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China Energy Databook

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Foreword

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.

This volume does not include data on Taiwan, which is not shown on any of the maps.

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

ACKNOWLEDGMENTS

Much of the material in this volume would not have been available without the close cooperation of the staff of the Energy Research Institute (ERI) of China's State Planning Commission (SPC), including the Director, Zhou Fengqi , the members of the China Energy Database team, Xie Zhijun, Hu Xiulian, Li Jingjing, Su Xiaojun, Dong Luying, Wang Jiacheng, and Su Zhengming, and the 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.. They were assisted in their efforts by members of the Energy Division of the State Statistical Bureau, the Resources Bureau of the SPC, the Chinese Ministry of Energy (MOE), the China National Energy Investment Corporation, the China National Coal Corporation, the Information Research Institute of Water Resources and Electric Power of the MOE, and the Research Center of the SPC.

Substantive contributions were made to this volume by Roland Hwang and Lee Schipper of the Energy Analysis Program (EAP) at the Lawrence Berkeley Laboratory, Marc Ross of the University of Michigan, Ann Arbor, Jessie Audette of Xenergy, Inc., Oakland, David Fridley and Nancy Kiang of the East-West Center, Honolulu, and Kazumasa Imada of Idemitsu Kosan Company, Tokyo. Ted Gartner and Holly Hubbell of EAP provided invaluable support in production.

We would especially like to thank Jon Gimpel, Mark Mandel, and Paul Volk of Mana Graphics for their excellent work in typesetting this volume, and for their vast reservoirs of patience in the face of many revisions and surprises.

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CHAPTER I. ENERGY RESOURCES AND RESERVES

CHAPTER II. ENERGY PRODUCTION

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Energy Units and Conversions (a)

Fuel	Heat Content (low heat) (GJ)	Multiplier (tonnes of coal equivalent)	Multiplier (barrels of oil equivalent)	Multiplier (million kcal)
Coal				
Standard coal (tonne)	29.310	1.000	5.147	7.00
Chinese average raw coal (tonne)	20.934	0.714	3.676	5.00
Chinese average washed coal (tonne)	26.377	0.900	4.632	6.30
Bituminous coals (tonne) (b)	19.92 to 33.11	0.68 to 1.13	3.50 to 5.82	4.76 to 7.91
Brown coals, lignites (tonne) (b)	7.91 to 19.92	0.27 to 0.68	1.39 to 3.50	1.89 to 4.76
Utility Coal (tonne) (c)	18.729	0.639	3.289	4.47
Coke (tonne)	28.470	0.971	5.000	6.80
Coking Coal Gas (thousand m3)	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)
Petroleum				
Chinese average crude oil (tonne) (d)	41.868	1.463	7.353	10.00
Chinese average crude oil (bbl)	5.694	0.199	1.000	1.36
Fuel Oil (tonne)	41.868	1.427	7.353	10.00
Gasoline (tonne)	43.124	1.471	7.574	10.30
Kerosene (tonne)	43.124	1.471	7.574	10.30
Diesel (tonne)	42.705	1.457	7.500	10.20
LPG (tonne)	50.241	1.714	8.823	12.00
Refinery Gas (tonne)	46.055	1.571	8.088	11.00
Natural Gas				
Chinese average natural gas (thousand m3)	38.98	1.33	6.846	9.31
Standard natural gas (thousand m3)	37.68	1.29	6.617	9.00
Electricity				
Electricity (thousand kWh) (e) 1 kW = 1.341 hp	11.841	0.404	2.080	2.83
Biomass				
Fuelwood, air-dried (tonne) (b)	14 to 17	0.48 to 0.58	0.084 to 0.102	3.34 to 4.06
Crop residues, air-dried (tonne) (b)	12 to 16	0.41 to 0.55	0.072 to 0.097	2.87 to 3.82
Dried dung (tonne) (b)	11 to 14	0.38 to 0.48	0.067 to 0.084	2.63 to 3.34
Peat (tonne) (b)	7.5 to 10.5	0.26 to 0.36	0.046 to 0.063	1.79 to 2.51
Biogas (thousand m3) (f)	21 to 27	0.71 to 0.93	3.7 to 4.8	5.0 to 6.5

(a) Unless otherwise noted all conversions are from the Energy Statistical Yearbook of China, 1989.
(b) From Smil, 1988.
(c) Coal used in utility boilers generally has a lower heat content than average coal (Wang Qingyi, 1988).
(d) This is the same factor used for toe by British Petroleum.
(e) 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.
(f) From Taylor, 1981.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Vaclav Smil, Energy in Shina's Modernization (Sharpe, 1988); Wang Qingyi, Energy in China's Modernization (Metallurgical Industry Press, 1988); Energy Statistics Handbook, 1987 (Energy Press, Tianjin); British Petroleum Statistical Review of World Energy, 1990 (London); Robert Taylor, Rural Energy Development in China (Resources for the Future, Wash., D.C.).

Chapter I—**Resources and Reserves**

Resources and Reserves

China is richly endowed with conventional energy resources. In this chapter two measures of available energy are presented: energy resources (Table I-1), or the estimated amount in place; and energy reserves (Table I-2), or the amount judged to be recoverable given current economic and technological constraints.[1] Estimates are for fossil fuels, uranium, and hydroelectricity only.

Coal

Estimated coal resources are second only to the United States, although proved reserves rank behind both the United States and the former Soviet Union due mainly to a lack of exploration. 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 rail system.

Crude Oil

China's oil resources are not large by world standards, ranking eleventh among oil-producing countries.[2] The easily-reached oil fields in the North and Northeast have been in production since the early 1960s. Production at China's largest oil field, Daqing in Heilongjiang, has peaked. Most exploration has been near currently producing basins, but development of more remote resources, such as in the Tarim and Junggar Basins in Xinjiang, will be required to meet long-term demand.

The results of offshore exploration have been disappointing so far. In the early 1980's some experts predicted that offshore production in 1990 would be tens of millions of tonnes per year, but actual production in that year was 1.4 million tonnes (just over 1% of total crude oil production), and it is unlikely that the figure will rise above eight million tonnes per year before 2000.[3] The most promising offshore fields are in the Bohai (northeast), the Pearl River basin, and the Beibuwan Basin near Hainan.

Natural Gas

Natural gas resources in China are also small by world standards. With the exceptions of Sichuan Province, where large gas fields are close to consumption centers, and offshore, where there has been foreign investment, natural gas has been relatively neglected both in exploration and development. Geologic formations have led to expectations that natural gas resources are much greater that current discoveries. Determining the magnitude of natural gas resources is probably the most significant issue regarding China's commercial energy resources.

Uranium

With the successful testing in 1992 of the first Chinese-designed and built pressurized water reactor at Qinshan near Shanghai, uranium resources are likely to play a more important role in China's energy future. China's resources will certainly be enough to meet long-term demand from the several GW of nuclear capacity currently under construction, but the potential to supply a large number of reactors is uncertain.

Hydroelectricity

Though China has the largest potential capacity in the world, it is significantly behind the former Soviet Union in terms of actual generation. China's hydropower reserves are nonetheless impressive–370 GW of potentially usable capacity[4]–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.

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 fuelwood and crop wastes (see Table IV-21),[5] but others are harder to estimate. Biogas digesters have been promoted since the 1970s, especially in the Southwest. According to some estimates, the potential biogas resource is about 82 Mtce,[6] or about 7% of total energy consumption in 1987 (commercial and biomass). Solar, wind, 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.

International Comparisons

Most energy resource and reserve figures are based on data provided by the countries surveyed. Since data collection standards and definitions 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.

NOTES

1 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".
2 Ranking is in terms of proved reserves (World Energy Conference, 1989).
3 Larry Chuen-ho Chow, 1991.
4 Currently slightly less than 10% of harnessable capacity (35 GW in 1989) has been exploited.
5 See also Vaclav Smil, 1988.
6 Robert Taylor, 1981.

Table I-1. Energy Resources, Selected Countries (a), 1987

Country	Coal (billion tonnes)				Crude Oil (c) (billion tonnes)	Natural Gas (c) (trillion m3)	Uranium (d) (million tonnes U)
	Subtotal	Bituminous & Anthracite	Sub-bituminous	Lignite			
China (b)	4,000	-	-	-	9.6	8.4	1 - 2
India	245	239	-	6	1.1	1.4	0.06
Japan	9	8	-	< 1	-	-	-
USA	1,570	696	440	434	13.4	19.4	2.04
USSR	5,487	2,230	1,947	1,310	24.7	87.6	2-5

(a) Unless otherwise noted, "resources" here 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 is defined as "the indicated and inferred [amount] additional to the Proved Amount in Place. It 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. Deposits whose existence is merely speculative are not included" (World Energy Conference, 1989). 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.

(b) Coal data for China come from the Chinese Ministry of Energy. Coal resources are those located within a depth of 1,500 m.

(c) 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.

(d) For India, 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 with currently proven mining and processing technology" (World Energy Conference, 1989). Estimated Additional Amounts Recoverable refers to expected additional deposits, estimated from extensions of already known deposits. For China and the USSR, figures correspond to Estimated Total Potential Resources, which includes elements of, but is not strictly comparable to the sum of Proved Reserves and Estimated Additional Amounts Recoverable.

– Not available.

Source: uranium & coal -- 1989 Survey of Energy Resources (World Energy Conference); Chinese coal -- Energy in China, 1990 (MOE, Beijing); oil & natural gas -- Resource Constraints in Petroleum Production Potential, C.D.Masters, et al., Science 352:146-152 (12 July 1991).

Figure I-1. Coal Resources

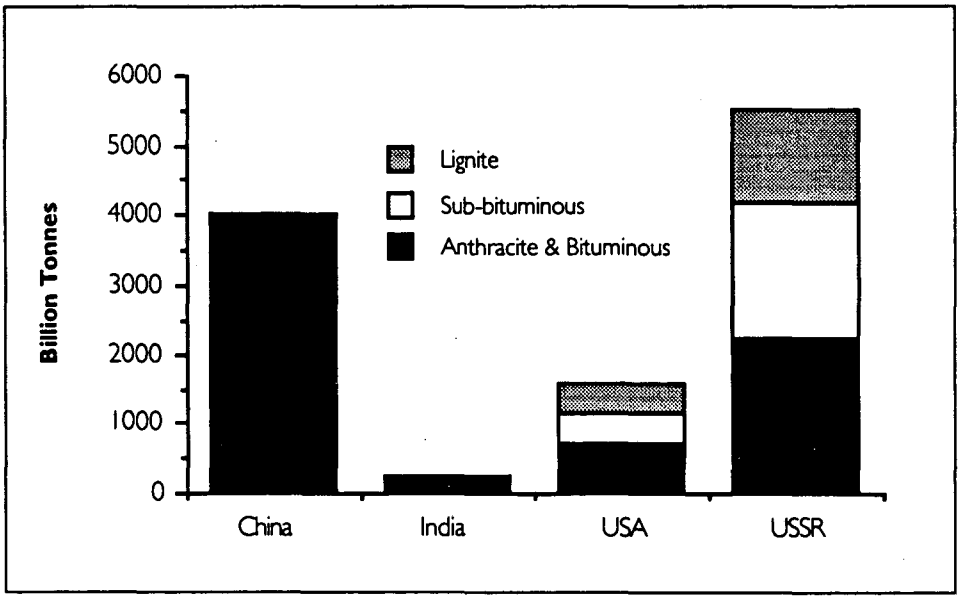


Figure I-2. Natural Gas Resources

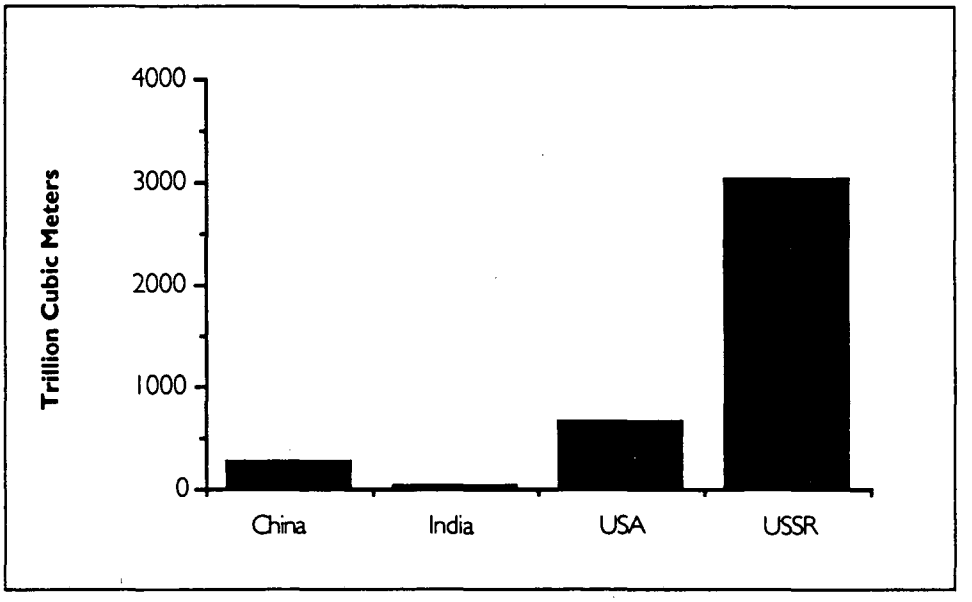


Figure I-3. Crude Oil Resources

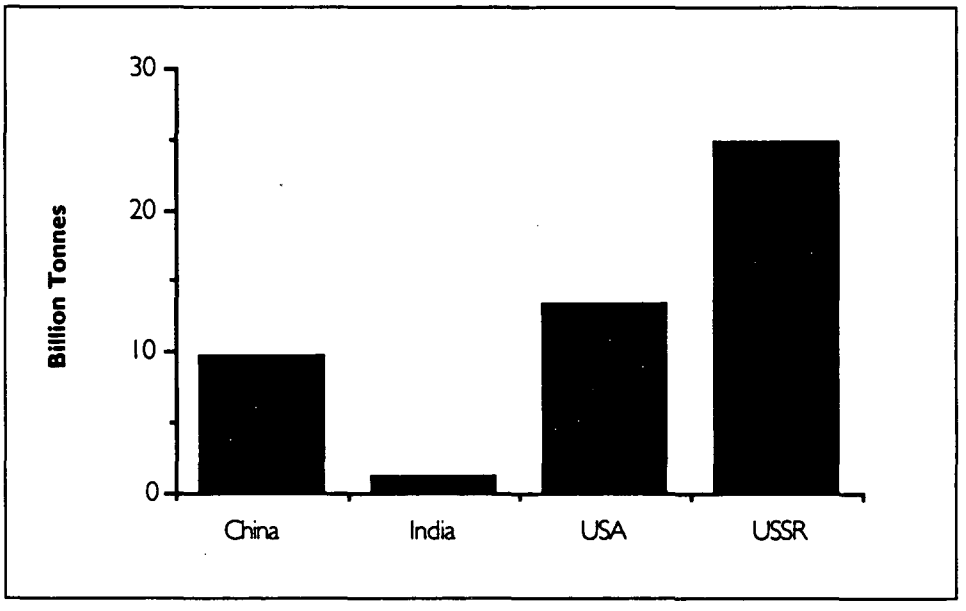


Figure I-4. Uranium Resources

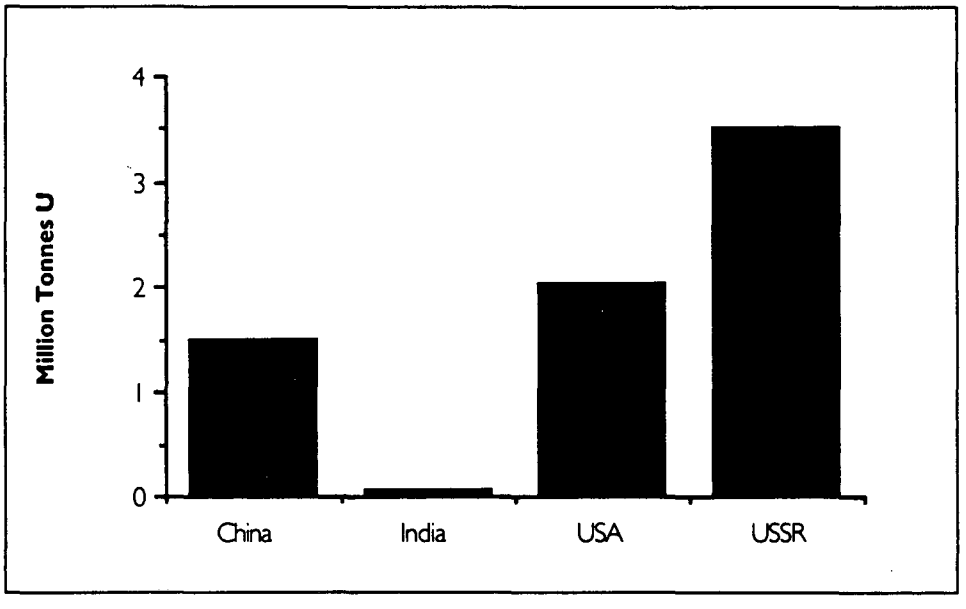


Table I-2. Energy Reserves, Selected Countries, end of 1989 (a)

Country	Coal (Mtonnes) Subtotal	Bituminous & Anthracite	Subbituminous & Lignite	Crude Oil (Mtonnes)	Natural Gas (billion m3)	Hydropower (b) (TWh/year)	Uranium (c) (tonnes U)
China	167,075 (d)	153,701 (d)	13,374 (d)	3,200	1,000	1,923	-
India	62,283	60,283	2,000	1,000	700	205	45,540
Japan	852	835	17	<50	<50	134	6,600
USA	261,253	130,194	131,059	4,300	4,700	376	387,000
USSR	239,647	102,980	136,667	8,000	42,500	3,831	-

(a) 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."

(b) 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 turbined 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 both small and large hydropower schemes. Data are for end of 1987. Figure for China is from Wang, 1988.

(c) Corresponds to WEC category of Proved Reserves. 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 measurments of the deposits together with knowledge of deposit characteristics" (World Energy Conference, 1989). Figure is for end of 1987.

(d) According to a recent Ministry of Energy report (Jia, 1991), proven coal reserves in China are about 6% anthracite, 79% bituminous coal (59% steam coal and 20% coking coal), and 15% lignite. Earlier breakdowns from the Ministry of Energy usually cite a larger percentage of anthracite and correspondingly smaller percentage of bituminous coal.

– Not available.

Source: hydropower & uranium—1989 Survey of Energy Resources (World Energy Conference); Wang Qingyi, Energy in China, 1988 (Metallurgical Industry Press, Beijing); coal, oil & gas—BP Statistical Review of World Energy, June 1990 (British Petroleum, London); Coal in Asia Pacific, Quarterly Report, vol.3, no. 3, Dec. 1991 (New Energy and Industrial Technology Development Organization, Japan).

Figure I-5. Coal Reserves

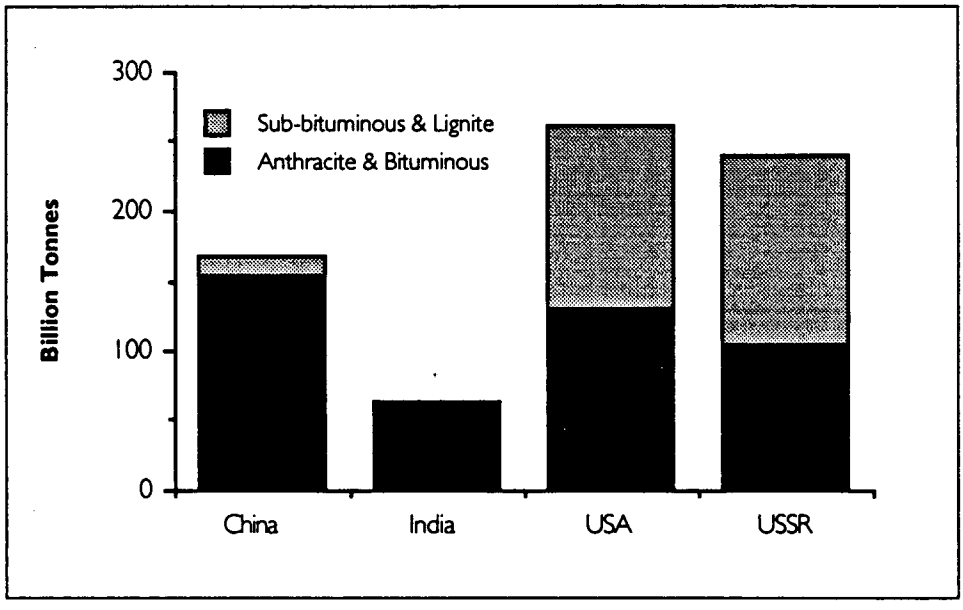


Figure I-6. Natural Gas Reserves

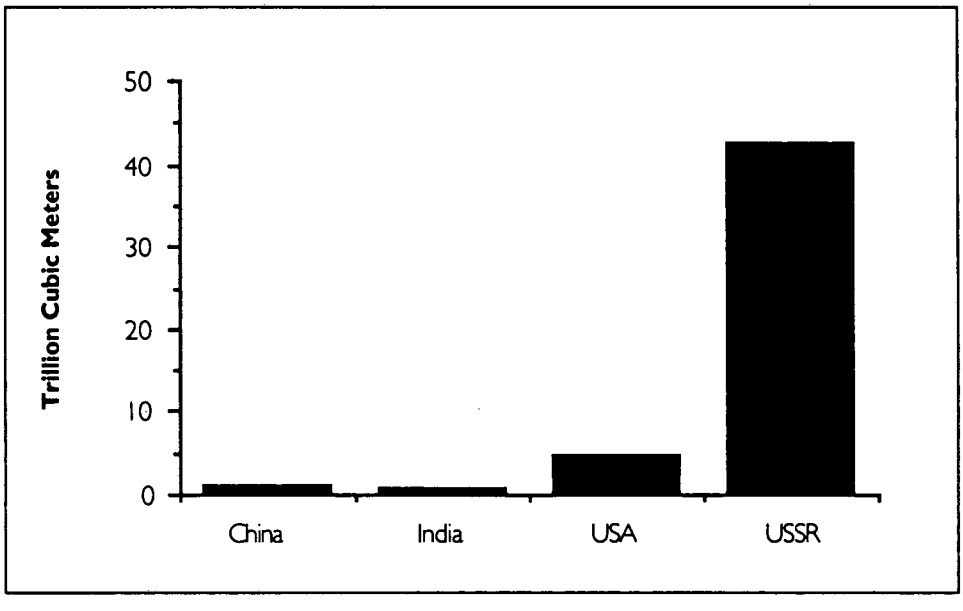


Figure I-7. Crude Oil Reserves

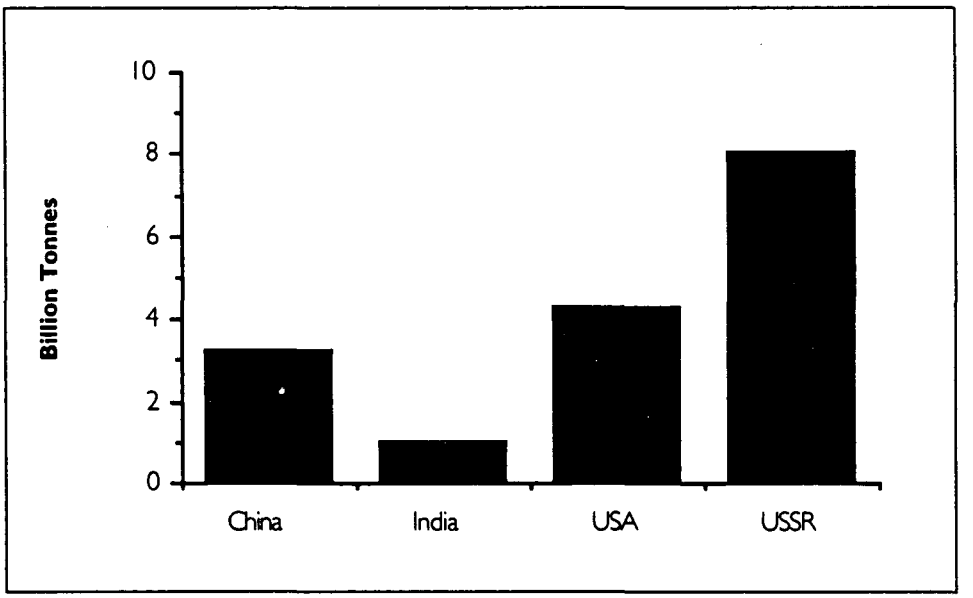


Figure I-8. Hydropower Reserves

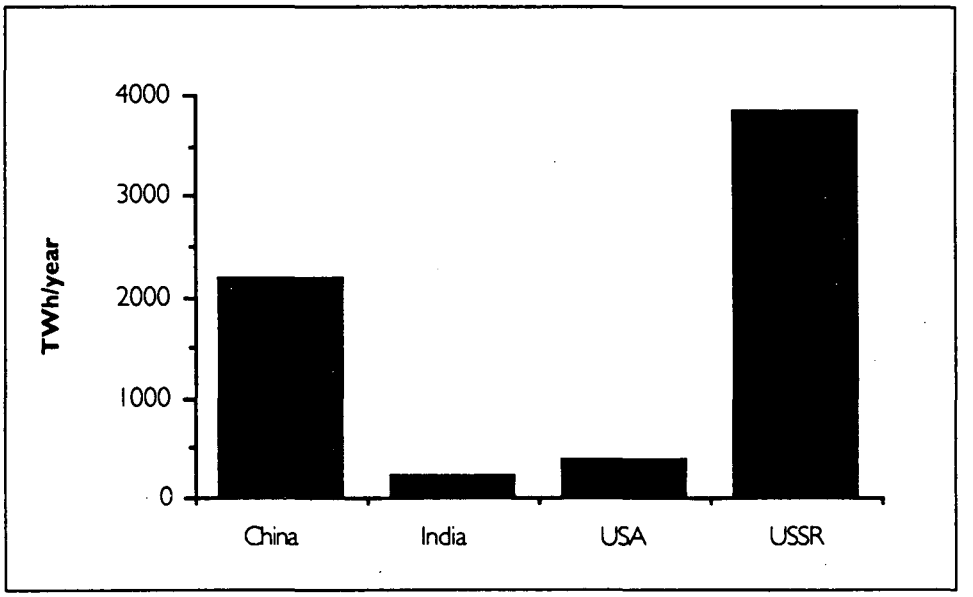


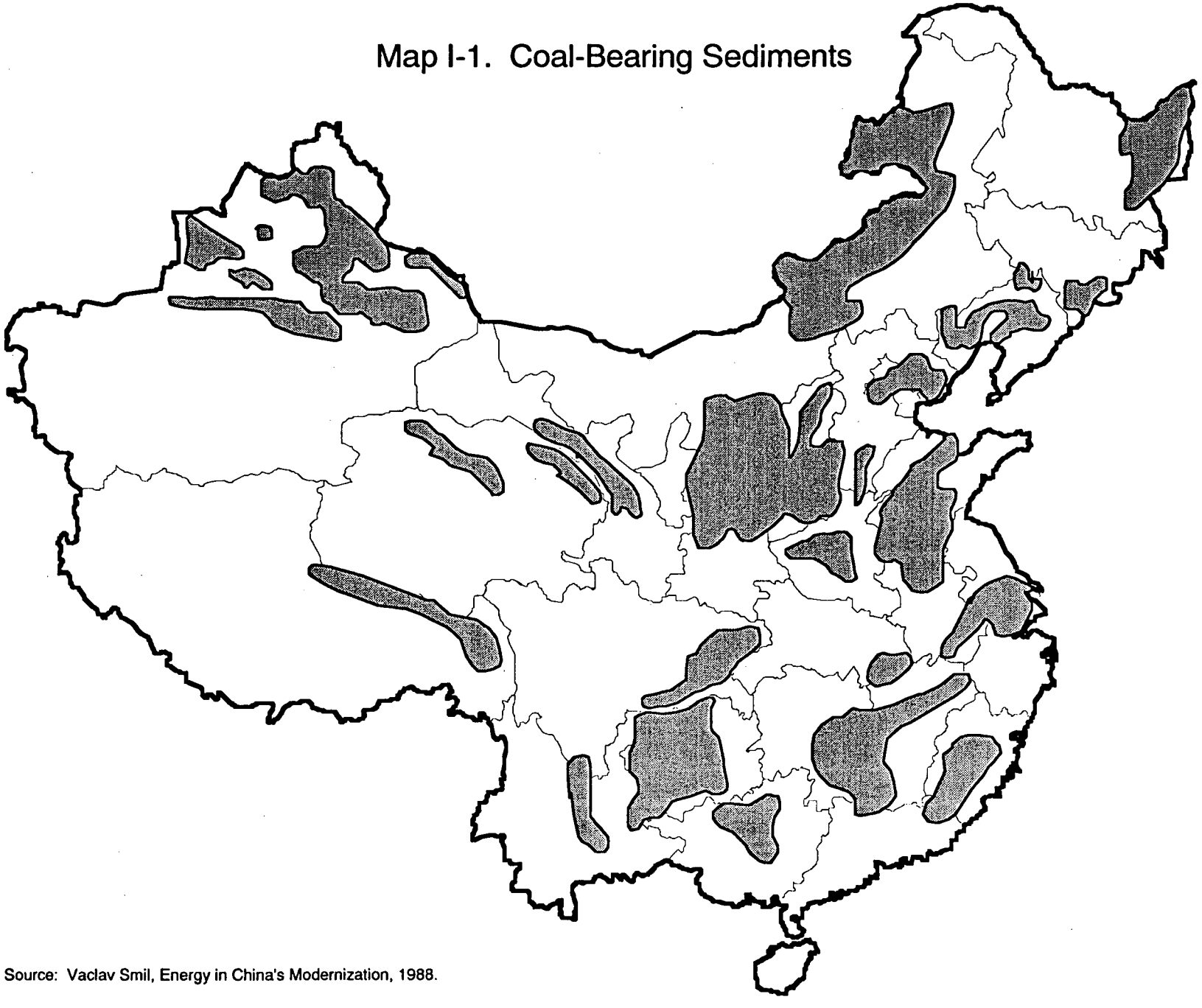
Table I-3. Exploitable Hydropower Resources by Province, 1980 (a)

Region or Province	Potential Installed Capacity (GW)	Potential Annual Generation (TWh/yr)	Share of Total Potential Annual Generation
North subtotal	*6.9*	*23.2*	*1.2%*
Hebei (b)	1.8	4.2	0.2%
Shanxi	2.6	10.7	0.6%
Inner Mongolia	2.4	8.4	0.4%
Northeast subtotal	*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%
East subtotal	*17.9*	*68.8*	*3.6%*
Shanghai & 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%
South-Central subtotal	*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%
Southwest subtotal	*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%
Northwest subtotal	*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%
National Total	378.5	1,923.3	100.0%

(a) Statistics in this table are calculated on the basis of sites which can accommodate power plants of ≥500 kW of installed capacity.
(b) Including Beijing and Tianjin.

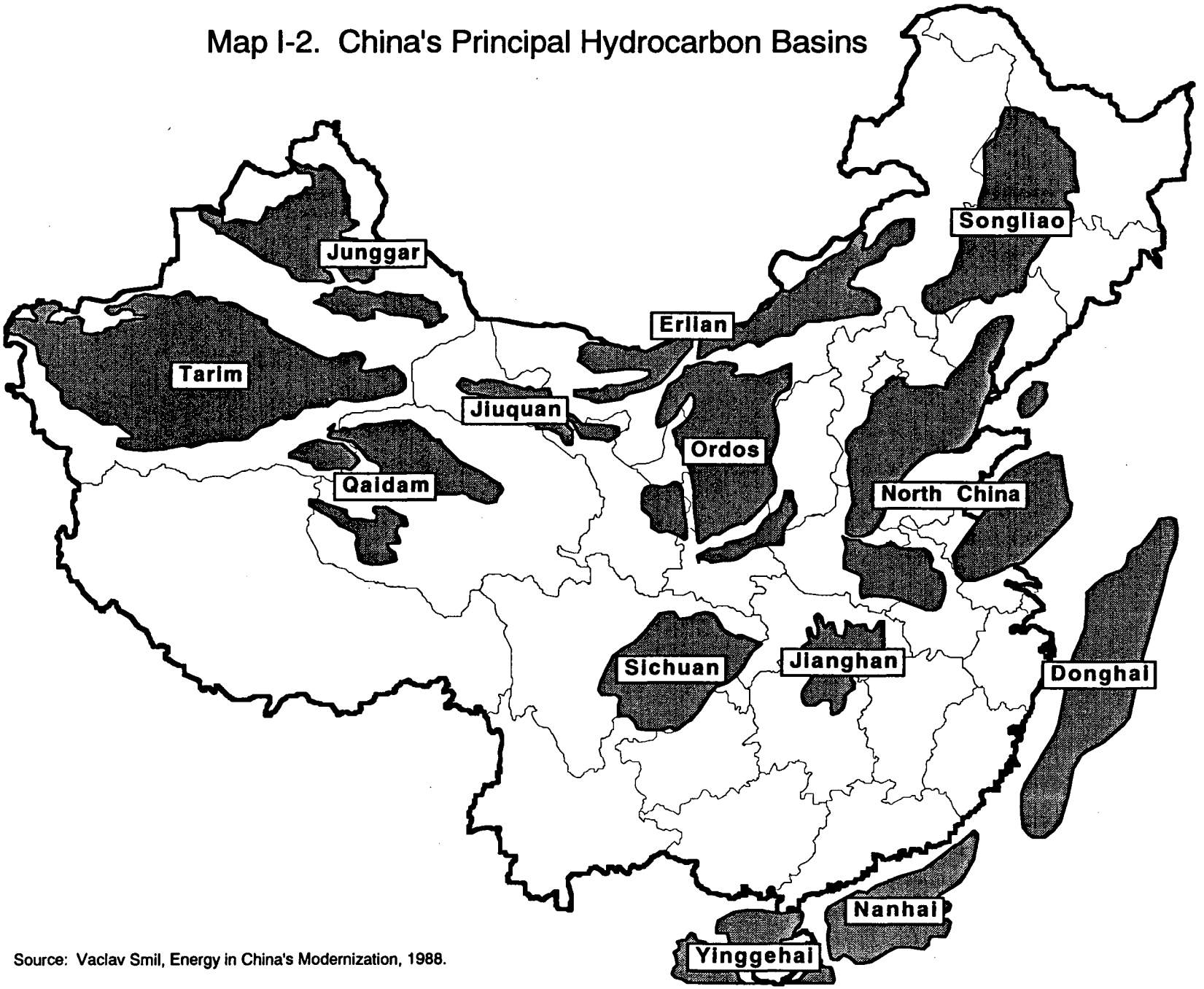
Source: Wang Qingyi, Energy in China, 1988 (Metallurgical Industry Press, Beijing).

Map I-1. Coal-Bearing Sediments



Source: Vaclav Smil, Energy in China's Modernization, 1988.

Map I-2. China's Principal Hydrocarbon Basins



Source: Vaclav Smil, Energy in China's Modernization, 1988.

Chapter II—**Energy Production**

Energy Production

Since 1949, sustained growth in energy production has been the rule. 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 in the 1960s. The period since 1971 has seen production increases interrupted only in 1980 and 1981, with annual growth averaging 6.8% and 5.7% over 1971-1980 and 1981-1990 respectively. 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 about 20% of total energy production.[1] 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 about 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 nearly 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. Although output from centrally- and locally-owned state-run mines has increased over the past decade, 61% of the growth in output between 1980 and 1989 came from the new rural mines, which now account for over one-third of output (Table II-4). Very little coal comes from open-cast mines (3% in 1989; MOE, 1990).

About 75% of coal mined is bituminous, most of the rest is anthracite, with lignite making up the remaining 4% (Table II-5). Nearly two-thirds of the bituminous coal is classified as coking coal (though considerably less is actually used in coking; see Table II-9).

Most coal is mined in North and Northeast China, with one province, Shanxi, accounting for over one-quarter of total output (Tables II-2 and II-3). Virtually all of the large state-owned mines are in this region (Table II-6). Even in the major coal-producing regions, with the exception of Shanxi, coal consumption outstrips production in most provinces (Table II-7). As a consequence coal accounts for a larger percentage of freight than any other commodity (about one-third in terms of tonne-km; Table II-28). Coal as a percentage of tonnage of freight handled is higher than as a percentage of tonne-km, indicating that, on average, coal is shipped shorter distances than other commodities.

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 "antique". 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, and at the same time consuming more coal and emitting more pollutants per unit of output. The spike in production during the Great Leap Forward (1957-1960) was due to the encouragement of local production of steel and consequently coke. Thousands of inefficient coke ovens were constructed, and millions of tonnes of coke were turned out for use in local smelters, the output of which was largely useless.

Less than 20% of raw coal output is washed, and nearly all washed coal is used in coking (Table II-10). The low rate of washing means that most of the coal transported contains relatively large amounts of dirt and rocks, taxing an already overburdened rail system. Prospects for increasing the percentage of coal washed are hampered by the dearth of water in the most productive coal mining regions.

Coal gas production, mainly from coking ovens, has increased steadily (Table II-11). Most coal gas is consumed on-site, but an increasing share is delivered to households for cooking.

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 (Table II-12). Growth 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. Development of potentially rich fields in remote Xinjiang will probably be required for China's future oil independence, since demand continues to rise (Tables IV-1 and IV-29). While the rate of crude oil loss at oil fields has been declining, oil field consumption of crude and electricity per unit of output has been increasing, indicating the greater effort needed to extract oil from older fields (Table II-13).

The mix of refined oil products has shifted somewhat over the past decade (Table II-14). While the shares of total refinery output of fuel oil and kerosene have declined somewhat over the past decade, shares of gasoline, diesel oil, LPG, and "Light Oil for the Petrochemical Industry" (probably mostly naphtha) have increased, especially that of gasoline. This reflects increasing demand for petroleum products in the transportation and residential sectors. Refinery capacity has consistently been less than petroleum extraction capacity, reflecting China's position as a net exporter of crude oil.

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-15). Most associated gas comes from a few large oil fields; in 1987 the Daqing, Shengli, Liaohe, Zhongyuan and Dagang oil fields accounted for over 80% of associated gas production. A large fraction of production is flared at oil fields because of the expense of transporting it to consumers.

Electricity

Electricity generation has grown faster and more consistently in recent years than production of any other energy source, more than doubling between 1980 and 1990 to 621 TWh (Table II-16). The share of generation from hydropower plants has declined slightly since the mid-1980s. Nearly four-fifths of electricity is generated thermally, reflecting heavier investment in thermal generation over much of China's history since 1949. Hydropower generation capacity has tended to increase at a faster rate than thermal capacity, however, and in 1989 made up 27% of total capacity, as opposed to 9% in 1950. The generation capacity growth rates in Table II-18 show that hydropower developed more rapidly than thermal power (though from a smaller base) during the period of rapid capacity expansion in the late 1950s. Again between 1964 and 1971 hydropower capacity grew at a much faster rate than thermal capacity. Thereafter generation capacity increased at similar rates, until the late 1980s, when thermal power received heavier emphasis.

Estimates of plant efficiency can be gained from data on capacity of large generating units (units over 6 MW, which made up 74 GW of a total of 83 GW installed capacity in 1988; see Table II-19). The share of capacity provided by "high-temperature, high-pressure" units has increased from 56% to 80% between 1974 and 1988. At the same time the capacity of "medium-temperature, medium-pressure" units has grown slowly, and that of "low-temperature, low-pressure" (i.e. inefficient) units has dropped. While the capacity of cogeneration units has risen steadily, its share of total thermal capacity shrank from 14% to 10% between 1974 and 1988.

National average capacity factors have increased overall since the late 1970s, peaking in 1986-1987 mainly through increased utilization of thermal capacity (Table II-20). In general, larger plants, both thermal and hydropower, tend to have larger capacity factors (Tables II-21 and II-23). National average capacity factors for thermal power plants have been steady at 60% ± 2% since the late 1970s, while capacity factors for hydropower plants have increased over the same period, from 29% to 39%. Capacity factors for individual plants can be very high (Tables II-24 and II-25), and for grids as well e.g. in 1985 the grid which supplies Shanghai had

a capacity factor of 80%. 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 less than 8% of gross generation, tend to have capacity factors under 0.5 (Table II-22).

China has been very successful in extending grids into most rural areas. Currently nearly 90% of villages have electricity available (Table II-26). In remote areas in the Southwest this has been accomplished mainly through the construction of small hydropower projects.

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. In 1979 and 1987 about 224 Mtce and 266 Mtce of biomass energy were consumed, and large amounts of firewood were harvested unsustainably (See Table IV-21 for estimates of biomass consumption and sustainable yield). About 4.6 million biogas digesters, producing 1 to 1.5 cubic meters of biogas per day for six to eight months per year, are currently in use, mainly in the Southwest.[2] Most serve individual families, but some community and factory digesters also are in operation.

Small hydropower projects have been a key element of developing rural areas. Tidal power stations have been built (5.92 MW installed capacity), but the resource base is small and capital costs are higher than for ordinary small hydropower projects. Wind generators have been used to provide power to remote communities. Most are less than one kW capacity (about 100,000 of this type are in use), although a few demonstration wind farms with units of several tens of kW have also been set up. Geothermal resources, the most promising of which are in Xizang and Yunnan, 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.

NOTES

1 Because coal is the dominant energy source, all energy sources in this data book, including raw and processed coal, are converted into standard coal equivalent (29.310 GJ/tonne standard coal) for purposes of comparison.

2 Chen Yingrong, 1991. Chen states that biogas makes up 0.5% to 1% of total biomass energy consumption. The rest of the information in this section also comes from this source.

Table II-1. Primary Energy Production, 1949-1990

1. Production in Physical Units

Year	Raw Coal (Mt)	Crude Oil (Mt)	Natural Gas (a) (million cubic m)	Hydro-electricity (billion kWh)
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	13,910	109.2
1989	1,054	137.65	14,493	118.4
1990	1,080	138.31	15,298	126.7
1991 (b)	*233*	*34.26*	*3,874*	*23.2*

(a) Figures for 1984 and 1987 are slightly different than in Table II-15 because data sources are different.
(b) First three months of 1991 only. Data are from China Statistics Monthly and should be considered preliminary.

Source: 1949-1989 -- Energy in China, 1990 (MOE, Beijing); 1990 -- China Statistical Yearbook, 1991 (SSB, Beijing); 1991 -- China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table II-1. Primary Energy Production, 1949-1990 (continued)

2. Production in Mtce

Year	Raw Coal (Mtce)	Crude Oil (Mtce)	Natural Gas (a) (Mtce)	Hydro-electricity (Mtce)	Total (Mtce)
1949	23	0.17	0.01	0.28	23
1950	31	0.29	0.01	0.32	31
1951	38	0.44	0.00	0.36	39
1952	47	0.63	0.01	0.53	48
1953	50	0.89	0.01	0.61	51
1954	60	1.13	0.02	0.89	62
1955	70	1.39	0.02	0.97	73
1956	79	1.66	0.03	1.41	82
1957	93	2.09	0.09	1.94	98
1958	193	3.23	0.15	1.66	198
1959	264	5.33	0.39	1.78	271
1960	284	7.43	1.38	2.99	295
1961	198	7.59	1.96	2.99	211
1962	157	8.21	1.61	3.64	170
1963	155	9.26	1.36	3.51	169
1964	153	12.11	1.41	4.28	171
1965	166	16.16	1.46	4.20	187
1966	180	20.79	1.78	5.09	208
1967	147	19.83	1.94	5.29	174
1968	157	22.84	1.86	4.65	186
1969	190	31.06	2.61	6.46	230
1970	253	43.79	3.82	8.28	309
1971	280	56.30	4.97	10.14	351
1972	293	65.24	6.44	11.64	376
1973	298	76.59	7.95	15.72	398
1974	295	92.64	10.01	16.73	414
1975	344	110.09	11.77	19.23	485
1976	345	124.52	13.43	18.42	501
1977	393	133.77	16.12	19.23	562
1978	441	148.65	18.26	18.02	626
1979	454	151.65	19.30	20.24	645
1980	443	151.36	18.98	23.51	637
1981	444	144.60	16.94	26.46	632
1982	476	145.89	15.87	30.06	668
1983	510	151.53	16.24	34.91	713
1984	564	163.73	16.52	35.07	779
1985	623	178.42	17.20	37.33	856
1986	639	186.70	18.30	38.18	882
1987	663	191.63	18.45	40.48	913
1988	700	195.79	18.50	44.12	958
1989	753	196.65	19.28	47.83	1,017
1990	771	197.58	20.35	51.20	1,041
1991 (b)	*167*	*48.94*	*5.15*	*9.37*	*230*

(a) Figures for 1984 and 1987 are slightly different than in Table II-15 because data sources are different.
(b) First three months of 1991 only. Data are from China Statistics Monthly and should be considered preliminary.

Source: 1949-1989 — Energy in China, 1990 (MOE, Beijing); 1990 — China Statistical Yearbook, 1991 (SSB, Beijing); 1991 — China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Figure II-1 Commercial Energy Production in China 1950-1990

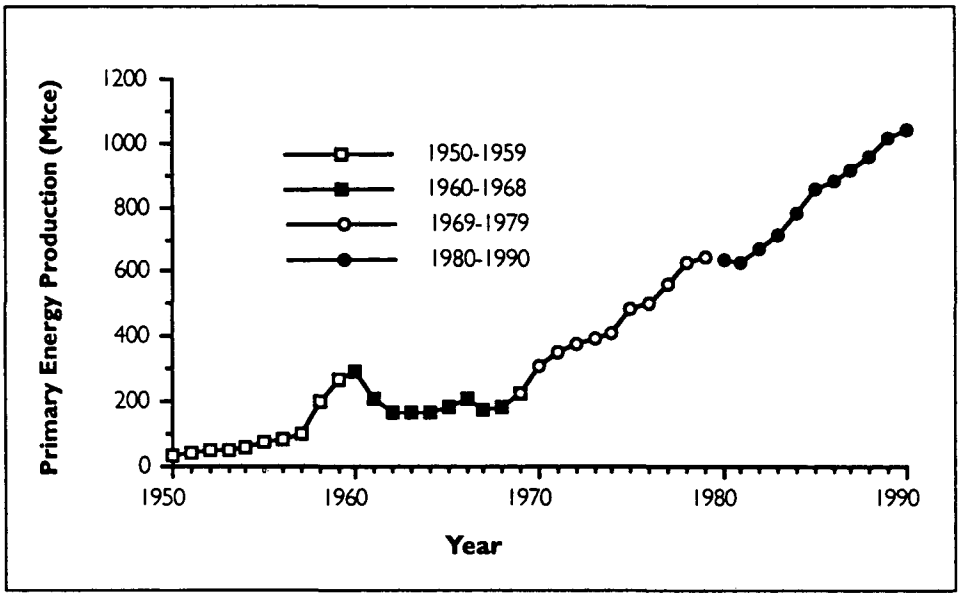


Figure II-2 Primary Energy Production by Source 1950-1990

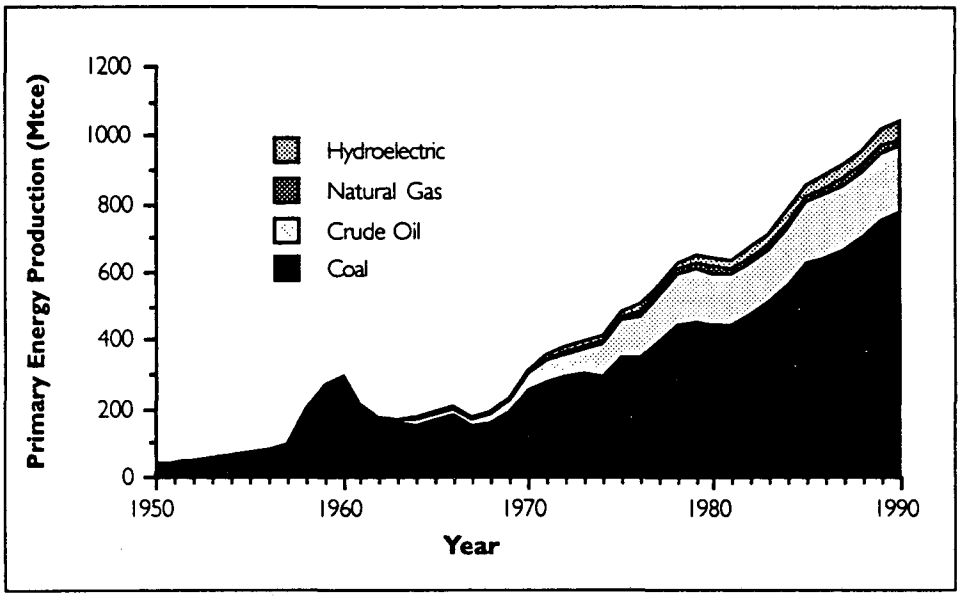


Table II-1. Primary Energy Production, 1949-1990 (continued)

3. Shares of Total

Year	Raw Coal (Mtce)	Crude Oil (Mtce)	Natural Gas (a) (Mtce)	Hydro-electricity (Mtce)
1949	98.0%	0.7%	0.0%	1.2%
1950	98.0%	0.9%	0.0%	1.0%
1951	97.9%	1.1%	0.0%	0.9%
1952	97.6%	1.3%	0.0%	1.1%
1953	97.1%	1.7%	0.0%	1.2%
1954	96.7%	1.8%	0.0%	1.4%
1955	96.7%	1.9%	0.0%	1.3%
1956	96.2%	2.0%	0.0%	1.7%
1957	95.8%	2.1%	0.1%	2.0%
1958	97.5%	1.6%	0.1%	0.8%
1959	97.2%	2.0%	0.1%	0.7%
1960	96.0%	2.5%	0.5%	1.0%
1961	94.1%	3.6%	0.9%	1.4%
1962	92.1%	4.8%	0.9%	2.1%
1963	91.6%	5.5%	0.8%	2.1%
1964	89.6%	7.1%	0.8%	2.5%
1965	88.4%	8.6%	0.8%	2.2%
1966	86.7%	10.0%	0.9%	2.5%
1967	84.5%	11.4%	1.1%	3.0%
1968	84.3%	12.2%	1.0%	2.5%
1969	82.6%	13.5%	1.1%	2.8%
1970	81.9%	14.2%	1.2%	2.7%
1971	79.7%	16.0%	1.4%	2.9%
1972	77.9%	17.3%	1.7%	3.1%
1973	74.8%	19.2%	2.0%	3.9%
1974	71.2%	22.4%	2.4%	4.0%
1975	70.9%	22.7%	2.4%	4.0%
1976	68.8%	24.8%	2.7%	3.7%
1977	69.9%	23.8%	2.9%	3.4%
1978	70.5%	23.7%	2.9%	2.9%
1979	70.3%	23.5%	3.0%	3.1%
1980	69.6%	23.8%	3.0%	3.7%
1981	70.3%	22.9%	2.7%	4.2%
1982	71.3%	21.8%	2.4%	4.5%
1983	71.6%	21.3%	2.3%	4.9%
1984	72.4%	21.0%	2.1%	4.5%
1985	72.8%	20.8%	2.0%	4.4%
1986	72.4%	21.2%	2.1%	4.3%
1987	72.6%	21.0%	2.0%	4.4%
1988	73.0%	20.4%	1.9%	4.6%
1989	74.1%	19.3%	1.9%	4.7%
1990	74.1%	19.0%	2.0%	4.9%
1991 (b)	72.4%	21.3%	2.2%	4.1%

Average Shares of Total:

Coal	
1949-1990	**85%**
1981-1990	**72%**
Petroleum	
1949-1990	**13%**
1981-1990	**21%**
Natural Gas	
1949-1990	**1.4%**
1981-1990	**2.1%**
Hydroelectricity	
1949-1990	**2.9%**
1981-1990	**4.5%**

(a) Figures for 1984 and 1987 are slightly different than in Table II-15 because data sources are different.
(b) First three months of 1991 only. Data are from China Statistics Monthly and should be considered preliminary.

Source: 1949-1989 — Energy in China, 1990 (MOE, Beijing); 1990 — China Statistical Yearbook, 1991 (SSB, Beijing); 1991 — China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table II-1. Primary Energy Production, 1949-1990 (continued)

4. Growth Rates (percent over previous year)

Year	Raw Coal (Mtce)	Crude Oil (Mtce)	Natural Gas (a) (Mtce)	Hydro-electricity (Mtce)	Total (Mtce)
1950	34.1%	66.7%	0.0%	14.3%	34.1%
1951	23.7%	55.0%	-57.1%	12.5%	23.8%
1952	24.3%	41.9%	166.7%	44.4%	24.7%
1953	5.7%	40.9%	37.5%	15.4%	6.2%
1954	20.0%	27.4%	36.4%	46.7%	20.4%
1955	17.6%	22.8%	13.3%	9.1%	17.6%
1956	12.2%	19.6%	52.9%	45.8%	12.8%
1957	18.5%	25.9%	169.2%	37.1%	19.0%
1958	106.5%	54.8%	57.1%	-14.6%	102.9%
1959	36.7%	65.0%	163.6%	7.3%	37.0%
1960	7.6%	39.4%	258.6%	68.2%	9.0%
1961	-30.1%	2.1%	41.3%	0.0%	-28.6%
1962	-20.9%	8.3%	-17.7%	21.6%	-19.2%
1963	-1.1%	12.7%	-15.7%	-3.3%	-0.6%
1964	-1.2%	30.9%	3.9%	21.8%	1.1%
1965	8.0%	33.4%	3.8%	-1.9%	9.5%
1966	8.7%	28.6%	21.8%	21.2%	10.8%
1967	-18.3%	-4.6%	9.0%	4.0%	-16.1%
1968	6.8%	15.2%	-4.1%	-12.2%	7.1%
1969	20.9%	36.0%	40.0%	39.1%	23.4%
1970	33.1%	41.0%	46.4%	28.1%	34.2%
1971	10.7%	28.6%	30.3%	22.4%	13.8%
1972	4.6%	15.9%	29.4%	14.7%	7.0%
1973	1.7%	17.4%	23.6%	35.1%	5.8%
1974	-1.0%	21.0%	25.9%	6.4%	4.1%
1975	16.7%	18.8%	17.5%	15.0%	17.1%
1976	0.2%	13.1%	14.1%	-4.2%	3.3%
1977	13.9%	7.4%	20.0%	4.4%	12.1%
1978	12.4%	11.1%	13.3%	-6.3%	11.5%
1979	2.8%	2.0%	5.7%	12.3%	2.9%
1980	-2.3%	-0.2%	-1.7%	16.2%	-1.2%
1981	0.3%	-4.5%	-10.7%	12.5%	-0.7%
1982	7.2%	0.9%	-6.4%	13.6%	5.6%
1983	7.2%	3.9%	2.3%	16.1%	6.8%
1984	10.5%	8.1%	1.7%	0.5%	9.3%
1985	10.5%	9.0%	4.1%	6.5%	9.9%
1986	2.5%	4.6%	6.4%	2.3%	3.0%
1987	3.8%	2.6%	0.8%	6.0%	3.6%
1988	5.6%	2.2%	0.3%	9.0%	4.9%
1989	7.6%	0.4%	4.2%	8.4%	6.1%
1990	2.5%	0.5%	5.6%	7.0%	2.3%
1991 (b)	-1.6%	0.9%	0.2%	-2.9%	-1.2%

Average Rates of Growth:

Coal	
1949-1971	**12.1%**
1971-1980	**4.7%**
1981-1991	**5.5%**
Petroleum	
1949-1971	**30.1%**
1971-1980	**9.8%**
1981-1991	**3.3%**
Natural Gas	
1949-1971	**33.0%**
1971-1980	**12.8%**
1981-1991	**1.9%**
Hydroelectricity	
1949-1971	**17.7%**
1971-1980	**8.1%**
1981-1991	**6.5%**
Total	
1949-1971	**13.1%**
1971-1980	**6.0%**
1981-1991	**5.0%**

(a) Figures for 1984 and 1987 are slightly different than in Table II-15 because data sources are different.
(b) Data are from China's Latest Economic Statistics and should be considered preliminary.

Source: 1949-1989—Energy in China, 1990 (MOE, Beijing); 1990—China Statistical Yearbook, 1991 (SSB, Beijing); 1991—China's Latest Economic Statistics, January 1992 (China Statistical Information and Consultancy Service Center, Hong Kong)

Table II-2. Commercial Energy Production by Province and Energy Source, 1989

Planning Region	Province	Coal (Mt)	Crude Oil (Mt)	Natural Gas (million cubic m)	Electricity (TWh)			Total Energy Production (Mtce) (a)
					Hydro Subtotal	*Thermal Subtotal*	Total Electricity	
North	Beijing	10.17	(b)	(b)	*0.22*	*11.72*	11.94	7.35
	Tianjin	(b)	4.70	0.38	*0*	*9.66*	9.66	7.23
	Hebei	63.24	5.78	0.23	*0.66*	*35.90*	36.56	53.98
	Shanxi	275.01	(b)	0.08	*0.80*	*29.51*	30.31	196.78
	Inner Mongolia	43.82	(b)	(b)	*0.05*	*15.32*	15.37	31.31
Northeast	Liaoning	49.80	13.45	2.00	*1.66*	*40.21*	41.87	58.12
	Jilin	24.38	3.42	0.10	*3.11*	*12.64*	15.75	23.70
	Heilongjiang	76.16	55.56	2.25	*0.42*	*27.49*	27.91	136.99
East	Shanghai	(b)	(b)	(b)	*0*	*27.83*	27.83	0
	Jiangsu	24.46	0.83	0.04	*0.05*	*36.58*	36.64	18.72
	Zhejiang	1.44	(b)	(b)	*6.36*	*13.67*	20.04	3.60
	Anhui	31.16	0.02	(b)	*1.15*	*16.13*	17.29	22.74
	Fujian	9.45	(b)	(b)	*6.84*	*6.12*	12.96	9.51
	Jiangxi	20.63	(b)	(b)	*3.06*	*8.91*	11.97	15.97
	Shandong	56.95	33.35	1.54	*0.01*	*41.97*	41.98	90.42
South-Central	Henan	88.58	9.53	1.32	*1.69*	*28.59*	30.28	79.31
	Hubei	10.38	0.93	0.07	*25.37*	*8.00*	33.37	19.08
	Hunan	36.90	(b)	(b)	*9.51*	*8.82*	18.33	30.19
	Guangdong	9.82	0.35	(b)	*7.02*	*22.82*	29.84	10.35
	Guangxi	11.40	0.11	(b)	*5.86*	*5.07*	10.93	10.66
	Hainan	0.00	(b)	(b)	*0.78*	*0.46*	1.24	0.32
Southwest	Sichuan	71.35	0.13	6.46	*14.68*	*18.01*	32.70	65.65
	Guizhou	34.96	(b)	0.02	*4.12*	*5.54*	9.65	26.65
	Yunnan	21.81	(b)	(b)	*5.91*	*5.50*	11.41	17.96
	Xizang	0.01	(b)	(b)	*0.27*	*0.01*	0.28	0.11
Northwest	Shaanxi	31.49	0.55	0.00	*1.30*	*13.56*	14.85	23.80
	Gansu	14.15	1.47	0.03	*10.52*	*5.80*	16.31	16.49
	Qinghai	3.02	0.73	0.04	*4.41*	*1.41*	5.82	5.02
	Ningxia	13.39	0.29	0.01	*1.23*	*4.19*	5.42	10.48
	Xinjiang	20.20	6.44	0.50	*1.31*	*4.99*	6.30	24.83
National Total		1,054.15	137.65	14.49	*118.40*	*466.30*	584.70	1,016.61
Balance (c)		0.01	0.01	-0.56	*0.01*	*-0.12*	-0.11	-0.72

(a) Sum of coal, oil, natural gas, and hydroelectricity production. Hydroelectricity converted at 0.404 kgce/kWh.
(b) Not available.
(c) Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total.

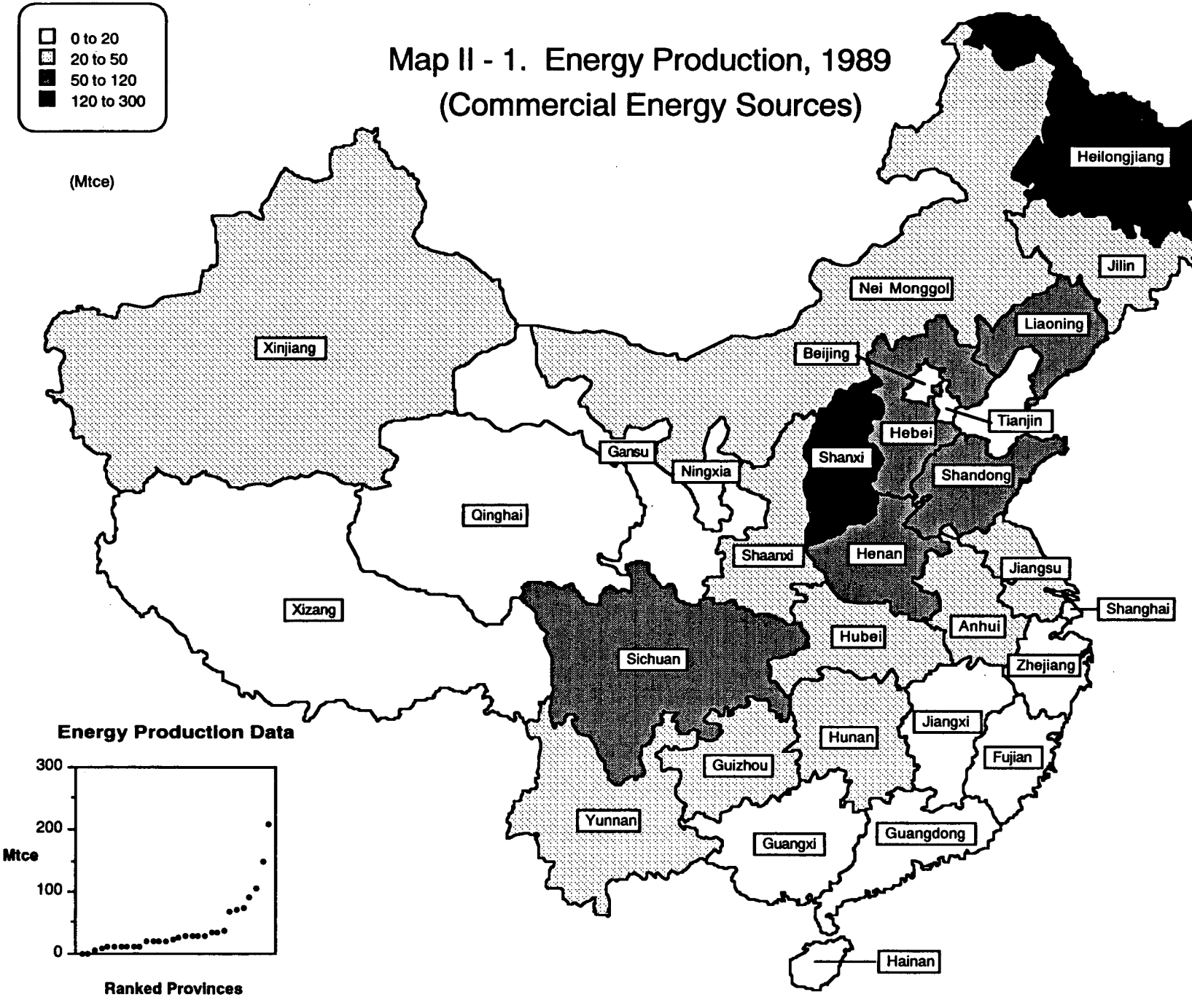
Source: China Statistical Yearbook, 1990 (SSB, Beijing).

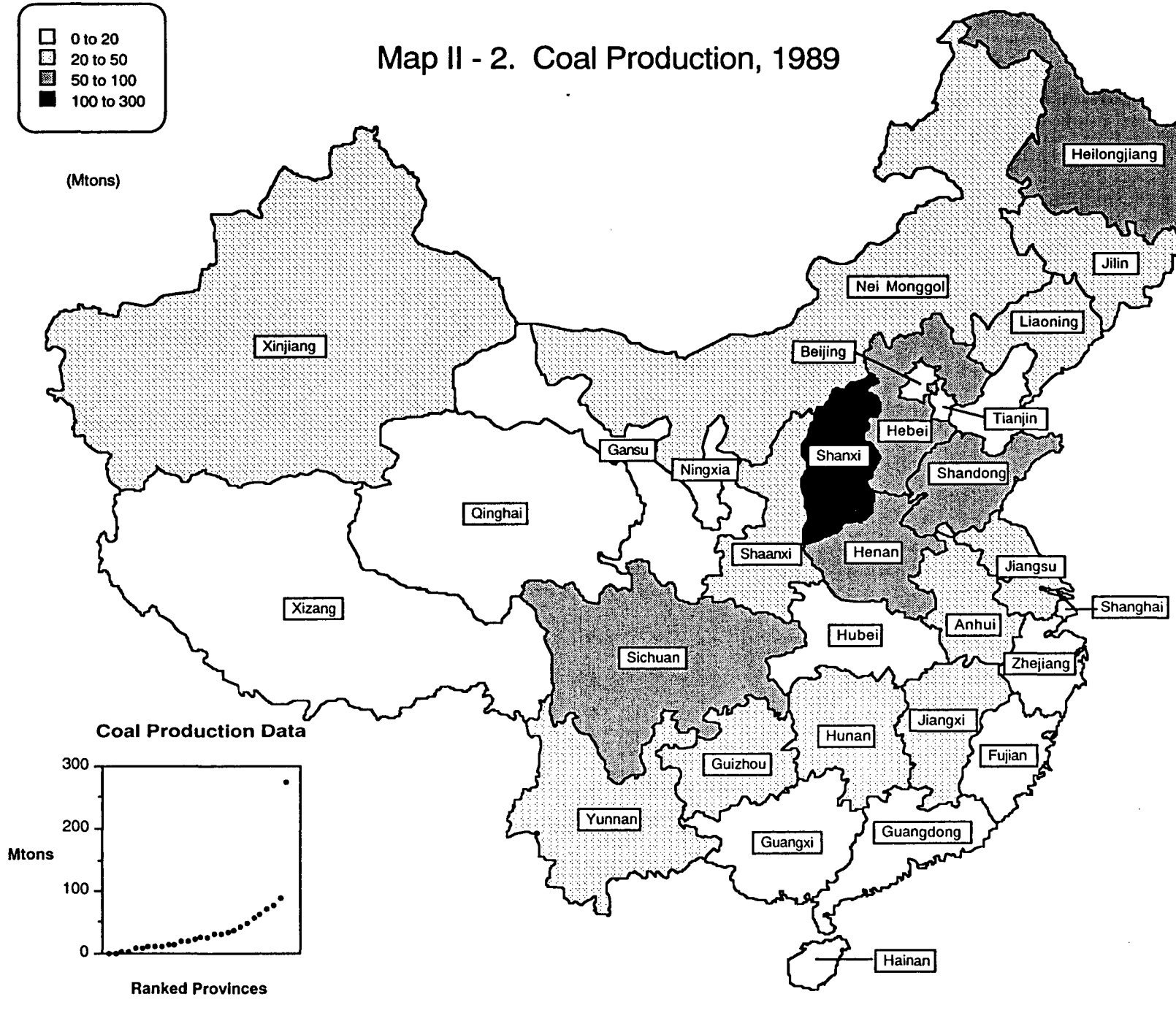
Table II-3. Commercial Energy Production by Province and Energy Source, 1990

Planning Region	Province	Coal (Mt)	Crude Oil (Mt)	Natural Gas (million cubic m)	Electricity (TWh)			Total Energy Production (Mtce) (a)
					Hydro Subtotal	*Thermal Subtotal*	Total Electricity	
North	Beijing	10	(b)	(b)	*0.21*	*12.33*	12.54	7.2
	Tianjin	(b)	4.70	0.37	*0.00*	*9.50*	9.50	7.2
	Hebei	62	5.71	0.29	*0.70*	*36.19*	36.90	53.1
	Shanxi	286	(b)	0.06	*0.72*	*30.70*	31.42	204.6
	Inner Mongolia	48	(b)	(b)	*0.07*	*16.88*	16.95	34.3
Northeast	Liaoning	51	13.69	2.04	*3.55*	*40.04*	43.58	60.1
	Jilin	26	3.57	0.10	*4.58*	*12.86*	17.45	25.6
	Heilongjiang	83	55.63	2.25	*0.59*	*28.92*	29.52	142.0
East	Shanghai	(b)	(b)	(b)	*0.00*	*28.41*	28.41	0.0
	Jiangsu	24	0.88	0.04	*0.05*	*40.39*	40.45	18.5
	Zhejiang	1	(b)	(b)	*5.60*	*15.27*	20.87	3.0
	Anhui	32	0.02	(b)	*1.33*	*18.09*	19.42	23.4
	Fujian	9	(b)	(b)	*7.81*	*5.85*	13.67	9.6
	Jiangxi	20	(b)	(b)	*2.78*	*9.36*	12.14	15.4
	Shandong	60	33.51	1.44	*0.04*	*44.59*	44.64	92.7
South-Central	Henan	91	8.82	1.39	*1.54*	*30.37*	31.91	80.1
	Hubei	9	0.83	0.08	*24.19*	*9.85*	34.04	17.5
	Hunan	34	(b)	(b)	*10.61*	*9.53*	20.14	28.6
	Guangdong	9	0.49	(b)	*7.72*	*26.68*	34.40	10.2
	Guangxi	10	0.12	(b)	*6.89*	*5.67*	12.56	10.1
	Hainan	(b)	(b)	(b)	*0.78*	*0.62*	1.40	0.3
Southwest	Sichuan	68	0.16	6.62	*15.14*	*19.13*	34.26	63.7
	Guizhou	37	(b)	0.03	*3.75*	*6.64*	10.39	28.0
	Yunnan	22	(b)	(b)	*7.55*	*5.03*	12.58	18.8
	Xizang	(b)	(b)	(b)	*0.32*	*0.01*	0.33	0.1
Northwest	Shaanxi	33	0.70	0.01	*1.26*	*13.71*	14.97	25.1
	Gansu	16	1.46	0.03	*10.65*	*6.49*	17.14	17.9
	Qinghai	3	0.81	0.05	*5.73*	*1.33*	7.06	5.7
	Ningxia	14	0.26	0.01	*1.10*	*4.50*	5.60	10.8
	Xinjiang	21	6.97	0.50	*1.43*	*5.55*	6.98	26.2
National Total		1,080	138.31	15.30	*126.72*	*494.48*	621.20	1,040.4
Balance (c)		1	0.00	0.00	*0.02*	*-0.02*	0.00	0.7

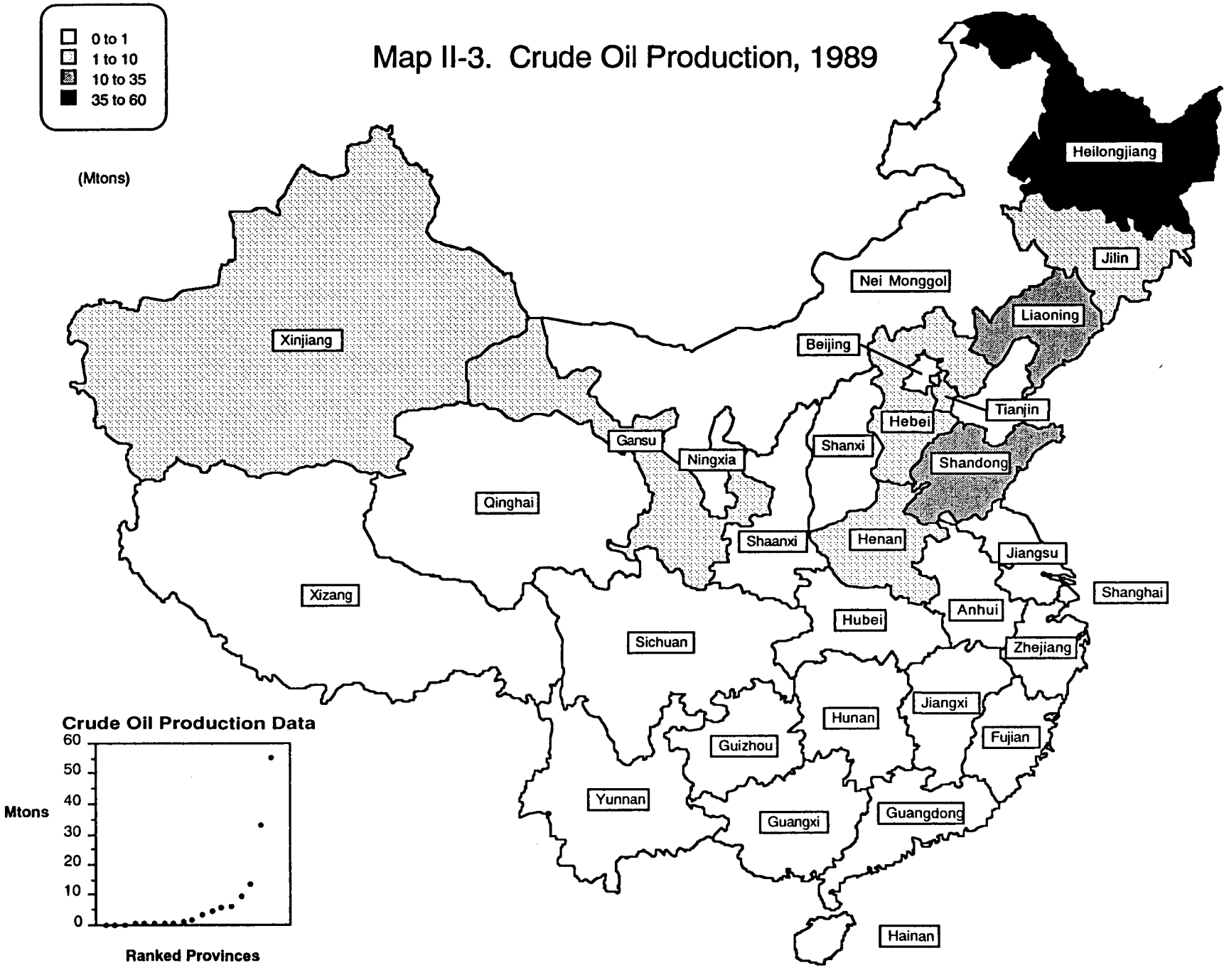
(a) Sum of coal, oil, natural gas, and hydroelectricity production. Hydroelectricity converted at 0.404 kgce/kWh.
(b) Not available.
(c) Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total.

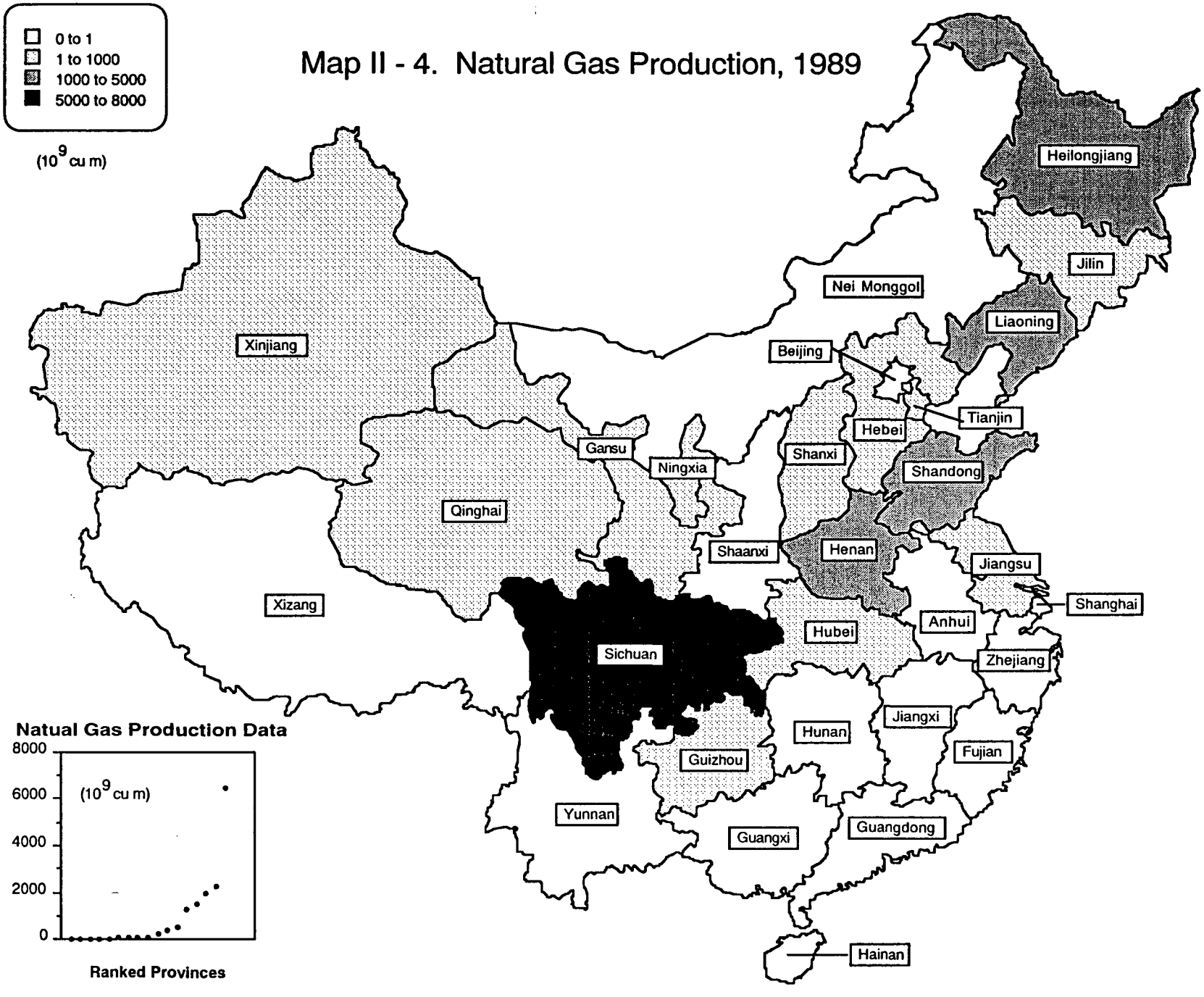
Source: China Statistical Yearbook, 1991 (SSB, Beijing).

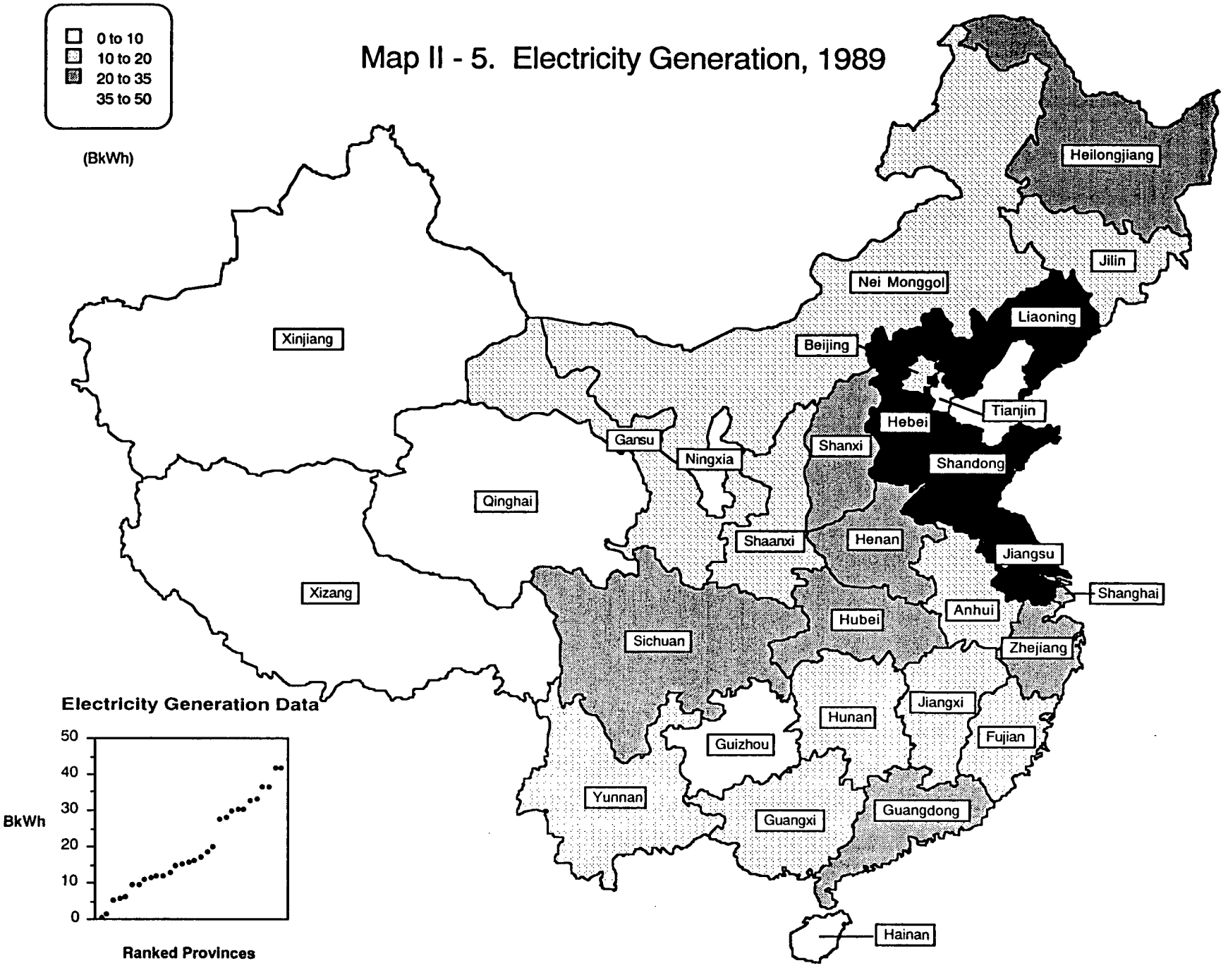

0 to 20
20 to 50
50 to 120
120 to 300
(Mtce)
Map II - 1. Energy Production, 1989
(Commercial Energy Sources)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Shanxi
Ningxia
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Energy Production Data
300
200
100
0
Mtce
Ranked Provinces

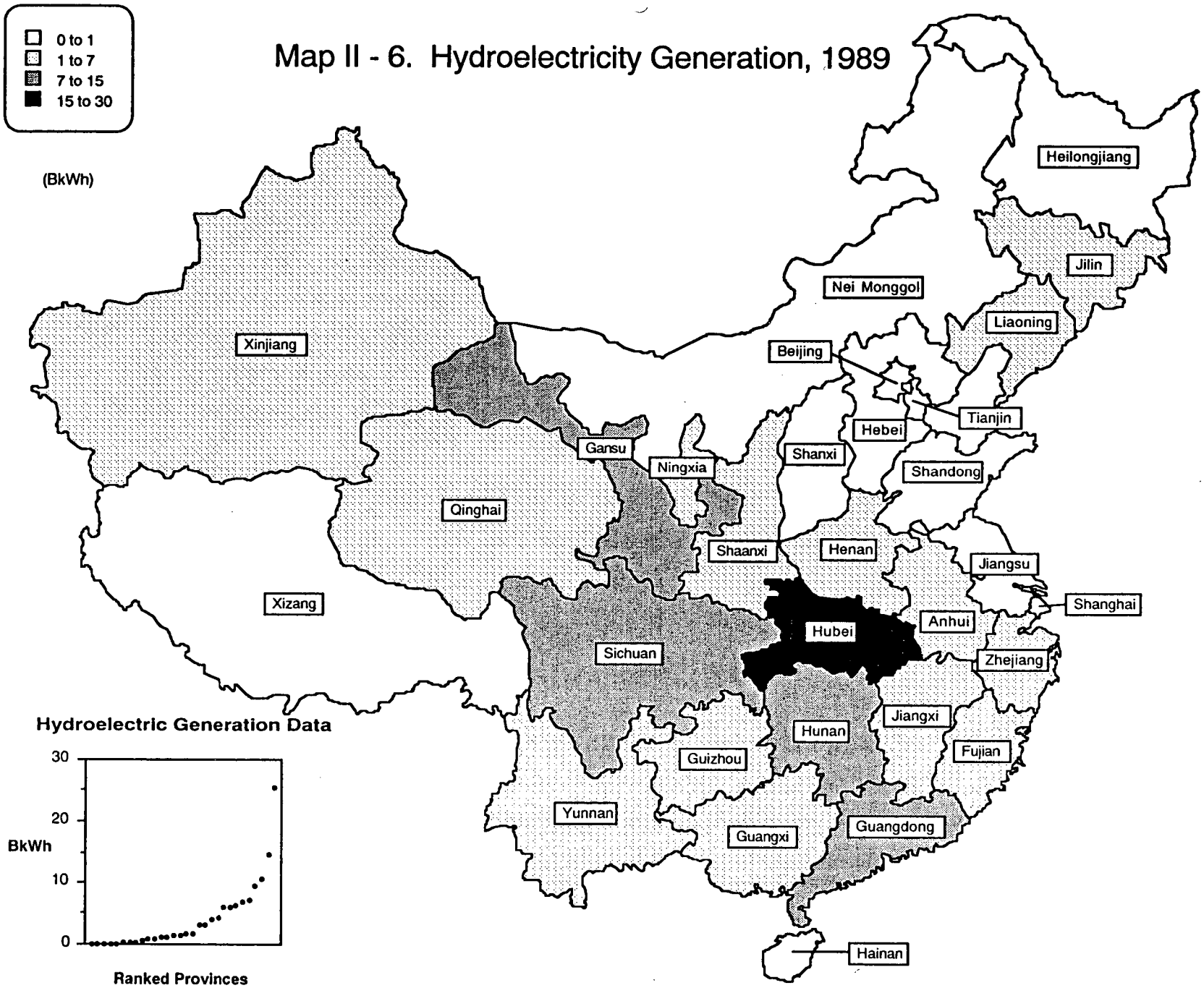

Map II - 2. Coal Production, 1989
0 to 20
20 to 50
50 to 100
100 to 300
(Mtons)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Coal Production Data
300
200
100
0
Mtons
Ranked Provinces

Map II-3. Crude Oil Production, 1989




Map II - 4. Natural Gas Production, 1989
0 to 1
1 to 1000
1000 to 5000
5000 to 8000
(10^9 cu m)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Natual Gas Production Data
8000
6000
4000
2000
0
(10^9 cu m)
Ranked Provinces


Map II - 5. Electricity Generation, 1989
0 to 10
10 to 20
20 to 35
35 to 50
(BkWh)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Electricity Generation Data
BkWh
50
40
30
20
10
0
Ranked Provinces


0 to 1
1 to 7
7 to 15
15 to 30
(BkWh)
Map II - 6. Hydroelectricity Generation, 1989
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Hubei
Anhui
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Hydroelectric Generation Data
30
20
10
0
BkWh
Ranked Provinces

Map II - 7. Thermal Electricity Generation, 1989

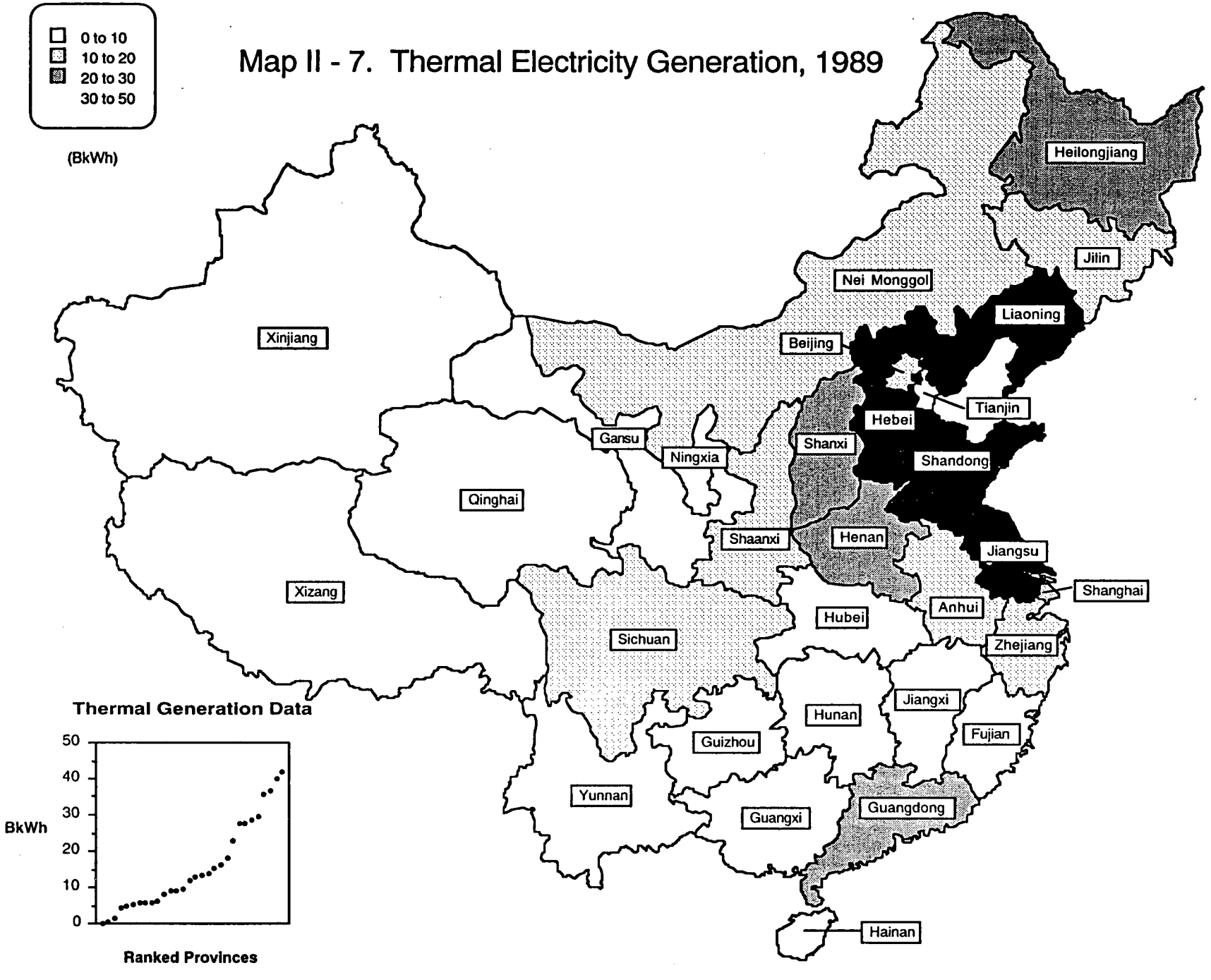


Table II-4. Raw Coal Production by Producer, 1950-1991

Year	TOTAL		CENTRALLY ADMINISTERED		
	Production (Mt)	Growth Over Previous Year	Production (Mt)	Growth Over Previous Year	Share of Total
1950	42.92		30.18		70.3%
1951	53.08	23.7%	37.14	23.1%	70.0%
1952	66.58	25.4%	48.43	30.4%	72.7%
1953	69.73	4.7%	52.18	7.7%	74.8%
1954	83.66	20.0%	62.28	19.4%	74.4%
1955	98.38	17.6%	73.00	17.2%	74.2%
1956	110.36	12.2%	81.51	11.7%	73.9%
1957	130.78	18.5%	94.33	15.7%	72.1%
1958	270.00	106.5%	157.77	67.3%	58.4%
1959	368.79	36.6%	216.43	37.2%	58.7%
1960	397.21	7.7%	240.36	11.1%	60.5%
1961	277.62	-30.1%	175.54	-27.0%	63.2%
1962	219.55	-20.9%	147.55	-15.9%	67.2%
1963	217.07	-1.1%	151.29	2.5%	69.7%
1964	214.57	-1.2%	150.56	-0.5%	70.2%
1965	231.80	8.0%	164.28	9.1%	70.9%
1966	251.47	8.5%	180.72	10.0%	71.9%
1967	205.70	-18.2%	135.88	-24.8%	66.1%
1968	219.59	6.8%	147.30	8.4%	67.1%
1969	265.95	21.1%	178.57	21.2%	67.1%
1970	353.99	33.1%	226.72	27.0%	64.0%
1971	392.30	10.8%	246.58	8.8%	62.9%
1972	410.47	4.6%	249.22	1.1%	60.7%
1973	416.97	1.6%	247.67	-0.6%	59.4%
1974	413.17	-0.9%	242.78	-2.0%	58.8%
1975	482.24	16.7%	279.95	15.3%	58.1%
1976	483.45	0.3%	273.64	-2.3%	56.6%
1977	550.68	13.9%	295.27	7.9%	53.6%
1978	617.86	12.2%	341.84	15.8%	55.3%
1979	635.57	2.9%	357.77	4.7%	56.3%
1980	620.09	-2.4%	344.39	-3.7%	55.5%
1981	621.69	0.3%	335.09	-2.7%	53.9%
1982	666.32	7.2%	349.90	4.4%	52.5%
1983	714.53	7.2%	363.12	3.8%	50.8%
1984	789.23	10.5%	394.70	8.7%	50.0%
1985	872.31	10.5%	406.29	2.9%	46.6%
1986	894.04	2.5%	413.92	1.9%	46.3%
1987	928.09	3.8%	420.20	1.5%	45.3%
1988	979.87	5.6%	434.45	3.4%	44.3%
1989	1,054.15	7.6%	458.30	5.5%	43.5%
1990 (a)	1,079.30	2.4%	480.22	4.8%	44.5%
1991 (b)	*1,062.43*	*-1.6%*	*501.34*	4.4%	47.2%

(a) Data are from an article by a Ministry of Energy author (Jia, 1991) and should be considered preliminary only. Other sources have reported different figures (e.g. the Ministry of Energy Publication, Energy in China 1990, reported 1990 production of 1,053 Mt (a 0.1% decrease over the previous year), while the 1991 China Statistical Yearbook reports 1,080 Mt.)
(b) Data are from "China's Latest Economic Statistics" and should be considered preliminary only.

Source: Yearbook of Coal Industry in China 1982-1988 (Coal Industry Press, Beijing); Energy in China, 1990 (MOE, Beijing); China's Latest Economic Statistics, Jan 1992 (China's Statistics Information Consultancy Service Centre, Hong Kong); Jia Yunzhen, Coal in Asia Pacific, Quarterly Report, vol.3, no. 3, Dec. 1991 (New Energy and Industrial Technology Development Organization, Japan).

Table II-4. Raw Coal Production by Producer, 1950-1991 (continued)

Year	LOCAL STATE-OWNED			RURAL COLLECTIVE		
	Production (Mt)	Growth Over Previous Year	Share of Total	Production (Mt)	Growth Over Previous Year	Share of Total
1950	12.74		29.7%	0		
1951	15.94	25.1%	30.0%	0		
1952	18.15	13.9%	27.3%	0		
1953	17.55	-3.3%	25.2%	0		
1954	21.38	21.8%	25.6%	0		
1955	25.38	18.7%	25.8%	0		
1956	28.85	13.7%	26.1%	0		
1957	36.45	26.3%	27.9%	0		
1958	78.23	114.6%	29.0%	34.00		12.6%
1959	124.36	59.0%	33.7%	28.00	-17.6%	7.6%
1960	134.85	8.4%	33.9%	22.00	-21.4%	5.5%
1961	102.08	-24.3%	36.8%	0		
1962	72.00	-29.5%	32.8%	0		
1963	65.78	-8.6%	30.3%	0		
1964	64.01	-2.7%	29.8%	0		
1965	67.52	5.5%	29.1%	0		
1966	70.75	4.8%	28.1%	0		
1967	61.82	-12.6%	30.1%	8.00		3.9%
1968	59.29	-4.1%	27.0%	13.00		5.9%
1969	69.38	17.0%	26.1%	18.00		6.8%
1970	96.27	38.8%	27.2%	31.00		8.8%
1971	113.72	18.1%	29.0%	32.00		8.2%
1972	125.25	10.1%	30.5%	36.00		8.8%
1973	127.30	1.6%	30.5%	42.00		10.1%
1974	118.39	-7.0%	28.7%	52.00		12.6%
1975	145.29	22.7%	30.1%	57.00		11.8%
1976	144.81	-0.3%	30.0%	65.00		13.4%
1977	176.41	21.8%	32.0%	79.00		14.3%
1978	189.02	7.1%	30.6%	87.00		14.1%
1979	171.50	-9.3%	27.0%	106.30		16.7%
1980	162.10	-5.5%	26.1%	113.60	6.9%	18.3%
1981	160.00	-1.3%	25.7%	126.60	11.4%	20.4%
1982	170.35	6.5%	25.6%	146.07	15.4%	21.9%
1983	181.34	6.5%	25.4%	170.07	16.4%	23.8%
1984	177.65	-2.0%	22.5%	216.88	27.5%	27.5%
1985	182.78	2.9%	21.0%	283.24	30.6%	32.5%
1986	182.21	-0.3%	20.4%	297.91	5.2%	33.3%
1987	183.20	0.5%	19.7%	324.69	9.0%	35.0%
1988	193.89	5.8%	19.8%	351.53	8.3%	35.9%
1989	215.51	11.2%	20.4%	380.34	8.2%	36.1%
1990 (a,c)	*599.08*		55.5%			
1991 (b,c)	*561.11*	-6.3%	52.8%			

(a) Data are from an article by a Ministry of Energy author (Jia, 1991) and should be considered preliminary only. Other sources have reported different figures.
(b) Data are from "China's Latest Economic Statistics" and should be considered preliminary only.
(c) For all local mines, including state-run, collectively- and individually-owned mines.

Source: Yearbook of Coal Industry in China 1982-1988 (Coal Industry Press, Beijing); Energy in China, 1990 (MOE, Beijing); China's Latest Economic Statistics, Jan 1992 (China's Statistics Information Consultancy Service Centre, Hong Kong); Jia Yunzhen, Coal in Asia Pacific, Quarterly Report, vol.3, no. 3, Dec. 1991 (New Energy and Industrial Technology Development Organization, Japan).

Figure II-3 Raw Coal Production, 1950-1991

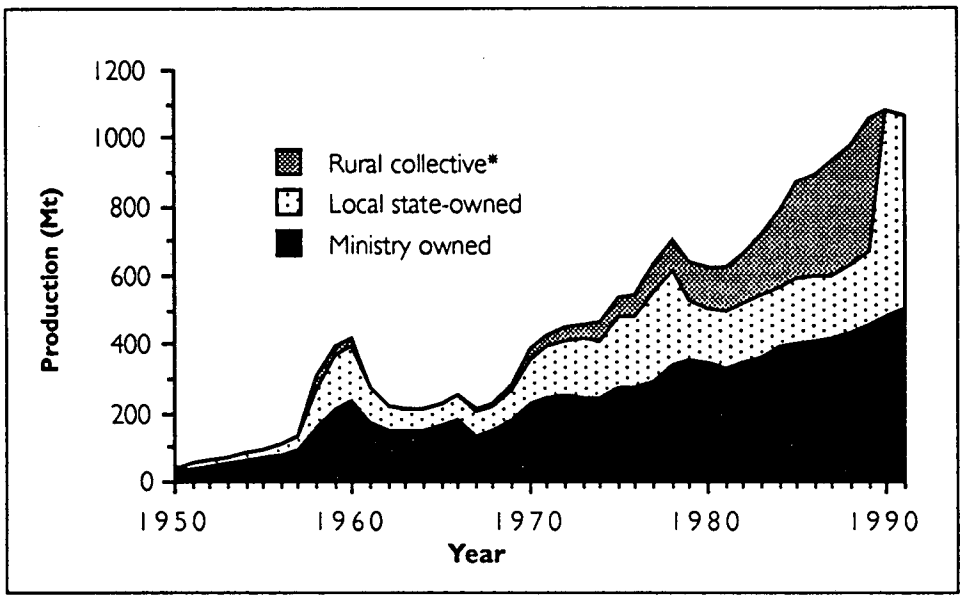
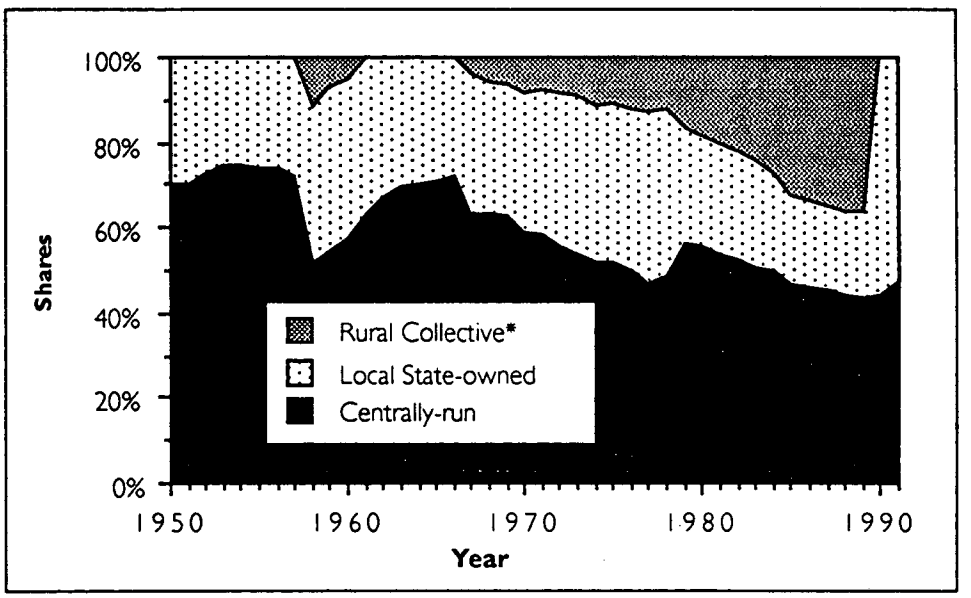


Figure II-4 Raw Coal Production Shares, 1950-1991



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

Table II-5. Raw Coal Production by Type of Coal, 1952, 1957, 1965 and 1979-1989 (Mt)

Year	Total	Bituminous Coal			Anthracite	Lignite
		Subtotal	Coking Coal	Other Bitum.		
1952	53.96	46.16	11.36	34.80	7.72	0.08
1957	124.24	101.24	45.86	55.38	20.14	2.86
1965	231.80	183.38	106.73	76.65	39.59	8.83
1979	635.54	484.45	249.49	234.96	125.84	25.25
1980	620.15	466.86	308.33	158.53	128.97	24.31
1981	621.64	467.14	303.99	163.15	131.11	23.39
1982	666.33	502.31	331.14	171.17	139.05	24.97
1983	714.53	535.77	347.84	187.93	151.86	26.90
1984	789.23	589.40	373.82	215.58	169.72	30.11
1985	872.28	657.78	391.09	266.69	182.28	32.22
1986	894.04	677.27	415.71	261.56	184.75	32.02
1987	927.96	702.42	454.94	247.48	192.34	33.20
1988	979.88	740.56	462.72	277.84	202.61	36.70
1989	1,054.15	793.39	499.66	293.73	217.98	42.78

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Coal Industry Yearbooks,1982 and 1990 (MOE, Beijing).

