Investment Analysis of Pylon Technologies
Application of SWOT and PEST Methods

Zuxin He(✉)

Dietrich School of Arts and Sciences, University of Pittsburgh, Pittsburgh, PA 15260, USA
zuh2@pitt.edu

Abstract. This paper focuses on the investment analysis of a listed technology company in China—Pylon Technologies. The company is one of the earliest domestic manufacturers to enter the energy storage industry field, mainly focusing on lithium battery energy storage technology and the overseas household energy storage market. SWOT and PEST analysis methods are applied to construct a comprehensive survey from both corporate and environmental factors. In particular, the company's core competitive advantages in technology, quality, and marketing are elaborated, then conducive environmental factors such as policy support and industrial growth trend are also discussed. The conclusion implies that the company products have industry-leading quality, high safety and cost-reduction capabilities, high market awareness, and strong market competitiveness in the global electrochemical energy storage market; Policies promoting "carbon neutral" and deepening combination of "new energy + energy storage" have led to the continuous growth of renewable energy industry and high demand of energy storage in downstream customer side. In addition, potential opportunities and challenges in the market are also discussed to show an objective perspective on the future development of the company.

Keywords: Pylon Technologies · Energy Storage · Household energy Storage · SWOT analysis · PEST analysis

1 Introduction

As global climate change becomes one of the biggest challenges to human development, the world's major economies have reached a "carbon-neutral" consensus. Sixty countries have committed to zero carbon emissions by 2050 or earlier, and renewable energy represented by solar, wind, water, and biomass energy in the electric power system is growing rapidly around the world at an unprecedented rate. However, different from the traditional thermal power installed capacity, the installation of new energy such as wind power and photovoltaic power is affected by climate and other factors, resulting in natural intermittency and volatility. Meanwhile, the current application of this new technology often comes with a high cost, causing an imbalance between power demand and supply, and instability of the power grid, thus resulting in a high abandonment rate. By adding the "storage + release" link, the energy storage system provides power peak regulation and renewable energy grid connection for the new energy power systems,

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which perfectly makes up for the shortcomings of renewable energy in this aspect. It has become the consensus of the industry that "new energy + energy storage" can perfectly replace traditional thermal power.

In the early stage of energy storage commercialization (2016–2020), with the increasing policy support, the gradual rationalization of the market mechanism, and the integration and penetration of multiple industrial fields, the installed capacity of energy storage increased rapidly and the business model was gradually established. Following this industrial trend, the global electrochemical energy storage market has also entered a period of rapid growth. Currently, the energy storage industry has entered the stage of industrial-scale development (2021–2025), energy storage projects are widely used, the technical level is rapidly improved, and the standard system is increasingly perfect, forming a relatively complete industrial system and a number of internationally competitive market players. Energy storage has become a new economic growth point in the energy field.

This paper focuses on the investment value analysis of a listed technology company in the field of electrochemical energy storage——Pylontech Technology, which has been deeply plowing in the lithium iron phosphate battery energy storage market for decades, and become one of the leading enterprises in the global market segment. Two main analysis methods are applied in this paper, SWOT is used to help conclude the core competitiveness and future development potentiality from an inner or corporate perspective, and PEST is used to summarize the external or environmental factors from the development and evolution of the global energy storage industry. The conclusion is optimistic about the future development of the company, considering its first-mover advantages and accumulated profound overseas customer groups, the industry-leading technology research, and development advantages, the broad prospects of the energy storage industry, and increasing household energy storage demand.

The SWOT (Strengths, Weaknesses, Opportunities, Threats) framework is proposed as an analytical tool that should be used to categorize significant environmental factors both internal and external to the organization [1]. By listing favorable and unfavorable internal and external issues in the four quadrants of a SWOT analysis grid, this analysis method is concerned with the analysis of an organization with the aim of identifying internal strengths in order to take advantage of its external opportunities and avoid external (and possibly internal) threats, while addressing its weaknesses [2]. In addition, Helms and Nixon [3] suggest that it is possible to postulate ways to overcome threats and weaknesses or future strategies, from SWOT analysis. Hill and Westbrook [4]: But these advocates all maintain a clear distinction between threats and opportunities and strengths and weaknesses, on the need for the testing of assumptions. Specifically, A strength can be viewed as a resource, a unique approach, or a capacity that allows an entity to achieve its defined goals; A weakness is a limitation, fault, or defect in the entity that impedes progress toward defined goals; An opportunity pertains to internal or external forces in the entity's operating environment, such as a trend that increases demand for what the entity can provide or allows the entity to provide it more effectively; A threat can be any unfavorable situation in the entity's environment that impedes its strategy by presenting a barrier or constraint that limits the achievement of goals [5–7].

