

INDUSTRY OVERVIEW

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OVERVIEW OF THE NEW ELECTRICITY SYSTEM INDUSTRY

As the global transition towards renewable energy continues to deepen, power sources represented by wind power, solar power and energy storage systems have assumed an increasingly prominent role within the overall energy system. On the demand side, sectors with high electricity consumption — most notably artificial intelligence and new energy vehicles — have experienced rapid growth on a global scale in recent years. This evolving supply-demand structure in the power sector presents both significant opportunities and challenges for a new round of upgrades to global power infrastructure. The development of new electricity systems has become pivotal to supporting a cleaner power generation mix, deeper intelligence in grid operations and energy services, and the comprehensive electrification of social production and daily life.

Core Definition and Characteristics of the New Electricity System

The new electricity system represents a modern electricity system built around a high proportion of new energy integration, a high penetration of power electronic devices as a technical feature, with the deep synergy among “power generation-transmission-distribution-load-storage” serving as its core operational feature, incorporating digital technologies and the concept of the energy internet. It is designed to resolve the structural limitations of traditional electricity systems, which are unable to accommodate the large-scale, intermittent, and volatile nature of new energy integration, and serves as the core driver for achieving a clean and low-carbon energy transition.

Through the in-depth application of digital technologies and intelligent control strategies, the integrated synergy of “power generation-transmission-distribution-load-storage” achieves the maximum consumption of new energy on the supply side, flexible interconnection on the grid side, active response on the demand side, and multi-timescale dynamic balance on the energy storage side. This five-dimensional, deeply integrated operational model significantly enhances the resource allocation efficiency and safety of the electricity system, thereby underpinning the high-level penetration of renewable energy.

Analysis of Challenges in the New Electricity System

Safety and stability of power grid operations in the new electricity system. The random volatility associated with a high penetration of renewable energy, a high penetration of power electronic devices and diversified loads places strain on the real-time balancing and the safety, and stability of the power grid. It is therefore necessary to leverage advanced technologies, such as artificial intelligence and digital twins, to enable intelligent operation and maintenance and proactive early warnings, thereby enhancing the resilience of the power grid.

Coordination of distributed resources and reliable power supply. The coordination of responses between distributed energy storage and controllable loads is hindered by challenges such as inconsistent standards and communication delays, which in turn compromise operational reliability. To address this issue, it is necessary to establish unified technical standards and a collaborative control platform to enable the rapid and reliable aggregation of resources.

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Synergy of “power generation-transmission-distribution-load-storage” and loss-reduction operations. The lack of data integration and asynchronous responses across the “power generation-transmission-distribution-load-storage” segments heightens the difficulty of achieving precise local accommodation and power flow optimization. Therefore, it is essential to develop a comprehensive monitoring and measurement system and to realize dynamic and coordinated dispatch using intelligent algorithms.

High proportion of new energy consumption and cross-temporal and spatial regulation. The severe volatility of wind and solar power generation, coupled with the inadequate regulation capacity of energy storage, constrains the continuous enhancement of consumption levels. It is necessary to improve market mechanisms and deploy large-scale flexible resources to enhance the cross-temporal and spatial regulation capabilities of the system.

Balancing power demand fluctuations and ensuring grid stability. The increasing penetration of renewable energy, electrification, and flexible loads has intensified power demand uncertainty and volatility. Meanwhile, limited visibility and controllability of distributed loads make real-time load management more challenging, affecting grid stability and operational efficiency. To address these challenges, advanced load forecasting, intelligent energy management platforms, and demand response mechanisms are needed to enhance load regulation capabilities and support reliable operation of new power systems.

Analysis of the Market Size of the New Electricity System

Market Size of the Global Renewable Energy

The global power supply structure is accelerating its transition towards renewable energy. The continuous expansion of installed capacities for wind and photovoltaic power, coupled with the intermittency and volatility of renewable energy generation, poses significant challenges to voltage regulation and stable energy transmission. From 2021 to 2025, the global installed capacity of renewable energy increased from 3,089 GW to 5,273 GW, representing a CAGR of 11.4%. It is expected that the global installed capacity of renewable energy will reach 10,272 GW by 2030, with a CAGR of 14.8% from 2025 to 2030.

Market Size of the Global New Electricity System

The rapid growth of the global new electricity system market is primarily driven by two major structural forces. Firstly, the explosive growth in emerging power demand, represented by AI data centers and new energy vehicles, has fundamentally reshaped the global electricity supply and demand landscape. Secondly, the accelerating advancement of the global energy transition, coupled with the continuous increase in the proportion of installed renewable energy capacity, has propelled the profound transformation of the electricity system towards clean and intelligent operations. From 2021 to 2025, the investment in the global new electricity system market, including various power equipment, civil engineering works, installation and commissioning services, as well as digital systems for smart grid management and others, increased from RMB2,907.7 billion to RMB6,025.2 billion, representing a CAGR of 20.0%. The investment in the global new electricity system market is expected to reach RMB13,362.6 billion by 2030, with a CAGR of 17.3% from 2025 to 2030.

The robust growth of the new electricity system market in China is attributable to the policy initiatives driven by the “dual carbon” goals, which have positioned China as the core engine of the global energy transition. Meanwhile, China’s leading advantages in key areas such as ultra-high voltage transmission, smart grids, and energy storage technologies have provided solid technical support and industrialization foundation for the construction of its new electricity system. From 2021 to 2025, the investment in the new electricity system market in China increased from RMB1,232.1 billion to RMB2,446.7 billion, representing a CAGR of 18.7%. The investment in the new electricity system market in China is expected to reach RMB5,327.7 billion by 2030, with a CAGR of 16.8% from 2025 to 2030.

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Overview of the Global New Electricity Markets in Major Countries and Regions

The development status, characteristics, and strategic priorities of power systems and new electricity systems vary significantly across countries, driven by differences in energy structures, resource endowments, grid infrastructure, and decarbonization goals. China has established a comprehensive and competitive new electricity system industry chain, supported by large-scale renewable energy deployment, advanced grid infrastructure, strong manufacturing capabilities, and continuous technological innovation. These advantages position China’s new electricity system ecosystem with significant potential to empower global markets and support the worldwide transition toward a more efficient, flexible, and intelligent power system.

