

INDUSTRY OVERVIEW

The information contained in this section, unless otherwise indicated, have been derived from various official government publications and other publications generally believed to be reliable and the market research report prepared by Frost & Sullivan which we commissioned. We believe that the sources of such information are appropriate sources for such information and have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is false or misleading in any material respect or that any fact has been omitted that would render such information false or misleading in any material respect. None of our Company, the Sole Sponsor, the [REDACTED], the [REDACTED] and the [REDACTED] or any of our or their respective directors, officers or representatives or any other person involved in the [REDACTED], except for Frost & Sullivan, has independently verified such information nor give any representation as to the accuracy or completeness of such information. As such, you should not unduly rely upon such information in making, or refraining from making, any [REDACTED] decision.

SOURCE OF INFORMATION

We have commissioned Frost & Sullivan, an independent market research and consulting company, to conduct an analysis of, and to prepare a report on the PRC energy solutions market. The report prepared by Frost & Sullivan for us is referred to in this [REDACTED] document as Industry Report. We agreed to pay Frost & Sullivan a fee of HK\$380,000 which we believe reflects market rates for reports of this type.

Founded in 1961, Frost & Sullivan has 40 offices with more than 2,000 industry consultants, market research analysts, technology analysts and economists globally. Frost & Sullivan’s services include technology research, independent market research, economic research, corporate best practices advising, training, client research, competitive intelligence and corporate strategy.

We have included certain information from the Industry Report in this [REDACTED] document because we believe this information facilitates an understanding of the PRC energy solutions market for the prospective [REDACTED]. The Industry Report includes information of the PRC energy solutions market as well as other economic data, which have been quoted in the [REDACTED] document. Frost & Sullivan’s independent research consists of both primary and secondary research obtained from various sources in respect of the PRC energy solutions market. Primary research involved in-depth interviews with leading industry participants and industry experts. Secondary research involved reviewing company reports, independent research reports and data based on Frost & Sullivan’s own research database. Projected data were obtained from historical data analysis plotted against macroeconomic data with reference to specific industry-related factors. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the Industry Report, various official government publications and other publications.

In compiling and preparing the research, Frost & Sullivan assumed that the social, economic and political environments in the relevant markets are likely to remain stable in the forecast period, which ensures the steady development of the PRC energy solutions market.

OVERVIEW OF THE PRC ENERGY SOLUTIONS MARKET

Definition

Energy solutions encompass a comprehensive, full-lifecycle service portfolio delivered by specialised power engineering firms, integrating survey and design, general contracting (EPC), and operation and maintenance services to support the development and optimisation of electric power infrastructure. This integrated model begins with front-end survey and design including engineering consulting, geological surveys, and detailed technical schemes for projects spanning various voltage-level grids, traditional power sources such as thermal, hydro, and nuclear, and new energy generation, with a particular emphasis on PV and wind power. It extends through turnkey general contracting, encompassing project management, construction, equipment procurement, and system development to deliver fully operational transmission, substation, distribution, and renewable energy facilities. It incorporates long-term operation and maintenance services focused on equipment upkeep, energy efficiency assessments, and performance-based management primarily for solar and wind systems to sustain or enhance generation output and achieve targeted efficiency goals. Tailored predominantly for central and state-owned enterprises, alongside select private commercial and industrial clients, this one-stop approach ensures efficient, reliable, and sustainable energy project planning, execution, and ongoing operation across the entire value chain.

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Advisory Consulting: Front-end strategic and decision-support services, including energy planning studies, project feasibility analysis, investment evaluation, energy-saving assessments, environmental impact evaluations, policy consulting, and carbon asset management. These services provide clients with scientific decision-making foundations through professional reports and proposals, ensuring alignment with national energy strategies and green development requirements.

Survey and Design: Core technical services encompassing geological, hydrological, and geotechnical surveys, as well as engineering design. Deliverables include survey reports, consulting reports, design schemes, and digital drawings. Applicable to grid transmission and distribution, new energy power stations, traditional power sources, and integrated energy projects, with emphasis on technological innovation, BIM applications, and full-process digital design.

General Contracting Engineering: Engineering, Procurement, and Construction (EPC), responsible for the process from equipment procurement, and construction management to system integration and commissioning. Focus areas include transmission and substation projects, new energy power stations, integrated smart energy systems, and related infrastructure, ensuring high-quality, safe, and timely project completion. In the energy solutions sector in the PRC, Survey and Design Services and EPC Services are classified as distinct business segments, reflecting their differing scopes, risk profiles, and project phases. Survey and Design operate as a front-end technical consulting segment, focusing on intellectual deliverables such as geological, hydrological, and geotechnical surveys, feasibility studies, and detailed engineering designs, including BIM-enabled digital drawings and reports. This segment emphasises technological innovation and regulatory compliance, with lower capital intensity and primarily technical risks, typically concluding upon design approval. In contrast, EPC represents an integrated mid-to-back-end project delivery segment, encompassing full turnkey responsibility from equipment procurement, and construction management to system integration, commissioning, and handover of operational facilities. It involves higher capital requirements, comprehensive execution risks, including schedule, cost, and performance guarantees, and longer durations. This segmentation enables energy solutions providers to offer specialised expertise or complete lifecycle solutions, optimising value capture while meeting client needs for standalone planning or fully executed power infrastructure projects.