Figure II-5 Raw Coal Production by Type of Coal, 1979-1989

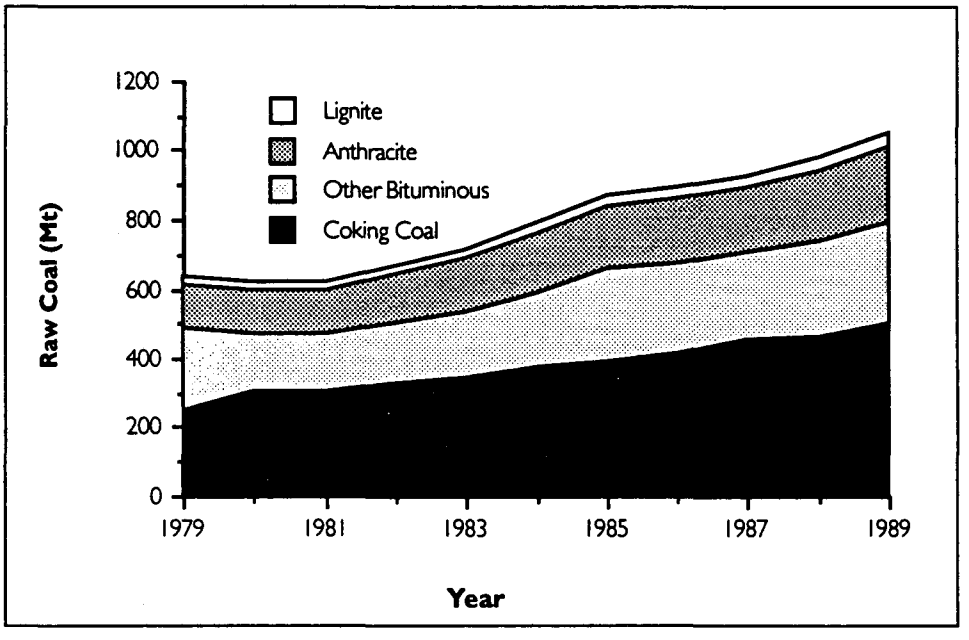


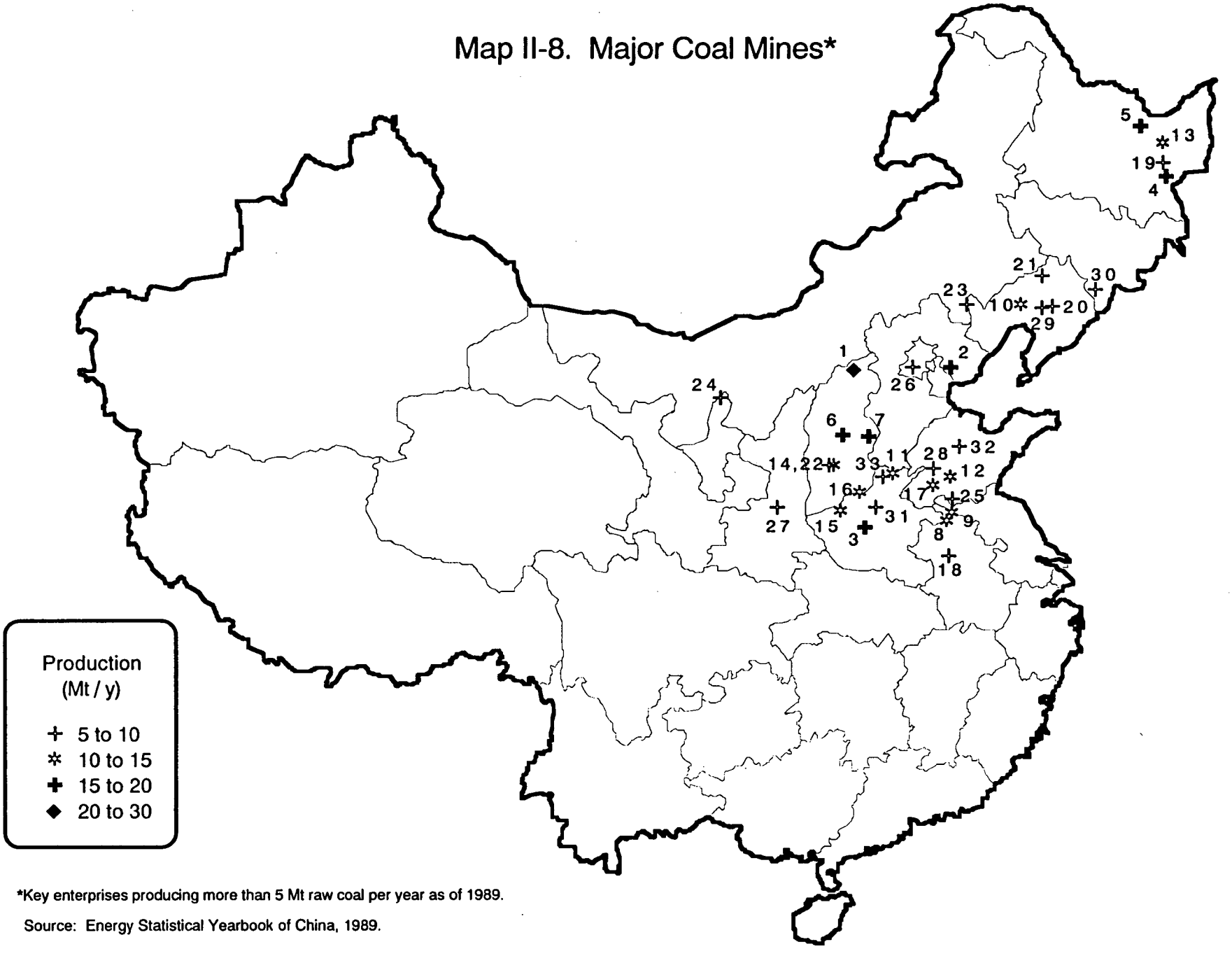
Table II-6. Major Coal Mining Enterprises: Annual Production > 5 Million Tonnes of Raw Coal, 1980 and 1985-1989 (a)

	Name of Mine	Province	Annual Production (million tonnes of raw coal)					
			1980	1985	1986	1987	1988	1989
1	Datong	Shanxi	24.520	30.805	29.184	28.738	29.229	29.990
2	Kailuan	Hebei	19.287	16.663	18.496	18.809	17.524	17.962
3	Pingdingshan	Henan	13.651	15.966	16.683	17.236	17.434	17.613
4	Jixi	Heilongjiang	12.700	12.997	13.486	13.440	13.322	17.270
5	Hegang	Heilongjiang	12.732	14.298	14.477	14.586	14.451	16.250
6	Xishan	Shanxi	9.308	11.772	12.573	13.557	13.111	15.701
7	Yangquan	Shanxi	12.178	13.932	14.298	14.972	15.089	15.681
8	Huaibei	Anhui	13.284	14.247	14.350	14.278	14.096	14.147
9	Xuzhou	Jiangsu	12.558	12.830	12.479	12.639	12.517	12.923
10	Fuxin	Liaoning	11.749	11.500	11.235	11.043	10.945	12.630
11	Fengfeng	Hebei	10.312	11.305	11.356	11.491	11.540	11.575
12	Xinwen	Shandong	5.631	6.667	6.696	6.828	7.519	10.837
13	Shuangyashan	Heilongjiang	5.272	6.741	7.389	8.035	8.290	10.320
14	Lu'an	Shanxi	4.517	6.840	8.026	8.805	10.001	10.104
15	Yima	Henan	6.416	8.304	8.497	8.233	8.252	10.082
16	Jincheng	Shanxi	4.165	6.131	6.786	8.155	10.033	10.042
17	Yanzhou	Shandong	2.333	5.200	6.348	7.437	8.659	10.033
18	Huainan	Anhui	9.043	9.232	9.537	7.910	8.948	9.162
19	Qitaihe	Heilongjiang	3.250	4.834	5.426	6.511	7.119	8.530
20	Fushun	Liaoning	8.079	8.213	8.150	6.904	7.053	8.360
21	Tiefa	Liaoning	2.173	4.555	4.929	5.630	6.709	8.030
22	Fenxi	Shanxi	4.502	6.185	6.731	6.668	6.924	7.083
23	Pingzhuang	Liaoning	-	-	-	-	-	6.330
24	Shitanjing	Ningxia	5.379	5.780	5.806	5.905	6.216	6.319
25	Zaozhuang	Shandong	7.509	6.613	6.316	6.388	6.161	6.213
26	Beijing		6.202	5.975	5.709	5.890	5.966	6.135
27	Tongchuan	Shaanxi	6.684	7.059	6.997	6.515	5.857	5.855
28	Feicheng	Shandong	3.683	3.071	3.032	3.299	3.546	5.618
29	Shenyang	Liaoning	1.126	4.953	4.816	4.279	4.616	5.520
30	Tonghua	Jilin	4.563	4.006	3.842	4.119	4.172	5.330
31	Zhengzhou	Henan	-	-	-	-	-	5.107
32	Zibo	Shandong	5.223	4.398	4.268	3.967	4.195	5.096
33	Hebi	Henan	4.683	4.854	4.917	5.135	5.181	5.009
34	Antaibao (b)	Shanxi	0	0	0	0	-	-

(a) The listed mines are all key enterprises (large state-run projects).
(b) The Antaibao mine (in northern Shanxi near Datong) has a capacity of over 15 Mt/yr (steaming coal), 12 Mt of which would be washed and 9 Mt of which would be export quality. The mine is a joint venture with Occidental Petroleum and 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.
– Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); Coal Industry Yearbook, 1990 (MOE, Beijing); Martin Weil, The China Business Review, 1991; Nancy Kiang, East-West Center.

Map II-8. Major Coal Mines*



*Key enterprises producing more than 5 Mt raw coal per year as of 1989.

Source: Energy Statistical Yearbook of China, 1989.

Table II-7. Net Coal Production by Province, 1988

Planning Region	Province	Raw Coal Production (Mt)	Coal Consumption (Mt)	Balance (a) (Mt)
North	Beijing	9.06	23.1	-14.05
	Tianjin	(b)	17.3	(b)
	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	(b)	24.7	(b)
	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	(b)	(b)
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	(b)	(b)
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 (c)		979.88	993.5	-13.66
Balance (d)		0.18	0.04	

(a) No attempt is made here to account for losses in coal transportation or processing
(b) Not available. In the cases of Tianjin and Shanghai it can probably be assumed that coal production is negligible compared to consumption.
(c) 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.
(d) 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table II-8. Coke Production, 1949-1990—Thousand Tonnes

Year	Total	"Modern" (a)	"Antique" (b)	"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%

(a) "Modern" coke is coke produced in industrial coke ovens.
(b) "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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, various years (SSB, Beijing).

Figure II-6 Coke Production, 1949-1990

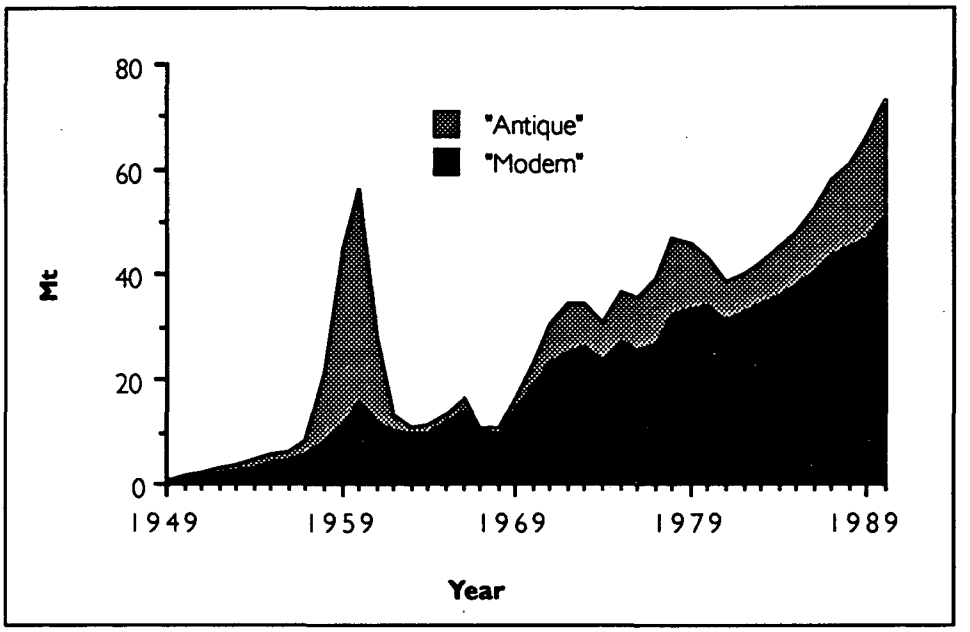


Table II-9. Coking Coal Used in Coke Production, 1980-1988—Million Tonnes

Year	Coking Coal Production	Used for Coking	Other Purposes	Coke Production	% Coking Coal Used for Coke
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	373.96	61.08	19.2%

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table II-10. Production of Washed Coal, 1949-1990 (a)

Year	Raw Coal Input to Coal Washing (b) (million t)	Percentage of Total Production Washed	Washed Coal Output (c) (million tonnes)		
			Washed Coking Coal (d)	Other Washed Coal (e)	Losses and Middlings (f) (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%	61.45	1.60	79.89
1986	152.70	17%	63.29	1.33	88.08
1987	163.28	18%	72.30	2.05	88.93
1988	171.17	17%	74.33	0.99	95.85
1989	181.11	17%	80.37	-	-
1990	-	-	68.58	-	-

(a) Data are from the Energy Statistical Yearbook of China unless otherwise noted.
(b) Data are from Yearbooks of China's Coal Industry. They are for key enterprises only, so they represent the majority of input, but still less than total input. 1989 figure based on washed percentage of raw coal output according to Energy in China.
(c) Washed coal data are from Yearbooks of Coal Industry unless otherwise noted.
(d) Data are from Statistical Yearbook of China's Economy. 1990 figure is from Energy of China, 1991, no. 1.
(e) Data are from the Energy Statistical Yearbook.
(f) 1980 figure is from the Energy Statistical Yearbook. Other years' figures are the difference 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."
– Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Yearbook of China's Coal Industry, 1983, 1985, 1987 &1989 (Coal Industry Press, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); Energy of China, 1991, no. 2 (Energy Research Institute, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing).

Figure II-7 Washed Coal Output, 1981-1989

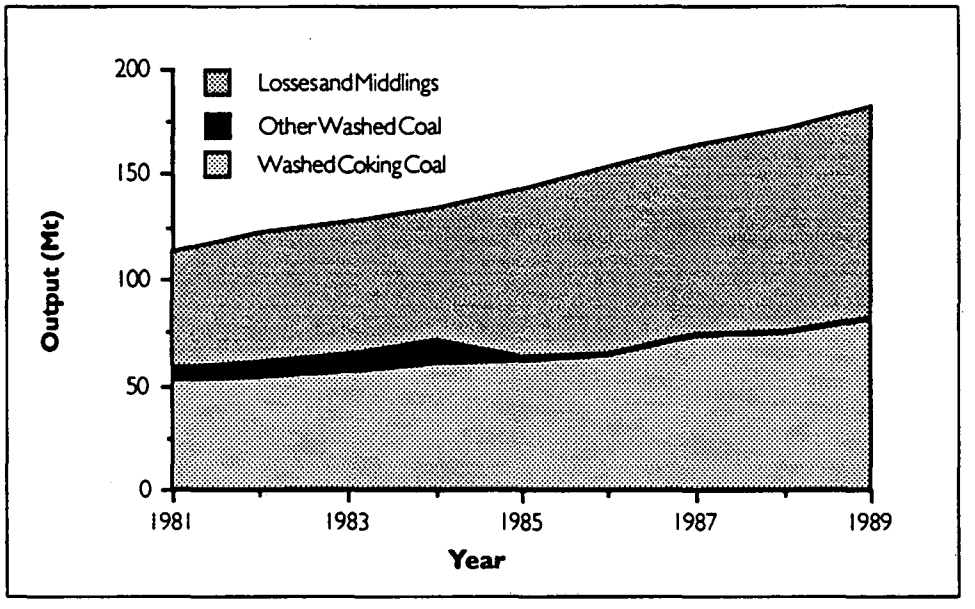


Figure II-8 Washed Coal & Total Raw Coal Production, 1981-1989

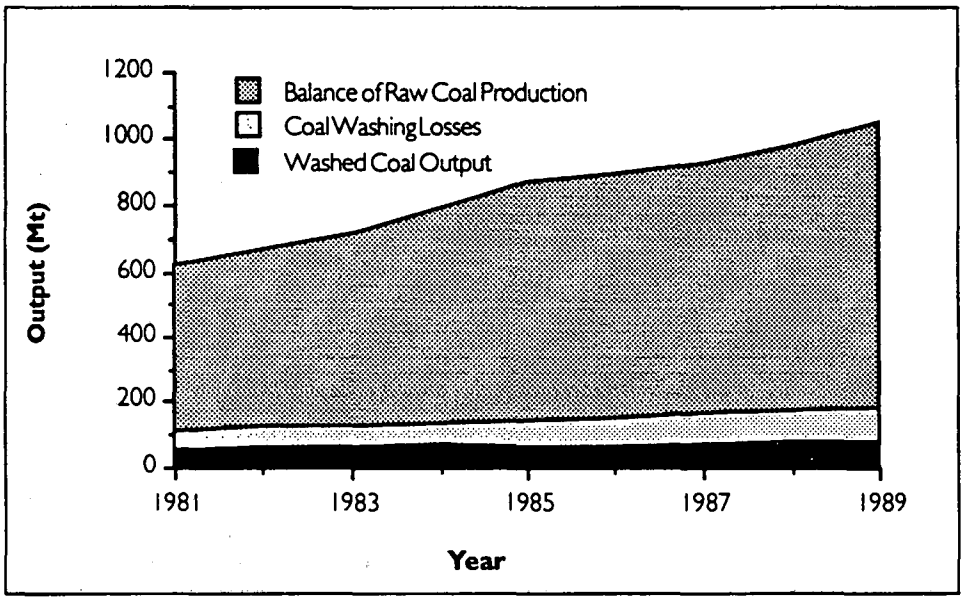


Table II-11. Coal Gas Production 1980-1989 (a)

Year	Coal Input to to Coal Gasification (million t) (b)	Coke Input to Coal Gasification (million t)	Coal Gas (million cubic meters)			Coal Gas (Mtce) (c)		
			From Coking Ovens	Other	Subtotal	From Coking Ovens	Other	Subtotal
1980	1.31	0.79	10.65	1.17	11.82	0.006	0.001	0.007
1981	1.37	0.80	10.74	1.30	12.04	0.006	0.001	0.007
1982	1.40	0.82	10.69	1.72	12.41	0.006	0.001	0.007
1983	1.48	0.89	11.89	1.52	13.41	0.007	0.001	0.008
1984	1.62	1.02	12.05	1.56	13.61	0.007	0.001	0.008
1985	1.91	0.99	13.19	1.64	14.83	0.008	0.001	0.009
1986	2.43	0.82	16.36	3.37	19.73	0.010	0.002	0.012
1987	2.24	0.29	15.53	4.21	19.74	0.009	0.002	0.012
1988	2.79	0.39	15.98	4.76	20.74	0.009	0.003	0.012
1989	3.69	(d)	(d)	(d)	(d)	(d)	(d)	(d)

(a) Data are from Energy Statistical Yearbook of China unless otherwise noted.
(b) Includes raw and washed coal. Sum is uncorrected for the different heat values of raw and washed coal.
(c) Coking coal gas is assigned a heat value of 0.59 tce/'000 cubic meters, and other coal gas is assigned a value of 0.58 tce/'000 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.
(d) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Yearbook of China's Coal Industry, 1983-1989 (Coal Industry Press, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing).

Table II-12. China's Crude Oil Production by Oilfield, 1950-1990 (a)

1. Thousand Barrels per Day

Year	OILFIELD: Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Offshore (c)	Others	Total
1950						2			2	4
1951						3			3	6
1952						2			7	9
1953						2			11	12
1954						2			14	16
1955						2			18	19
1956						2			21	23
1957						3			26	29
1958						14			31	45
1959						27			47	74
1960	16					32			52	100
1961	22					38			50	110
1962	40	1				34			45	120
1963	53	6				27			43	130
1964	68	12				61			40	180
1965	85	15				80			51	230
1966	108	40				86	2		54	290
1967	116	53				52	4		56	280
1968	124	65				43	8		61	301
1969	257	78				49	10		87	480
1970	353	90	3			29	19		105	600
1971	443	130	15			26	33		133	780
1972	459	144	31			44	38		186	902
1973	566	176	44			39	60		205	1,090
1974	680	240	57			26	82		230	1,315
1975	845	300	81			25	87		152	1,490
1976	864	331	60	80		16	82		241	1,675
1977	940	364	55	200		41	75		199	1,874
1978	1,000	380	77	220		55	68		282	2,082
1979	1,010	405	82	240		68	62		255	2,122
1980	1,038	401	90	226		82	55		228	2,120
1981	1,039	324	100	210		81	51		207	2,012
1982	1,039	327	106	227	43	81	58		164	2,045
1983	1,047	367	122	211	61	85	56		171	2,120
1984	1,079	463	154	205	98	91	64		149	2,302
1985	1,106	554	181	207	103	99	64	6	159	2,480
1986	1,116	593	201	201	127	110	79	8	191	2,625
1987	1,116	635	228	160	137	115	84	14	206	2,694
1988	1,119	669	253	123	145	124	85	15	221	2,752
1989 (b)	1,116	670	270	116	136	129	82	19	226	2,764
1990 (b)	1,116	673	270	106	127	137	88	29	233	2,777

(a) 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.
(b) Figures collected by David Fridley, East-West Center, based on Chinese press releases.
(c) Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: The Petroleum Resources of China (DOE, 1987); Yearbook of China's Economy, 1988-1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China National Offshore Oil Corporation.

Table II-12. China's Crude Oil Production by Oilfield, 1950-1990 (continued)

2. Growth Over Previous Year	OILFIELD:									
Year	Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Offshore (c)	Others	Total
1951						44.2%			63.9%	52.5%
1952						-44.1%			147.2%	42.9%
1953						2.4%			53.6%	42.7%
1954						-4.3%			32.5%	26.8%
1955						-4.5%			25.9%	22.4%
1956						1.3%			22.3%	20.4%
1957						86.2%			20.4%	25.4%
1958						325.6%			18.2%	52.7%
1959						92.0%			54.3%	66.1%
1960						19.4%			11.1%	35.5%
1961	36.4%					18.8%			-3.9%	9.7%
1962	85.2%					-9.9%			-11.0%	9.1%
1963	33.0%	597.3%				-20.0%			-4.1%	8.3%
1964	27.8%	85.9%				122.8%			-8.1%	38.8%
1965	25.0%	23.2%				30.7%			27.9%	27.4%
1966	27.1%	172.1%				8.0%			6.5%	26.1%
1967	7.4%	31.3%				-40.0%	100.0%		3.7%	-3.4%
1968	6.9%	23.8%				-16.7%	100.0%		8.9%	7.4%
1969	106.9%	19.2%				13.6%	25.0%		43.2%	59.6%
1970	37.7%	16.1%				-40.1%	92.0%		21.2%	25.0%
1971	25.3%	44.4%	428.6%			-9.5%	70.8%		26.4%	30.0%
1972	3.8%	10.8%	112.2%			64.5%	15.9%		39.7%	15.7%
1973	23.2%	22.2%	40.1%			-10.2%	57.9%		10.1%	20.8%
1974	20.2%	36.4%	28.6%			-33.1%	37.3%		12.2%	20.6%
1975	24.3%	25.0%	43.1%			-3.0%	5.3%		-33.9%	13.3%
1976	2.3%	10.3%	-25.9%			-35.3%	-5.3%		58.5%	12.4%
1977	8.8%	10.0%	-8.7%	149.3%		150.0%	-8.3%		-17.4%	11.9%
1978	6.4%	4.4%	40.0%	10.0%		33.3%	-9.1%		41.9%	11.1%
1979	1.0%	6.6%	7.1%	9.1%		25.0%	-10.0%		-9.7%	1.9%
1980	2.8%	-1.0%	10.0%	-6.0%		20.0%	-11.1%		-10.5%	-0.1%
1981	0.1%	-19.3%	10.4%	-6.8%		-1.1%	-6.6%		-9.3%	-5.1%
1982	0.0%	1.1%	6.4%	8.0%		-0.9%	13.7%		-20.8%	1.6%
1983	0.8%	12.3%	15.1%	-7.1%	40.3%	6.0%	-4.1%		4.2%	3.7%
1984	3.0%	26.1%	26.0%	-2.7%	61.5%	6.1%	14.1%		-12.9%	8.6%
1985	2.6%	19.6%	17.3%	0.7%	5.6%	9.7%	0.5%		7.2%	7.7%
1986	0.8%	6.9%	11.2%	-2.9%	22.4%	11.1%	22.7%	33.5%	20.2%	5.8%
1987	0.0%	7.1%	13.4%	-20.5%	7.9%	4.5%	6.7%	90.1%	7.6%	2.6%
1988	0.3%	5.4%	10.9%	-23.0%	6.2%	7.0%	1.2%	5.5%	7.3%	2.2%
1989 (b)	-0.3%	0.1%	6.9%	-5.6%	-6.1%	4.7%	-3.3%	25.9%	2.3%	0.4%
1990 (b)	0.0%	0.5%	-0.2%	-8.3%	-7.1%	5.6%	7.8%	51.2%	2.9%	0.5%

(a) 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.
(b) Figures collected by David Fridley, East-West Center, based on Chinese press releases.
(c) Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: The Petroleum Resources of China (DOE, 1987); Yearbook of China's Economy, 1988-1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China National Offshore Oil Corporation.

Figure II-9 Crude Oil Production Growth rates
Daqing and Total, 1951-1990

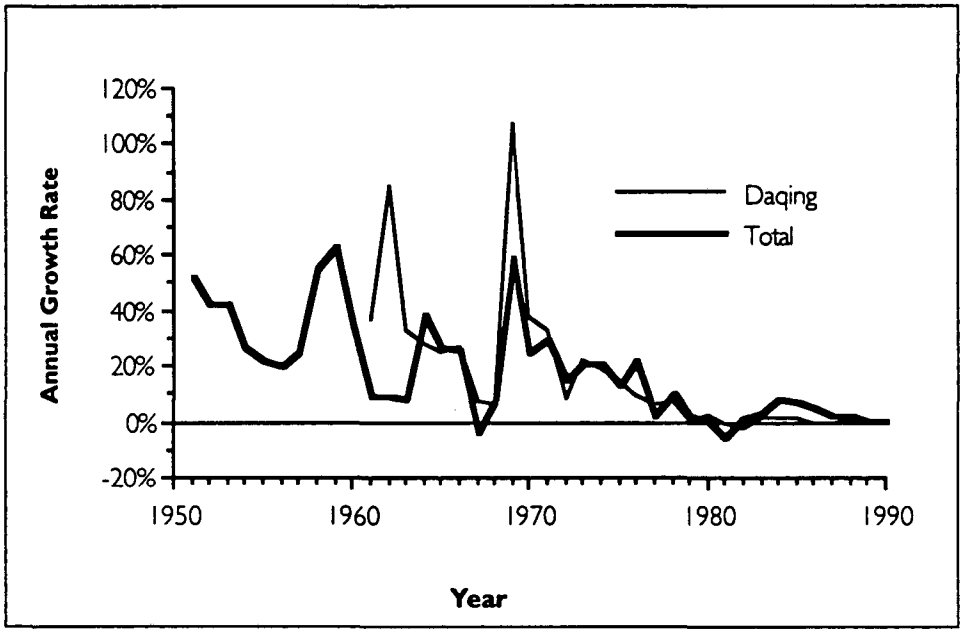


Table II-12. China's Crude Oil Production by Oilfield, 1950-1990 (continued)

3. Shares of Total Production

Year	OILFIELD: Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Offshore (c)	Others	Total
1950						58%			42%	100%
1951						55%			45%	100%
1952						21%			79%	100%
1953						15%			85%	100%
1954						12%			88%	100%
1955						9%			91%	100%
1956						8%			92%	100%
1957						11%			89%	100%
1958						31%			69%	100%
1959						36%			64%	100%
1960	16%					32%			52%	100%
1961	20%					35%			46%	100%
1962	33%	1%				29%			37%	100%
1963	41%	5%				21%			33%	100%
1964	38%	7%				34%			22%	100%
1965	37%	6%				35%			22%	100%
1966	37%	14%				30%	1%		19%	100%
1967	41%	19%				18%	1%		20%	100%
1968	41%	22%				14%	3%		20%	100%
1969	53%	16%				10%	2%		18%	100%
1970	59%	15%	0%			5%	3%		18%	100%
1971	57%	17%	2%			3%	4%		17%	100%
1972	51%	16%	3%			5%	4%		21%	100%
1973	52%	16%	4%			4%	6%		19%	100%
1974	52%	18%	4%			2%	6%		17%	100%
1975	57%	20%	5%			2%	6%		10%	100%
1976	52%	20%	4%	5%		1%	5%		14%	100%
1977	50%	19%	3%	11%		2%	4%		11%	100%
1978	48%	18%	4%	11%		3%	3%		14%	100%
1979	48%	19%	4%	11%		3%	3%		12%	100%
1980	49%	19%	4%	11%		4%	3%		11%	100%
1981	52%	16%	5%	10%		4%	3%		10%	100%
1982	51%	16%	5%	11%	2%	4%	3%		8%	100%
1983	49%	17%	6%	10%	3%	4%	3%		8%	100%
1984	47%	20%	7%	9%	4%	4%	3%		6%	100%
1985	45%	22%	7%	8%	4%	4%	3%	0.2%	6%	100%
1986	43%	23%	8%	8%	5%	4%	3%	0.3%	7%	100%
1987	41%	24%	8%	6%	5%	4%	3%	1%	8%	100%
1988	41%	24%	9%	4%	5%	4%	3%	1%	8%	100%
1989 (b)	40%	24%	10%	4%	5%	5%	3%	1%	8%	100%
1990 (b)	40%	24%	10%	4%	5%	5%	3%	1%	8%	100%

(a) 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.
(b) Figures collected by David Fridley, East-West Center, based on Chinese press releases.
(c) Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: The Petroleum Resources of China (DOE, 1987); Yearbook of China's Economy, 1988-1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China National Offshore Oil Corporation.

Figure II-10 Crude Oil Production Shares by Field, 1950-1990

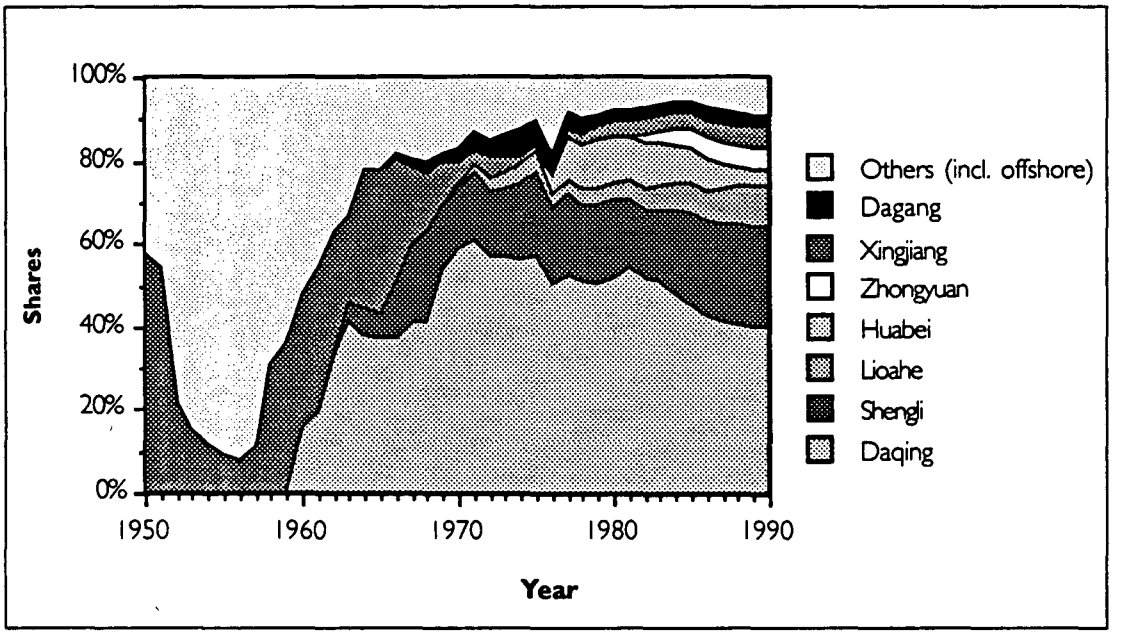


Table II-12. China's Crude Oil Production by Oilfield, 1950-1990 (continued)

4. Mtce

Year	OILFIELD: Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Offshore (c)	Others	Total
1950						0.2			0.1	0.3
1951						0.2			0.2	0.4
1952						0.1			0.5	0.6
1953						0.1			0.8	0.9
1954						0.1			1.0	1.1
1955						0.1			1.3	1.4
1956						0.1			1.5	1.7
1957						0.2			1.8	2.1
1958						1.0			2.2	3.2
1959						1.9			3.4	5.3
1960	1.1					2.3			3.7	7.1
1961	1.5					2.7			3.6	7.8
1962	2.8	0.1				2.4			3.2	8.5
1963	3.8	0.5				2.0			3.1	9.3
1964	4.8	0.8				4.3			2.8	12.9
1965	6.1	1.0				5.7			3.6	16.4
1966	7.7	2.8				6.1	0.1		3.8	20.7
1967	8.3	3.7				3.7	0.3		4.0	19.9
1968	8.8	4.6				3.1	0.6		4.3	21.4
1969	18.3	5.5				3.5	0.7		6.2	34.2
1970	25.2	6.4	0.2			2.1	1.4		7.5	42.7
1971	31.5	9.3	1.1			1.9	2.3		9.5	55.5
1972	32.7	10.3	2.2			3.1	2.7		13.3	64.3
1973	40.3	12.5	3.1			2.8	4.3		14.6	77.6
1974	48.4	17.1	4.0			1.9	5.9		16.4	93.6
1975	60.2	21.4	5.8			1.8	6.2		10.8	106.1
1976	61.5	23.6	4.3	5.7		1.2	5.9		17.1	119.2
1977	66.9	25.9	3.9	14.2		2.9	5.4		14.2	133.4
1978	71.2	27.1	5.5	15.7		3.9	4.9		20.1	148.3
1979	71.9	28.8	5.9	17.1		4.9	4.4		18.1	151.1
1980	73.9	28.6	6.4	16.1		5.9	3.9		16.2	150.9
1981	74.0	23.0	7.1	15.0		5.8	3.6		14.7	143.3
1982	74.0	23.3	7.6	16.2	3.1	5.7	4.1		11.7	145.6
1983	74.6	26.2	8.7	15.0	4.3	6.1	4.0		12.1	151.0
1984	76.8	33.0	11.0	14.6	7.0	6.5	4.5		10.6	163.9
1985	78.8	39.5	12.9	14.7	7.4	7.1	4.6	0.4	11.3	176.6
1986	79.4	42.2	14.3	14.3	9.0	7.9	5.6	0.5	13.6	186.9
1987	79.4	45.2	16.2	11.4	9.7	8.2	6.0	1.0	14.7	191.8
1988	79.7	47.6	18.0	8.8	10.3	8.8	6.0	1.1	15.7	196.0
1989 (b)	79.5	47.7	19.2	8.3	9.7	9.2	5.8	1.4	16.1	196.8
1990 (b)	79.5	47.9	19.2	7.6	9.0	9.7	6.3	2.0	16.6	197.8

(a) 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.
(b) Figures collected by David Fridley, East-West Center, based on Chinese press releases.
(c) Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: The Petroleum Resources of China (DOE, 1987); Yearbook of China's Economy, 1988-1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China National Offshore Oil Corporation.

Table II-12. China's Crude Oil Production by Oilfield, 1950-1990 (continued)

5. Million Tonnes (a)

Year	OILFIELD: Daqing	Shengli	Liaohe	Huabei	Zhongyuan	Xinjiang	Dagang	Offshore (c)	Others	Total
1950						0.11			0.08	0.20
1951						0.17			0.14	0.30
1952						0.09			0.34	0.43
1953						0.09			0.52	0.62
1954						0.09			0.70	0.79
1955						0.09			0.88	0.96
1956						0.09			1.07	1.16
1957						0.16			1.29	1.45
1958						0.70			1.52	2.22
1959						1.33			2.35	3.68
1960	0.79					1.59			2.61	4.99
1961	1.08					1.89			2.51	5.48
1962	1.99	0.05				1.70			2.23	5.98
1963	2.65	0.32				1.36			2.14	6.47
1964	3.39	0.59				3.04			1.97	8.99
1965	4.23	0.73				3.97			2.52	11.45
1966	5.38	1.99				4.29	0.10		2.68	14.44
1967	5.78	2.61				2.57	0.20		2.78	13.94
1968	6.17	3.24				2.15	0.40		3.02	14.98
1969	12.78	3.86				2.44	0.50		4.33	23.90
1970	17.59	4.48	0.14			1.46	0.96		5.25	29.88
1971	22.05	6.47	0.74			1.32	1.63		6.63	38.84
1972	22.88	7.17	1.56			2.17	1.89		9.27	44.94
1973	28.18	8.76	2.19			1.95	2.99		10.20	54.28
1974	33.86	11.95	2.82			1.30	4.10		11.44	65.48
1975	42.08	14.94	4.03			1.27	4.32		7.56	74.20
1976	43.04	16.48	2.99	3.99		0.82	4.09		11.98	83.39
1977	46.81	18.13	2.73	9.96		2.05	3.75		9.90	93.32
1978	49.80	18.92	3.82	10.95		2.73	3.41		14.04	103.67
1979	50.29	20.17	4.09	11.95		3.41	3.07		12.68	105.67
1980	51.68	19.97	4.50	11.23		4.09	2.73		11.35	105.56
1981	51.75	16.11	4.97	10.47		4.05	2.55		10.29	100.19
1982	51.73	16.29	5.29	11.31	2.15	4.01	2.90		8.15	101.83
1983	52.14	18.29	6.08	10.51	3.02	4.25	2.78		8.50	105.57
1984	53.72	23.07	7.67	10.23	4.87	4.51	3.17		7.40	114.64
1985	55.10	27.60	9.00	10.30	5.15	4.95	3.19	0.28	7.93	123.49
1986	55.55	29.51	10.01	10.00	6.30	5.50	3.91	0.38	9.54	130.69
1987	55.55	31.60	11.35	7.95	6.80	5.75	4.17	0.71	10.26	134.14
1988	55.70	33.30	12.58	6.12	7.22	6.15	4.22	0.75	11.00	137.05
1989 (b)	55.56	33.35	13.45	5.78	6.78	6.44	4.08	0.95	11.25	137.64
1990 (b)	55.56	33.51	13.42	5.30	6.30	6.80	4.40	1.43	11.58	138.30

(a) 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.
(b) Figures collected by David Fridley, East-West Center, based on Chinese press releases.
(c) Includes volumes produced from Extended Drill Stem Tests (EDST).

Source: The Petroleum Resources of China (DOE, 1987); Yearbook of China's Economy, 1988-1990 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China National Offshore Oil Corporation.

Figure II-11 Crude Oil Production by Field, 1950-1990

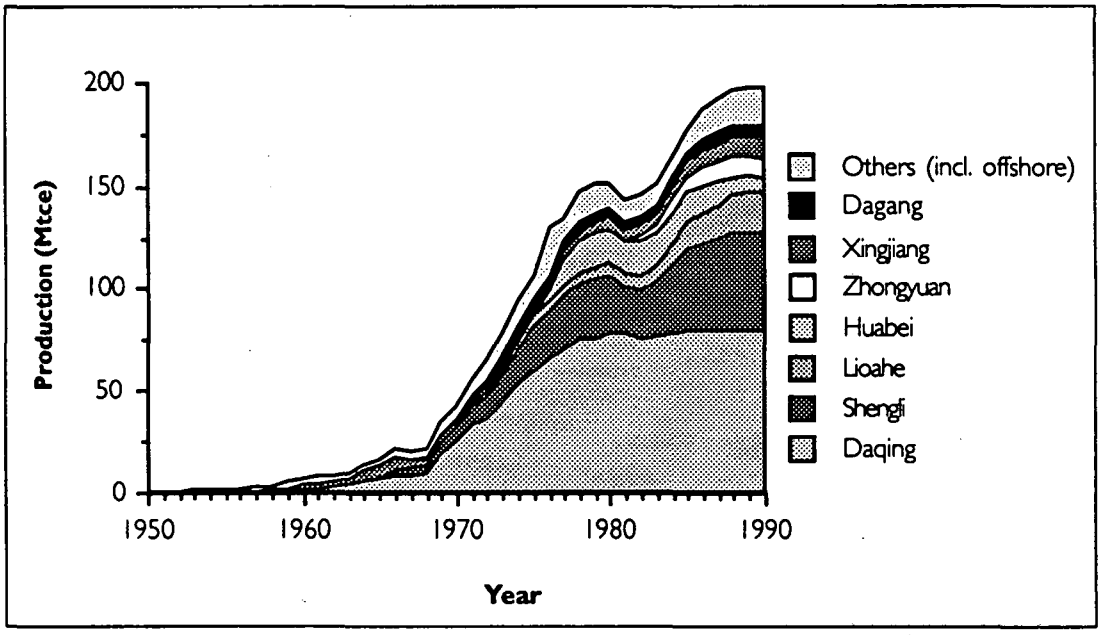
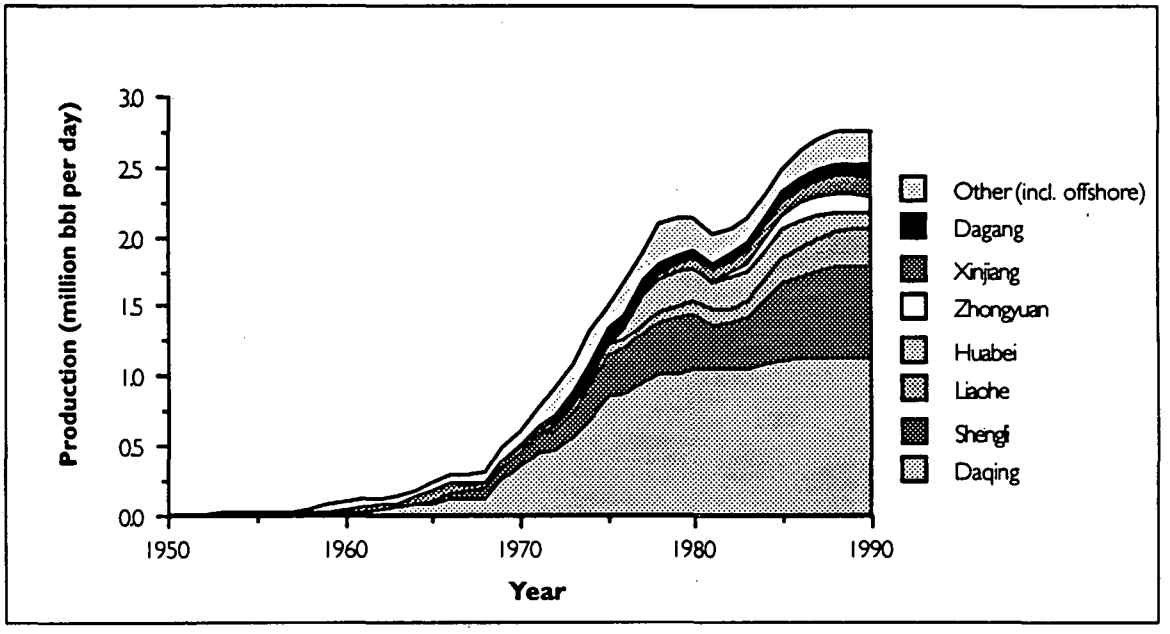


Figure II-12 Crude Oil Production by Field, Million Barrels per Day1950-1990



Map II-9. China's Onshore Oilfields

Radius scaled to 1988 production.

Source: Energy Statistical Yearbook of China, 1989.

Table II-13. Selected Technical Indicators of Crude Oil Production, 1970-1989

Year	Oilfield Self-Use (a) (%)	Oilfield Crude Losses (%)	Total (%)	Crude Production (Mt)	Oilfield Use & Loss (Mt)	Electricity Consumption (b) (kWh/tonne)
1970	1.34%	1.89%	3.23%	29.88	0.97	(c)
1971	1.01%	2.12%	3.13%	38.84	1.22	(c)
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%	1.80%	3.62%	137.64	4.98	78.75

(a) Sometimes referred to as "autoconsumption".
(b) Electricity consumed per tonne of crude oil produced; does not include refinery consumption.
(c) Not available.

Source: China Statistical Yearbook, various years (SSB, Beijing); Yearbook of China's Industrial Economy, 1988 & 1990 (SSB, Beijing).

Table II-14. Petroleum Products, 1973-1990 (Million Tonnes per Year)

Year	Crude Oil Input (a)	Gasoline	Kerosene	Diesel Oil	Fuel Oil (b)
1973	(d)	5.74	2.41	10.40	(d)
1974	(d)	6.63	2.61	11.79	(d)
1975	(d)	7.37	2.90	13.24	(d)
1976	(d)	8.16	2.94	14.89	(d)
1977	(d)	8.67	3.17	16.16	(d)
1978	70.69	9.91	3.56	18.26	(d)
1979	71.46	10.70	4.09	18.73	(d)
1980	78.69	10.49	3.99	18.28	31.42
1981	74.76	11.12	3.67	17.78	28.18
1982	75.33	11.14	3.84	17.46	27.99
1983	80.41	12.64	4.10	19.04	28.97
1984	82.51	13.50	4.08	19.47	28.57
1985	85.89	14.38	4.03	19.89	28.36
1986	92.60	16.47	4.14	21.99	29.86
1987	97.75	17.12	4.16	23.38	31.31
1988	102.39	18.85	3.85	24.55	32.19
1989	106.62	20.65	3.95	25.82	31.58
1990 (e)	109.61	21.75	3.85	26.09	30.88

		Other products (c)				
Year	LPG	"Refinery Gas"	Light Oil for Petrochemical Industry	Other	Product Subtotal	Crude Input minus Products
1980	1.23	(d)	2.79	9.39	77.58	1.1
1981	1.11	2.02	3.43	8.78	74.07	-0.3
1982	1.24	1.88	4.19	8.87	74.73	-0.4
1983	1.50	1.98	4.63	8.81	79.69	0.7
1984	1.54	2.18	4.88	9.80	81.84	0.7
1985	1.60	2.18	4.92	8.70	84.06	0.5
1986	2.02	2.43	4.65	8.85	90.41	1.2
1987	2.15	2.53	5.26	9.57	95.48	3.0
1988	2.32	2.59	5.46	10.65	100.46	2.8
1989	(d)	(d)	6.09	(d)	101.09	(d)
1990 (e)	(d)	(d)	6.60	(d)	103.17	(d)

(a) Figures are from the State Statistical Bureau. The difference in figures for refinery input and total crude production is largely due to net exports, oilfield self-use, and crude loss. For example, total crude production in 1990 was 137.7 Mt, while net exports were 21.1 Mt, leaving 116.6 Mt available (110.6 Mt for refinery input and 6 Mt for direct burning, self-use, loss, and stock changes). See Table II-13, Selected Technical Indicators of Crude Oil Production, and Table II-31, Crude Oil Consumption by End-Use Sector.

(b) Includes refinery use.

(c) Lubricants, asphalt, coke, paraffin wax, solvents, aromatics, and petrochemical feedstocks account for all but about 2 Mt in this category. The balance may be intermediate unfinished products. "Light oil for petrochemical industry" is probably mostly naphtha. Sources for this category are: Yearbook of the China National Petrochemical, 1988 (1980-1986); Sinopec (1986-1988); Sinopec and East-West Center estimates (David Fridley) of non-Sinopec production (1989-1990).

(d) Not available.

(e) 1990 data for Crude Oil Input and Other are Sinopec figures; gasoline and Diesel figures are from 1991 China Statistical Yearbook; fuel oil and kerosene figures are from Energy of China and should be considered preliminary.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, various years (SSB, Beijing); Energy of China, 1991, no. 2 (Energy Research Institute, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing); Yearbook of the China National Petrochemical Corporation, 1988; Sinopec figures; ERI database.

Figure II-13 Petroleum Refinery Output, 1980-1988

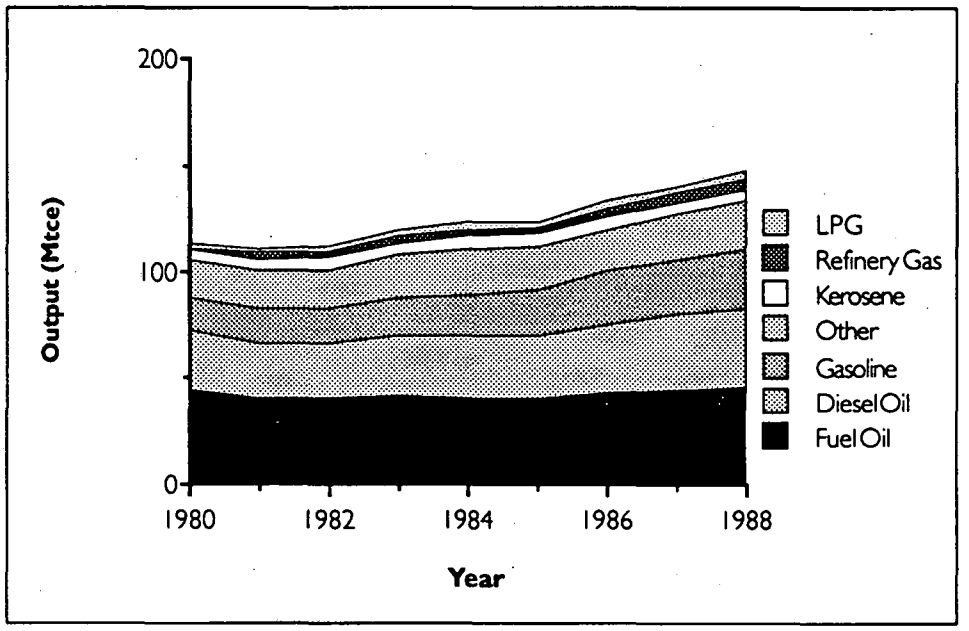


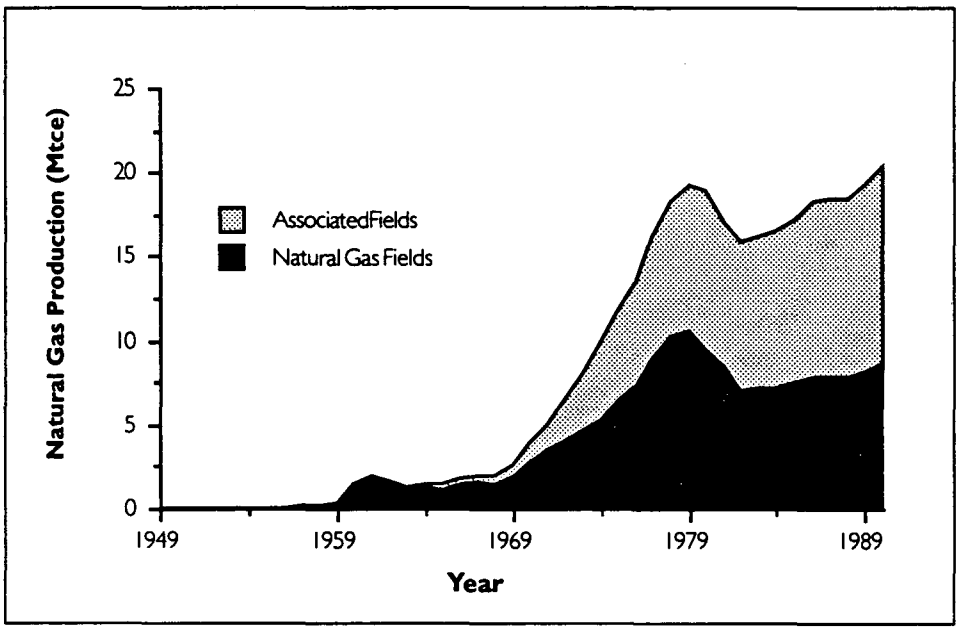
Table II-15. Natural Gas Production by Source, 1949-1990

Year	Natural Gas Production (million cubic meters) Total (a)	Natural Gas Fields (b)	Associated Gas (c)	Natural Gas from NG Fields as % of Total
1949	7	6	1	85.7%
1950	7	6	1	85.7%
1951	3	2	1	66.7%
1952	8	6	2	75.0%
1953	11	8	3	72.7%
1954	15	11	4	73.3%
1955	17	12	5	70.6%
1956	26	21	5	80.8%
1957	70	63	7	90.0%
1958	110	85	25	77.3%
1959	290	252	38	86.9%
1960	1,040	1,015	25	97.6%
1961	1,470	1,438	32	97.8%
1962	1,210	1,152	58	95.2%
1963	1,020	944	76	92.5%
1964	1,060	913	147	86.1%
1965	1,100	898	202	81.6%
1966	1,340	1,034	306	77.2%
1967	1,460	1,159	301	79.4%
1968	1,400	1,055	345	75.4%
1969	1,960	1,396	564	71.2%
1970	2,870	2,028	842	70.7%
1971	3,740	2,594	1,146	69.4%
1972	4,840	2,977	1,863	61.5%
1973	5,980	3,446	2,534	57.6%
1974	7,530	3,975	3,555	52.8%
1975	8,850	4,767	4,083	53.9%
1976	10,100	5,558	4,542	55.0%
1977	12,120	6,746	5,374	55.7%
1978	13,730	7,770	5,960	56.6%
1979	14,510	7,980	6,530	55.0%
1980	14,270	7,050	7,220	49.4%
1981	12,740	6,370	6,370	50.0%
1982	11,930	5,250	6,680	44.0%
1983	12,210	5,380	6,830	44.1%
1984	12,430	5,480	6,950	44.1%
1985	12,930	5,640	7,290	43.6%
1986	13,760	5,890	7,870	42.8%
1987	13,890	5,900	7,990	42.5%
1988	13,910	5,950	7,960	42.8%
1989	14,493	-	-	-
1990	15,298	-	-	-

(a) Figures for 1984 and 1987 are slightly different than in Table II-1 because data sources are different.
(b) Virtually all of this is from natural gas fields in Sichuan. In 1987 the Sichuan field produced 5,893 million cubic meters.
(c) Most other natural gas production comes from five large oil fields. In 1987 the Daqing, Shengli, Liaohe, Zhongyuan, and Dagang oilfields produced 2,205, 1,482, 1,550, 989, and 433 million cubic meters of natural gas, a total of 6,659 million cubic meters, or 83% of natural gas production outside of natural gas fields.
- Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Almanac of China's Economy, 1988 (Economic Management Press, Beijing); China Statistcal yearbook, various years (SSB, Beijing).

Figure II-14 Natural Gas Production, 1950-1990*



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

Table II-16. Gross Electricity Generation, 1949-1990

Year	Total		Hydroelectric		
	Generation (billion kWh)	Growth Rate (% over previous year)	Generation (billion kWh)	Growth Rate (% over previous year)	Percentage Share of Total
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%	100.2	6.0%	20.1%
1988	545.1	9.6%	109.2	9.0%	20.0%
1989	584.7	7.3%	118.4	8.4%	20.2%
1990	621.2	6.2%	126.7	7.0%	20.4%

Source: 1949-1989—Energy in China, 1990 (MOE, Beijing); 1990—China Statistical Yearbook, 1991 (SSB, Beijing).

Table II-16. Gross Electricity Generation, 1949-1990 (continued)

Year	Thermal		
	Generation (billion kWh)	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%
1961	40.6	-21.9%	84.6%
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	397.1	11.8%	79.9%
1988	435.9	9.8%	80.0%
1989	466.3	7.0%	79.8%
1990	494.5	6.0%	79.6%

(a) A breakdown of thermal generation by fuel type is unavailable. Data on thermal electricity fuel use is presented in Table IV-12. In 1988, for example, coal and fuel oil contributed about 86% and 9% respectively of the primary energy used in electricity generation.

Source: 1949-1989—Energy in China, 1990 (MOE, Beijing); 1990—China Statistical Yearbook, 1991 (SSB, Beijing).

Figure II-15 Electricity Generation, 1950-1990

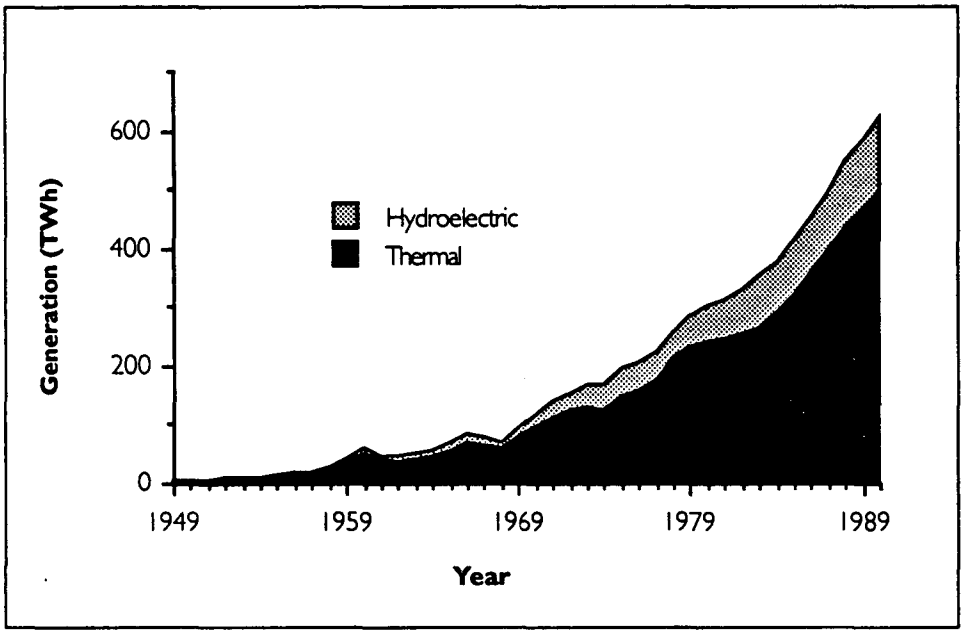


Table II-17. Electricity Generation and Consumption, 1980-1988 (TWh)

Year	Gross Generation	Power Sector Consumption (a)	Net Generation	Net Imports	T & D Losses (b)	Total End Use (c)
1980	300.6	42.38	258.2	0.00	24.29	233.9
1981	309.3	43.49	265.8	0.30	25.50	240.6
1982	327.7	45.81	281.9	0.33	26.23	256.0
1983	351.4	48.74	302.7	0.43	27.46	275.6
1984	377.0	52.55	324.4	0.80	29.36	295.9
1985	410.7	58.81	351.9	1.11	30.43	322.6
1986	449.5	64.02	385.5	1.21	33.21	353.5
1987	497.3	71.00	426.3	1.29	36.12	391.5
1988	545.2	76.92	468.3	1.51	37.95	431.8

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

(b) 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 (≥220 kV) to be 2-4%, 3-6% from urban networks (≤110 kV), 7-10% from rural grids (≤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%.

(c) Totals are slightly different than in Table IV-35, End Use Electricity Consumption by Sector, due to different methods of calculation. Whereas the totals in Table IV-35 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); National Rural Energy Planning, 1990 (China Standards Press, Beijing) [in Chinese]; Joint Survey Group, Survey of Network Power Loss in China (MOE, 1991).

Table II-18. Electricity Generation Capacity and Growth Rates, 1949-1989

Year	Total (GW)	Total Growth Rate	Hydro (GW)	Hydro Growth Rate	Thermal (GW)	Thermal Growth Rate
1949	1.85		0.16		1.69	
1950	1.87	1.1%	0.17	6.3%	1.70	0.6%
1951	1.88	0.5%	0.18	5.9%	1.70	0.0%
1952	1.96	4.3%	0.19	5.6%	1.77	4.1%
1953	2.35	19.9%	0.33	73.7%	2.02	14.1%
1954	2.60	10.6%	0.41	24.2%	2.19	8.4%
1955	3.00	15.4%	0.50	22.0%	2.50	14.2%
1956	3.83	27.7%	0.90	80.0%	2.93	17.2%
1957	4.63	20.9%	1.02	13.3%	3.61	23.2%
1958	6.29	35.9%	1.22	19.6%	5.07	40.4%
1959	9.54	51.7%	1.62	32.8%	7.92	56.2%
1960	11.92	24.9%	1.94	19.8%	9.98	26.0%
1961	12.86	7.9%	2.33	20.1%	10.53	5.5%
1962	13.04	1.4%	2.38	2.1%	10.66	1.2%
1963	13.33	2.2%	2.43	2.1%	10.90	2.3%
1964	14.06	5.5%	2.68	10.3%	11.38	4.4%
1965	15.08	7.3%	3.02	12.7%	12.06	6.0%
1966	17.02	12.9%	3.64	20.5%	13.38	10.9%
1967	17.99	5.7%	3.84	5.5%	14.15	5.8%
1968	19.16	6.5%	4.39	14.3%	14.77	4.4%
1969	21.04	9.8%	5.05	15.0%	15.99	8.3%
1970	23.77	13.0%	6.23	23.4%	17.54	9.7%
1971	26.28	10.6%	7.80	25.2%	18.48	5.4%
1972	29.50	12.3%	8.70	11.5%	20.80	12.6%
1973	33.92	15.0%	10.30	18.4%	23.62	13.6%
1974	38.11	12.4%	11.82	14.8%	26.29	11.3%
1975	43.41	13.9%	13.43	13.6%	29.98	14.0%
1976	47.15	8.6%	14.65	9.1%	32.50	8.4%
1977	51.45	9.1%	15.76	7.6%	35.69	9.8%
1978	57.12	11.0%	17.28	9.6%	39.84	11.6%
1979	63.02	10.3%	19.11	10.6%	43.91	10.2%
1980	65.87	4.5%	20.32	6.3%	45.55	3.7%
1981	69.13	4.9%	21.93	7.9%	47.20	3.6%
1982	72.36	4.7%	22.96	4.7%	49.40	4.7%
1983	76.44	5.6%	24.16	5.2%	52.28	5.8%
1984	80.12	4.8%	25.60	6.0%	54.52	4.3%
1985	87.05	8.6%	26.42	3.2%	60.63	11.2%
1986	93.82	7.8%	27.54	4.2%	66.28	9.3%
1987	102.90	9.7%	30.19	9.6%	72.70	9.7%
1988	115.50	12.2%	32.70	8.3%	82.80	13.9%
1989	126.64	9.6%	34.58	5.8%	92.06	11.2%

Source: Energy in China, 1990 (MOE, Beijing).

Figure II-16 Electricity Generation Capacity, 1950-1989

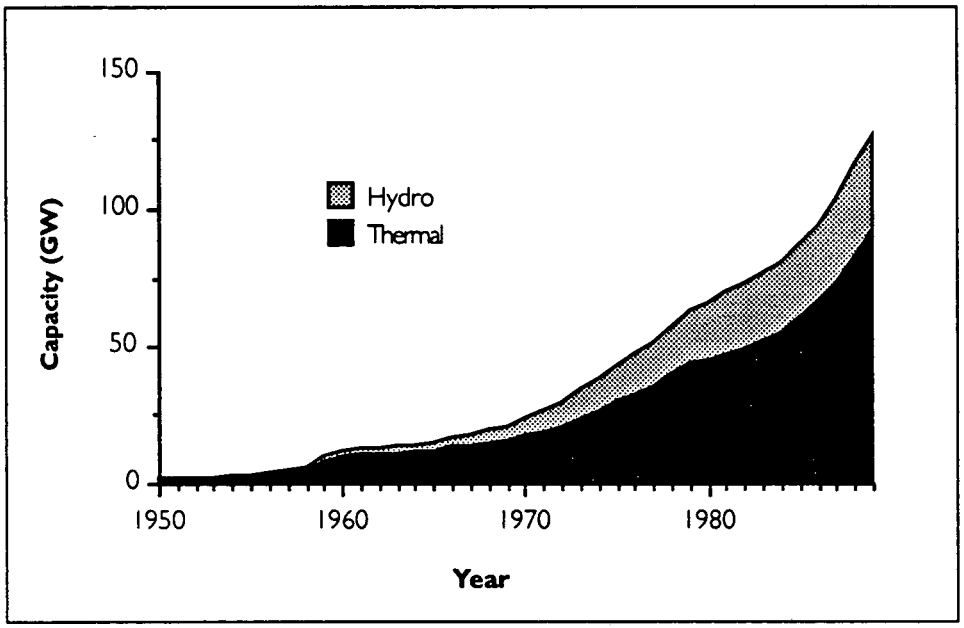


Table II-19. Installed Thermal Generation Capacity, by Type of Turbine, 1974-1988 (a)

Year	High Efficiency Units (b,c) (GW)	Low Efficiency Units (c)			Gas Turbines (GW)	Diesel (GW)	Total (d) (GW)	*of total:* Cogeneration (e) (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
1776	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	6.15
1988	59.41	13.38	0.23	13.61	0.91	0.28	74.21	7.39

(a) Includes only thermal power generation units over 6 MW capacity.
(b) High-efficiency units are those which are designed to operate under high temperature and pressure.
(c) According to Wang, 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).
(d) Before 1985, total does not include diesel generators. Total from 1974-1978 is greater than the sum of categories for which there are figures. These figures differ from those in Table II-18, Electricity Generation Capacity and Growth Rates, which include units with less than 6 MW capacity.
(e) 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Wang Qingyi, Energy in China (Metallurgical Industry Press, Beijing, 1988); China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing).

Table II-20. National Average Capacity Factors for Electric Power Generation, 1978-1989 (a)

Year	Total (b)			Hydro (c)			Thermal (d)		
	Installed Capacity (GW)	Gross Generation (billion kWh)	Capacity Factor	Installed Capacity (GW)	Gross Generation (billion kWh)	Capacity Factor	Installed Capacity (GW)	Gross Generation (billion kWh)	Capacity Factor
1978	57.12	256.6	0.51	17.28	44.6	0.29	39.84	212.0	0.61
1979	63.01	282.0	0.51	19.10	50.1	0.30	43.91	231.9	0.60
1980	65.87	300.6	0.52	20.32	58.2	0.33	45.55	242.4	0.61
1981	69.00	309.3	0.51	21.93	65.5	0.34	47.07	243.8	0.59
1982	72.36	327.7	0.52	22.96	74.4	0.37	49.40	253.3	0.58
1983	76.44	351.4	0.52	24.16	86.4	0.41	52.28	265.0	0.58
1984	80.12	377.0	0.54	25.60	86.8	0.39	54.52	290.2	0.61
1985	87.05	410.7	0.54	26.41	92.4	0.40	60.64	318.3	0.60
1986	93.82	449.6	0.55	27.54	94.5	0.39	66.28	355.1	0.61
1987	102.90	497.3	0.55	30.19	100.2	0.38	72.71	397.1	0.62
1988	115.50	545.1	0.54	32.70	109.2	0.38	82.80	435.9	0.60
1989	126.64	584.7	0.53	34.58	118.4	0.39	92.11	466.3	0.58

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

(b) In 1985 the average CF for grids with more than 500 kW of installed capacity was 0.713. The Huadong grid, the large thermal-based grid which supplies Shanghai, had a CF of 0.796 in the same year (Energy Research Institute, Beijing, December 1988). The much lower national average capacity factors may be partly explained by the idling of many smaller plants due to lack of fuel or water.

(c) In 1988, 18 of China's largest hydropower plants (over 150 MW) had CFs ranging from 0.197 to 0.619, with a weighted average CF of 0.415.

(d) In 1988, 32 of China's largest thermal power plants (over 450 MW) had CFs ranging from 0.301 to 0.961, with a weighted average CF of 0.658.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing).

Table II-21. Thermal Power Generation and Capacity by Plant Size, 1978-1989

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	(a)	35.36	(a)	(a)	4.48	(a)
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	(a)	60.01	(a)	(a)	6.27	(a)
1987	(a)	65.82	(a)	(a)	6.68	(a)
1988	(a)	73.02	(a)	(a)	9.78	(a)
1989	(a)	(a)	(a)	(a)	(a)	(a)

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
1978	(a)	(a)	(a)	(a)	(a)	(a)
1979	(a)	(a)	(a)	(a)	(a)	(a)
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	2.46	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

(a) Not available.

Source: Energy in China, 1990 (MOE, Beijing); Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing); Energy in China, 1990 (MOE, Beijing); Electric Power Industry in Cina, 1985-1990 (Information research Institute of Water Resources and Electric Power, MOE and MWR, Beijing).

Table II-22. Generation by Self-Producers, 1980-1989 (a)

Year	Gross Generation (TWh)	Installed Capacity (GW)	Capacity Factor
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

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

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing).

Table II-23. Hydropower Generation and Capacity by Plant Size, 1980-1989

1. Hydropower Generation for plants with installed capacities ≥500 kW and <500 kW.

Year	Total Gross Hydro Generation (TWh)	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	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

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)	Shares of: Annual Generation (percent)
Total	>70,000 (a)	24.17	86.36	0.41	100%	100%
>250	21	9.97	44.82	0.51	52%	52%
25-250	64	5.36	19.90	0.42	23%	23%
<25	>70,000 (a)	8.84	21.64	0.28	25%	25%
of which:						
12-25 MW	46	0.74	2.69	0.41	3%	3%
0.5-12 MW	2,669	1.39	13.87	0.34	16%	6%
<0.5 MW	>70,000 (a)	0.51	5.08	0.17	6%	2%

3. Small Hydropower Generation & Installed Capacity, 1987

Installed Capacity, Individual Station (kW)	Number of Stations	Total Installed Capacity (GW)	1987 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 (a)	11.000	28.80

(a) The totals in Table II-22.2 and II-22.3 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: Energy Statistical Yearbook of China (1989, SSB, Beijing); Wang Qingyi, Energy in China, 1988 (Metallurgical Industry Press, Beijing); China's Construction in Four Decades: Energy in China, 1990 (MOE, Beijing); Electric Power Industry in China, 1985-1990 (Information Research Institute of Water Resources and Electric Power, MOE and MWR, Beijing).

Table II-24. Capacity Factors for Principal Thermal Power Plants (600 MW and over), 1988

	Name of Power Plant	Location (Province)	Plant Capacity (MW) Design	Plant Capacity (MW) Existing in 1988 (a)	Gross Generation ('000 kWh in 1988)	Capacity Factor
1	Jianbi	Jiangsu	1625	1625	8.80	0.618
2	Douhe	Hebei	1550	1550	-	-
3	Shentou	Shanxi	1300	1300	6.22	0.546
4	Qinghe	Liaoning	1300	1300	8.73	0.766
5	Xuzhou	Jiangsu	1300	1300	8.14	0.714
6	Jinzhou	Liaoning	1200	1200	6.56	0.623
7	Yaomeng	Henan	1200	1200	7.33	0.696
8	Datong No. 2	Shanxi	1200	1200	5.41	0.515
9	Fularji No. 2	Heilongjiang	1200	1000	4.75	0.542
10	Shidongkou	Shanghai	1200	600	-	-
11	Shidongkou No. 2	Shanghai	1200	(b)		
12	Pingwei	Anhui	1200	(b)		
13	Zhouxian	Shandong	1200	900	-	-
14	Wangting	Jiangsu	1100	800	5.49	0.782
15	Qinling	Shaanxi	1050	1050	5.23	0.568
16	Yuanbaoshan	Inner Mongolia	900	900	4.08	0.518
17	Matou	Hebei	850	850	6.29	0.845
18	Jilin	Jilin	850	650	3.92	0.689
19	Jiaozuo	Henan	848	848	5.34	0.719
20	Huaibei	Anhui	750	750	4.92	0.749
21	Baoshan	Shanghai	700	700	-	-
22	Dalian	Liaoning	700	700	1.85	0.301
23	Fuzhou	Fujian	700	700	-	-
24	Shang'an	Hebei	700	350	-	-
25	Nantong	Jiangsu	700	350	-	-
26	Luohuang	Sichuan	700	(b)		
27	Yueyang	Hunan	700	(b)		
28	Chongqing	Sichuan	696	496	4.18	0.961
29	Xingtai	Hebei	690	690	4.75	0.785
30	Qingshan	Hubei	662	662	2.86	0.493
31	Qingzhen	Guizhou	658	458	1.72	0.428
32	Liaoning	Liaoning	650	650	4.90	0.860
33	Zhenhai	Zhejiang	650	650	3.82	0.671
34	Dagang	Tianjin	640	640	3.60	0.641
35	Shiliquan	Shandong	625	625	4.74	0.865
36	Jingmen	Hubei	625	625	2.56	0.468
37	Huangtai	Shandong	625	625	4.18	0.763
38	Shiheng	Shandong	600	600	3.13	0.594
39	Jinzhushan	Hunan	600	600	2.80	0.533
40	Huainan (d)	Anhui	600	600	7.79	1.481
41	Gaojing	Beijing	600	600	4.59	0.874
42	Shijingshan	Beijing	600	200	-	-
43	Shajiao	Guangdong	600	400	-	-
44	Xindian	Shandong	600	600	4.02	0.765
45	Luohe	Anhui	600	600	3.85	0.732
	Totals for those plants for which generation data are available (c):			25,794	148.78	0.658

(a) As of 31 December 1988.
(b) Under construction.
(c) This is for 31 of the largest power plants in China (all with installed capacities over 450 MW), excluding Huainan.
(d) Anomolous capacity factors may be the result of different sources for capacity and generation data.
- Not available.

Source: plant capacities—China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing); gross generation—Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table II-25. Capacity Factors for Principal Hydropower Plants (250 MW and over), 1988

	Name of Power Plant	Location		Installed Capacity (a) (MW)		Gross Generation ('000 kWh in 1988)	Capacity Factor
		Province	River				
1	Ertan	Sichuan	Yalong	3,000	(b)		
2	Gezhouba	Hubei	Yangtze	2,715		14.63	0.615
3	Lijiaxia	Qinghai	Yellow	1,600	(b)		
4	Baishan	Jilin	2nd Songhua	1,500		2.59	0.197
5	Shuikou	Fujian	Minjiang	1,400	(b)		
6	Tianshengqiao	Guizhou, Guangxi	Nanpan	1,320	(b)		
7	Longyangxia	Qinghai	Yellow	1,280		-	-
8	Manwan	Yunnan	Lancang	1,250	(b)		
9	Liujiaxia	Gansu	Yellow	1,225		3.29	0.306
10	Wuqiangxi	Hunan	Yuanshui	1,200	(b)		
11	Geheyan	Hubei	Qingjiang	1,200	(b)		
12	Yantan	Guangxi	Hongshui	1,200	(b)		
13	Danjiangkou	Hubei	Hanjiang	900		3.68	0.466
14	Ankang	Shaanxi	Hanjiang	800	(b)		
15	Gongzui	Sichuan	Daduhe	700		3.40	0.555
16	Xin'anjiang	Shejiang	Xin'an	662.5		1.58	0.272
17	Baozhusi	Sichuan	Bailong	640	(b)		
18	Wujiangdu	Guizhou	Wujiang	630		-	-
19	Shuifeng (c)	Liaoning	Yalu	630		1.29	0.234
20	Tongjiezi	Sichuan	Dadu	600	(b)		
21	Lubuge	Yunnan, Guizhou	Huangni	600		-	-
22	Fengman	Jilin	2nd Songhua	554		2.00	0.411
23	Dongfeng	Guizhou	Wujiang	510	(b)		
24	Dongjiang	Hunan	Leishui	500		-	-
25	Zhexi	Hunan	Zishui	447.5		2.43	0.619
26	Panjiakou (d)	Hebei	Luanhe	150		0.20	0.151
27	Dahua	Guangxi	Hongshui	400		1.63	0.464
28	Fengtan	Hunan	Youshui	400		1.54	0.440
29	Wan'an	Jiangxi	Ganjiang	400	(b)		
30	Yunfeng (c)	Jilin	Yalu	400		0.77	0.220
31	Laohushao (c)	Jilin	Yalu	390		-	-
32	Yan'guoxia	Gansu	Yellow	352		1.53	0.495
33	Bikou	Gansu	Bailong	300		1.45	0.553
34	Shaxikou	Fujian	Shaxi	300		-	-
35	Jinshuitan	Zhejiang	Oujiang	300		-	-
36	Fuchunjiang	Zhejiang	Fuchun	297.2		0.84	0.322
37	Xinfengjiang	Guangdong	Xinfeng	292.5		0.74	0.289
38	Qingtongxia	Ningxia	Yellow	272		0.83	0.349
39	Sanmenxia	Henan	Yellow	250		-	-
Totals for those plants for which generation data are available (e):				12,197.7		44.41	0.415

(a) As of 31 December 1988 unless otherwise noted.
(b) Under construction.
(c) 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.
(d) An additional 270 MW of pumped storage capacity (for a total capacity of 420 MW) was due to begin operation in 1989-1990.
(e) 18 plants with installed capacity ≥150MW.
- Not available.

Source: China's Construction in Four Decades: Electric Power Industry in China, 1990 (Information Institute of Water Resources and Electric Power, MOE, MWR, Beijing); Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table II-26. Coverage of Rural Electric Grids, 1979, 1983, 1984 and 1990 (a)

Region	Percent of Townships with Electricity				Percent of Villages with Electricity			
	1979	1983	1984	1990	1979	1983	1984	1990
Northeast	98.2%	98.1%	98.9%	(b)	94.5%	96.5%	96.3%	(b)
North	88.0%	93.6%	93.7%	(b)	78.3%	87.0%	86.3%	(b)
Northwest	70.0%	76.5%	76.8%	(b)	47.8%	55.6%	60.2%	(b)
East	90.2%	94.6%	94.8%	(b)	60.7%	76.5%	78.2%	(b)
South-Central	93.3%	90.7%	90.0%	(b)	64.1%	70.9%	74.3%	(b)
Southwest	82.6%	84.9%	85.9%	(b)	46.9%	59.1%	69.1%	(b)
National Average	87.1%	89.5%	89.7%	95.8%	62.6%	73.2%	75.3%	88.0%

(a) The decrease in coverage in some areas reflects a change in organizational structure in rural areas, e.g. some townships were reclassified as municipalities.
(b) Not available.

Source: Wang Qingyi, Energy in China, 1988 (Metallurgical Industry Press, Beijing); Economic Daily, 5 August 1991.

Table II-27. Year-End Production Capacity of Major Energy Products, 1978-1988

Year	Raw Coal Extraction			Washed Coal			Power Generation Installed Capacity		
		of which:			of which:			in which:	
	Total (Mt/yr)	Centrally-Run Mines (Mt/yr)	Other Mines (Mt/yr)	Total (Mt/yr)	Coking Coal (Mt/yr)	Steaming Coal (Mt/yr)	Total (GW)	Coking Coal (GW)	Lump Coal (GW)
1978	581.10	277.20	303.90	114.85	84.82	30.03	57.12	17.28	39.84
1979	603.35	285.07	318.28	116.05	84.52	31.53	63.01	19.10	43.91
1980	604.28	287.06	317.22	112.15	85.72	26.43	65.87	20.32	45.55
1981	619.25	299.75	319.50	118.60	88.42	30.18	69.00	21.93	47.07
1982	680.68	338.25	342.43	124.79	94.31	30.48	72.36	22.96	49.40
1983	724.23	352.92	371.31	131.67	99.99	31.68	76.44	24.16	52.28
1984	799.31	382.85	416.46	136.27	104.59	31.68	80.12	25.60	54.52
1985	886.01	390.52	495.49	145.02	112.89	32.13	87.05	26.41	60.64
1986	910.93	403.45	507.48	170.50	117.05	53.45	93.82	27.54	66.28
1987	958.77	417.32	541.45	185.56	123.45	62.11	102.90	30.19	72.71
1988	1010.45	443.74	566.71	190.26	126.20	64.06	115.50	32.70	82.80

Year	Industrial Coke (Mt/yr)	Natural Gas Extraction (Million cubic m/yr)	Crude Oil Extraction (Mt/yr)	Crude Oil Refining (Mt/yr)
1978	n.a.	9,250	97.48	92.91
1979	37.46	8,520	96.84	95.61
1980	38.31	7,750	95.57	93.86
1981	38.61	6,570	96.01	98.67
1982	39.04	6,390	97.94	99.13
1983	39.52	6,540	99.53	103.68
1984	40.32	6,860	107.46	104.84
1985	40.04	7,470	118.87	106.15
1986	40.48	7,790	126.58	106.86
1987	42.43	9,400	133.53	110.48
1988	44.66	9,960	138.45	115.72

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

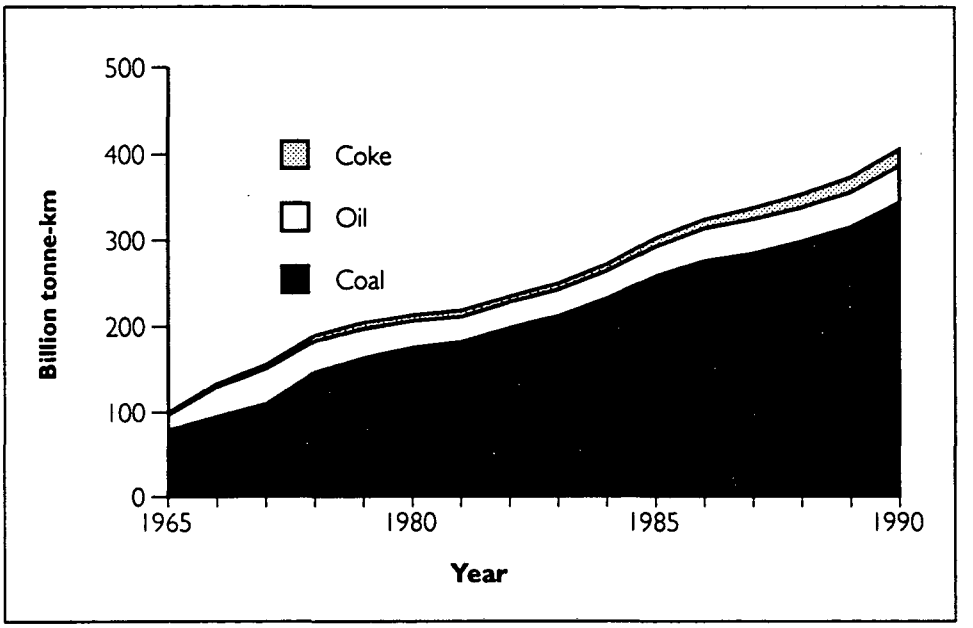
Table II-28. Railway Transportation of Coal and Oil, 1965, 1970, 1975, 1978-1990 (Billion Tonne-km)(a)

Year	Coal (Bt-km)	Coke (Bt-km)	Oil (Bt-km)	Subtotal: Energy Products (Bt-km)	Total Railway Freight (Bt-km)	Energy Products as % of Total Freight
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%
1978	148.13	6.62	35.64	190.39	533.35	35.7%
1979	164.68	7.28	33.07	205.03	558.87	36.7%
1980	176.67	6.87	30.07	213.61	570.73	37.4%
1981	183.17	6.92	28.68	218.77	570.13	38.4%
1982	199.76	6.49	28.85	235.10	610.90	38.5%
1983	213.15	7.30	29.96	250.41	663.45	37.7%
1984	233.55	7.68	31.26	272.49	723.48	37.7%
1985	259.59	9.59	34.07	303.25	811.16	37.4%
1986	277.00	10.38	37.53	324.91	875.01	37.1%
1987	285.74	12.61	39.69	338.04	945.57	35.7%
1988	299.51	15.36	39.12	353.99	986.02	35.9%
1989	316.18	17.28	39.99	373.45	1,037.30	36.0%
1990	344.64	19.46	42.00	406.10	1,060.12	38.3%

(a) This table is in terms of tonne-km. In terms of tonnage handled, coal, coke, and oil accounted for 43%, 1.7%, and 4.5%, for a total of 49% (1990).

Source: The Development of China's Transportation and Telecommunication, SSB, 1989, Beijing; Statistical Yearbook of China, various years (SSB, Beijing).

Figure II-17 Railway Transport of Energy Products



Chapter III—**Energy Industry Investment**

Energy Industry Investment

Overview

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 an increasing share of investment clearly indicates its importance to Chinese planners. The energy industry has been the primary recipient of industrial capital in China, accounting for nearly 30% of total investment in state-owned units in 1990 (Table III-1) and nearly 20% of total investment in units of all types of ownership (state-, collective-, and individual-owned; Table III-2).[1]

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 energy investment, with the electricity subsector taking the next largest and the coal subsector the smallest share (Table III-5). In response to a worsening electricity shortage causing slack industrial capacity, investment in electricity generation and distribution has taken an increasing share, from 32% in the early 1980s to over 44% in the late 1980s and 1990. This increase has been primarily at the expense of the coal subsector. Investment in the coal industry, the backbone of China's energy supply, increased little in the late 1980s, but jumped in 1990. Coal shortages began in the late 1980s, and have prevented many power plants in the nation's industrial areas from operating at full capacity.

Chinese investment data are often difficult to interpret because of inconsistencies in coverage, inclusion of investments in worker 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. In spite of the shortcomings, however, the data are still useful in analyzing past and future trends in energy production and the importance of the energy industry in China's economy.

Coal

There has been little real increase in coal industry investment in recent years. The main factor in this is probably the decision to rely more heavily on rural collective and private mines, which have provided most of the increase in production. Rural mines are generally very small and poorly equipped, however, and unit investment is much lower than that of large mines. The inclusion of investment data on rural collective and private mines, then, would certainly increase the investment figures presented here, but to an uncertain degree. It has been estimated that rural mines require 10 to 70 yuan of investment per annual ton of capacity, whereas large, mechanized state-run mines require 140 to 240 yuan per annual ton of capacity (Lu, 1988; Levine and Liu, 1990).[2]

Investment in coal washing has been consistently overlooked, even though the many benefits—reduced burden on the overloaded transportation system, increased end-use efficiency, reduced emissions—are well known. Facing rapid increases in demand, maintaining production increases has been given priority (Table III-7).

Oil and Natural Gas

Investment in crude oil extraction has outpaced production gains in recent years (Table III-5), possibly because of increased effort necessary to recover oil from older fields. Oil refining accounts for most of the rest of investment in this sector, and its share increased overall in the 1980s (Table III-7). The statistics would seem to indicate that natural gas development has been virtually ignored, actually decreasing in real terms in the late 1980s. This is at odds with the fact that new gas fields have been discovered and exploited recently. It is possible that much investment in natural gas is miscategorized as crude oil investment.

ELECTRICITY

As mentioned above, the capital-intensive electricity subsector currently accounts for nearly half of energy industry investment (Table II-5). Investment in thermal capacity has consistently outstripped that in hydropower plants, and the gap has continued to grow (Table III-7). 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 (several MW), which are easier for local authorities to build but offer lower efficiencies and less effective emissions controls. Investment in nuclear power generation has been substantial, and as of this writing one Chinese reactor (Qinshan near Shanghai) had been successfully tested. Electricity distribution has been funded at about the same level as 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 1989 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 special loan incentives in the early 80's. From 1981 to 1985 total investment in energy conservation by the central government and other sources amounted to 10 billion yuan (Levine and Liu, 1990). Although conservation investment is small in comparison to supply investment, its impact on China's economy is significant. It is estimated that through investment in energy conservation during the Sixth Five-Year Plan, China was able to reduce its energy consumption growth rate from a predicted 7% (based on 1977 energy intensity) to an actual 4% by 1985 (Levine and Liu, 1990; see also Table IV-3). Investment in energy conservation has increased gradually since 1985, reaching 3.052 billion yuan in 1988 (Energy Statistical Yearbook of China, 1989). Properly targeted investments in conservation have the potential to reduce demand by more than the supply increase resulting from the same amount invested in energy production.

While consistent time series data on conservation investments are not available, there is some data on investments made under the rubric of "technical updating and transformation" (Table III-10). This probably accounts for most of the energy conservation investment, although a significant amount is probably under the heading of "capital construction". It is easier to collect data on efficiency made on the supply side, since there are fewer energy producers than consumers. Some incomplete data suggest that nearly all energy conservation capital construction investment has been made by industrial enterprises, primarily by energy industries and electric utilities (which are considered part of the industrial sector in China) and most of the rest by the metallurgical industry (Ye and Huang, 1991). These data indicate that energy industries received a much larger share of their investment funds from the government than did other industries. An added difficulty is that defining energy conservation investment can be problematic, since increasing end-use efficiency might be only one of a number of goals, including expanding production capacity and meeting emissions standards, to be served by installing new or upgrading old equipment.

There has been considerable interest in residential energy conservation, particularly the improvement of biomass combustion in rural households through the introduction of improved stoves (Gu, 1991). 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. As for energy conservation investments in industry, the rationale for these investments is not purely energy conservation; they are also intended to improve environmental quality. It is hoped that improved biomass stoves will reduce stress on rural ecosystems resulting from overharvesting of firewood and other biomass, and that consolidation of residential boilers and popularization of briquettes will improve urban air quality.

Sources of Investment Funds

In the 1980s direct government investment in the energy industry decreased slightly in real terms and decreased substantially as a share of total investment (Table III-8).[3] This reflects the trend towards encouraging local financial responsibility for projects. The data presented here are for capital construction investment in enterprises belonging to the former ministry systems (centrally-controlled) only. Capital construction investment is probably a good indicator for the relative magnitude of investments (see technical note), although this will understate the petroleum subsector's share of funds. These data cover most capital construction investment in state-owned units in these subsectors (between 70% and virtually all, with the percentage declining towards the end of the 1980s).

For the coal industry, bank loans accounted for an increasing share, and coal substitution funds also played an important role.[4] Direct investment, however, continued to provide the bulk of capital for state-owned units. Although there must also have been substantial collective and private investment in rural mine capacity, as indicated by the enormous output from rural mines, no dependable data on investment in this quarter are available. The oil and natural gas industry came to rely to a remarkable degree on foreign capital, over 50% in 1988, replacing direct government investment as the primary source.[5] Direct government investment in the electric power industry dropped precipitously as well, forcing it to rely more on "self-raised funds" and "other sources".[6] 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 touzi*), "technical updating and transformation" (*gengxin gaizao touzi*), and "other" (*qita guding zichan touzi*). Capital construction and technical updating and transformation investments are further characterized as "productive" or "nonproductive".

Capital Construction Investment

Capital construction generally refers to construction and expansion projects as well as purchases and installation of equipment which result in net additions to productive capacity. Data on capital construction investment is generally available only for state-owned or state- and urban collective-owned enterprises. It 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 (40 years as opposed to 10 years), so it is a convenient proxy for total energy industry investment. In the 1980s the share of energy industry investment from capital construction funds was similar to the share for all industry from capital construction (Table III-7), providing some support for this.

Technical Updating and Transformation Investment

Investment in this category is generally intended for the repair and renovation of existing plant; projects are not intended to expand capacity, but often do in practice. 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 (Table III-9). The energy industry subsectoral shares of technical updating and transformation investment are similar to those for capital construction investment.

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 (Table III-5). Most of the rest of the category 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 "nonproductive". 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, especially in the petroleum subsector, from 16% in 1985 to 7% in 1990 (Table III-7).[7]

State-, Collective-, and Individual-Owned Units

The State Statistical Bureau divides industrial enterprises into the categories of state-owned, collective-owned, individual-owned, and other enterprises. 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; foreign-run 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 the 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 1990, while urban collectives received between 3% and 6% over the same period (Table III-2). The most important category of investment missing is probably investment in rural mines and small hydroelectric plants owned by rural collectives and individuals. Investment in rural mines especially could be significant, since they produce an ever-larger share of China's coal.

Investment Targets and Actual Investment

Most investment figures are based on the 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 of this type, 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, although we believe they provide a reasonable guide to relative size of investment in different sectors.

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NOTES

1 "Unit" refers to a Chinese "work unit", which could be a company, a school, a government agency, etc. Industrial enterprises are a type of work unit, and the terms "enterprise" and "unit" are nearly interchangable in the context of this data book.

Hereafter "total investment" will refer only to investment in state-owned enterprises, which account for nearly two-thirds of all investment, unless otherwise noted. State-owned enterprises are those owned by all levels of government, central, province (and autonomous region), and county. Some sources refer to state-owned units as those "owned by the people" (*quanmin suoyouzhi*). Data are not available for units under "other" ownership, e.g. domestic and foreigh joint ventures.

2 Investment in state-owned and urban collective-owned units was nearly 76 billion 1980 yuan over the Sixth and Seventh Five Year Plan Periods (1981-1990). If it is assumed that the difference between 1980 and 1989 output from rural collective mines approximates the increase in rural mine capacity, and that the higher figure of 70 (1980) yuan per annual ton is correct, investment in rural mines for the corresponding period would be of almost 19 billion yuan, or 20% of the resulting total investment.

3 Direct government investment includes funds from the central government, loans which replace originally planned direct investment, and funds invested by local governments at the direction of the central government.

4 "Coal substitution" funds (*mei dai you*) 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 equipment, which had been overbuilt based on those predictions, to coal.

5 "Foreign investment" includes not only funds from abroad, but equipment, materials, and technology as well. It does not include foreign equipment and materials bought with Chinese foreign exchange reserves or (until more recently than the publication of these figures) charged to Eastern European countries' import accounts.

6 These two categories include investment funds raised by government agencies at all levels (e.g. through bond issues or out-of-plan loans arranged by the unit) and any other sources not included in the other categories.

7 This has resulted from a decrease in the share of "nonproductive" investment in all energy industry subsectors, as well as the increasing share of investment going to the electricity industry, which has always had the smallest share of nonproductive investment.

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, 1953-1990 (a)

1. Billion Current Yuan

Year	Total Investment	Total Energy Industry Investment (b)	Total Capital Construction Investment	Industry Capital Construction Investment (c)	Energy Industry Capital Construction Investment (c)
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	170.26	95.26	55.83

(a) Figures are for state-owned units unless otherwise noted. State investment was 67% of all investment in 1983 and 66% in 1990. 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 guaged from its share of capital construction investment, detailed in Table III-8, 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.

(b) Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 and 1990, which are for state-owned units only.

(c) 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".

– Not available.

Source: Almanac of China's Economy, 1989 & 1990, State Economics Bureau, Beijing; Energy Statistical Yearbook of China, SSB, Beijing; Statistical Yearbook of China, various years, SSB, Beijing; China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, 1953-1990 (a) (continued)

2. Billion 1980 Yuan (b)

Year	Total Investment	Total Energy Industry Investment (c)	Total Capital Construction Investment	Industry Capital Construction Investment (d)	Energy Industry Capital Construction Investment (d)
1953	13.98	-	13.81	2.18	0.54
1954	15.43	-	14.88	3.14	0.84
1955	16.07	-	15.33	3.64	1.15
1956	24.19	-	23.36	6.32	1.83
1957	22.91	-	21.71	6.17	1.92
1958	38.94	-	37.53	14.83	3.54
1959	46.54	-	44.23	17.81	4.93
1960	49.50	-	46.19	19.72	5.45
1961	17.71	-	14.46	6.30	2.25
1962	10.45	-	8.53	3.17	1.24
1963	14.35	-	12.07	3.93	1.32
1964	20.19	-	17.54	5.74	1.73
1965	25.35	-	21.00	7.54	2.17
1966	29.50	-	24.25	8.41	2.39
1967	22.22	-	16.59	9.13	2.60
1968	17.91	-	13.36	9.89	2.84
1969	28.68	-	23.33	10.93	3.14
1970	42.15	-	35.79	11.96	3.43
1971	47.13	-	38.50	14.58	4.92
1972	46.33	-	36.81	17.28	5.66
1973	49.08	-	37.88	19.93	6.38
1974	52.07	-	39.09	22.53	6.78
1975	61.83	-	46.44	23.32	7.21
1976	59.79	-	42.96	21.13	7.07
1977	61.00	-	42.54	22.12	8.01
1978	72.47	-	54.29	27.65	11.61
1979	72.78	-	54.47	25.66	11.09
1980	74.59	-	55.89	27.56	11.57
1981	65.51	14.15	43.47	21.54	9.44
1982	83.07	17.38	54.59	26.02	10.21
1983	92.52	21.35	57.74	28.24	12.76
1984	109.64	27.23	68.75	33.33	16.19
1985	142.06	34.19	90.82	41.44	19.05
1986	160.91	40.32	95.65	47.89	24.06
1987	173.79	46.94	101.57	58.28	29.03
1988	184.53	51.47	105.15	62.78	32.34
1989	156.41	51.19	95.73	59.66	32.38
1990	172.24	51.19	100.47	68.85	40.35

(a) Refer to footnote (a) to Table IV-1.1.
(b) Total investment figures are deflated using the overall deflators given in Table IX-11.6, Implicit Deflators for National Income (see Economic Indicators section). Total industry and energy industry investment figures are deflated using the industry sector deflators in that table.
(c) Refer to footnote (b) to Table IV-1.1.
(d) Refer to footnote (c) to Table IV-1.1.
– Not available.

Source: Almanac of China's Economy, 1989 & 1990, State Economics Bureau, Beijing; Energy Statistical Yearbook of China, SSB, Beijing; Statistical Yearbook of China, various years, SSB, Beijing; China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, 1953-1990 (a) (continued)

3. Billion Current Yuan by Five-Year Plan

Period	Total Investment	Total Energy Industry Investment	Total Capital Construction Investment	Industry Capital Construction Investment	Energy Industry Capital Construction Investment
1953-1957	61.15	-	58.95	25.03	7.30
1958-1962	130.71	-	120.61	72.83	20.57
1963-1965	49.95	-	42.19	21.02	6.38
1966-1970	120.91	-	97.41	54.20	15.50
1971-1975	227.63	-	176.32	97.90	31.05
1976-1980	318.62	-	234.22	123.17	49.00
1981-1985	533.05	117.68	341.01	154.70	69.57
1986-1990	1,249.34	320.26	734.79	378.56	202.20

4. Billion 1980 Yuan by Five-Year Plan

Period	Total Investment	Total Energy Industry Investment	Total Capital Construction Investment	Industry Capital Construction Investment	Energy Industry Capital Construction Investment
1953-1957	92.57	-	89.09	21.45	6.27
1958-1962	163.14	-	150.93	61.83	17.41
1963-1965	59.90	-	50.61	17.21	5.22
1966-1970	140.46	-	113.31	50.31	14.39
1971-1975	256.44	-	198.71	97.64	30.95
1976-1980	340.62	-	250.15	124.12	49.35
1981-1985	492.80	114.29	315.37	150.56	67.65
1986-1990	847.87	241.11	498.57	297.46	158.16

(a) Refer to footnote (a) to Table IV-1.1.
(b) Refer to footnote (b) to Table IV-1.2.
– Not available.

Source: Almanac of China's Economy, 1989 (State Economics Bureau, Beijing); Energy Statistical Yearbook of China (SSB, Beijing); Statistical Yearbook of China, various years (SSB, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table III-1. Investment by State: Total and Capital Construction Compared to Energy Industry Investment, 1953-1990 (a) (continued)

5. Shares. Billion Current Yuan

Year	Total Investment	Total Energy Industry Investment (b)	Total Capital Construction Investment	Industry Capital Construction Investment (c)	Energy Industry Capital Construction Investment (c)
1953	100.0%	-	98.7%	15.6%	3.8%
1954	100.0%	-	96.5%	20.4%	5.4%
1955	100.0%	-	95.4%	22.6%	7.1%
1956	100.0%	-	96.6%	26.1%	7.6%
1957	100.0%	-	94.8%	26.9%	8.4%
1958	100.0%	-	96.4%	38.1%	9.1%
1959	100.0%	-	95.0%	38.3%	10.6%
1960	100.0%	-	93.3%	39.8%	11.0%
1961	100.0%	-	81.6%	35.6%	12.7%
1962	100.0%	-	81.6%	30.4%	11.9%
1963	100.0%	-	84.1%	27.4%	9.2%
1964	100.0%	-	86.9%	28.4%	8.5%
1965	100.0%	-	82.8%	29.7%	8.6%
1966	100.0%	-	82.2%	28.5%	8.1%
1967	100.0%	-	74.7%	41.1%	11.7%
1968	100.0%	-	74.6%	55.2%	15.8%
1969	100.0%	-	81.3%	38.1%	10.9%
1970	100.0%	-	84.9%	28.4%	8.1%
1971	100.0%	-	81.7%	30.9%	10.4%
1972	100.0%	-	79.5%	37.3%	12.2%
1973	100.0%	-	77.2%	40.6%	13.0%
1974	100.0%	-	75.1%	43.3%	13.0%
1975	100.0%	-	75.1%	37.7%	11.7%
1976	100.0%	-	71.9%	35.3%	11.8%
1977	100.0%	-	69.7%	36.3%	13.1%
1978	100.0%	-	74.9%	38.2%	16.0%
1979	100.0%	-	74.8%	35.3%	15.2%
1980	100.0%	-	74.9%	36.9%	15.5%
1981	100.0%	21.6%	66.4%	32.9%	14.4%
1982	100.0%	20.9%	65.7%	31.3%	12.3%
1983	100.0%	23.1%	62.4%	30.5%	13.8%
1984	100.0%	24.8%	62.7%	30.4%	14.8%
1985	100.0%	24.1%	63.9%	29.2%	13.4%
1986	100.0%	25.1%	59.4%	29.8%	15.0%
1987	100.0%	27.0%	58.4%	33.5%	16.7%
1988	100.0%	27.9%	57.0%	34.0%	17.5%
1989	100.0%	32.7%	61.2%	38.1%	20.7%
1990	100.0%	29.7%	58.3%	40.0%	23.4%

(a) Refer to footnote (a) to Table IV-1.1.
(b) Refer to footnote (b) to Table IV-1.1.
(c) Refer to footnote (c) to Table IV-1.1.
- Not available.

