519	3,154
1966	144	47	115	1,000	548	3,314
1967	119	47	134	1,039	573	3,420
1968	129	52	154	1,082	589	3,596
1969	159	52	179	1,132	613	3,809
1970	212	53	203	1,166	628	4,091
1971	241	56	210	1,173	667	4,242
1972	256	59	225	1,227	701	4,409
1973	266	61	251	1,275	731	4,648
1974	271	64	244	1,231	758	4,656
1975	314	69	234	1,179	796	4,629
1976	328	72	239	1,262	828	4,895
1977	366	87	252	1,270	857	5,034
1978	407	87	251	1,293	883	5,082
1979	416	91	260	1,301	891	5,366
1980	406	96	255	1,262	923	5,292
1981	403	103	250	1,213	908	5,121
1982	432	109	245	1,152	929	5,081
1983	455	119	240	1,158	944	5,072
1984	495	123	264	1,194	952	5,237
1985	537	134	254	1,218	1,033	5,413
1986	564	144	249	1,237	1,034	5,601
1987	603	152	247	1,283	1,077	5,727
1988	646	164	270	1,357	1,109	5,953
1989	657	179	281	1,370	1,082	6,068
1990	661	184	295	1,347	1,013	6,098
1991	694	192	298	1,346	977	6,188

Source: The Carbon Dioxide Information Analysis Center, ORNL, 1994.



Figure IX-21. Carbon Dioxide Emissions  
USA, USSR, China, India, Japan

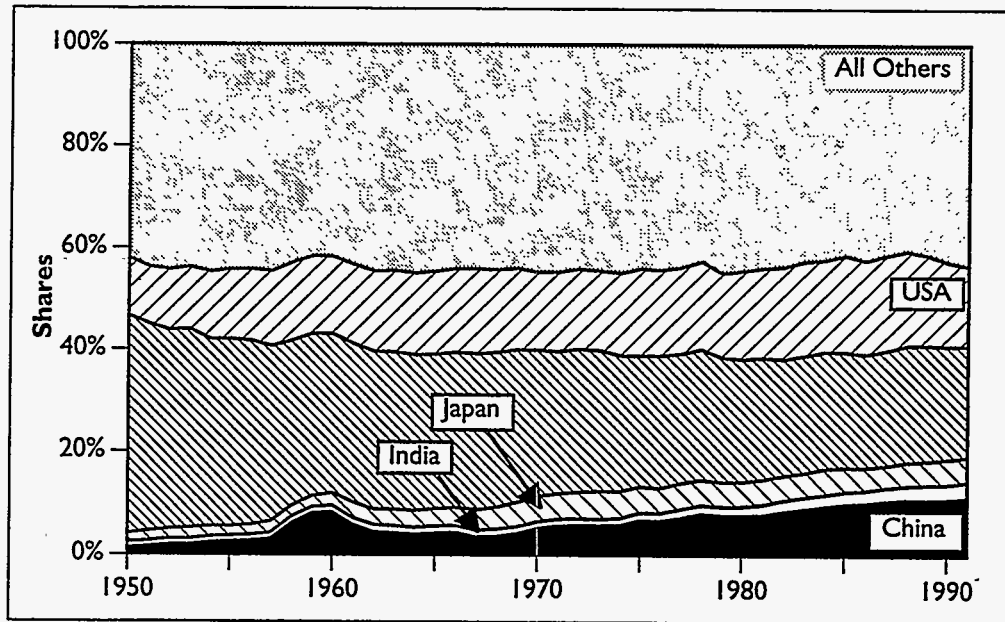


**Table IX-24. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1991 (continued)**

2. Shares						
Year	China	India	Japan	USA	FSU	Global Total
1950	1%	1%	2%	42%	11%	100%
1951	2%	1%	2%	40%	11%	100%
1952	2%	1%	2%	39%	12%	100%
1953	2%	1%	2%	39%	12%	100%
1954	2%	1%	2%	36%	13%	100%
1955	3%	1%	2%	36%	14%	100%
1956	3%	1%	2%	36%	14%	100%
1957	3%	1%	2%	34%	15%	100%
1958	6%	1%	2%	32%	15%	100%
1959	8%	1%	2%	32%	15%	100%
1960	8%	1%	2%	31%	15%	100%
1961	6%	1%	3%	31%	16%	100%
1962	4%	1%	3%	31%	16%	100%
1963	4%	1%	3%	31%	16%	100%
1964	4%	1%	3%	30%	16%	100%
1965	4%	1%	3%	30%	16%	100%
1966	4%	1%	3%	30%	17%	100%
1967	3%	1%	4%	30%	17%	100%
1968	4%	1%	4%	30%	16%	100%
1969	4%	1%	5%	30%	16%	100%
1970	5%	1%	5%	28%	15%	100%
1971	6%	1%	5%	28%	16%	100%
1972	6%	1%	5%	28%	16%	100%
1973	6%	1%	5%	27%	16%	100%
1974	6%	1%	5%	26%	16%	100%
1975	7%	1%	5%	25%	17%	100%
1976	7%	1%	5%	26%	17%	100%
1977	7%	2%	5%	25%	17%	100%
1978	8%	2%	5%	25%	17%	100%
1979	8%	2%	5%	24%	17%	100%
1980	8%	2%	5%	24%	17%	100%
1981	8%	2%	5%	24%	18%	100%
1982	8%	2%	5%	23%	18%	100%
1983	9%	2%	5%	23%	19%	100%
1984	9%	2%	5%	23%	18%	100%
1985	10%	2%	5%	22%	19%	100%
1986	10%	3%	4%	22%	18%	100%
1987	11%	3%	4%	22%	19%	100%
1988	11%	3%	5%	23%	19%	100%
1989	11%	3%	5%	23%	18%	100%
1990	11%	3%	5%	22%	17%	100%
1991	11%	3%	5%	22%	16%	100%

Source: The Carbon Dioxide Information Analysis Center, ORNL, 1994.

Figure IX-22. Shares of Global CO2 Emissions, USA, USSR, China, Japan and India,



**Table IX-24. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1991 (continued)**

<b>3. Per Capita Emissions, tonnes of carbon</b>						
<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU</b>	<b>Global Total</b>
1950	0.04	0.05	0.3	4.6	1.0	0.65
1951	0.05	0.05	0.4	4.4	1.1	0.69
1952	0.06	0.05	0.4	4.4	1.2	0.69
1953	0.06	0.05	0.5	4.5	1.2	0.70
1954	0.08	0.06	0.4	4.2	1.3	0.69
1955	0.09	0.06	0.4	4.5	1.4	0.74
1956	0.10	0.06	0.5	4.6	1.6	0.78
1957	0.11	0.07	0.6	4.5	1.7	0.80
1958	0.23	0.07	0.5	4.3	1.7	0.80
1959	0.31	0.07	0.6	4.4	1.8	0.83
1960	0.33	0.08	0.7	4.4	1.8	0.86
1961	0.24	0.08	0.8	4.4	1.9	0.85
1962	0.19	0.09	0.8	4.5	1.9	0.86
1963	0.18	0.09	0.9	4.6	2.0	0.89
1964	0.17	0.09	1.0	4.8	2.1	0.92
1965	0.18	0.09	1.1	4.9	2.2	0.95
1966	0.20	0.09	1.2	5.1	2.3	0.97
1967	0.16	0.09	1.4	5.2	2.4	0.98
1968	0.17	0.10	1.5	5.4	2.5	1.01
1969	0.20	0.10	1.8	5.6	2.5	1.05
1970	0.26	0.10	2.0	5.7	2.6	1.11
1971	0.29	0.10	2.0	5.7	2.7	1.12
1972	0.30	0.10	2.1	5.9	2.8	1.15
1973	0.30	0.10	2.3	6.0	2.9	1.18
1974	0.30	0.10	2.2	5.8	3.0	1.16
1975	0.34	0.11	2.1	5.5	3.1	1.13
1976	0.35	0.11	2.1	5.8	3.2	1.18
1977	0.39	0.13	2.2	5.8	3.3	1.19
1978	0.43	0.13	2.2	5.8	3.4	1.18
1979	0.43	0.13	2.2	5.8	3.4	1.23
1980	0.42	0.14	2.2	5.5	3.5	1.19
1981	0.41	0.15	2.1	5.3	3.4	1.13
1982	0.43	0.15	2.1	5.0	3.4	1.10
1983	0.45	0.16	2.0	4.9	3.5	1.08
1984	0.48	0.16	2.2	5.1	3.5	1.10
1985	0.51	0.18	2.1	5.1	3.7	1.12
1986	0.53	0.18	2.1	5.1	3.7	1.13
1987	0.56	0.19	2.0	5.3	3.8	1.14
1988	0.59	0.20	2.2	5.5	3.9	1.16
1989	0.59	0.22	2.3	5.5	3.8	1.17
1990	0.58	0.22	2.4	5.4	3.5	1.15
1991	0.60	0.22	2.4	5.3	3.4	1.15

Source: The Carbon Dioxide Information Analysis Center, ORNL, 1994.

Figure IX-23. Per Capita CO2 Emissions,  
USA, USSR, China, Japan and India, 1950-1988

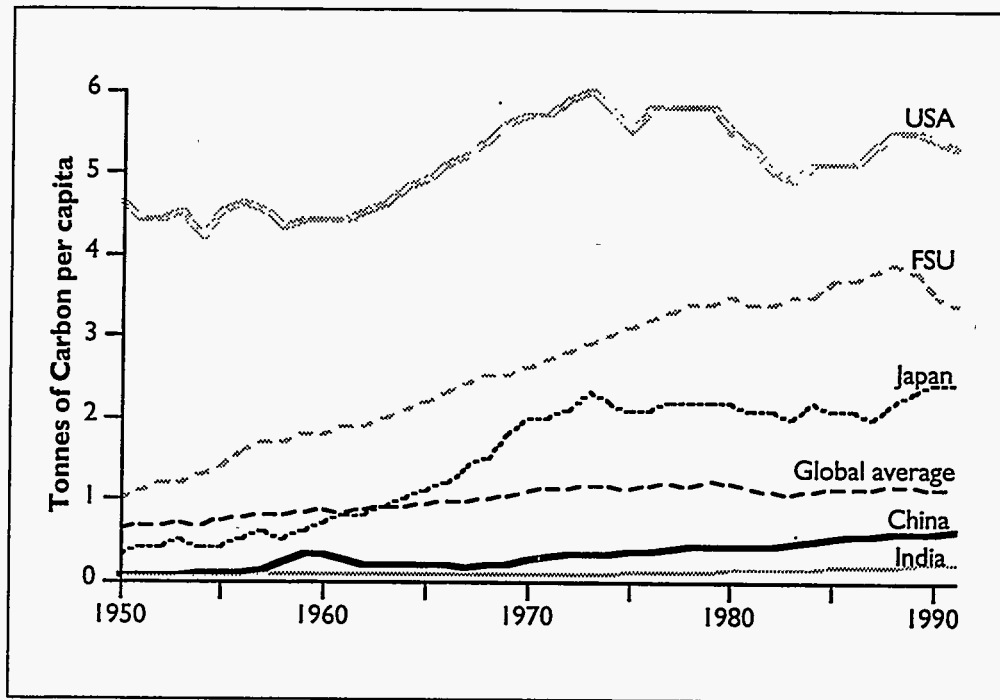


Table IX-25. GDP Structure \* for Selected Countries for Selected Years

**1. 1970**

	Agriculture	Industry		Services & Other
		Manufacturing	Subtotal	
China	34%	30%	38%	28%
India	45%	15%	22%	33%
Japan	6%	36%	47%	47%
USA	3%	25%	35%	63%
FSU	-	-	-	-
World	8%	27%	38%	55%

**2. 1980**

	Agriculture	Industry		Services & Other
		Manufacturing	Subtotal	
China	36%	-	49%	15%
India	38%	-	26%	36%
Japan	4%	-	42%	54%
USA	3%	-	34%	64%
FSU	14%	-	37%	49%
World	-	-	-	-

**3. 1987**

	Agriculture	Industry		Services & Other
		Manufacturing	Subtotal	
China	30%	-	52%	17%
India	30%	-	31%	39%
Japan	3%	-	45%	52%
USA	3%	-	33%	65%
FSU	18%	-	34%	48%
World	-	-	-	-

**4. 1993**

	Agriculture	Industry		Services & Other
		Manufacturing	Subtotal	
China	19%	38%	48%	33%
India	31%	17%	27%	41%
Japan	2%	24%	41%	57%
USA	-	-	-	-
Russian Fed.	9%	-	51%	39%
World	-	-	-	-

\* Based on current price series. Data for China are different from those that appear in Chapter X of this volume because sources are different.

Source: World Bank, 1990 and 1995; United Nations, 1992; International Energy Studies Group, EAP, LBNL.

Figure IX-24. GDP Structure, Selected Countries, 1980

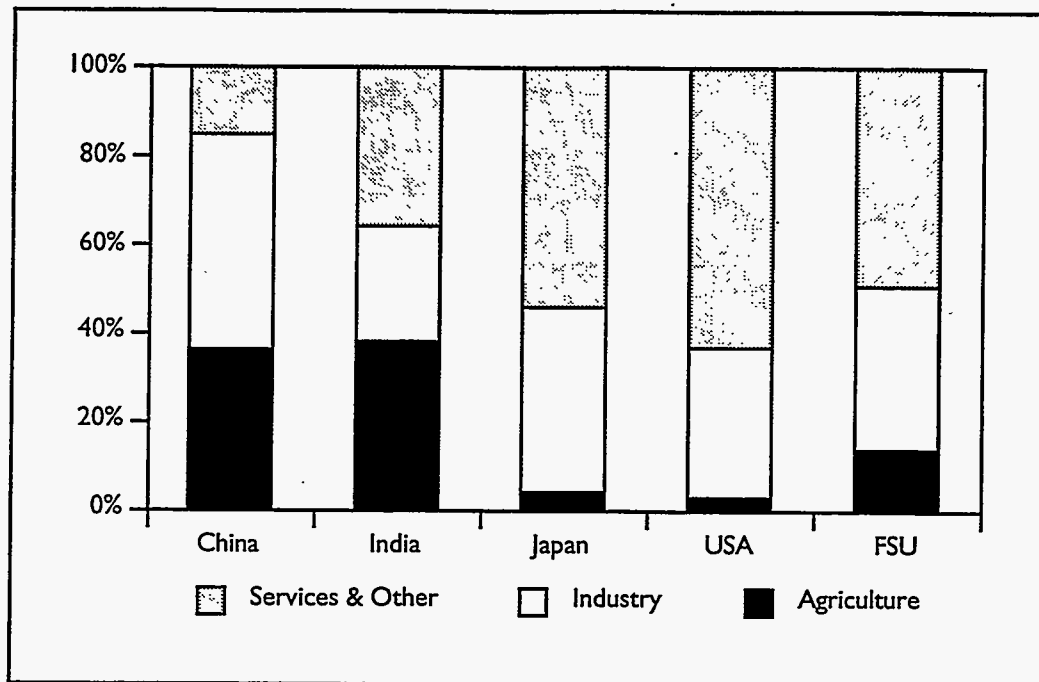
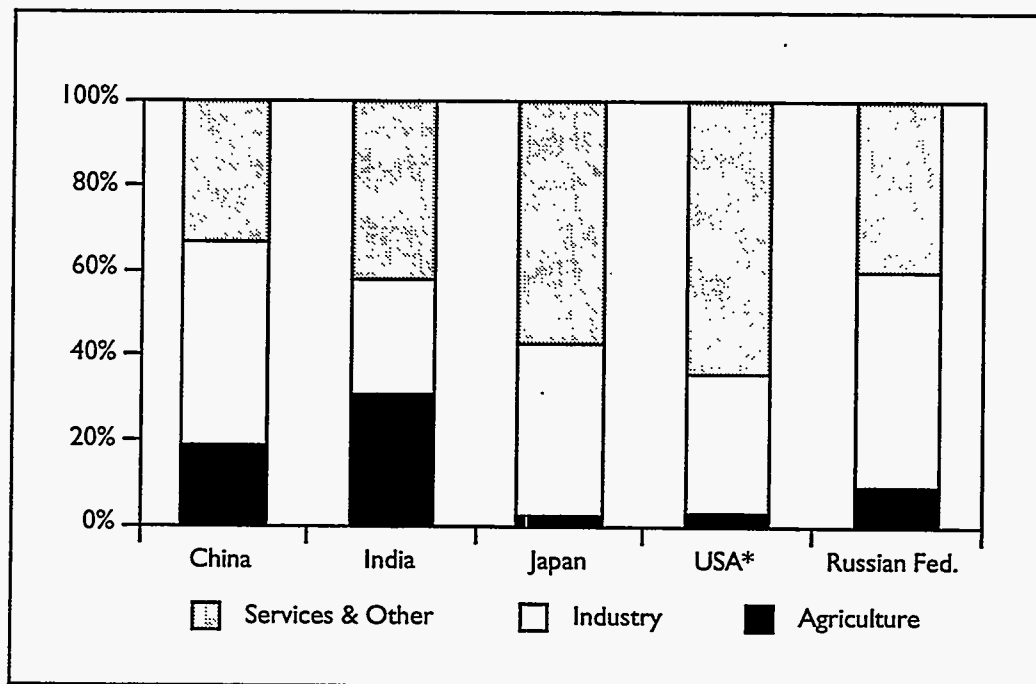


Figure IX-25. GDP Structure, Selected Countries, 1993



**Table IX-26. Population for Selected Countries— Millions**

<b>Year</b>	<b>China</b>	<b>India</b>	<b>Japan</b>	<b>USA</b>	<b>FSU*</b>	<b>World Total</b>
1968	775	523	101	201	-	-
1969	796	535	103	203	-	-
1970	818	548	104	205	242	-
1971	841	560	106	208	-	-
1972	862	573	107	210	-	-
1973	882	586	108	212	-	-
1974	900	600	110	214	-	-
1975	916	613	112	216	253	-
1976	931	628	113	218	-	-
1977	944	643	114	220	-	-
1978	956	657	115	223	-	-
1979	969	672	116	225	-	-
1980	981	687	117	228	-	4,453
1981	1,008	690	118	230	268	-
1982	1,021	705	118	232	270	-
1983	1,033	720	119	234	272	-
1984	1,046	736	120	236	275	-
1985	1,060	751	121	238	277	4,837
1986	1,074	766	121	241	280	4,917
1987	1,090	781	122	243	283	5,024
1988	1,106	797	123	245	285	5,115
1989	1,112	812	123	247	288	5,201
1990	1,139	827	124	250	289	5,284
1991	1,150	867	124	253	149	5,351
1992	1,162	884	125	255	149	5,438

\* 1970 and 1975 Soviet Union data from International Energy Studies Group, EAP, LBNL. 1991-1992 data for Russian Federation only.