	China	United States	Europe & Oceania	Emerging Markets (Asia, Africa, Latin America)
Development Status	- New energy has become the dominant source of incremental power supply. - Grid-side investment is pivoting towards intelligence and flexibility; the coordinated development of “power generation-transmission-distribution-load-storage” is accelerating. The business model of distribution networks is shifting towards “power generation-transmission-distribution-load-storage” collaborative projects.	- Rapid growth in AI data centres and increasing electrification across transportation and industrial sectors are driving a significant rise in electricity demand and creating mounting pressure on power system expansion. - Power grid ageing, coupled with challenges associated with renewable energy integration, is increasing the need for enhanced grid resilience and reliability.	- Entering a critical phase of the energy transition, characterized by large-scale deployment of renewable energy. - Elevated penetration of renewable energy sources is creating increasing demand for cross-border transmission infrastructure and grid interconnection.	- Structural growth in electricity demand, driven by population expansion, urbanization and industrialization, continues to outpace power supply in many regions. - Governments are advancing energy transition initiatives. However, power infrastructure remains underdeveloped, and significant investment is still required to enhance system resilience and reliability.
Key Trends	- New-type loads, represented by AI data centers and high-end manufacturing, impose stringent requirements on power quality, reliability, and low-carbon attributes. The power supply model is evolving towards high-efficiency, highly elastic, and highly reliable “power generation-transmission-distribution-load-storage” coordinated operation. - The nationwide unified electricity market will enter a high-quality construction phase, breaking provincial barriers and establishing a comprehensive market system covering energy, ancillary services, capacity, and green power/carbon linkages.	- Growing demand for greater flexibility in power systems, driven by the need to support AI-related electricity consumption and the increasing adoption of renewable energy, has become a key factor shaping market design and investment decisions. - Grid modernization, including transmission and distribution network upgrades and deployment of smart grid technologies, is accelerating to improve the integration and utilization efficiency of renewable energy resources.	- The rapid expansion of renewable energy penetration is driving increasing demand for system flexibility. In Europe, higher shares of wind and solar generation have intensified the need for grid balancing and dispatch optimization, accelerating investment in energy storage solutions. - Virtual power plants (VPPs) and demand-side response (DSR) resources are emerging as important sources of system flexibility, facilitating secure and stable grid operations.	- Structural growth in electricity demand remains supported by economic development, population growth and urbanization. - Distributed photovoltaic systems and localized energy solutions are gaining traction, particularly in regions with inadequate grid infrastructure, driving demand for solar modules, inverters, battery energy storage systems and related equipment, while balancing cost efficiency and energy security considerations.
Opportunities for China’s New Electricity System Industry	Leading enterprises are evolving from equipment manufacturing advantages towards full-stack system integration, digitalization, and lifecycle services.	- Chinese enterprises may capitalize on growing demand from AI data centres and new power infrastructure by supplying transmission and distribution equipment, energy storage systems, transformers and related products. - Opportunities are also emerging in localized manufacturing and service provision, including power equipment production, power quality management and long-term operations and maintenance services.	- Leveraging advantages in PCS technologies, energy storage systems and integrated solutions, Chinese companies are well positioned to provide energy storage solutions that support large-scale renewable energy integration and grid flexibility requirements. - Through EPC services, project delivery capabilities and grid connection expertise, Chinese participants can further expand their presence across European and Australian markets.	- Chinese companies can supply photovoltaic modules, battery energy storage systems, inverters, transformers and related equipment to address the rapidly growing demand for renewable energy infrastructure and power system upgrades. - Additional opportunities exist in EPC contracting and long-term O&M services, enabling participation across the full project lifecycle, from power generation and energy storage to grid connection and operation.

OVERVIEW OF THE NEW ELECTRICITY SYSTEM SOLUTIONS INDUSTRY

Definition of New Electricity System Solutions

The new electricity system (an integrated “generation-grid-load-storage” electricity system) solutions are designed for future electricity system that support the “dual carbon” goals and the integration of a high penetration of new energy and a high penetration of power electronic devices. With the core objective of achieving a safe and reliable, green and efficient, flexible and intelligent power supply, these solutions aim to form a comprehensive technical system and engineering implementation scheme with capabilities for comprehensive perception, intelligent synergy, dynamic balancing, and value optimization through systematically integrating power equipment across the generation, transmission, distribution, load, and energy storage segments, and by deeply incorporating software systems for monitoring and dispatch, analysis and simulation, and intelligent decision-making. Rather than merely representing a combination of hardware equipment, these solutions utilize “software-defined” and “data-driven” approaches to realize a electricity system that enables flexible interactions among the “power generation-transmission-distribution-load-storage” segments, the efficient consumption of new energy, enhanced system resilience, and the maximization of full-chain value.

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Segmentation of New Electricity System Solutions

Based on the type of product and equipment, new electricity system solutions can be classified into primary equipment, secondary equipment, primary and secondary integrated equipment, power electronics equipment, energy storage system, and others.

