

Overview of the 14th Five-Year Plan (2021-2025) for Renewable Energy Development in China

In June 2022, the National Development and Reform Commission (NDRC) united eight ministries to release the *14th Five-Year Plan (2021-2025) for Renewable Energy Development* (hereinafter referred to as the Plan), which clarified the renewable energy (hereinafter referred to as "RE") development targets, key tasks and supporting measures from 2021 to 2025.⁶

At the strategic planning level - the development of RE in China will adhere to the basic principles of *five simultaneous development*: 1) utility-scale and distributed projects; 2) onshore and offshore deployment; 3) local consumption and export; 4) Single-energy source and multi-energy complementation; 5) Single-application scenario and multi-application scenarios.

At the implementation level - the *Plan* puts more emphasis on optimal development by region. According to the resource characteristics of different regions, seven onshore new energy bases and five offshore wind power bases with different technical paths are proposed; the demonstration projects as the guide for technological and model innovation, 18 specific demonstration projects are proposed; and nine action plans are proposed for urban and rural areas.⁷

In addition, it is worth noting that the development of RE in the 14th Five-Year Plan period has put forward higher requirements for resources, the use of the land and ocean, meteorological services, ecological environment, and finance. Therefore, this is the first time that the *Plan* adopted the form of joint issuance by nine departments, which is more conducive to integrating the forces of all parties to achieve the targets.⁸

Jointly released by the following nine ministries

1. National Development and Reform Commission
2. National Energy Administration
3. Ministry of Finance
4. Ministry of Natural Resources
5. Ministry of Ecology and Environment
6. Ministry of Housing and Urban-Rural Development
7. Ministry of Agriculture and Rural Affairs
8. China Meteorological Administration
9. State Forestry and Grassland Administration



Please download the original policy document [here](#).

FOUR New features

The theme of RE development in the 14th Five-Year Plan period is high-quality leap-forward development, including four distinctive features: large-scale development as the foundation, high-level consumption as the key support, market-oriented development as the driving force, and high-quality development as the result.⁹

Large-scale - Accelerate to increase the share of RE in total installed power generation capacity

High-level consumption - RE becomes the dominant source of supply in incremental energy and power consumption

Market-oriented - Transfer from policy-driven to market-driven under the price parity environment

High-quality - Guarantee power supply security in parallel with scaled-up development and high-level consumption

EIGHT

Key indicative targets

The Plan sets indicative targets (i.e. non-mandatory) for RE on total consumption, power generation, power consumption, and non-electricity utilization. It is worth noting that the Plan no longer proposes the target of installed RE power capacity. According to the interpretation of the China Renewable Energy Engineering Institute (CREEI), this is because the amount of RE consumption is also affected by the power generation efficiency and utilization rate besides the installed capacity, so it is not appropriate to over highlight the installed capacity targets. At the same time, wind power and solar PV, which are the main body of incremental power sources, have entered the stage of price parity. Therefore, in the future, the amount of installed capacity and where to install requires the market to play a decisive role. The main role of the government is to create a good policy environment and guide the realization of planning goals.¹⁰

From 2021 to 2025

Over 50%

Share of RE in incremental primary energy consumption

Over 50%

Share of RE in incremental power consumption

1 billion tce

Annual RE energy consumption (680 million tce in 2020)

By 2025

Doubled

Annual wind and solar power generation (728 TWh in 2020)

Around 33%

Share of RE in annual power consumption (28.8% in 2020)

> 60 mn tce

Annual RE energy consumption in non-power sector

3300 TWh

Annual RE power consumption (2210 TWh in 2020)

Around 18%

Share of non-hydro RE in annual power consumption (11.4% in 2020)

Supply-side revolution

Technological roadmaps by region

North, Northwest, Northeast (Three-North)

Large-scale wind power and solar PV bases

Southwest

Hydro-wind-solar integrated utilization projects

Central, East, South

Nearby wind power and solar PV projects

East-coastal

Offshore wind power clusters

Engineering project driven

Vigorously promote large-scale onshore wind power and solar PV bases

Onshore projects with dessert and Gobi as key target regions
Offshore projects with orderly developing manner

Actively promote distributed wind power and PV projects

Roof-top PV in public buildings and industry parks
PV+ projects (i.e. integrated with other industries such as fishery and agriculture)
County-wide distributed wind power and solar PV projects and roof-top PV in rural areas
Wind power and solar PV project repowering
Road-side small-scale and distributed solar PV projects (e.g. railway, highway)

Coordinately promote hydro-wind-solar power integrated bases

Rely on southwest hydropower bases



Steadily promote diverse utilization of biomass energy

Biomass power, biomass heating, biogas, and non-grain liquid biofuel projects



Actively promote scaled-up development of geothermal energy

Geothermal power, shallow geothermal comprehensive utilization, and medium-deep-depth heating and cooling projects



Reliably promote marine energy demonstrative projects

Tidal and wave power, and island multi-RE energy integrated demonstrative projects



Consumption-side revolution

Storage capacity improvement & high-level consumption

To improve the adaptability of the power system to a high proportion of RE, the government will strengthen the construction of RE storage facilities and flexible power sources, and strengthen the support capability of the power grid infrastructure.

