Second-Party Opinion

Taiwan Cement Corporation Green Financing Framework

Second-Party Opinion

Reviewed by:

MORNINGSTAR | SUSTAINALYTICS

Evaluation Summary

Evaluation Date	18 September, 2023
Issuer Location	Taipei, Taiwan

Use of Proceeds Instruments

Green Bond Principles 2021, and Green Loan Principles 2023

Sustainalytics is of the opinion that the Taiwan Cement Corporation Green Financing Framework is credible and impactful and aligns with the four core components of the Green Bond Principles 2021 and Green Loan Principles 2023. The eligible categories for the use of proceeds – Alternative Fuels and Materials; Circular Economy Adapted Products, Production Technologies, and Processes; Energy Efficiency; Pollution Prevention and Control; Sustainable Water and Wastewater Management; Renewable Energy; Clean Transportation; Green Buildings; and Environmentally Sustainable Management of Living Natural Resources and Land Use – are aligned with those recognized by the applicable principles. Sustainalytics considers that the investments in the project categories are expected to lead to positive environmental impacts and the activities under the use of proceeds project categories to be credible from a transition perspective.

The UoPs contribute to the following SDGs:

Climate Transition Finance Handbook

Sustainalytics has evaluated Taiwan Cement Corporation's transition governance, strategy, decarbonization targets and intentions to report on transition progress and finds Taiwan Cement Corporation to be aligned with the recommendations of the Climate Transition Finance Handbook 2023.

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Scope of Work and Limitations

Sustainalytics' Second-Party Opinion reflects Sustainalytics' independent[1] opinion on the alignment of the Taiwan Cement Corporation Green Financing Framework with current market standards. As part of the Second-Party Opinion, Sustainalytics assessed the following:

- The Framework's alignment with the Green Bond Principles 2021[2] and Green Loan Principles 2023.[3]
- The credibility and anticipated positive impacts of the use of proceeds;
- The issuer's sustainability strategy, performance, and sustainability risk management; and
- The alignment with the recommendations of the Climate Transition Finance Handbook 2023;[4]

As part of this engagement, Sustainalytics held conversations with various members of Taiwan Cement Corporation's management team to understand the sustainability impact of its business processes and the core components of the Framework. Taiwan Cement Corporation representatives have confirmed that:

(1) They understand it is the sole responsibility of Taiwan Cement Corporation to ensure that the information provided is complete, accurate and up to date;

(2) They have provided Sustainalytics with all relevant information; and

(3) Any provided material information has been duly disclosed in a timely manner.

Sustainalytics also reviewed relevant public documents and non-public information. This document contains Sustainalytics' opinion of the Framework and should be read in conjunction with that Framework. Any update of the present Second-Party Opinion will be conducted according to the agreed engagement conditions between Sustainalytics and Taiwan Cement Corporation.

Sustainalytics' Second-Party Opinion assesses alignment of the Framework with current market standards but does not provide any guarantee of alignment nor warrants alignment with any future versions of such standards. Regarding the portion of the Second-Party Opinion which assesses:

- Use of proceeds categories, Taiwan Cement Corporation is encouraged to update the associated parts of the Framework after 24 (twenty-four) months from the evaluation date, if necessary, and seek an update to this Second-Party Opinion to ensure ongoing alignment of the Framework with market standards and expectations.

For use of proceeds instruments, Sustainalytics relied on its internal taxonomy, version 1.14, which is informed by market practice and Sustainalytics' expertise as an ESG research provider. This Second-Party Opinion:

- Addresses the anticipated impacts of eligible projects but does not measure their actual impact. Reporting and measuring impact of projects financed under the Framework is the responsibility of the Framework owner.
- Opines on the potential allocation of proceeds but does not guarantee their realized allocation towards eligible activities.

No information Sustainalytics provides under the present Second-Party Opinion shall be considered as being a statement, representation, warrant or argument in favour or against the truthfulness, reliability or completeness of any facts or statements and related circumstances that Taiwan Cement Corporation may have disclosed to Sustainalytics for the purpose of this Second-Party Opinion.

[1] When operating multiple lines of business that serve a variety of client types, objective research is a cornerstone of Sustainalytics and ensuring analyst independence is paramount to producing objective, actionable research. Sustainalytics has therefore put in place a robust conflict management framework that specifically addresses the need for analyst independence, consistency of process, structural separation of commercial and research (and engagement) teams, data protection and systems separation. Last but not the least, analyst compensation is not directly tied to specific commercial outcomes. One of Sustainalytics' hallmarks is integrity, another is transparency.
[2] The bond-related principles, guidelines and handbooks are administered by the International Capital Market Association and are available at: https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/
[3] The loan-related principles and guidelines are administered by the Loan Market Association, Asia Pacific Loan Market Association and Loan Syndications and Trading Association and are available at: https://www.lsta.org/content/?_industry_sector=guidelines-memos-primary-market
[4] The Climate Transition Finance Handbook is administered by the International Capital Market Association and is available at: https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/

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Introduction

Taiwan Cement Corporation ("TCC" or the "Company") is a construction materials company headquartered in Taipei, Taiwan. The Company is mainly engaged in the production, processing and sale of cement products; electricity and energy; and other segments, including land and marine transportation, and the production and sale of refractory materials.[5] TCC has a market value of NTD 240.67 billion (USD 7.6 billion) and has more than 12,000 employees as of March 2023.

TCC has developed the Taiwan Cement Corporation Green Financing Framework dated September 2023 (the "Framework"), under which TCC and its subsidiaries (including joint ventures and associates)[6] intend to issue green financing instruments, including bonds, convertible bonds[7], loans and other debt instruments with short maturities, such as commercial papers (the "Green Financing Instruments").[8] TCC has engaged Sustainalytics to review the Framework and provide a Second-Party Opinion on the Framework's alignment with the Green Bond Principles 2021, Green Loan Principles 2023 (the "Use of Proceeds Principles") and the recommendations of the Climate Transition Finance Handbook 2023. The Framework has been published in a separate document.[9]

An amount equivalent to the net proceeds from the Green Financing Instruments will finance or refinance, in whole or part, existing or future projects that are expected to lead to a positive environmental outcome in Asia, including Taiwan and Mainland China, Europe, Africa and North America, as well as in Australia.

The Framework defines eligibility criteria in the following areas:

1. Alternative Fuels and Materials
2. Circular Economy Adapted Products, Production Technologies and Processes
3. Energy Efficiency
4. Pollution Prevention and Control
5. Sustainable Water and Wastewater Management
6. Renewable Energy
7. Clean Transportation
8. Green Buildings
9. Environmentally Sustainable Management of Living Natural Resources and Land Use

[5] TCC, "The Taiwan Cement Corporation 2022 Annual Report", (2023), at: https://media.taiwancement.com/web_tcc/en/report/annual/2022%20Annual.pdf

[6] In the case of investments made via TCC's subsidiaries, joint ventures and associates, including joint ventures entered into by its subsidiaries, only TCC's share of the investments will be applicable as an allocation to the eligible green projects under this Framework.

