Value, Revenue and Carbon Assessment of Large-Scale Energy Storage in China

China Energy Storage Alliance (CNESA)

July 2026

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02 Key Market Developments in 2025

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Energy Transition Drivers

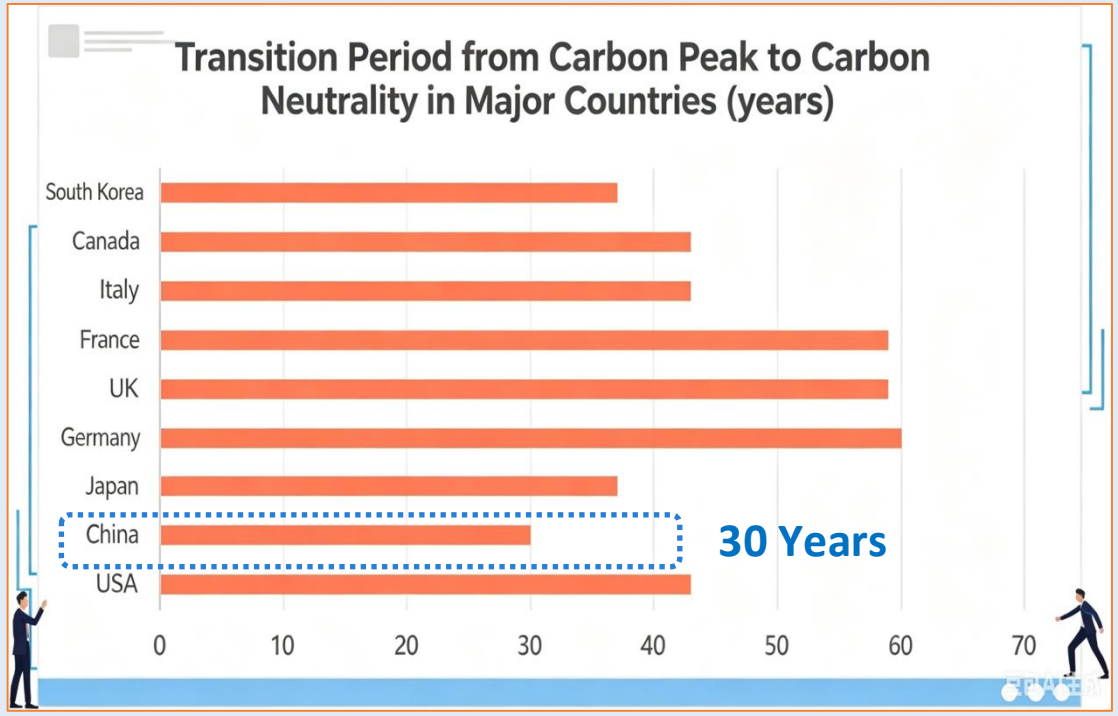
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Dual Carbon Goals & Shorter Transition

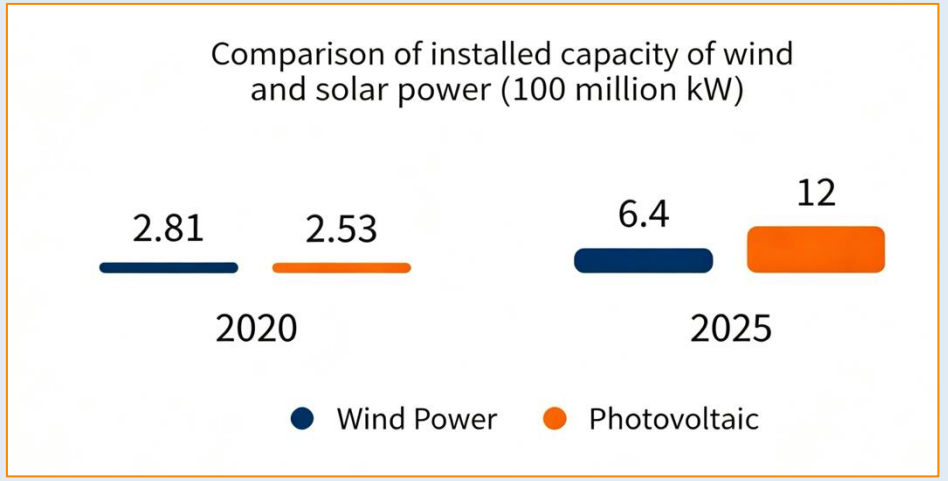
2030 Carbon Peak

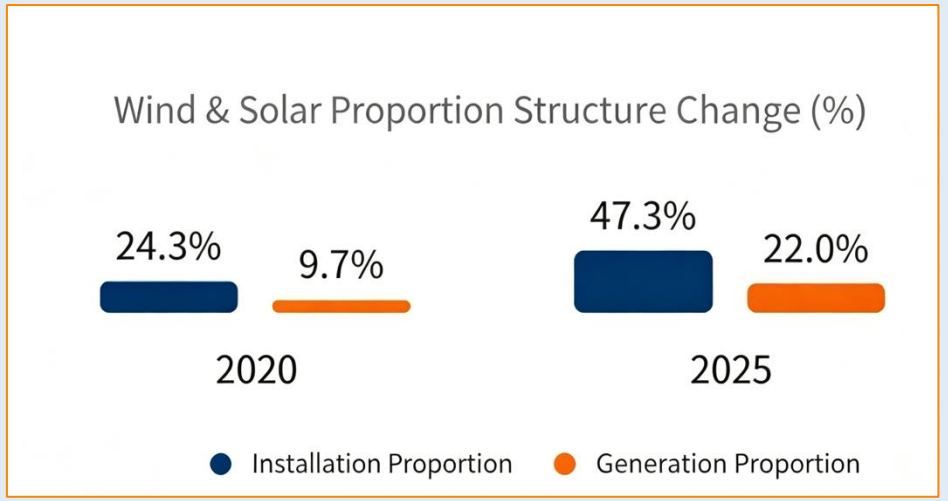
2060 Carbon Neutrality

Shorter Transition Period



Rapid Growth of Renewable Energy





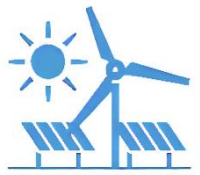
Strategic Role of New ES

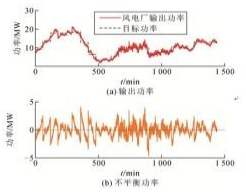
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Rising renewables → Greater Variability → Growing Need for Flexibility

- **Coal flexibility:** limited improvement potential and Carbon footprint
- **Pumped hydro:** long lead time & geographic constraints
- **Gas:** high operating cost
- **Demand response:** early stage

Generation





- High volatility
- Insufficient flexibility
- Inadequate supply adequacy

- Wind + ES
- Solar + ES
- Thermal Power +ES

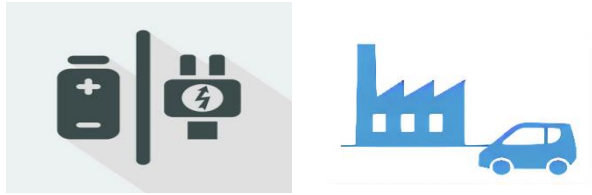
Transmission & Distribution



- T & D infrastructure congestion
- Declining system inertia

- Stand-alone ES Stations
- Grid-firming ES

Consumption



- High electricity costs
- Unreliable power supply

- C&I applications
- Zero-carbon Parks
- Etc.

