

Summary of statistic data in China energy and power sectors in 2020

March 2021



Energy consumption continues to transform

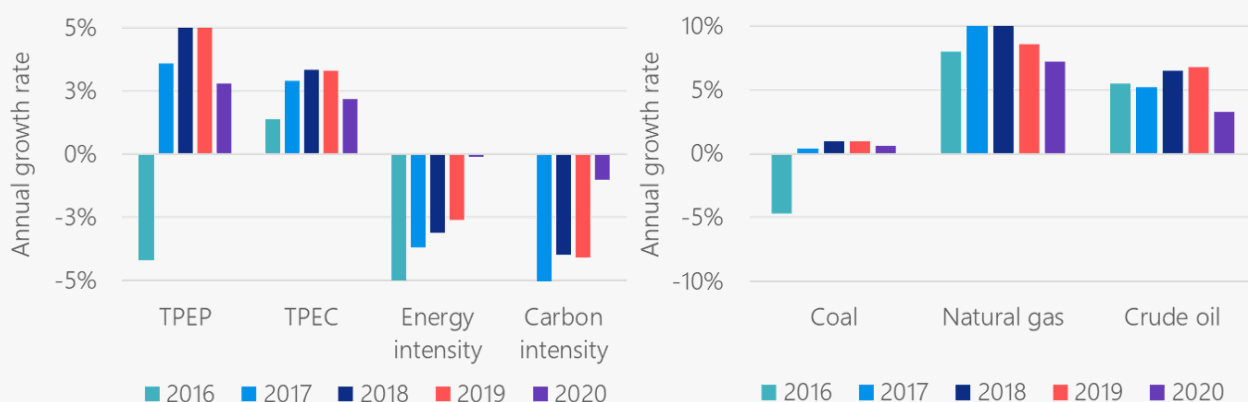
Under the impact of the COVID-19 epidemic, China's GDP still achieved a growth rate of 2.3% in 2020. The share of the tertiary industry in the national industrial added value further raised from 53.9% to 54.5%, accounting for the largest proportion. The proportion of the primary industry increased slightly to reach 7.7%, while the proportion of the secondary industry continued to decline to 37.8%. In the energy sector, according to preliminary calculations, the total energy consumption was 4.98 billion tons of coal equivalent (tce), increasing 2.2% over the previous year, and the share of coal further dropped from 57.7% to 56.8%. The growth rate of fossil fuel energy consumption has slowed down, with the growth rates of coal, natural gas and crude oil being 0.6%, 7.2% and 3.3% respectively. Affected by the decline in GDP growth, energy intensity (energy consumption/RMB 10,000 GDP) decreased by 0.1%, a decrease of 2.5 percentage points year-on-year; carbon intensity (carbon dioxide emissions/RMB 10,000 GDP) decreased by 1.0%, 3.1 percentage points lower than that in 2019. [1,10]



During the 13th Five-Year Plan period, the average annual growth rate of national primary energy consumption reached **2.6%**.

During the 13th Five-Year Plan period, China's energy consumption grew steadily. The energy consumption elasticity coefficient remained within a reasonable range of 0.4 to 0.6 during 2017-2019, reflecting the government's strategy of implementing high-quality energy development. The increase in coal consumption in power, steel, and chemical industries has led to a rebound in coal consumption across the country, which is generally at a peak level. As the domestic crude oil processing volume continued to increase, oil consumption continued to grow. Benefitted from the implementation of policies such as clean heating, natural gas consumption witnessed explosive growth. However, with the decline of subsidies for replacing coal with gas and the decline in the on-grid tariff for gas-fired power plants, the growth rate dropped significantly in the late 13th Five-Year Plan period.

2016-2020 Annual growth rate of of TPEP, TPEC, energy intensity and carbon intensity (left); 2016-2020 Annual growth rate of coal, natural gas and crude oil consumption (right)



Notes: TPEP refers to total primary energy production; TPEC refers to total primary energy consumption; energy intensity refers to energy consumption per RMB 10,000 GDP; carbon intensity refers to CO₂ emission per RMB 10,000 GDP.

