

Financially Material ESG Factors in DCF Valuation: A Retrospective Scenario Analysis of BYD

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Abstract. BYD's 2025 financial statements highlight a challenging valuation problem: while revenue continued to grow, operating cash flow weakened as capital expenditure reached RMB 140.2 billion. This essay constructs three retrospective free cash flow to the firm (FCFF) scenarios extending to 2035 based on BYD's annual report and sustainability report. Sustainability indicators are only considered when they affect forecast inputs; no additional ESG premium is applied. Assuming a weighted average cost of capital (WACC) of 6.6%, the estimated equity values per share under the downside, base-case, and upside scenarios are RMB 56.60, RMB 98.88, and RMB 130.66, respectively. In the base-case scenario, the present value of terminal value contributes 78.8% of enterprise value, indicating substantial dependence on long-term assumptions. Consequently, valuation outcomes are highly sensitive to assumptions regarding margin improvements, capital expenditure normalization, and terminal value parameters. By linking financially significant sustainability disclosures to specific DCF input parameters, this study provides a transparent framework for integrating ESG information at the corporate level without arbitrarily adding ESG premiums. The findings offer practical insights for investors assessing capital-intensive firms, whose valuations are heavily dependent on long-term reinvestment and terminal value assumptions.

Keywords: ESG, financial materiality, discounted cash flow, WACC, corporate valuation

1. Introduction

BYD shows the tension between growth and cash generation particularly clearly. In 2025, the company's operating revenue reached RMB 803.965 billion, but net cash flow from operating activities fell from RMB 133.454 billion in the previous year to RMB 59.136 billion; at the same time, capital expenditure as reported in the annual report rose from RMB 92.534 billion to RMB 140.222 billion [1]. The level of capital expenditure is significantly higher than net operating cash flow for this year, reflecting the considerable pressure on free cash flow faced by the company during its expansion phase. So, whether current investments can be converted into sustainable operating cash flow in the future constitutes the central issue in the valuation. Khan et al.'s distinction between material and non-material sustainability issues provides a more direct methodological basis for the industry-specific materiality screening adopted in this paper [2]. Caution is nevertheless required when applying this screening method in China, as ESG disclosure

remains largely voluntary and there are differences in the regulatory and measurement frameworks between the mainland and Hong Kong markets [3].

Building on the above discussion, this paper further examines which company-level sustainability disclosures can provide concrete grounds for DCF forecast variables. ESG-related operational disclosures, such as increases in warranty provisions, are used to construct stress scenarios for operating profit margins; changes in inventory turnover days are used to determine working capital assumptions, while capital expenditures, construction in progress, and capital commitments are used to establish the intensity of recent investment and its subsequent normalization path. The contribution of this study lies in translating financially material, firm-specific sustainability disclosures into explicit DCF assumptions, rather than treating ESG performance as a uniform valuation premium. This approach provides investors with a transparent framework for assessing how sustainability-related operating risks affect profit margins, working capital, capital expenditure, and, ultimately, firm value.

2. ESG materiality and valuation framework

ESG information is included in the analysis only where it can be linked to specific DCF forecast variables. Warranty-related risks inform assumptions regarding operating profit margins; inventory turnover affects working capital; and investment in manufacturing affects capital expenditure. The selection of these indicators follows the principle of financial materiality proposed by Khan et al., while the numerical assumptions are based on data disclosed by BYD [2].

There is no unconditional correlation between ESG performance and financing costs. Dhaliwal et al. found that, amongst firms that began publishing corporate social responsibility reports, only those with relatively strong social responsibility performance subsequently experienced a decline in the cost of equity capital [4]. With regard to negative environmental and social issues, the evidence concerning debt financing is more conclusive. Chava found that US firms facing significant environmental issues—such as emissions, hazardous chemicals, or climate change—encountered higher costs of equity capital and bank lending rates [5]. Goss and Roberts also found that US firms with negative corporate social responsibility (CSR) issues had bank lending spreads approximately 7 to 18 basis points higher [6]; however, banks' response to firms proactively engaging in CSR activities depended on the borrower's credit quality. In the Chinese market, Yeh et al. found that better corporate social responsibility performance is associated with lower debt financing costs but did not find that it significantly reduces the cost of equity [7].