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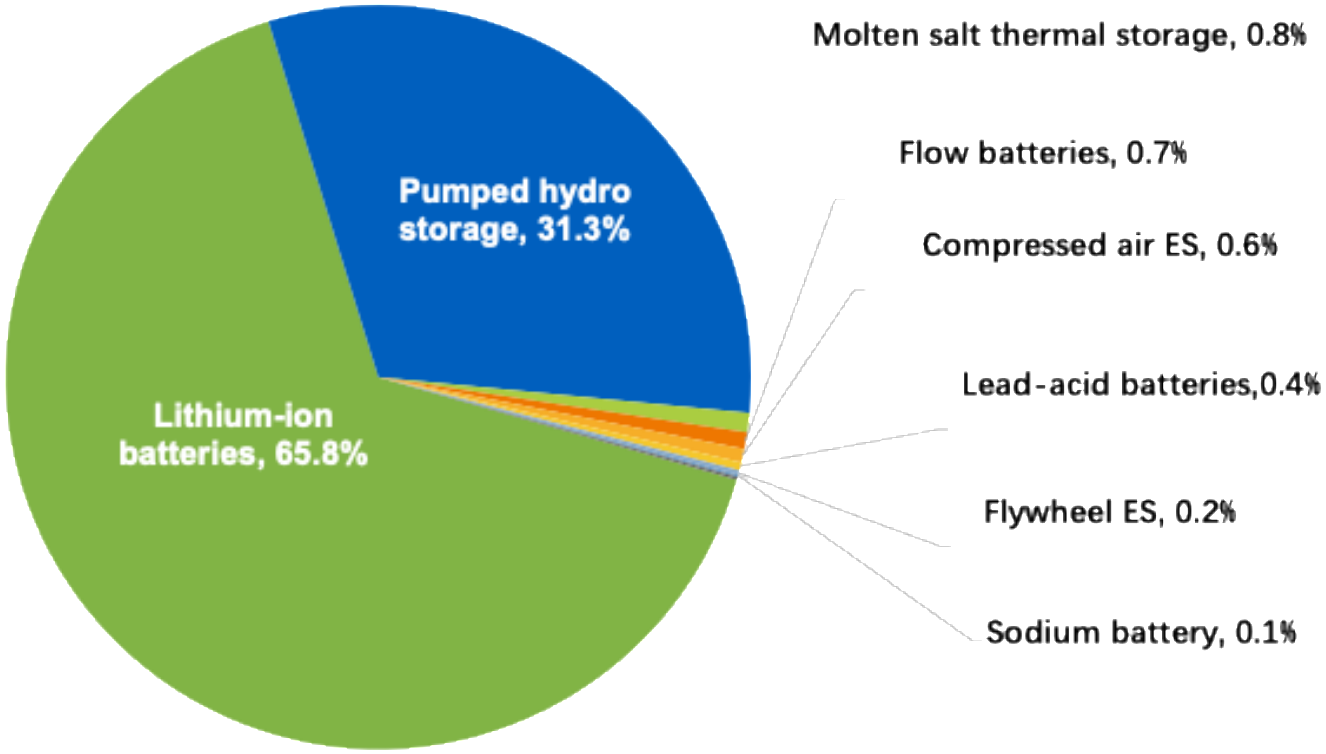
02 Key Market Developments in 2025

03 Future Trends and Outlook for New ES

China‘s Energy Storage：Scale & Technology Mix （2025）

- Total installed storage: 213.3 GW (+54% YoY)
- New energy storage: 144.7 GW (+85% YoY)
- Milestone: Pumped hydro share falls below 1/3 for the first time

Distribution of Installed Capacity of Power ES Technologies (as of end-2025)



Data Source: CNESA

China's New Energy Storage： Rapid Growth （2015-2025）

Cumulative Installed Capacity Expansion | 2015–2025（Unit: GW）

Data Source: CNESA

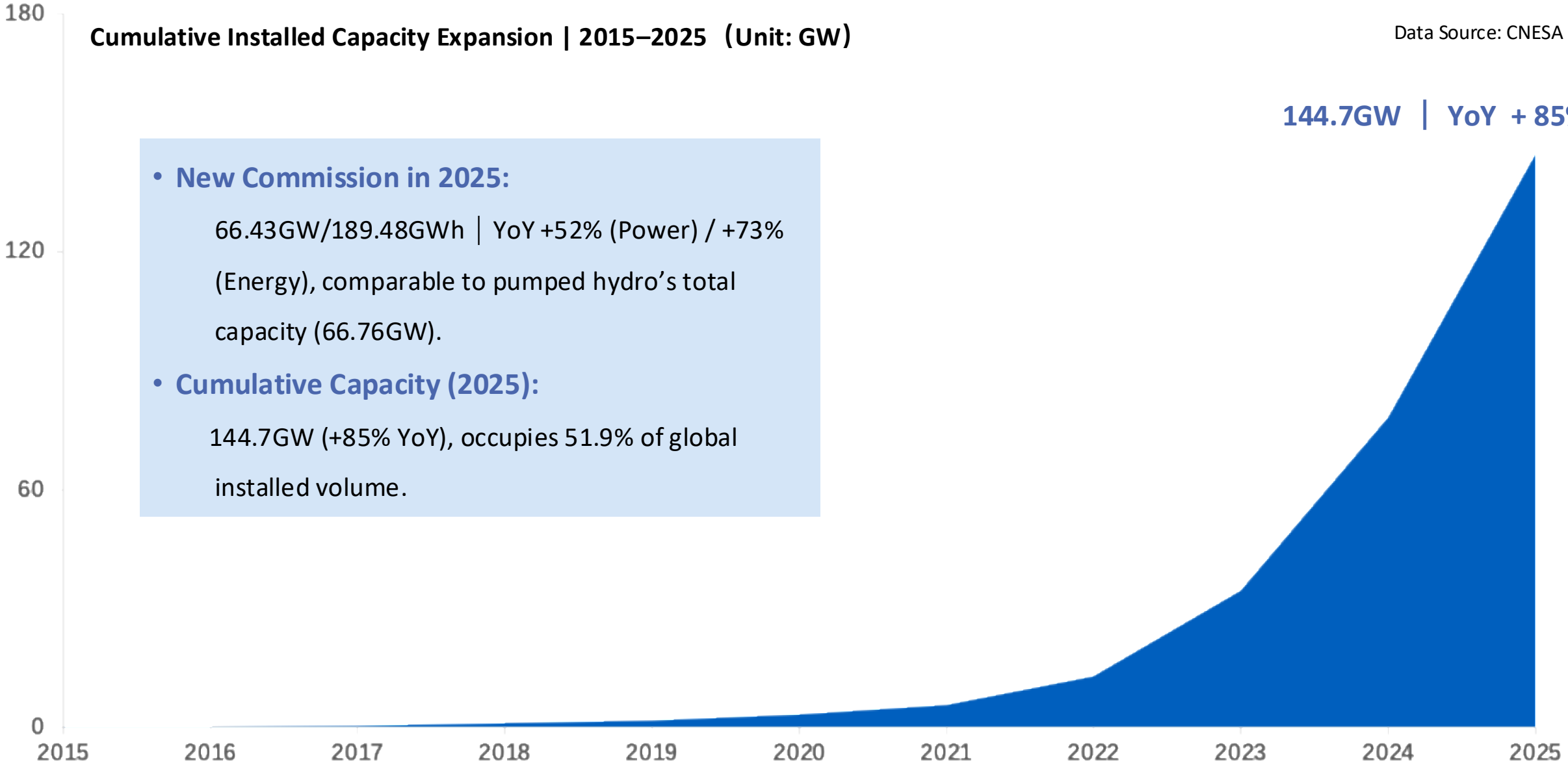
144.7GW | YoY + 85%

- **New Commission in 2025:**

  66.43GW/189.48GWh | YoY +52% (Power) / +73% (Energy), comparable to pumped hydro's total capacity (66.76GW).

- **Cumulative Capacity (2025):**

  144.7GW (+85% YoY), occupies 51.9% of global installed volume.