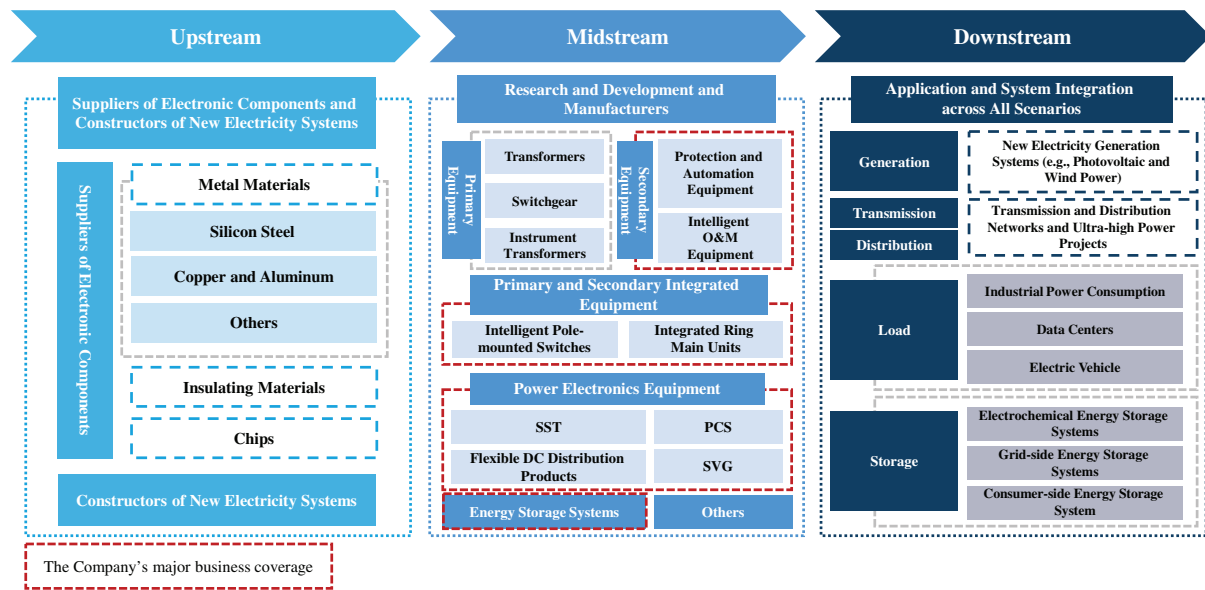
Category	Major Products	Role and Application
Primary Equipment	Transformers, Switchgear, Instrument Transformers	Directly participates in power generation, transmission, distribution, and consumption as the physical backbone of the grid.
Secondary Equipment	Protection & Automation Equipment, Measurement & Control Equipment, Distribution Network Dispatch & Control Equipment, Intelligent O&M Equipment (UAVs, Robots, Online Monitoring, AI-based tools)	Monitors, measures, controls, protects, and dispatches primary equipment to realize grid automation and informatization. Specifically: - Protection & automation: Ensures rapid fault isolation and stable grid operation. - Intelligent O&M: Enables automatic inspections, intelligent identification, and proactive early warnings to enhance O&M efficiency.
Primary & Secondary Integrated Equipment	Intelligent Pole-Mounted Switches, Primary & Secondary Integrated Ring Main Units	Deeply integrates primary and secondary equipment in physical structure, electrical connection, and information interaction, enabling automated upgrading of distribution networks.
Power Electronics Equipment	Solid State Transformers (SST), Power Conversion Systems (PCS), Flexible DC Distribution Products, SVG, Synchronous Condensers	Enables highly efficient conversion, control, and processing of electrical energy. Supports renewable energy integration, improves power quality, and strengthens system stability across all stages of the power chain.
Energy Storage Systems	Energy Storage Batteries, Power Conversion Systems (PCS), Battery Management Systems (BMS), Energy Management Systems (EMS)	Provides energy time-shifting, system frequency and peak regulation, and emergency reserve support. Acts as a buffer between generation and consumption, enhancing grid flexibility and reliability.
Others	Power Ancillary Equipment, Fire Protection Equipment	Ensures safe and stable operation of main equipment and personnel; provides environmental protection and safety assurance within the power system.

Analysis of the Value Chain of New Electricity System Solutions

The upstream sector of the value chain comprises suppliers of metal materials (such as silicon steel, copper, and aluminum), insulating materials, and electronic components (including semiconductor chips), as well as infrastructure constructors that provide planning, design, engineering construction, and system integration services for new electricity systems. The midstream sector consists of research and development and manufacturing enterprises focusing on the design and production of primary equipment, secondary equipment, primary and secondary integrated equipment, power electronics equipment, and energy storage systems. The downstream segment centers on practical applications and system integration across all “power generation-transmission-distribution-load-storage” scenarios. On the generation side, solutions are mainly applied new electricity generation systems, such as photovoltaic and wind power. On the grid side, solutions are deployed across transmission and distribution networks, as well as ultra-high voltage projects. On the load side, solutions mainly applied to emerging power loads, including industrial power consumption, data centers, and electric vehicle charging facilities. On the storage side, solutions mainly applied to electrochemical energy storage, grid-side and consumer-side energy storage systems.

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Value Chain of New Electricity System Solutions

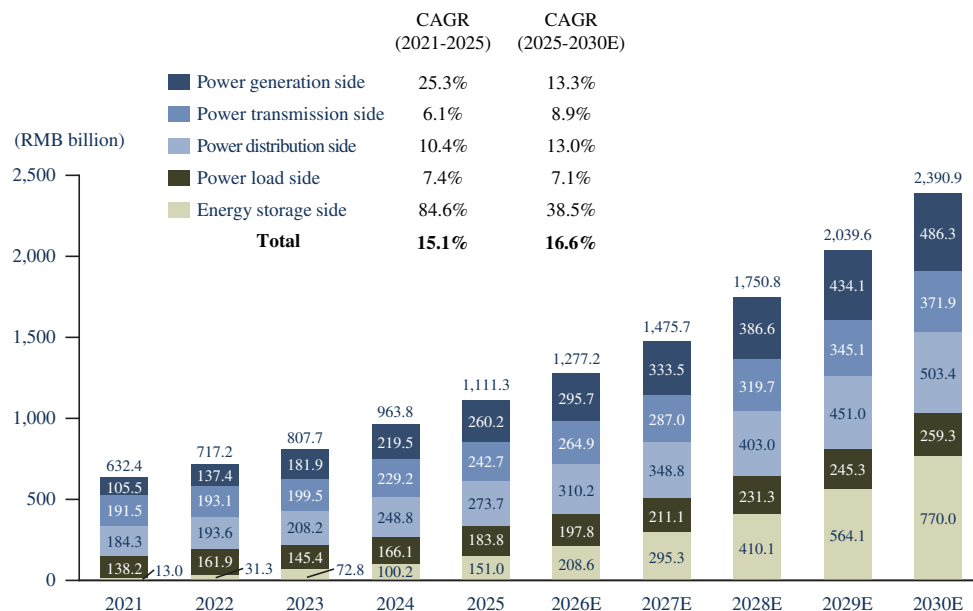


Source: Frost & Sullivan

Global Market Size of New Electricity System Solutions

From 2021 to 2025, the global market size of new electricity system solutions increased from RMB632.4 billion to RMB1,111.3 billion, representing a CAGR of 15.1%. The global market size of new electricity system solutions is expected to reach RMB2,390.9 billion by 2030, representing a CAGR of 16.6% from 2025 to 2030.