As these studies provide average correlations for samples of firms across different markets, rather than BYD's own risk parameters, this paper does not directly adjust BYD's weighted average cost of capital (WACC) upwards or downwards on this basis. The WACC should be estimated separately based on market data, BYD's cost of debt, and capital structure assumptions. The ESG-related indicators are incorporated into the valuation model through their potential effects on operating performance, reinvestment requirements, and working capital efficiency. To avoid double-counting, each ESG indicator is assigned to one primary financial channel. This classification represents a modelling convention rather than an assumption that each factor affects only one aspect of firm value.

3. Data and method

3.1. Data sources and accounting adjustments

The accounting reference date is 31 December 2025, and the information cut-off date is 27 March 2026, by which both the annual report and sustainability report had been published. Therefore, this study adopts a retrospective valuation approach based on information available up to 27 March 2026. Starting from a reported operating profit of RMB 40.185 billion, net financial income of RMB 649 million, investment income of RMB 2.857 billion, fair value gains of RMB 364 million, and disposal gains of RMB 28 million are deducted, resulting in an adjusted EBIT of RMB 36.287 billion, representing 4.51% of revenue. As no reliable breakdown of recurring items has been disclosed, other income and impairment losses are retained in the financial statements. A tax rate of approximately 15% is applied, which is broadly consistent with the reported tax expense relative to pre-tax profit.

In 2025, capital expenditure accounted for 17.44% of revenue, compared with 11.91% in 2024. Construction in progress increased from RMB 13.17 billion to RMB 42.815 billion, and capital committed payments reached 32.843 billion [1]. These figures indicate that capital expenditure intensity remained high during the expansion phase. Any subsequent decline in investment intensity is hypothetical: under the base-case scenario, the capital expenditure ratio gradually falls to 8% of revenue by 2030, after which the net reinvestment rate decreases gradually, reaching 12% of NOPAT until 2035.

3.2. ESG materiality mapping and scenario construction

Table 1. ESG materiality mapping and DCF forecast variables [1, 8]

Material issue	Observed 2025 indicator	Forecast use
Product safety and quality	Warranty provision RMB 31.27 bn; 37.6% annual increase	Margin stress
Technology and R&D	R&D investment RMB 63.4 bn; 7.9% of revenue	Revenue-growth cases; R&D remains expensed
Carbon and energy transition	Scope 1+2 emissions 12.26m tCO ₂ e; clean electricity 7.29bn kWh	Capital-spending path
Supply-chain and overseas logistics	Inventory days 72 versus 61; receivable days 29 versus 35	Working-capital cases
Governance and disclosure	Scope 3 emissions reported; climate CapEx not separately identified	WACC sensitivity

Table 1 summarizes the correspondence between relevant ESG indicators and DCF forecast variables. To avoid double-counting, each figure has been allocated to a single primary channel; this categorization is merely a modelling convention and does not imply exclusivity.

Table 2. Scenario assumptions

Assumption	Downside	Base	Upside
Revenue growth, 2026–2030	3%, 4%, 4%, 3%, 3%	8%, 8%, 7%, 6%, 5%	10%, 10%, 9%, 7%, 6%
EBIT margin, 2026–2030	4.3%, 4.4%, 4.5%, 4.6%, 4.8%	4.7%, 5.0%, 5.3%, 5.6%, 6.0%	5.0%, 5.4%, 5.9%, 6.4%, 6.8%
CapEx/revenue, 2026–2030	17%, 15.5%, 14%, 11.5%, 9%	16%, 14.5%, 12%, 10%, 8%	15.5%, 13.5%, 11%, 9%, 7.2%
Delta NWC / incremental revenue	1.5%	1.0%	0.5%
Growth, 2031 to 2035	3.0% to 2.5%	4.5% to 2.5%	5.5% to 2.5%
EBIT margin, 2031 to 2035	4.9% to 5.0%	6.1% to 6.2%	6.9% to 7.0%
CapEx/revenue, 2031 anchor	8.5%	7.5%	6.8%
Net reinvestment/NOPAT, 2035	12.0%	12.0%	12.0%

All scenarios used the adjusted 2025 EBIT margin of 4.51% as a starting point, while future assumptions regarding profitability and investment intensity differ across scenarios. The pace of normalization is considered the primary source of uncertainty. In the downside scenario, capital intensity remains persistently high; in the upside scenario, capital intensity is assumed to ease sooner, while the base-case scenario follows a gradual path. These assumptions are judgement-based stress tests rather than estimated ESG factors (Table 2). The ratio of depreciation and amortisation to revenue is indicated to fall from 9% in 2026 to 7% in 2030, subsequently declining to 6.5% in 2035, and to 6.4% in the positive scenario. A standard WACC of 6.6%, a terminal growth rate of 1.8% and a ROIC of 15% in the mature phase are applied to ensure comparability across scenarios.