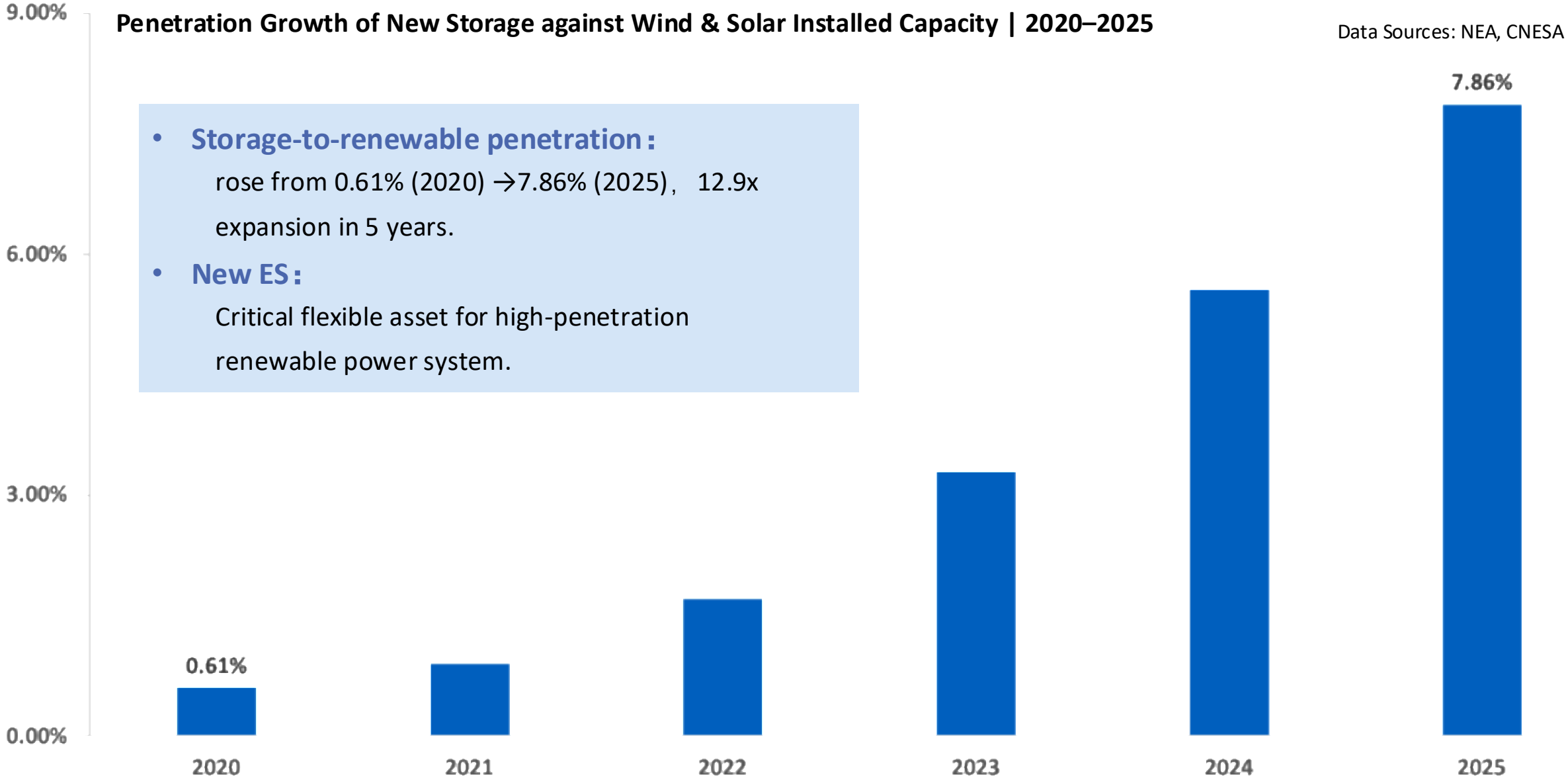


New ES as Core Flexible Asset for Renewable Integration

Penetration Growth of New Storage against Wind & Solar Installed Capacity | 2020–2025

Data Sources: NEA, CNESA

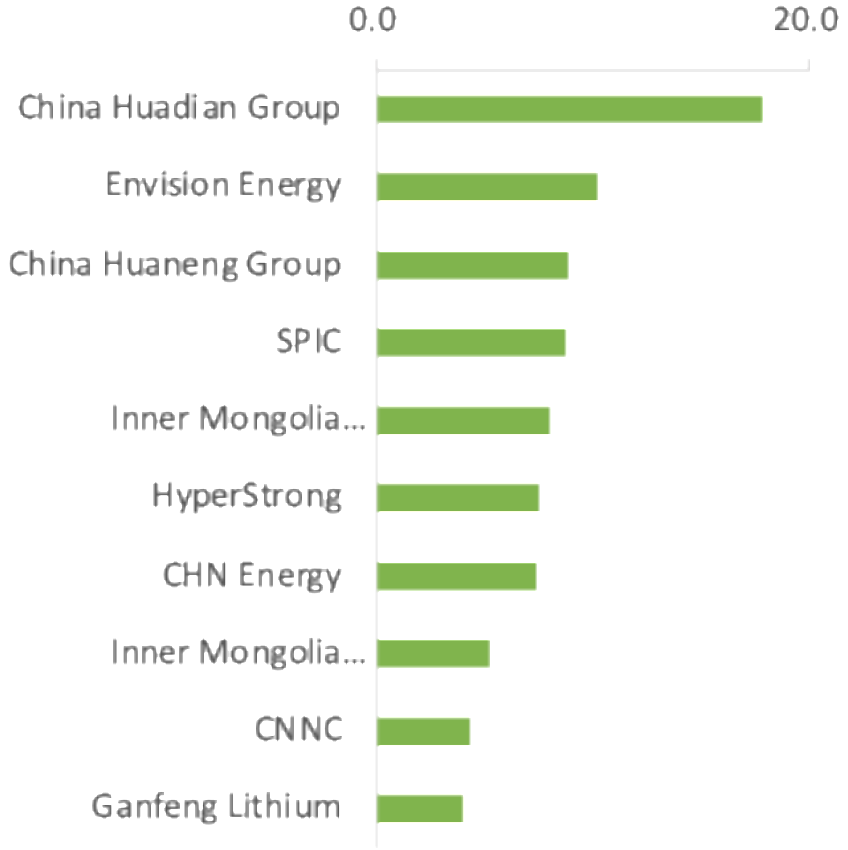
- **Storage-to-renewable penetration:**
  rose from 0.61% (2020) →7.86% (2025), 12.9x expansion in 5 years.
- **New ES:**
  Critical flexible asset for high-penetration renewable power system.