Source: World Bank, 1990 and 1994; International Energy Studies Group, EAP, LBNL.



# Chapter X—Economic Indicators and Population

# Economic / Population

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Since the late 1970s China's gross national product has risen quickly, at an average annual rate of 9.3%, nearly quadrupling in the 15 years from 1978 to 1993 (Table X-1).<sup>1</sup> Growth was fastest in the mid-1980s and in the years since 1990. Most growth came from the industrial sector,<sup>2</sup> the share in gross domestic product of which grew from 46% in 1978 to 60% in 1993. Growth rates in the services sector were also high, although its share peaked at 25% in 1989 and is now down to 21%, the same level as 15 years ago. Agriculture's contribution to gross domestic product has shrunk by more than half to under 17%.

## GROSS NATIONAL PRODUCT

Because of population growth, per capita gross national product rose more slowly than the total, averaging 8.3% per year between 1978 and 1993 (and over 10% after 1990), to 2,645 yuan in 1993, or US \$459 (Table X-2).<sup>3</sup> Growth rates were depressed to under 3% in 1989 and 1990 during a recessionary slowdown resulting in part from government deflationary monetary policies.

Regional distribution of gross domestic product roughly follows that of per capita energy use (Table X-3). Shanghai, Beijing, Tianjin, and the coastal provinces generally enjoy the highest gross domestic product per capita (over 4,500 yuan — or US \$780 — per person in 1993), while inland provinces tend to be poorer. The gap between rich and poor areas is widening very quickly; per capita output in Shanghai was seven times that in the poorest province, Guizhou, in 1990, and more than nine times larger in 1993.

## GROSS OUTPUT VALUE

In some ways gross output value is a less desirable measure of economic activity than gross national product. Unlike gross national product, gross output value double counts by including the value of intermediate goods and services and is conse-

quently about twice as large as gross national product. In some cases, however, gross output value data may be more useful in constructing energy intensity indicators than value-added indicators like gross national product or national income.<sup>4</sup> Unfortunately, China no longer publishes gross output value for all economic sectors; beginning with 1993 only agricultural and industrial sector statistics are available.

Trends in gross output value since 1952 have been similar to those in energy production and consumption (Table X-4). The structure of gross output value has changed considerably over the past 40 years. In 1952 agriculture accounted for nearly two-thirds of the total and industry only one-fifth. In 1992 the situation was the reverse, with industry taking 76% and agriculture 12%.

Gross output value statistics for the industrial sector make clear how deeply the economic system reforms of the past decade and a half have affected ownership structure. In 1980 state-owned enterprises accounted for three quarters of industrial output, and collectives of various sorts for nearly all the rest (Table X-5). By 1993 the picture was very different; state-owned enterprises accounted for only 43% of output, a share that was dropping at five percentage points a year. Rural industry — including units run by local governments, collectives, and private individuals — was responsible for by far the largest share of growth in output. Foreign and domestic joint ventures have become a significant economic force as well, with a share that grew from less than 1% in the early 1980s to over 10% in 1993. Foreign joint ventures have been a major factor in the rapid growth of China's exports over this period.

## NATIONAL INCOME

National income is probably the indicator closest in accounting terms to gross national product.<sup>5</sup> The structure of national income and trends since 1978 are very similar to those of gross national product,

and data are available for years beginning in 1952 (Table X-6). Assuming that this relationship has always held true, national income is probably the best replacement for gross national product in conducting historical comparisons. In this volume we have used deflators derived from national income data in converting current yuan to constant yuan. Regional and sectoral patterns of national income distribution are similar to those of gross national product and gross domestic product (Table X-7).

## POPULATION

By 1993 China's population had reached at least 1.185 billion.<sup>6</sup> The population remains mainly rural, with only about 23% living in urban areas (Table X-8).<sup>7</sup> The urban population, however, has been increasing much faster than the rural population, due in part to migration and in part to expansion and reclassification of rural towns; there were 570 cities in China at the end of 1993, compared to fewer than 300 in the early 1980s. Population is overwhelmingly concentrated in the eastern and southern coastal provinces and inland in the Yangtze and Yellow River valleys, for some provinces exceeding 500 persons per km<sup>2</sup> (Table X-9). Population in the Northeast and Southwest is somewhat less dense, and in the Northwest and West it is quite sparse.

Statistics on urban households show that rates of employment have been relatively steady, while average household size has decreased steadily, from 4.06 persons in 1983 to 3.31 persons in 1993 (Table X-10). Most household income is spent on commodities, with food and clothing together accounting for nearly 60%. Because housing and utilities are still subsidized for the vast majority of urban residents, rent requires less than 2% of disposable income, as does energy (including fuel and electricity).

## TECHNICAL NOTE: CHINA'S SYSTEM OF NATIONAL ACCOUNTS

The main sources of Chinese national accounts data are the China Statistical Yearbooks (*Zhongguo Tongji Nianjian*) and Almanacs of China's Economy (*Zhongguo Jingji Nianjian*) compiled by China's

State Statistical Bureau, and the World Tables which contain information from the data files of the World Bank. China's national accounts data differ from other countries' in statistical coverage and practice, although efforts have been under way for some time to bring accounts in line with international norms. Their primary measure of national wealth, national income, is comparable to the Material Product System concept of net material product. In order to facilitate international comparison, national income must be converted to the western System of National Accounts concept of gross domestic product. Using a methodology developed by the World Bank, China has begun to publish data on gross national product. China's State Statistical Bureau divides gross national product into primary, secondary, and tertiary industries, which are roughly comparable to the more conventional categories of agriculture, industry, and service sectors. The lack of coverage of the service sector, along with uneven coverage of rural industry in the Chinese data complicates the conversion of national income to gross national product. A further difficulty is the use of sectoral classifications which are different from the UN International Standard Industrial Classification.

## NET MATERIAL PRODUCT AND NATIONAL INCOME

The Chinese definition of national income is approximately the same as the United Nations' net material product, i.e., the net output from five "material sectors" of the economy which intentionally excludes the service sector. As defined by the State Statistical Bureau, the difference between material and nonmaterial production is that all activities contributing to the production of goods are material; all other services are nonmaterial. Material production is divided into five sectors: agriculture, including animal husbandry, fishery, forestry, and water conservation; industry; construction; transportation; and commerce, including food service, and materials supply, marketing, and storage. The non-material sector essentially includes all personal and most public services, for example health care, education, scientific research, government, and financial services.

The State Statistical Bureau has two different

methods for calculating national income: the production approach ("national income produced"), and the distribution approach ("national income used"). The distribution approach identifies two stages, primary distribution and redistribution. Primary distribution, or national income distributed, is comprised of personal income from activities in material sectors and the net revenue of enterprises and undertakings in these sectors. Redistribution is the sum of consumption and accumulation (investment). In practice, the State Statistical Bureau supplements data on national income produced with data on national income distributed, resulting in a hybrid approach. Theoretically, the methods should yield the same aggregate figure after adjustment for the balance of foreign transactions. Problems with the quantity and quality of the data, however, lead to statistical discrepancies.

The State Statistical Bureau also calculates the "gross output value of society", which is the sum of the gross outputs of the five material sectors. This figure, of course, cannot be used as an indicator of national wealth since it double counts the value of the inputs, a problem particularly serious in the industrial sector.

## **NATIONAL INCOME PRODUCED**

"National income produced" is the sum of the net output value of the five material sectors of the economy. Conceptually, to arrive at the net output value of a sector the gross output value of the sector is first determined by multiplying the list price of goods by the quantity produced. Next deductions are made for depreciation and intermediate products and inputs to arrive at the value added or net output value. Finally the net output values from all five material sectors are summed to arrive at national income produced.

### *Industry*

For industrial output, the State Statistical Bureau estimates the gross output value by valuing the volume of output at list prices. Township (formerly commune) industry output is included while village (formerly brigade) level is excluded. To arrive at

value added, the value of the inputs and depreciation should be deducted from the gross output value. Since detailed information is generally unavailable for production costs, however, the State Statistical Bureau uses an income approach by adding wages, fringe benefits, profits and other charges to estimate the value added.

### *Agriculture*

Agriculture consists of three principal activities: crop growing, animal husbandry and sideline production (until 1985 village-level industry was included in the agricultural sector rather than the industrial sector). Gross output is valued at prices prevailing in the locality. Output procured by the state is valued at procurement prices as is output consumed. Net output value is calculated by deducting seed, fertilizer, insecticide, animal feed and equipment inputs as well as depreciation.

### *Construction*

The gross output value of the construction sector covers the total cost of building "productive" and "nonproductive" (e.g., housing and hospitals) structures. As in the industrial sector, the State Statistical Bureau calculates the net output value by estimating depreciation and using the income approach to estimate the value added by labor.

### *Transport and Communications*

This sector covers all modes of freight transportation – water, air, road and rail – as well as the postal and telecommunications services provided to the material sectors. Passenger transportation and outlays on private postal and telecommunications services are excluded. Again, the State Statistical Bureau uses an income approach to estimate value added.

### *Commerce*

Commerce covers all wholesaling and retail-

ing activities, including restaurants, which are viewed as an extension of material production. Value added is estimated either by taking the difference between purchases and sales, then deducting outlays on transportation, storage and packaging, office expenses and depreciation, or by the income approach.

### **NATIONAL INCOME USED**

“National income used” is simply defined by the State Statistical Bureau as consumption plus accumulation (investment) and is theoretically equivalent to national income produced if exports are deducted and imports are added. This method attempts to track the distribution of income within the economy. Income is confined to the personal income and the net revenue of enterprises and undertakings from the five material sectors. Personal income consists of: wages and welfare benefits paid to workers; expenses incurred by enterprises for meeting health, education and welfare payments; and income in cash and in kind of agricultural workers and commune members, including income from sideline activities. Net revenue of enterprises includes profits, taxes and payments of interest, and for training workers.

The use of the income is subdivided into social and individual consumption and accumulation. Social consumption is comprised of government and communal consumption (including the expenditures by the state and enterprises on cultural, educational, public health and welfare services). Depreciation and minor repairs on private buildings, assets of government agencies, the armed forces and all nonproductive enterprises are included in consumption. Accumulation is further disaggregated into fixed accumulation and circulating assets. The former represents the part of the national product that leads to increases in fixed capital assets, while the latter comprises increases in inventories.

### **GROWTH RATES**

The State Statistical Bureau publishes indices of economic indicators which are intended to reflect the ratio of the real value of the indicator in a given year to the real value in the base year. The indica-

tor is assigned a value of 100 in the base year which is often 1952 (as is the case for national income). These indices can be used to construct deflators to a given base year. Tables of the indicator in current yuan can then be converted to constant yuan in the chosen base year. The implicit deflators are obtained by dividing the index number for the year of interest by the index number for the base year. For example, we calculated national income in constant yuan by the following formula:

$$\text{national income in constant yuan} = \frac{\text{base year national income in current yuan} \times (\text{current year index} \div \text{base year index})$$

Because of problems with overreporting of production in the past, especially in the 1950s and 1960s, basing constant prices on 1980 indices, as we do here, gives an upward bias to older indicator values.

In some cases (e.g., for gross output value) values for indicators are given in terms of constant yuan by subperiods of about 10 years, with one year overlapping between subperiods so that comparisons between subperiods are possible.

### **CHOICE OF INDICATOR FOR GROWTH RATES**

National income is about 20% lower than gross national product or gross domestic product figures due to two main differences: national income does not include the service sector, and national income subtracts depreciation. Because the State Statistical Bureau did not concentrate on collecting data on the service sector in the past, the figures for gross national product begin with 1978, whereas the State Statistical Bureau publishes figures for national income start at 1952, making the latter more attractive for describing long-term growth trends.

For descriptions of overall growth and the change in the structure of the economy, gross national product and gross domestic product give a truer picture because they include consumption of fixed assets and attempt to capture the service sector. The growth rate of national income, however, may be taken as approximately the same as the growth rates of gross national product and gross domestic product because, by the World Bank's estimates, the ratios of gross national product and gross domes-

tic product to national income were the same in both 1957 and 1979.<sup>8</sup> In terms of general quality of data, it is generally agreed that the statistics do reflect the trends in the economy. However, it is also recognized that statistical reporting was exaggerated during the Great Leap Forward and hence less confidence can be placed in these figures.

When determining growth trends in sectoral energy intensities for China, another macroeconomic indicator is used, i.e., gross output value. Despite the fact that gross output intensities will be quantitatively different from the "true" sector intensities calculated from the net output values, they are more likely to accurately reflect trends in energy intensities than those calculated from the net output value, since the ratio of the latter indicator to physical output probably fluctuates more over time. The State Statistical Bureau calculates net output by calculating the value added by the labor input minus wages, salaries, and social insurance. Even when properly deflated, however, the labor value input may not properly reflect physical net output because of changing productivity and deliberate underuse of labor inputs. Finally, the ratio of net output to physical output may change if production practices change. For instance a factory may begin to purchase from outside sources inputs that it had previously produced itself. The gross output to physical output ratio, on the other hand, is more likely to be constant and therefore is generally a better indicator to use for analyzing trends in energy intensity within subsectors. Aggregate energy intensities are calculated by weighting the sector intensities by energy shares rather than by gross output shares. If instead energy intensities were aggregated by gross output shares, the industrial sector trend would tend to be overweighted since that is where most of the double counting of output occurs

<sup>1</sup> China only recently began to issue figures on gross national product. Gross national product data are available for years beginning in 1978, unlike data on some other economic indicators, which go back to the early 1950s. See Technical Note.

<sup>2</sup> In gross domestic product accounts the "secondary" sector includes mining, manufacturing, utilities, and construction.

<sup>3</sup> Converted at the average 1993 official exchange rate of 5.76 yuan per US dollar. The yuan has since fallen against the dollar (as the Chinese government has taken steps towards making

the yuan fully convertible, including unifying the official and "swap" market exchange rates (January 1 1994) and abolishing Foreign Exchange Certificates, a convertible currency paralleling the nonconvertible Renminbi). As of August 1995 the exchange rate was about 8.31 yuan to the dollar.

The World Bank has published an adjusted per capita gross national product of China of US \$490 (also based on exchange rates) in 1993, 11% of the world average, and 2% of that in the United States (World Bank, 1995). Using purchasing power parity estimates of gross national product, the same source shows that China's per capita output is much higher, equivalent to about 9% of that in the United States in 1990.