3.3. DCF valuation model and assumptions

The valuation is based on free cash flow to the firm (FCFF):

$$FCFF = EBIT(1 - T) + D\&A - CapEx - \Delta NWC \quad (1)$$

where EBIT represents earnings before interest and taxes, T represents the corporate tax rate, D&A represents depreciation and amortisation, CapEx denotes capital expenditure, and NWC represents net working capital. Projected FCFF is discounted using the after-tax WACC. This approach is consistent with Fernández, who distinguishes between free cash flow discounted at WACC and equity cash flow discounted at the required rate of return on equity [9]. The terminal value at the end of 2035 is estimated as a growing perpetual annuity model:

$$TV_{2035} = \frac{FCFF_{2036}}{WACC - g} \quad (2)$$

where g represents the perpetual growth rate. On 12 December 2025, the yield on China's ten-year government bonds stood at 1.84% [10]. Data from Damodaran for January 2026 indicates that China's sovereign default spread was 0.60%, its country risk premium was 0.9%, and its developed market premium was 4.23% [11]. The default spread is deducted to avoid double-counting sovereign risk. The beta coefficient for the global automotive sector is 1.04; under a 90% equity target, this coefficient becomes 1.14 after adjustment for leverage [12]. Year-end share prices imply an equity weighting of approximately 87%–88%; therefore, a 90% target weighting is applied. The cost of equity is estimated as:

$$K_e = (1.84\% - 0.60\%) + 1.14 \times 4.23\% + 0.91\% = 6.97\% \quad (3)$$

Dividing interest expense by average borrowing and lease liabilities yields a pre-tax cost of debt proxy of 3.2%. The resulting WACC is approximately 6.55%; therefore, 6.6% is applied in the model. The nominal terminal growth rate of 1.8% is lower than the final explicit forecast growth rate. Reflecting the transition towards a mature manufacturing stage. The growth assumptions are as follows:

$$g = \text{Reinvestment rate} \times \text{ROIC} \quad (4)$$

At a mature-stage ROIC of 15%, approximately 12% of NOPAT must be reinvested to support the terminal growth assumption. The equity transition includes RMB 28.4 billion in recognised net financial and investment assets. Cash, trading assets and deposits totalling RMB 152.3 billion, together with RMB 33.5 billion in long-term investments, are offset by RMB 119.1 billion in debt and leases, RMB 18.7 billion in perpetual securities, RMB 12.3 billion in non-controlling interests, RMB 0.6 billion in derivative liabilities and RMB 6.7 billion in restricted cash. As the minimum operating cash requirement has not been disclosed, this transition statement remains provisional. Equity value is calculated based on 9.117 billion shares.

4. Results

Table 3 reports the annual base-case forecast; monetary amounts are in RMB billions.

Table 3. Base-case annual forecast

Year	Revenue	EBIT margin	D&A	CapEx	Delta NWC	FCFF	Present value
2026	868.3	4.7%	78.1	138.9	0.6	-26.7	-25.1
2027	937.7	5.0%	79.7	136.0	0.7	-17.1	-15.1
2028	1,003.4	5.3%	80.3	120.4	0.7	4.4	3.6
2029	1,063.6	5.6%	79.8	106.4	0.6	23.4	18.1
2030	1,116.8	6.0%	78.2	89.3	0.5	45.3	32.9
2031	1,167.0	6.1%	79.4	87.5	0.5	51.8	35.3
2032	1,213.7	6.1%	81.6	89.8	0.5	54.5	34.8
2033	1,256.2	6.2%	83.5	91.8	0.4	57.0	34.2
2034	1,293.9	6.2%	85.1	93.2	0.4	59.4	33.4

Table 3. (continued)

2035	1,326.2	6.2%	86.2	94.3	0.3	61.5	32.5
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Note: The total is calculated using unrounded figures and may not match the sum of the amounts displayed. The cash flow inflection point in 2028 is modest in scale and not decisive. NOPAT, together with depreciation and amortisation, totals approximately RMB 125.5 billion, whilst capital expenditure and additional working capital consume RMB 121.1 billion, resulting in FCFF of just RMB 4.4 billion. A slower recovery in profit margins or delayed investment normalization would postpone the improvement in free cash flow. The present value of explicit cash flows is RMB 184.8 billion, whilst their value beyond 2035 stands at RMB 688.4 billion. The resulting equity value is RMB 901.5 billion, or RMB 98.88 per share.

