



● MAY 2022

CHINA ENERGY POLICY NEWSLETTER

Boosting Renewable Energy as Part of China's Energy Revolution

1. China Energy Transition Updates

The 14th Five-Year Plan for energy technology innovation released

The National Energy Administration (NEA) and the Ministry of Science and Technology (MoST) jointly issued the *14th Five-Year Plan for Scientific and Technological Innovation in Energy Sector*.¹ This is a programmatic document to promote China's energy technology revolution in the next five years, and is linked with the *National Medium- and Long-Term Science and Technology Development Plan (2021-2035)*, the *14th Five-Year Plan for Modern Energy System Development*, and relevant specific plans.

The current development of China's energy technology and equipment still faces outstanding problems, such as being highly dependent on imports for key components, software, and materials, lack of original technologies, and imperfect policy mechanisms. The core idea of the Plan is "removing disadvantages, reinforcing advantages, and basing on practical projects". This puts forward specific targets in five aspects: comprehensive utilization of renewable energy, new-type power system to adopt high-share of renewable energy, safe and efficient nuclear power, high-efficient and low-emission use of fossil energy, and digitalization of the energy industry. The Plan also deploys relevant demonstration projects and formulates a technical roadmap.

¹ 国家能源局 科学技术部关于印发《“十四五”能源领域科技创新规划》的通知, 国能发科技(2021) 58号,” National Energy Administration, Ministry of Science and Technology, 29 November 2021, accessed at http://zfxgk.nea.gov.cn/2021-11/29/c_1310540453.htm; “国家能源局科技司、科技部高新司负责同志就《“十四五”能源领域科技创新规划》答记者问,” National Energy Administration, Ministry of Science and Technology, 2 April 2022, accessed at http://www.nea.gov.cn/2022-04/02/c_1310540855.htm; “一图读懂 | “十四五”能源领域科技创新规划,” National Energy Administration, 4 April 2022, accessed at https://m.thepaper.cn/baijiahao_17468195.

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The 14th Five-Year demonstration project plans related to new energy

Technology	Demonstration projects
Hydropower	<ul style="list-style-type: none"> Hydro-wind-solar-storage comprehensive utilization bases relying on the river basin as the boundary and the hydropower regulation capability as the foundation
Wind Power	<ul style="list-style-type: none"> Offshore wind power projects using 12~15 MW turbines Floating offshore wind projects in deep-water areas
Solar PV	<ul style="list-style-type: none"> Application of perovskite solar PV cells Application of high-efficient and low-cost solar PV cells Recycling and reusing of retired crystalline silicon solar PV modules
Other renewable energy	<ul style="list-style-type: none"> Bio-liquid fuel and biogas engineering High-efficient and comprehensive utilization of hot dry rock geothermal energy Verification of megawatt-scale ocean energy power generation technology
Hydrogen energy	<ul style="list-style-type: none"> Application of multi-scenario renewable energy-hydrogen energy integrated system Pipeline hydrogen transportation project Key technologies for liquid hydrogen storage and transportation Research and development of hydrogen refueling station equipment and technology Distributed 100-kilowatt fuel cell application
Energy storage	<ul style="list-style-type: none"> Seawater pumped storage project Large-scale lithium battery project Large-scale compressed air and flow battery energy storage systems design Spinning reserve energy storage technology

Source: National Energy Administration (NEA) and Ministry of Science and Technology (MoST), November 2021

23 provinces have clarified the 14th Five-Year wind power and solar PV targets

The NEA stated that it has issued *the 14th Five-Year Plan for Renewable Energy Development* (not yet disclosed to the public), and the provincial energy authorities are now required to report the local renewable energy development plans to NEA.² According to preliminary statistics, so far, 23 provinces have clarified their new installed capacity targets for wind power and solar PV during the 14th Five-Year Plan (2021-2025) period in public documents, with a total of more than 620 GW. It is worth noting that the development priorities of different regions are different. Northwest regions and Tibet focus on wind-solar-storage integration projects; north and northeast China focus on solar PV+ hydrogen energy; central and southern China focus on wind and solar PV power generation projects; southeast regions will vigorously promote the construction of distributed “solar PV+” projects and offshore wind power bases.³ From the perspective of various provinces:

- Inner Mongolia has the highest total target for newly installed wind power and solar PV capacity, reaching 84 GW, accounting for more than 60% of the province's newly installed capacity target, including 51 GW of wind power and 33 GW of solar PV.⁴ Inner Mongolia has good wind and solar power resources, with the average annual wind speed at a height of 100 meters exceeded 6m/s (4.2~7.2m/s nationwide) in 2021, and the total solar radiation on the horizontal plane reached 1580 kWh/m² (980~1920 kWh/m² nationwide).⁵

² “国家能源局综合司关于开展省级“十四五”可再生能源发展规划备案的通知,” National Energy Administration, 18 April 2022, accessed at http://www.nea.gov.cn/2022-04/18/c_1310563767.htm.