In terms of energy storage facilities, during the 14th Five-Year Plan period, all six major power-grid regions have made it clear to start the construction of a new batch of large-scale pumped hydropower stations, and carry out pilot demonstrations of distributed small and medium-sized pumped hydropower stations in the Central, East and South regions. At the same time, the government will conduct a new round of research on pumped storage resources and formulate a new medium and long-term development plan. Large-scale energy storage for cascade hydropower stations, long-time thermal storage CSPs and new-type energy storage are also key technology paths.



In terms of flexible power resources, based on continuing to carry out the flexibility retrofit of coal power units, the government will promote captive power plants (autoproducers) to participate in peak-load regulation, deploy dispatchable gas power plants, and explore the joint dispatch of various power sources.



In terms of power grid support, power grid enterprises (TSOs) will build more backbone transmission lines in RE-rich areas. Currently, 12 Ultra-High-Voltage (UHV) transmission lines have been planned for the 14th Five-Year Plan period and in principle, the proportion of RE in the newly built inter-regional transmission lines shall not be less than 50%. At the same time, the TSOs will continue to increase the proportion of RE in the existing transmission lines through the coordinated planning, construction and operation of large-scale wind-solar bases and integrated wind-solar-thermal-storage energy bases. In addition, the technical retrofit and intelligent upgrade of the distribution grids will be promoted in parallel to improve the ability to access large number of distributed projects and the ability to resist disturbances.



*The 14th Five-Year Plan will strengthen the diversified direct utilization of RE, that is, increase the **direct utilization of RE power on end-user side**, expand the scale of **direct utilization of RE in non-electric fields**, improve the **comprehensive utilization of RE in rural areas** and carry out **large-scale hydrogen production using RE**.*



Industry sector - The government encourages the construction of RE captive power plants (autoproducers), green micro-grids, or transmission lines directly connecting RE generators with industrial parks, large-scale production enterprises and big data centers.



Heating sector - With the northern regions as the core, carry out large-scale RE heating in areas where conditions permit, especially in new urban areas to promote the coupling mode of RE with natural gas and electric heating, and to study the integration of geothermal energy into the urban heating pipeline model.



Transportation sector - Expand the large-scale substitution of gasoline and diesel by fuel ethanol and biodiesel in heavy-duty road transportation and aviation sectors.



Gas supply sector - Explore the integration of biological natural gas into urban and rural gas pipelines.

RE consumption in rural areas has great potential for development. The main means include: 1) using vacant land and roofs to build distributed wind power and solar PV projects; 2) building a multi-energy complementary clean heating system relying on biomass, geothermal energy, solar energy and electricity; 3) Utilizing rural waste resources to develop biological natural gas and biogas.

RE large-scale hydrogen production is the key innovation field during the 14th Five-Year Plan period. First, in areas with low RE power generation costs and good storage and transportation conditions, build grid-connected and off-grid wind-solar power hydrogen production demonstration projects; Second, to promote the use of fuel cells and green hydrogen in key end-use sectors such as chemical industry, coal mines and transportation to reduce the direct consumption of fossil energy.



Mechanism revolution

Market-driven and institutional reform

To build a market-based RE development model, the government will improve the **market-oriented mechanism** through four aspects.

- 01 | Further relax market access restrictions, optimize project approval and recording procedures, and establish a credit rating system for market entities.
- 02 | Take the *Mandatory RE Power Consumption* policy as the guidance to decide the minimum newly added RE capacity by province each year, and establish a guarantee consumption mechanism centered on guaranteed grid-connection capacity by TSOs, spot power market transactions and the power market for distributed power sources.
- 03 | Improve the tendering mechanism for newly added RE power plants, and improve the transaction mechanism, price formation mechanism and compensation mechanism for RE to participate in power markets.
- 04 | Improve the green certificate mechanism, establish a green product certification and consumption evaluation system, and guide green product consumption especially in end-use sectors and public facilities.

References

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⁷ “权威发布 | 刚刚，九部委首次联合发布《“十四五”可再生能源发展规划》,” China Reform Daily, 1 June 2022, accessed to https://mp.weixin.qq.com/s/m0c3yFzNdN88Q3_zF0VGSg.

⁸ “权威解读《“十四五”可再生能源发展规划》 !,” National Development and Reform Commission and National Energy Administration, 1 June 2022, accessed at <https://www.in-en.com/article/html/energy-2316138.shtml>.

⁹ “【“十四五”可再生能源发展规划解读之三】 彭程：锚定碳达峰碳中和目标 推进可再生能源新时代新作,” China Renewable Energy Engineering Institute, 1 June 2022, accessed at https://www.sohu.com/a/554928477_120235844.

¹⁰ “【“十四五”可再生能源发展规划系列解读文章之一】 彭程：坚定推动可再生能源高质量跃升发展,” China Renewable Energy Engineering Institute, 2 June 2022, accessed at https://www.sohu.com/a/553331594_120235844.