In the downside scenario, sustainable value accounts for 93.4% of enterprise value, compared with 78.8% and 73.7% in the baseline and upside scenarios, respectively. This indicates that the downside valuation is particularly sensitive to assumptions regarding post-2035 growth and profitability. As revenue, profit margins, and investment will also change in tandem, Table 4 does not allow for an isolated analysis of any single ESG exposure. In the main comparison, the ROIC during the maturity phase is set at 15%; if this were set at 12.5% in the downside scenario and 17.5% in the upside scenario, the value per share would be RMB 55.23 and RMB 132.49, respectively.

Table 4. Results of operational scenarios under various conditions regarding the WACC, growth rate and ROIC in the mature phase

Output	Downside	Base	Upside
Enterprise value (RMB bn)	487.6	873.2	1,162.9
Equity value (RMB bn)	516.0	901.5	1,191.3
Implied value per share (RMB)	56.60	98.88	130.66
Terminal value / enterprise value	93.4%	78.8%	73.7%

Given that 78.8% of the base enterprise value is generated after 2035, the WACC and terminal growth rate remain critical. Table 5 adjusts these two parameters independently and reports the value per share in RMB.

Table 5. WACC and terminal-growth sensitivity

Terminal growth	WACC 6.1%	WACC 6.6%	WACC 7.1%
1.3%	105.93	94.00	84.18
1.8%	112.53	98.88	87.85
2.3%	120.84	104.87	92.26

Raising the Delta NWC in the base-case scenario from 1% of incremental revenue to 2% and 3% would only reduce enterprise value to 98.46 RMB and 98.03 RMB. This sensitivity analysis does not reflect sustained changes in cash conversion cycle rate.

The impact of taxation is even more pronounced. Assuming the weighted average cost of capital and operating trajectory keep unchanged, tax rates of 20% and 25% would reduce company value to 91.98 RMB and 85.08 RMB, respectively. This result is important as several disclosed tax incentives are due to expire during the forecast period.

For reference, the closing price of the A-shares on 31 December 2025 was 97.72 yuan; the closing price of the H-shares, at 95.10 Hong Kong dollars, converted at the official central exchange rate of 0.90322 yuan per Hong Kong dollar, equated to 85.90 yuan [13-15]. The benchmark value of 98.88 yuan is 1.2 per cent higher than the A-share price and 15.1 per cent higher than the converted H-share price. Both reports were published after the aforementioned market observation data, and the persistent price differential between A-shares and H-shares further exacerbates comparability issues. The comparison provided here is for descriptive purposes only.

5. Discussion and limitations

The indicators in Table 1 should not be interpreted as direct causal measures of enterprise value. The 37.6% increase in the warranty provision may partly reflect growth in sales volume, whilst the rise in days' inventory from 61 to 72 may reflect stockpiling for overseas markets. As the information disclosed by the company does not allow these causes to be distinguished, it is necessary to analyse product-level impacts or draw on a set of comparable company data.

Capital expenditure represents a more pressing source of uncertainty. Free cash flow is projected to turn positive in 2028, primarily because the ratio of base capital expenditure to revenue is set to fall from 16 per cent in 2026 to 12% two years later, although a recovery in profit margins also plays a role. Construction in progress and committed projects underpin the forecast for the first year but offer little explanation for the subsequent downward trend. If the planned expenditure of 140.2 billion yuan could be broken down into maintenance, capacity expansion and transformation-related costs, this would improve the forecast far more effectively than another aggregate ESG score.

The revised reinvestment path ensures a smoother transition between 2035 and 2036. However, reliance on sustained value remains. Once current incentives expire, the 15% tax rate may not be sustainable, and the equity transition plan does not guarantee a minimum operating cash flow. Given that 78.8% of the underlying enterprise value is generated after 2035, the impact of these uncertainties is more significant than the precision of the point estimates would suggest.

