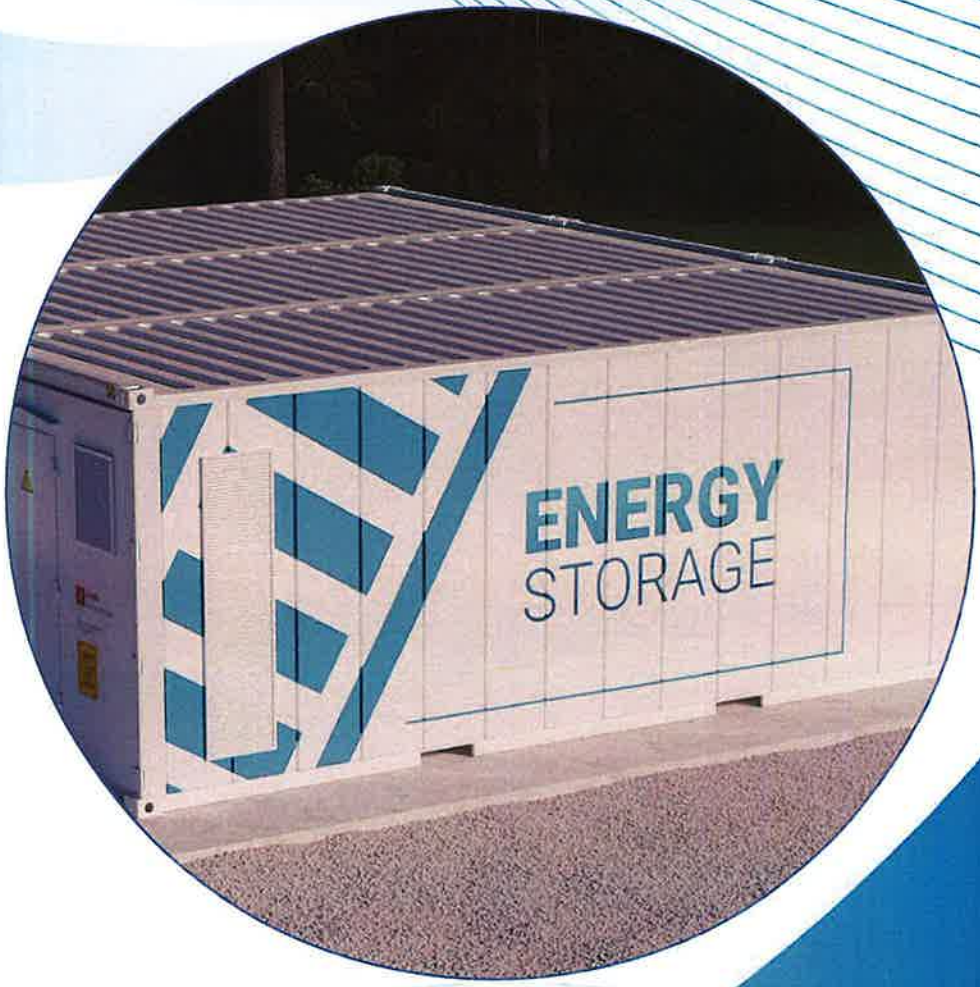
CIC 灼识咨询
China Insights Consultancy

Industry Report on Global Energy Storage System Solution Industry



Date: December 8, 2025

For and on behalf of
China Insights Industry Consultancy Limited

Name: Arden Dai
Title: Founding Partner

CIC introduction, methodologies, and assumptions

China Insights Industry Consultancy is commissioned to conduct research and analysis of and produce a report on the global energy storage system industry. The report commissioned was prepared by China Insights Industry Consultancy independently of the influence of the Company or any other interested party.

China Insights Industry Consultancy is an investment consulting company that was initially established in Hong Kong. Its services include industry consulting, commercial due diligence, strategic consulting, and so on. Its consultant team has been tracking the latest market trends in the automobile, agriculture, chemical, user goods, marketing and advertising, culture and entertainment, energy and industry, finance and service, healthcare, TMT, transportation, and other sectors, and has the most relevant and insightful market intelligence in these industries.

China Insights Industry Consultancy undertook primary and secondary research using various resources to construct this report. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from publicly available sources, including the National Bureau of Statistics, industry associations, etc. The information and data collected by China Insights Industry Consultancy have been analyzed, assessed, and validated using China Insights Industry Consultancy's in-house analysis models and techniques. The methodology used by China Insights Industry Consultancy is based on information gathered from multiple levels, which allows for such information to be cross-referenced for reliability and accuracy.

The CIC Report was compiled based on the following assumptions: (i) economic development globally is likely to maintain a steady growth trend in the next decade; (ii) related industry key drivers are likely to drive the continuing growth of global energy storage industry, such as favorable policies, continuous digitalization trends and, (iii) there will be no extreme force majeure or unforeseen industry regulations in which the market may be affected in either a dramatic or fundamental way during the forecast period.

All statistics are reliable and based on the most recent information available as of the date of this report. Other sources of information, including governments, industry associations, or marketplace participants, may have provided some information on which data or its analysis is based.

The Company provides all the information about the Company, which is sourced from either the Company's own audited report or management interviews. China Insights Industry Consultancy is not responsible for verifying the information obtained from the Company.

Terms and Abbreviations (1/3)

- **AI (Artificial Intelligence):** The simulation of human intelligence in machines, enabling them to perform tasks such as learning, decision-making, and problem-solving.
- **Backup Power:** Backup Power is temporary electricity provided when the main power supply is interrupted, such as through generators or battery storage systems.
- **Big Data:** Large and complex data sets that require advanced analytics and computing techniques to extract insights and trends.
- **BMS:** Battery Management System
- **BNEF:** BloombergNEF
- **Carbon neutrality:** Achieving a balance between carbon emissions and carbon removal, often through reductions and offsetting measures.
- **Compressed air energy storage:** Compressed-air-energy storage (CAES) is a way to store energy for later use using compressed air.
- **COP 21:** UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015
- **Cloud Computing**: the practice of storing computer data and programs on multiple servers that can be accessed through the internet.
- **DOD:** Depth of discharge (DoD) is an important parameter appearing in the context of rechargeable battery operation.
- **Electrochemical batteries:** Electrochemical Batteries store and release energy through chemical reactions, with common types including lead-acid and lithium-ion batteries.
- **Electromagnetic:** Electromagnetic refers to the interaction between electric and magnetic fields, used in devices like transformers and electric motors.
- **EMS:** Energy management system
- **EMBER:** A global energy think tank that aims to accelerate the clean energy transition with data and policy.
- **Energy Gateway:** Energy Gateway connects storage systems, renewable energy, and the grid, optimizing energy distribution.
- **Energy Storage as a Service (ESaaS):** Energy storage as a service (ESaaS) allows a facility to benefit from the advantages of an energy storage system by entering into a service agreement without purchasing the system.

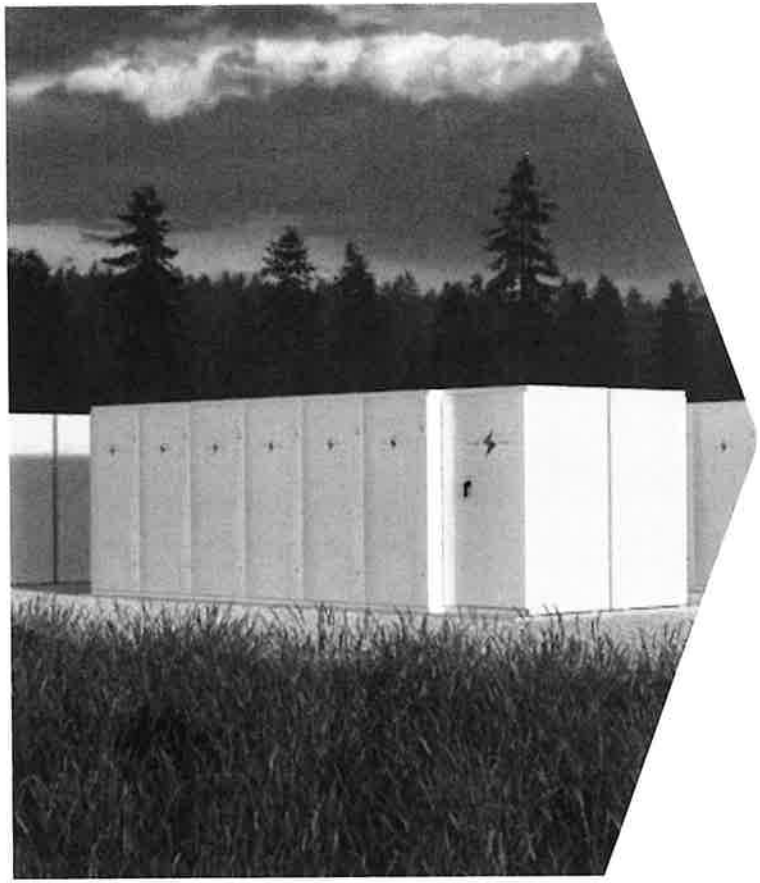
Terms and Abbreviations (2/3)

- **ESS:** Energy Storage System
- **EV (Electric Vehicle):** A vehicle powered by electricity, typically using rechargeable batteries instead of an internal combustion engine.
- **Flywheel energy storage:** Flywheel energy storage (FES) works by accelerating a rotor (flywheel) to a very high speed and maintaining the energy in the system as rotational energy.
- **IEA:** International Energy Agency
- **IoT (Internet of Things):** A network of interconnected devices that collect, transmit, and analyze data to enhance automation and efficiency.
- **KETIP:** Kenya Energy Transition & Investment Plan
- **Large-Scale storage:** Large-scale storage refers to energy storage on the power supply side and the grid side.
- **Lead-acid Battery:** A rechargeable battery that stores energy using lead plates and sulfuric acid, commonly used in vehicles and backup power systems.
- **Lithium-ion batteries:** Lithium-ion batteries are a type of rechargeable battery that uses the reversible intercalation of Li+ ions into electronically conducting solids to store energy.
- **MEEM:** Ministry of environment, energy and the sea of France
- **Microgrids:** A small-scale, localised energy network that can operate independently or in conjunction with the main power grid.
- **NBS:** National Bureau of Statistics of China
- **NEA:** National Energy Administration
- **Nickel electrode batteries:** Nickel Electrode Batteries refer to rechargeable batteries that use nickel-based electrodes.
- **NPCSC:** National People's Congress Standing Committee
- **NDRC:** National Development and Reform Commission

Terms and Abbreviations (3/3)

- **MIT CEEPR:** MIT Center for Energy and Environmental Policy Research
- **NDCSA:** National Planning Commission of South Africa
- **PCS:** Power Conversion System
- **Peak-valley arbitrage:** The practice of storing energy during low-demand (valley) periods and selling or using it during high-demand (peak) periods to optimise costs.
- **Power Plant:** Power plant is an industrial facility for the generation of electric power.
- **Pumped hydroelectric storage:** It stores energy in the form of gravitational potential energy of water, pumped from a lower elevation reservoir to a higher elevation.
- **Renewable energy:** Energy sourced from naturally replenishing resources, such as solar, wind, hydro, and geothermal power.
- **Sensors:** A sensor is a device that produces an output signal for the purpose of detecting a physical phenomenon. Different types of light sensors.
- **SOH:** State of health (SoH) is a figure of merit of the condition of a battery (or a cell, or a battery pack), compared to its ideal conditions.
- **Solar PV system:** Systems that convert sunlight into electricity using photovoltaic (PV) panels.
- **Smart Home:** A smart home is a residence that uses internet-connected devices to enable the remote monitoring and management of appliances and systems.
- **Smart meter:** A digital device that measures and records electricity consumption in real time, enabling more efficient energy management.
- **UNFCCC:** United Nations Framework Convention on Climate Change
- **Virtual power plants (VPPs):** A network of distributed energy resources, such as solar panels and batteries, that are centrally controlled to function as a single power plant.

Content



Background

Global Energy Structure Transformation: The Rising Share of Renewable Energy

- Accelerating the Transition to Renewable Energy in Line with the Paris Agreement Goals

The Paris Agreement

COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

At the United Nations Climate Change conference in Paris, COP 21, governments reached the consensus that mobilising more ambitious climate action was urgently needed to achieve the goals of the Paris Agreement, including maintaining the increase in the global average temperature to below 2°C above pre-industrial levels and limiting the temperature increase to 1.5°C above pre-industrial levels. These actions would significantly reduce the risks and impacts of climate change.

2019

In 2019, the European Union (EU) unveiled the **European Green Deal**, establishing a roadmap to achieve carbon neutrality by 2050.

2020

In 2020, China announced its 2060 **Carbon Neutrality Target** initiative to achieve carbon neutrality by 2060 and reach peak carbon emissions by 2030. This has emerged as a focal point in global climate action.

2022

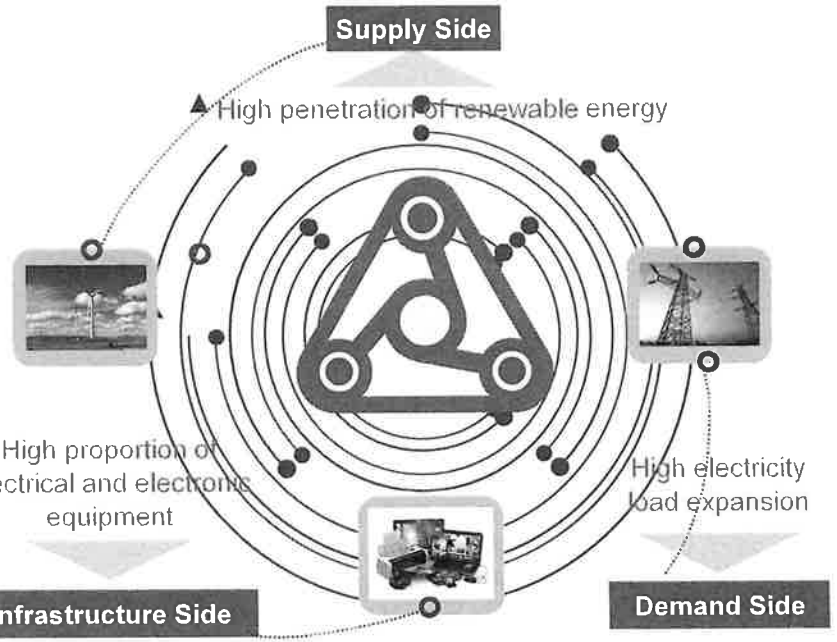
On August 16, 2022, U.S. President Joe Biden signed the **Inflation Reduction Act**, allocating approximately $369 billion in energy and climate change initiative investments. The act aims to reduce greenhouse gas emissions by 40% by 2030.

2023

In 2023, Kenya's long-term emissions strategy set a goal of achieving net zero by 2050 through renewable energy expansion, afforestation, reduced deforestation, and decarbonisation in industry and transport.

Fundamental Traits of the New Power System

New Power system refers to an advanced electricity network designed to accommodate and prioritise the large-scale integration of renewable energy sources, such as solar, wind, and hydropower. This system fulfills the power demands of high-quality economic and social development as its main goal through new technologies, grid enhancements, and flexible operational strategies.



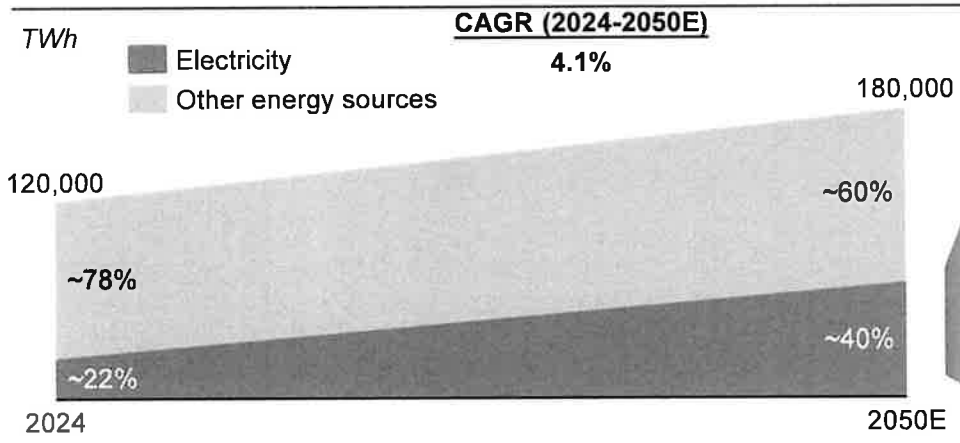
Source: Eurostat, IEA, KETIP, NEA, UNFCCC, CIC

Background

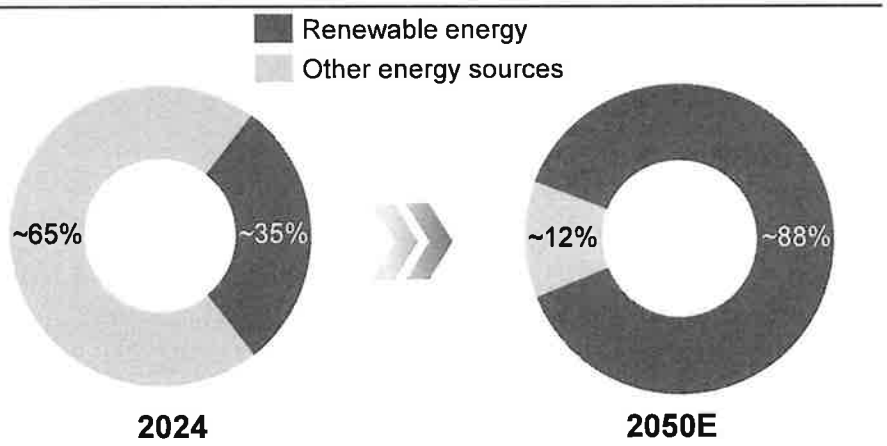
Global Energy Consumption Growth and the Rise of Renewable Electricity

- Global electricity consumption is projected to increase from 2.5-Terawatt hour (TWh) in 2024 to 7.0 TWh in 2050, necessitating a substantial increase in electricity generation. To meet this growing demand, renewable energy is expected to emerge as the dominant source, with its share in electricity generation expanding from 29% to 88% over the same period.