[7] For convertible bonds, the Second-Party Opinion is only valid until the time of conversion from the bond to common stock.

[8] TCC intends to allocate all the proceeds from Green Financing Instruments to such Eligible Green Projects within three calendar years following issuance. For existing Eligible Green Projects, TCC has set a look-back period, limiting the allocation of proceeds to expenditures for projects implemented in the three calendar years preceding the issuance of Green Financing Instruments.

[9] The Taiwan Cement Corporation Green Financing Framework is available on TCC's website at: https://www.taiwancement.com/en/

Sustainalytics' Opinion

Section 1: Alignment of the Framework with Relevant Market Standards

Alignment with Use of Proceeds Principles

Sustainalytics is of the opinion that the Taiwan Cement Corporation Green Financing Framework is credible and impactful and aligns with the Use of Proceeds Principles. For detailed information, please refer to Appendix 1: Sustainability Bond/Sustainability Bond Programme External Review Form. Sustainalytics highlights the following elements of the Framework:

Use of Proceeds

Overall Assessment of Use of Proceeds

Use of Proceeds	Activity	Description and Sustainalytics' Assessment
Alternative Fuels and Materials	Alternative fuels	- Financing the development and procurement of alternative fuels, such as: i) bioenergy produced from agricultural residues,[10] including wood chips, spent mushroom compost bulk bag, rice husks, rice straws and ISCC-certified waste cooking oil; and ii) solid recovered fuels (SRFs). Sustainalytics notes that SRFs offer a relatively low emissions reduction potential compared to green hydrogen and biofuels. Considering this, TCC has confirmed to Sustainalytics that it intends to shift to lower emissions-intensive fuels as its strategy to maintain alignment of its emissions intensity levels with Transition Pathway Initiative's (TPI) trajectory and prioritize alternative fuels with high biomass content. - TCC has confirmed to Sustainalytics that it will exclude financing of rubber, plastics and tire-derived fuels under this category. - Sustainalytics considers investments under this category to be aligned with market practice.
	Alternative raw materials	- Financing the development and acquisition of industrial waste byproducts to utilize as alternative raw materials, including calcium fluoride sludge, incinerated recycled aggregates, reducing slag from electric arc furnaces, construction waste soil, waste compression moulding, slag, waste ceramic, spent refractories, air-cooled slag, blast furnace slag and domestic waste. - TCC has confirmed that it has a robust safety mechanism in place to mitigate risks associated with the utilization of industrial waste byproducts. - Sustainalytics considers investments under this category to be aligned with market practice.
Circular Economy Adapted Products, Production Technologies and Processes	Recycling and co-processing of industrial waste byproducts	- Financing the collection, recycling and co-processing of industrial byproduct waste for utilization as alternative raw materials - Collection of waste from own operations, as well as other industrial and domestic sources. TCC has confirmed that the waste collected from all the sources, including its own operations and third parties, will support segregation at the source. - Waste-to-energy projects involving the processing of mixed residual waste to produce feedstock through a material recovery facility. TCC has ensured that recyclables, including plastics and metals, will be segregated from the mixed residual waste that will be used as a feedstock for the waste-to-energy projects.[11]

[10] ISCC: https://www.iscc-system.org/

[11] Sustainalytics recognizes that energy from waste could take out of circulation potentially recyclable materials and undermine two of the main objectives of a zero-waste circular economy, i.e. waste prevention and recycling. Additionally, for such projects to have low emissions intensities, the composition of residual waste, particularly fossil carbon content, is a crucial consideration. However, Sustainalytics also notes that due to constraints on recycling in many parts of the world, energy from waste can offer a better residual waste management option than landfills in many cases. Sustainalytics recommends Taiwan Cement Corporation to promote the removal of increasing amounts of recyclables, especially plastics and metals, and the monitoring of thermal efficiency of the financed facilities.

		- Sustainalytics considers investments under this category to be aligned with market practice.
Energy Efficiency	Equipment and process enhancements	- Investments in technologies and operational improvements that result in an energy efficiency improvement of at least 30% compared to the baseline.[12] Intended technologies include the installation of energy management systems, energy-efficient lighting and ventilation units, smart devices, energy storage systems and smart grids.[13] - Investments related to waste heat utilization from cement rotary kilns to generate electricity. Intended solutions include flash distillation technology to enhance heat recovery efficiency. - Sustainalytics notes that fossil fuel-powered ventilation, refrigeration and other equipment powered by fossil fuels will be excluded from financing. - Sustainalytics considers the investments under this category to be aligned with market practice.
Pollution Prevention and Control		- Investments in technology to eliminate or significantly mitigate environmental pollutants in water, air and soil, including NOx control technologies, non-catalytic reduction equipment (denitrification) and air quality monitoring stations. Other examples may include equipment retrofitting to manage air emissions systematically; multistage combustion equipment; optimization of bag dust precipitators; improvement of corridor belt conveyor system to reduce dust escape; optimization of electrostatic bag dust precipitators in kiln systems; and enclosed conveyor belts. - Investments in waste prevention, waste reduction, waste recycling facilities to produce secondary feedstock or raw materials for use in various other industries.[14] - TCC confirms that the waste collected from its own operations will support segregation at the source and for waste collected by third parties. - Sustainalytics considers investments under this category to be aligned with market practice.
	Carbon capture and storage	- Investments related to R&D and installation of carbon capture utilization and storage systems (CCUSs) in the cement manufacturing process. - TCC has confirmed the following: i) the captured carbon by these processes will not be utilized in processes such as enhanced oil recovery; and ii) it will adhere to the Climate Change Response Act[15] to implement CCUSs, thereby ensuring robust management plans are in place for leakage detection. - Sustainalytics considers investments under this category to be aligned with market practice.
Sustainable Water and Wastewater Management	Water optimization	- Investments in water efficiency projects, including wastewater treatment technologies to increase the amount of treated wastewater and its reuse, including zero liquid discharge processes. TCC has confirmed the exclusion of projects related to fossil fuel operations. - Water saving solutions, such as rainwater harvesting. - Sustainalytics considers investments under this category to be aligned with market practice.
Renewable Energy	Solar	- Investment in solar-plus storage systems, which consists of solar PV and battery storage, aimed at transforming intermittent energy generated from solar PV into a dispatchable power supply. - Battery storage systems that will be dedicated to connecting renewables to the power grid.[16] - Modular utility-scale battery storage systems to provide grid stabilization services and enable the integration of more renewable energy into the grid. Sustainalytics recognizes the critical need to expand utility-scale storage systems in order to enable the expansion of renewable energy, while also noting that the environmental benefit of storage systems depends on the