The remainder of the paper proceeds as follows. Section 2 introduces the corporate basic background information. Section 3 provides a SWOT analysis of the corporate performances and development. Section 4 presents the PEST analysis composed of political, economical, and social environmental factors and the technology factor in the main segment market. Section 5 gives a conclusion of all included contents and the investment logic of the company's competitive ascendancy and its growth expectation based on the analysis outcomes.

2 Firm Description

PYLON Technologies Co., Ltd., formerly known as ZTE-Pylon, was founded in 2009 in Shanghai, China. It is one of the earliest commercial manufacturers of lithium battery energy storage systems in China, focusing on integrating key links of the industrial train. The company mainly engages in the research and development, production, and sales of lithium iron phosphate cells, modules, energy storage batteries, battery management systems (BMS), and energy management systems (EMS). The products can be widely used in the generation, transmission, distribution, and consumption of electric power systems, as well as communication base station and data center scenarios. The whole production system is located upstream of the industry chain, meanwhile, the downstream customers are mainly home energy storage systems and communication backup system integrators. The business coverage includes many countries and regions in Europe, Africa, America, Southeast Asia, and Australia, having a high brand awareness and strong market competitiveness in the global electrochemical energy storage market. In 2019, the company ranked the third in the shipments of electric power system energy storage lithium batteries in China, and its home energy storage system shipments accounted for 8% of the global market share, ranking the third in the world, second only to Tesla and LG Chem (Fig. 1).

Since its establishment in 2009, the company has been focusing on the field of energy storage battery systems, which occupies the main position in the company's revenue. Products and sales focus mainly on two categories: household energy storage and communication power backup. Household energy storage is mainly for export, while communication power backup is all for domestic sales. Sales revenue is mainly concentrated in the field of household energy storage. The proportion of sales of household

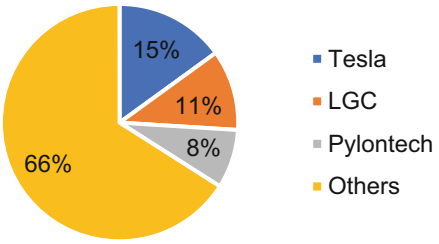

Fig. 1. 2019 Global household energy storage system shipments market pattern. (Data resources: Pylon Technologies Initial Public Offering Prospectus; Public Permission)

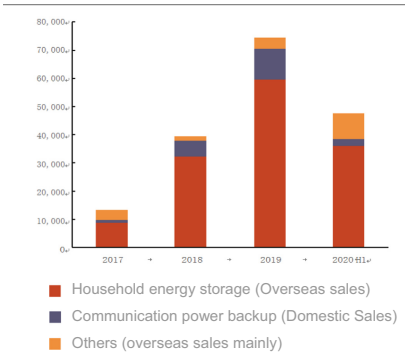

Fig. 2. Sales revenue distribution chart of energy storage battery system segmentation products. (Data resources: Pylon Technologies Initial Public Offering Prospectus; Public Permission)

energy storage systems in the company's total sales of energy storage battery system products has been maintained at about 65%–80% (Fig. 2).

The company's main products have passed the international IEC, EU CE, European VDE, American UL, Australian CEC, Japan JIS, United Nations UN38.3, and other safety certifications, and meet the requirements of REACH, RoHS and WEEE, and other environmental protection instructions, making the company one of the most qualified energy storage manufacturers in the industry.