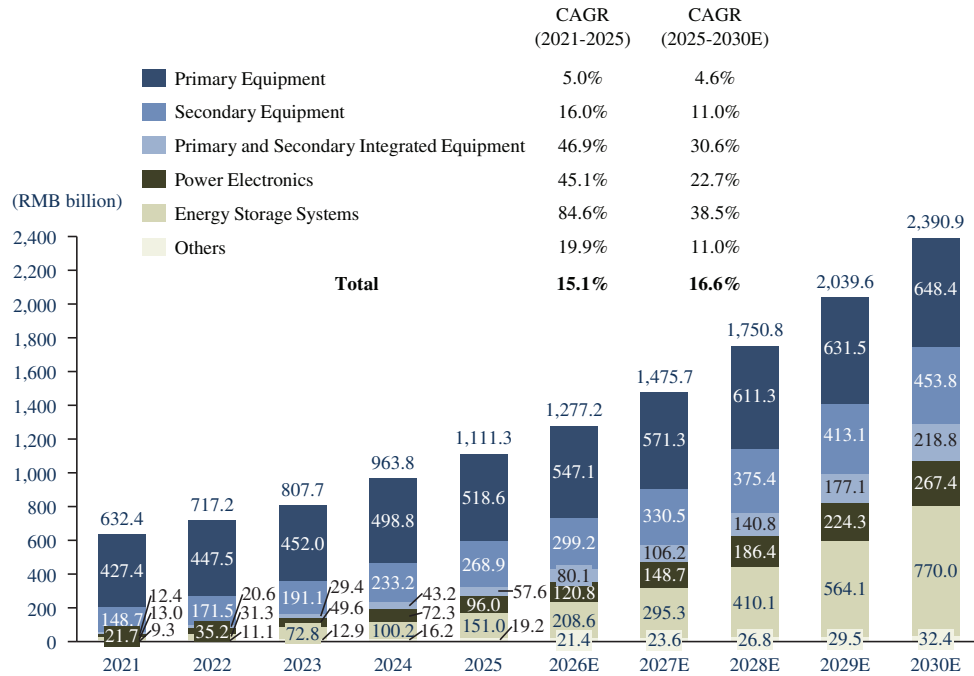
Market Size of New Electricity System Solutions by Downstream Application in terms of Revenue, Global, 2021-2030E



Source: International Energy Agency (IEA), Frost & Sullivan

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Market Size of New Electricity System Solutions by Product in terms of Revenue, Global, 2021-2030E

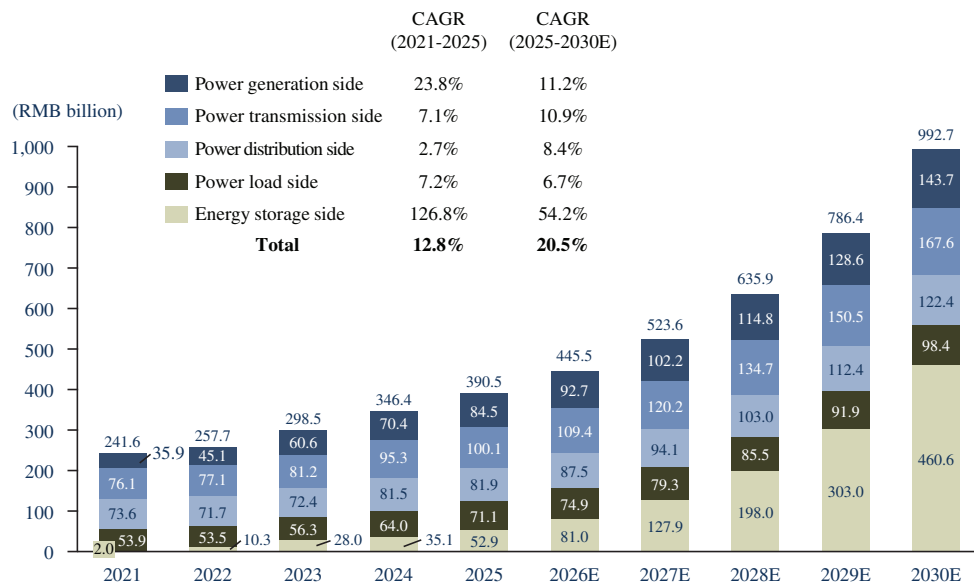


Source: National Energy Administration (NEA), Frost & Sullivan

Market Size of New Electricity System Solutions in China

From 2021 to 2025, the market size of new electricity system solutions in China increased from RMB241.6 billion to RMB390.5 billion, representing a CAGR of 12.8%. The market size of new electricity system solutions in China is expected to reach RMB992.7 billion by 2030, representing a CAGR of 20.5% from 2025 to 2030.