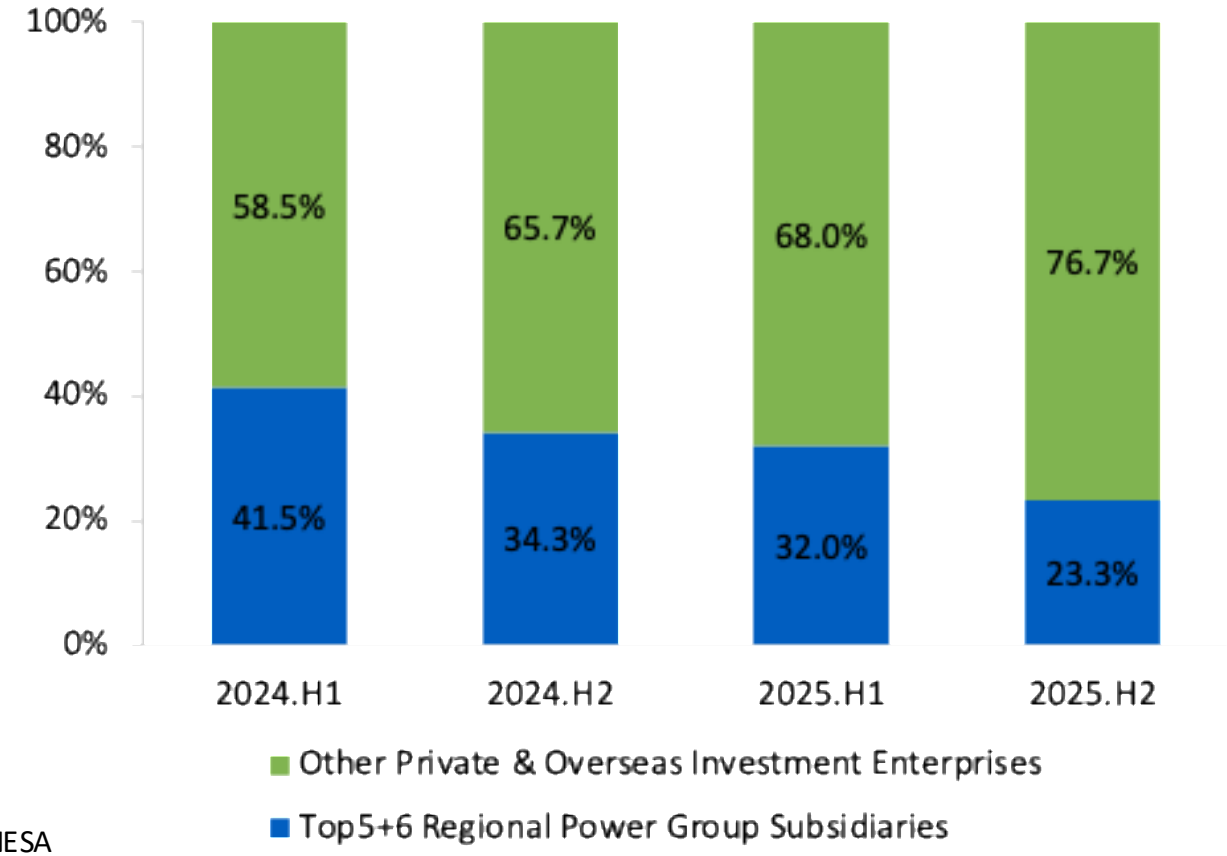
Market Participants : Owners of Utility-scale ES Projects

- Major power utilities lead large-scale utility storage deployment;
- In stand-alone storage segment, private & overseas investors expand rapidly to 76.7% by late 2025.

2025 China Newly Commissioned New ES: Top10 Owners (Ranked by energy)



Stand-alone Storage Investor Structure Trend: 2024 H1 – 2025 H2 Unit（% of MW）

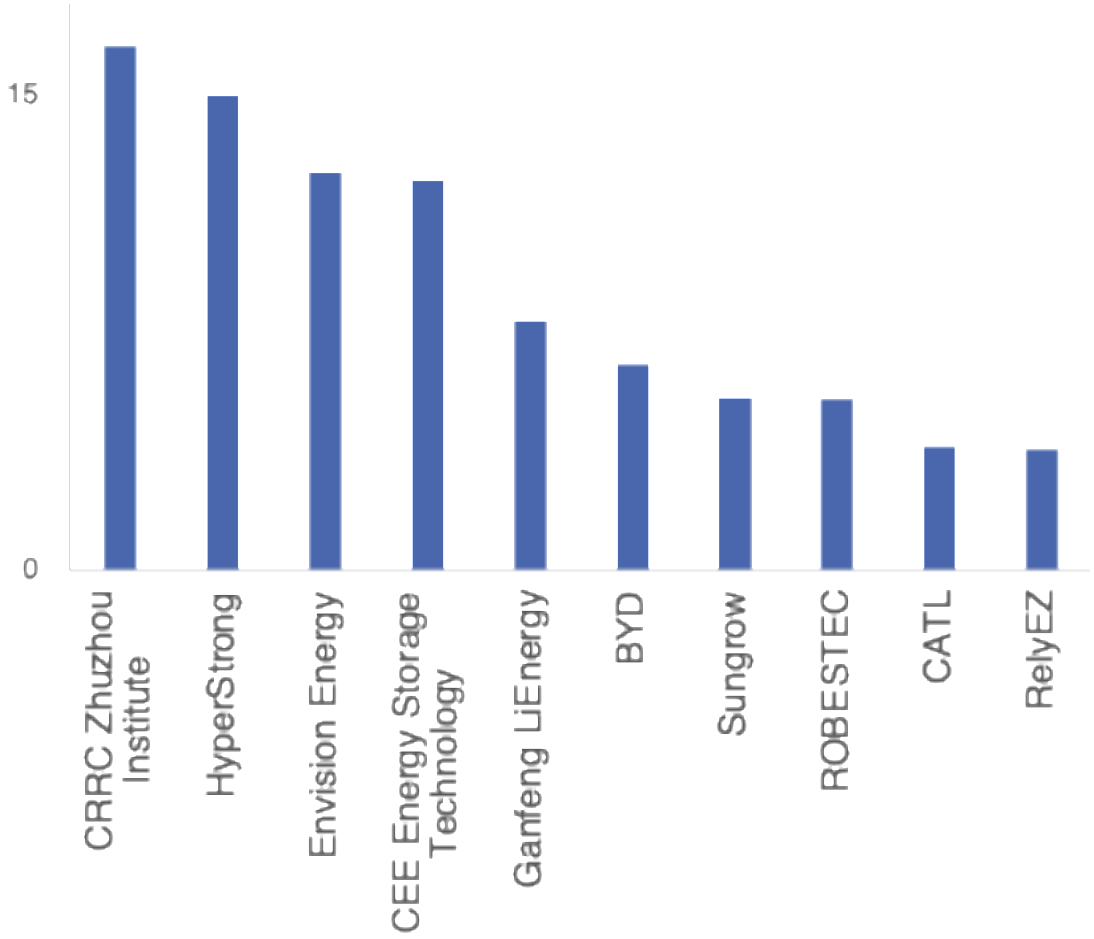


Data Sources: CNESA

Market Participants: ESS Integrators

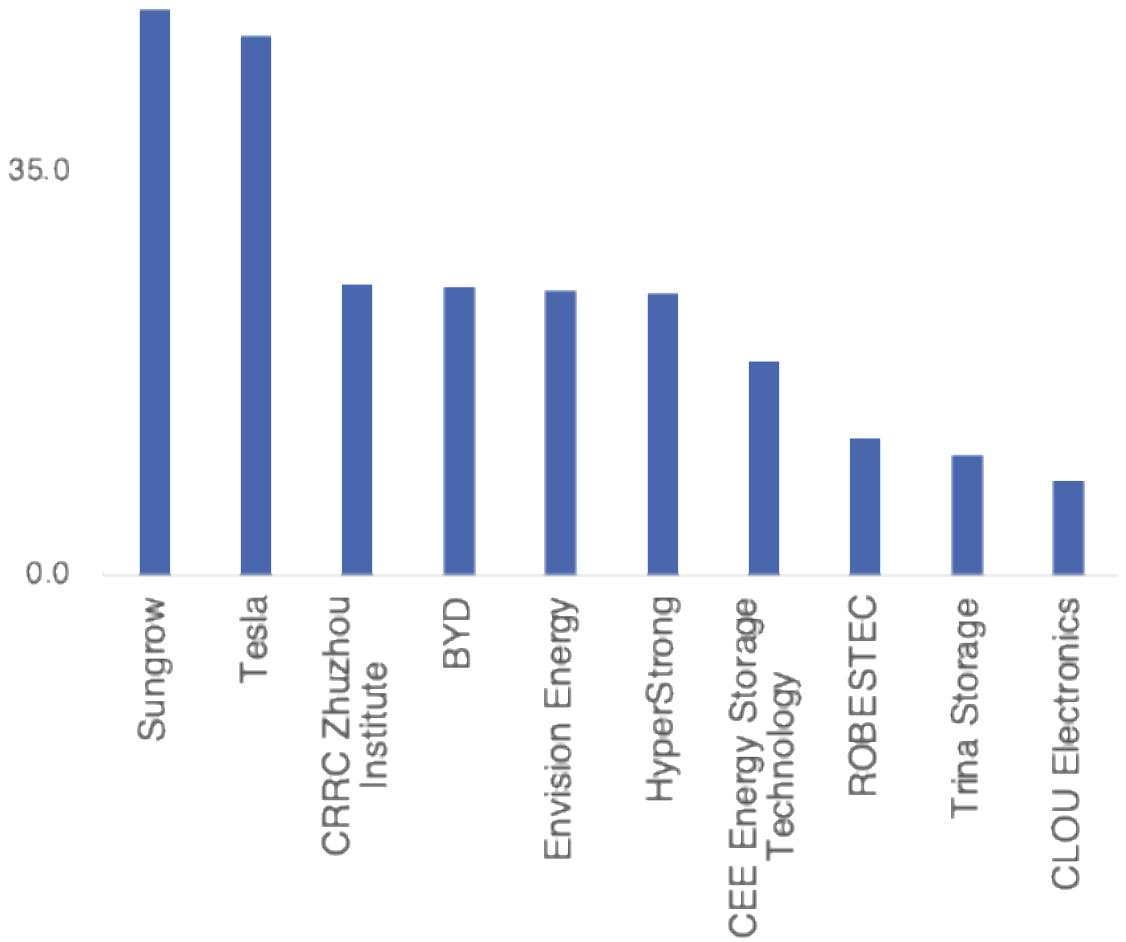
Top 10 Chinese ESS Integrators by Domestic Market Grid-Connected Installed Capacity (GWh)

