Exa^{x} Energy Tech

Storing the Future,

Carbon Empowers Energy

百穰新能源科技
Exa^{x} Energy Tech

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COMPANY INTRODUCTION

Founded in September 2021, Exa^{x} Energy Technology (Shenzhen) Co., Ltd. is a forward-thinking leader in energy technology. We specialize in providing advanced energy storage solutions for renewable power plants. Our expertise lies in designing and integrating high-capacity, long-duration energy storage systems that are safe, efficient, and intelligent.

Guided by a research-oriented development strategy, Exa^{x} Energy collaborates with Xi'an Jiaotong University through the Advanced Energy Storage System Power Equipment Research Center. Over 70% of our team comprises R&D professionals who have pioneered innovative breakthroughs in carbon dioxide energy storage technology. With more than 50 globally authorized patents and 180 Know-how items, we have established a comprehensive technical framework from concept to implementation.

Exa^{x} Energy is uniquely positioned as the sole company in China capable of constructing carbon dioxide energy storage systems. Our mission is to drive sustainable energy transformation through innovation and collaboration, contributing to a greener, smarter future.

COMPANY DEVELOPMENT TIMELINE

October 2017 — The R&D team of Exa[x] Energy Tech proposed the concept of an energy storage system and initiated project development

July 2020 — Exa[x] Energy Tech achieved a significant breakthrough in the R&D of its gas storage system

January 2021 — Exa[x] Energy Tech applied for core patents related to compressed CO_2 energy storage technology, establishing intellectual property rights

August 2022 — The world's first verification project for a CO_2 energy storage system was completed in Deyang, China

December 2023 — The world's first commercial CO_2 energy storage system was completed and connected to the grid at Wuhu Conch Cement Plant

January 2024 — The Wuhu Conch CO_2 energy storage project was selected as a demonstration project for renewable energy storage by the National Energy Administration

September 2024 — The world's first 100 MW-level commercial CO_2 energy storage system project was launched

January 2025 — Wuhu Conch project and the Huadian project were listed in the fourth batch of major technical equipment by the National Energy Administration

February 2025 — The Huadian project was listed in the National Key Low-Carbon Technology Promotion Catalog (5th Edition) issued by the Ministry of Ecology and Environment

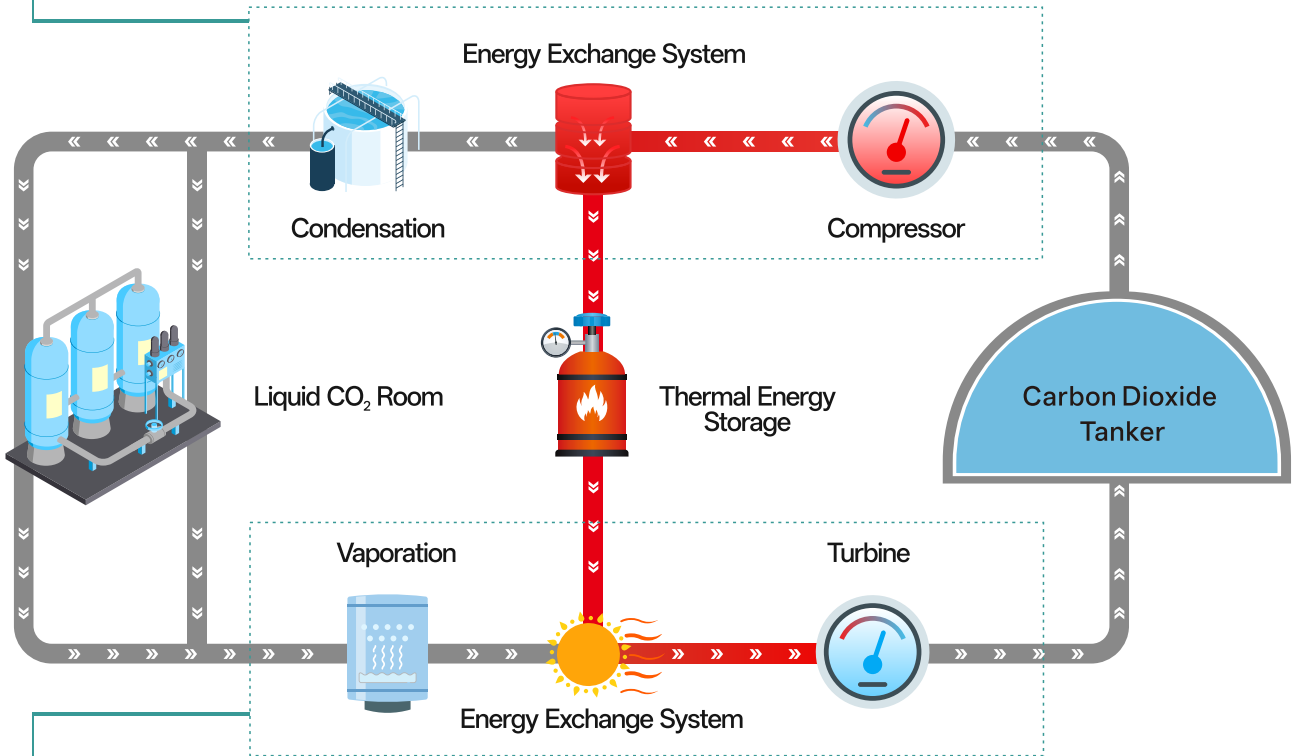
SYSTEM OPERATING PRINCIPLE

This innovative carbon dioxide energy storage system developed by Exa[x] Energy Technology utilizes a gas-liquid phase transition and dual-state coordinated energy storage technology. The basic principle involves compressing ambient-temperature, atmospheric-pressure carbon dioxide gas into a liquid state during off-peak electricity periods, while storing the thermal energy generated during compression. During peak electricity demand, the stored thermal energy heats liquid carbon dioxide, converting it back into a gas to drive a turbine to generate electricity.