As for the financial situation, Pylon has benefited from the rapid growth of the global electrochemical energy storage market and increasing overseas demand, showing steady growth in business profitability. From 2017 to 2020, the company's operating income and net profit increased rapidly, and gross profit margin and net interest rate were also improved continuously. Company revenue increased from 143 million yuan in 2017 to 1.12 billion yuan in 2020, with a compound growth rate of 98.6%. Net profit maintained rapid growth from 2017 to 2020, and attributable net profit increased from −40 million yuan in 2017 to 275 million yuan in 2020.

However, due to the Covid-19 situation and the rise of upstream raw material prices, the growth rate slowed down to a certain extent. From the 2021 annual report, the operating revenue was 2.063 billion yuan, increasing 84.14% year on year. The attributable net profit was 316 million yuan, which increased 15.19% year on year. However, affected by the increase in upstream raw material prices, both the gross profit margin and net interest rate fell. The company's sales expense ratio and management expense ratio also showed a downward trend year by year and were significantly reduced compared with 2017. Basic earnings per share of 2.04 yuan and 6.2 yuan (tax included) per 10 shares are sent to all shareholders. Business performance is basically consistent with the company's performance bulletin (Fig. 3).

In 2021Q4, the company revenue was 768 million yuan, increased 146% year on year and 25% month on month, mainly because the demand for overseas home energy storage raised and the new production capacity was released substantially, resulting in increased shipments month on month; However, net profit reduced to 65 million yuan, decreased 16.7% year on year and 32% month on month. This may be affected by the rise

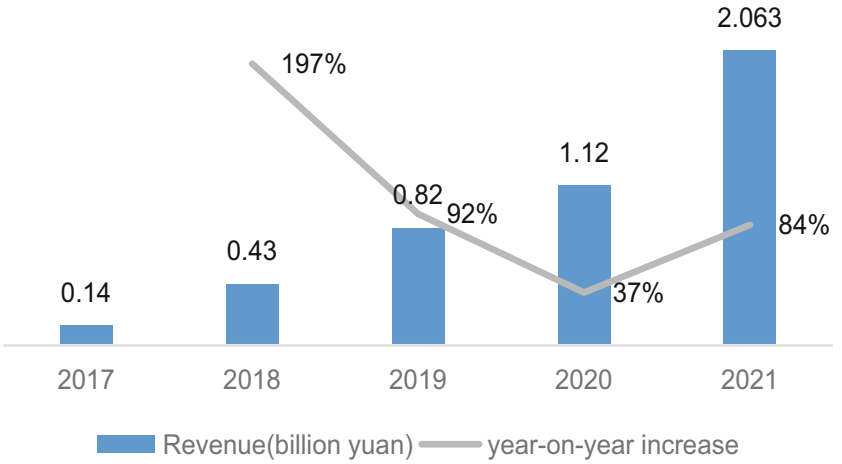

Fig. 3. Company revenue and growth rate. (Data resources: Pylontech annual financial reports http://emweb.eastmoney.com/PC_HSF10/NewFinanceAnalysis/Index?type=web&code=SH688063#zyzb-0)

in raw material prices, insufficient international shipping capacity, increased logistics costs, RMB appreciation, and other factors.

The shareholding structure of the company is concentrated, ZTCholdings is the controlling shareholder, and there is no actual controller. After the IPO, ZTCholdings holds a 27.91% stake in the company. ZTCholdings is also the largest shareholder of ZTE Corporation, the world's leading communication equipment manufacturer and telecommunication information technology provider, with a 21.29% stake.

3 Swot Analysis

3.1 Strength

3.1.1 Technology

Since its establishment, Pylontech has been deeply engaging in the application field of lithium battery energy storage for more than ten years. The company has adhered to the vertical layout of the industrial chain and the independent research and development of key technologies. It has become one of the few domestic enterprises with independent research and development and manufacturing capabilities of the core components in energy storage such as battery cells, modules, battery management systems, and energy management systems.

The company has a competitive advantage in continuous research and development, which can be implied by the R&D expenses on technological research and technological personnel investment. In 2017, the company's R & D expense ratio was as high as 20.28%, significantly higher than that of the comparable companies. It is mainly due to the company's low revenue in the current year but still maintaining a considerable

scale of R & D investment. From 2018 to2021, the R & D expense ratio decreased and basically stabilized at around 7%, basically consistent with the industry-leading level.