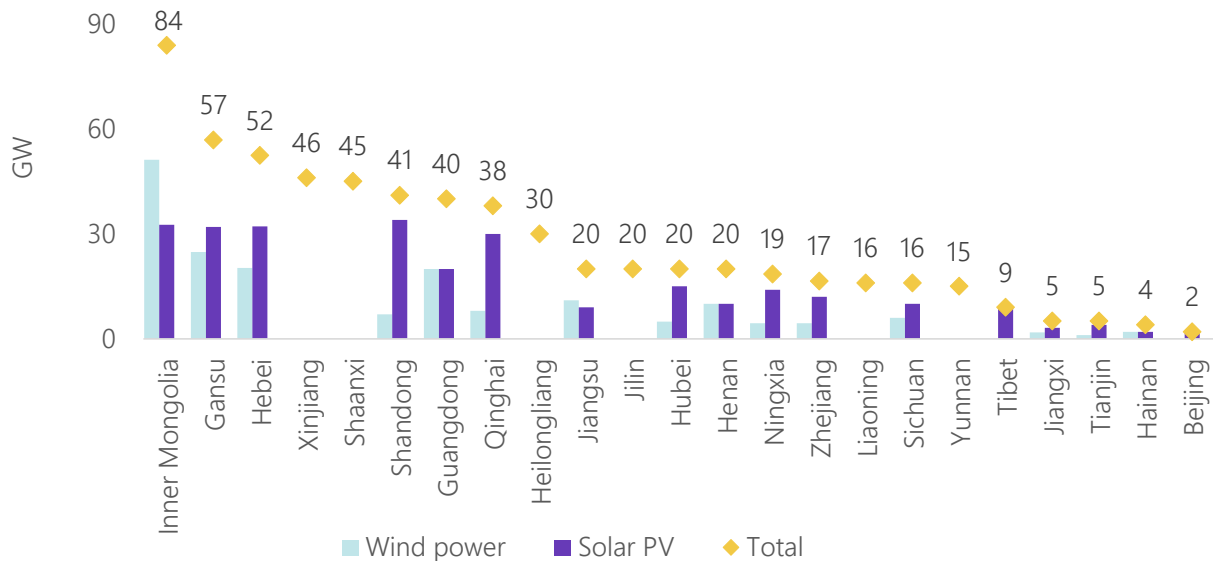
³ “23省份已公布“十四五”新增风光装机规模超620GW!,” National Energy Administration, 27 April 2022, accessed at http://news.sohu.com/a/541887670_121123791.

⁴ “《内蒙古自治区“十四五”可再生能源发展规划》,” Energy Bureau of Inner Mongolia Autonomous Region, 9 March 2022, accessed at <http://energylaw.chinalaw.org.cn/portal/article/index/id/3248.html>.

⁵ “2021年中国风能太阳能资源年景公报发布,” China Meteorological Administration, 28 April 2022, accessed at <https://mp.weixin.qq.com/s/Mj2PEPDt6HqONzbFGkB2BA>.

- The four coastal provinces of Guangdong, Jiangsu, Zhejiang, and Shandong plan to increase the installed capacity of offshore power generation to more than 30 GW in total, to actively implement the key task of “building offshore wind power bases” proposed in the *14th Five-Year Plan for Modern Energy System Development*,⁶ among which Zhejiang proposed the new development model of constructing offshore wind power-ocean energy-onshore industrial bases.
- Shandong, Hebei, Gansu, and Qinghai all have newly installed solar PV capacity targets of more than 30 GW, of which Shandong and Hebei currently have the highest proportion of distributed solar PV in the country, reaching 70% and 43% respectively in 2021.⁷