Retrofit and Upgrading: Front-Upgrade and optimisation services for existing energy facilities, including flexibility retrofits for coal-fired units, energy-saving and consumption-reduction modifications, technological upgrades (e.g., integration of energy storage and digital systems), capacity expansion, and replacement of ageing equipment. These services aim to enhance system efficiency, improve new energy accommodation capacity, and extend asset lifecycle.

Operation and Maintenance Services: Long-term post-project operation and maintenance, including equipment inspection and repair, performance monitoring, energy-saving management, fault diagnosis, and managed hosting services. Primarily targeting new energy systems, these services employ digital platforms and performance-based models (e.g., charging based on power generation or energy-saving outcomes) to ensure stable operation and continuous optimisation of generation or energy-use efficiency.

Settlement and Trading: Market-oriented energy operation services covering medium- and long-term power contracts, spot trading, green power certificate trading, ancillary services, deviation settlement, and carbon emissions trading. These support full guaranteed acquisition for new energy, direct green power supply, demand-side response, and differential compensation mechanisms, maximising energy value and hedging risks.

Value Chain

In upstream, the energy solutions provider monitors and influences raw material sourcing and core component manufacturing (e.g., polysilicon, PV cells/modules, wind turbine blades, rare earth magnets, and battery materials) primarily through strategic partnerships, qualified supplier frameworks, and procurement management rather than direct ownership. This phase ensures supply security, cost competitiveness, quality compliance, and sustainability standards (e.g., low-carbon silicon, responsible mining) to mitigate risks for downstream project execution.

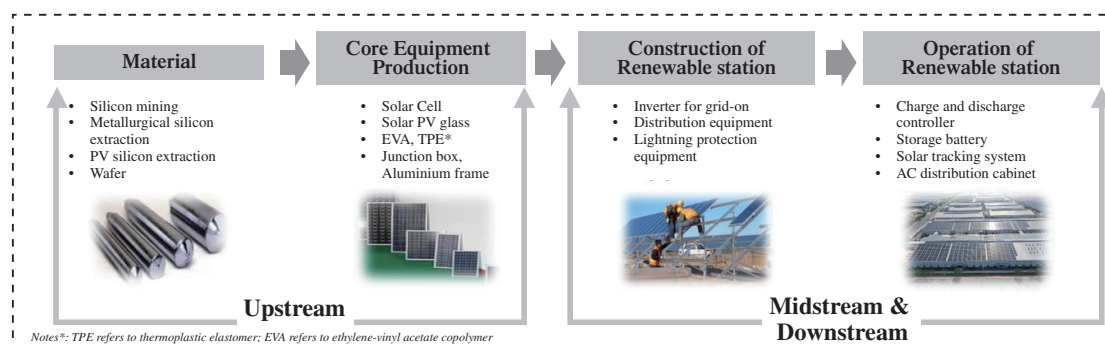
In midstream, the provider actively participates through technology evaluation, specification development, quality assurance, and bulk procurement of core equipment (PV modules, inverters, wind turbines, balance-of-system components, and storage systems). Leveraging deep engineering expertise, the provider optimises equipment selection and customisation to align with project-specific performance, reliability, and grid-integration requirements, thereby enhancing overall system efficiency and bankability.

In downstream, it encompasses full-lifecycle services including advisory consulting and feasibility studies, survey and design, EPC general contracting for station construction (site development, installation, electrical integration, and grid connection), retrofit/upgrading of existing assets, long-term

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operation and maintenance (with performance-based models), and energy trading/settlement support. By delivering integrated one-stop solutions particularly for large-scale ground-mounted, distributed, or hybrid renewable projects the provider maximises client returns through optimised design, accelerated project timelines, guaranteed performance, and sustained operational excellence.

Value Chain of PV stations



Source: Frost & Sullivan

Market Drivers and Trends

1. Grid Modernisation and Smart Infrastructure Development

Energy solutions market in the PRC is propelled by aggressive renewable energy expansion, driven by national dual carbon goals of peaking emissions before 2030 and achieving carbon neutrality by 2060. The 14th Five-Year Plan (2021–2025) targeted non-fossil fuels to reach 20% of primary energy consumption by 2025, a milestone overfulfilled ahead of schedule, with renewables supplying over one-third of electricity generation. In 2024, newly installed renewable energy generation capacity in the PRC reached 374 million kW, representing annual growth rate of 22.0%. Renewable energy power generation reached 3.47 trillion kWh, representing a annual growth rate of 17.3% and accounting for approximately 35.0% of the nation's total electricity generation, with wind and solar power combined accounting for about 18.5% of total electricity generation. Supportive policies, including subsidies, guaranteed grid access, and mandates for renewable substitution, have accelerated deployment. This policy framework fosters demand for full-lifecycle energy solutions, from survey/design to EPC and operation and maintenance, particularly in photovoltaic, wind, and hybrid systems.

