

# The 'artery' of carbon-neutral: energy storage

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"Carbon neutrality" is not only one of the recent hot topics, but also one of the C themes in the market.

Affected by this theme, the steel sector, which has not been interested in for many years, has risen first since the beginning of the year. Back to the new energy field we have been tracking, the speculation of new energy vehicles in 2020 made everyone overdraw the valuation to 2025, and this quantitative goal of carbon neutrality is directly given to 2030 and 2060. Researchers have begun to launch a 40-year DCF (cash flow discount model).

In addition to the thematic investment, we try to study the energy storage track that was not previously highly concerned in the market from the perspective of business operations. In fact, it is the carbon-neutral "dragon vein" and the main branch of the two trillion-dollar tracks - the left-engine "heat, electricity, hydrogen" and other clean energy, the right-powered battery and new energy vehicles.

The prophet of Chunjiang Plumbing Duck, the eldest brother in the industry has taken the lead in rushing into the energy storage track - we have seen that the Ningde era (305.000, -15.00, -4.69%) (SZ: 300750) is on the one hand, it is crazy to expand the power battery production capacity, and on the other hand, it frequently increases the field of energy storage.

## 01 Big Brother Enters

When it comes to the Ningde era, you will first think of power batteries, or they may only think of power batteries. After all, the honor of the world's number

one power battery shipments is too dazzling, but in fact, the Ningde era does not stop at power batteries. On February 6 this year, Ningde Times announced that it would jointly establish a joint venture with Yongfu Co., Ltd. (25.700, -0.83, -3.13%) (SZ: 300712), focusing on comprehensive smart energy.

At the time of the handover of the old and the new year, the wave of operations in the Ningde era really made many investors confused. You should know that Yongfu Co., Ltd. is a listed company engaged in power engineering design services. At first glance, it can't compete with power batteries.

Fortunately, Zeng Yuqun, chairman of Ningde Times, revealed key information at the signing ceremony: This cooperation is based on the advantages of Ningde Times in energy storage batteries and Yongfu's deep understanding of the power industry and leading technical integration capabilities, aiming to open up a new road for the integrated intelligent energy industry. At the same time, Lin Yiwen, chairman of Yongfu Co., Ltd., also said that Yongfu Co., Ltd. will join hands with the Ningde Times to follow the trend and grasp the general trend, and jointly develop the core technology of "renewable energy + energy storage".

It turned out that the Ningde era and Yongfu Co., Ltd. joined hands to store energy.

From the annual report of Yongfu Co., Ltd., it can be seen that it has continuously increased its innovative research and development investment in energy storage technology in recent years. At present, it has the planning, design and development capacity of large-scale energy storage power stations of more than 100MW, and has accumulated a large number of energy storage application project development reserves, with a cumulative capacity of more than 700MWh. It can be said that Yongfu Stock. It has a good strength in energy storage.



Figure 1: The signing ceremony between Ningde Times and Yongfu Technology, Source: the company's official website

Also during this year's Two Sessions, Zeng Yuqun, chairman of Ningde Times, a member of the National Committee of the Chinese People's Political Consultative Conference, also submitted a proposal on electrochemical energy storage to help new infrastructure. As the absolute leader of power batteries, Ningde Times did not defend the city well. How could it focus on the field of energy storage?

This article tries to answer the above questions from the past and present of the Ningde era, but because energy storage is not known as a power battery, let's briefly talk about energy storage first.

## **02 What is energy storage?**

The so-called energy storage mainly refers to the storage of electrical energy, which is divided into thermal energy storage, electric energy storage and hydrogen storage. Among them, pumping energy storage is the earliest energy storage technology, which has a history of more than 100 years. Since its development, it has become the most mature and installed energy storage

technology. As of 2019, the installed capacity of pumped energy storage accounted for 93.4%.

