

*Original Paper*

Applying the Value Assessment of New Energy Companies  
Based on the EVA Model—An Example from Ningde Times  
New Energy Technology Co

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**Abstract**

*Compared to traditional methods of assessing business value, the EVA method can evaluate business value in a more reasonable manner. The purpose of this paper is to assess the business value of Ningde Times, one of the representative firms in the new energy industry, based on EVA model in order to prove the reasonableness and reliability of EVA method in evaluating the value of new energy companies. By analyzing the current financial situation of Ningde Times and applying the two-step EVA model to evaluate its business value, in the final calculation, Ningde Times is found to overestimate its per-share value, which is consistent with the direction of its trend in the stock price market, indicating that the EVA model is reasonable and reliable for estimating firm value, which provides a benchmark for enterprise value assessment of the new energy sector.*

**Keywords**

*EVA model, value assessment of the enterprise, new energy, Ningde Times*

**1. Introduction**

In the context of global climatic anomalies and traditional energy crises, as countries around the world increase their efforts to develop and utilize new energy and power technologies. The rapid development of BYD, Tesla, and other companies in the new energy vehicle industry has also led to an increase in the demand for electric batteries. Ningde Times, as one of China's leading suppliers of electric batteries, has grown rapidly with the easterly wind of the development of the new energy vehicle industry, and has been able to enter the A-share market from a "unicorn" start-up. Today, the company is the world's largest supplier of electric batteries and has even begun to supply them to established automobile manufacturers

such as BMW, Mercedes-Benz, and Volkswagen. With governments providing large incentives and tax advantages to new energy companies, and with many investors hopeful about the new energy sector's development, as the value of firms in the new energy sector continues to increase, making it crucial for investors to have an accurate and realistic appraisal of the value of the new energy firms. A review of the references on enterprise value research related to new energy, however, reveals that the current focus of new energy industry research is on government policy-making as well as scientific and technological research and development, and there has been insufficient research on the valuation of new energy companies, it is therefore important to investigate the valuation of new energy companies.

Valuing a business involves every aspect of its survival and growth, and how to reliably assess the value of a business has long been a topic of heated discussion in both practice and academia. Financial indicators that were used to weight a company's business performance, such as the prompt ratio, accounts payable turnover ratio, earnings per share, and so on, all have some limitations: on the one hand, it ignores the cost of capital, which can lead to inflated profits and an overestimate of firm value; in contrast, traditional financial performance appraisal indicators do not make accounting adjustments for different scenarios, leading to incomplete cost estimates. The EVA valuation model focuses on the ability of intangible assets to create value and the opportunity cost of equity capital, as well as making significant adjustments to the traditional accounting indicators. This indicator is more in line with the current operating conditions of the business than the accounting indicators in the traditional system. (hereinafter referred to as Ningde Times), a representative business in the emerging energy sector, which is used as an example to evaluate its business value using the EVA model.

The contribution of this article is that, first, it demonstrates the rationality of the application of EVA models to the new energy sector. First, the pursuit of firm value maximization is one of the business goals of firms, and traditional indicators of firm performance have some information distortion so that traditional firm valuation based on financial statement data is difficult to truly reflect the value created by firms. Second, Ningde Times is a capital intensive new energy industry, and the existence of a large amount of capital necessitates a focus on the cost of equity capital. EVA's value management system is consistent with this demand, which can objectively measure the ability of businesses to create real value and provide a theoretical basis for the popularity of the EVA valuation method in the emerging energy industry. Second, it provides a theoretical foundation for improving EVA value assessment models. Although EVA has clear theoretical advantages, in reality, because of the different capital structures, business models, and strategic goals of different industries, EVA models must be combined with specific situations in order to perform their unique roles. Accordingly, this paper considers the characteristics of the new energy industry Ningde Times is located in as well as the company's own circumstances, and makes a focused selection of adjustments to the EVA calculation such as R&D expenses as well as non-recurring gains and losses, in order to fully reveal its value and provide a benchmark for EVA model improvement and refinement.

## 2. Literature Review

### 2.1 Research Related to Both Traditional and Improved EVA

The EVA approach to assessing firm value was first introduced in the 1980s by the New York-based consultancy firm Stensted with the aim of promoting value-maximum behavior by company managers. Joel (2010) points out that there are some potential pitfalls in using residual income as a single-period performance indicator and hence adjusting GAAP-based standards in order to produce a more economically meaningful version of residual Earnings, which can be used as a valuable indicator. According to Johann de Villiers (1997), EVA also provides an alternative account of inflation that can be used to estimate real profitability from traditional historical accounts of costs under inflation. They investigated the magnitude of the effect of inflation on EVA and found that EVA could not be used to estimate actual profitability in the presence of inflation, an adjusted EVA (AEVA) calculation procedure was therefore developed that provided a better estimate of the true cost-effectiveness under inflation, and the paper has suggested the use of AEVA as an alternative to EVA for financial decision-making under inflationary conditions. Zafiri (1999) attempts to improve the application of EVA by proposing an EVA that puts the opportunity cost of equity capital on the market rather than book value. Machuga SM (2002) argues that EVA includes information on incremental gains per share in the prediction of future earnings. Ronald (2001) improves upon the application of EVA by explicitly stating the relationship between the concepts of free cash flow and economic value added and the DCF thinking of a more traditional application of the DCF approach in order to assist users of the DCF approach. Margaret (2012) suggests the feasibility of 'linking' EVA to customers and the convergence between customer-driven and shareholder-driven systems of performance management. It can act as a link between strategy formulation, strategy execution, and profitability when combined with other techniques of strategic management accounting.