Source: Almanac of China's Economy, 1989 & 1990, State Economics Bureau, Beijing;Energy Statistical Yearbook of China, SSB, Beijing; Statistical Yearbook of China, various years, SSB, Beijing;China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Figure III-1. Capital Construction Investment, 1953-1989

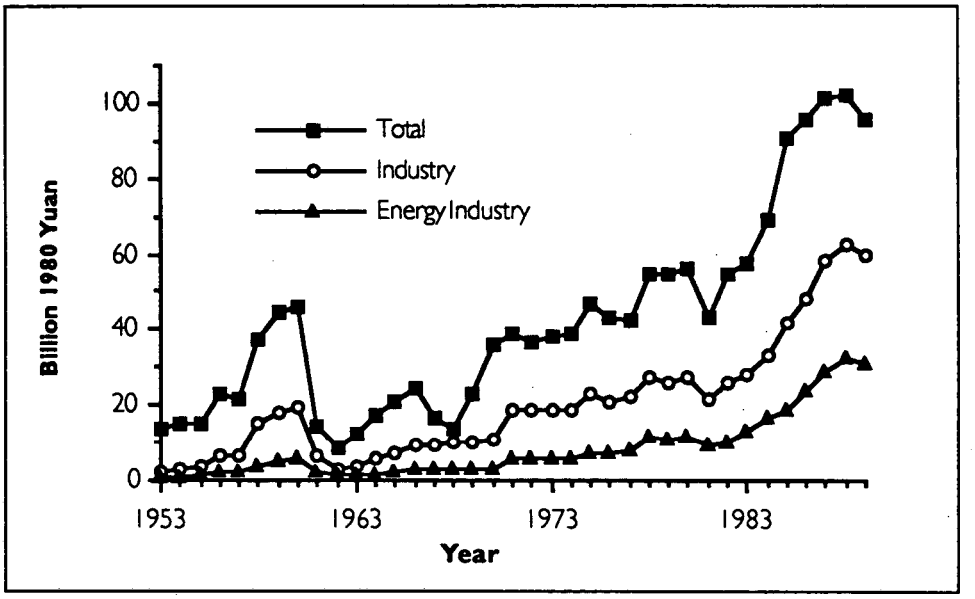


Figure III-2. Structure of Capital Construction Investment 1953-1989

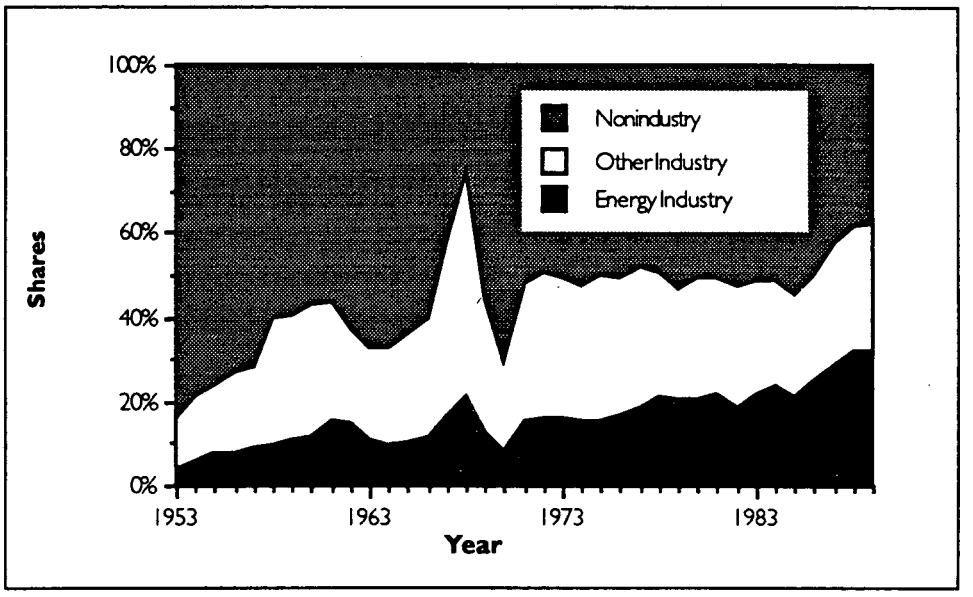


Table III-2. Total Investment by Ownership of Enterprise, 1983-1990 (a)

1. Billion Current Yuan

Year	State-Owned Units	Collective-Owned Units			Individual Investment			Total	Total Energy Industry Investment (b)
		Urban	*Rural*	Subtotal	*Urban*	*Rural*	Subtotal		
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

2. Shares of Total

Year	State-Owned Units	Collective-Owned Units			Individual Investment			Total	Total Energy Industry Investment
		Urban	*Rural*	Subtotal	*Urban*	*Rural*	Subtotal		
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%

(a) Unlike most of the tables in Chapter IV, 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.

(b) For state- and urban collective-owned units.

Source: China Statistical yearbook, various years (SSB, Beijing).

Table III-3. Total Investment and Total Energy Industry Investment by Investment Category, 1981-1990 (a)

1. Total Investment, Billion Current Yuan

Year	Capital Construction Investment	Technical Updating & Transformation Investment	Other Investment	Total Investment
1981	44.29	19.53	2.93	66.75
1982	55.55	25.04	3.94	84.53
1983	59.41	29.11	6.67	95.20
1984	74.32	30.93	13.28	118.52
1985	107.44	44.91	15.70	168.05
1986	117.61	61.92	18.32	197.85
1987	134.31	75.86	19.63	229.80
1988	157.43	98.06	20.79	276.28
1989	155.17	78.88	19.50	253.55
1990	170.38	83.02	19.91	273.31

2. Total Investment, Billion 1980 Yuan (b)

Year	Capital Construction Investment	Technical Updating & Transformation Investment	Other Investment	Total Investment
1981	43.47	19.17	2.88	65.51
1982	54.59	24.60	3.87	83.07
1983	57.74	28.29	6.48	92.51
1984	68.75	28.61	12.28	109.64
1985	90.82	37.97	13.27	142.06
1986	95.65	50.36	14.90	160.91
1987	101.57	57.37	14.85	173.79
1988	105.15	65.49	13.89	184.53
1989	95.68	48.64	12.02	156.34
1990	100.55	48.99	11.75	161.28

3. Total Investment, Share

Year	Capital Construction Investment	Technical Updating & Transformation Investment	Other Investment	Total Investment
1981	66%	29%	4%	100%
1982	66%	30%	5%	100%
1983	62%	31%	7%	100%
1984	63%	26%	11%	100%
1985	64%	27%	9%	100%
1986	59%	31%	9%	100%
1987	58%	33%	9%	100%
1988	57%	35%	8%	100%
1989	61%	31%	8%	100%
1990	62%	30%	7%	100%

(a) Includes investment in all sectors from all sources as reported by the State Statistical Bureau.
(b) Figures are deflated using the overall national income deflators given in Table IX-11.6.

Source: China Statistical Yearbook, various years (SSB, Beijing); Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table III-3. Total Investment and Total Energy Industry Investment by Investment Category, 1981-1990 (a) (continued)

4. Energy Industry Investment, Billion Current Yuan (c)

Year	Capital Construction Investment (d)	Technical Updating & Transformation Investment (d)	Other Investment (e)	Total Investment (f)
1981	9.46	4.66	0.07	14.19
1982	10.22	4.22	2.97	17.41
1983	12.76	5.63	2.95	21.34
1984	16.60	4.21	7.10	27.90
1985	20.53	5.59	10.71	36.83
1986	26.71	6.91	11.15	44.77
1987	34.01	7.93	13.06	55.00
1988	41.01	11.34	12.92	65.27
1989	42.31	11.56	16.69	70.56
1990	55.83	12.51	16.34	84.67

5. Energy Industry Investment, Billion 1980 Yuan (c,g)

Year	Capital Construction Investment (d)	Technical Updating & Transformation Investment (d)	Other Investment (e)	Total Investment (f)
1981	9.44	4.65	0.07	14.15
1982	10.21	4.21	2.96	17.38
1983	12.76	5.64	2.95	21.35
1984	16.19	4.11	6.93	27.23
1985	19.05	5.19	9.94	34.19
1986	24.06	6.22	10.05	40.32
1987	29.03	6.77	11.14	46.94
1988	32.34	8.94	10.19	51.47
1989	30.70	8.39	12.11	51.20
1990	40.35	9.04	11.81	61.20

6. Energy Industry Investment, Shares (c)

Year	Capital Construction Investment (d)	Technical Updating & Transformation Investment (d)	Other Investment (e)	Total Investment (f)
1981	67%	33%	0%	100%
1982	59%	24%	17%	100%
1983	60%	26%	14%	100%
1984	59%	15%	25%	100%
1985	56%	15%	29%	100%
1986	60%	15%	25%	100%
1987	62%	14%	24%	100%
1988	63%	17%	20%	100%
1989	60%	16%	24%	100%
1990	66%	15%	19%	100%

(a) Includes investment in all sectors from all sources as reported by the State Statistical Bureau.
(b) Figures are deflated using the overall national income deflators given in Table IX-11.6.
(c) Energy industry fixed assets investment figures are for state- and urban collective-owned units, except 1989 which is for state-owned units only.
(d) For state-owned units only. Unlike figures for 1981-1984, capital construction investment figures for 1985-1989 include electricity sector investment in steam and hot water supply (which in 1989 amounted to 322 million yuan).
(e) Includes all investment in urban collective-owned units.
(f) Includes investment in state-owned and urban collective-owned units.
(g) Figures are deflated using the industrial sector national income deflators given in Table IX-11.6.

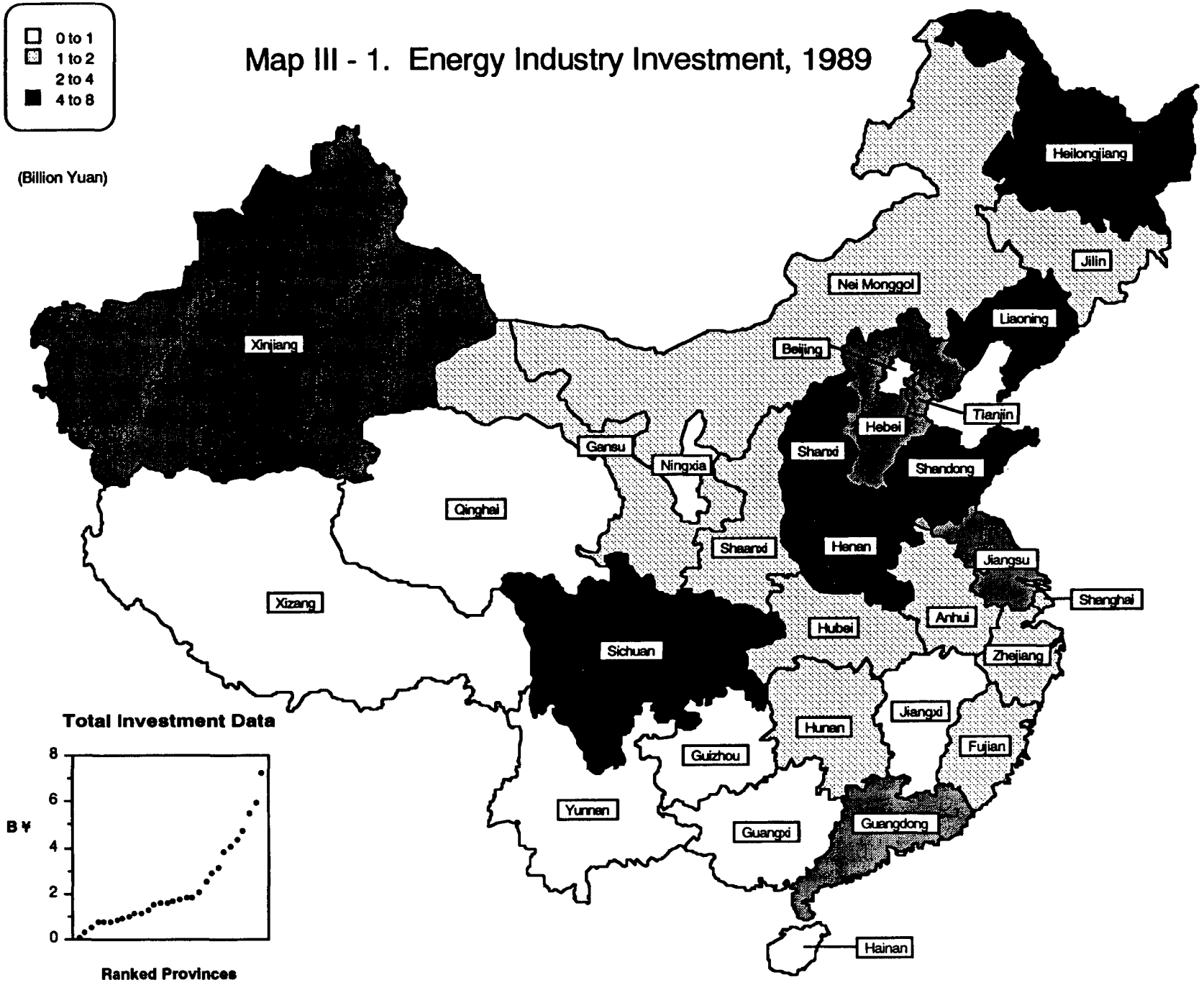
Source: China Statistical Yearbook, various years (SSB, Beijing); Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

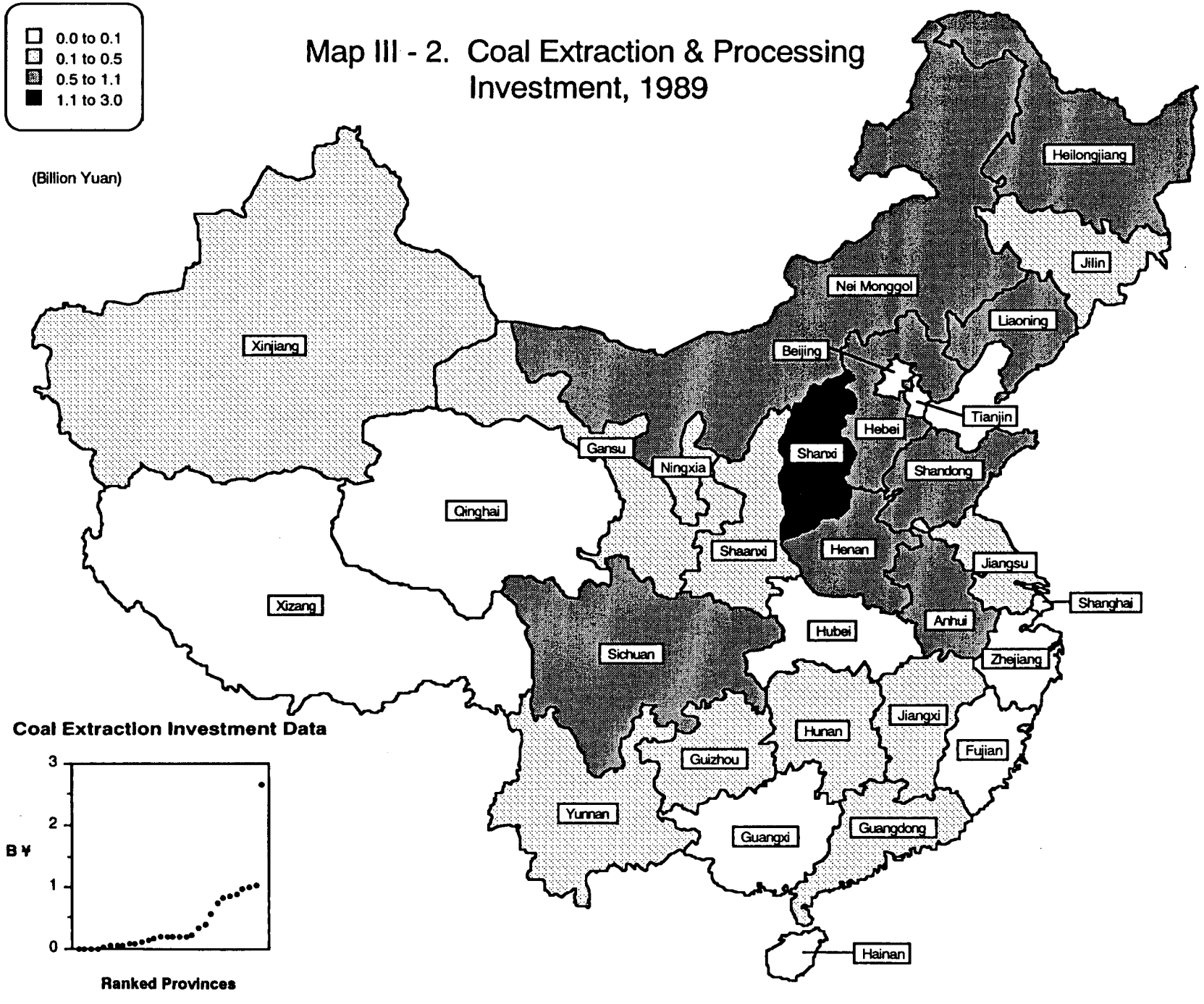
Table III-4. Total Energy Industry Investment by Energy Industry Subsector and Region, 1989—Billion Current Yuan

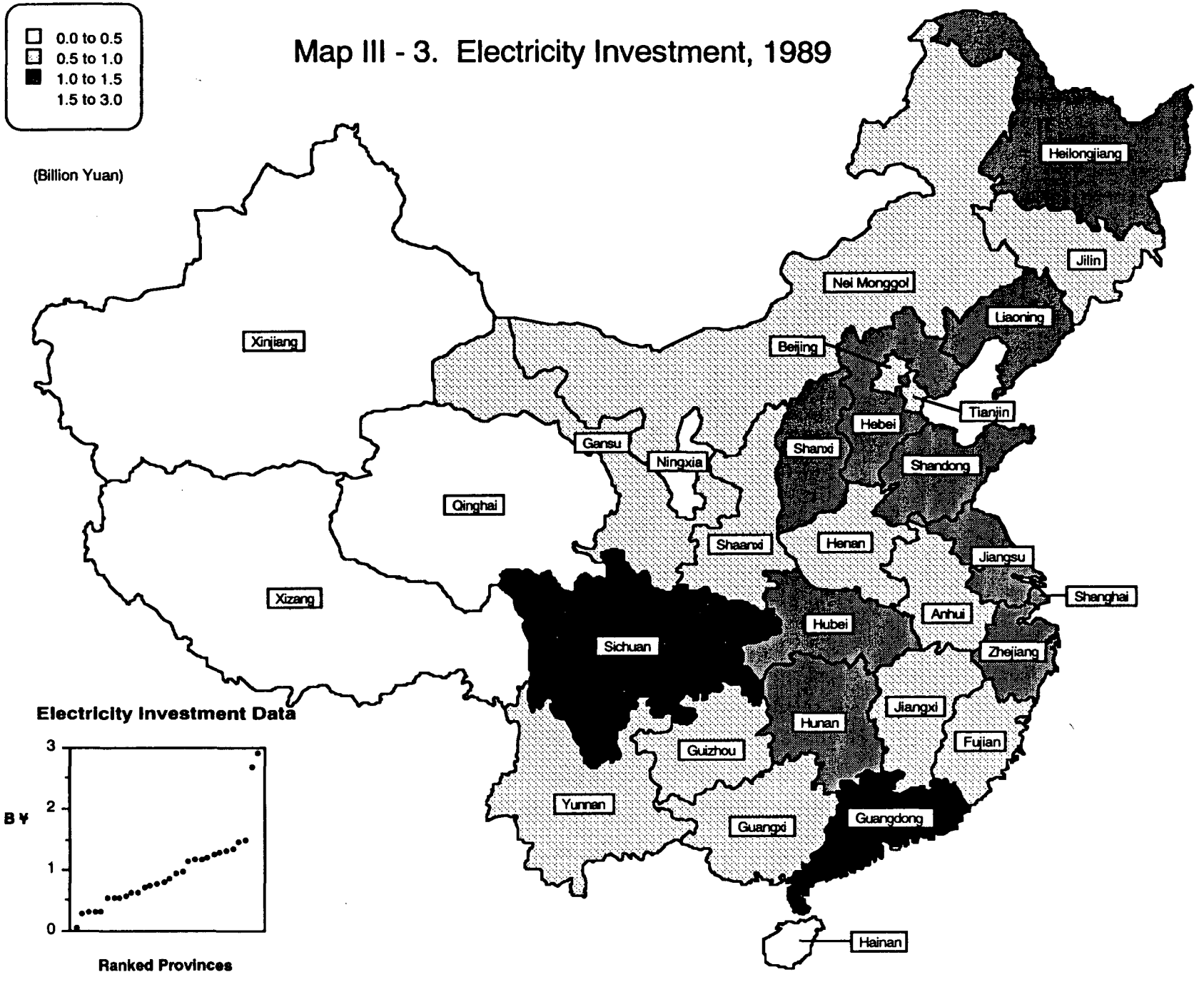
Planning Region	Province	Coal Extraction & Processing	Petroleum and Natural Gas Extraction	Electricity Generation and Supply (b)	Petroleum Refining	Coke, Coal Gas and Other Coal Products	Total
North	Beijing	0.044	(c)	0.533	0.211	0.108	0.895
	Tianjin	(c)	1.447	0.945	0.095	0.022	2.509
	Hebei	0.852	0.512	1.245	0.138	0.162	2.908
	Shanxi	2.657	(c)	1.296	0.001	0.072	4.025
	Inner Mongolia	0.731	(c)	0.803	0.015	0.024	1.573
Northeast	Liaoning	0.985	2.432	1.343	0.587	0.130	5.477
	Jilin	0.220	0.649	0.615	0.118	0.055	1.657
	Heilongjiang	1.026	3.522	1.140	0.182	0.081	5.951
East	Shanghai	(c)	0.017	1.199	0.128	0.417	1.761
	Jiangsu	0.337	0.226	1.303	0.152	0.060	2.078
	Zhejiang	0.086	(c)	1.481	0.159	0.083	1.809
	Anhui	1.002	(c)	0.754	0.032	0.044	1.831
	Fujian	0.083	(c)	0.958	0.075	0.028	1.143
	Jiangxi	0.181	0.003	0.541	0.030	0.028	0.785
	Shandong	0.898	4.514	1.446	0.301	0.084	7.243
South-Central	Henan	0.815	2.476	0.850	0.128	0.076	4.345
	Hubei	0.046	0.239	1.180	0.061	0.051	1.577
	Hunan	0.192	(c)	1.173	0.109	0.031	1.505
	Guangdong	0.111	0.238	2.686	0.616	0.173	3.824
	Guangxi	0.054	(c)	0.703	0.015	0.008	0.780
	Hainan	0.001	(c)	0.324	(c)	0.008	0.334
Southwest	Sichuan	0.574	1.134	2.917	0.006	0.068	4.699
	Guizhou	0.200	<0.001	0.538	(c)	0.025	0.763
	Yunnan	0.190	(c)	0.627	(c)	0.002	0.819
	Tibet	0.001	(c)	0.065	(c)	(c)	0.066
Northwest	Shaanxi	0.407	0.095	0.761	0.010	0.013	1.285
	Gansu	0.193	0.137	0.583	0.118	0.127	1.159
	Qinghai	0.019	0.632	0.319	<0.001	(c)	0.970
	Ningxia	0.192	(c)	0.272	0.060	0.011	0.534
	Xinjiang	0.133	2.567	0.325	0.126	0.003	3.154
National Total		12.230	23.294	29.573	3.474	1.993	70.564
Balance (d)		0	2.456	0.649	0	0.001	3.105

(a) Fixed assets investment in state-owned units only.
(b) Includes investment in steam and hot water generation and supply, which is generally only a very small portion of investment in this category (in 1989 investment in steam and hot water was slightly more than one percent of capital construction investment in state-owned electricity sector units).
(c) Not available.
(d) National totals sometimes did not equal sums of provincial data presented in the same table.

Source: Statistical Yearbook of China's Industrial Economy, 1990 (China Statistics Press, Beijing).


Map III - 1. Energy Industry Investment, 1989
0 to 1
1 to 2
2 to 4
4 to 8
(Billion Yuan)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Total Investment Data
B ¥
8
6
4
2
0
Ranked Provinces


Map III - 2. Coal Extraction & Processing Investment, 1989
0.0 to 0.1
0.1 to 0.5
0.5 to 1.1
1.1 to 3.0
(Billion Yuan)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Beijing
Tianjin
Hebei
Xinjiang
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Coal Extraction Investment Data
B ¥
3
2
1
0
Ranked Provinces


Map III - 3. Electricity Investment, 1989
0.0 to 0.5
0.5 to 1.0
1.0 to 1.5
1.5 to 3.0
(Billion Yuan)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Xizang
Shanghai
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Electricity Investment Data
B ¥
3
2
1
0
Ranked Provinces

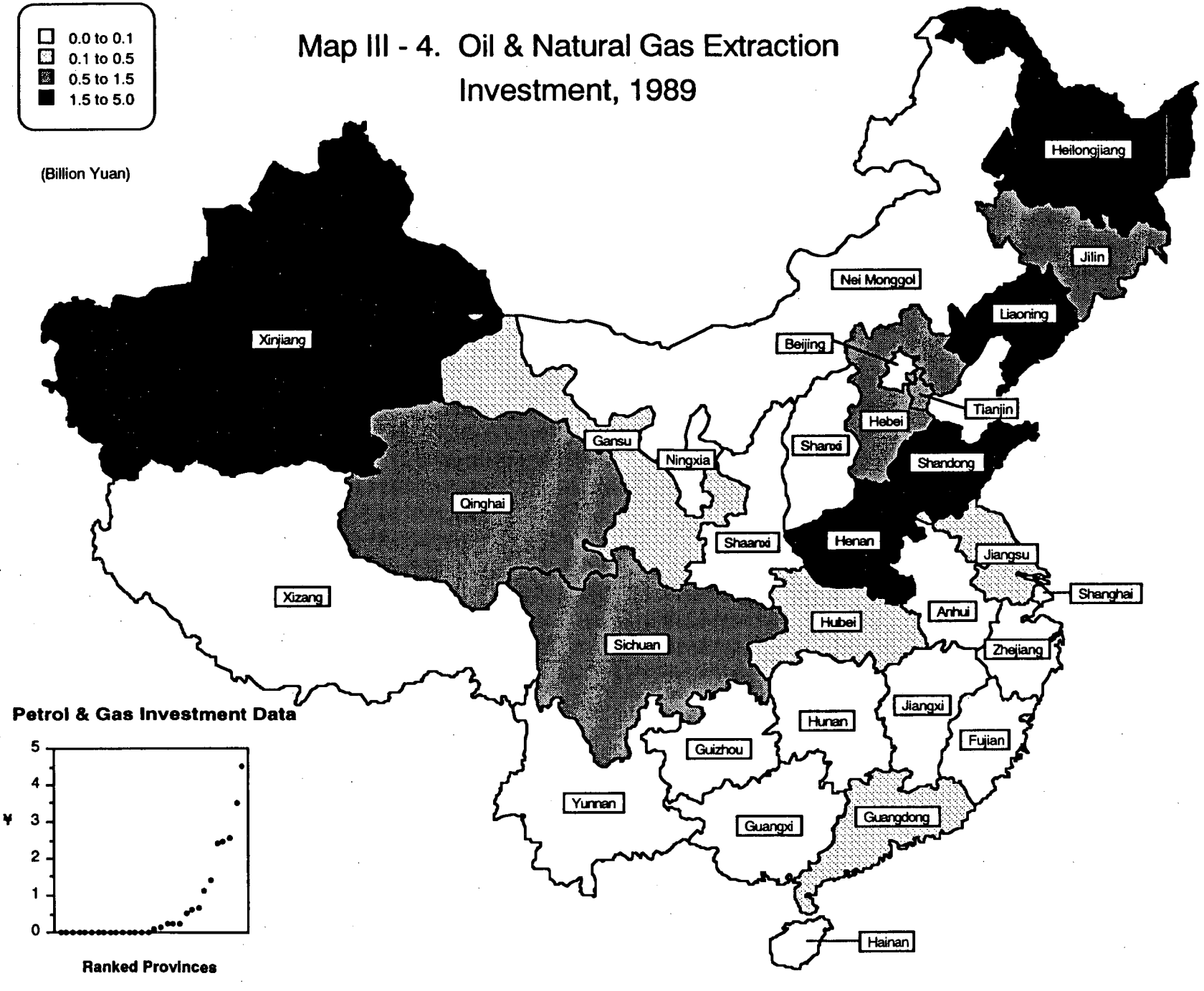

Map III - 4. Oil & Natural Gas Extraction Investment, 1989
0.0 to 0.1
0.1 to 0.5
0.5 to 1.5
1.5 to 5.0
(Billion Yuan)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Zhejiang
Sichuan
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Petrol & Gas Investment Data
B ¥
5
4
3
2
1
0
Ranked Provinces

Table III-5. Total Energy Industry Investment by Subsector, 1981-1990 (a)

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 (e)
1981	3.63	0.36	4.69	0.74	4.78	*14.19*	38.04
1982	4.87	0.11	6.20	0.70	5.53	*17.41*	46.74
1983	6.21	0.15	7.42	0.65	6.91	*21.34*	54.66
1984	8.19	0.37	9.46	0.99	8.90	*27.90*	65.35
1985	8.80	1.07	13.03	1.21	12.73	*36.83*	91.37
1986	9.31	1.63	13.78	1.63	18.42	*44.77*	115.98
1987	9.94	1.72	16.62	2.64	24.08	*55.00*	140.72
1988	10.80	2.00	19.69	4.21	28.58	*65.27*	170.91
1989 (c)	12.23	1.99	23.29	3.47	29.57	*70.56*	159.70
1990 (c)	14.63	3.28	24.93	4.24	36.65	*83.74*	180.99

2. Billion 1980 Yuan (b)

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 (e)
1981	3.62	0.36	4.67	0.73	4.76	*14.15*	37.93
1982	4.86	0.11	6.19	0.70	5.52	*17.38*	46.67
1983	6.21	0.15	7.43	0.65	6.92	*21.35*	54.68
1984	7.99	0.36	9.23	0.96	8.68	*27.23*	63.76
1985	8.17	0.99	12.09	1.12	11.81	*34.19*	84.80
1986	8.39	1.47	12.41	1.47	16.59	*40.32*	104.47
1987	8.48	1.47	14.19	2.25	20.55	*46.94*	120.11
1988	8.51	1.57	15.53	3.32	22.54	*51.47*	134.77
1989 (c)	8.87	1.45	16.90	2.52	21.45	*51.19*	115.85
1990 (c)	10.58	2.37	18.02	3.07	26.49	*60.52*	130.82

3. Shares of Energy Industry Investment

Year	Coal Extraction	Coking Coal Gas and Coal Products	Oil and Natural Gas Extraction	Oil Refining	Electricity Generation and Supply	*Energy Industry Subtotal*	Energy Industry as Percent of Total Industry (f)
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%	35%	3%	35%	*100%*	40%
1986	21%	4%	31%	4%	41%	*100%*	39%
1987	18%	3%	30%	5%	44%	*100%*	39%
1988	17%	3%	30%	6%	44%	*100%*	38%
1989 (c)	17%	3%	33%	5%	42%	*100%*	44%
1990 (c)	17%	4%	30%	5%	44%	100%	46%

(a) Unless otherwise noted, figures include investment in state- and urban collective-owned units only. 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.
(b) Deflated using the implicit deflators for the Industry sector in Table IX-11.6.
(c) 1989 figures for state-owned units only. (1988 investment in state-owned units was 64.3 billion yuan.) 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 13.5 billion yuan) was available.
(d) Not available.
(e) Includes investment in state-owned units only.
(f) Note that, except for 1989, coverage of energy industry investment is more complete than that of total industry investment, so that percentages for 1981-1988 are probably higher than actual.

Source: China Statistical Yearbook, various years (SSB, Beijing); Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing).

Figure III-3. Total Energy Industry Investment by Subsector, 1981-1989

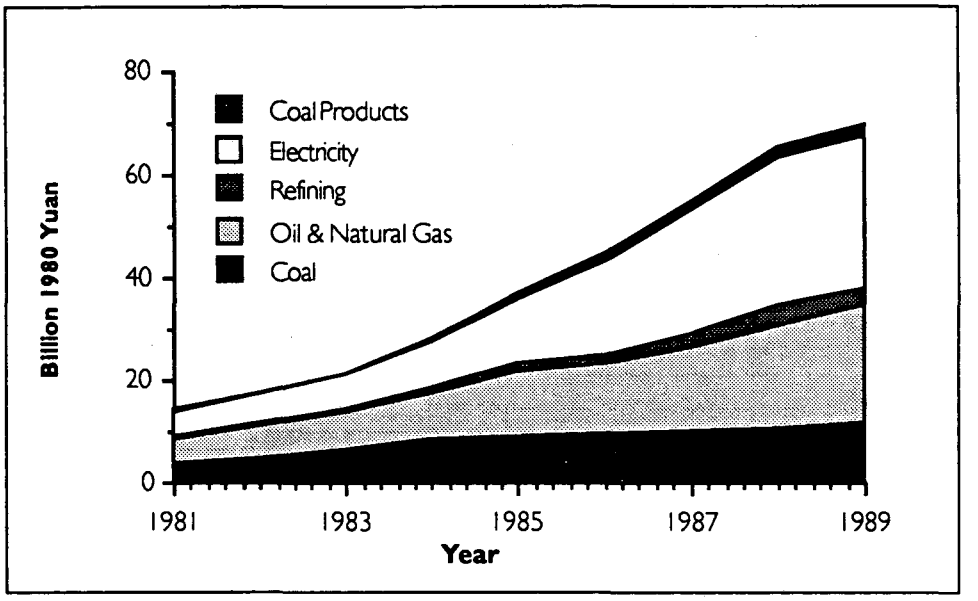


Figure III-4. Shares of Total Investment, 1981-1989

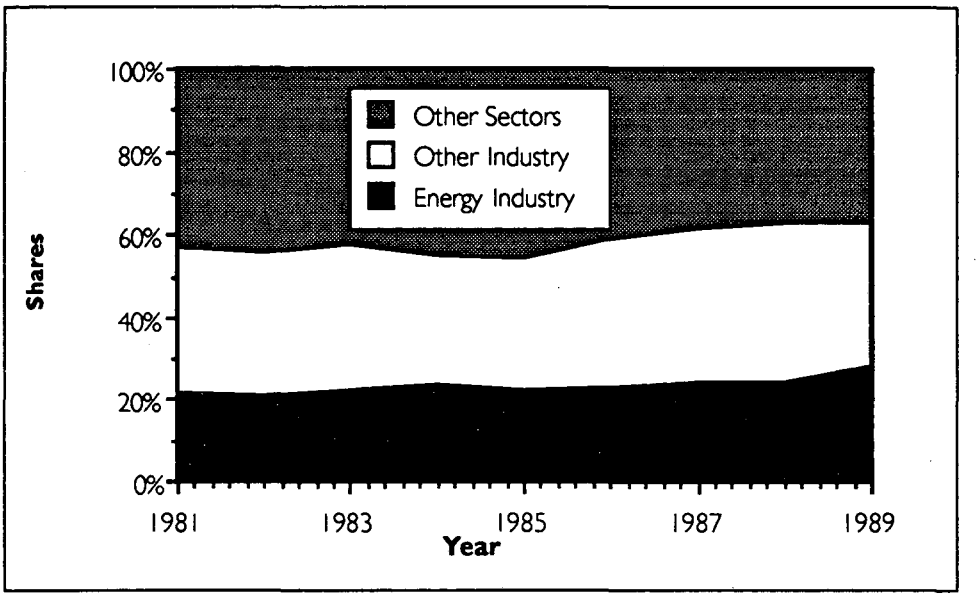


Table III-6. Energy Industry Capital Construction Investment by Subsector, 1953-1990 (a)

1. Billion Current Yuan

Year	Total (d)	Coal	Coke & Coal Products	Oil and Natural Gas (b)	Electric Power (c)
1953	0.70	0.36	0.01	0.07	0.26
1954	1.02	0.46	0.03	0.14	0.39
1955	1.36	0.60	0.05	0.18	0.54
1956	1.97	0.81	0.02	0.43	0.72
1957	2.25	0.75	0.05	0.38	1.07
1958	4.13	1.62	0.06	0.40	2.05
1959	5.78	2.17	0.33	0.52	2.76
1960	6.34	2.45	0.06	0.87	2.96
1961	2.75	1.56	0.02	0.40	0.76
1962	1.57	0.89	0.01	0.32	0.36
1963	1.65	0.82	0.01	0.43	0.39
1964	2.17	0.92	0.01	0.59	0.65
1965	2.56	0.77	0.001	0.62	1.17
1966	2.70	0.80	0.01	0.70	1.20
1967	2.90	0.90	0.01	0.70	1.30
1968	3.10	0.90	0.02	0.80	1.40
1969	3.30	1.00	0.03	0.80	1.40
1970	3.50	1.00	0.03	0.90	1.50
1971	5.00	1.30	0.03	1.20	1.90
1972	5.70	1.60	0.03	1.50	2.30
1973	6.40	2.00	0.03	1.80	2.60
1974	6.80	2.30	0.03	2.20	3.00
1975	7.15	1.87	0.06	2.16	3.07
1976	6.99	1.65	0.03	1.91	3.40
1977	7.87	2.26	0.06	2.08	3.47
1978	11.47	3.18	0.09	3.11	5.09
1979	11.10	3.19	0.11	2.71	5.10
1980	11.57	3.35	0.07	3.34	4.81
1981	9.46	2.32	0.34	2.80	4.01
1982	10.22	2.99	0.09	2.53	4.62
1983	12.76	4.01	0.11	2.90	5.75
1984	16.60	5.51	0.32	3.06	7.70
1985	20.37	5.51	0.76	3.32	10.79
1986	26.52	5.77	0.92	3.86	15.97
1987	33.78	5.96	1.10	5.86	20.86
1988	40.61	6.35	1.19	8.65	24.43
1989	44.32	7.05	1.45	9.35	26.46
1990	55.38	9.88	2.42	10.07	33.01

(a) 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 Industry sector in the National Income table (see Socioeconomic Indicators section).
(b) Includes investments in refining.
(c) Does not include investment in steam and hot water supply.
(d) 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).

Sources: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China, various years (SSB, Beijing).

Table III-6. Energy Industry Capital Construction Investment by Subsector, 1953-1990 (a) (continued)

2. Billion Constant 1980 Yuan

Year	Total (d)	Coal	Coke & Coal Products	Oil and Natural Gas (b)	Electric Power (c)
1953	0.54	0.27	0.01	0.05	0.20
1954	0.84	0.37	0.02	0.12	0.32
1955	1.15	0.50	0.04	0.15	0.45
1956	1.83	0.75	0.02	0.39	0.67
1957	1.92	0.64	0.04	0.33	0.91
1958	3.54	1.39	0.05	0.34	1.76
1959	4.93	1.85	0.28	0.44	2.35
1960	5.45	2.11	0.05	0.75	2.55
1961	2.25	1.28	0.01	0.33	0.63
1962	1.24	0.70	0.01	0.25	0.28
1963	1.32	0.66	0.01	0.34	0.31
1964	1.73	0.73	0.00	0.47	0.52
1965	2.17	0.65	0.00	0.53	0.99
1966	2.40	0.71	0.01	0.62	1.06
1967	2.61	0.81	0.01	0.63	1.16
1968	2.86	0.82	0.02	0.73	1.28
1969	3.06	0.95	0.02	0.76	1.33
1970	3.36	0.98	0.03	0.88	1.47
1971	4.36	1.28	0.03	1.18	1.87
1972	5.39	1.59	0.03	1.49	2.28
1973	6.41	1.99	0.03	1.79	2.59
1974	7.51	2.29	0.03	2.19	2.99
1975	7.21	1.88	0.06	2.18	3.09
1976	7.07	1.67	0.03	1.93	3.44
1977	8.01	2.30	0.06	2.11	3.53
1978	11.61	3.22	0.09	3.15	5.15
1979	11.09	3.18	0.11	2.70	5.09
1980	11.57	3.35	0.07	3.34	4.81
1981	9.44	2.31	0.34	2.79	4.00
1982	10.21	2.98	0.08	2.53	4.62
1983	12.76	4.01	0.11	2.90	5.75
1984	16.19	5.38	0.31	2.99	7.51
1985	18.91	5.11	0.70	3.08	10.01
1986	23.89	5.20	0.83	3.48	14.39
1987	28.84	5.09	0.94	5.00	17.81
1988	32.03	5.01	0.93	6.82	19.27
1989	32.16	5.12	1.05	6.79	19.20
1990	40.03	7.14	1.75	7.28	23.86

(a) 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 Industry sector in Table IX-11.6.
(b) Includes investments in refining.
(c) Does not include investment in steam and hot water supply.
(d) 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).

Sources: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China, various years (SSB, Beijing).

Table III-6. Energy Industry Capital Construction Investment by Subsector, 1953-1990 (a) (continued)

3. Billion Constant Yuan, by Five-Year Plan

Period	Total	Coal	Coke & Coal Products	Oil and Natural Gas (b)	Electric Power (c)
1953-1957	6.269	2.541	0.133	1.041	2.554
1958-1962	17.413	7.335	0.402	2.115	7.561
1963-1965	5.217	2.045	0.010	1.343	1.819
1966-1970	14.287	4.268	0.089	3.621	6.308
1971-1975	30.879	9.038	0.176	8.835	12.831
1976-1980	49.344	13.721	0.351	13.237	22.034
1981-1985	67.505	19.791	1.543	14.283	31.888
1986-1990	156.939	27.551	5.507	29.354	94.527

(a) For state-owned units only. Energy investment figures for years 1966-1970 and 1971-1974 are averages of Five-Year Plan Totals. Investment figures are deflated using the implicit deflators for the Industry sector in Table IX-11.6.
(b) Includes investments in refining.
(c) Does not include investment in steam and hot water supply.

Sources: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China, various years (SSB, Beijing).

Figure III-5. Capital Construction Investment in the Energy Industry by Subsector, 1953-1989

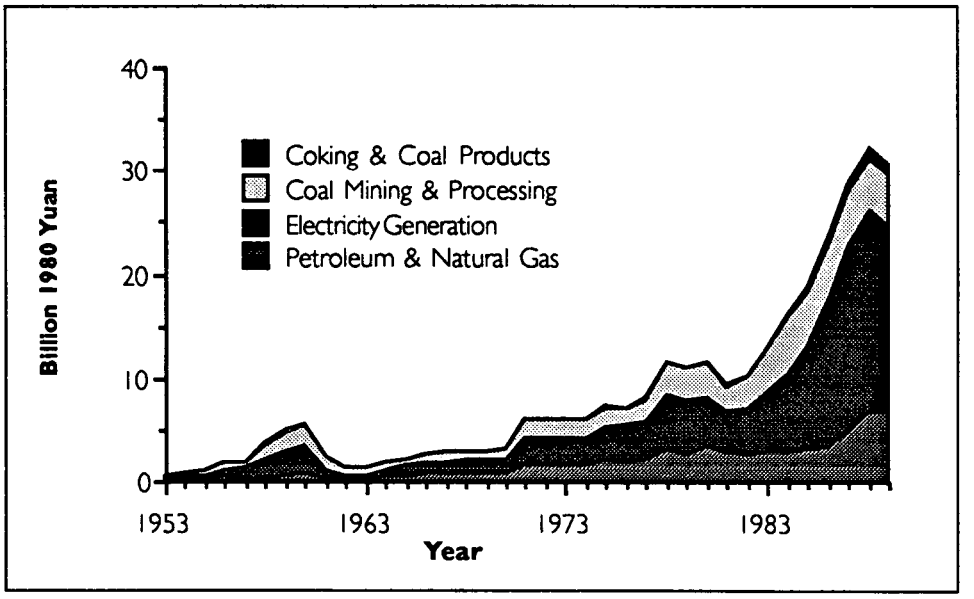


Figure III-6. Subsectoral Shares of Energy Industry Capital Construction Investment, 1953-1989

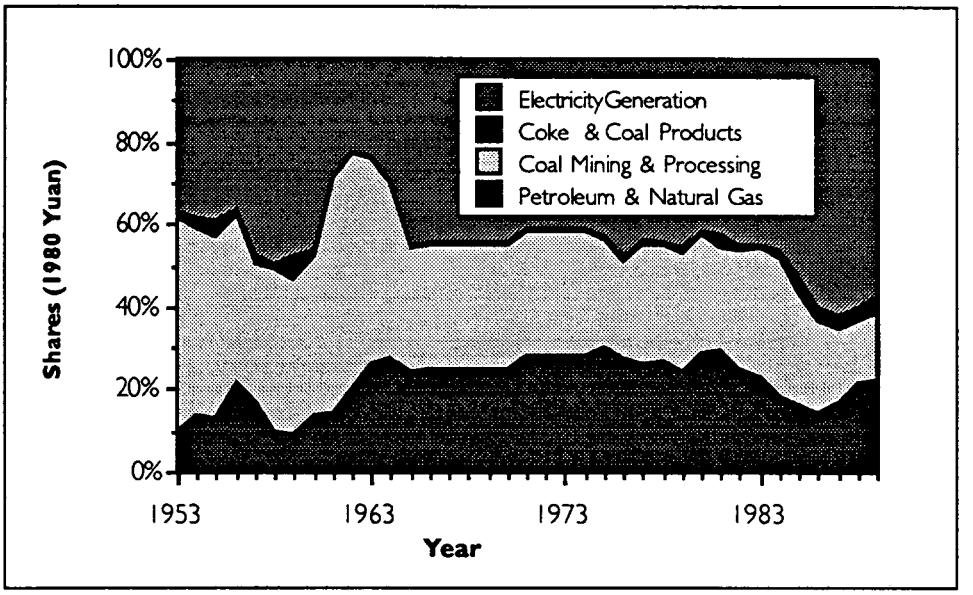


Table III-7. Energy Industry Capital Construction Investment by Subsector and Purpose, 1985-1990 (a)

1a. Total Energy Industry Capital Construction Investment, Billion 1980 Yuan (c)

Sector/Purpose	1985	1986	1987	1988	1989	1990
Coal	5.11	5.20	5.09	5.01	5.11	7.14
Coke, Coal Gas & Products	0.70	0.83	0.94	0.94	1.05	1.75
Oil & Natural Gas	3.08	3.48	5.00	6.83	6.78	7.28
Electric Power	10.16	14.55	18.00	19.58	19.43	24.18
Total	19.05	24.06	29.03	32.35	32.38	40.35
of which:						
productive (b)	16.00	21.33	26.01	29.29	29.60	37.33
nonproductive (b)	3.05	2.73	3.02	3.06	2.77	3.02

1b. Subsectoral Shares of Energy Industry Capital Construction Investment

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

(a) Figures refer to investment in capital construction of state-and urban collective-owned units only, and consequently differ slightly from those in Table III-7, Energy Industry Capital Construction Investment by Subsector, which are for state-owned units only.
(b) 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.
(c) Deflated using the implicit deflators for industry sector national income presented in Table IX-11.6.
- Not available.

Source: Energy Statistical Yearbook of China,1989 (SSB, Beijing). Statistical Yearbook of China, various years (SSB, Beijing).

Table III-7. Energy Industry Capital Construction Investment by Subsector and Purpose, 1985-1990 (a) (continued)

2a. Coal Industry Capital Construction Investment, Billion Constant Yuan

Sector/Purpose	1985	1986	1987	1988	1989	1990
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
of which:						
productive (b)	3.90	4.17	4.15	4.16	4.32	6.08
nonproductive (b)	1.21	1.03	0.94	0.85	0.80	1.07

2b. Shares of Coal Industry Capital Construction Investment

Sector/Purpose	1985	1986	1987	1988	1989	1990
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%
of which:						
productive (b)	76.3%	80.2%	81.5%	83.1%	84.4%	85.1%
nonproductive (b)	23.7%	19.8%	18.5%	16.9%	15.6%	14.9%

(a)-(c) Refer to footnotes to Table III-7.1.
– Not available.

Source: Energy Statistical Yearbook of China,1989 (SSB, Beijing). Statistical Yearbook of China, various years (SSB, Beijing).

Table III-7. Energy Industry Capital Construction Investment by Subsector and Purpose, 1985-1990 (a) (continued)

3a. Coke, Coal Gas, and Coal Products Industry Capital Construction Investment, Billion 1980 Yuan (c)

Purpose	1985	1986	1987	1988	1989	1990
Coke production	0.08	0.22	0.25	0.24	0.34	(d)
Coal gas production	0.46	0.35	0.43	0.40	0.47	(d)
Coal gas supply	0.15	0.24	0.25	0.28	0.23	(d)
Coal products production	0.01	0.01	0.01	0.01	0.02	(d)
Total	0.70	0.83	0.94	0.94	1.05	1.75
of which:						
productive (b)	0.54	0.66	0.78	0.81	0.95	1.60
nonproductive (b)	0.16	0.17	0.16	0.13	0.10	0.15

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

Purpose	1985	1986	1987	1988	1989	1990
Coke production	11.9%	27.1%	26.5%	25.5%	32.1%	(d)
Coal gas production	64.9%	42.2%	45.7%	43.0%	44.8%	(d)
Coal gas supply	21.8%	29.3%	26.4%	30.3%	21.7%	(d)
Coal products production	1.3%	1.4%	1.4%	1.2%	1.4%	(d)
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
of which:						
productive (b)	77.4%	80.0%	83.2%	86.3%	90.6%	91.5%
nonproductive (b)	22.6%	20.0%	16.8%	13.7%	9.4%	8.5%

(a)-(c) Refer to footnotes to Table III-7.1.
– Not available.

Source: Energy Statistical Yearbook of China,1989 (SSB, Beijing). Statistical Yearbook of China, various years (SSB, Beijing).

Table III-7. Energy Industry Capital Construction Investment by Subsector and Purpose, 1985-1990 (a) (continued)

4a. Oil & Natural Gas Industry Capital Construction Investment, Billion 1980 Yuan (c)

Purpose	1985	1986	1987	1988	1989	1990 (d)
Crude oil extraction	2.05	2.54	3.47	4.69	5.09	5.46
Natural gas extraction	0.46	0.14	0.13	0.13	0.13	(d)
Crude oil refining	0.57	0.80	1.39	2.00	1.56	1.81
Shale oil production	-	-	-	0.01	-	-
Total	3.08	3.48	5.00	6.83	6.78	7.28
of which:						
productive (b)	2.07	2.57	3.87	5.73	5.69	6.26
nonproductive (b)	1.00	0.91	1.13	1.10	1.10	1.01

4b. Oil & Natural Gas Industry Capital Construction Investment, Shares

Purpose	1985	1986	1987	1988	1989	1990 (d)
Crude oil extraction	66.6%	73.0%	69.4%	68.7%	75.1%	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%
Shale oil production	-	-	-	0.2%	-	-
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
of which:						
productive (b)	67.4%	73.9%	77.5%	83.9%	83.8%	86.1%
nonproductive (b)	32.6%	26.1%	22.5%	16.1%	16.2%	13.9%

(a)-(c) Refer to footnotes to Table III-7.1.
(d) For 1990 "crude oil extraction" includes "natural gas extraction."
(e) For 1990 "other power generation" includes all generation.
– Not available.

Source: Energy Statistical Yearbook of China,1989 (SSB, Beijing). Statistical Yearbook of China, various years (SSB, Beijing).

Table III-7. Energy Industry Capital Construction Investment by Subsector and Purpose, 1985-1990 (a) (continued)

5a. Power Industry Capital Construction Investment, Billion 1980 Yuan (c)

Purpose	1985	1986	1987	1988	1989	1990 (e)
Thermal Power Generation	4.64	7.68	9.10	11.53	11.10	(d)
Hydropower Generation	2.89	3.30	3.66	3.91	3.91	(d)
Nuclear Power Generation	0.14	0.16	0.79	(d)	0.71	(d)
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
Total	10.16	14.55	18.00	19.58	19.43	24.18
of which:						
productive (b)	9.48	13.93	17.21	18.59	18.65	23.39
nonproductive (b)	0.68	0.63	0.79	0.99	0.78	0.79

5b. Shares of Power Industry Capital Construction Investment

Purpose	1985	1986	1987	1988	1989	1990 (e)
Thermal Power Generation	45.7%	52.8%	50.6%	58.9%	57.1%	(d)
Hydropower Generation	28.4%	22.6%	20.3%	19.9%	20.1%	(d)
Nuclear Power Generation	1.4%	1.1%	4.4%	(d)	3.6%	(d)
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%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
of which:						
productive (b)	93.3%	95.7%	95.6%	95.0%	96.0%	96.7%
nonproductive (b)	6.7%	4.3%	4.4%	5.0%	4.0%	3.3%

(a)-(c) Refer to footnotes to Table III-7.1.
(d) For 1990 "crude oil extraction" includes "natural gas extraction."
(e) For 1990 "other power generation" includes all generation.
– Not available.

Source: Energy Statistical Yearbook of China,1989 (SSB, Beijing). Statistical Yearbook of China, various years (SSB, Beijing).

Figure III-7. Capital Construction Investment in Energy Industries, 1985 and 1989

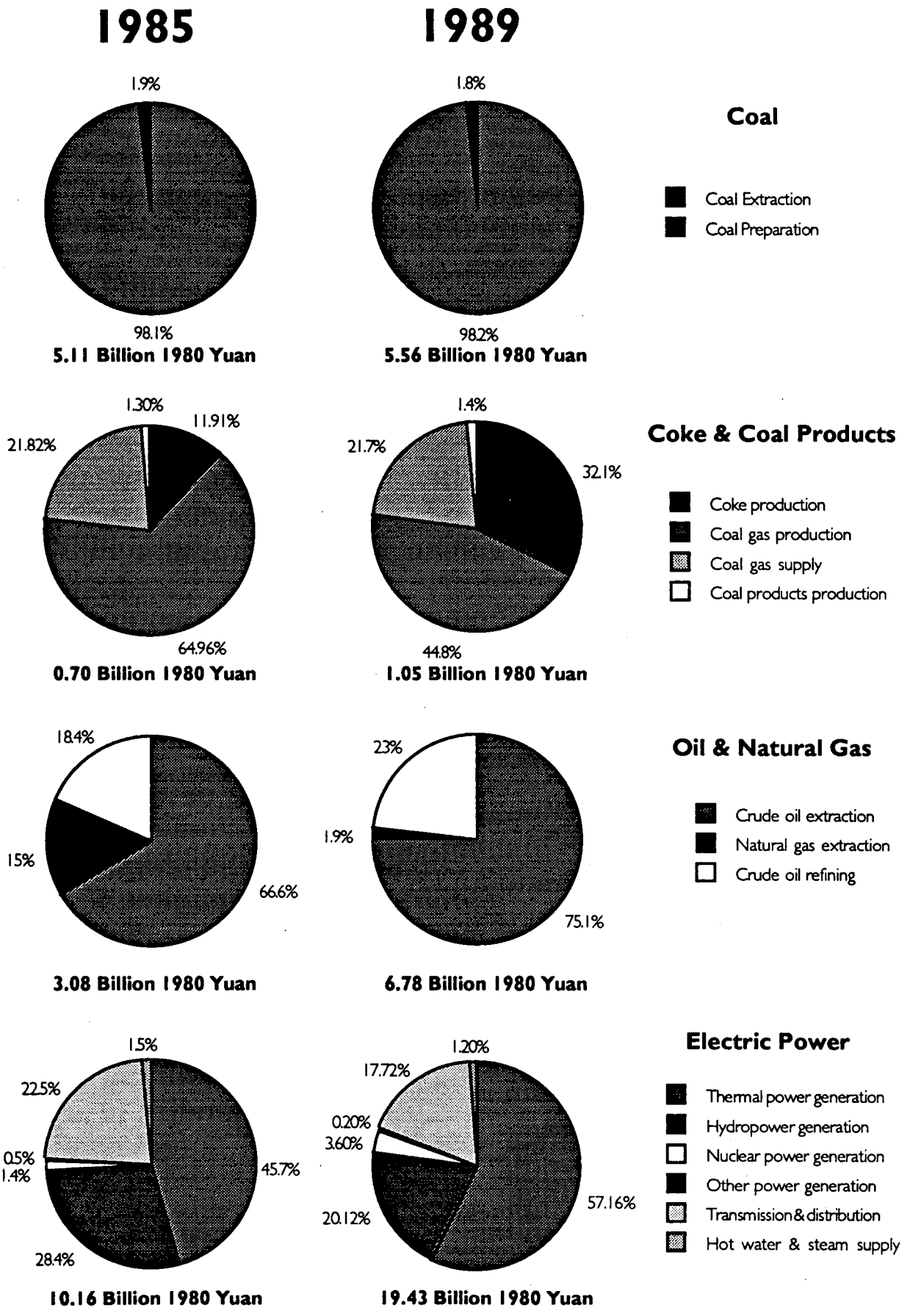


Table III-8. Capital Construction Investment in Units Formerly Belonging to Ministries' Systems by Source of Funds, 1981-1988 (a)

1a. Former Ministry of Coal, Billion 1980 Yuan (b)

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	1.66	0.08	0.43	(e)	0.32	(e)	2.50
1982	1.95	0.09	0.67	(e)	0.51	(e)	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

1b. Former Ministry of Coal, Shares

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	66.6%	3.0%	17.4%	(e)	13.0%	(e)	100.0%
1982	60.5%	2.9%	20.9%	(e)	15.8%	(e)	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%

(a) Figures include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (all of which were consolidated into the Ministry of Energy in 1988), so totals here are somewhat lower than in other tables. Direct Government Expenditures include some allocations which have been converted to loans. Please refer to the general notes on investment by source of funds.
(b) Deflated with the 1988 national income deflator for the industrial sector in Table IX-11.6.
(c) 1988 figures for direct government investment include loans which were originally allocated as direct government investment.
(d) 1981 and 1982 figures for self-raised funds include "other" investment.
(e) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table III-8. Capital Construction Investment in Units Formerly Belonging to Ministries' Systems by Source of Funds, 1981-1988 (a) (continued)

2a. Former Ministry of Petroleum, Billion 1980 Yuan (b)

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	2.30	0.11	0.10	(e)	0.38	(e)	2.89
1982	2.25	0.03	0.35	(e)	0.32	(e)	2.95
1983	2.50	0.04	0.05	(e)	0.39	0.00	2.98
1984	2.19	0.06	0.14	(e)	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

2a. Former Ministry of Petroleum, Shares

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	79.6%	3.6%	3.6%	(e)	13.2%	(e)	100.0%
1982	76.2%	0.9%	11.9%	(e)	10.9%	(e)	100.0%
1983	83.9%	1.3%	1.7%	(e)	13.0%	0.002%	100.0%
1984	79.4%	2.3%	5.1%	(e)	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%

(a) Figures include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (all of which were consolidated into the Ministry of Energy in 1988), so totals here are somewhat lower than in other tables. Direct Government Expenditures include some allocations which have been converted to loans. Please refer to the general notes on investment by source of funds.
(b) Deflated with the 1988 national income deflator for the industrial sector in Table IX-11.6.
(c) 1988 figures for direct government investment include loans which were originally allocated as direct government investment.
(d) 1981 and 1982 figures for self-raised funds include "other" investment.
(e) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table III-8. Capital Construction Investment in Units Formerly Belonging to Ministries' Systems by Source of Funds, 1981-1988 (a) (continued)

3a. Former Ministry of Electric Power, Billion 1980 Yuan (b)

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	2.05	1.12	0.12	(e)	0.47	(e)	3.75
1982	1.83	1.80	0.08	(e)	0.82	(e)	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

3b. Former Ministry of Electric Power, Shares

Year	Direct Government Expenditures (c)	Domestic Bank Loans	Foreign Investment	Coal Substitution	Self-Raised Funds (d)	Other Sources (d)	Total
1981	54.6%	29.8%	3.2%	(e)	12.4%	(e)	100.0%
1982	40.4%	39.7%	1.7%	(e)	18.1%	(e)	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%

(a) Figures include only funds administered by the former Ministries of Coal, Electric Power and Water Resources, and Petroleum (all of which were consolidated into the Ministry of Energy in 1988), so totals here are somewhat lower than in other tables. Direct Government Expenditures include some allocations which have been converted to loans. Please refer to the general notes on investment by source of funds.
(b) Deflated with the 1988 national income deflator for the industrial sector in Table IX-11.6.
(c) 1988 figures for direct government investment include loans which were originally allocated as direct government investment.
(d) 1981 and 1982 figures for self-raised funds include "other" investment.
(e) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Figure III-8. Capital Construction Investment by Source of Funds for State-Owned Coal Enterprises*

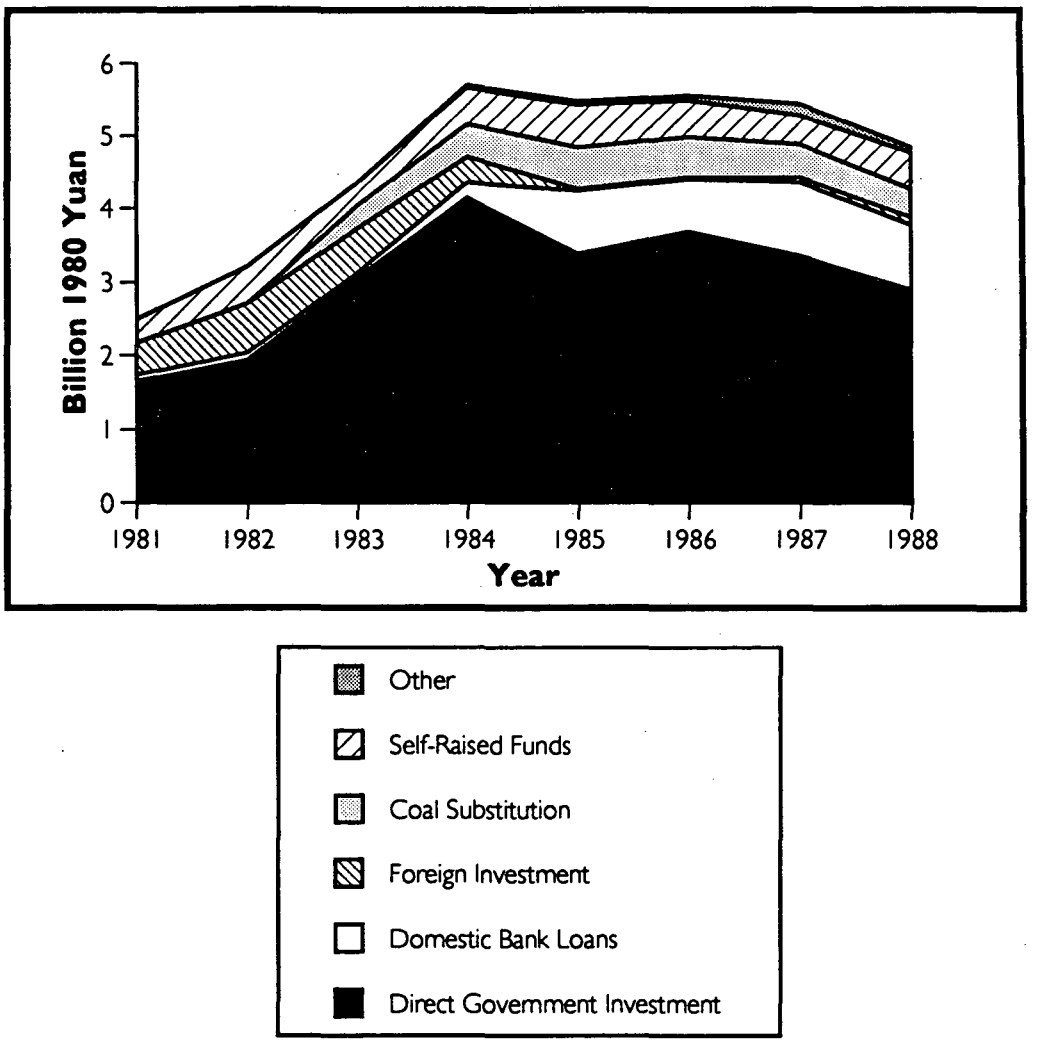
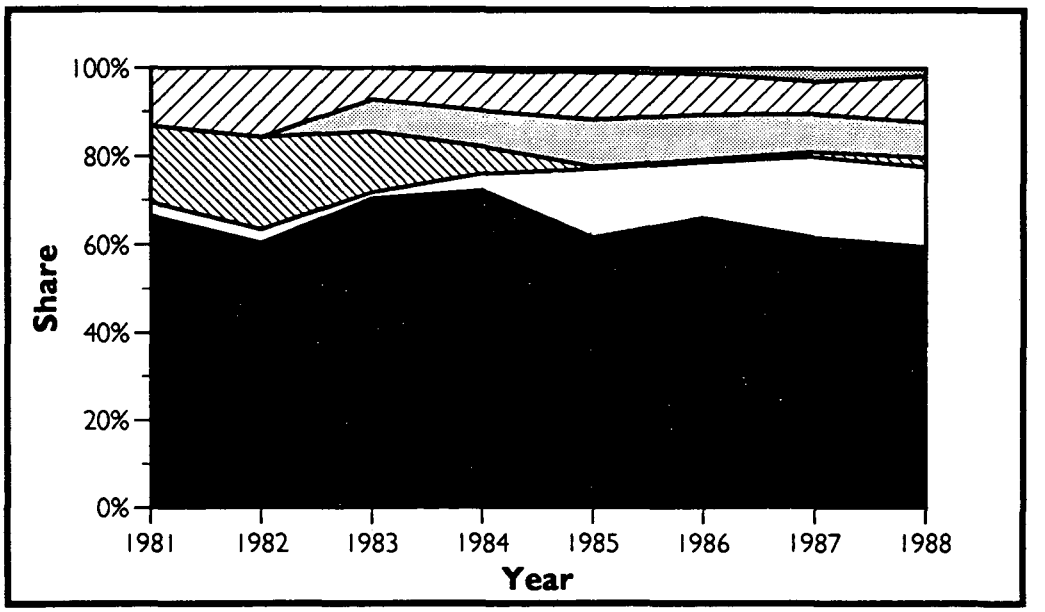


Figure III-9. Shares of Capital Construction Investment by Source of Funds for State-Owned Coal Enterprises*



*Coverage is only for enterprises formerly belonging to ministry systems.

Figure III-10. Capital Construction Investment by Source of Funds for State-Owned Petroleum Enterprises*

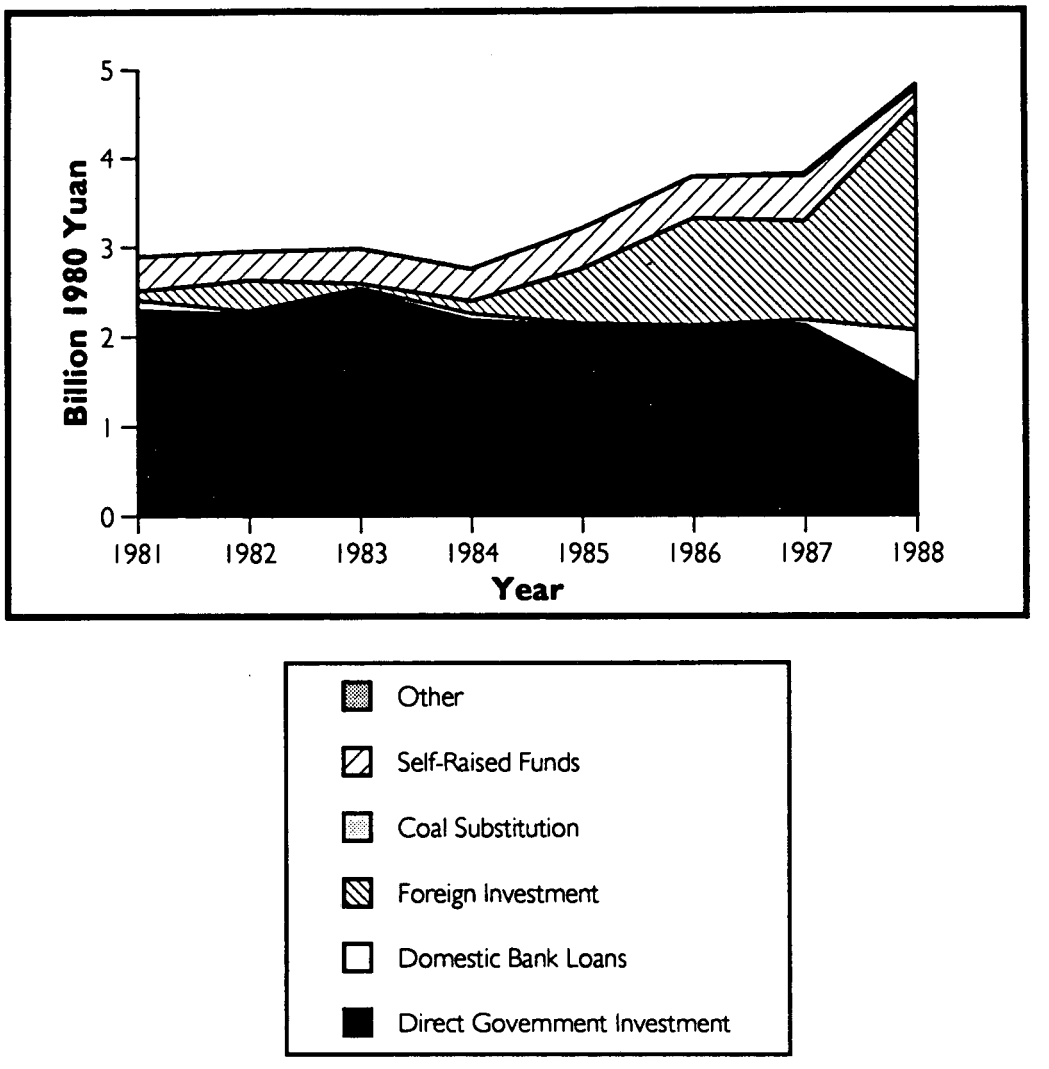
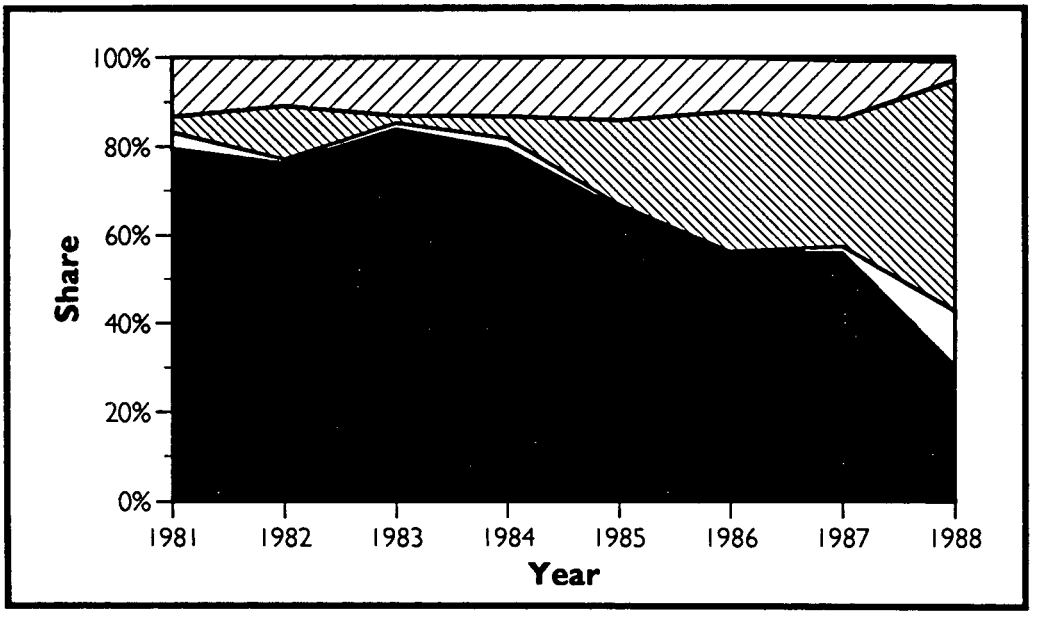


Figure III-11. Shares of Capital Construction Investment by Source of Funds for State-Owned Petroleum Enterprises*



*Coverage is only for enterprises formerly belonging to ministry systems.

Figure III-12. Capital Construction Investment by Source of Funds for State-Owned Electric Power Enterprises*

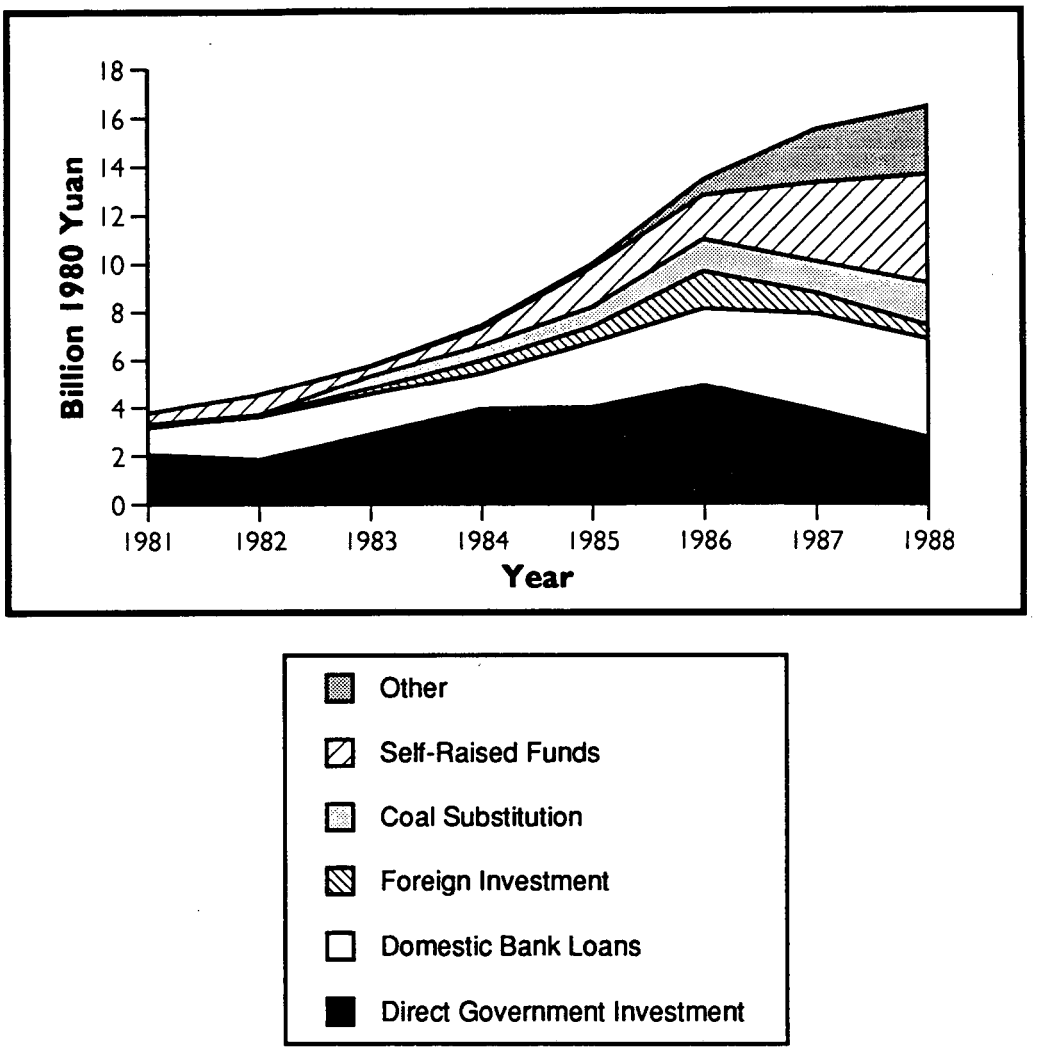
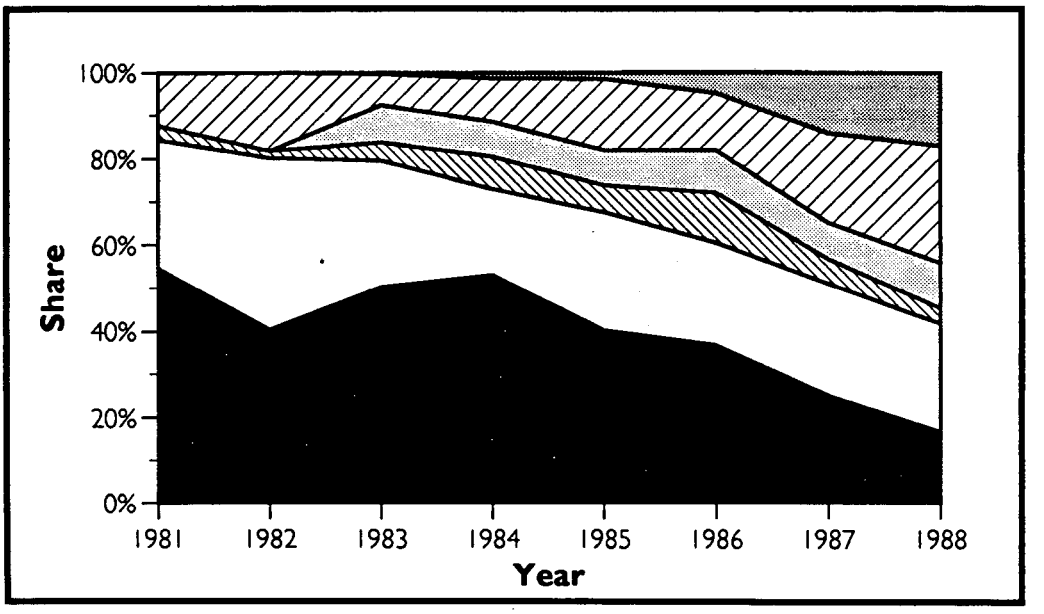


Figure III-13. Shares of Capital Construction Investment by Source of Funds for State-Owned Electric Power Enterprises*



*Coverage is only for enterprises formerly belonging to ministry systems.

Table III-9. Total Technical Updating and Tranformation Investment by Investment Category, 1981-1990—Billion 1980 Yuan (a)

	Technical Updating and Transformation Investment						
Year	Energy Conservation	Waste Management (b)	Environmental Protection	Residential Energy Conservation	Other (c)	*Total*	Total Investment
1981	0.898	0.337	0.135	-	18.103	*19.47*	66.55
1982	1.198	0.412	0.225	-	23.165	*25.00*	84.40
1983	1.327	0.437	0.144	-	27.212	*29.12*	95.22
1984	1.735	0.611	0.210	0.083	27.537	*30.18*	115.64
1985	1.737	0.908	-	0.101	38.939	*41.68*	155.97
1986	2.275	1.178	-	-	53.221	*56.67*	178.21
1987	2.590	1.433	-	-	60.728	*64.75*	196.15
1988	3.052	1.677	-	-	72.512	*77.24*	213.92
1989	2.525	1.499	-	-	53.193	*57.22*	183.92
1990	2.728	1.476	-	-	-	-	-

(a) Includes only funds actually invested in state-owned units, not investment targets. Includes investment in all sectors (see following table for breakdown by 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). We believe this includes the great majority of this category of investment in China's industry. Technical updating and transformation figures (including subcategory figures) are deflated using the industrial sector national income deflators (see Table IX-11.6). Total fixed assets investment figures are deflated using the overall national income deflators.

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

(c) The bulk of investment funds in the technical updating and transformation category are used for the replacement or renovation of industrial equipment (see Technical Note in the introduction to this section).

Source: Rational Resource Utilization in China, 1991, Ye Qin and Huang Yichen, eds. (SSB, Chinese Science and Technology Press, Beijing); China Statistical Yearbook, 1986-1990 (SSB, Beijing); Energy Research Institute database.

Chapter IV—**Energy Consumption**

Energy Consumption

Overview

In 1990 China consumed 1,037 Mtce of primary commercial energy (raw coal, crude oil, natural gas, and hydroelectricity; unless otherwise noted, "energy consumption" will refer to commercial energy forms) and probably close to 300 Mtce of biomass fuels (wood, crop wastes, and dung; Tables IV-1 and IV-2). Total per capita commercial energy end-use was 857 kilograms of coal equivalent (kgce) in the same year, the first decline in 10 years. Over a period in which the population doubled (1952-1990), commercial energy consumption increased 20-fold. The average annual growth rate of primary consumption was 8.3% over those years, slowing down between 1981 and 1990 to 5.7%. Since population growth has outpaced energy supply expansion, however, the average annual rates of increase in per capita energy consumption were 6.4% and 4.2% for the same periods. Except for coal, average annual growth rates for all types of energy decreased in the 1980s compared to the 1970s.

International trade and stockpiling have remained small, so energy consumption in China has followed production closely. The shares that each primary energy source contribute to consumption are almost identical to the production shares, except that the contribution of oil to consumption is slightly smaller due to net oil exports. Again coal is most important. Its share of commercial energy consumption fell slowly between 1952 and 1976, from 95% to 70%, rising thereafter to nearly 76% in 1990. Biomass, most of which is used in rural households, now contributes a smaller share to total energy consumption than in the late 1970s because of only slight growth in biomass consumption over that period. Fuel switching due to the wider availability of coal through rural coal mines, as well as the introduction of more efficient biomass stoves in many areas of the country, may be responsible for this trend.

The energy intensity of the Chinese economy (primary energy consumption per unit of national income) has fluctuated over time, and has decreased steadily since 1977 (Table IV-3). Several factors may lie behind this change in intensity. One is structural change in the industrial sector; although the share of GNP of the manufacturing sector has been increasing (Table VIII-1), light industries are developing more quickly than the older heavy industries. Another force driving down intensity has been investment in energy conservation. Since the early 1980s the central government has pursued a policy of introducing energy-efficient technologies into industrial enterprises (see Section III). Yet another factor may be the scarcity of energy. There have been reports of shortages of all forms of energy, forcing factories and utilities to operate at less than full capacity. This could accentuate the contribution of less energy-intensive sectors to economic indicators at the expense of heavy industry, resulting in a lower energy intensity than might have resulted had industrial energy demand been fulfilled. Prospects for further decreases in energy intensity are good, since many opportunities for improving energy efficiency remain.

End-use Energy Consumption by Sector

Industrial Sector

The industrial sector is by far the largest end-user of energy in China, accounting for nearly two-thirds of end-use energy consumption (hereafter "consumption" will refer to end-use consumption unless otherwise noted) throughout the 1980s. Between 1980 and 1988 industrial energy consumption increased 57% (from 352 Mtce to 550 Mtce), nearly the same as the 58% increase (from 533 Mtce to 841 Mtce) in end-use for all sectors (Table IV-7).[1] As for all other sectors but transportation, coal is the largest source of energy, although the share is smaller than for all sectors taken together because of the disproportionate consumption of higher-quality energy (oil and electricity) by industry. While between 45%

and 49% of industrial energy came from coal in the 1980s, the overall share was between 59% and 62% (Table IV-8). The proportion of electricity increased, while those of liquid and gaseous fuels declined. Subsectoral shares did not change greatly in the 1980s (Table IV-9 and Figure IV-9). The chemical, metals smelting and products, and building materials subsectors together still account for over half of industrial end-use, with machinery, electronics, and other manufacturing bringing the total to about 70%. Feedstocks account for a significant amount of coal and oil consumption, roughly one-tenth as much as industrial sector end-use (Table IV-11). Consumption in this sector, especially of coal, is centered in the Northeast and North (Table IV-10)

Although official Chinese data sources categorize utilities (both electric and gas) as industrial enterprises, electric utilities are listed separately here (Table IV-12).[2] Coal accounts for the bulk of electric utility consumption, 146 Mtce out of 169 Mtce in 1988.[3] Crude oil consumption in 1988 had declined to less that half of the 8 Mtce used in 1980, while fuel oil consumption remained steady near 15 Mtce over the same period. Fuel consumption at coal-fired power plants has improved steadily since the 1950s, and, according to official statistics, since the mid-1980s has been near 397 grams of coal equivalent (gce) per kWh and 432 gce per kWh for gross and net generation respectively (31% gross and 28% net efficiency; Table IV-13).

A significant amount of diesel oil consumption and nearly all gasoline consumption attributed to the industrial sector is actually used by trucks belonging to industrial work units. To compensate for this we have assumed that 10% of diesel and all gasoline consumption in industry (and all other sectors as well) were used for transportation and adjusted the figures accordingly.[4]

TRANSPORTATION SECTOR

Transportation sector consumption of all energy forms has risen, especially of gasoline and diesel oil (Table IV-15). Electricity use has increased greatly due to railroad electrification, and expansion of air traffic has pushed up kerosene consumption. In 1985 railroads accounted for almost half of total consumption; virtually all transportation sector consumption of coal and electricity is by railroads, as is 10% of oil consumption (Table 16).

Official statistics on energy consumption in the transportation sector only include consumption by work units whose primary function is transportation, e.g. railroads and long-distance trucking. Municipal transportation is not included in this sector, but in a municipal services category (we have included this in the "Commercial" sector). The most important omission is consumption by vehicles belonging to work units in the industry and agriculture categories. Statistics have been adjusted as noted above, and should be considered approximate only.

AGRICULTURAL SECTOR

Between 1980 and 1988 agricultural sector energy consumption grew more slowly than in any other sector (34% compared to 58% for all sectors; Table IV-17). Coal and electricity accounted for virtually all of the increase in consumption, while diesel use remained almost flat. In the same period the number of tractors grew substantially, with total tractor power increasing from 40 GW to over 80 GW, suggesting widespread rural fuel shortages (Table V-8).

As in the case of industry, many vehicles are owned by agricultural work units. In China nearly all tractors are diesel-fueled, and a large number of them are used for transportation. We assumed that 20% of agricultural sector diesel and all gasoline consumption were used for transportation.

RESIDENTIAL

Residential consumption of commercial energy increased an average of 8% per year between 1980 and 1988, faster than any other sector, although in 1989 coal use, and consequently total sectoral energy consumption, actually declined (Table IV-18). Although coal still dominates residential commercial energy use, electricity consumption has increased sharply as electrical appliances have become more widespread, accounting for nearly 11% of sectoral consumption in 1989, more than double its share in 1980. Slight increases in the shares of gas fuels and district heating point to improvements in heating

and cooking. The number of people with access to gas fuels for cooking more than doubled between 1981 and 1989, to almost 20% of the urban population (Table IV-22). Sales of coal briquettes, which burn more cleanly and efficiently than raw coal and are used almost exclusively in households, increased 65% between 1981 and 1988 (Table IV-23), while residential coal consumption grew 45% in the same period.

Because China's population is mostly rural, with little access to fossil fuels, residential energy consumption is dominated by biomass. The nature of biomass fuel cycles makes collecting data on aggregate biomass use virtually impossible, and most estimates are based on survey results (Table IV-21). Although biomass fuel use has continued to increase, consumption of commercial energy forms in rural households has increased faster (about 20% and 80% between 1979 and 1987 for biomass and commercial energy respectively). These data also indicate that rural households consume an increasing share of residential sector coal, although still less than one-half as of 1987, and that rural households use less that one-third of the output from rural mines.

High per capita rates of residential energy consumption (>100 tce per year) are found in the northern part of China (where winter heating of homes is permitted), although Shanghai and two southwestern provinces, Sichuan and Guizhou, also have high rates (Table IV-20). The highest per capita rates of residential energy use (>300 tce per year) are found in Beijing, Shanxi, and Xinjiang. All three have cold climates. The first is an affluent city near coal producing areas, the second is the largest coal producing and exporting province in China, and the last has high per capita coal production and exports very little (Table IV-36).

COMMERCIAL

As presented here, this sector includes not only commerce, but the "nonproductive" sectors as well (Table IV4).[5] Presumably a large part of consumption in this sector is for commercial and public buildings. Most of the increase in energy consumption in this sector, from 20 Mtce in 1980 to 36 Mtce in 1988, has come from coal and electricity.

CONSUMPTION BY TYPE OF ENERGY: END USE AND CONVERSIONS

The major change in end-use structure has been the growth in the share of electricity consumed, mainly at the expense of liquid fuels (Table IV-25).

COAL AND COAL PRODUCTS

While coal use expanding in every sector, it is increasingly being transformed into coal products and electricity (Table IV-26). In 1989 40% of coal consumption was for conversions, mainly electricity generation, whereas the share had been between 33% and 37% for most of the preceding decade. Industry accounted for more than half of direct use of coal from 1980 to 1989, and together with the residential sector accounted for almost 90% of direct use.[6]

Coal gas is mainly used by industry, which absorbed most of the increase in production in the 1980s (Table IV-27). The other significant end use is in home cooking, and some is also used in electricity generation.

PETROLEUM AND PETROLEUM PRODUCTS

After declining in the early 1980s, petroleum product consumption resumed growth in the mid-1980s and stood at 102 Mtce in 1988 (Table IV-29). Conversions of petroleum, on the other hand, declined steadily, from 32 Mtce in 1980 to 26 Mtce in 1987, but jumped to 29 Mtce in the following year. As usual, industry uses most oil products, taking two-thirds of end-use consumption in 1988.[7] Transportation took another 17%.[8] The greater part of converted oil products go to electric utilities.

In the 1970s, when tremendous growth in petroleum production was forecast, many industrial enterprises and electric utilities simply burned crude oil. Total crude oil consumption shrank by nearly 10% between 1980 and 1988, mainly due to fuel switching by electric utilities (Table IV-31). Fuel oil consumption has followed a similar pattern (Table IV-32).

After adjusting for transportation use of diesel that was reported as industrial and agricultural diesel

use (discussed above), it can be seen that in the early 1980s transportation surpassed agriculture as the main user of diesel (9.6 Mt out of 25 Mt in 1989; Table IV-32). Utility use of diesel has fluctuated, following no clear pattern.

NATURAL GAS

Again, the greater part of production is consumed by the industrial sector, which accounted for 12.8 billion cubic meters (bcm) out of total end-use of 14.7 bcm in 1989 (Table IV-33).[9] Household uses make up nearly all of the remaining consumption. Electric utilities used very little gas, less than 0.4 bcm in the same year.

ELECTRICITY

Total electricity consumption doubled between 1980 and 1989, from 234 billion kWh to 461 billion kWh (Table IV-34). Industry used about 75% of electricity in 1989, a share that declined from near 80% in the early 1980s. The agricultural sector's share also declined, while residential and commercial use grew from 8% to 14% of the total, with consumption more than tripling. Industries in China are becoming increasingly electrified, and light industries, which rely more heavily on electricity than heavy industries, have taken an increasing share of industrial electricity use (Tables IV-9 and IV-35). Increase in residential and commercial consumption are probably driven by the spread of electrical appliances and the construction of modern hotels and office buildings, which require power for climate control.

NOTES

1 If it is assumed that all biomass consumption is end-use (e.g. that an insignificant fraction goes for charcoal production) and that rural industry use of biomass fuels is negligible, then in 1987 total end-use energy consumption was 1,052 Mtce and the industrial sector accounted for 49% of end-use. If it is further assumed that all the biomass use is in rural households, then total end-use energy consumption in the residential sector was 415 Mtce, or 39% of the total.

2 This makes determination of primary and end-use energy consumption figures for industry and for utilities difficult to calculate. Where possible we have excluded inputs to electricity generation and coal gas production (as well as inputs to coking and oil refining) from end-use figures, e.g. Tables IV-7 and IV-8.

3 Data on thermal electricity generation by fuel unfortunately is not available.

4 The adjustment was not made for Table IV-9.

5 "Nonproductive" sectors include public services, public health, education, research, financial services, government, and other sectors (see Appendix). Commerce accounts for about one-quarter of consumption in this sector.

6 Frequently different types of coal are not well-matched to end uses. For instance, much coking coal is used for purposes other than producing coke (Table II-9). It is also reported that anthracite, the best type of coal for residential heating and cooking, is often used for other purposes. Industrial boilers are designed to burn specific types of coal and efficiency is degraded when other types of coal are substituted.

7 According to Table IV-9 (which is not adjusted for transportation energy use reported as industrial use), the chemical industry is the largest consumer of liquid fuels (petroleum products), followed by the building materials, ferrous metals smelting, machine building, and petroleum extraction and refining industries (1988).

8 This assumes the modifications to sectoral gasoline and diesel consumption

9 Natural gas accounts for about tho-thirds of gaseous fuel consumption. According to Table IV-9 almost half of industrial use is in oil and natural gas fields and refineries, with most of the rest going to the chemical and ferrous metals industries (1988).

Overall **Consumption**

Table IV-1. Primary Energy Consumption, 1952-1990

1. Consumption in Physical Units

Year	Raw Coal (a) (Mt)	Crude Oil (a) (Mt)	Natural Gas (b) (million cubic m)	Hydroelectricity (c) (billion kWh)
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	99.9
1988	993.54	110.93	14,360	108.8
1989	1,031.36	116.03	14,577	117.2
1990	1,037.21	116.62	15,474	128.1

(a) 1952, 1989 and 1990 consumption figures for coal and oil are not available in physical units and are derived from percentage share data (see Table IV-1.3); other figures are reported directly.

(b) 1952-1979, 1989 and 1990 consumption figures for natural gas are not available in physical units and are derived from percentage share data (see Table IV-1.3); other figures are reported directly.

(c) 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. In-plant use for 1989 is calculated at the 1988 rate of 0.34%. Reported in-plant consumption rates are for key plants only and are probably higher than the national averages, which are unavailable. Direct reports of primary consumption are not available.

Source: Energy Statistical Yearbook of China, 1989, (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Table IV-1. Primary Energy Consumption, 1952-1990 (cont.)

2. Consumption in Mtce (a)

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	23.47	603.06
1981	432.75	118.66	16.56	26.41	594.38
1982	458.05	117.29	15.83	29.99	621.16
1983	490.82	119.76	16.13	34.83	661.53
1984	535.50	123.65	16.78	34.98	710.91
1985	582.89	130.99	17.20	37.23	768.30
1986	614.41	138.97	18.30	38.07	809.75
1987	662.86	147.32	18.47	40.36	869.01
1988	709.69	158.47	19.10	43.97	931.23
1989	736.70	165.76	19.39	47.34	969.18
1990	740.88	166.60	20.58	51.76	979.82

(a) The figures presented here are converted from the previous table and are different than those in the Energy Statistical Yearbook of China, 1989.

Source: Energy Statistical Yearbook of China, 1989, (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Figure IV-1. Total Primary Energy Consumption, by Fuel Source, 1952-1990

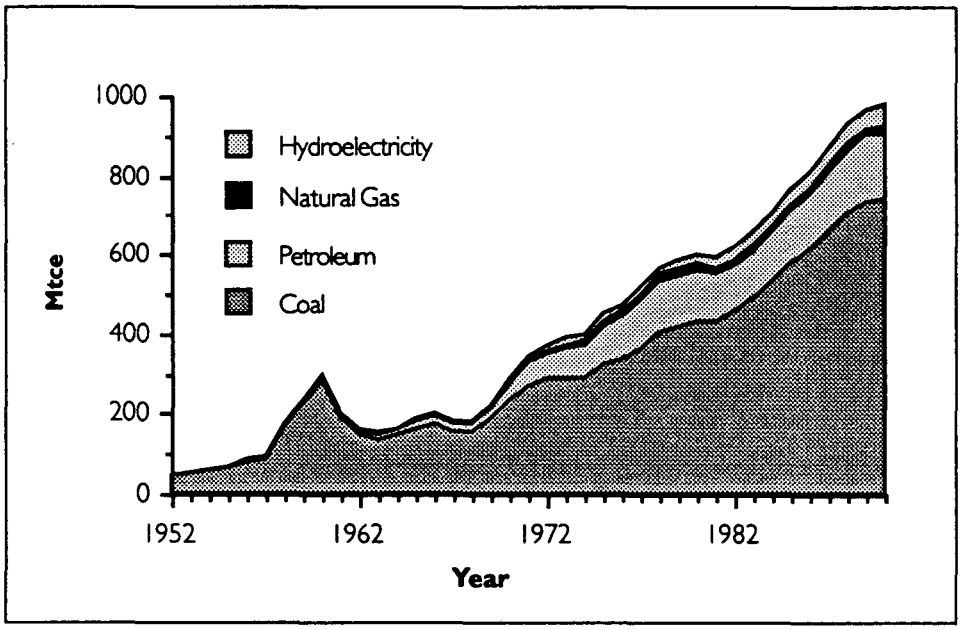


Table IV-1. Primary Energy Consumption, 1952-1990 (cont.)

3. Shares of Total (a)

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	72.3%	20.7%	3.1%	3.9%
1981	72.8%	20.0%	2.8%	4.4%
1982	73.7%	18.9%	2.5%	4.8%
1983	74.2%	18.1%	2.4%	5.3%
1984	75.3%	17.4%	2.4%	4.9%
1985	75.9%	17.0%	2.2%	4.8%
1986	75.9%	17.2%	2.3%	4.7%
1987	76.3%	17.0%	2.1%	4.6%
1988	76.2%	17.0%	2.1%	4.7%
1989	76.0%	17.1%	2.0%	4.9%
1990	75.6%	17.0%	2.1%	5.3%

(a) Calculated from figures in previous table. Totals may not equal exactly 100% due to rounding.

Source: Energy Statistical Yearbook of China, 1989, (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Figure IV-2. Shares of Primary Energy Consumption, by Fuel Source, 1952-1990

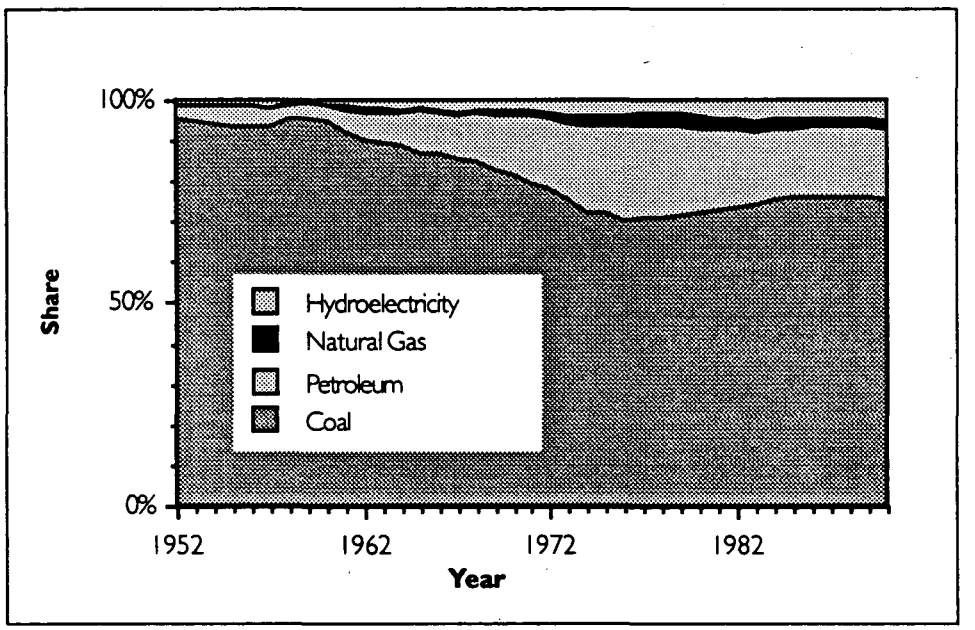


Table IV-1. Primary Energy Consumption, 1952-1990 (cont.)

4. Growth Rates, 1953-1990 (percent increase over previous year)

Year	Raw Coal (a) (%)	Crude Oil (a) (%)	Natural Gas (b) (%)	Hydro-electricity (c) (%)	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%	16.2%	3.1%
1981	-0.7%	-5.2%	-11.5%	12.5%	-1.4%
1982	5.8%	-1.2%	-4.4%	13.6%	4.5%
1983	7.2%	2.1%	1.9%	16.1%	6.5%
1984	9.1%	3.2%	4.0%	0.4%	7.5%
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%	6.0%	7.3%
1988	7.1%	7.6%	3.4%	8.9%	7.2%
1989	3.8%	4.6%	1.5%	7.7%	4.1%
1989	0.6%	0.5%	6.2%	9.4%	1.1%

Average Rates of Growth:

Coal	
1952-1970	**9.7%**
1971-1980	**5.3%**
1981-1990	**6.2%**
Petroleum	
1952-1970	**20.1%**
1971-1980	**9.5%**
1981-1990	**3.8%**
Natural Gas	
1952-1970	**36.5%**
1971-1980	**15.9%**
1981-1990	**2.4%**
Hydroelectricity	
1952-1970	**16.6%**
1971-1980	**9.8%**
1981-1990	**7.8%**
Total	
1952-1970	**10.7%**
1971-1980	**6.5%**
1981-1990	**5.7%**

(a)-(c) See footnotes to Table IV-1.1.