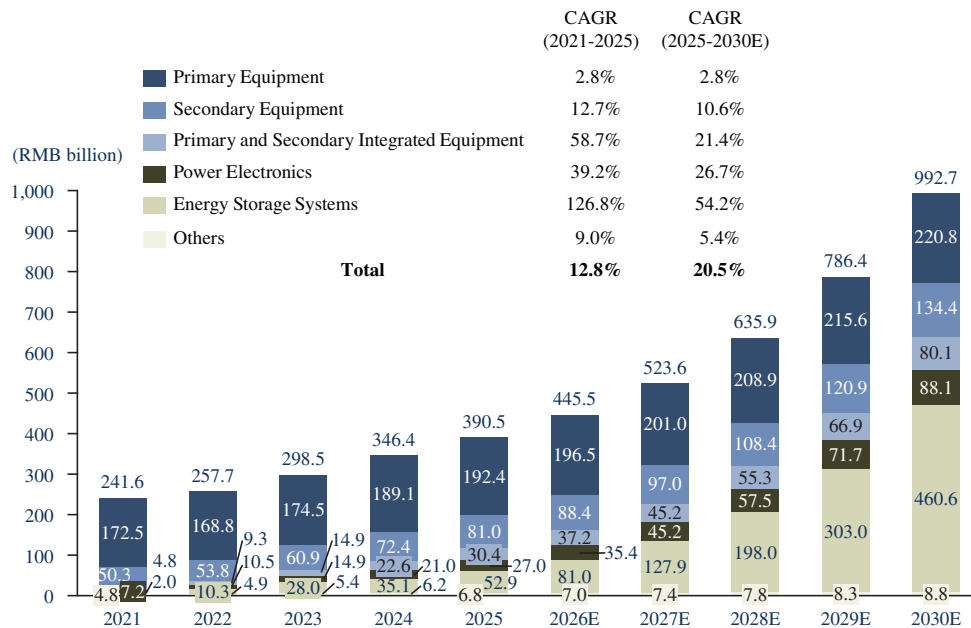
Market Size of New Electricity System Solutions by Downstream Application in terms of Revenue, China, 2021-2030E



Source: IEA, Frost & Sullivan

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Market Size of New Electricity System Solutions by Product in terms of Revenue, China, 2021-2030E



Source: NEA, Frost & Sullivan

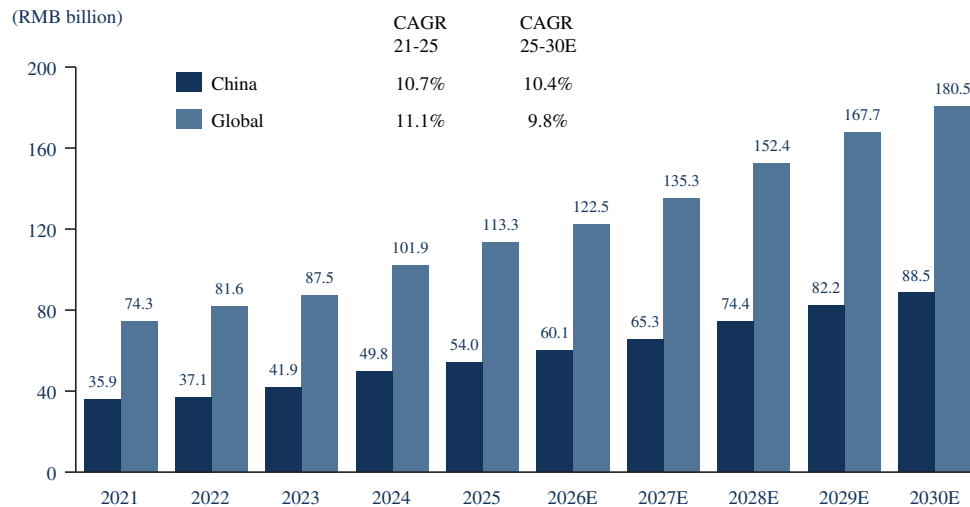
Definition and Market Size of Protection and Automation Solutions

Protection and automation solutions represent an integrated technical system comprising the comprehensive deployment of automation equipment, including relay protection devices, measurement and control units, supervisory control and data acquisition (SCADA) systems, and automatic generation control by utilizing communication networks, computing, and control technologies. These solutions enable real-time monitoring, intelligent control, automatic regulation, and rapid fault protection across the entire power grid value chain, spanning power generation, transmission, transformation, and distribution. By ultimately facilitating the tele-metering, tele-signaling, tele-control, and tele-adjustment of power equipment, these solutions comprehensively enhance the security, reliability, economic efficiency, and intelligent operational capabilities of the power grid.

From 2021 to 2025, the global market size of protection and automation solutions increased from RMB74.3 billion to RMB113.3 billion, representing a CAGR of 11.1%. The global market size of protection and automation solutions is expected to reach RMB180.5 billion by 2030, representing a CAGR of 9.8% from 2025 to 2030. From 2021 to 2025, the market size of protection and automation solutions in China increased from RMB35.9 billion to RMB54.0 billion, representing a CAGR of 10.7%. The market size of protection and automation solutions in China is expected to reach RMB88.5 billion by 2030, representing a CAGR of 10.4% from 2025 to 2030.

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Market Size of Protection and Automation Solutions in terms of Revenue, Global and China, 2021-2030E



Source: Frost & Sullivan

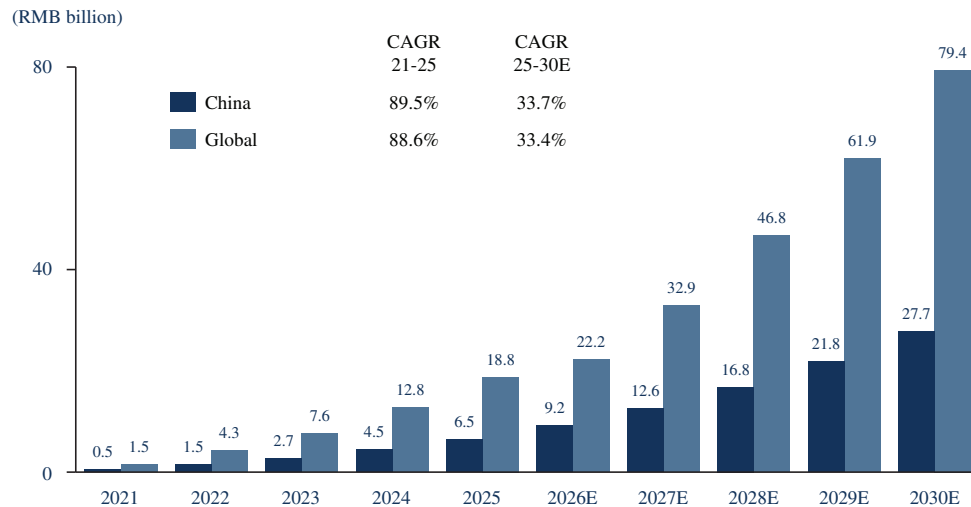
Definition and Market Size of Intelligent O&M Solutions

Intelligent O&M solutions represent an unmanned and intelligent equipment operation and maintenance management system constructed through the comprehensive integration of inspection robots, unmanned aerial vehicles, high-definition video, IoT sensors, and artificial intelligence analysis platforms, and designed to replace traditional manual inspections. These solutions enable the proactive perception, precise diagnosis, and effective control of power equipment status, operating environments, and underlying safety risks to enhance operation and maintenance efficiency, ensure robust equipment security, and significantly reduce manual labor costs.