Global Energy Consumption, 2024 & 2050E



Proportion of Renewable Energy in Global Electricity Generation, 2024 & 2050E



Analysis:

- The global energy structure is undergoing a profound transformation, with electricity emerging as the dominant form of final energy consumption, increasing percentage of power will be generated by renewable energy. By 2050, the electrification rate is expected to rise to 40%, positioning electricity as the primary global energy source. The related energy consumption scenarios have huge market potential, increasing proportion of electricity will be generated by renewable energy.
- It is not uncommon for application of EPC services model in the renewable energy industry in the PRC.
- As electricity demand continues to expand—projected to reach nearly 70,000 TWh—renewable energy generation technologies are set to become the mainstream power source. By 2050, renewable energy is expected to contribute more than 88% of the global electricity supply. This transition will not only reduce dependence on fossil fuels and help achieve carbon reduction targets but also highlight the critical role of electricity in the future energy system. The renewable energy industry, particularly the energy storage sector, is experiencing rapid growth and presents significant opportunities globally.
- Multiple structural drivers are propelling the global electrification trend. First, the steady expansion of global industrial manufacturing is driving electricity demand, reinforcing the shift toward electrified energy consumption. Second, the rapid advancement of AI technologies has triggered a significant increase in data center power consumption, the industry is expected to become smarter through adopting advanced technologies such as AI. Generally, data centers have intensive energy demands. Data centers' electricity usage is projected to surge from 2.2% of global electricity consumption in 2024 to 25.0% by 2050. Third, the accelerating adoption of new energy vehicles is further reshaping the global energy landscape. As governments and enterprises intensify efforts to reduce carbon emissions, electrification remains a central strategy for achieving long-term sustainability goals and optimizing global energy structures.

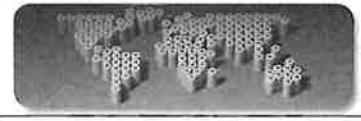
Sources: EMBER, IEA, CIC

Definition and Applications of ESS

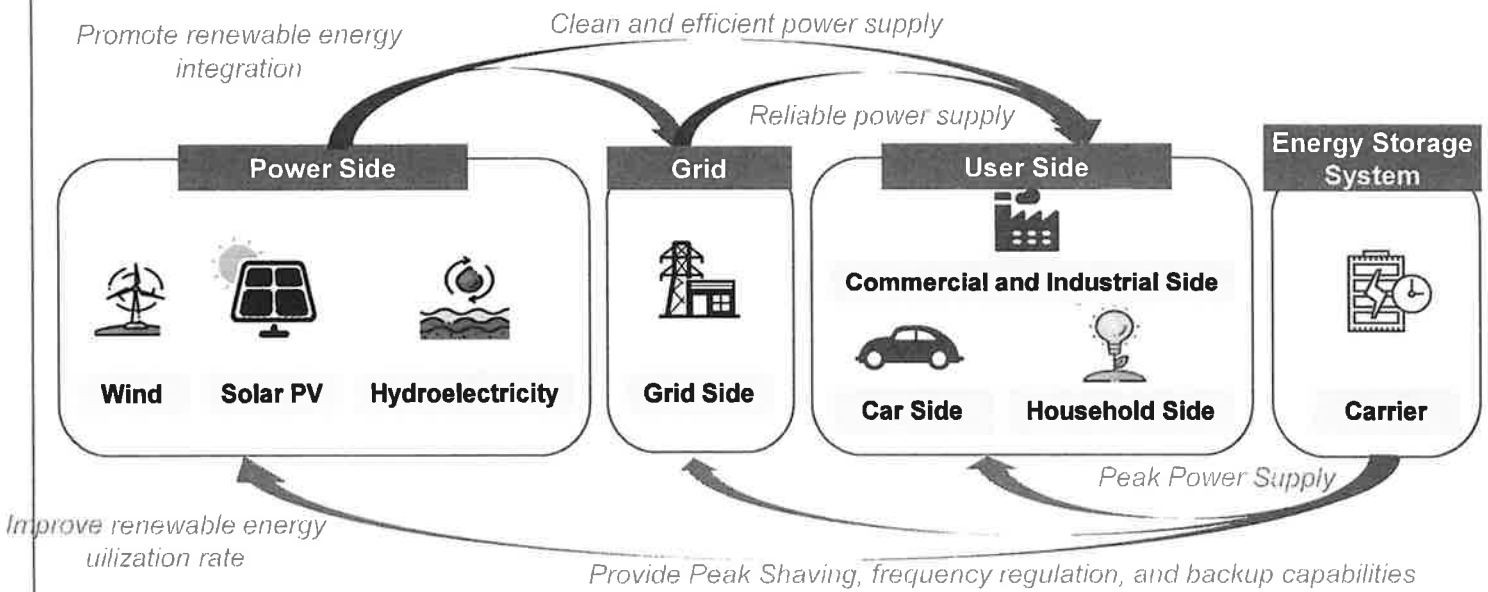
- ESS harness excess energy from power, grid, and user side for future use.

Definition of ESS

An ESS refers to a system that converts energy from various power generation sources into a storable form and releases it as electrical energy when needed.



Application of ESS



Analysis

ESS technology captures excess energy from wind, solar, and hydro, minimizing wastage and enhancing grid reliability. It also serves as backup power and enables peak shaving for users, ensuring a stable and flexible energy supply across industries, homes, and transportation.

With increasing electrification and renewable energy integration, the intermittent and volatile nature of these sources poses challenges to power system stability and security. Additionally, the uneven geographical distribution of renewable resources often creates a spatial mismatch between power generation and consumption. An ESS helps balance supply and demand by storing excess electricity during high-generation periods and discharging it during peaks or low-generation, enhancing grid stability, security, flexibility, and profitability.

Source: CIC

Value

Key Benefits of ESS

- Enabling Grid Stability, Operational Flexibility, and Economic Viability Through an Advanced ESS

Key Benefits of ESS

1

Maintains Grid Stability

- ESS maintains grid stability by balancing energy supply and demand fluctuations. With the increasing penetration of renewable energy sources, such as wind and solar, grid operators face challenges due to the variability, intermittent, and regional disparity nature of these resources.
- ESS solutions provide services like voltage support, frequency regulation, and backup power, ensuring that the grid remains stable during periods of variable energy output.

2

Enhances Operational Flexibility

- ESS augments the flexibility of power systems by allowing energy to be stored when production exceeds demand and discharged when consumption peaks. This capability helps manage fluctuations across different times and locations, addressing peak-valley load differences and maximizing grid efficiency. By acting as a buffer, energy storage technology strengthens grid supply capacity, prevents energy wastage, and optimizes overall resource use.

3

Fuels Economic Viability

- ESS enhance economic returns by optimizing electricity markets and maximizing renewable energy use. In China, subsidies for commercial and industrial users support energy storage deployment through discharge, capacity, and investment incentives. By shifting energy use from peak to off-peak periods, storage reduces costs and emissions, minimizing dependence on carbon-intensive energy sources.

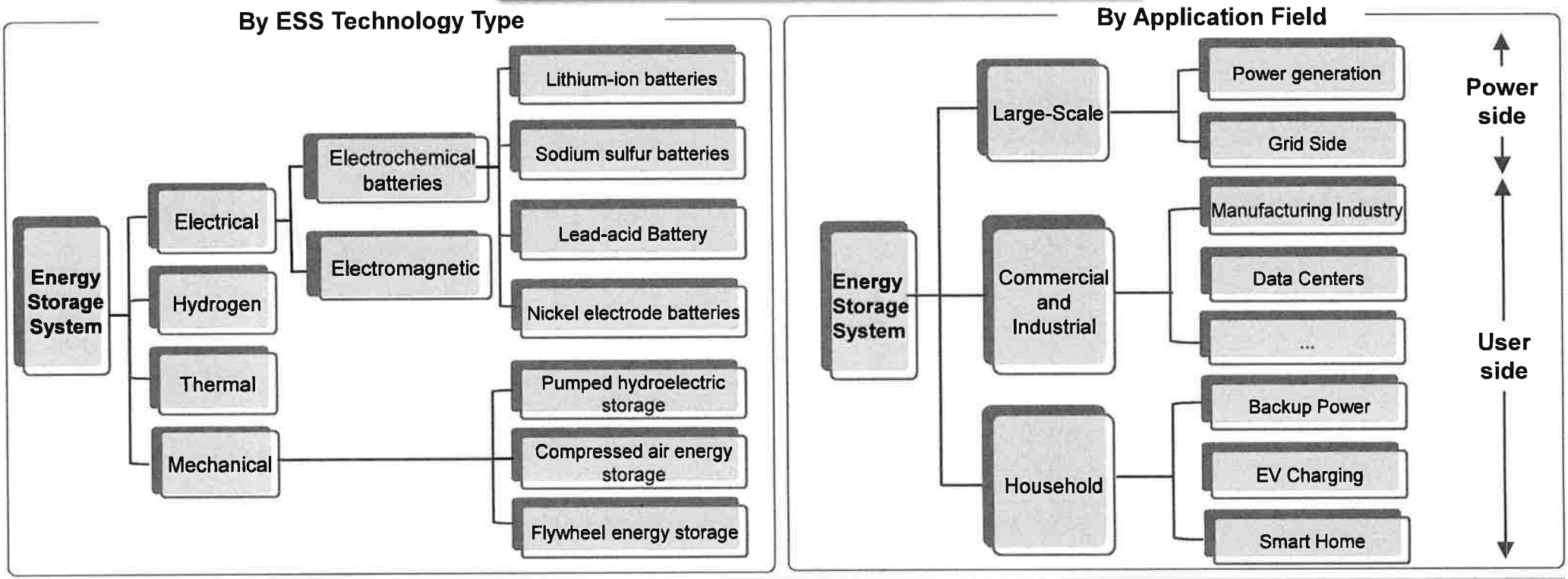
Source: MIT CEEPR, EESA database

Classification

ESS: Classification by Technology and Application Field

- A Comprehensive Overview of Storage Solutions and Use Cases in ESS

ESS Classification



- ESS can be categorized into traditional storage systems (mainly refers to pumped hydro storage) and new ESS, such as electrochemical storage, flywheel storage, and compressed air energy storage. Electrochemical storage stands out as one of the most rapidly developing and currently mainstream technologies. It offers advantages in regulation capacity, time scale, startup time, ramp-up speed, stability, and economic efficiency.

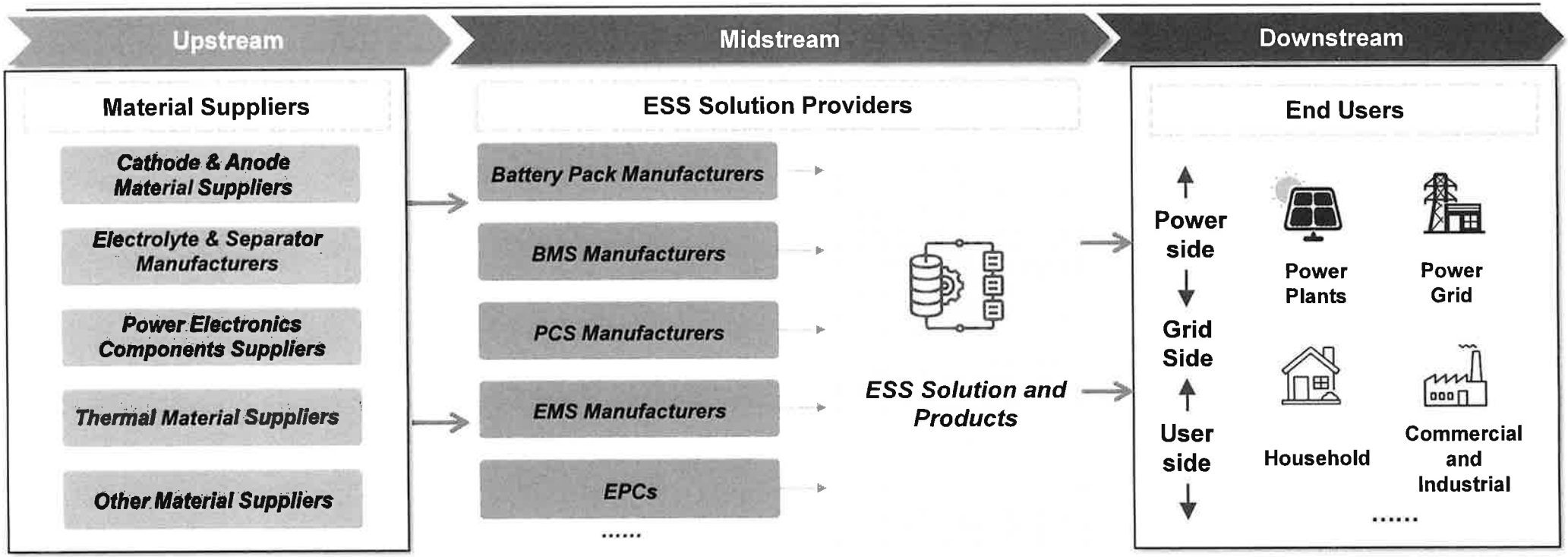
Source: CIC

Value chain

Value Chain of the ESS Solutions Industry

- The ESS market value chain encompasses upstream raw material providers, midstream component manufacturers and integrators, and downstream end users. Integrators develop and implement full ESS solutions for applications in power grids, households, factories, and additional sectors.

Value Chain Analysis of the ESS Industry



- As the most mainstream new ESS solution, the upstream of electrochemical ESS solution includes raw materials, including cathode/anode materials, electrolytes, separators, power electronics, and thermal materials. The midstream segment focuses on manufacturing and integrating core components, such as battery packs, BMS, PCS, and EMS, to develop complete ESS solutions and products. The downstream segment includes different energy storage end users, such as grid operators, power plants, commercial and industrial users, and household users, supporting diverse energy storage applications.

Source: CIC

Sales Channel Analysis of the ESS Solutions Industry

- The Company adopts a flexible sales strategy that includes both direct sales and partnerships such as distribution, especially in overseas markets.

Sales Channel Analysis of the ESS Solutions Industry

- **The Company's sales strategy is primarily divided into two channels: direct sales and distribution partnerships.** Distribution is a common and essential approach, particularly in international markets. Adopting distributorship model for our overseas markets is in line with industry norms. Consistent with market practice in the industry, the company sells their ESS products through distributors. It is prevalent in the Company's expansion into overseas markets including European countries, American countries, African countries and so on.
- The rationale behind this approach is twofold: Firstly, establishing an overseas sales team can be a costly and resource-intensive process. Setting up a new team requires not only significant investment but also the time and effort needed to build a reliable resource network from scratch. Additionally, the Company may face challenges in understanding the intricacies of local markets and consumer preferences. By leveraging established distributors, the Company can tap into their local expertise and existing networks, thus reducing the risk and costs associated with direct market entry. This strategy allows for faster market penetration and is a more efficient way to scale operations while minimizing initial investments and market risks.

Effectives on the ESS Solution Providers

- Compared to direct sales, distribution channels often result in longer account receivables periods and higher outstanding debts, as an additional layer is introduced into the sales process. This creates a longer payment cycle due to the involvement of distributors, who often have significant inventory pressures. In turn, distributors seek more favorable payment terms from the Company, negotiating extended credit periods to manage their inventory more effectively. For first-tier distributors, the typical credit period for leading European brands ranges from 1 to 6 months. However, for second- and third-tier brands, the payment terms can be as long as 12 months. In markets such as Africa, where inventory turnover is often slower and financial systems are less developed, credit periods can extend even further, typically ranging from 6 to 12 months.

Current Pain Points of Overseas Distributors

1. Installation and After-Sales Service
   - The recruitment and training costs for professional installation personnel are high, with team stability being fragmented. During peak seasons with a surge in orders, there may be a shortage of personnel, leading to installation delays, which affects customer satisfaction. Additionally, the inventory management of after-sales repair parts requires a high level of management capability from the distributors. Customers and end users in the field of energy storage, including distributors in overseas markets, have high requirements on the quality and performance of the products and/or services they procure, and usually set up stringent barriers to entry and quality control mechanisms for their own suppliers.
2. Market Education
   - The rapid development of the energy storage industry forces distributors to invest significant marketing costs to promote the concepts, safety, functionality, and value of products to enhance the acceptance level among potential end-users.

Source: CIC

Pain Points in Downstream Demand for the Energy Storage Solutions Industry

- The global ESS market is driven by cost reduction, dynamic energy management, affordability issues, and a growing focus on safety, reliability, and advanced technologies.