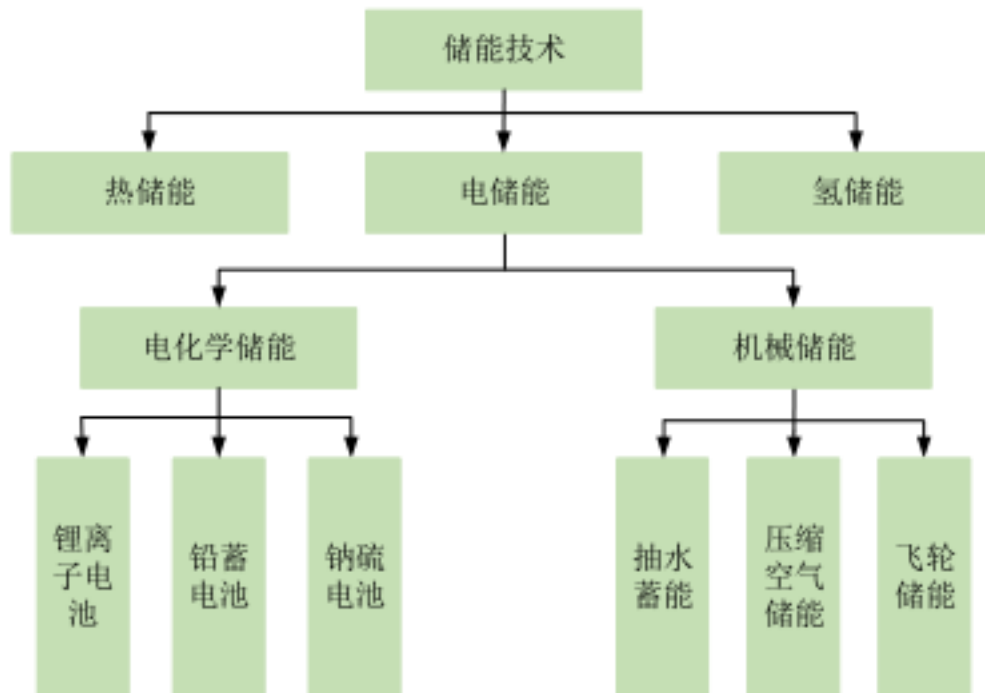


Figure 2: Classification of energy storage, Source: Pineng Technology Prospectus

However, the biggest limitation of pumping storage itself is that it must be built in areas with rich water resources and high and low differences, and the areas that can meet the conditions are limited. It can be said that there is only one place to be built, so it can be seen to the naked eye that the space for pump water storage is limited. Now the installed growth rate of global pumping storage has decreased year by year, from 13.44% at its peak to -0.35% in 2019.

On the contrary, electrochemical energy storage, which is not in a high status now, thanks to the advantages of flexible installation, short construction cycle and wider application range, is recognized as the most promising energy storage technology in the industry. The proportion of global installed capacity has increased from 1.7% in 2017 to 5.9% of 3Q in 2020, that is to say, electrochemical storage. The theoretical improvement space of energy is 20 times.

From the perspective of technical path, the realization of electrochemical energy storage basically depends on lithium batteries - is it very familiar? This goes back to the old profession of the Ningde era. Among the electrochemical

energy storage technology, it is the best lithium battery energy storage. Since 2013, the installed capacity of lithium batteries has accounted for the largest proportion of the installed electrochemical capacity and has been increasing.

As of 2019, the cumulative installed lithium-ion batteries worldwide accounted for 87.3% of electrochemical energy storage. It is no exaggeration to say that the field of electrochemical energy storage will be the world of lithium batteries in the future.

