China's Power Industry Milestones

1879-2008

- In 1879, Shanghai Public Concession installed 10 hp DC generating units, which started the electric light age in China.

- In 1882, the first public electricity company in China—Shanghai Electric Company was built and a power plant equipped with 16 hp steam engine generating units was built up in Shanghai. Poles and lines were also constructed from Shanghai Waitan to China Investment Bureau, and 15 arc lights were installed. It was at this moment that electric energy application started in China.

- In 1888, a generator of 15kW was built in Beijing for the Qing Imperial Palace.

- In 1890, the first Chinese company for public utility of electricity — Xingshi Company was built. The history of incandescent light also initiated from here.

- From 1890, public electricity service companies mushroomed in Shanghai, Tianjin, Hankou, Guangzhou, Beijing etc.

- In 1902, Dalian Power Plant was built in Tianjin in northeast China, followed by two other power plants built in Harbin, in 1905.

- In 1903, Qingdao Electric Lights Factory was built in Qingdao, with an installed

Upperleft: the 15 lighting arc lights at 7 o’clock on July 26, 1882 (the dotted area )
Lowerright: one of the lighting arc lights standing on the Waibaidu Bridge in Shanghai in 1887
capacity of $2 \times 272\text{kW}$ and drive force from steam engine.

- In 1908, power plants were set up in Fushun, Fengtian (today’s Shenyang) and in Changchun in 1910.

- In early 20th century, electric enterprises were established in Changsha, Ningbo, Shanghai, Beijing, Hankou, Kunming, Guangzhou, Suzhou, Hangzhou etc. Most of the enterprises are small in scale and low in developing speed.

- By 1911, capacity of generating equipments with Chinese capital was only 12,275kW, among which, 3,035kW was from the Chinese Metropolitan Electric Lights Company.

Lujiawan Diesel Power Plant of Shanghai French Electric Trams and Lights Company, which had 9 generating units installed with a capacity of 518,000 kW by the end of 1936.

- In 1912, Shilong Dam in Yunan Province (with $2 \times 240\text{kW}$ generating units), the first hydraulic station in China went into operation. Its construction started from 1910.

Close view of the $2 \times 240\text{kW}$ generating unit in Shilong Dam in Yunan Province, the first hydraulic generating unit in China.

- In 1913, the 4,000 kW riverside power plant (present name “Shanghai Yangshupu Power Plant”) in Shanghai was built.
Shanghai Yangshupu Power Plant in Shanghai in 1913. By 1936, it had an installed capacity of 1,835,000 kW, the largest thermal power plant in both China and Asia.

Inside of the Shanghai Yangshupu Power Plant

- In 1919, Daguan Power Plant (100,000 kW) and Jugong power plant (43,500 kW) as well as an electric power system of 154 kV from north to south were built. At the same time, the Taiwan Electric Company was set up, the generating capacity of 320,000 kW by late 1945.

- In 1929, Construction Commission in charge of electric industry with a National Electric Industry Guiding Committee was organized for making electric statues and promulgating standards of voltage and frequency.

- In 1935, Resource Commission was launched within the Military Council and began to survey the hydraulic electricity and prepare the organization of power plant.

- In 1934, Manchu Electric Company was built.

- In early 1938, the Construction Commission, Resource Commission, National Economic Commission and the Ministry of Trade and Industry were reorganized into Ministry of Economy, under which was Resource Commission in charge of state-run electric enterprises.

- In 1938, the Mongolia and Sinkiang Electric Company was established.

- In 1940, North China Electric Company was constructed in Beijing.

- In 1941, the 77kV transmission lines between Tianjin and Tanggu were constructed,
followed by the 77 kV lines between Beijing and Tianjin, Nanyuan Substation and Tanggu to Tangshan.

- From 1941 to 1942, the 220 kV transmission lines, the highest voltage transmission lines in China, between Shuifeng to Anshan, Shuifeng to Andong and Dalian were first presented in China, helping to form the rudiments of Northeast China Grid.

- In 1944, 77kV power grid in Beijing-Tianjin-Tangshan Area began to take shape.

- In 1945, Shuifeng, Fengman, Jingbo Lake power plants were constructed, among which, Shuifeng Power Plant was with a capacity of 100,000 kW, which together with the Grand Coulee Hydroelectric Power Station tied for the largest units in the world. Fushun Power Plants and Fuxin Power Plants had a respective capacity of 285,000 kW and 160,000 kW after being expanded and rebuilt. Two units with capacity of 53,000 kW were the largest thermal power plant in the world.

- In 1947, a 180t/h high-pressure and high-temperature boiler and a 17,650 kW backpressure steam turbine were constructed in Yangshupu Power Plant, which was the first high factor thermal power unit in China.