Household Users

- The global household ESS market is mainly contributed by Europe. For European household storage system customers, these customers are significantly impacted by fluctuations in electricity prices due to the energy crisis and supply-demand imbalances in the European market. They face high overall electricity costs and significant peak-valley electricity price differences, making them highly motivated to reduce electricity expenses through smart charging and discharging strategies. Additionally, in consideration of the widespread grid load pressures across European countries, the lack of unified energy storage subsidy policies, the high market entry barriers, the phase-out of solar subsidies, and the frequent occurrence of negative electricity prices, these customers generally prefer systems that are capable of dynamically allocating and storing energy based on their consumption needs and photovoltaic (PV) generation, thereby reducing their reliance on the local power grid.
- For African household storage system customers, these customers commonly face challenges where the price of household ESS exceeds their affordability, and they lack access to cost-effective purchasing channels. Additionally, the lack of after-sales support for purchased ESS further complicates adoption. These customers require affordable, off-grid, reliable and easy-to-maintain energy storage solutions from integrated energy solution providers that have established local service networks.

Large-scale and Commercial and Industrial Users

- Large-scale ESS and commercial and industrial ESS users are generally highly concerned about the costs of ESS, including both initial investment costs and long-term operation and maintenance costs. As market competition intensifies, customers are increasingly inclined to choose cost-effective energy storage products and services.
- Customers expect ESS to generate significant economic benefits. For commercial and industrial ESS users, their majority revenue sources encompass reducing electricity costs through energy storage and participating in demand-side response programs to earn compensation. Additionally, with the advancement of electricity spot market reforms, the policy mechanisms for energy storage participation in electricity markets and dispatch applications are being enhanced. Diversified profit models, including capacity leasing, ancillary services and electricity trading, are gradually maturing, providing customers with more business opportunities.
- The safety and reliability of ESS are becoming an increasingly critical concern for these customers. Particularly, as the scale of individual energy storage projects increases, issues such as battery heat dissipation and balance have become more prominent, leading to higher safety and thermal management requirements; and these customers are also increasingly demanding that ESS adopt relatively advanced technologies to enhance overall system performance and efficiency.

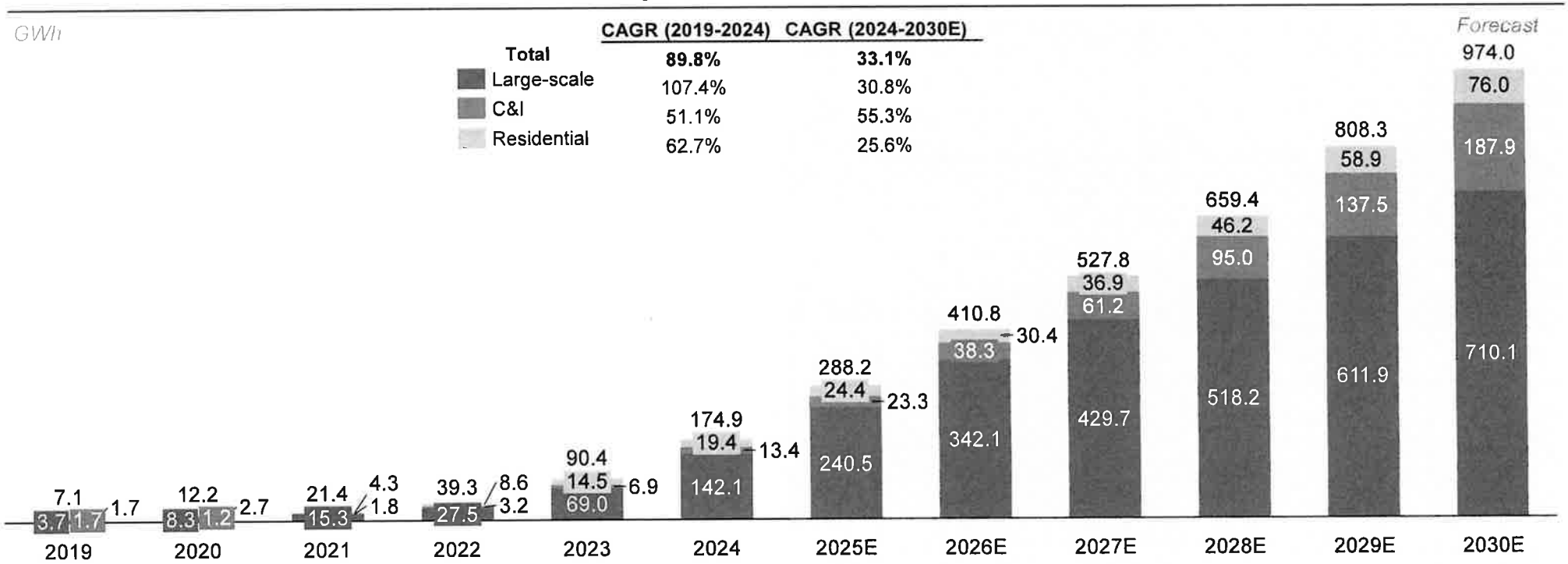
Source: CIC

Market Size

Market Size of Global Newly Installed ESS Capacity

- The global installed capacity of ESS (large-scale, commercial and industrial , and residential) grew significantly from 2019 to 2024 and is expected to continue growing rapidly through 2030.

Global newly installed ESS capacity, 2019-2030E



Analysis:

- From 2019 to 2024, the global newly installed capacity of ESS grew rapidly from 7.1 GWh to 174.9 GWh, with a CAGR of 89.8%. It is expected to increase to 974.0 GWh in 2030, with a CAGR of 33.1%. Large-scale energy storage dominates, accounting for 81.2% of total capacity in 2024. Commercial and industrial ESS accounts for 7.7% of the total market and household ESS accounted for 11.1% of the total market in 2024. The renewable energy industry, particularly the energy storage sector, is experiencing rapid growth and presents significant opportunities globally.
- The company has experienced the rapid growth phase of the energy storage industry from 2020 to 2024 and successfully weathered the slowing growth/intensified competition phase from 2023 to 2024.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

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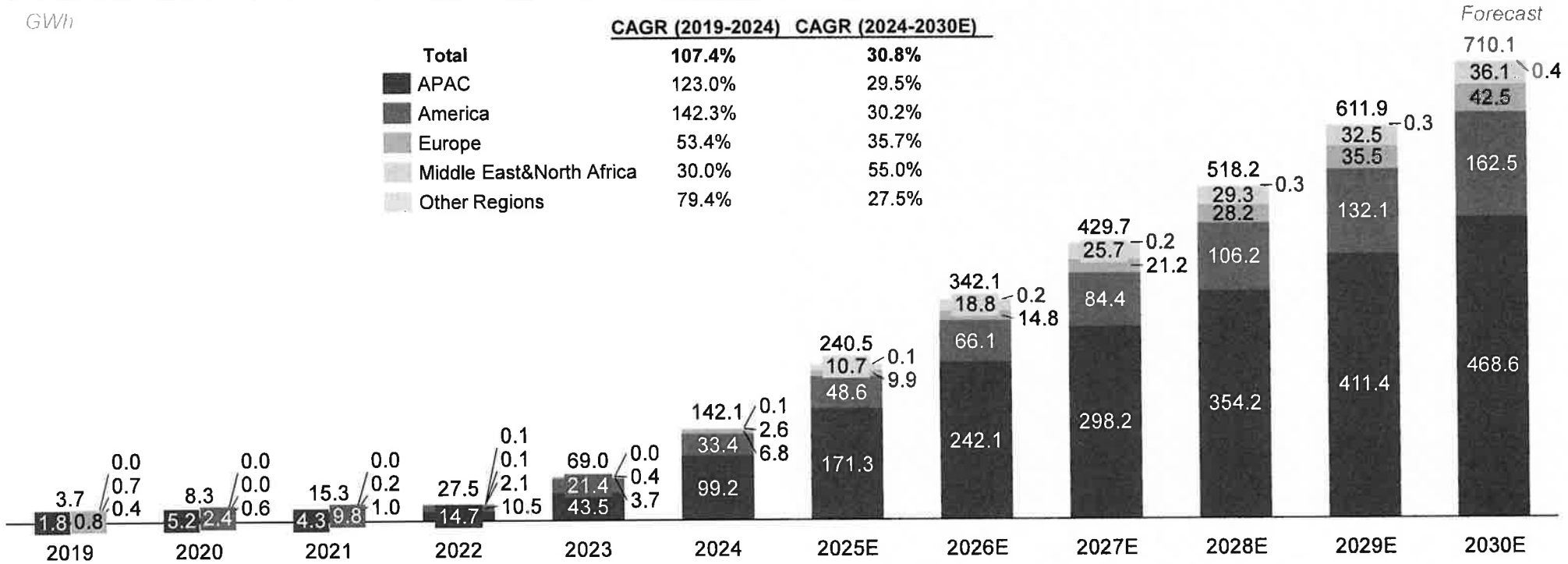
Source: BNEF, CIC

Market Size

Market Size of Global Newly Installed Large-scale ESS Capacity

- The global newly installed large-scale capacity of ESS experienced rapid growth from 2019-2024 an is expected to keep expanding strongly through 2030. APAC recorded the fastest growth during 2019-2024 while the Middle East&North Africa is expected to become the fastest-growing region from 2024-2030

Global newly installed large-scale ESS capacity, 2019-2030E, by region



Analysis:

- From 2019 to 2024, the global newly installed large-scale ESS capacity surged from 3.7 GWh to 142.1 GWh, with a CAGR of 107.4. It is expected to reach 710.1 GWh by 2030, with a CAGR of 30.8%. Among regions, APAC dominants the market from 1.8 GWh to 99.2 GWh with a CAGR of 123.0%. America follows, expanding from 0.8 GWh to 33.4 GWh with a CAGR of 142.3%
- The newly installed capacity of large-scale ESS products, C&I ESS products and residential ESS products from the perspective of global data, the data of China, Europe and Africa will continue to grow at relatively fast paces in the future, there will be an increase in the demand for our ESS products production capacity.

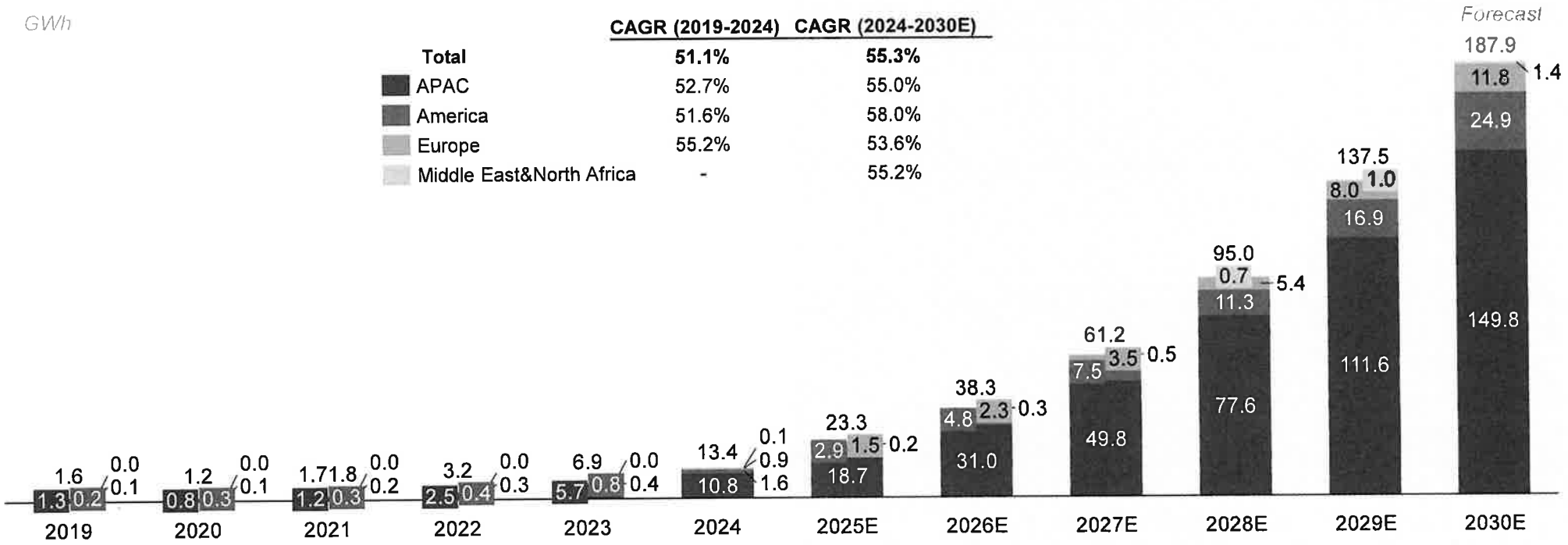
Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

Source: BNEF, CIC

Market Size of Global Newly Installed C&I ESS capacity

- The global newly installed large-scale capacity of ESS grew steadily from 2019 to 2024 and is projected to accelerate further through 2030. During 2019–2024, APAC led the global market with the fastest expansion, from 2024 to 2030, America is expected to become the fastest-growing region

Global newly installed C&I ESS capacity, 2019-2030E, by region



Analysis:

- From 2019 to 2024, the global newly installed C&I ESS capacity increased significantly from 1.6 GWh to 13.4 GWh with a CAGR of 51.1%. It is projected to further expand to 187.9 GWh by 2030 with a CAGR of 55.3%.
- APAC dominants both large-scale ESS and C&I ESS market. In other regions, large-scale ESS is the primary segment, with newly installed C&I and residential ESS capacity being almost negligible. In the future, the Middle East&North Africa is expected to be the fastest-growing large-scale ESS market, while the Americas is expected to be the most fast-growing C&I ESS market

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

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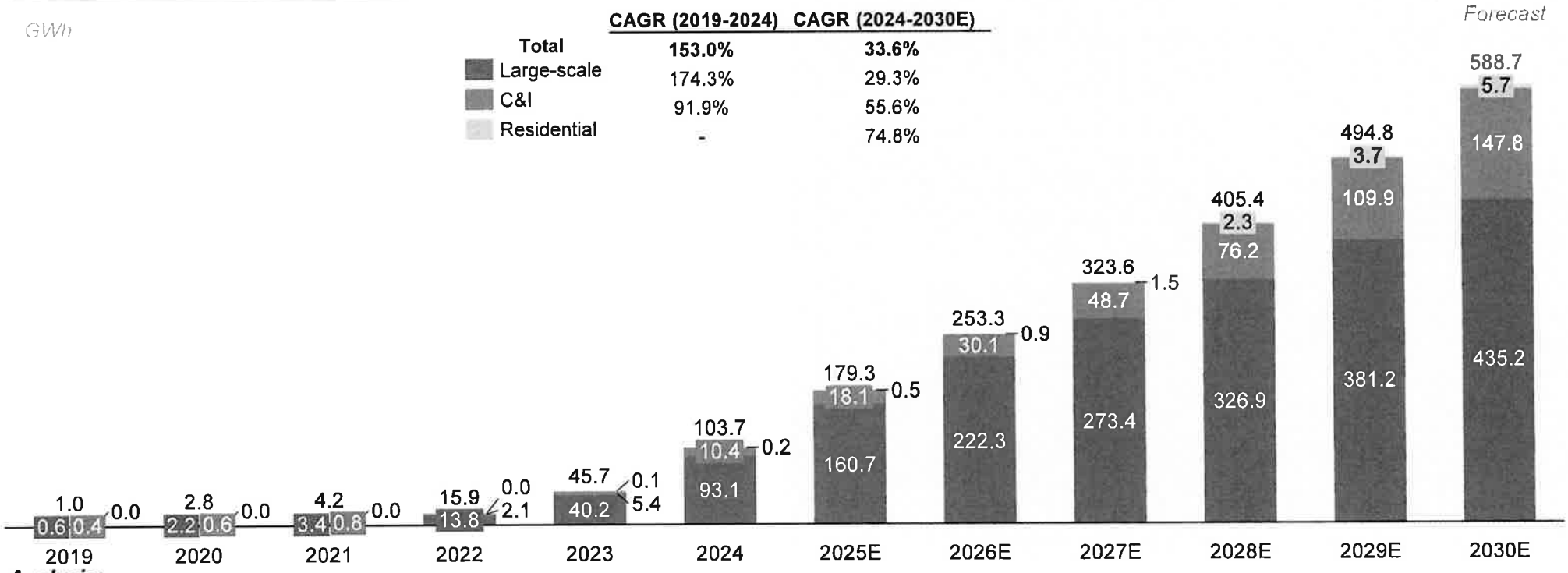
Source: BNEF, CIC

Market Size

Market Size of China's ESS Solution Industry

- China is the world's largest ESS market, with large-scale systems leading and commercial & industrial applications becoming key drivers of future growth.