The company's R & D team continues to grow and has strong team strength. By the half of 2021, the company has a total of 286 R & D technical personnel, accounting for nearly 30% of the total number of people in the company; The main R & D personnel have more than 10 years of experience in the field of lithium battery and energy storage system.

Pylontech currently possesses 17 core technologies and has obtained 127 intellectual property rights, including 16 invention patents and 89 utility model patents. The core technologies including the confidential nano-coating technology, the application technology of advanced anode water system binder, and the lithium battery voltage self-adaptation technology, etc., have equipped the products with characteristics and capabilities of long cycle-life, high safety and reliability, high magnification ratio, high environmental adaptability, system flexibility, and cost reduction (Fig. 4).

The company now has mastered a series of technologies from battery cells to system integration, and currently holds the intellectual property rights of the whole industry chain core technology. The company has also officially become a national high-tech enterprise and the lithium iron phosphate battery engineering technology research center. In addition, it is now cooperating with the Chinese Academy of Sciences and other well-known research institutes in research and development projects, realizing the integration of scientific research resources.

This investment in R&D has eventually become a competitive advantage, and this technological power makes sure of the products' comprehensive performance is better than the domestic industry standards [8–10].

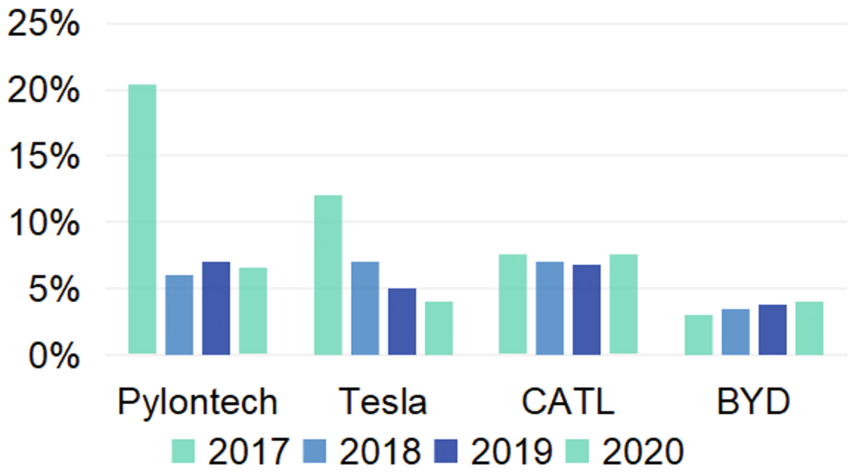

Fig. 4. Comparison of R&D Ratio. (Data resources: Pylon Technologies Initial Public Offering Prospectus; Public Permission)

3.1.2 Product

3.1.2.1 Product Quality

As for the product quality of the energy storage battery system, Pylontech is at the leading level in the international market. According to ITP's performance test report for household and industry-commercial lithium batteries, only SONY, Samsung, Pylontech and GNB batteries did not fail during the five years of testing. At the same time, Pylontech US2000B can still stably maintain 80% of the initial full charge capacity after 2,250 cycles, significantly better than the test results of LG Chemical RESU HV and Tesla Powerwall 2. The company products also perform well in terms of battery health and energy conversion efficiency. ITP estimates that the US2000B can still maintain 60% battery health after 4,470 cycles, ranking top among the competitors; And its energy conversion efficiency can remain around 90%, which is also among the best performers.

3.1.2.2 Cost Reduction

Economical efficiency has become the main driving force for household storage demand growth. Batteries, battery management systems (BMS), and energy management systems (EMS) account for 75% of the total cost of the energy storage system cost composition. By building a vertical industry chain, grasping the core link of energy storage battery system cost control, Pylontech has continuously improved production efficiency, increased production capacity, and improved capacity utilization rate, resulting in a continuous decline in unit direct labor and raw materials consumption, and a rapid increase in gross profit margin. In 2020, the company's main business gross profit margin has reached 43.52%, with significant results in cost reduction and efficiency improvement.

With the development of technology, the cost of household lithium energy storage systems is decreasing rapidly year by year. The three major international household storage manufacturers have their preferences for the technical route. Pylontech Technology mainly uses soft-coated lithium iron phosphate, while LG Chem mostly uses a soft-wrapped ternary lithium battery, and Tesla uses a cylindrical ternary lithium battery.