The newly installed wind power and solar PV capacity targets in the provincial 14th Five-Year Plans



Source: Provincial energy authorities, accessed in May 2022

NEA announced the 2021 renewable power consumption status by province

In 2021, the share of renewable energy in the total power consumption reached 29.4% nationwide, exactly complete the binding target, and with a year-on-year increase of 0.6 percentage points (pct). Among the 30 responsible provinces (Tibet is exempted), Xinjiang and Gansu did not complete the binding targets, with a 2.6 pct and 1.8 pct of gap respectively; while 13 provinces have completed the incentive targets, which is about 10-11% above the binding targets. The share of non-hydro renewable energy in the total power consumption reached 13.7%, a year-on-year increase of 2.3 pct, exceeding the binding target of 0.8 pct. Xinjiang is the only province that did not complete this binding target with a 0.6 pct of gap, while 19 provinces achieved the incentive targets.⁸

Xinjiang and Gansu have major renewable energy power bases in China, as well as being the net power export provinces. On generation side, the share of new energy power capacity in Xinjiang is 34%; and the share of renewable power capacity in Gansu is about 64%, of which 15% of hydropower and 48% of wind power and solar PV. Last year, power generation efficiency in both provinces increased, implying wind and solar curtailment eased effectively. On consumption side, with local power consumption continued to increase in both provinces, the share of power export in total power generation increased by 13.6% in Xinjiang and dropped by 0.8% in Gansu.⁹

⁶ “国家发展改革委 国家能源局关于印发《“十四五”现代能源体系规划》的通知, 发改能源〔2022〕210号” National Energy Administration, National Development and Reform Commission, 29 January 2022, accessed at http://zfxgk.nea.gov.cn/2022-01/29/c_1310524241.htm.

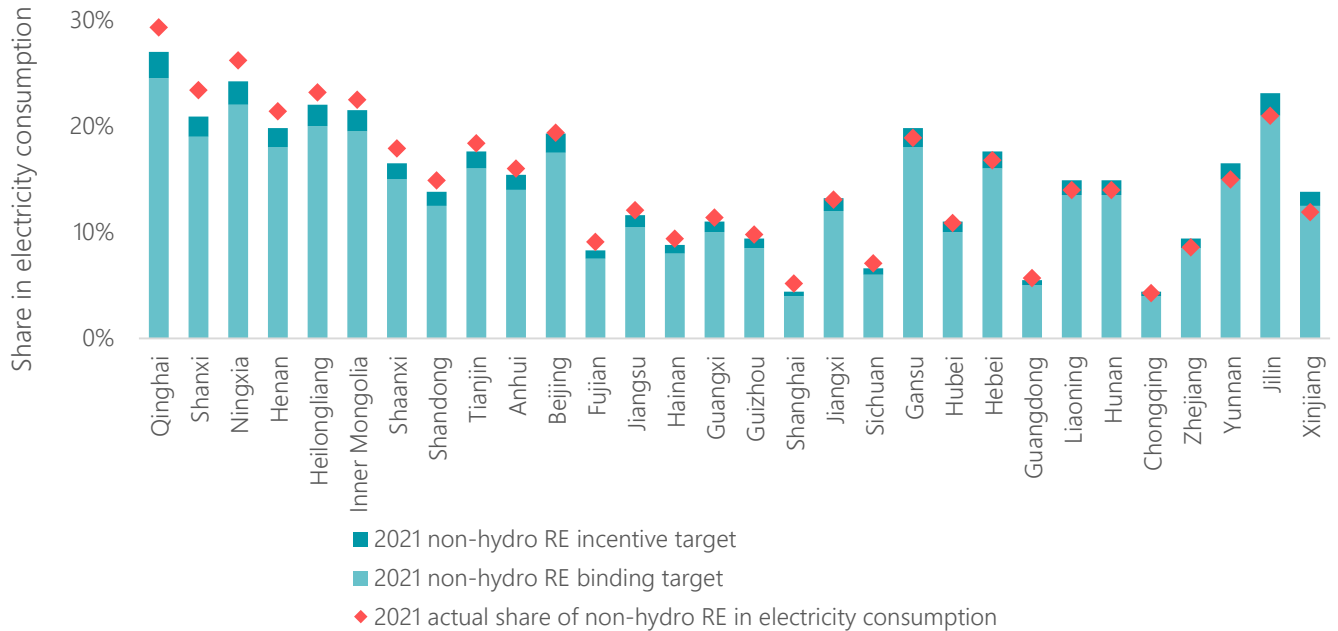
⁷ “2021年光伏发电建设运行情况,” National Energy Administration, 9 March 2022, accessed at http://www.nea.gov.cn/2022-03/09/c_1310508114.htm.

