



iGDP



China Energy Data 2019

Authored by
Wang Qingyi

Edited by
innovative Green Development Program

April 2020

Disclaimer: Data has been assembled with care and to the best of the author's knowledge. The author reserves the right not to be responsible for the topicality, correctness, completeness, or quality of the information provided. This report is funded by Energy Foundation China. Readers are advised that opinions and data contained herein do not represent an official position of Energy Foundation China.

Wang Qingyi is a researcher at the China Coal Information Institute. A leading energy expert in China, Wang is co-founder of the China Energy Research Association, a part-time researcher at the National Science and Technology Research Center, an adjunct professor at the China University of Mining and Technology, and an expert consultant to the Asian Development Bank and Energy Foundation China. He has undertaken over thirty national energy policy research projects. In 1987, his "National Energy Policy Research" project won the first prize in China's National Science and Technology Progress Award ceremony. He is the author of "China Energy", "Energy Dictionary", and the annual "Energy Data" (2002-present) reference book, and has published more than 200 articles in China and abroad.

Innovation Green Development Program (iGDP) is a non-governmental Chinese think tank that focuses on green and low-carbon development. It works to strengthen China's low-carbon environmental policy design and implementation through interdisciplinary, systematic, and empirical policy research. Initiated by Energy Foundation China, iGDP is the secretariat of China's Green and Low-Carbon Development Think Tank Partnership, sits on China's Green Finance Association Experts Committee, and is a member of the North-East Asian Subregional Programme for Environmental Cooperation's Low Carbon City Platform.

Innovative Green Development Program's research, consulting, and communications focus on the following areas:

- Macro-Level Climate Policy
- Urban Green and Low-Carbon Transformation
- Green Economic Policy
- Behavioral Change

Energy Foundation China (EFC), established in Beijing in 1999, is a grantmaking charity organization dedicated to China's sustainable energy development. It is registered under the Beijing Municipal Public Security Bureau and supervised by the National Development and Reform Commission of China. EFC's mission is to achieve decarbonization, world-class air quality, and green growth through dramatically expanding renewable energy, significantly improving energy efficiency, and optimizing economic structure.

Introduction

Energy Data 2019 was authored by Mr. Wang Qingyi, one of China's leading energy experts, with financial support from Energy Foundation China and research and editing assistance from innovative Green Development Program (iGDP). The Energy Data publication series (annual editions from 2014 to the present year) collates and organizes data published by China's official statistics bureaus and industry associations, as well as authoritative international energy agencies, across key sectors. The goal is to facilitate access by researchers and policymakers to comprehensive, multi-dimensional, and long time-scale energy data that accurately captures China's energy profile. The English version of the 2019 Energy Data report contains 40 data energy indicator tables covering China's energy economy, energy production and consumption, energy efficiency and technology, energy prices, and energy-related pollutant emissions and carbon emissions.

Abbreviations

BERC	Building Energy Conservation Research Center of Tsinghua University
CAREI	China Association of Rural Energy Industry
CBMF	China Building Materials Industry Association
CCIA	China Coal Industry Association
CEC	China Electricity Council
CERS	China Energy Research Society
CISA	China Iron and Steel Industry Association
CNPC	China National Petroleum Corporation
CPCIF	China Petroleum and Chemical Industry Federation
CPEA	China Petroleum Enterprise Association
CSES	China Solar Energy Society
CWEA	China Wind Energy Association
GACC	General Administration of Customs
IEA	International Energy Agency
IEEJ	Institute of Energy Economics, Japan
IMF	International Monetary Fund
MEE	Ministry of Ecology and Environment
MIIT	Ministry of Industry and Information Technology
MNR	Ministry of Natural Resources and Forestry
MOA	Ministry of Agriculture and Rural Affairs
MOT	Ministry of Transport
MOHURD	Ministry of Housing and Urban-Rural Development
MWR	Ministry of Water Resources
NBS	National Bureau of Statistics
NDRC	National Development and Reform Commission
NEA	National Energy Administration
OICA	International Organization of Motor Vehicle Manufacturers
PBS	Provincial Bureau of Statistics
SERC	State Electricity Regulatory Commission
WB	World Bank
WSA	World Steel Association

Table of Contents

Table of Contents.....	1
TABLE 1 KEY ENERGY AND ECONOMIC INDICATORS.....	1
TABLE 2 INTERNATIONAL COMPARISONS OF KEY ENERGY AND ECONOMIC INDICATORS PER CAPITA (2018).....	2
TABLE 3 ECONOMIC AND ENERGY CONSUMPTION DISPARITY BETWEEN REGIONS, URBAN AND RURAL AREAS, AND THE RICH AND POOR	3
TABLE 4 INTERNATIONAL COMPARISON OF LIVING STANDARDS OF CHINA'S MOST AFFLUENT CITIES (2018).....	4
TABLE 5 URBAN AND RURAL LIVING STANDARDS AND ENERGY CCONSUMPTION.....	5
TABLE 6 STATUS OF ELECTRIFICATION AND POVERTY IN RURAL CHINA.....	6
TABLE 7 COAL, OIL, AND NATURAL GAS RESOURCES AND RESERVES.....	6
TABLE 8 ENERGY PRODUCTION BY SOURCE.....	7
TABLE 9 TOP 10 OIL FIELDS FOR CRUDE OIL PRODUCTION	8
TABLE 10 CRUDE OIL REFINING VOLUME AND MAIN PRODUCTS OUTPUT	8
TABLE 11 TOP 10 LARGEST COAL COMPANIES	9
TABLE 12 INSTALLED ELECTRICITY CAPACITY AND ELECTRICITY GENERATION.....	9
TABLE 13 TOP 5 BIGGESTPOWER GENERATION GROUPS (2018).....	10
TABLE 14 KEY INDICATORS FOR THE POWER INDUSTRY.....	10
TABLE 15 DEVELOPMENT AND UTILIZATION AMOUNT OF RENEWABLE ENERGY.....	11
TABLE 16 RENEWABLE ENERGY USE IN CONSTRUCTION.....	12
TABLE 17 PRIMARY ENERGY CONSUMPTION AND STRUCTURE.....	13
TABLE 18 FINAL ENERGY CONSUMPTION AND STRUCTURE BY SECTOR.....	14
TABLE 19 OIL PRODUCTS CONSUMPTION BY SOURCE.....	14
TABLE 20 NATURAL GAS CONSUMPTION AND STRUCTURE.....	15
TABLE 21 ELECTRICITY CONSUMPTION PPER CAPITA.....	15
TABLE 22 ENERGY CONSUMPTION OF THE MANUFACTURING INDUSTRY (2018).....	16
TABLE 23 ENERGY CONSUMPTION OF TRANSPORT.....	17
TABLE 24 AGRICULTURAL AND RURAL ENERGY INDICATORS.....	17
TABLE 25 ELECTRICITY CONSUMPTION OF HOUSEHOLD ELECTRIC APPLIANCES (2018).....	18
TABLE 26 ENERGY SAVING (2018).....	18
TABLE 27 ENERGY SAVING IN THE MANUFACTURING INDUSTRY (2018).....	19
TABLE 28 ENERGY SAVING IN TRANSPORTATION (2018).....	20
TABLE 29 ENERGY SAVING IN CONSTRUCTION (2018).....	20
TABLE 30 PHYSICAL ENERGY EFFICIENCY.....	21
TABLE 31 ENERGY CONSUMPTION OF ENERGY INTENSIVE PRODUCTS.....	21
TABLE 32 INDUSTRIAL SECTOR CAPACITY ELIMINATION.....	23
TABLE 33 ENERGY IMPORT AND EXPORT.....	24
TABLE 34 ENERGY PRICES.....	24
TABLE 35 R&D EXPENDITURE FOR COMPANIES IN THE ENERGY AND ENERGY-INTENSIVE INDUSTRY.....	25
TABLE 36 CLEAN COAL TECHNOLOGY AND COAL CHEMICAL INDUSTRY (2018).....	26
TABLE 37 PROGRESS OF ENERGY-SAVING TECHNOLOGY IN ENERGY-INTENSIVE INDUSTRIES.....	27
TABLE 38 COMPARISON OF MAIN INDICATORS OF COAL INDUSTRY BETWEEN CHINA AND THE US (2018).....	28
TABLE 39 EMISSIONS OF MAJOR POLLUTANTS.....	29
TABLE 40 CO2 EMISSIONS IN CHINA AND THE WORLD.....	30