- By 1949, the national generating capacity was only 1,850,000 kW, and generation output was 4.3 billion kWh, with a per capita of 9 kWh. The installed capacity and the output ranked respectively 21st and 25th in the world list. At that time, the Beijing-Tianjin-Tangshan area power grid was of a 77kV except for only one 220 kV line and several 154 kV lines in the North China and 154 kV lines in Taiwan.

- In March 1951, construction project of Gutianxi Grade 1 Hydropower Station with an installed capacity of 62,000 kW—the first cascade power station in China was launched.

- On Sept. 17th, 1952, the first 25,000 kW steam turbine generating units were successfully installed in Fuxin Power Plant.

- In 1952, Heilongjiang Fulaer Thermal Power Plant construction project started and
was put into operation in 1955. It was the first high temperature and high pressure thermal power plant.

An overview of the Heilongjiang Fulaer Thermal Power Plant.

- In 1953, the first 220 kV line of Songhu, Songli Transmission and Transformation Project went into operation. Later, 17 inter-province and provincial grid of 220kV were formed.
- In Jan. 1955, the first 12,000 kW units were put into operation in Taiyuan No.1 Thermal Power Plant, the first leading power plant of heat and electricity co-generation.

An overview of the Phase 1 project of Taiyuan No.1 Thermal Power Plant.

- On July 30th, 1955, the Ministry of Electric Power of P.R.C was established.
- In Feb. 1956, the first domestic 6,000 kW steam turbine generator units was installed and put into operation in Tianjiaan Power Plant in Huainan of Anhui Province.
In 1957, the Liaoning Power Plant was built, with total capacity of 1,050,000 kW. In 1960s, this power plant was the largest in Asia.

In Feb. 1958, the Ministry of Electric Power and Ministry of Water Resources were combined into Ministry of Water Resources and Electric Power.

On Oct. 29th 1958, the first domestic double water cooling steam turbine generator units with a capacity of 12,000 kW began to be put into service in Nanshi Power Plant in Shanghai.
• In Aug. 1959, the first 25,000 kW generating unit was put into service in Baotou No.1 thermal power plant, whose total capacity is 412,000 kW.

The 412,000 kW Baotou No.1 Thermal Power Plant.

• In Sept. 1960, the first 50,000 kW double water cooling steam turbine generator unit was put into service in Zhabei Power Plant in Shanghai.

A close view of the first double water cooling steam turbine generator units of 50,000 kW in Zhabei Power Plant in Shanghai.

• In 1960, Xinanjiang Hydraulic Power Station was built and put into operation. It was the first 662,500 kW hydraulic power station in the China.

• In 1966, the Qinghe Power Plant with an installed generating capacity of 1,300,000 kW was built. It was the first million kW class thermal power plant in China.

An overview of the Qinghe Power Plant—the first million kW class thermal power plant in China.
• In 1967, the first domestically made generating units of 100 MW were put into service in Beijing Gaojing Power Plant.

A close view of the first domestically made 100,000 kW high pressure steam turbine generating unit in Beijing Gaojing Power Plant.

• In March 1969, Liujiaxia Hydraulic Power Station with an installed power generating capacity of 1,255,000 kW was completed and put into operation. It was the first million kW class hydraulic power plant in China. Its construction was from Sept. 1958.

Liujiaxia Hydraulic Power Station.
• On Sept. 21, 1969, the first 125 MW super high pressure steam turbine generating units were put into operation in Shanghai Wujing Power Plant.

A close view of the first 125 MW super high pressure steam turbine generating units in Shanghai Wujing Power Plant.

• In 1972, the first home-made 200,000 kW super high pressure steam turbine generating units were put into service in Liaoning Chaoyang Power Plant.

A close view of the first home made 200,000 kW super high pressure steam turbine generating units in Liaoning Chaoyang Power Plant.
In June 1972, Gansu Qinan Substation, the first 330kV hub substation, was built and put into service.

An overview of the Gansu Qinan Substation, the first 330 kV hub substation.

In 1972, the first 534 km long Liujiaxia- Tianshui (in Gansu Province)-Guanzhong (in Shanxi Province) super high voltage transmission and transformation project was completed, which uplifted the top high voltage to 330 kV, greatly contributing to the formation of the 330 kV Northwest China grid frame.

In April 1973, the first home-made 200MW units started working in Chaoyang Power Plant in Liaoning Province.

In Nov. 1974, the first domestic 300 MW unit was put into service in Wangting Power Plant in Jiangsu province.

An overview of the Wangting Power Plant in Shanghai.

By 1978, China’s generating installation reached a new high—57, 120MW, and the output was 256.65 billion kWh, respectively 29.9 times and 58.7 times more than those in 1949, with respective increase rates of 12.8% and 15.1%. Installation capacity and power generation output ranked respectively 8th and 7th in the world. The electric grid was also developed in scale, with the 535km long 330 kV line and 22, 672 km long 220 kV line completed and transforming equipment of 490 MVA and 24, 790 MVA. The largest electric grid was the Northeast China Grid with a capacity as
much as 7,588,200 kW.