[12] Sustainalytics views positively the inclusion of a defined energy-efficiency threshold for the installation of energy-efficient systems, equipment and technologies.
[13] Despite the variety of definitions and applications of smart grid technology, Sustainalytics views positively investments that are designed to improve grid efficiency and encourages TCC to select projects that are clearly anticipated to deliver tangible efficiency improvements.
[14] Under this category, TCC confirmed with Sustainalytics that the recycled secondary feedstock and raw material is not circled back into the Company's operations.
[15] Government of Taiwan, "Climate Change Response Act", (2023), at: https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=O0020098
[16] Despite the variety of definitions and applications of smart grid technology, Sustainalytics views positively investments that are designed to improve grid efficiency and encourages TCC to select projects that are clearly anticipated to deliver tangible efficiency improvements.

		carbon intensity of the grid to which they are connected, and that deploying such assets to carbon-intensive grids or associated systems may result in increased emissions intensity. Nevertheless, Sustainalytics notes that the issuer intends to prioritize instalments of storage systems on grids that follow a credible decarbonization pathway[17] and report on the positive impact of such instalments, where feasible. - Industrial microgrids that combine distributed renewable energy sources, storage capacity and conventional backup to supplement or replace grid supply for both single and multiple users. TCC has confirmed that the microgrids will be powered primarily by solar PVs or small wind farms, and the fossil fuel backup of such microgrids is limited to 15%.
	Wind	- Investment in onshore and offshore wind energy generation projects
	Geothermal	- Investment in geothermal projects that will be limited to those with direct emissions below 100 gCO_2/kWh
	Biomass	- Investments in clean fuels related to R&D and manufacturing of advanced biofuels sourced from various types of non-food waste biomass[18]
	Marine Renewables	- Investment in marine renewable projects, such as offshore, wind, tidal and wave energy[19]
		- Sustainalytics notes that the deployment of renewable energy addresses primarily scope 2 emissions, and therefore, has a relatively low mitigation potential for cement production as it does not address the emissions inherent to the production process. - Sustainalytics considers investments under this category to be aligned with market practice.
Clean Transportation		- Financing related to the design, development, construction, acquisition, operation, maintenance and upgrades of: o Low-carbon and zero-carbon vehicles such as: i) vehicles with zero tailpipe emissions, including electric vehicles (EVs); ii) public transport or passenger vehicles with direct emissions below 50 gCO_2e/pkm; iii) hybrid passenger vehicles with direct emissions below 75 gCO_2e/pkm, based on WLTP and NEDC. o Infrastructure projects associated with low-carbon and electric vehicles,[20] such as charging infrastructure, equipment and stations, including: i) private and public charging solutions for EVs; and ii) advanced EV charging technology that enables the use of parked EVs as energy storage systems for grid stabilization. o Additionally, TCC may finance or refinance the acquisition of parking lots that support the EV charging facilities under the Framework. TCC has communicated to Sustainalytics that the financed parking lots will be operated by TCC or any of its subsidiaries and may have integrated energy storage systems when needed. TCC or any of its subsidiaries will ensure that the financed parking lots will be for the exclusive use of EVs, and this may be ensured through a booking system. o Investments in facilities that design and manufacture battery components, batteries and charging solutions for EVs.[21] - Sustainalytics considers investments under this category to be aligned with market practice.

[17] Sustainalytics considers a transmission and distribution grid to be aligned with a credible decarbonization pathway if it meets either of the following criteria: i) more than 67% of newly enabled generation installed capacity in the system is below the emissions threshold of 100 gCO_2e/kWh, measured on a life cycle basis in accordance with electricity generation criteria, over a rolling five-year period; or ii) the average system grid emissions factor is below the threshold of 100 gCO_2e/kWh over a rolling five-year period.

[18] Non-food waste biomass may include agriculture residue materials, including waste wood chips, spent mushroom compost bulk bag, food, agricultural and forestry waste, risk husks rice straws and waste cooking oil.

[19] In case of marine renewable projects for heating and cooling, Sustainalytics recommends that fossil fuel back-up be limited to power monitoring, operating and maintenance equipment, as well as resilience and protection measures and restart capabilities.

[20] TCC confirmed that the financing of infrastructure related to low-carbon vehicles will be subject to the relevant emissions intensity thresholds provided in the Clean Transportation category. Additionally, TCC confirmed the following activities will be excluded: i) new construction or existing road infrastructure retrofits, including roads, bridges or parking facilities; and ii) infrastructure dedicated to the transport or storage of fossil fuels.

[21] TCC has confirmed that such facilities will be wholly dedicated to electric vehicles and the batteries manufactured will be intended for use in EVs and renewable energy storage.

Green Buildings		- Investments related to the purchase, construction or acquisition of residential or commercial buildings that meet one of the following criteria: o Buildings that have achieved or are expected to achieve one of the following levels of green buildings certification: LEED Gold or above;[22] BREEAM Excellent or above;[23] or EEWH Gold or Diamond.[24] - Expenditures related to the retrofit, renovation or refurbishment of buildings that result in: o At least a 30% improvement in energy efficiency over the initial or pre-retrofit performance; or one of the above-mentioned green buildings certification levels. - Sustainalytics considers investments under this category to be aligned with market practice.
Environmentally Sustainable Management of Living Natural Resources and Land Use	Projects for sustainable management of natural resources	- Investments in preservation and restoration projects, including: o Protection of indigenous species, including: i) coral restoration and conservation projects, such as the Hoping EcoPort Bio Cube Coral Restoration Project, which uses bio cubes for coral restoration; ii) restoration of local species and habitats by rebuilding and modelling ecosystems to address ecology challenges; and iii) repurposing of discarded oil tanks from mines to use as water tanks for irrigating plants. o Forest and soil restoration projects, such as TCC's Ho-Ping Ecological Program, involving long-term monitoring of the decomposition of the large stubs on the base, increasing habitat heterogeneity with dead branches and fallen woods, observing decomposition constants for different wood qualities, investigating soil nutrients and animal composition, measuring microbiota in different stages of decomposition, and estimating data for carbon sequestration of soil and forest. o Projects for overcoming harsh environments for the reforestation and restoration of landscapes, including solar-powered micro irrigation systems, precision irrigation, windbreak nets to block strong winds and rainwater harvesting. o Transplanting of plants and recreation of animals and habitats to accelerate species reintroduction. o Projects involving the cultivation of fruit trees, vines, root tubers, stem tubers and hydroponic vegetables to provide food for animals. - TCC has confirmed that such projects will – i) use tree species well adapted to the site conditions and have a sustainable management plan in place; and ii) exclude remediation of any negative environmental impact of TCC's carbon-intensive operations. - While noting the environmental impact of activities, such as restoration and reforestation, Sustainalytics encourages TCC to finance activities that allow for transparent reporting of the impact of such expenditures. - Sustainalytics considers investments under this category to be aligned with market practice.