Source: Energy Statistical Yearbook of China, 1989, 1991 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); 1952-1979, 1989, and 1990 consumption figures for natural gas are not available in physical units China Statistical Yearbook, 1991 (SSB, Beijing). and are derived from percentage share data (see Table IV-1.3); other figures are reported directly.

Table IV-1. Primary Energy Consumption, 1952-1990 (cont.)

5. Per Capita Consumption in Physical Units

Year	Population (millions)	Raw Coal (a) (kg/cap)	Crude Oil (a) (kg/cap)	Natural Gas (b) (cubic m/cap)	Hydro-electricity (c) (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	611
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	726
1986	1,075.07	800	90	12.8	88	753
1987	1,093.00	849	94	12.7	91	795
1988	1,110.26	895	100	12.9	98	839
1989	1,127.04	915	103	12.9	104	860
1990	1,143.33	907	102	13.5	112	857

Average Per Capita Rates of Growth:

Coal	
1952-1970	**7.5%**
1971-1980	**1.6%**
1981-1990	**4.6%**
Petroleum	
1952-1970	**17.7%**
1971-1980	**7.8%**
1981-1990	**2.3%**
Natural Gas	
1952-1970	**33.7%**
1971-1980	**21.7%**
1981-1990	**0.9%**
Hydroelectricity	
1952-1970	**14.2%**
1971-1980	**8.0%**
1981-1990	**6.2%**
Total	
1952-1970	**8.5%**
1971-1980	**4.7%**
1981-1990	**4.2%**

(a)-(c) See footnotes to Table IV-1.1.

Source: Energy Statistical Yearbook of China, 1989, 1991 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); 1952-1979, 1989, and 1990 consumption figures for natural gas are not available in physical units China Statistical Yearbook, 1991 (SSB, Beijing). and are derived from percentage share data (see Table IV-1.3); other figures are reported directly.

Table IV-2. Primary Energy Consumption: Commercial and Biomass Energy, 1979 and 1987

Energy Source	Total Consumption (mtce) 1979	1987	Percent of Commercial Energy Consumption 1979	1987	Percent of Total Energy Consumption 1979	1987
Fossil Fuels (a):						
Coal	418	663	71%	76%	52%	58%
Oil	128	147	22%	17%	16%	13%
Natural Gas	19	18	3%	2%	2%	2%
Hydroelectricity	20	40	3%	5%	2%	4%
fossil subtotal	585	869	100%	100%	72%	77%
Biomass Fuels (b):						
Crop Stalk	114	130			14%	11%
Dung Cake	6	3			1%	0.3%
Firewood	104	133			13%	12%
biomass subtotal	224	266	0%	0%	28%	23%
Total	809	1,135	100%	100%	100%	100%

(a) Fossil fuels are counted in their primary forms. Hydropower is converted as 1 kWh = 0.404 kgce.
(b) Biomass figures are for rural household consumption (see Table IV-21, Rural Energy).

Sources: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1989 (MOE, Beijing); National Rural Energy Planning, 1990 (China Standards Press, Beijing).

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

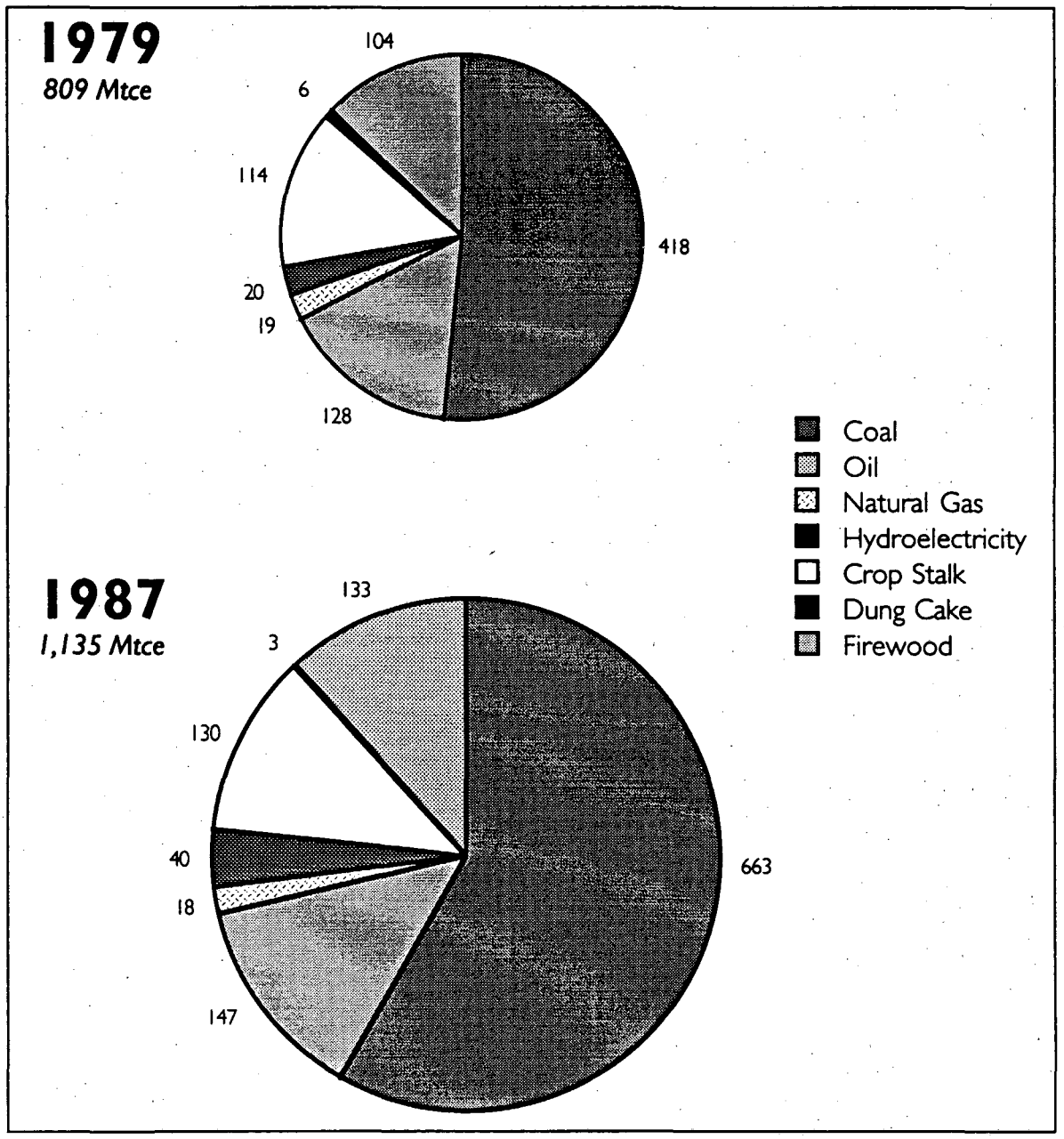


Table IV-3. Actual Primary Energy Consumption and Projected Energy Consumption at Frozen 1977 Intensity, 1952-1990 (a)

Year	National Income (billion 1980 yuan)	Growth Rate	Energy Consumption (mtce)	Energy Intensity (mtce/billion 1980 yuan NI)	Consumption at 1977 Intensity	Difference
1952	100.1		46.73	0.47		
1953	108.2	8.2%	53.74	0.50		
1954	112.4	3.8%	61.88	0.55		
1955	120.3	7.1%	69.19	0.57		
1956	132.7	10.2%	87.31	0.66		
1957	137.6	3.7%	95.51	0.69		
1958	156.0	13.4%	175.23	1.12		
1959	154.5	-0.9%	238.41	1.54		
1960	145.0	-6.2%	300.33	2.07		
1961	113.0	-22.0%	202.31	1.79		
1962	110.6	-2.2%	163.74	1.48		
1963	123.0	11.2%	154.46	1.26		
1964	141.9	15.4%	165.27	1.16		
1965	162.1	14.2%	188.23	1.16		
1966	183.6	13.3%	201.90	1.10		
1967	176.0	-4.2%	182.20	1.04		
1968	167.2	-5.0%	182.54	1.09		
1969	187.8	12.4%	225.85	1.20		
1970	220.5	17.4%	290.92	1.32		
1971	234.6	6.4%	343.54	1.46		
1972	239.7	2.2%	371.02	1.55		
1973	259.7	8.3%	389.03	1.50		
1974	264.0	1.6%	399.44	1.51		
1975	284.0	7.6%	452.75	1.59		
1976	277.0	-2.5%	476.24	1.72		
1977	294.1	6.2%	521.54	1.77	521.54	0.00
1978	326.2	10.9%	570.07	1.75	578.38	8.31
1979	348.6	6.9%	585.06	1.68	618.10	33.05
1980	368.8	5.8%	603.06	1.64	653.92	50.85
1981	386.8	4.9%	594.38	1.54	685.84	91.46
1982	418.4	8.2%	621.16	1.48	741.95	120.79
1983	460.3	10.0%	661.53	1.44	816.08	154.54
1984	522.9	13.6%	710.91	1.36	927.10	216.20
1985	593.4	13.5%	768.30	1.29	1,052.20	283.90
1986	639.2	7.7%	809.75	1.27	1,133.29	323.54
1987	704.3	10.2%	869.01	1.23	1,248.81	379.80
1988	784.0	11.3%	931.23	1.19	1,390.08	458.86
1989	812.5	3.6%	969.18	1.19	1,440.60	471.43
1990	851.5	4.8%	979.82	1.15	1,509.77	529.95

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

Source: Statistical Yearbook of China, 1990 & 1991 (SSB, Beijing).

Figure IV-4. Energy Intensity of the Chinese Economy, 1952-1990

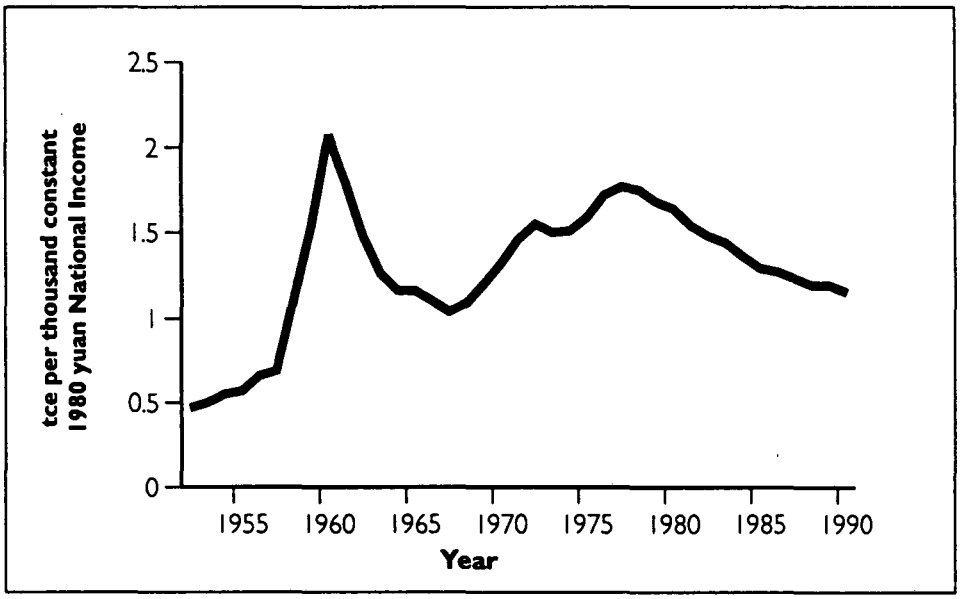


Figure IV-5. Primary Commercial Energy Consumption: Actual Use and Use Predicted by 1977 Energy Intensity, 1952-1990

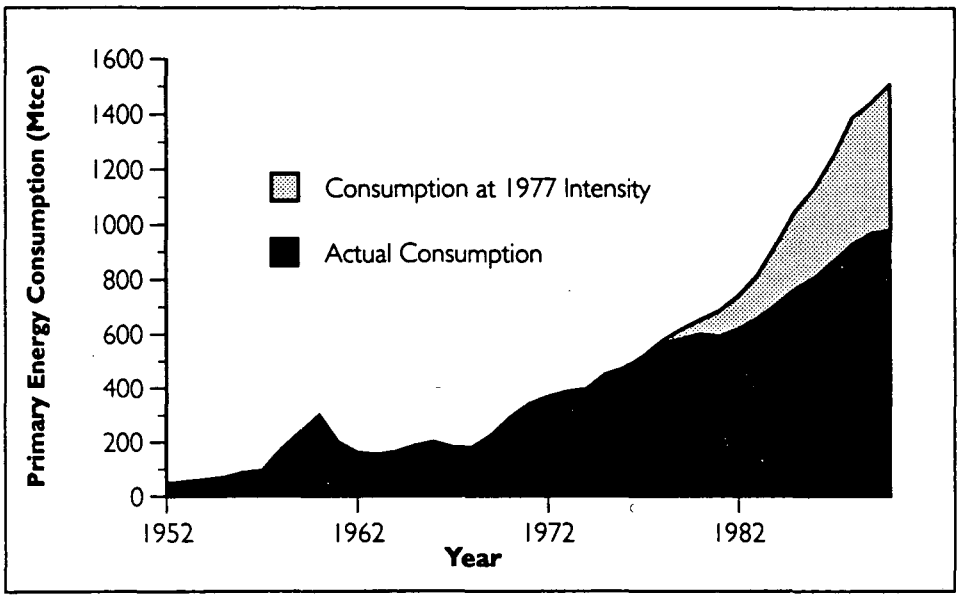


Table IV-4. Primary Commercial Energy Consumption by Province and Energy Source, 1988

Planning Region	Province	Total Primary Energy Consumption (Mtce) (a)	Coal Consumption (Mtons)	Oil Consumption (Mtons) (b)	Electricity Consumption (TWh) (c)
North	Beijing	26.1	23.1	5.45	15.8
	Tianjin	20.3	17.3	4.52	11.4
	Hebei	59.6	77.6	3.70	32.2
	Shanxi	48.0	72.5	1.28	22.7
	Inner Mongolia	20.4	34.0	0.97	9.9
Northeast	Liaoning	75.8	79.3	11.83	42.7
	Jilin	32.8	36.2	3.61	17.8
	Heilongjiang	50.0	55.9	7.39	26.2
East	Shanghai	29.8	24.7	8.54	24.1
	Jiangsu	55.1	60.7	6.69	37.3
	Zhejiang	24.2	23.4	2.78	20.7
	Anhui	25.9	31.6	2.34	16.8
	Fujian	13.6	12.1	1.14	11.4
	Jiangxi	17.6	23.2	1.38	11.7
	Shandong	63.0	64.7	10.65	38.1
South-Central	Henan	52.9	62.7	3.11	30.1
	Hubei	38.8	33.7	5.03	25.5
	Hunan	38.6	41.1	2.75	20.5
	Guangdong	33.6	22.8	9.19	29.0
	Guangxi	11.6	15.0	0.82	10.2
	Hainan	(d)	(d)	(d)	(d)
Southwest	Sichuan	63.2	66.8	2.01	29.5
	Guizhou	19.9	23.9	0.68	9.0
	Yunnan	16.2	21.0	0.77	10.6
	Xizang	(d)	(d)	(d)	(d)
Northwest	Shaanxi	20.8	25.5	1.21	14.5
	Gansu	20.2	17.1	2.66	14.9
	Qinghai	4.5	4.5	0.43	3.0
	Ningxia	5.5	7.3	0.28	4.3
	Xinjiang	17.9	16.0	2.92	5.5
National Total		931.2	993.5	110.93	546.7
Balance (e)		25.4	<0.05	6.79	1.2

(a) Includes coal, oil, natural gas, and hydroelectricity.
(b) Includes crude oil and petroleum products.
(c) Includes electricity from both hydro and thermal generation.
(d) Not available.
(e) Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total.

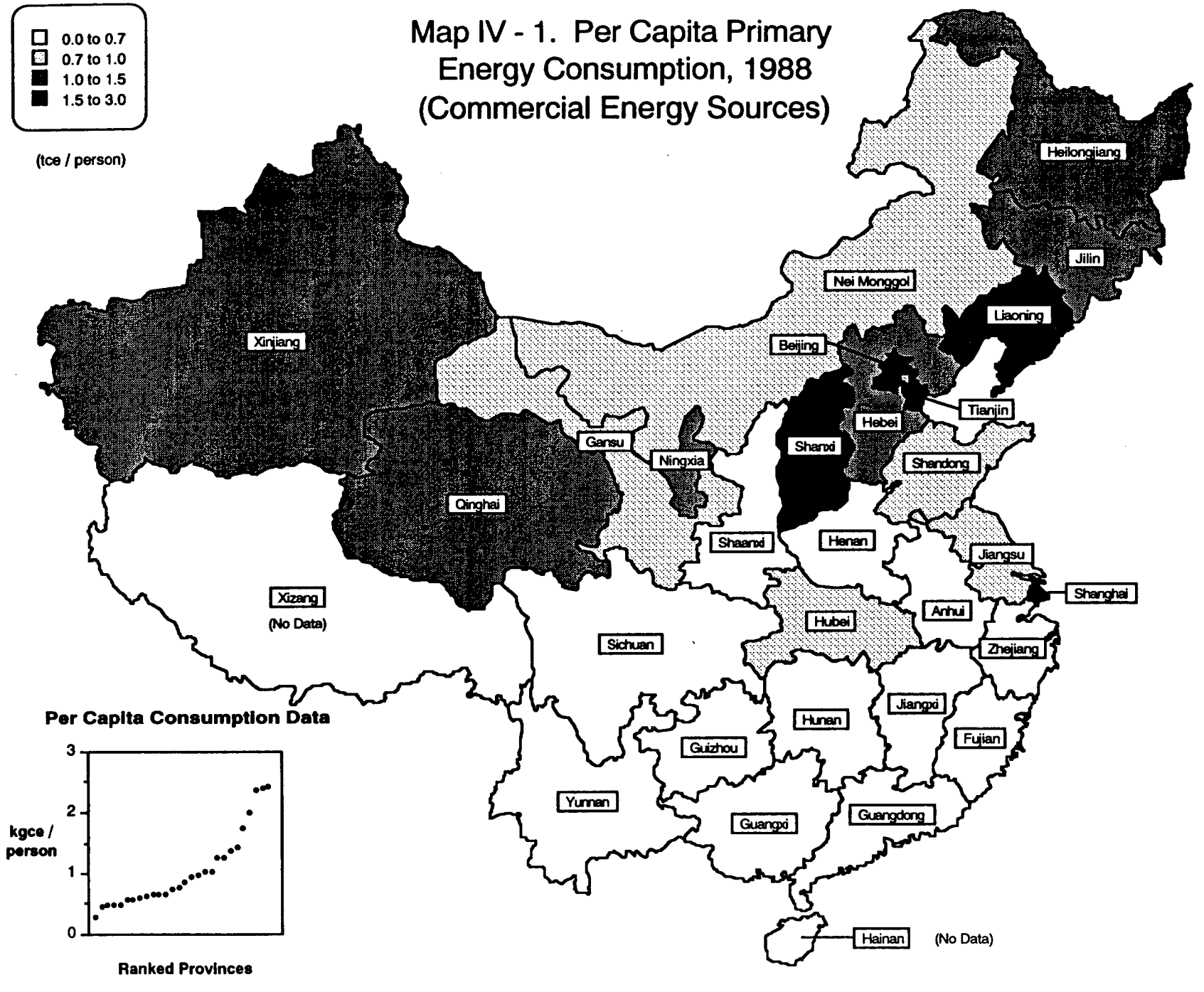
Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table IV-5. Per Capita Primary Commercial Energy Consumption by Province and Energy Source, 1988

Planning Region	Province	1988 Population (millions)	Per Capita Primary Energy Consumption (tce/yr) (a)	Per Capita Coal Consumption (tons/yr)	Per Capita Oil Consumption (tons/yr) (b)	Per Capita Electricity Consumption (thousand kWh/yr) (c)
North	Beijing	10.81	2.42	2.14	0.50	1.46
	Tianjin	8.43	2.41	2.05	0.54	1.35
	Hebei	57.95	1.03	1.34	0.06	0.56
	Shanxi	27.55	1.74	2.63	0.05	0.83
	Inner Mongolia	20.94	0.97	1.62	0.05	0.47
Northeast	Liaoning	38.20	1.99	2.08	0.31	1.12
	Jilin	23.73	1.38	1.53	0.15	0.75
	Heilongjiang	34.66	1.44	1.61	0.21	0.76
East	Shanghai	12.62	2.36	1.95	0.68	1.91
	Jiangsu	64.38	0.86	0.94	0.10	0.58
	Zhejiang	41.70	0.58	0.56	0.07	0.50
	Anhui	53.77	0.48	0.59	0.04	0.31
	Fujian	28.45	0.48	0.43	0.04	0.40
	Jiangxi	36.09	0.49	0.64	0.04	0.32
	Shandong	80.61	0.78	0.80	0.13	0.47
South-Central	Henan	80.94	0.65	0.78	0.04	0.37
	Hubei	51.85	0.75	0.65	0.10	0.49
	Hunan	58.90	0.66	0.70	0.05	0.35
	Guangdong	59.28	0.57	0.38	0.16	0.49
	Guangxi	40.88	0.28	0.37	0.02	0.25
	Hainan	6.28	(d)	(d)	(d)	(d)
Southwest	Sichuan	105.76	0.60	0.63	0.02	0.28
	Guizhou	31.27	0.64	0.76	0.02	0.29
	Yunnan	35.94	0.45	0.59	0.02	0.29
	Xizang	2.12	(d)	(d)	(d)	(d)
Northwest	Shaanxi	31.35	0.66	0.81	0.04	0.46
	Gansu	21.36	0.95	0.80	0.12	0.70
	Qinghai	4.34	1.03	1.03	0.10	0.69
	Ningxia	4.41	1.25	1.65	0.06	0.99
	Xinjiang	14.26	1.26	1.12	0.20	0.38
National Average		1,096.14	0.85	0.91	0.10	0.50

(a) Includes coal, oil, natural gas, and hydroelectricity.
(b) Includes crude oil and petroleum products.
(c) Includes electricity from both hydro and thermal generation.
(d) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook 1990 (SSB, Beijing).


Map IV - 1. Per Capita Primary Energy Consumption, 1988 (Commercial Energy Sources)
0.0 to 0.7
0.7 to 1.0
1.0 to 1.5
1.5 to 3.0
(tce / person)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Xinjiang
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Per Capita Consumption Data
kgce / person
3
2
1
0
Ranked Provinces

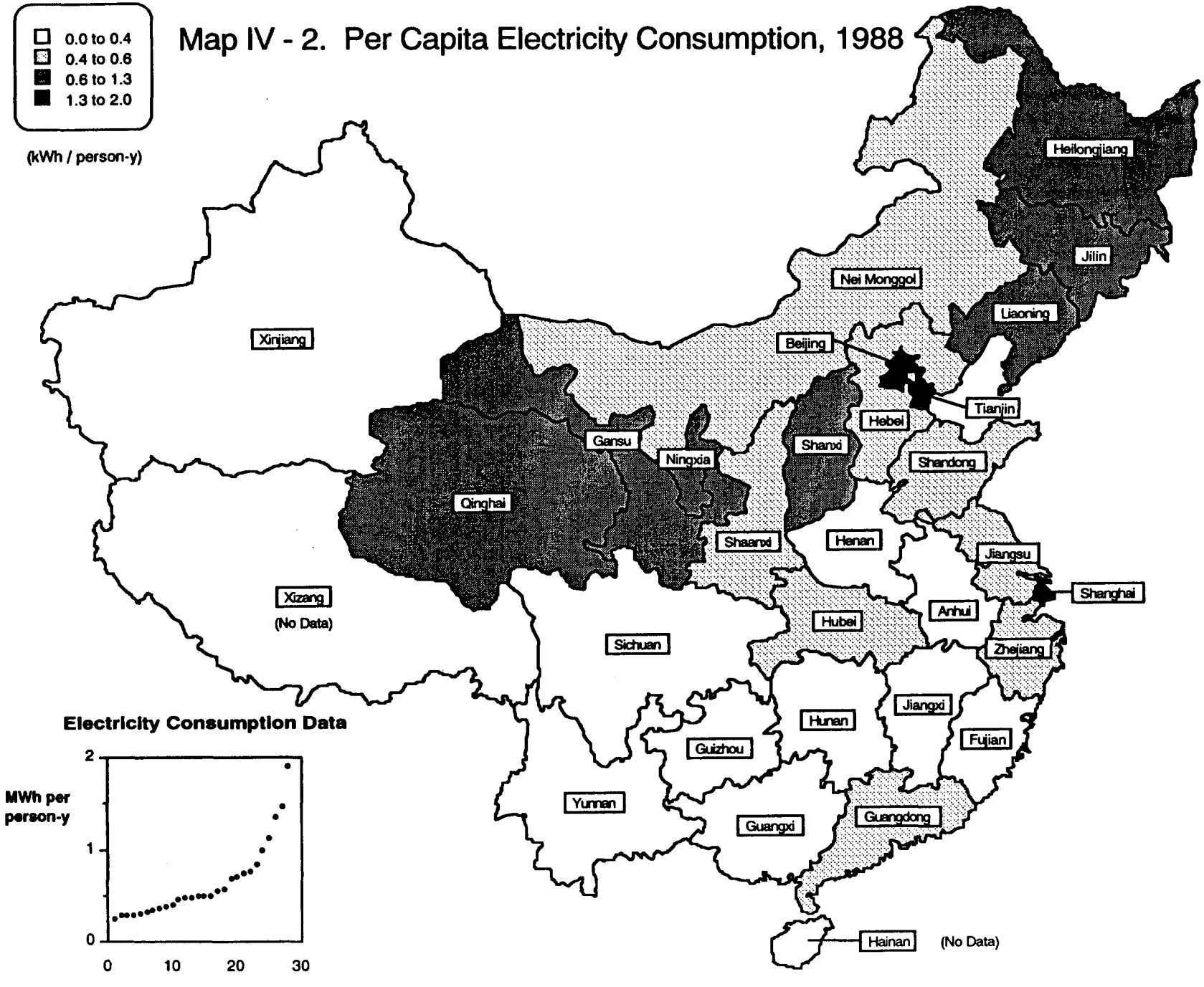
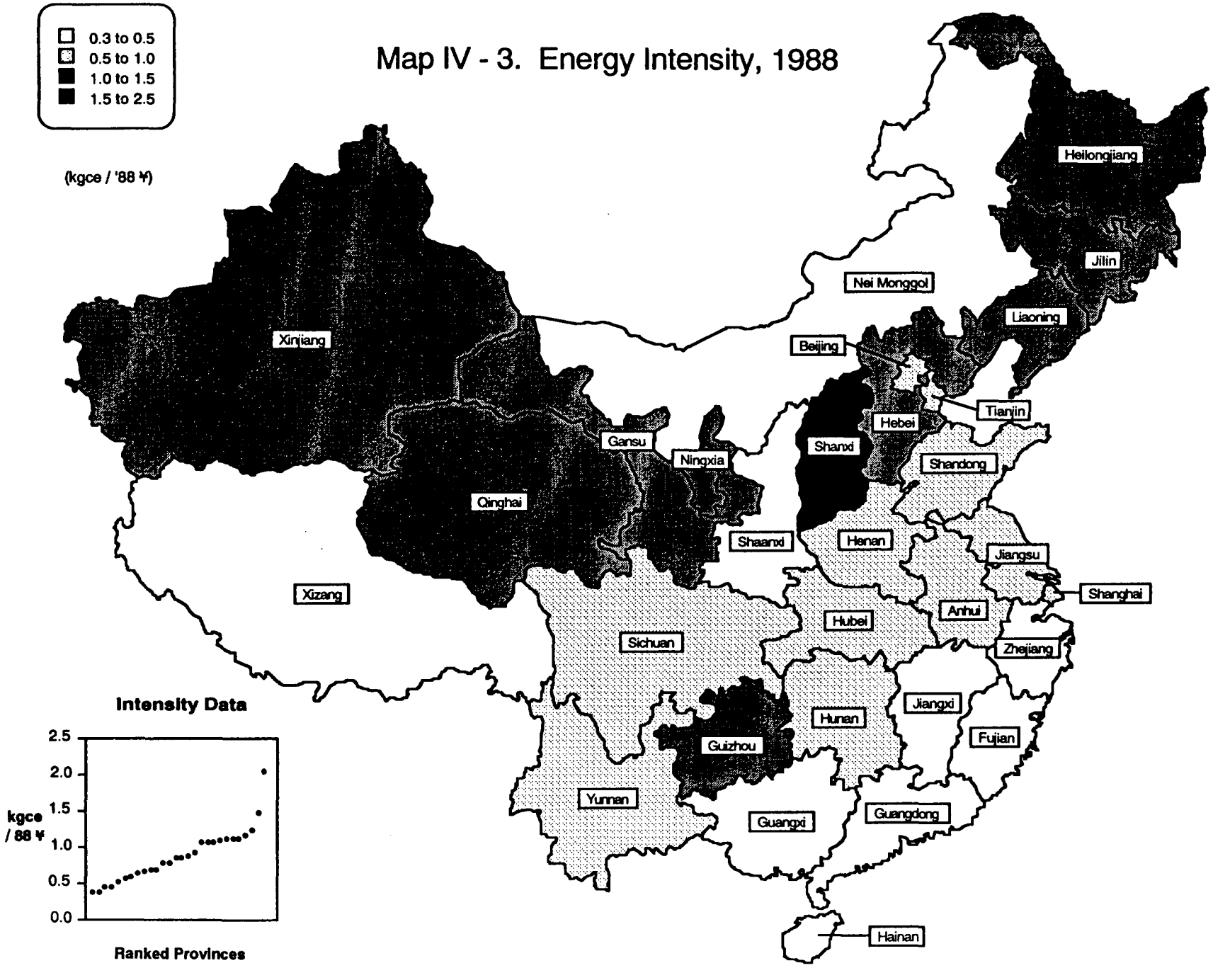

Map IV - 2. Per Capita Electricity Consumption, 1988
0.0 to 0.4
0.4 to 0.6
0.6 to 1.3
1.3 to 2.0
(kWh / person-y)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Anhui
Hubei
Zhejiang
Xizang
(No Data)
Sichuan
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Electricity Consumption Data
MWh per person-y
2
1
0
0
10
20
30

Table IV-6. Energy Intensity by Province, 1988
Primary Energy Consumption per Unit of National Income

Planning Region	Province	Primary Energy Consumption (Mtce)	National Income (billion current yuan)	NI Energy Intensity (kgce/thousand current yuan)
North	Beijing	26.12	30.11	0.87
	Tianjin	20.28	22.11	0.92
	Hebei	59.62	55.83	1.07
	Shanxi	47.99	23.33	2.06
	Inner Mongolia	20.36	19.96	1.06
Northeast	Liaoning	75.83	69.45	1.09
	Jilin	32.84	29.32	1.12
	Heilongjiang	49.98	44.58	1.12
East	Shanghai	29.81	56.53	0.53
	Jiangsu	55.08	96.92	0.57
	Zhejiang	24.24	63.87	0.38
	Anhui	25.89	44.01	0.59
	Fujian	13.60	30.76	0.44
	Jiangxi	17.56	26.98	0.65
	Shandong	62.97	91.53	0.69
South-Central	Henan	52.92	60.40	0.88
	Hubei	38.79	55.30	0.70
	Hunan	38.61	49.50	0.78
	Guangdong	33.60	89.46	0.38
	Guangxi	11.60	25.18	0.46
	Hainan	(a)	6.21	(a)
Southwest	Sichuan	63.18	79.90	0.79
	Guizhou	19.90	17.91	1.11
	Yunnan	16.22	23.99	0.68
	Tibet	(a)	1.57	(a)
Northwest	Shaanxi	20.76	23.95	0.87
	Gansu	20.20	16.41	1.23
	Qinghai	4.47	4.16	1.07
	Ningxia	5.50	3.72	1.48
	Xinjiang	17.91	15.44	1.16
National Total/Average		931.23	1,173.80	0.79
Balance (b)		25.40	-4.58	0.77

(a) Not available.
(b) 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing)


Map IV - 3. Energy Intensity, 1988
0.3 to 0.5
0.5 to 1.0
1.0 to 1.5
1.5 to 2.5
(kgce / '88 ¥)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Intensity Data
kgce / 88 ¥
2.5
2.0
1.5
1.0
0.5
0.0
Ranked Provinces

Sectoral **Consumption**

Table IV-7. End-Use Energy Consumption by Sector, 1980-1988 (a)

1. Mtce

Year	Industrial (b)	Agricultural	Transportation (c)	Residential	Commercial	Total
1980	351.50	31.01	39.57	91.74	19.64	533.46
1981	341.58	31.10	39.67	96.34	20.02	528.71
1982	360.29	31.70	41.72	98.94	21.04	553.69
1983	386.61	32.58	44.13	104.49	22.97	590.78
1984	415.33	34.60	47.47	112.87	25.09	635.36
1985	445.21	36.25	52.39	127.45	27.57	688.87
1986	478.80	37.79	56.68	131.29	28.78	733.34
1987	516.37	39.95	59.73	138.38	31.11	785.54
1988	550.42	41.94	63.64	149.09	35.72	840.81

2. Shares of Total

Year	Industrial (b)	Agricultural	Transportation (c)	Residential	Commercial
1980	65.9%	5.8%	7.4%	17.2%	3.7%
1981	64.6%	5.9%	7.5%	18.2%	3.8%
1982	65.1%	5.7%	7.5%	17.9%	3.8%
1983	65.4%	5.5%	7.5%	17.7%	3.9%
1984	65.4%	5.4%	7.5%	17.8%	3.9%
1985	64.6%	5.3%	7.6%	18.5%	4.0%
1986	65.3%	5.2%	7.7%	17.9%	3.9%
1987	65.7%	5.1%	7.6%	17.6%	4.0%
1988	65.5%	5.0%	7.6%	17.7%	4.2%

(a) Figures given here differ from official data. We obtained these figures by summing sectoral consumption of individual energy sources using the conversion figures presented in the forward to this databook.
(b) Industrial sector includes construction.
(c) Energy use for transportation is adjusted from official Chinese data. Details can be found in Table IV-25, Transportation Energy Consumption 1980-1988. Energy use in other sectors is adjusted accordingly, so that the figures presented above differ from official data.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Figure IV-6. Commercial Energy End-Use by Sector, 1980-1988

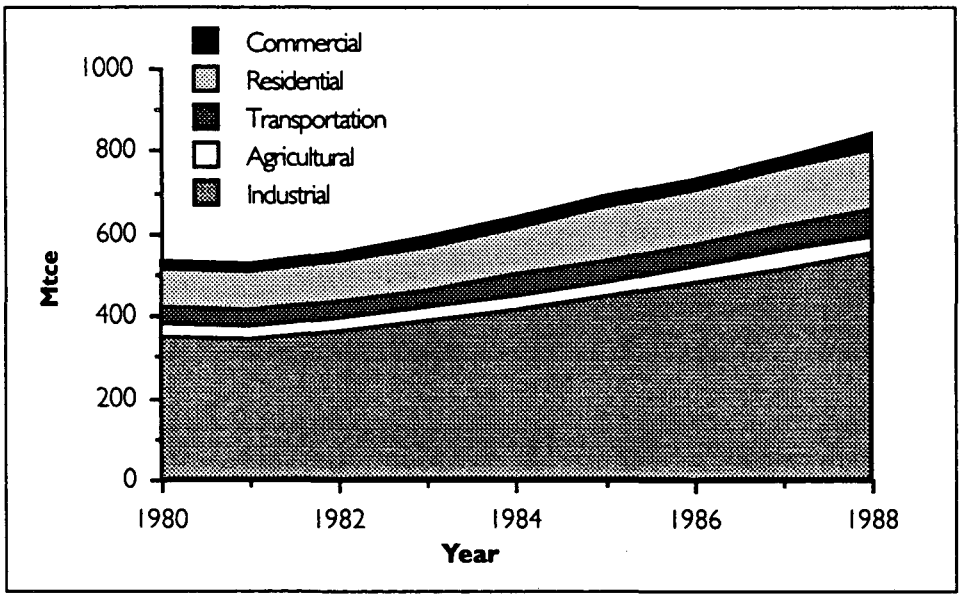


Figure IV-7. Sectoral Shares of Commercial Energy End-Use, 1980-1988

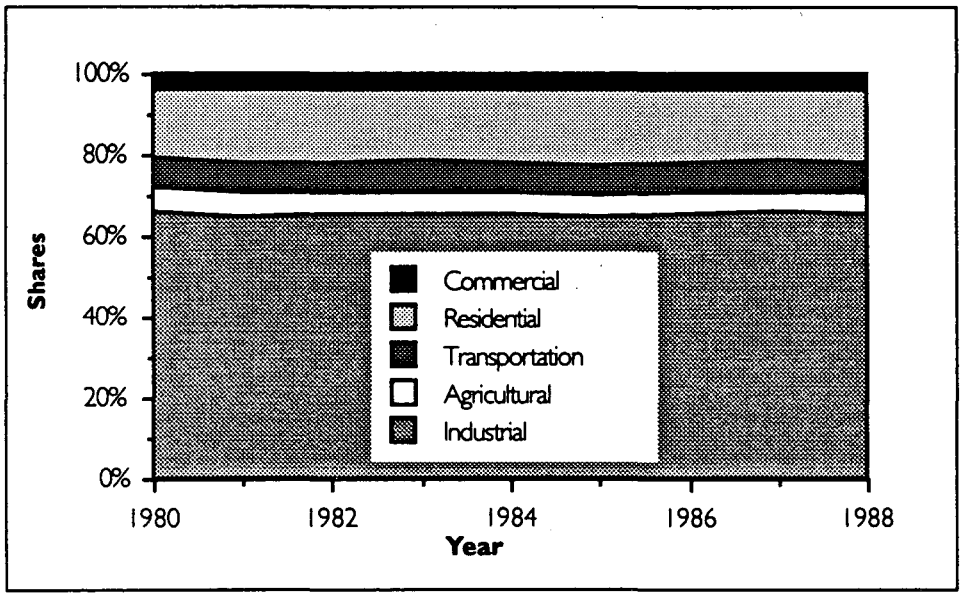


Table IV-8. Industrial End-Use Energy Consumption by Fuel, 1980-1988—Mtce

1. Mtce

Year	Coal (a)	Coke	Electricity	Heat (b)	Liquids (c)	Gases (d)	Total (e)
1980	158.50	41.46	84.13	8.29	35.56	23.56	351.50
1981	155.73	37.87	85.69	8.60	32.28	21.41	341.58
1982	168.35	38.56	91.79	8.76	32.05	20.78	360.29
1983	184.56	40.06	99.10	8.96	32.11	21.82	386.61
1984	202.15	42.62	106.22	9.51	32.74	22.09	415.33
1985	215.96	44.90	112.58	10.77	34.41	26.59	445.21
1986	225.80	49.90	124.28	11.47	37.91	29.44	478.80
1987	244.92	54.33	136.22	12.65	39.98	28.27	516.37
1988	260.87	57.14	148.80	13.01	41.02	29.58	550.42

2. Shares

Year	Coal (a)	Coke	Electricity	Heat (b)	Liquids (c)	Gases (d)	Total (e)
1980	45.1%	11.8%	23.9%	2.4%	10.1%	6.7%	100.0%
1981	45.6%	11.1%	25.1%	2.5%	9.5%	6.3%	100.0%
1982	46.7%	10.7%	25.5%	2.4%	8.9%	5.8%	100.0%
1983	47.7%	10.4%	25.6%	2.3%	8.3%	5.6%	100.0%
1984	48.7%	10.3%	25.6%	2.3%	7.9%	5.3%	100.0%
1985	48.5%	10.1%	25.3%	2.4%	7.7%	6.0%	100.0%
1986	47.2%	10.4%	26.0%	2.4%	7.9%	6.1%	100.0%
1987	47.4%	10.5%	26.4%	2.4%	7.7%	5.5%	100.0%
1988	47.4%	10.4%	27.0%	2.4%	7.5%	5.4%	100.0%

(a) Coal includes uncorrected total of raw coal, washed coal, and middlings (conversion factor: 0.714 kgce/kg).
(b) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(c) Liquids include crude oil, fuel oil, kerosene, diesel, and LPG. Diesel use is adjusted to exclude estimated transportation use by industrial enterprises (see Table IV-15, Transportation Energy Consumption, for details).
(d) Gases include natural gas, "refinery gas" (1985-1988 only), and coal gas (mainly coke-oven gas).
(e) Total includes construction industry and excludes power industry energy consumption. Feedstocks are not disaggregated; "other petroleum products" and "other coking products", which may serve as feedstocks or may not be used for fuel, are excluded.

Source: Energy Statistical Yearbook of China, 1989, SSB, Beijing.

Figure IV-8. Industrial Energy End-Use by Energy Source, 1980-1988

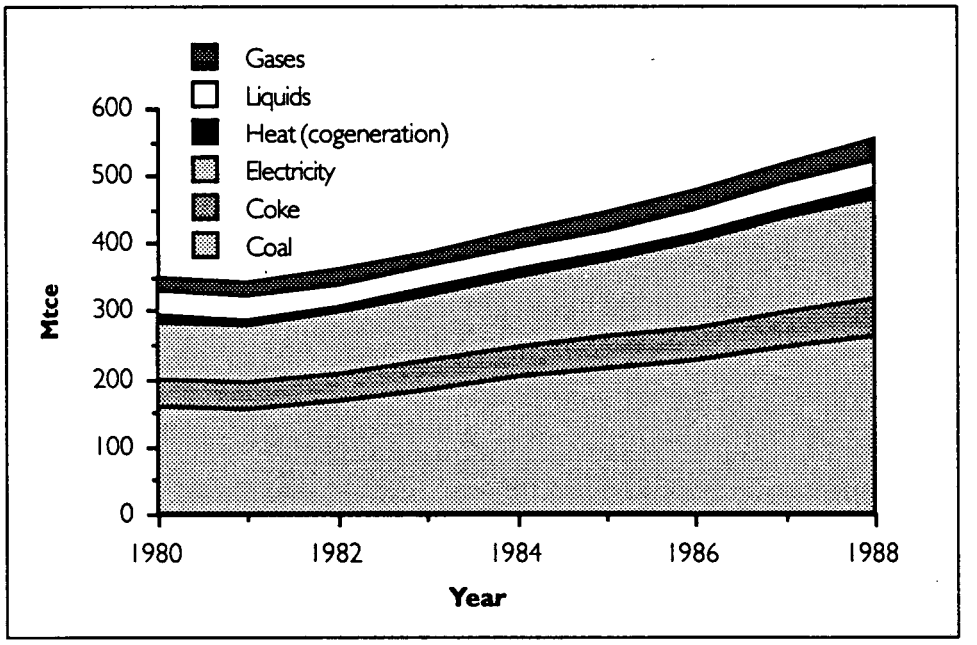


Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (a)

1. 1980

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	Total Energy End-Use
Total Industry	195.96	37.17	21.09	17.30	8.33	92.06	371.91
Light Industry	38.80	6.63	1.37	2.66	2.71	15.94	68.11
Heavy Industry	141.81	29.55	19.72	14.64	5.61	73.58	284.92
Heavy & Light Subtotals Balance (c)	15.35	0.99	0.00	0.00	0.01	2.54	18.88
Excavation subtotal	*10.77*	*6.97*	*8.83*	-	*0.87*	*11.02*	*38.45*
Mining	8.85	6.38	8.83	-	0.87	10.71	35.64
Coal (d)	1.21	0.41	0.45	-	0.10	7.17	9.35
Oil & Natural Gas (d)	0.50	5.97	8.83	-	0.77	3.54	19.61
Manufacturing subtotal	*185.19*	*27.31*	*10.69*	-	*7.46*	*81.04*	*311.70*
Food, Beverages & Tobacco	10.07	0.73	0.41	-	0.18	2.91	14.30
Textiles (e)	10.06	1.28	0.61	-	2.03	5.03	19.02
Paper Products	5.18	0.91	0.03	-	0.23	2.33	8.67
Electricity, Steam & Hot Water (f)	0.43	0.10	0.00	-	0.07	8.08	8.68
Chemicals	37.49	8.50	6.43	-	2.50	20.24	75.15
Building Materials	33.13	3.01	0.09	-	0.28	4.63	41.14
Metals Smelting & Products (g)	41.91	6.91	3.17	-	1.05	18.99	72.03
Machinery & Electronics	17.34	3.98	0.74	-	0.83	8.42	31.31
Other	12.15	3.55	0.32	-	0.27	7.05	23.33
Manufacturing Subsectors Balance (h)	17.43	-1.65	-1.11	-	0.01	3.37	18.06
Mfg & Excavation Subtotals Balance (i)	0.00	2.89	1.56	-	0.00	0.00	21.76

(a) Figures in this table were prepared by the Energy Research Institute based on State Statistical Bureau data, data from their own surveys, and the MEDEE-S energy demand model. Energy consumption figures differ from those in Tables IV-7 and IV-8, Industrial Energy End-Use Energy Consumption by Fuel, 1980-1988, and End-Use Energy Consumption by Sector, 1980-1988, because sources are different. Gross output value figures are not available for 1980.

(b) State Statistical Bureau definitions of subsectors for 1984 and previous years are different from those for 1985 and later years. The Energy Research Institute has reconstructed 1980-1984 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. Figures for 1980-1984 subsectors may not be strictly comparable to those for 1985-1988. Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.

(c) Total Industry – Light Industry subtotal – Heavy Industry subtotal. This difference is probably mainly due to the exclusion of "other petroleum products" and "other coking products" from the Light and Heavy Industry subtotals, which difference cannot be resolved.

(d) Energy consumption for the coal and oil & natural gas subsectors may include the coal products and refining subsectors, which are listed separately for 1985-1988.

(e) Energy consumption for the textiles subsector probably includes the chemical fibers subsector, which is listed separately for 1985-1988.

(f) This is a utilities subsector and in most countries is not reported as an industrial subsector.

(g) Energy consumption in this subsector includes the ferrous metals smelting, nonferrous metals smelting, and metal products subsectors, which are reported individually in the tables for 1985-1988. Gross output value figures include only the ferrous metals smelting and nonferrous metals smelting subsectors.

(h) Manufacturing subtotal – sum of manufacturing subsector figures.

(i) Total Industry – Excavation subtotal – Manufacturing subtotal.

– Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

2. 1981

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	Total Energy End-Use	Gross Output Value of Industry (billion yuan)
Total Industry	190.97	33.93	18.77	16.73	8.64	92.49	361.53	517.77
Light Industry	40.00	6.73	1.31	2.39	2.81	17.58	70.82	266.29
Heavy Industry	132.75	26.12	17.46	14.34	5.82	72.26	268.76	251.48
Heavy & Light Subtotals Balance (c)	18.21	1.07	0.00	0.00	0.01	2.65	21.95	0.00
Excavation subtotal	*10.22*	*6.12*	*7.64*	-	*0.90*	*11.07*	*35.95*	-
Mining	8.39	5.47	7.64	-	0.90	10.75	33.15	-
Coal (d)	7.95	0.42	0.52	-	0.11	7.21	16.20	15.73
Oil & Natural Gas (d)	0.44	5.06	7.13	-	0.79	3.53	16.95	28.21
Manufacturing subtotal	*182.57*	*23.06*	*10.83*	-	*7.74*	*71.68*	*295.88*	-
Food, Beverages & Tobacco	10.44	0.76	0.35	-	0.19	3.29	15.03	69.00
Textiles (e)	10.67	1.41	0.64	-	2.11	5.81	20.63	57.15
Paper Products	4.78	0.79	0.03	-	0.24	2.36	8.20	6.90
Electricity, Steam & Hot Water (f)	0.44	0.09	0.00	-	0.08	8.38	8.98	19.49
Chemicals	35.28	7.91	6.14	-	2.59	19.76	71.67	59.14 (j)
Building Materials	32.67	2.83	0.08	-	0.29	4.65	40.52	19.51 (k)
Metals Smelting & Products (g)	38.38	5.96	2.89	-	1.09	18.34	66.66	45.67
Machinery & Electronics	15.19	3.13	0.71	-	0.86	8.20	28.09	108.00
Other	12.50	4.08	0.30	-	0.28	7.09	24.25	-
Manufacturing Subsectors Balance (h)	22.24	-3.89	-0.31	-	0.02	-6.20	11.86	-
Mfg & Excavation Subtotals Balance (i)	-1.83	4.75	0.30	-	0.00	9.74	29.70	-

(a) - (i) See notes for Table VI-9.1.
(j) Gross output value for chemicals subsector includes rubber products subsector.
(k) Gross output value for building materials manufacturing subsector includes building materials mining subsector.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

3. 1982

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	Total Energy End-Use	Gross Output Value of Industry (billion yuan)
Total Industry	203.75	33.36	19.26	17.40	8.80	98.14	380.71	557.75
Light Industry	42.73	6.69	1.29	2.47	2.86	18.79	74.81	281.49
Heavy Industry	141.89	25.96	16.98	14.94	5.93	75.76	281.46	276.26
Heavy & Light Subtotals Balance (c)	19.14	0.71	1.00	0.00	0.01	3.59	24.44	0.00
Excavation subtotal	*10.59*	*5.72*	*7.35*	-	*0.92*	*11.59*	*36.16*	-
Mining	8.87	5.18	7.35	-	0.92	11.26	33.57	-
Coal (d)	8.33	0.43	0.46	-	0.11	7.58	16.91	16.63
Oil & Natural Gas (d)	0.54	4.75	6.89	-	0.81	3.68	16.66	28.80
Manufacturing subtotal	*193.17*	*27.24*	*11.91*	-	*7.89*	*82.96*	*323.17*	-
Food, Beverages & Tobacco	11.34	0.75	0.29	-	0.19	3.52	16.10	75.60
Textiles (e)	11.15	1.36	0.61	-	2.15	6.27	21.53	55.27
Paper Products	5.22	0.65	0.09	-	0.25	2.51	8.71	7.40
Electricity, Steam & Hot Water (f)	0.47	0.09	0.00	-	0.08	8.64	9.28	20.71
Chemicals	37.09	7.92	5.87	-	2.64	20.71	74.23	65.9 (j)
Building Materials	37.50	2.99	0.08	-	0.29	5.38	46.25	22.26 (k)
Metals Smelting & Products (g)	39.00	5.99	2.89	-	1.11	18.92	67.91	48.52
Machinery & Electronics	16.50	3.16	0.79	-	0.88	8.59	29.91	122.50
Other	13.46	3.79	0.29	-	0.28	7.46	25.29	-
Manufacturing Subsectors Balance (h)	21.44	0.53	1.00	-	0.02	0.97	23.96	-
Mfg & Excavation Subtotals Balance (i)	0.00	0.40	0.00	-	0.00	3.59	21.39	-

(a) - (i) See notes for Table VI-9.1.
(j) - (k) See notes for Table VI-9.2.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

4. 1983

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	Total Energy End-Use	Gross Output Value of Industry (billion yuan)
Total Industry	221.30	33.71	19.04	17.73	9.00	104.74	405.53	616.44
Light Industry	45.87	6.69	1.36	2.59	2.93	20.66	80.10	305.97
Heavy Industry	149.81	25.71	17.68	15.15	6.06	80.18	294.60	310.47
Heavy & Light Subtotals Balance (c)	25.62	1.30	0.00	0.00	0.01	3.90	30.83	0.00
Excavation subtotal	*10.89*	*5.72*	*7.48*	-	*0.94*	*12.25*	*37.28*	-
Mining	9.15	5.16	7.48	-	0.94	11.92	34.65	-
Coal (d)	8.67	0.48	0.48	-	0.11	8.04	17.78	17.83
Oil & Natural Gas (d)	0.48	4.68	7.00	-	0.83	3.88	16.87	31.01
Manufacturing subtotal	*212.15*	*27.98*	*11.56*	-	*8.07*	*100.84*	*360.60*	-
Food, Beverages & Tobacco	12.32	0.71	0.27	-	0.20	4.03	17.53	79.43
Textiles (e)	11.77	1.42	0.74	-	2.20	6.67	22.80	60.51
Paper Products	5.67	0.63	0.04	-	0.25	2.72	9.30	8.14
Electricity, Steam & Hot Water (f)	0.49	0.10	0.00	-	0.08	8.99	9.66	22.02
Chemicals	39.15	7.85	6.10	-	2.70	21.55	77.35	74.1 (j)
Building Materials	40.24	3.05	0.11	-	0.30	5.84	49.53	24.54 (k)
Metals Smelting & Products (g)	41.27	5.95	3.12	-	1.13	20.29	71.76	52.37
Machinery & Electronics	16.93	3.11	0.88	-	0.90	9.11	30.93	144.05
Other	14.56	3.78	0.30	-	0.29	8.38	27.32	-
Manufacturing Subsectors Balance (h)	29.75	1.38	0.01	-	0.02	13.27	44.43	-
Mfg & Excavation Subtotals Balance (i)	-1.73	0.00	0.00	-	0.00	-8.36	7.65	-

(a) - (i) See notes for Table VI-9.1.
(j) - (k) See notes for Table VI-9.2.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

5. 1984

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	Total Energy End-Use	Gross Output Value of Industry (billion yuan)
Total Industry	241.44	34.68	19.22	19.32	9.55	111.77	435.98	702.99
Light Industry	49.04	7.09	1.40	2.80	3.11	21.98	85.41	348.42
Heavy Industry	161.26	26.34	17.82	16.52	6.43	85.75	314.13	354.57
Heavy & Light Subtotals Balance (c)	31.14	1.25	0.00	0.00	0.01	4.04	36.44	0.00
Excavation subtotal	*11.95*	*5.82*	*7.41*	-	*1.00*	*13.10*	*39.27*	-
Mining	10.15	5.31	7.41	-	1.00	12.76	36.63	-
Coal (d)	9.53	0.54	0.48	-	0.12	8.47	19.14	19.42
Oil & Natural Gas (d)	0.62	4.77	6.92	-	0.88	4.29	17.48	33.41
Manufacturing subtotal	*229.49*	*28.87*	*11.82*	-	*8.56*	*98.67*	*377.40*	-
Food, Beverages & Tobacco	13.14	0.80	0.27	-	0.21	4.41	18.82	86.58
Textiles (e)	12.34	1.40	0.74	-	2.33	6.86	23.68	66.75
Paper Products	6.21	0.62	0.03	-	0.27	2.85	9.97	9.22
Electricity, Steam & Hot Water (f)	0.57	0.11	0.00	-	0.08	9.64	10.40	23.56
Chemicals	41.25	7.79	6.42	-	2.86	22.32	80.64	83 (j)
Building Materials	43.16	3.22	0.08	-	0.32	6.75	53.53	28.73 (k)
Metals Smelting & Products (g)	45.18	6.05	3.07	-	1.20	21.52	77.03	57.94
Machinery & Electronics	18.33	3.27	0.85	-	0.95	10.17	33.57	175.70
Other	15.50	4.06	0.34	-	0.31	9.06	29.26	-
Manufacturing Subsectors Balance (h)	33.80	1.55	0.03	-	0.02	5.11	40.50	-
Mfg & Excavation Subtotals Balance (i)	0.00	0.00	0.00	-	0.00	0.00	19.32	-

(a) - (i) See notes for Table VI-9.1.
(j) - (k) See notes for Table VI-9.2.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

6. 1985

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	267.38	37.72	24.98	18.56	12.28	118.57	479.50	30.47	509.97	895.72
Light Industry	62.67	7.26	1.61	0.00	3.78	26.10	101.41	0.02	101.43	439.54
Heavy Industry	204.71	30.47	23.38	18.56	8.50	92.47	378.08	30.45	408.54	456.19
Excavation subtotal	*18.14*	*5.43*	*4.86*	-	*0.19*	*17.23*	*45.84*	*11.68*	*57.52*	*56.96*
Mining	17.01	4.87	4.86	-	0.19	15.37	42.29	11.68	53.97	51.02
Coal	12.29	0.64	0.11	-	0.02	8.56	21.61	8.41	30.02	21.82
Oil & NG	0.67	3.42	4.39	-	0.16	3.39	12.03	3.27	15.30	16.13
Manufacturing subtotal	*249.25*	*32.29*	*20.13*	-	*12.09*	*101.34*	*415.09*	*18.80*	*433.89*	*838.76*
Food, Beverages & Tobacco	17.95	1.15	0.05	-	0.46	4.32	23.93	0.00	23.93	99.47
Textiles	13.68	1.18	0.12	-	1.40	7.39	23.76	0.00	23.76	121.51
Paper Products	8.68	0.67	0.04	-	0.33	3.22	12.95	0.00	12.95	16.47
Electricity, Steam & Hot Water (c)	0.64	0.44	0.52	-	0.10	11.30	13.01	12.12	25.12	27.36
Petroleum Processing	0.30	2.21	3.93	-	0.92	1.60	8.95	1.13	10.08	21.13
Coal Processing	1.21	0.42	0.93	-	0.13	0.34	3.02	3.26	6.29	2.42
Chemicals	42.27	8.12	6.42	-	3.48	20.44	80.73	0.23	80.96	56.51
Chemical Fibers	1.82	0.40	0.56	-	1.01	1.33	5.13	0.03	5.15	10.33
Building Materials	65.28	5.35	0.31	-	0.38	8.82	80.14	0.00	80.14	49.31
Ferrous Metals Smelting	47.93	4.64	5.55	-	1.76	14.46	74.33	2.03	76.36	43.89
Nonferrous Metals Smelting	5.44	0.90	0.04	-	0.38	6.92	13.69	0.00	13.69	19.16
Metal Products	3.36	0.45	0.04	-	0.01	2.56	6.40	0.00	6.40	27.75
Machinery & Electronics	22.22	4.12	0.99	-	1.16	12.75	41.25	0.00	41.25	207.84
Other	7.55	0.82	0.56	-	0.06	1.12	10.10	0.00	10.10	16.46
Manufacturing Subsectors Balance (d)	10.91	1.43	0.07	-	0.53	4.78	17.71	0.00	17.71	119.16

(a) Figures in this table are based on figures in the Energy Statistical Yearbook of China, 1989, and on Energy Research Institute calculations. Figures differ from those in Tables IV-7 and IV-8, Industrial Energy End-Use Energy Consumption by Fuel, 1980-1988, and End-Use Energy Consumption by Sector, 1980-1988, because sources are different.
(b) Light and Heavy Industry subtotals are independent of Excavation and Manufacturing subtotals.
(c) This is a utilities subsector and in most countries is not reported as an industrial subsector.
(d) Manufacturing subtotal - sum of manufacturing subsector figures.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

7. 1986

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	278.73	41.03	28.25	17.74	13.13	132.00	510.88	33.52	544.40	986.70
Light Industry	66.07	7.86	1.80	0.00	4.33	28.81	108.88	0.03	108.91	490.35
Heavy Industry	212.66	33.16	26.45	17.74	8.80	103.20	402.01	33.49	435.50	496.35
Excavation subtotal	*17.78*	*5.83*	*4.32*	-	*0.21*	*19.86*	*48.00*	*12.90*	*60.89*	*61.26*
Mining	16.69	5.30	4.29	-	0.20	17.65	44.13	12.90	57.03	54.83
Coal	11.80	0.74	0.01	-	0.04	9.47	22.06	9.49	31.55	22.52
Oil & NG	0.64	3.70	4.10	-	0.16	3.92	12.52	3.41	15.93	17.15
Manufacturing subtotal	*260.95*	*35.19*	*23.93*	-	*12.92*	*112.14*	*445.14*	*20.62*	*465.76*	*925.44*
Food, Beverages & Tobacco	18.56	1.14	0.07	-	0.28	5.65	25.70	0.00	25.70	109.05
Textiles	14.06	1.07	0.09	-	2.00	7.93	25.15	0.00	25.15	131.38
Paper Products	9.08	0.66	0.04	-	0.39	3.59	13.76	0.00	13.76	18.88
Electricity, Steam & Hot Water (c)	0.71	0.37	0.39	-	0.35	12.26	14.07	13.22	27.29	29.31
Petroleum Processing	0.37	2.64	5.04	-	1.05	1.95	11.06	1.12	12.17	23.37
Coal Processing	1.32	0.46	0.99	-	0.16	0.48	3.41	3.94	7.36	2.60
Chemicals	43.44	9.29	6.72	-	3.74	22.09	85.28	0.28	85.56	62.01
Chemical Fibers	1.94	0.23	0.80	-	1.03	1.71	5.70	0.03	5.73	12.06
Building Materials	68.72	6.22	0.36	-	0.24	10.22	85.75	0.00	85.75	58.28
Ferrous Metals Smelting	53.27	5.26	7.70	-	1.40	15.62	83.25	2.01	85.27	50.33
Nonferrous Metals Smelting	5.78	1.16	0.08	-	0.37	7.59	14.98	0.00	14.98	21.47
Metal Products	3.55	0.51	0.07	-	0.01	2.79	6.93	0.00	6.93	32.75
Machinery & Electronics	22.62	4.13	1.29	-	1.37	13.72	43.13	0.02	43.16	222.65
Other	6.14	0.67	0.06	-	0.01	1.82	8.69	0.00	8.69	18.08
Manufacturing Subsectors Balance (d)	11.39	1.39	0.24	-	0.51	4.75	18.27	0.00	18.27	133.24

(a) - (d) See notes for Table VI-9.6.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

8. 1987

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	302.67	42.71	27.83	19.63	14.58	144.69	552.11	35.81	587.92	1,147.25
Light Industry	76.06	9.13	1.49	0.00	4.85	32.38	123.92	0.10	124.01	570.36
Heavy Industry	226.60	33.57	26.34	19.63	9.73	112.31	428.20	35.71	463.91	576.89
Excavation subtotal	*19.31*	*5.86*	*4.71*	-	*0.22*	*21.62*	*51.72*	*13.63*	*65.35*	*65.96*
Mining	18.34	5.31	4.71	-	0.20	18.99	47.55	13.63	61.18	58.97
Coal	12.99	0.83	0.07	-	0.03	10.03	23.94	10.39	34.33	23.34
Oil & NG	0.58	3.65	4.46	-	0.17	4.34	13.19	3.24	16.43	17.56
Manufacturing subtotal	*283.36*	*36.84*	*23.12*	-	*14.36*	*123.07*	*480.76*	*22.18*	*502.94*	*1,081.29*
Food, Beverages & Tobacco	20.67	1.19	0.06	-	0.64	6.44	29.00	0.00	29.00	123.76
Textiles	15.20	1.04	0.27	-	1.62	8.43	26.56	0.00	26.56	147.13
Paper Products	9.54	0.55	0.04	-	0.64	4.07	14.84	0.00	14.84	22.82
Electricity, Steam & Hot Water (c)	0.84	0.52	0.09	-	0.05	13.85	15.35	14.34	29.69	32.41
Petroleum Processing	0.46	3.17	5.27	-	1.22	2.06	12.17	1.39	13.56	26.13
Coal Processing	1.40	0.56	1.09	-	0.20	0.49	3.74	4.08	7.82	3.09
Chemicals	50.43	9.54	7.04	-	3.82	25.08	95.90	0.46	96.36	73.88
Chemical Fibers	2.09	0.29	0.94	-	1.54	1.99	6.85	0.04	6.89	15.34
Building Materials	73.82	6.30	0.53	-	0.18	11.65	92.48	0.00	92.48	68.87
Ferrous Metals Smelting	56.50	5.31	6.16	-	2.24	16.88	87.09	1.81	88.90	55.59
Nonferrous Metals Smelting	5.58	1.18	0.11	-	0.43	8.23	15.52	0.00	15.52	23.72
Metal Products	4.10	0.58	0.08	-	0.02	2.79	7.56	0.00	7.56	40.94
Machinery & Electronics	23.42	4.13	1.27	-	1.36	13.48	43.66	0.06	43.72	273.77
Other	6.45	0.99	0.04	-	0.04	1.94	9.46	0.00	9.46	13.34
Manufacturing Subsectors Balance (d)	12.87	1.50	0.15	-	0.38	5.69	20.59	0.00	20.59	160.50

(a) - (d) See notes for Table VI-9.6.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

9. 1988

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	324.25	45.31	27.40	21.83	15.29	158.21	592.28	37.11	629.39	1,383.08
Light Industry	80.96	9.21	1.75	0.00	4.26	36.94	133.13	0.04	133.17	694.28
Heavy Industry	243.28	36.10	25.79	21.83	11.03	121.27	459.29	37.07	496.36	688.80
Excavation subtotal	*21.09*	*6.46*	*5.16*	-	*0.29*	*24.00*	*57.00*	*13.53*	*70.53*	*73.90*
Mining	19.86	5.90	5.16	-	0.27	21.19	52.38	13.53	65.90	66.53
Coal	13.75	0.90	0.22	-	0.08	10.74	25.68	9.80	35.48	25.81
Oil & NG	0.71	4.15	4.79	-	0.18	4.87	14.69	3.73	18.42	18.34
Manufacturing subtotal	*303.16*	*38.85*	*22.38*	-	*15.00*	*134.21*	*513.59*	*23.59*	*537.18*	*1,309.18*
Food, Beverages & Tobacco	22.39	1.22	0.20	-	0.51	7.16	31.48	0.00	31.48	145.46
Textiles	16.51	1.21	0.20	-	1.63	9.33	28.87	0.00	28.87	167.44
Paper Products	10.14	0.55	0.17	-	0.72	4.39	15.96	0.00	15.96	28.17
Electricity, Steam & Hot Water (c)	1.40	0.54	0.33	-	0.81	15.48	18.55	15.25	33.80	35.79
Petroleum Processing	0.50	3.62	5.61	-	1.25	2.27	13.24	1.50	14.74	29.26
Coal Processing	1.42	0.09	1.32	-	0.18	0.52	3.52	4.60	8.12	3.73
Chemicals	54.57	9.45	7.14	-	3.55	26.94	101.65	0.39	102.05	89.42
Chemical Fibers	2.11	0.50	0.98	-	1.51	2.01	7.11	0.04	7.15	18.84
Building Materials	79.09	6.83	0.54	-	0.22	12.66	99.34	0.00	99.34	83.91
Ferrous Metals Smelting	59.23	5.92	6.48	-	2.50	18.26	92.39	1.73	94.12	61.24
Nonferrous Metals Smelting	6.20	0.90	0.20	-	0.32	9.37	16.98	0.00	16.98	26.10
Metal Products	4.50	0.58	0.17	-	0.02	2.95	8.23	0.00	8.23	50.08
Machinery & Electronics	24.80	4.78	0.67	-	1.31	13.83	45.39	0.07	45.45	349.45
Other	6.47	0.93	0.15	-	0.03	2.65	10.23	0.00	10.23	18.01
Manufacturing Subsectors Balance (d)	13.83	1.73	-1.76	-	0.46	6.39	20.66	0.00	20.66	202.28

(a) - (d) See notes for Table VI-9.6.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

10. 1989

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	339.76	49.55	27.02	22.73	16.97	167.21	623.25	39.66	662.91	1,467.55
Light Industry	82.54	9.14	1.51	0.00	5.05	37.58	135.82	0.05	135.88	733.17
Heavy Industry	257.23	40.41	25.51	22.73	11.92	129.63	487.42	39.61	527.03	734.38
Excavation subtotal	*22.71*	6.93	4.32	-	*0.33*	*25.47*	59.75	*13.76*	*73.51*	*79.71*
Mining	21.62	6.37	4.32	-	0.33	22.44	55.08	13.76	68.83	72.22
Coal	15.52	0.95	0.11	-	0.08	11.33	27.98	10.17	38.15	28.84
Oil & NG	0.71	4.54	4.10	-	0.16	5.17	14.66	3.59	18.25	18.79
Manufacturing subtotal	*317.06*	*42.62*	*22.71*	-	*16.64*	*141.75*	*540.77*	*25.90*	*566.67*	*1,387.84*
Food, Beverages & Tobacco	23.62	1.37	0.04	-	0.58	7.20	32.81	0.00	32.81	149.54
Textiles	17.27	1.28	0.07	-	1.92	9.61	30.15	0.00	30.15	174.87
Paper Products	11.01	0.56	0.04	-	0.84	4.52	16.97	0.00	16.97	30.48
Electricity, Steam & Hot Water (c)	1.69	0.78	0.21	-	0.29	17.11	20.08	16.49	36.57	38.65
Petroleum Processing	0.29	6.13	4.08	-	1.28	2.54	14.33	1.78	16.10	31.59
Coal Processing	1.68	0.11	0.93	-	0.14	0.55	3.41	5.29	8.70	4.40
Chemicals	59.04	10.32	7.21	-	4.60	27.93	109.10	0.36	109.46	96.03
Chemical Fibers	2.20	0.67	0.63	-	1.56	2.17	7.24	0.05	7.29	21.45
Building Materials	81.63	6.81	0.44	-	0.25	12.92	102.04	0.02	102.06	87.15
Ferrous Metals Smelting	61.36	6.11	7.53	-	2.58	20.37	97.96	1.84	99.80	64.55
Nonferrous Metals Smelting	6.08	1.19	0.28	-	0.34	10.08	17.97	0.00	17.97	28.45
Metal Products	4.36	0.61	0.08	-	0.03	2.99	8.07	0.00	8.07	53.96
Machinery & Electronics	24.51	4.24	1.08	-	1.42	14.41	45.67	0.07	45.75	370.20
Other	7.01	0.68	0.02	-	0.22	2.49	10.41	0.00	10.41	18.72
Manufacturing Subsectors Balance (d)	15.32	1.75	0.06	-	0.59	6.86	24.57	0.00	24.57	217.80

(a) - (d) See notes for Table VI-9.6.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Table IV-9. Industrial Sector Energy End-Use by Subsector and Energy Type, with Gross Output Value by Subsector, 1980-1990—Mtce (continued) (a)

11. 1990

Subsector (b)	Solid Fuels	Liquid Fuels	Gaseous Fuels	Other Fuels	Thermal Energy	Electricity	End-Use Subtotal	End-Use & Conversion Losses	Total Consumption	Gross Output Value of Industry (billion yuan)
Total Industry	336.47	49.07	27.87	23.46	20.66	174.89	632.39	43.39	675.78	2,309.31
Light Industry	81.06	8.93	1.67	0.00	6.24	39.24	137.14	0.04	137.19	1,124.36
Heavy Industry	255.40	40.13	26.19	23.46	14.42	135.65	495.25	43.34	538.59	1,184.95
Excavation subtotal	*22.14*	*7.40*	4.39	-	*0.37*	*26.60*	*60.89*	*16.90*	*77.78*	*160.54*
Mining	21.08	6.80	4.39	-	0.36	23.20	55.83	16.90	72.72	142.69
Coal	15.63	1.03	0.09	-	0.06	11.80	28.61	12.98	41.59	58.29
Oil & NG	0.78	4.70	4.07	-	0.14	5.70	15.38	3.91	19.30	43.60
Manufacturing subtotal	*314.33*	*41.66*	*23.48*	-	*20.29*	*148.29*	*548.05*	*26.49*	*574.54*	*2,148.78*
Food, Beverages & Tobacco	23.27	1.38	0.04	-	0.91	7.18	32.79	0.00	32.79	271.97
Textiles	17.15	1.23	0.07	-	2.18	9.72	30.34	0.00	30.34	279.54
Paper Products	10.47	0.54	0.03	-	1.19	4.72	16.94	0.00	16.94	49.11
Electricity, Steam & Hot Water (c)	2.08	0.78	0.03	-	0.54	17.85	21.28	17.40	38.67	63.30
Petroleum Processing	0.39	5.73	4.17	-	1.76	2.82	14.86	2.20	17.06	50.69
Coal Processing	2.03	0.14	1.27	-	0.15	0.63	4.21	3.81	8.02	10.59
Chemicals	57.29	9.77	7.44	-	5.81	28.96	109.27	0.59	109.86	175.47
Chemical Fibers	2.10	0.73	0.76	-	1.53	2.33	7.46	0.03	7.49	30.57
Building Materials	76.72	6.72	0.51	-	0.19	13.03	97.17	0.04	97.22	136.70
Ferrous Metals Smelting	64.14	6.27	7.77	-	3.14	21.90	103.21	2.33	105.55	136.16
Nonferrous Metals Smelting	6.58	1.17	0.17	-	0.36	10.63	18.91	0.00	18.91	57.13
Metal Products	4.36	0.61	0.08	-	0.02	3.22	8.28	0.00	8.28	74.19
Machinery & Electronics	24.04	4.07	1.07	-	1.54	14.42	45.13	0.10	45.23	466.39
Other	8.37	0.64	0.02	-	0.23	4.00	13.26	0.00	13.26	25.09
Manufacturing Subsectors Balance (d)	15.36	1.89	0.06	-	0.76	6.88	24.94	0.00	24.94	321.87

(a) - (d) See notes for Table VI-9.6.
- Not available.

Source: Energy Research Institute calculations based on China Statistical Yearbook, 1980-1991 (SSB, Beijing) and Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing).

Figure IV-9. Subsectoral Shares of Industrial Sector End-Use Energy Consumption, 1980 & 1990

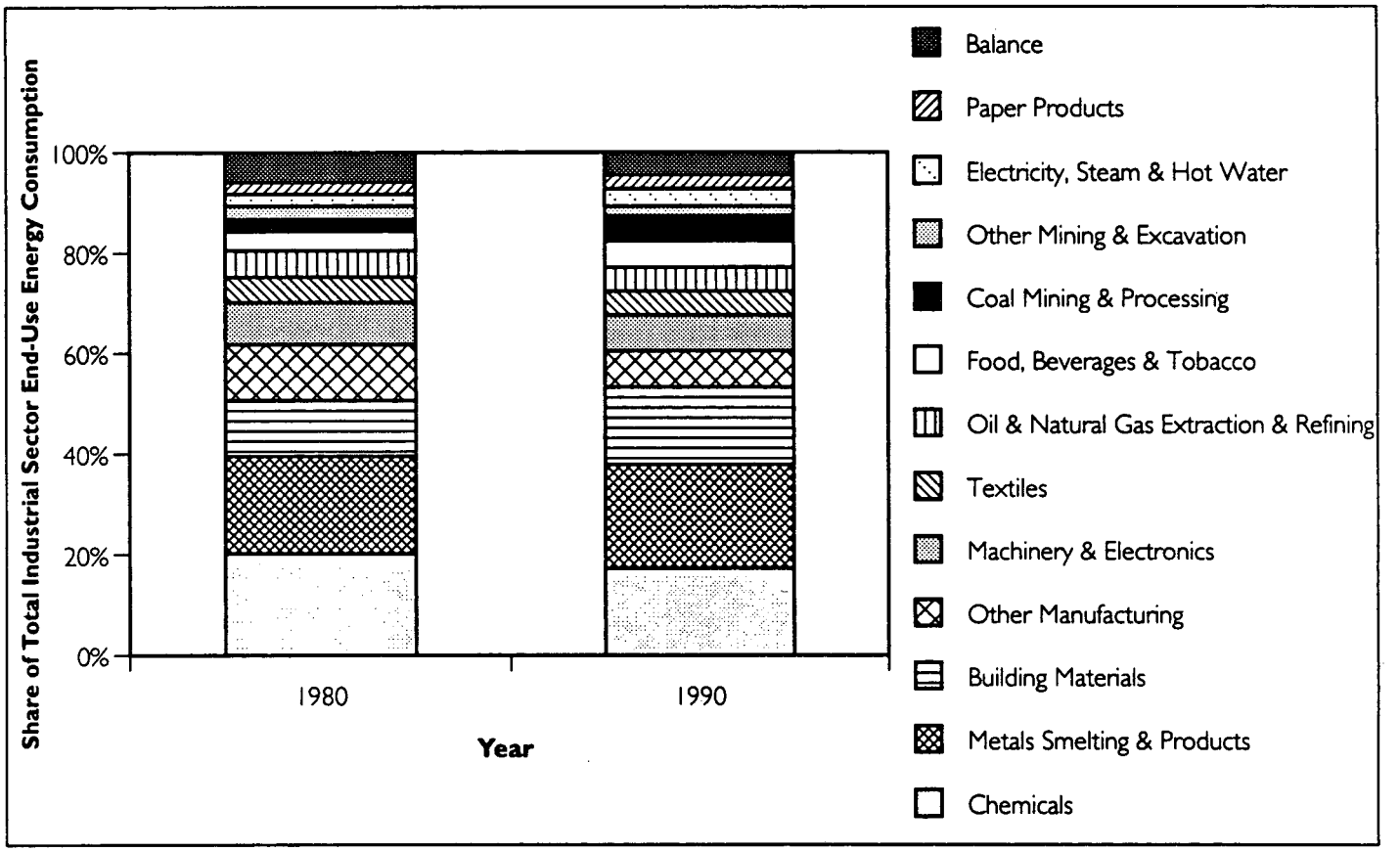
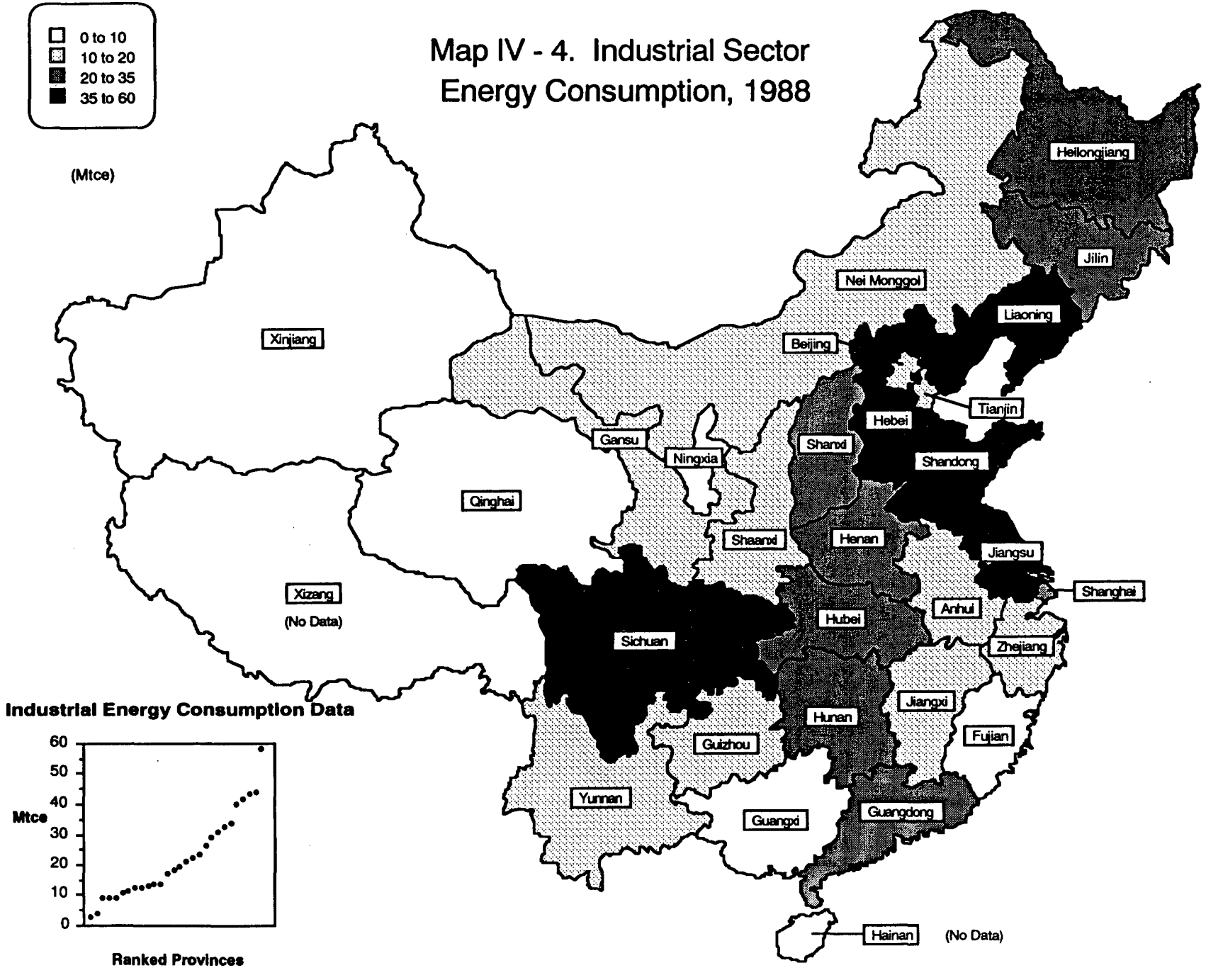


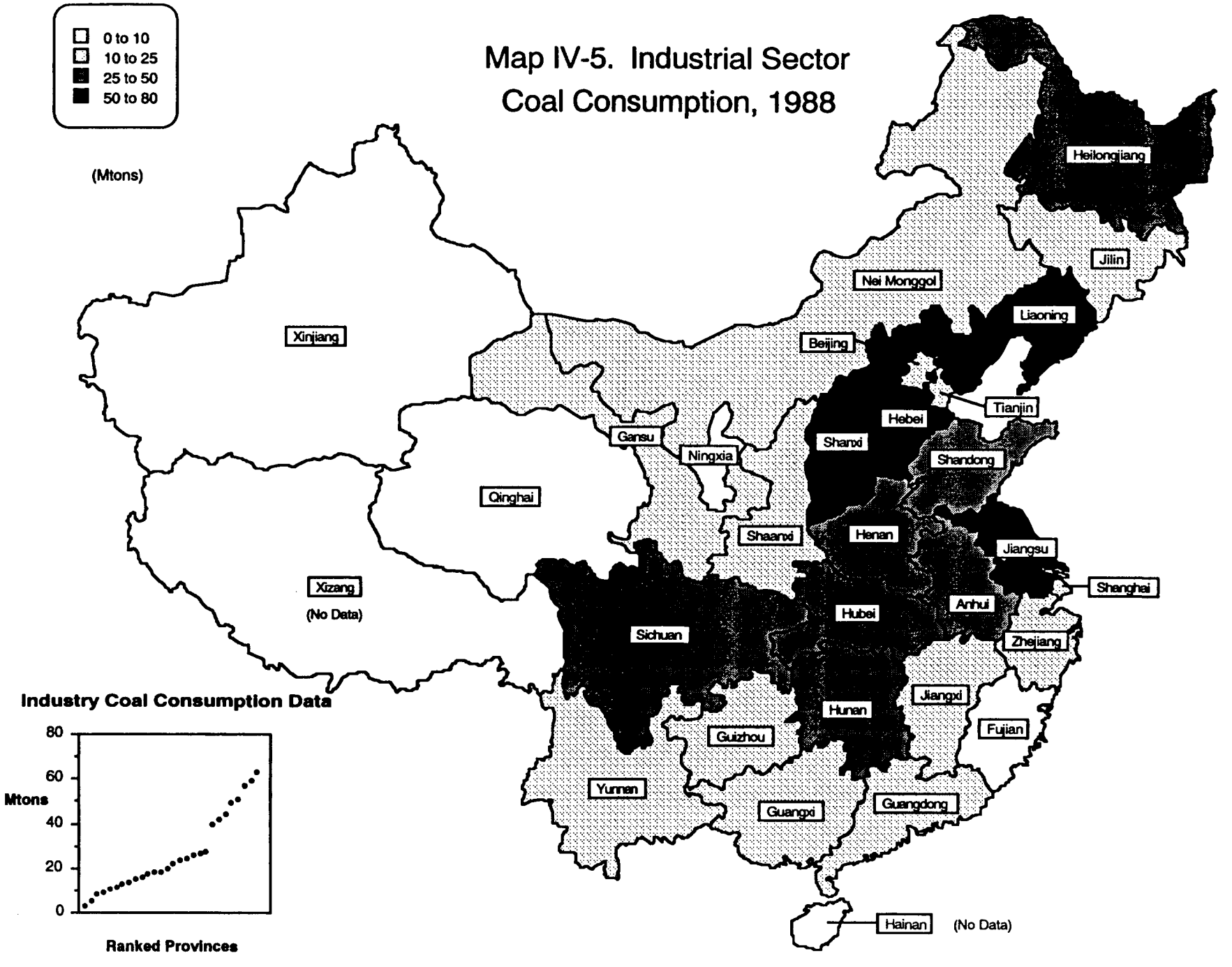
Table IV-10. Industrial Sector Commercial Energy Consumption by Province and Energy Source, 1988 & 1989 (a)

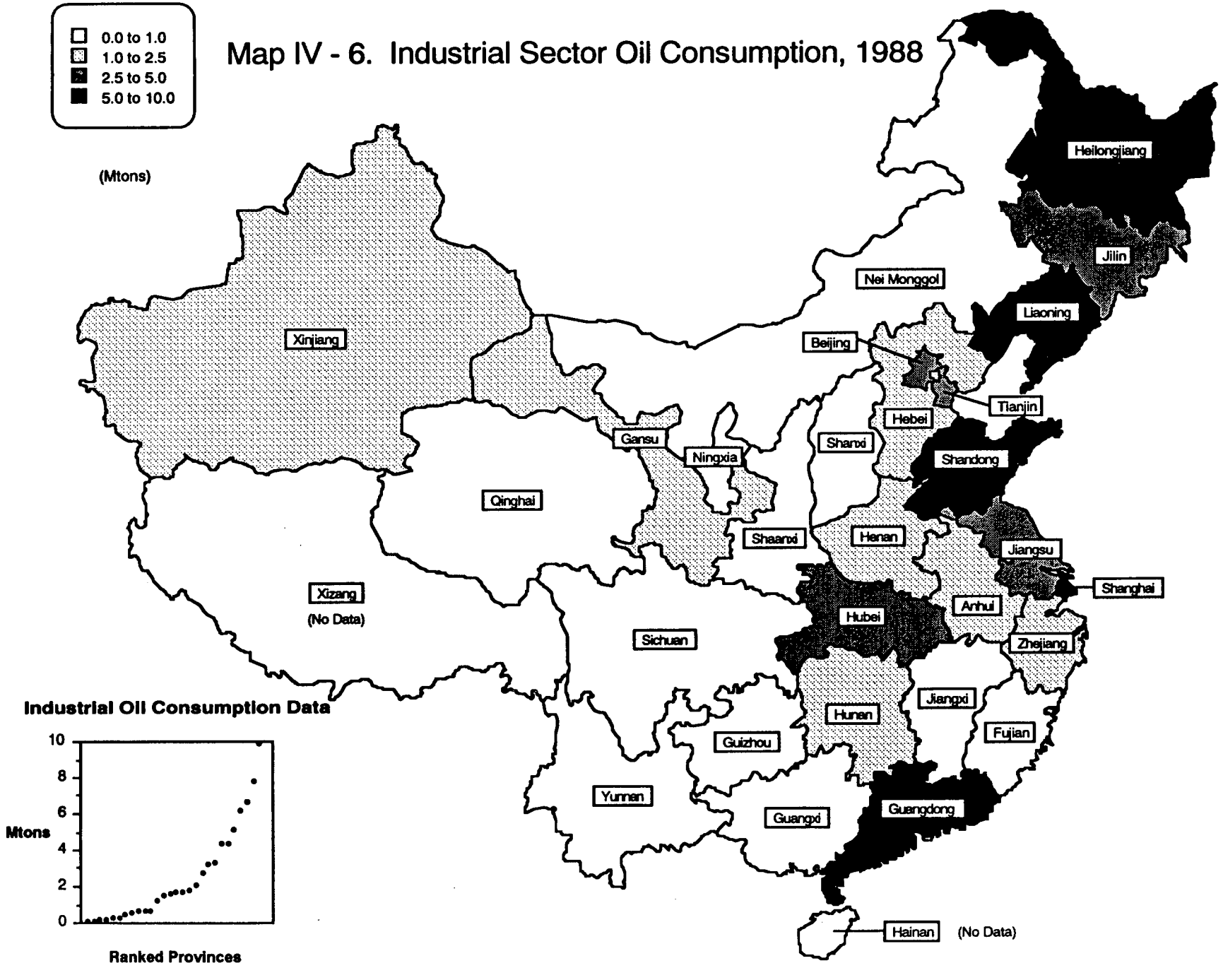
Planning Region	Province	1988 Industrial Coal Consumption (Mt) (b)	1988 Industrial Oil Consumption (Mt) (b,c)	1988 Industrial Electricity Consumption (TWh) (d)	1988 Total Industrial Energy Consumption (Mtce) (g)	1989 Industrial Electricity Consumption (TWh) (d)	1989 Total Industrial Energy Consumption (Mtce) (g)
North	Beijing	15.5	4.39	11.7	17.2	11.3	17.0
	Tianjin	11.4	3.37	9.3	13.4	9.5	13.3
	Hebei	59.1	1.70	24.3	40.2	26.6	41.8
	Shanxi	57.0	0.58	18.8	33.6	20.5	34.8
	Inner Mongolia	23.9	0.46	7.9	12.6	8.9	14.3
Northeast	Liaoning	63.5	9.91	36.7	58.1	37.3	59.0
	Jilin	24.2	2.77	14.4	21.1	14.5	22.0
	Heilongjiang	39.9	5.15	20.2	30.7	21.7	31.6
East	Shanghai	22.1	6.63	20.5	23.5	20.7	23.8
	Jiangsu	50.8	4.40	29.8	41.5	30.8	42.4
	Zhejiang	20.0	1.58	16.6	18.4	16.9	18.7
	Anhui	25.9	1.51	13.4	19.3	14.0	20.0
	Fujian	9.5	0.33	8.7	9.4	9.2	9.4
	Jiangxi	18.1	0.70	9.3	12.5	9.7	12.8
	Shandong	49.3	7.84	30.1	44.1	33.0	45.8
South-Central	Henan	41.9	1.26	24.2	32.6	26.5	32.0
	Hubei	26.6	3.24	20.7	29.2	21.6	30.1
	Hunan	27.7	1.74	17.2	26.4	17.6	27.2
	Guangdong	18.1	6.16	19.8	22.2	23.0	28.7
	Guangxi	13.5	0.27	8.1	9.1	8.6	9.4
	Hainan	(e)	(e)	(e)	(e)	(e)	(e)
Southwest	Sichuan	44.5	0.68	25.3	43.2	26.5	42.8
	Guizhou	12.9	0.14	7.9	10.6	8.3	11.8
	Yunnan	15.7	0.20	8.3	11.3	8.6	11.5
	Xizang	(e)	(e)	(e)	(e)	(e)	(e)
Northwest	Shaanxi	17.8	0.63	11.1	13.0	12.2	13.7
	Gansu	10.9	2.14	12.0	13.6	13.8	14.1
	Qinghai	2.8	0.23	2.6	2.7	3.6	3.6
	Ningxia	5.7	0.08	3.6	3.8	4.2	4.5
	Xinjiang	8.5	1.81	3.6	9.2	4.4	10.1
National Total		739.1	72.34	436.5	630.4	464.7	662.9
Balance (f)		2.4	2.46	0.3	7.6	1.1	16.8

(a) 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.
(b) Includes fossil fuels used in electricity generation, coking, coal gas production, and production. of other coal products.
(c) Includes crude oil and petroleum products.
(d) Includes electricity from both hydro and thermal generation. Includes electric power subsector and coal products subsector consumption of electricity.
(e) Not available.
(f) Because of differences in the coverage of statistics and conversions to standard coal, the sum of local statistics does not equal the national total.
(g) Total energy consumption in industry figures are as reported in the Energy Statistical Yearbook of China and the China Statistical Yearbook, and include inputs to secondary conversions (e.g. electricity generation). The total end use can not 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 as well as consumption of thermal electricity in the electricity consumption subtotal, and the exclusion of natural gas consumption. 1989 figures are from 1991 China Statistical Yearbook.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).


Map IV - 4. Industrial Sector
Energy Consumption, 1988
0 to 10
10 to 20
20 to 35
35 to 60
(Mtce)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Shanxi
Ningxia
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Industrial Energy Consumption Data
Mtce
60
50
40
30
20
10
0
Ranked Provinces


0 to 10
10 to 25
25 to 50
50 to 80
(Mtons)
Map IV-5. Industrial Sector
Coal Consumption, 1988
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Industry Coal Consumption Data
80
60
40
20
0
Mtons
Ranked Provinces


Map IV - 6. Industrial Sector Oil Consumption, 1988
0.0 to 1.0
1.0 to 2.5
2.5 to 5.0
5.0 to 10.0
(Mtons)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Shanxi
Shandong
Xinjiang
Gansu
Ningxia
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Anhui
Hubei
Zhejiang
Xizang
(No Data)
Sichuan
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Industrial Oil Consumption Data
Mtons
10
8
6
4
2
0
Ranked Provinces

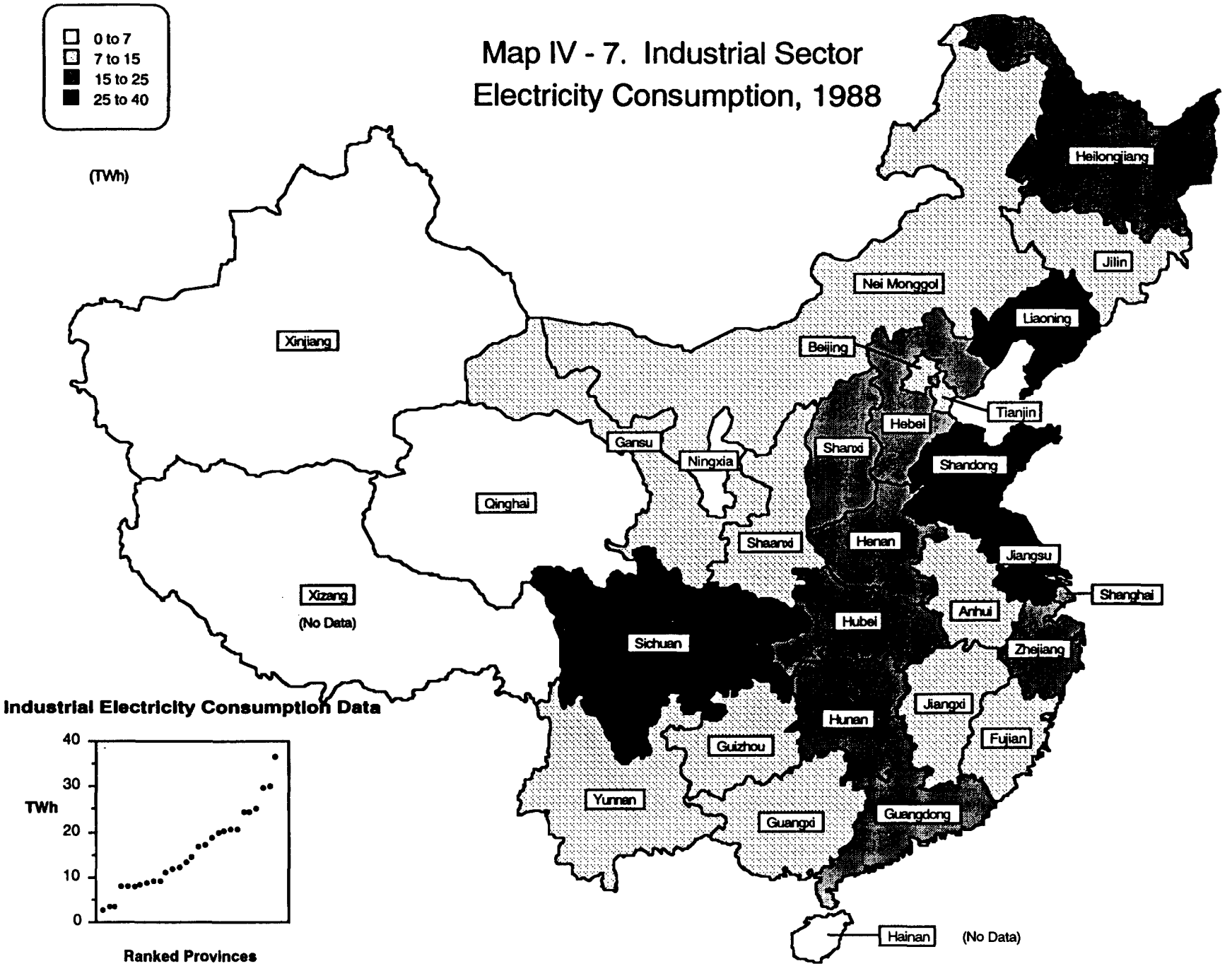

Map IV - 7. Industrial Sector
Electricity Consumption, 1988
0 to 7
7 to 15
15 to 25
25 to 40
(TWh)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Industrial Electricity Consumption Data
TWh
40
30
20
10
0
Ranked Provinces

Table IV-11. Energy Used as Feedstocks, 1980-1988—Mtce

Year	Coal	Coke	Crude Oil	Heavy Oil	Natural Gas	Subtotal	Other Petroleum Products (a)	Other Coking Products (a)	Total Feedstocks
1980	17.76	6.49	0.88	1.33	4.62	31.08	16.00	2.26	49.34
1981	13.82	6.85	0.70	1.38	4.80	27.55	15.68	2.03	45.26
1982	12.46	6.76	0.72	1.50	4.52	25.96	16.33	2.09	44.38
1983	15.23	6.57	0.80	1.86	4.20	28.66	16.56	2.20	47.42
1984	16.17	6.22	0.56	3.64	5.45	32.04	18.06	2.38	52.48
1985	12.10	5.47	0.94	1.60	7.20	27.31	17.20	2.42	46.93
1986	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.76	2.07	n.a.
1987	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	18.91	2.01	n.a.
1988	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	21.05	2.21	n.a.

(a) Some of the crude oil and heavy oil feedstock is used in ethylene production.
(b) Note inclusion of other petroleum and coking products, which we here assume are 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.
(c) 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: Energy Statistical Yearbook of China, 1986, 1989 (SSB, Beijing); David Fridley, East-West Center.

Table IV-12. Thermal Electric Utility Fuel Use, 1980-1988—Mtce

Year	Coal (a)	Crude Oil (b)	Fuel Oil (b)	Gasoline	Diesel Oil (b)	Liquefied Petroleum Gas	Refinery Gas (c)	Natural Gas	Coal Gas	Other Coking Products	Total
1980	68.16	8.08	15.85	(e)	1.04	(e)	(e)	0.32	0.09	(e)	93.54
1981	68.15	7.61	15.08	(e)	1.73	(e)	(e)	0.32	0.09	(e)	92.98
1982	72.28	6.76	14.75	(e)	1.04	(e)	(e)	0.28	0.09	(e)	95.20
1983	77.05	5.57	15.14	(e)	0.78	(e)	(e)	0.27	0.10	(e)	98.91
1984	85.75	4.72	15.13	(e)	1.00	(e)	(e)	0.27	0.10	(e)	106.97
1985	105.06	4.00	15.32	(e)	1.51	(e)	(e)	0.36	0.09	(e)	126.34
1986	115.10	3.52	15.38	<0.005	0.86	<0.005	0.05	0.63	0.15	<0.005	135.67
1987	129.65	3.70	14.97	<0.005	1.35	0.01	0.07	1.01	0.12	<0.005	150.87
1988	145.91	3.35	15.77	<0.005	2.86	0.01	0.15	0.76	0.09	0.06	168.95

Year	Thermal Gross Generation (billion kWh)	kgce per gross kWh (d)	Rate of in-plant electricity consumption	Net Thermal Generation (billion kWh)	Ratio of Gross to Net	kgce per net kWh (d)
1980	242.4	0.386	7.65%	223.86	1.083	0.418
1981	243.8	0.381	7.76%	224.88	1.084	0.413
1982	253.3	0.376	7.71%	233.77	1.084	0.407
1983	265.0	0.373	7.78%	244.38	1.084	0.405
1984	290.2	0.369	7.70%	267.85	1.083	0.399
1985	318.3	0.397	7.78%	293.54	1.084	0.430
1986	355.1	0.382	7.83%	327.30	1.085	0.415
1987	397.1	0.380	7.88%	365.81	1.086	0.412
1988	435.9	0.388	7.94%	401.29	1.086	0.421

(a) 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%).

(b) In official statistics, 1980-1984 values for power generation consumption of certain 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%.

(c) Refinery gas (lianchang ganqi) is a byproduct of oil refining.

(d) Calculated from data in this table; differs from official data on heat rates.

(e) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Figure IV-10. Fuel Use in Electricity Generation, 1980-1988

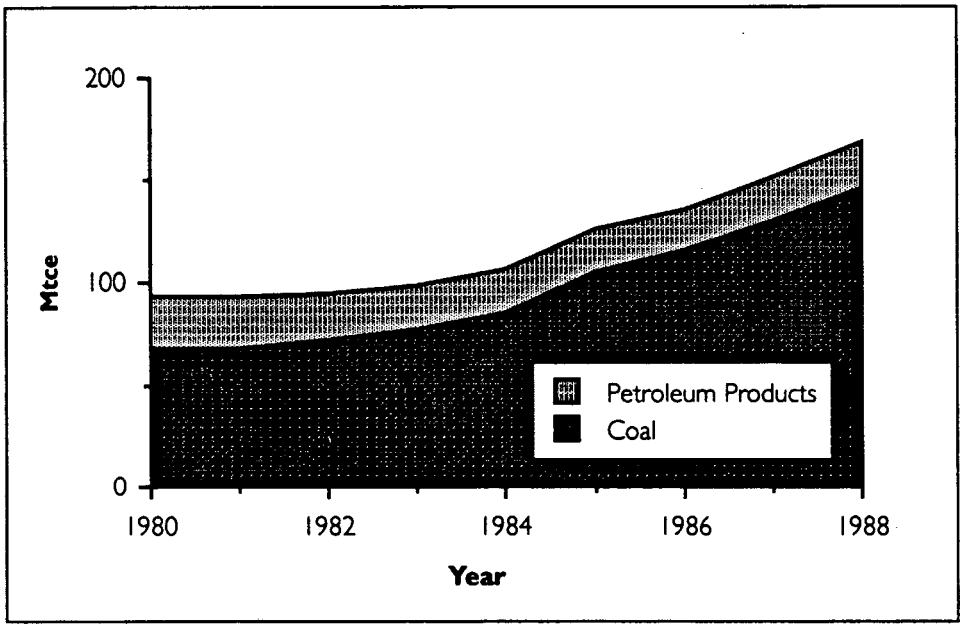


Table IV-13. Heat Rate of Thermal Plants, 1952, 1957, 1965-1989 (a)

Year	Gross Generation Efficiency	Net Generation Efficiency	Coal Consumption of Gross Generation (gce/kWh)	Coal Consumption of Net Generation (gce/kWh)
1952	0.15	(b)	727	(b)
1957	0.17	(b)	604	(b)
1965	0.22	0.20	477	518
1966	0.23	0.21	461	498
1967	0.23	0.21	463	502
1968	0.23	0.21	464	503
1969	0.23	0.21	464	503
1970	0.23	0.21	463	502
1971	0.23	0.21	465	505
1972	0.23	0.21	464	504
1973	0.23	0.21	457	496
1974	0.23	0.22	450	488
1975	0.23	0.22	450	489
1976	0.24	0.22	449	487
1977	0.24	0.22	446	484
1978	0.24	0.22	434	471
1979	0.25	0.23	422	457
1980	0.26	0.24	413	448
1981	0.26	0.24	407	442
1982	0.26	0.24	404	438
1983	0.26	0.24	400	434
1984	0.27	0.24	398	432
1985	0.27	0.24	398	431
1986	0.27	0.24	398	432
1987	0.27	0.24	398	432
1988	0.27	0.24	397	431
1989	0.27	0.24	397	432

(a) For power plants with ≥6 MW of installed capacity, which in the 1980s accounted for about 89% of installed capacity and 97% of gross thermal electricity generation.
(b) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); ERI.