- In 1978, the first 9 km long DC transmission experimental line—a 31 kV and 150 A distribution cable was put into service in Shanghai.
- In 1978, standard coal consumption fell from 930g / kWh in 1950 to 434g / kWh.
- From 1970s, over 10 tide power stations were built. These stations include Jiangsha Tide Power Station (2000 kW), Baishakou Tide Station (960 kW) and Yangbajing Geothermal Power Station in Tibet.
- In Feb. 1979, the Ministry of Water Resources was revoked and Ministry of Electric Power Industry was established.
- From 1979, China had 5,000,000 kW generating units put into service each year on average.
- In 1981, the first 595 km long 500 kV line from Pingdingshan in Henan Province to Wuhan in Hubei Province was completed.
- In 1985, North China Electric Power College made the first thyristor advanced static var generator (ASVG), a sample machine for experiment.
- By 1987, China had a total generating capacity of over 100 GW. Later, electric construction entered a wholly new situation—from 1988, China had kept a yearly increase of over 100 GW in generating capacity.
- In 1989, the first home-made 600MW generating units went into service in Pingyu Power Plant in Anhui Province.
- Also in 1989, China completed the first ±500kV DC distance transmission line over large area—Geshang Line.
- On Nov. 1 1993, Power Grid Dispatch Management Statue came into effect.
- In Nov. 1993, the world’s largest hydropower project—the Three Gorge Water Conservancy Hub Project was started.
- In 1994, Zhejiang Qinshan Nuclear Power Station and the Guangdong Daya Bay Nuclear Power Station with imported equipments were constructed, which put an end to the non nuclear history in the mainland.
Qinshan Nuclear Power Station in Zhejiang Province.

Daya Bay Nuclear Power Station in Guangdong Province

- In 1995, the total generation capacity was over 200 GW.
- In 1996, Electric Power Law of P.R.C. and Power Supply and Use Statue were implemented nationwide.
- In 1996, China had a generation capacity ranking the second in the world, becoming a great producer and consumer in the world.
- In 1996, the China Electric Power Research Institute, together with Tsinghua University, Shanghai Jiaotong University, South East University and Northeast Electric Power Bureau embarked on a joint research project on TCSC with the support of National Natural Science Foundation.
- In 1997, the power plant of the highest altitude in Asia—the Tibet Yangzhuoyong Lake Hydraulic Power Plant was built and started its service.
- In March 1999, China’s first 20MVA STATCOM equipment developed by Tsinghua University and Henan Electric Power Bureau was put into operation in Chaoyang 220 kV Substation in Luoyang, Henan Province, marking a new stage of the development of FACTS technology in China.
- In 1990s, for the first time, limestone wet flue desulphurization device was installed in the two 360MW units in Chongqing Luohuang Power Plant; Sichuan Neijiang
Power Plant introduced the first 100 MW circulating fluid bed boiler and conducted many types of commercial desulphurization experiments. In the mean time, room pressure circulating fluid bed demonstrate project was constructed in Sichuan Baima Power Plant, research on the pressurized circulating fluid bed was carried out in Dalian Taishan Power Plant and Jiangsu Jiawang Power Plant and early stage work of Integrated Gasification Combined Cycle (IGCC) demonstration project was started in Shandong Yantai Power Plant. All these efforts mark significant progress in China’s environment protection.

- In 2000, the world’s largest pumped storage hydropower station—Guangzhou Pumped Storage Hydropower Station with an installed generating capacity of 2,400,000 kW was built.
- By 2001, new type of resources and renewable resources generation capacity reached 360,000 kW.
- In 2001, 220kV and above transmission lines reached a length of 169,849 km, and a transmission capacity of 472,840 MVA, 7.3 times and 18.7 times respectively than 1978.
- On January 8th 2003, Lingao Nuclear Power Station with two 990,000 kW units, was built and went into operation. It was the second largest nuclear power station in Guangdong since the Daya Bay Nuclear Power Station.
- In July 2003, the ±500 kV DC transmission project connecting the Three Gorge and Changzhou was started. It was a 860 km long line with a transmission capacity of 3 million kW. It was the longest DC transmission project with largest transmission capacity in the world.
- On Sept. 20 2003, the 210 km tie line between the north China Grid to the central China Grid was completed, which also marked the beginning of networking of the north China Grid, northeast China Grid, central China Grid and Sichuan-Chongqing Grid.
- In April 2004, the first 35kV/2kA superconductive cable system was put into operation at Puji 220kV substation in Kunming, Yunnan province.
- On June 6 2004, ±500 kV DC transmission project from the Three Gorge to Guangdong went into operation
- On July 16th 2004, ±500 kV DC transmission project from Guizhou Province to Guangdong Province went into operation, marking the new pattern of the west-to-east electricity diverting featuring five AC lines and three DC lines.
- On Nov. 18th 2004, the 500 kV Jiangyin Grand Span Project over Yangtze River was completed and put into operation. The span tower was 346.5 m high, the highest transmission tower in the world.
- On Nov. 23 2004, No.1 unit of Qinbei Power Plant of China Huaneng Group Corporation—the first 6,00MW super critical coal generation unit was put into
operation after a successful trial operation for 168 hours, marking a new stage of power station equipment manufacturing level and electric industry equipment level.