Table 1 **Key Energy and Economic Indicators**

	1949	1978	2000	2010	2015	2016	2017	2018
<i>Population (10,000)</i>	54167	96529	126743	133920	137462	138271	139008	139538
<i>Proportion of city and town population (%)</i>	10.6	17.9	36.2	49.7	56.1	57.4	58.5	59.6
<i>GDP growth rate (%)</i>		11.7	8.4	10.6	6.9	6.7	6.9	6.6
<i>GDP (100 million Chinese yuan)</i>	466	3650	99215	413030	689052	744127	827122	900309
<i>Economic structure</i>								
<i>Primary industry (%)</i>	68	27.9	15.1	10.1	9	8.6	7.9	7.2
<i>Secondary industry (%)</i>	13	47.9	45.9	46.7	40.5	39.8	40.5	40.6
<i>Tertiary industry (%)</i>	19	24.2	39	43.2	50.5	51.6	51.6	52.2
<i>GDP per capita (USD)</i>	23	149	949	4556	8007 s	8127	8836	9750
<i>Primary energy consumption (Mtce)</i>	26	571.4	1469.6	3606.5	4299.1	4358.2	4490	4640
<i>Crude oil import dependency/%</i>		-12.4	26.4	54.5	60.7	65.5	68.6	70.9
<i>Urban resident disposable income per capita (Chinese yuan)</i>	100	343	6280	19109	31195	33616	36396	39251
<i>Rural resident net income per capita (Chinese yuan)</i>	44	134	2253	5919	11422	12363	13432	14617
<i>Civil vehicle ownership (10,000 vehicle)</i>	5.1	135.8	1608.9	7801.8	16284.5	18574.5	20906.7	24028
<i>Energy consumption per capita (kgce)</i>	48	594	1160	2693	3128	3152	3230	3325
<i>Electricity per capita (kWh)</i>	8	218	1063	2752	4142	4312	4538	4905
<i>Electricity production (TWh)</i>	41.3	256.6	1355.6	4207.1	5814.6	6133.2	6495.1	7111.8
<i>Steel output (Mt)</i>	0.16	31.8	128.5	637.2	803.8	808.4	831.7	928
<i>Cement output (Mt)</i>	0.66	65.2	597	1881.9	2359	2414	2340	2208
<i>Total amount of export goods (USD 100 million)</i>	5.5	97.5	2492	15777.5	22739.7	20976.3	22635.2	24809.9
<i>Total amount of import goods (USD 100 million)</i>	5.8	108.9	2250.9	3962.4	16795.6	15879.3	18409.8	21288.4
<i>SO₂ emissions (Mt)</i>			19.95	21.85	18.59	17.55	16.15	15.07
<i>Chinese yuan/USD exchange rate</i>		1.5300	8.2785	6.7695	6.2284	6.6423	6.7518	6.6174

Notes: 1. GDP is calculated at current prices and the growth rate is calculated at constant prices. 2018's GDP at constant prices was 11814600 million Chinese yuan.

2. The urbanization rate of household registered population in 2018 was 46.3%.

3. In 2018, nationwide per capita income at constant price increased 59.2 times compared to that of 1949.

4. Energy industry investment in fixed assets includes coal mining and washing industries, petroleum and natural gas extraction, petroleum processing and coking industries, electric power, hot water production and supply, gas production and supply industries. In 1990, they refer to state-owned industries. Between 2000 and 2018, they refer to urban fixed-assets investment.

Sources: NBS; GACC; CEC; MEE.

Table 2 International Comparisons of Key Energy and Economic Indicators Per Capita (2018)

	China	US	EU	Japan	Russia	India	World
Population (millions)	1395.4	327.2	513.6	126.2	146.2	1339	7578
GDP per capita (USD)	9750	62518	36605	40106	10950	2016	11196
Fossil fuel recoverable reserves per capita							
Coal (t)	259	765	148	3	1079	76	168
Oil (t)	2.51	25.37	1.17	0.05	99.86	0.21	32.21
Natural gas (m ³)	4372	36369	1974	164	266074	971	25983
Primary energy consumption per capita (kgce)	3325	10045	4696	5140	7042	863	2614
Electricity production per capita (kWh)	5097	13633	6391	8333	7598	1166	3512
Steel output per capita (kg)	665	265	327	826	490	80	239
Vehicle ownership per thousand people	172	797	657	591	389	56	177
CO ₂ emissions per capita (t)	6.39	15.33	6.7	9.11	10.56	1.85	4.46

Note: 1. China's fossil fuel recoverable reserves data are from the Ministry of Natural Resources.

Sources: NBS; IEA; WB; IMF; BP Statistical Review of World Energy, June 2018; IEEJ, Handbook of Energy and Economic Statistics in Japan, 2016 version; WSA; OICA.

Table 3 Economic and Energy Consumption Disparity between Regions, Urban and Rural Areas, and the Rich and Poor

Economy	
GDP per capita (USD) (2018)	National average: 9750 Max: Beijing 211105 Min: Gansu 4735
Urban residents disposable income per capita/Chinese yuan (2018)	National average: 39251 Max: Shanghai 68034 Min: Gansu 29957
Rural residents disposable income per capita/Chinese yuan (2018)	National average: 14617 Max: Shanghai 30375 Min: Gansu 8804
Energy Consumption	
Regional	
Energy consumption per capita/kgce (2018)	National average: 3325 Max: Ningxia 9432 Min: Tibet 1383**
Electricity consumption per capita/kWh (2018)	National average: 4905 Max: Ningxia 15616 Min: Tibet 2047
Residential electricity consumption per capita/kWh (2018)	National average: 694 Max: Fujian 984* Min: Tibet 306*
Urban and rural	
Energy consumption per capita/kgce (2017)	National average: 3230 Urban: 4320 Rural: 1470
Electricity consumption per capita/kWh (2018)	National average: 4905 Urban: 7108 Rural: 1659
Residential electricity consumption per capita/kWh (2018)	National average: 694 Urban: Shenzhen 1128* Rural: Gansu 264*
Rich and Poor	
Rich and poor disparity	In 2018, 1% of China's highest-income families possessed 1/3 of the nation's wealth, and 1/4 of the lowest-income families owned only 1% of the nation's wealth.
Urban residents disposable income per capita/yuan (2018)	20% high-income households: 84907 20% low-income households: 14387
Rural residents disposable income per capita/yuan (2018)	20% high-income households: 34043 20% low-income households: 3666
Home computer ownership/100 households (2018)	National average: 53.4 Urban: 73.1 Rural: 26.9 Max: Shanghai 106.7 Min: Tibetan rural areas 3.4
Air conditioner ownership/100 households (2018)	National average: 109.3 Urban: 142.2 Rural: 65.2 Max: Zhejiang 220.5 Min: Tibetan rural areas 0.5
Private car ownership/100 households (2018)	National average: 33.0 Urban: 41.0 Rural: 22.3 Max: Ordos 96.5 Min: Hainan rural areas 9.8

Note: 1.*2016;**2017.

Sources: NBS; PBS; China Social Science Survey Center of Peking University; CEC; China's Report on the Development of the People's Livelihood 2018.

Table 4 International Comparison of Living Standards of China's Most Affluent Cities (2018)

	Beijing	Shanghai	Shenzhen	Ordos	Dongguan	Tokyo (Japan)
Total population (10,000)	2154	2424	1302	208	217	1330
Urbanization Rate	86.5	87.6	99.7	75.6	69	
GDP per capita (USD)	21105	20403	29778	28291	32588	76842
GDP per capita ranking	11	14	2	3	1	
Disposable income per capita (USD)	10273	10281	7544	7077	7240	32550
Housing area per capita (m ²)	35	37	40	42	38	35
Private cars (per 100 households)	49.2	34.7	75	96.5	81	46
Air conditioners (per 100 households)	169.8	210.2	167		197	248

Note: 1. Private car and air conditioner ownership data refer only to urban households. Data for Beijing and Shenzhen are from 2017, data for Tokyo is from 2016.

Source: China Statistical Yearbook 2018; Beijing, Shanghai, Shenzhen, and Dongguan Statistics Bureaus; Statistics Bureau of Japan.