Charge Phase

Input: Power from the grid & Renewable energy sources

Main Equipment: Compressor



Discharge Phase

Output: Power to the grid & Cooling supply

Main Equipment: Turbine

ADVANTAGES

Low Levelized Cost of Energy

Low levelized cost of energy (LCOE) over full lifecycle

Green and Carbon-Negative

Zero-carbon sourcing and negative emissions during operation

Enhanced Safety

Low pressure and temperature , no risk of combustion or explosion, and no environmental pollution

Universal Adaptability

Unaffected by climate conditions or geological constraints, adaptable to various environments

Large-Capacity and Long-Duration

Simultaneous charging and discharging, capable of 24-hour continuous power generation

Grid-Friendly

Steady power delivery with consistent performance; supports grid stability services like rotational inertia, frequency control, and automatic generation control(AGC)

APPLICATION SCENARIOS

01

Distributed Carbon-Negative Power Plants

•In collaboration with renewable energy sources like wind and solar power, our solution supports simultaneous charging and discharging, stable power output, fast charging, and slow discharging.

•Suitable for industrial and commercial sites, islands, rural areas, and remote regions, enabling localized construction, off-grid power plants operation, and 24/7 power generation without requiring additional transmission infrastructure.

•During power grid node construction, it delivers stable green electricity, providing grid services like rotational inertia, large-scale peak regulation, black start.

02

Integrated Power and Cooling System for Data Centers

7/24 Green Power Supply

The CO_2 energy storage system offers uninterrupted power output, catering to the energy demands of data centers with high efficiency, safety, reliability, and long service life.

Cooling Capability

While generating power, the system provides adequate cooling capacity for data centers. In emergencies, the system's internal condensation unit serves as a backup cooling source, eliminating the need for additional cooling equipment and ancillary systems.

Cost-Effectiveness

① Reduces fixed investment in water-cooling units;
② Saves on cooling tower and pipeline investment;
③ Minimizes backup cooling equipment costs.

Fire Safety

CO_2 offers an environmentally friendly, non-toxic, efficient, and safe fire suppression solution.

APPLICATION SCENARIOS

03

Coupled CO_2 Energy Storage and CCUS System for Coal-Fired Power Plant

This system synergizes CO_2 energy storage, CCUS (Carbon Capture, Utilization, and Storage), and peak shaving for coal-fired power plants. It captures CO_2 as an energy storage mass, stores surplus power during valley periods, and releases energy during peak demand, achieving a balanced approach to emission reduction and peak regulation. This innovative solution enhances the environmental performance and flexibility of coal-fired power plants while supporting power system transformation toward carbon neutrality.

- Enhanced Energy Utilization
- Reduced Carbon Emission
- Strengthened Peak Shaving Capacity
- Resource Sharing and Economic Benefits

04

Resource Sharing and Economic Benefits

Addressing challenges in large-scale wind and solar power base integration:

•Extreme Environment Adaptability: Operates reliably in harsh conditions like sandstorms, severe cold, extreme heat, strong winds, and heavy snowfall areas.

•Long-Duration Energy Storage & Peak Regulation: Minimizes waste of wind and solar energy, supports inter-day and inter-seasonal peak regulation, enhances grid stability, and smooths renewable energy fluctuations.

•Optimized Power Export: Stabilizes renewable energy output, enhancing long-distance transmission efficiency.

•Efficient External Energy Coupling: Improves system performance in cold regions with extended winters, reducing operational costs.

REFERENCE

DEYANG 18MW/36MWh CO_2 ENERGY STORAGE VALIDATION PROJECT

Location:
Deyang, Sichuan

Performance:
Charging power of 18 MW (2 hours); Discharging power of 10 MW (2 hours)

Area: 18,130 m^2

Completion:
August 2022

Awards: Exceeded design expectations in all performance metrics verified by the State Grid Shanxi Electric Power Research Institute in March 2023

REFERENCE

WUHU CONCH 18MW/144MWh CO_2 ENERGY STORAGE DEMONSTRATION PROJECT

Location: Anhui ,Wuhu

Performance: Charging power of 18 MW (8 hours); Discharging power of 10 MW (8 hours)

Area: 39,950 m^2

Grid Connection: December 30, 2023

Project Highlights:
Utilizes the low-grade waste heat from cement production (50°C+) combined with large-scale energy storage, significantly reducing carbon emissions. The CO_2 captured from the Conch Cement CCS production line is utilized in the energy storage system, realizing true carbon capture, utilization, and storage.

Awards: Recognized as a National Energy Administration New Energy Storage Demonstration Project and a Major Technical Equipment Project in the Fourth Batch of National Energy Field Achievements

REFERENCE

HUADIAN CORPORATION 100MW/1GWh CO_2 ENERGY STORAGE POWER PLANT

Performance:
Charging power of 73*3 MW (7.2 hours); Discharging power of 100 MW (10 hours)
Supporting a 600 MW wind and 400 MW solar power base

Area: 400,000 m^2

Timeline:
Construction started on September 2024; expected grid connection on December 2025

Awards: Listed in the Fifth Batch of Key Low-Carbon Technology Catalog by the Ministry of Ecology and Environment.

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