From 2021 to 2025, the global market size of intelligent O&M solutions increased from RMB1.5 billion to RMB18.8 billion, representing a CAGR of 88.6%. The global market size of intelligent O&M solutions is expected to reach RMB79.4 billion by 2030, representing a CAGR of 33.4% from 2025 to 2030. From 2021 to 2025, the market size of intelligent O&M solutions in China increased from RMB0.5 billion to RMB6.5 billion, representing a CAGR of 89.5%. The market size of intelligent O&M solutions in China is expected to reach RMB27.7 billion by 2030, representing a CAGR of 33.7% from 2025 to 2030.

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Market Size of Intelligent O&M Solutions in terms of Revenue, Global and China, 2021-2030E



Source: Frost & Sullivan

Market Drivers and Development Trends of the Global New Electricity System Solutions Industry

Global Energy Transition Accelerating the Development of the New Electricity System. Driven by global “carbon neutrality” goals, the energy structure is accelerating the transition towards renewable sources, and the core position of the electricity system within the broader energy architecture continues to elevate. The rapid growth in installed capacity for renewable energy, such as wind and photovoltaic power, has imposed heightened demands on the flexibility, regulation capacity, and cross-regional allocation capabilities of the power grid, thereby propelling the construction of the new electricity system.

Explosion of AI Computing Power Driving a Surge in Electricity Demand. The rapid advancement of artificial intelligence, big data, and cloud computing has significantly escalated global electricity demand. The training of AI models and the operation of massive data centers result in substantial electricity consumption. It is expected that future energy consumption from these sectors will grow exponentially and power supply capacity is progressively emerging as a key factor in the development of new electricity systems.

Digitalization and Intelligent Transformation. Driven by the continuous advancement of artificial intelligence, the IoT, and big data technologies, the electricity system is accelerating its evolution towards digitalization and intelligentization. The deep integration of AI with the electricity system has been elevated to a national strategic level across various countries. Numerous countries are actively promoting the synergized development of the “Electricity + AI” model to construct intelligent energy systems.

Accelerated Overseas Expansion of China-based Enterprises. Driven by the global energy transition and the demand for power grid upgrades, China-based power equipment enterprises are accelerating their overseas expansion. Underpinned by technological advantages in fields such as ultra-high voltage, flexible direct current transmission, and smart energy storage, and leveraging international cooperation frameworks such as the Belt and Road Initiative, these enterprises provide numerous countries across the globe with comprehensive solutions, covering new electricity generation, smart grids, energy storage systems, and microgrids.

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Green and Low-Carbon Transition. Against the backdrop of the “Dual Carbon” goals and increasingly stringent regulations on environment protection, traditional high-carbon materials such as mineral oils are being phased out in favor of eco-friendly insulating gases and bio-based insulating oils. This substitution is driving a reduction in the full-lifecycle carbon emissions of power equipment, establishing green development as a critical technological pathway for the industry.

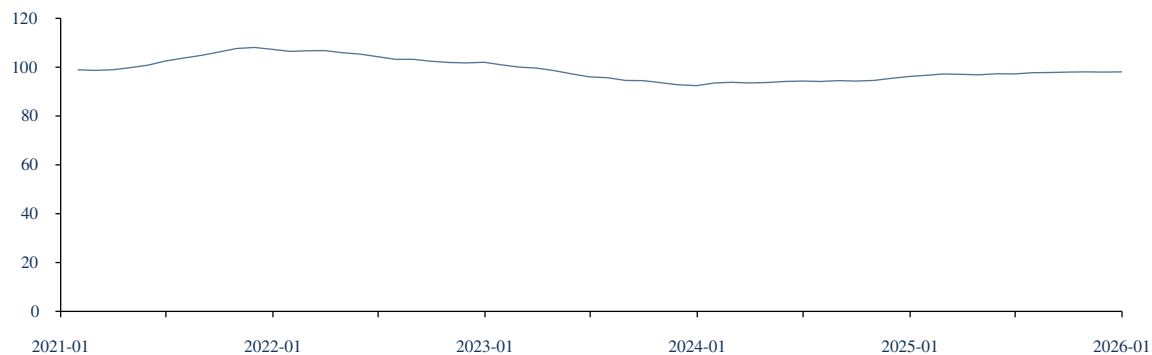
Comprehensive Solution Capabilities Emerging as the Core of Competition. Driven by the escalating complexity of power systems, industry competition is transitioning from standalone equipment manufacturing towards the provision of comprehensive solutions, including the integrated delivery of “equipment + software + services”, with market players gradually transforming into energy system integrators and comprehensive service providers.

Cost Analysis of the New Electricity System Solutions Industry

Major raw materials for the new electricity system solutions providers are various electronic components, including insulated-gate bipolar transistor (IGBT) power modules, MOSFETs, DSP/MCU main control chips, driver chips, sensor chips, power inductors, etc.

The PPI of electronic components in China experienced a cycle of expansion, adjustment, and stabilization from 2021 to 2025. After rising above 100 during 2021-2022 amid strong demand and supply constraints, the index declined in 2023 due to market adjustment and weaker demand. Since 2024, the PPI has gradually stabilized and recovered, indicating easing price pressure and improving supply-demand conditions in the electronic components industry.

PPI of Electronic Components, China, 2021-2025



Note: PPI (Producer Price Index) reflects the change in producer prices compared with the same month of the previous year. An index above 100 indicates that producer prices increased year-on-year, while an index below 100 indicates a year-on-year decline.