Table 5 Urban and Rural Living Standards and Energy Consumption

	2000	2010	2015	2016	2017	2018
Per capita GDP (USD)	949	4556	8007	8127	8836	9750
Urban residents disposable income per capita (Chinese yuan)	6280	19109	31195	33616	36396	39251
Rural residents net income per capita (Chinese yuan)	2253	5919	11422	12363	13432	14617
Engel's coefficient, urban households (%)	39.40	35.70	29.70	29.30	28.60	27.70
Engel's coefficient, rural households (%)	49.10	41.10	33.00	32.20	31.20	30.10
Housing area per capita (m ²)						
Urban (building area)	20.30	31.60	33.50	37.00	40.00	39.00
Rural (living area)	24.90	27.30	31.20	32.00	33.60	47.30
Penetration rate of energy-consuming appliances (per 100 households)						
Indoor air conditioners						
Urban	30.80	112.10	114.60	123.70	128.60	142.20
Rural	1.30	16.00	38.80	47.60	52.80	55.20
Refrigerators						
Urban	80.10	96.60	94.00	96.40	98.00	100.90
Rural	12.30	45.20	82.60	89.50	91.70	95.90
Color TVs						
Urban	116.60	137.40	122.30	122.30	123.80	121.30
Rural	48.70	111.80	116.90	118.80	120.80	116.60
Home computers						
Urban	9.70	71.20	78.50	80.00	80.80	73.10
Rural	0.50	10.40	25.70	27.90	29.20	26.90
Private cars						
Urban	0.50	13.10	30.00	35.50	37.50	41.00
Rural	30.80	112.10	114.60	123.70	128.60	22.30
Energy consumption per capita (kgce)	1160	2693	3128	3153	3230	3325
Electricity consumption per capita (kWh)						
Urban	2574	4519	6212	6370	6587	7108
Rural	205	989	1496	1566	1652	1659

Note: 1. In 2017, per capita income for urban residents at constant prices was 8218 Chinese yuan, and rural residents' per capita income was 3197 Chinese yuan.

Sources: NBS; CEC.

Table 6**Status of Electrification and Poverty in Rural China**

	1978	2000	2010	2015	2016	2017	2018
<i>Rural population/million</i>	790.14	808.37	674.15	603.46	589.73	576.61	564.01
<i>Poverty standard/Chinese yuan /per capita</i>	100	625	1274	2300	2300	3000	3535
<i>Population poverty/million</i>	250	32.1	26.9	55.8	43.4	30.46	16.6
<i>Population without access to electricity/million</i>	450.0	35.0	5.3	0	0	0	0
<i>Electricity consumption per capita/kWh</i>	218	205	989	1496	1566	1652	1659

Note 1. The poverty standard for 2018 is calculated using constant prices based on the 2010 poverty standard of 2300 Chinese yuan.

2. According to the World Bank poverty level (i.e. living on less than 1 USD a day per capita), there were 212 million people in China living below the poverty line in 2018.

3. In 2015, electricity was provided to the remaining 39800 persons without access to electricity.

Sources: NBS; CEC; NEA; SERC.

Table 7**Coal, Oil, and Natural Gas Resources and Reserves****Coal**

The estimated total amount of coal resources is 3879.6 billion t. At the end of 2018, the proven reserves were 1.7 trillion t, and the remaining technically recoverable reserves were 261 billion t.

Petroleum

Crude oil: the amount of geological resources is 125.7 billion t, and the recoverable resources are 30.1 billion t. The remaining technically recoverable reserves are 3.5 billion t. 2018 were 3.5

Oil sand: the amount of geological resources is 6 billion t, and the amount of recoverable resources are 2.3 billion t.

Oil shale: the technically recoverable resources are 243.2 billion t, and the amount of shale oil that can be recovered is 12 billion t.

Natural gas

Conventional natural gas: the amount of the geological resources is 90 trillion m³, the volume of the recoverable resources is 50 trillion m³. In 2018, the total proven geological reserves were 15.44 trillion m³, and the remaining technically recoverable reserves were 6.1 trillion m³.

Coal bed gas: the amount of geological resources is 30 trillion m³, and the recoverable resources are 12.5 trillion m³. In 2018, the accumulated geological reserves were 599.3 billion m³, and the remaining technically recoverable reserves were 310.2 billion m³.

Shale gas: the amount of geological resources is 122 trillion m³, and the recoverable resources are 22 trillion m³. In 2018, the proven geological reserves were 1041.5 billion m³, and the technically recoverable reserves were 225.3 billion m³.

Source: MNR.

Table 8**Energy Production by Source**

Year	Raw coal (Mt)	Crude oil (Mt)	Natural gas (100 million m ³)	Electricity production (TWh)	Share of electricity production from hydropower (TWh)
1990	1080	138.30	153.0	621.20	126.70
1991	1087	141.00	160.7	677.50	124.70
1992	1116	142.10	157.9	753.90	130.70
1993	1150	145.20	167.7	839.50	151.80
1994	1240	146.10	175.6	928.10	167.40
1995	1361	150.10	179.5	1007.00	190.60
1996	1397	157.30	201.1	1081.30	188.00
1997	1388	160.70	227.0	1135.60	196.00
1998	1332	161.00	232.8	1167.00	198.90
1999	1364	160.00	252.0	1239.30	196.60
2000	1384	163.00	272.0	1355.60	222.40
2001	1472	164.00	303.3	1480.80	277.40
2002	1550	167.00	326.6	1654.00	288.00
2003	1835	169.60	350.2	1910.60	283.70
2004	2123	175.87	414.6	2203.30	353.50
2005	2365	181.35	493.2	2500.30	397.00
2006	2570	184.77	585.5	2865.70	435.80
2007	2760	186.32	692.4	3281.60	485.30
2008	2903	190.43	803.0	3495.76	637.00
2009	3115	189.49	852.7	3714.65	615.60
2010	3428	202.41	957.9	4207.16	722.17
2011	3764	202.88	1053.4	4713.02	698.95
2012	3945	207.48	1106.1	4987.60	872.10
2013	3974	209.92	1208.6	5431.64	920.29
2014	3874	211.43	1301.6	5794.46	1072.88
2015	3747	214.36	1346.1	5810.58	1126.42
2016	3411	199.69	1368.7	6142.49	1193.37
2017	3524	191.51	1480.3	6495.14	1189.84
2018	3683	189.11	1602.7	7111.77	1234.23

Source: NBS.

Table 9 Top 10 Oil Fields for Crude Oil Production (crude oil/10000 t)

	2017	2018
1. PetroChina Daqing Oilfield	3952	4167
2. CNOOC Bohai Oilfield	2900	3000
3. PetroChina Tarim Oilfield	2538	2673
4. PetroChina Changqing Oilfield	2372	2528
5. Sinopec Shengli Oilfield	2340	2383
6. PetroChina southwest oil and gas field	1533	1812
7. PetroChina Xinjiang oil field	1131	1379
8. Yanchang oil group	1127	1310
9. CNOOC Nanhai Oilfield	912	1305
10. PetroChina Liaohe Oilfield	976	1040

Source: CPEA.

Table 10 Crude Oil Refining Volume and Main Products Output Unit: Mt

	2000	2010	2014	2015	2016	2017	2018
Crude refining volume	210.80	426.80	503.00	522.00	541.00	567.77	603.57
Production of main products							
Total of Gasoline, kerosene and diesel	120.83	252.09	316.83	335.17	347.80	328.62	324.34
Gasoline	41.32	76.76	110.29	119.99	129.00	121.03	138.88
Kerosene	8.78	17.08	30.01	35.19	39.80	30.01	47.70
Diesel	70.73	158.25	176.53	179.99	179.00	177.58	137.76
Fuel oil	20.54	25.37	25.42	23.84	25.87	26.93	20.24

Sources: NBS; CPCIF.

Table 11**Top 10 Largest Coal Companies****Unit: Mt**

	2014	2015	2016	2017	2018
1. National Energy Group	541.7	495.9	506.0	510.0	
2. China Coal Energy Group	183.0	159.4	146.0	163.7	
3. Yankuang Group	120.1	108.0	114.0	130.0	161.5
4. Shanxi Coal and Chemical Industry Group	127.1	127.0	106.3	137.1	160.2
5. Shandong Energy Group	139.3	133.0	120.2	141.3	145.4
6. Datong Coal Mine Group	167.5	173.5	117.9	126.2	137.2
7. Shanxi Coking Coal Group	107.0	105.3	91.2	96.1	100.1
8. Jinneng Group	70.3	70.4	71.4	80.2	84.5
9. Yang Quan Coal Group	69.6	76.2	79.0	81.9	82.0
10. Jizhong Energy Group	102.0	101.0	81.4	79.3	81.0

Source: CCIA.