Data Sources: CNESA



Top 10 ESS Integrators by Global Market Energy Storage System Shipments (GWh)

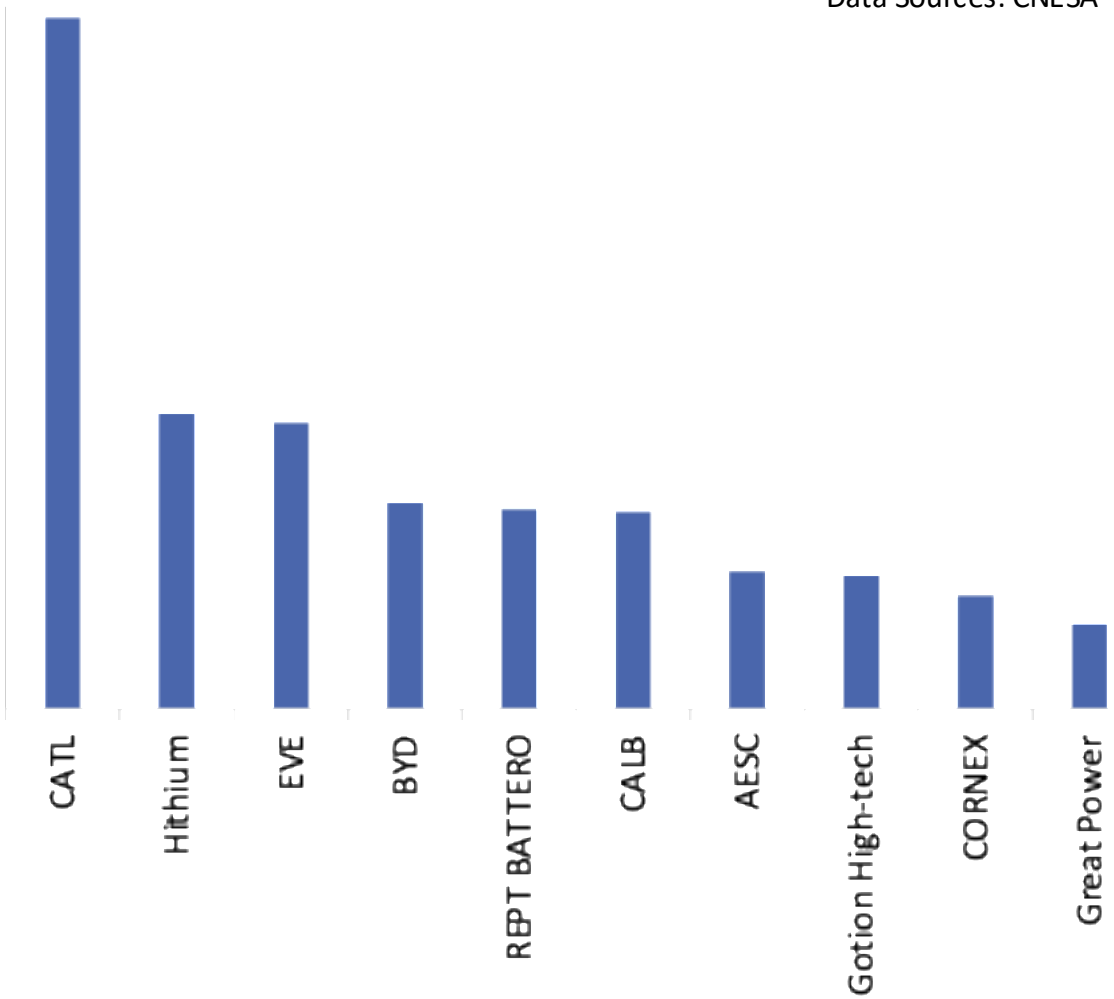
Data Sources: CNESA



Market Participants: Batteries & PCS Providers

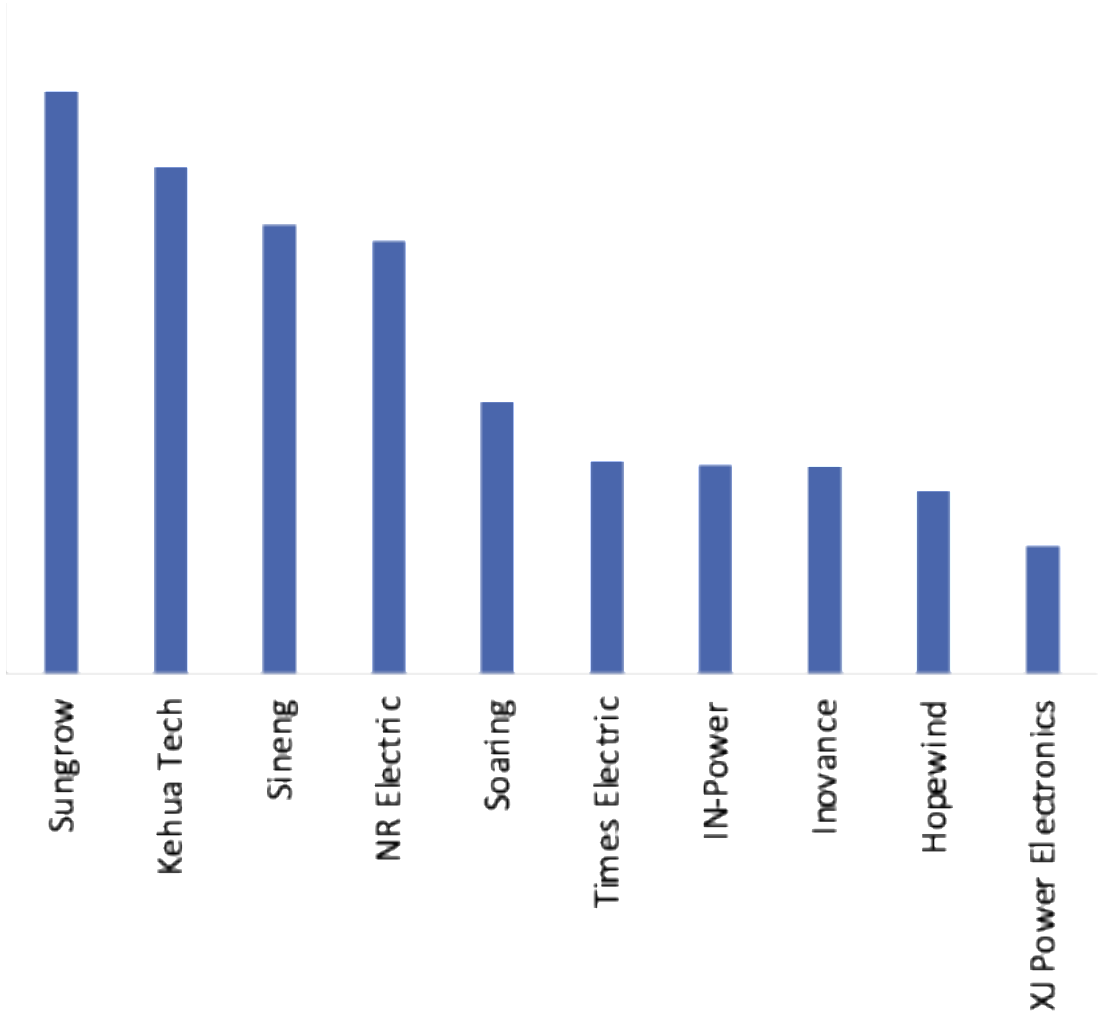
Top 10 Chinese ES Technology Providers by Global Market Battery Shipments (GWh)

