

TCC 2023 Sustainability Impact Valuation Report

Quantitative Evaluation of the Value Chain-Supply Chain, Operations, and Products & Services

TCC Group Holdings (hereinafter referred to as TCC) focuses on three businesses: low-carbon construction materials, resource recycling, and green energy. TCC has initiated four sustainable drivers of sustainable development: diversity, resilience, innovation, and growth. TCC pioneered the world's lowest-carbon infrastructure material and the most comprehensive new energy industry chain. It enhances sustainability skills and cross-domain knowledge from employees to suppliers and customers. Simultaneously, TCC promotes a just transition. TCC aims to build a low-carbon, safe, and sustainable ark for the next generation.

Since 2023, TCC has reviewed the impact of its value chain activities on human well-being through an external perspective (Outside In). Following the Natural Capital Protocol, the Social & Human Capital Protocol, and the ISO 14008:2019 framework for environmental impacts and related considerations, TCC further integrates the Impact-Weighted Accounts (IWA) developed by Harvard Business School and the monetary valuation methods from the Value Balancing Alliance (VBA) into Materiality Analysis. From upstream supply chain and production operations to downstream products and services, TCC employs the impact pathway method to analyze the cross-domain intersections of economic, environmental, and social issues. Based on Profit and Loss (P&L) approach, TCC incorporates externalities, whether costs (negative) or benefits (positive), transforming the changes and impacts of operational activities on stakeholder well-being into a consistent monetary language. The sustainability impact management framework is based on the Triple Bottom Line (TBL).

TCC utilizes the input-output model for the supply chain to analyze the procurement demand's impact on the overall industry chain, including the driving value creation, employment opportunities, and workers' income. To address the accompanying environmental issues, TCC employs hotspot analysis to identify industries and regions with significant impacts, incorporating these findings into procurement strategies for balanced decision-making.

Regarding products and services, TCC is dedicated to a low-carbon transformation and developing five core energy capabilities: energy creation, energy storage, energy transmission, energy supply, and energy solutions. Through the perspective of Life Cycle Assessment (LCA), TCC analyzes the carbon reduction benefits that Low-carbon Circular and New Energy Building Solutions bring to customers, achieving net-zero goals.

Internal Perspective		External Perspective				
Operational Inputs/Outputs	→	What Has Changed	→	Who is Affected	→	Monetary Valuation of Impact
Resources used in operational activities (e.g., raw materials, energy, and human resources) and their direct outcomes (e.g., pollutant emissions, number of beneficiaries, and energy-saving benefits).		Operational inputs and outputs indirectly cause or contribute to changes in human well-being. For example, training programs that equip employees with professional skills enhance employability, while air pollution can lead to respiratory diseases.		Stakeholders whose well-being is affected— internal and external employees, shareholders/investors, customers, suppliers, the environment, and society.		Using a profit and loss (P&L) approach, it can be seen that the impact of operational activities on stakeholders is quantified in monetary terms, referred to as sustainability impact valuation.

In 2023, TCC's value chain activities generated externalities impacting human well-being, including positive benefits amounting to NT\$93.5 billion and negative costs of NT\$46.5 billion.

In terms of social aspects:

- **Comprehensive training programs have driven employees' skill and employability growth, resulting in NT\$540 million in salary growth benefits.**
- Workplace accidents involving employees and contractors resulted in NT\$30.05 million in social costs, primarily due to two fatal accidents involving contractors in Taiwan. Consequently, 2024 will be the Year of Occupational Health and Safety Enhancement, with plans to elevate the Labor Safety and Health Office (LSH Office) and appoint dedicated supervisors. Regular reports will be made at management meetings to ensure the group's appropriate occupational safety management.

In terms of environmental aspects:

- **TCC promotes alternative raw materials, alternative fuels, alternative energy, water resource recycling, and energy and water conservation projects, creating NT\$16.6 billion in environmental benefits.**
- However, while TCC strengthens its core business, its environmental footprint resulting from resource consumption and pollutant emissions has led to NT\$43.9 billion in social costs.

TCC is committed to reducing the environmental impact caused by its product manufacturing processes. It has established its Environmental Protection Policy, which was approved by the Board of Directors and signed by the Chairman. All cement plants in Taiwan and Mainland China, as well as RMC plants and the Operation Headquarters, have obtained ISO 14001 and ISO 50001 certifications. Environmental impact assessments have been conducted for all operational sites and production plants, and environmental performance has improved. The management scope covers energy, water, waste, and more. It also requires suppliers, contractors, subcontractors, joint ventures, and other business partners to manage environmental impacts during production, manufacturing, transportation, distribution, logistics, and service processes. All management policies and pertinent legal records are reviewed throughout the due diligence phase of mergers and acquisitions to ensure strict adherence to environmental laws and regulations to prevent violations.