China's newly installed ESS capacity, 2019-2030E



Analysis:

- China is the world's largest newly installed ESS market, accounting for 59.3% of the global newly installed ESS market in 2024. From 2019 to 2024, China's newly installed ESS capacity grew from 1.0 GWh to 103.7 GWh, with a CAGR of 153.0%. It is expected to grow at a CAGR of 33.6%, reaching 588.7 GWh by 2030. Large-scale ESS is the major application in China, and household ESS emerged around 2023. Commercial and industrial ESS has been experiencing rapid growth since 2022. The C&I segment is expected to be a key driver of future market expansion in China. Residential section has seen minimal activity since 2023 and remain at a comparatively early stage of development.
- China has continuously introduced favorable policies to promote the development of energy storage devices and technologies, particularly large-scale ESS, since 2021.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

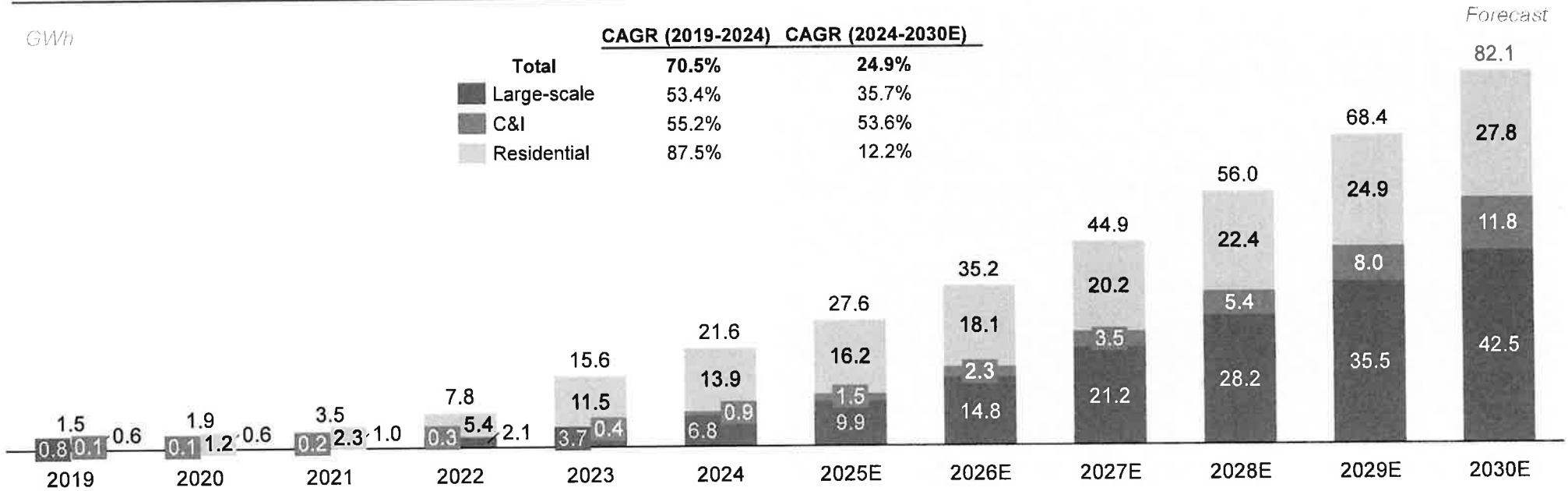
Source: BNEF, CNESA, CIC

Market Size

Market Size of Europe's ESS Solution Industry

- Europe is the most mature market for household energy storage, with growth driven by supportive policies, rising electricity costs, and increasing demand for grid stability.

Europe's newly installed ESS capacity, 2019-2030E



Analysis:

- From 2019 to 2024, Europe's newly installed ESS capacity grew rapidly from 1.5 GWh to 21.6 GWh, with a CAGR of 70.5%. The market is expected to grow at a CAGR of 24.9%, reaching 82.1 GWh by 2030. Europe is the most mature region for residential ESS sector, accounting for 71.6% of the global newly installed residential ESS market in 2024. In the future, large-scale ESS and C&I ESS scenarios in Europe will follow the growth of the residential ESS market.
- In the European market, the industry is expected to benefit further from strong local policy support, including but not limited to subsidies and tax incentives introduced by the EU and European national governments to achieve carbon neutrality targets. Additionally, market demand is being driven by extreme fluctuations in energy prices, the continued rise in overall electricity costs, and the growing need for power supply stability, as the increasing frequency of extreme weather events, such as winter storms and summer heatwaves, frequently leads to power outages, contributing to market expansion.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included. Europe denotes the geographic region rather than the political entity of the European Union

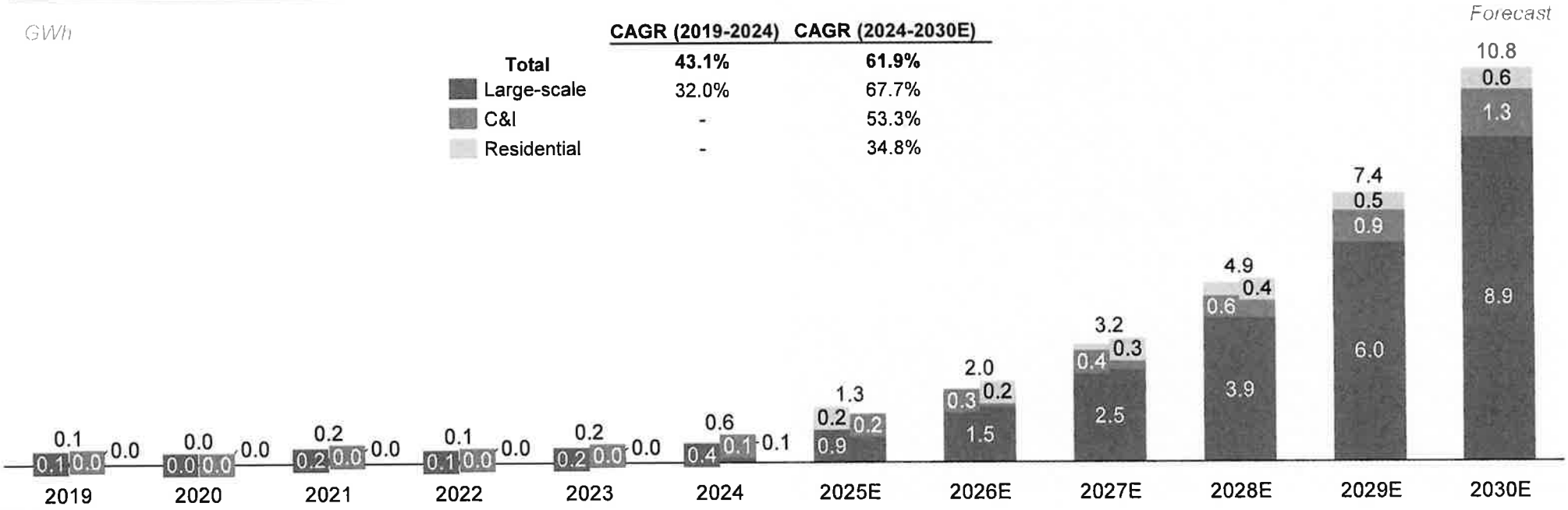
CIC 灼识咨询

Source: BNEF, CIC

Market Size of Africa's ESS Solution Industry

- Africa remains a nascent energy storage market, with growth potential driven by abundant renewable resources and a pressing need to address power shortages through large-scale and emerging distributed energy storage solutions.

Africa's newly installed ESS capacity, 2019-2030E



Analysis:

- Africa represents a small proportion of the global ESS market. However, the region boasts abundant wind and solar resources, making it a potential emerging market. It is expected that by 2030, Africa's share of the global newly installed ESS capacity will increase from 0.3% in 2024 to 1.1%, with the newly installed capacity growing from 0.6 GWh in 2024 to 10.8 GWh in 2030, representing a CAGR of 61.9%. Africa primarily focused on large-scale ESS to address fundamental power supply challenges. Residential and C&I ESS have only started to gain traction around 2024, remaining in the early stage of development.
- In the African market, the application of ESS has laid the foundation for addressing severe power shortages, which significantly hinder both daily life and economic development. At the same time, Africa's unique advantage has enabled active development of solar photovoltaic and energy storage projects, creating a substantial potential market opportunity for our business.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

CIC 灼识咨询 China Insights Consultancy

Source: BNEF, CIC

Market Drivers of the Global ESS Solution Industry

- How Renewable Integration, Policy, Technological Improvements and Electricity Pricing are Shaping the Evolution of ESS Industry.

Drivers of ESS Growth

Driver 1: Large-scale renewable integration

- Growing net-zero targets drive rapid expansion of solar and wind, increasing variability and intermittency in power generation, This poses challenges to grid stability and reliability, making energy storage essential for balancing supply-demand, smoothing fluctuations, and ensuring power quality, thereby boosting global ESS demand.

Driver 2: Policy support and regulatory frameworks

- Governments worldwide are advancing the green energy transition through policies such as the EU's Clean Energy Package and China's Renewable Energy Law amendments, supported by subsidies, tax incentives, portfolio standards and grid modernization. Solar and wind, the key renewable sources, are inherently intermittent, volatile and unevenly distributed across regions, which creates challenges for continuous supply and spatial alignment between power generation and consumption, Against this backdrop, policy support and application needs have accelerated the adoption of ESS, which enhance grid stability, security, flexibility and economic efficiency. These advantages have positioned energy storage as a cornerstone of low carbon and resilient energy infrastructure and are driving the growth of the global ESS solutions industry.

Driver 3: Technological advancements

- Innovations in battery chemistry, especially lithium iron phosphate(I.FP), have markedly improved system safety, lifecycle durability, and thermal stability. These enhancements, combined with declining costs, have made energy storage more economically viable and accessible, encouraging widespread commercial deployment.

Driver 4: Market-driven electricity pricing and grid service

- The shift toward deregulated and dynamic electricity markets allows ESS to capitalize on peak shaving, load shifting, and ancillary services such as frequency regulation. This market environment creates multiple revenue streams, making energy storage investments more attractive and accelerating industry growth.

Future Trends in the Global ESS Solution Industry

- Key Trends in the ESS Industry include Digitalization, Evolving Business Models, Collaboration, and Globalization

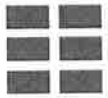
Future Trends in the Global ESS Industry

Digitalization

1 **Accelerating Digitalization and AI integration**

Digitalization is becoming more prevalent in ESS, and this trend is expected to continue. Through technologies such as cloud platforms and machine learning, digitalization enhances efficiency, boosts reliability, and facilitates integration with modern energy grids. The adoption of digital technologies, such as cloud platforms and machine learning, is enhancing ESS efficiency, thereby improving reliability and integration with modern energy grids. This growth is driven by performance and predictive maintenance demands.

Various Business Models



2 **Emerging innovative business models**

As the global energy landscape evolves, companies are adopting innovative business models to meet market and customer needs. New business models, such as Virtual Power Plants (VPP), and Multi-use ESS, are reshaping the energy storage industry, improving financial payback periods, and diversifying revenue streams.

Collaboration

3 **Cross-value chain collaboration**

Increasing partnerships across industry segments, particularly with upstream and downstream partners, is providing a better understanding of downstream needs. This knowledge results in improved product offerings and more effective technology implementation. As a result, these collaborations foster greater innovation, driving the development of more efficient and tailored energy storage solutions. It is necessary for the company to strengthen vertical integration from the perspective of the industry chain to carry out their business and enhance their comprehensive competitiveness.

Globalization

4 **Global expansion**

The energy storage industry is expanding across global markets as companies in different regions aim to seize international growth opportunities. International partnerships and cross-border projects are accelerating deployment and creating a more interconnected energy landscape. The rising demand for grid stability, renewable energy integration, and sustainable energy transitions drives this global push. Enterprises are not only entering emerging markets but also forging international partnerships, investing in cross-border projects, and aligning with global energy policies. As competition and collaboration intensify on a global scale, the collective effort of regional players is accelerating the deployment ESS worldwide, shaping a more interconnected and resilient global energy landscape.

The energy storage sector has recently demonstrated several trends, including but not limited to: increasing demand for improved energy management efficiency in energy storage; real-time battery monitoring and the ability to detect and respond to unexpected issues promptly; intelligent upgrades in energy storage to align with smarter and more flexible grids; extending the lifespan of ESS through intelligent management; and rapid development and maturation of smart technologies, such as IoT technology and big data, along with their increasing application in the industry.

Source: ESCN, Fluence, CIC

Policies

Relevant Policies and Regulations for the ESS Solutions in China (1/2)

- To promote the development of ESS and regulate industry growth, various policies and regulations have been introduced.

Policies and Regulations for ESS in China

Issuing date	Policy and regulation	Policy content
Jul 2021	Guiding Opinions on Accelerating the Development of New Energy Storage 《关于加快推动新型储能发展的指导意见》	• Aims to promote the development of energy storage technologies, enhance storage capacity, and accelerate the construction of storage infrastructure. • Encourages investment in innovation and establishes a more comprehensive policy framework to support the industry.
Mar 2022	14th Five-Year Plan for New Energy Storage Development Implementation Plan 《"十四五"新型储能发展实施方案》	• Outlines the development goals and key tasks for new energy storage technologies during the 14th Five-Year Plan period. • Focuses on improving ESS's efficiency, reducing costs, and facilitating integration with renewable energy sources.
Oct 2022	Action Plan for Enhancing Standardization to Achieve Carbon Peak and Carbon Neutrality in the Energy Sector 《能源碳达峰碳中和标准化提升行动计划》	• Promotes standardization of energy storage technology for safety and performance. • Aims to establish a unified standard system for scalable and efficient deployment.
May 2022	Action Plan for Accelerating the Green and Low-Carbon Innovative Development of Power Equipment 《加快电力装备绿色低碳创新发展行动计划》	• Encourages breakthroughs in high-voltage transmission, smart grid, and renewable energy integration. • Supports integration of storage in smart grid and source-grid-load-storage projects.
Sep 2023	Implementation Plan for Demonstration Projects of Green and Low-Carbon Advanced Technologies 《绿色低碳先进技术示范工程实施方案》	• Outlines the key focus areas and strategic goals for energy development in 2025, prioritizes energy storage as a key demonstration area. • Supports pilots for grid services like peak shaving and frequency regulation.

Source: NEA, NDRC , NPCSC, CIC

Relevant Policies and Regulations for the ESS Solutions in China (2/2)

- To promote the development of ESS and regulate industry growth, various policies and regulations have been introduced.

Policies and Regulations for ESS in China

Issuing date	Policy and regulation	Policy content
Jan 2024	Implementation Plan for the Special Action on Optimizing Power System Regulation Capabilities (2025–2027) 《电力系统调节能力优化专项行动实施方案（2025—2027年）》	• Positions storage as critical for enhancing grid regulation and flexibility. • Promotes storage as market participants for reserves and emergency support.
Mar 2024	2024 Energy Work Guiding Opinions 《2024年能源工作指导意见》	• Highlights key energy development tasks for the year, including energy transition, carbon neutrality, and the promotion of clean energy technologies. • Stresses the importance of energy storage as a critical element for supporting renewable energy integration into the national grid.
Nov 2024	The Energy Law of the People's Republic of China 《中华人民共和国能源法》	• Defines the legal framework for the energy sector, focusing on the sustainable development of energy resources. • Establishes regulations for energy conservation, renewable energy development, and energy security.
Dec 2024	National Energy Work Conference Plan for 2025 2025年全国能源工作会议规划2025重点工作任务	• Outlines the key focus areas and strategic goals for energy development in 2025, including expanding the use of new energy storage technologies and improving grid infrastructure. • Sets specific targets for energy storage capacity and its role in enhancing energy security and supporting the green transition.

- China has been continuously introducing favorable policies to promote the development of energy storage, especially large-scale ESS since 2021. Notable examples include the Action Plan for Enhancing Standardization to Achieve Carbon Peak and Carbon Neutrality in the Energy Sector (《能源碳達峰碳中和標準化提升行動計劃》) introduced in 2022, the Action Plan for Accelerating the Green and Low-Carbon Innovative Development of Power Equipment (《加快電力裝備綠色低碳創新發展行動計劃》) introduced in 2022, the Implementation Plan for Demonstration Projects of Green and Low-Carbon Advanced Technologies (《綠色低碳先進技術示範工程實施方案》) introduced in 2023. These policies have supported the construction and deployment of ESS, particularly large-scale ESS projects. Accordingly, from 2019 to 2024, the China's newly large-scale energy storage installed capacity grew from 0.6GWh to 93.1 GWh, with a CAGR of 174.3%.

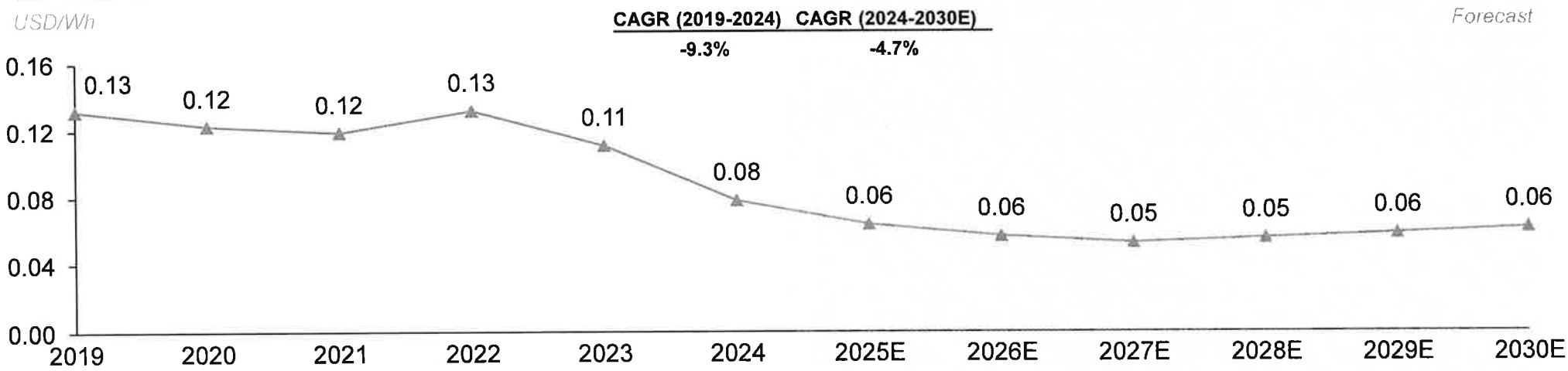
Source: NEA, NDRC , NPCSC, CIC

Raw Material Price

Raw Material Analysis of ESS Solution Industry

- Since 2023, falling lithium-ion ESS battery prices have boosted market growth by improving project economics and easing cost pressures. This trend encourages investment and innovation, though it also intensifies competition, favoring tech-strong players.