Data Sources: CNESA



Top 10 Chinese ES PCS Providers by Global Market PCS Shipments (GW)

Data Sources: CNESA



Evolution of Energy Storage Applications

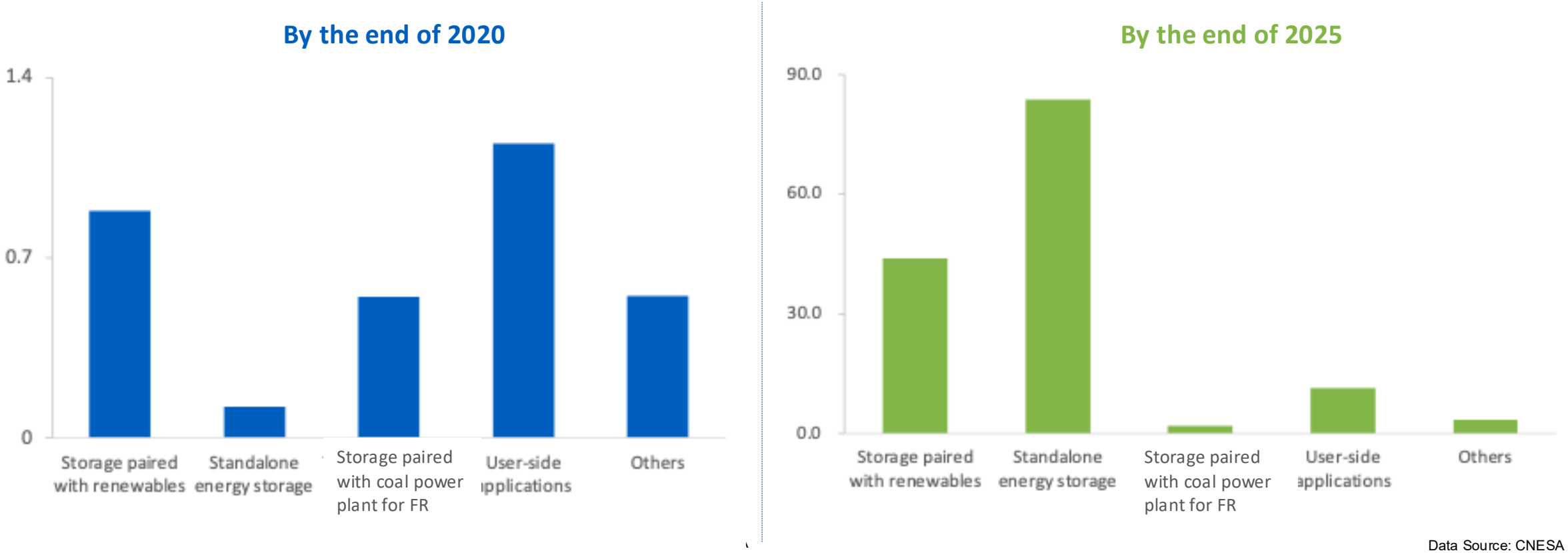
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Stand-alone ES
Provides grid support (peak shaving, frequency regulation).

Storage + Renewables(Co-located)
Mitigates intermittency of solar and wind power.

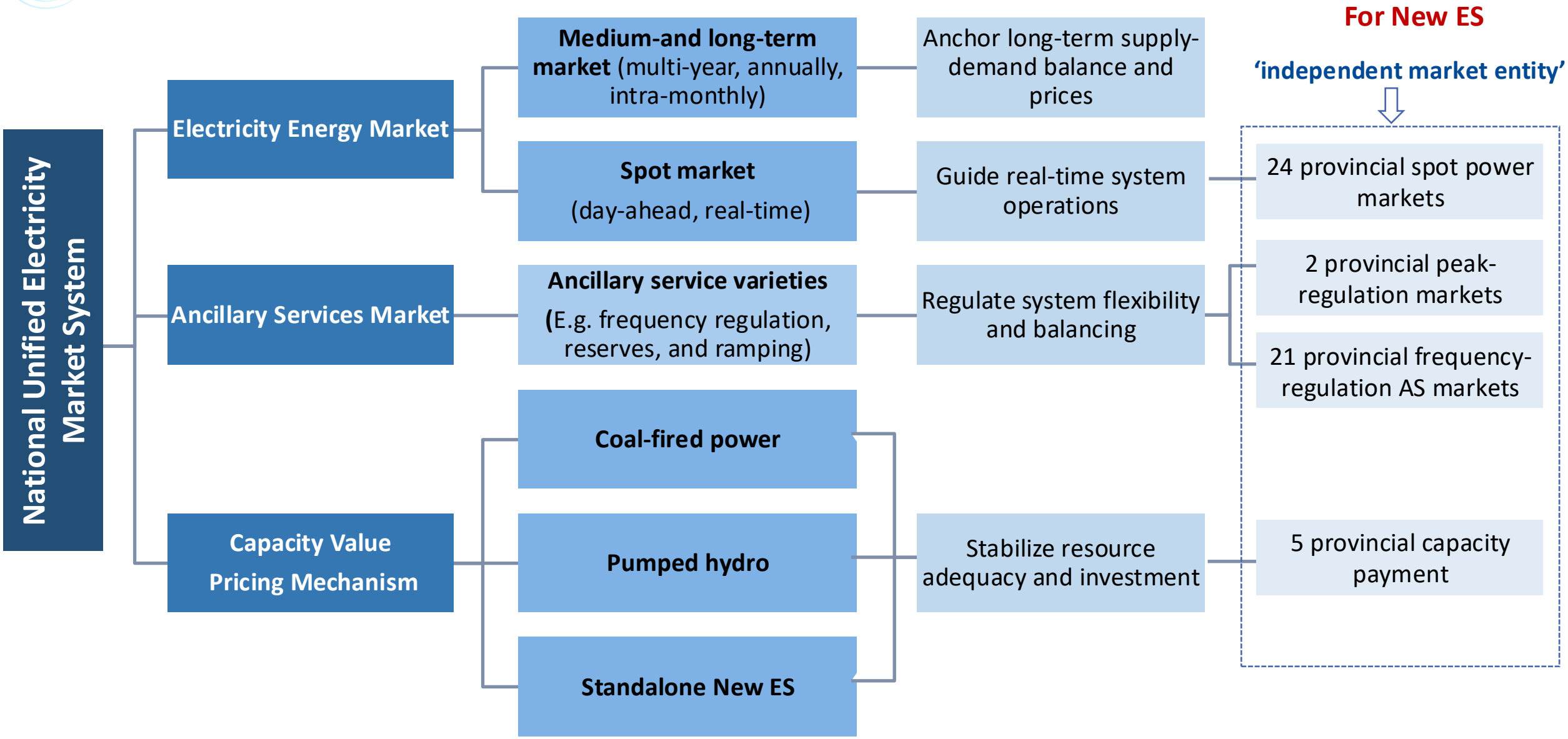
User-side Applications
Enables cost savings and demand management.