Table IV-14. Power Sector Electricity Consumption, Selected Years, 1952-1989

Year	Overall		Hydro		Thermal	
	Percent of Gross Generation (a)	Consumption (billion kWh) (b)	Percent of Gross Generation (a)	Consumption (billion kWh) (b)	Percent of Gross Generation (a)	Consumption (billion kWh) (b)
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

(a) Figures for years before 1971 are for plants with installed capacities ≥500 kW, while those for 1971 and later years are for plants with installed capacities ≥6 MW.

(b) 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 Tables II-21 and 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing).

Table IV-15. Transportation Energy Consumption, 1980-1988, Mtce (a)

Year	Coal (b)	Gasoline (c)	Diesel (d)	Electricity	Other Fuels (e)	Total
1980	13.89	14.68	7.47	1.07	2.46	39.57
1981	14.93	13.82	7.15	1.18	2.59	39.67
1982	15.55	14.60	7.44	1.21	2.92	41.72
1983	15.70	16.10	8.00	1.45	2.88	44.13
1984	16.33	17.63	8.54	1.67	3.30	47.47
1985	16.53	20.52	9.44	2.56	3.34	52.39
1986	16.45	22.10	11.51	2.70	3.92	56.68
1987	16.05	23.89	12.71	3.10	3.98	59.73
1988	16.17	26.33	13.35	3.62	4.17	63.64

(a) 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 and is not separated here.

(b) Coal includes raw coal and small amounts of coke and middlings.

(c) Gasoline includes national total use; non-transportation consumption of gasoline is considered insignificant, so all gasoline consumption is treated as transportation.

(d) Transportation sector consumption of diesel oil includes reported transportation use plus 20% of agricultural use and 10% of industrial 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 1980-1987 data as well.

(e) Other fuels include kerosene, crude oil, fuel oil, and natural gas.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1986-1989 (SSB, Beijing).

Figure IV-11. Transportation Sector Energy Consumption, 1980-1988

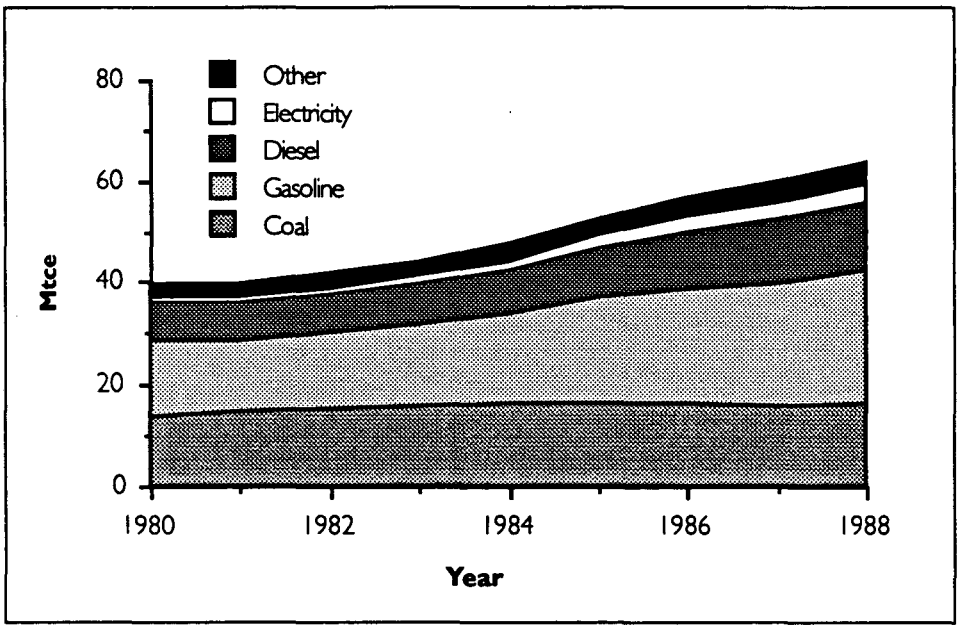


Table IV-16. Transportation End Use Consumption Shares by Mode, 1985 (a)

Sector	Consumption				Percent of Total Consumption
	Coal (Mt)	Oil (Mt)	Electricity (billion kWh)	Total (Mtce)	
Rail *of which:*	-	-	-	23.3	48%
Steam Locomotives (b)	26.0	-	-	18.6	38%
Diesel Locomotives	-	2.1	-	3.0	6%
Electric Locomotives	-	-	4.2	1.7	4%
Road (c)	-	12.0	-	17.5	36%
Water (d)	-	4.3	-	6.2	13%
Air (e)	-	0.7	-	1.0	2%
Pipeline (f)	-	0.6	-	0.9	2%
Total	-	19.6	-	48.9	100%

(a) Figures in this table are slightly different than in Table IV-15, Transportation Energy Consumption, 1980-1988, because sources are different. For passenger and freight transportation.
(b) Coal is converted as standard coal, although the real value is probably higher since high-quality lump coal is used by steam locomotives.
(c) 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.
(d) Includes diesel oil and residual oil; converted as diesel oil.
(e) Kerosene and gasoline.
(f) Assumed to be crude oil.

Source: Yang Hongnian, "Energy and Transport in China", in Proceedings of the Chinese-American Symposium on Energy Markets and the Future of Energy Demand, Nanjing, June 1988 (LBL).

Figure IV-12. Energy Use by Different Transport Modes, 1985

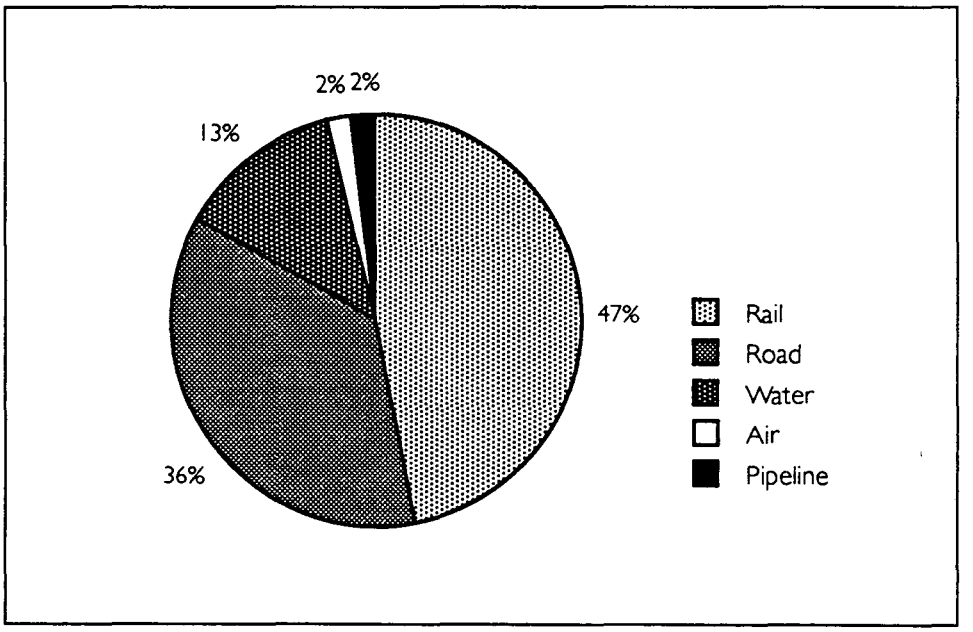


Table IV-17. Agricultural Energy Consumption, 1980-1988, (Commercial Fuels Only)—Mtce (a)

Year	Coal (b)	Electicity	Diesel (c)	Other Fuels (d)	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

(a) 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.
(b) 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.
(c) Diesel use is adjusted to exclude estimated transportation use (see Table IV-15, Transportation Energy Consumption, for details).
(d) Other fuels include crude oil, fuel oil, and kerosene.

Source: Energy Statistical Yearbook of China, 1989, SSB, Beijing.

Figure IV-13. Agricultural Energy Consumption, 1980-1988

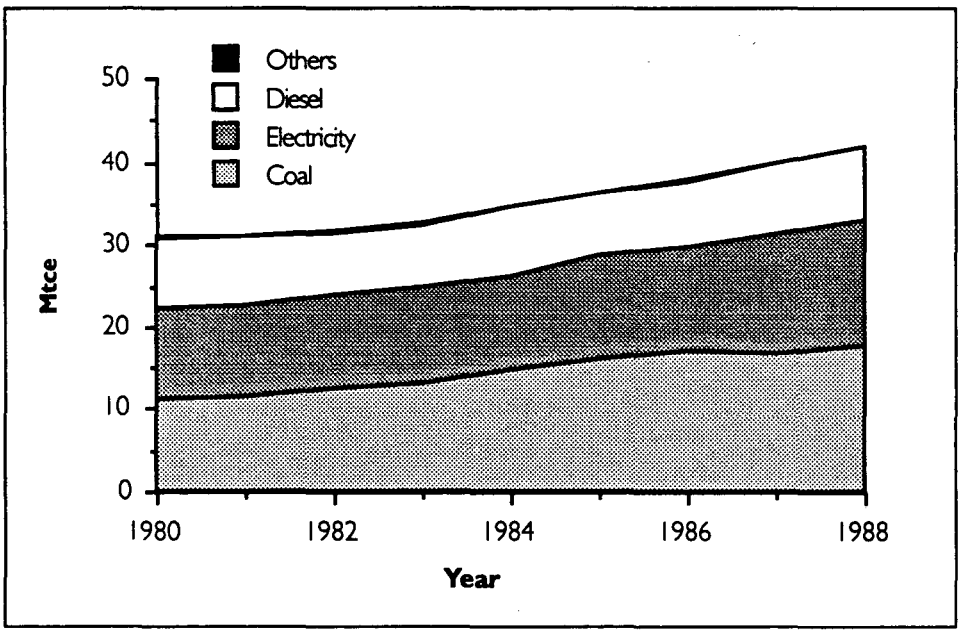


Table IV-18. Residential Energy Consumption, 1980-1989, (Commercial Energy Only)

1. Physical Units

Year	Coal (a) (Mtons)	Electricity (b) (TWh)	District Heating (c) (TJ)	Kerosene (Mtons)	LPG (Mtons)	Natural Gas (billion m3)	Town Gas (d) (billion m3)
1980	115.74	10.52	45.72	0.99	0.43	0.20	1.37
1981	120.89	11.80	47.42	1.16	0.46	0.22	1.43
1982	124.57	12.05	48.34	1.00	0.49	0.20	1.48
1983	130.64	13.73	49.43	1.25	0.61	0.14	1.49
1984	139.83	15.91	52.43	1.48	0.61	0.45	1.63
1985	156.24	22.25	56.51	1.22	0.91	0.43	1.33
1986	158.22	24.79	65.96	1.34	1.14	0.65	1.39
1987	164.86	28.65	78.16	1.28	1.24	0.77	1.70
1988	175.25	34.33	77.29	1.20	1.32	1.53	1.72
1989	170.43	39.52	83.67	1.28	1.54	1.68	2.70

2. Mtce

Year	Coal (a)	Electricity (b)	District Heating (c)	Kerosene	LPG	Natural Gas	Town Gas (d)	Total
1980	82.64	4.25	1.56	1.45	0.74	0.27	0.84	91.75
1981	86.32	4.76	1.62	1.70	0.78	0.29	0.88	96.35
1982	88.94	4.87	1.65	1.48	0.84	0.27	0.91	98.95
1983	93.28	5.55	1.69	1.83	1.04	0.19	0.91	104.49
1984	99.84	6.43	1.79	2.18	1.04	0.60	1.00	112.88
1985	111.78	8.99	1.93	1.79	1.56	0.57	0.82	127.43
1986	113.30	10.06	2.25	1.98	1.96	0.86	0.85	131.26
1987	118.03	11.57	2.67	1.88	2.13	1.02	1.04	138.35
1988	125.44	13.87	2.64	1.77	2.25	2.03	1.06	149.06
1989	121.74	15.97	2.85	1.89	2.64	2.23	1.66	148.98

(a) 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.

(b) 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 ≥ 500 kW.

(c) 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 7% of installed electricity generation capacity nationally (1988).

(d) Composed mainly of coke-oven gas and other coal gas (0.614 tce/1000 m3). Also includes a very small amount of refinery gas (1.571 tce/tonne) for 1985-1988.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Figure IV-14. Residential Energy Consumption (Commercial Energy), 1980-1989

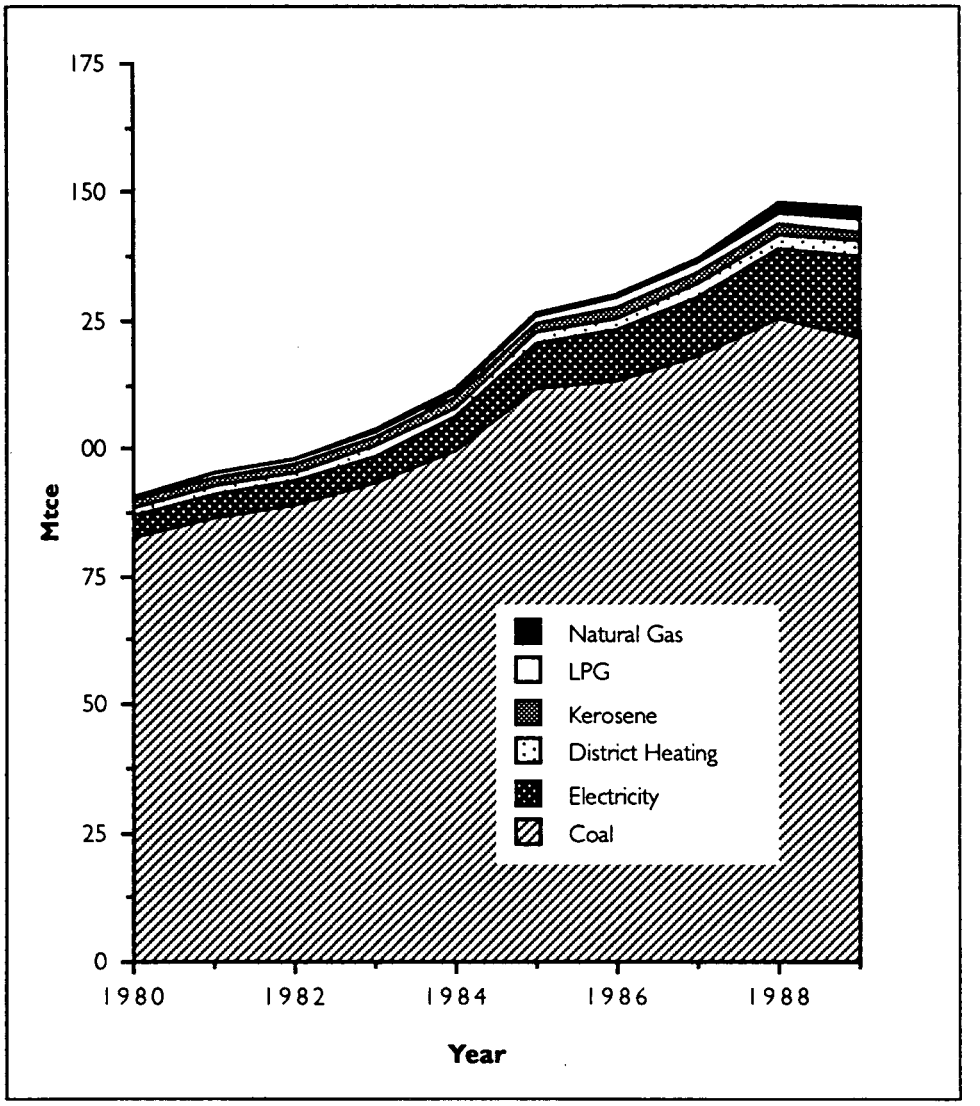


Table IV-19. Residential Sector Commercial Energy Consumption by Province and Energy Source, 1988

Planning Region	Province	Total Residential Energy Consumption (Mtce)	Residential Coal Consumption (Mtons)	Residential Electricity Consumption (TWh)
North	Beijing	3.39	3.79	0.75
	Tianjin	2.13	2.25	0.53
	Hebei	11.74	14.92	1.67
	Shanxi	8.35	10.79	1.01
	Inner Mongolia	4.06	6.07	0.57
Northeast	Liaoning	7.75	7.95	2.16
	Jilin	5.82	6.50	1.18
	Heilongjiang	10.20	10.64	2.54
East	Shanghai	2.21	2.12	0.99
	Jiangsu	5.51	6.17	1.60
	Zhejiang	2.51	2.35	1.79
	Anhui	3.22	3.63	1.15
	Fujian	1.92	1.84	1.23
	Jiangxi	2.40	3.36	0.73
	Shandong	6.95	7.19	2.60
South-Central	Henan	12.69	16.50	1.45
	Hubei	3.77	4.36	1.15
	Hunan	6.37	8.52	0.91
	Guangdong	4.75	4.16	3.63
	Guangxi	0.87	0.68	1.12
	Hainan	(a)	(a)	(a)
Southwest	Sichuan	16.42	21.04	2.43
	Guizhou	5.80	7.68	0.45
	Yunnan	3.13	4.79	0.79
	Xizang	(a)	(a)	(a)
Northwest	Shaanxi	4.69	6.09	0.60
	Gansu	3.05	3.65	0.73
	Qinghai	1.07	1.40	0.09
	Ningxia	0.84	1.08	0.16
	Xinjiang	4.90	5.73	0.24
National Total		155.3	175.25	34.3
Balance (b)		8.8	0.0	0.1

(a) Not available.
(b) 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: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table IV-20. Per Capita Residential Sector Commercial Energy Consumption by Province and Energy Source, 1988

Planning Region	Province	1988 Population (millions)	Per Capita Residential Energy Consumption (tce/year)	Per Capita Residential Coal Consumption (tons/year)	Per Capita Residential Electricity Consumption ('000 kWh)
North	Beijing	10.81	0.31	0.35	0.07
	Tianjin	8.43	0.25	0.27	0.06
	Hebei	57.95	0.20	0.26	0.03
	Shanxi	27.55	0.30	0.39	0.04
	Inner Mongolia	20.94	0.19	0.29	0.03
Northeast	Liaoning	38.20	0.20	0.21	0.06
	Jilin	23.73	0.25	0.27	0.05
	Heilongjiang	34.66	0.29	0.31	0.07
East	Shanghai	12.62	0.18	0.17	0.08
	Jiangsu	64.38	0.09	0.10	0.02
	Zhejiang	41.70	0.06	0.06	0.04
	Anhui	53.77	0.06	0.07	0.02
	Fujian	28.45	0.07	0.06	0.04
	Jiangxi	36.09	0.07	0.09	0.02
	Shandong	80.61	0.09	0.09	0.03
South-Central	Henan	80.94	0.16	0.20	0.02
	Hubei	51.85	0.07	0.08	0.02
	Hunan	58.90	0.11	0.14	0.02
	Guangdong	59.28	0.08	0.07	0.06
	Guangxi	40.88	0.02	0.02	0.03
	Hainan	6.28	(a)	(a)	(a)
Southwest	Sichuan	105.76	0.16	0.20	0.02
	Guizhou	31.27	0.19	0.25	0.01
	Yunnan	35.94	0.09	0.13	0.02
	Xizang	2.12	(a)	(a)	(a)
Northwest	Shaanxi	31.35	0.15	0.19	0.02
	Gansu	21.36	0.14	0.17	0.03
	Qinghai	4.34	0.25	0.32	0.02
	Ningxia	4.41	0.19	0.25	0.04
	Xinjiang	14.26	0.34	0.40	0.02
National Average		1,096.14	0.14	0.16	0.03

(a) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

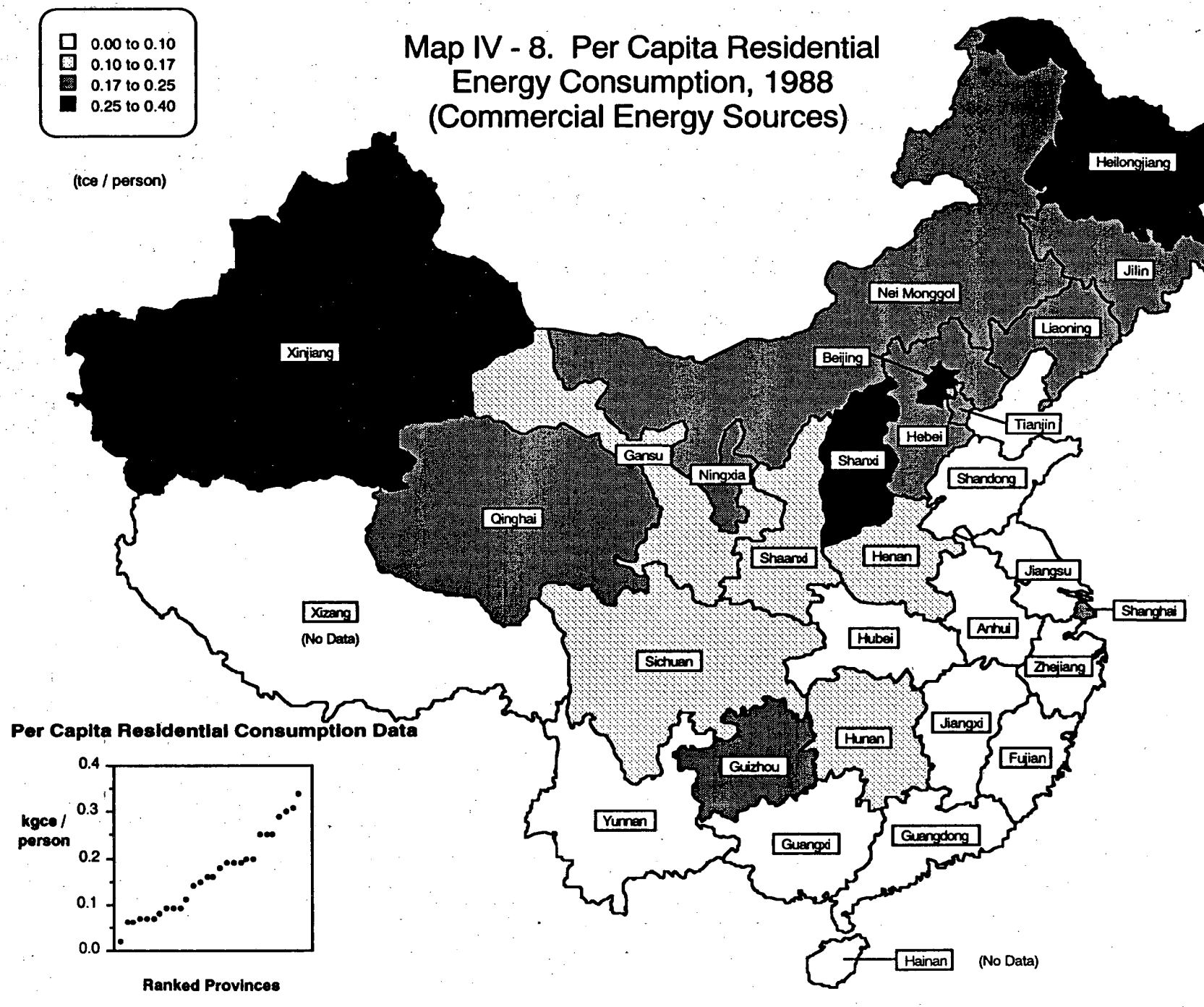

Map IV - 8. Per Capita Residential Energy Consumption, 1988 (Commercial Energy Sources)
0.00 to 0.10
0.10 to 0.17
0.17 to 0.25
0.25 to 0.40
(tce / person)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Xinjiang
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
(No Data)
Per Capita Residential Consumption Data
kgce / person
0.4
0.3
0.2
0.1
0.0
Ranked Provinces

Table IV-21. Rural Energy: Available Energy Sources and Houshold Consumption, 1979 and 1987—Mtce

Energy Source	1979 Available Energy (a)	1979 Household Consumption	1979 Balance	1987 Available Energy (a)	1987 Household Consumption	1987 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	(b)	1.51	(b)	(b)	1.89	(b)
Commercial Subtotal	76.49	37.19	40.81	223.61	66.45	159.05
Total Energy Available	456.31	260.97	195.34	659.90	332.64	327.26

(a) 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 hydro stations (rural grids), and available coal is the output of rural mines.
(b Not available.

Source: National Rural Energy Planning, 1990 (China Standards Press, Beijing) [in Chinese].

Table IV-22. Urban Gas Use, 1981, 1985, 1988, 1989

Year	Total Number of Cities	Number of Cities in Which Gas Available	Population Using Gas (Million Persons)	Percentage of Urban Population Using Gas
1981	225	64	16.72	8.3%
1985	324	133	26.29	10.5%
1988	424	247	48.70	17.0%
1989	447	259	55.50	18.8%
Growth (81-89)	99%	305%	232%	127%

Table IV-23. Total Coal Briquette Sales, 1981, 1985 & 1988—Million Tonnes

	1981	1985	1988
Briquette Sales	20.00	27.59	33.04
of which:			
Honeycomb Briquettes (a)	-	20.75	27.20
Other	-	6.84	5.84

(a) Honeycomb briquettes burn more efficiently than older, egg-shaped briquettes. They are cylindrical, with several round holes running top to bottom, and are between 0.5 and 1.5 kg

\- Not available.

Source: Energy Statistical Yearbook of China, 1986 & 1989 (SSB, Beijing); China Urban Yearbook, 1990 (SSB, Beijing).

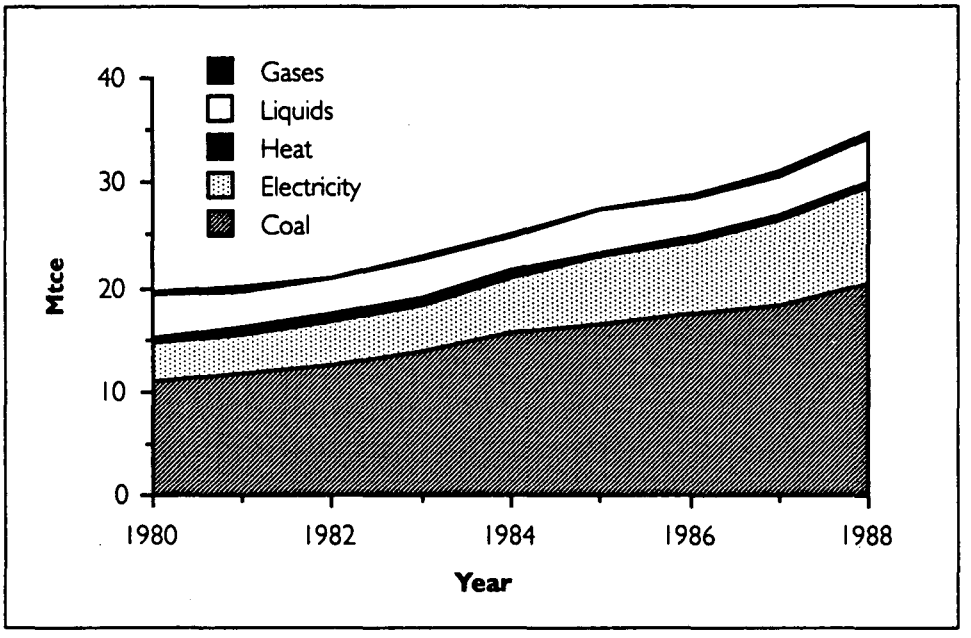
Table IV-24. Commercial Sector Energy Consumption, 1980-1988—Mtce (a)

Year	Coal (b)	Electricity	Heat (c)	Liquids (d)	Gases (e)	Total
1980	11.09	3.46	0.66	4.13	0.30	19.64
1981	11.70	3.75	0.68	3.60	0.29	20.02
1982	12.61	4.12	0.69	3.46	0.16	21.04
1983	13.78	4.58	0.71	3.74	0.16	22.97
1984	15.65	5.22	0.75	3.29	0.18	25.09
1985	16.60	6.45	0.28	4.00	0.24	27.57
1986	17.61	6.79	0.32	3.75	0.31	28.78
1987	18.36	8.01	0.44	3.90	0.40	31.11
1988	20.35	9.20	0.45	5.35	0.37	35.72

(a) This table covers energy use in both the "commerce" and "non-productive" sectors, as used by the SSB.
(b) Coal includes raw coal and small amounts of coke and middlings.
(c) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(d) Liquids include kerosene, diesel, and LPG
(e) Gases include natural gas and coal gas (mainly coke-oven gas).

Source: Energy Statistical Yearbook of China (1989, SSB, Beijing).

Figure IV-15. Commercial Sector Energy Consumption by Fuel, 1980-1988



Energy Source **Consumption**

Table IV-25. End-Use Energy Consumption by Source 1980-1988 (Commercial Energy Only)

1. Mtce

Year	Solids (a)	Liquids (b)	Gases (c)	Electricity	Heat (d)	Total Energy End-Use (e)	Primary Energy Supply (f)	Balance (Losses)	Losses as percent of Supply
1980	318.8	75.6	24.8	103.8	10.5	533.5	602.8	69.3	11.5%
1981	317.9	70.5	22.7	106.8	10.9	528.8	594.5	65.7	11.1%
1982	336.3	70.6	22.1	113.7	11.1	553.9	620.7	66.8	10.8%
1983	360.6	73.6	23.0	121.8	11.4	590.4	660.4	70.0	10.6%
1984	391.2	77.1	23.8	131.2	12.1	635.3	709.0	73.7	10.4%
1985	421.7	82.4	28.3	143.4	13.0	688.8	766.8	78.0	10.2%
1986	439.9	90.9	31.6	156.8	14.1	733.3	808.5	75.3	9.3%
1987	468.5	97.1	30.8	173.4	15.8	785.7	866.3	80.6	9.3%
1988	497.5	103.1	33.2	190.8	16.1	840.7	930.0	89.3	9.6%

2. Shares

Year	Solids (a)	Liquids (b)	Gases (c)	Electricity	Heat (d)	Total Energy End-Use (e)
1980	59.8%	14.2%	4.6%	19.5%	2.0%	100.0%
1981	60.1%	13.3%	4.3%	20.2%	2.1%	100.0%
1982	60.7%	12.8%	4.0%	20.5%	2.0%	100.0%
1983	61.1%	12.5%	3.9%	20.6%	1.9%	100.0%
1984	61.6%	12.1%	3.7%	20.6%	1.9%	100.0%
1985	61.2%	12.0%	4.1%	20.8%	1.9%	100.0%
1986	60.0%	12.4%	4.3%	21.4%	1.9%	100.0%
1987	59.6%	12.4%	3.9%	22.1%	2.0%	100.0%
1988	59.2%	12.3%	3.9%	22.7%	1.9%	100.0%

(a) Solids include raw coal, washed coal, middlings, and coke;
(b) Liquids include crude oil, heavy oil, diesel, gasoline, kerosene, and LPG;
(c) Gases include natural gas, coal gas, "refinery dry gas" (a byproduct of oil refining). Feedstock use is not separated.
(d) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(e) There is a considerable amount of "other petroleum products" and "other coking products" which are excluded from total end use (see for instance the category of "other petroleum products" in Table IV-30, Petroleum Products, 1980-1988).
(f) The difference between this column and total end-use consumption represents conversion and other losses.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Figure IV-16. End-Use Energy Consumption by Energy Source, 1980-1988

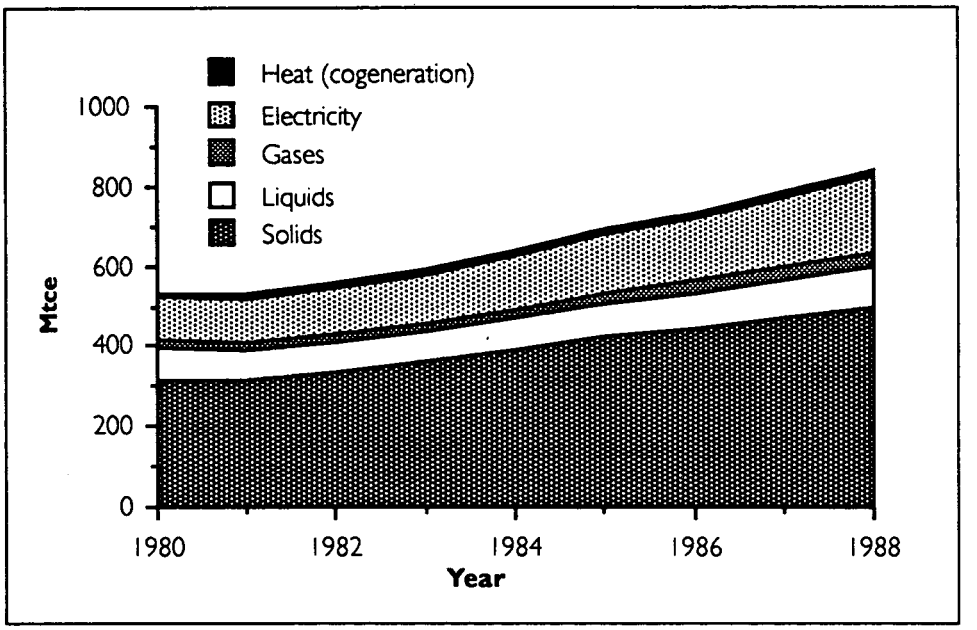


Table IV-26. Coal Consumption by End-Use Sector, 1980-1989

1. Million Tonnes of Raw Coal (a)

Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Industry (b)	222.0	218.1	235.8	258.5	283.1	302.5	316.2	343.0	365.4	376.1
Agriculture	15.5	15.7	17.1	18.4	20.2	22.1	23.0	22.9	23.8	21.8
Transportation	19.3	20.9	21.7	21.9	22.8	23.1	23.0	22.4	22.6	22.8
Commercial	4.6	5.2	5.7	6.4	7.3	7.4	7.8	8.3	9.3	10.2
Other (c)	10.9	11.1	11.9	13.0	14.5	15.8	16.7	17.3	19.1	18.8
Residential	115.7	120.9	124.6	130.6	139.8	156.2	158.2	164.9	175.3	170.4
Subtotal:	*388.0*	*391.9*	*416.8*	*448.7*	*487.8*	*527.0*	*544.9*	*578.7*	*615.4*	*620.2*
Inputs to Conversions:										
Power Generation	126.5	127.0	134.3	143.1	159.4	164.4	180.1	202.9	228.3	251.5
Heat (d)	(e)	(e)	(e)	(e)	(e)	14.6	16.2	18.9	21.2	23.9
Coking	66.8	59.1	60.8	63.9	69.6	73.0	80.6	87.7	88.8	96.3
Coal Gas	1.3	1.4	1.4	1.5	1.6	1.9	2.4	2.2	2.8	3.7
Coal Washing Losses	27.4	26.5	28.0	29.9	31.3	35.0	35.9	37.5	37.1	38.7
Subtotal:	*222.1*	*213.9*	*224.4*	*238.4*	*261.9*	*289.0*	*315.3*	*349.3*	*378.2*	*414.0*
Total	610.1	605.8	641.3	687.1	749.7	816.0	860.2	928.0	993.5	1,034.3

(a) Figures are uncorrected sums of consumption of raw and washed coal.
(b) Figures include feedstocks. Industry category includes industry and construction, but excludes power generation, heating, coking and coal gas production, and differs from official statistical categories.
(c) This is reported in official data as "nonproductive" sector use of coal, e.g., government, education, financial services, etc. See Appendix for sector definitions.
(d) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(e) 1980-1984 heating use of coal was included in electricity generation use of coal.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Table IV-26. Coal Consumption by End-Use Sector, 1980-1989 (continued)

2. Mtce

Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Industry (b)	158.5	155.7	168.4	184.6	202.2	216.0	225.8	244.9	260.9	268.6
Agriculture	11.1	11.2	12.2	13.1	14.4	15.8	16.4	16.3	17.0	15.6
Transportation	13.8	14.9	15.5	15.6	16.3	16.5	16.4	16.0	16.1	16.3
Commercial	3.3	3.7	4.0	4.5	5.2	5.3	5.6	5.9	6.7	7.3
Other (c)	7.8	7.9	8.5	9.3	10.4	11.3	11.9	12.4	13.6	13.4
Residential	82.6	86.3	88.9	93.3	99.8	111.6	113.0	117.7	125.1	121.7
Subtotal:	*277.1*	*279.8*	*297.6*	*320.4*	*348.3*	*376.3*	*389.1*	*413.2*	*439.4*	*442.8*
Inputs to Conversions:										
Power Generation	90.3	90.7	95.9	102.2	113.8	117.4	128.6	144.9	163.0	179.6
Heat (d)	(e)	(e)	(e)	(e)	(e)	10.4	11.6	13.5	15.1	17.0
Coking	47.7	42.2	43.4	45.6	49.7	52.1	57.5	62.6	63.4	68.8
Coal Gas	0.9	1.0	1.0	1.1	1.2	1.4	1.7	1.6	2.0	2.6
Coal Washing Losses	19.6	18.9	20.0	21.3	22.3	25.0	25.6	26.8	26.5	27.6
Subtotal:	*158.5*	*152.8*	*160.2*	*170.2*	*187.0*	*206.3*	*225.1*	*249.4*	*270.0*	*295.6*
Total	435.6	432.6	457.9	490.6	535.3	582.6	614.1	662.6	709.4	738.5

(a) Figures are uncorrected sums of consumption of raw and washed coal.
(b) Figures include feedstocks. Industry category includes industry and construction, but excludes power generation, heating, coking and coal gas production, and differs from official statistical categories.
(c) This is reported in official data as "nonproductive" sector use of coal, e.g., government, education, financial services, etc. See Appendix for sector definitions.
(d) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(e) 1980-1984 heating use of coal was included in electricity generation use of coal.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Table IV-27. Coal Gas Consumption by End-Use Sector, 1980-1988

1. Billion Cubic Meters

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry	9.41	9.64	9.65	10.77	10.83	12.14	15.81	14.07	16.33
Commercial & Other	(a)	(a)	(a)	(a)	(a)	0.29	0.40	0.42	0.48
Residential	1.37	1.43	1.48	1.49	1.63	1.33	1.39	1.70	1.72
Subtotal:	*10.78*	*11.07*	*11.13*	*12.26*	*12.46*	*13.76*	*17.60*	*16.19*	*18.53*
Inputs to Conversions:									
Thermal Power Generation	0.89	0.86	0.91	0.98	1.02	0.93	1.47	1.17	0.86
Heat Supply	(a)	(a)	(a)	(a)	(a)	(a)	0.05	0.23	0.13
Subtotal:	*0.89*	*0.86*	*0.91*	*0.98*	*1.02*	*0.93*	*1.52*	*1.40*	*0.99*

2. Mtce

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry	5.58	5.72	5.72	6.39	6.42	7.20	9.37	8.34	9.68
Commercial & Other	(a)	(a)	(a)	(a)	(a)	0.17	0.24	0.25	0.28
Residential	0.81	0.85	0.88	0.88	0.97	0.79	0.82	1.01	1.02
Subtotal:	6.39	6.56	6.60	7.27	7.39	8.16	10.44	9.60	10.99
Inputs to Conversions:									
Thermal Power Generation	0.53	0.51	0.54	0.58	0.60	0.55	0.87	0.69	0.51
Heat Supply	(a)	(a)	(a)	(a)	(a)	(a)	0.03	0.14	0.07
Subtotal:	0.53	0.51	0.54	0.58	0.60	0.55	0.90	0.83	0.58

(a) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Figure IV-17. Coal Consumption by End-Use Sector, 1980-1989

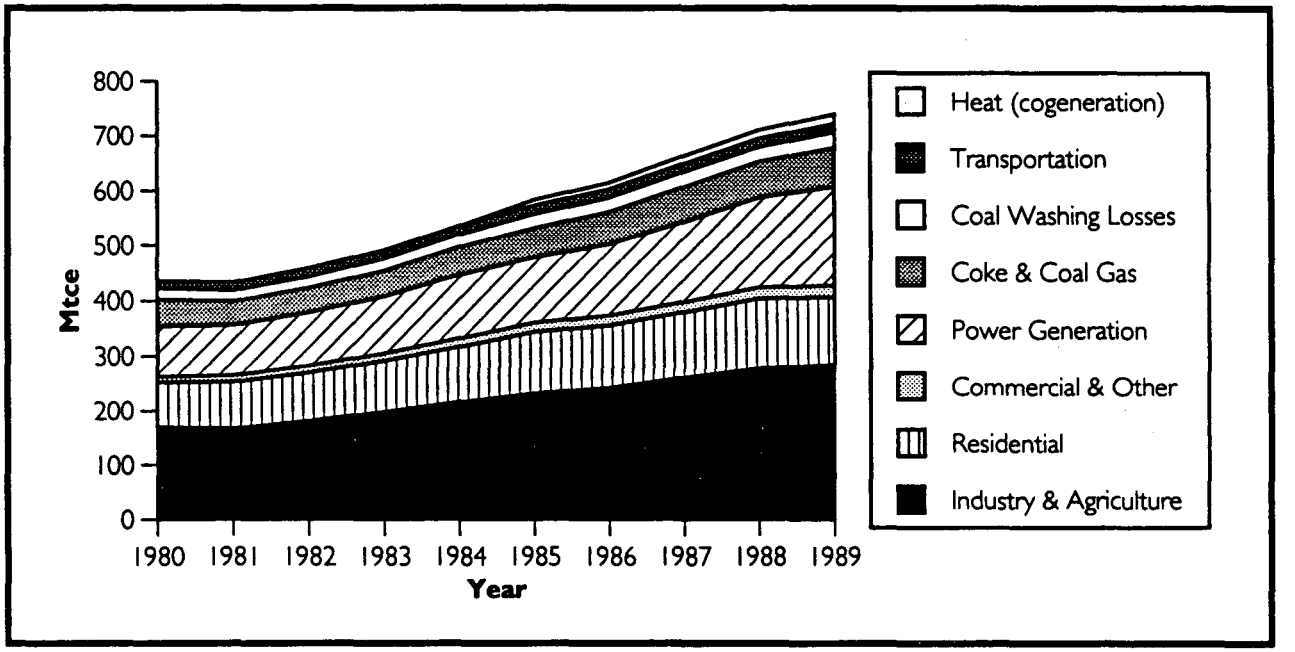
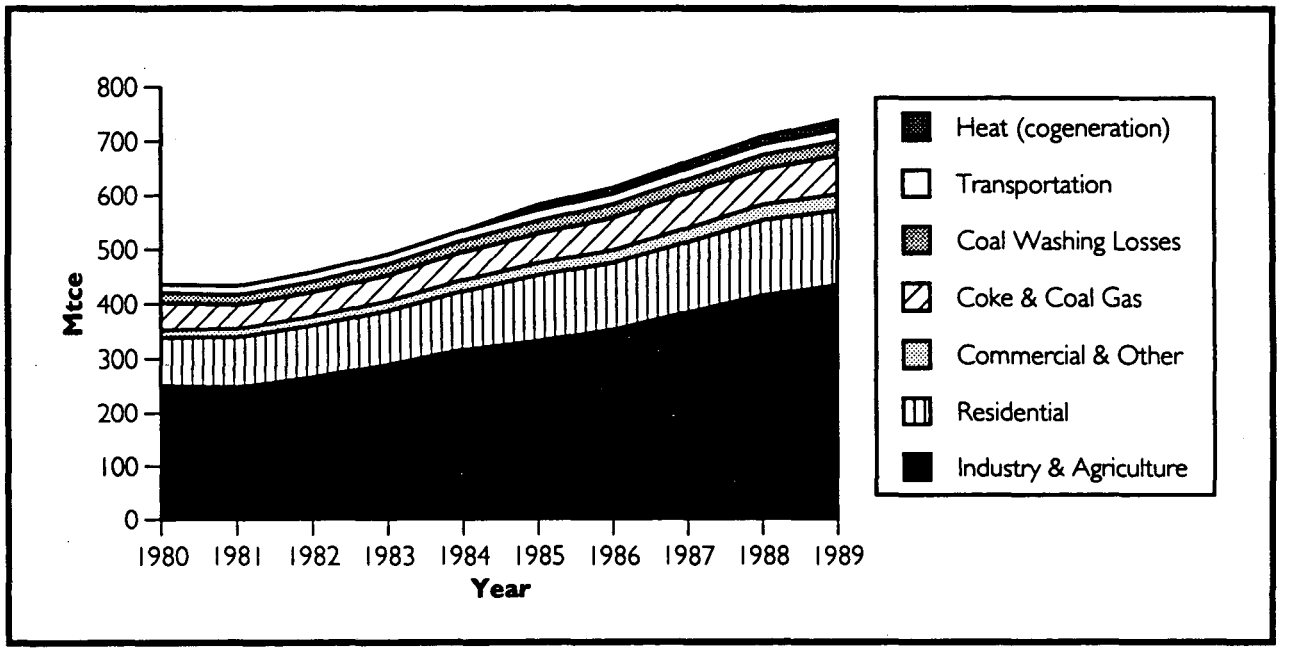


Figure IV-18. Coal Consumption by End-Use Sector, 1980-1989: Coal Inputs to Electricity Generation Attributed to Electricity End-Use Sectors*



*Shares of coal used in electricity generation have been assigned according to sectoral shares of end-use electricity consumption (Table IV-34).

Table IV-28. Total Oil Product Consumption by End-Use Sector and Inputs to Conversions, 1980-1988 (a)

1. Million Tonnes

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry (b)	35.82	33.33	33.61	33.78	35.26	37.98	40.24	43.29	45.49
Agriculture	6.12	5.78	5.34	5.37	5.69	5.11	5.41	5.91	6.22
Transportation	6.79	6.66	7.08	7.43	8.09	8.66	10.46	11.37	11.88
Commercal & Other (c)	2.97	2.60	2.45	2.63	2.32	2.81	2.62	2.72	3.65
Residential	1.42	1.61	1.49	1.85	2.09	2.14	2.51	2.55	2.58
of which:									
urban residential	-	-	-	-	-	0.99	1.29	1.37	1.48
rural residential	-	-	-	-	-	1.17	1.24	1.21	1.13
Subtotal:	*53.12*	*49.97*	*49.98*	*51.06*	*53.45*	*56.71*	*61.25*	*65.84*	*69.82*
Inputs to Conversions:									
Thermal Power Generation	20.65	20.12	18.73	18.06	17.60	14.25	13.59	13.75	15.13
Heat (d)	(e)	(e)	(e)	(e)	(e)	2.30	2.63	2.62	3.12
Refinery Losses	0.71	0.62	0.57	0.88	0.60	0.68	0.79	0.89	1.19
Gasification	0.37	0.37	0.38	0.38	0.40	0.35	0.38	0.37	0.38
Subtotal:	*21.73*	*21.10*	*19.69*	*19.31*	*18.60*	*17.58*	*17.38*	*17.62*	*19.81*

2. Mtce (e)

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry	52.17	48.50	48.92	49.21	51.35	55.52	58.90	63.33	66.51
Agriculture	8.93	8.43	7.80	7.84	8.31	7.45	7.90	8.63	9.08
Transportation	9.93	9.72	10.35	10.86	11.82	12.66	15.28	16.61	17.37
Commercal & Other (c)	4.36	3.81	3.59	3.86	3.40	4.14	3.86	3.99	5.37
Residential	2.19	2.48	2.31	2.87	3.22	3.37	3.97	4.05	4.11
of which:									
urban residential	-	-	-	-	-	1.76	2.28	2.44	2.62
rural residential	-	-	-	-	-	1.72	1.83	1.78	1.65
Subtotal:	*77.58*	*72.95*	*72.98*	*74.63*	*78.10*	*83.15*	*89.91*	*96.62*	*102.43*
Inputs to Conversions:									
Thermal Power Generation	30.12	29.35	27.34	26.38	25.73	20.83	19.85	20.10	22.13
Heat (d)	(e)	(e)	(e)	(e)	(e)	3.38	3.86	3.85	4.47
Refinery Losses	1.01	0.89	0.82	1.25	0.86	0.97	1.13	1.27	1.70
Gasification	0.54	0.54	0.56	0.55	0.59	0.51	0.56	0.54	0.55
Subtotal:	*31.68*	*30.77*	*28.72*	*28.19*	*27.18*	*25.69*	*25.38*	*25.76*	*28.85*

(a) 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 and 10% of reported industrial use. Figures for agricultural and industrial sector consumption have been adjusted accordingly. See also Table IV-15, Transportation Energy Consumption.
(b) Includes construction sector, which is listed separately in official Chinese statistics.
(c) 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.
(d) This category includes heat produced by cogeneration and dedicated heat plants and sold to the industrial, commercial, and residential sectors.
(e) Crude, fuel, and diesel oil used for heating is included in the total for electricity generation for 1980-1984.
(f) Figures are sums of each petroleum product in the relevant category converted with the appropriate conversion factor.
– Not available

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing).

Table IV-29. Total Oil Product Consumption and Inputs to Conversions by Petroleum Product, 1980-1988

1. End-Use Million Tonnes

Petroleum Product	1980	1981	1982	1983	1984	1985	1986	1987	1988
Crude Oil	5.00	4.60	4.29	3.80	3.84	3.50	4.07	4.02	4.53
Fuel Oil	16.18	14.62	14.52	14.63	14.85	15.39	16.72	18.09	18.52
Diesel Oil	15.91	15.24	15.15	15.92	16.83	18.27	20.57	22.21	23.79
Kerosene	3.66	3.47	3.41	3.68	3.84	3.85	3.86	3.82	3.58
LPG	1.19	1.08	1.20	1.45	1.47	1.55	2.00	2.07	2.29
Refinery Gas (a)	-	-	-	-	-	2.13	2.33	2.44	2.43
Other Oil Products (b)	11.19	10.96	11.42	11.58	12.63	12.03	11.72	13.22	14.72
Total	53.12	49.97	49.98	51.06	53.45	56.72	61.27	65.87	69.85

2. End-Use (Mtce)

Petroleum Product	1980	1981	1982	1983	1984	1985	1986	1987	1988
Crude Oil	7.14	6.57	6.13	5.43	5.49	5.01	5.83	5.74	6.48
Fuel Oil	23.78	21.49	21.34	21.51	21.82	22.62	24.58	26.60	27.22
Diesel Oil	23.23	22.25	22.11	23.25	24.57	26.68	30.03	32.43	34.73
Kerosene	5.38	5.10	5.02	5.41	5.65	5.65	5.67	5.61	5.27
LPG	2.04	1.86	2.06	2.48	2.51	2.65	3.43	3.55	3.92
Refinery Gas (a)	-	-	-	-	-	3.35	3.65	3.83	3.81
Other Oil Products (b)	16.00	15.68	16.33	16.56	18.06	17.20	16.76	18.91	21.05
Total	77.58	72.95	72.98	74.63	78.10	83.16	89.95	96.66	102.47

3. Inputs to Conversions (Million Tonnes)

Petroleum Product	1980	1981	1982	1983	1984	1985	1986	1987	1988
Crude Oil (c)	6.45	6.03	5.37	4.83	3.95	3.53	3.31	3.50	3.54
Fuel Oil	14.56	13.87	13.59	13.93	13.95	12.96	13.36	13.12	13.86
Diesel Oil	0.72	1.21	0.73	0.55	0.70	1.09	0.60	0.93	1.96
Kerosene	0	0	0	0	0	0	0	0	0
LPG	0	0	0	0	0	0	<0.01	0.01	0.02
Refinery Gas (a)	-	-	-	-	-	-	0.04	0.07	0.16
Other Oil Products (b)	-	-	-	-	-	-	0.06	0.01	0.26
Total	21.73	21.10	19.69	19.31	18.60	17.58	17.38	17.62	19.81

4. Inputs to Conversions (Mtce)

Petroleum Product	1980	1981	1982	1983	1984	1985	1986	1987	1988
Crude Oil (c)	9.22	8.62	7.68	6.91	5.65	5.05	4.73	5.00	5.07
Fuel Oil	21.40	20.39	19.98	20.48	20.50	19.05	19.64	19.28	20.38
Diesel Oil	1.06	1.76	1.06	0.80	1.02	1.59	0.88	1.35	2.86
Kerosene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LPG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03
Refinery Gas (a)	-	-	-	-	-	-	0.07	0.11	0.25
Other Oil Products (b)	-	-	-	-	-	-	0.06	0.01	0.26
Total	31.68	30.77	28.72	28.19	27.18	25.69	25.38	25.76	28.85

(a) 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.
(b) 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.
(c) Includes refinery losses of crude oil.
(d) Primarily thermal power generation.
- Not available

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing).

Table IV-30. Crude Oil Consumption by End-Use Sector and Inputs to Conversion, 1980-1988 (a)

1. Million Tonnes

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry	4.59	4.18	3.96	3.61	3.51	3.29	3.74	3.74	4.30
Agriculture	0.08	0.07	0.05	0.00	0.00	0.01	0.01	0.01	0.01
Transportation	0.27	0.29	0.27	0.19	0.32	0.20	0.32	0.23	0.22
Commercial & Other	0.06	0.06	0.01	0.01	0.00	0.01	0.00	0.04	0.00
Subtotal:	*5.00*	*4.60*	*4.29*	*3.80*	*3.84*	*3.50*	*4.07*	*4.02*	*4.53*
Inputs to Conversions:									
Thermal Power Generation	5.74	5.41	4.80	3.96	3.35	2.80	2.46	2.59	2.34
Heat Supply	(b)	(b)	(b)	(b)	(b)	0.61	0.65	0.24	0.13
Refinery Losses	0.71	0.62	0.57	0.88	0.60	0.68	0.79	0.89	1.19
Subtotal:	*6.45*	*6.03*	*5.37*	*4.83*	*3.95*	*4.08*	*3.90*	*3.72*	*3.66*
Total	11.44	10.62	9.66	8.63	7.79	7.59	7.97	7.73	8.19

2. Mtce

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988
Industry	6.56	5.98	5.66	5.16	5.02	4.70	5.35	5.35	6.15
Agriculture	0.11	0.10	0.07	0.00	0.00	0.01	0.01	0.01	0.01
Transportation	0.39	0.41	0.39	0.26	0.46	0.29	0.46	0.33	0.31
Commercial & Other	0.09	0.08	0.01	0.01	0.00	0.01	0.00	0.05	0.00
Subtotal:	*7.14*	*6.57*	*6.13*	*5.43*	*5.49*	*5.01*	*5.83*	*5.74*	*6.48*
Inputs to Conversions:									
Thermal Power Generation	8.21	7.73	6.87	5.66	4.79	4.00	3.51	3.70	3.35
Heat Supply	(b)	(b)	(b)	(b)	(b)	0.88	0.94	0.35	0.18
Refinery Losses	1.01	0.89	0.82	1.25	0.86	0.97	1.13	1.27	1.70
Subtotal:	*9.22*	*8.62*	*7.68*	*6.91*	*5.65*	*5.84*	*5.58*	*5.32*	*5.23*
Total	16.37	15.19	13.81	12.34	11.14	10.85	11.40	11.06	11.71

3. Refinery Losses

Category	1980	1981	1982	1983	1984	1985	1986	1987	1988
Refinery Input	78.69	73.76	74.34	80.41	82.51	84.52	91.58	98.52	103.25
Percentage of Refinery Loss	0.90%	0.84%	0.77%	1.09%	0.73%	0.80%	0.86%	0.90%	1.15%
Refinery Losses	0.71	0.62	0.57	0.88	0.60	0.68	0.79	0.89	1.19

(a) Figures are based on end-use data in comprehensive energy balance tables in the Energy Statistical Yearbook of China, 1989, and differ from data in other official tables of petroleum use.
(b) Crude oil used for heating is included in the total for electricity generation for 1980-1984.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing).

Table IV-31. Diesel Oil Consumption by End-Use Sector and Inputs to Conversion, 1980-1989 (a)

1. Million Tonnes

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989(a)
Industry	4.15	4.05	4.29	4.41	4.74	5.91	6.53	6.65	6.35	6.37
Agriculture	5.99	5.64	5.23	5.32	5.64	5.03	5.37	5.84	6.14	6.61
Transportation	5.12	4.89	5.09	5.48	5.84	6.46	7.88	8.70	9.14	9.57
Commercal & Other	0.64	0.67	0.53	0.72	0.60	0.85	0.77	1.00	2.10	2.57
Residential	(b)	(b)	(b)	(b)	(b)	0.02	0.02	0.03	0.06	0.01
urban residential	(b)	(b)	(b)	(b)	(b)	<0.01	0.02	0.01	0.03	(b)
rural residential	(b)	(b)	(b)	(b)	(b)	0.01	(b)	0.02	0.03	(b)
Subtotal:	*15.91*	*15.24*	*15.15*	*15.92*	*16.83*	*18.27*	*20.57*	*22.21*	*23.79*	*25.13*
Inputs to Conversions:										
Thermal Power Generation	0.72	1.21	0.73	0.55	0.70	1.04	0.59	0.92	1.96	2.35
Heat Supply	(c)	(c)	(c)	(c)	(c)	0.05	0.01	<0.01	<0.01	(c)
Subtotal:	*0.72*	*1.21*	*0.73*	*0.55*	*0.70*	*1.09*	*0.60*	*0.92*	*1.96*	*2.35*
Total	16.63	16.45	15.87	16.47	17.53	19.36	21.17	23.14	25.75	27.48

2. Mtce

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989(a)
Industry	6.07	5.91	6.26	6.43	6.92	8.63	9.53	9.71	9.27	9.31
Agriculture	8.75	8.23	7.64	7.77	8.23	7.35	7.84	8.52	8.96	9.65
Transportation	7.48	7.14	7.44	8.00	8.53	9.43	11.50	12.70	13.34	13.97
Commercal & Other	0.94	0.97	0.78	1.05	0.88	1.24	1.13	1.46	3.07	3.75
Residential	(b)	(b)	(b)	(b)	(b)	0.03	0.03	0.04	0.09	0.02
urban residential	(b)	(b)	(b)	(b)	(b)	0.01	0.03	0.01	0.04	(b)
rural residential	(b)	(b)	(b)	(b)	(b)	0.02	(b)	0.03	0.04	(b)
Subtotal:	*23.23*	*22.25*	*22.11*	*23.25*	*24.57*	*26.68*	*30.03*	*32.43*	*34.73*	*36.69*
Inputs to Conversions:										
Thermal Power Generation	1.06	1.76	1.06	0.80	1.02	1.51	0.86	1.35	2.86	3.43
Heat Supply	(c)	(c)	(c)	(c)	(c)	0.07	0.02	0.01	<0.01	(c)
Subtotal:	*1.06*	*1.76*	*1.06*	*0.80*	*1.02*	*1.59*	*0.88*	*1.35*	*2.86*	*3.43*
Total	24.28	24.01	23.17	24.05	25.59	28.27	30.90	33.78	37.59	40.12

(a) 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 and 10% of reported industrial use. Figures for agricultural and industrial sector consumption have been adjusted accordingly. Figures for 1980-1988 are based on end-use data in comprehensive energy balance tables in the Energy Statistical Yearbook of China, 1989, and differ from data in other official tables of petroleum use. 1990 figures are based on data in the 1991 China Statistical Yearbook, which is close to the data used for 1980-1988.

(b) Not available.

(c) Diesel oil used for heating is included in the totals for electricity generation for 1980-1984 and 1989.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Table IV-32. Natural Gas Consumption by End-Use Sector, 1980-1989

1. Billion Cubic Meters

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Industry (a)	13.16	11.44	10.99	11.27	11.41	12.08	12.46	12.15	12.08	12.82
of which:										
Oil & NG Extraction	(b)	(b)	(b)	(b)	(b)	3.42	3.35	3.91	4.00	3.85
Chemical Industry	(b)	(b)	(b)	(b)	(b)	4.14	4.28	4.43	4.56	4.73
Other Ind Sectors	(b)	(b)	(b)	(b)	(b)	4.52	4.83	3.81	3.52	4.24
Transportation	0.01	0.01	0.01	0.01	0.01	0.08	0.10	0.05	0.11	0.07
Commercial & Other	0.05	0.06	0.03	0.03	0.05	0.05	0.05	0.13	0.06	0.10
Residential	0.20	0.22	0.20	0.14	0.45	0.43	0.65	0.77	1.53	1.68
Subtotal:	*13.42*	*11.73*	*11.23*	*11.45*	*11.92*	*12.64*	*13.26*	*13.10*	*13.78*	*14.67*
Inputs to Conversions:										
Thermal Power Generation	0.24	0.24	0.21	0.20	0.20	0.27	0.47	0.76	0.57	0.36
Heat Supply	(b)	(b)	(b)	(b)	(b)	0.02	0.03	0.03	0.01	(b)
Subtotal:	*0.24*	*0.24*	*0.21*	*0.20*	*0.20*	*0.29*	*0.50*	*0.79*	*0.58*	*0.36*
Total	13.66	11.97	11.44	11.65	12.12	12.93	13.76	13.89	14.36	15.03

2. Mtce

End Use Sector	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Industry (a)	17.50	15.22	14.62	14.99	15.18	16.07	16.57	16.16	16.07	17.05
of which:										
Oil & NG Extraction	(b)	(b)	(b)	(b)	(b)	4.55	4.46	5.20	5.32	5.12
Chemical Industry	(b)	(b)	(b)	(b)	(b)	5.51	5.69	5.89	6.06	6.29
Other Ind Sectors	(b)	(b)	(b)	(b)	(b)	6.01	6.42	5.07	4.68	5.64
Transportation	0.01	0.01	0.01	0.01	0.01	0.11	0.13	0.07	0.15	0.09
Commercial & Other	0.07	0.08	0.04	0.04	0.07	0.07	0.07	0.17	0.08	0.13
Residential	0.27	0.29	0.27	0.19	0.60	0.57	0.86	1.02	2.03	2.23
Subtotal:	*17.85*	*15.60*	*14.94*	*15.23*	*15.85*	*16.81*	*17.64*	*17.42*	*18.33*	*19.51*
Inputs to Conversions:										
Thermal Power Generation	0.32	0.32	0.28	0.27	0.27	0.36	0.63	1.01	0.76	0.48
Heat Supply	(b)	(b)	(b)	(b)	(b)	0.03	0.04	0.04	0.01	(b)
Subtotal:	*0.32*	*0.32*	*0.28*	*0.27*	*0.27*	*0.39*	*0.67*	*1.05*	*0.77*	*0.48*
Total	18.17	15.92	15.22	15.49	16.12	17.20	18.30	18.47	19.10	19.99

(a) Industry category includes industry and construction, but excludes power generation and heating.
(b) Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Table IV-33. End-Use Electricity Consumption by Sector, 1980-1989

1. Billion kWh

Year	Industry (a)	Agriculture	Trans-portation (b)	Residential (c) & Commercial	Total (d)
1980	185.23	27.00	2.65	19.08	233.96
1981	188.42	28.16	2.91	21.09	240.58
1982	202.10	28.64	2.99	22.69	256.42
1983	218.38	28.64	3.58	24.07	274.67
1984	234.04	28.84	4.14	28.83	295.85
1985	246.22	31.74	6.34	38.22	322.52
1986	273.01	32.19	6.69	41.59	353.48
1987	299.30	35.96	7.67	48.47	391.40
1988	327.85	37.89	8.95	57.11	431.80
1989	345.23	41.05	9.87	64.44	460.59

2. Shares

Year	Industry (a)	Agriculture	Trans-portation (b)	Residential (c) & Commercial	Total (d)
1980	79%	12%	1%	8%	100%
1981	78%	12%	1%	9%	100%
1982	79%	11%	1%	9%	100%
1983	80%	10%	1%	9%	100%
1984	79%	10%	1%	10%	100%
1985	76%	10%	2%	12%	100%
1986	77%	9%	2%	12%	100%
1987	76%	9%	2%	12%	100%
1988	76%	9%	2%	13%	100%
1989	75%	9%	2%	14%	100%

(a) Includes construction sector and excludes power sector consumption, which is composed of in-plant consumption and other power sector use (see Table IV-14, Power Sector Electricity Consumption).
(b) Does not include that used for transportation by units in other sectors.
(c) Includes electricity consumption for "nonproductive" sectors. Note change in definition of residential electricity consumption in 1985.
(d) Totals are slightly different than in Table II-17, Electricity Generation and Consumption due to different methods of calculation. Whereas the totals in this table are derived by subtracting power sector use and transmission and distribution losses from gross generation, the totals in Table II-17 are the sum of reported sectoral end use minus power sector consumption.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Energy in China, 1990 (MOE, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Figure IV-19. Electricity Consumption by Sector, 1980-1989

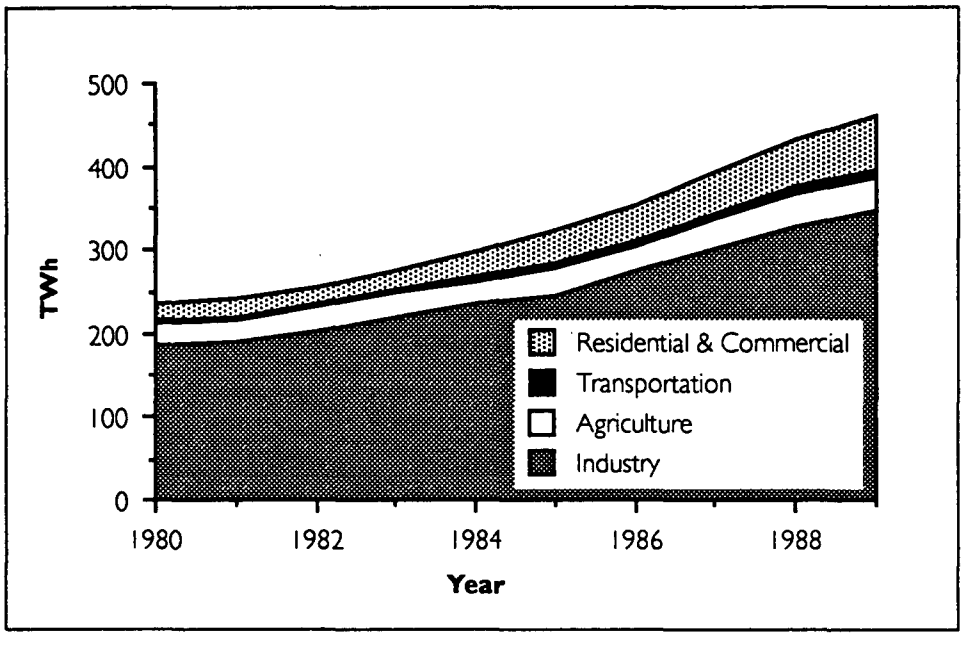


Table IV-34. Electricity Consumption by Sector, Various Years 1949-1972, and 1976-1989 (a)

1. Shares

Year	Industry: Heavy	Industry: Light	Industry: Subtotal	Trans-poration (b)	Rural (c)	Urban (d)	Total Consumption
1949	34%	35%	69%	0.6%	0.6%	30%	100%
1952	43%	37%	80%	0.9%	0.7%	18%	100%
1957	59%	24%	83%	0.4%	0.7%	16%	100%
1962	70%	15%	85%	0.6%	4%	11%	100%
1966	69%	15%	84%	0.6%	8%	8%	100%
1972	70%	13%	82%	0.6%	11%	7%	100%
1976	65%	14%	78%	1%	14%	7%	100%
1977	65%	14%	79%	1%	14%	7%	100%
1978	66%	13%	79%	1%	14%	6%	100%
1979	66%	13%	79%	1%	14%	7%	100%
1980	65%	13%	78%	1%	15%	7%	100%
1981	63%	14%	76%	1%	16%	7%	100%
1982	62%	14%	76%	1%	16%	8%	100%
1983	61%	15%	76%	1%	16%	8%	100%
1984	61%	15%	75%	1%	16%	8%	100%
1985	59%	15%	74%	1%	17%	9%	100%
1986	58%	15%	73%	1%	16%	10%	100%
1987	58%	15%	73%	1%	16%	10%	100%
1988	57%	15%	72%	2%	16%	10%	100%
1989	54%	17%	71%	2%	17%	10%	100%

2. TWh

Year	Industry: Heavy	Industry: Light	Industry: Subtotal	Trans-portation (b)	Rural (c)	Urban (d)	Total Consumption
1949	1.2	1.2	2.4	0.0	0.0	1.0	3.5
1952	2.7	2.3	5.0	0.1	0.0	1.1	6.2
1957	9.6	4.0	13.6	0.1	0.1	2.6	16.4
1962	26.5	5.5	32.0	0.2	1.5	4.0	37.8
1966	48.4	10.5	58.9	0.4	5.5	5.3	70
1972	86.1	15.6	101.7	0.7	13.0	8.2	123.6
1976	106.4	22.6	129.0	1.8	23.2	10.7	164.7
1977	121.1	25.2	146.2	2.2	25.5	12.3	186.3
1978	141.6	28.2	169.8	2.4	29.4	13.5	214.9
1979	153.9	30.6	184.5	1.4	32.5	15.2	233.6
1980	162.3	33.7	196.0	1.5	37.5	16.6	251.6
1981	162.1	35.2	197.4	2.1	41.4	18.1	259
1982	170.7	38.5	209.2	1.9	44.0	20.9	275.3
1983	180.9	44.0	224.9	2.1	47.5	22.6	297.1
1984	193.4	47.0	240.3	2.6	50.8	25.9	319.6
1985	204.9	52.3	257.2	3.1	57.5	30.7	348.5
1986	219.1	57.7	276.8	4.6	62.3	36.1	379.7
1987	245.2	61.8	307.0	5.1	69.5	41.9	423.5
1988	264.3	66.9	331.2	8.8	75.7	45.7	461.3
1989	266.9	84.7	351.6	9.4	82.7	51.5	495.2

(a) Data are slightly different than those in Table IV-34, End-Use Electricity Consumption by Sector, because of different sources. The major difference is that these figures include consumption by electric power plants in the heavy industry category, while those in the other table do not. Consumption by the commercial sector is probably contained mainly in the "urban" category, with a small amount in the "rural" category.
(b) 1988 and 1989 figures include consumption by the post and telecommunications sector.
(c) Includes rural household electricity consumption.
(d) Besides urban and municipal consumption, this category probably includes most of commercial sector consumption.

Source: Energy in China, 1990 (MOE, Beijing); Electric Power Industry in China, 1985-1990 (Information Research Institute of Water Resources and Electric Power, MOE and MWR, Beijing); China Statistical Yearbook, 1991 (SSB, Beijing).

Chapter V—Energy Consuming Equipment and Activities

Equipment and Activities

Industrial Equipment and Products

Because the industrial sector consumes two-thirds of all commercial energy, industrial machinery is probably the category of most interest in this chapter. Unfortunately, the sources of data on stocks of industrial equipment usually have serious deficiencies, e.g. incomplete coverage, omission of averages or ranges for equipment capacity, and undefined physical energy intensities.

The output of major industrial products showed large increases in the 1980s (Table V-11), suggesting that improvements in industrial energy efficiency could provide substantial benefits. Energy consumption per unit of output of industrial products is generally higher than for developed countries because funds are not available for investment in newer processes and equipment. Official statistics for physical energy intensities of some major products at key plants show improvement over the past two decades (Table V-12). There is anecdotal evidence, however, that many small urban and rural enterprises use old and inefficient equipment discarded by larger enterprises. Better figures on energy intensities and equipment stocks are needed to develop strategies for investments in energy efficiency.

The industrial sector share of electrical equipment capacity is smaller than its share of electricity consumption (61% and 76% respectively in 1988; Table V-9 and IV-34), indicating that industrial sector equipment is more intensively utilized than that in other sectors, especially agriculture. Not surprisingly, heavy industry accounts for most of the capacity, with electrical demand dominated by the chemical, metals, minerals, machinery, and coal industries (Table V-10).

Transportation

Rail has been the most important means of passenger and freight transportation for most of the period since 1949 (Tables V-1 and V-2).[1] In the late 1980s, however, waterborne shipping, mainly coastal shipping, surpassed railroad as the primary mode of freight transportation, and in 1990 passenger mileage on highways exceeded that on railroads for the first time. Although river and ocean transportation of freight has grown, passenger travel by water dropped from 20 billion passenger-km (bp-km) in 1987 and 1988 to 16 bp-km 1990. Air travel has surged, from less than 4 bp-km in 1980 to 23 bp-km for air travel in 1990.

The number of motor vehicles has climbed tremendously over the past two decades, with growth in the stock of motorcycles and passenger vehicles especially pronounced since the early 1980s (Table V-3). In 1990 motorcycles were the most numerous vehicles after tractors (4.2 million and 4.6 million units respectively). Many of the tractors are used primarily for transportation. The stock of trucks, 3.7 million in 1990, is dominated by gasoline-fueled vehicles with payloads of about 5 tons. There were 1.6 million passenger vehicles, in 1990, about four-fifths of which were small vehicles (mainly sedans) and the remainder buses.[2]

For reasons of economics, energy conservation, and reducing urban air pollution, the stock of railway locomotives has shifted away from coal-burning steam engines (which are no longer manufactured) to diesel and electric locomotives (Table V-4). Of the nearly 14,000 locomotives in use in 1990, steam, diesel, and electric locomotives accounted for 47%, 42%, and 11% respectively. Since the early 1980s, there has been heavy investment in electrification of railways, especially on coal transportation routes.

Household Appliances

Consumer appliances are available on a scale undreamed of 15 years ago. The numbers of electric fans, television sets, washing machines, and refrigerators all increased by more than an order of magnitude between 1978 and 1990 (Table V-5), and the total capacity of household appliances as a percentage of all electrical equipment has been increasing (Table V-9). Most urban households now have at least one fan and television set, and in 1990 78% and 42% owned washing machines and refrigerators respectively (Table V-6). The figures for rural households are much lower, owing to lower incomes and insufficient electricity supply (Table V-7).

Agricultural Machinery

The largest category of agricultural machinery, in terms of power, is tractors, followed by motors for irrigation and drainage, and trucks (Table V-8). The stock of small tractors increased most rapidly in the 1980s, and the growth in the stock of trucks nearly matched that. Slightly more than half of irrigation motors are powered by electricity, and the rest are diesel-fueled. Growth in rural fuel consumption (Table IV-21) has not matched increases in agricultural equipment, suggesting that fuel shortages are worsening.

NOTES

1 The comparisons here are made on the basis of tonne-km and passenger km, not simple tonnage or number of passengers.

2 Published data on fuel consumption by vehicle type generally covers samples unrepresentative of the total vehicle stock; therefore we do not present them here.

Table V-1. Freight Movements by Mode, 1949-1990—Billion Tonne-km

Year	Railroad			Highway (a)	River	Ocean	Pipeline	Air	Total
	Central	*Local*	Total RR						
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	1.70	-	<0.005	63.06
1952	*60.16*	-	60.16	1.45	11.78	2.80	-	<0.005	76.19
1953	*78.14*	-	78.14	2.33	14.46	4.10	-	<0.005	99.03
1954	*93.24*	-	93.24	2.91	20.47	3.70	-	0.01	120.33
1955	*98.15*	-	98.15	3.41	23.40	7.00	-	0.01	131.97
1956	*120.35*	-	120.35	4.44	27.69	6.60	-	0.01	159.09
1957	*134.59*	-	134.59	4.80	33.86	7.70	-	0.01	180.96
1958	*185.53*	-	185.53	7.75	44.22	7.50	-	0.01	245.01
1959	*247.63*	-	247.63	10.67	59.30	9.60	-	0.02	327.22
1960	*276.69*	-	276.69	13.25	64.98	11.80	-	0.03	366.75
1961	*200.77*	-	200.77	7.61	42.58	11.70	-	0.02	262.68
1962	*171.91*	*0.20*	172.11	6.21	33.96	11.30	0.00	0.02	223.60
1963	*181.46*	*0.14*	181.60	6.43	33.70	13.10	0.00	0.02	234.85
1964	*212.45*	*0.15*	212.60	7.42	36.93	18.10	0.00	0.02	275.07
1965	*269.65*	*0.23*	269.88	9.51	43.32	23.70	0.00	0.03	346.44
1966	*301.63*	*0.27*	301.89	11.64	48.60	28.00	0.00	0.03	390.16
1967	*226.58*	*0.30*	226.88	10.15	41.57	26.40	0.00	0.04	305.04
1968	*223.53*	*0.35*	223.88	8.44	43.07	35.50	0.00	0.03	310.92
1969	*277.93*	*0.40*	278.33	11.03	49.53	36.50	0.00	0.03	375.42
1970	*349.14*	*0.46*	349.60	13.81	51.23	41.90	0.00	0.04	456.58
1971	*375.95*	*0.64*	376.59	15.38	56.87	70.70	0.90	0.03	520.47
1972	*390.51*	*0.81*	391.32	16.43	60.88	90.10	5.70	0.03	564.46
1973	*407.48*	*0.74*	408.22	17.57	67.22	127.70	8.70	0.03	629.44
1974	*380.58*	*0.71*	381.29	17.48	69.18	147.10	16.30	0.04	631.39
1975	*424.62*	*0.95*	425.57	20.27	81.77	175.70	26.20	0.06	729.57
1976	*386.07*	*0.88*	386.95	20.96	85.52	161.20	35.70	0.07	690.40
1977	*455.73*	*1.15*	456.88	25.13	102.07	174.10	38.70	0.08	796.96
1978	*533.35*	*1.17*	534.52	27.41	129.22	248.70	43.00	0.10	982.95
1979	*558.80*	*1.00*	559.80	74.50	139.32	317.10	47.60	0.12	1,138.44
1980	*570.75*	*0.96*	571.70	76.40	152.08	353.20	49.10	0.14	1,202.62
1981	*570.13*	*1.07*	571.20	78.00	150.69	364.30	49.90	0.17	1,214.26
1982	*610.92*	*1.08*	612.00	94.90	170.81	376.90	50.10	0.20	1,304.91
1983	*663.39*	*1.21*	664.60	108.40	181.06	397.70	52.40	0.23	1,404.39
1984	*723.51*	*1.29*	724.80	153.60	196.10	437.40	57.20	0.31	1,569.41
1985	*811.19*	*1.41*	812.60	169.30	237.10	532.90	60.30	0.42	1,812.62
1986	*875.03*	*1.47*	876.50	211.80	270.00	594.80	61.20	0.48	2,014.78
1987	*945.62*	*1.58*	947.20	266.00	288.90	657.60	62.50	0.65	2,222.85
1988	*986.06*	*1.74*	987.80	322.00	310.40	696.60	65.00	0.73	2,382.53
1989	*1,037.30*	*2.12*	1,039.42	337.47	349.76	768.90	62.90	0.69	2,559.14
1990	*1,060.12*	*2.12*	1,062.24	335.81	(b)	1,159.19 (c)	62.70	0.82	2,620.76

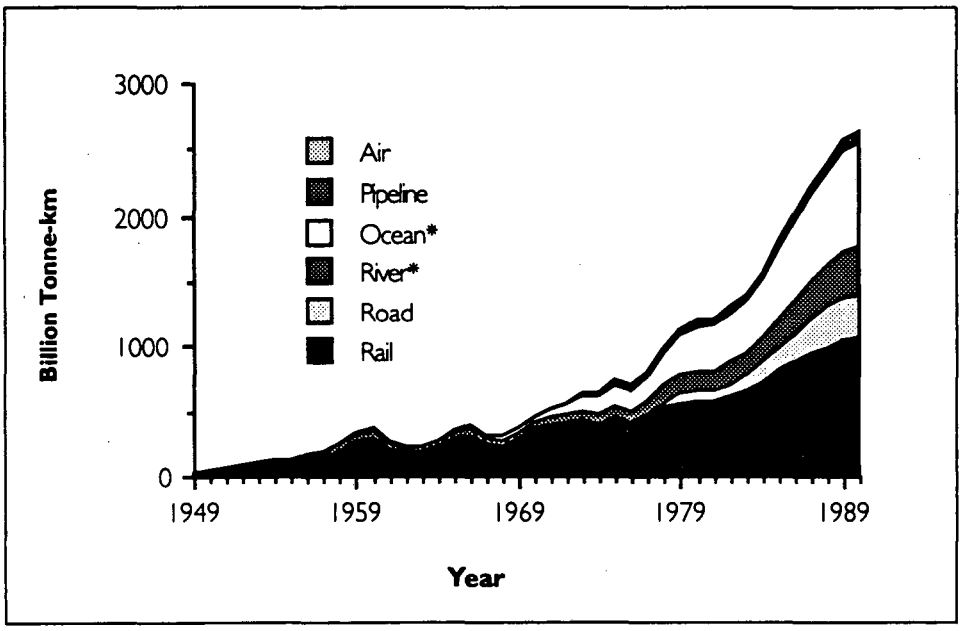
(a) Data on highway transport for 1949-1978 include freight carried by transportation work units only. Subsequent data also include freight carried by vehicles belonging to other types of work units, e.g., industrial and agricultural. Data for 1984 and later years further include freight carried by private motor vehicles.
(b) River shipping is contained in 1990 figure for ocean shipping.
(c) Sum of ocean and river shipping.
– Not available.

Source: Statistical Yearbook of China, 1990 & 1991 (SSB, Beijing).

Table V-1. Freight Movements by Mode, 1949-1990—Billion Tonne-km (continued)

Average Rates of Growth (tonne-km):	
Rail	
1949-1971	14.3%
1971-1980	4.7%
1981-1990	7.1%
Highway	
(see not (a) on previous page)	
1949-1971	12.9%
1979-1983	9.8%
1984-1990	13.9%
River	
1949-1971	10.0%
1971-1980	11.5%
1981-1989	11.1%
Ocean	
1951-1971	17.4%
1971-1980	19.6%
1981-1989	9.8%
Pipeline	
1971-1975	132.3%
1976-1980	8.3%
1981-1990	2.6%
Air	
1949-1971	3.0%
1971-1980	18.7%
1981-1990	19.1%
Total	
1949-1971	14.0%
1971-1980	9.8%
1981-1990	8.9%

Figure V-1. Freight Movements by Mode, 1949-1990



*1990 figures for river and ocean freight are calculated from total water freight at their 1989 ratio.

Table V-2. Passenger Travel by Mode, 1949-1990—Billion Passenger-km

Year	Railroad			Highway	Water	Air	Total
	Central	*Local*	Total RR				
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

Source: Statistical Yearbook of China, 1989 -1991 (SSB, Beijing).

Table V-2. Passenger Travel by Mode, 1949-1990—Billion Passenger-km (continued)

Average Rates of Growth: (passenger-km)	
Rail	
1949-1971	8.4%
1971-1980	6.8%
1981-1990	6.6%
Highway	
1949-1971	17.3%
1979-1983	11.8%
1984-1990	13.5%
Water	
1949-1971	7.4%
1971-1980	6.5%
1981-1989	2.0%
Air	
1949-1971	2.1%
1971-1980	33.4%
1981-1990	18.5%
Total	
1949-1971	9.3%
1971-1980	8.4%
1981-1990	9.4%

Figure V-2. Passenger Travel by Mode, 1949-1989

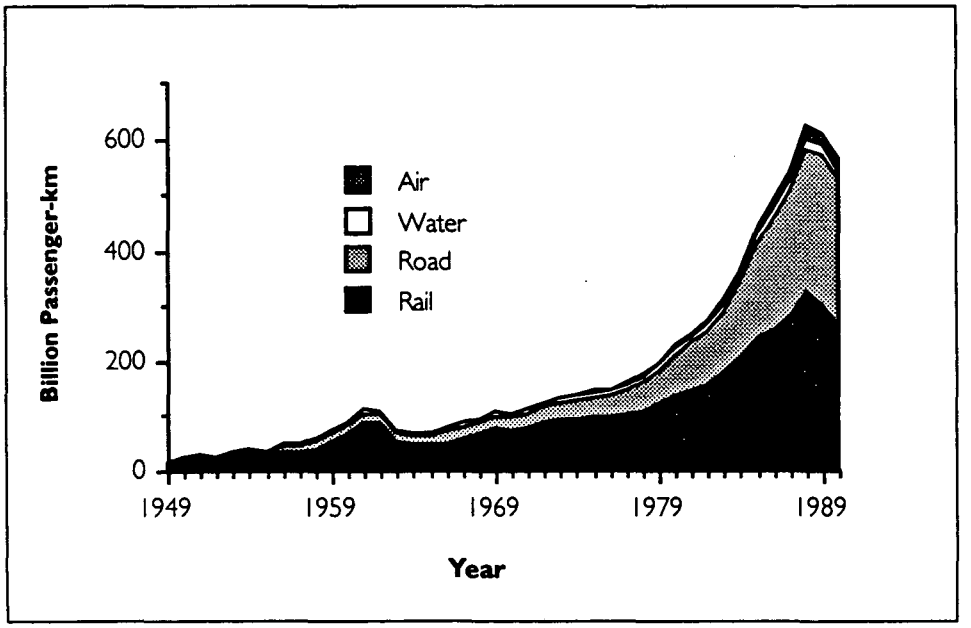


Table V-3. Stock of Civil Motor Vehicles in China, 1970-1990—Thousands

Year	Trucks			Passenger Vehicles			Specialty Vehicles (e)
	Large Trucks (a)	Small Trucks (b)	*Trucks Subtotal*	Buses (c)	Small Vehicles (d)	*Passenger Subtotal*	
1970	305.2	15.2	320.4	31.1	44.2	75.3	-
1971	356.3	20.1	376.4	35.7	48.1	83.8	-
1972	418.0	19.4	437.4	40.9	59.3	100.2	-
1973	483.9	20.8	504.7	47.9	71.6	119.5	-
1974	561.7	24.4	586.1	52.5	90.3	142.8	-
1975	652.5	27.8	680.3	60.3	112.8	173.1	-
1976	754.2	31.2	785.4	68.9	134.2	203.1	-
1977	854.2	29.4	883.6	77.3	149.1	226.4	-
1978	966.8	34.9	1,001.7	87.9	171.1	259.0	-
1979	1,107.2	36.5	1,143.7	99.6	197.2	296.8	-
1980	1,257.6	41.4	1,299.0	113.0	237.8	350.8	-
1981	1,374.1	66.8	1,440.9	130.4	275.3	405.7	-
1982	1,480.6	86.9	1,567.5	145.6	296.2	441.8	-
1983	1,576.7	117.7	1,694.4	161.3	316.5	477.8	-
1984	1,695.6	188.1	1,883.7	182.3	380.5	562.8	-
1985	-	-	2,232.0	-	-	794.5	-
1986	-	-	2,465.7	-	-	966.1	-
1987	2,191.9	620.3	2,812.1	273.6	841.0	1,114.6	154.0
1988	2,370.1	718.8	3,178.5	299.4	1,004.4	1,303.8	161.6
1989	-	-	3,463.7	311.9	1,152.4	1,464.3	185.2
1990	-	-	3,684.8	333.0	1,288.9	1,621.9	206.9

Year	Motorcycles			Wheeled Tractors			Other Vehicles
	Two-Wheeled	Three-Wheeled	*Motorcycle Subtotal*	Four-Wheeled	Walking	*Tractor Subtotal*	
1970	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-
1972	-	-	-	-	-	-	-
1973	-	-	-	-	-	-	-
1974	-	-	-	-	-	-	-
1975	-	-	-	-	-	-	-
1976	-	-	-	-	-	-	-
1977	-	-	-	-	-	-	-
1978	-	-	126.0	-	-	-	-
1979	-	-	-	-	-	-	-
1980	-	-	244.7	-	-	-	-
1981	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-
1985	-	-	946.0	-	-	1,783.5	-
1986	-	-	1,483.2	-	-	2,288.2	-
1987	1,358.5	1,119.2	2,477.6	1,429.2	2,318.2	3,747.4	304.6
1988	2,136.0	887.9	3,023.9	1,403.4	2,512.7	3,916.1	318.2
1989	2,670.0	923.3	3,593.3	1,580.9	2,523.2	4,104.1	374.7
1990	3,105.8	1,107.0	4,212.8	1,977.7	2,648.1	4,625.8	410.5

(a) Large trucks have an average payload of about 5 tonnes.
(b) Small trucks have an average payload of about 1.7 tonnes.
(c) Buses have an average of 40 seats.
(d) Small passenger vehicles have an average of 8 seats.
(e) Includes the categories of "specialized motor vehicles" and "special purpose motor vehicles".
– Not available.

Sources: Energy Statistical Yearbook of China 1989 (SSB, Beijing); Statistical Yearbook of China 1988 – 1991 (SSB, Beijing).

Figure V-3. Civilian Motor Vehicles, 1970-1990

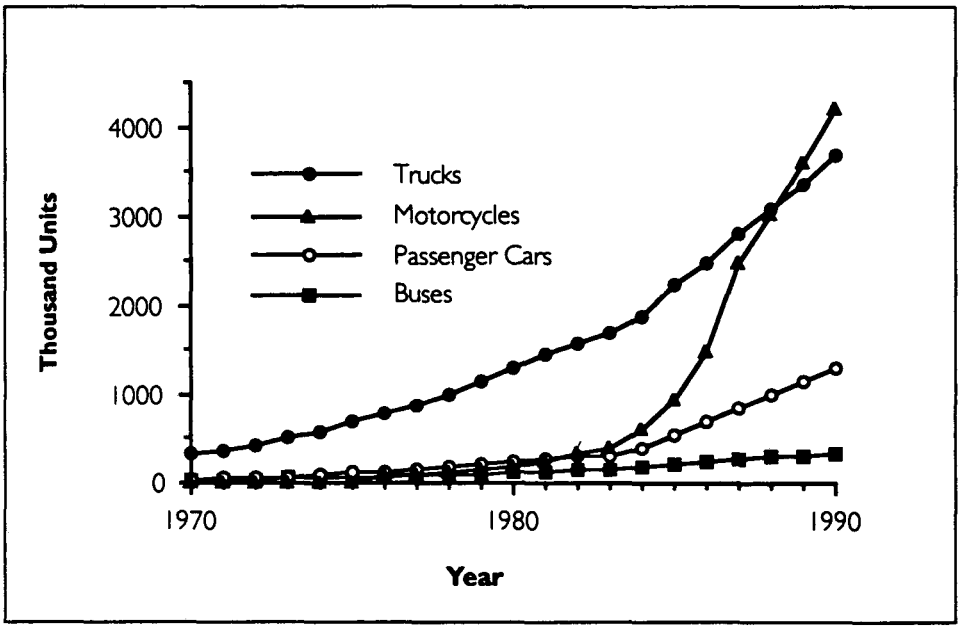


Table V-4. Stock of Railway Locomotives by Engine Type, Various Years 1952-1990

1. Central Railway Locomotives

Year	Steam		Diesel		Electric	
	Quantity (units)	Haulage/Unit (tonnes)	Quantity (units)	Haulage/Unit (tonnes)	Quantity (units)	Haulage/Unit (tonnes)
1952	4,180	-	0	-	0	-
1955	4,218	-	0	-	0	-
1960	6,039	-	12	-	2	-
1965	6,142	-	66	-	30	-
1970	6,878	-	566	-	60	-
1971	7,076	-	701	-	85	-
1972	7,272	-	887	-	94	-
1973	7,522	-	1,064	-	140	-
1974	7,715	-	1,253	-	170	-
1975	7,824	-	1,352	-	191	-
1976	7,836	-	1,478	-	191	-
1977	7,830	-	1,617	-	199	-
1978	7,828	-	1,805	-	221	-
1979	7,899	-	2,014	-	236	-
1980	7,801	-	2,190	-	287	-
1981	7,718	-	2,325	-	317	-
1982	7,613	-	2,508	-	350	-
1983	7,530	-	2,734	-	407	-
1984	7,551	2,156	3,102	2,018	484	2,248
1985	7,674	2,192	3,511	2,216	587	2,378
1986	7,542	2,212	4,017	2,379	707	2,483
1987	7,381	2,207	4,400	2,460	948	2,577
1988	7,130	2,191	4,836	2,489	1,197	2,597
1989	6,686	-	5,250	-	1,430	-
1990	6,279	-	5,680	-	1,633	-

2. Local Railway Locomotives

Year	Steam Quantity (units)	Diesel Haulage/Unit (tonnes)
1978	211	114
1979	-	-
1980	279	126
1981	-	-
1982	-	-
1983	-	-
1984	-	-
1985	239	129
1986	250	124
1987	247	122
1988	233	128
1989	233	122
1990	253	125

- Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); China Statistical Yearbook, 1990 & 1991 (SSB, Beijing).

Figure V-4. Locomotive Stock, 1952-1989

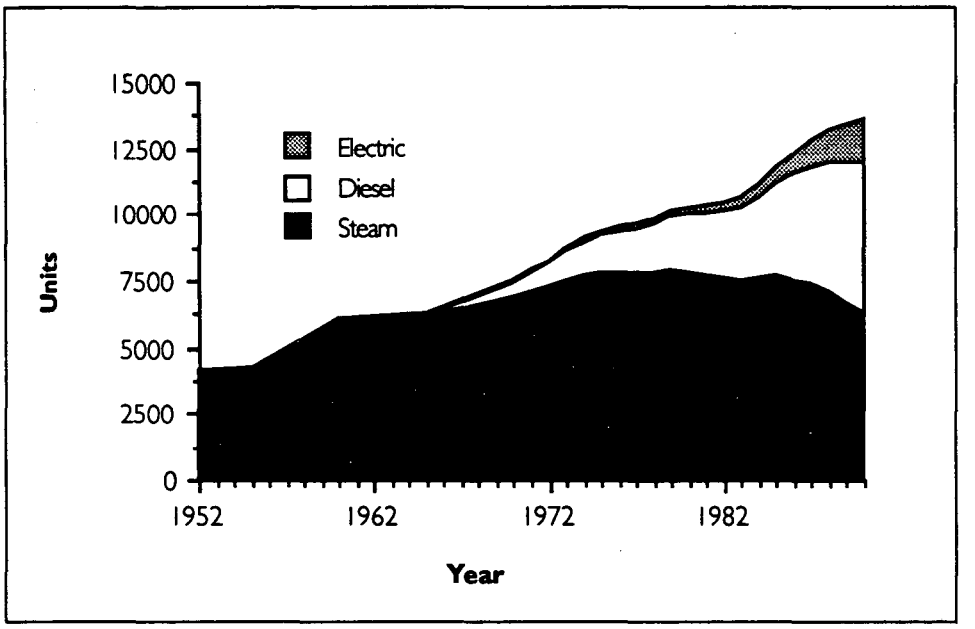
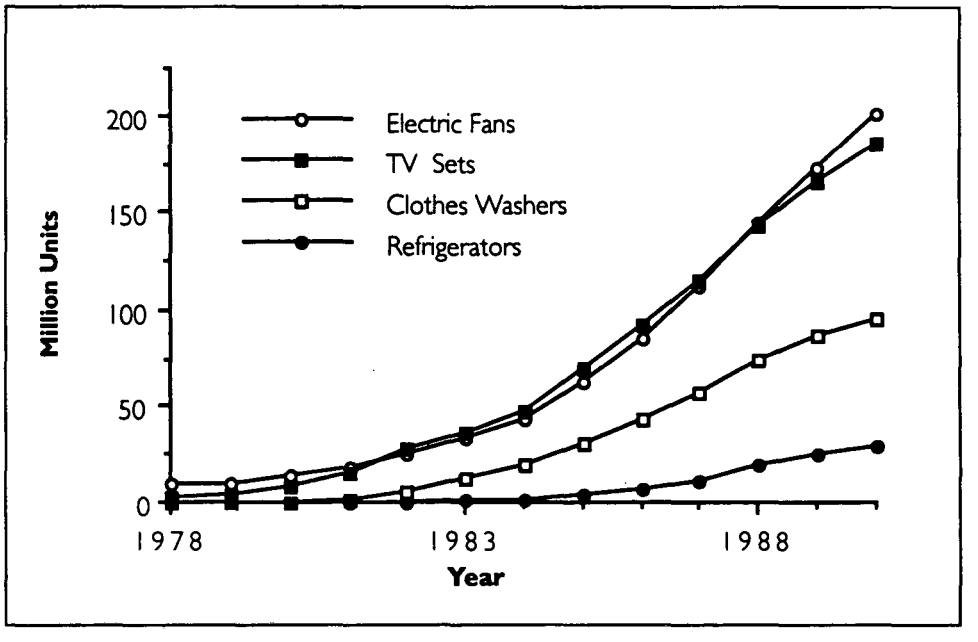


Table V-5. Stock of Major Appliances, 1978-1990—Millions

Year	Electric Fans	TV Sets	Electric Clothes Washers	Refrigerators
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

Figure V-5. Appliance Stocks, 1978-1990

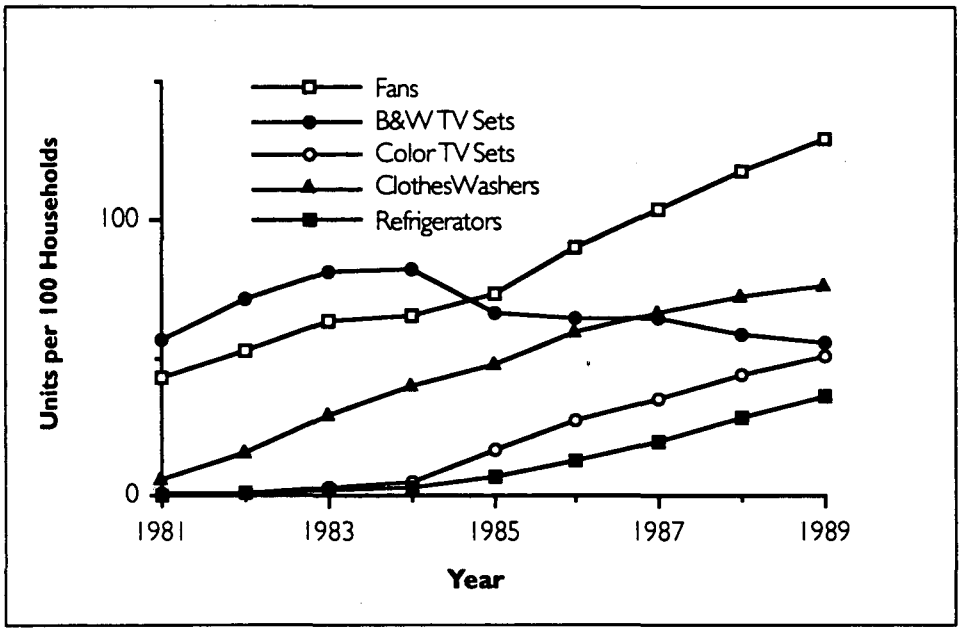


Source: Statistical Yearbook of China, various years (SSB, Beijing).

Table V-6. Urban Household Survey Data, 1981-1990 (a)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Surveyed Households	8,715	9,020	9,060	12,500	24,338	31,126	32,855	34,945	35,235	35,660
People per Household	4.24	4.14	4.06	4.04	3.89	3.82	3.74	3.63	3.55	3.50
Average Annual Income (yuan/yr) (b)	2,122	2,216	2,326	2,667	2,913	3,476	3,786	4,327	4,927	5,330
Annual Cost of Living (yuan/yr) (b)	1,937	1,950	2,054	2,260	2,619	3,052	3,308	4,007	4,299	4,476
of which cost of fuels & utilities (yuan/yr)	56	57	59	62	71	80	84	100	122	140
Floor Area per Person (m2)	5.27	5.61	5.9	6.32	7.46	8.04	8.47	8.79	(c)	(c)
Coal Use per Household (kg/yr)	1,018	950	931	1,029	1,053	1,022	884	1,019	772	721
Appliances per 100 Households:										
Fans	43	53	64	66	74	90	104	118	129	136
B & W TV Sets	57	72	81	82	67	65	65	59	56	(c)
Color TV Sets	0.6	1	3	5	17	27	35	44	51	(c)
Clothes Washers	6	16	29	40	48	60	67	73	76	78
Refrigerators	0.2	0.7	2	3	7	13	20	28	36	42

Figure V-6. Urban Appliance Ownership, 1981-1989



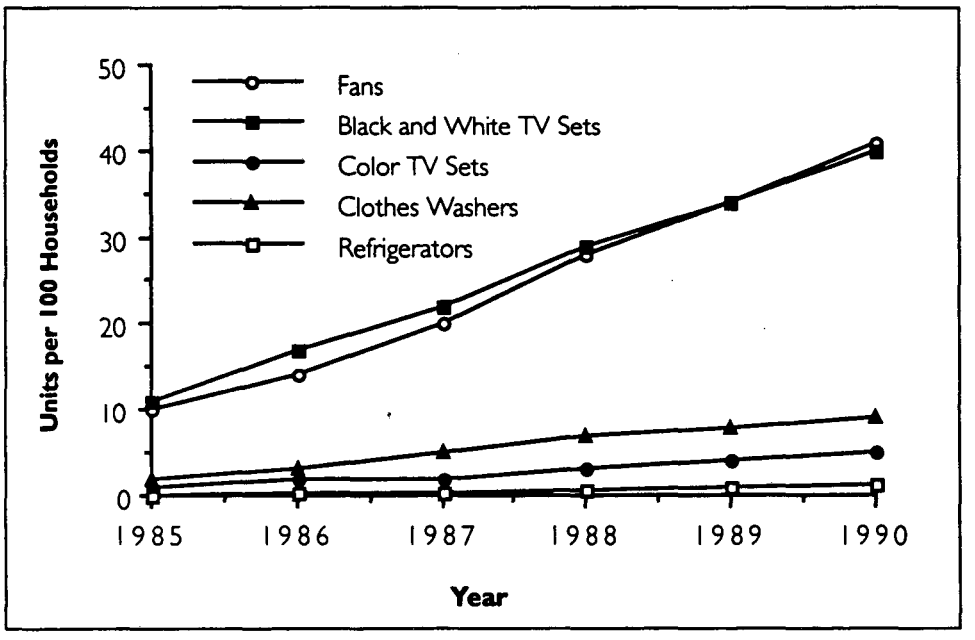
(a) The surveys were conducted among a wide variety of cities. Data may not be statistically representative of all urban areas in China.
(b) Current yuan per household.
(c) Not available.