[22] LEED: https://www.usgbc.org/leed
[23] BREEAM: https://bregroup.com/products/breeam/
[24] EEWH: https://www.greenjump.com.tw/en/service/eewh-service

Additional Considerations on Use of Proceeds

- For refinancing existing projects, TCC has set a look-back period, limiting the allocation of proceeds to expenditures for projects implemented within three calendar years from the green bond's issuance date or the green loan's execution date. Sustainalytics views this to be in line with market practice. Eligible projects may include expenditures to related assets; capital expenditures; operational expenditures, including research and development expenses; and equity investments in pure play companies.[25] Sustainalytics acknowledges that the GBP and GLP favor project-based lending and financing, which provide more transparency in general than non-project-based lending, but notes that financing pure play companies through green bonds and loans is commonly accepted in the market as an approach that can generate a positive impact.
- Sustainalytics recognizes that due to the carbon-intensive nature of the cement sector and the technological barriers to decarbonization, the sector is facing hurdles to become low-carbon. Nevertheless, cement production remains critical for economic development and infrastructure helping meet human needs.
- Sustainalytics notes that expenditures related to cement manufacturing in the Alternative Fuels and Materials; Circular Economy Adapted Products, Production Technologies and Processes; Energy Efficiency; Pollution Prevention and Control; Sustainable and Wastewater Management; and Renewable Energy categories will be limited to facilities that are expected to result in a carbon intensity below 0.585 tCO_2e/tonne of cementitious product (for scope 1 and 2 emissions), which is slightly above the TPI's 2030 below-2°C scenario benchmark for the cement sector (0.547 tCO_2e/tonne of cementitious product).[26] Hence, Sustainalytics encourages TCC to target expenditures that are expected to result in a carbon intensity below 0.547 tCO_2e/tonne of cementitious product in line with the TPI's 2030 below-2°C scenario benchmark.[27] However, by limiting the use of proceeds to these assets, the financing is expected to contribute to substantial climate change mitigation and is likely to avoid a lock-in of carbon-intensive assets.

Project Evaluation and Selection

- TCC has established a Green Finance Committee (the "Committee"), which is responsible for the project evaluation and selection process in accordance with eligibility criteria listed in the Framework. The Committee consists of representatives from the Finance, Corporate Sustainability and Operation departments of the Company and is headed by the CEO. The Committee will meet quarterly to review and monitor eligible green projects and facilitate the management of any future updates to the Framework.
- TCC makes use of its existing sustainability and risk management framework to assess and mitigate any potential environmental and social risks associated with eligible green projects. Additionally, the Company will ensure that the eligible projects adhere to all the applicable national and international laws and regulations for all project evaluation and selection decisions made under the Framework.
- Based on the project evaluation and selection process and the presence of a management framework to identify and mitigate potential environmental and social risks, Sustainalytics considers this process to be in line with market practice.

[25] The Framework defines a pure play business as one that derives at least 90% of its revenue from one or more eligible categories described in the Use of Proceeds section.
[26] Sustainalytics notes that only scope 1 emissions are taken into account in the TPI's sectoral decarbonization benchmark for the cement sector. TCC's emissions intensity threshold of 0.585 tCO_2/tonne of cementitious product includes both scope 1 and 2 emissions, with limited contribution from scope 2 emissions.
[27] TCC confirmed with Sustainalytics that the Company is currently in the process of revising the targeted emissions intensity threshold and it intends to update the Framework once the targets are finalized.

Management of Proceeds

- TCC's Treasury Team will be responsible for the management and allocation of proceeds to the eligible projects. The Company will manage the proceeds on an aggregate basis for multiple Green Financing Instruments on a portfolio basis. TCC will track the proceeds quarterly using a green financing register.
- TCC intends to allocate all the proceeds within three calendar years of issuance. Pending full allocation, unallocated proceeds will be used for the repayment of outstanding indebtedness or temporarily invested in cash and cash equivalents or any other liquid marketable investments according to the Company's treasury management policy. Furthermore, TCC has confirmed to Sustainalytics that it will exclude TCC's cement operations, carbon-intensive assets or activities associated with the temporary allocation of proceeds under the repayment of indebtedness.
- Based on the use of an internal tracking system and the disclosure of the temporary allocation of proceeds, Sustainalytics considers this process to be in line with market practice.

Reporting

- The Company commits to report on the allocation of proceeds and the corresponding impact on its website on an annual basis, starting one year after issuance until the maturity date.
- The allocation report will include: i) the amount of the net proceeds of the outstanding Green Financing Instruments; ii) the amount of net proceeds allocated to the eligible projects; iii) the share of financing versus refinancing; iv) the balance of unallocated proceeds; and v) a list of eligible green projects financed, including a description of the projects and their geographical distribution, where feasible, subject to confidentiality considerations.
- Where feasible, TCC intends to align its impact reporting with the ICMA Harmonised Framework for Impact Reporting.[28] The Company's impact reporting will include relevant indicators, including alternative raw materials or fuels used, percentage of reduction in CO_2 emissions intensity, annual energy savings (in MWh or GWh, and GJ or TJ for other energy savings), annual GHG emissions reduced or avoided (in tCO_2e). For more information, refer to Appendix 1.
- Based on the commitment to allocation and impact reporting, Sustainalytics considers this process to be in line with market practice.

[28] ICMA, "Handbook: Harmonized Framework for Impact Reporting", (2023), at: https://www.icmagroup.org/assets/documents/Sustainable-finance/2023-updates/Handbook-Harmonised-framework-for-impact-reporting-June-2023-220623.pdf

Alignment against the Climate Transition Finance Handbook 2023

Sustainalytics has assessed TCC's alignment with the recommendations of the Climate Transition Finance Handbook and considers the Company's transition strategy to be adequate overall. Sustainalytics highlights the following key elements of the assessment:

Key Elements	ICMA Recommendation	Sustainalytics' Assessment	
Issuer's climate transition strategy and governance	- Transition strategy to address climate-related risks and contribute to alignment with the goals of the Paris Agreement - Relevant interim targets on the trajectory towards long-term goal - Governance of transition strategy	- TCC's Roadmap to Net Zero by 2050 outlines the decarbonization pathway for the Company and is underpinned by three main focus areas: i) low-carbon cement; ii) resource recycling; and iii) green energy. See the detailed assessment of the decarbonization pathway and implementation plan in Section 2. - As part of the roadmap, TCC has set a short-term target of reducing scope 1 and scope 2 GHG emissions by 11% and 32% per tonne of cementitious materials, respectively, from its Taiwan operations by 2025 compared to the 2016 base year. TCC has also set a medium-term target of reducing 31% of carbon emissions intensity in its Taiwan operations by 2030 compared to the 2016 base year. Similarly, TCC has set a target of reducing the carbon emissions intensity in its Mainland China operations by 20% by 2030.[29] - The Company's strategy to achieve the targets established through its roadmap will be overseen by the Corporate Sustainability Development Committee (the "Committee"). The Committee consists of representatives from eight functional groups: Corporate Integrity and Risk Management, Eco-Manufacturing, Sustainable Products, and Employee Care and Social Care; as well as three ESG-oriented taskforces: Task Force on Climate-Related Financial Disclosures (TCFD), Information Security, and Supply Chain. TCC's Board of Directors is the highest decision-making body in TCC's sustainable development. - Additionally, since 2019, TCC has been a supporter of the TCFD and implemented its recommendations for climate-related disclosures on governance, strategy, risk management and metrics and targets. The Board of Directors are responsible for the monitoring of climate-related risks and opportunities, approval of climate-related strategies, and tracking of performance indicators.	Aligned
Business model environmental materiality	- Transition trajectory should be relevant to the environmentally material parts of the issuer's business model	- TCC's operations are carbon- and energy-intensive as it is mainly involved in the production of cement, which is identified as one of the key hard-to-abate sectors. - TCC's transition strategy directly addresses the environmental impact of the core part of its business.	Aligned
Climate transition strategy to be science-based, including targets and pathways	- Transition strategy should reference science-based targets and transition pathways	- TCC's short-term emissions reduction target has been validated and approved by the SBTi. The short-term target requires reducing scope 1 and scope 2 GHG emissions by 11% and 32% per tonne of cementitious materials, respectively, by 2025 compared to the 2016 base year, which is comparable with the SBTi's well-below 2°C decarbonization trajectory.	Aligned

[29] TCC, "GHG Management: Net Zero by 2050", at: https://www.taiwancement.com/en/esgGhgCarbonEmissions.html

		- TCC also aims to achieve net zero by 2050. See the detailed assessment of emissions reduction targets in Section 2.	
Implementation transparency	- Disclosure of capital expenditure and operating expenditure plans - Climate-related outcomes and impacts of expenditures	- TCC has disclosed the capital expenditures related to the R&D of carbon capture technology in its sustainability report. Going forward, the Company also intends to report on capital and operating expenditures to activities related to its overall decarbonization efforts in any standard reporting channel, such as TCFD report, Sustainability Report or annual report to investors. - TCC intends to report on the progress of decarbonization and the overall climate transition strategy, including other ESG initiatives, sustainability targets and its performance, in its annual Sustainability Report. - The Company additionally adheres to the reporting guidelines of the following carbon disclosure platforms: i) Carbon Disclosure Project (CDP), ii) TPI and iii) TCFD.	Aligned

Section 2: Assessment of TCC's Sustainability Strategy

Credibility of TCC's Climate Transition Strategy

Emissions-Reduction Targets

ICMA's Climate Transition Finance Handbook recommends issuers to develop a climate transition strategy that includes short-, medium- and long-term emissions reduction targets aligned with the Paris Agreement.[30] In 2020, TCC launched its Roadmap to 2050 Net Zero, which includes a short-term 2025 target and a medium-term 2030 target. TCC aims to reduce its scope 1 and 2 GHG emissions per tonne of cementitious materials by 11% and 32%, respectively, from its Taiwan operations by 2025 compared to the 2016 base year. TCC's decarbonization target for 2025 is validated by the SBTi to be in line with the well-below 2°C scenario. TCC has also set a medium-term target of reducing the carbon intensity of its Taiwan operations by 31% by 2030 compared to the 2016 base year. Similarly, TCC has set target of reducing the carbon intensity of its Mainland China operations by 20% by 2030.[31] By 2050, TCC and its global subsidiaries aim to make 100% of its concrete products to be carbon neutral, thereby achieving net zero.

Decarbonization Pathway and Implementation Plan

To achieve its 2050 net zero targets, TCC's carbon reduction strategy mainly focuses on carbon reduction for basic building materials, renewable energy generation and energy storage, and carbon capture technologies.[32]

Under carbon reduction for basic building materials, TCC focuses on equipment and process enhancement, power generation by waste heat recovery, alternative raw materials and alternative fuels. As a part of EP 100, TCC set a target of 50% energy efficiency improvement across all operations by 2040 relative to the 2016 baseline year to reduce GHG emissions and the carbon intensity of its products.[33] Furthermore, TCC introduced flash distillation technology in all cement plants to raise the efficiencies in heat recovery. The consumption of alternative fuels and alternative raw materials help TCC to reduce the clinker factor of cement and thereby lower the carbon footprint of its products. Regarding renewable energy, TCC aims to achieve the following through NHOA, its energy storage subsidiary: i) generate 500 MW electricity from renewables by 2025; ii) create energy storage capacity of more than 2 GWh and develop infrastructure for 5,000-10,000 charging stations by 2025; and iv) enable battery power cell production capacity of 3.3 GWh/year by 2024. Moreover, TCC has been working with the Industrial Technology Research Institute to develop carbon capture technology (oxy-fuel combustion).[34] In connection with this, TCC has set target of capturing 100,000 tCO_2/year by 2030 and 1600,000 tCO_2/year by 2050.

[30] ICMA, "Climate Transition Finance Handbook", (2023), at: https://www.icmagroup.org/assets/documents/Sustainable-finance/2023-updates/Climate-Transition-Finance-Handbook-CTFH-June-2023-220623v2.pdf
[31] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf
[32] Ibid.
[33] Climate Group, "EP100 members", at: https://www.theclimategroup.org/ep100-members?page=10
[34] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf

TCC introduced internal carbon pricing of TWD 300/tonne (USD 9.5/tonne) to support its decision-making process in relation to climate change impacts, risks and opportunities. TCC also launched a pilot internal carbon trading platform that allocates allowances based on the respective production capacity of individual plants and stipulated carbon intensity targets and carbon emissions caps.[35] The Company is also actively involved in national, regional and global industry associations that promote the transition to a green economy, including the Global Cement and Concrete Association, Taiwan Cement Manufacturers' Association and Taiwan Institute for Sustainable Energy.[36]

Sustainalytics considers TCC's climate transition strategy to be credible and supportive of the Company's short-, medium- and long-term decarbonization targets.

Environmental and Social Risk Management

Sustainalytics recognizes that the use of proceeds from the Framework will be directed towards eligible projects that are expected to have a positive environmental impact. However, Sustainalytics is aware that such eligible projects could also lead to negative environmental and social outcomes. Some key environmental and social risks potentially associated with the eligible projects include issues related to carbon – own operations; emissions, effluents and waste generated during operations; resource use; land use and biodiversity; environmental and social (E&S) impact of products and services; occupational health and safety; and community relations.