Source: NBS, Frost & Sullivan

Overview of the New Power Electronics Equipment Industry

Definition of New Power Electronics Equipment

Power electronics equipment refers to the critical apparatus that applies power electronics technology to achieve the highly efficient conversion, control, and processing of electrical energy. Against the backdrop of the accelerating trend towards direct current grids and the integration of a high penetration of new energy, the market for new power electronics equipment is experiencing rapid development to facilitate power grid operations with higher efficiency, stronger controllability, and superior power quality. New power electronics equipment serves as the core apparatus that enable power conversion, precise power flow regulation, and power quality optimization. With a diversified product ecosystem, it has emerged as a high-growth, burgeoning segment within the transformation and upgrading of the electricity system. The core product categories primarily include solid-state transformer (SST), reactive power compensation system, converter, and flexible direct current distribution products:

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Solid-State Transformer. It is an intelligent equipment replacing traditional line-frequency transformers based on power electronics technology, which is capable of achieving highly efficient, high-frequency conversion and isolation of electrical energy. Furthermore, equipped with functionalities such as power flow control and power quality regulation, solid-state transformer serves as the core components for constructing flexible alternating current and direct current hybrid grids.

Reactive Power Compensation System. It comprises static var generator (SVG) and static synchronous compensator (SSC). Specifically, SVG, acting as a dynamic reactive power compensation device, rapidly injects or absorbs reactive power to stabilize grid voltage in real-time, improve power quality, and enhance transmission efficiency, thereby supporting the grid connection of new energy and ensuring the stable operation of sensitive loads. On the other hands, SSC, functioning as a static synchronous compensation device, provides inertia and sustained static reactive power support, thereby bolstering the voltage stability and disturbance-resistance capabilities of the power grid.

Converter. It is a power conversion equipment tasked with facilitating the bi-directional conversion between direct current on the battery side and alternating current on the grid side, whilst simultaneously enabling precise control over voltage, current, and power.

Flexible Direct Current Distribution Products. It is a core equipment for direct current distribution technology based on voltage source converters (VSC). These products enable the highly efficient, flexible, and controllable transmission of power, making them highly suitable for high-density, high-reliability power supply scenarios such as distributed new energy, data centers, and direct current loads.

Global Market Size of Data Centre Power Equipment

Data centers are imposing increasingly stringent demands on the stability, energy efficiency, and reliability of power systems. The limitations of traditional transformer equipment in scenarios demanding high power density and dynamic response drive the development of power equipment towards high efficiency, integration, modularization, and intelligent operation and maintenance, thereby supporting the large-scale deployment of massive data centers. Against this backdrop, the global market for complete sets of data center transmission and distribution equipment has also experienced rapid growth, primarily benefiting from the momentum of digital transformation, artificial intelligence, and high computing power demands. In 2021, the global market size of complete sets of data center transmission and distribution equipment was RMB9.3 billion and then increased to RMB25.4 billion in 2025, representing a CAGR of 28.6% for the period. Driven by the demand for highly reliable power supply propelled by cloud computing, hyperscale data centers, and AI, the market size is expected to further reach RMB107.5 billion by 2030, representing a CAGR of approximately 33.4% from 2026 to 2030.

In terms of technological evolution, in response to the industry shift from current power supply configurations towards an 800V high-voltage direct current (HVDC) power architecture tailored for next-generation AI data centers, solid-state transformers are emerging as a transformative solution, serving as a critical enabling technology. Leveraging the advantages of highly efficient power conversion, high power density, and the capabilities for bi-directional power flow control and intelligent regulation, SSTs not only better align with the stringent demands of data centers for high reliability and highly dynamic response power supply, but also provide critical support for the green, flexible, and system-level optimization of future data center power supply architectures, driving the industry towards highly efficient, reliable, and scalable power solutions.

Market Size of Energy Storage PCS

Driven by factors such as the rapid growth in installed capacities of photovoltaic and wind power, the continuous refinement of spot electricity market mechanisms, and the increasing demand for system peak and frequency regulation, the global energy storage market has maintained its rapid growth. From 2021 to 2025, the annual shipment volume of global energy storage systems increased from 33.9 GWh to 403.8 GWh, representing a CAGR of 85.8%. As the installed scale of new energy expands and application scenarios for energy storage across the generation, grid, and consumer sides continue to broaden, the annual shipment volume of global energy storage systems is expected to reach 1,149.3 GWh by 2030, representing a CAGR of 23.3% from 2025 to 2030. The rapid increase in the shipment volume of energy

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storage systems has robustly driven market demand for their core power conversion component, i.e. the energy storage power conversion system. In 2025, the global shipment volume of energy storage PCS stood at 185.1 GW, of which medium-to-large power energy storage PCS accounted for 89.1%. The global shipment volume of energy storage PCS is expected to reach 412.8 GW by 2030, representing a CAGR of 17.4% from 2025 to 2030.

Market Size of Reactive Power Compensation Systems and Flexible Direct Current Distribution Products

Driven by factors such as the power grid stability challenges arising from the large-scale grid connection of new energy, the implementation of national policies aimed at energy conservation and loss reduction, and the accelerated construction of smart grids, the market for reactive power compensation systems in China has maintained its rapid growth. In terms of revenue, the market size of reactive power compensation systems in China increased from RMB360 million to RMB4.05 billion from 2021 and 2025, representing a CAGR of 83.2%. Driven by the deepening development of the new electricity system, the continuous growth in demand for dynamic reactive power support resulting from the integration of a high penetration of renewable energy, and the comprehensive advancement of intelligent upgrades to distribution networks, the market size of reactive power compensation systems in China is expected to reach RMB19.9 billion by 2030, representing a CAGR of 37.5% from 2025 to 2030.

The market for flexible direct current distribution products in China is developing rapidly, primarily driven by the urgent need to construct a new electricity system under the “dual carbon” strategy, the demands for distribution network flexibility necessitated by the grid connection and consumption of a high penetration of new energy, as well as their widespread application in scenarios such as flexible direct current ultra-high voltage transmission, urban power grid capacity expansion, and data centers. In terms of revenue, the market size of flexible direct current distribution products in China stood at RMB10.8 billion in 2025. It is expected that the market size of flexible direct current distribution products in China will reach RMB34.37 billion by 2030, representing a CAGR of 26.0% from 2025 to 2030.