### 2.2 Research on EVA in The Valuation of New Energy Enterprises

There has been a gradual increase in the application of EVA in the value assessment of new energy companies in recent years. Zeng Fanrong (2016) investigated the application of EVA efficiency of business value creation in new energy companies, selected 104 new energy-rated firms, and found that: the EVA model has a good effect on measuring the value creation capacity of new energy firms, which laid a good foundation for the application of the EVA model in newly listed energy companies. Zhang Xinyue (2022) improved upon the original EVA model based on the characteristics of new energy companies by the addition of non-financial factors, and found that the EVA model after taking into account non-financial factors may better reflect the true value of new energy companies. According to Sun Zhi (2022), the EVA model is better suited for evaluating the value of new energy companies, primarily because it considers the cost of equity and the cost of debt capital; it is conducive to the evaluation of the company's performance; and the assessment results are consistent with the financial management objectives of the enterprise.

### *2.3 EVA's Advantages over Other Methods of Enterprise Value Assessment*

After using empirical research, Byrne Stephen (1996) found EVA to be superior to traditional evaluation metrics. Likewise, Herzberg (1998) found that one of the main reasons for EVA's superiority over the discounted cash flow method is that EVA focuses on the increase in firm value as a reflection of the value of the firm, while the cash flow method reflects the value of the firm by increasing the number of profits distributed to shareholders. In addition, Lary (2001) confirms that the EVA method is more accurate than traditional business valuation methods, and that the EVA method more closely approximates the true value of a firm than the market and cash flow methods (Shimon Chen, 2010), and that the EVA method is more accurate than the other methods in evaluating the value of the firm (Vaijyanthi, 2011). The selection of listed software companies in China as the research object was based on different methods of valuing the companies based on financial data from the case companies respectively, and EVA's method of assessment was found to be more accurate (Xie, 2018). For empirical analysis, Wang (2019) selected NASDAQ-listed Chinese Internet firms, which not only proved the applicability of EVA to high tech companies but also further illustrated where the benefits of the EVA valuation model lie. Later Hu (2017) extended the study sample to include typical firms in a variety of industries, comparing the results of the traditional tax net operating profit and EVA indicators in assessing the value of the business, and concluded that the EVA valuation method is more accurate and efficient. In a similar vein, Bennett Stewart (2019) selected 3, 000 listed companies in Russell and found that EVA could better assist company managers in identifying the drivers of firm value growth and in determining the intrinsic value of the firm by comparing economic value added with EBITDA.

## **3. Research Methods**

### *3.1 Literary Research Method*

The author of this article has read a great deal of literature and related books in order to gain a deeper understanding and research into the connotation, characteristics, advantages and disadvantages of traditional business value assessment methods and EVA methods, in order to make efforts to solidify the theoretical underpinnings of this study.

### *3.2 Case Study Method*

In this paper, Ningde Times New Energy Technology Co., Ltd. is chosen as the research object, a reasonable EVA-based enterprise value assessment system is constructed based on the unique background of industry development and company status of the case company, substitutes relevant financial data information into the valuation model in order to obtain the results and analyze them, supporting the application effect of the EVA valuation model in new energy companies, and finally, drawing out relevant Conclusions and recommendations.

### *3.3 Quantitative Research Method*

This paper begins with an explanation of Ningde Times financial situation, and the EVA value is then derived by applying the one-step EVA model based on financial data from the last 5 years, and then the

two-step EVA model is applied to forecast EVA value over the next five years, and finally the overall firm value is calculated.

### 3.3.1 Introduced the EVA Models

Usually referred to as economic value-added, EVA was first introduced by a US consulting firm in the 1980s and is usually intended to maximize shareholders' equity capital. In comparison to other traditional performance appraisal indicators, EVA primarily focuses on evaluating a firm's ability to create value and focuses on controlling the cost of equity capital of a firm, which is in practice more accurate than earlier performance appraisal indicators based on net income. If a firm's EVA value in a given year is greater than zero, this implies that the value created by the firm completely overshadows the maximum benefit derived from the opportunity cost of equity capital, whereas the reverse is true if EVA is less than zero.

#### (1) EVA Basic Calculation Formula

$$\text{EVA} = \text{NOPAT} - \text{COC}$$

$$\text{COC} = \text{TC} * \text{WACC}$$

Note: NOPAT is the net operating profit after taxes; COC is the cost of capital; TC is the total capital; WACC is the weighted average cost of capital.

$$\text{WACC} = K_e * \frac{S}{S+D} + K_d * \frac{D}{S+D} (1-T)$$

Notes:  $K_e$  is the cost of equity capital; S is equity capital; D is debt capital;  $K_d$  is the cost of debt capital; and T is the income tax rate.

#### (2) EVA Enterprise Value Assessment Model

As firms move through different stages of development and life-cycles, they have different capital structure needs at different stages of their development, therefore, the valuation model must be further disaggregated according to the EVA growth rate and the weighted cost of capital at different stages of a firm's development. There are currently four types of EVA firm value models: no growth, perpetual growth, binary growth, and ternary growth models.

Zero-growth EVA model. The model is primarily applied to firms with small or nearly constant changes in EVA value from one year to the next, i.e., the growth rate of EVA is approximately equal to zero.

$$V = BV_0 + \sum_{t=1}^n \frac{\text{EVA}}{(1+WACC)^t}$$

Notes: V is firm value; t is the period;  $BV_0$  is the initial outlay cost.

EVA perpetual growth model. The main application of this model is to firms whose EVA value continues to grow at a constant rate each year.

$$V = BV_0 + \frac{\text{EVA}_1}{\text{WACC} - g} \quad (\text{WACC} > g)$$

Note:  $\text{EVA}_1$  refers to the economic value added in the first year.

His relationship with the zero-growth model is that the zero-growth model is a special case of the perpetual growth model, when the perpetual growth rate model is zero. Although both of these models are less commonly used in practical situations, it is the basis for the multivariate growth model.