Global price of lithium-ion ESS battery, 2019-2030E



Analysis:

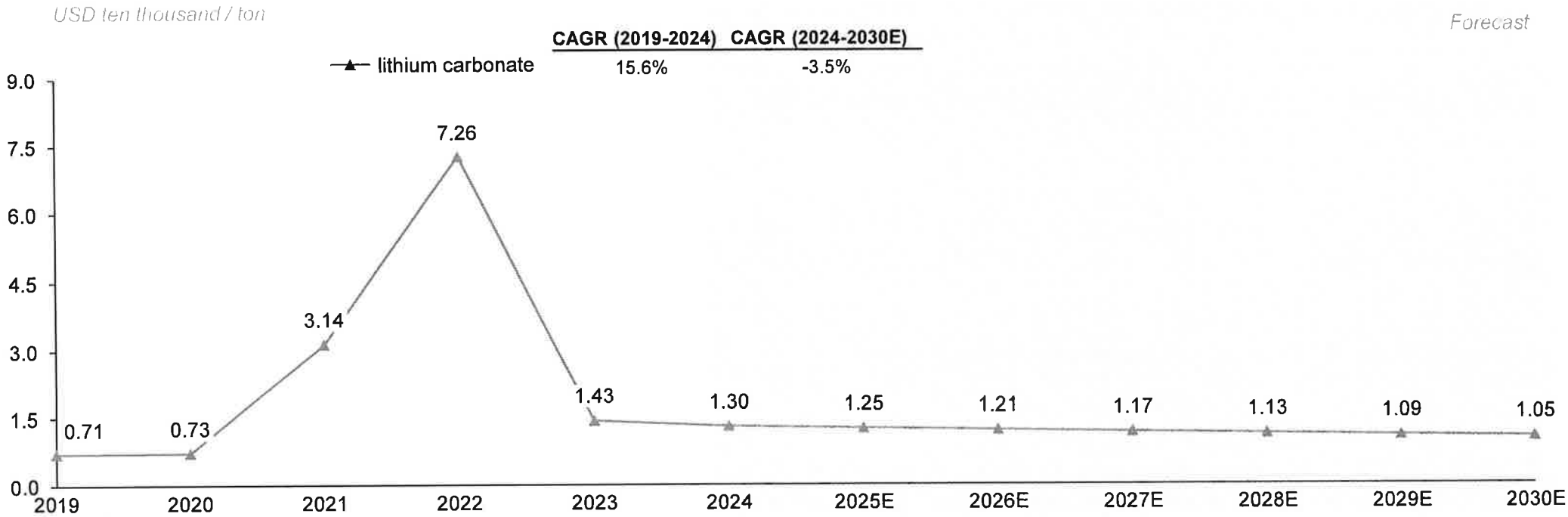
- Since 2023, the sharp decline in lithium carbonate prices and the expansion of lithium-ion ESS battery production have significantly reduced price of lithium-ion ESS batteries, driving a notable drop in lithium-ion ESS prices as well. The changes in the average selling prices of ESS mainly subject to the raw materials price and the intensity of market competition. For the Track Record Period, the average price for battery cells were USD0.13 per Wh, USD0.11 per Wh and USD0.08 per Wh, respectively. The price of lithium-ion energy storage battery fell from USD 0.11/Wh in 2023 to USD 0.08/Wh in 2024 and are expected to further decrease to USD 0.06/Wh by 2030.
- As a major component of ESS, lower costs of lithium-ion ESS batteries have enhanced the feasibility of ESS market development. It shortens the project payback period, attracting more investors, thereby driving industry growth. Meanwhile, the decrease in battery price also alleviates cost pressure of ESS solution providers, enable them to allocate more resources to the development of new technologies and products, thus promoting industry innovation. However, intensifying price competition poses challenges for cost efficiency and management. Only companies with strong technological capabilities and continuous innovation can maintain a competitive edge and achieve long-term growth.
- Lithium-ion ESS battery also experienced technology upgrade these years, new technologies such as the environmentally friendly and high-temperature-resistant lithium iron phosphate (LFP) batteries are adopted by industry participants such as the Company.

Source: BNEF, CIC

Raw Material Analysis of ESS Solution Industry

- The global price of lithium carbonate surged between 2021 and 2022 due to EV-driven demand outpacing supply, before dropping in 2023 as new production came online. Since then, prices have remained relatively stable, driven by market dynamics and supply negotiations.

Global price trend of lithium carbonate, 2020-2030E



Analysis:

- The global price of lithium carbonate increased significantly since 2021, it increased from USD7.1 thousand per ton in 2019 to USD31.4 thousand per ton in 2021 and reached the peak of USD72.6 thousand per ton in 2022. This is due to supply-demand imbalances and market dynamics led by boom of electric vehicle market. In 2023, the price of lithium carbonate of decreased to USD14.3 thousand per ton as new lithium mines were put into production. And the price remained stable afterwards, in 2024, the price was USD11.4 thousand per ton. The prices of lithium carbonate are determined principally by market forces as well as bargaining power with suppliers.

Seasonality Analysis of the ESS Solution Industry

- The global ESS industry experiences seasonality due to factors like weather, policy changes, and seasonal energy demand, with higher demand in colder months and reduced need in warmer months.

Seasonality Analysis of the ESS Solution Industry

The sales of ESS solutions and products exhibit certain level seasonality, and this phenomenon can be attributed to various factors, including, among others, seasonal demand fluctuations, policy influences, holidays, climate conditions and project application cycles. The energy storage industry experiences seasonality, with higher demand in colder months due to increased energy consumption for heating. During warmer months, higher solar power generation reduces storage needs, leading to fluctuations in demand. Additionally, weather conditions, government policies, fiscal year-end subsidies, and market incentives contribute to cyclical variations in project deployment and investment decisions.

Reasons of Seasonality

1. **Policy Factors:** In many countries, policy incentives require project applications and approvals to be completed before the fiscal year ends in December, a trend particularly evident in the UK. In Africa, energy storage projects often rely on international aid funds, which are typically disbursed by year-end, driving project launches in the final quarter.

2. **Project Planning and Supply Chain Management:** Energy storage projects require significant lead time for construction, prompting companies to complete key work by Q4 of the previous year to ensure smooth operations in the new year. Additionally, as a large share of battery cells and systems are sourced from China, and given the Chinese New Year in February, many customers prefer to finalize procurement in advance to mitigate supply chain delays.

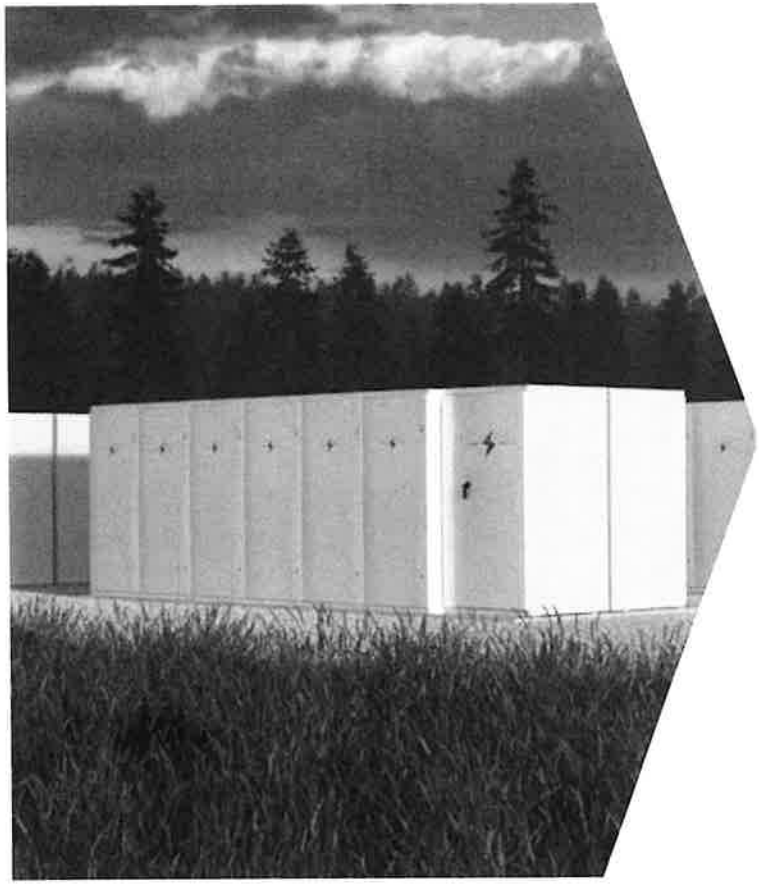
3. **Climate-Driven Electricity Demand:** Increased heating demand during winter in the Northern Hemisphere leads to higher electricity consumption and grid load. This drives the need for energy storage solutions to stabilize power supply and optimize energy distribution. Additionally, extreme weather conditions can strain energy infrastructure, further increasing reliance on storage systems.

Source: CIC

Industry Norms

- It is not uncommon for application of EPC services model in the renewable energy industry in the PRC.
- There is no substantial barrier for us to recruit and retain a sufficient number of qualified employees for our capacity expansion and maintain good relationship with them
- Adopting distributorship model for our overseas markets is in line with industry norms.
- Strategic cooperation agreements with defined terms and mutual commitments are a common practice in the ESS and battery industries.
- It is a common practice in the industry to have overlapping customers and suppliers, for example, purchasing raw materials from suppliers and selling energy storage products and solutions to them.
- Those loans primarily represented lending extended to support those industry players' expenditures associated with power station projects or ESS projects, which was not uncommon in the industry for the purpose of maintaining a good relationship with other industry players and potential cooperation in the future.
- Guoxia Technology Co.,Ltd. is the first solution provider in the industry to develop and commercially scale a dedicated IOT platform and the first to establish an AI-driven energy storage industry model.
- Guoxia is the first solution provider who developed IoT platform specifically for the industry where we operate and the first solution provider to develop an energy storage industry model based on technology and coupled with AI algorithms. This pioneering integration of advanced AI and Internet technology directly addresses the long-standing market need for truly intelligent, lifecycle-optimized and easily deployable systems, setting us fundamentally apart from conventional product-centric competitors and providing a robust foundation to capture emerging opportunities in the fast-evolving global energy storage market.

Content



Definition

Definition of the Multi-use ESS Solution Model

- The rapid growth in ESS installations has revealed challenges with self-built storage models. With policy support and electricity market liberalization, the multi-use energy storage model has emerged as an innovative solution.

Main challenges of traditional self-built storage models

Poor profitability

- Traditional self-built storage systems generate limited income streams, primarily relying on peak shaving, which may not provide sufficient returns. Without diversified revenue sources, businesses struggle to recover investment costs and achieve sustainable profitability.

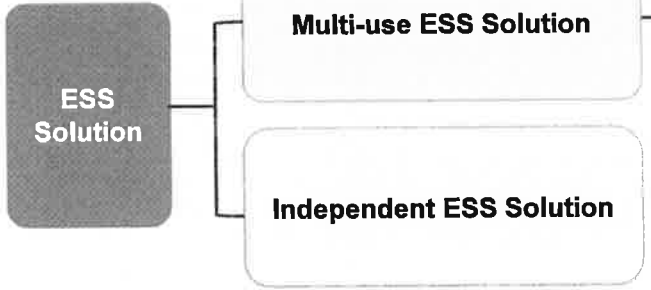
Low utilization

- ESS often experience long idle periods due to inconsistent demand and inefficient dispatching. Without an optimized scheduling mechanism, a significant portion of the storage capacity remains underused, reducing overall economic efficiency.

Operational Complexity

- Managing an ESS requires expertise in market dynamics, grid interaction, and technical maintenance. Many businesses lack the necessary knowledge and resources to operate storage efficiently.

Classification of ESS solution



Definition of multi-use ESS solution

Definition: Multi-use ESS solution refers to a shared-use model in which an ESS is jointly invested in or utilized by multiple stakeholders, such as grid operators, renewable energy producers, C&I users, or third-party investors. By contrast, an independent ESS solution is developed for and used by a single end user, without shared infrastructure or coordinated usage. A multi-use ESS solution is an advanced energy storage model that is invested or used by multiple users or entities. Such system can be developed and operated by any party, including renewable energy producers, grid operators, commercial and industrial users, or third-party investors, while providing diversified energy storage services including peak shaving, frequency regulation, backup power, and other energy storage services. The model enhances ESS utilization and reduces investment costs for individual users, thereby attracting more entities to participate in ESS development and further accelerating industry growth.

Key Features: Broad market applicability, Diversified revenue models, Market-driven transactions, High resource utilization

Source: CIC

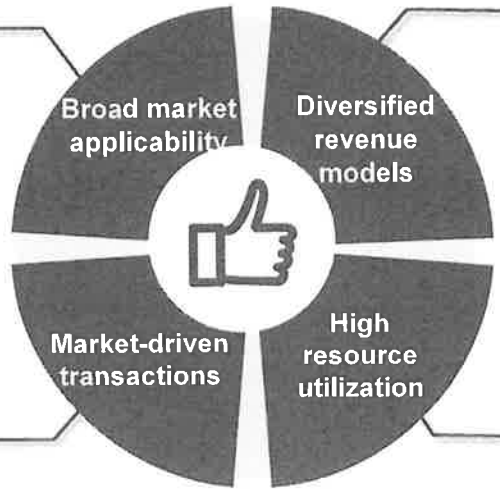
Key Features of the Multi-use ESS Solution Model

- The multi-use ESS offers the following key features: broad market applicability, diversified revenue models, market-driven transactions and high resource utilization.

Characteristics of the Multi-use ESS Solution

Serves a diverse range of end users with flexibility across utility, grid-based, and commercial sectors. It supports integration with renewable energy sources, enhances grid stability, and provides backup power solutions. Additionally, its modular design allows for scalable deployment, catering to varying capacity needs across different applications.

Offers multiple revenue streams, such as peak shaving, grid stabilization, and ancillary services. Additionally, it enables participation in energy trading markets, demand response programs, and virtual power plants, maximizing financial returns. Its adaptability to various pricing mechanisms and regulatory frameworks further enhances long-term profitability and investment value.



Supports market-based trading, which optimizes financial returns. By enabling real-time energy pricing and demand-response participation, it enhances profitability and system efficiency. Additionally, its integration with virtual power plants and decentralized energy markets allows for greater flexibility and value creation in dynamic energy ecosystems.

Maximizes energy storage efficiency through shared resource usage. By enabling dynamic load balancing and intelligent energy dispatch, it reduces wastage and enhances overall system performance. Additionally, advanced energy management algorithms optimize charge and discharge cycles, extending battery lifespan and improving cost-effectiveness.

Source: CIC

Comparison

Comparison between multi-use ESS and independent ESS

-Multi-use ESS offers higher flexibility, efficiency, and faster payback through shared usage and intelligent management, while independent ESS provides greater stability and reliability for single-purpose applications.

The Comparison between multi-use ESS and independent ESS

	Functionality	Target Users	Technology Requirement	Flexibility	Efficiency	Payback Period	Stability
Muti-use ESS Solutions	Multi-use ESS serves diverse ESS users and it can be developed by diverse users including a third-party investor. It provide flexible services like peak shaving, frequency regulation, backup power and others.	A single multi-use ESS station can serve diverse users including renewable energy producers and grid operators to C&I.	Requires smarter and more advanced ESS management systems because it performs more complex, dynamic, and interconnected tasks	◕	◕	◕	◕
Independent Solutions	Developed for a single user, but the independent ESS can provide several usage including peak shaving, frequency regulation, backup power and others.	An independent ESS can serve diverse users including renewable energy producers and grid operators to C&I, but a single station only serve a single user.	Rely on robust, single-purpose technology with deterministic controls and hardened reliability for mission-specific applications	◑	◑	◔	◕

Low/Short ◔ ⟶ ***High/Long*** ◕

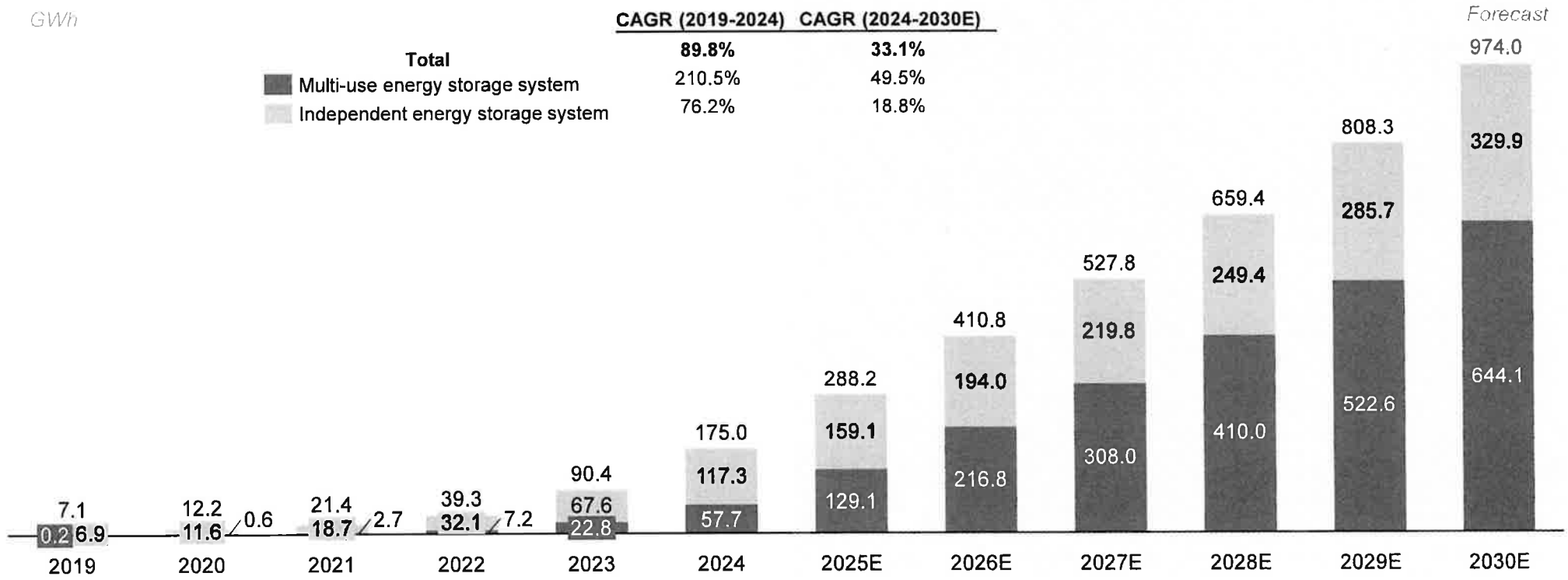
Source: CIC

Market Size

Market Size of Global Multi-use ESS Solution Industry

- From 2019 to 2024, global multi-use energy storage capacity grew rapidly, with strong growth expected to continue through 2030. The penetration rate also increased significantly and is projected to keep rising.