Competitive Landscape of New Electricity System Solutions Industry

Competitive Landscape of Protection and Automation Solution Market

The domestic protection and automation solution market has high technical and qualification barriers, with a relatively concentrated market structure. Industry competition has shifted from the supply of standalone products to integrated solutions and full-lifecycle services, and industry participants form differentiated competition based on their technological accumulation, scenario layout and service capabilities. In terms of revenue in 2025, the Company ranked second in the protection and automation solution market in China with a revenue of RMB5.5 billion and a market share of 10.3%.

Ranking of Protection and Automation Solution Market in terms of Revenue, China, 2025

Ranking	Company Name	Revenue (RMB billion)	Market share
1	Company A	10.5	19.5%
2	The Company	5.5	10.3%
3	Company B	3.0	5.5%
4	Company C	2.8	5.1%
5	Company D	2.4	4.4%
	Others	29.8	55.2%
	Total	54.0	100.0%

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Note: Company A, headquartered in Nanjing, a listed company on the Shanghai Stock Exchange, was established in 2001 and primarily provides relay protection, substation integrated automation, and overall power dispatch solutions for grid and industrial automation.

Company B, headquartered in Xuchang, a listed company on the Shenzhen Stock Exchange, was established in 1993 and focuses on the R&D and supply of transmission and distribution protection and automation, UHV DC, and related complete systems.

Company C, headquartered in Nanjing, a listed company on the Shanghai Stock Exchange, was established in 1999 and mainly provides relay protection, distribution automation terminals, as well as grid dispatch communication and monitoring equipment for power systems.

Company D, headquartered in Shenzhen, a listed company on the Shanghai Stock Exchange, was established in 1994 and mainly provides substation protection and control, DC protection, and related power monitoring devices.

Source: Public information, Frost & Sullivan

Entry Barriers in the New Electricity System Solutions Industry

Technology R&D and Engineering Verification Barriers. New power system solutions belong to a technology-intensive field with multidisciplinary integration, covering professional technologies such as steady-state and transient analysis of power systems, power grid safety and stability control, power electronic control, new energy grid connection, source-grid-load-storage coordinated control, communication protocols, as well as software and hardware platform R&D. Relevant solutions require systematic modeling, simulation verification, control strategy design, algorithm optimization, equipment R&D and on-site commissioning under complex power grid operating conditions, followed by continuous technological iteration through long-term engineering application. Given the extremely high requirements for the safety, reliability, real-time performance and stability of power systems, new entrants are generally unable to build a mature and reliable technical system and engineering capability in the short term.

System-level Solution Design and Integrated Delivery Barriers. As industry demands evolve from standalone equipment supply to complete solution provision for regional power grids, suppliers are required to possess comprehensive capabilities covering cross-product portfolio integration, system adaptation, collaborative control, data communication and full-lifecycle services. Relevant projects involve the integration of various software and hardware devices, including relay protection and automation equipment, active power grid support systems, energy storage systems, power distribution equipment, and intelligent operation and maintenance systems. In addition, customized solution design and parameter adaptation are required to fit the power grid structure, energy mix and customer scenarios of different regions. Such capabilities rely on long-term project performance, accumulated technical platforms and cross-disciplinary organizational collaboration, making it difficult for new entrants to rapidly establish complete system integration and solution delivery capabilities.

Project Experience and Market Access Barriers. New power system solutions primarily serve key scenarios such as power grid operation, power generation, new energy utilization, industrial power consumption and energy storage. Customers impose stringent requirements on suppliers in terms of product reliability, historical operation records, technical support competence, project delivery capacity and after-sales service quality. Suppliers need to build customer trust through long-term project practice, verification in typical scenarios and stable operation performance, and provide continuous support throughout solution demonstration, equipment selection, grid-connected commissioning, operation and maintenance. New entrants lacking mature project experience and verifiable operation track records face high thresholds in customer access and large-scale project expansion.

Capital Strength and Sustained Investment Barriers. New power system projects are generally characterized by long cycles for solution demonstration, high requirements for equipment R&D and production preparation, and lengthy cycles for on-site construction, commissioning and operation and maintenance services. Some large-scale projects require phased capital investment and feature long capital recovery cycles. Meanwhile, driven by rapid technological iteration in the industry, enterprises need to continuously invest in R&D, testing and verification platforms, production and manufacturing capacity, and service network construction. Enterprises with insufficient capital strength and sustained investment capacity cannot support long-term technological R&D and the delivery of complex projects.

INDUSTRY OVERVIEW

Standard, Certification and Safety Compliance Barriers. Power system-related products and solutions must comply with national, industrial and customer-specific technical standards, and meet strict specifications in grid connection, safety, communication, reliability, quality management and operation and maintenance services. Suppliers are required to have in-depth understanding of the relevant standard systems, keep track of updates to technical specifications on an ongoing basis, and ensure full compliance in product design, testing and verification, on-site implementation, as well as daily operation and maintenance. These stringent standards, certification and safety compliance requirements further raise the entry barriers of the industry.

SOURCE OF INFORMATION AND RESEARCH METHODOLOGY

We engaged Frost & Sullivan for preparing an independent industry report in respect of the global new electricity system solutions market. The information from Frost & Sullivan disclosed in this document is extracted from the Frost & Sullivan Report, a report commissioned by us for a fee of RMB550,000, and is disclosed with the consent of Frost & Sullivan. The Frost & Sullivan Report has been prepared by Frost & Sullivan independently without any influence from us or other interested parties. Frost & Sullivan is an independent global consulting firm founded in 1961 in New York. Its services include, among others, industry consulting, market strategic consulting and corporate training. Frost & Sullivan conducted (i) primary research, which involved discussing the status of the industry with certain leading industry participants, and interviews with industry experts on a best-effort basis to collect information in aiding in-depth analysis; and (ii) secondary research, which involved reviewing government statistics, industry association publication, company reports, independent research reports and data based on its own research database.