The EVA binary-growth model. There are two stages to the model, first the first stage where the firm maintains growth at a constant rate for a period of time, followed by the second step where the EVA value remains mostly constant beyond this point.

$$V = BV_0 + \sum_{t=1}^n \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{n+1}}{(1+WACC)^t(WACC-g)}$$

Note: V is firm value;  $BV_0$  is the initial outlay cost; n is the number of years in the forecast period; WACC is the weighted average cost of capital; g is the steady state rate of growth in the next period.

This model is applicable to high tech, new energy, and other businesses. The binary growth model is then used in this paper to calculate the firm value of Ningde Times.

The EVA model of ternary development. The ternary-growth model is an extension of the two-time-point model, since in reality few firms are able to sustain a constant growth rate, and further subdivision of growth stages may increase the accuracy of the calculation, though it is seldom used in practice because it is unwieldy.

$$V = V_0 + \sum_{t=1}^m \frac{EVA_1}{(1+WACC)^t} + \sum_{t=n+1}^n \frac{EVA_1}{(1+WACC)^t} + \frac{EVA_{n+1}}{WACC-g}$$

## 4. Study Results

### 4.1 Ningde Times Corporate Profile

Ningde Times New Energy Technology Co., Ltd. was founded in 2011, as the first Chinese company to enter the new energy sector and with its first mover advantage has now become the leading company in the new energy sector in China and is also at the top of the industry in the world. Ningde Times' core business is split into three parts: power cells, energy storage systems, and lithium battery materials. Ningde Times, formerly a subsidiary of ATL, has benefited from the third technological revolution and exponential growth in the development of smart electronic devices, which has made ATL the world's largest supplier of polymer lithium batteries. In the field of lithium batteries, Ningde Times has inherited ATL, and has been fairly successful in carving out a niche for itself in the energy battery market.

Due to its R&D benefits in ternary lithium batteries and the subsequent incremental implementation of new energy policies, Ningde Times has steadily grown its domestic and international market share, particularly in China where its market share has risen to 51%, boasting of a dominant position. Ningde Times was also listed on the Shenzhen Stock Exchange in 2018 due to its dominant position in the emerging energy sector, and with a wider fundraising channel, Ningde Times has now grown into a business giant with a market capitalization of almost \$500 billion. Ningde Times will continue to develop even more excellent products in energy storage batteries and systems, still at the cutting edge of the new energy sector in the future.

#### *4.2 Applicability of EVA Model to Ningde Times Evaluation*

(1) In comparison to the cost method, the new energy vehicle battery companies are happy technology companies, which have a relatively high proportion of R&D expenditure, but the current R&D expenditure of the enterprises will only be recovered in the future, for example, the cost method that considers only current expenditures and revenues will ignore the value produced by firms in the future; in addition, compared with traditional enterprises, the profitability of technology enterprises mainly depends on their innovation ability, intellectual In addition, the profitability of technology enterprises, as compared to traditional enterprises, depends mainly on their innovation capabilities, intellectual resources, patented technologies, business models, corporate strategies and organizational structures, which are abstract assets.

(2) In comparison to the cash-flow method, the market for new energy products is an emerging market with enormous potential to be explored and a fully competitive market environment has yet to form. When cash flows are so volatile, it is extremely inaccurate to use the cash flow method to evaluate the value of a company.

(3) In the relative value approach, the precision of the assessment is related to the number of similar firms available for reference. For the new energy industry, however, which is still in its infancy, the difficulty of finding a number of similar companies in the market, particularly for Ningde Times, which is already a leader in the industry, means that the relative value method cannot accurately assess the value of the company.

(4) The EVA valuation model focuses on the firm's net after-tax profit, focus on the operating conditions of the business, which can help the business discover new points of profit growth, and may also effectively avoid the problem of fluctuating firm cash flows caused by investment, in order to make the results of assessing firm value based on continuous and stable earning more realistic and reliable. Second, the EVA valuation model also incorporates the opportunity cost of equity capital, which may help firms adjust their own capital cost structure in a timely fashion based on the cost of capital in the same industry so as to achieve the goal of cost savings.

#### *4.3 Selection of EVA Adjustment Items for Ningde Times*

Overall, EVA has a large number of fit elements, and different criteria must be adopted for different industries according to the principles of concreteness and applicability. Wang (2017) suggested that the adjustment items of the EVA model should be controlled to 5-10 items for consideration of cost-effectiveness, so as to achieve relatively accurate results. On this basis, this paper combines the environment of the new energy industry and the own situation of Ningde Times companies, the items to be adjusted for the accounting items are as follows.

(1) Deferred income taxation. Deferred income tax is the difference between the tax paid and the tax payable by a company. A deferred income tax asset is an asset that has been paid for and cannot be used to create future economic benefits for the business. Accordingly, in accordance with the principle of substance over form, they must be excluded from the total capital in the actual process of calculation. In

contrast, deferred tax liabilities are tax advantages enjoyed by the firm and should be included in total capital as a portion of invested capital.

(2) Interest charges. Since interest expense has been included as an element of the cost of debt in the calculation of EVA-weighted average capital, it would have to be adjusted in calculating the after-tax operating profit.

(3) Expenditures for research and development. As most new energy enterprises are high-tech enterprises, high investment in R&D is one of the characteristics of high-tech enterprises, so R&D expenses are the focus of adjustment. Since the EVA approach encourages firms to engage in R&D, according to the EVA view, expensed R&D expenditures should be capitalized as part of the firm's total capital. So, it would have to be adjusted in calculating net operating profit after taxes and total capital.

(4) Non-recurrent gains and losses. As a representative of the new energy industry, non-operating revenues and expenses are not part of the ordinary business of the company, specifically, Ningde Times, received a large amount of government subsidy and thus should be excluded from the calculation.

(5) The provision for the impairment of property. Asset impairment provision is an allowance account for the assets of a firm where the total inflow of economic benefits from assets is not materially altered in the case of a provision to be held for an extended period of time, and thus the present value of the asset impairment provision should be added to the calculation.