### 2019年全球投运电力储能项目的装机规模占比

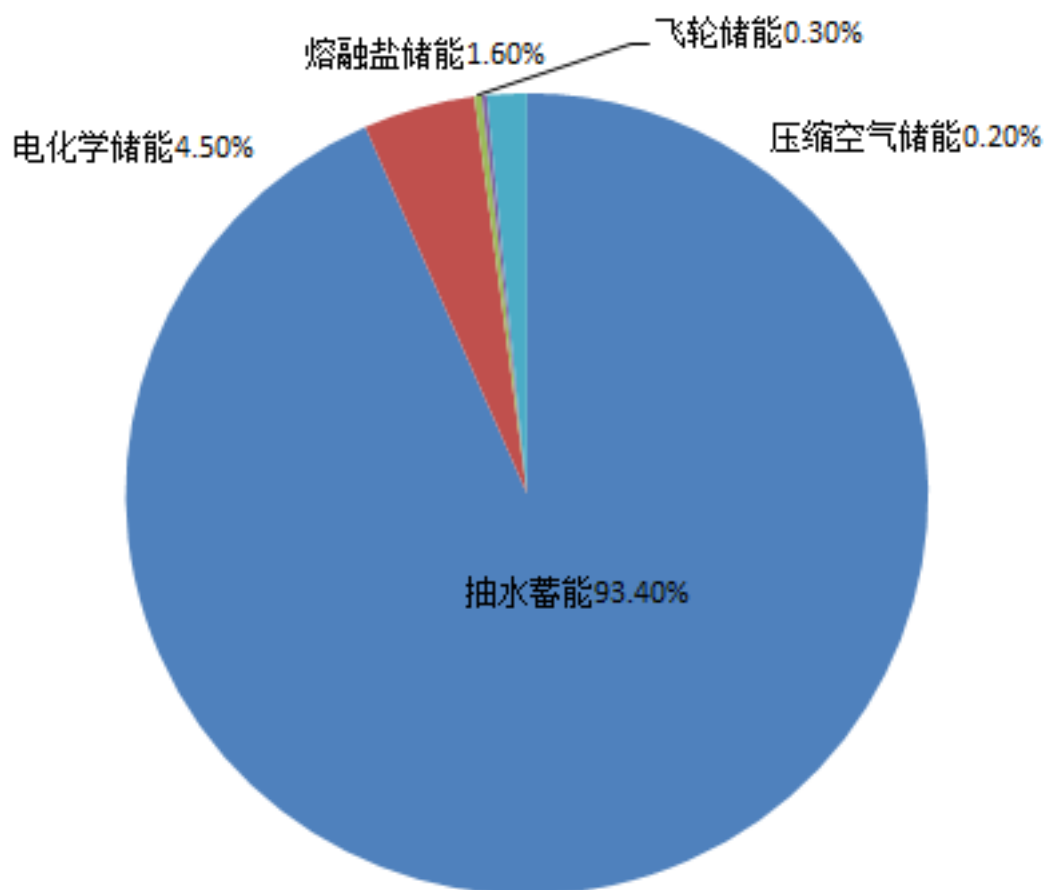


Figure 3: Global energy storage installation is still mainly pumped and stored.