Table 12**Installed Electricity Capacity and Electricity Generation**

	1990	2000	2010	2014	2015	2016	2017	2018
Installed electricity capacity by year-end/GW	137.9	319.3	966.4	1370.2	1508.3	1645.8	1777.0	1899.7
Hydropower	36.1	79.4	216.1	304.9	319.4	332.1	341.2	352.3
Thermal power	101.8	237.5	709.7	923.6	990.2	1053.9	1106.0	1143.7
Nuclear power	—	2.1	10.8	20.1	26.1	33.6	35.8	44.7
Wind power		0.4	44.7	114.8	145.4	168.7	188.3	221.0
Electricity generation/TWh	621.3	1386.5	4207.2	5649.6	5814.6	6133.2	6495.1	7111.8
Hydropower	126.4	243.1	722.2	1064.3	1130.3	1184.1	1189.8	1232.9
Thermal power	495.0	1107.9	3331.9	4233.7	4284.2	4437.1	4662.7	4923.1
Nuclear power	—	16.7	73.9	132.5	170.8	213.3	248.1	294.4
Wind power			72.2	200.3	251.2	294.4	305.7	366.0

Note: In 2018, the share of coal power in the total electricity generation was 63.7%.

Sources: NBS; CEC.

Table 13**Top 5 Biggest Power Generation Groups (2018)**

	National Energy Group	Huaneng Group	Datang Group	Huadian Group	China Power Investment Corp
Installed capacity (GW)	238.9	176.6	138.9	147.8	140.3
Clean energy ratio (%)	24.4	33.2	35.6	39.7	48.9
Power generation (TWh)	953.3	702.6	554.1	555.9	498.0
Net coal consumption (gce/kWh)	304.8	298.7	301.8	300.3	300.4

Note: The National Energy Group was founded by the reconstruction of China Guodian Corporation and China Shenhua Group on Nov. 28th, 2017.

Source: CEC.

Table 14**Key Indicators for the Power Industry**

	2000	2005	2010	2014	2015	2016	2017	2018
Net coal consumption rate (gce/kWh)	392	370	333	319	315	312	309	308
Gross coal consumption rate (gce/kWh)	363	343	312	300	297	294	292	290
Power consumption rate of thermal power plants (%)	7.31	6.80	6.33	5.84	6.04	6.01	6.04	5.81
Line loss rate (%)	7.70	7.21	6.53	6.64	6.64	6.49	6.48	6.21
Utilization hours for power generating equipment	4517	5425	4650	4318	3988	3779	3786	3862
Hydropower	3258	3664	3404	3669	3590	3619	3579	3613
Thermal power	4848	5865	5031	4739	4364	4186	4209	4361

Source: CEC.

Table 15 Development and Utilization Amount of Renewable Energy

		2000	2005	2010	2015	2016	2017	2018
Hydropower	GW	79.40	117.40	213.40	319.40	332.10	341.20	352.00
	TWh	243.10	397.00	722.20	1126.40	1193.40	1194.50	1232.90
	Mtce	88.20	136.20	225.30	335.60	352.10	348.80	357.50
Of which:								
small-scale hydropower	GW	24.80	38.50	59.00	75.00	77.90	79.30	80.40
	TWh	80.00	120.90	202.30	240.00	268.20	247.70	234.60
	Mtce	29.00	41.50	63.10	71.5	79.10	72.30	68.00
Solar energy	Mtce	3.10	9.60	22.60	64.60	75.10	85.50	109.30
Photovoltaic power generation	10,000 kW	1.80	7.00	122.00	4318.00	7742.00	13025.0	17445.0
	100M kWh	0.19	0.74	12.90	392.00	662.00	967.00	1775.00
	Mtce	0.01	0.03	0.40	11.64	19.53	28.20	51.50
Water heaters	10,000 m ²	2600	8000	18500	44200	46400	47780	48200
	Mtce	3.10	9.60	22.20	53.00	55.60	57.30	57.80
Wind power generation	GW	0.34	1.22	44.78	145.40	168.70	188.30	221.00
	TWh	0.50	2.00	72.20	251.20	294.40	305.70	444.90
	Mtce	0.20	0.70	22.50	74.60	86.80	89.30	129.00
Rural biogas	100M m ³	23	86	145	168	174	184	188
	Mtce	1.60	6.10	10.40	12.00	12.10	13.10	13.40
Biomass and waste power generation	GW	0.80	2.00	6.70	16.00	12.30	14.80	17.80
	TWh	3.50	8.70	29.00	68.90	66.10	79.50	90.60
	Mtce	1.30	3.00	9.00	20.40	19.30	23.20	26.40
Geothermal utilization	Mtce	0.70	1.20	6.70	24.10	31.10	37.00	44.20
	Total	86.30	197.80	284.30	491.10	580.50	596.50	671.20

Note: 1. Small-scale hydropower refers to stations with an installed capacity of less than 50MW.

2. In 2018, photovoltaic utilization hours amounted to 1113h and wind power utilization hours were 2013h.

3. The energy provided by solar water heaters was 120kgce/m²/a.

4. For geothermal energy, in every heating season, ground source heat pumps generated 25 kgce/m² of energy, and geothermal space heating generated 28 kgce/m².

5. Renewable energy power generation was converted to standard coal equivalent using coal consumed in thermal power generation for the same year, the gross coal consumption rate (gce/kWh) in 2000, 2005, 2010, 2013, 2014, 2015, 2016, 2017 and 2018 was 363, 343, 312, 302, 300, 297, 294, 292 and 290 respectively.

Sources: NBS; China Energy Statistical Yearbook 2018; NDRC; NEA; MWR; MOA; MOHURD; MNR; CEC; CSES; CAREI; China Resource Comprehensive Utilization Association; CWEA; National Geothermal Energy Center; BERC.

Table 16

Renewable Energy Use in Construction

	2015		2016		2017		2018	
	Physical quantity	Standard quantity	Physical quantity	Standard quantity	Physical quantity	Standard quantity	Physical quantity	Standard quantity
	/Mt	/Mtce	/Mt	/Mtce	/Mt	/Mtce	/Mt	/Mtce
Direct combustion of biomass energy	Firewood 107	100.0		90.0		80.0		
	Straw 82							
New energy								
Solar water heaters	442M m ²	53.0	476 M m ²	57.1	478 M m ²	57.3	482 Mm ²	57.8
Photovoltaic power generation	687 GWh	0.2	1170 GWh	0.3	3363 GWh	0.9	5643 GWh	1.5
Ground source heat pumps	410 M m ²	10.3	478 M m ²	12.0	618 M m ²	15.5	793 Mm ²	19.9
Geothermal space heating	494 M m ²	13.8	690 M m ²	19.3	77 M m ²	21.5	87 M m ²	24.3
Rural biogas	16.8 BN m ³	12.0	17.4 BN m ³	12.4	18.4 BN m ³	13.1	18.8 BN m ³	13.4
Subtotal		89.3		101.1				116.9
Total		189.3		197.1		198.3		116.9

Note: 1. Solar water heaters provided 120kgce/m²/a of energy, geothermal heating, 28kgce/m²/heating season, and ground source heat pumps 25kgce/m²/heating season.

2. Power generation was converted into coal equivalent according to the gross coal consumption rate of thermal power generation.

Sources: NBS; NDRC; NEA; Department of Education, Science & Technology, MOA; BERC; MOHURD; Solar Thermal Utilization Specialty Committee of CAREI; Energy Saving Stove Professional Committee of CAREI; CSES; MNR; Geothermal Specialty Committee, CERS; National Geothermal Energy Center.

Table 17

Primary Energy Consumption and Structure

Year	Total energy consumption (10,000 tce)	Share (total energy consumption =100)			
		Coal	Oil	Natural gas	Hydro, nuclear and wind power
1978	57144	70.7	22.7	3.2	3.4
1980	60275	72.2	20.7	3.1	4.0
1985	76682	75.8	17.1	2.2	4.9
1990	98703	76.2	16.6	2.1	5.1
1991	103783	76.1	17.1	2.0	4.8
1992	109170	75.7	17.5	1.9	4.9
1993	115993	74.7	18.2	1.9	5.2
1994	122737	75.0	17.4	1.9	5.7
1995	131176	74.6	17.5	1.8	6.1
1996	135192	73.5	18.7	1.8	6.0
1997	135909	71.4	20.4	1.8	6.4
1998	136184	70.9	20.8	1.8	6.5
1999	140569	70.6	21.5	2.0	5.9
2000	146946	68.5	22.0	2.2	7.3
2001	155547	68.0	21.2	2.4	8.4
2002	169577	68.5	21.0	2.3	8.2
2003	197083	70.2	20.1	2.3	7.4
2004	230281	70.2	19.9	2.3	7.6
2005	261369	72.4	17.8	2.4	7.4
2006	286467	72.4	17.5	2.7	7.4
2007	311442	72.5	17.0	3.0	7.5
2008	320611	71.5	16.7	3.4	8.4
2009	336126	71.6	16.4	3.5	8.5
2010	360648	69.2	17.4	4.0	9.4
2011	387043	70.2	16.8	4.6	8.4
2012	402138	68.5	17.0	4.8	9.7
2013	416913	67.4	17.1	5.3	10.2
2014	425806	65.6	17.4	5.7	11.3
2015	429905	63.7	18.3	5.9	12.1
2016	435819	62.0	18.5	6.2	13.3
2017	449000	60.4	18.8	7.0	13.8
2018	464000	59.0	18.9	7.8	14.3

Source: NBS.