#### *4.4 Analysis of Current State of Ningde Times Finances*

In the next section, Ningde Times will be analysed on the basis of its financial statements for the last five years (2017-2021) from three perspectives: profitability, solvency and operating capacity so as to make some assessment of its financial condition and pave the way for the EVA valuation method later on.

##### *4.4.1 Profitability Analysis*

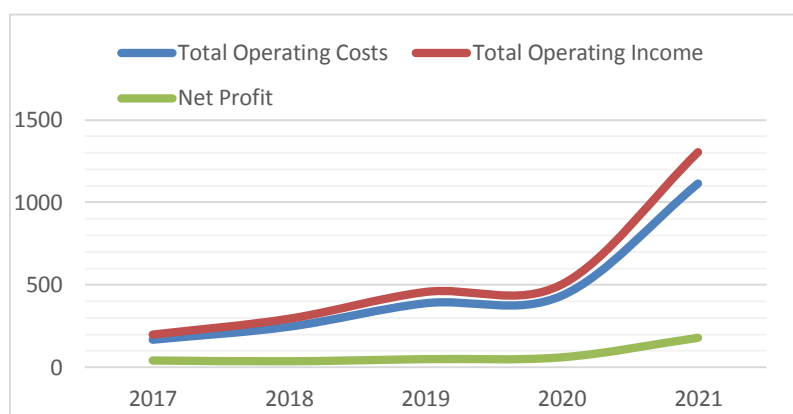
As shown in Table 1 and Figure 1, Ningde Times' return on net assets and net margin on total assets nearly doubled in 2021 after three consecutive years of decline from 2018 to 2020, peaking in 2021. This was primarily due to Ningde Times having a "bumper year" in 2021, with its net profit skyrocketing 192.61% to 17.86 billion Yuan, more than 20 times higher than the industry average, leading directly to a doubling of NAV. The reason that the total net asset margin did not skyrocket was that Ningde Times' rapid expansion was the cause of its fixed assets, ongoing construction and other assets to nearly double that of the previous year, which substantially offset the growth in net profit and the increase in its equity multiplier also contributed to the growth in the return on net assets.

Ningde Times' gross profit margin also continued to decrease, indicating that its production costs were also increasing at a very rapid rate, compensating profits from increased operating revenues, so the firm's ability to control costs must be strengthened. At the same time, the gradual reduction in government subsidies and the worldwide increase in the price of lithium ore for 16 months in a row further compressed the profit margin of Ningde's battery products.

In contrast, the net margin of sales grew slowly after a decline, indicating that the growth rate of its administrative expenses, selling expenses and financial expenses was lower than the growth rate of



operating revenue, which contributed to a slight increase in the net margin of sales that laterally confirmed that his “three expenses” were still under control in a reasonable range. We must note, however, that Ningde Times’ asset impairment losses are increasing at a very rapid rate, which has significantly dragged down the improvement in the net profit margin.



**Figure 1. Changes in Operating Costs, Operating Income and Net Profit of Ningde Times**

**Table 1. Analysis of Ningde Times Profitability Indicators**

Type	Yearly	2017	2018	2019	2020	2021
	Return on Net Assets (weighted)		18.99%	11.75%	12.78%	10.91%
Return on Net Assets (average)		19.30%	11.75%	12.83%	11.27%	21.52%
Net Margin on Total Assets		10.72%	6.05%	5.72%	5.40%	8.56%
Net Sales Margin		20.97%	12.62%	10.95%	12.13%	13.70%
Gross Profit Margin on Sales		36.29%	32.79%	29.06%	27.76%	26.28%
$\frac{\text{Total Operating Costs}}{\text{Total Operating Revenue}}$		84.39%	86.89%	88.72%	86.42%	85.43%
$\frac{\text{Selling Expenses}}{\text{Total Operating Revenue}}$		3.98%	4.66%	4.71%	4.41%	3.35%
$\frac{\text{Administrative Expenses}}{\text{Total Operating Revenue}}$		14.78%	12.10%	10.54%	3.51%	2.58%

<u>Finance Costs</u>					
Total Operating Revenue	0.21%	-0.94%	-1.71%	-1.42%	-0.49%
<u>R&amp;D Expenses</u>					
Total Operating Revenue	6.64%	6.72%	6.53%	7.09%	5.90%
Cost Margin	25.37%	16.54%	14.04%	16.06%	17.86%

#### 4.4.2 Debt Servicing Capability Analysis

Table 2 shows that, in terms of capital structure, Ningde Times' gearing ratio and its financial leverage ratio are steadily increasing apart from minor fluctuations in all the other indicators. Ningde Times, in particular, has a high proportion of present assets in total assets, which is primarily due to its holding of much higher levels of money holdings and inventories than its peers, which both make up about 40% of total assets, indicating that it has a significant amount of funds flowing into its operations. Current liabilities also account for about two-thirds of total liabilities, which consists mainly of notes payable, accounts payable and dividends payable, indicating that Ningde Times has an extremely strong voice in the industry chain and that both upstream and downstream firms are willing to sell on credit, which allows it to take over the funds of other firms without interest. The higher level of side-by-side current liabilities relative to industry confirms the firm's higher operational risk and capital constraints, and the need to be alert to the potential for its cash flow to break down.

Ningde Times's current ratio, the quick ratio, and the cash ratio have fallen significantly in terms of solvency and are lower than the industry average. This is due to the company's rapid expansion, which has stretched its working capital and therefore stimulated a significant increase in both long and short-term debt, although the steady increase in net cash flow from operating activities/net debt indicates that its solvency is gradually increasing and that the fundamental rights of creditors may be effectively safeguarded.

Despite this, it is worth noting that money funds and interest-bearing liabilities have exceeded the industry average after rapid growth and may have high potential risks.