According to BNEF, the benchmark capital cost of a fully installed home lithium energy storage system (14kWh) is expected to reduce to $405/kWh by 21 years, decreased 38.1% in the past three years. At the same time, lithium iron phosphate battery has more cost advantage compared with a ternary lithium battery. At present, the single-cycle cost of lithium iron phosphate batteries is 0.25–0.3 yuan/kWh, far lower than the 0.65–0.7 yuan/kWh of ternary lithium batteries. With CTP, blade technology, and other technology iterations, the cost of lithium batteries is expected to be continuously reduced in the future. Pylontech adheres to the lithium iron phosphate technology route, and its household storage products have economically efficient advantages in the international market. The US2000B, for example, costs A $718/kWh, which is lower than most home energy storage systems in other markets, including domestic competitors BYD (A $840/kWh) and international manufacturers like Tesla (A $1022/kWh) and LG Chem (A $795/kWh).

While maintaining superior product performance, the cost advantage reflects the excellent cost performance of the company products and strong competitiveness in the market that promotes demand by economical efficiency. At the same time, as it has been

continuously plowing in the mainstream technology route, the company is expected to further deepen the above characteristics in the future and continue its competitive advantages.

3.1.3 Market

With high market awareness, it has established stable partnerships with many overseas energy storage system integrators giants, including the core suppliers of large overseas qualified customers, such as the largest energy storage system integration in Europe, Sonnen, and Segen, the largest photovoltaic product provider in the UK. In domestic markets, Pylontech and ZTE are closely connected. The communication power backup product sales are mainly bound with ZTE.

In addition, Pylontech has a group of ZTE-background management teams, and the senior executive team represented by Chairman Wei Zaisheng has rich marketing and management experience at home and abroad. Backed by ZTE, the company was insured of sustained and steady support on customer resources, sales channels and related-party transaction (Table 1).

Energy storage batteries have high requirements for safety and other performance, causing a strong stickiness of the downstream customers. The company's top five customers account for more than 50% of the sales. The customer relationship is stable, and the company is the core supplier of the core customers, showing a strong brand and product strength.

3.2 Weakness

The company products focuses mainly on the overseas household energy storage market, therefore, it has a low market share in the domestic market and other business areas in China, as a result, the company's long-term growth could be limited. In 2019, the top three

Table 1. Corporation situation with core customers. (Data resources: Pylon Technologies Initial Public Offering Prospectus; Public Permission)

Customer Name	Sales Area	Corporation History (years)	Share of Procurement Value	Core Supplier (YES/NO)
SonnenGmbH/SonnenInc	Global	3 years+	/	YES
SegenLtd/SegenSolarPty	UK, South Africa	3 years+	90%+	YES
ENERGY S.R.L.	UK	5 years	90%+	YES
CNBM International SouthAfrica (PTY)Ltd	South Africa	3 years-	90%+	YES
ZTE	China	5 years+	90%+	YES
Zucchetti Centro Sistemi S.p.A	Europe	3 years+	50%~ 90%	YES

enterprise revenue scale of China's communication energy storage lithium battery filed are Coslight, Gotion High-tech and Highstar, accounting for 20.2%, 14.7% and 11.9% of the market share. In 2019, the company sold a total of 100MWh of communication power backup products, accounting for only about 1.7% of the total shipment of communication energy storage lithium batteries in China in the same period, accounting for a relatively low proportion.

In addition, the company's domestic customer structure is relatively single, and with a high proportion of related party transactions. In the field of communication energy storage, the company's sales to its related party ZTE accounted for more than 95%.

In the competition in overseas markets, the company's main competitors in the global home energy storage system market are Tesla and LG Chem.

Tesla's Powerwall2 is now actually dominating the home battery energy storage market in the United States. From the perspective of revenue scale, the scale of Tesla far exceeds that of other comparable companies. The revenue of Ningde Times and Sunshine Power are slightly higher than Pylontech in the past three years.

LG Chem is bound with key global car customers, working closely with Tesla and Geely in China market; and almost controls all mainstream European car companies; and GM in America, including three mainstream car companies; Hyundai in Korea, Honda and Yamaha in Japan.