2. Rising Electricity Demand and Infrastructure Development

Surging electricity consumption underpins robust growth in energy solutions, with nationwide power use projected to exceed 10 trillion kWh in 2025, marking a record high. This demand surge is fueled by economic expansion, rapid electrification in transport, emerging loads from data centres, 5G infrastructure, and high-tech manufacturing. Industrial and advanced sectors have driven disproportionate increases, necessitating expansive infrastructure development, including large-scale renewable bases, transmission enhancements, and distributed projects. Energy solutions providers benefit from opportunities in EPC contracting, retrofit/upgrading, and advisory services to support reliable supply and integration of new capacity amid this demand trajectory.

3. Continuous Development of One-stop Energy Solutions

The market for one-stop energy solutions in the PRC is experiencing sustained growth, driven by the need for comprehensive services that span advisory consulting, survey and design, EPC general contracting, retrofit/upgrading, operation and maintenance, and settlement/trading. Leading market participants are expanding their portfolios to deliver seamless, end-to-end solutions, particularly in renewable energy integration and multi-energy complementarity. This trend is fueled by national priorities for building a new-type power system, where clients seek single-point accountability to reduce project risks, accelerate timelines, and optimise long-term performance. The rise of energy solutions models further promotes integrated offerings that minimise upfront capital for users while ensuring efficiency and sustainability. Moreover, policies encouraging market reforms, digital transformation such as BIM and AI in project management, and hybrid systems are stimulating demand for providers capable of orchestrating the entire value chain, supporting dual carbon goals and enhancing energy security through resilient, low-carbon infrastructure.

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Market Opportunities

1. *Large-Scale Renewable Energy Storage Integration and Hybrid Systems*

Renewable energy expansion in the PRC has created significant challenges in grid stability, renewable curtailment reduction, and peak-load regulation, driving substantial demand for large-scale energy storage solutions. As of mid-2025, the PRC’s installed new-type energy storage capacity exceeded 100 GW, with ambitious targets under the 14th and emerging 15th Five-Year Plans emphasising coordinated development of source-grid-load-storage systems. This presents prime opportunities for energy solutions providers in full-lifecycle services, including advisory consulting and feasibility studies for hybrid projects, detailed survey and design incorporating storage optimisation, EPC general contracting for utility-scale battery energy storage systems, pumped hydro, and compressed air facilities, as well as retrofit integration into existing renewable bases.

2. *Distributed Photovoltaics and Whole-County Rooftop Solar Development*

Distributed PV systems continue to dominate the PRC’s solar growth trajectory, underpinned by national initiatives such as “whole-county rooftop PV promotion” and mandatory installation requirements for new public buildings, industrial parks, and rural households. This decentralised model aligns with goals for high-quality renewable integration and local energy self-sufficiency, particularly in eastern and central provinces with high electricity demand density. Energy solutions providers are well-positioned to capture value across the entire chain, including front-end advisory and resource assessment, customised survey and design for rooftop/complex terrain applications, EPC delivery encompassing module procurement, structural mounting, and microgrid integration, and long-term operation/maintenance under performance-linked models that tie remuneration to actual generation output. Additional opportunities arise in upgrading legacy distributed assets, incorporating energy management systems for demand-side response, and facilitating green power trading/settlement, serving a diverse client base including local governments, industrial/commercial enterprises, and rural cooperatives pursuing energy cost reduction and carbon compliance.

Market Challenges

1. *Grid Integration and Infrastructure Limitations*

The rapid expansion of renewable energy capacity in the PRC has outpaced grid infrastructure development, leading to integration challenges and rising curtailment rates, which highlight transmission bottlenecks. Insufficient flexibility from storage, demand-side response, and smart grid technologies exacerbates intermittency issues, increasing reliance on coal for backup and raising system costs. These limitations pose risks to project bankability, revenue stability for energy solutions providers, and the efficient utilisation of investments in survey/design, EPC, and operation and management services.

2. *Environmental and Land Use Constraints*

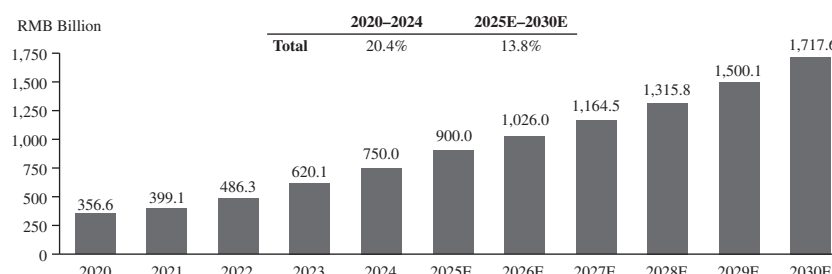
Large-scale renewable projects, particularly solar and wind farms, face growing constraints from environmental regulations and land availability, complicating site selection and development timelines. The PRC’s ecological protection red lines and policies prohibiting alteration of arable land, forests, or sensitive ecosystems restrict suitable areas, pushing developments toward deserts and arid regions while requiring rigorous environmental impact assessments. Competition for land amid urbanisation, agriculture, and biodiversity goals delays permitting and increases costs for energy solutions providers. Furthermore, potential ecological risks from vegetation removal, soil disturbance, and dust accumulation in fragile desert environments demand integrated approaches like agro-photovoltaics or grazing-compatible designs to mitigate impacts and ensure long-term sustainability.