Table 18**Final Energy Consumption and Structure by Sector**

	2010		2015		2016		2017	
	Mtce	%	Mtce	%	Mtce	%	Mtce	%
Agriculture	78.7	3.3	98.4	3.3	96.8	3.1	95.0	3.0
Industry	1610.9	67.5	1803.3	60.3	1814.6	58.8	1810.1	57.7
Transportation	330.2	13.8	448.4	15.0	503.5	16.3	532.9	17.0
Buildings	368.0	15.4	638.2	21.4	672.9	21.8	700.2	22.3
Total	2387.8	100	2988.3	100	3087.8	100	3138.2	100

Note: This table is based on China's energy balance sheet, but calculated according to internationally-agreed definitions of energy balance and methodology. Electricity is converted to standard coal equivalent by heat value equivalent.

1. (1) Final energy consumption is calculated by losses from processing, conversion, transportation, and the energy consumption of the energy industry.

(2) Intermediate link losses (which include thermal power generation, transmission, coal transport by rail, coal preparation, coking, and oil refining) comprised 23.15% of primary energy consumption in 2017.

The energy industry's energy consumption was calculated by adding together the energy consumption of the coal mining and washing industry, the oil and natural gas mining industry, oil processing, coking, and nuclear fuel processing industries, the power production, supply industries, and the gas production; and then deducting 95% of gasoline and 35% of diesel consumption, which represents 9.8 % of primary energy consumption in 2017. The final energy consumption in China's energy balance sheet did not deduct the energy consumption from the energy industry.

2. The consumption of agricultural diesel oil, residential coal, and transport gasoline and diesel oil was on the low side. In 2017, agricultural diesel oil consumption in China's energy balance sheet was 22.54Mtce; whereas the China Petroleum and Chemical Industry Federation (CPCIF) and the China Association of Rural Energy Industry (CAREI) reported 49.1 Mtce. Therefore, in 2017, agricultural energy consumption was 95.0 Mtce.

Table 19**Oil Products Consumption by Source****Unit: Mt**

	2000	2005	2010	2015	2016	2017	2018
Gasoline	35.05	48.53	68.56	115.99	119.83	122.20	131.73
Diesel	67.74	109.73	146.99	174.07	164.69	166.70	173.53
Kerosene	8.70	10.77	17.65	27.90	30.23	33.45	37.42
Fuel oil	38.73	42.42	37.58	29.20	29.03	29.40	24.56

Sources: NBS; CPCIF; CNPC Economics & Technology Research Institute.

Table 20**Natural Gas Consumption and Structure**

	2010		2014		2015		2016		2017		2018	
	100 million m ³	%	100 million m ³	%	100 million m ³	%	100 million m ³	%	100 million m ³	%	100 million m ³	%
Power generation	192.4	17.9	352.0	18.8	395.0	20.5	446.0	21.4	467.0	19.5	485.0	17.3
Chemicals	187.3	17.4	264.0	14.1	245.0	12.7	254.0	12.2	273.0	11.4	286.0	10.2
Industry	381.3	35.4	480.0	25.7	454.0	23.5	493.0	23.6	727.0	30.4	1022.0	36.5
Transportation	79.7	7.4	224.0	12.0	243.0	12.6	261.0	12.5	272.0	11.3	300.0	10.7
Buildings	235.1	21.9	549.0	29.4	594.0	30.7	631.0	30.3	655.0	27.4	710.0	25.3
Total	1075.8	100.0	1869.0	100.0	1931.0	100.0	2085.0	100.0	2394.0	100.0	2803.0	100.0

Sources: NBS; NEA; CNPC Economics & Technology Research Institute; Gas-consuming Industries.

Table 21 Electricity Consumption Pper Capita**Unit: kWh**

	National	Urban	Rural
1978	218	1072	32
1995	535	1747	100
2000	1063	2574	205
2005	1624	2999	587
2010	2752	4519	989
2015	4142	6212	1496
2016	4321	6370	1566
2017	4538	6578	1652
2018	4905	7108	1659

Sources: NBS.

Table 22

Energy Consumption of the Manufacturing Industry (2018)

	energy consumption per unit of product	2018 production	2018 energy consumption (Mtce)
Steel	861 kgce/t	928.0 Mt	799.0
Electrolytic aluminum	13555 kWh/t	35.8 Mt	140.7
Copper smelting	342 kgce/t	8.69 Mt	3.0
Cement	132 kgce/t	2208 Mt	291.5
Building ceramics	6.7 kgce/m ²	9.01 billion m ²	61.6
Wall materials	425 kgce/10,000 block standard bricks	1.2010 TN standard bricks	51.0
Sheet glass	14.0 kgce/ weight case	869 million weight cases	11.7
Building Lime	142 kgce/t	115 Mt	16.3
Oil refining	96 kgce/t	831 Mt (process load)	79.8
Ethylene	840 kgce/t	18.41 Mt	15.5
Synthetic ammonia	1453 kgce/t	56.12 Mt	81.5
Caustic soda	871 kgce/t	34.20 Mt	29.8
Sodium carbonate	331 kgce/t	26.20 Mt	8.7
Calcium carbide	3208 kWh/t	25.57 Mt	23.8
Paper and paperboard	318 kgce/t	116.1 Mt	36.9
Total			1650.8
			2358.3

Note: 1. The comprehensive energy consumption of products is industrywide. Wall materials' energy consumption is a weighted average of clay solid bricks and new wall materials.

2. Product power consumption is converted into coal equivalent according to the gross coal consumption rate.

3. The energy consumption of the 15 products of six industries shown in the above table accounts for about 70% of the energy consumption of the manufacturing industry.

Sources: NBS; NDRC; MIIT; China Iron and Steel Association; China Nonferrous Metals Industry Association; CEC; CBMF; China Petroleum and Chemical Industry Federation; China Chemical Energy Conservation Technology Association; China Ceramics Industry Association; China Carbide Industry Association; China Paper Making Association.

Table 23**Energy Consumption of Transport**

	2005	2010	2013	2014	2015	2016	2017	2018
Highways								
Gasoline (Mt)	46.08	67.50	95.50	101.70	112.00	118.00	120.40	122.90
Diesel (Mt)	54.6	77.9	106.0	108.0	105.3	90.2	108.6	107.6
Railways								
Diesel (Mt)	5.61	6.72	6.81	6.58	6.25	7.03	8.28	8.16
Electricity (100 million kWh)	198.1	307.0	428.4	478.0	507.7	571.2	595.0	603.0
Waterways								
Diesel and Fuel oil (Mt)	14.83	22.45	26.80	27.49	26.19	27.50	27.80	27.30
Civil aviation								
Kerosene (Mt)	9.52	16.01	19.80	23.40	25.60	30.30	33.45	37.41

Sources: NBS; NDRC; National Railway Administration; State Railway Administration; MOT; The National Civil Aviation Authority; Chinese Automotive Technology Research Center; CNPC Economics & Technology Research Institute.

Table 24**Agricultural and Rural Energy Indicators**

	2000	2010	2015	2016	2017	2018
Total power of agricultural machinery (10,000 kW)	52574.0	92786.0	111728.0	97250.0	99017.0	100372.0
Effective irrigation area (10,000 ha)	5382.0	6034.8	6587.3	6714.9	6785.1	6827.2
Water-saving irrigation area (10,000 ha)	1640.0	2731.0	3106.0	3317.0	3461.0	3614.0
Chemical fertilizers application (10,000 t)	4145.0	5562.0	6023.0	5984.0	5859.0	5653.0
Installed capacity of small rural hydropower plants (10,000 kW)	698.5	5924.0	7588.0	7791.0	7927.0	8044.0
Rural electricity consumption (100 million kWh)	2421.3	6632.3	9026.9	9238.3	9524.4	9358.5

Source: NBS.