According to the results of comparison of major companies in energy storage business, there is a distinct gap between Pylontech and those market leaders in terms of business coverage, capital reserves, and enterprise scale.

The company also has the problem with larger overseas business risks in the international competition, and deficient market share and expansion of power generation side and grid side in the energy storage field.

3.3 Opportunity

With the growing importance of the energy storage industry, countries have given great support for energy storage technology. Most countries position energy storage technology as a national strategic technology to support the development of new energy, and have formulated a series of relevant incentive plans, investment and subsidy policies for the development of energy storage industry. Therefore, the energy storage market space will continue to expand, and the demand for household energy storage is also expected to grow rapidly.

In recent years, household energy storage has been maintaining a rapid growth trend, and the demand is mainly concentrated in overseas developed areas. By 2024, the global residential energy storage market is expected to grow to $17.5 billion from $6.3 billion in 2019, at a compound annual growth rate of 22.88%. China's energy storage development in power generation and transmission and distribution side benefits from the long-term new energy consumption targets and quantitative energy storage supporting policies of various provinces and cities, and the demand for power generation and transmission and distribution side energy storage is about 44.87GWh in the next 5 years. Although the market proportion of the company in those business areas can be hard to predict now, there is still massive growth opportunity for Pylontech to expand in this market.

The overseas household storage market is bound with household photovoltaics, and there is still a broad space for a development under the background of advocating "rooftop solar energy" and spontaneous self-use of power. In the future, the household light storage market in Europe, the United States, Asia Pacific, South Africa and other regions will continue to grow rapidly. Benefiting from the wide overseas channels, the company's growth in the overseas household storage segment is far from the ceiling.

3.4 Threats

Changes and adjustments in energy storage-related industrial policies will affect the stability and rapidity of the development of the industry, and thus affect the company's operating performance and future potentiality.

Overseas income accounts for a significant proportion of the company's main business income, and the risk of international trade friction and exchange rate fluctuations affects the company's product export and the supply of imported raw materials;

The company's products are exported to Europe, South Africa, Southeast Asia, North America and Australia and other overseas markets, overseas sales mainly use US dollars, euro and other foreign currency settlements. If adverse changes are found in the international situation, and the deterioration of the international trade environment leads to unilateral exchange rate fluctuations, and the exchange rate fluctuations have a certain impact on the company's performance, The company faces the risk of exchange rate fluctuations in the process of international trade.

The COVID-19 situation has posed the risk of global new energy installations falling below market expectations. The company's current production capacity has reached a bottleneck, the supply and demand relationship is tight, and the raised funds are mainly used for production capacity expansion. If the Covid situation continues to ferment in the future and affects the construction progress, it will affect the company's future market expansion plan, so the company will face with the risk of capacity expansion less than the performance growth expectation.

Domestic power battery leaders are gradually entering the field of household storage, resulting in intensified market competition. The company will gradually no longer have a competitive advantage in this field. Major domestic and foreign lithium battery enterprises, new energy enterprises, power equipment enterprises have layout energy storage industry, market competition is intensifying.

The company mainly faces the international market and competes with the international giant's Tesla and LG Chem. If the overseas market development does not meet the expectations in the future, the market share will shrink, which will weaken the company's sustainable competitiveness in the global market.

4 Pest Analysis

4.1 Politics

Under the background of global carbon neutrality, the importance of energy storage is growing rapidly. Global policies are improving to promote the commercialization and

large-scale development of the energy storage industry, and the growth space of the energy storage market is increasingly broad.

Countries around the world have successively introduced energy storage incentives and formulated relevant industrial policies to remove obstacles and pave the way for the development of the energy storage market, specifically, including: supporting the development of energy storage technology, carrying out energy storage project demonstrations, formulating relevant norms and standards, and establishing and improving laws and regulations related to energy storage.

Major developed countries around the world have formulated relevant industrial policies for energy storage. Countries have given great support to energy storage technology. Most countries position energy storage technology as a strategic technology to support the development of new energy and have formulated a series of relevant incentive plans, investment, and subsidy policies for the development of the energy storage industry.