**Table 2. Analysis of Ningde Times's Debt Servicing Capacity Indicators**

Type	Yearly	2017	2018	2019	2020	2021
	Capital Structure					
Gearing Ratio		46.70%	52.36%	58.37%	55.82%	69.9%
Equity Multiplier		1.88%	2.10%	2.40%	2.26%	3.32%

<u>Current Assets</u> Total Assets	66.51%	72.97%	70.74%	72.06%	57.77%
<u>Non – current Assets</u> Total Assets	33.49%	27.03%	29.26%	27.94%	42.23%
<u>Current Liabilities</u> Total Liabilities	77.14%	80.36%	77.09%	62.89%	69.45%
<u>Non – current Liabilities</u> Total Liabilities	22.86%	19.64%	22.91%	37.11%	30.55%
Debt Service Capacity					
Current Ratio	1.85%	1.73%	1.57%	2.05%	1.19%
Quick Ratio	1.66%	1.51%	1.32%	1.81%	0.92%
Cash Ratio	1.09%	1.21%	2.10%	1.30%	0.64%
Equity Ratio	0.88%	1.10%	1.40%	1.36%	2.54%
<u>Net cash from Operating</u> Net Debt	-4.63%	-1.13%	-2.77%	-0.75%	1.87%

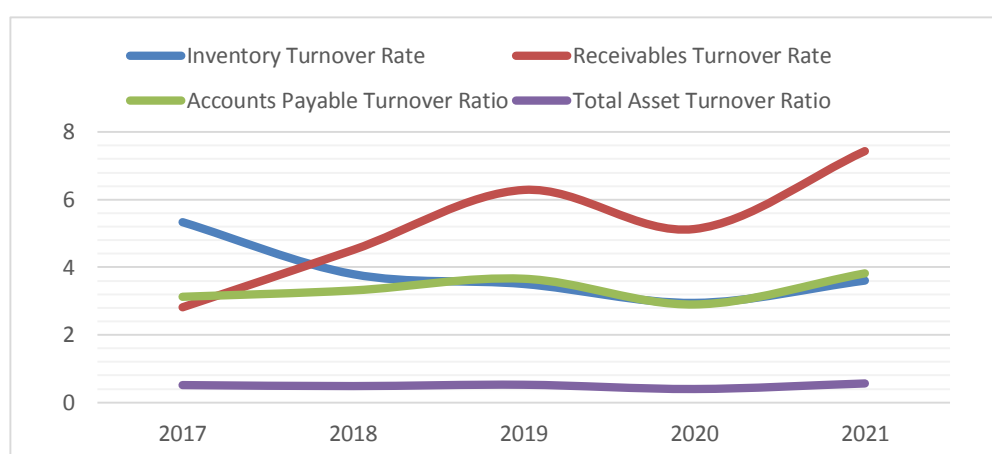
#### 4.4.3 Operating Capability Analysis

Consistent with Figure 2 and Table 3, it can be seen that in terms of inventory turnover, The liquidity of Ningde Times' stocks declines year on year from 2018 to 2020, with a short rise in 2022, but there is still a large gap from the average for the industry, which leads Ningde Times to incur asset impairment losses of 1, 434 million Yuan, 827 million Yuan, and 2, 034 million Yuan, respectively, during the period 2019 to 2021, indicating that the mismatch between its sales capacity and its production capacity has led to a serious decline in the overall performance of the Company.

Ningde Times' receivables turnover showed an overall increase in accounts receivable, which were all higher than the industry average, indicating that its receivables management capability was stronger and that its stronger collection capability could substantially reduce the risk of bad debt. Ningde Times' turnover in accounts payable remained steady, but slightly below the industry level in terms of accounts payable, indicating that the firm has a stronger ability to make payments when they are due and is able to make payments sooner than its competitors in the same sector. Coupled with the large proportion of accounts payable and notes payable within Ningde Times' existing liabilities, this may be a side-note to prove that both upstream and downstream firms in the supply chain are more willing to sell to it on credit, which is conducive to the formation of a stable and harmonious relationship with the supplier and the enhancement of its commercial reputation in the supply chain. This practice, however, not only requires

firms to reserve more money for repayment in their day-to-day operations, but also places greater demands on the firm's capital operating capacity, which increases cash flow risk.

Ningde Times' total asset turnover ratios fluctuate less in terms of total assets and are all less than the industry average. The reason for this is that Ningde Times belongs to an asset-heavy and capital intensive technology manufacturing industry, and at the same time, as it has been expanding its industrial scale over the last five years, making its fixed assets, construction in progress, and other assets grow at an extremely rapid pace, which is much higher than the industry average, so it still takes Ningde Times a while to get its production capacity out and sell its products This determines that its turnover rate is bound to go down.



**Figure 2. Analysis of Ningde Times' Operating Capacity Indicators**

**Table 3. Analysis of Ningde Times' Operating Capacity Indicators**

Type	Yearly	2017	2018	2019	2020	2021
	Operating Cycle (Days)		195.63	174.80	160.08	192.7
Inventory Turnover (Days)		67.50	94.91	102.83	122.34	100.07
Turnover Days of Accounts Receivable (Days)		128.13	79.90	57.25	70.23	48.39
Inventory Turnover Rate (Times)		5.33	3.79	3.50	2.94	3.60
Accounts Receivable Turnover (Times)		2.81	4.51	6.29	5.13	7.44
Current Assets Turnover Rate (Times)		0.73	0.68	0.73	0.55	0.90
Fixed Assets Turnover Rate (Times)		3.35	2.99	3.16	2.72	2.78

Total Assets Turnover Rate (Times)	0.51	0.48	0.52	0.39	0.56
Accounts Payable Turnover(Days)	3.13	3.31	3.66	2.89	3.82

In short, in terms of profitability Ningde Times' return on net assets was growing at a satisfactory pace, but it is noteworthy that its production costs are high and the rate of growth of "three-expenses" is accelerating, which must be properly curbed to further improve the profit margin of its products. Both the current ratio and the prompt ratio are well below the industry average in terms of solvency, indicating that its debt is expanding rapidly and that even with a large amount of money on its books it has not been able to improve its creditworthiness. Ningde Times performed well in terms of operating capacity in terms of customer turnover and turnover in accounts payable, but its performance with respect to total asset turnover and inventory turnover was concerning.