Table 25 Electricity Consumption of Household Electric Appliances (2018)

	Ownership (100 million)		Electricity consumption (100 million kWh)	
	Households	Whole society	Households	Whole society
Air conditioners	5.08	7.81	2743	4271
Refrigerators	4.60	4.65	1343	1358
Color TVs	5.55	6.17	699	777
Rice cookers	3.50	3.50	341	341
Electric fans	6.10	8.70	120	171
Electric shower water heaters	2.03	2.26	964	1074
Kitchen ventilators	2.62	2.92	317	353
Microwave ovens	1.82	2.03	93	104
Washing machines	4.36	2.03	174	194
Total			6794	8643

Note: 1. The ownership rate of households was calculated by multiplying the national average per 100 households by 465.1 million households. 2. The ratio of ownership of householdS to ownership of whole society: electric cooker, 100%; room air conditioner, 65%; electric fan, 70%; and all the other appliances, 90%.

3. The average power and annual utilization hours per appliance: room air conditioner 1200W, 450h; color TV 120W, 1050h; electric cooker, 650W, 150h; electric fan 55W, 360h; electric shower water heater 2500W, 190h; lampblack machine 220W, 550h; microwave oven 750W 60h; washing machine 400W, 100h; refrigerators had an average daily power consumption of 0.8kWh.

Sources: NBS; Average power and annual utilization hours of household appliances compiled by Wang Qingyi, Energy Data in 2014.

Table 26**Energy Saving (2018)****Unit: Mtce**

	Energy saving in 2018 compared with 2017	Share %
Technical energy saving	106.41	74.7
Manufacturing Industry	35.77	25.1
Transportation	8.33	5.8
Construction	62.31	43.8
Structural energy saving	36.00	25.3
Total energy saving	142.40	100.0

Table 27

Energy Saving in the Manufacturing Industry (2018)

	Product energy consumption					Production in 2018	Energy saving in 2018 compared with 2017 (Mtce)
	Unit	2010	2015	2016	2017	2018	
Steel	kgce/t	950.0	899.0	898.0	890.0	861.0	928 Mt
Electrolytic aluminum	kWh/t	13979.0	13562.0	13599.0	13577.0	13555.0	35.8 Mt
Copper	kgce/t	500.0	372.0	337.0	321.0	342.0	9.03 Mt
Cement	kgce/t	143.0	137.0	135.0	135.0	132.0	2208 Mt
Building ceramics	kgce/m ²	7.7	7.0	6.9	6.8	6.7	9.01 billion m ²
Wall materials	kgce/10,000 standard bricks	468.0	444.0	434.0	429.0	425.0	1201 billion standard bricks
Building Lime	kgce/t	160.0	145.0	144.0	143.0	142.0	115 Mt
Sheet glass	kgce/ weight case	16.9	14.7	14.4	14.2	14.0	8.69 million weight cases
Oil refining	kgce/t	100.0	96.0	97.0	97.0	96.0	831Mt (processing amount)
Ethylene	kgce/t	950.0	854.0	842.0	841.0	840.0	18.41 Mt
Synthetic ammonia	kgce/t	1587.0	1495.0	1486.0	1463.0	1453.0	56.12 Mt
Caustic soda	kgce/t	1006.0	897.0	878.0	875.0	871.0	34.20 Mt
Sodium Carbonate	kgce/t					331.0	26.20 Mt
Calcium carbide	kWh/t	3340.0	3303.0	3224.0	3279.0	3208.0	25.57 Mt
Paper and paperboard	kgce/t	390.0	339.0	333.0	326.0	318.0	116.1 Mt
Total							34.32
Total of manufacturing industry							49.03

Note: 1. In the product energy consumption column, electricity consumption was converted into standard coal equivalent by coal consumption in power generation.

2. Each product's energy consumption is the average of the whole industry.

3. In this table, the 16 products listed came from six industries whose energy consumption accounted for 70% of the aggregate consumption in manufacturing.

Sources: NBS; 2018 China Statistical Abstract; China Energy Statistical Yearbook 2018; NDRC; MIIT; CEC; CISA; China Nonferrous Metals Industry Association; CBMF; China Cement Association; China Ceramics Industrial Association; China Petroleum and Chemical Industry Federation; China Chemical Energy Conservation Technology Association; China Soda Industry Association; China Carbide Industry Association; China Paper-making Association.

Table 28**Energy Saving in Transportation (2018)**

	Unit workload energy consumption (kgce/10,000 conversion t-km)				Workload in 2018 (100 million converted t-km)	Energy-saving amount (10,000 tce) in 2018 compared with 2017
	2015	2016	2017	2018		
Highways	506.5	492.0	480.0	480.0	72177	433
Railways	47.1	47.1	43.3	41.1	42968	95
Waterways	41.3	40.8	40.7	40.1	99133	10
Civil aviation	5152.0	5134.0	5134.0	4223.0	1046	355
Total						833

Sources: NBS; State Railway Administration; MOT; CEC; China Association of Automobile Manufacturers; China Automotive Technology Research Center; CNPC Economics & Technology Research Institute; Statistical Bulletin of Transportation Industry Development in 2018; Statistical Bulletin of China Civil Aviation in 2018; 2018 Railway Statistics Bulletin.

Table 29**Energy Saving in Construction (2018)**

Unit: Mtce

	2012	2013	2014	2015	2016	2017	2018
New buildings	10.00	13.00	10.65	10.20	15.67	16.00	18.30
Existing residential buildings	2.42	2.46	1.92	1.67	1.32	1.60	2.38
Lighting	11.10	13.10	12.80	22.10	24.50	30.60	48.55
Total	30.72	39.76	39.97	45.97	52.20	60.03	69.23

Note: 1. The indicator of new buildings in 2018 refers to the energy-saving capacity of the newly built buildings that adopted energy-saving building codes (amount to a total of 1.97 billion m²).

2. The indicator of existing residential buildings in 2018 refers to the energy-saving capacity of buildings, which was achieved through improvements by energy-saving technology in the north (159million m²).

3. Energy-saving from lighting was achieved by the replacement of incandescent lamps with LED lighting.

4. Renewable energy applications include solar water heaters, photovoltaic power generation, ground source heat pumps, geothermal heating, and biogas in rural areas.

Sources: MOHURD; NRDC; MNR; MOA; China Association of Rural Energy Industry; China Association of Solar Energy; National Semiconductor Lighting Industry Development and Industry Alliance.

Table 30**Physical Energy Efficiency****Unit: %**

	2000	2005	2010	2014	2015	2016	2017
1. Mining efficiency	33.0	33.3	35.9	36.2	36.2	36.3	36.6
2. Intermediate efficiency	68.5	70.8	70.9	68.7	67.5	70.7	70.0
3. End-use efficiency							
Industry	46.0	47.3	50.5	53.8	54.0	54.8	55.0
Transportation	28.9	29.2	29.1	33.1	33.3	34.5	34.5
Residential and commercial	66.0	68.4	74.2	74.2	74.5	74.8	75.4
Total	46.7	48.3	51.0	53.5	54.8	55.2	55.4
4. Energy efficiency (2×3)	32.0	34.2	36.0	36.8	37.0	39.0	38.8
5. Overall efficiency of energy system (1×4)	10.6	11.4	12.9	13.3	13.4	14.1	14.2

Notes: 1. This table was calculated according to internationally accepted definitions of energy balance and calculation methods.