Market Size

The energy solutions market in the PRC market has exhibited rapid growth from RMB356.6 billion in 2020 to RMB750.0 billion in 2024 at a CAGR of 20.4% from 2020 to 2024, driven by the dual-carbon goals and the construction of a new power system. The market is projected to maintain the growth at a CAGR of 13.8% from 2025 to 2030, reaching RMB1,717.6 billion in 2030. The energy solutions market in the PRC is driven primarily by the national dual carbon goals peaking carbon emissions before 2030 and achieving carbon neutrality by 2060 bolstered by supportive government policies and incentives that accelerate renewable energy deployment and green certification. Surging electricity demand, fueled by urbanisation, industrialization, widespread electrification, and sustained economic growth, requires substantial investments in power infrastructure. Rapid technological advancements and declining costs in solar, wind, energy storage, and grid systems, coupled with extensive funding for grid modernisation and smart infrastructure, propel the transition toward a new-type power system characterised by high renewable penetration and enhanced resilience.

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Market Size of Energy Solutions (The PRC), 2020–2030E



Source: China Electricity Council, Frost & Sullivan

15th Five-Year Plan (2026–2030)

China’s 15th Five-Year Plan (FYP), officially the Outline of the 15th Five-Year Plan for National Economic and Social Development of the People’s Republic of China (2026–2030), was promulgated in March 2026 during the annual session of the National People’s Congress. This strategic blueprint, succeeding the 14th FYP (2021–2025), emphasises high-quality development, innovation-driven growth, and green transformation amid global economic challenges and domestic priorities such as achieving carbon peak by 2030 and neutrality by 2060. The plan outlines 20 binding targets across economic, social, and environmental domains, with a strong focus on enhancing energy security, efficiency, and sustainability. It proposes 109 major projects in six key areas, including fostering new quality productive forces and advancing ecological conservation, many of which directly pertain to the energy sector.

Key Targets for Electricity Generation Capacity and New Energy Integration: China’s 15th Five-Year Plan (2026–2030) establishes key targets to significantly expand electricity generation capacity while prioritising new energy integration, particularly renewables, to support the transition toward a new-type power system. The plan aims to increase the share of non-fossil energy in total energy consumption to 25% by 2030, up from approximately 21.7% in 2025, aligning with China’s international commitments and dual-carbon goals. This plan already surpassing earlier 2030 targets of 1,200 GW, and projections in aligned analyses suggesting cumulative installations could reach around 766 GW for wind and 1,880 GW for solar by 2030 in baseline scenarios, contributing to renewables supplying over 50% of installed power capacity and 30–40% of electricity generation. Overall energy production capacity is targeted to reach the equivalent of 5.8 billion tonnes of standard coal by 2030, emphasising domestic output growth alongside a 17% reduction in CO₂ emissions per unit of GDP. To enable this integration, the plan drives massive infrastructure development, including commissioning 15 new ultra-high voltage transmission lines to boost cross-provincial capacity by 35% and integrate substantial renewable volumes, while advancing energy storage, pumped hydro, and grid flexibility measures to address intermittency and enhance system resilience. These targets collectively accelerate the dominance of clean energy in China’s power mix, fostering opportunities across the full-lifecycle energy solutions sector.

Infrastructure Development of Generation, Transmission, and Storage: China’s 15th Five-Year Plan prioritises massive, coordinated infrastructure development across generation, transmission, and storage facilities, involving investments estimated in the trillions of yuan to support a resilient, renewables-dominated “new-type power system.” In generation infrastructure, accelerated deployment focuses on large-scale renewable bases including desert-based wind and solar power complexes in the three northern regions and integrated hydro-wind-solar projects in the southwest, as well as major hydropower initiatives (e.g., the Yarlung Tsangpo dam) and expansions in offshore wind (targeting 100 GW by 2030) and nuclear (reaching 110 GW by 2030), enabling hundreds of gigawatts of annual additions to meet rising electricity demand while minimising fossil fuel reliance. Transmission infrastructure receives particular emphasis through the construction of power-transmission corridors capable of delivering up to 420 GW from western clean-energy bases to eastern load centres, supported by State Grid’s commitment to commission 15 new ultra-high voltage (UHV) transmission lines between 2026 and 2030; these long-distance, high-capacity lines, spanning thousands of kilometres, will increase cross-provincial transmission capacity by approximately 35% and facilitate the annual integration of around 200 GWh of renewable power, thereby reducing curtailment and enhancing nationwide resource allocation. For storage and system flexibility, the plan mandates vigorous development of battery energy storage alongside the addition of approximately 100 GW of pumped hydro storage capacity during the period, complemented by smart grids, microgrids, and interprovincial mutual-aid schemes to address the intermittency of variable renewables and ensure grid stability amid growing electrification and clean energy penetration. This comprehensive infrastructure push aligned with national priorities for energy

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security, ecological conservation, and dual-carbon objectives creates substantial opportunities for full-lifecycle energy solutions providers in survey and design, EPC contracting, retrofits, O&M, and market-oriented services.

