



# Decarbonizing the Battery Value Chain: How CATL Operationalizes Double Materiality in its Sustainability Reporting

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**Abstract.** Against the backdrop of global carbon neutrality goals and the standardization of ESG information disclosure, the 'double materiality' principle has become central to corporate sustainability reporting. Companies not only need to assess the impact of external environmental factors on their financial performance, but also pay attention to the significant impacts generated by their own operations. However, this principle still faces challenges in practical application. This paper takes CATL's 2024 ESG report as a case study, focusing on its practices in climate change and supply chain responsibility disclosure. The study finds that although CATL has made good progress in building an ESG management system, there is still room for improvement: the weighting of indicators in climate performance assessment has not been disclosed, the quantitative evaluation of the financial impact of climate-related issues is insufficient, and some resource indicators are not fully reported. This paper aims to provide practical reference for other companies to more effectively apply the double materiality principle.

**Keywords:** Double Materiality; ESG; CATL; Climate Disclosure; Supply Chain Responsibility; Sustainability Reporting

## 1 Introduction

As regulations continue to improve, the principle of “double materiality” has emerged as the cornerstone of ESG reporting. Previous studies have analyzed ESG from different perspectives. Gillan et al. revealed how ESG activities synergize to create economic, social, and environmental benefits [1]. Ding et al. found that high-carbon-emitting firms disclose more climate-relevant information [2]. Liu et al. demonstrated that the sustainable management of key raw materials in the supply chain contributes to the low-carbon transition [3]. Wan et al. provided an in-depth analysis of the impact mechanism of LCPP policies on corporate ESG practices [4]. Tian et al. and others the impact of climate risk perception on the fulfillment of environmental responsibility

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and its mechanisms [5]. However, few case studies have been conducted on specific enterprises.

Therefore, this paper selects CATL for a case study. As a high-carbon-emitting enterprise, CATL has issued ESG reports for four consecutive years and has an MSCI rating of AA. Analyzing CATL's ESG report provides a practical reference program for other enterprises to improve their ESG disclosure levels and implement the double materiality requirement.

## **2 Data and Methodology**

The data for this study was sourced from CATL's 2024 ESG report. This study employs a case study methodology to systematically analyze the company's ESG practices, with a particular focus on climate change and supply chain responsibility.

## **3 Results and Analysis**

### **3.1 Company Profile**

CATL is a global leader in creating new energy technology. It was founded in 2011 and specializes in lithium-ion batteries. The company's main activities are researching, developing, producing, and selling batteries for storing power and energy. CATL is trying to take over key battery-related mineral resources.

### **3.2 Double Materiality Analysis**

#### **3.2.1 Governance and Strategy.**

As Figure 1 shows, CATL identifies 2 issues with only financial materiality, 15 with only impact materiality, and 9 with both financial and impact materiality. This paper focuses on two main issues: Climate Change and Supply Chain Responsibility & Product, to understand how double materiality is used at CATL.

Table 1 shows how CATL integrates the concept of double materiality into its daily management. In terms of climate, CATL's board serves as the highest authority, overseeing climate-related decisions, which undoubtedly reflects the top management's emphasis on climate. Various training programs are conducted, and executive compensation is linked to climate indicators to ensure that everyone works together to achieve corporate decarbonization. In terms of supply chain and products, the company has established dedicated departments to handle various matters and set targets to make the supply chain sustainable, which can reduce corporate costs as well as environmental damage. In addition, by focusing on product quality to enhance customer satisfaction, the company's revenue can continue to increase, and its market competitiveness will become stronger.