Global newly installed ESS capacity, 2019-2030E



Analysis:

- From 2019 to 2024, the global newly installed multi-use capacity of energy storage grew from 0.2 GWh to 57.7 GWh, with a CAGR of 210.5%. It is expected to increase to 644.1 GWh in 2030, with a CAGR of 49.5%. The penetration rate of multi-use ESS was 2.8% in 2019 and later reached 33.0% in 2024. The penetration rate is projected to reach 66.1% in 2030.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

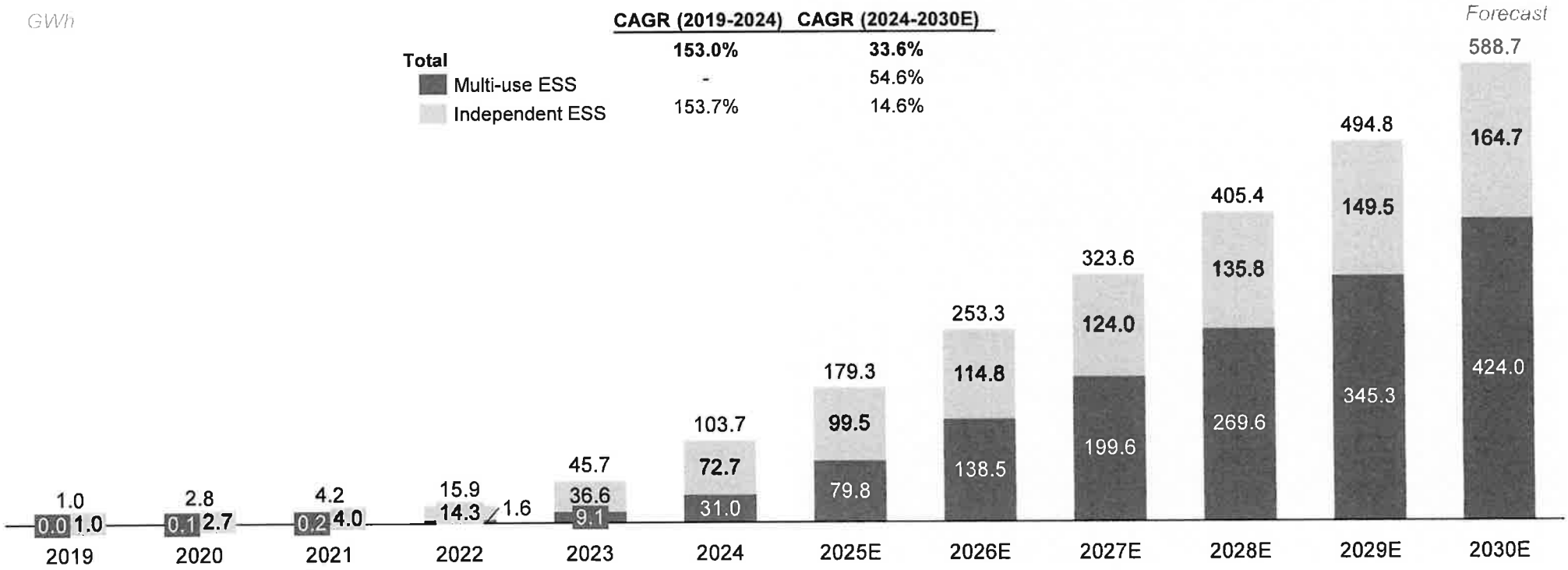
Source: BNEF, CIC

Market Size

Market Size of China's Multi-use ESS Solution Industry

- the multi-use ESS model is a relatively new deployment format that began to gain momentum in China around 2022.

China's newly installed ESS capacity, 2019-2030E



Analysis:

- China's multi-use ESS sector experienced significant growth since 2022, and in 2024, newly installed multi-use ESS capacity reached 31.0 GWh. The market is expected to continue expanding rapidly, with a projected CAGR of 54.6% from 2024 to 2030, reaching 424.0 GWh by 2030.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

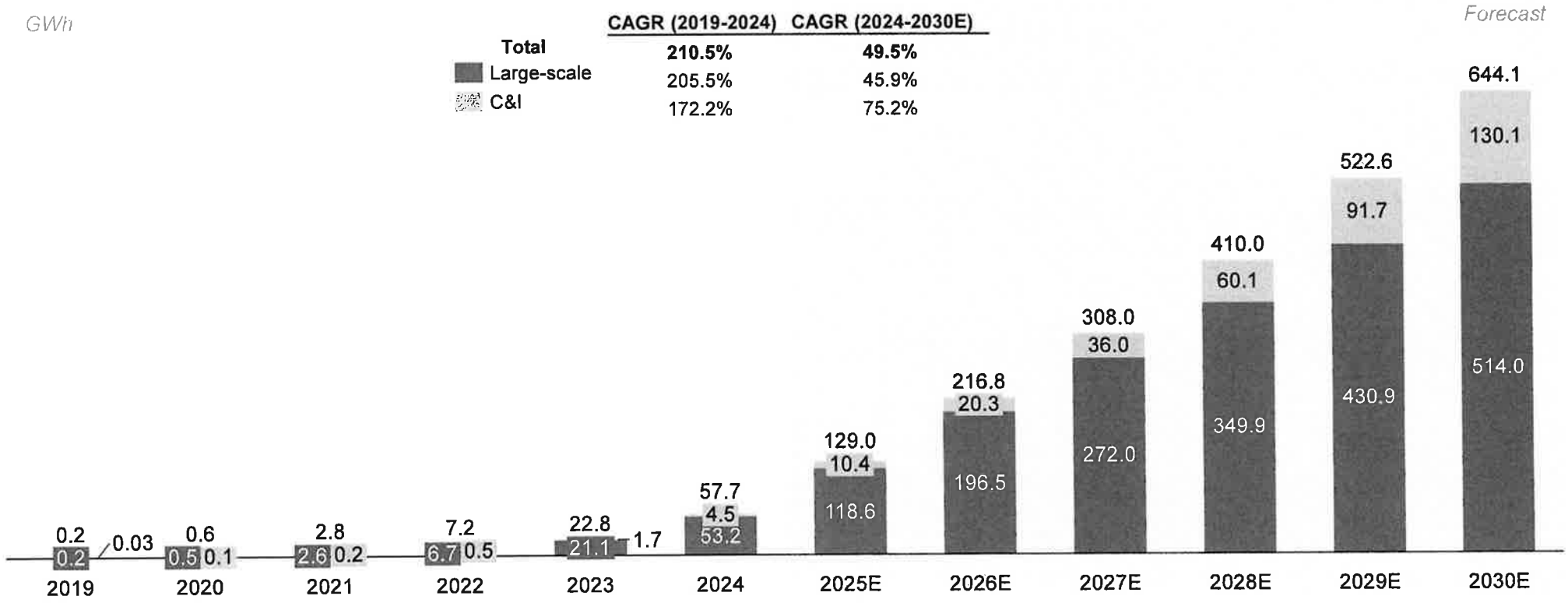
Source: BNEF, CIC

Market Size

Market Size of Global Multi-use ESS Solution Industry

- Multi-use ESS are suited for large-scale and commercial/industrial applications, as household ESS are not compatible with this shared business model.

Global newly installed multi-use ESS capacity, 2019-2030E



Analysis:

- Due to the idea of multiple users sharing the multi-use ESS, household ESS is inherently not suitable for the new business model. The concept of multi-use ESSs applies only to large-scale ESSs and commercial and industrial ESSs.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

CIC 灼识咨询

Source: CIC

Market Size of China's newly installed multi-use ESS capacity, 2019-2030E

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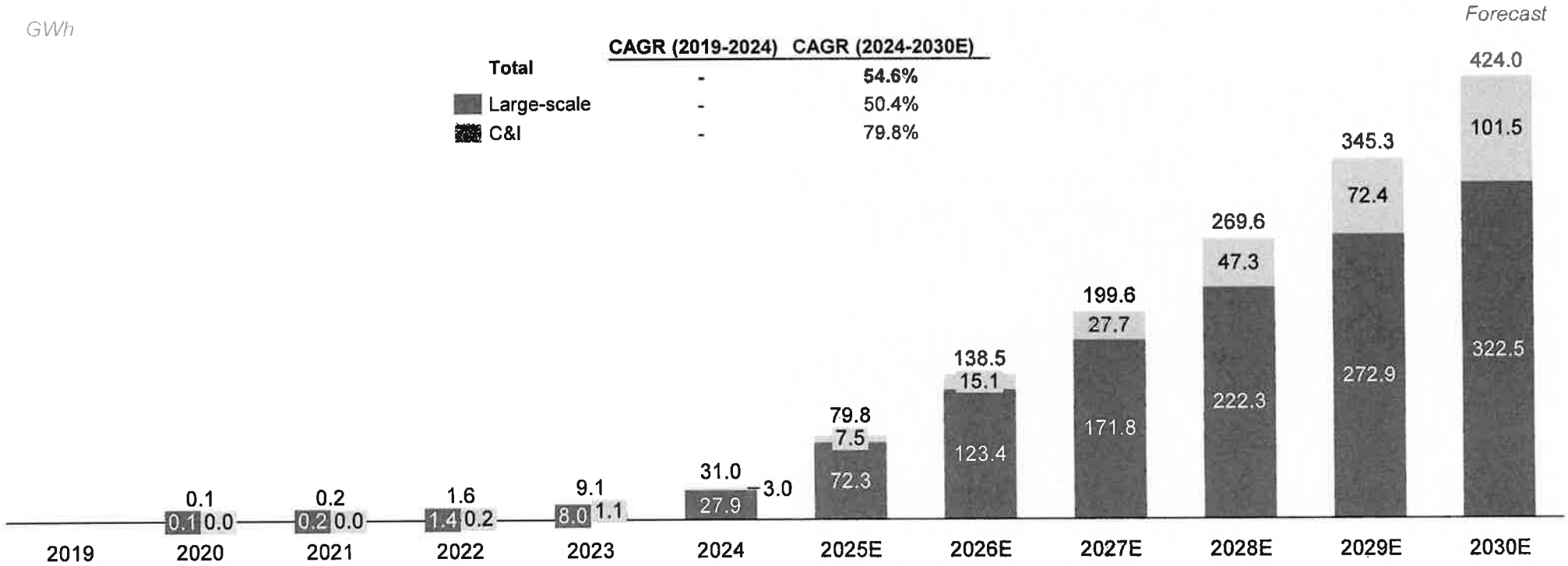

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Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

Source: CIC

Market Drivers of the Global Multi-use ESS Solution Industry

- Policy support, cost efficiency, enhanced resource utilization, and market-driven electricity pricing are key drivers of the global multi-use ESS market.

Drivers of the global multi-use ESS

Driver 1: Policy supports and market liberalization

- Government incentives, regulatory frameworks, and electricity market liberalization are creating a favorable environment for the growth of multi-use energy storage, making it more economically viable and attractive for various market players. These policies encourage innovation and investment, accelerating the deployment of multi-use storage solutions across different energy sectors.

Driver 2: Cost efficiency and resource optimization

- Multi-use energy storage maximizes the utilization of storage resources, reducing the need for large-scale individual storage investments and enabling better cost-efficiency for all parties involved. This collaborative approach lowers the financial barriers for smaller energy players, allowing broader market participation. Additionally, it enhances overall grid flexibility by efficiently distributing stored energy based on real-time demand fluctuations.

Driver 3: Enhanced resource utilization and economic efficiency

- This growth is driven by the need to improve resource utilization and economic efficiency in energy storage plants. Multi-use ESSs allow multiple stakeholders to access and leverage storage assets more effectively, reducing the necessity for large-scale, individual investments. This collaborative approach not only minimizes idle capacity but also distributes costs across users, fostering a more sustainable and economically attractive energy infrastructure.

Driver 4: Market-driven electricity pricing

- The increasing adoption of renewable energy sources, such as solar and wind power, is driving the need for efficient energy storage solutions. Multi-use ESSs help balance the intermittent nature of renewables by storing excess energy during peak production and releasing it when demand is high. This enhances grid stability, optimizes energy distribution, and accelerates the transition toward a more sustainable and resilient energy ecosystem.

Source: CIC

Future Trends of the Global Multi-use ESS Solution Industry

- Increasing market penetration, decentralized energy systems, and technological innovation with AI integration are key trends of the global multi-use ESS market.

Future trends of the global multi-use ESS

Market Penetration

1 **Increasing market penetration**

The penetration rate of multi-use ESSs will expand across residential, commercial and industrial sectors. This growth is driven by the need to improve resource utilization and economic efficiency in energy storage plants. As the technology becomes more affordable and accessible, multi-use ESSs will increasingly be deployed across various sectors to reduce energy costs and enhance energy security.

Decentralization

2 **Decentralized energy systems**

The push towards decentralized energy systems will continue, with multi-use energy storage playing a key role in enabling local energy communities, supporting microgrids, and providing backup power in remote or underserved areas. This shift towards decentralization will empower consumers and communities to have greater control over their energy usage, fostering resilience and reducing dependency on centralized power grids.

Innovation

3 **Technological Innovation and AI Integration**

As artificial intelligence (AI) and advanced energy management technologies evolve, multi-use ESSs will increasingly leverage predictive analytics and real-time optimization. AI-driven management will enhance energy dispatch efficiency, minimize costs, and improve grid stability by dynamically adjusting storage operations based on demand fluctuations and renewable energy generation patterns.

There are following major trends in the industry, in particular for the overseas energy storage sector, which primarily include (i) multi-use ESS products are increasingly utilized across large-scale and C&I sectors to improve efficiency and energy security; (ii) there are more business opportunities in relation to infrastructure network construction in recent years; (iii) there are more diverse business models of ESS operation in the industry; and (iv) increasing digitalization, Internet connectivity and AI penetration rate within the industry, enabling smart energy management, predictive analytics and real-time optimization of ESS solutions and products.

Source: CIC

AI Application in the Global Multi-use ESS Solution Industry

– AI enhances multi-use energy storage by optimizing resource allocation, market participation, and user demand matching, thereby improving utilization, maximizing revenue, and reducing operational costs.

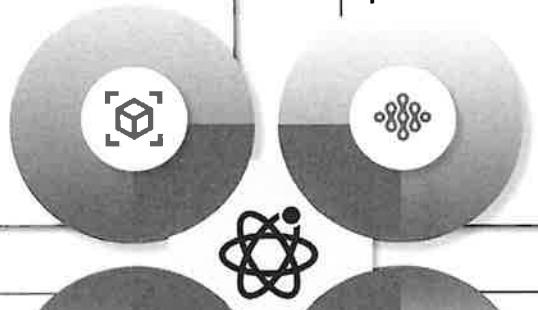
AI Application in the Multi-use ESS

Intelligent Dispatch Optimization

- AI dynamically adjusts charging and discharging strategies based on grid load, renewable generation forecasts, and user demand, maximizing asset utilization and reducing idle capacity. It enhances system resilience by responding to real-time fluctuations and market signals. Additionally, predictive analytics improve long-term performance, reducing operational costs and extending battery lifespan.

Price Forecasting and Market Optimization

- AI analyzes historical pricing, supply-demand fluctuations, policy changes, and other factors that might affect price to predict electricity prices and optimize energy trading strategies for higher returns. It enables proactive decision-making, allowing users to buy and sell energy at optimal times. Additionally, machine learning models continuously refine forecasts, improving accuracy and adaptability to market dynamics.



Multi-User Smart Matching

- AI helps predict and manage the diverse energy demands of different users, including grid operators, renewable energy providers, and industrial consumers. By optimizing resource allocation and dispatch strategies, AI improves utilization efficiency and maximizes overall system profitability. Additionally, real-time data analytics enhance coordination among users, enabling more dynamic and responsive energy trading.

Renewable Generation Forecasting and Storage Coordination

- AI predicts wind and solar power output using weather and historical generation data, optimizing battery operations to stabilize grid fluctuations and enhance energy integration. It enables proactive energy storage management, reducing curtailment and improving renewable energy utilization. And real-time forecasting adjustments enhance grid reliability and support demand-side response strategies.