Source: CNESA

## 2019年全球电化学储能装机规模占比

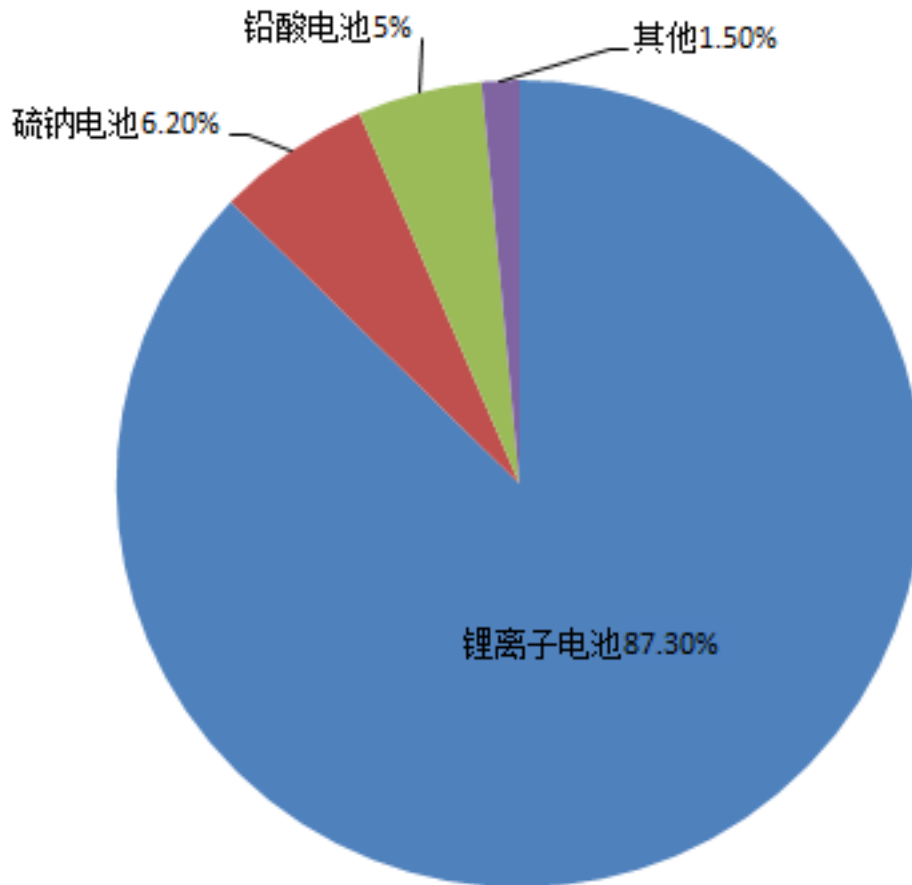


Figure 4: Lithium batteries dominate electrochemical energy storage. Source: CNESA, Chuancai Securities

### 03 There has been a long-mpiracy.

#### [1] Origin

The energy storage layout mentioned in the Ningde era mentioned above is actually not a whim. Looking at the history of the Ningde era, the Ningde era won the bid for the Zhangjiakou scenery storage demonstration project as early as March 2011.

Huang Shilin, vice chairman of Ningde Times, also said, "As early as the establishment of the Ningde era, two main business directions were determined, one is to make power batteries, and the other is energy storage batteries." It can

be said that the scenery storage project in Zhangbeikou has led to the Ningde era to connect with energy storage.

However, in the following years, the Ningde era was mainly invisible in the field of energy storage. In contrast, its record on the power battery made great progress all the way until he became king.

According to CNESA, from 2013 to 2017, the newly installed scale of the global electrochemical energy storage project in the power system only increased from 0.1GW to 0.9GW. It can be said that electrochemical energy storage has not broken through the shackles of 0-1. The whole industry is still in its infancy. No wonder the energy storage in the Ningde era. Business is not getting improved.

## **[2] Turning point**

Until 2018, electrochemical energy storage finally ushered in a turning point. At that year, the newly installed scale of global electrochemical energy storage reached 3.7GW, an increase of 305% year-on-year, and the electrochemical energy storage market, which had been silent for many years, finally broke ground.

Also in 18 years, Ningde Times set up a separate energy storage business department and began to promote the energy storage business to the fast lane. In June of that year, Ningde Times first signed a contract for the construction of Fujian Jinjiang Energy Storage Power Station, and then won the bid for the Luneng Haixizhou Demonstration Project.

So far, the Ningde era has ridden the dust on the road of energy storage, from investing heavily in energy storage research and development, to working with the State Grid, Kostar (11.900, -0.30, -2.46%), Easystar (6.510, -0.17, -2.54%), Yongfu Co., Ltd., etc., with an all-round layout. Energy storage upstream and downstream.

| 时间      | 事件                        | 主要内容   |
|---------|---------------------------|--|
| 2011 年  | 国网张家口风光储示范项目              | 4 家锂离子储能电池供应商之一，最早完成整体项目安装和调试、唯一具备“黑启动”功能                    |
| 2018/06 | 签约福建晋江储能电站示范              | 分三期建设，一、二、三期建设规模分别为 100MWh、500MWh、1000MWh 锂电池                |
| 2018/10 | 中标鲁能海西州示范工程               | 建设 50MW/100MWh 储能  |
| 2019/03 | 与美国 Powin 公司签订供货合同        | 提供 1.85GWh 电芯，主要为磷酸铁锂，用于集成到 PowinEnergy 的最新型号电池储能系统中         |
| 2019/04 | 与科士达合作设立储能公司              | 合资公司主要以开发、生产及销售储能系统 PCS、特殊储能 PACK、充电桩及“光储充”产品                |
| 2020/01 | 福建晋江储能电站示范一期投运            | 一期 30MW/108MWh 储能并网，储能专用磷酸铁锂电池，单体循环寿命可达 12,000 次             |
| 2020/02 | 公司 200 定向增发               | 20 亿用于电化学储能前沿技术储备研发，55 亿用于动力及储能电池研发与生产                       |
| 2020/03 | 与国网综能合资成立新疆国网时代储能发展有限公司   | 出资 3000 万，与国家电网合作进行储能项目的投资、建设、运营                             |
| 2020/04 | 与国网综能合资成立国网时代（福建）储能发展有限公司 | 出资 4 亿，电力储能项目开发、建设和运维，储能研发、集成，储能调试                           |
| 2020/04 | 与科士达合资公司开工                | 建设 PCS 生产线 2 条，储能 PACK 生产线 1 条，充电桩整桩生产线 2 条。首期储能产能 PACK 1GWh |
| 2020/04 | 与易事特成立合资公司                | 开发、生产及销售储能 Pack 产品及相关配套服务。产能初步设计为 1GWh 电池                    |

