

## **Hidden Liabilities Behind Financial Statements: Environmental External Costs and Corporate Competitiveness of Taiwan's Listed and OTC Companies**

***Lo, Vincent*** | Research Associate, Center for Green Economy, CIER

***Wen, Lih-Chyi*** | Advisor, Center for Green Economy, CIER

***Kuo, Ying-Shan*** | Assistant, Center for Green Economy, CIER

***Lin, Chun-Hsu*** | Research Fellow and Director, Center for Green Economy, CIER

This article analyzes the environmental external costs of Taiwan's listed and over-the-counter (OTC) companies while examining how pressures arising from carbon pricing, waste treatment, and the energy transition materially affect their underlying profitability and market competitiveness. The study draws on 2024 data from the Taiwan Stock Exchange's ESG Digital Platform, covering 1,643 listed and OTC companies, 33 industries, and 14 ESG indicators. Using monetary valuation, it converts carbon emissions and waste into potential financial costs.

### **The Erosive Effects of Carbon Pricing Scenarios on Corporate Profitability and EPS Rankings**

The study indicates that carbon emissions from Taiwan's listed and OTC companies total 278 million metric tons of CO<sub>2</sub>e, accounting for over 95% of Taiwan's overall emissions. Under an international carbon-price scenario of approximately NT\$2,250 per metric ton and based on the EU Emissions Trading System (EU ETS), the companies' total environmental cost of carbon emissions would reach NT\$624.9 billion, and 238 companies would each incur environmental external costs exceeding NT\$100 million. Once the cost of carbon emissions is internalized, it will severely affect corporate profit structures:

### **The Dual Cost Revolution: Carbon Emissions and Industrial Waste**

The environmental external costs faced by companies are not limited to carbon emissions; industrial waste treatment also creates substantial financial pressure. Currently, the treatment cost for general industrial waste is approximately NT\$2,200 to NT\$3,600 per metric ton, while that for hazardous industrial waste ranges from NT\$10,000 to NT\$50,000 per metric ton. Industries face different combinations of pressures. For example, carbon costs are the primary concern for the steel industry, whereas the chemical and chemical materials industry must simultaneously address the

“dual challenge” of carbon emissions and hazardous waste. This requires companies to make systematic adjustments spanning raw material selection, process design, and end-of-pipe treatment.

### Four Structural Types of Industry Competitiveness

Once environmental and waste costs are internalized, the key determinant of a company’s competitiveness will be its cost structure rather than its revenue alone. The study classifies the structural risks facing industries into four types:

- **Direct Impact (e.g., cement, plastics, and steel):** These industries have high emissions intensity and limited profit buffers. Environmental costs could reduce net profit to zero or even result in a net loss.
- **Vulnerable and Sensitive (e.g., textiles and optoelectronics):** Although these are not extremely emissions-intensive industries, their inherently thin net profit margins mean that even a slight increase in environmental costs could severely constrain their viability.
- **Divergent (e.g., semiconductors):** Industry leaders can absorb carbon costs because of their technological advantages and high profitability, but second-tier manufacturers and mature-process fabs may face significant impacts if they lack financial resilience.
- **Complex Pressure (e.g., chemicals):** These industries must simultaneously manage combined cost pressures related to energy, raw materials, manufacturing processes, and hazardous waste.

### The Scope 2 Green Electricity Crisis and Scope 3 Risks in the Financial Sector

- **Scope 2 Green Electricity Crisis:** At 796 listed and OTC companies, Scope 2 emissions from purchased electricity account for over 90% of combined Scope 1 and Scope 2 emissions. The problem is particularly acute in electricity-intensive industries such as communications and networking, optoelectronics, electronic components, and semiconductors.
- **Scope 3 Climate Risks in the Financial Sector:** Although financial institutions’ own operational carbon emissions are low, their actual exposure is embedded in the Scope 3 emissions associated with their investment and financing portfolios. When environmental costs erode the profitability of emissions-intensive clients, the

resulting effects may translate into credit risk for financial institutions. The financial sector should therefore use instruments such as sustainability-linked loans and green and transition bonds to steer capital flows and serve as a “transition accelerator.”

## **Conclusion and Recommended Corporate Actions**

Companies’ future core competitiveness will depend on their ability to incorporate environmental data into substantive decision-making:

- **Conduct Carbon Cost Stress Tests:** Incorporate domestic and international carbon-pricing scenarios into financial models to assess their actual impact on net profit and earnings per share (EPS).
- **Improve Waste Management:** Incorporate circular economy principles at the R&D and process-design stages to reduce end-of-pipe treatment costs.
- **Green Supply Chains and Procurement:** Proactively plan for green electricity procurement and energy management. Incorporate environmental indicators into supplier management and risk assessments.