Source: CIC

Value of digital ESS

Empowerment Across the ESS Industry Value Chain

- Located downstream in the industrial chain, platform-based digital integrated energy solutions serve as an enabler for ecosystem participants and a profit hub for upstream and midstream stakeholders.

Empowerment Across the ESS Industry Value Chain

Upstream Industry Participants

- **Ensuring Precise Market Entry:** The solution facilitates the sales of products through precise market entry, enabling products to reach the target markets and achieve profitability.
- **Avoiding Homogenization:** The solution helps prevent product homogenization, particularly with the rapid development of cells and batteries, by emphasising higher-level differences in batteries and data management systems.
- **Empowerment Through Data:** The solution empowers upstream participants by leveraging their data to assist in market-oriented product research and development, helping align products with market demand.

Midstream Industry Participants

- **Facilitating Product Sales:** The solution facilitates product sales through precise market penetration, allowing the products to reach the proper market segments and achieve profitability.
- **Better Connection with End Customers:** The solution supports the implementation of integration services and operations and maintenance, helping companies connect with and serve their end customers.
- **Empowering Collaboration, Reducing Costs:** The solution empowers midstream enterprises to collaborate, reduce costs, and utilize their own strengths to improve operational efficiency.

Downstream Generation Side

- **Peak-shaving:** The solution enables peak-shaving in electricity generation by managing power output during periods of high demand.
- **System Frequency Regulation:** The solution supports system frequency regulation, ensuring grid stability.
- **Auxiliary Dynamic Operations:** The solution optimizes grid stability by enabling real-time, flexible adjustments to power supply and demand.
- **Integration of Energy Storage:** The solution facilitates the integration of ESSs into the grid, ensuring efficient energy flow and stability.

Downstream Grid Side

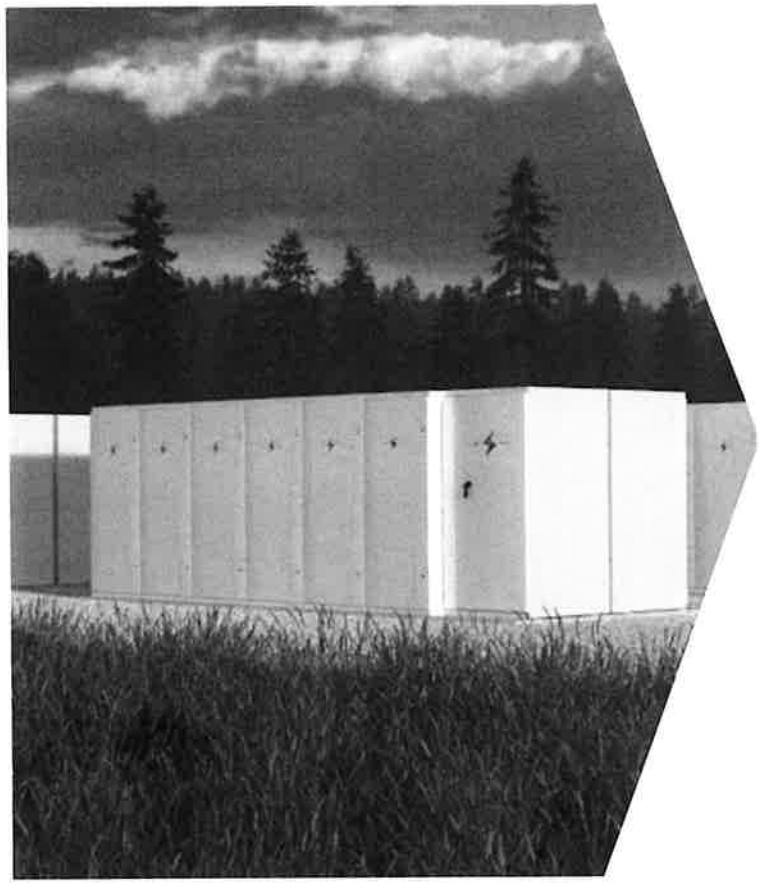
- **Alleviation of Grid Congestion:** The solution alleviates grid congestion by optimizing energy distribution and reducing the strain on the electrical infrastructure.
- **Delay of Capacity Expansion and Upgrades:** The solution assists in delaying the need for capacity expansion and upgrades by optimizing existing resources and improving grid efficiency.

Downstream Consumers

- **Self-generation and self-consumption of electricity: Generating and** consuming electricity on-site to reduce reliance on the grid.
- **Management of capacity-related electricity costs:** Optimizing energy use to lower costs associated with peak demand.
- **Arbitrage of peak and valley price differences:** Exploiting price differences between peak and off-peak times for cost savings.
- **Improvement of electricity reliability:** Enhancing the stability and continuity of electricity supply.

Source: CIC

Content

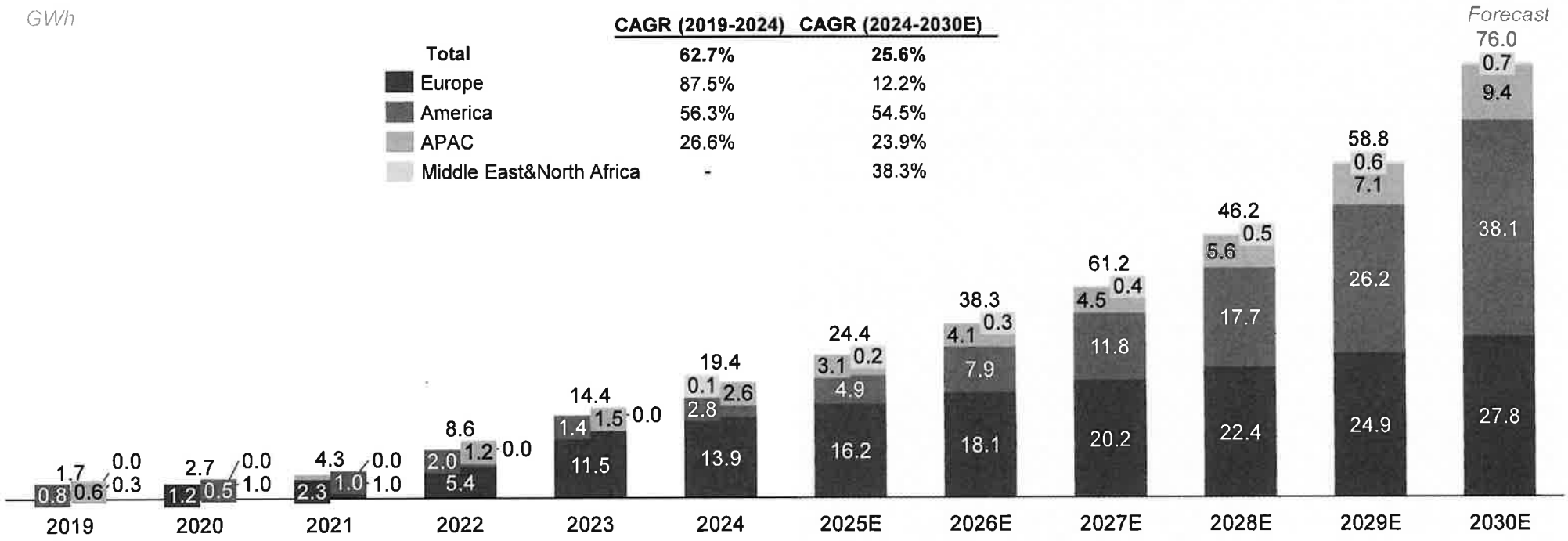


Market Size

Market Size of Global newly installed residential ESS capacity

-Global newly installed residential ESS capacity grew rapidly from 2019 to 2024 and is expected to maintain steady expansion through 2030, with America leading future growth and Europe remaining the largest contributor.

Global newly installed residential capacity, 2019-2030E, by region



Analysis:

- From 2019 to 2024, the global newly installed residential capacity of energy storage grew from 1.7 GWh to 19.4 GWh, with a CAGR of 62.7%. It is expected to reach to 76.0 GWh in 2030, with a CAGR of 25.6%. Europe is the leading market that contribute to the global residential ESS industry, the newly installed residential ESS capacity in 2024 was 13.9 GWh, accounting for 71.6% of the global market. The current residential energy storage market in the UK is relatively small, with a newly installed ESS capacity of only 0.6 GWh in 2024. However, it is expected to grow rapidly at a CAGR of 42.4%, reaching a scale of 5.0 GWh by 2030.

Note: Non-electrochemical storage technologies, such as pumped hydro, flywheel, and compressed air energy storage are not included.

Source: BNEF, CIC

Market Drivers of the Global Household ESS Industry

- Rising costs and grid independence, battery tech advancements, AI energy management and policy support are key drivers of the global household ESS industry.

Drivers of the global household ESS industry

Driver 1: Rising energy costs and grid independence

- The upward trend in electricity prices, combined with heightened concerns regarding power reliability, has led to a growing preference for ESSs in residential settings, enabling peak shaving and backup power capabilities. This shift empowers homeowners to manage energy consumption more efficiently and reduce reliance on volatile grid prices.

Driver 2: Technological advancements in battery storage

- Ongoing advancements in battery technology, particularly in lithium-ion battery efficiency, cost reduction, and safety improvements, are significantly driving down the barriers to entry for residential ESSs. Emerging solid-state and next-generation battery technologies promise even higher energy density and longer lifespans. And innovations in recycling and second-life applications enhance sustainability and reduce environmental impact.

Driver 3: AI-driven energy management

- AI and smart technologies are becoming increasingly integrated into household ESSs. These innovations enable more efficient energy management, predictive maintenance, and intelligent load forecasting, optimizing overall system performance and reducing operational costs. As AI algorithms continue to evolve, ESSs will become more adaptive, learning from user behavior and environmental conditions to optimize performance.

Driver 4: Government Policies and Incentives

- Supportive policies, subsidies, and tax incentives are accelerating the adoption of household energy storage. Governments worldwide are implementing feed-in tariffs, net metering programs, and energy storage mandates to promote distributed energy solutions and reduce grid dependency. Governments are also setting ambitious renewable energy targets and implementing carbon reduction policies, further driving the need for energy storage solutions.

Source: CIC

Future Trends of the Global Household ESS Industry

- Solar-storage-charging integration, blockchain application and eco-friendly materials application are key trends of the global household ESS industry.

Future trends of the global household ESS industry

Solar-Storage-Charging Integration

1 **Solar-storage-charging all-in-one systems**

The market is experiencing a shift towards integrated solar-storage-charging systems that enable seamless management of solar energy, storage, and electric vehicle (EV) charging. This trend is expected to drive greater consumer adoption and enhance the overall efficiency of household energy solutions. This integration not only simplifies energy management for homeowners but also maximizes self-consumption of renewable energy, reducing reliance on the grid.

Blockchain Application

2 **Application of Blockchain Technology in Energy Trading**

Integrating multiple home ESSs into virtual power plants allows collective participation in electricity markets, enhancing community energy management and efficiency. This approach enables households to sell excess stored energy back to the grid, creating new revenue streams and improving overall grid stability. As regulatory frameworks evolve, virtual power plants are expected to play a crucial role in decentralized energy networks, supporting the transition to a more resilient and sustainable energy system.

Eco-Friendly Materials Application

3 **Application of Eco-Friendly Materials**

Future home energy storage devices will increasingly utilize renewable and eco-friendly materials, reducing environmental impact and improving energy conversion efficiency, promoting sustainable development. Advancements in battery recycling technologies will further enhance sustainability by reducing waste and reliance on raw material extraction. Additionally, the development of biodegradable and non-toxic battery components will contribute to a greener and safer energy storage ecosystem.

AI Application in the Household ESS Industry

– In the household ESS sector, AI-driven energy management improves efficiency, enhances integration with smart homes and distributed grids, and optimizes cost savings.

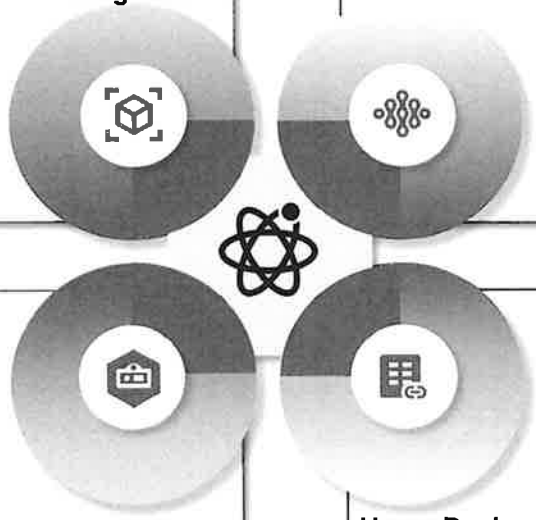
AI Application in the household ESS

Smart solar-storage-charging integration

- AI enables seamless coordination between solar generation, battery storage, and EV charging, prioritizing energy usage based on availability and cost to maximize economic benefits. It dynamically adjusts charging schedules to leverage off-peak electricity rates and excess solar generation. Additionally, real-time monitoring and predictive analytics enhance system efficiency, extending battery lifespan and reducing energy waste.

Self-consumption optimization

- AI analyses household electricity consumption, electricity generation forecasts, and real-time electricity prices to maximize self-consumption, reduce grid dependence, and lower energy costs. It adjusts energy storage and appliance usage to align with peak solar production. Additionally, machine learning continuously refines consumption patterns, further enhancing efficiency and cost savings over time.



Intelligent Home Integration

- AI seamlessly integrates with household appliances, including heat pumps, EV chargers, and other smart home systems, to optimize energy consumption and energy storage, enhance efficiency, and prevent peak demand overloads. By dynamically managing electricity usage, AI enables a more autonomous and cost-effective home energy ecosystem.

Home Device Operation Safety Control

- With the increasing adoption of AI in home environments, smart energy systems can optimize device management through energy control, ensuring the safe operation of various household smart devices including robots while enhancing overall efficiency. Advanced monitoring systems detect anomalies in real time, preventing potential malfunctions and hazards. Additionally, automated fault diagnosis and predictive maintenance further improve system reliability and longevity.

Source: CIC

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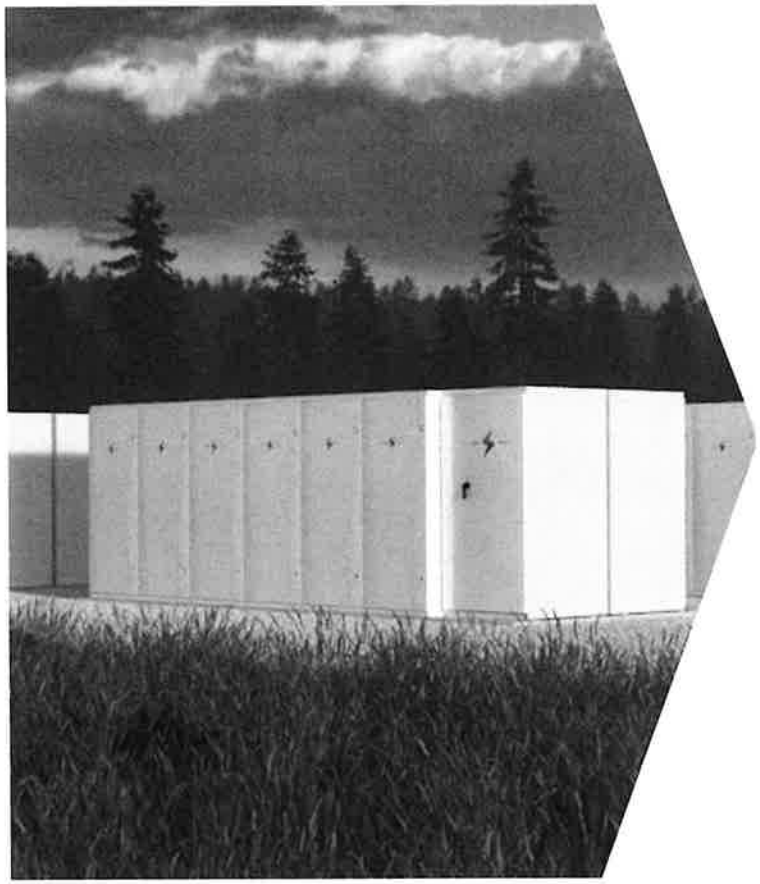
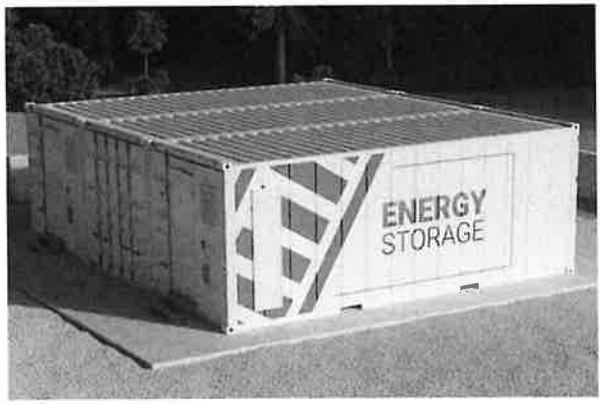


Competitive Landscape

The competitive landscape of the global ESS industry and advantages of the company

-The ESS market is highly competitive and dominated by Chinese players, while the Company stands out as an early mover in AI- and cloud-based ESS solutions with strong production flexibility.



- The ESS market is highly competitive, with over 300 players globally. Beyond the top 30 companies, the market remains highly fragmented, the top 30 companies occupied over 90% of the market share in terms of the newly installed ESS capacity. Chinese companies play a key role in the global ESS market, driven by their strong supply chain capabilities and technological innovation. In 2024, over 70% of newly installed energy storage capacity worldwide was provided by Chinese players.
- The average selling price of ESS has shown a downward trend globally and in China, primarily due to the intense competition in the ESS solutions industry, where low-price competition is prevalent.