Cumulative Installed Capacity by Major Application Scenario of New Energy Storage in China (GW)



Data Source: CNESA

Value Sources for Stand-alone ES



Business Models

ENERGY ARBITRAGE
(Spot & Medium-Long Term Market)

Regulation Revenue
(Ancillary Service Market)

CAPACITY PAYMENT
(Capacity Pricing Mechanism)

Energy Arbitrage

Capture spreads via low-charge/high-discharge on real-time prices for spot & TOU markets.

Regulation Revenue

Minute-level fast response for frequency & voltage regulation; compensation based on response speed, duration, and accuracy.

Capacity Payment

Duration-based capacity compensation, benchmarked to local coal power capacity prices, dynamically adjusted by supply-demand and reliability.

New Application Scenarios

- In 2025, China expands its Renewable Energy Consumption Target to 5 new industries, while the first batch of national zero-carbon pilot parks drives demand for energy storage with a ≥50% green power requirement.

Zero-Carbon Park Pilots

Nationwide Rollout:
52 pilot parks across 31 provinces.

Near-Zero Target:
Emission intensity ~1/10 of the current average.

Requirement:
≥50% green power supply, enabled by energy storage

Renewable Energy Consumption Requirement

Industry	Provincial Green Power Consumption Ratio (2025)	Provincial Green Power Consumption Ratio (2026)
Electrolytic Aluminum	25.2%–70%	26.2%–70%
Steel*	25.2%–70%	26.2%–70%
Polysilicon*	25.2%–70%	26.2%–70%
Cement *	25.2%–70%	26.2%–70%
Newly Built Data Centers at National Hub Nodes*	80%	80%

* Refers to Newly added to the mandatory renewable consumption quota in 2025"

Carbon Footprint Standards

Key Takeaway：

New Carbon Footprint Standard for Battery Energy Storage Systems——The new standard helps establish a more consistent and comparable framework for carbon footprint assessment of lithium-ion battery energy storage systems.

Benchmarking of International Standards and China's New Technical Standard

Standard	Scope	Functional Unit	Gap
 EU CFB-IND	Battery ESS	Delivered Energy + Reserve Capacity	No operational phase
 Italy EPD	Battery ESS	Delivered Energy	No demand-response ESS
 China T/CQAE	Lithium-ion Battery Only	Delivered Energy + Reserve Capacity	Not system-level
 **New CN Standard***	**Complete ESS**	**Unified Methodology**	**Comprehensive Coverage**

Key Advantages of the New Standard

- ✓ Complete ESS coverage
- ✓ Unified functional unit
- ✓ Standardized lifecycle boundary
- ✓ Improved international comparability

**Developed by CNESA, Envision Energy, and project partners under a National Key R&D Program of China project on value assessment and carbon footprint evaluation methodologies for utility-scale energy storage systems.*

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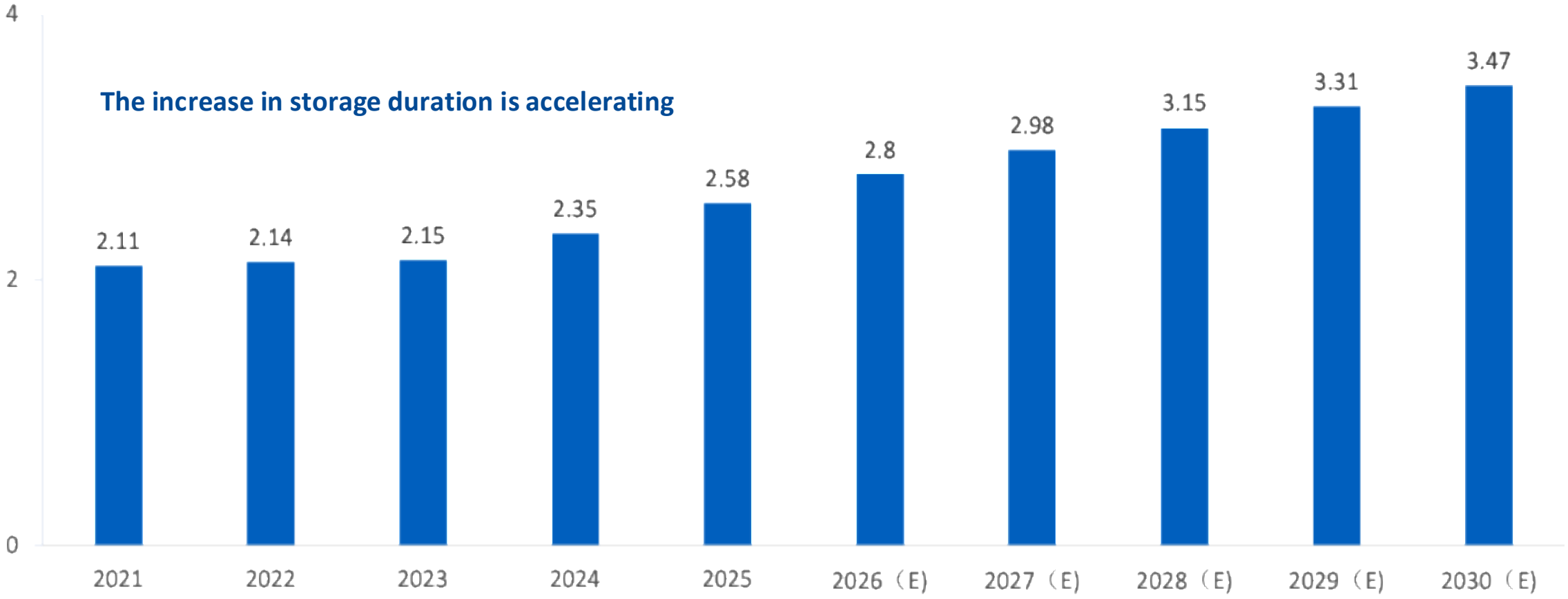
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Duration Expansion Trend

- 2021-2025: average duration up from 2.11h to 2.58h
- Projection to 2030: rapid expansion to 3.47h, fueled by long-duration storage & energy arbitrage needs

Forecast of the Average Duration of Cumulative Installed Capacity of New ES in China (h)