Source: National Bureau of Statistics (NBS), accessed in March 2021



Fossil fuel production continues to grow

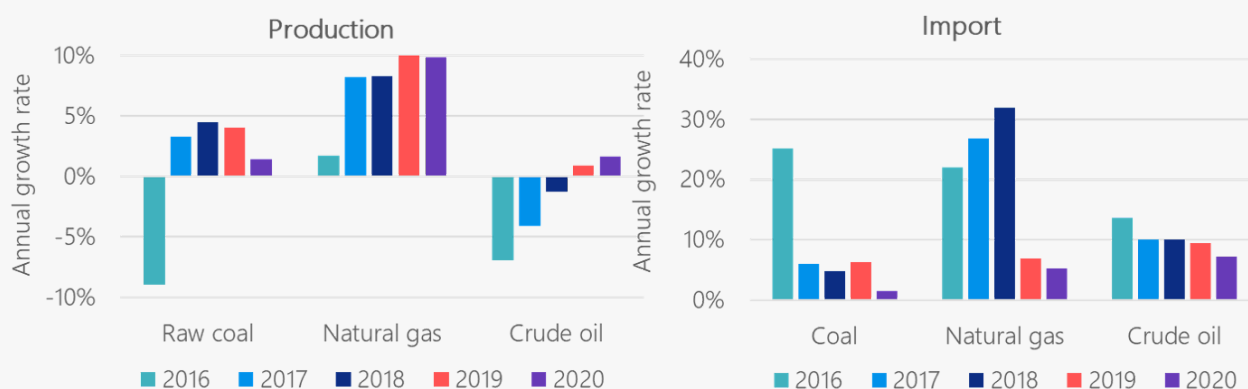
In 2020, China's total primary energy production reached 4.08 billion tce, an increase of 2.8% year-on-year, and the growth rate has slowed down. Among these, the annual production of raw coal reached 3.9 billion tons, a 1.4% year-on-year increase, and the import of coal increased to 304 million tons, a 1.5% increase compared to 2019. Natural gas production increased by 9.8% to 193 billion cubic meters and the import of natural gas increased by 5.3%. The domestic crude oil production increased by 1.6% in 2020 to 195 million tons, while the import of crude oil grew by 7.3%. [1]

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During the 13th Five-Year Plan period, the average annual growth rate of national primary energy production reached **2.5%**.

During the 13th Five-Year Plan period, the structural reform of coal production ^{a)} has been further promoted. While shutting down the outdated small coal mines, coal mining has become further concentrated in areas with high-quality coal resources. The government has also strengthened the exploration and exploitation of petroleum and gas resources: natural gas production has increased by more than 10 billion cubic meters for four consecutive years, and the dependency on importing resources is gradually stabilized; net increase of crude oil production has turned from negative to positive, and the growth rate of foreign dependence has gradually declined.

2016-2020 Annual growth rate of coal, natural gas and crude oil production (left) and import (right)



Source: National Bureau of Statistics (NBS), accessed in February 2021

a) China's raw coal production capacity is relatively large, while the structure is unreasonable before the 13th Five-Year Plan period. The small-scale and inefficient production capacity accounted for a relatively large proportion, and the contradiction between regional supply and demand was obvious.