- The company were among the early participants in the industry to achieve Internet cloud integration for ESS solutions and/or products and develop a full-scenario Internet cloud platform for digitalized energy management. We are recognized as one of the innovators in the energy storage industry, with AI technology playing a core role in driving our business. We are among the early participants in the industry to achieve the scaling and commercialization of an AI and internet-based platform in residential energy storage scenarios.
- We are able to build an integrated solutions and products portfolio centered around energy usage scenarios, dedicated to addressing the needs of our customers and the end users related to the lack of systematic energy storage solutions.
- The time required for our production lines to switch from the production of one product to another within the same type of large-scale ESS product/C&I ESS product is approximately two hours; and the time required for our production lines to switch between large-scale ESS product and C&I ESS product is approximately eight hours. Such switching times are relatively short and considered competitive in the industry.
- The changes in our average selling prices during the Track Record Period were generally in line with our peers.
- Guoxia Technology Co.,Ltd. is the first solution provider in the industry to develop and commercially scale a dedicated IOT platform and the first to establish an AI-driven energy storage industry model.

Competitive Landscape

The Ranking of Chinese Multi-use ESS Solution Industry Providers

- The Chinese ESS market is highly competitive, with local companies supplying over 70% of global capacity in 2024. The company ranks eighth largest Chinese ESS providers in terms of newly installed multi-use ESS capacity worldwide in 2024,with approximately 4% market share.

The ranking of Chinese multi-use ESS providers by global newly installed capacity, 2024

Ranking	Company	Description	Global newly installed multi-use ESS capacity	Market share
1	Company A	Founded in 1997 and headquartered in Anhui Company A specializes in renewable energy solutions, solar inverters, ESSs. It was listed on the Shenzhen Stock Exchange in 2011.	~10GWh	~16.5%
2	Company B	Founded in 1992 and headquartered in Hunan, Company B is a subsidiary of Chinese state-owned enterprise which listed in Hongkong Exchange and Shanghai Exchange specializes in electric traction systems and vehicle control technology.	~7GWh	~11.3%
3	Company C	Founded in 2011 and headquartered in Beijing, Company C specializes in ESSs. It was listed on the Shanghai Stock Exchange in 2025.	~6GWh	~9.5%
4	Company D	Founded in 2015 and headquartered in Jiangsu, Company D is an unlisted company and specializes in energy storage solutions, and developed digital technologies to deliver better energy storage solutions.	~4GWh	~6.1%
5	Company E	Founded in 2007 and headquartered in Shanghai, Company E is an unlisted company and specializes in smart wind turbines, ESSs solutions.	~4GWh	~6.1%
6	Company F	Founded in 2016 and headquartered in Shandong, Company F is subsidiary of Chinese state-owned enterprise and specializes in power transmission and distribution equipment, ESSs solutions.	~3GWh	~4.6%
7	Company G	Founded in 1995 and headquartered in Shenzhen, Company G specializes in electric vehicles, battery technology, and energy storage solutions. It was listed on the Hong Kong Stock Exchange in 2002 and Shenzhen Exchange in 2011.	~3GWh	~4.3%
8	**The Company**	**Founded in 2019 and headquartered in Jiangsu, the Company is a renewable energy solutions and products provider based on platform technology and driven by AI in the energy storage industry in the PRC.**	**~2GWh**	**~3.1%**
9	Company H	Founded in 2021 and headquartered in Beijing, Company H is an unlisted company and specializes in energy storage solutions, and developed digital technologies to deliver better energy storage solutions.	~2GWh	~2.8%
10	Company I	Founded in 2011 and headquartered in Fujian, Company I specializes in the development and production of lithium-ion batteries for electric vehicles and ESSs. It is a global leader in the battery industry and was listed on the Shenzhen Exchange in 2018 and listed on the Hongkong Exchange in 2025.	<2GWh	~2.6%

- The [ESS] market in China is highly competitive and concentrated, and we expect that the competition will be even more intense in the future. The ESS market is highly competitive, with over 300 players within the PRC. Beyond the top 30 companies, the market remains highly fragmented, the top 30 companies occupied over 90% of the market share in terms of the newly installed ESS capacity in 2024. Chinese companies play a key role in the global ESS market, driven by their strong supply chain capabilities and technological innovation. In 2024, over [70%] of newly installed energy storage capacity worldwide was provided by Chinese players. There has been an undersupply of the company's products in recent years and the markets of their products still have great potential of increase in the future. The company ranks as the eighth largest Chinese ESS provider by newly installed multi-use ESS capacity worldwide in 2024.

Source: CIC

The Ranking of Global Multi-use ESS Solution Industry Providers

- The global ESS market is highly concentrated, with companies supplying over 70% of global capacity in 2024. The company ranked 10th largest ESS provider globally in terms of newly installed multi-use ESS capacity worldwide in 2024 with approximately 3% market share.

The ranking of global multi-use ESS providers by global newly installed capacity, 2024

Ranking	Company	Description	Global newly installed multi-use ESS capacity	Market Share
1	Company Q	Founded in 2003 and headquartered in California, Company Q is a global leader in electric vehicles and energy storage technologies. It was listed on the NASDAQ Stock Exchange in 2010.	~11GWh	~18.6.%
2	Company A	Founded in 1997 and headquartered in Anhui Company A specializes in renewable energy solutions, solar inverters, ESSs. It was listed on the Shenzhen Stock Exchange in 2011.	~10GWh	~16.3%
3	Company R	Founded in 2018 and headquartered in Virginia, Company R specializes in energy storage products and digital applications for grid-scale energy management. It was listed on the NASDAQ Stock Exchange in 2021.	~7GWh	~11.3%
4	Company B	Founded in 1992 and headquartered in Hunan, Company B is a subsidiary of Chinese state-owned enterprise which listed in Hongkong Exchange and Shanghai Exchange specializes in electric traction systems and vehicle control technology.	~7GWh	~11.3%
5	Company C	Founded in 2011 and headquartered in Beijing, Company C specializes in ESSs. It was listed on the Shanghai Stock Exchange in 2025.	~6GWh	~9.5%
6	Company D	Founded in 2015 and headquartered in Jiangsu, Company D is an unlisted company and specializes in energy storage solutions, and developed digital technologies to deliver better energy storage solutions.	~4GWh	~6.1%
7	Company E	Founded in 2007 and headquartered in Shanghai, Company E is an unlisted company and specializes in smart wind turbines, ESSs solutions.	~4GWh	~6.1%
8	Company F	Founded in 2016 and headquartered in Shandong, Company F is subsidiary of Chinese state-owned enterprise and specializes in power transmission and distribution equipment, ESSs solutions.	~3GWh	~4.6%
9	Company G	Founded in 1995 and headquartered in Shenzhen, Company G specializes in electric vehicles, battery technology, and energy storage solutions. It was listed on the Hong Kong Stock Exchange in 2002 and Shenzhen Exchange in 2011.	~3GWh	~4.3%
10	**The Company**	**Founded in 2019 and headquartered in Jiangsu, the Company is a renewable energy solutions and products provider based on platform technology and driven by AI in the energy storage industry in the PRC.**	**~2GWh**	**~3.1%**

- The global ESS market is highly competitive, with over 300 players across the upstream, midstream and downstream segments. There are more than 300 participants globally, with top 30 companies counted for over 90.0% of the newly installed ESS capacity in 2024. Chinese ESS provider globally in terms of newly installed multi-use ESS capacity worldwide in 2024, with approximately 4% market share.

Source: CIC

The Ranking of Chinese Residential ESS Providers

- The company ranks as the tenth largest Chinese ESS provider globally in terms of residential ESS shipment capacity in 2024, with approximately 4% market share.

The ranking of Chinese residential ESS solution providers by global shipment capacity, 2024

Ranking	Company	Description	Global residential shipment capacity	Market share
1	Company J	Founded in 2021 and headquartered in Shenzhen. Company J is an unlisted company and specializes in digital energy solutions, focusing on smart grid, photovoltaic, and ESSs..	~4.0GWh	~20.6%
2	Company G	Founded in 1995 and headquartered in Shenzhen, Company G specializes in electric vehicles, battery technology, and energy storage solutions. It was listed on the Hong Kong Stock Exchange in 2002 and Shenzhen Exchange in 2011.	~4.0GWh	~20.6%
3	Company K	Founded in 2009 and headquartered in Shanghai, Company K specializes lithium-ion ESSs, focusing on energy storage applications for residential sector. It was listed on the Shanghai Stock Exchange in 2020.	~1.5GWh	~7.7%
4	Company L	Founded in 2000 and headquartered in Zhejiang, Company L is an specializes solar inverters and ESSs, focusing on efficient power conversion. It was listed on the Shanghai Exchange in 2021.	~1.0GWh	~5.2%
5	Company M	Founded in 2010 and headquartered in Shenzhen, Company M is an unlisted company and specializes in solar inverters and energy storage solutions, focusing on residential sector.	~0.6GWh	~3.1%
6	Company N	Founded in 2010 and headquartered in Jiangsu, Company N specializes in photovoltaic inverters and ESSs, focusing on innovative power conversion solutions for renewable energy applications. It was listed on Shanghai Exchange in 2020.	~0.4GWh	~2.1%
7	Company A	Founded in 1997 and headquartered in Anhui Company A specializes in renewable energy solutions, solar inverters, ESSs. It was listed on the Shenzhen Stock Exchange in 2011.	~0.3GWh	~1.5%
8	Company O	Founded in 2022 and headquartered in Shanghai, Company O specializes in solar power generation systems and energy storage solutions, focusing on integrated renewable energy storage solutions.	~0.3GWh	~1.5%
9	Company P	Founded in 2012 and headquartered in Jiangsu, Company P is an unlisted company and specializes in digitalized energy storage solutions which focuses on residential sector.	~0.3GWh	~1.5%
10	**The Company**	**Founded in 2019 and headquartered in Jiangsu, the Company specializes in energy storage solutions, and is a leading platform-featured technology service provider of integrated AI-driven energy solutions in the ESS**	**~0.2GWh**	**~1.0%**

Source: CIC

The Ranking of Global Residential ESS Providers

The global residential ESS solution market is predominantly dominated by leading players, with the top three accounting for half of the market share. The remaining market is highly fragmented. In 2024, the Company ranked among the top twenty global ESS providers by residential ESS shipment capacity. Outside the leading players, most market participants are of a similar scale and publicly available information is limited, making it difficult to provide an accurate ranking beyond the top ten.

Ranking of the Global Residential ESS Solution providers by global shipment capacity, 2024

Ranking	Company	Description	Global residential shipment capacity	Market Share
1	Company Q	Founded in 2003 and headquartered in California, Company Q is a global leader in electric vehicles and energy storage technologies. It was listed on the NASDAO Stock Exchange in 2010.	~6.0	~30.9%
2	Company J	Founded in 2021 and headquartered in Shenzhen. Company J is an unlisted company and specializes in digital energy solutions, focusing on smart grid, photovoltaic, and energy storage systems..	~4.0	~20.6%
3	Company G	Founded in 1995 and headquartered in Shenzhen, Company G specializes in electric vehicles, battery technology, and energy storage solutions. It was listed on the Hong Kong Stock Exchange in 2002 and Shenzhen Exchange in 2011.	~4.0	~20.6%
4	Company K	Founded in 2009 and headquartered in Shanghai, Company K specializes lithium-ion energy storage systems, focusing on energy storage applications for residential sector. It was listed on the Shanghai Stock Exchange in 2020.	~1.5	~7.7%
5	Company L	Founded in 2000 and headquartered in Zhejiang, Company L is an specializes solar inverters and energy storage systems, focusing on efficient power conversion. It was listed on the Shanghai Exchange in 2021.	~1.0	~5.2%
6	Company M	Founded in 2010 and headquartered in Shenzhen, Company M is an unlisted company and specializes in solar inverters and energy storage solutions, focusing on residential sector.	~0.6	~3.1%
7	Company N	Founded in 2010 and headquartered in Jiangsu, Company N specializes in photovoltaic inverters and energy storage systems, focusing on innovative power conversion solutions for renewable energy applications. It was listed on Shanghai Exchange in 2020.	~0.4	~2.1%
8	Company A	Founded in 1997 and headquartered in Anhui Company A specializes in renewable energy solutions, solar inverters, energy storage systems. It was listed on the Shenzhen Stock Exchange in 2011.	~0.3	~1.5%
9	Company O	Founded in 2022 and headquartered in Shanghai, Company O specializes in solar power generation systems and energy storage solutions, focusing on integrated renewable energy storage solutions.	~0.3	~1.5%
10	Company P	Founded in 2012 and headquartered in Jiangsu, Company P is an unlisted company and specializes in digitalized energy storage solutions which focuses on residential sector.	~0.3	~1.5%

Source: CIC

The Company's Competitive Advantages Analysis

- The company's competitive advantages lie in its leadership as an industry pioneer, strong data and equipment management capabilities, and efficient customer management strategies.

Competitive Advantage Analysis of the Company

The Company is a **leading** platform-based technology service provider of integrated AI-driven energy solutions in the energy storage industry in the PRC.

Industry Pioneer

- The Company is one of the pioneers in the industry to achieve seamless cloud integration for ESS solutions and/or products and develop a full-scenario cloud platform, which further reinforce the Company's leadership in the digitalized energy management.
- Leveraging the outstanding R&D capability, the Company is the first solution provider who developed IoT platform specifically for ESS solution industry and the first solution provider that developed end-to-end energy storage industry model. With leading technology in digital platform and integrated solution, the company continues to deliver differentiated and high quality products and services, which position them favorably in the competitive environment and will continue to play a crucial part in their future competition.
- The Company is **the earliest** energy storage solution provider who built IoT platform for the ESS sector and **the earliest** energy storage solution provider who developed end-to-end large-scale models.
- The Company is recognized as one of the leading innovators in the energy storage industry, with AI technology playing a core role in driving their market leadership.
- The Company is able to build an integrated, integrated solutions and products portfolio centered around energy usage scenarios, dedicated to addressing the needs of our customers and the end users related to the lack of systematic energy storage solutions. This differentiates them from their competitors and lays a solid foundation for us to closely follow industry trends, meet the continuously emerging new demands in this sector, and seize potential business opportunities.
- The Company is one of the pioneers in the industry to achieve scaling and commercialization of an AI platform in residential energy storage scenarios.

Data Management

- The Company is **one of the earliest** energy storage solution providers in the industry who established a multi-dimensional data pool.
- Through the company's collaboration with third-party provider, i.e., Octopus Energy, one of the Europe's largest renewable energy investors, the company integrates data on end user electricity prices and wholesale prices.

Source: CIC

The Company's Competitive Advantages Analysis

- The company's competitive advantages lie in its leadership as an industry pioneer, strong data and equipment management capabilities, and efficient customer management strategies.

Competitive Advantage Analysis of the Company

Equipment Management

- The Company's solutions are equipped with a comprehensive and leading battery safety management system.
- The Company is **one of the few** providers in the industry who are capable of second-level intelligent variable frequency data monitoring. The Company is **one of the few** providers in the industry who are capable of precise fault localization and millisecond-level circuit breaking.
- The Company's full life cycle quality control system for products from design to after-sales is in line with international standards and customer requirements.
- The Company's switching times between same-type and different-type product production lines reflect a leading position within the industry.
- As of the Latest Practicable Date, the company has achieved an average networking installation time of less than eight seconds for a single device and less than five minutes for system upgrades, which significantly reduces installation time, improves convenience, and improves the maintainability of the device, all of which surpasses the industry average level.
- A stable, reliable and cost-efficient supply chain is critical to company's success. Regarding the major products we manufacture, which primarily include energy storage cabinets, energy storage containers, inverters, bi-directional AC/DC converters and DC outdoor cabinet systems, the cost of raw materials accounts for approximately 80% of company's total production costs.
- According to CIC, our failure rate is strictly controlled within 2.0% during the Track Record Period, which is within the industry range during the same periods.
- The Company's inventory turnover days were better than the industry average for the same periods

Customer Management

- The Company's goods return policy with distributors is in line with the industry practice.
- The Third-Party Settlement Arrangement is not uncommon in the industry and is consistent with the industry practice and such third-party payors involved in these arrangements are primarily the entities of the respective business partners who are under common control or have stable business relationships with each other.
- It is a common practice in the industry to have overlapping customers and suppliers, for example, purchasing raw materials from suppliers and selling energy storage products and solutions to them. Alpha ESS purchases inverter modules from GoodWe while also selling energy storage battery systems to GoodWe. This overlap occurs because ESSs consist of multiple subsystems, come in diverse product specifications and formats, and need to meet varying project implementation requirements. As a result, companies can simultaneously act as both customers and suppliers within the industry.
- In the energy storage industry, customer acquisition tends to be relatively challenging. As a result, ESS providers typically adopt various approaches to maintain relationships with existing and potential clients. The Company's practices represent one such approach. In addition, potential clients that have provided loans to the Company have purchased products at market prices, in accordance with standard procurement practices. Therefore, the aforementioned circumstances are not uncommon within the industry and do not constitute exceptional cases.
- There is no substantial barrier for us to recruit and retain a sufficient number of qualified employees for our capacity expansion and maintain good relationship with them.
- Our customers and the end users, including our distributors, for ESS solutions and products in the overseas markets, have high requirements on the quality and performance of the solutions and products they procure, and usually set up stringent barriers to entry and quality control mechanisms for their own suppliers.

Source: CIC

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Thank you!