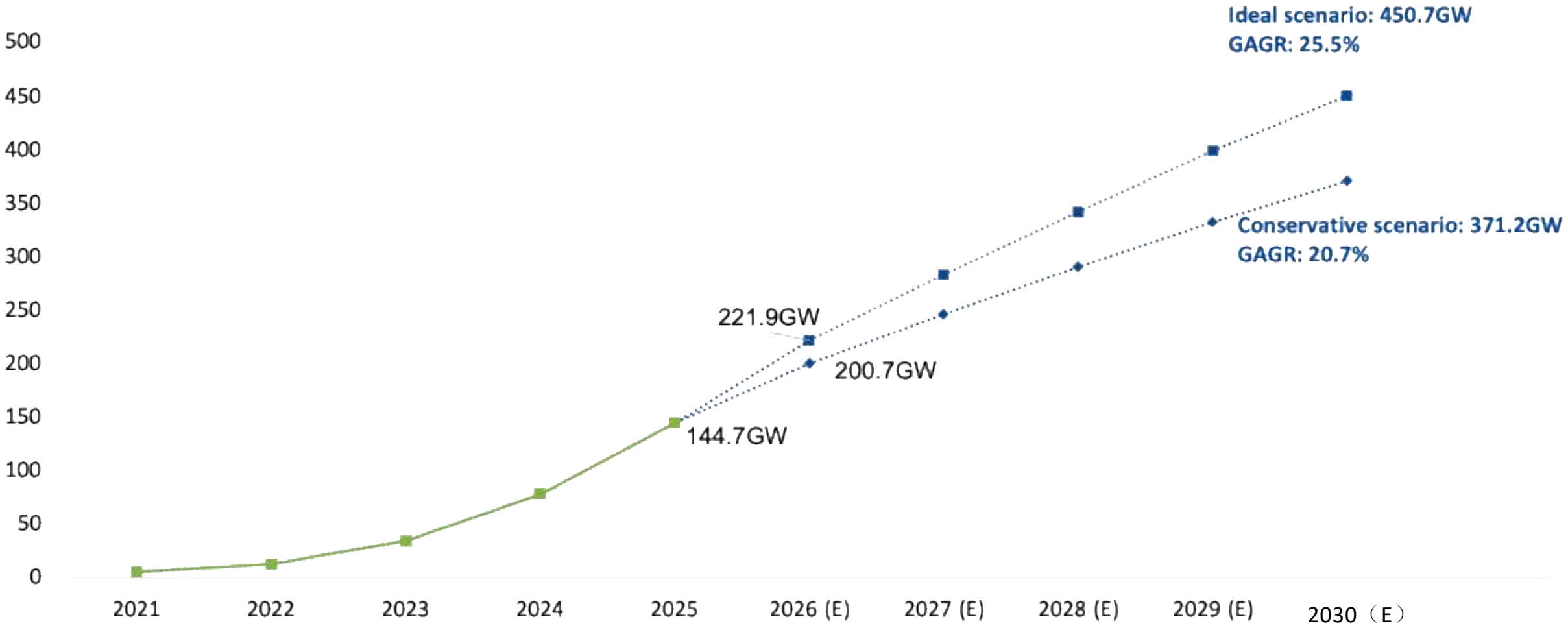


Data Sources: CNESA

Capacity Forecast

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Forecast of Cumulative Installed Capacity of New Energy Storage in China (GW)



Data Source: CNESA

Key Takeaways



Past Year’s Achievements

China's energy storage industry has moved from rapid scale-up to commercialization.



Future Year’s Trends

Growth rates may moderate, but annual capacity additions are expected to remain strong. Market mechanisms will play an increasingly important role in driving future deployment.

Key Takeaway：

China's energy storage sector is entering a new stage of market-driven, high-quality growth, with storage playing an increasingly critical role in enabling the energy transition.

Research Acknowledgement

KEY SOURCE: NATIONAL KEY R&D PROGRAM OF CHINA

"Technology Cooperation Research on Value, Revenue and Carbon Emission Assessment of Large-Scale Energy Storage"

Project Lead Institution

Led by China Energy Storage Alliance (CNESA), a leading authority in the energy storage industry

Strategic Academic Collaboration

Jointly executed with Tsinghua University and other key academic institutions, integrating top-tier scientific research capabilities and interdisciplinary expertise in energy systems.

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Energy Storage International Conference & Expo – Asia's largest ES event

March 17-19, 2027
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新源智储 XYZ STORAGE | 索英电气 SOARING | 智光 Zhiguang | 科陆 美的能源 | HUAWEI | 融和元储 ROBESTEC | risen 东方日升 | 南瑞继保 NR ELECTRIC | 鹏辉能源 GREAT POWER

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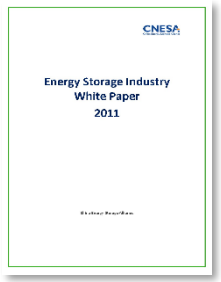
融捷能源 YOUNGY ENERGY | CALB 中创新航 | TBEA 特变电工 | ZTT 中天科技 | HYPER STRONG 海博思创 | Goldwind Carbon Neutral | 思格新能源 SIGENERGY | TrinaStorage 天合储能 | JD ENERGY 奇点能源

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Previous Exhibitors（Patial）

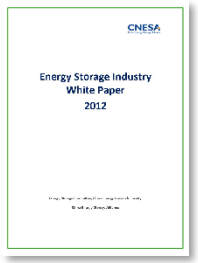
Energy Storage Industry White Paper 2026

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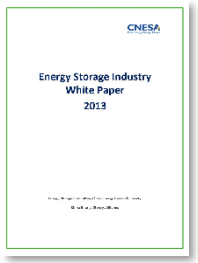


Founded in 2011

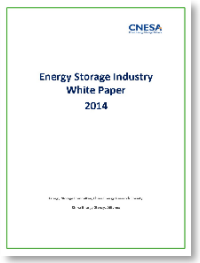
12 technology routes



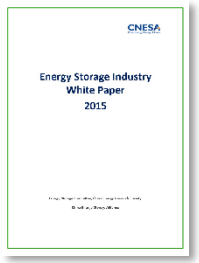
2012
17 major application fields



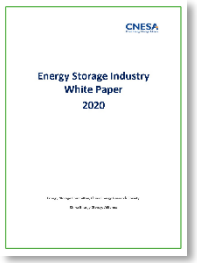
2013
Electricity market and policies



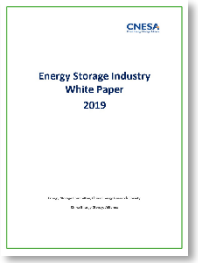
2014
Revenue analysis



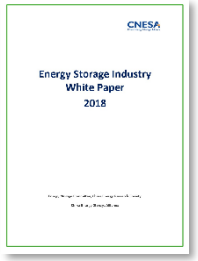
2015
The Gentle Breeze of Energy Storage Begins to Rise.



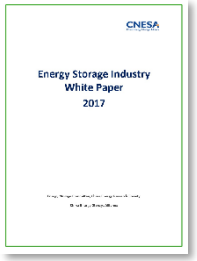
2020
Standing Our Ground in Next 10 Years
Southern Rise Brings Revival



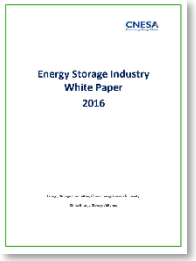
2019
Unstoppable Revitalization after Trials and Tribulations



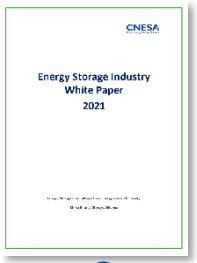
2018
Staying True to Our Founding Mission and Forging Ahead



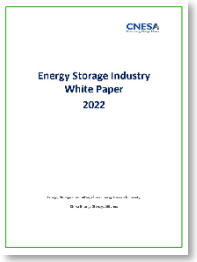
2017
Steady Growth towards Bright and Encouraging Prospects



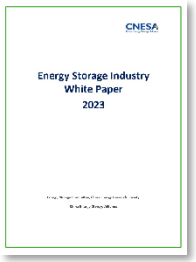
2016
Early Spring of the Beginning Energy Storage Industry



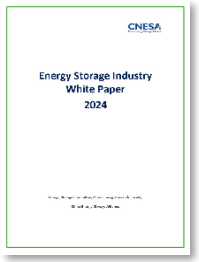
2021
A Time to Ride the Wind and Cleave the Waves
and Set Our Cloud-like Sail to Cross the Sea which Raves



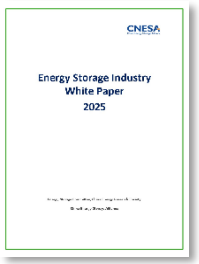
2022
Embracing the Upcoming Changes in the Industry Policies



2023
The Entire Industry Is, Bustling with Life



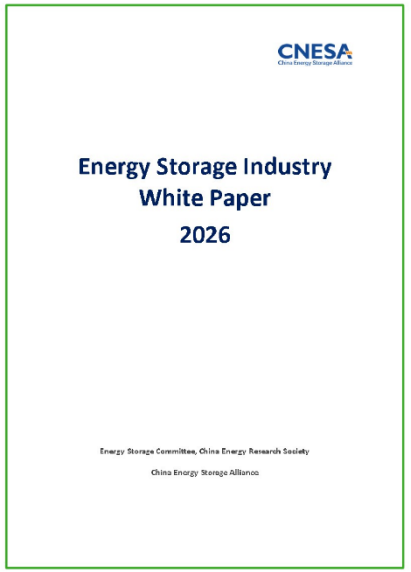
2024
A Bright Vision of Industry Development
against Uncertainties in Downward Economy



2025
Mist-clad trees blur like an ink mishap;
Wind sweeps pines, soughing with new whispers.

Edition 16

Every Tree Wears Autumn
Every Hill Glows in Sunset



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E-mail: overseas@cnesa.org

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THANK YOU!

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