Source: China Statistical Yearbook, various years (SSB, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago).

Table V-7. Rural Household Survey Data, Various Years 1981-1990 (a)

	1978	1980	1985	1986	1987	1988	1989	1990
Surveyed Households	6,095	15,914	66,642	66,836	66,912	67,186	66,906	66,478
People per Household	5.74	5.54	5.12	5.07	5.01	4.94	4.86	4.84
Average Annual Income (yuan/yr) (b)	767	1,060	2,036	2,148	2,317	2,692	2,923	3,048
Annual Cost of Living (yuan/yr) (b)	666	(c)	1,625	1,810	1,995	2,355	2,602	2,604
of which cost of fuels (yuan/yr)	48	(c)	93	94	97	107	114	118
Floor Area per Person (m2)	8.1	9.4	14.7	15.3	16.0	16.6	17	(c)
Appliances per 100 Households:								
Fans	(c)	(c)	10	14	20	28	34	41
B & W TV Sets	(c)	0.4	11	17	22	29	34	40
Color TV Sets	(c)	(c)	1	2	2	3	4	5
Clothes Washers	(c)	(c)	2	3	5	7	8	9
Refrigerators	(c)	(c)	0.1	0.2	0.3	0.6	0.9	1.2

Figure V-7. Rural Appliance Ownership, 1985-1989



(a) Surveys were conducted in a wide variety of areas. Data may not be statistically representative of all rural areas in China.
(b) Current yuan per household
(c) Not available.
(d) 1980 figure is total of color and black and white television sets.

Source: Statistical Yearbook of China, various years (SSB, Beijing).

Table V-8. Stock of Agricultural Machinery, 1980-1990—GW

Year	Large & Medium Tractors	Small & Walking Tractors	Boat Tractors (c)	Rice Trans planters	Drainage and Irrigation Motors				Trucks	Motorized Fishing Boats	Motor-Driven Sprayers	Balance/ Other(b)	Total
					diesel	*electric*	*other*	Subtotal					
1980 (a)	24.02	16.38	0.58	0.21	27.57	20.35	7.74	55.66	9.09	2.62	0.54	-15.26	149.50
1981 (a)	25.59	17.85	0.62	0.16	27.12	20.81	7.99	55.92	11.75	2.97	0.59	-12.40	158.97
1982 (a)	26.49	20.16	0.55	0.12	26.92	29.75	0.52	57.19	14.08	3.27	0.62	-11.24	168.45
1983 (a)	27.46	24.25	0.48	0.07	27.41	30.66	0.46	58.53	19.11	3.31	0.67	-9.69	182.73
1984 (a)	27.57	29.27	0.39	0.05	26.54	31.59	0.44	58.57	24.97	3.40	0.64	-5.74	197.68
1985 (a)	27.82	34.14	0.32	0.03	26.03	31.95	0.36	58.35	31.18	3.72	0.57	-2.45	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	-0.39	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	1.95	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	2.61	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	3.67	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	0.49	287.08

(a) Values in these rows (except for irrigation motor subtotals, boats, and totals, which are given in watts in the Energy Statistical Yearbook) were calculated using a factor of 1 kW = 1.341 hp, derived from figures for the same year given in horsepower in the Statistical Yearbook of China and figures given in watts in the Energy Statistical Yearbook of China, 1989.

(b) "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 indicates discrepancies in reported values for categories and totals.

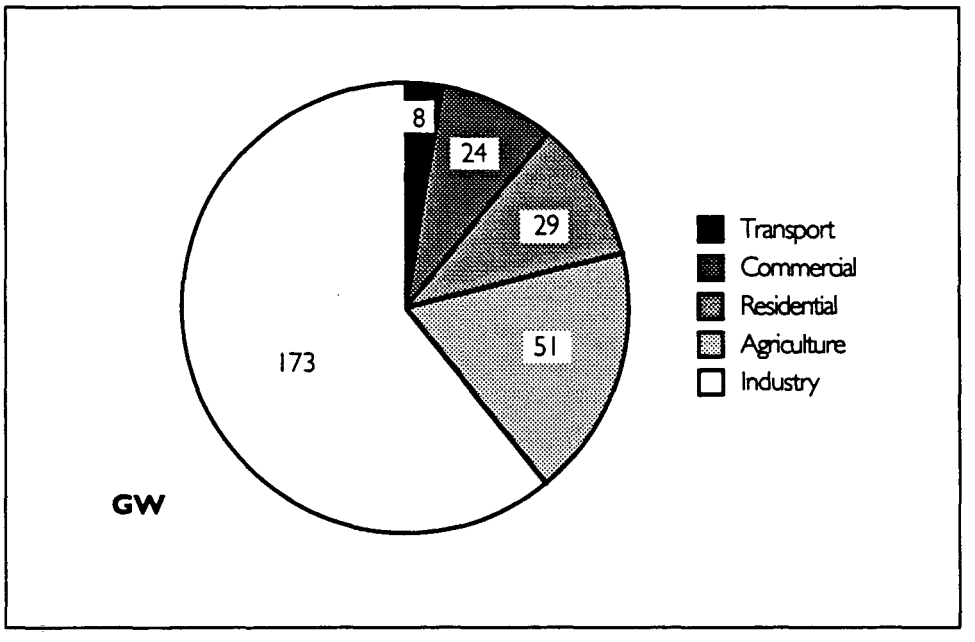
(c) "Boat tractors" are used in rice cultivation.

Sources: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China, various years, (SSB, Beijing).

Table V-9. Total Stock of Electricity-Consuming Equipment by Sector, 1986-1988—GW

Sector	1986	1987	1988
Agriculture (a)	43.91	47.72	51.29
Industry subtotal	145.67	160.48	173.47
of which:			
Light Industry	*42.30*	*45.99*	*49.53*
Heavy Industry	*98.83*	*109.34*	*118.40*
Other (b)	*4.54*	*5.14*	*5.54*
Communication & Transport	6.12	7.18	8.34
Commercial and Other	18.46	20.36	23.97
Subtotal Nonresidential Stock	**214.15**	**235.74**	**257.24**
Urban and Rural Domestic Electrical Appliances	19.96	25.21	28.90
Total Stock	**234.11**	**260.95**	**285.96**

Figure V-8. Capacity of Electricity Consuming Equipment, 1988



(a) Includes SSB categories of Agriculture, Forestry, Animal Husbandry, Fishery and Water Conservation.
(b) Includes SSB categories of Geological Survey and Exploration, and Construction.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing).

Table V-10. Total Stock of Industrial Electricity-Consuming Equipment by Subsector, 1988—GW

Light Industry	49.53
Heavy Industry	118.40
Other (a)	5.54
	173.47
Mining:	
Coal	11.50
Petroleum & NG	4.51
Ferrous Metals	1.94
Nonferrous Metals	2.41
Constr. Materials & Other Nonmetal	1.85
Salt	0.35
Other Mineral	0.11
Timber & Bamboo	0.36
Water Supply	2.57
Mining Subtotal	*25.59*
Manufacturing:	
Food, Beverage & Tobacco	12.01
Spinning & Weaving	9.51
Paper & Paper Prod.	4.05
Electricity, Steam & Hot Water	1.23
Petroleum Refining	2.35
Coking, Coal Gas & Coal Products	0.89
Chemical	19.99
Medicine	1.44
Chemical Fiber	1.90
Rubber & Plastics	4.50
Construction Materials and Nonmetal Mineral Products	15.22
Ferrous Metals Smelting & Rolling	14.49
Nonferrous Metals Smelting & Rolling	6.46
Metal Products	8.87
Machinery	17.05
Transportation and Electrical & Electronic Equipment	8.97
Other Industrial	13.42
Manufacturing Subtotal	*142.35*
Non-mining and Non-manufacturing Subtotal	*5.53*
Total	**173.47**

(a) Includes SSB categories of Geological Survey and Exploration, and Construction.

Source: Energy Statistical Yearbook of China

Table V-11. Output of Major Energy-Intensive Industrial Raw Materials 1980-1990—Million Tonnes

1. Physical Output, Million Tonnes

Year	Paper & Paperboard	Rolled Steel Products	Cement	Soda Ash	Caustic Soda	Sulfuric Acid	Synthetic Ammonia	Ethylene
1980	5.35	27.16	79.86	1.61	1.92	7.64	14.97	0.49
1981	5.40	26.70	82.90	1.65	1.92	7.81	14.83	0.51
1982	5.89	29.02	95.20	1.74	2.07	8.18	15.46	0.56
1983	6.61	30.72	108.25	1.79	2.12	8.70	16.77	0.65
1984	7.56	33.72	123.02	1.88	2.22	8.17	18.37	0.65
1985	9.11	36.93	145.95	2.01	2.35	6.76	17.18	0.65
1986	9.99	40.58	166.06	2.15	2.52	7.63	16.76	0.69
1987	11.41	43.86	186.25	2.36	2.74	9.83	19.41	0.94
1988	12.70	46.89	210.14	2.61	3.01	11.11	19.86	1.23
1989	13.33	48.59	210.29	3.04	3.21	11.53	20.68	1.40
1990	13.72	51.53	209.71	3.57	3.79	11.26	21.29	1.57
1991	12.58	55.47	243.56	3.88	3.51	13.14	21.96	-

2. Average Annual Rates of Growth, 1980-1991, Percent

Product	Growth Rate
Paper & Paperboard	8.1%
Rolled Steel Products	6.7%
Cement	10.7%
Soda Ash	8.3%
Caustic Soda	5.6%
Sulfuric Acid	5.1%
Ammonia Synthetic	3.5%
Ethylene (1980-1990)	12.4%

– Not available.

Source: China Statistical Yearbook, 1991 (SSB, Beijing); Statistical Yearbook of China'a Industrial Economy, 1990 (China Statistics Press, Beijing); China Statistical Information and Consultancy Service Center, 1992.

Table V-12. Physical Energy Intensity of Selected Industrial Products, 1970-1988

Year	Electric Arc Furnace Consumption (kwh/ ton of steel)	Overall Energy Use In Crude Steel Production (tce/ton)	AC Electricity Use In Electrolyzed Aluminum Production (MWh/ton)	Overall Energy Use for Electrolyzed Aluminum (tce/ton)	Electricity Consumed In Cement Production (a) (kwh/ton)	Fuel Used In Cement Clinker Production (a) (kgce/ton)
1970	696	-	19.21	-	91.2	223.1
1971	700	-	19.03	-	94.1	224.2
1972	691	-	17.14	-	93.4	223.6
1973	668	-	16.58	-	95.4	215.1
1974	691	-	16.80	-	96.8	216.2
1975	698	-	17.26	-	95.9	215.9
1976	710	-	16.94	-	99.2	215.4
1977	702	-	16.88	-	98.3	214.4
1978	677	-	16.06	-	96.7	211.2
1979	659	-	15.82	-	96.0	207.2
1980	647	2.04	15.43	-	96.7	206.5
1981	651	1.93	15.73	-	98.6	207.5
1982	643	1.91	16.11	-	100.0	207.6
1983	625	1.85	15.63	-	100.9	206.0
1984	619	1.78	15.46	-	102.4	205.9
1985	626	1.75	15.05	6.50	103.9	201.1
1986	650	1.71	15.29	6.89	105.6	198.2
1987	670	1.67	15.38	6.86	106.2	193.3
1988	644	1.65	15.25	7.14	107.3	191.2
International Comparisons						
India	-	1.40 (d)	-	-	-	-
Japan	428 (b)	0.64 (e)	16.09 (h)	-	108 (k)	116 (k)
USA	590 (c)	0.75 (f)	16.69 (i)	7.06 (j)	149 (b)	181 (f)
USSR	-	0.79 (g)	-	-	112 (g)	231 (g)

(a) For key plants only. As of 1988, there were 65 key plants, with annual capacities ranging from 200,000 to over 1 million tons of cement, producing about 18% of the total 1988 output of 200 million tons. About 60%, 10%, and 30% of key-plant cement output were from wet, semi-dry, and dry processes respectively.
(b) 1984; Kahane, 1986.
(c) 1983; from Azimi and Lowitt, 1988.
(d) 1980; from Meunier and Bruyn Kops, 1984.
(e) 1989; from database compiled by IES, 1991.
(f) 1985; from database compiled by IES, 1991.
(g) 1985; Cooper and Schipper, 1991.
(h) 1986; Federation of Japanese Aluminum Industry.
(i) 1988; sector 3334. U.S. Dept. of Commerce, 1989.
(j) 1988; Does not include refining alumina. U.S. Dept. of Commerce, 1989, and EIA, 1991b.
(k) 1988; from database compiled by IES, 1991.
– Not available.

Source: China – Energy Statistical Yearbook of China, 1989; others – IES database; Federation of Japanese Aluminum Industry; Kahane, 1986; U.S. Dept. of Commerce, 1989; EIA, 1991b.

Chapter VI—**Imports and Exports**

Imports and Exports

Energy Imports and Exports

China has been a net exporter of coal since 1950 and of petroleum since the mid-1960s (Table VI-1). Exports of crude oil and petroleum products have accounted for a substantial share of crude production (between 21% and 30% since 1984), but are not large by world standards (about 1.3% of the volume of petroleum traded internationally in 1989; BP, 1990). Earnings from petroleum exports have been substantial, but have declined in importance relative to other exports since 1985, when 25% of gross export earnings came from petroleum (Table VI-2). More than half of China's exported crude goes to Japan, as does one-third of exported petroleum products (1990, Table VI-3). The next largest buyers of Chinese crude are the United States and Singapore, with the latter also accounting for about one-third of Chinese petroleum product exports.

Imports of petroleum were generally less than 1 Mt until the late 1980s, when imports of crude oil and especially petroleum products (mainly diesel oil) shot up to over 6 Mt (1990; Table VI-1).

While coal imports have remained between 1 MT and 2.5 Mt per year since the 1960s, exports nearly tripled between 1980 and 1990 as newly built coal washing, rail, and port facilities made more of China's high quality coal available for export (Table VI-1). Japan is by far the most important buyer of Chinese coal, followed by Hong Kong, South Korea, and North Korea (Table VI-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 (OECF, 1991).

China imports a small amount of electricity (0.3% of its total supply in 1990) from Hong Kong, and sells an even smaller amount to Macau and Myanmar (formerly Burma; Table VI-3). 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, although the magnitude of this trade is not known (Information Research Institute of Water Resources and Electric Power, 1989).

Energy-Intensive Products

China's exports of energy-intensive industrial products varied greatly from year to year during the 1980s, with no clear pattern emerging (Table VI-4). Without more detailed knowledge of international markets and domestic production and marketing condition it is difficult to interpret these data.

The situation for energy-intensive imports is similar; imports of most products increased in the first half of the 1980s, only to decrease in the latter half (Table VI-5). Imports of steel, for example, were near 4 Mt in 1981 and 1990, but during this period hit a peak of 20 Mt in 1985. Chemical fertilizer imports are a notable exception, increasing from 5.5 Mt in 1981 to 15.3 Mt in 1990.

Table VI-1. Energy Exports and Imports, 1950-1990

1. Physical Units

	Exports					Imports			
Year	Coal (Mt)	Coke (Mt)	Crude Oil (Mt)	Petroleum Products (a) (Mt)	Electricity (million kWh)	Coal (Mt)	Crude Oil (Mt)	Petroleum Products (b) (Mt)	Electricity (million kWh)
1950	1.960	0.003	-	-	-	0.043	0.040	-	-
1951	0.250	0.001	-	-	-	0.001	0.065	-	-
1952	0.290	0.004	-	-	-	(c)	0.099	-	-
1953	0.950	0.004	-	-	-	(c)	0.111	-	-
1954	1.510	0.036	-	-	-	(c)	0.151	-	-
1955	1.630	0.000	-	-	-	0.020	0.378	-	-
1956	2.030	0.113	-	-	-	0.240	0.397	-	-
1957	1.880	0.156	-	-	-	0.067	0.379	-	-
1958	2.000	0.035	-	-	-	0.565	0.665	-	-
1959	1.990	0.053	-	-	-	1.254	0.655	-	-
1960	2.120	0.046	-	-	-	1.242	0.594	-	-
1961	2.320	0.038	-	0.001	-	1.425	0.056	-	-
1962	2.600	0.054	0.063	0.027	-	1.410	0.105	-	-
1963	2.600	0.088	0.075	0.007	-	1.203	0.117	-	-
1964	2.970	0.124	0.092	0.035	-	1.299	0.125	-	-
1965	3.360	0.124	0.196	0.102	-	1.987	0.127	-	-
1966	3.970	0.112	0.199	0.197	-	1.597	0.168	-	-
1967	3.490	0.072	0.161	0.136	-	1.129	0.058	-	-
1968	2.130	0.067	0.131	0.106	-	1.076	0.092	-	-
1969	1.460	0.061	0.107	0.142	-	0.964	0.196	-	-
1970	2.270	0.268	0.192	0.193	-	1.232	0.473	-	-
1971	2.870	0.390	0.263	0.374	-	1.218	0.074	-	-
1972	2.820	0.356	0.636	0.890	-	1.351	0.166	-	-
1973	2.820	0.450	1.834	1.162	-	1.562	0.177	-	-
1974	2.870	0.437	5.069	1.478	-	1.843	0.896	-	-
1975	3.000	0.428	9.878	2.101	-	2.591	1.759	-	-
1976	2.270	0.245	8.496	1.946	-	2.061	0.799	-	-
1977	2.630	0.203	9.107	1.965	-	2.044	0.476	-	-
1978	3.120	0.298	11.313	2.074	-	2.444	0.690	-	-
1979	4.630	0.298	13.432	3.034	-	2.150	0.257	-	-
1980	6.320	0.271	13.309	4.203	-	1.992	0.366	-	-
1981	6.570	0.249	13.860	4.670	-	1.934	0.070	-	300
1982	6.444	0.472	14.680	4.910	-	2.187	0.645	-	330
1983	6.555	0.349	14.820	4.910	-	2.140	0.370	-	430
1984	7.040	0.350	22.010	5.700	30	2.430	0.246	-	800
1985	7.770	0.370	30.300	6.214	40	2.310	0.717	0.069	1,100
1986	9.820	0.460	28.498	5.456	40	2.470	1.075	1.966	1,210
1987	13.530	0.610	27.225	4.941	40	1.940	1.715	1.982	1,290
1988	15.650	1.030	26.045	4.793	40	1.690	0.855	3.066	1,510
1989	15.340	1.660	24.388	4.736	-	2.290	3.263	5.345	1,642
1990	17.271	1.304	23.986	5.263	85	1.983	2.923	3.165	1,925
1991	20.001	1.082	22.598	4.814	-	1.368	5.972	4.607	-

(a) Composed mainly of gasoline, gas oil, fuel oil, naphtha, aviation kerosene, and lubricant oil base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t).
(b) Mainly diesel oil.
(c) Negligible.
– Not available.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91 (The Editorial Board of the Almanac of China's Foreign Economic Relations and Trade, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago); Customs statistics. All figures are from MOFERT, except the following which are customs statistics: EXPORTS of coal (1984-1990), coke (1984-1990), crude oil (1981-1990), oil products (1981-1990), and electricity (1990), and IMPORTS of coal (1984-1990), crude oil (1988-1990), oil products (1985-1990), and electricity (1989-1990).

Table VI-1. Energy Exports and Imports, 1950-1990 (continued)

2. Mtce

	Exports					Imports			
Year	Coal (d)	Coke	Crude Oil	Petroleum Products (a)	Electricity	Coal (b)	Crude Oil	Petroleum Products (c)	Electricity
1950	1.960	0.002	-	-	-	0.043	0.058	-	-
1951	0.250	0.001	-	-	-	0.001	0.093	-	-
1952	0.290	0.003	-	-	-	(d)	0.142	-	-
1953	0.950	0.004	-	-	-	(d)	0.159	-	-
1954	1.510	0.034	-	-	-	(d)	0.215	-	-
1955	1.630	0.000	-	-	-	0.020	0.540	-	-
1956	2.030	0.110	-	-	-	0.240	0.568	-	-
1957	1.880	0.151	-	-	-	0.067	0.542	-	-
1958	2.000	0.034	-	-	-	0.565	0.950	-	-
1959	1.990	0.051	-	-	-	1.254	0.936	-	-
1960	2.120	0.044	-	-	-	1.242	0.849	-	-
1961	2.320	0.037	-	0.001	-	1.425	0.080	-	-
1962	2.600	0.052	0.090	0.040	-	1.410	0.150	-	-
1963	2.600	0.085	0.107	0.010	-	1.203	0.168	-	-
1964	2.970	0.120	0.131	0.052	-	1.299	0.178	-	-
1965	3.360	0.121	0.281	0.150	-	1.987	0.181	-	-
1966	3.970	0.109	0.284	0.290	-	1.597	0.240	-	-
1967	3.490	0.070	0.230	0.200	-	1.129	0.083	-	-
1968	2.130	0.065	0.188	0.156	-	1.076	0.132	-	-
1969	1.460	0.059	0.153	0.209	-	0.964	0.281	-	-
1970	2.270	0.260	0.274	0.284	-	1.232	0.676	-	-
1971	2.870	0.378	0.375	0.549	-	1.218	0.106	-	-
1972	2.820	0.345	0.909	1.308	-	1.351	0.238	-	-
1973	2.820	0.436	2.623	1.708	-	1.562	0.253	-	-
1974	2.870	0.423	7.249	2.173	-	1.843	1.281	-	-
1975	3.000	0.415	14.125	3.088	-	2.591	2.515	-	-
1976	2.270	0.238	12.149	2.861	-	2.061	1.142	-	-
1977	2.630	0.197	13.023	2.888	-	2.044	0.681	-	-
1978	3.120	0.289	16.178	3.049	-	2.444	0.986	-	-
1979	4.630	0.289	19.207	4.460	-	2.150	0.367	-	-
1980	6.320	0.263	19.032	6.178	-	1.992	0.523	-	-
1981	6.570	0.241	19.820	6.865	-	1.934	0.100	-	0.121
1982	6.444	0.458	20.992	7.218	-	2.187	0.922	-	0.133
1983	6.555	0.338	21.193	7.218	-	2.140	0.529	-	0.174
1984	6.955	0.340	31.474	8.379	0.012	2.497	0.351	-	0.323
1985	7.569	0.359	43.329	9.135	0.016	2.310	1.025	0.101	0.444
1986	9.673	0.446	40.752	8.020	0.016	2.470	1.537	2.870	0.489
1987	13.445	0.592	38.932	7.263	0.016	1.940	2.453	2.894	0.521
1988	16.260	0.999	37.244	7.046	0.016	1.690	1.223	4.476	0.610
1989	16.260	1.610	34.875	6.962	-	2.290	4.666	7.804	0.663
1990	16.260	1.265	34.300	7.737	0.034	1.983	4.180	4.621	0.778
1991	16.260	1.049	32.316	7.077	-	1.368	8.541	6.727	-

(a) Composed mainly of gasoline, gas oil, fuel oil, naphtha, aviation kerosene, and lubricant oil base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t).
(b) Exported coal is of high quality and is here assumed to be equivalent to standard coal (29.3 GJ/t, low heat).
(c) Mainly diesel oil.
(d) Negligible.
– Not available.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91 (The Editorial Board of the Almanac of China's Foreign Economic Relations and Trade, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago). All figures are from MOFERT, except the following which are customs statistics: EXPORTS of coal (1984-1990), coke (1984-1990), crude oil (1981-1990), oil products (1981-1990), and electricity (1990), and IMPORTS of coal (1984-1990), crude oil (1988-1990), oil products (1985-1990), and electricity (1989-1990).

Table VI-1. Energy Exports and Imports, 1950-1990 (continued)

3. Net Exports, Mtce

Year	Coal and Coke (a)			Petroleum & Products (b)			Electricity (c)			Overall Net Exports
	Exports	Imports	Net Exports	Exports	Imports	Net Exports	Exports	Imports	Net Exports	
1950	1.962	0.043	1.920	-	0.058	-0.058	-	-	-	1.86
1951	0.251	0.001	0.250	-	0.093	-0.093	-	-	-	0.16
1952	0.293	(d)	0.293	-	0.142	-0.142	-	-	-	0.15
1953	0.954	(d)	0.954	-	0.159	-0.159	-	-	-	0.79
1954	1.544	(d)	1.544	-	0.215	-0.215	-	-	-	1.33
1955	1.630	0.020	1.610	-	0.540	-0.540	-	-	-	1.07
1956	2.140	0.240	1.900	-	0.568	-0.568	-	-	-	1.33
1957	2.031	0.067	1.964	-	0.542	-0.542	-	-	-	1.42
1958	2.034	0.565	1.469	-	0.950	-0.950	-	-	-	0.52
1959	2.041	1.254	0.787	-	0.936	-0.936	-	-	-	-0.15
1960	2.164	1.242	0.922	-	0.849	-0.849	-	-	-	0.07
1961	2.357	1.425	0.932	0.001	0.080	-0.079	-	-	-	0.85
1962	2.652	1.410	1.242	0.130	0.150	-0.020	-	-	-	1.22
1963	2.685	1.203	1.482	0.117	0.168	-0.051	-	-	-	1.43
1964	3.090	1.299	1.791	0.183	0.178	0.005	-	-	-	1.80
1965	3.481	1.987	1.494	0.431	0.181	0.250	-	-	-	1.74
1966	4.079	1.597	2.482	0.574	0.240	0.334	-	-	-	2.82
1967	3.560	1.129	2.431	0.430	0.083	0.347	-	-	-	2.78
1968	2.195	1.076	1.118	0.343	0.132	0.212	-	-	-	1.33
1969	1.519	0.964	0.555	0.362	0.281	0.081	-	-	-	0.64
1970	2.530	1.232	1.298	0.558	0.676	-0.118	-	-	-	1.18
1971	3.248	1.218	2.030	0.924	0.106	0.819	-	-	-	2.85
1972	3.165	1.351	1.815	2.218	0.238	1.980	-	-	-	3.79
1973	3.256	1.562	1.694	4.330	0.253	4.078	-	-	-	5.77
1974	3.293	1.843	1.450	9.422	1.281	8.141	-	-	-	9.59
1975	3.415	2.591	0.824	17.213	2.515	14.699	-	-	-	15.52
1976	2.508	2.061	0.447	15.010	1.142	13.868	-	-	-	14.31
1977	2.827	2.044	0.783	15.911	0.681	15.230	-	-	-	16.01
1978	3.409	2.444	0.966	19.227	0.986	18.240	-	-	-	19.21
1979	4.919	2.150	2.770	23.667	0.367	23.300	-	-	-	26.07
1980	6.583	1.992	4.591	25.210	0.523	24.687	-	-	-	29.28
1981	6.811	1.934	4.877	26.685	0.100	26.584	-	0.121	-0.121	31.34
1982	6.902	2.187	4.715	28.210	0.922	27.288	-	0.133	-0.133	31.87
1983	6.893	2.140	4.753	28.410	0.529	27.881	-	0.174	-0.174	32.46
1984	7.295	2.497	4.798	39.853	0.351	39.502	0.012	0.323	-0.311	43.99
1985	7.928	2.325	5.603	52.464	1.025	51.439	0.016	0.444	-0.428	56.61
1986	10.119	2.418	7.702	48.772	4.408	44.365	0.016	0.489	-0.473	51.59
1987	14.036	1.889	12.147	46.195	5.346	40.849	0.016	0.521	-0.505	52.49
1988	17.259	1.714	15.545	44.290	5.699	38.591	0.016	0.610	-0.594	53.54
1989 (e)	17.870	1.714	16.156	41.837	12.470	29.367	-	0.663	-	<45.52
1990 (f)	17.525	1.714	15.811	42.037	8.801	33.236	0.034	0.778	-0.744	48.30
1991 (e)	17.309	1.368	15.941	39.393	15.267	24.126	-	-	-	40.07

(a) Exported coal is of high quality and is here assumed to be equivalent to standard coal (29.3 GJ/t, low heat).
(b) Composed mainly of gasoline, gas oil, fuel oil, naphtha, aviation kerosene, and lubricant oil base oil. Petroleum products are converted as gasoline or kerosene (1.47 tce/t).
(c) Converted at 0.404 kgce/tce.
(d) Negligible.
(e) Subtotals are for fossil fuels only.
(f) Data available for coal and crude oil exports only.
- Not available.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990/91 (The Editorial Board of the Almanac of China's Foreign Economic Relations and Trade, Beijing); China Statistics Monthly, May 1991 (China Statistical Information and Consultancy Service Center & the University of Illinois at Chicago). All figures are from MOFERT, except the following which are customs statistics: EXPORTS of coal (1984-1990), coke (1984-1990), crude oil (1981-1990), oil products (1981-1990), and electricity (1990), and IMPORTS of coal (1984-1990), crude oil (1988-1990), oil products (1985-1990), and electricity (1989-1990).

Table VI-1. Net Energy Exports, 1950-1990 (continued)

Annual Average Rates of Growth:	
Petroleum	
1950-1970	-3.6%
1970-1985	50.0%
1985-1991	-11.9%
Coal	
1950-1979	1.3%
1979-1988	21.1%
1988-1991	0.8%
Total	
1950-1970	-2.3%
1970-1985	29.4%
1985-1991	-5.6%

Figure VI-1. Net Energy Exports, 1950-1990

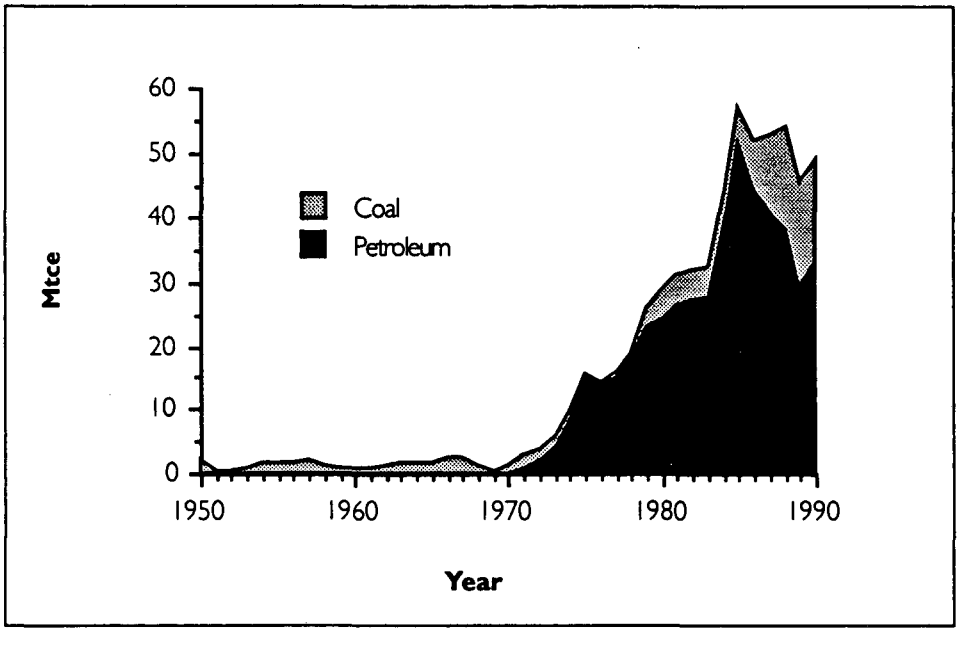


Table VI-2. Gross Energy Exports Earnings and Total Export Earnings Selected Years 1953-1970, and 1975-1990, Billion Current US Dollars

Year	Total Gross Export Earnings	Coal & Coke Subtotal	Oil & Oil Products Subtotal	Gross Energy Export Earnings (a)	Percentage of Total Gross Export Earnings (b)
1953	1.022	(c)	(c)	0.008	0.8%
1957	1.597	(c)	(c)	0.018	1.1%
1965	2.228	(c)	(c)	0.068	3.1%
1966	2.366	(c)	(c)	0.068	2.9%
1970	2.260	(c)	(c)	0.063	2.8%
1975	7.264	(c)	(c)	1.093	15.0%
1976	6.855	(c)	(c)	0.942	13.7%
1977	7.590	(c)	(c)	1.068	14.1%
1978	9.745	(c)	(c)	1.345	13.8%
1979	13.660	(c)	2.231	2.654	19.4%
1980	18.270	(c)	4.119	4.588	25.1%
1981	22.015	(c)	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	6.736	7.085	25.9%
1986	30.942	0.459	3.330	3.789	12.2%
1987	39.437	0.537	3.969	4.506	11.4%
1988	47.516	0.594	3.492	4.086	8.6%
1989	52.486	0.680	3.581	4.261	8.1%
1990	62.050	0.755	4.460	5.215	8.4%

(a) 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.
(b) Percentages for 1979-1985 may be in error because of different sources for total exports and energy exports in those years.
(c) Not available.

Source: Almanac of China's Foreign Economic Relations and Trade, 1984-1990 (data from MOFERT); Customs statistics. All figures from MOFERT except the following, which were compiled by David Fridley, East-West Center, from customs statistics: total gross export earnings (1979-1990); coal exports (1985-1990); oil exports (1979-1990); and gross energy exports (1985-1990).

Table VI-2. Export Earnings, 1975-1990 (continued)

Annual Average Rates of Growth:	
Energy	
1975-1985	**20.6%**
1985-1991	**-5.9%**
Total	
1975-1985	**14.2%**
1985-1991	**17.8%**

Figure VI-2. Gross Export Earnings, 1975-1990

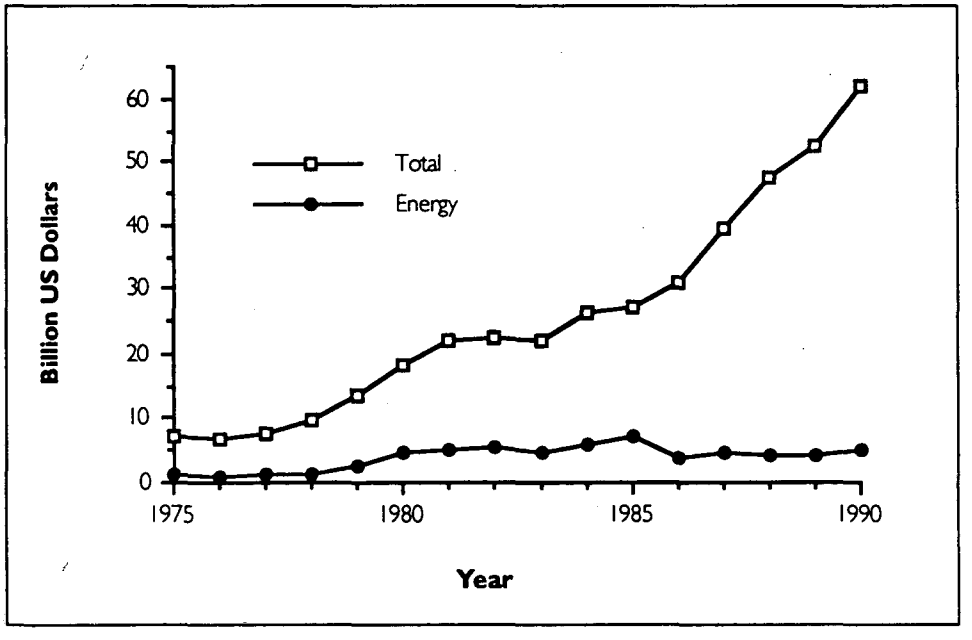


Table VI-3. Energy Exports and Imports by Destination and Origin, 1990 (a)

Country	Coal and Coal Products (thousand tonnes)		Crude Petroleum (thousand tonnes)		Petroleum Products (b) (thousand tonnes)		Electricity (million kWh)	
	Exports to:	Imports from:	Exports to:	Imports from:	Exports to:	Imports from:	Exports to:	Imports from:
Albania	13.9	-	-	-	<0.05	36.1	-	-
Argentina	-	-	-	-	0.2	-	-	-
Australia	<0.05	405.0	163.1	54.0	23.6	50.4	-	-
Bahrain	-	-	-	-	0.2	-	-	-
Bangladesh	5.6	-	-	-	2.5	<0.05	-	-
Belgium	352.1	-	-	-	0.1	0.2	-	-
Brazil	204.7	-	598.3	-	-	-	-	-
Brunei	-	-	-	27.0	-	-	-	-
Bulgaria	-	-	-	-	-	27.4	-	-
Burma	0.2	-	-	-	10.9	-	1.4	-
Canada	-	177.8	-	-	-	1.5	-	-
Chile	-	-	-	-	0.3	-	-	-
Costa Rica	-	-	-	-	0.1	-	-	-
Cuba	-	-	-	-	1.1	-	-	-
Cyprus	-	-	-	-	0.1	-	-	-
Czechoslovakia	-	-	-	-	0.5	-	-	-
Denmark	-	-	-	-	0.4	<0.05	-	-
Ecuador	-	-	-	-	1.1	-	-	-
Egypt	-	-	-	-	2.0	-	-	-
Finland	93.2	-	-	-	0.5	<0.05	-	-
France	1,637.5	-	-	-	-	0.5	-	-
Germany (FRG)	18.6	-	-	-	8.0	1.5	-	-
Honduras	-	-	-	-	0.3	-	-	-
Hong Kong	2,643.4	0.1	-	-	946.8	158.1	-	1,925.3
India	171.3	-	-	-	10.7	-	-	-
Indonesia	660.8	78.1	-	1,230.8	5.9	<0.05	-	-
Iran	24.0	-	-	301.2	0.1	-	-	-
Italy	313.9	-	-	-	1.7	27.6	-	-
Jamaica	-	-	-	-	0.2	-	-	-
Japan	5,425.9	24.2	13,664.3	-	2,242.7	236.6	-	-
Jordan	0.2	-	-	-	0.1	-	-	-
Kenya	-	-	-	-	9.1	-	-	-
Korea (DPRK)	1,792.4	1,172.4	1,062.6	-	9.8	0.7	-	-
Korea (RK)	1,986.1	66.0	1,000.0	-	92.7	5.2	-	-
Kuwait	-	-	-	-	-	48.0	-	-
Macau	-	-	-	-	67.6	0.2	83.6	-
Madagascar	-	-	-	-	12.1	-	-	-
Malaysia	645.5	-	-	336.5	8.5	0.6	-	-
Mauritius	-	-	-	-	2.8	-	-	-
Mexico	-	-	-	-	11.7	-	-	-
Morocco	-	-	-	-	3.5	-	-	-
Mozambique	-	62.6	-	-	11.8	-	-	-
Nepal	-	-	-	-	1.0	-	-	-
Netherlands	560.9	-	-	-	0.2	0.7	-	-
New Zealand	-	-	-	-	2.1	-	-	-
Nigeria	0.1	-	-	-	-	-	-	-
Norway	-	-	-	-	1.0	<0.05	-	-
Oman	-	-	-	852.4	-	-	-	-
Pakistan	0.1	-	-	120.7	8.8	<0.05	-	-
Panama	-	-	-	-	0.3	-	-	-
Peru	112.7	-	-	-	0.5	-	-	-
Philippines	875.4	-	166.5	-	34.8	5.8	-	-
Romania	279.5	-	0.0	-	-	-	-	-
Singapore	12.1	-	3,319.7	-	2,254.7	2,308.0	-	-
Spain	-	-	-	-	<0.05	0.6	-	-
Sri Lanka	-	-	-	-	2.3	-	-	-
Sweden	-	-	-	-	0.7	<0.05	-	-
Switzerland	-	-	-	-	39.3	<0.05	-	-
Syria	-	-	-	-	0.1	-	-	-
Taiwan	679.7	-	-	-	11.3	0.5	-	-
Tanzania	-	-	-	-	0.1	-	-	-
Thailand	89.1	-	-	-	78.1	4.0	-	-
Uganda	-	-	-	-	0.2	-	-	-
UAE	-	-	-	-	<0.05	30.4	-	-
United Kingdom	0.4	-	-	-	0.2	9.0	-	-
USSR	-	17.0	-	-	<0.05	179.9	-	-
United States	<0.05	-	4,004.2	-	220.2	129.1	-	-
Rep. Yemen	<0.05	-	-	-	0.6	-	-	-
Other	<0.05	-	-	-	1.8	1.8	-	-
Total	18,599.3	2,003.1	23,978.7	2,922.7	6,148.0	3,264.4	85.0	1,925.3

(a) Customs statistics indicate proximate destination only, not final destination. Thus these figures may not reflect the actual balance of trade with some trading partners, especially Hong Kong, from where many Chinese goods are transhipped to another destination.
(b) Does not include liquefied petroleum gasses.

Source: China's Customs Statistics Yearbook, 1990 (Economic Information Agency, Hong Kong).

Table VI-4. Energy-Intensive Exports, 1981-1991

Year	Cement (1,000 t)	Cement (% of total production)	Rolled Steel (a) (1,000 t) (a)	Rolled Steel (a) (% of total production)	Paper and Paperboard (1,000 t)	Paper and Paperboard (% of total production)	Plate Glass (million m2)	Zinc and Alloys (1,000 t)
1981	817	1.0%	704	2.6%	215.4	4.0%	3.72	17.47
1982	700	0.7%	990	3.4%	219.8	3.7%	2.73	10.18
1983	380	0.4%	625	2.0%	263.1	4.0%	2.14	2.05
1984	174	0.1%	296	0.9%	211.6	2.8%	2.31	1.45
1985	142	0.1%	222	0.6%	185.1	2.0%	2.25	2.37
1986	192	0.1%	313	0.8%	258.3	2.6%	3.62	56.77
1987	168	0.1%	517	1.2%	321.0	2.8%	7.27	95.34
1988	152	0.1%	971	2.1%	259.8	2.0%	13.71	13.84
1989	436	0.2%	969	2.0%	219.6	1.6%	33.54	20.11
1990	6,829	3.3%	2,161	4.2%	130.4	1.0%	32.86	16.71
1991	10,736	4.4%	2,598	4.7%	-	-	41.94	6.28

(a) Includes iron and steel wire.
– Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing); Statistical Yearbook of China, 1991 (SSB, Beijing); China Statistical Information and Consultancy Service Center, 1992; sources use customs statistics.

Table VI-5. Energy-Intensive Imports, 1981-1990

Year	Rolled Steel (a) (thousand tonnes)	Rolled Steel (a) (% of total production)	Caustic Soda (thousand tonnes)	Caustic Soda (% of total production)	Soda Ash (thousand tonnes)	Soda Ash (% of total production)
1981	3,544	14%	51.7	2.6%	204	11%
1982	3,773	12%	66.6	3.2%	247	12%
1983	9,661	27%	247.0	11.5%	609	27%
1984	12,323	29%	227.4	9.9%	852	33%
1985	20,096	40%	224.5	8.9%	1,057	37%
1986	18,473	36%	283.2	10.6%	1,221	39%
1987	12,452	22%	304.9	10.7%	853	26%
1988	9,149	16%	231.9	7.7%	823	23%
1989	9,522	18%	187.9	5.9%	969	26%
1990	4,233	8%	40.5	1.3%	211	6%
1991	3,579	-	-		-	

Year	Copper and Alloys	Aluminum and Alloys	Zinc and Alloys	Chemical Fertilizers	Paper Pulp	Synthetic Fiber (b)
1981	53.7	57.8	12.4	5,550	682	497
1982	110.9	169.6	108.1	6,060	475	239
1983	485.9	283.8	228.7	8,000	731	134
1984	254.0	252.7	230.2	9,230	640	270
1985	355.7	487.9	268.6	7,610	547	490
1986	171.1	266.2	116.9	5,100	523	301
1987	75.5	184.1	68.2	10,900	683	241
1988	84.4	75.4	62.0	14,710	795	451
1989	70.1	175.5	19.2	13,930	476	392
1990	40.3	71.8	4.1	16,270	342	376
1991	114.0	43.9	-	-	672	502

(a) Includes iron and steel wire.
(b) Used for spinning.
– Not available.

Source: Energy Statistical Yearbook of China, 1989 (SSB, Beijing) [based on customs statistics]; Statistical Yearbook of China, 1990 (SSB, Beijing) [based on customs statistics]; China Statistical Information and Consultancy Service Center, 1992.

Chapter VII—**Energy and Environment**

Energy and Environment

Carbon Dioxide

China is currently the third largest contributor of anthropogenic carbon dioxide emissions. Its 610 Mt of carbon dioxide (carbon weight) accounted for 10.4% of worldwide emissions in 1988 (Tables VII-1 and VIII-25). Fossil fuels were the source of 95% of carbon dioxide emissions, with coal alone responsible for 80%. The graph of emissions by source is very similar to that of energy production, although coal's contribution to total carbon dioxide emissions is even larger than its contribution to energy production. Continued growth in energy production and consumption insures that China's importance as a contributor to the buildup of atmospheric carbon dioxide will increase.

Sulfur Dioxide and Particulate Emissions

Sulfur dioxide and particulates are considered by many environmental experts in China to be ambient air pollutants of gravest concern. Most efforts at controlling air pollution have so far been aimed at these two pollutants. China's State Statistical Bureau collects data on sulfur dioxide and particulate emissions from industrial enterprises.[1] Sulfur dioxide emissions from industry declined between 1980 and 1986, but rose again thereafter (Table VII-2). Since industrial coal consumption increased steadily over this period, the decline before 1986 could be explained by improvement in emissions controls, while the subsequent rise may reflect the increasing expense of further levels of control. Particulate emissions show no clear trend, even though a large share of environmental protection funds are believed to have been used to control particulates.

Maps VII-1 and VII-2 show emissions densities (in tonnes per square km). Values are highest in the industrial centers of the North and Northeast. Although not the region with the highest sulfur dioxide emissions density, the Southwest suffers more than any other region from acid precipiation. Southern coals are typically high in sulfur, resulting in serious problems where local industry has no access to higher quality coal from the north.

Ambient Pollution in Urban Areas

Tables VII-4 through VII-8 show ambient levels of total suspended particulates (TSP), sulfur dioxide, nitrogen oxides, carbon monoxide, as well as particulate deposition for various cities throughout China. TSP levels seem to have declined in most of the cities for which data are available between 1980 and 1989 (Table VII-4). Annual variation is considerable, however, often due to weather, so trends based on only a few data points may not be conclusive. In 1989 annual averages for the various cities ranged between 130 μg/m3 in Yichang, Hubei and 828 μg/m3 in Linfeng, Shanxi. Concentrations are generally higher in northern latitudes, but averages in some southern cities exceed those in some northern cities.

Ambient levels of sulfur dioxide exhibit much less variation among years, making identification of trends easier (Table VII-5). In most cities (e.g., Chengdu where concentrations were more than halved from 150 μg/m3 to 70 μg/m3 between 1979 and 1989) sulfur dioxide concentrations declined during the 1980s. Guangzhou was a notable exception; in 1989 the annual average was 100 μg/m3 whereas it was 70 μg/m3 in 1982. In 1989 sulfur dioxide concentrations ranged between 8 μg/m3 in Daqing, Heilongjiang and 467 μg/m3 in Lanzhou, Gansu. After Lanzhou, cities in the southwest and in Shanxi suffered the highest concentrations.

Nitrogen oxide levels are usually most closely related to motor vehicle fuel consumption, and do not seem to vary significantly with region (Table VII-6). Most annual average concentrations in 1989 were between 20 μg/m3 (Jiayuguan, Gansu) and 70 μg/m3 (Tianshui, Gansu). The highest reported

value was 182 μg/m3 in Lanzhou. Guangzhou, Guangdong, a city with a rapidly growing number of motorcycles, was next at 133 μg/m3.

Data on ambient carbon monoxide are available for only six cities, all but one of which (Guangzhou) are in the North and Northeast (Table VII-7). No clear trends are apparent. Annual averages in 1989 ranged between 1.49 mg/m3 in Changchun, Jilin and 3.76 mg/m3 in Harbin, Heilongjiang. 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. Anecdotal evidence suggests that a number of deaths each year result from coal burning in residences that have been tightly sealed against winter weather.

Particle deposition velocity is reported for 20 cities (Table VII-8). While this measure cannot easily be related to health effects, it may be related to total emissions of particulates, especially in areas where the anthropogenic processes are the dominant source of particulate matter. For most cities the trend is clearly downward, although some exhibit increasing or ambiguous trends.

China has three classes of ambient air pollution standards, as shown in Table VII-A below. The Class II standards are intended to apply to residential and other areas where people spend most of their time. Comparison with the figures in the discussion above show that exceedances of these standards are common.

NOTES

1 The term used for the category of particulates reported here, literally translated, is "smoke dust" (*yanchen*). This category is assumed to be particulates resulting from fuel combustion. Data are also collected on particulates emitted from industrial production processes, such as grinding. We do not report data from this latter category here. It is assumed that inventories include only stationary, coal-burning sources.

Emissions from non-industrial sources, most importantly the residential sector, are not reported. Since small stoves and boilers are unlikely to have emissions controls, emissions from these sources will likely to follow coal consumption trends.

Table VII-A. Ambient Air Quality Standards

Pollutant		STANDARDS (arithemetic means in μg/m3) (a) Class I	Class II	Class III
TSP (b)	daily average	150	300	500
	max at any time	300	1,000	1,500
PM10 (c)	daily average	50	150	250
	max at any time	150	500	700
Carbon Monoxide (d)	daily average 8-hour average	4,000	4,000	6,000
	max at any time	10,000	10,000	20,000
Sulfur Dioxide (e)	annual average	20	60	100
	daily average	50	150	250
	max at any time	150	500	700
Nitrogen Oxides (f)	daily average	50	100	150
	max at any time	100	150	300

(a) Class I standards appy 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.
(b) Total suspended particulate matter.
(c) Particulates with diameter ≤10 um.
(d) Conversion factor: 1.145 mg/m3 per ppm.
(e) Conversion factor: 2.854 mg/m3 per ppm.
(f) Conversion factor: 2.052 mg/m3 per ppm.

Table VII-1. Carbon Dioxide Emissions by Source, 1952-1988

1. Million Tonnes of Carbon

Year	Fossil Fuels				Cement	Gas Flaring	Total Emissions	Per Capita Emissions (t C)
	Solid	Liquid	Gas	Subtotal				
1950	21.40	0.20	0.00	21.60	0.10	0.00	21.70	0.04
1951	27.60	0.30	0.00	27.90	0.20	0.00	28.10	0.05
1952	34.60	0.40	0.00	35.00	0.40	0.00	35.40	0.06
1953	36.00	0.50	0.00	36.50	0.50	0.00	37.00	0.06
1954	43.00	0.90	0.00	43.90	0.60	0.00	44.50	0.08
1955	50.60	1.50	0.00	52.10	0.60	0.00	52.70	0.09
1956	56.60	2.20	0.00	58.80	0.90	0.00	59.70	0.10
1957	67.30	2.50	0.00	69.80	0.90	0.00	70.70	0.11
1958	140.30	3.40	0.10	143.80	1.30	0.00	145.00	0.23
1959	192.00	5.20	0.20	197.40	1.70	0.00	199.00	0.31
1960	206.60	6.30	0.50	213.40	1.80	0.00	215.30	0.33
1961	144.30	6.10	0.80	151.20	1.10	0.00	152.20	0.24
1962	113.70	5.90	0.60	120.20	1.10	0.00	121.40	0.19
1963	112.10	6.40	0.50	119.00	1.40	0.00	120.40	0.18
1964	110.90	7.60	0.60	119.10	1.40	0.00	120.40	0.17
1965	119.60	9.60	0.60	129.80	1.50	0.00	131.20	0.18
1966	129.70	12.20	0.70	142.60	1.50	0.00	144.10	0.20
1967	105.90	11.60	0.80	118.30	1.10	0.00	119.40	0.16
1968	114.00	13.30	0.70	128.00	1.20	0.00	129.20	0.17
1969	138.40	18.20	1.00	157.60	1.40	0.00	159.00	0.20
1970	183.90	24.90	1.50	210.30	1.40	0.00	211.60	0.26
1971	203.30	31.80	2.00	237.10	3.10	0.20	240.50	0.29
1972	212.80	36.80	2.50	252.10	3.10	0.30	255.50	0.30
1973	216.40	42.40	3.10	261.90	3.40	0.30	265.70	0.30
1974	214.30	48.90	3.90	267.10	3.40	0.40	271.00	0.30
1975	250.30	54.70	4.60	309.60	4.10	0.50	314.30	0.34
1976	251.40	64.30	5.30	321.00	6.70	0.50	328.20	0.35
1977	282.30	69.40	6.30	358.00	7.60	0.60	366.20	0.39
1978	317.20	73.40	7.20	397.80	8.90	0.70	407.40	0.43
1979	325.40	72.40	7.60	405.40	10.10	0.80	416.20	0.43
1980	316.60	70.70	7.50	394.80	10.90	0.80	406.40	0.42
1981	317.50	66.30	6.70	390.50	11.40	0.70	402.60	0.41
1982	345.10	66.80	6.30	418.20	12.80	0.70	431.50	0.43
1983	365.00	68.40	6.40	439.80	14.70	0.70	455.20	0.45
1984	400.90	70.00	6.60	477.50	16.50	0.90	494.80	0.48
1985	437.00	74.10	6.80	517.90	19.40	0.00	537.30	0.52
1986	459.70	78.40	7.20	545.30	22.00	0.00	567.40	0.54
1987	479.00	83.60	7.30	569.90	24.40	0.00	594.40	0.56
1988	487.90	86.90	7.50	582.30	27.60	0.00	609.90	0.56

Source: Trends '90: A Compendium of Data on Global Change, 1990 (The Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN).

Figure VII-1 Carbon Dioxide Emissions, 1950-1988

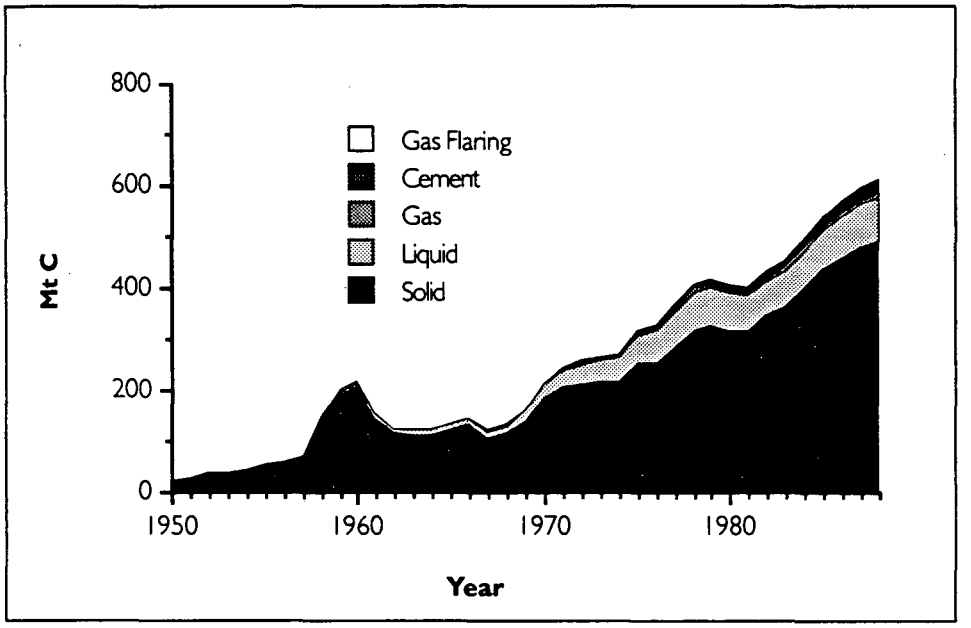


Table VII-1. Carbon Dioxide Emissions by Source, 1952-1988 (cont.)

2. Shares

Year	Fossil Fuels				Cement	Gas Flaring	Total Emissions
	Solid	Liquid	Gas	Subtotal			
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%	0.08%	100%
1972	83%	14%	1%	99%	1%	0.12%	100%
1973	81%	16%	1%	99%	1%	0.11%	100%
1974	79%	18%	1%	99%	1%	0.15%	100%
1975	80%	17%	1%	99%	1%	0.16%	100%
1976	77%	20%	2%	98%	2%	0.15%	100%
1977	77%	19%	2%	98%	2%	0.16%	100%
1978	78%	18%	2%	98%	2%	0.17%	100%
1979	78%	17%	2%	97%	2%	0.19%	100%
1980	78%	17%	2%	97%	3%	0.20%	100%
1981	79%	16%	2%	97%	3%	0.17%	100%
1982	80%	15%	1%	97%	3%	0.16%	100%
1983	80%	15%	1%	97%	3%	0.15%	100%
1984	81%	14%	1%	97%	3%	0.18%	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	80%	14%	1%	95%	5%	0%	100%

Source: Trends '90: A Compendium of Data on Global Change, 1990 (The Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN).

Table VII-2. National Sulfur Dioxide and Particulate Emissions from Enterprises, 1980 and 1985-1989 (a)

Year	Sulfur Dioxide (Mt)	Particulates from Smoke (Mt) (b)	Particulates from Industrial Processes (Mt) (c)
1980	16.00	14.85	-
1985	13.25	12.95	14.31
1986	12.50	13.84	16.44
1987	14.12	14.45	16.03
1988	15.23	14.36	18.61
1989	15.65	13.99	17.86

(a) This probably refers to emissions from enterprises engaged in production, which would include electric utilities.
(b) Literally "smoke dust". Here assumed to be particulates resulting from combustion of fuels.
(c) Refers to solid particulate matter released in the course of production processes (e.g. grinding).
- Not available.

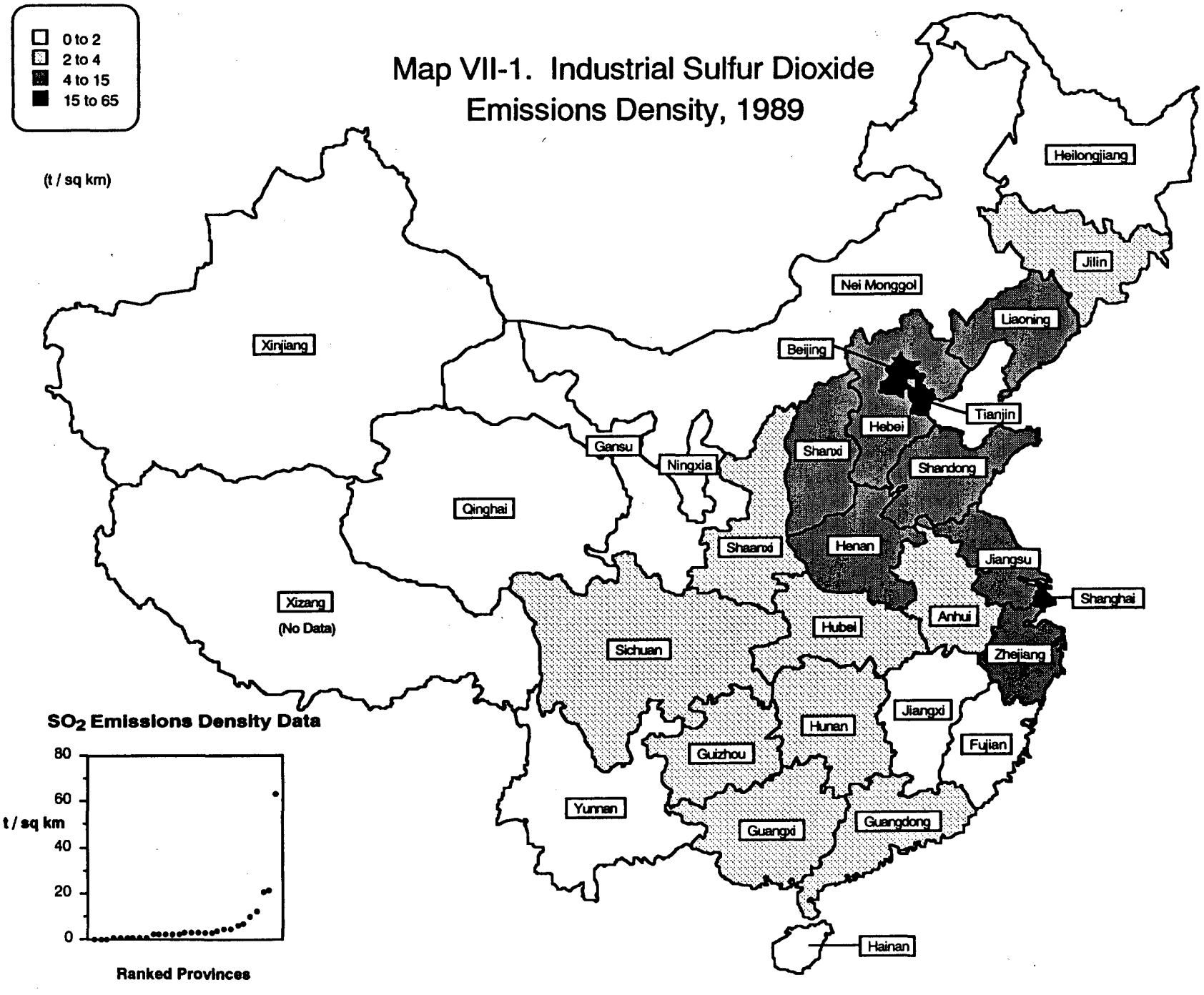
Source: China Statistical Yearbook, 1990 (SSB, Beijing).

Table VII-3. Sulfur Dioxide and Particulate Emissions from Enterprises, 1989 (a)

Planning Region	Province	Sulfur Dioxide (Mt)	Particulates from Combustion (b) (Mt)	Provincial Area ('000 sq km)	Sulfur Dioxide Emissions Density (tons per sq km-yr)	Particulates Emissions Density (tons per sq km-yr)
North	Beijing	0.34	0.25	16.8	20.24	14.88
	Tianjin	0.24	0.09	11.3	21.24	7.96
	Hebei	0.90	0.79	188.0	4.79	4.20
	Shanxi	0.97	0.81	156.1	6.21	5.19
	Inner Mongolia	0.49	0.65	1,200.0	0.41	0.54
Northeast	Liaoning	1.05	1.08	145.8	7.20	7.41
	Jilin	0.28	0.90	138.0	2.03	6.52
	Heilongjiang	0.32	1.41	473.4	0.68	2.98
East	Shanghai	0.39	0.23	6.2	62.90	37.10
	Jiangsu	1.02	0.75	102.6	9.94	7.31
	Zhejiang	0.47	0.29	101.8	4.62	2.85
	Anhui	0.41	0.45	139.5	2.94	3.23
	Fujian	0.13	0.11	121.5	1.07	0.91
	Jiangxi	0.32	0.30	166.8	1.92	1.80
	Shandong	1.89	1.30	153.1	12.34	8.49
South-Central	Henan	0.68	0.72	166.9	4.07	4.31
	Hubei	0.62	0.50	187.5	3.31	2.67
	Hunan	0.58	0.39	210.1	2.76	1.86
	Guangdong	0.42	0.22	178.0	2.36	1.24
	Guangxi	0.59	0.28	230.5	2.56	1.21
	Hainan	0.01	0.01	34.0	0.29	0.29
Southwest	Sichuan	1.50	0.91	566.6	2.65	1.61
	Guizhou	0.54	0.28	176.3	3.06	1.59
	Yunnan	0.23	0.26	392.2	0.59	0.66
	Tibet	(c)	(c)	1,182.7	(c)	(c)
Northwest	Shaanxi	0.62	0.48	205.0	3.02	2.34
	Gansu	0.15	0.21	455.0	0.33	0.46
	Qinghai	0.35	0.06	779.1	0.45	0.08
	Ningxia	0.03	0.13	66.0	0.45	1.97
	Xinjiang	0.11	0.13	1,635.2	0.07	0.08
National Total/Average		15.65	13.99	9,586.0	1.63	1.46

(a) Emissions are for industrial enterprises only and include only emissions from processes which contribute to the production of material goods. Significant emissions sources such as residences and restaurants are not included. Electric utilities are usually considered to be industrial enterprises in Chinese statistics.
(b) The literal translation for this category is "smoke particulates."
(c) Not available.

Source: China Statistical Yearbook, 1990 (SSB, Beijing).


0 to 2
2 to 4
4 to 15
15 to 65
(t / sq km)
Map VII-1. Industrial Sulfur Dioxide Emissions Density, 1989
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
SO2 Emissions Density Data
80
60
40
20
0
t / sq km
Ranked Provinces

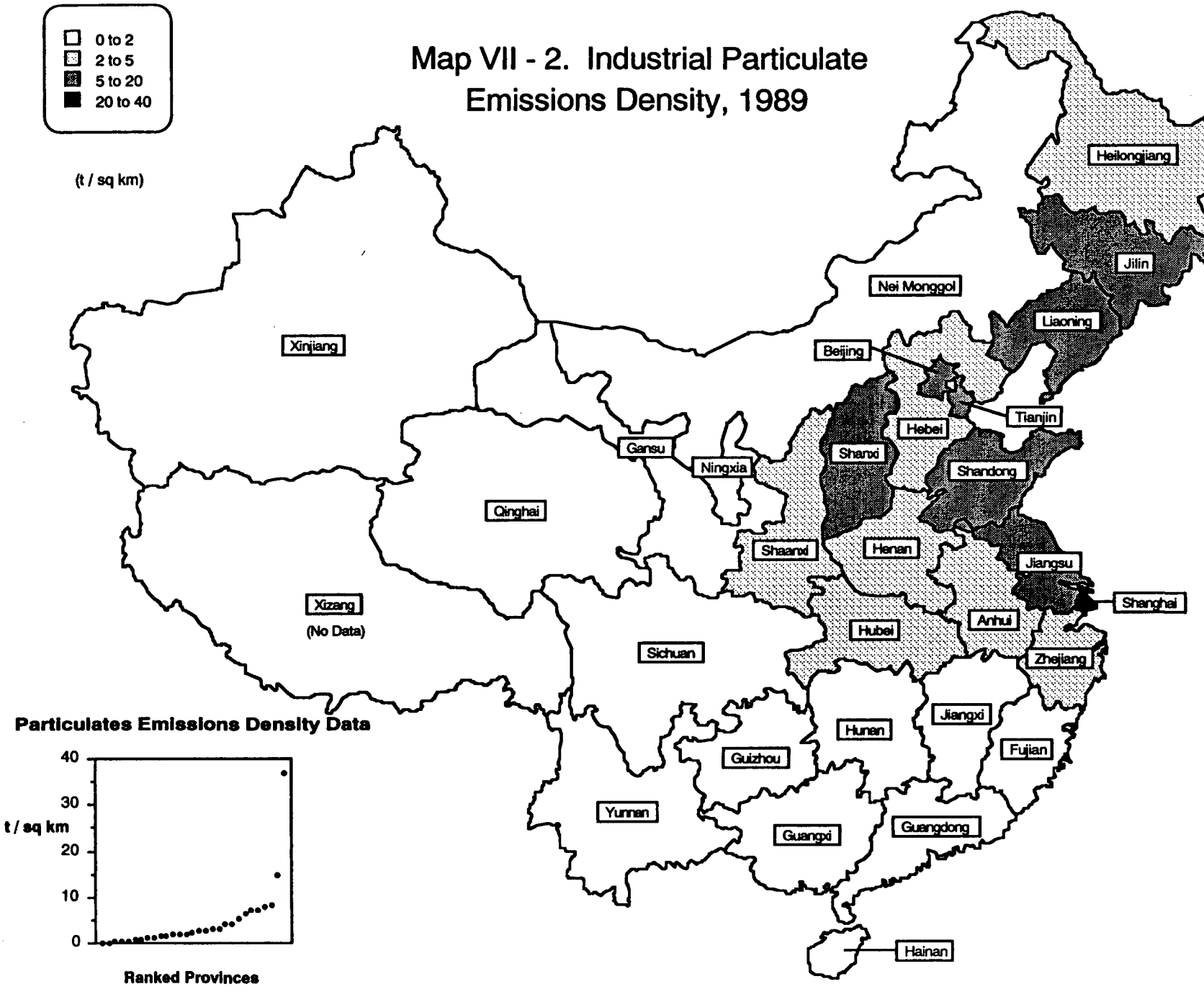

Map VII - 2. Industrial Particulate Emissions Density, 1989
0 to 2
2 to 5
5 to 20
20 to 40
(t / sq km)
Heilongjiang
Jilin
Liaoning
Nei Monggol
Beijing
Tianjin
Hebei
Xinjiang
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
(No Data)
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Particulates Emissions Density Data
40
30
20
10
0
t / sq km
Ranked Provinces

Table VII-4. Ambient Air Quality in Selected Chinese Cities: Total Suspended Particulates, 1980-

Annual Averages, ug/m3

City	Province	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
major cities (a)		-	-	-	-	-	-	-	-	-	432
major southern cities (a)		-	-	-	330	450	444	391	370	-	318
major northern cities (a)		-	-	-	870	870	740	715	805	-	526
Beijing		-	494	-	-	-	-	-	-	399	-
Tianjin		-	690	710	690	560	570	540	470	410	360
Taiyuan	Shanxi	-	-	-	-	-	-	970	890	1,041	783
Datong	Shanxi	-	-	-	-	-	-	676	674	854	566
Yangquan	Shanxi	-	-	-	-	-	-	872	808	1,153	600
Changzhi	Shanxi	-	-	-	-	-	-	421	359	440	420
Linfeng	Shanxi	-	-	-	-	-	-	1,336	982	1,479	828
Hohhot	Inner Mongolia	-	-	-	-	-	-	-	-	-	679
Shenyang	Liaoning	-	1,023	689	1,142	1,167	608	534	646	593	460
Dalian	Liaoning	750	780	910	590	490	340	420	430	440	400
Changchun	Jilin	-	-	-	-	-	-	-	-	550	470
Harbin	Heilongjiang	-	-	-	-	-	-	-	-	540	450
Qiqihar	Heilongjiang	-	-	-	-	-	-	-	-	540	400
Daqing	Heilongjiang	-	-	-	-	-	-	-	-	130	120
Jiamusi	Heilongjiang	-	-	-	-	-	-	-	-	500	350
Mudanjiang	Heilongjiang	-	-	-	-	-	-	-	-	790	790
Shanghai		-	-	280	-	-	-	-	190	-	-
Nanjing (b)	Jiangsu	-	235	246	224	341	455	469	423	627	273
Xuzhou	Jiangsu	-	440	-	-	-	-	-	-	-	443
Hangzhou	Zhejiang	-	-	-	-	-	-	-	-	-	250
Ningbo	Zhejiang	-	-	-	-	-	-	-	-	-	152
Wenzhou	Zhejiang	-	-	-	-	-	-	-	-	-	280
Jiaxing	Zhejiang	-	-	-	-	-	-	-	-	-	350
Shaoxing	Zhejiang	-	-	-	-	-	-	-	-	-	169
Hefei	Anhui	-	-	-	-	-	460	450	360	-	240
Huainan	Anhui	-	-	-	-	-	540	550	580	660	330
Huaibei	Anhui	-	-	-	-	-	560	700	600	940	550
Anqing	Anhui	-	-	-	-	-	520	240	240	220	160
Wuhu	Anhui	-	-	-	-	-	1,030	980	950	440	260
Ma'anshan	Anhui	-	-	-	-	-	370	510	370	420	520
5-city avg. (c)	Henan	-	1,417	750	960	878	765	792	671	765	-
Wuhan	Hubei	-	-	495	567	474	335	349	333	358	320
Huangshi	Hubei	-	-	-	-	-	-	-	-	670	290
Xiangfan	Hubei	-	-	-	-	-	-	-	-	686	358
Shashi	Hubei	-	-	-	-	-	-	-	-	450	370
Yichang	Hubei	-	-	-	-	-	-	-	-	410	130
Shiyan	Hubei	-	-	-	-	-	-	-	-	620	480
Guangzhou	Guangdong	-	-	280	-	-	270	230	230	290	277
Shenzhen SEZ	Guangdong	-	-	-	-	-	-	-	-	200	
Zhuhai SEZ	Guangdong	-	-	-	-	-	-	-	-	390	190
Chongqing	Sichuan	-	-	-	-	-	-	-	-	600	430
Chengdu	Sichuan	-	-	300	340	330	380	360	330	420	-
province avg.	Guizhou	-	-	-	-	-	-	799	745	539	552
Guiyang	Guizhou	-	-	-	-	-	-	574	465	470	385
Lanzhou	Gansu	-	-	-	-	-	-	-	-	-	710
Tianshui	Gansu	-	-	-	-	-	-	-	-	-	730
Jiayuguan	Gansu	-	-	-	-	-	-	-	-	-	290
Yinchuan	Ningxia	-	-	-	-	-	-	-	-	-	392

(a) Average of measurements in major cities. Source did not specify which cities.
(b) 1981-1984 figures are for "floating dust" ("piaochenzhi").
(c) Average of measurements in Zhengzhou, Kaifeng, Luoyang, Pingdingshan, and Anyang.

Source: Yearbook of China's Environment, 1990 (China Environmental Science Press, Beijing).

Table VII-5. Ambient Air Quality in Selected Chinese Cities: Sulfur Dioxide, 1979-1989

Annual Averages, ug/m3

City	Province	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
major cities (a)		-	-	-	-	-	-	-	-	-	-	105
major southern cities (a)		-	-	-	-	-	-	-	-	-	-	119
major northern cities (a)		-	-	-	-	-	-	-	-	-	-	93
Beijing		-	-	-	-	-	-	107	-	-	-	99
Tianjin		-	-	160	200	200	190	160	190	170	190	130
Taiyuan	Shanxi	-	-	-	-	-	-	-	290	240	247	409
Datong	Shanxi	-	-	-	-	-	-	-	157	129	182	258
Yangquan	Shanxi	-	-	-	-	-	-	-	113	148	123	145
Changzhi	Shanxi	-	-	-	-	-	-	-	62	31	42	37
Linfeng	Shanxi	-	-	-	-	-	-	-	94	166	222	356
Hohhot	Inner Mongolia	-	-	-	-	-	-	-	-	-	-	88
Shenyang	Liaoning	-	-	158	116	109	127	116	159	143	100	146
Dalian	Liaoning	-	60	60	70	50	70	60	60	60	60	54
Changchun	Jilin	-	-	-	-	-	-	-	-	-	-	45
Harbin	Heilongjiang	-	-	-	-	-	-	-	-	-	48	45
Qiqihar	Heilongjiang	-	-	-	-	-	-	-	-	-	30	24
Daqing	Heilongjiang	-	-	-	-	-	-	-	-	-	7	8
Jiamusi	Heilongjiang	-	-	-	-	-	-	-	-	-	26	25
Mudanjiang	Heilongjiang	-	-	-	-	-	-	-	-	-	51	62
Nanjing	Jiangsu	-	-	57	63	73	92	92	88	80	83	65
Xuzhou	Jiangsu	-	-	47	-	-	-	-	-	-	-	70
Hangzhou	Zhejiang	-	-	-	-	-	-	-	-	-	-	97
Ningbo	Zhejiang	-	-	-	-	-	-	-	-	-	-	30
Wenzhou	Zhejiang	-	-	-	-	-	-	-	-	-	-	51
Jiaxing	Zhejiang	-	-	-	-	-	-	-	-	-	-	49
Shaoxing	Zhejiang	-	-	-	-	-	-	-	-	-	-	71
Hefei	Anhui	-	-	-	-	-	-	30	60	40	-	50
Huainan	Anhui	-	-	-	-	-	-	40	50	50	30	20
Huaibei	Anhui	-	-	-	-	-	-	20	20	20	30	20
Anqing	Anhui	-	-	-	-	-	-	30	40	30	30	30
Wuhu	Anhui	-	-	-	-	-	-	20	60	70	40	30
Ma'anshan	Anhui	-	-	-	-	-	-	20	20	20	10	10
5-city avg. (b)	Henan	-	-	64	73	70	56	61	57	57	59	-
Wuhan	Hubei	-	-	-	48	62	79	71	54	48	43	48
Huangshi	Hubei	-	-	-	-	-	-	-	-	-	144	121
Xiangfan	Hubei	-	-	-	-	-	-	-	-	-	44	42
Shashi	Hubei	-	-	-	-	-	-	-	-	-	69	88
Yichang	Hubei	-	-	-	-	-	-	-	-	-	192	246
Shiyan	Hubei	-	-	-	-	-	-	-	-	-	26	17
Guangzhou	Guangdong	-	-	-	70	-	-	80	90	80	90	100
Shenzhen SEZ	Guangdong	-	-	-	-	-	-	-	-	-	20	10
Shantou SEZ	Guangdong	-	-	-	-	-	-	-	-	-	-	10
Zhuhai SEZ	Guangdong	-	-	-	-	-	-	10	<10	10	10	20
Chongqing	Sichuan	-	-	-	-	-	-	-	-	-	360	340
Chengdu	Sichuan	150	140	110	100	100	80	80	70	80	70	-
province avg.	Guizhou	-	-	-	-	-	-	-	219	236	214	204
Guiyang	Guizhou	-	-	-	-	-	-	-	465	439	374	330
Lanzhou	Gansu	-	-	-	-	-	-	-	-	-	-	467
Tianshui	Gansu	-	-	-	-	-	-	-	-	-	-	59
Jiayuguan	Gansu	-	-	-	-	-	-	-	-	-	-	26
Yinchuan	Ningxia	-	-	-	-	-	-	-	-	-	-	19

(a) Average of measurements in major cities. Source did not specify which cities.
(b) Average of measurements in Zhengzhou, Kaifeng, Luoyang, Pingdingshan, and Anyang.

Source: Yearbook of China's Environment, 1990 (China Environmental Science Press, Beijing).

Table VII-6. Ambient Air Quality in Selected Chinese Cities: Nitrogen Oxides, 1979-1989

Annual Averages, ug/m3

City	Province	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Tianjin		-	-	80	70	60	50	60	60	60	70	50
Taiyuan	Shanxi	-	-	-	-	-	-	-	-	-	-	68
Datong	Shanxi	-	-	-	-	-	-	-	-	-	-	44
Yangquan	Shanxi	-	-	-	-	-	-	-	-	-	-	43
Changzhi	Shanxi	-	-	-	-	-	-	-	-	-	-	50
Linfeng	Shanxi	-	-	-	-	-	-	-	-	-	-	48
Shenyang	Liaoning	-	-	94	609	608	71	75	69	62	61	60
Dalian	Liaoning	-	70	70	110	60	70	60	60	60	60	65
Changchun	Jilin	-	-	-	-	-	-	-	-	-	-	50
Harbin	Heilongjiang	-	-	-	-	-	-	-	-	-	-	61
Hefei	Anhui	-	-	-	-	-	-	50	70	40	-	60
Huainan	Anhui	-	-	-	-	-	-	40	40	50	50	40
Huaibei	Anhui	-	-	-	-	-	-	40	40	40	30	30
Anqing	Anhui	-	-	-	-	-	-	40	40	40	30	30
Wuhu	Anhui	-	-	-	-	-	-	20	20	30	20	50
Ma'anshan	Anhui	-	-	-	-	-	-	30	30	40	30	40
5-city avg. (a)	Henan	-	-	33	40	41	38	46	38	47	49	-
Wuhan	Hubei	-	-	-	60	68	47	45	52	54	58	59
Guangzhou	Guangdong	-	-	-	50	-	-	80	100	110	110	133
Shenzhen SEZ	Guangdong	-	-	-	-	-	-	-	-	-	60	50
Shantou SEZ	Guangdong	-	-	-	-	-	-	-	-	-	-	23
Zhuhai SEZ	Guangdong	-	-	-	-	-	-	30	20	20	40	40
Chongqing	Sichuan	-	-	-	-	-	-	-	-	-	70	60
Chengdu	Sichuan	70	40	-	50	50	40	50	50	60	50	-
province avg.	Guizhou	-	-	-	-	-	-	-	30	33	30	34
Guiyang	Guizhou	-	-	-	-	-	-	-	47	44	34	29
Lanzhou	Gansu	-	-	-	-	-	-	-	-	-	-	182
Tianshui	Gansu	-	-	-	-	-	-	-	-	-	-	70
Jiayuguan	Gansu	-	-	-	-	-	-	-	-	-	-	20
Yinchuan	Ningxia	-	-	-	-	-	-	-	-	-	-	25

(a) Average of measurements in Zhengzhou, Kaifeng, Luoyang, Pingdingshan, and Anyang.

Source: Yearbook of China's Environment, 1990 (China Environmental Science Press, Beijing).

Table VII-7. Ambient Air Quality in Selected Chinese Cities: Carbon Monoxide, 1981-1989

Annual Averages, ug/m3

City	Province	1981	1982	1983	1984	1985	1986	1987	1988	1989
Tianjin		-	2.25	3.00	2.84	6.82	3.11	3.83	3.61	3.33
Shenyang	Liaoning	3.03	1.72	1.11	2.72	2.00	2.46	1.78	1.67	1.92
Dalian	Liaoning	-	-	2.59	4.32	2.36	2.04	2.49	3.33	2.62
Changchun	Jilin	-	-	-	-	-	-	-	-	1.49
Harbin	Heilongjiang	-	-	-	-	-	-	-	-	3.76
Guangzhou	Guangdong	-	2.75	-	-	2.90	2.70	2.61	3.10	2.33

Source: Yearbook of China's Environment, 1990 (China Environmental Science Press, Beijing).

Table VII-8. Particulate Deposition for Selected Chinese Cities, 1980-1989

Annual Averages, tonnes per square km per month

City	Province	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Beijing		-	31.40	-	-	-	26.40	-	-	20.00	17.80
Tianjin		-	-	45.95	32.60	33.90	31.50	30.60	24.38	19.51	18.23
Shenyang	Liaoning	-	50.15	39.88	46.19	48.36	39.10	41.01	53.63	48.03	41.20
Dalian	Liaoning	24.31	27.86	29.98	28.60	29.40	29.34	28.99	27.59	24.72	23.70
Changchun	Jilin	-	-	-	-	-	-	-	-	46.03	45.16
Harbin	Heilongjiang	-	-	-	-	-	-	-	-	-	44.20
Shanghai		-	-	28.80	-	-	-	-	25.00	-	-
Xuzhou	Jiangsu	-	28.00	-	-	-	-	-	-	-	16.40
Hefei	Anhui	-	-	-	-	-	12.13	10.43	14.85	-	19.29
Huainan	Anhui	-	-	-	-	-	-	-	13.45	-	17.32
Huaibei	Anhui	-	-	-	-	-	9.32	11.85	11.54	13.25	12.85
Anqing	Anhui	-	-	-	-	-	14.17	14.61	11.69	13.12	12.93
Wuhu	Anhui	-	-	-	-	-	19.01	15.20	27.50	-	25.64
Ma'anshan	Anhui	-	-	-	-	-	47.80	34.61	29.75	26.21	-
5-city avg. (a)	Henan	-	45.89	41.13	33.25	32.84	36.50	32.45	26.14	24.54	-
Wuhan	Hubei	-	-	24.30	20.23	23.24	22.63	22.76	17.85	22.72	17.62
Guangzhou	Guangdong	-	-	15.09	-	-	12.66	13.75	14.19	13.65	10.04
Shantou SEZ	Guangdong	-	-	-	-	-	-	-	-	-	5.50
Chengdu	Sichuan	-	-	11.48	11.56	16.86	10.43	12.29	9.29	11.75	-
province avg.	Guizhou	-	-	-	-	-	-	14.30	14.60	11.20	10.80
Guiyang	Guizhou	-	-	-	-	-	-	-	17.20	15.90	21.90

(a) Average of measurements in Zhengzhou, Kaifeng, Luoyang, Pingdingshan, and Anyang.

Source: Yearbook of China's Environment, 1990 (China Environmental Science Press, Beijing).

Chapter VIII—**International Comparisons**

International Comparisons

Overview

China is one of the largest consumers of commercial energy and produces an increasing share of the world's output of industrial products. In this sense it resembles already developed countries. In terms of per capita consumption and patterns of energy use and other activities, however, China more closely resembles other developing countries and countries characterized until recently by large 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. The former has a dynamic economy, which though very efficient is almost completely reliant on imported energy. The latter is more self-sufficient in energy, but has the highest total and per capita rates of energy consumption in the world. The former Soviet Union was chosen for comparison to another country with a large, centrally-planned economy that has also emphasized the development of heavy industry over other sectors.

Primary Energy Production and Consumption

China produced 1017 Mtce, or 8.5% of the world's primary energy in 1989 (Table VIII-1). This was less than half of that produced in the United States and the former Soviet Union, both with about 2400 Btce, and several times that in India and Japan, with 221 Mtce and 119 Mtce respectively. In its structure of primary energy production China is closest to India, which also receives more than half of its energy from coal, but has slightly larger shares of oil, natural gas, and hydroelectricity. The United States and the former Soviet Union differ in their much larger shares of primary production from oil and natural gas. Both also have small shares from nuclear electricity. Because its fossil fuel resources are insignificant, Japan's primary energy production structure is the farthest from China's; 63% comes from nuclear electricity and another 26% from hydroelectricity.

Between 1970 and 1988 China's share of world primary energy consumption (commercial energy only) doubled from 4% to 8% while world consumption increased by one-half, from 7464 Mtce to 11280 Mtce (Table VIII-2). India share also doubled, from 1% to 2%, while the former Soviet Union's increased from 14% to 18%, Japan's remained at 5%, and the United States' declined from 32% to 25%. Per capita consumption increased in all of these countries but the United States, although in 1988 the comparison between developed and developing countries was still very unfavorable. In that year per capita commercial energy consumption in the United States was 13 times China's 859 Mtce per capita.

When biomass is included in the accounting of primary energy consumption, the differences in fuel structure between developed and developing countries becomes very apparent (Table VIII-3). Coal is still important in both India and China, providing 35% and 59% in 1988, but coal's importance is rivaled by biomass, with 37% and 22%. The three developed countries here are by contrast much more dependent on fossil fuels, which account for 83%, 85%, and 92% of primary energy consumption in Japan, the United States, and the former Soviet Union respectively.

Absolute amounts of coal consumed have increased in all the countries examined here, but it has become relatively more important for the developing countries. China and India's shares of world coal consumption doubled between 1970 and 1988, to 22% and 4% respectively, while developed country shares fell (Table VIII-4).

While it is difficult to compare directly the energy intensities (primary energy consumption per unit of gross domestic product (GDP)) of different national economies, comparisons of intensity trends can give information on the relative direction of structural and technological change. Table VIII-5 shows that energy intensities in developed countries, represented by Japan and the United States, have declined fairly steadily since 1970, while those in developing countries rose. After the mid-1970s, however, China became an exception to this trend. A combination of improvements in the physical energy intensity of production and growth in the contributions of less energy-intensive sectors to GDP has led to dramatic declines in energy intensity.

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 comparable. Figures come from many different sources, including research papers which estimate sectoral consumption on the basis of samples. The data and comparisons in this section, therefore, are not meant to be accurate, but are intended to provide a rough indication of the relative importance of major sectors in energy consumption.

Table VIII-6 shows total commercial energy consumption by sector for 1987. China stands out in that industry's share (66%) is larger by far than that in any other country, including the former Soviet Union (51%) on which China's development was closely modeled. The parallel to economic structure can be seen in Table VIII-26; China's industrial sector accounted for 52% of GDP in 1987, whereas the shares were 45% in Japan and about one-third in the remaining countries. China's transportation sector also takes a smaller share than in any of the other countries, 8% as opposed to 18% in the former Soviet Union, which has the next smallest transportation share. At 22% the residential sector share is close to that of all the other countries but the United States, where 36% of end-use is in residences.

China's industrial sector is similar to that in India in the dominance of coal (58% and 52% respectively; Table VIII-7). The developed countries rely much more heavily on fossil fuels, and the contribution of electricity to Japan's industrial end-use consumption is particularly high at 54%.[1] The situation is similar for the transportation sector; because steam locomotives are still common in both China and India, coal makes significant contributions to sectoral consumption (26% and 22% respectively) although petroleum products dominate in all countries (Table VIII-8). China's residential and commercial sector again reflect the importance of coal in China's energy system. Of the countries examined it is the only one for which coal use forms the major part of energy consumption (80% of commercial energy and 31% of total energy end use; Table VIII-9). Commercial energy is relatively more important in China's residential sector than in India's, while biomass is only a small portion of residential end use in the only developed country for which the information was available (the United States; 3%).

For all five countries examined end-use energy consumption shows that a large amount of primary energy consumption is used in electricity generation (Table VIII-10). China's reliance on the direct use of coal, then, becomes even more apparent; at 59% it is similar to the share of end use for all fossil fuels in the other four countries. China's end use share of electricity, 22%, is smaller than for any of the other countries.

The importance of direct use of coal is see again in Table VIII-11. Of the five countries, China converts the smallest share of its coal into electricity, 25% compared to the former Soviet Union's 43%, the next lowest. China's residential and commercial sector also takes a larger share (22%) than in any other country. The share of coal end use in industry is similar to that in all the other countries but the United States.

China's petroleum end use structure is unique in the large share going to industry (34%) and the small share going to residences and commerce (3%; Table VIII-12). As in the United States, only a very small portion of China's petroleum products is used to generate electricity (9%), and as in Japan and the former Soviet Union about one-third is used for transportation.

The dominance of the industrial sector in China relative to other countries is again evident in the pattern of electricity consumption (Table VIII-13). Industrial sector shares of electricity consumption in the other four countries presented here range from 36% in the United States to 62% in the former Soviet Union, compared to the 78% share in China. Agriculture takes the next largest share in China at 9%, similar to that in the Soviet Union. Agricultural end use is significant in India (19%). For the developed countries, Japan and the United States, residential and commercial shares are several times larger than in China.

Energy-Intensive Industrial Products

This chapter reports statistics on production of several energy-intensive industrial products including crude steel, cement, primary aluminum, ethylene, ammonia production, caustic soda, soda ash, sulfuric acid, and wood pulp for 1979 through 1988 (Tables VIII-14 to VIII-22). Production of all of these in both China and India increased, and China's share of worldwide production also clearly increased for each product. China's share of cement production especially is noteworthy; its 1988 share of 19% was larger than that of any other country, whereas in 1979 its 8.5% share was lower than that of the former Soviet Union, Japan, or the United States. Japanese and American production has declined in absolute terms for a number of products, including crude steel, cement, and primary aluminum, and the two countries' shares of production have also decreased for ethylene, soda ash, sulfuric acid, and wood pulp. Production of all products rose in the former Soviet Union, although shares of world production of cement, soda ash, and wood pulp declined. These statistics confirm in a general way the trend of increasing transfer of the production of energy-intensive products from developed to developing countries.

Transportation Structure

China has the smallest total and per capita rates of travel among the countries compared, less than half of the figures for India in both categories (Table VIII-23). Another feature that distinguishes passenger travel in China is that rail and water transport are more significant than in any of the other countries. In China 53% of passenger-km traveled are by rail, and the former Soviet Union and Japan are next at about one-third. The share of road transportation in China is very small, 40% compared to a range of 65% to 81% for the other countries.

In terms of freight traffic, rail transportation is again more important in China than the other countries; 61% of tonne-km traveled go by rail, compared with 52% in the country with the next highest rate, the former Soviet Union (Table VIII-24). Rail traffic in Japan is comparatively minuscule at 5%. Freight traffic by road (17%) is less important than in all other countries but the former Soviet Union (7%). The share of freight traveling by water is 19%, in the middle of the range provided by Japan (45%) and the former Soviet Union (3%). 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, though not as small as India's in this case.

Carbon Dioxide Emissions

Table VIII-25 shows the world's three largest emitters of anthropogenic carbon dioxide, the United States, the former Soviet Union in China. Respectively they contribute 22%, 18%, and 10%, summing to 51% of total emissions (5.9 billion tonnes in 1988). The first two have been major contributors for the past 40 years, but, except for a spike in the late 1950s during the Great Leap Forward, China's emissions were similar to those from Japan until the mid-1970s.

In terms of per capita emissions the picture is somewhat different. The United States is by far the highest, fluctuating between 4.2 and 6.0 tonnes per person from 1950 to 1988. The former Soviet Union ranks next, with per capita emission rising steadily to 3.8 tonnes. Japan's per capita emissions leveled off in the early 1970s near 2.2 tonnes per person. The fact that per capita emissions in China' are 0.6 tonnes, while China's total emissions are twice Japan's underscores the importance of population in analyzing greenhouse gas issues.

NOTES

1 For the former Soviet Union only aggregate figures for all fossil fuel use in the industrial, transportation, and residential and commercial sectors are available.

Table VIII-1. Total Primary Energy Production by Energy Source for Selected Countries, 1989

1. Mtce

Country	Coal	Oil	Natural Gas	Hydro Electricity (a)	Nuclear Electricity (a)	Total
China	753	197	19	48	0	1,017
India (b)	133	50	12	24	2	221
Japan	10	1	3	31	75	119
USA	779	635	641	108	230	2,393
USSR	453	889	943	90	73	2,449
ROW (c)	1,144	2,744	899	564	348	5,699
World Total (d)	*3,272*	*4,515*	*2,518*	*865*	*728*	*11,897*

2. Energy Source Shares of Country Energy Consumption

Country	Coal	Oil	Natural Gas	Hydro Electricity (a)	Nuclear Electricity (a)	Total
China	74%	19%	2%	5%	0%	100%
India (b)	60%	23%	6%	11%	1%	100%
Japan	8%	1%	2%	26%	63%	100%
USA	33%	27%	27%	5%	10%	100%
USSR	19%	36%	39%	4%	3%	100%
ROW (c)	-	-	-	-	-	-
World Total (d)	*27%*	*38%*	*21%*	*7%*	*6%*	*100%*

3. Country Shares of World Energy Source Consumption

Country	Coal	Oil	Natural Gas	Hydro Electricity (a)	Nuclear Electricity (a)	Total
China	23%	4%	1%	6%	0%	9%
India (b)	4%	1%	<1%	3%	<1%	2%
Japan	<1%	<1%	<1%	4%	10%	1%
USA	24%	14%	25%	12%	32%	20%
USSR	14%	20%	37%	10%	10%	21%
ROW (c)	35%	61%	36%	65%	48%	48%
World Total (d)	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

(a) BP figures are in toe. BP estimates about 4 billion kWh per million toe in a modern power plant. Using the standard Chinese conversion factor of 0.404 kgce/kWh we have converted electricity at 1.616 tce/toe rather than the 1.43 tce/toe used elsewhere in this data book. Except for India, electricity production figures are actually consumption figures.
(b) Natural gas, hydroelectricity, and nuclear electricity figures for India are for 1988 (IES database).
(c) Rest of the world.
(d) World total is adjusted to reflect difference between BP and SSB figures for China's primary energy consumption.

Source: China -- Energy in China, 1990 (MOE, Beijing); India -- IES, EAP, LBL, Berkeley, 1990; Others -- BP Statistical Review of World Energy, 1990

Figure VIII-1. Shares of Primary Energy Production by Energy Source, Selected Countries, 1989

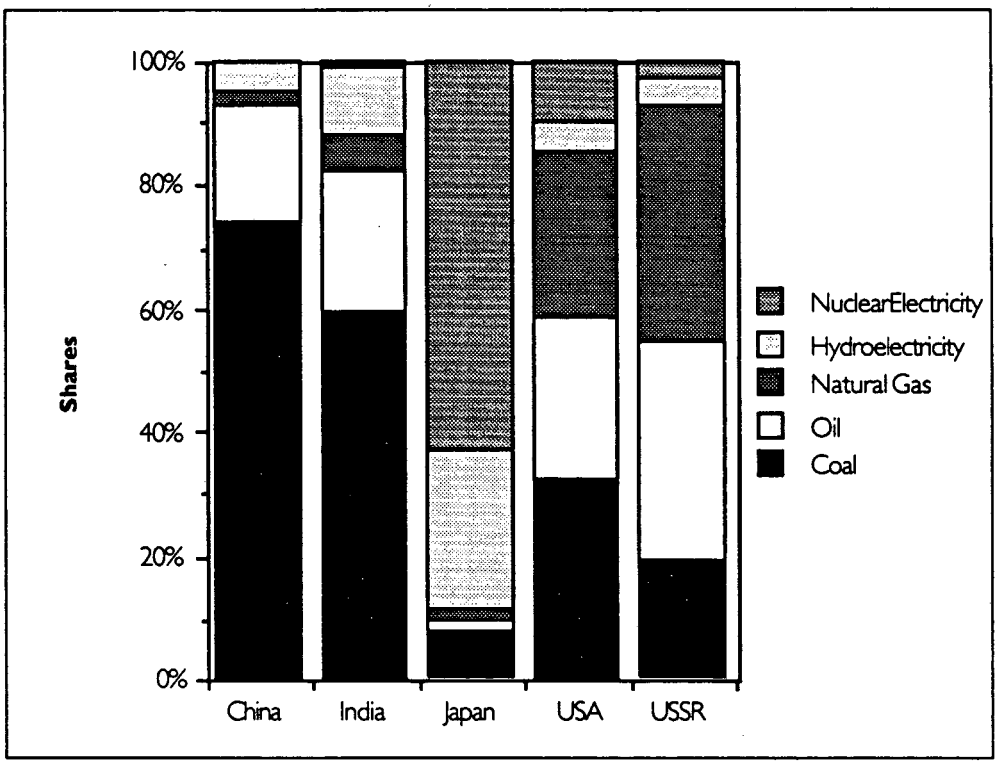


Figure VIII-2. Shares of World Primary Energy Source Production by Country, 1989

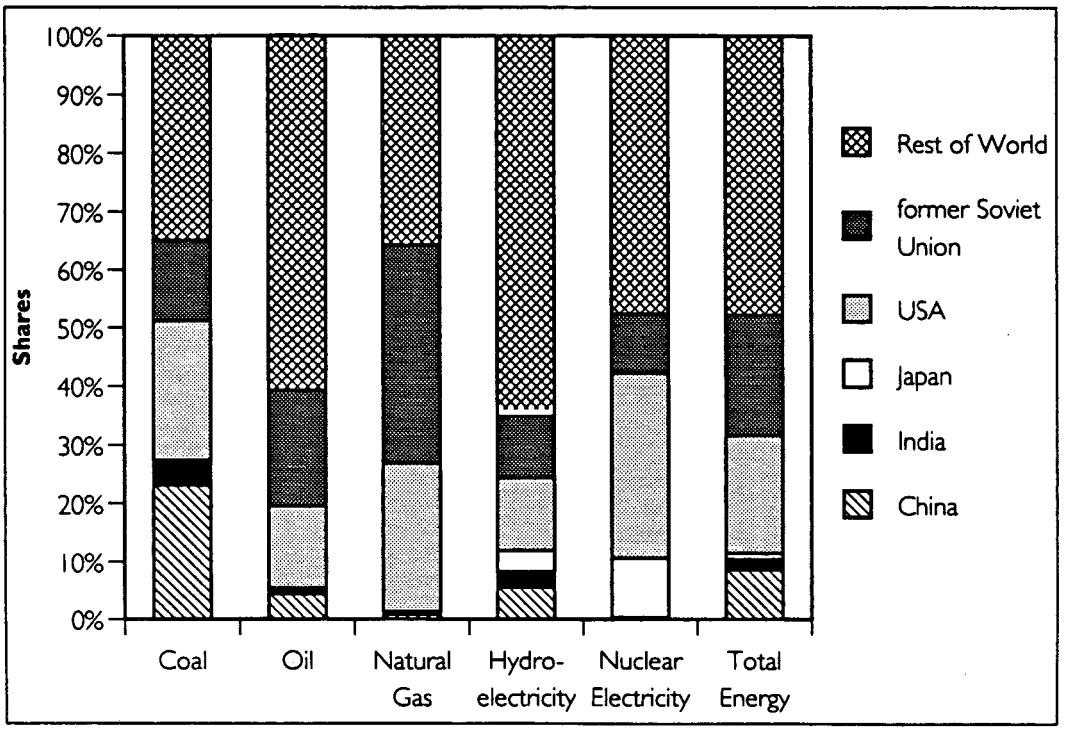


Table VIII-2. World Primary Commercial Energy Consumption by Region or Nation, 1970 & 1988

1. Mtce

Country	1970	1988
China	291	931
India	92	252
Japan	408	575
USA	2,374	2,768
USSR	1,071	1,988
ROW (a)	3,229	4,765
World Total (b)	*7,464*	*11,280*

2. Shares

Country	1970	1988
China	4%	8%
India	1%	2%
Japan	5%	5%
USA	32%	25%
USSR	14%	18%
RoW (a)	43%	42%
World Total	*100%*	*100%*

3. Per Capita Consumption (kgce)

Country	1970	1988
China	356	859
India	167	310
Japan	3,920	4,717
USA	11,578	11,253
USSR	4,431	7,048 (c)

(a) Rest of the world.
(b) World total is adjusted to reflect difference between BP and SSB figures for China's primary energy consumption.
(c) 1988 per capita figure for USSR based on 1987 population.

Source: China -- Energy Statistical Yearbook of China, 1989; India -- LDC Energy Database, International Energy Studies, LBL; Others -- BP Statistical Review of World Energy, 1990.