Figure 5: Important events in the layout of energy storage business in Ningde era over the years. Source: Company Announcement, Societe Generale Securities

According to BloombergNEF, the global average price of lithium-ion battery packs fell from \$1,100/kWh to \$137/kWh between 2010 and 2020, a decrease of 89%. In the past decade, the cost of the whole energy storage system has decreased from the perspective of equipment. 75%.

Although energy storage was laid out in the Ningde era a long time ago, it has been stagnant for many years. One of the reasons is that the cost of lithium batteries is still too high. At present, although good progress has been made in the cost of energy storage batteries, the three core driving forces are cheap, cheap or cheap to realize their maximum potential.

### [3] Harvest



The real highlight of the energy storage industry is in 2020, when China announced to the world that it will strive to achieve carbon emissions by 2030 and carbon neutrality by 2060, the so-called 30-60 goal.

The main way to achieve the ultimate goal of carbon neutrality is to develop renewable energy such as photovoltaic and wind power to replace fossil energy.

But renewable energy such as photovoltaic and wind power are typical intermittent energy sources. What do you mean? Take wind power as an example. Generally, it is the peak of wind power generation in the early morning, but it is the low peak of user consumption. It generates so much power and can't be used up. When the peak of electricity consumption comes in the morning, the wind stops, and users can't use wind power. To put it bluntly, photovoltaic and wind power are unreliable.

From the first half of 2019 alone, the abandoned wind is more severe in Xinjiang, Gansu and Inner Mongolia, with wind abandonment rates of 17.0%, 10.1% and 8.2% respectively. The proportion of eye wind power and photovoltaic power generation is still in the single-digit stage, and it is expected to rise to 25% in 2030. At that time, this contradiction will become more prominent.

The inherent deficiency of photovoltaic and wind power can currently solve the urgent needs by adjusting peaks. When the ultimate solution is to store energy, store electricity when photovoltaic and wind energy are sufficient, and release energy stored electricity when needed.

Another level that you may not normally reach is that although photovoltaic and wind power are clean energy sources, they are not friendly to the power grid at all. As we all know, electricity is transmitted at the speed of light, from power generation, transmission to electricity consumption, which is almost synchronized. The whole power grid requires the dynamic balance between the power generation end and the consumption end at all times.

Due to the uncertain power generation capacity of renewable energy, it significantly increases the workload of the power grid and will also cause additional losses of power equipment. In serious cases, it will lead to the collapse of the frequency of the power grid and cause large-scale power outages. At this

time, the allocation of energy storage equipment on the power grid can play an important role of "buffers".

Therefore, at the beginning of this year, the State Grid said that in the next five years, it will invest an average annual investment of more than 70 billion US dollars to promote the upgrading of the power grid, promote clean and low-carbon transformation, and help achieve the carbon neutrality goal.

Concentrate into one sentence, achieving a grand blueprint for carbon neutrality is inseparable from the common progress of energy storage and renewable energy.