Further slowdown in the electricity consumption growth

Despite the impact of the COVID-19 epidemic, China's power consumption in 2020 has turned from negative to positive in the second quarter of the year with the resumption of work and production. In the second half of the year, the demand for electricity consumption of the whole society returned to normal because of the steady recovery of economy. The annual electricity consumption reached 7,510 TWh, with the growth rate further declined to 3.1% (9.1% in 2018, 5.0% in 2019). [3]

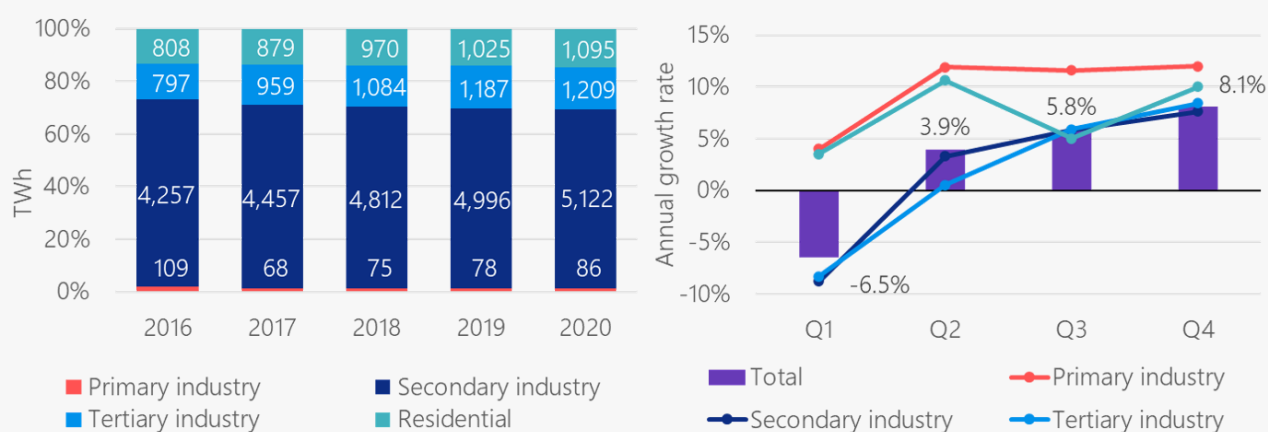
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During the 13th Five-Year Plan period, the average annual growth rate of national electricity consumption reached **5.7%**.

Thanks to the rural electrification and the upgrading and retrofit of rural power grids, the growth rate of electricity consumption in the primary industry was 10.2%, an increase of 5.7 percentage points from 2019. While the secondary and tertiary industries were more affected by the epidemic. The growth rate of electricity consumption of the secondary and tertiary industry in 2020 was 2.5% and 1.9% respectively, which witnessed decline compared with 2019. In this context, the electricity consumption of the high-tech and equipment manufacturing industries in the secondary industry both grew by more than 10% in the third and fourth quarter of the year, reflecting the high-quality development of China's industry. The telecom, software and IT industries in the tertiary industry have achieved an annual electricity consumption growth rate of 23.9% because of the rapid growth of online service.

In addition, affected by the weather of hot summer and severe cold winter, the annual growth rate of residential electricity consumption increased from 5.7% in 2019 to 6.9% in 2020. [2,3] During the 13th Five-Year Plan period, the average annual growth rate of electricity consumption was obviously higher than that of energy consumption, implying the electrification level has been continuously increasing.

2016-2020 Power consumption by sector (left) and 2020 power consumption growth rate by sector (right)