The policies formulated by different countries can be categorized into three development stages:

i. For countries where energy storage has not yet been promoted or has just started commercialization, energy storage is included in the national strategic planning, and the government starts setting out the energy storage development route;
ii. For countries where energy storage already has a certain industrial scale, tax, and subsidy preferential policies are promoted;
iii. For countries where energy storage has developed deeply into the industrial auxiliary market, they will open up the regional electricity market.

By summarizing the development process of energy storage policies in various countries, it can be seen that the energy storage industry in most economies in the world is still in the second stage, with only a certain industrial scale, and has not yet been able to assist the power systems of countries. Therefore, the energy storage industry is still expected to be strongly supported by the policies of governments around the world.

4.2 Economics

The demand for household energy storage mainly comes from some overseas countries and regions with high power prices. Its role mainly is to reduce the electricity cost through peak and valley price difference arbitrage, improving the self-use level of household photovoltaics, etc. Moreover, the rapid popularization of overseas home photovoltaics also brings along the increasing demand for household energy storage.

The high electricity price is the main factor in the rapid development of household energy storage overseas. In Europe, Japan, Australia, the United States, and other countries and regions with high electricity prices, one of the main economic drivers of household "photovoltaic + energy storage" applications is to improve the level of self-use of electricity to delay and reduce the risks caused by rising electricity prices. At the same time, with rising electricity prices and the rapid cost of photovoltaic systems, strong and stable new photovoltaic installations in these regions also provide a solid market for energy storage applications. Germany, the United States and Japan became the main markets for home energy storage, accounting for nearly 70% of the 2020 shipments.

Household photovoltaic developed rapidly in the early stage due to policy incentives. However, Since 2012, due to the continuous decline of photovoltaic power generation costs and the financial crisis, and other factors, European countries have rapidly reduced photovoltaic subsidies, prompting users to change the way of power access to the Internet and become more inclined to store excess power for their own use, thus saving electricity bills. With the decline of medium-term subsidies, the market penetration rate of household energy storage was increasing in the pursuit of self-use and economy. The combination of household light and storage has been the general trend, creating a good market opportunity for the development of energy storage.

4.3 Social

Scientific research has shown that excessive carbon emissions can lead to climate change, global warming, greenhouse effects, and other global problems facing mankind. Also, along with the continuous consumption of non-renewable fossil energy, the global energy consumption structure is transforming to low carbon or zero-carbon. The international community are paying increasing attention to ensuring energy security, protecting the ecological environment and tackling climate change. The ESG (Environmental Social Governance) concept was proposed by the United Nations Environment Programme in 2004, it has become an important criterion to measure whether a listed company has sufficient social responsibility. At present, more and more companies, investors, and regulation institutions are paying attention to ESG, and major stock exchanges around the world have already deployed in ESG.

Countries around the world are also devoted in reducing greenhouse gases by the global agreement of carbon peak and carbon neutrality. China thus put forward a carbon peak target in 2030, and a carbon-neutral target at 2060. At the present stage, China's power generation structure is still dominated by fossil fuel power generation. In the future, the global stock of fossil energy will be increasingly exhausted, and the proportion of low-cost and clean renewable energy represented by solar, wind, hydropower and biomass energy in the power system should be gradually increased. Compared with the world, as of 2019, China has had the largest carbon emissions in the world, with carbon emissions accounting for 27.92% of the global carbon emissions, and this huge amount was followed by the United States, India, Russia and Japan, accounting for 14.5%, 7.18% and 4.61%, respectively. According to the Global Energy Internet Cooperation Organization, by 2025, the proportion of coal in Chinese power generation structure will decrease from 66.4% in 2018 to 48.8%, and the proportion of solar power generation will rise to about 20.2%; by 2050, the proportion of coal power generation will drop significantly to 5.7%, with wind and photovoltaic power generation becoming the main force.

4.4 Technology

4.4.1 Energy Storage

Energy storage can be divided into electro energy storage, thermal energy storage and hydrogen energy storage according to the energy storage form. Electroenergy storage is

the most important energy storage method. The different storage principles, it is divided into electrochemical energy storage and mechanical energy storage technologies. Electrochemical energy storage refers to various secondary battery energy storage, mainly including lithium-ion batteries, lead batteries and sodium-sulfur batteries; mechanical energy storage mainly includes pumped storage, compressed air energy storage and flywheel energy storage.