So far, 20 provinces in the country have introduced policies to encourage renewable energy + energy storage. Among them, there are clear requirements for the proportion of energy storage, including: Shandong 2020 photovoltaic bidding project requires 20% energy storage; Shanxi 2020 photovoltaic project is recommended to allocate 15-20% energy storage; Inner Mongolia gives priority to supporting photovoltaic construction configuration of 5% energy storage in 2020, Guizhou 2021 scenery configuration 10 % energy storage, Hubei 2020 wind power project is not less than 10% allocated energy storage.

According to Wood Mackenzie, one of the world's largest energy consultants, global energy storage deployment will increase 13 times to 230GWh by 2025, and the total investment in global energy storage is expected to increase from \$18 billion in 2019 to 10 in 2025. Billion US dollars.

This will be the next trillion market. Who is not moved by such a big cake?

Compared with the lack of achievements in the early stage of bonded energy storage, Ningde's current energy storage can finally save some face. According to the financial report data, the energy storage revenue of Ningde Times in 2018 was 189 million yuan, 11.8 times that of 2017, and in 2019 it was higher, with a revenue of 610 million yuan. In the 2019 China's new electrochemical energy storage installation ranking, Ningde Times surpassed the Nandu Power Supply (12.650, -0.06, -0.47%), which ranked first for two consecutive years, and successfully won the first place.

By 2020, the shipments of energy storage batteries in Ningde Times have increased to 2.8GWh, ranking first in China and third in the world, with a global market share of about 14% of energy storage batteries. Speaking of this, the layout of the Ningde era has been clearly visible.

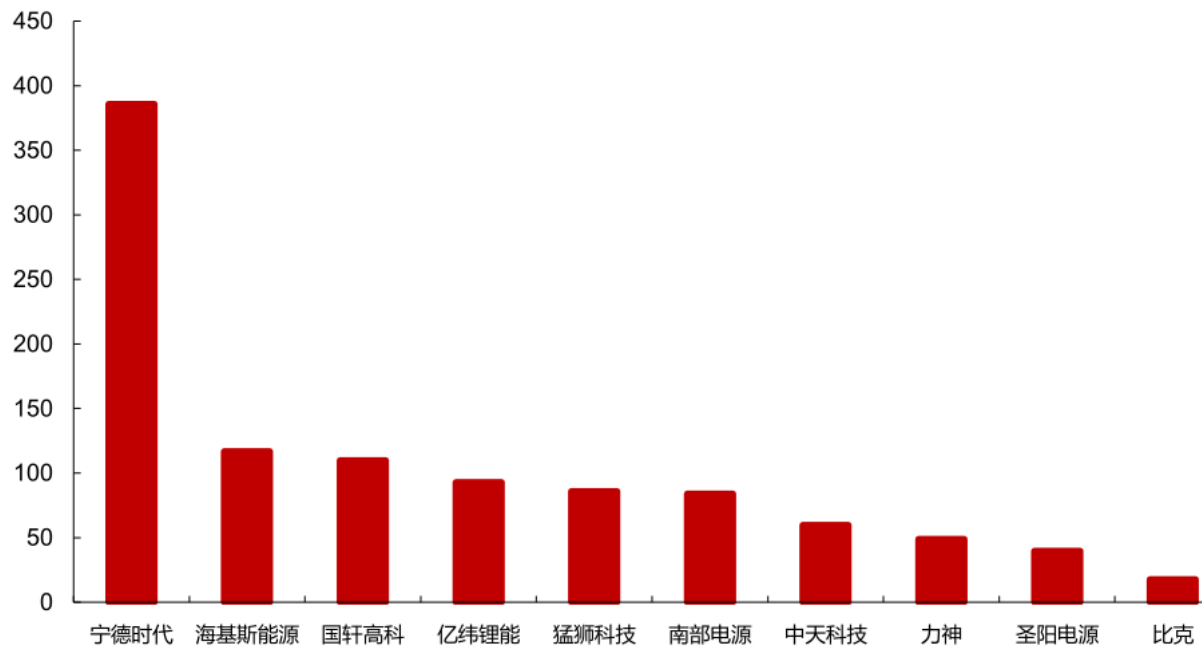


Figure 6: 2019 China Energy Storage Technology Provider Shipment Ranking (MWh), Source: CNESA, Western Securities

## 04 New Long March for Energy Storage

### [1] Ning De took the lead.

As the most important part of the energy storage system, lithium batteries account for 40% of the value of the energy storage system. Enterprises like the Ningde era can get the largest piece of cake, because leading power battery manufacturers have unique advantages in switching to energy storage batteries.