#### 4.5 Applying EVA Model Specifically to Ningde Times

##### 4.5.1 Calculation of EVA Valuation of Ningde Times at One Stage

###### (1) Calculating the Net Profit from Post Tax Operations

Using the adjustment terms from the previous section, we have rescaled net profit after taxes. Adjusted net profit from operations after tax = (net profit + interest expense + income tax expense) x (1 - income tax rate) + non-operating income + change in value of deferred income tax + research expenses + provision for impairment of current assets.

Ningde Times financial data from 2016 to 2021 were used to calculate the pre-interest and tax profit level as shown in Tables 4. Since there are several Ningde Times subsidiaries with different applicable income tax rates and different incentives, for the purposes of this paper, we used the nominal interest rate of 15% for Ningde Times' parent company and did not consider its effective income tax rate.

**Table 4. Ningde Times EBIT 2016-2021 (Unit: Million Yuan)**

Type	Yearly	2016	2017	2018	2019	2020	2021
	Operating Profit		338218.62	492598.36	416847.63	575879.33	695948
Income Tax Expense		48177.69	65404.36	46891.68	74809.07	87863.54	202639.9
Interest Expense		8044.38	4216.97	20443.53	28925.45	64043.43	116110.04
Profit Before Interest and Tax		394440.69	562219.69	484182.84	679613.84	719768.11	2301122.86
Nominal Tax Rate		0.15%	0.15%	0.15%	0.15%	0.15%	0.15%

Profit after Interest and Tax	335274.58	477886.73	411555.42	577671.76	611802.89	1955954.43
Add: Research and Development Expenses	108098.81	160291.92	199100.04	299210.75	356937.77	769142.76
Deferred Income Tax Liabilities	-209.06	4086.2	-2800.76	5020.75	-567.31	95305.81
Non-operating Expenses	88.15	257.58	2596.63	6045.68	7125.42	11963.98
Increase in Provision for Asset Impairment	17521.72	1088.52	73016.81	-240924.13	-50053.36	87826.75
Less: Deferred Income Tax Assets	12967.06	12967.06	73069.25	83847.28	108789.94	237544.45
Non-operating Income	18897.45	1865.55	73069.25	6242.81	9431.81	18303.97
Adjusted Net Profit from Operations After Tax	428909.69	628778.34	537329.63	556934.72	807023.66	2664345.31

## (2) Calculation of Total Capital

Using the adjustment items from the previous section, we excluded items related to income tax assets and reversed search costs, items relating to non-operating income and asset impairment reserves when calculating the total capital of Ningde Times. The final formula for calculating total capital is: Total capital = common equity + minority interest + short-term borrowings + long-term borrowings due within one year + bonds payable + long-term borrowings + research expenses + non-operating income - increase in deferred income tax assets + decrease in deferred income tax liabilities + provision for asset impairment for the year. Detailed calculations are given in Tables 5.

**Table 5. Ningde Times's Adjusted Total Capital (Unit: Million Yuan)**

Yearly Type	2016	2017	2018	2019	2020	2021
Short-term Loan	338218.62	492598.36	416847.63	575879.33	695948	1982372.92
Bonds payable	48177.69	65404.36	46891.68	74809.07	87863.54	202639.9
Non-current liabilities due within one year	8044.38	4216.97	20443.53	28925.45	64043.43	116110.04

Long-term loan	394440.69	562219.69	484182.84	679613.84	719768.11	2301122.86
Total debt capital	176909.92	473913.59	559988.39	969201.76	2813453.82	5364572.05
Equity in ordinary shares	1548864.63	2470143.96	3293828.09	3813498.39	6420729.94	8451327.13
Minority interests	30247.28	176979.95	226188.97	405289.13	498741.71	810890.32
Total equity capital	1579111.91	2647123.91	3520017.06	4218787.52	6919471.65	9262217.45
Add: Provision for asset impairment	23385.89	24474.40	97491.22	-143432.92	-193486.28	-105659.53
Current						
Research and development expenses	108098.81	160291.92	199100.04	299210.75	356937.77	769142.76
Balance of deferred income tax liabilities	2813.01	6899.21	4098.45	9119.19	8551.88	103857.69
Non-operating expenses	88.15	257.58	2596.63	6045.68	7125.42	11963.98
Less: Deferred income tax assets	26491.20	51004.52	124073.77	207921.05	316710.99	554255.44
Non-operating income	18897.45	1865.55	6230.33	6242.81	9431.81	18303.97
Total capital	1882813.93	3263821.65	4265448.34	5157253.74	9585911.46	14833534.93

Using total equity and total debt capital derived in Table 5, we again calculated the weights on their equity and debt capital and report the results in Table 6.

**Table 6. Equity Capital and Debt Capital Ratios for Ningde Times from 2016-2021**

Type \ Yearly	2016	2017	2018	2019	2020	2021
Share of Debt Capital	9.4%	14.52%	13.13%	18.79%	28.91%	36.68%
Share of Equity Capital	91.6%	85.48%	86.87%	81.21%	71.09%	63.32%

### (3) Calculation of The Weighted Cost of Capital

This paper has selected relevant data for the calculation of weighted average capital based on the following considerations: first, in order to keep the risk-free rate objective and stable, in this paper, the 5-year cash flow rate was taken as the risk-free rate level. The 5-year cash flow rate is reported to be 4.27% from 2016 to 2019 and the adjusted rate is 3.97% in 2020; second, in the case of the market risk premium, this paper uses China's GDP growth rate in each year as a benchmark, while also considering the significant slowdown in GDP growth in 2020, it is appropriate to include the coefficient on inflation; finally, for the Beta coefficient, from 2016 to 2019, the Due to the relative difficulty of gathering information and the listing of Ningde Times in 2018, the average value of the Shenzhen-Shanghai 300 energy storage equipment sector is selected. 2020-2021 is chosen as the level of the coefficient obtained by deleting the Ningde Times financial leverage coefficient from the WAND database as the metric for this article.