⁸ “国家能源局关于2021年可再生能源电力消纳责任权重完成情况的通报,” National Energy Administration, 21 April 2022, accessed at http://zfxgk.nea.gov.cn/2022-04/21/c_1310587748.htm.

⁹ “关注 | 甘肃、新疆可再生能源消纳考核未达标,” Energy Observer, 9 May 2022, accessed at <https://mp.weixin.qq.com/s/dCH0ixHI6E9dv-k04E0-YHw>.

Therefore, in overall, the reason why Xinjiang did not complete the renewable power and non-hydro renewable power consumption binding targets is related to local power consumption conditions; while Gansu failed to complete the renewable power consumption binding target is expected due to less river flow and precipitation in 2021, but nevertheless, such amount of consumption gap is allowed to be completed in next year with no punishment.

Completion status of 2021 renewable energy power consumption targets by province



Notes: This is ranked by the surplus amount of actual consumption compared with the binding target.

Source: NEA, May 2022

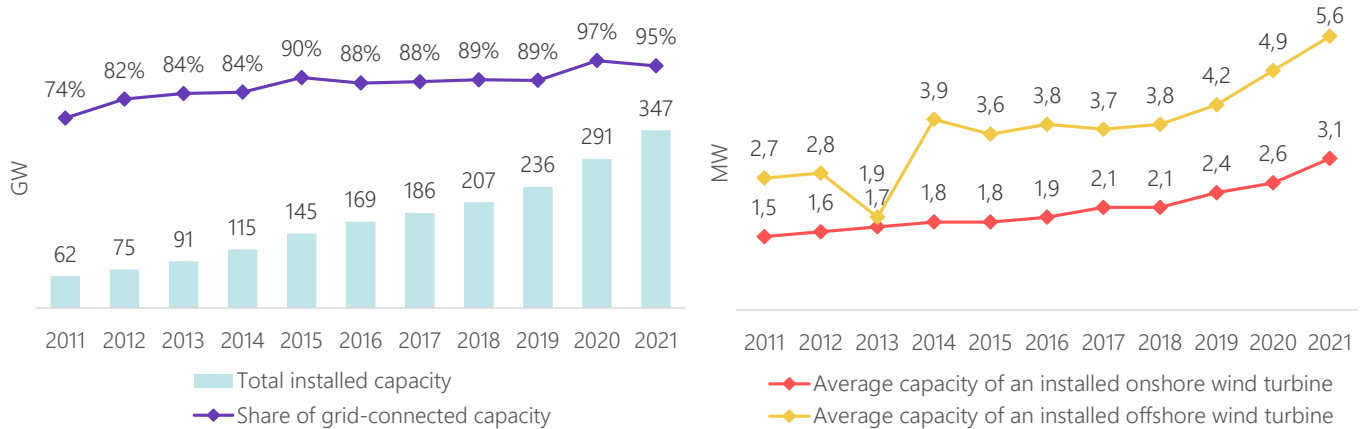
CWEA published the statistics of China's wind power industry in 2021

According to statistics from the China Wind Energy Association (CWEA), the cumulative installed capacity¹⁰ of wind power units in China reached 347 GW in 2021, a year-on-year increase of 19.2%, of which 322 GW was onshore wind power and 25 GW was offshore wind power. In 2021, the new installed onshore wind power unit reached 41 GW, accounting for 74.1% of total incremental wind power units; the average capacity of new units was 3.1 MW, a year-on-year increase of 20.7%. The proportion of units of 3 MW and above in the total installed capacity increased by 11 percentage points year-on-year to 23.0%. The market share of Goldwind, Envision Energy, and Mingyang Smart Energy ranked among the top three, reaching 24.0%, 11.0% and 8.7% respectively. Offshore wind power units increased by 14 GW, accounting for 25.9%; the average newly installed capacity of individual unit was 5.6 MW, a year-on-year increase of 13.9%. The proportion of units of 5 MW and above in the total installed capacity increased by 29 percentage points year-on-year, accounting for 58.8%. Shanghai Electric Wind Power, Mingyang Smart Energy and Goldwind ranked the top three in terms of market share, reaching 33.6%, 21.1% and 16.1% respectively.¹¹

¹⁰ The installed capacity of wind power refers to the installed capacity after the wind turbine manufacturer has shipped it to the wind farm site, the construction unit has completed the hoisting of all components and completed the installation acceptance or static state testing.