First of all, energy storage does not require high energy density for batteries.

For power battery enterprises, engineers rack their brains in the limited space of the chassis of the car to let electric vehicles run an extra kilometer. Nowadays, energy storage products are designed in the volume of containers, and energy storage batteries are installed outdoors. There is a lot of space for you to pile up batteries, and you no longer have to pursue high energy density. Simply put, letting power battery enterprises make energy storage batteries is to reduce dimensions, which is naturally difficult to defeat the Ningde era.



Secondly, lithium energy storage batteries generally follow the power battery production line, which can make full use of the production capacity of the power battery production line.

Previously, production in the Ningde era kept expanding, and the planned production capacity in the future reached 500GWh, which once caused social concern. Nowadays, when we see the space in the field of energy storage, we don't have to worry too much about the underutilization rate of its production capacity. To put it optimistically, the Ningde era can even take another impact.

Third, lithium iron phosphate is the best partner for energy storage systems.

At present, the lithium batteries used for energy storage are mainly lithium iron phosphate and ternary routes, foreign countries dominated by ternary routes, and lithium iron phosphate as the main routes. Because the core requirements of energy storage are price, stability, cycle life, etc., it is in line with the characteristics of low cost, stable discharge, high safety and long cycle life of lithium iron phosphate batteries. This is also the route that Ningde was good at in the era.

Finally, like power batteries, energy storage batteries also attach great importance to safety.

The safety of the energy storage system is related to the safety of the power grid and the user. If a battery goes out of control and catches fire, it will not only affect the operation of the entire energy storage system, but also cause accidents such as power station fires and power grid line burning, resulting in large-scale power outages on the user side.

In terms of energy storage battery safety, the Ningde era has achieved good results. At present, it has passed the UL 9540A test, which is currently recognized as the most challenging international safety test, the only one in China.

## **[2] Naturally, the little brothers are unwilling to lag behind.**

In the field of power batteries, the Ningde era is undoubtedly the boss, and many domestic second-line battery enterprises are unparadated. Nowadays, in the Ningde era, when taking the initiative to lower its posture to make energy storage batteries, it will naturally face the problem of dilution of technical advantages.

Second-line power battery enterprises themselves have good strength, and they are more than enough to deal with energy storage batteries. It is equivalent to the Ningde era and all kinds of players who came to an echelon, and the brothers who chased desperately finally had the opportunity to compete on the same stage.

It is worth mentioning that for second-line power battery enterprises, the market is most worried about the potential risk of insufficient capacity utilization. Reducing dimensions to make energy storage batteries turn burdens into an advantage, so second-line battery enterprises are also flocking to the field of energy storage.

For example, Yiwei Lithium Energy (74.000, -8.46, -10.26%) invested in Jingmen Yiwei Energy Storage Power Lithium Ion Battery Project, won the order for lithium Iron Phosphate for China Mobile Communications in May last year, and also carried out energy storage cooperation with Huawei; and Guoxuan High-tech (32.690) , -1.92, -5.55%), began to work with Shanghai Electric (5.520, 0.08, 1.47%) to lay out energy storage in 2018. The supporting project of the 2022 Winter Olympics, the "Olympic Landscape" project, among which the

energy storage battery system is provided by Guoxuan Hi-Tech; and BYD (176.730, -19.64, -10.00%), released a new grid-grade energy storage product BYD Cube last August, pointing directly to the Ningde era.

At present, the Ningde era seems to be one step ahead in the field of energy storage, but after all, energy storage is a long-term track. Carbon neutrality will not be achieved until 2060. There are already a group of opponents staring at it. If you want to become another king, you have to compete again.

Now the energy storage track has gradually changed from an unattended rural path to a noisy and crowded urban road. In the field of energy storage, second-tier enterprises must not be defeated easily, and may even fight a turnaround.

The first step of the Long March of Energy Storage Trillion has only begun, and the track is expected to be wonderful.