Figure VIII-3. Shares of World Primary Commercial Energy Consumption

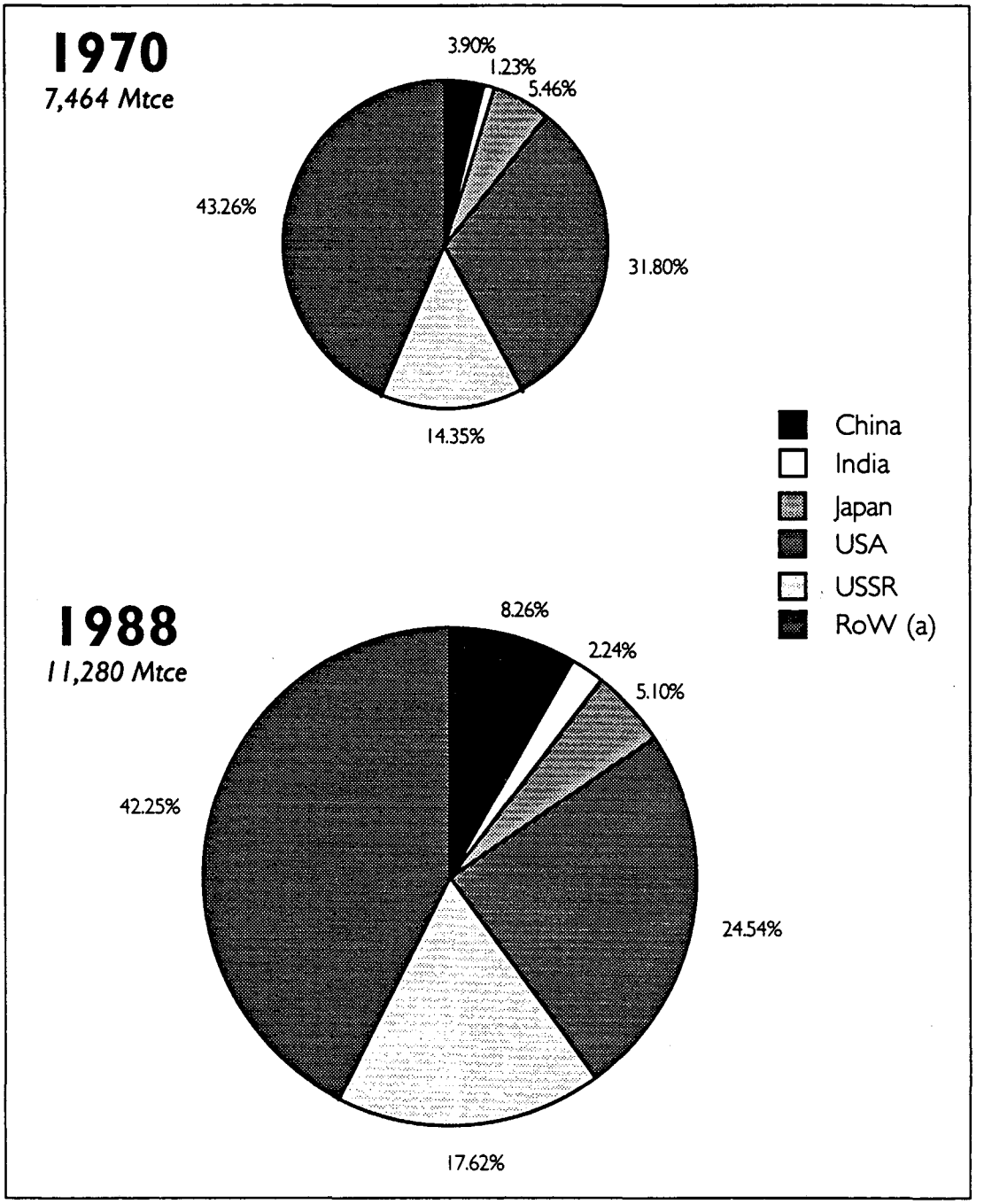


Figure VIII-4. Per Capita Primary Commercial Energy Consumption, 1970 & 1988

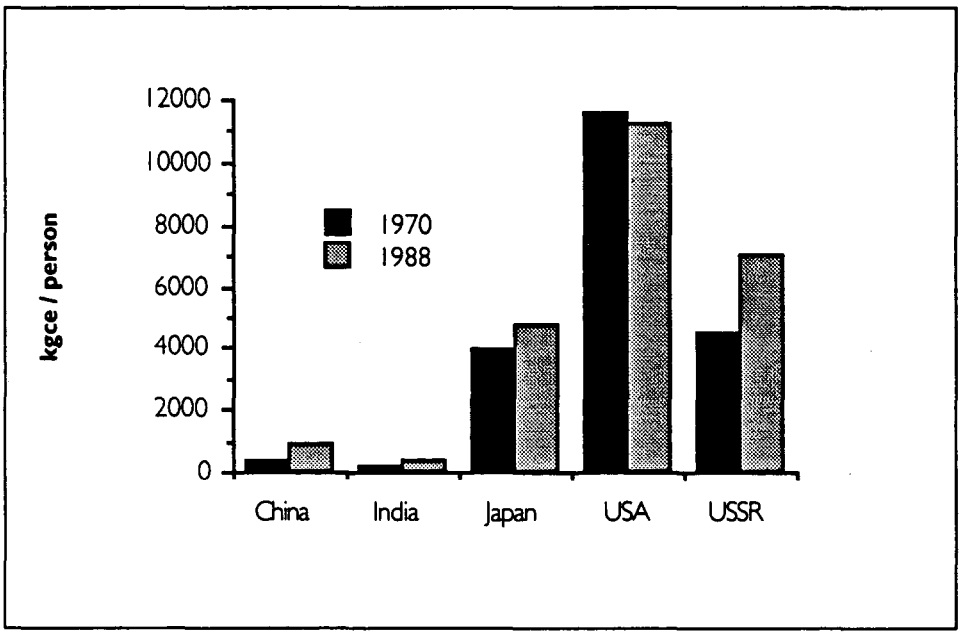


Table VIII-3. Primary Energy Consumption by Energy Source for Selected Countries, 1988

1. Mtce

Country	Coal	Oil	Natural Gas	Hydro Electricity (a)	Nuclear Electricity (a)	Biomass	Total
China (b)	710	158	19	44	0	266	1,197
India (b)	143	74	12	24	2	150	405
Japan	109	342	56	31	75	(d)	613
USA (c)	674	1,177	663	108	230	104	2,956
USSR	434	633	785	91	73	(d)	2,015

2. Shares

Country	Coal	Oil	Natural Gas	Hydro Electricity (a)	Nuclear Electricity (a)	Biomass	Total
China (b)	59%	13%	2%	4%	0%	22%	100%
India (b)	35%	18%	3%	6%	1%	37%	100%
Japan	18%	56%	9%	5%	12%	(d)	100%
USA (c)	23%	40%	22%	4%	8%	4%	100%
USSR	22%	31%	39%	4%	4%	(d)	100%

(a) BP figures are in toe. BP estimates about 4 billion kWh per million toe in a modern power plant. Using the standard Chinese conversion factor of 0.404 kgce/kWh we have converted electricity at 1.616 tce/toe rather than the 1.43 tce/toe used elsewhere in this data book.
(b) Biomass figure is for 1987.
(c) Biomass figure is for 1989.
(d) Not available.

Source: China -- Energy Statistical Yearbook of China, 1989 (SSB, Beijing); National Rural Energy Planning, 1990 (China Standards Press, Beijing); India -- IES, EAP, LBL, Berkeley, 1990; Others -- BP Statistical Review of World Energy, 1990; USA biomass -- Estimates of U.S. Biofuels Consumption 1989(EIA, DOE, Washington, D.C.).

Figure VIII-5. Shares of Primary Energy Consumption by Energy Source, Selected Countries, 1988

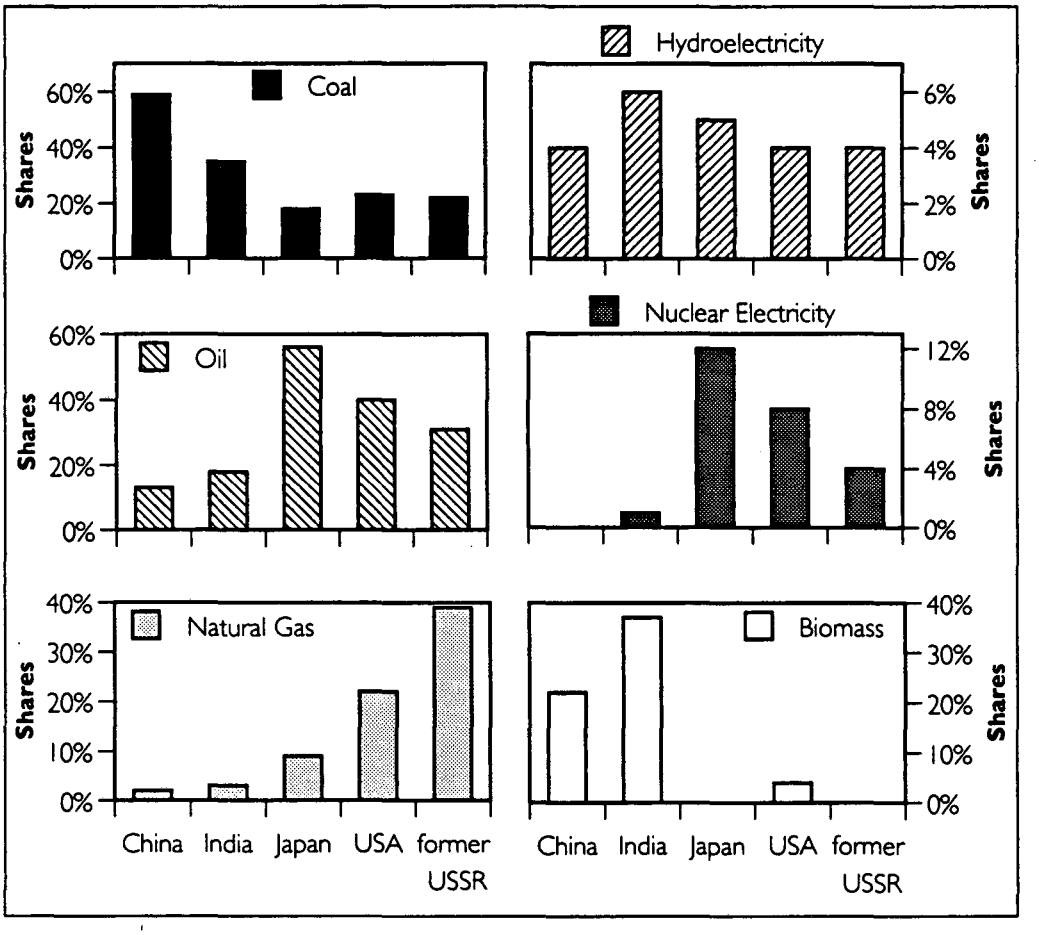


Table VIII-4. World Primary Coal Consumption, 1970 & 1988

1. Mtce

Country	1970	1988
China	237	710
India	53	143
Japan	86	109
USA	471	674
USSR	420	434
ROW (a)	886	1,118
Total (b)	*2,154*	*3,187*

2. Shares

Country	1970	1988
China	11%	22%
India	2%	4%
Japan	4%	3%
USA	22%	21%
USSR	20%	14%
ROW (a)	41%	35%
Total	*100%*	*100%*

(a) Rest of the world
(b) World total is adjusted to reflect difference between BP and SSB figures for China's primary coal consumption.

Source:
China – Energy Statistical Yearbook of China, 1989 (SSB, Beijing);
India – LDC Energy Database, International Energy Studies, LBL;
Others – BP Statistical Review of World Energy, 1990.

Figure VIII-6. Coal Consumption Shares, Selected Countries

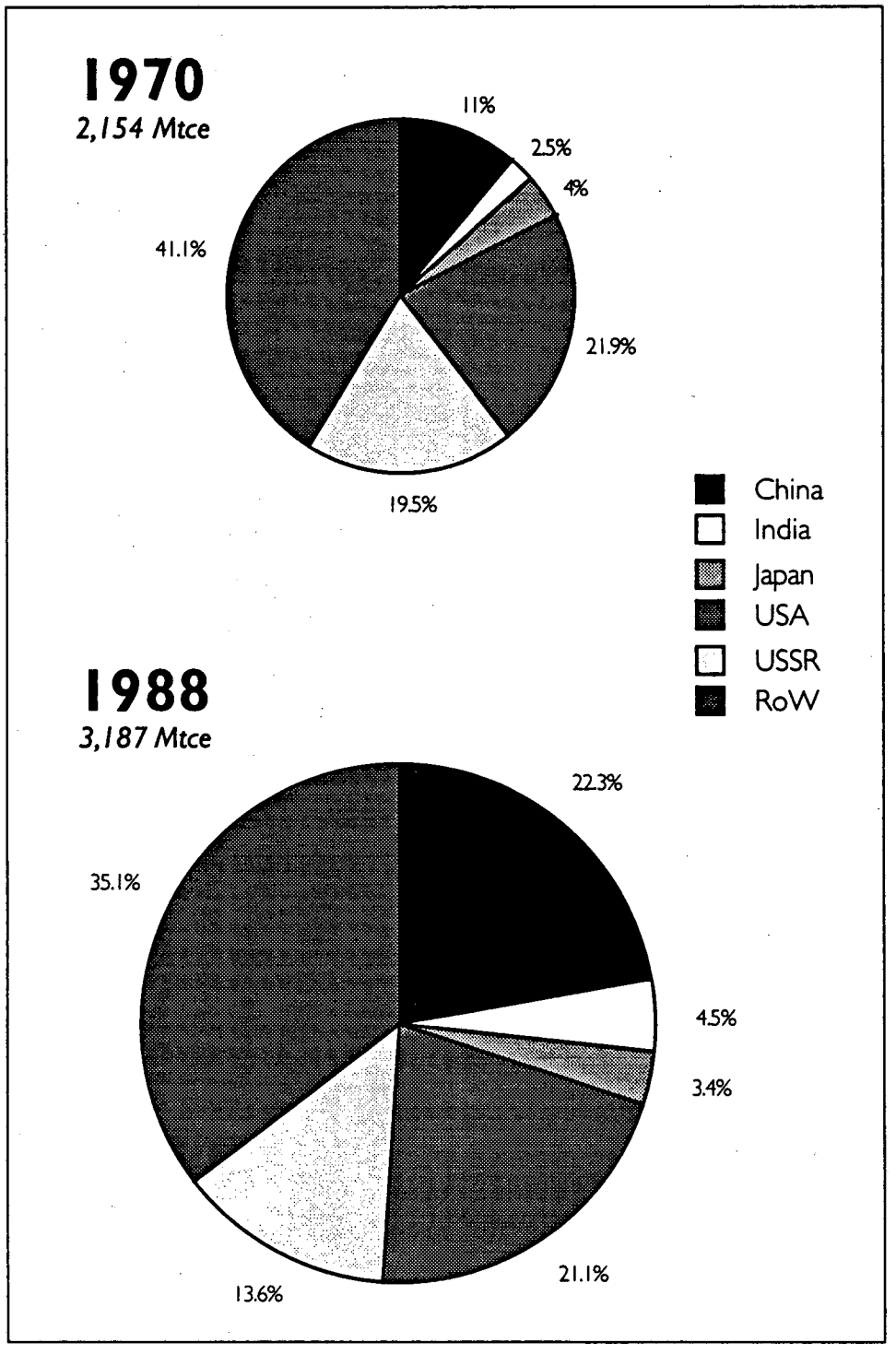


Table VIII-5. Intensity Trends: Primary Commercial Energy Consumption per Unit GDP, 1970-1988 (a)

1. China (b) (e)

Year	Primary Energy Consumption (million tce)	GDP (billion 1980 yuan)	Intensity (tce per thousand 1980 yuan)	Growth Rate (percent)	Intensity Indices 1970 = 1	Intensity Indices 1977 = 1
1970	291	262	1.11		1.00	0.74
1971	344	280	1.23	10.4%	1.10	0.82
1972	371	289	1.29	4.9%	1.16	0.86
1973	389	313	1.24	-3.2%	1.12	0.83
1974	399	316	1.26	1.6%	1.14	0.85
1975	453	342	1.32	4.7%	1.19	0.89
1976	476	324	1.47	11.2%	1.33	0.99
1977	522	349	1.49	1.5%	1.35	1.00
1978	570	393	1.45	-2.9%	1.31	0.97
1979	585	420	1.39	-4.1%	1.25	0.93
1980	603	447	1.35	-3.1%	1.21	0.90
1981	594	469	1.27	-6.0%	1.14	0.85
1982	621	508	1.22	-3.5%	1.10	0.82
1983	662	558	1.19	-3.0%	1.07	0.79
1984	711	633	1.12	-5.3%	1.01	0.75
1985	768	716	1.07	-4.5%	0.97	0.72
1986	810	773	1.05	-2.4%	0.94	0.70
1987	869	855	1.02	-2.9%	0.92	0.68
1988	931	950	0.98	-3.6%	0.88	0.66

2. India (c)

Year	Primary Energy Consumption (million tce)	GDP (billion 1980 rupees)	Intensity (tce per thousand 1980 rupees)	Growth Rate (percent)	Intensity Indices 1970 = 1	Intensity Indices 1977 = 1
1970	92	904	0.101		1.00	0.88
1971	96	913	0.105	3.2%	1.03	0.91
1972	99	911	0.109	3.9%	1.07	0.95
1973	104	952	0.109	0.6%	1.08	0.95
1974	111	963	0.115	5.2%	1.13	1.00
1975	118	1,050	0.113	-2.0%	1.11	0.98
1976	127	1,063	0.119	5.8%	1.18	1.04
1977	131	1,142	0.115	-3.6%	1.13	1.00
1978	137	1,205	0.114	-0.8%	1.12	0.99
1979	142	1,142	0.124	9.0%	1.22	1.08
1980	148	1,222	0.121	-2.4%	1.19	1.05
1981	163	1,298	0.125	3.4%	1.24	1.09
1982	169	1,338	0.126	0.5%	1.24	1.10
1983	180	1,448	0.124	-1.3%	1.23	1.08
1984	189	1,505	0.126	1.1%	1.24	1.09
1985	206	1,582	0.130	3.5%	1.28	1.13
1986	219	1,644	0.133	2.1%	1.31	1.16
1987	229	1,704	0.134	1.0%	1.32	1.17
1988	252	1,874	0.135	0.3%	1.33	1.17

(a) No comparable series of data for the USSR was available and so is not presented here.
(b) Energy consumption data from Energy in China, 1990 (MOE, Beijing).
(c) Energy consumption data from LDC Energy Database, IES, EAP.
(d) Energy consumption data from BP Statistical Review of World Energy, June 1990.
(e) 1988 GDP figure estimated by WB.

Source: Energy in China, 1990 (MOE, Beijing); LDC Energy Database, IES, EAP; BP Statistical Review of World Energy, June 1990. World Tables, 1989-90 (The World Bank, Washington, D.C.).

Table VIII-5. Intensity Trends: Primary Commercial Energy Consumption per Unit GDP, 1970-1988 (continued) (a)

3. Japan (d) (e)

Year	Primary Energy Consumption (million tce)	GDP (billion 1980 yen)	Intensity (tce per thousand 1980 yen)	Growth Rate (percent)	Intensity Indices 1970 = 1	Intensity Indices 1977 = 1
1970	408	142,796	2.86		1.00	1.12
1971	431	148,910	2.89	1.4%	1.01	1.14
1972	444	161,512	2.75	-4.9%	0.96	1.08
1973	497	174,064	2.86	3.8%	1.00	1.12
1974	495	173,465	2.86	0.0%	1.00	1.12
1975	473	178,539	2.65	-7.3%	0.93	1.04
1976	493	186,817	2.64	-0.3%	0.92	1.04
1977	498	195,843	2.54	-3.7%	0.89	1.00
1978	507	206,018	2.46	-3.2%	0.86	0.97
1979	529	215,696	2.45	-0.3%	0.86	0.96
1980	514	226,081	2.27	-7.3%	0.80	0.89
1981	506	234,213	2.16	-5.1%	0.76	0.85
1982	488	240,832	2.02	-6.2%	0.71	0.80
1983	490	248,940	1.97	-2.9%	0.69	0.77
1984	533	260,136	2.05	4.1%	0.72	0.81
1985	535	271,549	1.97	-3.7%	0.69	0.78
1986	537	278,324	1.93	-2.1%	0.68	0.76
1987	544	287,681	1.89	-2.1%	0.66	0.74
1988	575	302,895	1.90	0.5%	0.67	0.75

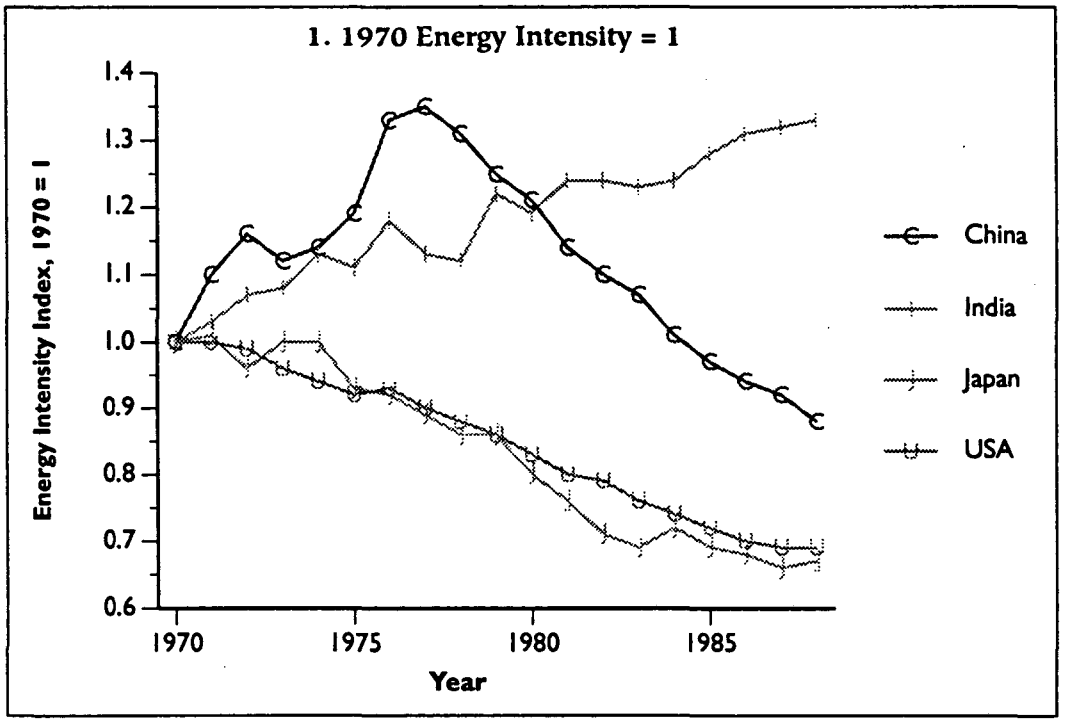
4. United States (d) (e)

Year	Primary Energy Consumption (million tce)	GDP (billion 1980 dollars)	Intensity (tce per thousand 1980 dollars)	Growth Rate (percent)	Intensity Indices 1970 = 1	Intensity Indices 1977 = 1
1970	2,374	1,865	1.27		1.00	1.11
1971	2,432	1,911	1.27	0.0%	1.00	1.11
1972	2,528	2,011	1.26	-1.2%	0.99	1.09
1973	2,579	2,114	1.22	-3.0%	0.96	1.06
1974	2,513	2,102	1.20	-2.0%	0.94	1.04
1975	2,444	2,082	1.17	-1.8%	0.92	1.02
1976	2,574	2,184	1.18	0.4%	0.93	1.03
1977	2,635	2,292	1.15	-2.5%	0.90	1.00
1978	2,698	2,423	1.11	-3.1%	0.88	0.97
1979	2,729	2,483	1.10	-1.3%	0.86	0.96
1980	2,626	2,477	1.06	-3.6%	0.83	0.92
1981	2,566	2,513	1.02	-3.7%	0.80	0.89
1982	2,458	2,454	1.00	-1.9%	0.79	0.87
1983	2,451	2,545	0.96	-3.9%	0.76	0.84
1984	2,573	2,718	0.95	-1.7%	0.74	0.82
1985	2,563	2,814	0.91	-3.8%	0.72	0.79
1986	2,570	2,903	0.89	-2.8%	0.70	0.77
1987	2,661	3,022	0.88	-0.6%	0.69	0.77
1988	2,768	3,158	0.88	-0.4%	0.69	0.76

(a) No comparable series of data for the USSR was available and so is not presented here.
(b) Energy consumption data from Energy in China, 1990 (MOE, Beijing).
(c) Energy consumption data from LDC Energy Database, IES, EAP.
(d) Energy consumption data from BP Statistical Review of World Energy, June 1990.
(e) 1988 GDP figure estimated by WB.

Source: Energy in China, 1990 (MOE, Beijing); LDC Energy Database, IES, EAP; BP Statistical Review of World Energy, June 1990. World Tables, 1989-90 (The World Bank, Washington, D.C.).

Figure VIII-7. Energy Intensity Trends, Selected Countries, 1970-1988



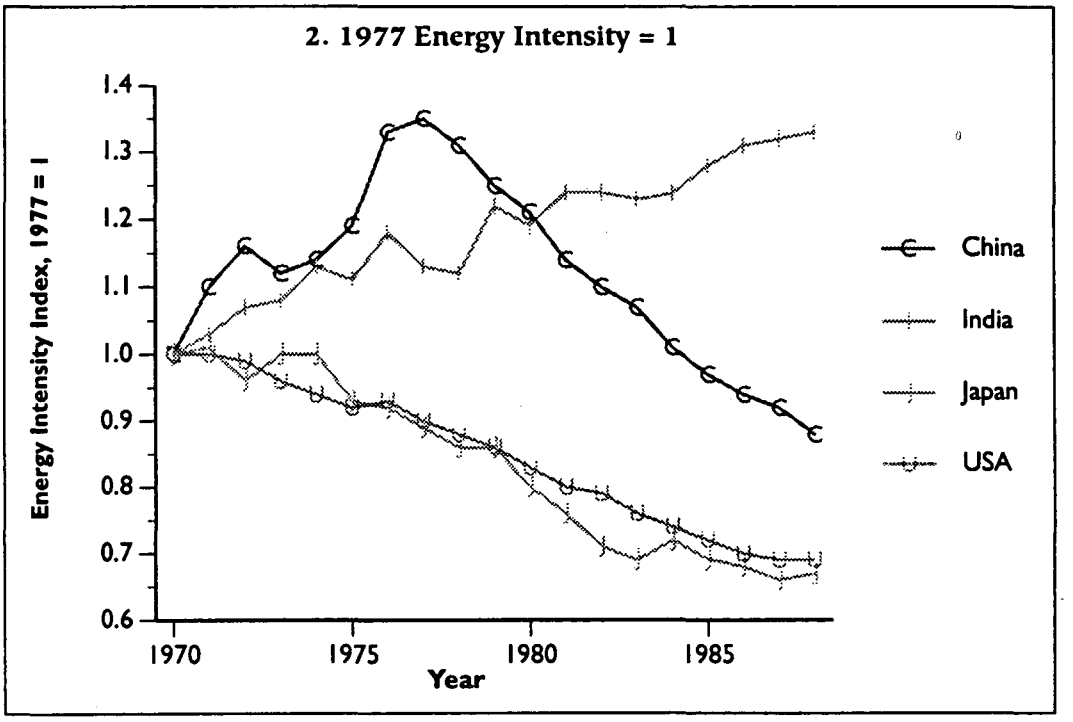


Table VIII-6. Total Energy Consumption by Sector for Selected Countries, 1987

1. Commercial Energy Only, Mtce (a)

Country	Industry	Agriculture	Transportation	Residential & Commercial	Total
China	516	40	60	169	786
India	84	19	32	29	164
Japan	172	7	89	94	361
USA	1,007	-	772	998	2,776
USSR	860	134	297	397	1,688

2. Commercial Energy Only, Shares

Country	Industry	Agriculture	Transportation	Residential & Commercial	Total
China	65.7%	5.1%	7.6%	21.6%	100.0%
India	51.0%	11.6%	19.7%	17.7%	100.0%
Japan	47.6%	1.9%	24.6%	25.9%	100.0%
USA	36.3%	-	27.8%	35.9%	100.0%
USSR	50.9%	8.0%	17.6%	23.5%	100.0%

3. Commercial and Biomass Energy, Mtce (a,b)

Country	Industry	Agriculture	Transportation	Residential & Commercial	Total
China	516	40	60	436	1,052
India	84	19	32	179	315
Japan	172	7	89	94	361
USA	1,007	-	772	1,102	2,880
USSR	860	134	297	397	1,688

4. Commercial and Biomass Energy, Shares

Country	Industry	Agriculture	Transportation	Residential & Commercial	Total
China	49.1%	3.8%	5.7%	41.4%	100.0%
India	26.7%	6.1%	10.3%	57.0%	100.0%
Japan	47.6%	1.9%	24.6%	25.9%	100.0%
USA	35.0%	-	26.8%	38.3%	100.0%
USSR	50.9%	8.0%	17.6%	23.5%	100.0%

(a) Electricity has been converted at 0.404 kgce/kwh.
(b) Biomass figures are for 1988. All biomass is assumed to be used in the residential sector.
– Not available.

Source: China – Energy Statistical Yearbook of China, 1989, SSB, Beijing;
India – IES data base, EAP, LBL, Berkeley, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – Cooper and Schipper, 1992.

Figure VIII-8. Sectoral Shares of Energy End-use, Commercial Energy Only, 1987

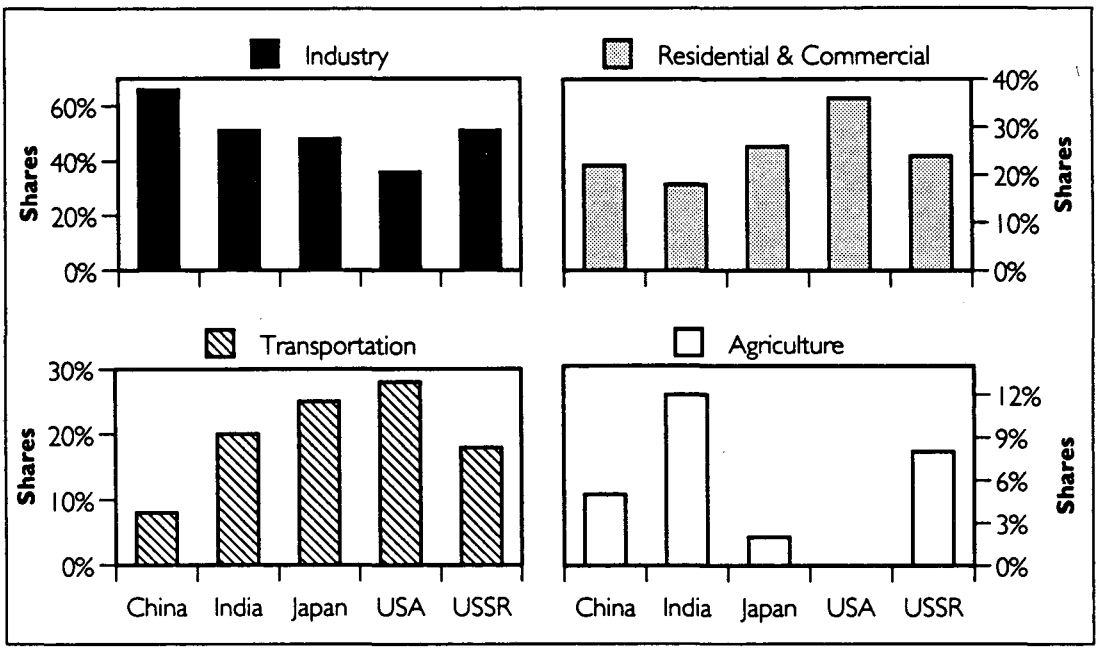
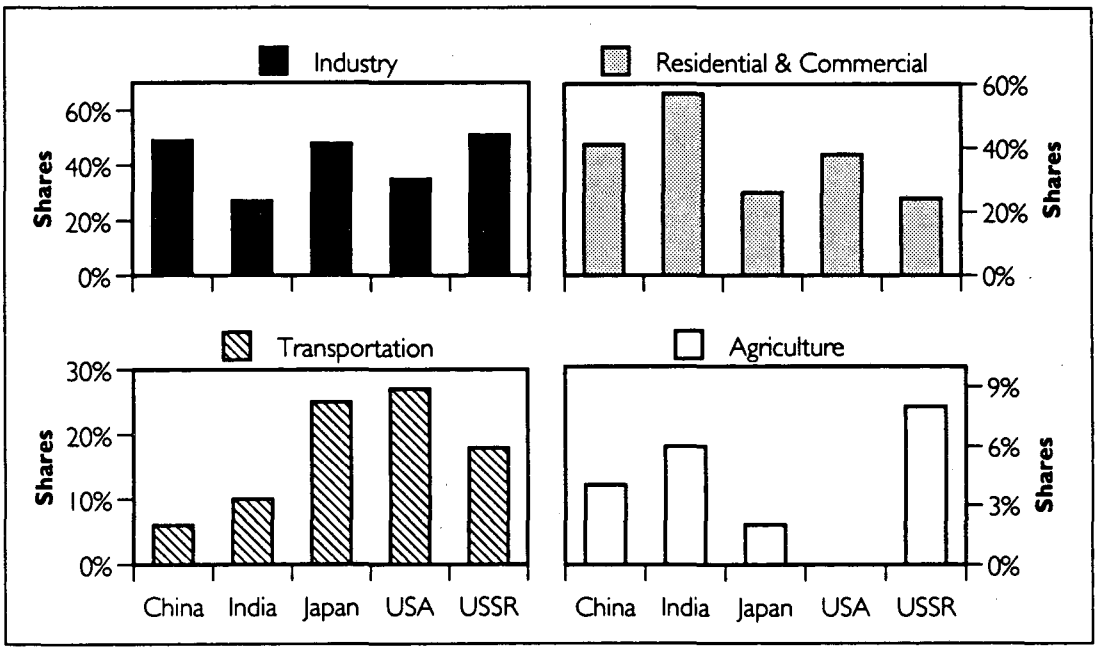


Figure VIII-9. Sectoral Shares of Energy End-use, Commercial and Biomass Energy, 1987*



* Biomass consumption figures from 1988.

Table VIII-7. Industrial Energy Consumption by Source, 1987

1. Mtce (a)

Country	Coal	Liquids	Gasses	Electricity	Heat (c)	Total
China (a)	299.25	39.98	28.27	136.22	12.65	516.37
India	43.80	7.72	1.49	30.82	-	83.83
Japan	48.12	73.27	5.09	148.26	0.03	274.77
USA	96.44	295.83	262.23	341.21	-	995.71
USSR (b)	453.31	(b)	(b)	327.55	78.02	858.88

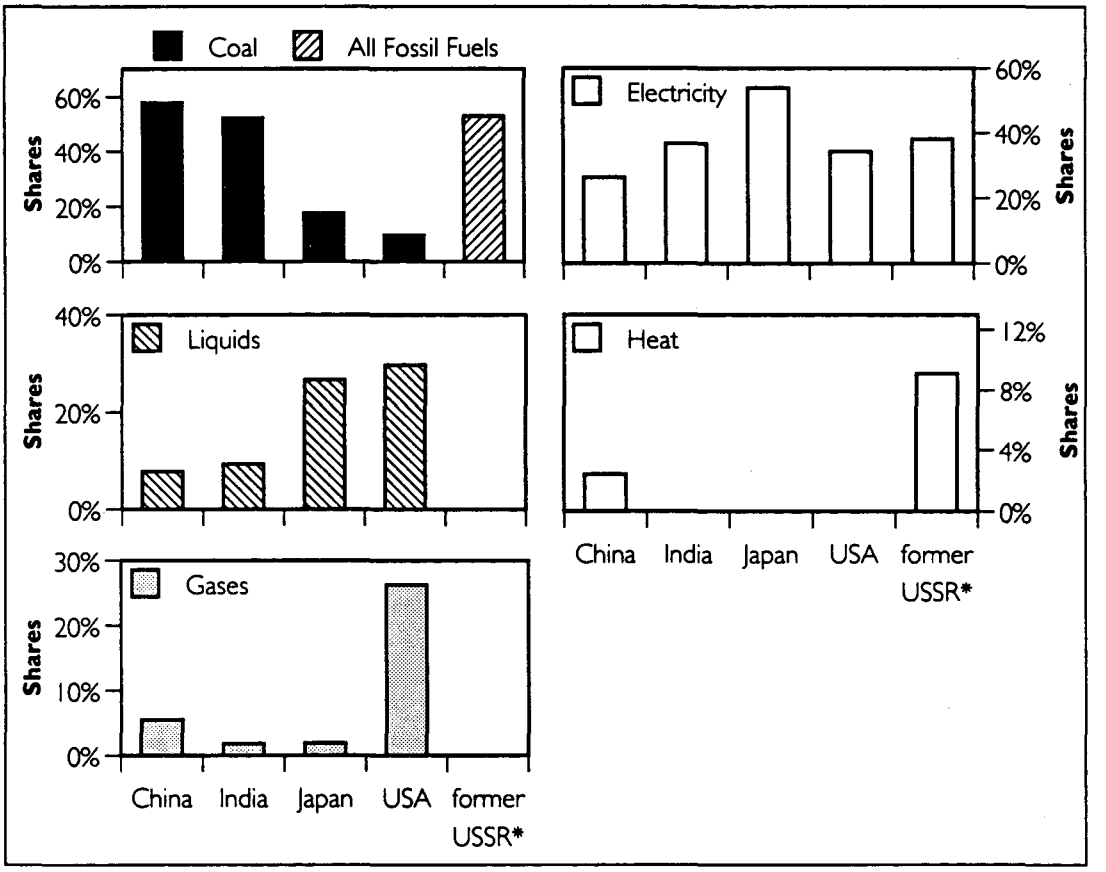
2. Shares

Country	Coal	Liquids	Gasses	Electricity	Heat (c)	Total
China (a)	58.0%	7.7%	5.5%	26.4%	2.4%	100.0%
India	52.2%	9.2%	1.8%	36.8%	-	100.0%
Japan	17.5%	26.7%	1.9%	54.0%	<0.1%	100.0%
USA	9.7%	29.7%	26.3%	34.3%	-	100.0%
USSR (b)	52.8%	(b)	(b)	38.1%	9.1%	100.0%

(a) Includes feedstocks.
(b) The figure under coal for the USSR incudes total end use of fuels, including coal and coal products, petroleum products, and natural gas. A reliable breakdown by type of fuel was unavailable.
(c) Heat includes the energy value in end use of process steam and other heat sources. Since electricity has been converted to Mtce in this table, the heat category double counts to the extent that heat used in industry comes from cogeneration. In the case of China the correction is likely to be small since less than 10% of installed capacity is in the form of cogeneration units.
– Not available.

Source: China – Energy Statistical Yearbook of China 1989;
India – IES database, LBL, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – Cooper and Schipper, 1992

Figure VIII-10. Shares of Total Industrial Sector Energy End-Use by Energy Source, 1987



*The share of coal for the USSR represents total direct use of fossil fules.

Table VIII-8. Transportation Energy Consumption by Source, 1987

1. Mtce

Country	Coal	Oil	Natural Gas (a)	Electricity	Total
China	16.05	43.74	0.07	3.10	62.96
India	7.15	23.80	0.00	1.40	32.35
Japan	0	86.59	0.00	6.89	93.48
USA	0	744.44	25.65	1.44	771.53
USSR (b)	246.30	(b)	(b)	50.60	296.90

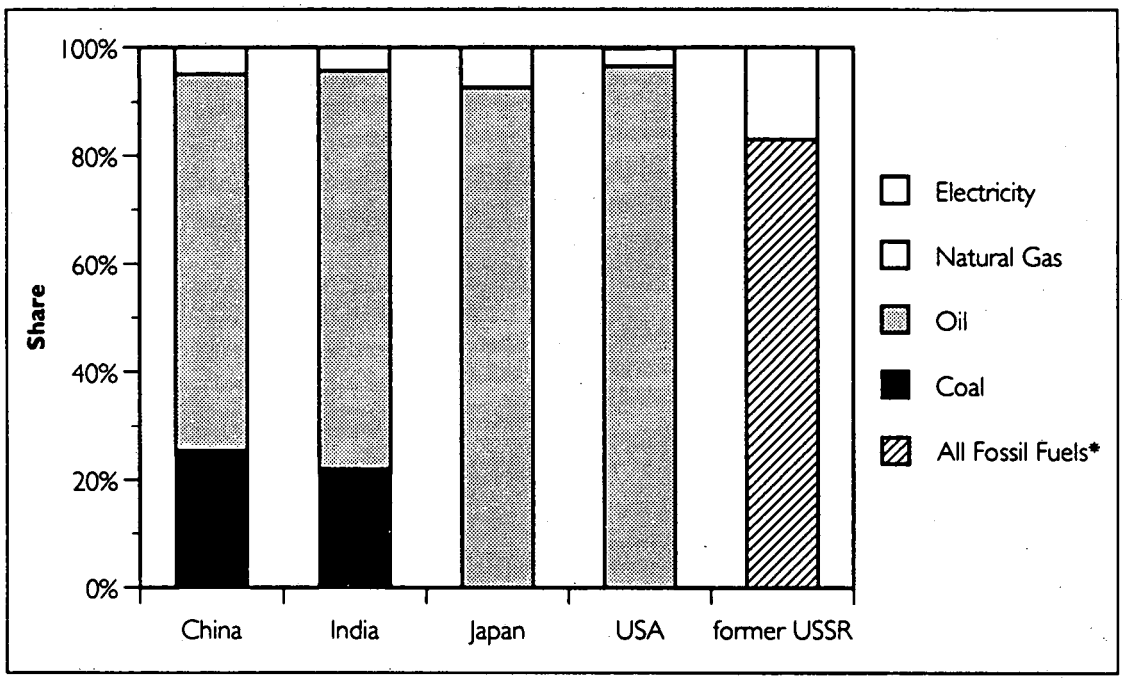
2. Shares

Country	Coal	Oil	Natural Gas (a)	Electricity	Total
China	25.5%	69.5%	0.1%	4.9%	100.0%
India	22.1%	73.6%	0.0%	4.3%	100.0%
Japan	0.0%	92.6%	0.0%	7.4%	100.0%
USA	0.0%	96.5%	3.3%	0.2%	100.0%
USSR (b)	83.0%	(b)	(b)	17.0%	100.0%

(a) Mainly pipeline use.
(b) The figure under coal for the USSR incudes total end use of fuels, including coal and coal products, petroleum products, and natural gas. A reliable breakdown by type of fuel was unavailable.

Source: China – Energy Statistical Yearbook of China 1989;
India – IES database, LBL, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – Energy Use and Conservation in the USSR, L. Schipper & C. Cooper, upcoming issue of Energy, the International Journal.

Figure VIII-11. Energy Use in Transportation, Selected Countries, 1987



*The share of coal for the USSR represents total direct use of fossil fules.

Table VIII-9. Residential and Commercial End Use Energy Consumption by Source, 1987

1. Mtce

Country	Coal	Liquids	Gasses	Heat (d)	Electricity	Biomass	Total
China	136.4	8.0	2.5	3.1	19.6	266.2	436
India (a)	2.0	12.8	0.1	0	14.2	150.2	179
Japan	0.4	50.0	12.9	0	99.0	-	162
USA (b)	0	49.5	302.0	-	610.0	33.1	995
USSR (c)	218.0	(c)	(c)	77.4	101.2	-	397

2. Shares

Country	Coal	Liquids	Gasses	Heat (d)	Electricity	Biomass	Total
China	31%	2%	1%	1%	4%	61%	100%
India (a)	1%	7%	0.1%	0%	8%	84%	100%
Japan	0.3%	31%	8%	0%	61%	-	100%
USA (b)	0%	5%	30%	-	61%	3%	100%
USSR (c)	55%	(c)	(c)	20%	26%	-	100%

(a) Biomass figure is for all biomass fuel use.
(b) Biomass figure is for 1989.
(c) The figure under coal for the USSR incudes total end use of fuels, including coal and coal products, petroleum products, and natural gas. A reliable breakdown by type of fuel was unavailable.
(d) Heat includes the energy value in end use of process steam and other heat sources. Since electricity has been converted to Mtce in this table, the heat category double counts to the extent that heat used in industry comes from cogeneration. In the case of China the correction is likely to be small since less than 10% of installed capacity is in the form of cogeneration units.
– Not available.

Source: China – Energy Statistical Yearbook of China 1989; Energy in China, 1989 (MOE, Beijing);
India – IES database, LBL, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USA biomass – Estimates of U.S. Biofuels Consumption 1989 (EIA, DOE, Washington, D.C.);
USSR – Cooper and Schipper, 1992.

Figure VIII-12. Residential and Commercial Energy Use Selected Countries, 1987

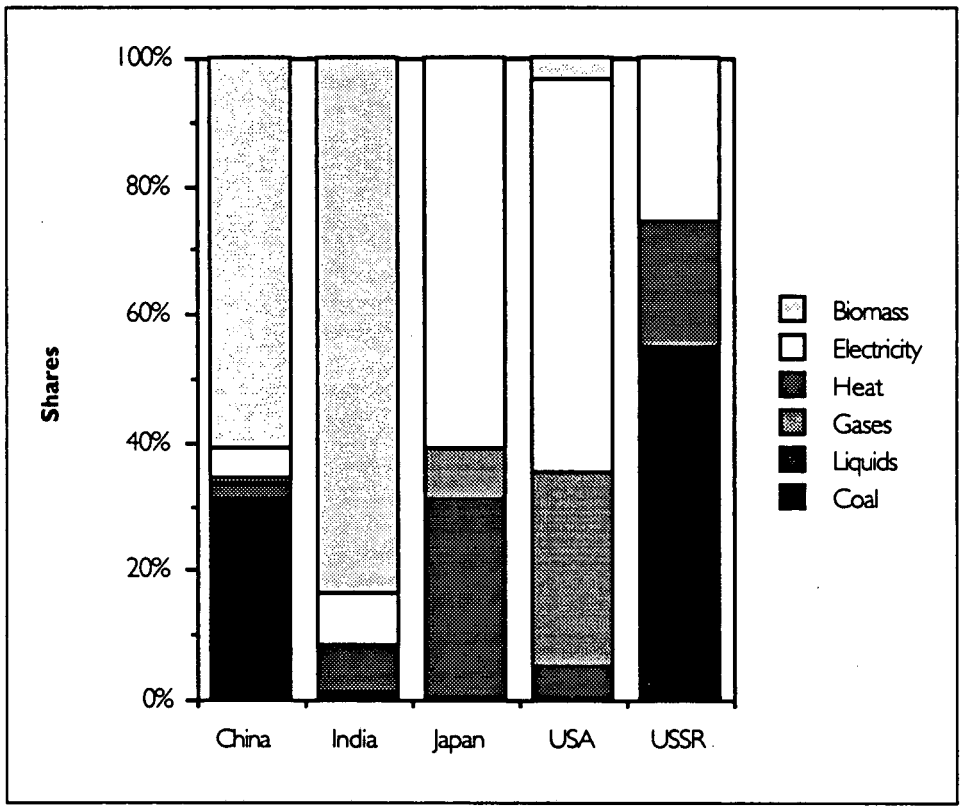


Table VIII-10. End Use Energy Consumption by Source, 1987

1. Mtce

Country	Coal (a)	Liquids (b)	Gasses (c)	Electricity (d)	Heat (e)	Total
China	468.48	98.26	30.82	177.00	15.77	790.33
India	52.90	51.27	1.59	58.60	(f)	164.36
Japan	48.55	230.60	18.00	254.73	0.03	551.91
USA	92.46	1,110.70	529.68	992.63	(f)	2,725.47
USSR	254.51	389.81	358.21	517.28	135.56	1,655.37

2. Shares

Country	Coal (a)	Liquids (b)	Gasses (c)	Electricity (d)	Heat (e)	Total
China	59.3%	12.4%	3.9%	22.4%	2.0%	100.0%
India	32.2%	31.2%	1.0%	35.7%	(f)	100.0%
Japan	8.8%	41.8%	3.3%	46.2%	0.0%	100.0%
USA	3.4%	40.8%	19.4%	36.4%	(f)	100.0%
USSR	15.4%	23.5%	21.6%	31.2%	8.2%	100.0%

(a) Coal also includes coke.
(b) Liquids include major oil products and LPG.
(c) Gases are mainly natural gas.
(d) Conversion factor for electricity is 0.404 kgce/kwh.
(e) Heat includes district heat and co-generated heat.
(f) Not available.

Source: China – Energy Statistical Yearbook of China, 1989, SSB, Beijing
India – IES, EAP, LBL, Berkeley, 1990
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990
USA – Annual Energy Review, 1989, EIA, DoE
USSR – World Energy Statistics and Balances, 1971-1987, IEA, Paris, 1989

Figure VIII-13. Shares of End Use Energy Consumption by Energy Source, Selected Countries, 1987

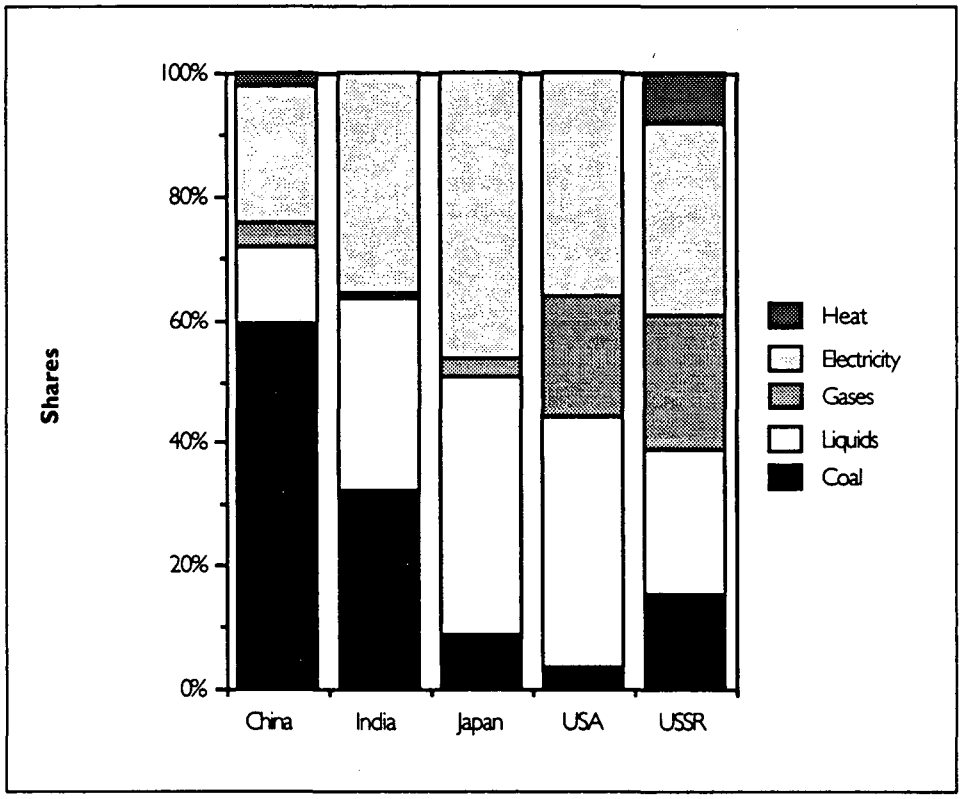


Table VIII-11. End Use Coal Consumption by Sector, 1987

1. Mtce

Country	Power Generation	Industry (b)	Residential & Commercial	Other (c)	Total
China (a)	159.98	307.51	135.96	32.33	635.78
India	67.86	44.80	2.01	7.15	121.82
Japan	47.03	48.11	0.41	-	95.55
USA	557.81	87.10	5.36	<0.01	650.27
USSR	191.91	194.62	48.62	11.27	446.42

2. Shares

Country	Power Generation	Industry (b)	Residential & Commercial	Other (c)	Total
China (a)	25.2%	48.4%	21.4%	5.1%	100.0%
India	55.7%	36.8%	1.6%	5.9%	100.0%
Japan	49.2%	50.4%	0.4%	-	100.0%
USA	85.8%	13.4%	0.8%	<0.02%	100.0%
USSR	43.0%	43.6%	10.9%	2.5%	100.0%

3. Power generation coal consumption allocated to end-use sectors, Mtce (d)

Country	Industry (b)	Residential & Commercial	Other (c)	Total
China (a)	432.55	154.35	48.88	635.78
India	83.55	16.91	21.36	121.82
Japan	75.48	18.69	-	94.16
USA	288.87	360.46	0.94	650.27
USSR	312.91	87.18	46.33	446.42

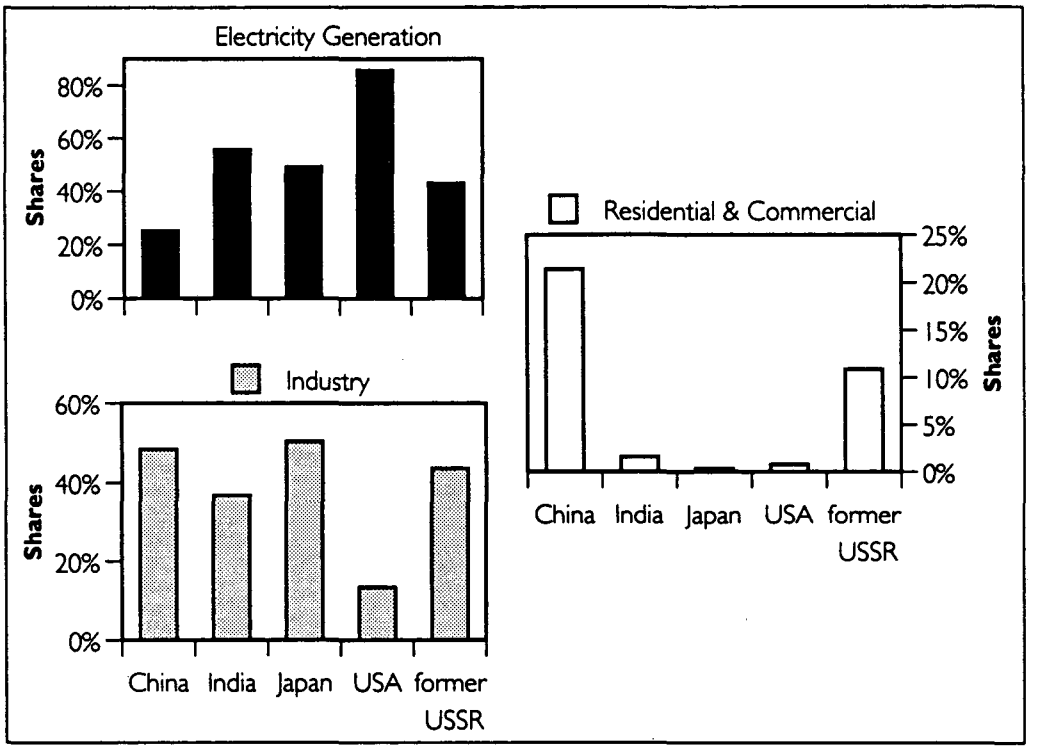
4. Power generation coal consumption allocated to end-use sectors, Shares (d)

Country	Industry (b)	Residential & Commercial	Other (c)	Total
China (a)	68.0%	24.3%	7.7%	100.0%
India	68.6%	13.9%	17.5%	100.0%
Japan	80.2%	19.8%	-	100.0%
USA	44.4%	55.4%	0.1%	100.0%
USSR	70.1%	19.5%	10.4%	100.0%

(a) China's industrial coal use includes feedstock.
(b) Industrial coal includes coal used for making coke.
(c) "Other" includes transportation and agricultural use.
(d) Power sector coal use is allocated among end-use sectors according to end-use electricity consumption shares (see Table VIII-13).
– Not available.

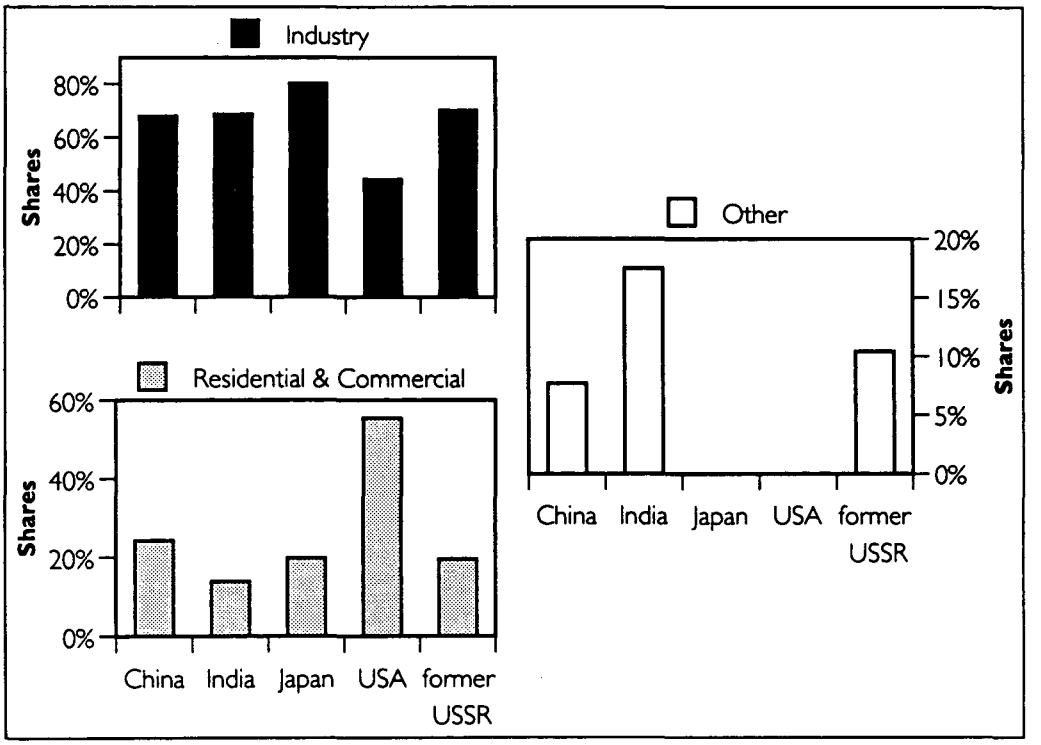
Source: China – Energy Statistical Yearbook of China, 1989, SSB, Beijing;
India – LDC Energy Database, International Energy Studies, EAP, LBL, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – World Energy Statistics and Balances, 1971-1987, 1989 (IEA, Paris).

Figure VIII-14. Sectoral Shares of Coal Consumption, 1987*



*Coal comsumed in other sectors (transportation and agriculture) is not shown here. See Table VIII-11.

Figure VIII-15. Sectoral Shares of Coal Consumption, 1987: Power Generation Coal Consumption Allocated to End-Use Sectors*



*See Table VIII-11 for details.

Table VIII-12. Petroleum Products Consumption by Sector, 1987

1. Mtce

Country	Power Generation	Industry	Transportation	Residential & Commercial	Agriculture	Total
China (a)	23.6	40.0	40.5	4.0	8.6	116.8
India	5.3	7.7	23.8	12.8	6.9	56.6
Japan (b)	54.8	73.3	86.6	50.0	6.7	271.4
USA	45.5	294.7	744.4	94.3	-	1,179.0
USSR (c)	130.6	128.4	189.0	46.5	53.6	547.9

2. Shares

Country	Power Generation	Industry	Transportation	Residential & Commercial	Agriculture	Total
India	20%	34%	35%	3%	7%	100%
China (a)	9%	14%	42%	23%	12%	100%
Japan (b)	20%	27%	32%	18%	2%	100%
USA	4%	25%	63%	8%	-	100%
USSR (c)	24%	23%	34%	8%	10%	100%

(a) China's industrial sector petroleum prouct use includes feedstock. China's power generation figure includes consumption in heat supply plants.
(b) Japan's commercial and residential sector figure includes 15.54 Mtce of non-specified use.
(c) The USSR's commercial and residential sector figure includes 27.57 Mtce of non-specified use.
- Not available.

Source: China – Energy Statistical Yearbook of China, 1989, SSB, Beijing;
India – LDC Energy Database, International Energy Studies, LBL, USA;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – World Energy Statistics and Balances 1971-1987, IEA, Paris, 1989.

Figure VIII-16. Sectoral Shares of Petroleum Consumption Selected Countries, 1987

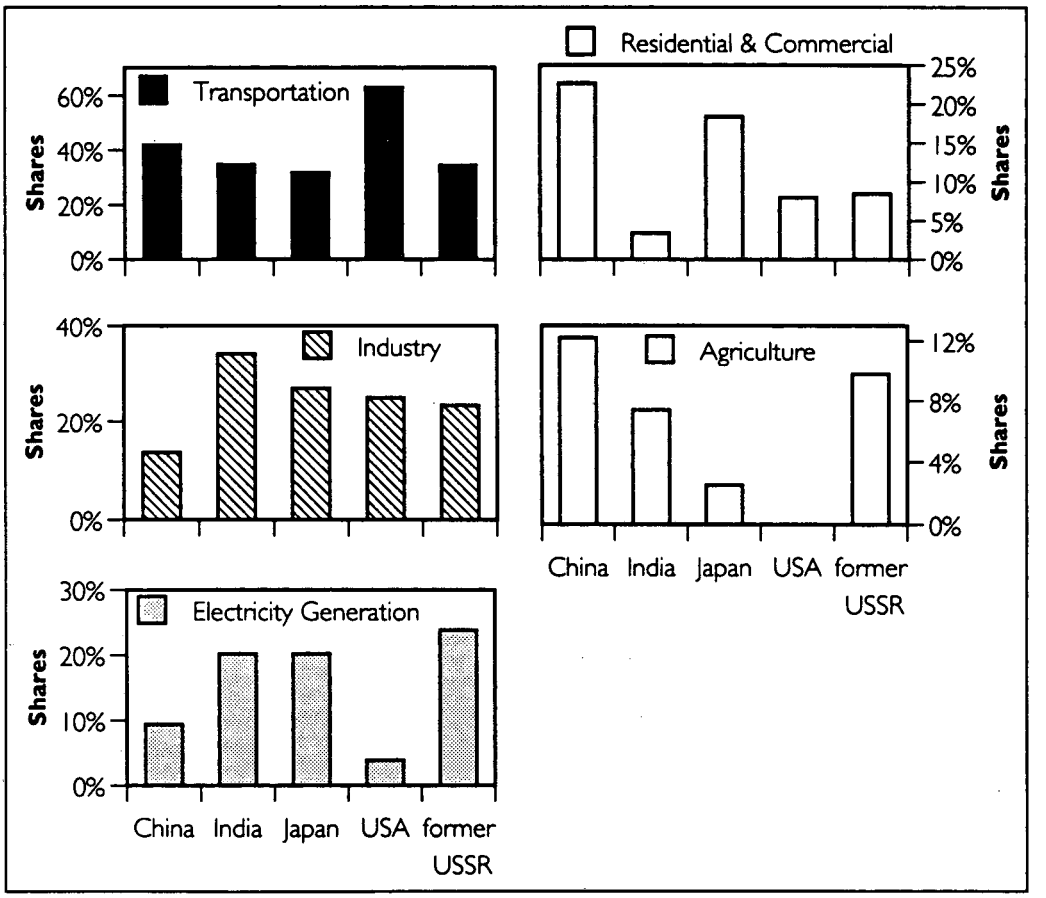


Table VIII-13. End Use Electricity Consumption by Sector, 1987

1. Billion kWh (TWh)

Country	Industry	Residential	Commercial	Transportation	Agriculture	Total
China	329.58	28.65	19.82	7.67	35.96	421.68
India	91.69	20.59	14.66	3.47	30.15	160.56
Japan	367.50	154.86	90.57	17.09	1.51	631.53
USA	858.00	850.00	660.00	4.00	(c)	2,372.00
USSR (a)	813.00	265.00	(c)	126.00	115.00	1,319.00

2. Shares

Country	Industry	Residential	Commercial	Transportation	Agriculture	Total
China	78.2%	6.8%	4.7%	1.8%	8.5%	100.0%
India	57.1%	12.8%	9.1%	2.2%	18.8%	100.0%
Japan	58.2%	24.5%	14.3%	2.7%	0.2%	100.0%
USA	36.2%	35.8%	27.8%	0.2%	(c)	100.0%
USSR (a)	61.6%	20.1%	(c)	9.6%	8.7%	100.0%

(a) Residential sector use includes commercial sector use for the USSR.
(b) There is additional unspecified use of electricity, 15 Twh for the USSR and 84 Twh for the US.
(c) Not available.

Source: China – Energy Statistical Yearbook of China, 1989, SSB, Beijing;
India – LDC Energy Database, International Energy Studies, EAP, LBL, 1990;
Japan – Energy Balances of OECD Countries 1987-1988, IEA, Paris, 1990;
USA – Annual Energy Review, 1989, EIA, DoE;
USSR – Energy Use and Conservation in the USSR, L. Schpper & C. Cooper, upcoming issue of Energy, The International Journal.

Figure VIII-17. Sectoral Shares of Electricity Consumption Selected Countries, 1987

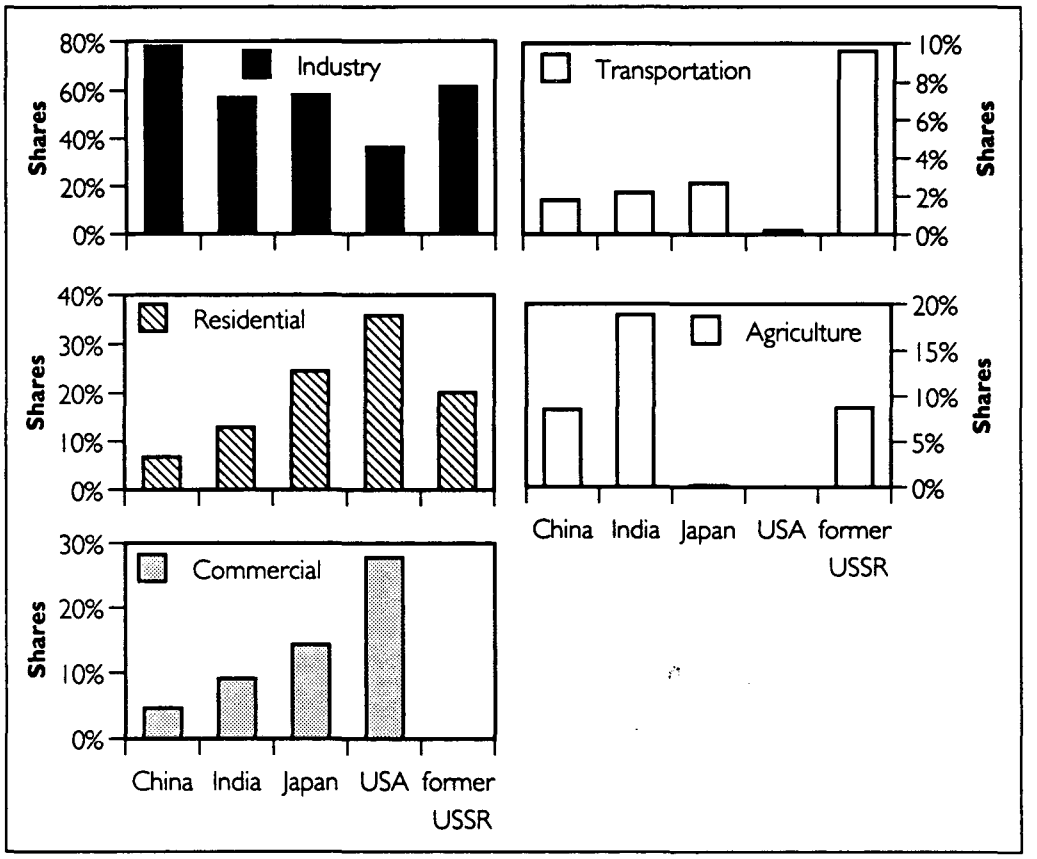


Table VIII-14. Crude Steel Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
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	634.85
1984	43.47	10.26	104.68	83.94	154.24	396.59	676.99
1985	46.79	10.96	104.39	80.07	154.67	396.88	682.92
1986	52.20	11.33	97.56	74.03	160.55	395.67	675.79
1987	56.28	11.98	97.87	80.88	161.89	408.90	692.57
1988	59.43	13.65	104.96	90.63	163.04	431.71	730.38

2. Shares

Year	China	India	Japan	USA	USSR	Subtotal
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	6.3%	1.6%	15.2%	12.1%	24.0%	59.2%
1984	6.4%	1.5%	15.5%	12.4%	22.8%	58.6%
1985	6.9%	1.6%	15.3%	11.7%	22.6%	58.1%
1986	7.7%	1.7%	14.4%	11.0%	23.8%	58.6%
1987	8.1%	1.7%	14.1%	11.7%	23.4%	59.0%
1988	8.1%	1.9%	14.4%	12.4%	22.3%	59.1%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-15. Cement Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
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	905.91
1984	123.02	29.54	78.86	70.45	129.87	431.74	933.09
1985	145.95	31.97	72.85	70.28	130.77	451.82	948.99
1986	166.06	34.98	71.26	71.11	135.12	478.54	996.45
1987	186.25	37.14	71.60	67.38	137.40	499.77	1047.49
1988	210.14	37.30	72.38	71.54	134.99	526.36	1098.83

2. Shares

Year	China	India	Japan	USA	USSR	Subtotal
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%	7.1%	14.1%	44.9%
1984	13.2%	3.2%	8.5%	7.6%	13.9%	46.3%
1985	15.4%	3.4%	7.7%	7.4%	13.8%	47.6%
1986	16.7%	3.5%	7.2%	7.1%	13.6%	48.0%
1987	17.8%	3.5%	6.8%	6.4%	13.1%	47.7%
1988	19.1%	3.4%	6.6%	6.5%	12.3%	47.9%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-16. Primary Aluminum Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
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	15.24
1986	0.41	0.23	0.15	3.04	2.30	6.13	15.22
1987	0.62	0.25	0.05	3.34	2.40	6.66	16.10
1988	0.80	0.29	0.05	3.94	2.40	7.48	16.95

2. Shares

Year	China	India	Japan	USA	USSR	Subtotal
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%	23.0%	14.4%	43.3%
1986	2.7%	1.5%	1.0%	20.0%	15.1%	40.3%
1987	3.8%	1.5%	0.3%	20.8%	14.9%	41.3%
1988	4.7%	1.7%	0.3%	23.3%	14.2%	44.1%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-17. Ethylene Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
1979	0.43	0.10	4.78	13.24	na	18.56	35.32
1980	0.49	na	4.18	13.00	1.77	19.44	34.20
1981	0.50	na	3.65	13.34	2.09	19.60	34.14
1982	0.57	na	3.59	11.11	2.13	17.40	31.90
1983	0.65	0.08	3.69	13.01	2.27	19.70	36.17
1984	0.65	0.09	4.39	14.24	2.54	21.90	39.37
1985	0.65	0.09	4.23	13.54	2.67	21.17	38.96
1986	0.70	0.18	4.29	14.90	2.80	22.87	41.18
1987	0.94	0.15	4.58	15.85	2.98	24.51	44.49
1988	1.23	na	5.06	16.88	3.17	26.34	47.86

2. Shares

Year	China	India	Japan	USA	USSR	Subtotal
1979	1.2%	0.3%	13.5%	37.5%	na	52.6%
1980	1.4%	na	12.2%	38.0%	5.2%	56.8%
1981	1.5%	na	10.7%	39.1%	6.1%	57.4%
1982	1.8%	na	11.3%	34.8%	6.7%	54.6%
1983	1.8%	0.2%	10.2%	36.0%	6.3%	54.5%
1984	1.6%	0.2%	11.1%	36.2%	6.5%	55.6%
1985	1.7%	0.2%	10.8%	34.7%	6.8%	54.3%
1986	1.7%	0.4%	10.4%	36.2%	6.8%	55.5%
1987	2.1%	0.3%	10.3%	35.6%	6.7%	55.1%
1988	2.6%	na	10.6%	35.3%	6.6%	55.0%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-18. Ammonia Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
1979	13.48	n.a.	0.12	13.99	n.a.	27.59	71.76
1980	14.97	n.a.	0.13	14.74	n.a.	29.84	75.05
1981	14.83	n.a.	n.a.	11.76	17.89	44.49	73.14
1982	15.46	n.a.	n.a.	10.22	17.76	43.44	70.70
1983	16.77	n.a.	n.a.	12.44	20.55	49.76	78.30
1984	18.37	n.a.	n.a.	12.09	21.49	51.96	83.68
1985	17.19	n.a.	n.a.	14.26	22.17	53.62	85.81
1986	16.73	n.a.	1.80	13.14	23.82	55.49	85.83
1987	19.41	n.a.	1.79	14.60	24.23	60.04	92.13
1988	19.73	n.a.	1.82	15.26	24.43	61.23	93.65

2. Shares

Year	China	India	Japan	USA	USSR	Subtotal
1979	18.8%	n.a.	0.2%	19.5%	n.a.	38.4%
1980	20.0%	n.a.	0.2%	19.6%	n.a.	39.8%
1981	20.3%	n.a.	n.a.	16.1%	24.5%	60.8%
1982	21.9%	n.a.	n.a.	14.5%	25.1%	61.4%
1983	21.4%	n.a.	n.a.	15.9%	26.2%	63.5%
1984	22.0%	n.a.	n.a.	14.5%	25.7%	62.1%
1985	20.0%	n.a.	n.a.	16.6%	25.8%	62.5%
1986	19.5%	n.a.	2.1%	15.3%	27.8%	64.6%
1987	21.1%	n.a.	1.9%	15.9%	26.3%	65.2%
1988	21.1%	n.a.	1.9%	16.3%	26.1%	65.4%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-19. Caustic Soda Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
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	30.85
1984	2.22	0.70	2.99	9.90	2.97	18.78	32.97
1985	2.35	0.72	2.98	9.81	3.06	18.91	33.27
1986	2.52	0.73	2.98	9.64	3.23	19.11	33.80
1987	2.74	0.95	3.13	10.72	3.23	20.77	35.53
1988	3.01	0.96	3.40	9.77	3.32	20.46	35.79

2.Shares

Year	China	India	Japan	USA	USSR	Subtotal
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%	9.2%	56.6%
1984	6.7%	2.1%	9.1%	30.0%	9.0%	57.0%
1985	7.1%	2.2%	9.0%	29.5%	9.2%	56.9%
1986	7.5%	2.2%	8.8%	28.5%	9.6%	56.5%
1987	7.7%	2.7%	8.8%	30.2%	9.1%	58.4%
1988	8.4%	2.7%	9.5%	27.3%	9.3%	57.2%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-20. Soda Ash Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA (b)	USSR	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	26.66
1984	1.88	0.83	1.03	7.72	5.12	16.57	27.56
1985	2.01	0.83	1.05	7.72	5.03	16.64	27.55
1986	2.15	0.87	1.02	7.65	5.15	16.83	28.04
1987	2.36	0.97	1.09	8.07	5.16	17.65	28.92
1988	2.61	0.96	1.08	8.74	5.10	18.48	29.91

2. Shares

Year	China	India	Japan	USA	USSR	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	6.7%	2.8%	4.1%	28.8%	19.1%	61.6%
1984	7.1%	3.1%	3.9%	29.0%	19.2%	62.2%
1985	7.3%	3.0%	3.8%	28.0%	18.2%	60.4%
1986	7.8%	3.2%	3.7%	27.8%	18.7%	61.1%
1987	8.4%	3.5%	3.9%	28.8%	18.4%	63.0%
1988	8.7%	3.2%	3.6%	29.2%	17.0%	61.8%

(a) 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.
(b) Includes natural sodium carbonate.

Source: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-21. Sulphuric Acid Production, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	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	129.54
1984	8.17	2.68	6.46	37.91	25.34	80.57	137.30
1985	6.76	2.63	6.58	35.96	26.04	77.97	133.03
1986	7.63	2.88	6.56	32.65	27.85	77.57	131.80
1987	9.83	3.16	6.54	35.61	28.53	83.68	135.48
1988	11.11	3.42	6.77	38.23	29.37	88.90	143.40

2.Shares

Year	China	India	Japan	USA	USSR	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%	4.9%	27.0%	19.6%	58.6%
1986	5.8%	2.2%	5.0%	24.8%	21.1%	58.9%
1987	7.3%	2.3%	4.8%	26.3%	21.1%	61.8%
1988	7.7%	2.4%	4.7%	26.7%	20.5%	62.0%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-22. Wood Pulp, Selected Countries, 1979-1988

1. Millions of tonnes

Year	China	India	Japan	USA	USSR	Subtotal	World Total
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	135.12
1984	4.76	2.51	9.14	50.70	10.46	77.57	115.06
1985	5.87	2.69	9.29	49.36	10.73	77.95	153.98
1986	6.09	2.72	9.25	52.20	10.73	80.98	159.67
1987	6.66	2.83	9.74	54.37	10.73	84.32	155.35
1988	6.68	2.83	10.42	55.83	10.73	86.48	160.13

2.Shares

Year	China	India	Japan	USA	USSR	Subtotal
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%	35.5%	7.5%	54.5%
1984	4.1%	2.2%	7.9%	44.1%	9.1%	67.4%
1985	3.8%	1.7%	6.0%	32.1%	7.0%	50.6%
1986	3.8%	1.7%	5.8%	32.7%	6.7%	50.7%
1987	4.3%	1.8%	6.3%	35.0%	6.9%	54.3%
1988	4.2%	1.8%	6.5%	34.9%	6.7%	54.0%

(a) 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: Industrial Statistics Yearbook 1988, Vol.II, Commodity Production Statistics, United Nations, New York, 1990.

Table VIII-23. Structure of Passenger Travel, 1987

1. Billion passenger-km

Country	Rail	Road	Water	Air	Total
China	284.3	219.0	19.9	18.7	541.9
India (a)	240.0	853.7	(b)	7.3	1,101.0
Japan	345.0	719.0	(b)	38.5	1,102.5
USA	19.0	2,484.0	(b)	549.0	3,052.0
USSR	566.0	1,089.0	8.0	19.1	1,682.1

2. Shares

Country	Rail	Road	Water	Air	Total
China	52.5%	40.4%	3.7%	3.5%	100.0%
India (a)	21.8%	77.5%	(b)	0.7%	100.0%
Japan	31.3%	65.2%	(b)	3.5%	100.0%
USA	0.6%	81.4%	(b)	18.0%	100.0%
USSR	33.6%	64.7%	0.5%	1.1%	100.0%

3. Passenger-km per capita

Country	Rail	Road	Water	Air	Total
China	266	205	19	17	507
India (b)	301	1,070	(c)	9	1,380
Japan	2,828	5,893	(c)	316	9,037
USA	78	10,180	(c)	2,250	12,508
USSR	2,009	3,866	28	68	5,971

(a) 1985 data
(b) Not available.

Source: China – Statistical Yearbook of China 1988;
India – Tata Energy Research Institute (TERI) Energy Data Directory and Yearbook, 1988;
Japan – OECD Energy Database, International Energy Studies, EAP, LBL;
USA – Statistical Abstract of the US 1990;
USSR – IES, EAP, LBL, 1990.

Figure VIII-18. Passenger Traffic, Selected Countries, 1987

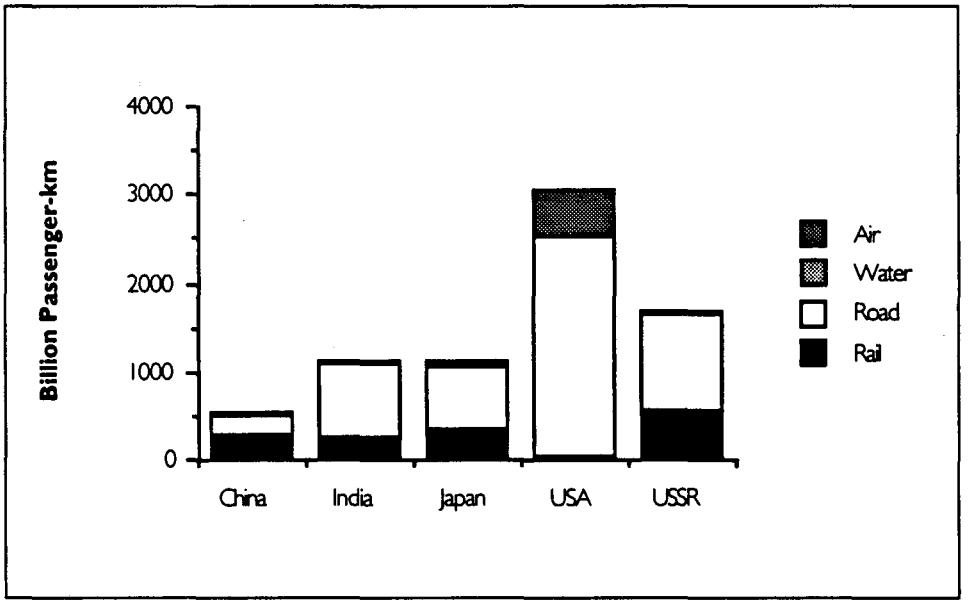


Figure VIII-19. Per Capita Passenger Travel by Mode, 1987

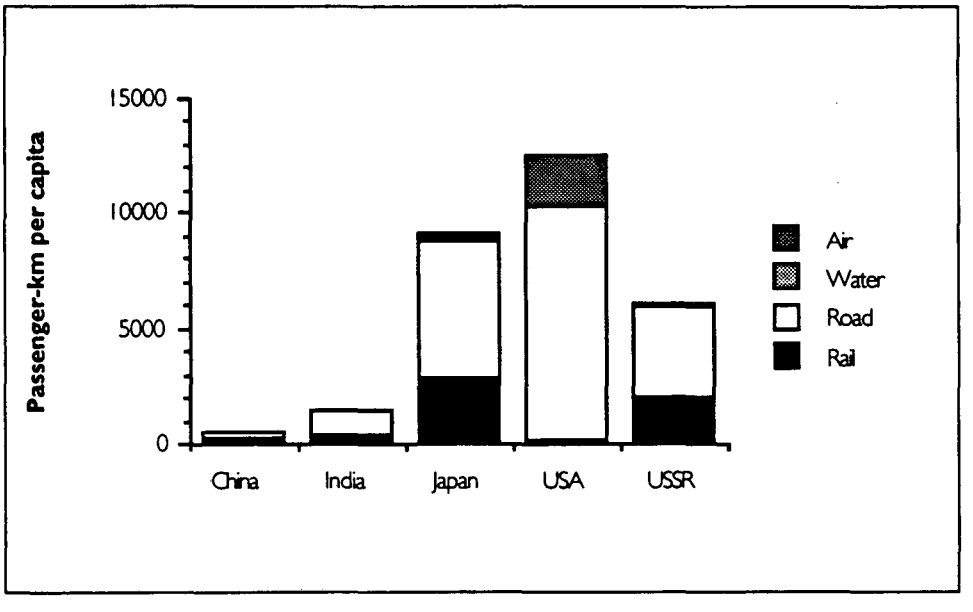


Figure VIII-20. Mode Structure of Passenger Traffic Selected Countries, 1987

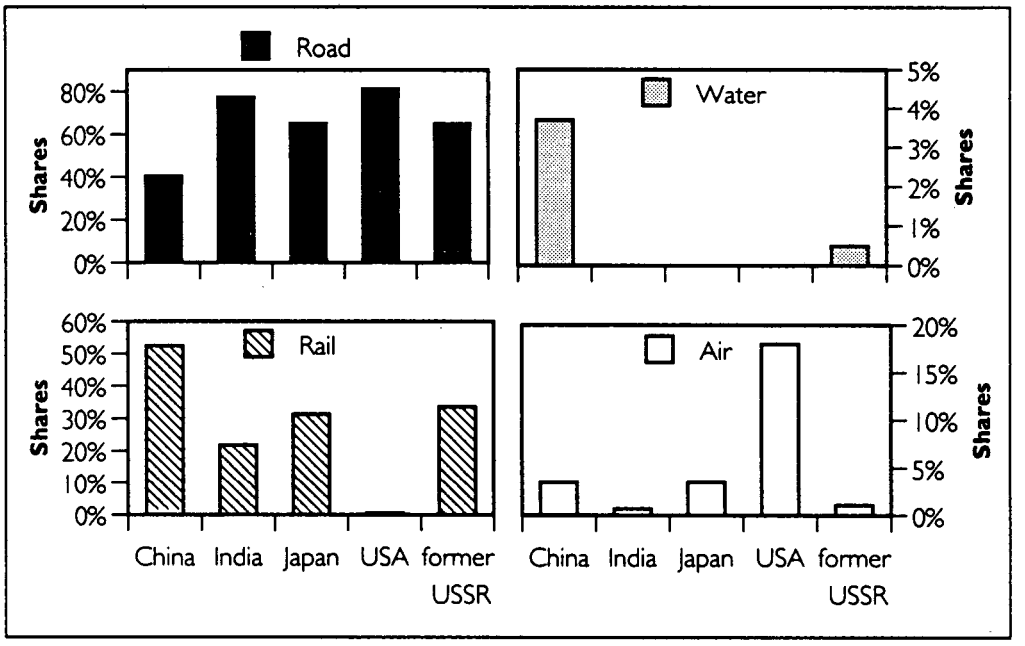


Table VIII-24. Structure of Freight Transportation, 1987

1. Billion tonne-km

Country	Rail	Road	Water (a)	Air	Pipeline	Total
China	947.2	266.0	288.9	0.7	62.5	1,565.3
India (b)	205.9	240.0	(c)	(c)	(c)	445.9
Japan	20.8	226.0	201.0	0.6	(c)	448.4
USA	1,419.0	965.0	600.0	12.7	857.0	3,853.7
USSR	3,825.0	492.0	253.0	3.4	2,793.0	7,366.4

2. Shares

Country	Rail	Road	Water (a)	Air	Pipeline	Total
China	60.5%	17.0%	18.5%	0.04%	4.0%	100.0%
India (b)	46.2%	53.8%	(c)	(c)	(c)	100.0%
Japan	4.6%	50.4%	44.8%	0.1%	(c)	100.0%
USA	36.8%	25.0%	15.6%	0.3%	22.2%	100.0%
USSR	51.9%	6.7%	3.4%	0.05%	37.9%	100.0%

3. Tonne-km per capita

Country	Rail	Road	Water (a)	Air	Pipeline	Total
China	886	249	270	1	58	1,464
India (b)	258	301	(c)	(c)	(c)	559
Japan	170	1,852	1,648	5	(c)	3,676
USA	5,816	3,955	2,459	52	3,512	15,794
USSR	13,578	1,747	898	12	9,915	26,150

(a) Inland waterways only, except for Japan.
(b) 1985 data
(c) Not available.

Source: China – Statistical Yearbook of China 1988
India – Tata Energy Research Institute (TERI) Energy Data Directory and Yearbook, 1988;
Japan – OECD Energy Database, International Energy Studies, EAP, LBL;
USA – Statistical Abstract of the US 1990;
USSR – IES, EAP, LBL, 1990;
World Tables, 1989-90 (World Bank).

Figure VIII-21. Freight Traffic, Selected Countries, 1987

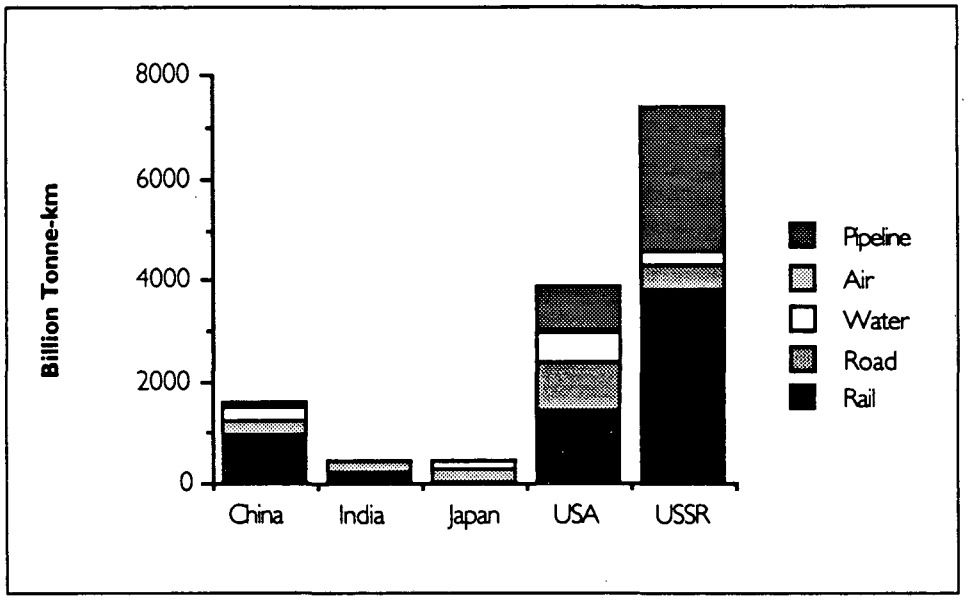


Figure VIII-22. Per Capita Freight Traffic by Mode, 1987

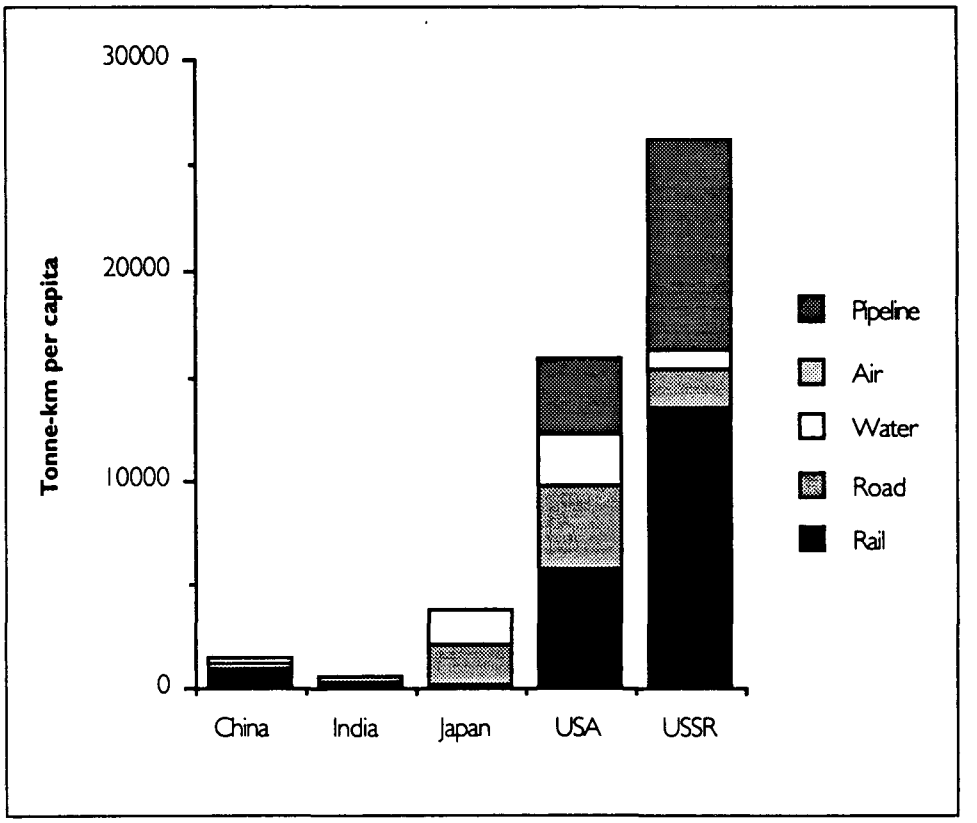


Figure VIII-23. Mode Structure of Freight Traffic
Selected Countries, 1987

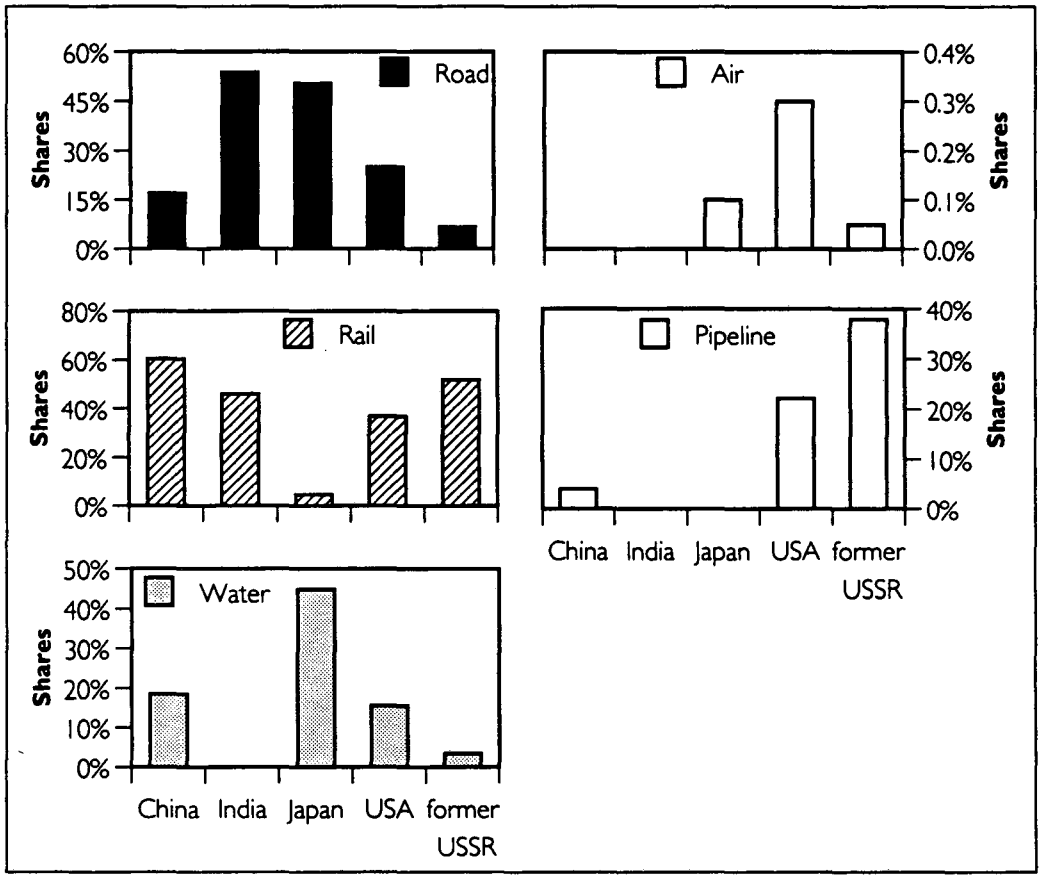


Table VIII-25. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1989

1. Million Tonnes of Carbon

Year	China	India	Japan	USA	former USSR	Global Total
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	1,259	896	5,264
1981	403	103	250	1,211	906	5,129
1982	432	109	245	1,147	929	5,094
1983	455	119	240	1,149	941	5,085
1984	495	123	264	1,188	947	5,243
1985	537	134	254	1,201	976	5,369
1986	568	144	249	1,205	1,000	5,551
1987	594	152	247	1,254	1,022	5,661
1988	604	164	270	1,314	1,085	5,897
1989	652	178	284	1,329	1,038	5,967

Source: Trends '91: A Compendium of Data on Global Change, 1991 (The Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN).

Figure VIII-24. Carbon Dioxide Emissions USA, USSR, China, India, Japan, 1950-1988

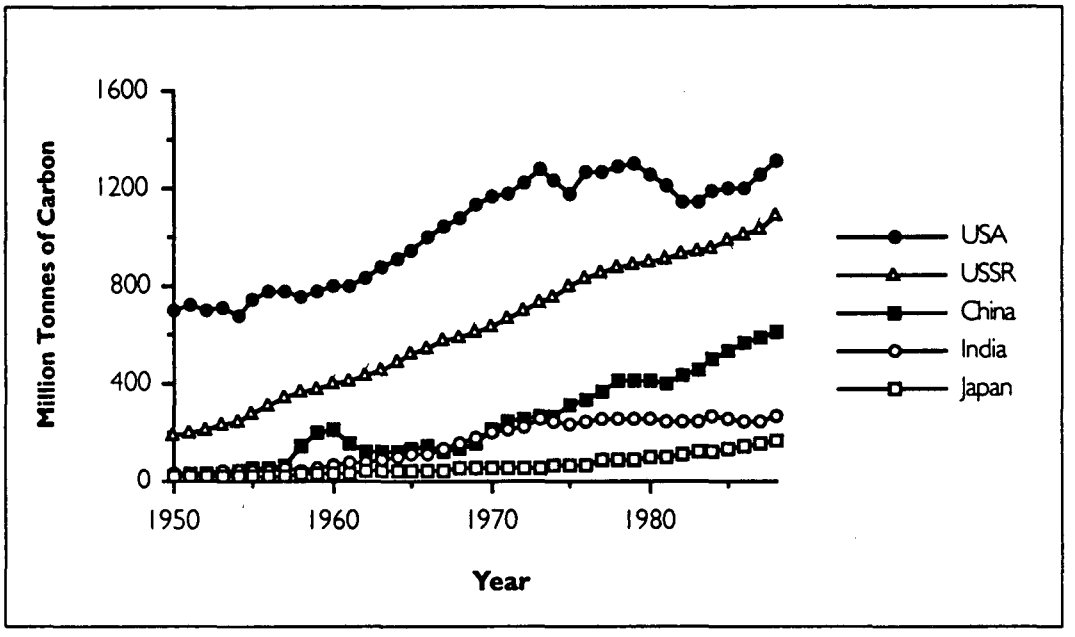


Table VIII-25. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1989 (continued)

2. Shares

Year	China	India	Japan	USA	former USSR	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%	3%	5%	22%	18%	100%
1986	10%	3%	4%	22%	18%	100%
1987	10%	3%	4%	22%	18%	100%
1988	10%	3%	5%	22%	18%	100%
1989	11%	3%	5%	22%	17%	100%

Source: Trends '91: A Compendium of Data on Global Change, 1991 (The Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN).

Figure VIII-25. Shares of Global CO2 Emissions USA, USSR, China, Japan and India, 1950-1988

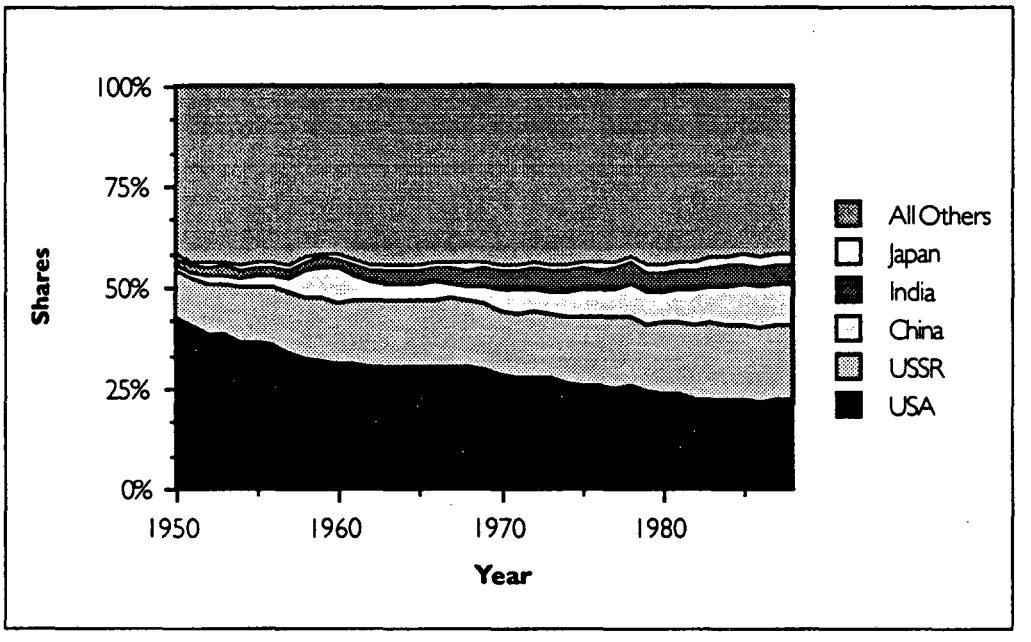


Table VIII-25. Carbon Dioxide Emissions from Fossil Fuel Combustion, Cement Production, and Gas Flaring, 1950-1989 (continued)

3. Per Capita Emissions, tonnes of carbon

Year	China	India	Japan	USA	former USSR	Global Total
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	3.4	1.18
1981	0.41	0.15	2.1	5.3	3.4	1.13
1982	0.43	0.15	2.1	4.9	3.4	1.11
1983	0.45	0.16	2.0	4.9	3.5	1.09
1984	0.48	0.16	2.2	5.0	3.4	1.10
1985	0.52	0.17	2.1	5.0	3.5	1.11
1986	0.54	0.18	2.1	5.0	3.6	1.12
1987	0.56	0.19	2.0	5.2	3.6	1.13
1988	0.56	0.20	2.2	5.4	3.8	1.15
1989	0.59	0.21	2.3	5.4	3.6	1.15

Source: Trends '91: A Compendium of Data on Global Change, 1991 (The Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN).