Sustainalytics is of the opinion that TCC is able to manage or mitigate potential risks through the implementation of the following:

- To manage the Company's overall environmental risks, TCC has established a Risk Management Committee to conduct risk identification and analysis on seven aspects, including ESG-related aspects based on the Company's Corporate Social Responsibility Best Practice Principles and Risk Management Committee Charter. Through this risk management process, the committee develops risk mitigation strategies with plans for continuous monitoring and reviews of the implementation status of these strategies. The Committee reports to the Company's board of directors on the risk management status annually.[37]
- To reduce the impact of GHG emissions generated from its operations sites, TCC has an environmental management system that complies with ISO 14001 standards to effectively manage environmental risks and enhance performance.[38] Additionally, it has obtained ISO 14064 verification for GHG emissions inventory, ensuring compliance to quantification and reporting requirements for GHG emissions.[39]
- In terms of wastewater management, the Company has installed wastewater management systems and ensures that the discharged effluents meet the applicable effluent standards.[40] For waste management, the Company conducts off-site disposal for all the waste generated during its operations, and industrial waste, including iron and metals, is recovered by qualified third-party agencies on a regular basis.[41] In terms of air emissions, TCC adheres to all the applicable standards and manages emissions concentration levels well below the acceptable level as per the government's standards by implementing measures such as equipment retrofitting, enclosed conveyor belts and relevant NOx control technologies.[42]
- To manage risks associated with resource use, such as water usage, TCC undertakes water resource risk assessments and uses the World Resources Institute Aqueduct Water Risk Atlas to identify water supply sites that are in high water stress areas.[43,44] The Company also implements water-saving solutions, including water use control, rainwater harvesting and targets to achieve 100% zero discharge of wastewater from its operational sites.[45] Furthermore, TCC has obtained ISO 14046 water footprint and ISO 46001 water efficiency management systems certifications for all its plants.[46] In terms of the use of alternative raw materials, TCC has achieved BS 8001 Circular Economy certification to implement circular economy methods and obtain verification of the alternative raw materials and fuels on the path to carbon neutrality as per certification requirements.[47]

[35] Ibid.
[36] TCC, "Social Engagement", at: https://www.taiwancement.com/en/esgSocialEngagement.html
[37] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf
[38] TCC, "Environment: ISO 14001 Energy Management System", at: https://www.taiwancement.com/en/esgEnvironmentAirPollutant.html
[39] TCC, "Sustainability Recognition", at: https://www.taiwancement.com/en/esgRecognition.html
[40] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf
[41] Ibid.
[42] Ibid.
[43] Ibid.
[44] TCC, "Environment: Water Management", at: https://www.taiwancement.com/en/esgEnvironmentWasteAndWater.html?anchor=2
[45] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf
[46] TCC, "Environment: Water Management", at: https://www.taiwancement.com/en/esgEnvironmentWasteAndWater.html?anchor=2
[47] TCC, "Sustainability Recognition", at: https://www.taiwancement.com/en/esgRecognition.html

- To minimize risks related to biodiversity and land use, TCC has a biodiversity policy in place, which ensures adherence to all local laws and regulations to minimize environmental impacts.[48] Through this policy, the Company commits to undertaking environmental impact assessments for its mines, achieving 100% zero deforestation beyond its mining areas and developing biodiversity management plans.[49,50]
- To manage the E&S impact of its products and services, TCC has established a Green Procurement Policy, through which it ensures that it prioritizes procurement of green products and requires its suppliers to meet TCC's environmental performance requirements while providing products and services to the Company. Through this policy, TCC commits to prioritizing suppliers with environmental certifications and conducting regular evaluations considering environmental indicators.[51] TCC's products, including cement and concrete, are certified with ISO 14067 – carbon footprint of products.[52] Additionally, TCC has developed a Supplier Management Policy, which requires its suppliers to have environmental health and safety measures in place, promote environmental protection and make sustainable use of resources.[53] TCC has classified its suppliers based on the types of products and services procured and established a supplier management mechanism to monitor suppliers' operations for reducing and mitigating any risks related to its supply chain.
- Regarding occupational health and safety, TCC has an Occupational Health and Safety Policy in place, which ensures compliance with all applicable local and international health and safety regulatory standards and commits to conducting annual reviews for compliance checks.[54] Through this policy, TCC commits to improving the work environment and reducing occurrences of occupational health-related incidents. All of TCC's occupational health and safety management systems at its operational plant sites, including its headquarters, are certified with ISO 45001.[55] Through its compliance with the ISO management system, the Company commits to assessing risks related to health and safety and formulating plans to address these risks. Furthermore, TCC provides its employees with health and safety training to create awareness on aspects related to occupational health and safety.[56] To manage the health and safety risks related to its suppliers, TCC has established a Supplier Code of Conduct, which applies to the entire supply chain and manufacturing processes, ensures that all its suppliers comply with the occupational health and safety laws and regulations and requires the suppliers to carry out regular safety audits and implement measures to reduce safety-related incidents at the workplace by implementing safety procedures.[57]
- In terms of community relations and stakeholder engagement, TCC actively communicates with its key stakeholders, including employees, local communities, environmental groups, NGOs, government agencies, industry associations and investors, in accordance with AA 1000 Stakeholder Engagement Standards.[58] Through this stakeholder engagement, the Company identifies material issues and evaluates its impact levels and risks on stakeholders and business operations.

Based on these policies, standards and assessments, Sustainalytics is of the opinion that TCC has adequate policies and measures in place and is well positioned to manage and mitigate environmental and social risks commonly associated with the eligible categories.