The energy storage industry is still in the stage of coexistence of various energy storage technology routes. Pumped storage is still the most mature and installed mainstream energy storage technology at present, but electrochemical energy storage has the fastest development, large space for cost reduction and great industrial application prospects.

Electrochemical energy storage is the most widely used and most potential electric energy storage technology. It has the advantages of being less affected by geographical conditions, having a short construction period, and can be flexibly applied in all links of the power system and other scenarios. At the same time, with the continuous decline of cost and the increasingly mature commercial application, the advantages of electrochemical energy storage technology are increasingly obvious, gradually becoming the mainstream of new installed energy storage capacity.

4.4.2 Lithium Battery

In the future, with the scale effect of the lithium battery industry further appearing, the cost of electrochemical energy storage still has a large room to decline, and the development prospect is broad. The lithium-ion battery is the most widely used electrochemical energy storage technology with the largest cumulative installation capacity of electrochemical energy storage types. In 2020, lithium battery energy storage will account for 92% of the world's total installed electrochemical energy storage capacity. The lithium-ion battery has low pollution, high energy density, long cycle life, high magnification ratio and other excellent performance. With the gradual decline of its cost, the economic efficiency of lithium-ion batteries also begins to highlight. Lithium ion batteries are increasingly used for new battery energy storage, gradually replacing lead-acid batteries, and become more and more widely used in the energy storage market.

Currently, there are various technical routes for lithium batteries used in energy storage. The types of cathode materials, they can be divided into iron phosphate lithium batteries and ternary lithium batteries. In 2019, lithium iron phosphate batteries accounted for 41% of the global household energy storage product shipments; nickel-cobalt-manganese ternary lithium batteries accounted for 55%, and other lithium batteries accounted for 4%. Although ternary lithium battery has advantages in energy density over lithium iron phosphate battery, the energy storage battery system does not emphasize portability, and the safety disadvantage of ternary lithium battery makes lithium iron phosphate battery slightly better in the field of household energy storage. From the current application situation and development trend, long-life (6000 times) lithium iron phosphate battery will be the mainstream technology direction of energy storage battery.

4.4.3 Technological Barriers

Electrochemical energy storage technology has the core characteristics of electrochemistry, is interdisciplinary, and has high technical requirements for enterprises. The production process of lithium-ion batteries, especially soft coated lithium iron phosphate batteries, is relatively complex.

The process control is strict, and the accumulation of technical experience is particularly important for the production process. In addition, in recent years, the energy storage lithium battery continues to develop in the direction of high safety and long life, and the safety certification standards of various countries rise accordingly, which has formed a technological obstacle to many enterprises. In addition, the battery management system is the core component of the energy storage system, widely involving battery management technology, automatic control technology, power electronic technology, and communication bus technology, with high technical barriers.

5 Conclusion

With the proposal of carbon neutrality and the increasing proportion of renewable energy, the global electrochemical energy storage market is now at the inflection point of commercialization and industrial-scale development. This paper provides an investment analysis of Pylon Technologies, a world's leading manufacturer of household energy storage systems. The contents are constructed first with the basic firm information, then with SWOT and PEST analysis methods to develop a detailed discussion about the corporate and environmental factors. From the analysis result, three main competitive advantages can be concluded:

Technological advantage: independent research and development and manufacturing capacity of core technologies; excellent product quality; mainstream technology growth, high technical barriers.

Market advantage: accumulated overseas leading energy storage integrators and customers with in-depth cooperation; High brand awareness; The market shows strong growth potentiality and certainty; the overseas home energy storage market demand is still expanding driven by high electricity prices and photovoltaic penetration,

Track advantage: Countries have launched stimulus policies providing long-term and targeted support for the development of the energy storage industry; Future research needs a further investigation into the industry development trends and market size forecast. Deep observation should be attached with comparable companies and potential competitors on their potential intention to involve in Pylontech's business area (Eg. Ningde Times); Development of different technologies under the electric energy storage track should also be tracked. Research methods including expert interviews and workshops, scenario planning, and demand-supply analysis should be considered.

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