In supply chain management, TCC collaborates closely with its supply chain to promote sustainability, guided by "sustainable supplier management" and "local and green procurement" strategies.

- **TCC's procurement demand has driven the supply chain to create NT\$70.3 billion in value,** generating 9,800 employment opportunities and NT\$3.9 billion in wage income for supply chain workers.
- However, the environmental footprint resulting from the industry's supply and demand processes has led to NT\$2.6 billion in social costs.

TCC refers to UNGC and integrates the principles of ISO 20400 into its procurement processes. Meanwhile, TCC conducts written reviews of the supply chain, referencing the Corporate Sustainability Due Diligence Directive (CSDDD) to enhance the ESG supplier program through its five major steps and to strengthen its influence over suppliers.

Regarding products and services, TCC has built a comprehensive new energy industry chain with diverse renewable energy projects. It has created efficient green energy storage and critical battery cells for mobile devices. Combining low-carbon cement and innovative new energy IP, TCC developed the patented EnergyArk Energy Storage Cabinet. Centered around EnergyArk, TCC developed integrated solar charging and storage stations, green energy wheeling services, and power trading. It is supplying customers with new energy solutions. **In 2023, TCC helped its customers reduce carbon emissions by 1.32 million metric tons of CO₂e, resulting in carbon reduction benefits worth NT\$2.1 billion.** Not only did this assistance help customers achieve their net-zero goals and promote the industry's low-carbon transformation.

By adopting an impact-making mindset, TCC has understood that pursuing business growth can lead to financial gains and enhanced well-being. Still, it may also cause negative impacts on society and the environment. This perspective helps the company consider broader and longer-term effects when making decisions, thereby identifying the risks and opportunities that sustainability material issue management may bring to the company's future development. In its pursuit of sustainable development, TCC will continuously innovate, striving to achieve a net positive impact on corporate sustainability. By leveraging core technologies and collaborating with stakeholders, TCC aims to build a win-win symbiotic partnership between the company and society.

TCC Sustainability Impact Roadmap

Cause of the Impact	Material Issue Management	Input / Output	Impact on Well-being	Impact Indicator	Impact Level		Stakeholder
Supply Chain	Sustainable Supplier Management	Payment to Suppliers for Procurement	Procurement demand drives industry supply and demand relationships, thereby increasing value creation.	Social externalities: Supply chain output value	+	●●●●●●	Society
			Procurement demand creates supply chain job opportunities and income	Social externalities: Supply chain employee compensation	+	●●●●●○	External employee
			Environmental impact of GHG emissions derived from supply chain production processes	Environmental externalities: Supply chain GHG emissions	-	●●●●○○	Environment
			Environmental impact of air pollution emissions derived from supply chain production processes	Environmental externalities: Supply Chain air pollution Emissions	-	●●●●●○	Environment
TCC Operations	Climate Actions and Net-Zero Emissions/ Green Energy and Energy Storage/ Resource Co-Processing	GHG Emissions	Changes in GHG concentrations result in social costs of carbon	Environmental externalities: GHG Emissions	-	●●●●●●	Environment
		Power Generation by Waste Heat Recovery (self-generated and consumption)	Avoiding the social costs of carbon resulting from changes in GHG concentrations	Environmental externalities: Use renewable energy	+	●●●●●●	Environment
		Renewable Energy (self-generated and consumption)		Environmental externalities: Use power generation by waste heat recovery	+	●●●●○○	Environment
		Equipment & Process Enhancements (Energy Conservation Projects)		Environmental externalities: Promote energy conservation projects	+	●●●○○○	Environment
		Alternative Clinker		Environmental externalities: 使用替代熟料 Use alternative clinker	+	●●●●○○	Environment
		Alternative Raw Materials		Environmental externalities: 使用替代原料 Use alternative raw materials	+	●●●●○○	Environment
		Alternative Fuels		Environmental externalities: Use alternative fuels	+	●●●●●○	Environment
	Water Resources Management	Water Resources Withdrawal and Consumption	Changes in water resource availability lead to environmental impacts and human health effects.	Environmental externalities: Water resource utilization	-	●●●○○○	Environment
		Process Recycled Water	Avoiding human health impacts resulting from changes in water resource availability	Environmental externalities: Use process recycled water	+	●●●●○○	Environment
		Rainwater Harvesting and Reuse		Environmental externalities: Rainwater harvesting and reuse	+	●○○○○○	Environment
		Water Conservation Projects		Environmental externalities: Promote water conservation projects	+	●●○○○○	Environment
		Wastewater Discharge	Changes in pollutant concentrations in water bodies leading to human health and ecological effects	Environmental externalities: Wastewater discharge	-	●●○○○○	Environment
	Pollution Control and Management	Air Pollution Emissions	Changes in air pollution concentrations leading to human health effects	Environmental externalities: Air pollution emissions	-	●●●●●○	Environment
		Waste Disposal	Environmental impact of outsourced waste disposal in non-cement production areas	Environmental externalities: Waste disposal	-	●●○○○○	Environment
	Workplace Health and Safety	Employee Occupational Accidents	Potential Physical and mental impact of workers and healthcare expenditure	Social externalities: Employee occupational accidents	-	●●○○○○	Internal employee, Society