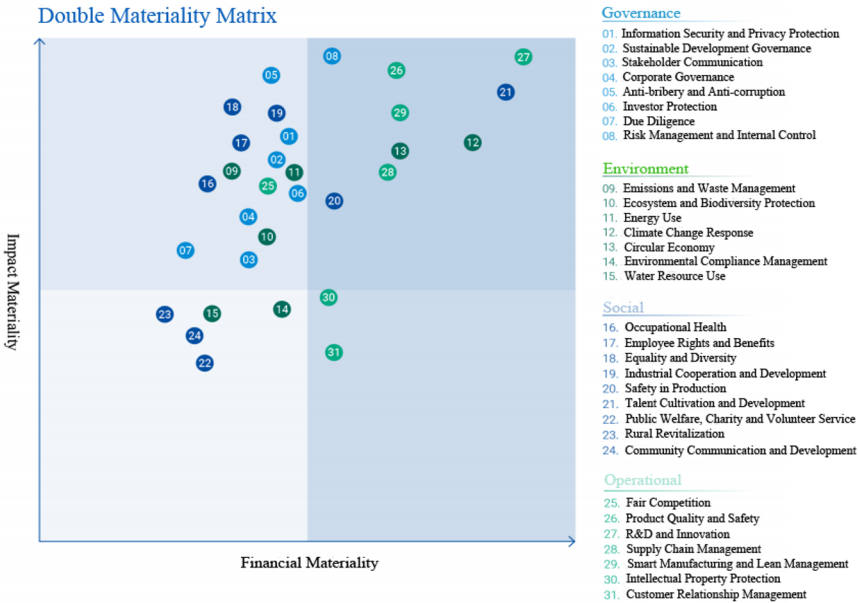


Fig. 1. Identification of double materiality issues for CATL

Table 1. Governance and strategy

Core issue	Core elements	Specific measures
Climate Change	Governance&strategy	The company has established a governance system, with the Board of Directors as the highest authority responsible for formulating climate-related strategies. The Sustainable Development Committee is responsible for identifying climate risks and opportunities, managing the climate affairs budget, and linking climate indicators to executive compensation. Through climate training, the formation of specialized teams, strategy development, and continuous innovation.
		The company establishes a committee to oversee the overall situation forming a quality management model with CATL characteristics.
Supply Chain & Product Responsibility	Governance&strategy	Multiple departments participate in supply chain development, set strategic goals, focus on strategic direction, strengthen supply chain competitiveness, and create long-term value for society.

3.2.2 Risk Management.

The principle of double materiality is reflected in CATL's management practices concerning climate change and supply chain issues. A comprehensive overview of the salient details is provided in the following tabular presentation, as shown in Table 2.

**Table 2.** Risk & Opportunity Management

Core Issue	Assessment Dimension	Financial Materiality	Impact Materiality
Climate Change	Identification & Assessment	Analyze and research according to standards, quantify impacts using scenario analysis, and thereby identify the company's risks and opportunities.	Identifies the impact of its operational (Scope 1&2) and value chain (Scope 3) greenhouse gas emissions on global climate change.
	Management Measures & Actions	Increase the proportion of green electricity, build zero-carbon factories, and develop low-carbon products.	Improve processes, increase energy efficiency, and use renewable energy
Supply Chain & Product Responsibility	Identification & Assessment	Identify financial risks and market opportunities arising from changes in the external environment.	Identifies potential impacts of mineral procurement on communities and ecology, as well as environmental hazards that may be caused by product disposal.
	Management Measures & Actions	Increase investment in research and development and obtain international environmental certification (EPD), develop green products.	Systematically mitigates negative impacts through due diligence audits of mineral supply chains and the use of recyclable packaging, among other measures.

As shown in the table, CATL's carbon reduction approach is not limited to addressing a single link but is integrated throughout the entire product lifecycle. From raw material supply to the production process and waste management, CATL takes targeted actions at each stage, fully reflecting the company's efforts toward sustainable development. External pressures drive CATL to implement internal changes, thereby mitigating external impacts. This combination of internal and external actions perfectly demonstrates the dual importance of risk management.

### 3.2.3 Metrics and Targets.

CATL discloses numerous key indicators in its ESG report, providing data support for the double materiality evaluation.

From Table 3, we can see that more than 70% of the company's electricity comes from green sources, and the carbon emission intensity per unit is 4.56kg CO<sub>2</sub>e/kWh, indicating that the company has made good progress in decarbonization. It also reflects that the company's strategic goals are not merely slogans but are accompanied by concrete actions that bring about change. The company's investment in R&D and the scale of its research team demonstrate its intention to achieve low carbon emissions through product innovation. The three products certified by EPD undoubtedly serve as the best proof. The nine zero-carbon factories indicate that CATL has reduced some carbon emissions, thereby lessening its impact on the environment and society. All these data undoubtedly demonstrate that CATL's strategy implementation is excellent.

**Table 3.** Quantitative Metrics

Core Issue	KEY PERFORMANCE INDICATOR	2024
<b>Climate Change</b>	<b>Financial Materiality</b>	
	Proportion of Green Electricity in Core Operations	74.52%
	Investment in environmental protection & technology development	162997.62
	<b>Impact Materiality</b>	
	Number of Zero-Carbon Factories	9
	Annual Emissions Reduction (kgCO <sub>2</sub> e)	217700
	Absolute Scope 1 & 2 GHG emissions (tCO <sub>2</sub> e)	2,353,799.4
<b>Supply Chain &amp; Product Responsibility</b>	Carbon emission intensity per unit product (kgCO <sub>2</sub> e/kWh)	4.56
	<b>Financial Materiality</b>	
	R&D Investment as % of Revenue	5.14%
	Number of R&D Personnel	20346
	<b>Impact Materiality</b>	
	Number of Suppliers Undergoing Mineral Due Diligence	74
	Proportion of Bases Using Recyclable/Renewable Packaging	100%
Number of battery cell products obtaining international environmental certifications (e.g., EPD)	3	

## 4 Conclusion

This study shows that although CATL has already established a double materiality framework and put it into practice, there are still shortcomings in its disclosure. For example, the weight of climate considerations in assessments is not transparent, which can lead to black-box operations and undermine the credibility of this initiative. The financial cost savings are not explained in detail, and future ESG reports could strengthen data disclosure in this area.

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