Source: China Electricity Council (CEC), accessed in February 2021



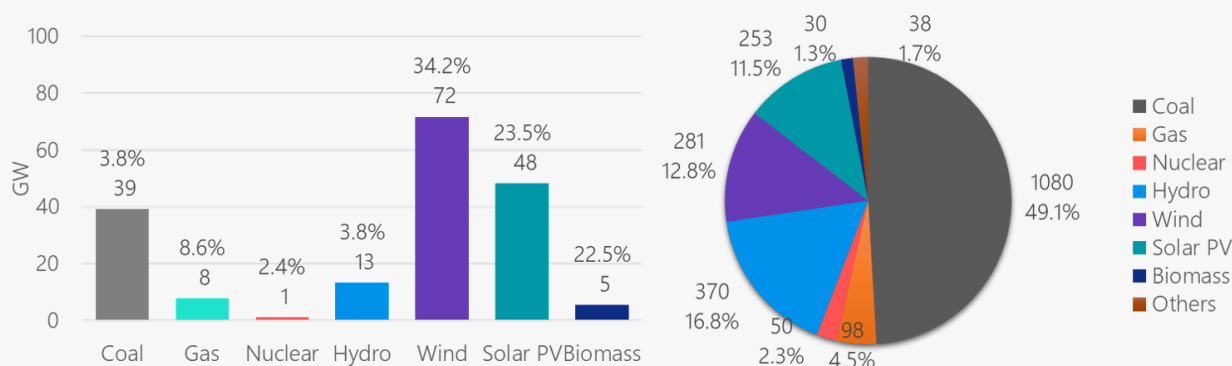
Newly installed capacity of wind power and solar PV reaches record peak

By the end of 2020, China's total installed power generation capacity reached 2,201 GW, with a year-on-year increase of 9.5%, which is 3.7 percentage points higher than that in 2019. Non-fossil fuel accounted for 44.7%, increased 2.7 percentage points from 2019. Renewable energy accounted for 72.8% of newly installed capacity, and cumulative installed capacity reached 934 GW, making an increase of 17.5% year-on-year. Therefore, although coal power generation capacity increased by 39 GW, its share in total installed capacity fell below 50% (49.1%) for the first time. [4,5,8]

” During the 13th Five-Year Plan period, the average annual growth rate of national installed capacity reached **7.6%**.

Wind power and solar PV development both shown a blowout growth in 2020. The central government no longer provides subsidies for new wind power projects from 2021. Therefore, the rush to install wind power has led to 72 GW of newly installed capacity throughout the year of 2020, hitting the highest point in history. The ratio of newly installed wind power capacity of the Three-North Region to the central-east region is 6:4. The total installed capacity of wind power reached 281 GW, of which onshore wind power was 271 GW and offshore wind power was 9 GW. [5] Inner Mongolia (13.4%), Xinjiang (8.4%) and Hebei (8.1%) ranked the top three. [6] The National Development and Reform Commission (NDRC) also issued a policy clarifying that the delayed grid connection of solar PV projects will be reduced or eliminated in subsidies, resulted in rapid construction of solar PV projects. In 2020, the newly installed solar PV capacity was 48 GW, bringing the total installed capacity to 253 GW. [5] Among which, 174 GW was utility-scale PV and 78 GW was distributed PV. [7]

2020 Incremental installed power capacity and year-on-year growth rate by fuel (left); 2020 installed capacity in GW by fuel and share (right)



Source: data of coal, gas and nuclear from CEC, January 2021; data of hydro, wind and solar PV from the National Energy Administration (NEA), January 2021; the others is calculated.

Non-hydro renewable power generation exceeds 10%

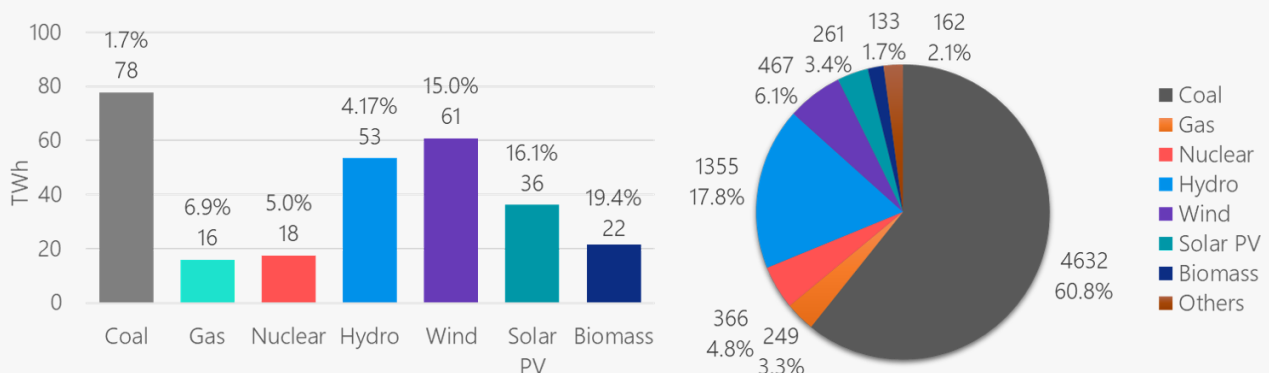
In 2020, the power sector in China generated 7,624 TWh, up 4.0% compared to 2019 (this figure includes own consumption at the power plants). The share of non-fossil fuel power reached 33.9%, a year-on-year increase of 1.2 percentage points. The growth rate of wind power, solar PV and biomass power generation all exceeded 15%, and the total power generation accounted for 11.3%. At the same time, the proportion of coal power generation dropped to 60.8%. [4,5,8]