2. Intermediate refers to energy processing, conversion, storage, and transportation.

Table 31**Energy Consumption of Energy Intensive Products**

	2000	2010	2015	2016	2017	2018	International advanced level
Coal mining and preparation							
Full energy consumption (kgce/t)	38.2	32.7	29.5	31.0	30.5	31.0	
Electricity consumption (kWh/t)	29.0	24.0	23.6	24.8	25.8	26.7	17.0
Petroleum and natural gas recovery							
Full energy consumption (kgce/toe)	208	141	121	117	115	118	105
Electricity consumption (kWh/toe)	172	121	137	132	129	133	90
Gross heat consumption of thermal power generation (gce/kWh)	363	312	298	294	292	290	287
Net heat consumption of thermal power plants (gce/kWh)	392	333	315	312	309	308	275
Full energy consumption for steel (kgce/t)							
Whole industry	1475	950	899	898	890	861	
Large and medium-sized enterprises	906	701	663	676	670	634	
Comparable energy consumption for steel (kgce/t)	784	681	644	640	634	613	576
AC power consumption for electrolytic aluminum (kWh/t)	15418	13979	13562	13599	13577	13555	12900
Full energy consumption for copper smelting (kgce/t)	1227	500	372	337	321	342	360
Full energy consumption for cement (kgce/t)	172	143	137	135	135	132	97

Full energy consumption for wall materials (kgce/10,000 standard bricks)	763	468	444	434	429	425	300
Full energy consumption for building ceramics (kgce/m ²)	8.6	7.7	7.0	6.9	6.8	6.7	3.4
Full energy consumption for building lime /kgce/t		160	145	144	143	142	120
Full energy consumption for sheet glass (kgce/weight case)	25.0	16.9	14.7	14.4	14.2	14.0	13.0
Full energy consumption for crude oil processing (kgce/t)	118	100	96	97	97	97	73
Full energy consumption for ethylene (kgce/t)	1125	950	854	842	841	841	629
Full energy consumption for synthetic ammonia (kgce/t)	1699	1587	1495	1486	1464	1453	990
Full energy consumption for caustic soda (kgce/t)	1439	1006	897	878	875	871	670
Full energy consumption for sodium carbonate (kgce/t)	406	385	329	336	333	331	255
Electricity consumption for calcium carbide (kWh/t)	3475	3340	3303	3224	3279	3208	3000
Full energy consumption for paper and paperboard (kgce/t)							
Whole industry	912	390	339	333	326	318	
Home made pulp and paper enterprises	1540	1200	1045	1027	1006	981	506

Note:

1. The international advanced level is an average of the leading nations.
2. For full energy consumption in China and overseas for all years, electricity consumption was converted to coal equivalent by gross coal consumption.
3. The US is the world's leading nation in mining and washing coal. In 2018, surface mines output made up 65.0% of all mines in the US, the percentage in China was 16.3%; electricity consumption per ton of coal in surface mining made up about 1/5 of mines in the US.
4. The international leading level for electricity consumption of the oil and gas recovery industry is an estimated value from Shell and British Petroleum Company.
5. The gross heat consumption rate and net heat consumption rate in China were calculated from generators above 6MW; the international advanced level is Japan, and net heat consumption is Italy. In 2017, in China, coal made up 95.3% of all thermal power stations, oil 0.2%; and gas 4.5%. In Japan those ratios were 45.6%, 7.3%, and 47.1%. In Italy, those were 21.0%, 6.2%, 72.8%.
6. The full energy consumption for steel in China is from large and medium-sized enterprises, whose production accounted for 75.7% of the whole country in 2018. The international advanced level was from Germany.
7. The full energy consumption for cement is split into the heat consumption of clinker and full electricity consumption for cement. Electricity consumption was calculated as standard coal equivalent. Here, the international advanced level was from Germany. In 2014, the substitution rate of alternative fuel (petrol coke, waste plastics, waste tire, city garbage, and so on) was 63.4%.
8. The international leading level of full energy consumption for wall materials was the US.
9. Most ethylene in China is manufactured from naphtha. In the Middle East, classified as an international advanced leading country here, ethylene is manufactured from ethane.
10. The international advanced level of caustic soda is a German and Italian joint venture called Thyssenkrupp Industrial Solutions AGCorp.
11. Full energy consumption for synthetic ammonia was calculated from the average value of large-, medium-, and small-sized enterprises with coal, oil, and gas as raw materials. In 2018, 75% of China's synthetic ammonia production was from coal. The international advanced level was from the US, which uses natural gas for 98% of ammonia production.

Sources: NBS; MIIT; China Coal Industry Association; CEC; CISA; China Nonferrous Metals Industry Association; CBMF; Sinopec and Chemical Industry Federation; China Ceramics Industrial Association; China

Paper Association; China Chemical Fibers Association; Institute of Energy Economics, Japan, Handbook of Energy and Economic Statistics, 2016 version; The Germany Iron and Steel Enterprises Association; The Germany Cement Engineering Association.

Table 32 **Industrial Sector Capacity Elimination**

	Production capacity elimination					2018 Production
	2006~2010	2015	2016	2017	2018	
Coal	450.0 Mt	90 Mt	290 Mt	150 Mt	150 Mt	3683 Mt
Charcoal	10.38 Mt	19.35 Mt	40 Mt	16.8 Mt	19.2 Mt	438.2 Mt
Thermal power	72.1 GW	4.23 GW	4 GW	5.0 GW	12.9 GW	1143.7 GW
Steel	68.6 Mt	17.1 Mt	65 Mt	50 Mt	30 Mt	928.0 Mt
Electrolytic aluminum	0.80 Mt	0.34 Mt	0.88 Mt	2.4 Mt	2.72 Mt	35.80 Mt
Cement	403 Mt	39 Mt	0.11 Mt	50 Mt	84 Mt	2208 Mt
Sheet glass	152million weight cases	11million weight cases	33million weight cases	230million weight cases	120million weight cases	869million weight cases
Calcium carbide	4.0 Mt	2.0 Mt	2.52 Mt	3.5 Mt	3.7 Mt	25.57 Mt
Paper and paperboard	10.3 Mt	5.90 Mt	10.0 Mt	3.0 Mt	1.6 Mt	116.1 Mt

Sources: NBS; MIIT; CEC; CISA; CBMF; China Cement Association; China Ceramics Industrial Association; CPCIF; China Chemical Energy Conservation Technology Association; China Paper-making Association.

Table 33**Energy Import and Export**

	2000	2005	2010	2013	2014	2015	2016	2017	2018
Crude oil (Mt)									
Exports	10.44	8.07	3.04	1.62	0.60	2.87	2.94	4.86	2.63
Imports	70.27	127.08	239.31	282.14	308.36	335.49	381.04	419.97	461.90
Petroleum products (Mt)									
Exports	10.30	16.88	30.44	32.78	33.84	40.92	53.07	52.16	58.64
Imports	24.32	41.45	47.84	56.48	46.55	52.63	53.27	60.56	60.19
Natural gas (100 million m ³)									
Exports	31.40	29.70	40.30	27.10	25.70	32.00	33.30	34.80	34.00
Imports			164.70	518.20	583.50	603.20	736.20	943.60	1250.00
Coal (Mt)									
Exports	58.84	71.68	19.03	7.51	5.74	5.33	8.78	8.17	4.93
Imports	2.02	26.17	164.78	327.08	291.22	204.06	255.51	270.90	281.23

Note: 1. Coal imports include brown coal imports, which was 94.28 million t in 2018.

2. China imported 126 Mt coal from Indonesia, 80.4 Mt from Australia, 36.24 Mt from Mongolia, 27.35 Mt from Russia, 4.4 Mt from Philippines. Total imports from the above five countries add up to 97.5% of total coal imports in 2018.

3. China imported 125 billion m³ natural gas, including 51.4 billion m³ pipeline gas and 73.6 billion m³ LNG.

4. China imported 47.4 billion m³ pipeline gas from Central Asia, which takes up 92.2% of China's total pipeline natural gas import in 2018. China imported 32.39 billion m³ LNG from Australia and 12.75 billion m³ from Qatar.

Source: GACC.

Table 34**Energy Prices**

		2017	2018
Steam coal for power generation	Yuan/t	490.9	528.6
No.92 gasoline retail price	Yuan/litre	6.37	6.42
Civil natural gas	Yuan/m ³	2.44	2.95
Electricity for residents	Yuan/MWh	0.53	0.56

Note: 1. Steam coal prices are prices for June.

Sources: National Development and Reform Commission.