<sup>4</sup> Gross output value may be the indicator most useful in tracking time trends within subsectors. The most reliable measures of energy intensity generally are based on units of physical output, but this is not possible for most industrial and other subsectors, and not easy to incorporate into aggregate indicators. One advantage of gross output value over value added in comparing energy intensities between years is that the former more directly measures production activity. Another advantage of gross output is that the calculation of value added, which is based on the deflated prices of inputs and outputs, introduces more error than the calculation of gross output value, which is based only on the prices of outputs. In studies of U.S. industries for which data on physical output were available, it was found that trends in energy intensity based on gross output value followed trends in physical energy intensity more closely than did those based on value added (Ross, 1992).

All aggregate indicators of energy intensity within sectors or whole economies are problematic, largely because of structural changes within sectors. Comparing time series of output statistics is possible so long as the degree of vertical integration among enterprises — and therefore transactions counted in output statistics — remains relatively constant, a troublesome assumption for China's changing economic system. This point should be kept in mind when using any of the aggregate data in this chapter in constructing energy intensity indices (or for any other purpose).

<sup>5</sup> Chinese national accounts define national income as the net output value (or value added) of the five "material production" sectors: agriculture, industry, transportation, construction, and commerce. It does not include value added in the "nonmaterial production" sectors, e.g., financial services, education, scientific research, etc. Gross national product is the sum of national income, value added in the "nonmaterial production" sectors, and depreciation of fixed assets. See the Technical Note at the end of this section.

<sup>6</sup> Some analysts believe that China's official population statistics understate actual population by up to 100 million.

<sup>7</sup> Many of those classified as residents of urban areas actually inhabit rural counties under the administration of cities. According to this scheme 28% of China's populations lives in urban areas (before these figures were adjusted in 1991 official statistics reported that over half of China's population lived in urban areas). A more realistic figure for rural population is that based on household classification as "agricultural" and "nonagricultural"

<sup>8</sup> World Bank, 1983.

**Table X-1. Gross National Product and Gross Domestic Product**

<b>I. Total Gross National Product</b>						
Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Deflators: 1980 Yuan	Nominal Growth	Real Growth
1978	358.81	100.0	385.34	1.074		
1979	399.81	107.6	414.63	1.037	11.4%	7.6%
1980	447.00	116.0	447.00	1.000	11.8%	7.8%
1981	477.30	121.2	467.04	0.978	6.8%	4.5%
1982	519.30	131.8	507.88	0.978	8.8%	8.7%
1983	580.90	145.4	560.29	0.965	11.9%	10.3%
1984	696.20	166.9	643.14	0.924	19.8%	14.8%
1985	855.76	188.2	725.22	0.847	22.9%	12.8%
1986	969.63	203.5	784.18	0.809	13.3%	8.1%
1987	1,130.10	225.7	869.72	0.770	16.5%	10.9%
1988	1,406.82	251.2	967.99	0.688	24.5%	11.3%
1989	1,599.33	262.1	1,009.99	0.632	13.7%	4.3%
1990	1,769.53	272.7	1,050.84	0.594	10.6%	4.0%
1991	2,023.63	295.0	1,136.77	0.562	14.4%	8.2%
1992	2,437.89	334.5	1,288.98	0.529	20.5%	13.4%
1993	3,134.23	378.7	1,459.30	0.466	28.6%	13.2%

<b>Total GNP Average Real Growth</b>	
1981-1985	11.6%
1986-1990	7.6%
1981-1990	9.4%
1990-1993	11.6%

<b>2. Total Gross Domestic Product</b>						
Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	358.81	100.0	385.34	1.074	-	-
1979	399.81	107.6	414.63	1.037	11.4%	7.6%
1980	447.00	116.0	447.00	1.000	11.8%	7.8%
1981	477.51	121.2	467.04	0.978	6.8%	4.5%
1982	518.23	131.5	506.73	0.978	8.5%	8.5%
1983	578.70	144.9	558.36	0.965	11.7%	10.2%
1984	692.82	166.0	639.67	0.923	19.7%	14.6%
1985	852.74	187.4	722.14	0.847	23.1%	12.9%
1986	968.76	203.3	783.41	0.809	13.6%	8.5%
1987	1,130.71	225.9	870.49	0.770	16.7%	11.1%
1988	1,407.42	251.3	968.37	0.688	24.5%	11.2%
1989	1,599.76	262.2	1,010.37	0.632	13.7%	4.3%
1990	1,768.13	272.4	1,049.68	0.594	10.5%	3.9%
1991	2,018.83	294.2	1,133.68	0.562	14.2%	8.0%
1992	2,436.29	334.2	1,287.82	0.529	20.7%	13.6%
1993	3,138.03	379.0	1,460.46	0.465	28.8%	13.4%
1994¶	4,380.00	-	1,632.79	-	39.6%	11.8%

<b>Total GNP Average Real Growth</b>	
1981-1985	11.5%
1986-1990	7.6%
1981-1990	9.4%
1990-1994	11.7%

\* These index numbers can be thought of as percentages, e.g., at constant prices, GNP in 1993 was 379% of GNP in 1978. Total GNP in current yuan is slightly different from sum of GNP for sectors due to rounding.

† GNP in constant yuan = base year GNP in current yuan \* (index for current year ÷ index for base year). Total GNP in real yuan is slightly different from sum of GNP for sectors due to rounding and differences in deflators.

¶ Constant yuan figures based on reported real growth rates.

Source: China Statistical Yearbook, various years; China Daily (overseas edition), 2 March, 1995.

Table X-1. Gross National Product and Gross Domestic Product (continued)

3. Agricultural Sector GNP						
Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	101.84	100.0	129.96	33.4%		
1979	125.89	106.1	137.89	33.0%	23.6%	6.1%
1980	135.94	104.6	135.94	30.4%	8.0%	-1.4%
1981	154.56	111.9	145.43	31.1%	13.7%	7.0%
1982	176.16	124.8	162.19	32.0%	14.0%	11.5%
1983	196.08	135.1	175.58	31.5%	11.3%	8.3%
1984	229.55	152.6	198.32	31.0%	17.1%	13.0%
1985	254.16	155.4	201.96	28.0%	10.7%	1.8%
1986	276.39	160.5	208.59	26.6%	8.7%	3.3%
1987	320.43	168.1	218.47	25.1%	15.9%	4.7%
1988	383.10	172.3	223.92	23.1%	19.6%	2.5%
1989	422.80	177.6	230.81	22.8%	10.4%	3.1%
1990	501.70	190.7	247.84	23.6%	18.7%	7.4%
1991	528.86	195.2	253.69	22.3%	5.4%	2.4%
1992	580.00	204.4	265.64	20.6%	9.7%	4.7%
1993	665.00	212.6	276.30	18.4%	14.7%	4.0%
1994¶	823.10	-	285.97	16.8%	23.8%	3.5%

**Agriculture Sector GNP Average Real Growth**

1981-1985	8.6%
1986-1990	4.4%
1981-1990	6.1%
1990-1994	3.6%

4. Industrial Sectors GDP (Includes manufacturing, construction, and transportation)						
Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	174.52	100.0	178.36	45.9%	-	-
1979	191.35	108.2	192.98	46.2%	9.6%	8.2%
1980	219.20	122.9	219.20	49.0%	14.6%	13.6%
1981	225.55	125.2	223.30	47.8%	2.9%	1.9%
1982	238.30	132.1	235.61	46.5%	5.7%	5.5%
1983	264.62	145.8	260.04	46.6%	11.0%	10.4%
1984	310.57	166.9	297.68	46.6%	17.4%	14.5%
1985	386.66	197.9	352.97	48.9%	24.5%	18.6%
1986	449.27	218.2	389.17	49.7%	16.2%	10.3%
1987	525.16	248.1	442.50	50.8%	16.9%	13.7%
1988	658.72	284.1	506.71	52.3%	25.4%	14.5%
1989	727.80	294.8	525.79	52.0%	10.5%	3.8%
1990	771.74	304.1	542.38	51.7%	6.0%	3.2%
1991	910.22	344.7	614.79	54.1%	17.9%	13.4%
1992	1,169.95	419.8	748.74	58.1%	28.5%	21.8%
1993	1,624.49	505.4	901.41	59.9%	38.9%	20.4%
1994§	2,125.90	-	1,058.26	62.3%	30.9%	17.4%

**Industrial Sectors GNP Average Real Growth**

1981-1985	12.1%
1986-1990	8.7%
1981-1990	10.4%
1990-1994	18.2%

\* These index numbers can be thought of as percentages, e.g., at constant prices, GNP in 1993 was 379% of GNP in 1978. Total GNP in current yuan is slightly different from sum of GNP for sectors due to rounding.

† GNP in constant yuan = base year GNP in current yuan \* (index for current year ÷ index for base year). Total GNP in real yuan is slightly different from sum of GNP for sectors due to rounding and differences in deflators.

¶ Based on sum of real sectoral GDP.

§ Constant yuan figures based on reported real growth rates.

Source: China Statistical Yearbook, various years; China Daily (overseas edition), 2 March, 1995.



Table X-1. Gross National Product and Gross Domestic Product (continued)

5. Manufacturing Sector GDP (contained within Industrial Sectors above)

Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	160.70	100.0	163.11	42.0%		
1979	176.97	108.7	177.30	42.5%	10.1%	8.7%
1980	199.65	122.4	199.65	44.7%	12.8%	12.6%
1981	204.84	124.5	203.08	43.5%	2.6%	1.7%
1982	216.23	131.7	214.82	42.4%	5.6%	5.8%
1983	237.56	144.5	235.70	42.2%	9.9%	9.7%
1984	278.90	166.0	270.77	42.4%	17.4%	14.9%
1985	344.87	196.2	320.03	44.3%	23.7%	18.2%
1986	396.70	215.2	351.02	44.8%	15.0%	9.7%
1987	458.58	243.6	397.34	45.6%	15.6%	13.2%
1988	577.72	280.8	458.02	47.3%	26.0%	15.3%
1989	648.40	295.0	481.18	47.6%	12.2%	5.1%
1990	685.50	304.9	497.33	47.4%	5.7%	3.4%
1991	808.71	346.9	565.84	49.8%	18.0%	13.8%
1992	1,028.45	422.9	689.80	53.5%	27.2%	21.9%
1993	1,414.00	512.1	835.30	55.6%	37.5%	21.1%

Manufacturing Sector GNP Average Real Growth

1981-1985	12.0%
1986-1990	9.1%
1981-1990	10.5%
1990-1993	18.9%

6. Services Sector GDP

Year	Billion Current Yuan	Index Based on Constant Prices * (1978=100)	Billion Constant 1980 Yuan †	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	82.45	100.0	80.37	20.7%		
1979	82.57	107.8	86.64	20.8%	0.1%	7.8%
1980	91.86	114.3	91.86	20.6%	11.3%	6.0%
1981	97.40	122.2	98.21	21.0%	6.0%	6.9%
1982	103.77	135.2	108.66	21.5%	6.5%	10.6%
1983	118.00	152.3	122.40	21.9%	13.7%	12.6%
1984	152.70	178.3	143.30	22.4%	29.4%	17.1%
1985	212.92	207.9	167.08	23.1%	39.4%	16.6%
1986	243.10	231.0	185.65	23.7%	14.2%	11.1%
1987	285.12	260.8	209.60	24.1%	17.3%	12.9%
1988	365.60	296.2	238.05	24.6%	28.2%	13.6%
1989	449.16	316.2	254.12	25.1%	22.9%	6.8%
1990	494.69	323.0	259.59	24.7%	10.1%	2.2%
1991	579.75	340.8	273.89	24.0%	17.2%	5.5%
1992	686.34	371.1	298.24	22.7%	18.4%	8.9%
1993	848.54	405.6	325.97	21.7%	23.6%	9.3%
1994§	1,431.00	-	354.33	20.9%	68.6%	8.7%

Services Sector GNP Average Real Growth

1981-1985	14.2%
1986-1990	8.7%
1981-1990	11.4%
1990-1994	8.1%

\* These index numbers can be thought of as percentages, e.g., at constant prices, GNP in 1993 was 379% of GNP in 1978. Total GNP in current yuan is slightly different from sum of GNP for sectors due to rounding.

† GNP in constant yuan = base year GNP in current yuan \* (index for current year ÷ index for base year). Total GNP in real yuan is slightly different from sum of GNP for sectors due to rounding and differences in deflators.

‡ Based on sum of real sectoral GDP.

§ Constant yuan figures based on reported real growth rates.

Source: China Statistical Yearbook, various years; China Daily (overseas edition), 2 March, 1995.

Figure X-1. Gross Domestic Product by Sector

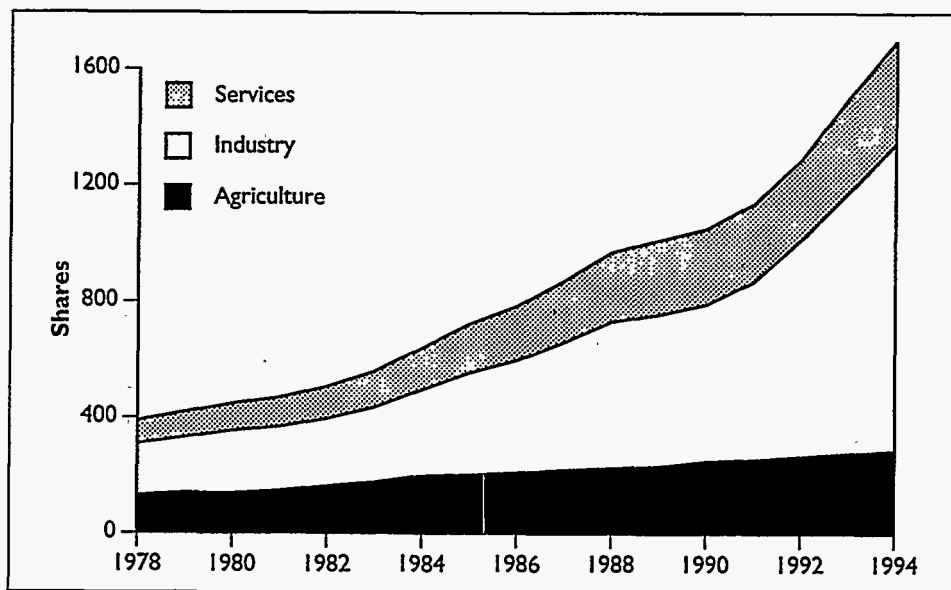
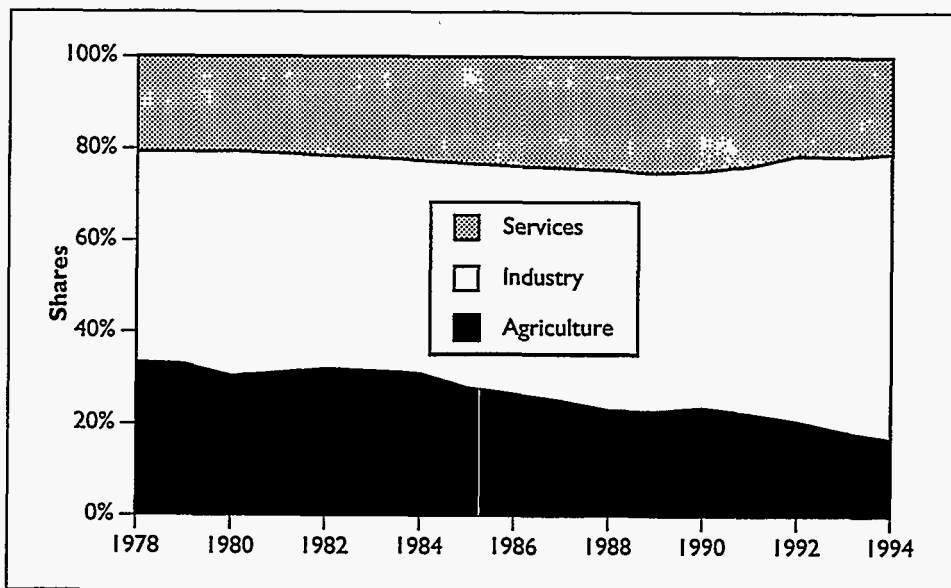


Figure X-2. Sectoral Shares of GDP



**Table X-2. Per Capita Gross National Product, 1978-1993**

Year	Total Population (millions)	GNP (Billion Current Yuan)	GNP (Billion Constant 1980 Yuan)	Per Capita GNP (Current Yuan)	Per Capita GNP (Constant 1980 Yuan)	Nominal Growth Rate (percent)	Real Growth Rate (percent)
1978	962.59	358.81	385.34	373	400	-	-
1979	975.42	399.81	414.63	410	425	10.0%	6.2%
1980	987.05	447.00	447.00	453	453	10.5%	6.5%
1981	1,000.72	477.30	467.04	477	467	5.3%	3.1%
1982	1,016.54	519.30	507.88	511	500	7.1%	7.1%
1983	1,030.08	580.90	560.29	564	544	10.4%	8.9%
1984	1,043.57	696.20	641.98	667	615	18.3%	13.1%
1985	1,058.51	855.76	723.68	808	684	21.2%	11.1%
1986	1,075.07	969.63	783.79	902	729	11.6%	6.6%
1987	1,093.00	1,130.10	870.11	1,034	796	14.6%	9.2%
1988	1,110.26	1,401.82	965.67	1,263	870	22.1%	9.3%
1989	1,127.04	1,591.63	1,003.82	1,412	891	11.8%	2.4%
1990	1,143.33	1,768.61	1,056.23	1,547	924	9.5%	3.7%
1991	1,158.23	2,023.63	1,136.77	1,747	981	12.9%	6.8%
1992	1,171.71	2,437.89	1,288.98	2,081	1,100	19.1%	12.1%
1993	1,185.17	3,134.23	1,459.30	2,645	1,231	27.1%	11.9%

Per Capita GNP Average Real Growth	
1981-1985	10.1%
1986-1990	5.9%
1981-1990	7.8%
1990-1993	10.2%

Sources: China Statistical Yearbook, various years.