During the 13th Five-Year Plan period, the average annual growth rate of national power generation reached **5.8%**.

In terms of power generation efficiency, the national average utilization hours continued to fall, reaching 3,758 hours in 2020, a decrease of 70 hours year-on-year. Among them, coal power has the largest drop of 89 hours. [3] Though the utilization hours of wind power and solar PV also declined slightly, the curtailment rates remained low. The wind curtailment rate in 2020 was 3%, decreased 1 percentage point from 2019. The wind curtailment rate in Xinjiang, Gansu and west Inner Mongolia dropped significantly year-on-year. The solar curtailment rate was 2%, the same as in 2019. The solar PV curtailment rate in Northwest China, where the problem of solar PV consumption is more prominent, dropped to 4.8%, with a year-on-year decrease of 1.1 percentage points. [5]

2020 incremental power generation and year-on-year growth rate by fuel (left); 2020 total power generation in TWh by fuel and share



Source: data of coal, gas and nuclear from CEC, January 2021; data of hydro, wind and solar PV from NEA, January 2021; the others is calculated.

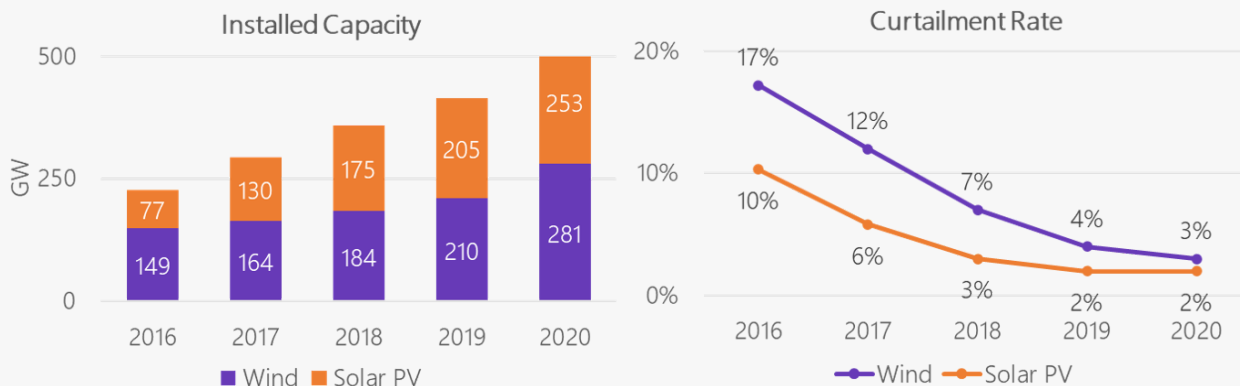
Assessment of renewable power development with focus of wind power and solar PV