Table 35 R&D Expenditure for Companies in the Energy and Energy-Intensive Industry**Unit: 100 million Chinese yuan**

	2010	2014	2015	2016	2017	2018
Industry total	4015.4	9254.3	10013.9	10944.7	12013.0	12459.8
Coal mining and washing	108.7	151.5	143.3	132.1	148.9	146.5
Petroleum and natural gas exploitation	88.1	84.4	62.5	63.9	57.3	89.3
Petroleum processing, coking and nuclear fuel processing	43.8	106.6	100.8	119.6	146.6	145.4
Production and supply of electric power and heating	31.9	61.9	81.4	81.6	85.8	96.9
Steel	402.1	642.0	561.2	537.7	638.7	706.9
Non-ferrous metals	118.9	330.6	371.5	406.8	461.6	442.5
Building materials	81.3	246.5	277.6	323.1	362.8	415.9
Chemical industry	247.5	746.5	794.4	840.7	912.5	899.9
Chemical fibers	41.0	75.0	78.5	83.8	106.1	112.1
Food, beverages and tobacco	98.8	232.4	246.2	274.8	267.7	298.4
Textile and apparel	101.2	251.9	297.8	236.9	343.7	358.4
Paper and paper products	36.7	91.4	107.6	122.8	144.6	167.8
Transportation equipment	582.2	1213.3	1340.1	1348.3	1593.4	1712.9
Electrical machinery and apparatus	425.1	922.9	1012.7	1102.4	1242.4	1320.1
Communications equipment, computers and other electronic equipment manufacture	686.3	1392.5	1611.7	1811.0	2002.8	2279.9
General and special machinery manufacture	472.2	1161.5	1199.7	1242.8	1333.7	1461.4

Note: 2010 data was from large and medium-sized enterprises; 2011-2018 data was from enterprises above the designated size.

Source: NBS.

Table 36**Clean Coal Technology and Coal Chemical Industry (2018)**

Coal preparation	Raw coal preparation rate in 2018 was 71.8% and 2470 Mt raw coal was washed, saving 264 Mt of coal.
Briquette	Annual production and sales for residential use were more than 100 Mt.
Coal water slurry	Capacity in 2018 was 180 Mt, of which 30 Mt was used for fuel and 150 Mt for the gasification of raw material.
Ultra supercritical thermal power units	In 2018, China had 103 units of 1,000 MW ultra-supercritical power units in operation.
Circulating fluidized bed boilers	In 2018, there was a total capacity of 130 GW. 600 MW supercritical CFBC has been built.
Integrated gasification combined-cycle, IGCC	A 250 MW demonstration plant went into operation in Tianjin in 2012. By 2018, the cumulative generation reached 5.8TWh.
Power plant air pollution control	By 2018, approximately 100% of the coal power installed capacity had desulphurization systems. 98.0% of coal power installed capacity had denitration systems.
Coal chemical industry	In 2018, China used coal to manufacture 2.8 billion m ³ of synthetic natural gas; 12.42 Mt of methanol; 6.175 Mt of oil.

Sources: China Coal Processing & Utilization Association; Coal Industry Clean Coal Engineering Technology Research Center; CEC; CPCIF.

Table 37 Progress of Energy-Saving Technology in Energy-Intensive Industries

	2000	2010	2015	2016	2017	2018	Energy-saving technology
Coal							
Raw coal washing rate (%)	24.3	50.9	65.9	68.9	70.2	71.8	Washing reduces coal consumption by 10%. In 2017, emissions of SO ₂ were cut by 12 Mt.
Tens of millions of ton of coal mine	1	35	57	59	43	61	The production efficiency of a 10-million-ton mine has reached world advanced level.
Electricity generation industry							
Proportion of 300 MW and above 300 MW units in thermal power installed capacity (%)	42.7	72.7	78.6	80.3	88	80.1	In 2017, 1000 MW plants consumed 285.3 gce/kWh while 300 MW consumed 318.5 gce/kWh.
GW ultra-supercritical units	0	33	82	100	104	103	Average coal consumption for electricity generation is less than the average of thermal power by 30gce/kWh
Steel							
Blast furnace pulverized coal injection (kg/t)	118	149	143	142		139	Spray 1t coal instead of coke reduced energy consumption by 90kgce/t
Penetration rate of coke dry quenching (%)	6	80	95	95	95	95	Processing 1Mt red coke saves 100,000 tce in energy.
Electrolytic aluminum							
Proportion of large capacity preroaster in output (%)	52	90	98	98	98	98	Large scale pre-roaster 160kA uses 9% less power than self-roaster.
Chemical industry							
Proportion of caustic soda production by ion exchange membrane (%)	24.9	76	88.4	88.2	83.1	83	Ion exchange membranes saved 123 kWh more for per ton of caustic soda compared with diaphragms.
Petrochemical industry							
Tens of millions of ton of refinery number	4	20	24	24	27	29	Energy consumption per ton was 22% lower than the industry average
Proportion of new dry technique for cement production in cement output (%)	12	80	97	97	98	98	Heat consumption of large-scale new dry process was 40% lower than mechanical shaft kiln
Cement unpackaged rate (%)	28	48.1	58.4	57.9	62.7	66.9	Compared with bagged cement, 100 million t unbagged cement saved 3.3 million m ³ in wood, avoiding the 4.5% rate of bag damage, or 2.37 million tce.
Proportion of floating shaping output in sheet glass output (%)	57	85	88	89	90	98	Full energy consumption in the float process is 16% lower than the Fourcault process

Note: The penetration rate of coke dry quenching is the proportion of coke dry quenching processing capacity in the total coke output.

Sources: China Coal Processing & Utilization Association; CEC; CISA; China Non-ferrous Metals Industry Association; CBMF; China Building Glass and Industrial Glass Association.

Table 38 Comparison of Main Indicators of Coal Industry between China and the US (2018)

	China	US
Raw coal production (Mt)	3683.00	797.00
Coal exports (Mt)	4.93	109.40
Coal imports (Mt)	281.23	5.44
Coal consumption (Mt)	3839.00	624.10
Percentage of coal used in power generation (%)	49.10	92.60
Percentage of production in surface mines (%)	16.30	65.00
Average mining exploitation depth (m)	510.00	90.00
Average coal price on mine (USD/t)	66.10	38.50
Coal mines in operation	5800.00	978.00
Coal industry employees (10,000 people)	350.00	7.40
Raw coal production efficiency (ton per capita each year)	1052.00	10784.00
Coal miners average wage (USD/year)	11088.00	84080.00
Death number of mine accidents	333.00	15*
Death rate of mine accidents (person/Mt)	0.09	0.019*

Note: 1. Commodity coal takes up 86% of raw coal in the U.S.

2. * for 2017.

Source: NBS; China Coal Industry Association; DOE/EIA; National Mining Association.

Table 39**Emissions of Major Pollutants**

Year	PM2.5 (ug/m ³)	SO ₂ (Mt)	NO _x (Mt)	Chemical oxygen demand (COD) (Mt)
2000	22	23.70		14.45
2001		19.48		14.05
2002		19.27		13.67
2003		21.59		13.34
2004		22.55		13.39
2005		25.49		14.14
2006	28	25.89	15.24	14.28
2007		24.68	16.40	13.82
2008		23.21	16.25	13.21
2009		22.14	16.93	12.78
2010		21.85	18.52	12.38
2011		22.18	24.04	25.00
2012		21.18	23.38	24.24
2013	72	20.44	22.27	23.53
2014	61	19.74	20.78	22.95
2015	50	18.59	18.51	22.24
2016	47	17.55	17.77	21.66
2017	43	16.15	16.90	20.99
2018	39	15.07	16.07	20.17

Note: From the beginning of 2011, the COD statistics collection method has changed, thus post-2011 data cannot be directly compared with data collected before 2011.

Source: MEE.

Table 40**CO₂ Emissions in China and the World**

	Total emissions /Mt-CO ₂					2018 Emissions per capita /t-CO ₂
	2010	2015	2016	2017	2018	
China	7530 (8138)	8674 (9534)	8661 (9485)	8737 (9667)	8920 (9869)	6.39
United States	5508	5214	5130	5088	5018	15.33
India	1662	2146	2251	2344	2481	1.85
Russia	1490	1496	1511	1525	1551	10.56
Japan	1182	1197	1181	1177	1150	9.11
Germany	780	754	765	764	717	8.72
South Korea	610	656	665	680	696	13.60
Iran	530	596	599	634	656	8.00
Saudi Arabia	485	587	591	595	571	17.02
Canada	526	530	543	560	555	14.00
EU	3934	3488	3499	3542	3440	6.70
World	31074	32852	33018	33444	33685	4.46

Note: China's emissions were calculated by fossil fuel consumption and its CO₂ emissions factors. CO₂ emissions related to coal consumption are based on commercial coal metrology, the number in the parentheses () represents CO₂ emissions based on raw coal. Commercial coal refers to coal on sale after the process of washing. In 2018, the washing rate of raw coal in China was 71.8%, the share of the removal of waste rock in washed raw rock was 18%. CO₂ emissions calculated by BP in 2010, 2015, 2016, 2017, and 2018 were 8105 Mt, 9163 Mt, 9114 Mt, 9233 Mt, and 9420 Mt respectively.

Sources: BP Statistical Review of World Energy, June 2019.