Market Opportunities for The PRC Energy Solutions Market:

The 15th Five-Year Plan mandated an accelerated transition to a clean, low-carbon, safe, and efficient modern energy system often termed the “new-type power system”. The plan creates sustained, large-scale demand for comprehensive, full-lifecycle services provided by specialised power engineering firms. This framework aligns national priorities such as energy security, technological self-reliance, ecological civilization and the dual-carbon goals, while supporting high-quality economic growth through innovation in green technologies.

At the core of this drive is the plan’s emphasis on scaling renewable energy to dominate the power mix. Massive infrastructure investments estimated in the trillions of yuan necessitate extensive front-end advisory consulting and survey and design services that ensure projects align with national strategies and secure approvals for grid integration.

The plan’s push for power generation and transmission infrastructure, notably the commissioning of 15 new ultra-high voltage lines to boost cross-provincial capacity by approximately 35 percent and integrate around 200 GWh of renewables annually, along with smart grid enhancements, creates substantial opportunities for general contracting and EPC services, particularly for firms that can deliver turnkey solutions under design-led EPC models and handover for transmission routes, substations, distribution networks, and large renewable facilities.

Flexibility and resilience requirements further amplify demand for enhanced peaking and deep cycling to accommodate renewable energy featured by variable power output. Long term O&M contracts applying performance-based models, supported by digital platforms for real-time monitoring, predictive maintenance, fault diagnosis, and yield optimisation, become essential for sustaining high generation output in solar, wind, and hybrid assets.

Market-oriented mechanisms embedded in the outline of 15th Five-Year Plan, including expanded green power certificate trading, carbon emissions markets, medium- and long-term carbon-trade contracts, spot trading, ancillary services and demand-side response, drive services for carbon trade and settlement. Providers assist clients in maximising environmental attribute value, hedging risks, ensuring full guaranteed acquisition for renewables, and participating in unified power markets, thereby capturing premiums or receiving compensation for pursuing environmental protection policies.

Overall, the 15th Five-Year Plan positions the energy solutions sector as a cornerstone of China’s economic resilience and global clean-technology leadership. It fosters recurring, high-margin revenue streams beyond one-off construction, encourages bundling of services across the value chain for risk minimization and efficiency gains, and intensifies competition among major players such as China Energy Engineering Corporation and Power Construction Corporation of China, which benefit from scale, policy alignment, and integrated capabilities. This dynamic not only accelerates the nation’s energy transition but also enhances the competitiveness and sustainability of its power infrastructure ecosystem.

COMPETITIVE LANDSCAPE OF THE PRC ENERGY SOLUTIONS MARKET

Competition Overview

In 2024, the energy solutions market in the PRC exhibits a relatively concentrated competitive landscape, characterised by the significant dominance of leading enterprises, with the top five market participants collectively accounting for 65.3% of the total market share. Notably, Power Construction Corporation of China, Ltd. ranked first with a market share of 34.1%, establishing a distinct leading position, while other major participants maintain competitive advantages in their respective niche segments. The Group has accounted a market share of approximately 0.04% with a revenue of RMB0.3 billion.

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Ranking and Market Share of Leading Energy Solution Providers by Revenue (the PRC), 2024

Rank	Company	Revenue in 2024 (RMB Billion)	Market Share (%)
1	Power Construction Corporation of China, Ltd. (中國電力建設集團有限公司)	255.8	34.1%
2	China Energy Engineering Group Co., Ltd. (中國能源建設股份有限公司)	117.2	15.6%
3	TBEA SUNOASIS CO., LTD (特變電工新疆新能源股份有限公司)	63.7	8.5%
4	Zhejiang Chint New Energy Development Co., Ltd. (浙江正泰新能源開發有限公司)	32.7	4.4%
5	Sungrow Power Supply Co., Ltd. (陽光電源股份有限公司)	20.6	2.8%
	Top 5 Sub-total	489.9	65.3%
	Total	750.0	100%

Source: Frost & Sullivan

Entry Barriers

1. Hefty Capital Investment

Participation in the energy solution market requires substantial upfront capital commitments. Service providers engaged in engineering survey and design, EPC contracting, and operation and maintenance are often required to advance funds for equipment procurement, component purchases, preliminary construction works, and related project expenses. When multiple projects are executed concurrently, market participants must also maintain sufficient financial resources to support working-capital turnover and ensure uninterrupted project delivery. These considerable capital requirements pose a significant barrier for new entrants seeking to establish a competitive presence in the market.

2. Technical

The provision of comprehensive energy solutions-ranging from front-end resource assessment and system design to procurement, engineering construction, commissioning, and long-term operation and maintenance-requires a high level of technical expertise and the possession of relevant industry qualifications. As system integration quality directly determines the operational performance, reliability, and energy yield of renewable power facilities, providers must demonstrate strong engineering capabilities and multidisciplinary competence across each stage of the project lifecycle. New entrants without mature technical systems or proven integration capabilities face substantial challenges in meeting customer and regulatory expectations.

