

The difference between energy storage battery cells and Power battery cells

In the field of new energy, energy storage cells and power cells are two key battery technologies, each used in different scenarios and meeting specific needs. The following is a comprehensive comparison of energy storage cells and power cells:

- **Application Scenario**
- **Performance requirements**
- **Technical features**
- **Cost Structure**



I, Application Scenario

- **Power cells:** Mainly used in **electric vehicles, hybrid vehicles** and other scenarios to provide power for the vehicle. Power cells need to have **high energy density and high power output** to meet the vehicle's starting, acceleration and endurance requirements.

Scenario characteristics:

high frequency charging and discharging, severe vibration, extreme temperature change

Typical requirements:

fast charging capability above 3C, no attenuation at low temperature discharge of -30°C

Representative case:

Tesla 4680 battery cell (energy density 300Wh/kg)



SEVB 314AH ENERGY STORAGE BATTERY CELL



BYD 162 AH BLADE BATTERY CELL

- **Energy storage cells:** Mainly used in grid **energy storage, home energy storage, industrial and commercial energy storage**, etc., providing long-term energy storage to balance power demand and prevent power fluctuations and peak currents. Energy storage cells usually need to **have high safety and long cycle life** to meet the energy storage needs of fixed locations.

Scenario characteristics:

1-2 times of charge and discharge per day, fixed installation, long-term operation

Typical requirements:

steady-state output below 0.5C, life of more than 15 years

Representative case:

CATL 500Ah energy storage cell (mass production in the second half of 2025)

II, Performance requirements

1. Energy density:

- **Energy storage cells:** have relatively low energy density requirements, and pay more attention to cost control and safety to achieve the economy of large-scale energy storage systems.
- **Power cells:** have high energy density requirements to meet the needs of electric vehicles for range and space utilization.

2. Cycle life:

- **Energy storage cells:** require long cycle life, usually **3500-5000 cycles**, to meet the frequent charging and discharging needs of the energy storage system.
- **Power cells:** The cycle life is relatively low, usually **1000-2000 cycles**, because the frequency of use of electric vehicles is relatively low.

3. Power output:

- **Energy storage cells:** The requirements for high power output are not high, and the focus is mainly on the stable storage and release of energy.
- **Power cells:** They need to have high power output capabilities to meet the power requirements of vehicle starting, acceleration, etc.

Indicator	Power battery cell	Energy storage Battery Cell
Energy Density	200-300Wh/kg	150-200Wh/kg
Recycle time	1200-2000 (8 years)	3500-5000(15 years)
Power Density	3000-5000W/kg	500-1000 W/kg
Cost ratio	Cell costs 80% of total system	Cell costs 60% of total system
Thermal Threshold protection	Bear temperature rise at 80 °Cper second	Mainly prevent systematic thermal extends

III, Technical features

- **Battery type:**

Energy storage cells: Usually lithium iron phosphate batteries are selected, taking into account both safety and economy. **Power cells:** Common ones are lithium iron phosphate batteries and NCM batteries. The latter has a higher energy density and is suitable for electric vehicles with higher requirements for driving range.

- **Battery Management System (BMS):**

Energy storage cells: BMS needs to deal with the management of large-scale battery packs, focusing on battery consistency and life management. **Power cells:** BMS needs to monitor the battery status in real time to ensure safety and performance optimization under dynamic conditions. Due to the frequent safety accidents in energy storage power stations, the energy density requirements for energy storage-specific lithium batteries are not high but the safety requirements are high. On June 29, 2022, the National Energy Administration issued the "Twenty-Five Key Requirements for Preventing Power Production Accidents (2022 Edition) (Draft for Comments)", which mentioned that medium and large electrochemical energy storage power stations should not use NCM batteries and sodium-sulfur batteries.



IV, Cost Structure

- **Power battery system:** The cost of battery cells accounts for about 80%, and the cost of the pack (including structural parts, BMS, housing, auxiliary materials, manufacturing costs, etc.) accounts for about 20% of the total battery pack cost.
- **Energy storage battery system:** Compared with the power battery system, the cost of battery cells in the energy storage battery system is lower, with the battery pack accounting for 60%, the energy storage inverter accounting for 20%, the EMS accounting for 10%, the BMS accounting for 5%, and others accounting for 5%.