Figure VIII-26. Per Capita CO2 Emissions
USA, USSR, China, Japan and India, 1950-1988

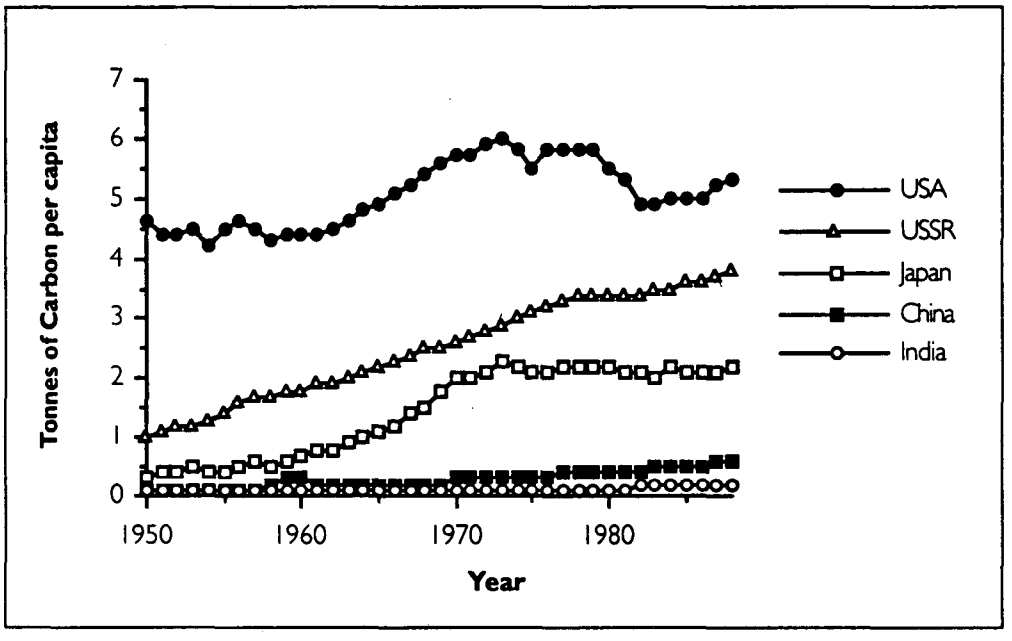


Table VIII-26. GDP Structure for Selected Countries, 1980 and 1987

1. Monetary Units

Country	Units (billion 1980)	Industry		Agriculture		Services and Other		Total	
		1980	1987	1980	1987	1980	1987	1980	1987
China (a)	Chinese yuan	218.7	445.6	160.8	260.6	67.7	148.3	447.2	854.5
India (b)	Indian rupees	316.3	522.3	464.8	519.2	441.1	662.2	1222.2	1703.7
Japan (a)	thousand Japanese yen	100.7	138.9	8.8	9.3	130.6	162.5	240.2	310.7
USA (a)	US dollars	901.0	1,067.1	70.2	90.6	1,713.2	2,123.1	2684.4	3280.8
USSR (c)	rubles	(d)	(d)	(d)	(d)	(d)	(d)	(d)	900

2. Percent of Total (e)

Country	Industry		Agriculture		Services and Other	
	1980	1987	1980	1987	1980	1987
China (a)	49%	52%	36%	30%	15%	17%
India (b)	26%	31%	38%	30%	36%	39%
Japan (a)	42%	45%	4%	3%	54%	52%
USA (a)	34%	33%	3%	3%	64%	65%
USSR (c)	37%	34%	14%	18%	49%	48%

(a) Data for at least some years are by purchaser values and not at factor cost, so sum does not accurately reflect actual total GDP by factor cost (i.e. GDP may include indirect taxes).
(b) Data are for fiscal years.
(c) Figures are for GNP, not GDP. Figures listed under 1987 are for 1988. Figures in percent only. 1980 Services category includes services, construction, and other. 1988 services and other category includes Narhos categories of services, trade, construction, and other.
(d) Not available.
(e) Percentages may not add up to 100 due to rounding.

Source: China, India, Japan, and USA: World Tables,1988-1989 Edition, The World Bank, Johns Hopkins University Press
USSR: 1980 – U.S. Congress, Joint Economic Committee, USSR: Measures of Economic Growth and Development, 1950-1980 (Washington D.C., US Gov't Printing Office, 1982), p.61. 1988 – Narhos 1989 [Statistical Yearbook], (Finance and Statistics Press, Moscow, 1990).

Figure VIII-27. GDP Structure, Selected Countries, 1987

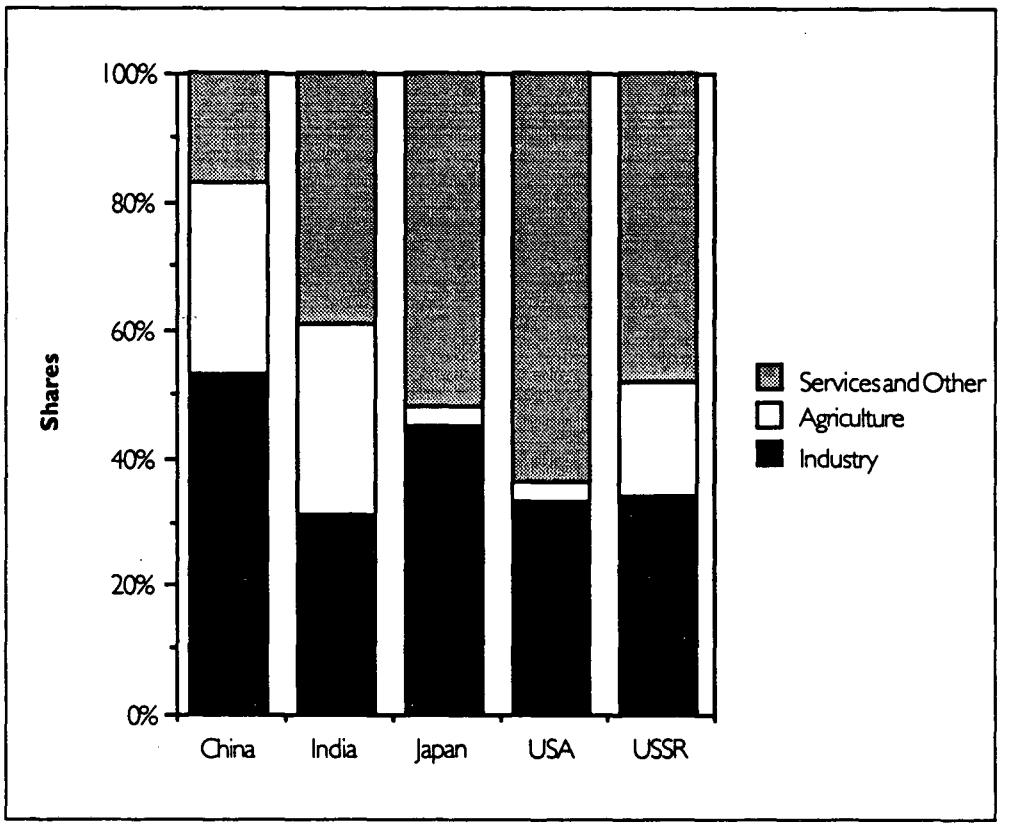


Table VIII-27. Population for Selected Countries, 1968-1990 — Millions (a)

Year	China	India	Japan	USA	USSR (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	
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
1986	1,074	766	121	241	280
1987	1,090	781	122	243	283
1988	1,106	797	123	245	285
1989	1,112	812	123	247	288
1990	1,139	827	124	250	289

(a) 1960-1980 data from the World Bank the World Bank, data for subsequent years from the United Nations (midyear estimates).
(b) 1960-1975 USSR data from International Energy Studies, Soviet Study.

Source: World Tables, 1989-90 (World Bank); United Nations, 1992; IES, EAP, LBL.

Chapter IX—Economic Indicators and Population

Economic / Population

Gross National Product

During the 1980s gross national product (GNP) rose steadily and rapidly, at an average annual rate of 9.5%, more than doubling to 1060 billion yuan in 1990 (constant 1980 yuan; Table IX-1).[1] Growth was more pronounced in the first half of the decade, averaging 11.6% annually between 1981 and 1985, then slowing to 7.7% between 1986 and 1990. Most growth came from the manufacturing sector, although the services sector grew faster overall. Both the manufacturing and services sectors increased their shares of GNP (52% and 24% respectively in 1990) at the expense of agriculture.

Because of population growth, per capita GNP rose more slowly, at an average annual rate of 7.9%, to 924 yuan in 1990 (constant 1980 yuan; Table IX-2).[2] Regional distribution of per capita GNP roughly follows that of per capita energy use (Table IX-3). Shanghai, Beijing, Tianjin, and the coastal provinces generally enjoy the highest GNP per capita, while inland provinces tend to be poorer. The figure for the richest area, Shanghai, is more than seven times that for the poorest, Guizhou (5459 yuan and 743 yuan respectively in 1989).

Gross Output Value

In some ways gross output value (GOV) is a less desirable measure of economic activity than GNP. Unlike GNP, GOV double counts by including the value of intermediate goods and services and is consequently about twice as large as GNP. In some cases, however, GOV data may be more useful in measuring energy intensity than value-added indicators like GNP or national income (NI).[3]

Trends in GOV since 1952 have been similar to those in energy production and consumption (Table IX-4). GOV structure has changed considerably over the past 40 years. In 1952 agriculture accounted for nearly two-thirds of GOV and industry one-fifth. In 1990 the situation was the reverse, with industry taking 72% and agriculture 15%. The regional distribution of GOV mirrors that of GNP (Tables IX-5 through IX-8).

Industrial GOV data is broken down among 15 major industrial subsectors in Table IX-9. Machinery, textiles, and food processing together account for about half of industrial GOV, and chemicals, energy, and metallurgy for most of the rest (Figure IX-5). The energy intensive subsectors responsible for the bulk of industrial energy consumption are not those that contribute most to GOV.

National Income

National income is probably the indicator closest to GNP.[4] The structure of NI and trends since 1978 are very similar to those of GNP, and data are available for years beginning in 1952 (Table IX-10). Assuming that this relationship has always held true, NI is probably the best replacement for GNP in conducting historical comparisons. In this databook we have used deflators derived from NI data in converting current yuan to constant yuan. Regional patterns of NI distribution are similar to those of GNP (Table IX-11).

Population

In 1990 China's population stood at 1.14 billion. The population is mainly rural, with only about 21% living in urban areas (Table IX-12).[5] The urban population, however, has been increasing much faster than the rural population. The fraction of the population engaged in nonagricultural activities only recently matched the peak of 21% reached during the Great Leap Forward, when huge numbers of farmers were put to work on local industrial projects. Population is overwhelmingly concentrated in the central and southern coastal provinces (Table IX-13). Population in the northeast and southwest is some-

what less dense, and in the northwest and west it is quite sparse.

TECHNICAL NOTE: CHINA'S NATIONAL ACCOUNTING SYSTEM

The main sources of Chinese national accounts data are the China Statistical Yearbooks (CSY) and Almanacs of China's Economy compiled by the State Statistical Bureau (SSB), 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. Their primary measure of national wealth, national income (NI), is comparable to the Material Product System (MPS) concept of net material product (NMP). In order to facilitate international comparison, national income must be converted to the western System of National Accounts (SNA) concept of gross domestic product (GDP). Using a methodology developed by the World Bank, China has recently begun to publish data on GNP, of which correspond to the data published by the World Bank. The SSB divides GNP into primary, secondary and tertiary industries[6] whereas the World Bank uses the more conventional categories of agriculture, industry, and service sectors. The lack of coverage of the service sector in the Chinese data complicates the conversion of national income to GNP. A further difficulty is the use of sectoral classifications which are different from the UN International Standard Industrial Classification (ISIC).

Net Material Product and National Income

The Chinese definition of NI is approximately the same as the United Nations' NMP, i.e., the net output from five "material sectors" of the economy which intentionally excludes the service sector. As defined by the SSB, 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. It should be noted that the Chinese use a different method of sector classifications. The nonmaterial sector essentially includes all personal and most public services, for example health care, education, scientific research, government, and financial services.

The SSB 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 SSB 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 SSB 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 (World Bank 1983, 244; CSY 1989, xxxiii).

a. Industry

For industrial output, the SSB 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 SSB uses an income approach by adding wages, fringe benefits, profits and other charges to estimate the value added.

b. Agriculture

Agriculture consists of three principal activities: crop growing, animal husbandry and sideline production, including village-level industry. 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 calculating by deducting seed, fertilizer, insecticide, animal feed and equipment inputs as well as depreciation.

c. 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 SSB calculates the net output value by estimating depreciation and using the income approach to estimate the value added by labor.

d. Transport and Communication

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 SSB uses an income approach to estimate value added.

e. Commerce

Commerce covers all wholesaling and retailing 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 SSB as consumption plus accumulation (investment) and is theoretically equivalent to national income produced if exports are deducted and imports are added (CSY 1989, xxxiii). 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. Accumulation represents the part of the national product that leads to increases in fixed capital assets, inventories and other material reserves. Circulating assets comprise increases in inventories (World Bank, 1983, 244).

Growth Rates

The SSB 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 indicator is assigned a value of 100 in the base year which is often 1952 (as is the case for NI). 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 NI in constant yuan by the following formula:

NI in constant yuan = base year NI in current yuan x (current year index ÷ base year index)

Because of problems with overreporting of production in the past, especially the 50s and 60s, 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 GNP or GDP figures due to two main differences: national income does not include the service sector, and national income subtracts depreciation. Because the SSB did not concentrate on collecting data on the service sector in the past, the figures for GNP begin with 1978, whereas the SSB 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, GNP and GDP 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 GNP and GDP because, by the World Bank's estimates, the ratios of GNP and GDP to national income were the same in both 1957 and 1979 (World Bank, 1983, 267). 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, GOV. 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 SSB calculates net output by calculating the value added by the labor input minus wages, salaries, and social insurance (World Bank, 1983). 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

NOTES

1 China only recently began to issue figures on GNP. GNP data are available for years beginning in 1978, unlike data on other economic indicators which go back to the early 1950s. See the Technical Note at the end of this introduction.

2 1990 per capita GNP was 1547 current yuan, or US$ 324 at the average 1990 official exchange rate of 4.78 yuan per US$.

3 Gross output value is probably the indicator most useful in tracking time trends within subsectors. The best measures of energy intensity are based on units of physical output, but this is not possible for most industrial and other subsectors. 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 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 (Marc Ross, personal communication, 19 June 1992).

All aggregate indicators of energy intensity within sectors or whole economies are problematic, largely because of structural changes within sectors. This point should be kept in mind when using any of the aggregate data in this chapter in constructing energy intensity indices.

4 Chinese national accounts define NI 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. GNP is the sum of NI, value added in the "nonmaterial production" sectors, and depreciation of fixed assets. See the Technical Note at the end of this section for details on the methods of calculating GNP and NI.

5 This is based on the fraction of the population classified as "nonagricultural" rather than the fraction classified as "urban". The inclusion of towns in the "urban" category is subject to frequent change. It can be assumed that nearly all people living in households classified as "nonagricultural" live in cities.

6 The categories of primary, secondary and tertiary industry in Chinese statistics roughly correspond to the agriculture, manufacturing, and service sectors respectively. Primary industry includes agriculture and forestry (but not processing of forest products), animal husbandry, fishery, etc. Secondary industry includes mining, manufacturing, utilities (water, gas, electricity, and steam), and construction. Tertiary industry includes transportation (except that performed by enterprises in other categories; see for example Table IV-15), communications, commerce, food service, financial services and insurance, technical, scientific, educational, and health services, government and party agencies, armed forces, police, and other services.

Table IX-1. Gross National Product, 1978-1990

1. Total Gross National Product

Year	Billion Current Yuan	Index Based on Constant Prices (a) (1978=100)	Billion Constant 1980 Yuan (b)	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	166.6	641.98	0.922	19.8%	14.6%
1985	855.76	187.8	723.68	0.846	22.9%	12.7%
1986	969.63	203.4	783.79	0.808	13.3%	8.3%
1987	1,130.10	225.8	870.11	0.770	16.5%	11.0%
1988	1,401.82	250.6	965.67	0.689	24.0%	11.0%
1989	1,591.63	260.5	1,003.82	0.631	13.5%	4.0%
1990	1,768.61	274.1	1,056.23	0.597	11.1%	5.2%

Total GNP Average Real Growth

1981-1985	11.6%
1986-1990	7.7%
1981-1990	9.5%

2. Agricultural Sector GNP

Year	Billion Current Yuan	Index Based on Constant Prices (a) (1978=100)	Billion Constant 1980 Yuan (b)	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	101.84	100.0	129.96	33.7%		
1979	125.89	106.1	137.89	33.3%	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	31.9%	14.0%	11.5%
1983	196.08	135.1	175.58	31.3%	11.3%	8.3%
1984	229.55	152.6	198.32	30.9%	17.1%	13.0%
1985	254.16	155.4	201.96	27.9%	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	23.2%	19.6%	2.5%
1989	422.80	177.6	230.81	23.0%	10.4%	3.1%
1990	502.40	190.9	248.10	23.5%	18.8%	7.5%

Agricultural Sector GNP Average Real Growth

1981-1985	8.6%
1986-1990	4.4%
1981-1990	6.1%

(a) These can be thought of as percentages; e.g. at constant prices, GNP in 1988 was 250.4% of GNP in 1978. Total GNP in current yuan is slightly different from sum of GNP for sectors due to rounding.

(b) 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.

Source: China Statistical Yearbook, 1990 & 1991 (SSB, Beijing); ERI.

Table IX-1. Gross National Product, 1978-1990 (continued)

3. Manufacturing Sector GNP

Year	Billion Current Yuan	Index Based on Constant Prices (a) (1978=100)	Billion Constant 1980 Yuan (b)	Sectoral Share (% of 1980 yuan total)	Nominal Growth	Real Growth
1978	174.52	100.0	178.36	46.3%		
1979	191.35	108.2	192.98	46.5%	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	46.4%	5.7%	5.5%
1983	264.62	145.8	260.04	46.4%	11.0%	10.4%
1984	310.57	166.9	297.68	46.4%	17.4%	14.5%
1985	386.66	197.9	352.97	48.8%	24.5%	18.6%
1986	449.27	218.2	389.17	49.7%	16.2%	10.3%
1987	525.16	248.1	442.50	50.9%	16.9%	13.7%
1988	658.72	284.1	506.71	36.1%	25.4%	14.5%
1989	727.80	294.8	525.79	33.0%	10.5%	3.8%
1990	782.90	310.5	553.80	31.3%	7.6%	5.3%

Manufacturing Sector GNP Average Real Growth

1981-1985 12.1%
1986-1990 9.2%

1981-1990 10.6%

4. Services Sector GNP

Year	Billion Current Yuan	Index Based on Constant Prices (a) (1978=100)	Billion Constant 1980 Yuan (b)	Deflators: 1980 Yuan	Nominal Growth	Real Growth
1978	82.45	100.0	80.37	20.9%		
1979	82.57	107.8	86.64	20.9%	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	21.4%	6.5%	10.6%
1983	118.00	152.3	122.40	21.8%	13.7%	12.6%
1984	152.70	178.3	143.30	22.3%	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	360.60	293.3	235.72	16.8%	26.5%	12.5%
1989	441.46	308.3	247.77	15.6%	22.4%	5.1%
1990	481.81	314.9	253.08	14.3%	9.1%	2.1%

Sevices Sector GNP Average Real Growth

1981-1985 14.2%
1986-1990 8.1%

1981-1990 11.1%

(a)-(b) See footnotes on previous page.

Source: China Statistical Yearbook, 1990 & 1991 (SSB, Beijing); ERI.

Figure IX-1. Gross National Product by Sector, 1978-1990

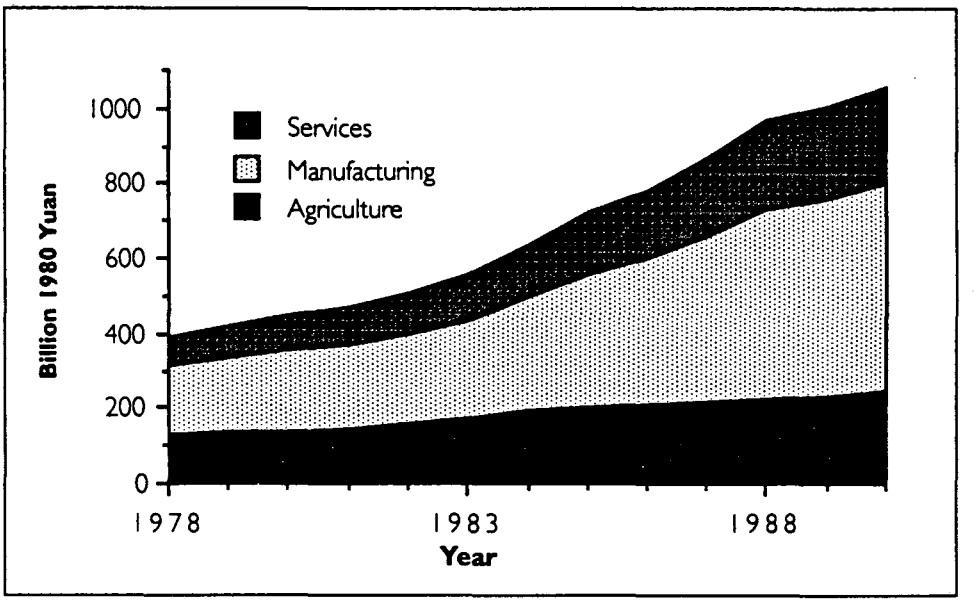


Figure IX-2. Sectoral Shares of GNP, 1978-1990

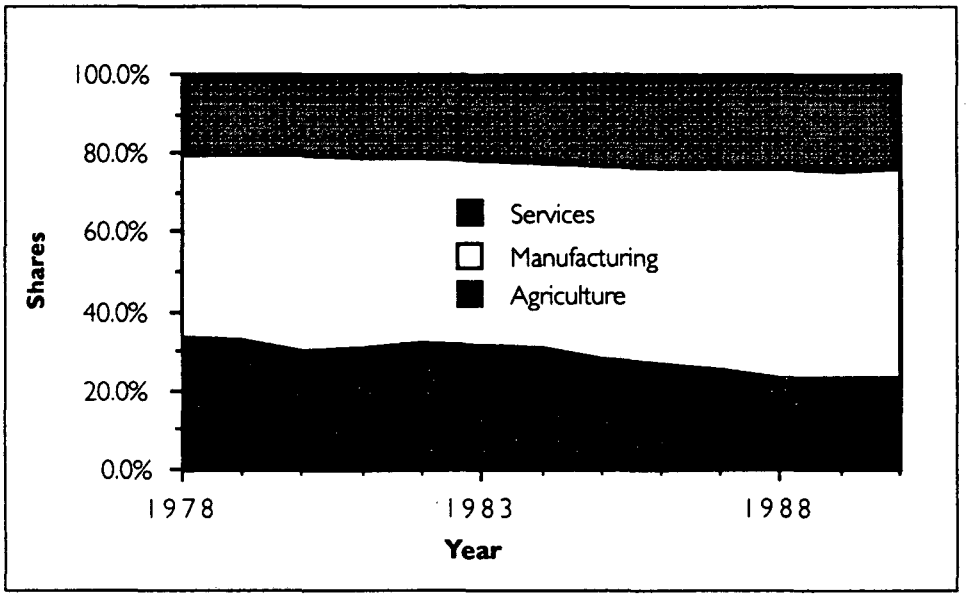


Table IX-2. Per Capita Gross National Product, 1978-1990

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%

Per Capita GNP Average Real Growth

1981-1985	10.0%
1986-1990	6.1%
1981-1990	7.9%

Source: Statistical Yearbook of China, 1990 & 1991 (SSB, Beijing).

Table IX-3. Gross National Product by Province, 1988 and 1989

Planning Region	Province	Total GNP (Billion Current Yuan)				Per Capita GNP (Current Yuan)			
		1988	1989	Nominal Growth	Real Growth (a)	1988	1989	Nominal Growth	Real Growth (b)
North	Beijing	41.02	45.58	11.1%	4.4%	3,795	4,395	15.8%	8.8%
	Tianjin	25.96	28.33	9.1%	1.6%	3,080	3,310	7.5%	0.1%
	Hebei	65.42	74.90	14.5%	4.3%	1,129	1,274	12.8%	2.8%
	Shanxi	29.64	35.01	18.1%	4.5%	1,076	1,253	16.5%	3.1%
	Inner Mongolia	23.48	25.71	9.5%	2.3%	1,121	1,212	8.0%	1.0%
Northeast	Liaoning	84.00	92.21	9.8%	2.3%	2,199	2,379	8.2%	0.8%
	Jilin	34.78	36.13	3.9%	-4.1%	1,466	1,504	2.6%	-5.3%
	Heilongjiang	51.50	58.26	13.1%	5.0%	1,486	1,660	11.7%	3.7%
East	Shanghai	67.08	69.65	3.8%	3.0%	5,316	5,459	2.7%	1.9%
	Jiangsu	113.20	122.85	8.5%	1.4%	1,758	1,880	6.9%	-0.1%
	Zhejiang	72.17	78.97	9.4%	-0.6%	1,731	1,877	8.4%	-1.5%
	Anhui	51.25	57.21	11.6%	4.8%	953	1,046	9.8%	3.0%
	Fujian	35.41	41.67	17.7%	6.5%	1,245	1,439	15.6%	4.6%
	Jiangxi	32.14	36.35	13.1%	5.1%	890	984	10.5%	2.7%
	Shandong	105.08	120.07	14.3%	4.0%	1,304	1,471	12.9%	2.7%
South-Central	Henan	73.75	82.60	12.0%	4.4%	911	1,004	10.1%	2.7%
	Hubei	62.51	70.08	12.1%	2.5%	1,206	1,333	10.5%	1.1%
	Hunan	58.41	64.08	9.7%	3.6%	992	1,066	7.5%	1.5%
	Guangdong	109.86	131.17	19.4%	7.0%	1,853	2,177	17.5%	5.3%
	Guangxi	30.03	34.94	16.4%	2.9%	735	842	14.6%	1.3%
	Hainan	7.48	8.69	16.2%	5.4%	1,190	1,359	14.2%	3.6%
Southwest	Sichuan	92.50	99.85	7.9%	2.8%	875	933	6.6%	1.6%
	Guizhou	21.14	23.55	11.4%	4.6%	676	743	10.0%	3.2%
	Yunnan	26.83	31.55	17.6%	5.8%	747	865	15.8%	4.2%
	Tibet	2.03	2.19	8.0%	8.4%	955	1,012	6.0%	6.4%
Northwest	Shaanxi	30.20	33.98	12.5%	3.3%	963	1,065	10.6%	1.5%
	Gansu	19.18	21.68	13.0%	8.8%	898	998	11.2%	7.0%
	Qinghai	5.50	6.04	9.8%	1.2%	1,266	1,372	8.3%	-0.2%
	Ningxia	4.76	5.58	17.1%	8.4%	1,081	1,225	13.4%	4.9%
	Xinjiang	18.89	21.74	15.1%	5.9%	1,324	1,495	12.9%	3.9%
National Total		1,398.42	1,578.87	12.9%	3.6%	1,276	1,420	11.3%	2.1%
Balance (c)		3.22	18.26						

(a) As reported in the China Statistical Yearbook.
(b) Calculated using reported real growth rates for GNP by province.
(c) The gross national product totals differ from the sum of regional gross national product because each region calculates gross national product by its own methods, which may differ from those used by the State Statistical Bureau.

Source: China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-4. Gross Output Value by Sectors, 1952-1990

1. Gross Output, Billion Current Yuan

Year	Total	Agriculture	Industry	Construction	Transportation	Commerce
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	220.4
1990	3,799.6	766.2	2,392.4	300.9	127.5	212.6

Source: Statistical Yearbook of China, 1991 (SSB, Beijing)

Table IX-4. Gross Output Value by Sectors, 1952-1990 (continued)

2. Gross Output, Index Based on Constant Prices (1952 = 100) (a)

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	2,364.2	404.8	6,465.1	2,582.0	2,222.6	868.3

(a) These can be thought of as percentages; e.g. at constant prices, total gross output in 1988 was 2,106% of total gross output in 1952.

Source: Statistical Yearbook of China, 1991 (SSB, Beijing)

Table IX-4. Gross Output Value by Sectors, 1952-1990 (continued)

3. Gross Output, Billion Constant 1980 Yuan (b)

Year	Total (c)	Sum of Sectors (c)	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	2,362.0	2,362.4	357.2	1,689.5	154.4	65.8	95.5

(b) Gross output in constant yuan = base year gross output in current yuan * (index for current year ÷ index for base year).
(c) 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: Statistical Yearbook of China, 1991 (SSB, Beijing)

Figure IX-3. Gross Output Value, 1952-1990

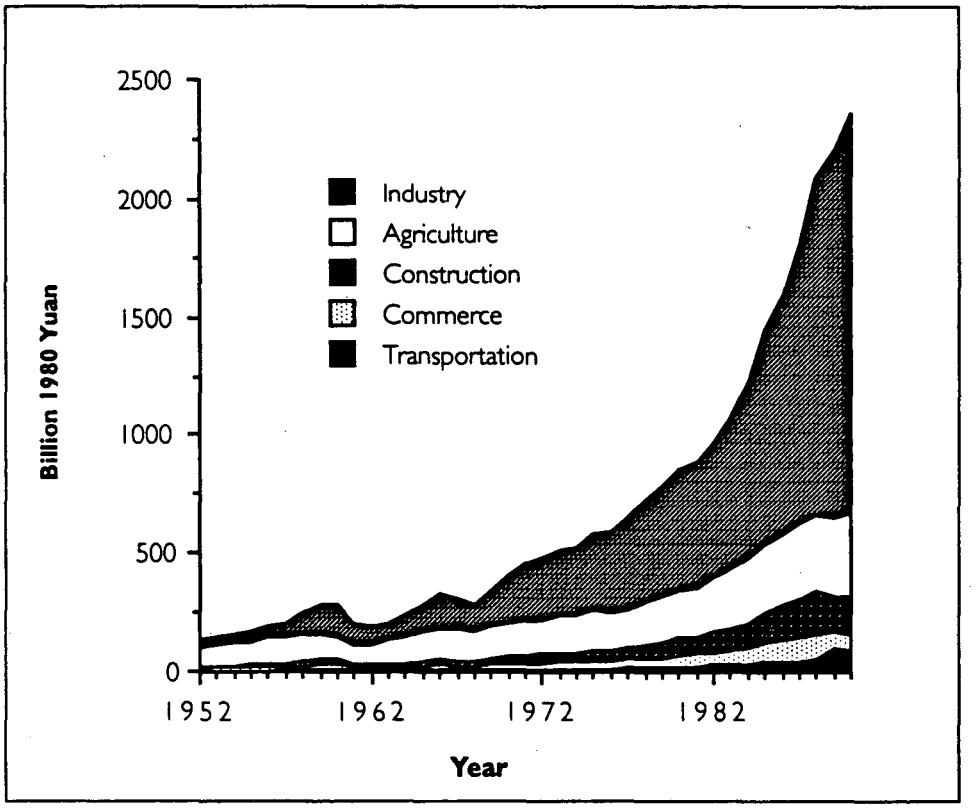


Table IX-4. Gross Output Value by Sectors, 1952-1990 (continued)

4. Sectoral Shares of Gross Output, Percent (d)

Year	Agriculture	Industry	Construction	Transportation	Commerce	Sectoral Shares of GNP (e) Agriculture	Manufacturing	Services
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%	33.7%	46.3%	20.9%
1979	24.0%	59.7%	8.3%	2.7%	5.2%	33.3%	46.5%	20.9%
1980	22.5%	60.4%	9.0%	2.9%	5.2%	30.4%	49.0%	20.6%
1981	22.8%	60.3%	8.1%	2.9%	5.8%	31.1%	47.8%	21.0%
1982	23.2%	59.4%	8.8%	2.9%	5.6%	31.9%	46.4%	21.4%
1983	22.7%	59.9%	8.8%	2.9%	5.6%	31.3%	46.4%	21.8%
1984	22.2%	60.7%	8.7%	2.8%	5.5%	30.9%	46.4%	22.3%
1985	19.6%	62.9%	9.0%	2.9%	5.6%	27.9%	48.8%	23.1%
1986	18.4%	63.8%	9.3%	2.9%	5.7%	26.6%	49.7%	23.7%
1987	17.0%	65.8%	8.9%	2.8%	5.4%	25.1%	50.9%	24.1%
1988	15.3%	68.6%	8.3%	2.7%	5.1%	23.2%	52.5%	24.4%
1989	15.0%	70.6%	6.9%	2.9%	4.6%	23.0%	52.4%	24.7%
1990	15.1%	71.5%	6.5%	2.8%	4.0%	23.5%	52.4%	24.0%

(d) Relative to the sum of real sectoral gross output (second column of data on Table IX-4.3), not the total calculated from a single deflator (first column of data on Table IX-4.3).
(e) From Table IX-1.

Source: Statistical Yearbook of China, 1991 (SSB, Beijing)

Figure IX-4. Sectoral Shares of GOV, 1952-1989

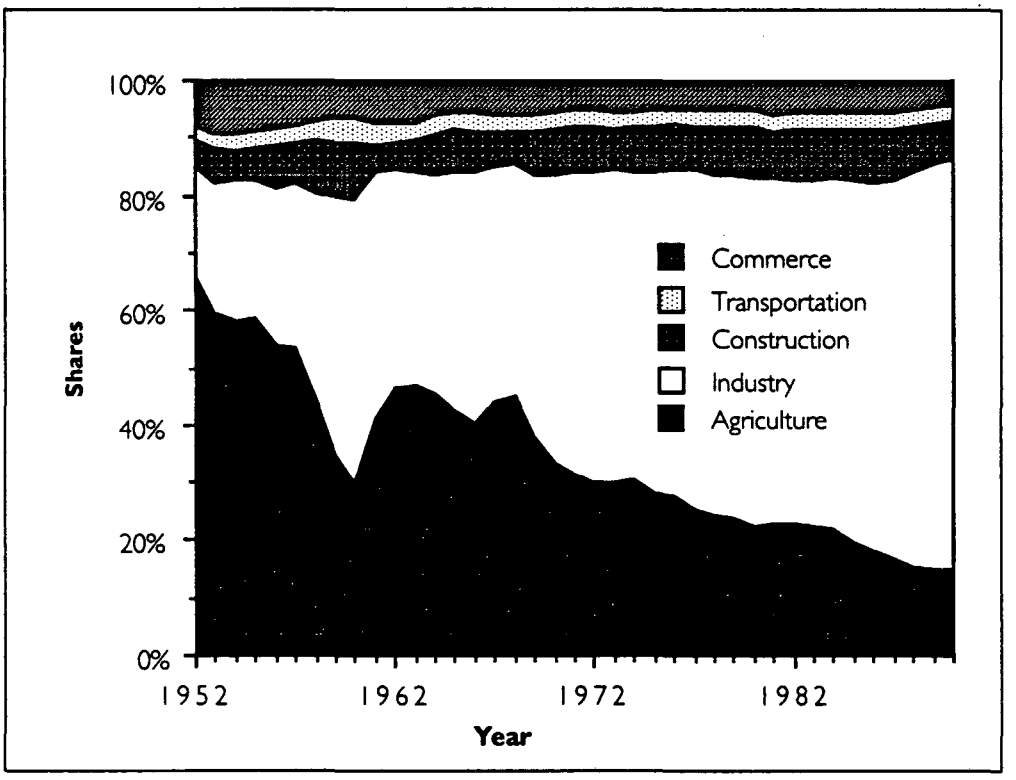


Table IX-5. Gross Output Value by Sector and Province, 1988, Billion Current Yuan

Planning Region	Province	Sectoral Gross Output Value					Total Gross Output Value
		Agriculture	Industry	Construction	Trans-portation	Commerce	
North	Beijing	5.3	57.2	10.1	3.4	5.9	81.8
	Tianjin	4.4	52.1	5.3	3.4	5.4	70.7
	Hebei	25.7	84.1	12.1	4.2	8.5	134.6
	Shanxi	8.7	38.7	7.0	2.6	4.3	61.4
	Inner Mongolia	12.2	19.4	4.6	2.1	3.0	41.3
Northeast	Liaoning	22.7	130.5	16.0	7.0	9.9	186.1
	Jilin	14.1	45.4	6.3	2.4	4.4	72.6
	Heilongjiang	15.2	68.6	10.8	4.3	5.3	104.1
East	Shanghai	5.3	130.5	12.1	6.5	11.4	165.7
	Jiangsu	49.8	215.0	21.8	8.3	12.7	307.5
	Zhejiang	28.3	114.1	14.3	4.2	10.1	171.0
	Anhui	31.5	51.8	9.4	2.9	5.0	100.5
	Fujian	18.2	38.9	6.3	2.5	4.4	70.2
	Jiangxi	17.4	34.5	5.9	2.0	3.5	63.5
	Shandong	49.5	145.5	21.5	5.6	12.6	234.6
South-Central	Henan	37.1	78.0	14.9	4.7	9.0	143.7
	Hubei	29.8	83.5	10.1	3.6	8.7	135.6
	Hunan	30.3	58.2	10.8	3.5	8.0	110.8
	Guangdong	47.4	131.9	21.9	6.9	20.6	228.8
	Guangxi	16.9	27.2	5.3	1.7	4.5	55.6
	Hainan	5.8	3.1	1.4	0.4	1.1	11.9
Southwest	Sichuan	47.6	96.4	16.8	5.0	12.6	178.4
	Guizhou	12.3	16.7	3.2	1.6	2.2	36.1
	Yunnan	13.5	24.5	4.8	1.3	3.2	47.3
	Tibet	1.3	0.3	0.5	0.2	0.5	2.8
Northwest	Shaanxi	13.1	33.2	6.0	2.5	3.4	58.1
	Gansu	8.5	20.4	3.9	2.2	3.9	38.9
	Qinghai	1.9	4.3	1.7	0.4	0.7	9.0
	Ningxia	2.0	4.4	1.3	0.5	0.6	8.7
	Xinjiang	10.8	14.9	3.3	1.4	2.5	33.0
National Total		586.5	1,822.4	296.7	83.7	191.4	2,980.7
Balance (a)		<0.05	-0.7	27.2	-13.4	3.4	16.4

(a) The gross output value totals differ from the sum of regional gross output value because each region calculates gross output value by its own methods, which may differ from those used by the State Statistical Bureau.

Source: Statistical Yearbook of China, 1990 (SSB, Beijing)

Table IX-6. Gross Output Value for Agricultural and Industrial Sectors by Province, 1989, Billion Current Yuan (a)

Planning Region	Province	Sectoral Gross Output Value				Sum of Sectoral Gross Output Values (a)
			Industry composed of:			
		Agriculture	Total Industry	Light Industry	Heavy Industry	
North	Beijing	6.0	70.9	32.3	38.6	76.9
	Tianjin	5.2	63.5	33.6	29.9	68.7
	Hebei	30.7	102.6	49.5	53.1	133.3
	Shanxi	10.5	48.8	13.1	35.7	59.3
	Inner Mongolia	12.7	24.2	10.5	13.6	36.8
Northeast	Liaoning	22.3	154.6	51.0	103.7	176.9
	Jilin	13.4	53.0	22.4	30.7	66.4
	Heilongjiang	16.2	80.5	27.4	53.1	96.7
East	Shanghai	6.1	151.5	79.0	72.6	157.6
	Jiangsu	52.2	250.7	133.9	116.9	303.0
	Zhejiang	30.8	133.4	84.0	49.4	164.2
	Anhui	34.2	62.8	32.9	29.9	96.9
	Fujian	21.0	48.9	29.7	19.3	69.9
	Jiangxi	19.8	40.6	17.8	22.8	60.4
	Shandong	54.8	192.1	98.3	93.8	246.9
South-Central	Henan	45.0	95.4	43.6	51.8	140.4
	Hubei	33.5	97.7	46.3	51.4	131.2
	Hunan	33.8	68.0	30.0	38.0	101.8
	Guangdong	54.9	164.7	107.3	57.4	219.6
	Guangxi	21.2	32.7	17.8	14.9	53.9
	Hainan	6.5	3.9	2.5	1.4	10.4
Southwest	Sichuan	52.8	114.7	52.6	62.2	167.5
	Guizhou	13.4	20.1	8.6	11.6	33.5
	Yunnan	15.3	30.5	15.5	15.0	45.8
	Tibet	1.4	0.3	0.1	0.2	1.7
Northwest	Shaanxi	14.8	40.7	16.9	23.8	55.5
	Gansu	8.9	24.8	7.3	17.5	33.7
	Qinghai	2.2	5.4	1.7	3.8	7.6
	Ningxia	2.1	5.9	1.8	4.1	8.0
	Xinjiang	12.2	18.7	8.9	9.8	30.9
National Total		653.5	2,201.7	1,076.1	1,125.6	2,855.2

(a) This is less than total gross output value since the gross output value of the construction, transportation, and commerce sectors is excluded.

Source: Statistical Yearbook of China, 1990 (SSB, Beijing)

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989

TOTAL: INDUSTRY (a)

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	34.3	0.768	26.3
1953	44.7	0.768	34.3
1954	52.0	0.768	39.9
1955	54.9	0.768	42.2
1956	70.3	0.768	54.0
1957	78.4	0.768	60.2
1957	70.4	0.855	60.2
1958	109.0	0.855	93.2
1959	148.4	0.855	126.9
1960	165.0	0.855	141.1
1961	101.9	0.855	87.2
1962	85.0	0.855	72.7
1963	92.2	0.855	78.9
1964	110.3	0.855	94.3
1965	139.4	0.855	119.2
1966	168.6	0.855	144.2
1967	145.3	0.855	124.3
1968	138.0	0.855	118.0
1969	185.3	0.855	158.5
1970	242.1	0.855	207.1
1971	278.2	0.855	237.9
1971	238.9	0.996	237.9
1972	254.7	0.996	253.7
1973	278.9	0.996	277.8
1974	279.6	0.996	278.5
1975	321.9	0.996	320.6
1976	326.2	0.996	324.9
1977	372.8	0.996	371.3
1978	423.1	0.996	421.4
1979	459.1	0.996	457.2
1980	499.2	0.996	497.2
1981	519.9	0.996	517.8
1981	517.8	1.000	517.8
1982	557.7	1.000	557.7
1983	616.4	1.000	616.4
1984	703.0	1.000	703.0
1985	829.5	1.000	829.5
1986	897.9	1.000	897.9
1987	1,030.7	1.000	1,030.7
1988(d)	1,245.0	1.000	1,245.0
1989(d)	1,351.3	1.000	1,351.3

METALLURGY

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	2.02	0.887	1.79
1953	2.76	0.887	2.45
1954	3.36	0.887	2.98
1955	4.19	0.887	3.72
1956	5.94	0.887	5.27
1957	7.26	0.887	6.44
1957	6.00	1.074	6.44
1958	11.02	1.074	11.83
1959	16.10	1.074	17.28
1960	20.52	1.074	22.03
1961	11.43	1.074	12.27
1962	8.57	1.074	9.20
1963	9.53	1.074	10.23
1964	11.79	1.074	12.66
1965	14.95	1.074	16.05
1966	18.10	1.074	19.43
1967	13.30	1.074	14.28
1968	10.70	1.074	11.49
1969	16.60	1.074	17.82
1970	22.81	1.074	24.49
1971	27.23	1.074	29.23
1971	26.59	1.099	29.23
1972	28.02	1.099	30.81
1973	30.04	1.099	33.03
1974	26.28	1.099	28.89
1975	28.83	1.099	31.70
1976	26.55	1.099	29.19
1977	29.05	1.099	31.94
1978	36.89	1.099	40.56
1979	41.03	1.099	45.11
1980	43.03	1.099	47.31
1981	41.54	1.099	45.67
1981	45.67	1.000	45.67
1982	48.52	1.000	48.52
1983	52.37	1.000	52.37
1984	57.94	1.000	57.94
1985	66.40	1.000	66.40
1986	74.99	1.000	74.99
1987	82.24	1.000	82.24
1988(e)	90.88	1.000	90.88
1989(e)	98.64	1.000	98.64

(a) Village-level rural industry is not included; therefore totals given here are less than those in the Statistical Yearbook of China, 1989 (SSB, Beijing).
(b) Constant prices have been set by the SSB for four subperiods: 1952 constant prices for 1949-1957; 1957 constant prices for 1958-1970; 1970 constant prices for 1971-1980; and 1980 constant prices for the period since 1981.
(c) Bridging indices are used to convert constant prices from one subperiod into constant prices of the next subperiod. They are based on prices given for overlapping years in the subperiods (italicized years), e.g. for 1965 gross output value in 1980 yuan = 1965 gross output value in 1957 yuan * (1971 gross output in 1970 yuan ÷ 1971 gross output in 1957 yuan) * (1981 gross output in 1980 yuan ÷ 1981 gross output in 1970 yuan).
(d) Total industrial gross output value for 1988 and 1989 are calculated from real growth rates for the whole industrial sector (20.8% and 8.5% respectively; includes village industries).
(e) Subsectoral data for 1988 and 1989 are calculated from their percentage share of total industrial gross output value at constant 1980 prices.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

PETROLEUM

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.18	1.073	0.19
1953	0.21	1.073	0.23
1954	0.31	1.073	0.33
1955	0.45	1.073	0.48
1956	0.65	1.073	0.70
1957	0.74	1.073	0.79
1957	0.80	0.992	0.79
1958	1.24	0.992	1.23
1959	1.91	0.992	1.90
1960	2.38	0.992	2.36
1961	1.85	0.992	1.84
1962	2.18	0.992	2.16
1963	2.40	0.992	2.38
1964	3.32	0.992	3.29
1965	4.51	0.992	4.48
1966	6.20	0.992	6.15
1967	5.40	0.992	5.36
1968	6.20	0.992	6.15
1969	6.90	0.992	6.85
1970	10.53	0.992	10.45
1971	12.73	0.992	12.63
1971	10.99	1.150	12.63
1972	12.52	1.150	14.39
1973	13.78	1.150	15.84
1974	15.70	1.150	18.05
1975	17.98	1.150	20.67
1976	20.14	1.150	23.15
1977	22.68	1.150	26.07
1978	23.33	1.150	26.82
1979	24.96	1.150	28.69
1980	25.23	1.150	29.00
1981	24.54	1.150	28.21
1981	28.21	1.000	28.21
1982	28.80	1.000	28.80
1983	31.01	1.000	31.01
1984	33.41	1.000	33.41
1985	37.26	1.000	37.26
1986	40.52	1.000	40.52
1987	43.47	1.000	43.47
1988(e)	48.56	1.000	48.56
1989(e)	52.70	1.000	52.70

CHEMICALS

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	1.66	0.377	0.63
1953	2.26	0.377	0.85
1954	2.87	0.377	1.08
1955	3.20	0.377	1.21
1956	4.72	0.377	1.78
1957	6.46	0.377	2.43
1957	4.82	0.505	2.43
1958	8.39	0.505	4.24
1959	11.93	0.505	6.02
1960	14.27	0.505	7.20
1961	10.27	0.505	5.19
1962	9.43	0.505	4.76
1963	10.81	0.505	5.46
1964	13.75	0.505	6.94
1965	17.94	0.505	9.06
1966	25.30	0.505	12.77
1967	22.20	0.505	11.21
1968	19.40	0.505	9.79
1969	29.80	0.505	15.05
1970	39.92	0.505	20.16
1971	46.76	0.505	23.61
1971	26.00	0.908	23.61
1972	28.68	0.908	26.04
1973	31.83	0.908	28.90
1974	30.80	0.908	27.97
1975	36.45	0.908	33.10
1976	36.02	0.908	32.71
1977	42.37	0.908	38.47
1978	52.50	0.908	47.67
1979	56.18	0.908	51.01
1980	62.23	0.908	56.51
1981	65.13	0.908	59.14
1981	59.14	1.000	59.14
1982	65.90	1.000	65.90
1983	74.11	1.000	74.11
1984	83.03	1.000	83.03
1985	92.67	1.000	92.67
1986	103.95	1.000	103.95
1987	121.71	1.000	121.71
1988(e)	150.64	1.000	150.64
1989(e)	164.86	1.000	164.86

(a)-(c) See footnotes on first page of Table IX-7.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

FORESTRY

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	2.23	1.369	3.05
1953	3.04	1.369	4.16
1954	3.59	1.369	4.92
1955	3.24	1.369	4.44
1956	4.00	1.369	5.48
1957	4.24	1.369	5.81
1957	4.06	1.430	5.81
1958	4.88	1.430	6.98
1959	5.71	1.430	8.17
1960	6.04	1.430	8.64
1961	3.62	1.430	5.18
1962	3.16	1.430	4.52
1963	3.36	1.430	4.81
1964	3.77	1.430	5.39
1965	3.99	1.430	5.71
1966	4.10	1.430	5.86
1967	3.50	1.430	5.01
1968	2.80	1.430	4.00
1969	3.40	1.430	4.86
1970	3.63	1.430	5.19
1971	3.88	1.430	5.55
1971	4.56	1.217	5.55
1972	5.16	1.217	6.28
1973	5.60	1.217	6.81
1974	5.72	1.217	6.96
1975	6.11	1.217	7.44
1976	6.57	1.217	8.00
1977	7.00	1.217	8.52
1978	7.74	1.217	9.42
1979	8.48	1.217	10.32
1980	8.67	1.217	10.55
1981	8.62	1.217	10.49
1981	10.49	1.000	10.49
1982	11.23	1.000	11.23
1983	11.61	1.000	11.61
1984	12.68	1.000	12.68
1985	13.31	1.000	13.31
1986	14.27	1.000	14.27
1987	15.75	1.000	15.75
1988(e)	18.68	1.000	18.68
1989(e)	18.92	1.000	18.92

FOOD PROCESSING

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	8.28	1.266	10.48
1953	10.35	1.266	13.10
1954	11.87	1.266	15.03
1955	13.01	1.266	16.47
1956	14.06	1.266	17.80
1957	15.36	1.266	19.45
1957	13.84	1.405	19.45
1958	16.95	1.405	23.82
1959	19.20	1.405	26.98
1960	17.25	1.405	24.24
1961	14.16	1.405	19.90
1962	12.69	1.405	17.83
1963	13.16	1.405	18.49
1964	15.29	1.405	21.48
1965	17.55	1.405	24.66
1966	16.00	1.405	22.48
1967	15.70	1.405	22.06
1968	15.70	1.405	22.06
1969	16.40	1.405	23.04
1970	19.79	1.405	27.81
1971	21.85	1.405	30.70
1971	28.48	1.078	30.70
1972	31.66	1.078	34.13
1973	34.89	1.078	37.61
1974	35.85	1.078	38.64
1975	38.61	1.078	41.62
1976	38.86	1.078	41.89
1977	43.57	1.078	46.97
1978	47.17	1.078	50.85
1979	51.87	1.078	55.91
1980	56.80	1.078	61.23
1981	64.02	1.078	69.01
1981	69.01	1.000	69.01
1982	75.55	1.000	75.55
1983	79.43	1.000	79.43
1984	86.58	1.000	86.58
1985	95.17	1.000	95.17
1986	103.26	1.000	103.26
1987	114.78	1.000	114.78
1988(e)	135.71	1.000	135.71
1989(e)	143.24	1.000	143.24

(a)-(e) See footnotes on first page of Table IX-7.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

LEATHER

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.47	-	-
1953	0.56	-	-
1954	0.57	-	-
1955	0.56	-	-
1956	0.72	-	-
1957	0.87	-	-
1957	0.89	-	-
1958	1.19	-	-
1959	1.72	-	-
1960	1.83	-	-
1961	1.20	-	-
1962	0.90	-	-
1963	0.82	-	-
1964	0.84	-	-
1965	0.92	-	-
1966	-	-	-
1967	-	-	-
1968	-	-	-
1969	-	-	-
1970	-	-	-
1971	-	-	-
1971	-	1.014	0.00
1972	2.13	1.014	2.16
1973	2.03	1.014	2.06
1974	2.14	1.014	2.17
1975	2.49	1.014	2.52
1976	2.69	1.014	2.73
1977	3.12	1.014	3.16
1978	3.39	1.014	3.44
1979	3.78	1.014	3.83
1980	5.09	1.014	5.16
1981	5.78	1.014	5.86
1981	5.86	1.000	5.86
1982	5.57	1.000	5.57
1983	5.70	1.000	5.70
1984	6.22	1.000	6.22
1985	7.65	1.000	7.65
1986	8.96	1.000	8.96
1987	10.43	1.000	10.43
1988(e)	12.54	1.000	12.54
1989(e)	13.51	1.000	13.51

PAPER AND PULP

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.76	0.966	0.73
1953	0.88	0.966	0.85
1954	1.00	0.966	0.97
1955	1.12	0.966	1.08
1956	1.44	0.966	1.39
1957	1.82	0.966	1.76
1957	1.54	1.141	1.76
1958	2.06	1.141	2.35
1959	2.88	1.141	3.29
1960	3.05	1.141	3.48
1961	1.80	1.141	2.05
1962	1.74	1.141	1.99
1963	1.98	1.141	2.26
1964	2.20	1.141	2.51
1965	2.45	1.141	2.80
1966	2.50	1.141	2.85
1967	2.30	1.141	2.62
1968	2.00	1.141	2.28
1969	2.60	1.141	2.97
1970	2.88	1.141	3.29
1971	3.06	1.141	3.49
1971	3.22	1.084	3.49
1972	3.44	1.084	3.73
1973	3.83	1.084	4.15
1974	3.61	1.084	3.91
1975	4.14	1.084	4.49
1976	4.15	1.084	4.50
1977	4.75	1.084	5.15
1978	5.38	1.084	5.83
1979	6.03	1.084	6.54
1980	6.41	1.084	6.95
1981	6.40	1.084	6.94
1981	6.94	1.000	6.94
1982	7.40	1.000	7.40
1983	8.14	1.000	8.14
1984	9.22	1.000	9.22
1985	10.77	1.000	10.77
1986	12.03	1.000	12.03
1987	13.82	1.000	13.82
1988(e)	16.18	1.000	16.18
1989(e)	17.57	1.000	17.57

(a)-(c) See footnotes on first page of Table IX-7.
- Not available.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

ELECTRICITY

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.43	1.079	0.46
1953	0.51	1.079	0.55
1954	0.62	1.079	0.67
1955	0.70	1.079	0.76
1956	0.93	1.079	1.00
1957	1.09	1.079	1.18
1957	1.17	1.005	1.18
1958	1.60	1.005	1.61
1959	2.61	1.005	2.62
1960	3.78	1.005	3.80
1961	3.11	1.005	3.13
1962	3.00	1.005	3.02
1963	3.21	1.005	3.23
1964	3.63	1.005	3.65
1965	4.31	1.005	4.33
1966	5.30	1.005	5.33
1967	4.90	1.005	4.93
1968	4.70	1.005	4.72
1969	6.40	1.005	6.43
1970	7.45	1.005	7.49
1971	8.84	1.005	8.89
1971	8.85	1.004	8.89
1972	9.72	1.004	9.76
1973	10.61	1.004	10.65
1974	10.72	1.004	10.76
1975	12.47	1.004	12.52
1976	12.94	1.004	12.99
1977	14.14	1.004	14.20
1978	16.14	1.004	16.21
1979	17.67	1.004	17.74
1980	18.84	1.004	18.92
1981	19.41	1.004	19.49
1981	19.49	1.000	19.49
1982	20.71	1.000	20.71
1983	22.02	1.000	22.02
1984	23.56	1.000	23.56
1985	27.27	1.000	27.27
1986	29.22	1.000	29.22
1987	32.28	1.000	32.28
1988(e)	36.11	1.000	36.11
1989(e)	40.54	1.000	40.54

COAL AND COKE

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.91	1.872	1.70
1953	1.01	1.872	1.89
1954	1.22	1.872	2.28
1955	1.43	1.872	2.68
1956	1.67	1.872	3.13
1957	2.01	1.872	3.76
1957	2.31	1.629	3.76
1958	4.56	1.629	7.43
1959	6.31	1.629	10.28
1960	7.10	1.629	11.57
1961	4.88	1.629	7.95
1962	3.72	1.629	6.06
1963	3.70	1.629	6.03
1964	3.44	1.629	5.60
1965	3.79	1.629	6.17
1966	4.10	1.629	6.68
1967	3.00	1.629	4.89
1968	3.25	1.629	5.29
1969	4.05	1.629	6.60
1970	5.69	1.629	9.27
1971	6.54	1.629	10.65
1971	8.27	1.288	10.65
1972	8.56	1.288	11.03
1973	8.55	1.288	11.01
1974	8.25	1.288	10.63
1975	9.76	1.288	12.57
1976	9.82	1.288	12.65
1977	11.15	1.288	14.36
1978	12.67	1.288	16.32
1979	12.82	1.288	16.52
1980	12.40	1.288	15.97
1981	12.21	1.288	15.73
1981	15.73	1.000	15.73
1982	16.63	1.000	16.63
1983	17.83	1.000	17.83
1984	19.47	1.000	19.47
1985	20.85	1.000	20.85
1986	21.56	1.000	21.56
1987	22.48	1.000	22.48
1988(e)	24.90	1.000	24.90
1989(e)	28.38	1.000	28.38

(a)-(c) See footnotes on first page of Table IX-7.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

MACHINERY

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	3.90	0.531	2.07
1953	6.08	0.531	3.23
1954	7.19	0.531	3.82
1955	8.06	0.531	4.28
1956	12.52	0.531	6.65
1957	14.30	0.531	7.60
1957	11.90	0.639	7.60
1958	23.43	0.639	14.96
1959	36.07	0.639	23.04
1960	49.28	0.639	31.47
1961	23.70	0.639	15.14
1962	17.17	0.639	10.97
1963	18.98	0.639	12.12
1964	22.77	0.639	14.54
1965	31.02	0.639	19.81
1966	42.00	0.639	26.82
1967	31.20	0.639	19.93
1968	27.20	0.639	17.37
1969	43.30	0.639	27.65
1970	64.79	0.639	41.38
1971	83.42	0.639	53.28
1971	60.51	0.880	53.28
1972	63.85	0.880	56.22
1973	71.00	0.880	62.51
1974	74.35	0.880	65.46
1975	89.05	0.880	78.41
1976	89.77	0.880	79.04
1977	103.71	0.880	91.31
1978	115.55	0.880	101.74
1979	124.48	0.880	109.60
1980	127.36	0.880	112.14
1981	122.66	0.880	108.00
1981	108.00	1.000	108.00
1982	122.51	1.000	122.51
1983	144.05	1.000	144.05
1984	175.71	1.000	175.71
1985	223.51	1.000	223.51
1986	237.24	1.000	237.24
1987	288.71	1.000	288.71
1988(e)	371.01	1.000	371.01
1989(e)	401.34	1.000	401.34

BUILDING MATERIALS

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	1.03	0.893	0.92
1953	1.43	0.893	1.28
1954	1.57	0.893	1.40
1955	1.60	0.893	1.43
1956	2.25	0.893	2.01
1957	2.56	0.893	2.29
1957	2.27	1.008	2.29
1958	4.07	1.008	4.10
1959	6.85	1.008	6.90
1960	7.77	1.008	7.83
1961	3.09	1.008	3.11
1962	1.80	1.008	1.81
1963	2.31	1.008	2.33
1964	3.11	1.008	3.13
1965	3.96	1.008	3.99
1966	5.40	1.008	5.44
1967	4.30	1.008	4.33
1968	3.60	1.008	3.63
1969	5.10	1.008	5.14
1970	6.21	1.008	6.26
1971	7.15	1.008	7.20
1971	6.68	1.078	7.20
1972	7.76	1.078	8.37
1973	8.36	1.078	9.02
1974	8.32	1.078	8.97
1975	10.00	1.078	10.78
1976	10.98	1.078	11.84
1977	13.33	1.078	14.38
1978	15.39	1.078	16.60
1979	16.73	1.078	18.04
1980	18.15	1.078	19.57
1981	18.09	1.078	19.51
1981	19.51	1.000	19.51
1982	22.26	1.000	22.26
1983	24.54	1.000	24.54
1984	28.73	1.000	28.73
1985	35.06	1.000	35.06
1986	40.82	1.000	40.82
1987	45.96	1.000	45.96
1988(e)	54.78	1.000	54.78
1989(e)	59.46	1.000	59.46

(a)-(c) See footnotes on first page of Table IX-7.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

TEXTILES

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	9.43	0.987	9.31
1953	11.50	0.987	11.36
1954	12.67	0.987	12.51
1955	12.17	0.987	12.02
1956	14.70	0.987	14.51
1957	14.25	0.987	14.07
1957	14.36	0.980	14.07
1958	19.96	0.980	19.56
1959	25.29	0.980	24.78
1960	20.27	0.980	19.86
1961	13.62	0.980	13.35
1962	12.23	0.980	11.98
1963	13.69	0.980	13.41
1964	17.58	0.980	17.23
1965	22.07	0.980	21.63
1966	24.00	0.980	23.52
1967	21.90	0.980	21.46
1968	20.50	0.980	20.09
1969	26.30	0.980	25.77
1970	32.42	0.980	31.77
1971	31.29	0.980	30.66
1971	31.10	0.986	30.66
1972	31.36	0.986	30.92
1973	34.92	0.986	34.43
1974	34.60	0.986	34.11
1975	39.61	0.986	39.05
1976	39.41	0.986	38.85
1977	46.07	0.986	45.42
1978	52.91	0.986	52.16
1979	59.31	0.986	58.47
1980	73.55	0.986	72.51
1981	86.83	0.986	85.60
1981	85.60	1.000	85.60
1982	86.69	1.000	86.69
1983	95.60	1.000	95.60
1984	108.29	1.000	108.29
1985	127.32	1.000	127.32
1986	135.13	1.000	135.13
1987	151.29	1.000	151.29
1988(e)	174.30	1.000	174.30
1989(e)	187.83	1.000	187.83

CLOTHING

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	1.52	-	-
1953	2.13	-	-
1954	2.20	-	-
1955	2.20	-	-
1956	3.07	-	-
1957	3.05	-	-
1957	3.08	-	-
1958	3.66	-	-
1959	5.73	-	-
1960	3.49	-	-
1961	3.35	-	-
1962	32.10	-	-
1963	30.80	-	-
1964	34.10	-	-
1965	37.10	-	-
1966	-	-	-
1967	-	-	-
1968	-	-	-
1969	-	-	-
1970	-	-	-
1971	-	-	-
1971	-	0.960	0.00
1972	5.43	0.960	5.21
1973	6.00	0.960	5.76
1974	6.33	0.960	6.07
1975	7.29	0.960	7.00
1976	7.85	0.960	7.53
1977	8.88	0.960	8.52
1978	9.08	0.960	8.71
1979	10.10	0.960	9.69
1980	13.47	0.960	12.93
1981	15.34	0.960	14.72
1981	14.72	1.000	14.72
1982	14.19	1.000	14.19
1983	15.35	1.000	15.35
1984	17.87	1.000	17.87
1985	19.93	1.000	19.93
1986	20.93	1.000	20.93
1987	24.28	1.000	24.28
1988(e)	29.88	1.000	29.88
1989(e)	35.13	1.000	35.13

(a)-(e) See footnotes on first page of Table IX-7.
- Not available.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Table IX-7. Gross Output Value of Major Industrial Subsectors, 1952-1989 (continued)

EDUCATION, ENTERTAINMENT AND SPORTS EQUIPMENT

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	0.70	-	-
1953	1.07	-	-
1954	1.25	-	-
1955	1.40	-	-
1956	1.78	-	-
1957	1.74	-	-
1957	1.51	-	-
1958	2.01	-	-
1959	2.86	-	-
1960	3.47	-	-
1961	2.35	-	-
1962	2.04	-	-
1963	2.24	-	-
1964	2.41	-	-
1965	2.96	-	-
1966	-	-	-
1967	-	-	-
1968	-	-	-
1969	-	-	-
1970	-	-	-
1971	-	-	-
1971	-	1.002	0.00
1972	4.03	1.002	4.04
1973	4.86	1.002	4.87
1974	5.30	1.002	5.31
1975	6.07	1.002	6.08
1976	6.29	1.002	6.31
1977	7.12	1.002	7.14
1978	8.31	1.002	8.33
1979	9.65	1.002	9.67
1980	11.21	1.002	11.24
1981	12.15	1.002	12.18
1981	12.18	1.000	12.18
1982	12.94	1.000	12.94
1983	13.41	1.000	13.41
1984	15.19	1.000	15.19
1985	21.32	1.000	21.32
1986	22.72	1.000	22.72
1987	27.70	1.000	27.70
1988(e)	33.62	1.000	33.62
1989(e)	39.19	1.000	39.19

BALANCE (f)

Year	Billion Constant Yuan by Sub-period (b)	Bridging Indices for 1980 prices (c)	Billion Constant 1980 Yuan
1952	-	-	-
1953	-	-	-
1954	-	-	-
1955	-	-	-
1956	-	-	-
1957	1.94	-	-
1957	1.85	-	-
1958	-	-	-
1959	3.20	-	-
1960	-	-	-
1961	-	-	-
1962	3.18	-	-
1963	-	-	-
1964	-	-	-
1965	5.25	-	-
1966	-	-	-
1967	-	-	-
1968	-	-	-
1969	-	-	-
1970	-	-	-
1971	-	-	-
1971	-	1.001	0.00
1972	12.44	1.001	12.45
1973	12.57	1.001	12.58
1974	11.66	1.001	11.67
1975	13.05	1.001	13.06
1976	14.19	1.001	14.20
1977	15.89	1.001	15.90
1978	16.63	1.001	16.64
1979	15.98	1.001	15.99
1980	16.81	1.001	16.82
1981	17.22	1.001	17.23
1981	17.23	1.000	17.23
1982	18.87	1.000	18.87
1983	21.27	1.000	21.27
1984	25.08	1.000	25.08
1985	30.95	1.000	30.95
1986	32.27	1.000	32.27
1987	35.83	1.000	35.83
1988(e)	46.07	1.000	46.07
1989(e)	50.00	1.000	50.00

(a)-(e) See footnotes on first page of Table IX-7.
(f) Difference between total for industry and subtotal for industrial subsectors presented in this table.
- Not available.

Source: Statistical Yearbook of China's Industrial Economy, 1988 & 1990 (in Chinese; SSB, Beijing); China Statistical Yearbook, 1990 (SSB, Beijing).

Figure IX-5. Gross Output Value, Industrial Subsectors 1972-1989

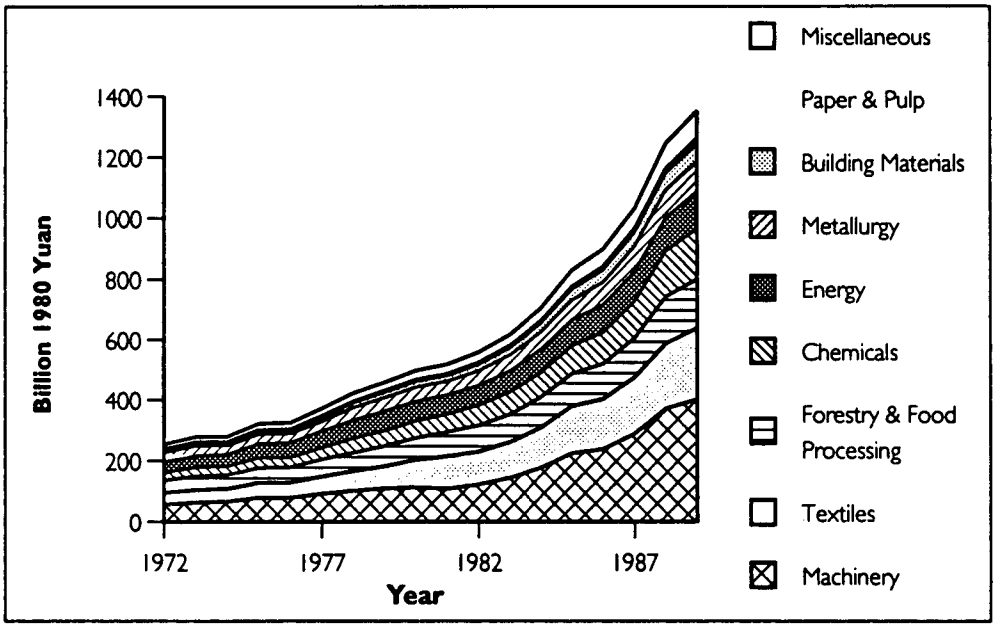
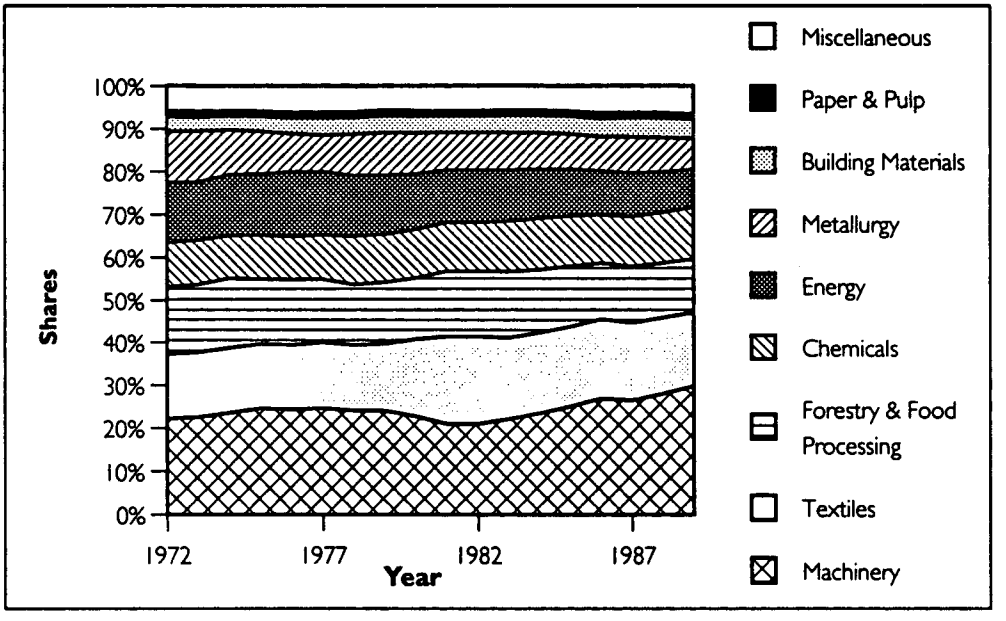


Figure IX-6. Shares of Gross Output Value, Industrial Subsectors 1972-1989



Gross Output Value by Industrial Subsector, 1971-1987

(This table shows the relationship between the industrial subsector categories in Table IX-7 and the subsector categories in Figures IX-5 and IX-6.)

sector categories in: **Table IX-7**	**Figures IX-5 and IX-6**
Education, Entertainment and Sports Equipment Balance	Miscellaneous
Paper & Pulp Stationary	Paper & Pulp
Building Materials	Building Materials
Metallurgy	Metallurgy
Electricity Coal & Coke Petroleum	Energy
Chemicals	Chemicals
Forestry Food Processing	Forestry & Food Processing
Textiles Clothing Leather	Textiles
Machinery	Machinery

Table IX-8. National Income, 1952-1990

1. National Income, Billion Current Yuan

Year	Total	Agri-culture	Industry	Con-struction	Trans-portation	Commerce
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	1,442.9	500.0	661.0	82.2	70.5	129.2

Source: Statistical Yearbook of China, various years (SSB, Beijing).

Table IX-8. National Income, 1952-1990 (continued)

2. National Income Constant Price Index, 1952 = 100 (a)

Year	Total	Agri-culture	Industry	Con-struction	Trans-portation	Commerce
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	1,191.6	309.9	5,330.5	1,724.3	1,603.6	684.0

(a) These can be thought of as percentages; e.g. at constant prices, total national income in 1988 was 1,097.2% of total national income in 1952.

Source: Statistical Yearbook of China, various years (SSB, Beijing).

Table IX-8. National Income, 1952-1990 (continued)

3. National Income Billion Constant 1980 Yuan (a)

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	851.5	244.0	477.8	42.1	34.6	53.0

(a) National income in constant yuan = base year national income in current yuan *(index for current year ÷ index for base year).
(b) Sum of real sectoral national incomes, not calculated from indices.

Source: Statistical Yearbook of China, various years (SSB, Beijing).

Figure IX-7, National Income, 1952-1989

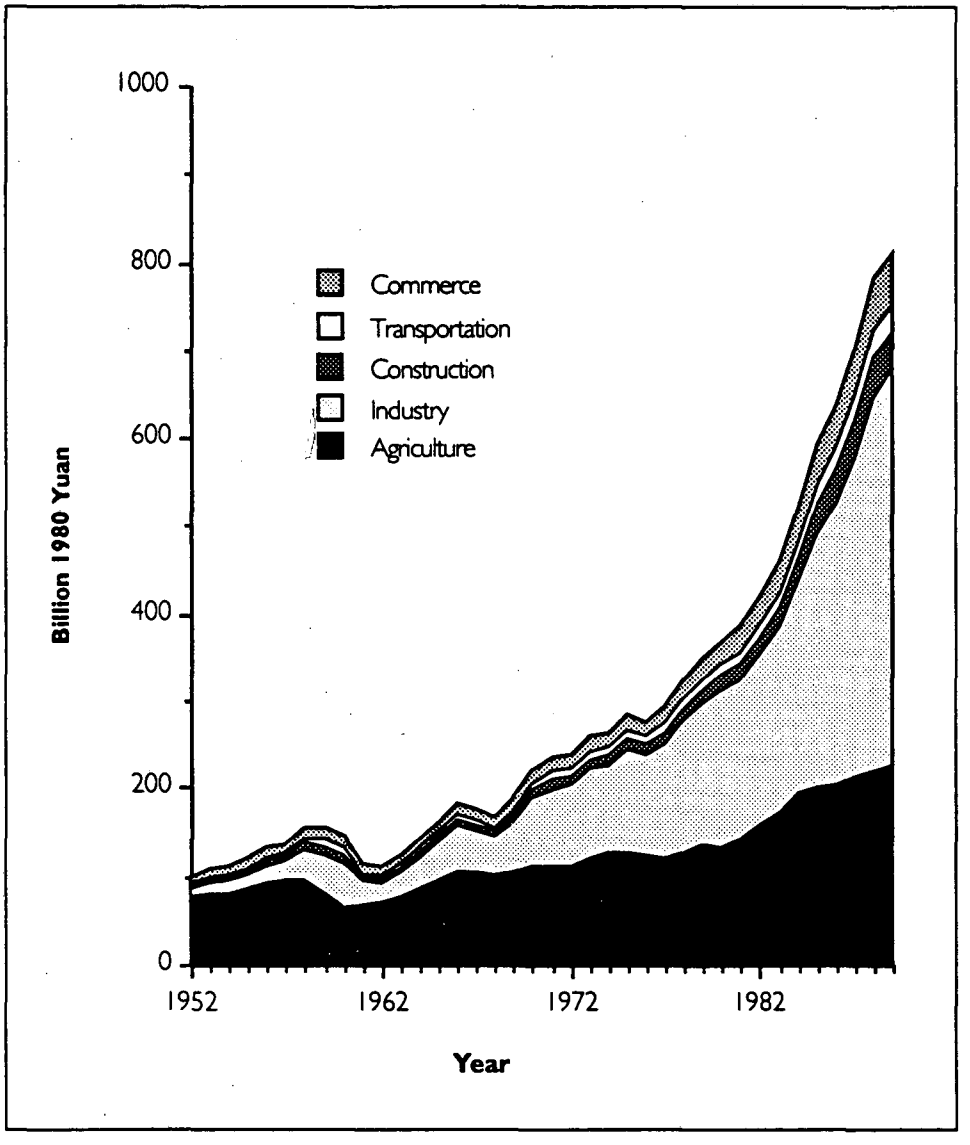


Table IX-8. National Income, 1952-1990 (continued)

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%	28.7%	56.1%	4.9%	4.1%	6.2%

Source: Statistical Yearbook of China, various years (SSB, Beijing).

Figure IX-8. Sectoral Shares of National Income, 1952-1989

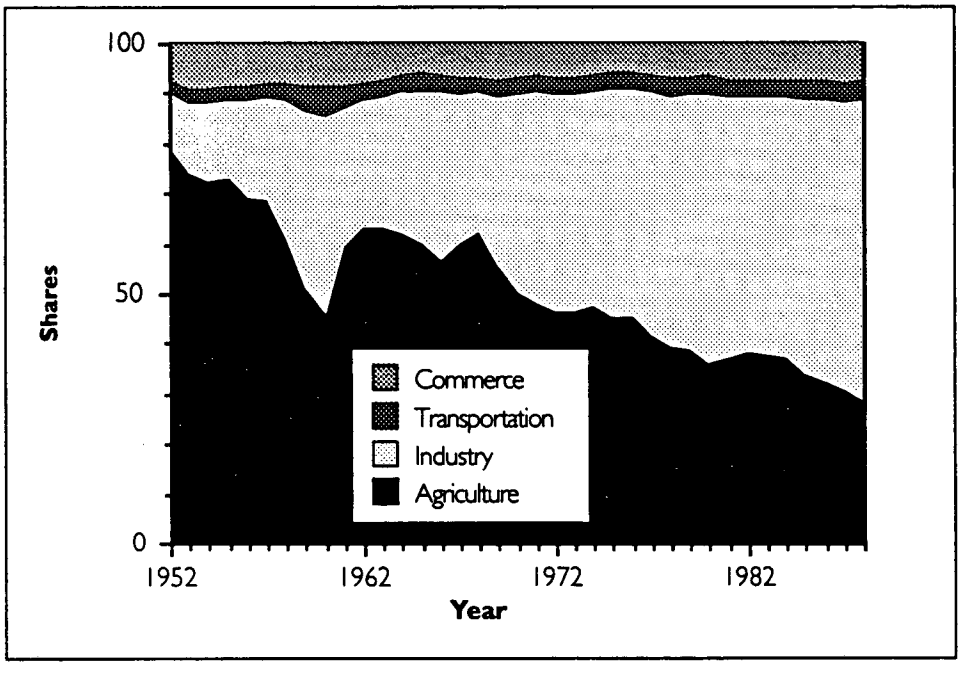


Table IX-8. National Income, 1952-1990 (continued)

5. Real Growth Rates by Sector of National Income, Percent, 1953-1990

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	4.8%	7.5%	5.5%	0.0%	3.0%	-6.9%

Source: Statistical Yearbook of China, various years (SSB, Beijing)

Table IX-8. National Income, 1952-1990 (continued)

6. National Income Implicit Deflators to Constant 1980 Yuan (a)

Year	Total	Agri-culture	Industry	Con-struction	Trans-portation	Commerce
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	169.5	204.9	138.3	195.2	203.8	243.8

(a) Used in converting investment figures to constant yuan (see Chapter III).

Source: Statistical Yearbook of China, various years (SSB, Beijing)

Table IX-9. National Income by Sector and Province, 1989—Billion Current Yuan

Planning Region	Province	Sectoral National Income					Total National Income	Per Capita National Income (current yuan)	Rank
		Agriculture	Industry	Construction	Trans-portation	Commerce			
North	Beijing	3.8	20.5	3.8	1.2	4.5	33.68	3,015	2
	Tianjin	2.8	15.1	1.4	1.6	2.5	23.44	2,738	3
	Hebei	19.5	33.7	3.5	2.4	4.1	63.14	1,074	15
	Shanxi	6.7	15.4	1.9	1.2	2.7	27.90	999	17
	Inner Mongolia	8.7	7.7	1.5	1.2	2.0	21.05	992	18
Northeast	Liaoning	14.0	48.1	4.8	3.6	6.8	77.10	1,989	4
	Jilin	8.1	16.2	1.6	1.2	3.2	30.48	1,268	9
	Heilongjiang	9.5	30.2	4.8	2.5	3.6	50.50	1,439	8
East	Shanghai	3.1	42.0	3.2	3.2	7.2	58.68	4,599	1
	Jiangsu	31.1	57.4	5.3	4.2	7.7	105.71	1,617	7
	Zhejiang	20.6	34.9	4.0	2.4	7.9	69.84	1,660	6
	Anhui	21.9	20.0	2.1	1.5	4.2	49.74	910	20
	Fujian	13.7	14.8	2.2	1.7	3.5	35.98	1,243	11
	Jiangxi	13.3	11.5	1.8	1.4	2.8	30.87	835	24
	Shandong	35.6	51.9	6.1	2.8	6.6	103.04	1,263	10
South-Central	Henan	28.4	27.7	3.6	2.8	6.3	68.79	836	
	Hubei	23.7	27.9	2.2	1.8	4.7	60.35	1,147	13
	Hunan	23.0	20.8	2.6	1.9	5.8	54.03	899	21
	Guangdong	34.8	43.8	7.6	4.1	13.3	103.49	1,718	5
	Guangxi	14.6	9.9	1.4	0.8	3.3	30.03	723	
	Hainan	4.4	1.2	0.7	0.3	0.8	7.23	1,131	14
Southwest	Sichuan	34.4	34.1	5.8	2.5	9.9	86.58	809	25
	Guizhou	8.9	7.5	1.0	0.9	1.5	19.84	626	28
	Yunnan	11.4	12.4	1.3	0.5	2.5	28.12	771	27
	Tibet	1.1	0.1	0.2	0.1	0.2	1.68	778	26
Northwest	Shaanxi	9.2	12.8	2.1	1.8	1.6	27.40	859	22
	Gansu	5.2	7.8	1.3	1.2	3.1	18.59	856	23
	Qinghai	1.5	1.9	0.5	0.1	0.6	4.61	1,049	16
	Ningxia	1.5	1.9	0.3	0.2	0.4	4.42	971	19
	Xinjiang	7.9	5.7	1.3	0.7	2.3	17.92	1,232	12
National Total		420.9	624.1	77.4	54.7	140.5	1,317.60	1,185	(12-13)
Balance (a)		-1.5	-10.7	-2.4	3.0	15.0	3.39		

(a) The 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, 1991 (SSB, Beijing).

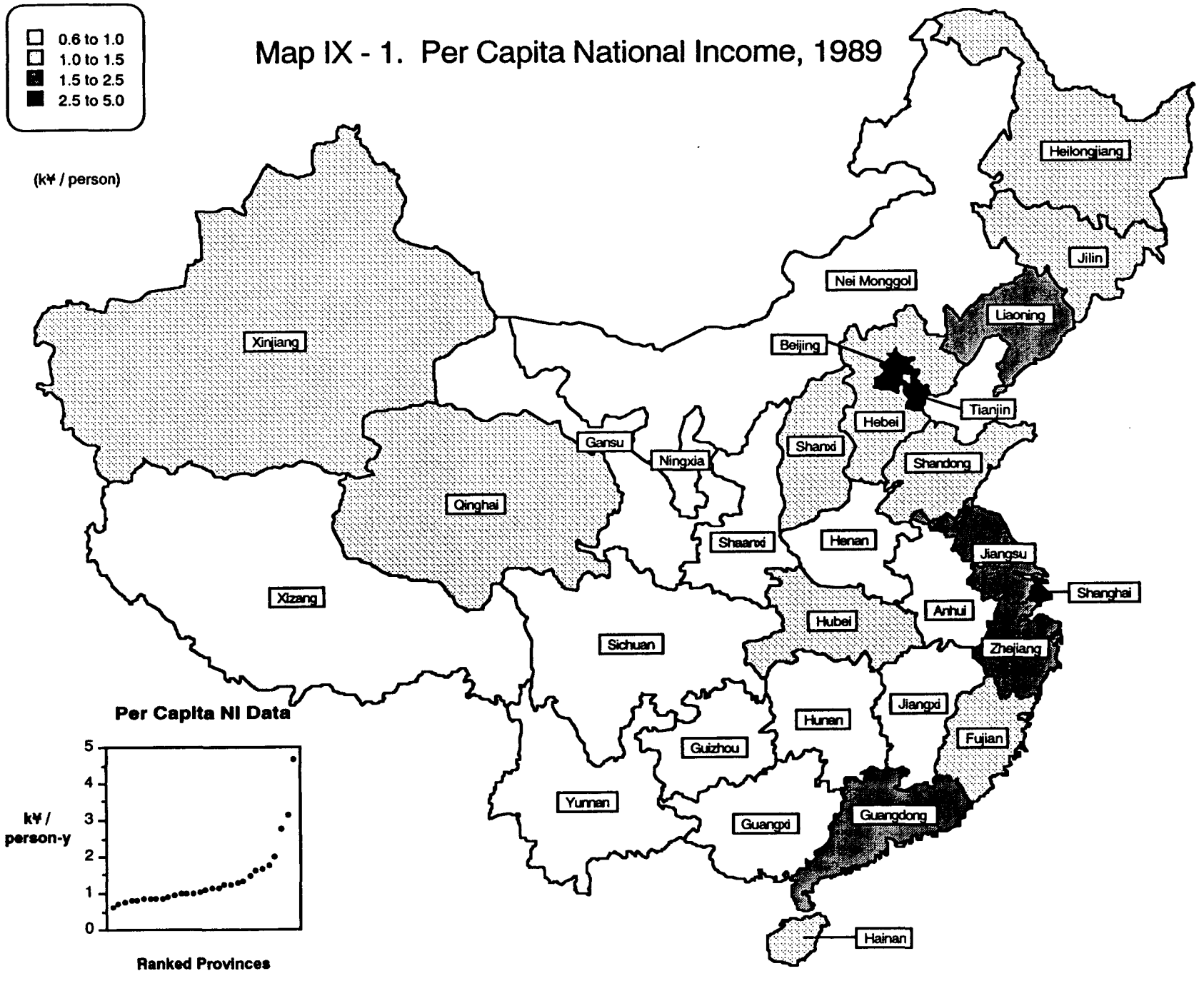

Map IX - 1. Per Capita National Income, 1989
0.6 to 1.0
1.0 to 1.5
1.5 to 2.5
2.5 to 5.0
(k¥ / person)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Beijing
Xinjiang
Tianjin
Hebei
Gansu
Shanxi
Ningxia
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangdong
Guangxi
Hainan
Per Capita NI Data
k¥ / person-y
5
4
3
2
1
0
Ranked Provinces

Table IX-10. Population in China, 1950-1990—Millions (a)

Year	Total Population	Type I Categories (a)		Type II Categories (a,b)	
		City & Town	Rural	Non-Agricultural	Agricultural
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	(c)	(c)

(a) 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), which are supposed to be comparable with the urban and rural categories in the West. A change in the definition of urban areas in 1984 increased the reported urban population, though the 1991 Statistical Yearbook of China has mostly corrected for this. Another type of division cuts the population into non-agricultural and agricultural categories (Type II). We consider the Type I division to reflect more closely the division of population between urban and rural areas.
(b) The sum of these two categories as reported is not always equal to the total population.
(c) Not available.

Source: Almanac of China's Population, 1990 (Population Research Institute, Beijing); Statistical Yearbook of China, 1990 & 1991 (SSB, Beijing).

Figure IX-9. Population, 1950-1988

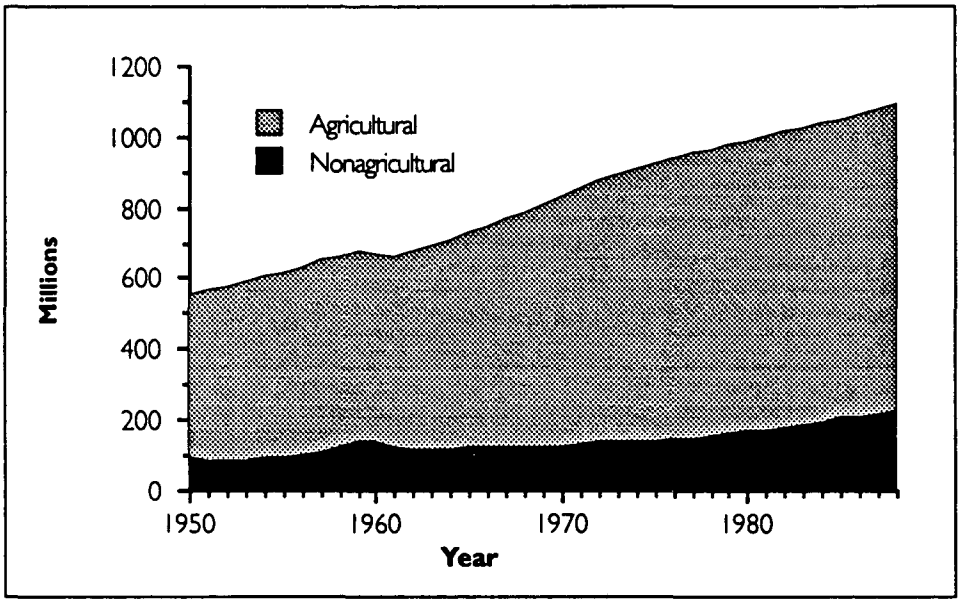


Figure IX-10. Nonagricultural Fraction of Total Population 1950-1988

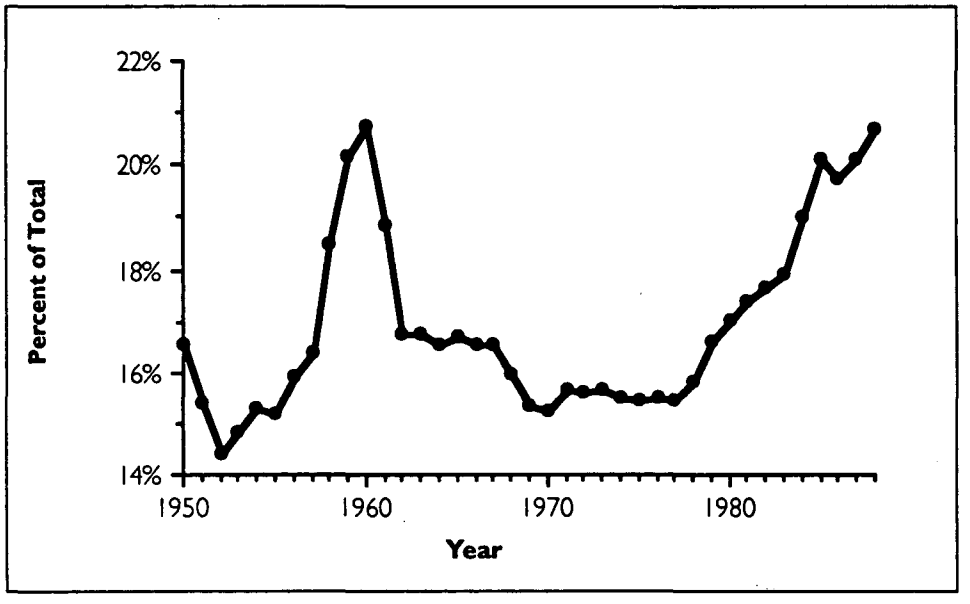


Table IX-11. Population and Area by Province, 1988 and 1989

Planning Region	Province	1988 Population (Millions)	1989 Population (Millions)	Provincial Area ('000 sq km)	1989 Population Density (persons/sq km)
North	Beijing	10.81	10.37	16.8	617
	Tianjin	8.43	8.56	11.3	758
	Hebei	57.95	58.81	188.0	313
	Shanxi	27.55	27.93	156.1	179
	Inner Mongolia	20.94	21.22	1,200.0	18
Northeast	Liaoning	38.20	38.76	145.8	266
	Jilin	23.73	24.03	138.0	174
	Heilongjiang	34.66	35.10	473.4	74
East	Shanghai	12.62	12.76	6.2	2,058
	Jiangsu	64.38	65.36	102.6	637
	Zhejiang	41.70	42.08	101.8	413
	Anhui	53.77	54.69	139.5	392
	Fujian	28.45	28.96	121.5	238
	Jiangxi	36.09	36.95	166.8	222
	Shandong	80.61	81.60	153.1	533
South-Central	Henan	80.94	82.31	166.9	493
	Hubei	51.85	52.59	187.5	280
	Hunan	58.90	60.09	210.1	286
	Guangdong	59.28	60.25	178.0	338
	Guangxi	40.88	41.51	230.5	180
	Hainan	6.28	6.39	34.0	188
Southwest	Sichuan	105.76	107.06	566.6	189
	Guizhou	31.27	31.69	176.3	180
	Yunnan	35.94	36.48	392.2	93
	Tibet	2.12	2.16	1,182.7	2
Northwest	Shaanxi	31.35	31.91	205.0	156
	Gansu	21.36	21.72	455.0	48
	Qinghai	4.34	4.40	779.1	6
	Ningxia	4.41	4.55	66.0	69
	Xinjiang	14.26	14.54	1,635.2	9
National Total / Average		1,096.14	1,111.91	9,586.0	116
Balance (a)		7.32	7.08		

(a) 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 1990 (SSB, Beijing).

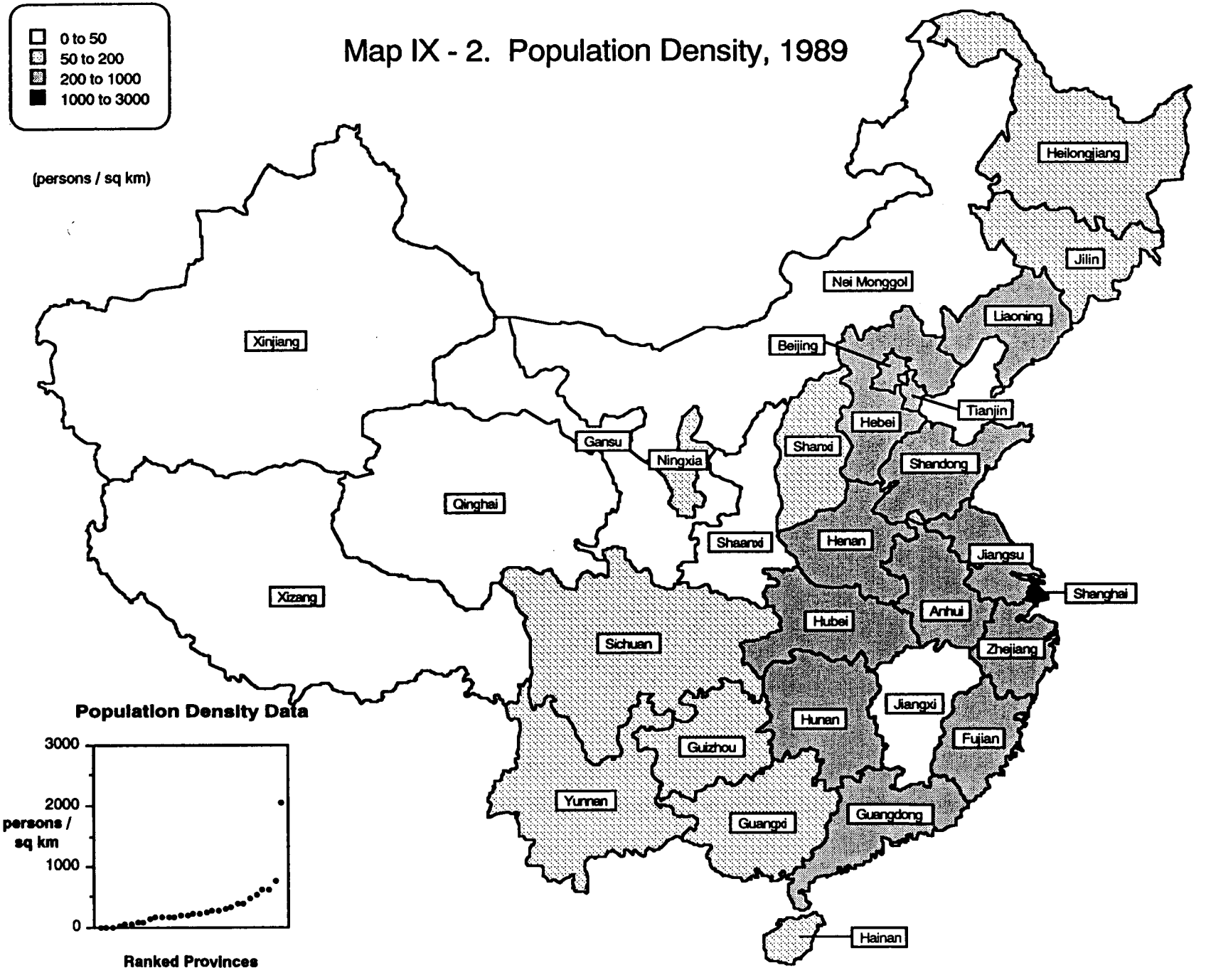

Map IX - 2. Population Density, 1989
0 to 50
50 to 200
200 to 1000
1000 to 3000
(persons / sq km)
Heilongjiang
Jilin
Nei Monggol
Liaoning
Xinjiang
Beijing
Tianjin
Hebei
Gansu
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Xizang
Anhui
Hubei
Sichuan
Zhejiang
Jiangxi
Hunan
Fujian
Guizhou
Yunnan
Guangxi
Guangdong
Hainan
Population Density Data
3000
2000
persons / sq km
1000
0
Ranked Provinces

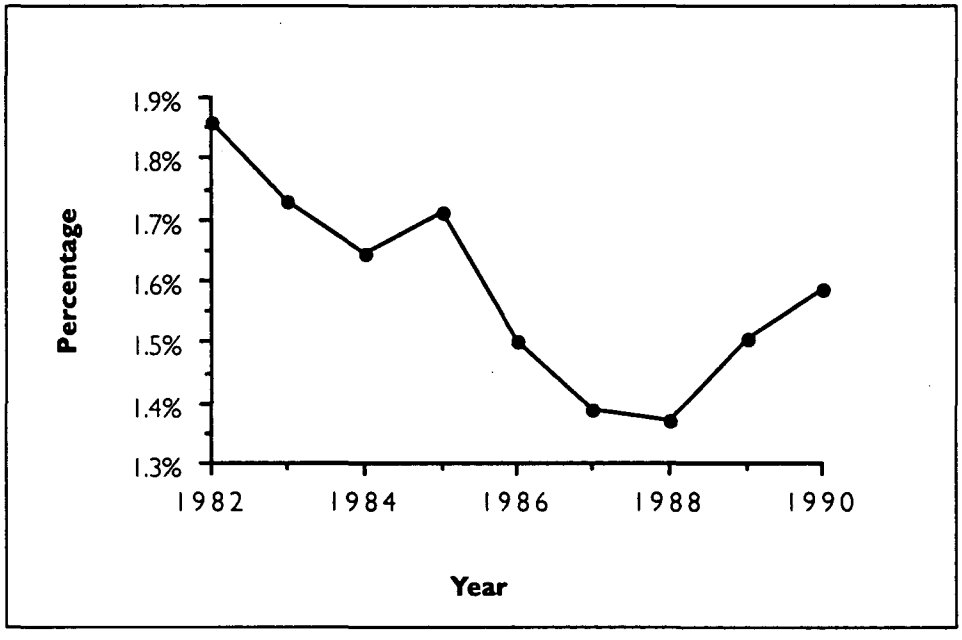
Table X-12. Socioeconomic Indicators of Urban Households (a)

Item	Unit	1982	1983	1984	1985	1986	1987	1988	1989	1990
Sample Size	households	-	9,060	12,500	24,338	31,126	32,855	34,945	35,235	35,660
Average Household Size	person	-	4.06	4.04	3.89	3.82	3.74	3.63	3.55	3.50
Average Number of Employed Persons per Household	person	-	2.38	2.36	2.15	2.12	2.09	2.03	2.00	1.98
Percentage of Household Members Employed	percent	-	58.6%	58.4%	55.3%	55.5%	55.9%	56.0%	56.3%	56.6%
Number of Persons Supported per Employed Member	person	-	1.71	1.71	1.81	1.80	1.79	1.79	1.78	1.77
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
of which										
Available Income (b)	yuan	-	525.96	607.56	685.32	827.88	915.96	1,119.36	1,260.67	1,387.27
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
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
Food	yuan	276.24	299.52	324.24	351.72	418.92	472.93	567.01	659.96	693.72
Clothing	yuan	67.68	73.56	86.88	98.04	113.04	121.09	153.21	149.15	170.88
Items for Daily Use	yuan	43.44	45.72	50.64	71.88	88.92	100.57	148.62	133.97	129.12
Items for Recreation	yuan	21.72	20.76	24.60	51.96	54.48	49.58	66.68	70.05	68.04
Books, Newspapers & Magazines	yuan	4.20	4.92	5.88	6.12	6.96	7.48	8.26	10.59	11.04
Medicine and Medical Items	yuan	2.88	3.12	3.36	6.24	7.56	8.87	12.59	15.98	19.44
Fuels	yuan	8.76	8.76	9.21	11.52	12.00	12.27	15.12	18.23	20.31
Other Expenditures:	yuan	38.88	41.88	45.12	51.72	64.32	75.13	90.04	111.06	127.44
Rent	yuan	7.08	7.68	7.80	6.48	7.20	7.74	7.83	8.82	9.36
Water & Electricity	yuan	5.04	5.76	6.24	6.84	8.88	10.32	12.32	16.20	19.80
Tuition	yuan	2.76	3.24	4.44	7.68	8.76	11.28	18.71	25.24	28.33
Child Care	yuan	2.76	2.40	2.52	3.36	3.72	3.70	4.58	5.19	5.28
Urban Transportation	yuan	6.60	6.96	7.56	6.72	8.40	9.10	9.12	10.16	13.52
Post & Telecommunications	yuan	0.60	0.60	0.72	0.60	0.72	0.82	0.97	1.26	1.79
Cultural Events & Recreation	yuan	2.40	2.28	2.16	2.28	2.71	3.01	3.28	3.62	4.68

(a) 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.
(b) Available income refers to total family income excluding support to family members living in other households, donations, and food expenditures by non-family members living in the houshold.
– Not available.

Source: Yearbook of China's Economy, 1990 (China Economic Management Press, Beijing); China Statistical Yearbook, various years (SSB, Beijing).

Figure X-11. Urban Household Expenditures on Fuels as a Percentage of Total Expenditures, 1982-1990



Appendix 1.
Sectoral Divisions in Official Chinese Statistics

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 databook 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

CSY
China Statistical Yearbook

DOE
U.S. Department of Energy

EAP
Energy Analysis Program; belongs to the Applied Sciences Division of LBL.

ERI
Energy Research Institute of the Chinese State Planning Commission

ESYC
Energy Statistical Yearbook of China

IEA
International Energy Agency

IES
International Energy Studies Group, LBL

LBL
Lawrence Berkeley Laboratory

MOE
Chinese Ministry of Energy, formed in 1988 through the merger of the Ministries of Coal, Petroleum, and Water Resources and Electric Power

SSB
State Statistical Bureau of China

WB
World Bank

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