3. Qualification and Management

Effective execution of renewable energy engineering and EPC projects depends on the availability of qualified technical personnel and experienced project management teams capable of ensuring safety, quality, cost control, and timely delivery. In light of the rapid expansion of the renewable energy industry in the PRC and the relative scarcity of skilled professionals with practical engineering experience, it is difficult for new entrants to rapidly assemble and train teams with the requisite expertise. The high threshold for talent, qualifications, and managerial capability therefore constitutes an additional barrier to entry for prospective market participants.

4. Corporate and Individual Qualifications

Corporate and individual qualifications impose rigorous professional and educational standards, acting as barriers by demanding proven expertise and certifications that new entrants may struggle to assemble. Firms must demonstrate a history of compliance with national standards, no major violations in the past 3–5 years, and possession of ISO certifications for quality, environmental, and safety management. On the other hand, key personnel such as chief engineers and project managers must hold senior titles, such as professor-level senior engineers, and national registrations, namely Registered Structural Engineers or Certified Constructors, with minimum experience thresholds, such as 10 years for senior roles in Level 1 qualifications. This emphasis on accredited talent creates high recruitment costs and time delays for newcomers, reinforcing the advantage of established firms with internal talent pools.

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5. *Net Asset Size Thresholds*

A key entry barrier is the prescribed net asset thresholds, which serve as a financial gatekeeper to ensure firms can handle large-scale projects and associated risks. For Power Engineering General Contracting Qualifications, Level 1 requires net assets exceeding RMB100 million, Level 2 over RMB40 million, and Level 3 at least RMB8 million. Similarly, Power Facility O&M Licences (Levels 1–3) require net assets commensurate with their activities of installing, repairing, and testing power facilities, and these net assets account for no less than 15% of their total assets. These requirements deter startups and small firms, as they necessitate substantial capital reserves, often favouring state-owned or large private enterprises with strong balance sheets, thereby limiting market access and consolidating industry dominance among incumbents.

6. *Staff Size Requirements*

Staff size thresholds represent another formidable barrier, requiring firms to maintain a minimum number of qualified employees to demonstrate operational capacity. For Level 1 Power Engineering General Contracting, enterprises need over 300 technical and management staff, including at least 15 senior engineers and 30 intermediate-level professionals; Level 3 requires at least 50 staff with 5 seniors and 10 intermediates. Design qualifications (Grade A) mandate over 100 technical personnel, with over 40 registered engineers, while O&M licences (Level 1) stipulate more than 200 staff. These mandates increase overhead costs for labour, training, and retention, particularly in a competitive talent market, making it challenging for smaller or foreign entrants to scale up quickly and comply, thus protecting incumbent players.

7. *Standards of Compliance and Operational Performance*

Stringent standards for compliance and operational performance, both for obtaining and maintaining licences, create ongoing barriers through continuous oversight and potential revocation risks. Initial approval involves audits for safety records, environmental compliance, and financial health, with no major incidents in recent years. Maintenance requires annual reporting, periodic inspections by Ministry of Housing and Urban-Rural Development (住房和城乡建设部) and National Energy Administration (國家能源局), adherence to updated standards and minimum performance metrics. Non-compliance can lead to downgrades or suspensions, imposing high administrative burdens and legal costs, which disproportionately affect resource-limited entrants while favouring well-established firms with robust compliance systems.

Factors of Competition

1. *Acquisition of Resources*

Competition in the energy solution market is closely linked to participants’ ability to secure high-quality resources across the value chain. Service providers must maintain strong relationships with reputable upstream suppliers to procure key equipment and components in a timely and cost-effective manner, ensuring smooth project execution and adherence to construction schedules. At the same time, providers must build and sustain effective downstream customer channels, particularly in the more fragmented segments such as distributed renewable projects, requiring strong managerial capability, brand recognition, and localised customer engagement. The breadth and reliability of both upstream and downstream resource networks therefore represent a critical determinant of competitive strength.

2. *Strategic Partnerships*

As large SOEs and CSOs increasingly expand into the renewable EPC and engineering services market, many leverage their financial scale and credibility while seeking partners with deeper technical expertise and on-the-ground execution experience. This creates opportunities for experienced energy solution providers to form complementary partnerships, particularly on projects with higher technical complexity or more demanding construction environments. Such collaborations enhance service capacity, strengthen market presence, and broaden access to project and client resources. The ability to develop and maintain strong strategic partnerships, supported by a solid market reputation and proven project-delivery track record, constitutes an important factor in market competitiveness.

3. *Market Know-how*

With the growing complexity of renewable energy project models, especially as distributed systems proliferate alongside continued expansion of centralised projects, specialised industry knowledge has become a key differentiator. Competent service providers must possess deep understanding of policy developments, technical standards, installation requirements, and component cost trends, and must continuously upgrade construction techniques and system-integration capabilities. Comprehensive market insight enables companies to respond effectively to evolving project demands, optimise solution design, and position themselves competitively in business development. As a result, market know-how and accumulated operational experience serve as essential competitive advantages for energy solution providers.