6. Conclusion

This study examined how financially material sustainability disclosures can be incorporated into a DCF valuation of BYD without applying a separate ESG premium. Using BYD's 2025 annual and sustainability reports, it linked warranty-related risks to operating margins; inventory turnover to working capital; and capital expenditure, construction in progress, and capital commitments to reinvestment assumptions. With a WACC of 6.6%, the estimated equity values were RMB 56.60, RMB 98.88, and RMB 130.66 per share in the downside, base, and upside scenarios, respectively.

The results show that the base-case estimate depends heavily on long-term assumptions. In the base-case scenario, FCFF is projected to turn positive in 2028, but at only RMB 4.4 billion, leaving little headroom if margins recover more slowly or investment intensity declines later than assumed. The present value of the terminal value represents 78.8% of base-case enterprise value. The valuation is therefore particularly sensitive to capital-expenditure normalization, the tax rate, WACC, the terminal growth rate, and mature-phase return on invested capital. Accordingly, RMB 98.88 per share should be interpreted as the value implied by a specific scenario, rather than as a precise estimate of intrinsic value.

The analysis also clarifies the role of sustainability information in valuation. These disclosures can identify financially material operating risks and discipline forecast inputs but do not by themselves justify a separate ESG premium. The main limitation is disclosure granularity. BYD

reported approximately RMB 140.2 billion in 2025 capital expenditure but did not distinguish between maintenance, capacity expansion, and transformation-related expenditure or disclose the expected return on each component. Available data also cannot isolate the causal effects of individual sustainability indicators. Future research could combine product-level information, comparable company evidence, and a more detailed investment breakdown to test these assumptions. Overall, BYD's value depends on whether its current investment can generate durable operating cash flows and adequate returns as capital intensity normalizes.

References

- [1] BYD Company Limited. (2026). Annual report 2025. Hong Kong Exchanges and Clearing Limited. <https://www1.hkexnews.hk/listedco/listconews/sehk/2026/0327/2026032703008.pdf>
- [2] Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6), 1697–1724. <https://doi.org/10.2308/accr-51383>
- [3] Shen, H., Lin, H., Han, W., & Wu, H. (2023). ESG in China: A review of practice and research, and future research avenues. *China Journal of Accounting Research*, 16(4), Article 100325. <https://doi.org/10.1016/j.cjar.2023.100325>
- [4] Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The Accounting Review*, 86(1), 59–100. <https://doi.org/10.2308/accr.00000005>
- [5] Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, 60(9), 2223–2247. <https://doi.org/10.1287/mnsc.2013.1863>
- [6] Goss, A., & Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, 35(7), 1794–1810. <https://doi.org/10.1016/j.jbankfin.2010.12.002>
- [7] Yeh, C.-C., Lin, F., Wang, T.-S., & Wu, C.-M. (2020). Does corporate social responsibility affect cost of capital in China? *Asia Pacific Management Review*, 25(1), 1–12. <https://doi.org/10.1016/j.apmr.2019.04.001>
- [8] BYD Company Limited. (2026). Sustainability report 2025. Hong Kong Exchanges and Clearing Limited. <https://www1.hkexnews.hk/listedco/listconews/sehk/2026/0327/2026032702828.pdf>
- [9] Fernández, P. (2007). Valuing companies by cash flow discounting: Ten methods and nine theories. *Managerial Finance*, 33(11), 853–876. <https://doi.org/10.1108/03074350710823827>
- [10] Asian Development Bank. (2025, December 15). Weekly debt highlights. *AsianBondsOnline*. <https://asianbondsonline.adb.org/newsletters/abowdh20251215.pdf>
- [11] Damodaran, A. (2026). Country default spreads and risk premiums [Data set]. New York University Stern School of Business. <https://pages.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xlsx>
- [12] Damodaran, A. (2026). Levered and unlevered betas by industry: Global [Data set]. New York University Stern School of Business. <https://pages.stern.nyu.edu/~adamodar/pc/datasets/betaGlobal.xls>
- [13] Xinhua News Agency. (2025, December 31). Market exchange rates in China—Dec. 31. https://www.china.org.cn/china/Off_the_Wire/2025-12/31/content_118255014.shtml
- [14] Yahoo Finance. (n.d.). BYD Company Limited (002594.SZ) stock historical prices and data. Retrieved July 12, 2026, from <https://uk.finance.yahoo.com/quote/002594.SZ/history/>
- [15] Yahoo Finance. (n.d.). BYD Company Limited (1211.HK) stock historical prices and data. Retrieved July 12, 2026, from <https://uk.finance.yahoo.com/quote/1211.HK/history/>