Furthermore, when calculating the cost of debt capital, in 2016 to 2019, the level of conventional bank interest rates and the average level of interest rates on general corporate debt are used; from 2020 to 2021, looking at the financial reports of Ningde Times for every year after 2018, the amount of short-term borrowings, bonds payable, non-current liabilities due within a year and long-term borrowings as well as the range of interest rates for each year can be known and calculated by a weighted average calculation in order to calculate the average level of interest rate on the debt for each year.

According to the capital asset pricing model equation:

$$K_e = R_f + \beta (R_m - R_f)$$

Notes:  $K_e$  is the cost of equity capital;  $R_f$  is the risk-free rate;  $R_m$  is the market risk premium rate.

Using the formula above and related data, the weighted average capital of Ningde Times for the years 2016-2021 can be derived and computed as shown in Table 7.



**Table 7. Weighted Average Cost of Capital for Ningde Times 2016-2021**

Type \ Yearly	2016	2017	2018	2019	2020	2021
Risk-free Rate	4.27%	4.27%	4.27%	4.27%	3.97%	3.97%
Market risk Premium Rate	6.70%	6.90%	6.60%	6.10%	2.20%	8.10%
Beta Factor	0.7883	0.7883	0.7883	0.7883	0.86	0.85
Cost of Equity Capital	9.55%	9.71%	9.47%	9.08%	5.86%	10.86%
Short-term Loan Rate	4.35%	4.35%	4.35%	4.35%	4.25%	4.50%
Interest Rate on Bonds Payable	3.68%	3.68%	3.68%	3.68%	3.52%	3.39%
Long-term Loan (Including Bonds payable Within One Year)	4.90%	4.90%	4.90%	4.90%	4.90%	4.90%
Weighted Average Cost of Debt Capital of Above 3 Items	4.52%	4.64%	4.78%	4.59%	4.05%	4.36%
Weighted Average Cost of Capital	9.59%	8.97%	8.85%	8.24%	5.34%	8.47%

#### (4) Calculations of EVA Values from 2016 to 2021

Based on adjusted net profit from operations (NOPAT) in Table 4, total cost of capital (TC) in Table 5 and weighted average cost of capital (WACC) in Table 7.

According to the formula of the EVA calculation:

$$EVA = NOPAT - WACC * TC$$

It is possible to calculate EVA for each of the years 2016-2021 for Ningde Times and the results are given in Table 8.

**Table 8. Ningde Times EVA by Year 2016-2021(Unit: Million Yuan)**

Type \ Yearly	2016	2017	2018	2019	2020	2021
EVA	248295.98	335890.97	159635.24	132171.09	295357.43	1407338.06

#### 4.5.2 Ningde Times Second-stage EVA Evaluation Calculation

A review of the relevant literature revealed that the mean EVA growth rate for each year in the base period is often used when calculating future EVA values. However, when the EVA value of Ningde Times was calculated for 2016-2021, it was found that its growth rate of EVA for 2021 reached about 300% in

2021 due to the rapid growth of its adjusted net operating profit, which is not representative of its normal level of growth. Consequently, in the actual calculation of the second-stage EVA value, on the one hand, the highest and lowest values of the EVA growth rates for each year were removed and the average growth rate over four years was used as the second-stage growth level; in contrast, estimates of the net profit and total capital of large brokerage houses such as CITIC Securities and Guotai Junan were used as the starting point, and the rates of adjustment for each item in the past were used as a reference point to further adjust the estimates to the new Recalculate the Phase II EVA value estimated using the basic EVA calculation formula. Lastly, the mean of the two EVA values of Ningde Times in the second step was calculated, and the current value was then computed based on the mean EVA value. Table 9 shows the specific computational results.

**Table 9. 2022-2027 Ningde Times EVA (Unit: Million Yuan)**

Type \ Yearly	2022	2023	2024	2025	2026	2027
Estimated Average Net Profit (Adjusted)	2952701.25	4181687.50	4865025.00	6266152.20	-	-
Estimated Total Capital (Adjusted)	17058565.24	21323206.55	26654008.19	33317510.23	-	-
Weighted Average Cost of Capital Estimate	8.65%	8.65%	8.65%	8.65%	-	-
EVA Based on Pro Forma Adjusted	1477135.36	2337230.13	2559453.29	3384187.56	-	-
EVA Based on One Period Growth Rate	1576218.62	1765364.859	1941901.34	2233186.55	3229990.11	3552989.13
Average EVA	1526676.99	2051297.49	2250677.32	2808687.06	3229990.11	3552989.13
Discount Rate	0.9196%	0.8457%	0.7778%	0.7152%	0.6578%	0.6049%
Present Value of EVA	1403932.16	1734782.29	1750576.82	2008772.98	2124687.50	2149203.12

According to the EVA binary growth model:

$$V = BV_0 + \sum_{t=1}^n \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{n+1}}{(1+WACC)^t(WACC-g)}$$

The WACC metric used in the calculation is 8.65%, which is the average of the weighted average capital over a period of years and is assumed to grow at this level over the next five years. In addition, based on the perpetual growth rate, the following formula was used:

perpetual growth rate = net the equity margin \* (1 - dividend payout ratio) / 1 - the net equity margin \* (1 - dividend payout ratio).

For each year in the period, the highest level of 12.3% and the lowest level of 2.7% were removed from the calculation and the average of 6% over the four years was chosen as the standard rate, so that  $g = 6\%$ .

Table 10 shows the results of the calculation.