¹¹ “2021年中国风电吊装容量统计简报发布,” China Wind Energy Association, 22 April 2022, accessed at <https://mp.weixin.qq.com/s/eW30uSxYRQeGqmXdpXVaoQ>.

2011-2021 Total installed and grid-connected wind power capacity (left); 2016-2021 Average capacity of an installed onshore and offshore turbines (right)



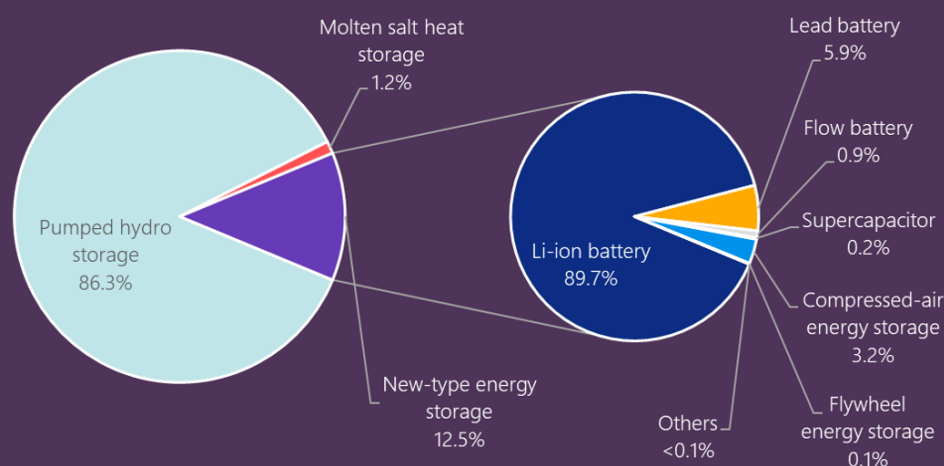
Source: China Wind Energy Association (CWEC) and NEA, accessed in May 2022

2. CNESA reviews the development status of energy storage industry in 2021

The energy storage industry in China is undergoing a transition from the initial stage of commercialization to large-scale development. In 2021, the central and local governments issued a total of more than 300 supportive policies, ushering in an unprecedented upsurge in investment in the energy storage industry. The newly installed electric energy storage capacity exceeded 10 GW for the first time, a year-on-year increase of 231%. The main body of the market increment was mostly the new-type energy storage, mainly the supporting energy storage equipment for renewable energy power generation projects and independent energy storage facilities on the power supply side. The 100-megawatt project has become the mainstream project. In addition to lithium batteries, China has put into operation a 100-megawatt compressed air energy storage project for the first time.

According to statistics from the China Energy Storage Alliance (CNESA), by 2021, the total capacity of electric energy storage projects in operation in China has reached 46.1 GW, accounting for 22% of the global market size, a year-on-year increase of 30%. The cumulative installed capacity of pumped hydro storage, electrochemical energy storage and compressed air energy storage increased the most, reaching 25%, 63% and 15 times respectively.¹²

2021 Cumulative installed capacity of electric energy storage facilities by technology



Source: China Energy Storage Alliance (CNESA), May 2022

China has initially established an energy storage policy system

For the conventional energy storage technology of pumped hydro storage, the NEA issued the *Mid-and Long-Term Development Plan for Pumped Storage (2021-2035)* in September 2021, which clarifies the cumulative installed capacity of pumped hydro storage aims to reach 62 GW and 120 GW by 2025 and 2030 respectively, and formulates a reserve project list of 421 GW of key projects¹³ and 305 GW of reserve projects^{14,15}. For new-type energy storage, the central government issued the *Guidance on Accelerating the Development of New-type Energy Storage* and the *14th Five-Year Implementation Plan for New-type Energy Storage Development* in July 2021 and January 2022 respectively, clarifying that by 2025, new-type energy storage will enter large-scale development, with a total installed capacity of more than 30 GW; Market-oriented development will be fully realized by 2030.¹⁶

In addition, 14 of the 32 provinces have released provincial energy storage plans, and the total installed capacity target exceeds the national target; more than 20 provinces have put forward binding requirements for the allocation of energy storage equipment for newly built renewable energy power generation projects, which laid the foundation for the large-scale development of new-type energy storage. However, the business model and market mechanism of energy storage still need improvements. For example, the ancillary service market needs a reasonable cost-sharing mechanism to reflect the market value of being reserves of flexible resources such as energy storage.