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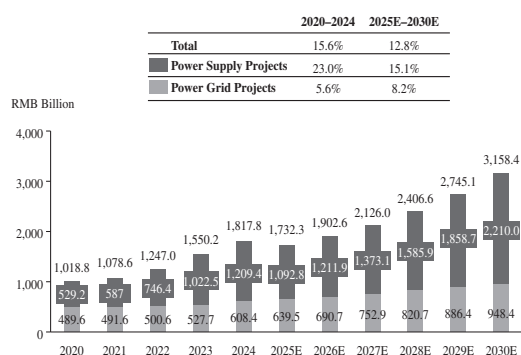
OVERVIEW OF THE PRC POWER FACILITY CONSTRUCTION MARKET

Total Electricity-Related Project Investment

Driven by the national “Dual Carbon” strategy and the 14th Five-Year Plan, total electricity project investment in China surged from RMB1,018.8 billion in 2020 to RMB1,817.8 billion in 2024, representing a CAGR of 15.6%. The upward trend is projected to continue, growing from RMB1,732.3 billion in 2025 to RMB3,158.4 billion in 2030, representing a CAGR of 12.8%. Historically, Power Supply Projects were the primary growth driver, expanding to reach RMB1,209.4 billion in 2024, representing a CAGR of 23.0%. Moving forward, supply-side growth will moderate to represent a CAGR of 15.1%, reaching RMB2,210.0 billion by 2030. Conversely, Power Grid Projects are entering an acceleration phase to support new power system construction and resolve renewable connection bottlenecks. Grid investment will accelerate from a historical CAGR of 5.6%, which reached RMB608.4 billion in 2024, to a forecasted CAGR of 8.2%, reaching RMB948.4 billion by 2030.

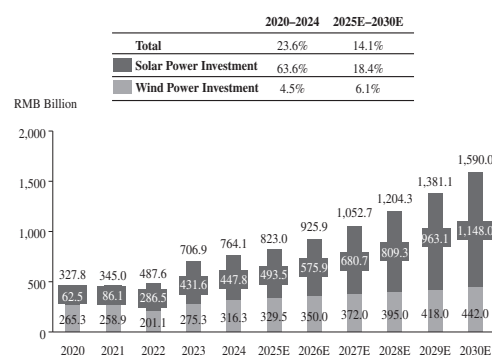
Within power supply, Wind and Solar Projects demonstrated explosive historical growth, rising from RMB327.8 billion in 2020 to RMB764.1 billion in 2024, representing a robust CAGR of 23.6%. The figure is projected to reach RMB1,590.0 billion by 2030, representing a CAGR of 14.1%. Solar power was the dominant engine, surging to RMB447.8 billion in 2024, representing a historical CAGR of 63.6% due to supply chain cost reductions and distributed solar adoption. As the market matures from rapid capacity expansion to systemic integration, solar’s forecasted growth will stabilize to represent a CAGR of 18.4%, reaching RMB1,148.0 billion in 2030. Despite this percentage deceleration, absolute investment growth between 2025 and 2030, totaling RMB654.6 billion, will nearly double its historical counterpart, ensuring solar remains the primary engine of the energy transition. Meanwhile, Wind power investment will pick up momentum, accelerating from a historical CAGR of 4.5%, reaching RMB316.3 billion in 2024, to a forecasted CAGR of 6.1%, reaching RMB442.0 billion in 2030, driven by high-value offshore projects and the repowering of older onshore turbines.

Total Annual Investment Completed in Electricity Projects (The PRC), 2020–2030E



Source: China Electricity Council (CEC), Frost & Sullivan

Total Annual Investment Completed in Solar Power and Wind Power (The PRC), 2020–2030E



Source: China Electricity Council (CEC), Frost & Sullivan

Newly Installed Power Generating Capacity

Underpinned by the 14th Five-Year Plan and a strategic pivot toward non-fossil fuels, China’s newly installed power generating capacity surged from 190.9 GW in 2020 to 430.0 GW in 2024, representing a robust CAGR of 22.5%. Looking ahead, growth momentum is expected to normalize as annual installations increase from 542.7 GW in 2025 to 901.5 GW in 2030, representing a CAGR of 10.7%. The sustained expansion is driven by the ongoing construction of the New Power System and the continuous electrification of the broader economy.

In particular, solar power was the primary catalyst for historical industry expansion, with annual newly installed capacity surging from 48.2 GW in 2020 to 280.0 GW in 2024, representing a remarkable CAGR of 55.2%. It was driven by the Whole Country PV pilot policy and massive desert energy bases. In 2025, the sector enters a market-oriented transformation phase, guided by new policies including a Contract for Difference (CfD) mechanism, carbon market expansion, and classified distributed PV management. Under this high-quality framework, growth will normalize to reach an annual installation of 651.8 GW by 2030, representing a CAGR of 15.4%. Despite the moderating rate, absolute capacity additions from 2025 to 2030 (333.8 GW) will exceed the 2020–2024 period (231.8 GW), reflecting a shift toward massive-scale stability.