Review of the 13th Five-Year Plan period

Renewable power experienced rapid expansion in the 13th Five-Year Plan period and played a significant role in the transition to clean energy supply. The cumulative installed capacity of non-hydro renewable power at the end of the 13th Five-Year Plan was three times that at the end of the 12th Five-Year Plan period, and the proportion of power generation increased from 5% to 11.5%. The capacity expansion and the upgrading of technology are benefited from feed-in tariff subsidies on the one hand, and from the pressure of subsidy decline on the other. The government has also issued a number of policies aimed at reducing wind and solar curtailment to implement a high-quality development strategy. China's renewable energy support policy has begun to transform in 2019, and has gradually shifted from a purely supply-side incentive to a consumer-side responsibility.

2016-2020 Wind power and solar PV installed capacity (left); 2016-2020 Wind power and solar PV curtailment rates (right)



Source: NEA, accessed in March 2021



Outlook of the 14th Five-Year Plan period

It is estimated that in 2021, the newly installed capacity of wind power and solar PV will reach 70-100 GW. Among which, the newly-added wind power is mainly the onshore projects approved in 2019-2020 and the offshore projects approved during the 13th Five-Year Plan period; the newly-installed solar PV is the subsidized projects through bidding in 2020, subsidy-free projects approved in 2019-2020, and household solar PV projects approved in 2021. According to the government's renewable power consumption target, during the 14th Five-Year Plan period, the growth of renewable power installed capacity will be significantly higher than that of the 13th Five-Year Plan period.

” At the end of the 14th Five-Year Plan period, the total installed capacity of renewable power is expected to reach about **1,000 GW**.

In order to connect large-scale wind power and solar PV projects to the grid, the government is expected to make arrangements as soon as possible in terms of power system construction, supply-side operations, power-consuming methods, and corresponding policies. In addition, in the first quarter of 2021, NEA issued two policy drafts for soliciting opinions, reflecting the development direction of wind power and solar PV policies of the 14th Five-Year Plan period. For the details of the policies, please refer to the *China Energy Policy Newsletter - March 2021*.

01 Under the “30-60-carbon-target”, to determine the renewable power development strategy and targets, and implement them through the mandatory renewable power consumption mechanism;

02 All provinces equally bear the responsibility of renewable power consumption, that is, the proportion of renewable power consumption target of each province in 2030 is the same, and the annual increase percentage of non-hydro renewable power consumption target in the period of 2022-2030 is the same; [11]

03 To achieve nationwide subsidy-free available of wind power and solar PV. The central government mainly plays a role in the macro level of planning, strategy, and market environment evaluation, while the local government plays a leading role in promotion of renewable power development, such as project development and grid-connected capacity improvement;

04 Promote marketization. New projects will be determined by participating in feed-in tariff bidding or project developers can voluntarily reduce determined subsidies for existing projects in order to increase capacity approved for new projects. [12] After the project is put into operation, all projects will gradually participate in the power market, while the specific model is still under development.