References

¹² “《储能产业研究白皮书2022》”, China Energy Storage Alliance, 26 April 2022, accessed at <http://www.esresearch.com.cn/#/resReport/Rdetail>.

¹³ Key projects are with mature construction conditions and qualify for ecological red-line requirements

¹⁴ Reserve projects are yet to be qualify for the ecological red-line requirements, but with potential to breakthrough the environmental constraints in the future.

¹⁵ “抽水蓄能中长期发展规划（2021-2035年）”, National Energy Administration, 9 September 2021, accessed at http://zfxqk.nea.gov.cn/2021-09/17/c_1310193456.htm.

¹⁶ “国家发展改革委 国家能源局关于加快推动新型储能发展的指导意见, 发改能源规〔2021〕1051号”, National Development and Reform Commission and National Energy Administration, 15 July 2021, accessed at http://www.gov.cn/zhengce/zhengceku/2021-07/24/content_5627088.htm; “关于印发《“十四五”新型储能发展实施方案》的通知, 发改能源[2022]209号”, National Development and Reform Commission and National Energy Administration, 22 February 2022, accessed at https://www.sohu.com/a/525162072_120112874.

3. Policy monitoring

2022-04-08

https://www.thepaper.cn/newsDetail_forward_17740350

NDRC published the 2022 wind power and solar PV feed-in tariff policy

Letter on the Continuing the Subsidy-free Feed-in Tariff Policy for New Wind Power and Solar PV Projects in 2022

In 2022, the newly approved onshore wind power, utility-scale solar PV, and distributed industrial and commercial solar PV will continue implementing the feed-in tariff policy in 2021, that is, the local coal power baseline tariff (i.e. without central government subsidies), while these projects can voluntarily participate in power markets to form a market price. The document does not clarify whether newly-built household solar PV will continue to enjoy feed-in tariff subsidies.

2022-03-25

http://www.gov.cn/zhengce/2022-04/10/content_5684385.htm

State Council calls for building a national unified energy market system

Opinions on Accelerating the Construction of a National Unified Market

The government aims to orderly promote the construction of the national energy market system on the premise of ensuring the safe supply of energy. The document emphasizes the overall planning and optimization of the oil and gas trading system and pipeline infrastructure construction; establishing a unified natural gas metering and pricing system; improving the unified national coal trading market; to improving the multi-level unified power market system and to establish a national power trading center in due time; to build unified national carbon emission rights and water rights trading markets, and to implement unified industry standards and trading supervision mechanisms.

2022-02-21

<https://baijiahao.baidu.com/s?id=1732039557268953970&wfr=spider&for=pc>

The government updates the schedule of spot power market development

Notice on Accelerating the Construction of Spot Power Market, NDRC General Office Institutional Reform [2022] No. 129

By the end of June 2022, the second batch of six provincial spot power market pilots should start trial operation, meanwhile, to start the trial operation of inter-provincial spot trading and carry out the preparation of regional spot power market construction plans for the Beijing-Tianjin-Hebei and Yangtze River Delta regions. By the end of 2022, the first batch of eight provincial spot power market pilots should achieve long-term continuous trial operation.

2021-12-20

https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/202205/t20220510_1324436.html?code=&state=123

NDRC determines the 14th Five-Year technology roadmap for bio-energy

Notice on Issuing the 14th Five-Year Plan for Bio-economic Development, NDRC High Technology [2021] No. 1850

In the energy sector, the government encourages to develop biomass power generation in an orderly manner, pushing forward CHP retrofit of biomass power generation units. China aims to construct industrial parks with biomass CHPs, biomass briquette and other renewable energy as the main source of energy. To carry out biomass heating in qualified counties to replace coal consumption, to steadily develop waste incineration CHPs in urban areas, and to put forward biogas and biomass briquette heating technologies.