[48] TCC, "Environment: Biodiversity", at: https://www.taiwancement.com/en/esgEnvironmentWasteAndWater.html?anchor=3
[49] Ibid.
[50] TCC, "TCC Sustainability Report", (2022), at: https://media.taiwancement.com/web_tcc/en/report/csr/report_2022_all.pdf
[51] TCC, "Green Procurement Policy", at: https://www.taiwancement.com/en/report/supplier/Green%20Procurement%20Policy.pdf?t=1693207061932
[52] TCC, "Sustainability Recognition", at: https://www.taiwancement.com/en/esgRecognition.html
[53] TCC, "Supplier Management Policy", at: https://www.taiwancement.com/en/report/supplier/Supplier%20Management%20Policy.pdf?t=1693207061932
[54] TCC, "Occupational Safety and Health Policy", at: https://www.taiwancement.com/en/report/esg/recognition/2022/%E8%81%B7%E6%A5%AD%E5%AE%89%E5%85%A8%E8%A1%9B%E7%94%9F%E6%94%BF%E7%AD%96.pdf
[55] Ibid.
[56] Ibid.
[57] TCC, "Supplier Corporate Social Responsibility Code of Conduct", at: https://www.taiwancement.com/en/report/supplier/Supplier%20Code%20of%20Conduct.pdf?t=1693207061932
[58] TCC, "Stakeholder Engagement", at: https://www.taiwancement.com/en/esgStakeholder.html

Section 3: Impact of the UoPs

Importance of energy efficiency enhancement and electrification in the cement sector

Improving energy efficiency and electrification in the cement industry is of paramount importance due to its significant impact on various aspects of sustainability, including environmental, economic and social dimensions. The cement industry is classified as a hard-to-abate sector owing to its substantial energy consumption, GHG emissions-intensive nature and heavy reliance on fossil fuels. The cement industry is the second-largest industrial CO_2 emitter and contributes to approximately 7% of global CO_2 emissions, primarily due to the combustion of fossil fuels for energy and the chemical process of clinker production.[59] Demand for concrete has tripled in the past 40 years[60] and if current trends continue, global cement production is expected to increase by 12-23% from 2018 levels by 2050.[61] The International Energy Agency estimates that the direct CO_2 intensity of cement production needs to fall by 4% every year to 2030 for the sector to reach net zero by 2050 and align with the 1.5°C target. However, the direct CO_2 intensity of cement production has remained largely flat in the last five years and is estimated to have increased by 1% in 2022.[62] Decarbonizing the cement sector while producing enough cement to meet demand poses significant challenges due to process emissions. Strategies to cut carbon emissions include improving energy efficiency, switching to lower-carbon fuels, reducing clinker content in cement or cement content in concrete and using emerging technologies, such as bioenergy with carbon capture, electrification and novel binders.[63]

The Global Cement and Concrete Association, a global industry association representing nearly 80% of global cement production outside of China, published its 2050 Net Zero Roadmap, outlining the pathways and milestones in an achievable net zero pathway to help limit global warming to 1.5ºC. The roadmap targets a 20% reduction in CO_2 emissions per tonne of cement by 2030 from a 2020 baseline, with key priorities including increasing clinker substitution, reducing fossil fuel use, increasing alternative fuel use, improving concrete production efficiency and integrating CCUS.[64] Similarly, the Climate Group introduced the ConcreteZero initiative in 2022 in partnership with World Green Building Council to establish a market for net zero concrete. Members of this initiative have pledged to incorporate 30% low-emissions concrete[65] into their projects by 2025 and increase it to 50% by 2030.[66]

Sustainalytics notes that mitigating these emissions may pose significant challenges with the growing demand for cement. Hence, Sustainalytics highlights that the Framework – primarily focused on reducing GHG emissions, reducing clinker factor and increasing alternative fuels usage – is expected to support TCC's decarbonization pathway to become net zero by 2050 and develop low-carbon products.

Importance of energy storage projects in the global energy transition

According to the Intergovernmental Panel on Climate Change, a global transition to clean energy is critical for climate change mitigation and achieving the Paris Agreement's goals.[67] Energy storage systems, such as batteries, help address inherent intermittency and curtailment issues associated with solar photovoltaic, wind and other renewable electricity-generating sources.[68] In addition, energy storage is expected to play an important role in existing and future energy systems by: i) lowering peak electricity costs; ii) reducing price fluctuations; and iii) enabling users to tailor their energy consumption to pricing and their needs.[69] In 2022, global investment in battery energy storage surpassed USD 20 billion, primarily directed towards large-scale integration into electrical grids, accounting for more than 65% of the total investment for that year. Following robust growth in 2022, the investment in battery energy storage is projected to establish a new record, surpassing USD 35 billion in 2023. This

[59] Science Based Targets, "Cement Science Based Target Setting Guidance", (2022), at: https://sciencebasedtargets.org/resources/files/SBTi-Cement-Guidance.pdf
[60] McKinsey, "The circular cement value chain: Sustainable and profitable", at: https://www.mckinsey.com/industries/engineering-construction-and-building-materials/our-insights/the-circular-cement-value-chain-sustainable-and-profitable
[61] IEA, "Cement technology roadmap plots path to cutting CO2 emissions 24% by 2050", (2018), at: https://www.iea.org/news/cement-technology-roadmap-plots-path-to-cutting-co2-emissions-24-by-2050
[62] IEA, "Cement", (2023), at: https://www.iea.org/reports/cement
[63] Science Based Targets, "Cement Science Based Target Setting Guidance", (2022), at: https://sciencebasedtargets.org/resources/files/SBTi-Cement-Guidance.pdf
[64] GCCA, "Concrete Future", at: https://gccassociation.org/concretefuture/
[65] According to the Climate Group's definition, low-emissions concrete is characterized by an embodied carbon intensity that falls below a specific threshold tied to the concrete's designated strength category. For the lowest strength category, concrete qualifies as low-emissions if its embodied carbon measures below 100 $kgCO_2e/m^3$. In contrast, for the highest strength category, the threshold is set at below 270 $kgCO_2e/m^3$.
[66] Climate Group, "Concrete Zero", at: https://www.theclimategroup.org/concretezero
[67] IPCC, "Global Warming of 1.5°C", at: https://www.ipcc.ch/sr15/
[68] Thejo Kalyani, N. et al. (2021), "Applications and propelling opportunities", Energy Materials: Fundamentals to Applications, at: https://www.sciencedirect.com/science/article/abs/pii/B978012823710600011X
[69] European Commission, "Energy Storage - Underpinning a decarbonised and secure EU energy system", (2023), at: https://energy.ec.europa.eu/system/files/2023-03/SWD_2023_57_1_EN_document_travail_service_part1_v6.pdf

forecast is based on the existing pipeline of projects and new capacity objectives and targets established by governmental bodies.[70]

TCC's investments in utility-scale energy storage under the Framework through its subsidiaries are expected to take place in Australia, the US and the UK, as well as the EU and Asia. Australia is expected to increase its energy storage capacity from 500 MW in 2021 to more than 12.8 GW by 2030, increasing its share of global installations from 3% to 7%.[71] The Asia-Pacific region is cumulatively expected to increase its deployment of energy storage to 39 GW by 2030, led by China.[72] The US had an installed energy storage capacity of 4 GW as of 2021.[73] The 2022 Inflation Reduction Act is expected to facilitate significant investments in wind, solar and storage systems in the US, resulting in the projected installation of 30 GW of energy storage from 2022 to 2030.[74] In 2022, European battery storage capacity reached 4.5 GW, with the potential to achieve 95 GW by 2050.[75] The top 10 countries in Europe, including the UK, France and Italy, aim to add 73 GWh of energy storage by 2031.[76]

Based on the above context, Sustainalytics is of the opinion that TCC's financing of energy storage systems are expected to improve global renewable energy integration and aid the global energy transition.