		Contractor Occupational Accidents		Social externalities: Contractor occupational accidents	-	●●●○○○	External employee, Society
	Talent Cultivation and Development	Hours and Investments in Education and Training	Enhanced professional skills and employability through employee training	Social externalities: Employee future income	+	●●●●○○	Internal employee, Society
Products and Services	Sustainable Products and Services/Green Energy and Energy Storage	Low-carbon Construction Materials (Cement/Concrete)	Avoiding the social costs of carbon resulting from changes in GHG concentrations	Environmental externalities: Low-carbon construction materials	+	●●●●●○	Customers, Environment
		Energy Storage Site		Environmental externalities: Energy storage site	+	●●●●○○	Customers, Environment
		External Sale of Renewable Energy (Solar Energy/ Onshore Wind Power)		Environmental externalities: External sale of renewable energy	+	●●●○○○	Customers, Environment
		Power Cell R&D and Process		Environmental externalities: EV services with power cell	+	●●○○○○	Customers, Environment
		EV Green Transportation		Environmental externalities: EV green transportation	+	●○○○○○	Customers, Environment
		Resource Co-Processing		Environmental externalities: Co-processing of waste	+	●●●●○○	Customers, Environment

Monetary Value (Thousands NTD)	Impact Level
10,000,000-100,000,000	●●●●●●
1,000,000-10,000,000	●●●●●○
100,000-1,000,000	●●●●○○
10,000-100,000	●●●○○○
1,000-10,000	●●○○○○
0-1,000	●○○○○○

Note 1: The upstream supply chain uses the Input-Output Model to calculate the economic benefits (positive) derived from procurement activities driving supply and demand effects in the industry chain, the creation of employment opportunities and wage income (positive), and the accompanying environmental issues (negative). Reference sources include the Directorate-General of Budget, Accounting and Statistics - Input-Output Tables (2020), the Green National Income Accounting Report (2021), and the EXIOBASE 2 database.

Note 2: Environmental externalities are calculated using the Environmental Profit and Loss (EP&L) methodology, considering the social cost of carbon, human health loss costs, and ecosystem damage costs (negative) derived from greenhouse gases, air pollution, waste, and water resource consumption, as well as the environmental benefits (positive) brought by promoting alternative raw materials, alternative fuels, alternative energy, water resource recycling, and energy and water-saving programs. Reference sources include US EPA (2016), OECD (2012), and CE Delft (2018).

Note 3: The social cost of occupational accidents considers the willingness to pay to avoid occupational accidents and the medical resources invested due to occupational accident events (negative). The methodology references UK HSE (2017).

Note 4: The future salary growth benefits brought by employee training are evaluated based on the professional skills and knowledge employees gain from company training programs, which not only enhance productivity but also improve employability for future career development, thereby affecting the annual expected value of career salary development (positive). The methodology references VBA (2021).

Note 5: Downstream products and services are analyzed from a Life Cycle Assessment (LCA) perspective to evaluate the carbon reduction benefits (positive) that low-carbon building materials and new energy businesses bring to customers, with the avoided social cost of carbon estimated based on US EPA (2016).

Note 6: Considering the economic conditions of different countries, the valuation coefficients are adjusted based on the per capita Gross National Income (GNI) measured by Purchasing Power Parity (PPP) in each region, and factors such as inflation and exchange rates are considered to align the time boundary to the monetary value benchmarked to 2021. The methodology references OECD (2012) and PwC UK (2015).