**Table X-3. Gross National Product by Province, 1990-1993**

Planning Region	Province	GDP (billion 1990 Yuan)					Per Capita GDP (1990 Yuan)				
		1990	1991	1992	1993	avg annual growth	1990	1991	1992	1993	avg annual growth
North	Beijing	50.08	56.65	63.14	67.69	10.6%	4,611	5,178	5,729	6,088	9.7%
	Tianjin	31.10	32.42	36.61	42.03	10.6%	3,518	3,567	3,980	4,529	8.8%
	Hebei	83.61	90.77	102.85	122.81	13.7%	1,358	1,459	1,639	1,939	12.6%
	Shanxi	39.99	40.82	46.28	50.63	8.2%	1,379	1,388	1,554	1,681	6.8%
	Inner Mongolia	28.67	30.36	33.71	38.15	10.0%	1,325	1,390	1,527	1,709	8.8%
Northeast	Liaoning	96.57	101.52	115.55	141.75	13.6%	2,434	2,544	2,877	3,507	12.9%
	Jilin	39.40	40.11	45.82	52.68	10.2%	1,587	1,598	1,810	2,062	9.1%
	Heilongjiang	65.90	69.50	76.21	84.42	8.6%	1,860	1,944	2,112	2,319	7.6%
East	Shanghai	74.47	81.13	99.22	118.50	16.7%	5,570	6,055	7,377	8,785	16.4%
	Jiangsu	131.58	139.15	175.55	215.94	18.0%	1,944	2,033	2,540	3,100	16.8%
	Zhejiang	83.69	93.03	108.69	133.11	16.7%	2,008	2,214	2,566	3,121	15.8%
	Anhui	60.65	56.77	65.02	76.80	8.2%	1,069	985	1,114	1,302	6.8%
	Fujian	45.95	51.78	61.86	80.60	20.6%	1,513	1,682	1,985	2,559	19.1%
	Jiangxi	41.95	43.99	49.82	55.03	9.5%	1,101	1,138	1,273	1,388	8.0%
	Shandong	133.34	151.05	176.48	211.86	16.7%	1,570	1,763	2,050	2,452	16.0%
South-Central	Henan	89.57	93.94	108.02	124.11	11.5%	1,036	1,072	1,219	1,387	10.2%
	Hubei	79.11	81.05	89.16	101.79	8.8%	1,454	1,470	1,598	1,801	7.4%
	Hunan	70.26	74.33	81.93	93.48	10.0%	1,147	1,197	1,307	1,481	8.9%
	Guangdong	147.18	168.43	204.21	252.85	19.8%	2,319	2,616	3,130	3,827	18.2%
	Guangxi	39.28	42.85	50.96	61.78	16.3%	922	991	1,163	1,392	14.7%
	Hainan	9.50	10.21	12.62	17.65	22.9%	1,433	1,515	1,839	2,518	20.7%
Southwest	Sichuan	114.49	121.18	131.89	153.55	10.3%	1,060	1,112	1,199	1,383	9.3%
	Guizhou	25.49	27.41	29.53	32.02	7.9%	780	827	879	939	6.4%
	Yunnan	39.60	40.94	45.41	51.91	9.4%	1,061	1,083	1,185	1,336	8.0%
	Tibet	2.45	2.89	2.97	2.92	6.1%	1,101	1,278	1,300	1,260	4.6%
Northwest	Shaanxi	37.41	40.48	43.86	48.17	8.8%	1,128	1,204	1,288	1,399	7.4%
	Gansu	23.40	24.16	26.85	28.09	6.3%	1,038	1,057	1,161	1,198	4.9%
	Qinghai	6.63	6.87	7.51	8.29	7.7%	1,481	1,512	1,628	1,774	6.2%
	Ningxia	6.11	6.48	7.00	7.71	8.1%	1,300	1,350	1,437	1,558	6.2%
	Xinjiang	25.19	29.48	34.04	37.78	14.5%	1,647	1,896	2,153	2,354	12.6%
National Total		1,768.13	1,909.63	2,169.27	2,460.06	11.6%	1,546	1,649	1,851	2,076	10.3%
Balance*		45.52	59.89	36.52	-54.05	-	-	-	-	-	-

\* Totals differ from the sum of regional GDP because regions calculate GDP with their own methods, which may differ from those used by the State Statistical Bureau.

Source: China Statistical Yearbook, various years.

**Table X-4. Gross Output Value by Sectors, \* 1952-1993**

<b>I. Gross Output, Billion Current Yuan</b>						
<b>Year</b>	<b>Total</b>	<b>Agriculture</b>	<b>Industry</b>	<b>Construction</b>	<b>Transportation</b>	<b>Commerce</b>
1952	101.5	46.1	34.9	5.7	3.5	11.3
1953	124.1	51.0	45.0	8.5	4.2	15.4
1954	134.6	53.5	51.5	8.2	4.8	16.6
1955	141.5	57.5	53.4	8.6	5.0	17.0
1956	163.9	61.0	64.2	14.6	5.6	18.5
1957	160.6	53.7	70.4	11.8	6.0	18.7
1958	213.8	56.6	108.3	20.2	9.0	19.7
1959	254.8	49.7	148.3	23.5	12.1	21.2
1960	267.9	45.7	163.7	24.8	13.1	20.6
1961	197.8	55.9	106.2	9.0	7.6	19.1
1962	180.0	58.4	92.0	7.4	6.2	16.0
1963	195.6	64.2	99.3	9.7	6.6	15.8
1964	226.8	72.0	116.4	15.1	7.2	16.1
1965	269.5	83.3	140.2	17.7	9.1	19.2
1966	306.2	91.0	162.4	19.7	10.2	22.9
1967	277.4	92.4	138.2	15.5	8.6	22.7
1968	264.8	92.8	128.5	13.2	8.3	22.0
1969	318.4	94.8	166.5	22.2	9.9	25.0
1970	380.0	102.1	211.7	27.1	11.7	27.4
1971	420.3	106.8	241.4	31.1	12.8	28.2
1972	439.6	107.5	256.5	32.3	13.6	29.7
1973	477.6	117.3	279.4	33.5	14.4	33.0
1974	485.9	121.5	279.2	37.6	14.2	33.4
1975	537.9	126.0	320.7	43.7	16.0	31.5
1976	543.3	125.8	327.8	43.5	15.5	30.7
1977	600.3	125.3	372.5	46.2	17.9	38.4
1978	684.6	139.7	423.7	56.9	20.5	43.8
1979	764.2	169.8	468.1	64.5	20.9	40.9
1980	853.4	192.3	515.4	76.7	25.0	44.0
1981	907.5	218.1	540.0	74.7	25.7	49.0
1982	996.6	248.3	581.1	91.2	28.6	47.4
1983	1,113.1	275.0	646.1	105.3	31.8	54.9
1984	1,317.1	321.4	761.7	126.3	38.8	68.9
1985	1,658.2	361.9	971.6	165.6	48.8	110.3
1986	1,904.5	401.3	1,119.4	203.8	59.8	120.2
1987	2,303.4	467.6	1,381.3	243.1	70.2	141.2
1988	2,980.7	586.5	1,822.4	296.7	83.7	191.4
1989	3,451.9	653.5	2,201.7	283.4	99.0	214.3
1990	3,803.5	766.2	2,392.4	304.3	153.5	187.1
1991	4,380.3	815.7	2,824.8	370.0	166.5	20.3
1992	5,584.2	908.5	3,706.6	519.6	180.5	269.0
1993	-	1,099.6	5,269.2	-	-	-

\* 1992 is the last year for which total gross output value statistics are available. Only industrial and agricultural gross output value data are published for subsequent years.

Source: China Statistical Yearbook, various years.

Table X-4. Gross Output Value by Sectors, 1952-1993 \* (continued)

2. Gross Output, Index Based on Constant Prices (1952 = 100) †						
Year	Total	Agriculture	Industry	Construction	Transportation	Commerce
1952	100.0	100.0	100.0	100.0	100.0	100.0
1953	118.7	103.1	130.3	154.4	125.7	130.1
1954	128.8	106.6	151.6	152.6	145.7	137.2
1955	136.6	114.7	160.1	163.2	154.3	140.7
1956	161.1	120.5	205.0	249.1	177.1	153.1
1957	170.9	124.8	228.6	236.8	200.0	151.3
1958	226.6	127.8	353.9	403.4	303.3	159.4
1959	267.4	110.4	481.8	439.6	406.7	171.6
1960	279.8	96.4	535.7	453.6	443.3	165.9
1961	186.2	94.1	330.8	162.6	256.7	135.1
1962	167.5	99.9	276.0	138.5	206.7	131.9
1963	184.6	111.5	299.4	184.7	220.0	140.8
1964	216.9	126.7	358.1	285.0	240.0	142.4
1965	258.2	137.1	452.6	351.2	303.3	142.4
1966	301.9	149.0	547.4	395.4	340.0	170.7
1967	272.0	151.3	471.8	311.1	290.0	169.9
1968	259.2	147.6	448.1	264.9	283.3	164.3
1969	324.7	149.2	601.6	445.6	336.7	188.6
1970	403.2	157.8	798.1	543.9	400.0	210.4
1971	445.4	162.9	915.3	614.2	437.6	216.5
1972	465.3	161.2	978.2	630.2	465.0	228.1
1973	505.5	174.5	1,071.3	640.3	492.3	253.4
1974	515.1	180.7	1,077.7	702.5	485.5	256.5
1975	574.4	186.3	1,244.7	800.8	547.0	266.5
1976	582.3	185.5	1,274.9	784.8	529.9	275.7
1977	642.5	184.8	1,461.1	820.9	612.0	303.3
1978	726.3	199.8	1,659.0	995.5	700.9	344.8
1979	788.2	214.8	1,805.3	1,101.9	714.5	376.3
1980	854.2	217.9	1,972.3	1,282.6	844.4	400.1
1981	891.7	230.5	2,057.1	1,212.3	868.1	469.2
1982	976.4	256.5	2,217.7	1,438.1	966.0	499.2
1983	1,076.2	276.5	2,465.8	1,588.6	1,053.9	551.9
1984	1,234.6	310.4	2,867.3	1,800.9	1,172.1	617.4
1985	1,446.3	321.0	3,480.7	2,167.1	1,405.2	741.0
1986	1,593.1	331.8	3,886.8	2,469.8	1,553.8	822.0
1987	1,818.2	351.0	4,574.5	2,717.3	1,726.0	899.2
1988	2,106.0	364.9	5,525.4	2,914.6	1,945.6	981.1
1989	2,219.9	376.2	5,997.3	2,576.5	2,158.4	926.5
1990	2,367.5	404.9	6,462.9	2,588.5	2,266.5	892.9
1991	2,640.0	419.9	7,419.4	2,848.0	2,412.7	964.0
1992	3,212.6	446.6	9,459.7	3,561.6	2,609.1	1,043.2
1993	-	481.4	12,110.3	-	-	-

\* 1992 is the last year for which total gross output value statistics are available. Only industrial and agricultural gross output value data are published for subsequent years.

† These index figures can be thought of as percentages, e.g., at constant prices, total gross output in 1992 was 3,213% of gross output in 1952.

Source: China Statistical Yearbook, various years.

Table X-4. Gross Output Value by Sectors, 1952-1990 \* (continued)

3. Gross Output, Billion Constant 1980 Yuan †							
Year	Total	Sum of Sectors‡	Agriculture	Industry	Construction	Transportation	Commerce
1952	99.9	134.3	88.3	26.1	6.0	3.0	11.0
1953	118.6	152.3	91.0	34.0	9.2	3.7	14.3
1954	128.7	162.2	94.1	39.6	9.1	4.3	15.1
1955	136.5	172.9	101.2	41.8	9.8	4.6	15.5
1956	160.9	196.9	106.3	53.6	14.9	5.2	16.8
1957	170.7	206.6	110.1	59.7	14.2	5.9	16.6
1958	226.4	255.9	112.8	92.5	24.1	9.0	17.5
1959	267.1	280.5	97.4	125.9	26.3	12.0	18.9
1960	279.5	283.6	85.1	140.0	27.1	13.1	18.2
1961	186.0	201.7	83.0	86.4	9.7	7.6	14.9
1962	167.3	189.2	88.2	72.1	8.3	6.1	14.5
1963	184.4	209.7	98.4	78.2	11.0	6.5	15.5
1964	216.7	245.2	111.8	93.6	17.0	7.1	15.7
1965	258.0	284.9	121.0	118.3	21.0	9.0	15.7
1966	301.6	327.0	131.5	143.0	23.6	10.1	18.8
1967	271.7	302.7	133.5	123.3	18.6	8.6	18.7
1968	259.0	289.7	130.3	117.1	15.8	8.4	18.1
1969	324.4	346.2	131.7	157.2	26.6	10.0	20.7
1970	402.8	415.3	139.3	208.6	32.5	11.8	23.1
1971	445.0	456.4	143.8	239.2	36.7	13.0	23.8
1972	464.9	474.4	142.3	255.6	37.7	13.8	25.1
1973	505.0	514.7	154.0	280.0	38.3	14.6	27.9
1974	514.6	525.7	159.5	281.6	42.0	14.4	28.2
1975	573.9	583.1	164.4	325.3	47.9	16.2	29.3
1976	581.8	589.8	163.7	333.2	46.9	15.7	30.3
1977	641.9	645.5	163.1	381.8	49.1	18.1	33.4
1978	725.6	728.1	176.3	433.5	59.5	20.8	37.9
1979	787.5	789.8	189.6	471.8	65.9	21.2	41.4
1980	853.4	853.4	192.3	515.4	76.7	25.0	44.0
1981	890.9	890.8	203.4	537.6	72.5	25.7	51.6
1982	975.5	975.4	226.4	579.5	86.0	28.6	54.9
1983	1,075.2	1,075.3	244.0	644.4	95.0	31.2	60.7
1984	1,233.4	1,233.5	273.9	749.3	107.7	34.7	67.9
1985	1,444.9	1,445.5	283.3	909.6	129.6	41.6	81.5
1986	1,591.6	1,592.6	292.8	1,015.7	147.7	46.0	90.4
1987	1,816.5	1,817.7	309.8	1,195.4	162.5	51.1	98.9
1988	2,104.0	2,105.7	322.0	1,443.9	174.3	57.6	107.9
1989	2,217.8	2,219.1	332.0	1,567.2	154.1	63.9	101.9
1990	2,365.3	2,366.3	357.3	1,688.9	154.8	67.1	98.2
1991	2,637.5	2,657.2	370.6	1,938.8	170.3	71.4	106.0
1992	3,209.6	3,271.1	394.1	2,472.0	213.0	77.2	114.7
1993	-	-	424.9	3,164.7	-	-	-

\* 1992 is the last year for which total gross output value statistics are available. Only industrial and agricultural gross output value data are published for subsequent years.

† Gross output in constant yuan = base year gross output in current yuan \* (index for current year ÷ index for base year).

‡ Total gross output in 1980 yuan is not equal to the sum of sectoral gross outputs because the sectoral deflators are different from the deflators for total gross output.

Source: China Statistical Yearbook, various years.