Appendix - 2020 China energy and power datasheet

| | Amount Data | Year-on-year | Amount Reference | Year-on-year |
|--------------------------------------|----------------|--------------|----------------------|------------------|
| Energy consumption | | | | |
| Total (billion tce) | 5.0 | 2.2% | [1] | [1] |
| Coal (billion tons) | 4.0 | 0.6% | [1][9][10]calculated | [1] |
| Natural gas (billion m3) | 328 | 7.2% | [1][9][10]calculated | [1] |
| Crude oil (million tons) | 695 | 3.3% | [1][9][10]calculated | [1] |
| Energy production | | | | |
| Total (billion tce) | 4.1 | 2.8% | [1] | [1] |
| Raw coal (billion tons) | 3.9 | 1.4% | [1] | [1] |
| Natural gas (billion m3) | 193 | 9.8% | [1] | [1] |
| Crude oil (million tons) | 195 | 1.6% | [1] | [1] |
| Energy import (million tons) | | | | |
| Coal | 304 | 1.5% | [1] | [1] |
| Natural gas | 102 | 5.3% | [1] | [1] |
| Crude oil | 540 | 7.3% | [1] | [1] |
| Electricity consumption (TWh) | | | | |
| Total | 7511 | 3.1% | [4] | [4] |
| Primary Industry | 86 | 10.2% | [4] | [4] |
| Secondary Industry | 5122 | 2.5% | [4] | [4] |
| Tertiary Industry | 1209 | 1.9% | [4] | [4] |
| Residential | 1095 | 6.9% | [4] | [4] |
| Power installed capacity (GW) | | | | |
| Total | 2201 | 9.5% | [4] | [4] |
| Thermal * | 1216 | 4.3% | [4][5]calculated | [4][5]calculated |
| of which coal | 1080 | 3.8% | [8] | [8] |
| of which gas | 98 | 8.6% | [8] | [8] |
| Nuclear | 50 | 2.4% | [4] | [4] |
| Hydro | 370 | 3.8% | [5] | [5]calculated |
| of which pumped storage | 31 | 4.0% | [5] | [5][8]calculated |
| Wind | 281 | 34.2% | [5] | [5]calculated |
| of which onshore wind | 271 | 33.6% | [5] | [5]calculated |
| of which offshore wind | 9.0 | 51.5% | [5] | [5]calculated |
| Solar PV | 253 | 23.5% | [5] | [5]calculated |
| of which utility-scale solar PV | 174 | 23.1% | [7] | [5][7]calculated |
| of which distributed solar PV | 78 | 24.8% | [7] | [5][7]calculated |
| Biomass | 30 | 22.5% | [5] | [5]calculated |
| Non-fossil fuel | 984 | 16.6% | [4][5]calculated | [4][5]calculated |
| Renewable energy | 934 | 17.5% | [5] | [5] |
| Share of non-fossil fuel | 44.7% | 2.7 pct | [4][5]calculated | [4][5]calculated |
| Share of renewable energy | 42.4% | 2.9 pct | [4][5]calculated | [4][5]calculated |
| Power generation (TWh) | | | | |
| Total | 7624 | 4.0% | [4] | [4] |
| Thermal * | 5042 | 2.2% | [4][5]calculated | [4][5]calculated |
| of which coal | 4632 | 1.7% | [8] | [8] |
| of which gas | 249 | 6.9% | [8] | [8] |
| Nuclear | 366 | 5.0% | [4] | [4] |
| Hydro | 1355 | 4.1% | [5] | [5] |
| Wind | 467 | 15.0% | [5] | [5] |
| Solar PV | 261 | 16.1% | [5] | [5] |
| Biomass | 133 | 19.4% | [5] | [5] |
| Non-fossil fuel | 2581 | 7.9% | [4][5]calculated | [4][5]calculated |
| Renewable energy | 2215 | 8.4% | [5] | [5] |
| Share of non-fossil fuel | 33.9% | 1.2 pct | [4][5]calculated | [4][5]calculated |
| Share of renewable energy | 29.1% | 1.2 pct | [4][5]calculated | [4][5]calculated |
| Utilization hours (hours) | | | | |
| National | 3758 | -70 | [3] | [3] |
| Thermal | 4216 | -92 | [3] | [3] |
| of which coal | 4340 | -89 | [3] | [3] |
| of which gas | 2618 | -28 | [8] | [8] |
| Nuclear | 7453 | 59 | [3] | [3] |
| Hydro | 3827 | 130 | [3] | [3] |
| Wind | 2073 | -10 | [3] | [3] |
| Solar PV | 1281 | -10 | [3] | [3] |
| Curtailment | | | | |
| Wind | 3.0% | -1 pct | [5] | [5] |
| Solar PV | 2.0% | unchanged | [5] | [5] |

Notes: *The figure of thermal power is revised as CEC's thermal power - NEA's biomass power because CEC's thermal power data includes biomass.

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