- On Dec. 2004, the home-made 220 kV Thyristor Controlled Series Compensator (TCSC) demonstrate project with a capacity of 94Mvar, and a compensation degree of 50% went into operation in Chengbi 220 kV line in Gansu Province, making China the fourth country completely mastering the TCSC technology with an exclusive intellectual property right.

![The home-made 220 kV 94Mvar TCSC demonstrate project in Gansu Province](image)

- In 2004, the national installed generating capacity exceeded 400 GW.
- On 28th April 2005, the first 600MW straight air-cooling unit was put into service.
- In July 2005, the Lingbao back-to-back Converter station, the first back-to-back inter-network project was put into operation and the rated capacity is 360MW.
- On Sept. 26th 2005, the 750 kV demonstrate transmission and transformation project from Guanting in Qinghai Province to east Lanzhou in Gansu Province—the first 750 kV extra high voltage transmission project, was officially put into operation.

![Guanting—east Lanzhou transmission and transformation project, the first 750 kV transmission and transformation demonstrate project](image)
A night view of the 750 kV transformation power station in east Lanzhou

- On Dec. 30th 2005, the 110 kV transmission line (Qinghai part) along Qinghai-Tibet Railway was put into operation. It was the highest and longest transmission line in the world with altitude above 3000 meters.

The highest and longest transmission line in the world—the 110 kV transmission line along the Qinghai-Tibet Railway

- On Feb. 28 2006, the first ±50Mvar STATCOM was put into service on 500kV substation in Shanghai power grid.

- On May 20th 2006, the Three Gorge Dam, the core part of the Three Gorge Water Conservancy Hub Project, was completed. The installed generating capacity is 18,200MW in 2008, and is expected to be 22,400MW in 2009.

The completed Three Gorge Water Conservancy Hub Project
A bird view of the Three Gorge Water Conservancy Hub Project

- On July 3 2006, the 500 kV series compensation equipments in Sanpu in Xuzhou province was put into operation. This project was the first domestic 500 kV series capacitive compensation equipments granted exclusive intellectual property right, making China the fourth country in the world which can make 500 kV extra high voltage series capacitive compensator independently.

The 500 kV series compensation equipments in Sanpu in Xuzhou province

- On Nov. 18th 2006, No.1 unit of Zhejiang Yuhuan Power Plant of China Huaneng Group Corporation was put into service. It was the first home-made ultra super critical units of million kW class in China.

- In Aug. 2006, the 1000kV AC transmission and transformation test and demonstration project was started, from Jindongnan, Nanyang to Jingmen and about 650km long, which will be put into operation at the end of 2008.

- On Dec. 4th 2006, No. 7 unit, another home-made ultra super critical units of million kW class went into service in Shandong Zouxian Power Plant of China Huadian Group Corporation, which together with the No.1 unit started in Zhejiang Yuhuan Power Plant of China Huaneng Group Corporation in Nov. 18th marked the new era of the overall industrial technological and equipment level as well as manufacturing capacity in China’s electric industry.
• On Dec. 19 2006, Yunnan-Guangdong ±800 kV ultra high voltage DC transmission demonstration project was launched in Chuxiong in Yunnan Province. This project was the first ±800 kV ultra high voltage class DC transmission project in the world, and the DC transmission project with the highest voltage class.

• On May 12 2007, the Vietnam 220 kV Laojie series capacitive compensator was put into operation. It was the first foreign series capacitive compensation project China had undertook, marking China’s first entry into the world market in this field.

![The Vietnam 220 kV Laojie series capacitive compensator](image)

• On Oct. 23 2007, the Yifeng 500 kV TCSC project was put into service. It was the TCSC project featuring largest capacity, most complicated system and worst operation environment in the world.

![The Yifeng 500 kV TCSC project](image)

• On Dec. 21st 2007, Sichuan-Shanghai ±800 kV ultra high voltage DC transmission demonstration project was started.

• On April 2 2008, the first of the eight series capacitive compensator of Hunyuan 500 kV series capacitive compensation project was put into service. This project was the project with most sets, largest size and most add-up capacity in the world.
Hunyuan 500 kV series capacitive compensation project