Figure X-3. Gross Output Value

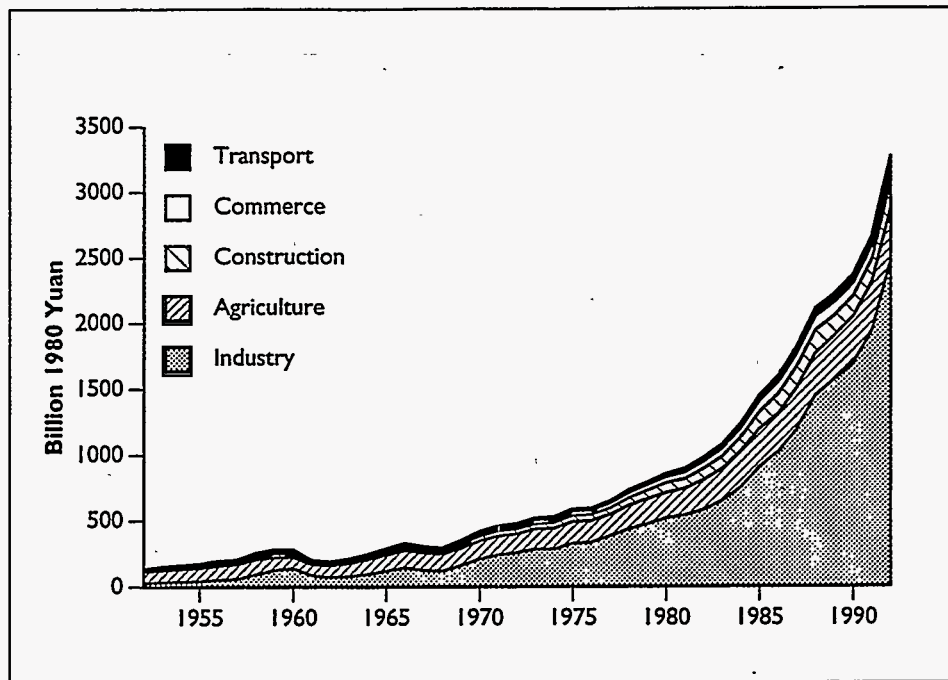
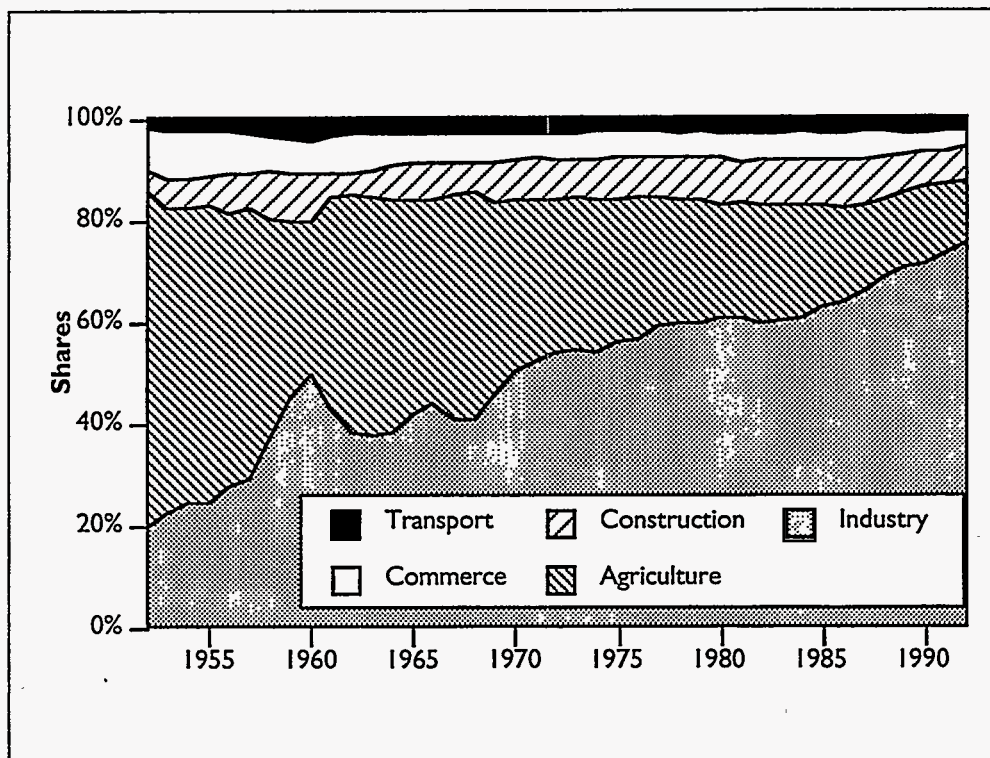


Figure X-4. Sectoral Shares of GOV





**Table X-4. Gross Output Value by Sectors, 1952-1990 \* (continued)**

<b>4. Sectoral Shares of Gross Output, Percent ¥</b>					
<b>Year</b>	<b>Agriculture</b>	<b>Industry</b>	<b>Construction</b>	<b>Transport</b>	<b>Commerce</b>
1952	65.7%	19.5%	4.5%	2.2%	8.2%
1953	59.7%	22.4%	6.1%	2.4%	9.4%
1954	58.0%	24.4%	5.6%	2.7%	9.3%
1955	58.6%	24.2%	5.6%	2.6%	9.0%
1956	54.0%	27.2%	7.6%	2.7%	8.6%
1957	53.3%	28.9%	6.9%	2.9%	8.1%
1958	44.1%	36.1%	9.4%	3.5%	6.9%
1959	34.7%	44.9%	9.4%	4.3%	6.7%
1960	30.0%	49.4%	9.6%	4.6%	6.4%
1961	41.2%	42.9%	4.8%	3.8%	7.4%
1962	46.6%	38.1%	4.4%	3.2%	7.7%
1963	46.9%	37.3%	5.3%	3.1%	7.4%
1964	45.6%	38.2%	7.0%	2.9%	6.4%
1965	42.5%	41.5%	7.4%	3.2%	5.5%
1966	40.2%	43.7%	7.2%	3.1%	5.7%
1967	44.1%	40.7%	6.1%	2.8%	6.2%
1968	45.0%	40.4%	5.5%	2.9%	6.2%
1969	38.0%	45.4%	7.7%	2.9%	6.0%
1970	33.5%	50.2%	7.8%	2.9%	5.6%
1971	31.5%	52.4%	8.0%	2.8%	5.2%
1972	30.0%	53.9%	7.9%	2.9%	5.3%
1973	29.9%	54.4%	7.4%	2.8%	5.4%
1974	30.3%	53.6%	8.0%	2.7%	5.4%
1975	28.2%	55.8%	8.2%	2.8%	5.0%
1976	27.8%	56.5%	8.0%	2.7%	5.1%
1977	25.3%	59.2%	7.6%	2.8%	5.2%
1978	24.2%	59.5%	8.2%	2.9%	5.2%
1979	24.0%	59.7%	8.3%	2.7%	5.2%
1980	22.5%	60.4%	9.0%	2.9%	5.2%
1981	22.8%	60.3%	8.1%	2.9%	5.8%
1982	23.2%	59.4%	8.8%	2.9%	5.6%
1983	22.7%	59.9%	8.8%	2.9%	5.6%
1984	22.2%	60.7%	8.7%	2.8%	5.5%
1985	19.6%	62.9%	9.0%	2.9%	5.6%
1986	18.4%	63.8%	9.3%	2.9%	5.7%
1987	17.0%	65.8%	8.9%	2.8%	5.4%
1988	15.3%	68.6%	8.3%	2.7%	5.1%
1989	15.0%	70.6%	6.9%	2.9%	4.6%
1990	15.1%	71.4%	6.5%	2.8%	4.1%
1991	13.9%	73.0%	6.4%	2.7%	4.0%
1992	12.0%	75.6%	6.5%	2.4%	3.5%
1992	-	-	-	-	-

\* 1992 is the last year for which total gross output value statistics are available. Only industrial and agricultural gross output value data are published for subsequent years.

¥ Relative to the sum of real sectoral gross output (second column of data on previous page), not the total calculated from a single deflator.

Source: China Statistical Yearbook, various years.

Table X-5. Industrial Gross Output Value by Ownership of Enterprise, 1980-1993

I. Billion Current Yuan												
Year	State-Owned Enterprises	Non-State Enterprises					Subtotal	Private			Other*	Total
		Township-Owned	Village-Owned	Rural Collective	Urban Collective	Uncategorized		Rural	Urban	Subtotal		
1980	391.560	-	-	-	-	-	121.336	-	-	0.081	2.449	515.426
1981	403.710	-	-	-	-	-	132.938	-	-	0.190	3.140	539.978
1982	432.600	-	-	-	-	-	144.242	-	-	0.340	3.940	581.122
1983	473.940	-	-	-	-	-	166.314	-	-	0.750	5.040	646.044
1984	526.270	-	-	-	-	-	226.309	-	-	1.480	7.670	761.729
1985	630.212	76.055	66.272	15.175	-	154.217	311.719	14.636	3.339	17.975	11.741	971.647
1986	697.112	98.108	83.849	22.723	2.056	168.418	375.154	27.941	2.913	30.854	16.306	1,119.426
1987	825.009	128.419	116.535	28.615	3.031	201.574	478.174	45.212	5.027	50.239	27.877	1,381.299
1988	1,035.128	184.669	170.363	40.011	3.927	259.779	658.749	72.200	6.848	79.048	49.532	1,822.458
1989	1,234.291	219.384	211.768	44.627	5.003	305.023	785.805	96.796	8.970	105.766	75.844	2,201.706
1990	1,306.375	244.141	239.402	48.447	5.453	314.830	852.273	118.306	10.724	129.030	104.756	2,392.436
1991	1,495.458	300.131	293.408	50.026	6.901	358.009	1,008.475	147.982	12.928	160.910	159.958	2,824.801
1992	1,782.412	441.724	453.983	76.794	10.188	427.432	1,410.121	231.142	19.538	250.680	263.358	3,706.571
1993	2,272.467	749.520	645.429	116.644	15.552	494.176	2,021.321	400.587	39.618	440.205	535.206	5,269.199

2. Shares												
Year	State-Owned Enterprises	Non-State Enterprises					Subtotal	Private			Other*	Total
		Township-Owned	Village-Owned	Rural Collective	Urban Collective	Uncategorized		Rural	Urban	Subtotal		
1980	76.0%	-	-	-	-	-	23.5%	-	-	0.0%	0.5%	100.0%
1981	74.8%	-	-	-	-	-	24.6%	-	-	0.0%	0.6%	100.0%
1982	74.4%	-	-	-	-	-	24.8%	-	-	0.1%	0.7%	100.0%
1983	73.4%	-	-	-	-	-	25.7%	-	-	0.1%	0.8%	100.0%
1984	69.1%	-	-	-	-	-	29.7%	-	-	0.2%	1.0%	100.0%
1985	64.9%	7.8%	6.8%	1.6%	-	15.9%	32.1%	1.5%	0.3%	1.8%	1.2%	100.0%
1986	62.3%	8.8%	7.5%	2.0%	0.2%	15.0%	33.5%	2.5%	0.3%	2.8%	1.5%	100.0%
1987	59.7%	9.3%	8.4%	2.1%	0.2%	14.6%	34.6%	3.3%	0.4%	3.6%	2.0%	100.0%
1988	56.8%	10.1%	9.3%	2.2%	0.2%	14.3%	36.1%	4.0%	0.4%	4.3%	2.7%	100.0%
1989	56.1%	10.0%	9.6%	2.0%	0.2%	13.9%	35.7%	4.4%	0.4%	4.8%	3.4%	100.0%
1990	54.6%	10.2%	10.0%	2.0%	0.2%	13.2%	35.6%	4.9%	0.4%	5.4%	4.4%	100.0%
1991	52.9%	10.6%	10.4%	1.8%	0.2%	12.7%	35.7%	5.2%	0.5%	5.7%	5.7%	100.0%
1992	48.1%	11.9%	12.2%	2.1%	0.3%	11.5%	38.0%	6.2%	0.5%	6.8%	7.1%	100.0%
1993	43.1%	14.2%	12.2%	2.2%	0.3%	9.4%	38.4%	7.6%	0.8%	8.4%	10.2%	100.0%

\* Joint ventures, including foreign and domestic joint ventures.

Source: China Statistical Yearbook, various years.

**Table X-6. National Income, 1952-1993**

<b>I. National Income, Billion Current Yuan</b>						
<b>Year</b>	<b>Total</b>	<b>Agri- culture</b>	<b>Industry</b>	<b>Con- struction</b>	<b>Trans- portation</b>	<b>Commerce</b>
1952	58.9	34.0	11.5	2.1	2.5	8.8
1953	70.9	37.4	15.6	2.8	2.9	12.2
1954	74.8	38.8	17.4	2.6	3.2	12.8
1955	78.8	41.7	17.9	3.0	3.3	12.9
1956	88.2	43.9	21.2	5.5	3.7	13.9
1957	90.8	42.5	25.7	4.5	3.9	14.2
1958	111.8	44.0	40.1	6.8	5.9	15.0
1959	122.2	37.6	52.7	7.6	7.8	16.5
1960	122.0	33.2	56.5	7.9	8.4	16.0
1961	99.6	43.2	34.5	2.5	4.8	14.6
1962	92.4	44.4	30.3	3.2	3.8	10.7
1963	100.0	48.8	33.7	4.0	3.9	9.6
1964	116.6	54.9	42.2	5.0	4.4	10.1
1965	138.7	64.1	50.5	5.3	5.8	13.0
1966	158.6	69.2	60.6	5.8	6.6	16.4
1967	148.7	70.3	50.5	5.5	5.2	17.2
1968	141.5	71.4	44.9	4.4	4.9	15.9
1969	161.7	72.2	58.7	6.0	6.2	18.6
1970	192.6	77.8	78.9	8.0	7.4	20.5
1971	207.7	80.8	89.1	9.1	8.0	20.7
1972	213.6	80.8	94.2	8.8	8.4	21.4
1973	231.8	88.6	102.0	9.2	8.9	23.1
1974	234.8	92.2	101.5	9.9	8.5	22.7
1975	250.3	94.6	115.2	11.3	9.6	19.6
1976	242.7	94.0	110.6	12.0	9.2	16.9
1977	264.4	91.3	126.3	12.4	10.6	23.8
1978	301.0	98.6	148.7	12.5	11.8	29.4
1979	335.0	122.6	162.8	13.0	12.1	24.5
1980	368.8	132.6	180.4	18.5	12.6	24.7
1981	394.1	150.9	184.0	19.3	13.1	26.8
1982	425.8	172.3	194.8	20.9	14.7	23.1
1983	473.6	192.1	213.6	25.9	16.6	25.4
1984	565.2	225.1	251.6	30.3	20.5	37.7
1985	702.0	249.2	316.3	40.9	25.9	69.7
1986	785.9	272.0	357.3	51.4	32.0	73.2
1987	931.3	315.4	426.2	63.7	38.4	87.6
1988	1,173.8	381.8	541.6	78.3	46.0	126.1
1989	1,317.6	420.9	624.1	77.4	54.7	140.5
1990	1,438.4	500.0	661.0	83.9	78.7	114.8
1991	1,655.7	526.9	770.3	100.9	88.7	168.9
1992	2,022.3	579.5	788.5	141.1	96.8	216.4
1993	2,488.2	631.7	1286.2	205.4	111.3	253.6

Source: China Statistical Yearbook, various years.