- **Xinjiang:** Newly grid-connected capacity skyrocketed from 1.5 to 2,668.2 ten thousand kW (2020–2024), representing a CAGR of 549.4%, driven by the national “Sha-Ge-Huang” strategy and expanded UHV transmission corridors.

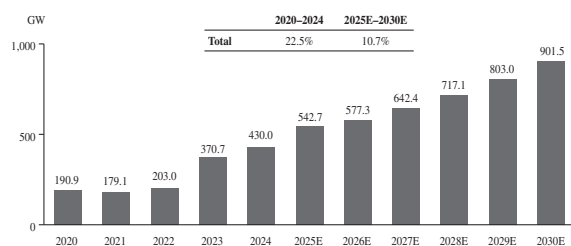
INDUSTRY OVERVIEW

- **Guangdong:** Installations climbed from 130.5 to 1,594.2 ten thousand kW, representing a CAGR of 87.0%, fueled by a strategic pivot toward commercial and industrial distributed rooftop PVs.
- **Shanxi:** Capacity grew from 165.0 to 986.5 ten thousand kW, representing a CAGR of 56.4%, underpinned by the innovative “Photovoltaic + Mining Subsidence” model to achieve ecological restoration.

Wind power maintained a steady trajectory as it transitioned to grid parity. Annual newly installed capacity grew from 72.1 GW in 2020 to 81.4 GW in 2024, representing a CAGR of 3.1%, reflecting a shift toward high-yield northern bases and complex offshore projects. Looking ahead, the sector will accelerate slightly under the 15th Five-Year Plan, driven by turbine repowering and the commercial scaling of deep-sea offshore wind, projected to reach 150.6 GW by 2030, representing a CAGR of 4.8%.

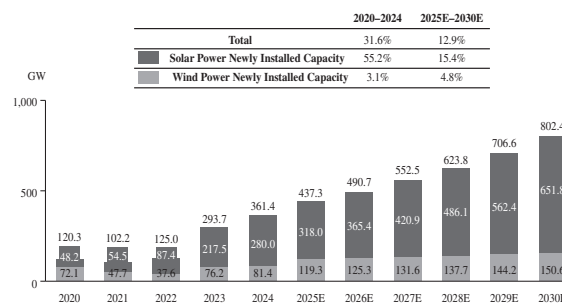
- **Xinjiang:** Newly grid-connected capacity surged from 64.0 to 1,228.0 ten thousand kW (2020–2024), representing a CAGR of 109.3%, serving as a critical baseload for massive hybrid renewable bases.
- **Guangdong:** Installations grew from 107.0 to 144.4 ten thousand kW, representing a CAGR of 7.8%, driven by an aggressive marine economy strategy focusing on offshore wind clusters in the Pearl River Delta.
- **Shanxi:** Solidified its position as a mature energy hub with cumulative installed capacity reaching 2,616.0 ten thousand kW in 2024. The province focused on the “Coal-to-Green” transition by integrating wind power with existing coal-fired regulation capabilities for grid stability.

**Newly installed power generating capacity
(The PRC), 2020–2030E**



Source: China Electricity Council (CEC), Frost & Sullivan

**Newly installed power generating capacity of
Solar and Wind Power (The PRC), 2020–2030E**



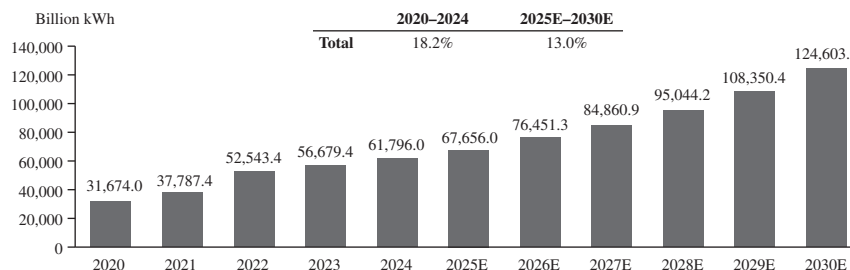
Source: China Electricity Council (CEC), Frost & Sullivan

OVERVIEW OF THE PRC ELECTRICITY SALES MARKET

Market-based Electricity Trading Volume in the PRC

The market-based electricity trading volume in the PRC experienced consistent growth, rising from 31,674.0 billion kWh in 2020 to 61,796.0 billion kWh in 2024 at a CAGR of 18.2%. It is expected that the trading volume would reach 124,603.0 billion kWh in 2030, at a CAGR of 13.0% from 2025 to 2030. This trajectory is primarily driven by ongoing power market liberalisation reforms, including the progressive establishment of a unified national market, expanded spot and ancillary services trading, and the full integration of renewable energy into competitive mechanisms, which enhance resource allocation efficiency, promote cross-regional flows, and support the new-type power system’s development.

Market-based Electricity Trading Volume (The PRC), 2020–2030E



Source: Frost & Sullivan