**Table 10. Intrinsic Value Per Share under The EVA Binary Growth Model (Unit: Million Yuan)**

Initial Invested Capital (2021)	$\sum_{2022}^{2026} \text{EVA}$	Discount Value (2027)	Corporate Value (2021)	Value of Liabilities (2021)	Number of Ordinary Shares (2021)	Intrinsic Value Per Share (2021)
14833534.93	11867328.97	81102004.61	107802868.58	21504468.64	233085.12 million shares	370.24Yuan

#### 4.6 Results of Applying EVA Model in Ningde Times

Using data from each year's annual report and EVA's binary growth model, it was calculated that the intrinsic value of Ningde Times as at 31 December 2021 was 107, 802, 868, 580, 000 Yuan and the value of its liabilities was 21, 504, 468, 400 Yuan, which could yield its equity value of 86, 298, 399, 400 Yuan, and the number of its ordinary shares on the day of querying the enterprise's financial statements was 23, 308, 512, 000 shares, The intrinsic value of Ningde Times' shares per share can be calculated to be 370.24 Yuan, which is significantly lower than the closing price of 588 Yuan that day, indicating that its stock price is overstated. In China's current development of the capital market is not mature enough, the market share price is mainly determined by the prevailing cash flow, a variety of factors mean that the stock price does not fully reflect the true value of the company, from time to time, the stock price deviates from the true value of the firm. As of October 29, 2022, the date of writing's completion, the closing price of Ningde Times in the Chinese A share market on that day was 365.5 Yuan per share, taken together with the trend in the Ningde Times k-chart this year is broadly consistent with the trend predicted in this paper, indicating that the inflated share price of Ningde Times is completing its return to the value itself, as a result, the results of this paper for the Ningde Times business value calculation have a strong benchmark value. This demonstrates that the EVA evaluation model parameters used in this paper are more accurately selected for fitting, and tests the practicality of EVA model in the emerging energy sector.

## 5. Conclusions and Recommendations

### 5.1 Conclusions

To summarize, the EVA model considers the weighting of debt and equity capital in assessing firm value, focuses on shareholders' equity, and the value of the firm calculated using EVA indicators is relatively reliable. In this article Ningde Times, a representative firm in the new energy sector, was chosen as an example to perform the business value assessment under the EVA model, analyze various financial indicators, and estimate business value. By thoroughly understanding the EVA model and estimating the firm value of the case firm, in this study, we have improved our knowledge and understanding of the model, provided ideas for reference and benchmarking the new energy industry using the EVA model, and expanded and extended based on previous EVA model research, enriched the research theory of the EVA model, and provided supporting evidence for the application of the EVA method in the new energy industry. The paper also validates the validity and rationality of its research in this field and contributes to the popularity of EVA model in the new energy industry.

Areas for improvement in this paper: First, there are numerous accounting adjustments to EVA, and this paper selects only a few of the basic adjustments for the new energy industry, and there is no unified standard for EVA adjustments at the international level. Furthermore, only publicly traded representative firms in the new energy industry have been selected for EVA modelling, which is not general enough to evaluate the value of other types of firms in the industry; lastly, only economic but not social factors have been considered in EVA calculations, and social factors should be included as a significant influencing variable in the calculation of firm value. Which serves as a reference point for subsequent research.

### 5.2 Recommendations

#### 5.2.1 The New Energy Industry Features of High R&D and High Subsidies Should Be Considered When Adjusting Accounting Items

So that it can reflect the actual operating capability of the company, in the EVA model, accounting items are typically adjusted for net profit. Up to 164 adjustment items are initially identified, but too many adjustment items may make the entire assessment process too complex, difficult to understand, and the accuracy of the data cannot be guaranteed. Thus, when applying the EVA model to the assessment of firm value, adjustments should be made to items that have a high degree of impact, taking into account the specifics of the industry. New energy companies are more dependent on capital investment and technology research and development than are traditional companies, and high levels of investment in research and development are among the characteristics of high-tech firms, thus, research and development expenditures should be the focus of the adjustment; in addition, new energy companies enjoy greater policy benefits, such as the amount of government subsidy they receive, since non-operating income and expenses are not part of the day-to-day operations of the business, non-recurring gains and losses should therefore be included in the calculation. The non-recurring gains and losses should be left out of the calculation.

### 5.2.2 In Order to Measure the Present Value of Future EVA, the Choice of the Discount Rate Must Be Combined with the Characteristics of the Present Capital Market

We have read a large body of literature and found that the new energy industry typically uses the weighted average cost of capital as its discount rate. Given that China's capital market is still in a state of development, the changes brought about by capital market development have some bearing on the choice of discount rate, and the accuracy of discount rate selection is also affected to some degree. Thus, when choosing the discount rate, the current state of capital market development must be taken into account and the selection must be made in conjunction with industry characteristics.

### 5.2.3 In Forecasting Future Earnings, the Rate of Growth Should Be Set in Conjunction with the State of Development of the Firm

To measure the value of the firm, we use forecasts based on the firm's historical data in previous years, and forecasts of the future growth rate are also based on historical information. It is important to combine the setting of the growth rate with the life cycle in which the firm is currently located, and application of the business value measurement model should be evaluated, and the framework would need to be combined with the macro market environment and overall industry development, with the aim of reducing the deficiencies brought about by fixing the growth rate solely on the basis of historical data.

### 5.2.4 When Measuring Firm Value, It Is Important to Consider the Impact of Nonfinancial Factors on Firm Value

The measurement data used in firm value assessment is fundamentally derived from the financial statement information of the firm, but for the evaluation of firm value it is often necessary to take into account the influence of non-financial factors such as firm reputation, system of internal control and human resources on the firm while the influence of non-financial factors has been largely ignored in the application of the model at the present time. We have not yet considered the impact of nonfinancial indicators in this study, there is, therefore, some influence on the outcomes of enterprise value assessment.

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