**Table X-6. National Income, 1952-1993 (continued)**

<b>2. National Income Constant Price Index, 1952 = 100 *</b>						
<b>Year</b>	<b>Total</b>	<b>Agri- culture</b>	<b>Industry</b>	<b>Con- struction</b>	<b>Trans- portation</b>	<b>Commerce</b>
1952	100.0	100.0	100.0	100.0	100.0	100.0
1953	114.0	101.6	133.6	138.1	120.0	133.0
1954	120.6	103.3	159.1	133.3	136.0	136.4
1955	128.3	111.5	169.1	152.4	140.0	137.5
1956	146.4	116.5	219.1	261.9	164.0	146.6
1957	153.0	120.1	244.5	242.9	176.0	146.6
1958	186.7	120.3	383.5	367.0	270.8	155.9
1959	202.0	100.6	501.5	388.6	356.5	170.3
1960	199.1	83.6	541.4	394.0	383.6	164.1
1961	140.0	84.7	315.9	129.5	221.1	130.1
1962	130.9	88.7	267.4	161.9	171.5	117.7
1963	144.9	98.9	300.7	205.1	176.0	120.8
1964	168.8	111.9	374.9	259.0	198.6	123.9
1965	197.4	122.9	477.7	286.0	261.7	128.0
1966	231.0	131.9	598.5	313.0	297.8	155.9
1967	214.3	134.2	504.3	296.8	239.2	164.1
1968	200.3	131.6	458.6	237.5	225.6	151.8
1969	239.0	132.2	622.3	323.8	284.3	179.6
1970	294.6	139.8	863.0	421.0	343.0	199.2
1971	315.3	142.0	979.0	468.3	370.8	201.2
1972	324.3	140.5	1,043.5	452.5	389.3	208.0
1973	351.2	153.1	1,134.3	457.8	412.5	224.5
1974	355.2	159.2	1,128.9	484.1	394.0	220.6
1975	384.7	162.3	1,297.3	542.0	444.9	220.6
1976	374.5	159.1	1,249.2	568.3	426.4	214.8
1977	403.7	155.1	1,434.0	578.8	491.3	242.0
1978	453.4	161.2	1,679.1	573.5	546.9	296.4
1979	485.1	171.5	1,814.7	584.1	560.8	316.8
1980	516.3	168.4	2,012.7	757.7	584.0	318.8
1981	541.5	180.4	2,046.8	770.0	607.2	379.4
1982	585.8	201.6	2,170.1	806.9	681.3	397.5
1983	644.2	218.7	2,383.7	954.3	755.5	449.1
1984	731.9	247.0	2,738.8	1,056.7	852.8	499.5
1985	830.6	253.7	3,275.2	1,310.6	1,024.3	593.7
1986	894.5	261.4	3,590.6	1,540.0	1,140.2	636.3
1987	985.7	273.2	4,058.8	1,744.8	1,269.9	715.0
1988	1,097.2	279.4	4,765.0	1,884.0	1,413.6	779.5
1989	1,137.2	288.3	5,052.6	1,724.3	1,557.3	734.4
1990	1,195.3	309.9	5,328.0	1,732.8	1,631.2	706.9
1991	1,287.4	317.0	6,011.2	1,922.6	1,743.3	711.1
1992	1,485.4	332.8	7,297.1	2,347.7	1,895.3	864.6
1993	1,709.8	346.1	8,895.2	2,643.6	2,045.1	904.3

\* These can be thought of as percentages; e.g. at constant prices, total national income in 1993 was 1,710% of total national income in 1952.

Source: China Statistical Yearbook, various years.

Table X-6. National Income, 1952-1993 (continued)

3. National Income Billion Constant 1980 Yuan *						
Year	Total ¶	Agri- culture	Industry	Con- struction	Trans- portation	Commerce
1952	100.1	78.7	9.0	2.4	2.2	7.7
1953	108.2	80.0	12.0	3.4	2.6	10.3
1954	112.4	81.3	14.3	3.3	2.9	10.6
1955	120.3	87.8	15.2	3.7	3.0	10.7
1956	132.7	91.7	19.6	6.4	3.5	11.4
1957	137.6	94.6	21.9	5.9	3.8	11.4
1958	156.0	94.7	34.4	9.0	5.8	12.1
1959	154.5	79.2	44.9	9.5	7.7	13.2
1960	145.0	65.8	48.5	9.6	8.3	12.7
1961	113.0	66.7	28.3	3.2	4.8	10.1
1962	110.6	69.8	24.0	4.0	3.7	9.1
1963	123.0	77.9	27.0	5.0	3.8	9.4
1964	141.9	88.1	33.6	6.3	4.3	9.6
1965	162.1	96.8	42.8	7.0	5.6	9.9
1966	183.6	103.9	53.6	7.6	6.4	12.1
1967	176.0	105.7	45.2	7.2	5.2	12.7
1968	167.2	103.6	41.1	5.8	4.9	11.8
1969	187.8	104.1	55.8	7.9	6.1	13.9
1970	220.5	110.1	77.4	10.3	7.4	15.4
1971	234.6	111.8	87.7	11.4	8.0	15.6
1972	239.7	110.6	93.5	11.0	8.4	16.1
1973	259.7	120.6	101.7	11.2	8.9	17.4
1974	264.0	125.4	101.2	11.8	8.5	17.1
1975	284.0	127.8	116.3	13.2	9.6	17.1
1976	277.0	125.3	112.0	13.9	9.2	16.6
1977	294.1	122.1	128.5	14.1	10.6	18.7
1978	326.2	126.9	150.5	14.0	11.8	23.0
1979	348.6	135.0	162.7	14.3	12.1	24.5
1980	368.8	132.6	180.4	18.5	12.6	24.7
1981	386.8	142.0	183.5	18.8	13.1	29.4
1982	418.4	158.7	194.5	19.7	14.7	30.8
1983	460.3	172.2	213.7	23.3	16.3	34.8
1984	522.9	194.5	245.5	25.8	18.4	38.7
1985	593.4	199.8	293.6	32.0	22.1	46.0
1986	639.2	205.8	321.8	37.6	24.6	49.3
1987	704.3	215.1	363.8	42.6	27.4	55.4
1988	784.0	220.0	427.1	46.0	30.5	60.4
1989	812.5	227.0	452.9	42.1	33.6	56.9
1990	853.8	244.0	477.6	42.3	35.2	54.8
1991	928.0	249.6	538.8	46.9	37.6	55.1
1992	1081.3	262.0	654.0	57.3	40.9	67.0
1993	1248.6	272.6	797.3	64.5	44.1	70.1

† National income in constant yuan = base year national income in current yuan \* (index for current year ÷ index for base year).

¶ Sum of real sectoral national incomes, not calculated from indices.

Source: China Statistical Yearbook, various years.

Figure X-5. National Income

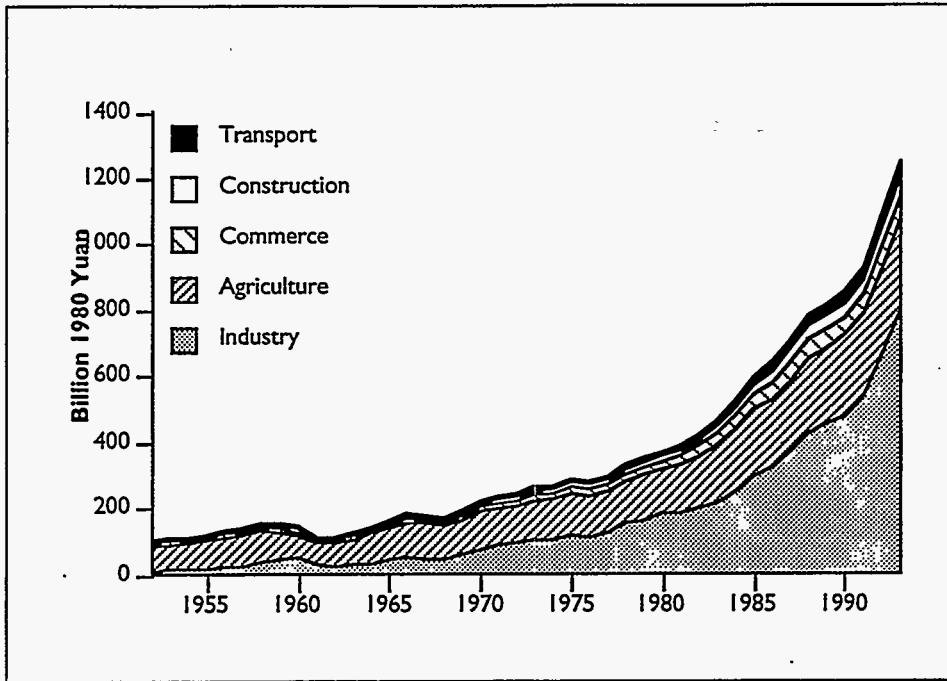


Figure X-6. Sectoral Shares of National Income

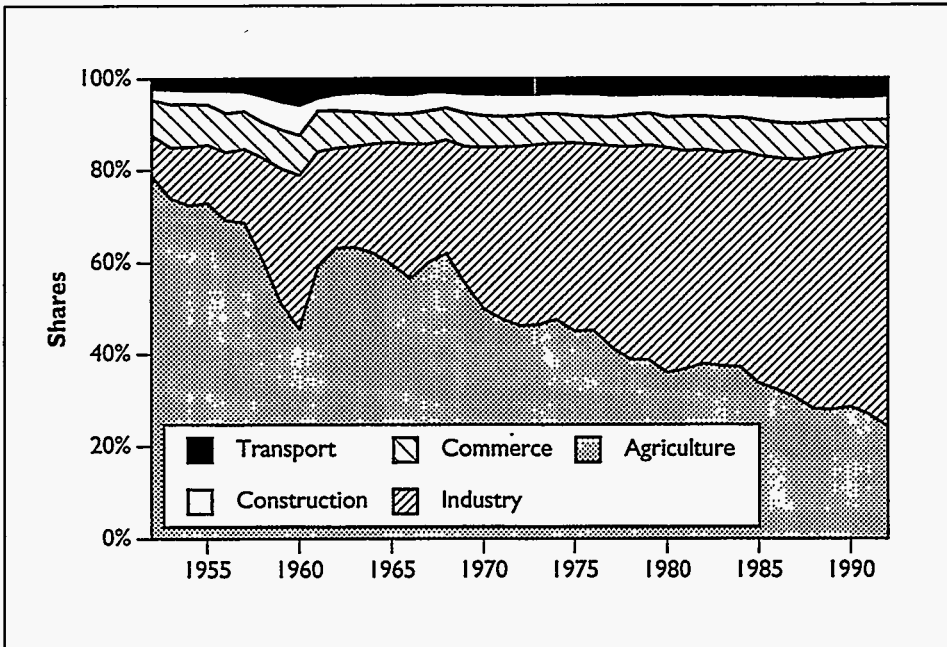


Table X-6. National Income, 1952-1993 (continued)

4. Sectoral Shares of Real National Income, Percent						
Year	Total	Agri- culture	Industry	Con- struction	Trans- portation	Commerce
1952	100.0%	78.7%	9.0%	2.4%	2.2%	7.7%
1953	100.0%	73.9%	11.1%	3.1%	2.4%	9.5%
1954	100.0%	72.4%	12.7%	2.9%	2.6%	9.4%
1955	100.0%	73.0%	12.6%	3.1%	2.5%	8.9%
1956	100.0%	69.1%	14.8%	4.8%	2.7%	8.6%
1957	100.0%	68.7%	15.9%	4.3%	2.8%	8.3%
1958	100.0%	60.7%	22.0%	5.7%	3.7%	7.7%
1959	100.0%	51.3%	29.1%	6.1%	5.0%	8.5%
1960	100.0%	45.4%	33.5%	6.6%	5.7%	8.8%
1961	100.0%	59.0%	25.1%	2.8%	4.2%	8.9%
1962	100.0%	63.2%	21.7%	3.6%	3.3%	8.2%
1963	100.0%	63.3%	21.9%	4.1%	3.1%	7.6%
1964	100.0%	62.1%	23.7%	4.5%	3.0%	6.8%
1965	100.0%	59.7%	26.4%	4.3%	3.5%	6.1%
1966	100.0%	56.6%	29.2%	4.2%	3.5%	6.6%
1967	100.0%	60.0%	25.7%	4.1%	2.9%	7.2%
1968	100.0%	62.0%	24.6%	3.5%	2.9%	7.0%
1969	100.0%	55.4%	29.7%	4.2%	3.3%	7.4%
1970	100.0%	49.9%	35.1%	4.7%	3.4%	7.0%
1971	100.0%	47.7%	37.4%	4.9%	3.4%	6.6%
1972	100.0%	46.1%	39.0%	4.6%	3.5%	6.7%
1973	100.0%	46.4%	39.1%	4.3%	3.4%	6.7%
1974	100.0%	47.5%	38.3%	4.5%	3.2%	6.5%
1975	100.0%	45.0%	40.9%	4.7%	3.4%	6.0%
1976	100.0%	45.2%	40.4%	5.0%	3.3%	6.0%
1977	100.0%	41.5%	43.7%	4.8%	3.6%	6.4%
1978	100.0%	38.9%	46.1%	4.3%	3.6%	7.0%
1979	100.0%	38.7%	46.7%	4.1%	3.5%	7.0%
1980	100.0%	36.0%	48.9%	5.0%	3.4%	6.7%
1981	100.0%	36.7%	47.4%	4.9%	3.4%	7.6%
1982	100.0%	37.9%	46.5%	4.7%	3.5%	7.4%
1983	100.0%	37.4%	46.4%	5.1%	3.5%	7.6%
1984	100.0%	37.2%	46.9%	4.9%	3.5%	7.4%
1985	100.0%	33.7%	49.5%	5.4%	3.7%	7.8%
1986	100.0%	32.2%	50.4%	5.9%	3.8%	7.7%
1987	100.0%	30.5%	51.7%	6.0%	3.9%	7.9%
1988	100.0%	28.1%	54.5%	5.9%	3.9%	7.7%
1989	100.0%	27.9%	55.7%	5.2%	4.1%	7.0%
1990	100.0%	28.6%	55.9%	5.0%	4.1%	6.4%
1991	100.0%	26.9%	58.1%	5.1%	4.1%	5.9%
1992	100.0%	24.2%	60.5%	5.3%	3.8%	6.2%
1993	100.0%	21.8%	63.9%	5.2%	3.5%	5.6%

Source: China Statistical Yearbook, various years.

Table X-6. National Income, 1952-1993 (continued)

5. Real Growth Rates by Sector of National Income, Percent, 1953-1993						
Year	Total	Agri- culture	Industry	Con- struction	Trans- portation	Commerce
1953	8.2%	1.6%	33.6%	38.1%	20.0%	33.0%
1954	3.8%	1.7%	19.1%	-3.5%	13.3%	2.6%
1955	7.1%	7.9%	6.3%	14.3%	2.9%	0.8%
1956	10.2%	4.5%	29.6%	71.9%	17.1%	6.6%
1957	3.7%	3.1%	11.6%	-7.3%	7.3%	0.0%
1958	13.4%	0.2%	56.9%	51.1%	53.9%	6.3%
1959	-0.9%	-16.4%	30.8%	5.9%	31.6%	9.2%
1960	-6.2%	-16.9%	8.0%	1.4%	7.6%	-3.6%
1961	-22.0%	1.3%	-41.7%	-67.1%	-42.4%	-20.7%
1962	-2.2%	4.7%	-15.4%	25.0%	-22.4%	-9.5%
1963	11.2%	11.5%	12.5%	26.7%	2.6%	2.6%
1964	15.4%	13.1%	24.7%	26.3%	12.8%	2.6%
1965	14.2%	9.8%	27.4%	10.4%	31.8%	3.3%
1966	13.3%	7.3%	25.3%	9.4%	13.8%	21.8%
1967	-4.2%	1.7%	-15.7%	-5.2%	-19.7%	5.3%
1968	-5.0%	-1.9%	-9.1%	-20.0%	-5.7%	-7.5%
1969	12.4%	0.5%	35.7%	36.3%	26.0%	18.3%
1970	17.4%	5.7%	38.7%	30.0%	20.6%	10.9%
1971	6.4%	1.6%	13.4%	11.2%	8.1%	1.0%
1972	2.2%	-1.1%	6.6%	-3.4%	5.0%	3.4%
1973	8.3%	9.0%	8.7%	1.2%	6.0%	7.9%
1974	1.6%	4.0%	-0.5%	5.7%	-4.5%	-1.7%
1975	7.6%	1.9%	14.9%	12.0%	12.9%	0.0%
1976	-2.5%	-2.0%	-3.7%	4.9%	-4.2%	-2.6%
1977	6.2%	-2.5%	14.8%	1.8%	15.2%	12.7%
1978	10.9%	3.9%	17.1%	-0.9%	11.3%	22.5%
1979	6.9%	6.4%	8.1%	1.8%	2.5%	6.9%
1980	5.8%	-1.8%	10.9%	29.7%	4.1%	0.6%
1981	4.9%	7.1%	1.7%	1.6%	4.0%	19.0%
1982	8.2%	11.8%	6.0%	4.8%	12.2%	4.8%
1983	10.0%	8.5%	9.8%	18.3%	10.9%	13.0%
1984	13.6%	12.9%	14.9%	10.7%	12.9%	11.2%
1985	13.5%	2.7%	19.6%	24.0%	20.1%	18.9%
1986	7.7%	3.0%	9.6%	17.5%	11.3%	7.2%
1987	10.2%	4.5%	13.0%	13.3%	11.4%	12.4%
1988	11.3%	2.3%	17.4%	8.0%	11.3%	9.0%
1989	3.6%	3.2%	6.0%	-8.5%	10.2%	-5.8%
1990	5.1%	7.5%	5.5%	0.5%	4.7%	-3.7%
1991	8.7%	2.3%	12.8%	11.0%	6.9%	0.6%
1992	16.5%	5.0%	21.4%	22.1%	8.7%	21.6%
1993	15.5%	4.0%	21.9%	12.6%	7.9%	4.6%

Source: China Statistical Yearbook, various years.



Table X-6. National Income, 1952-1993 (continued)

6. National Income Implicit Deflators to Constant 1980 Yuan §						
Year	Total	Agri- culture	Industry	Con- struction	Trans- portation	Commer- ce
1952	58.9	43.2	128.3	86.0	115.9	113.6
1953	65.5	46.7	130.3	83.0	112.0	118.4
1954	66.6	47.7	122.0	79.9	109.1	121.1
1955	65.5	47.5	118.1	80.6	109.3	121.1
1956	66.5	47.9	108.0	86.0	104.6	122.4
1957	66.0	44.9	117.3	75.9	102.7	125.0
1958	71.7	46.4	116.7	75.9	101.0	124.2
1959	79.1	47.5	117.2	80.1	101.4	125.1
1960	84.2	50.4	116.4	82.1	101.5	125.8
1961	88.1	64.8	121.8	79.1	100.6	144.8
1962	83.6	63.6	126.4	81.0	102.7	117.3
1963	81.3	62.7	125.0	79.9	102.7	102.6
1964	82.2	62.3	125.6	79.1	102.7	105.2
1965	85.5	66.2	117.9	75.9	102.7	131.1
1966	86.4	66.6	113.0	75.9	102.7	135.8
1967	84.5	66.5	111.7	75.9	100.8	135.3
1968	84.7	68.9	109.2	75.9	100.7	135.2
1969	86.1	69.4	105.2	75.9	101.1	133.7
1970	87.3	70.7	102.0	77.8	100.0	132.8
1971	88.5	72.3	101.5	79.6	100.0	132.8
1972	89.1	73.0	100.7	79.7	100.0	132.8
1973	89.3	73.5	100.3	82.3	100.0	132.8
1974	89.0	73.6	100.3	83.8	100.0	132.8
1975	88.1	74.0	99.1	85.4	100.0	114.7
1976	87.6	75.0	98.8	86.5	100.0	101.5
1977	89.9	74.8	98.3	87.7	100.0	126.9
1978	92.3	77.7	98.8	89.3	100.0	128.0
1979	96.1	90.8	100.1	91.2	100.0	99.8
1980	100.0	100.0	100.0	100.0	100.0	100.0
1981	101.9	106.2	100.3	102.7	100.0	91.2
1982	101.8	108.5	100.2	106.1	100.0	75.0
1983	102.9	111.6	100.0	111.2	101.8	73.0
1984	108.1	115.7	102.5	117.4	111.4	97.4
1985	118.3	124.7	107.7	127.8	117.2	151.5
1986	123.0	132.1	111.0	136.7	130.1	148.5
1987	132.2	146.6	117.2	149.5	140.2	158.1
1988	149.7	173.5	126.8	170.2	150.8	208.8
1989	162.2	185.4	137.8	183.8	162.8	246.9
1990	168.5	204.9	138.4	198.3	223.6	209.6
1991	178.4	211.1	143.0	214.9	235.8	306.6
1992	187.0	221.2	151.1	246.2	236.7	323.1
1993	199.3	231.8	161.3	318.2	252.2	362.0

§ Used in converting investment data (elsewhere in this volume) to constant yuan.

Source: China Statistical Yearbook, various years.

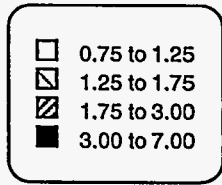
Table X-7. National Income by Sector and Province, 1992

Region	Province	Sectoral National Income (billion current yuan)					Popu- lation	Total National Income	Per Capita National Income (yuan)		Rank
		Agriculture	Industry	Construction	Trans- portation	Commerce			Income	Rank	
North	Beijing	4.63	31.24	5.12	2.56	7.18	50.73	11.02	4,603	2	
	Tianjin	3.14	20.52	2.12	2.90	5.77	34.45	9.20	3,744	3	
	Hebei	25.61	51.35	5.57	4.26	8.19	94.98	62.75	1,514	14	
	Shanxi	8.35	22.78	2.96	2.38	4.14	40.61	29.79	1,363	17	
	Inner Mongolia	12.14	11.16	3.24	2.44	1.66	30.64	22.07	1,388	16	
Northeast	Liaoning	20.11	65.17	7.75	5.35	7.69	106.07	40.16	2,641	5	
	Jilin	13.23	22.47	2.77	1.76	3.23	43.46	25.32	1,716	12	
	Heilongjiang	18.11	39.06	5.56	2.63	4.90	70.26	36.08	1,947	9	
East	Shanghai	3.60	62.37	4.15	5.89	12.08	88.09	13.45	6,550	1	
	Jiangsu	39.57	102.50	10.02	6.19	11.42	169.70	69.11	2,456	7	
	Zhejiang	25.67	59.49	7.15	3.75	11.06	107.12	42.36	2,529	6	
	Anhui	24.41	30.17	5.15	2.07	4.74	66.54	58.34	1,141	28	
	Fujian	19.74	24.82	4.98	3.24	6.22	59.00	31.16	1,893	10	
	Jiangxi	20.19	17.64	2.66	2.03	4.07	46.59	39.13	1,191	22	
	Shandong	52.34	88.13	10.62	6.14	11.33	168.56	86.10	1,958	8	
South- Central	Henan	35.03	46.24	6.87	4.03	9.56	101.73	88.61	1,148	27	
	Hubei	30.27	37.90	4.54	2.71	6.91	82.33	55.80	1,475	15	
	Hunan	32.40	28.48	5.32	3.88	6.66	76.74	62.67	1,225	21	
	Guangdong	46.43	87.87	17.28	8.05	19.73	179.36	65.25	2,749	4	
	Guangxi	23.25	16.87	2.71	1.65	3.91	48.39	43.80	1,105	29	
	Hainan	5.77	2.01	1.77	0.51	1.05	11.11	6.86	1,620	13	
Southwest	Sichuan	48.85	50.01	10.50	3.76	13.20	126.32	109.98	1,149	25	
	Guizhou	11.80	10.20	1.62	0.87	2.57	27.06	33.61	805	30	
	Yunnan	18.25	18.51	2.54	0.79	4.58	44.67	38.32	1,166	24	
	Xizang	1.78	0.22	0.34	0.12	0.36	2.82	2.28	1,237	20	
Northwest	Shaanxi	12.69	18.71	3.54	2.71	2.25	39.90	34.05	1,172	23	
	Gansu	7.45	11.08	1.81	1.42	4.81	26.57	23.14	1,148	26	
	Qinghai	1.92	2.30	0.89	0.19	0.95	6.25	4.61	1,355	18	
	Ningxia	1.81	2.64	0.66	0.33	0.61	6.05	4.87	1,242	19	
	Xinjiang	11.26	9.58	3.98	1.43	2.95	29.20	15.81	1,847	11	
National Total		579.50	988.50	141.10	96.80	216.40	2,022.30	1,171.71	1,726	(11-12)	
Balance*		-0.28	-2.99	-3.09	10.76	32.62	37.02	6.01	-	-	

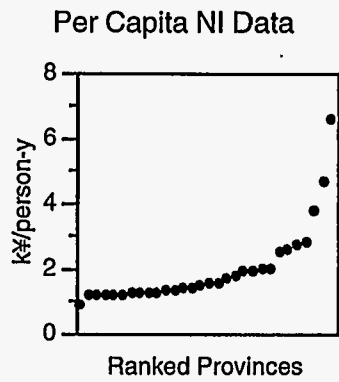
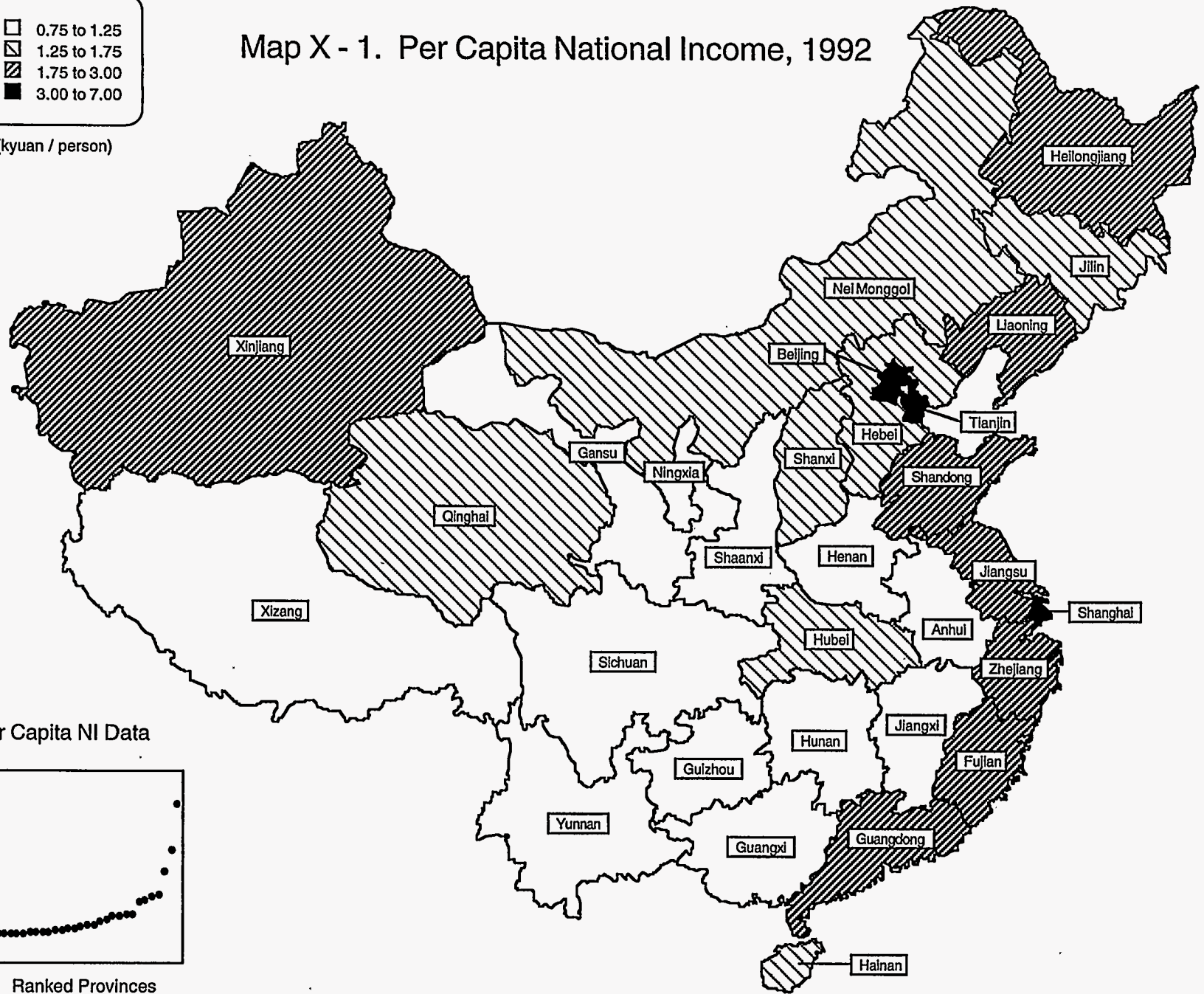
\* National income totals differ from the sum of regional national income because each region calculates national income by its own methods, which may differ from that used by the State Statistical Bureau.

Source: China Statistical Yearbook, various years.

### Map X - 1. Per Capita National Income, 1992



(kyuan / person)



**Table X-8. Population, \* 1950-1993**

<b>I. Millions</b>					
<b>Year</b>	<b>Total Population</b>	<b>Type I Categories</b>		<b>Type II Categories†</b>	
		<b>City &amp; Town</b>	<b>Rural</b>	<b>Non-Agricultural</b>	<b>Agricultural</b>
1950	551.96	61.69	490.27	91.37	460.59
1955	614.65	82.85	531.80	93.35	521.30
1960	662.07	130.73	531.34	137.31	524.76
1965	725.38	130.45	594.93	121.22	604.16
1970	829.92	144.24	685.68	126.60	703.32
1971	852.29	147.11	705.18	133.50	718.79
1972	871.77	149.35	722.42	136.32	735.45
1973	892.11	153.45	738.66	139.92	752.19
1974	908.59	155.95	752.64	140.79	767.80
1975	924.20	160.30	763.90	142.78	781.42
1976	937.17	163.41	773.76	145.17	792.00
1977	949.74	166.69	783.05	146.74	802.80
1978	962.59	172.45	790.14	152.30	810.29
1979	975.42	184.95	790.47	161.86	813.56
1980	987.05	191.40	795.65	168.00	819.05
1981	1,000.72	201.71	799.01	174.13	826.59
1982	1,016.54	214.80	801.74	179.10	836.31
1983	1,030.08	222.74	807.34	183.78	841.17
1984	1,043.57	240.17	803.40	196.86	837.89
1985	1,058.51	250.94	807.57	210.54	834.78
1986	1,075.07	263.66	811.41	209.03	848.18
1987	1,093.00	276.74	816.26	215.92	856.48
1988	1,110.26	286.61	823.65	225.51	864.27
1989	1,127.04	295.40	831.64	233.71	873.05
1990	1,143.33	301.91	841.42	238.87	904.46
1991	1,158.23	305.43	852.80	246.93	905.25
1992	1,171.71	323.72	847.99	260.17	911.54
1993	1,185.17	333.51	851.66	271.84	913.34

\* Here we present two different types of population divisions in China. One type divides the population into city & town and rural categories (referred to above as Type I). A change in the definition of urban areas in 1984 increased the reported urban population, though 1991 and later editions of the China Statistical Yearbook have corrected for this. Another type of division cuts the population into non-agricultural and agricultural categories (Type II). We consider the latter to reflect more closely the division of population between urban and rural areas.

† The sum of these two categories as reported is not always equal to total population.

Source: Almanac of China's Population, various years; China Statistical Yearbook, various years; China Rural Statistical Yearbook, various years.

Table X-8. Population, \* 1950-1993 (continued)

2. Shares of Total					
Year	Total Population	Type I Categories		Type II Categories†	
		City & Town	Rural	Non-Agricultural	Agricultural
1950	100%	11%	89%	17%	83%
1955	100%	13%	87%	15%	85%
1960	100%	20%	80%	21%	79%
1965	100%	18%	82%	17%	83%
1970	100%	17%	83%	15%	85%
1971	100%	17%	83%	16%	84%
1972	100%	17%	83%	16%	84%
1973	100%	17%	83%	16%	84%
1974	100%	17%	83%	15%	85%
1975	100%	17%	83%	15%	85%
1976	100%	17%	83%	15%	85%
1977	100%	18%	82%	15%	85%
1978	100%	18%	82%	16%	84%
1979	100%	19%	81%	17%	83%
1980	100%	19%	81%	17%	83%
1981	100%	20%	80%	17%	83%
1982	100%	21%	79%	18%	82%
1983	100%	22%	78%	18%	82%
1984	100%	23%	77%	19%	80%
1985	100%	24%	76%	20%	79%
1986	100%	25%	75%	19%	79%
1987	100%	25%	75%	20%	78%
1988	100%	26%	74%	20%	78%
1989	100%	26%	74%	21%	77%
1990	100%	26%	74%	21%	79%
1991	100%	26%	74%	21%	78%
1992	100%	28%	72%	22%	78%
1993	100%	28%	72%	23%	77%

- Here we present two different types of population divisions in China. One type divides the population into city & town and rural categories (referred to above as Type I). A change in the definition of urban areas in 1984 increased the reported urban population, though 1991 and later editions of the China Statistical Yearbook have corrected for this. Another type of division cuts the population into non-agricultural and agricultural categories (Type II). We consider the latter to reflect more closely the division of population between urban and rural areas.

† The sum of these two categories as reported is not always equal to total population.

Source: Almanac of China's Population, various years; China Statistical Yearbook, various years; China Rural Statistical Yearbook, various years.

Figure X-7. Population

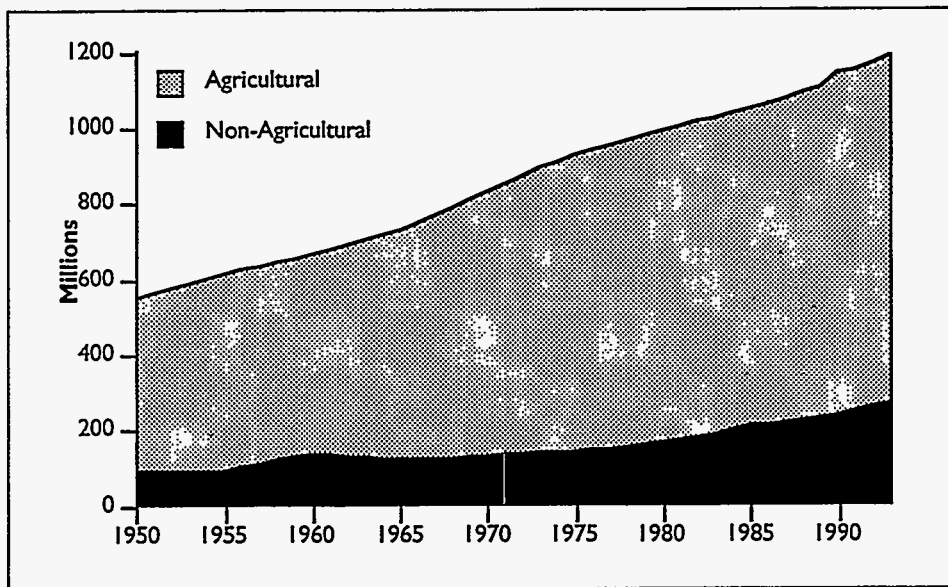


Figure X-8. Nonagricultural Fraction of Total Population

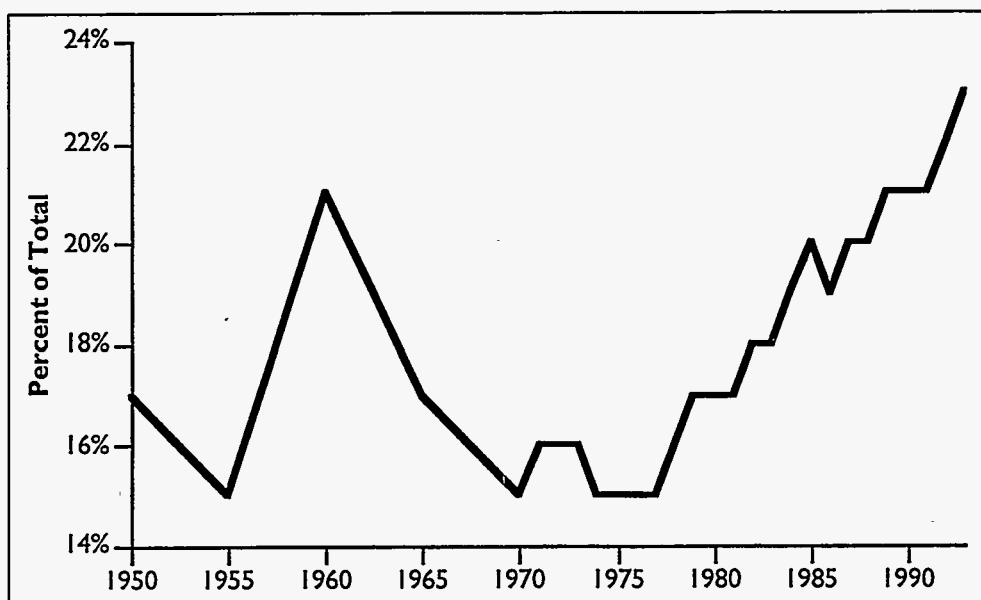


Table X-9. Population and Area by Province, 1992 and 1993

Planning Region	Province	1992 Population (Millions)	1993 Population (Millions)	Provincial Area (1000 sq km)	1993 Population Density (persons/sq km)
North	Beijing	11.02	11.12	16.8	662
	Tianjin	9.20	9.28	11.3	821
	Hebei	62.75	63.34	188.0	337
	Shanxi	29.79	30.12	156.1	193
	Inner Mongolia	22.07	22.32	1,200.0	19
Northeast	Liaoning	40.16	40.42	145.8	277
	Jilin	25.32	25.55	138.0	185
	Heilongjiang	36.08	36.40	473.4	77
East	Shanghai	13.45	13.49	6.2	2,176
	Jiangsu	69.11	69.67	102.6	679
	Zhejiang	42.36	42.66	101.8	419
	Anhui	58.34	58.97	139.5	423
	Fujian	31.16	31.50	121.5	259
	Jianxi	39.13	39.66	166.8	238
	Shandong	86.10	86.42	153.1	564
South-Central	Henan	88.61	89.49	166.9	536
	Hubei	55.80	56.53	187.5	301
	Hunan	62.67	63.11	210.1	300
	Guangdong	65.25	66.07	178.0	371
	Guangxi	43.80	44.38	230.5	193
	Hainan	6.86	7.01	34.0	206
Southwest	Sichuan	109.98	111.04	566.6	196
	Guizhou	33.61	34.09	176.3	193
	Yunnan	38.32	38.85	392.2	99
	Xizang	2.28	2.32	1,182.7	2
Northwest	Shaanxi	34.05	34.43	205.0	168
	Gansu	23.14	23.45	455.0	52
	Qinghai	4.61	4.67	779.1	6
	Ningxia	4.87	4.95	66.0	75
	Xinjiang	15.81	16.05	1,635.2	10
National Total/ Average		1,171.71	1,185.17	9,586.0	124
Balance*		6.01	7.81	-	-

\* Because of differences in the coverage and collection of local and national statistics the sum of local statistics may not equal the national total.

Source: China Statistical Yearbook, various years.

Table X-10. Socioeconomic Indicators of Urban Households \*

Item	Unit	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Sample Size	households	-	9,060	12,500	24,338	31,126	32,855	34,945	35,235	35,660	36,730	36,290	35,390
Average Household Size	person	-	4.06	4.04	3.89	3.82	3.74	3.63	3.55	3.50	3.43	3.37	3.31
Average Number of Employed Persons per Household	person	-	2.38	2.36	2.15	2.12	2.09	2.03	2.00	1.98	1.96	1.95	1.92
Percentage of Household Members Employed	percent	-	58.6%	58.4%	55.3%	55.5%	55.9%	56.0%	56.3%	56.6%	57.1%	57.9%	58.0%
Number of Persons Supported per Employed Member	person	-	1.71	1.71	1.81	1.80	1.79	1.79	1.78	1.77	1.75	1.73	1.72
Total Annual per Capita Income	yuan	-	572.88	660.12	748.92	909.96	1,012.20	1,192.12	1,387.81	1,522.79	1,713.10	2,031.53	2,583.16
of which Available Income †	yuan	-	525.96	607.56	685.32	827.88	915.96	1,119.36	1,260.67	1,387.27	1,544.30	1,826.07	2,335.54
Annual per Capita Expenditures	yuan	471.00	505.92	559.44	673.20	798.96	884.40	1,103.98	1,210.95	1,278.89	1,453.81	1,671.73	2,110.81
of which Expenditures on Commodities:	yuan	432.12	464.04	514.32	621.48	734.64	809.27	1,013.94	1,099.89	1,151.40	1,294.84	1,467.08	1,899.16
Food	yuan	276.24	299.52	324.24	351.72	418.92	472.93	567.01	659.96	693.72	782.50	844.82	1,058.20
Clothing	yuan	67.68	73.56	86.88	98.04	113.04	121.09	153.21	149.15	170.88	199.64	240.60	300.61
Items for Daily Use	yuan	43.44	45.72	50.64	71.88	88.92	100.57	148.62	133.97	129.12	139.83	161.98	184.96
Items for Recreation ¶	yuan	21.72	20.76	24.60	51.96	54.48	49.58	66.68	70.05	68.04	68.68	74.04	175.09
Books, Newspapers & Magazines ¶¶	yuan	4.20	4.92	5.88	6.12	6.96	7.48	8.26	10.59	11.04	13.11	16.14	18.92
Medicine and Medical Items	yuan	2.88	3.12	3.36	6.24	7.56	8.87	12.59	15.98	19.44	32.10	30.34	56.89
Fuels	yuan	8.76	8.76	9.21	11.52	12.00	12.27	15.12	18.23	20.31	25.05	28.57	-
of which: gas	yuan	-	-	-	-	-	-	-	-	2.62	4.27	5.42	8.99
Commodities	yuan	7.20	7.68	9.51	24.00	32.76	36.48	42.45	41.96	38.20	33.93	30.59	95.50
Other Expenditures:	yuan	38.88	41.88	45.12	51.72	64.32	75.13	90.04	111.06	127.44	147.55	138.13	211.55
Rent	yuan	7.08	7.68	7.80	6.48	7.20	7.74	7.83	8.82	9.36	10.66	35.72	22.00
Water & Electricity	yuan	5.04	5.76	6.24	6.84	8.88	10.32	12.32	16.20	19.80	24.16	28.58	38.26
Tuition ¥	yuan	2.76	3.24	4.44	7.68	8.76	11.28	18.71	25.24	28.33	33.82	-	-
Child Care ¥	yuan	2.76	2.40	2.52	3.36	3.72	3.70	4.58	5.19	5.28	7.01	-	-
Urban Transportation §	yuan	6.60	6.96	7.56	6.72	8.40	9.10	9.12	10.16	13.52	16.89	44.17	80.63
Post & Telecommunications §	yuan	0.60	0.60	0.72	0.60	0.72	0.82	0.97	1.26	1.79	2.82	-	-
Cultural Events & Recreation ¶¶	yuan	2.40	2.28	2.16	2.28	2.71	3.01	3.28	3.62	4.68	6.14	-	-
Other Noncommercial ¥	-	-	-	-	-	-	-	-	-	-	46.05	29.66	70.66

\* Figures for 1985 and previous years are from sample surveys of urban staff and workers households. Figures for later years includes households of retired staff and workers, independent laborers, households of other professions, and those in county towns.

† Available Income refers to total family income of family excluding support to family members living in other households, donations, and food expenditures by non-family members living in the household.

¶ After 1992, recreation includes expenditures on cultural events.

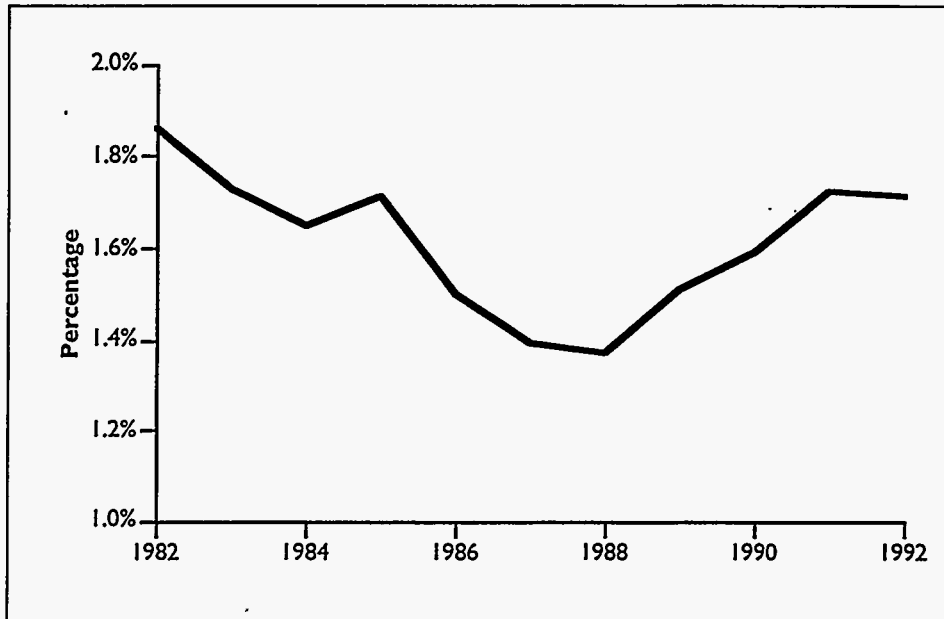
§ Beginning in 1992, urban transportation and post and telecommunications are combined in one category.

¥ Beginning in 1992, other noncommercial expenditures include tuition and child care.

Source: Yearbook of China's Economy, 1990; China Statistical Yearbook, various years; China Social Statistics Yearbook, 1993.



**Figure X-9. Urban Household Expenditures on Fuels  
as a Percentage of Total Expenditures**



# Appendix 1.

## Sectoral Divisions in Official Chinese Statistics

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**PRODUCTIVE:** This refers to sectors primarily involved in the production and distribution of physical goods.

### **AGRICULTURE**

Includes agriculture, forestry (excludes harvesting of timber and other forest products, which is included under industry, usually in the mining subsector), animal husbandry, fishery, and water conservancy.

### **INDUSTRY**

Often divided into light and heavy. Subsectoral divisions vary. In official statistics industrial subsectors for 1984 and previous years are not strictly comparable to 1985 and later years because of a change in definition.

### **GEOLOGY**

Includes prospecting and surveying.

### **CONSTRUCTION**

In this book the construction sector is often added to the industrial sector.

### **TRANSPORTATION**

Includes post and telecommunications as well as units devoted exclusively to transportation. Many units in other sectors, especially industry and agriculture, perform transportation functions, so the official figures for this sector tend to undercount actual transportation sector statistics.

### **COMMERCE**

Includes the sale of goods, public food preparation (e.g. restaurants), and the supply, distribution and storage of materials.

**NONPRODUCTIVE:** This refers to sectors primarily engaged in activities which do not contribute directly to the production or distribution of physical goods.

### **PUBLIC SERVICES**

Includes the management of buildings and land, residential services, and public services such as public transportation and street lighting.

### **PUBLIC HEALTH**

Sanitation, sports, and social services.

### **EDUCATION**

Includes also cultural and artistic activities, and broadcasting.

### **RESEARCH**

Scientific research and "comprehensive technical services".

### **FINANCIAL**

Banking, other financial services, and insurance.

### **GOVERNMENT**

Government, Party, and social organizations.

### **OTHER SECTORS**

## Appendix 2. Abbreviations

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<b>BP</b>	British Petroleum
<b>CERS</b>	China Energy Research Society
<b>CSY</b>	China Statistical Yearbook
<b>DOE</b>	U.S. Department of Energy
<b>EAP</b>	Energy Analysis Program, Energy Environment Division, LBNL
<b>ERI</b>	Energy Research Institute of the Chinese State Planning Commission
<b>CESY</b>	China Energy Statistical Yearbook
<b>IEA</b>	International Energy Agency
<b>IES</b>	International Energy Studies Group, EAP, LBNL
<b>LBNL</b>	Lawrence Berkeley National Laboratory
<b>MOE</b>	Chinese Ministry of Energy, formed in 1988 through the merger of the Ministries of Coal, Petroleum, and Water Resources and Electric Power
<b>SSB</b>	State Statistical Bureau of China
<b>WB</b>	World Bank

# Appendix 3. Bibliographic References for Selected Sources in the Data Tables

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## Simplified Reference

## Full Reference

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China Statistical Yearbook	State Statistical Bureau (1982-1994). Zhongguo Tongji Nianjian (China Statistical Yearbook), 1982-1994 editions. Beijing, Zhongguo Tongji Chubanshe.
China Transportation Yearbook	China Transportation Association (1994). Zhongguo Jiaotong Nianjian (China Transportation Yearbook), 1994. Beijing, Zhongguo Jiaotong Nianjian She.
Energy in China	Ministry of Energy (1989-1992). Zhongguo Nengyuan (Energy in China), 1989-1992 editions. Beijing, Ministry of Energy.
Energy Conservation in China	State Planning Commission, Department of Resources Conservation and Comprehensive Utilization (1993). Energy Conservation in China, 1993. Beijing, State Planning Commission.
Handbook of Comprehensive	State Planning Commission, Department of Resources Conservation and Resources Utilization Comprehensive Utilization (1991). Ziyuan Heli Liyong Shouce (Handbook of Comprehensive Resource Utilization). Beijing, Zhongguo Kexue Jishu Chubanshe.
Sinopec Yearbook	Editorial Board of the Sinopec Yearbook (1991). Zhongguo Shiyou Huagong Zonggongsi Nianjian (Sinopec Yearbook), 1991. Beijing, Zhongguo Shihua Chubanshe.
Statistical Yearbook of China's	State Statistical Bureau (1988-1993). Zhongguo Gongye Jingji Tongji Nianjian Industrial Economy (Statistical Yearbook of China's Industrial Economy), 1988-1993 editions. Beijing, Zhongguo Tongji Chubanshe.

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