Contribution to SDGs

The Sustainable Development Goals were adopted in September 2015 by the United Nations General Assembly and form part of an agenda for achieving sustainable development by 2030. The instruments issued under Framework are expected to help advance the following SDGs and targets:

Use of Proceeds Category	SDG	SDG Target
Alternative Fuels and Materials: Circular Economy	12. Responsible Consumption and Production	12.4 By 2030, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
Circular Economy Adapted Products, Production Technologies and Processes	12. Responsible Consumption and Production	12.4 By 2030, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
Energy Efficiency	7. Affordable and Clean Energy 9. Industry, Innovation, and Infrastructure	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix 7.3 By 2030, double the global rate of improvement in energy efficiency 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

[70] IEA, "Grid-scale Storage", at: https://www.iea.org/energy-system/electricity/grid-scale-storage
[71] Forsyth, O. (2021), "Australia's energy storage installed base to grow more than five times by 2030", PV Magazine, at: https://www.pv-magazine.com/2021/05/31/australias-energy-storage-installed-base-to-grow-more-than-five-times-by-2030/
[72] BloombergNEF, "1H 2023 Energy Storage Market Outlook", (2023), at: https://about.bnef.com/blog/1h-2023-energy-storage-market-outlook/
[73] European Commission, "Energy Storage - Underpinning a decarbonised and secure EU energy system", (2023), at: https://energy.ec.europa.eu/system/files/2023-03/SWD_2023_57_1_EN_document_travail_service_part1_v6.pdf
[74] BloombergNEF, "Global Energy Storage Market to Grow 15-Fold by 2030", (2022), at: https://about.bnef.com/blog/global-energy-storage-market-to-grow-15-fold-by-2030/
[75] Murray, C. (2023), "Europe reached 4.5GW of battery storage installed in 2022; could hit 95GW by 2050", Energy Storage, at: https://www.energy-storage.news/europe-reached-4-5gw-of-battery-storage-installed-in-2022-could-hit-95gw-by-2050/
[76] Darmani, A. (2022), "Europe's grid-scale energy storage capacity will expand 20-fold by 2031", Wood Mackenzie, at: https://www.woodmac.com/news/opinion/europes-grid-scale-energy-storage-capacity-will-expand-20-fold-by-2031/

Pollution Prevention and Control	12. Responsible Consumption and Production	12.4 By 2030, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
Sustainable Water and Wastewater Management	6. Clean Water and Sanitation	6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
Renewable Energy	7. Affordable and Clean Energy	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
Clean Transportation	9. Industry, Innovation and Infrastructure	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
	11. Sustainable Cities and Communities	11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons
Green Buildings	9. Industry, Innovation and Infrastructure	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
Environmentally Sustainable Management of Living Natural Resources and Land Use	14. Life Below Water	14.2 Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
	15. Life on Land	15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

Conclusion

TCC has developed the Taiwan Cement Corporation Green Financing Framework, under which TCC and its subsidiaries intend to issue green financing instruments, including bonds, convertible bonds, loans and other debt instruments with short maturities, and use the net proceeds to finance or refinance, in whole or in part, existing or future green eligible projects. The projects are expected to support the decarbonization of TCC's operations in line with its climate transition roadmap. Sustainalytics considers that the green eligible projects funded by the net proceeds from the Green Financing Instruments are expected to provide positive environmental impacts.

The Framework outlines a process for tracking, allocating and managing proceeds of the Green Financing Instruments and makes commitments for TCC to report on its allocation and impact. Furthermore, Sustainalytics believes that the Framework is aligned with the overall sustainability strategy of the Company and is expected to contribute to the advancement of UN Sustainable Development Goals 6, 7, 9, 11, 12, 14 and 15. Additionally, Sustainalytics is of the opinion that TCC has implemented adequate measures and is well positioned to manage and mitigate environmental and social risks commonly associated with its operations. Furthermore, Sustainalytics notes that the Framework is aligned with the recommendations of the Climate Transition Finance Handbook 2023.

Based on the above, Sustainalytics is of the opinion that the Framework aligns with the Green Bond Principles 2021 and Green Loan Principles 2023.

Appendix 1 Green Bond / Green Bond Programme - External Review Form

Section 1. Basic Information

Issuer name:	Taiwan Cement Corporation
Green Bond ISIN or Issuer Green Bond Framework Name, if applicable:	Taiwan Cement Corporation Green Financing Framework
Review provider's name:	Sustainalytics
Completion date of this form:	September 18, 2023
Publication date of review publication: **Original publication date *[please fill this out for updates]*:**	

Section 2. Review overview

SCOPE OF REVIEW

The review:

☒ assessed the 4 core components of the Principles (**complete review**) and confirmed the alignment with the GBP/SBP/SBG (*delete where appropriate*).

☐ assessed only some of them (**partial review**) and confirmed the alignment with the GBP/SBP/SBG (*delete where appropriate*); please indicate which ones:

- ☒ Use of Proceeds
- ☒ Process for Project Evaluation and Selection
- ☒ Management of Proceeds
- ☒ Reporting

☐ assessed the alignment with other regulations or standards (CBI, EU GBS, ASEAN Green Bond Standard, ISO 14030, etc.); please indicate which ones:

ROLE(S) OF INDEPENDENT REVIEW PROVIDER

- ☒ Second Party Opinion
- ☐ Certification
- ☐ Verification
- ☐ Scoring/Rating
- ☐ Other (please specify):

Does the review include a sustainability quality score?

☐ Of the issuer

☐ Of the project

☐ Of the Framework

☐ Other (please specify):

☒ No scoring

ASSESSMENT OF THE PROJECT(S)

Does the review include:

☒ The environmental and/or social features of the type of project(s) intended for the Use of Proceeds?

☒ The environmental and/or social benefits and impact targeted by the eligible Green and/or Social Project(s) financed by the Green, Social or Sustainability Bond?

☒ The potentially material environmental and/or social risks associated with the project(s) (where relevant)?

ISSUER'S OVERARCHING OBJECTIVES

Does the review include:

☒ An assessment of the issuer's overarching sustainability objectives and strategy, and the policies and/or processes towards their delivery?

☐ An identification and assessment of environmental, social and governance related risks of adverse impact through the Issuer's [actions] and explanations on how they are managed and mitigated by the issuer?

☒ A reference to the issuer's relevant regulations, standards, or frameworks for sustainability-related disclosure and reporting?

CLIMATE TRANSITION STRATEGY

Does the review assess:

☒ The issuer's climate transition strategy & governance?

☒ The alignment of both the long-term and short/medium-term targets with the relevant regional, sector, or international climate scenario?

☒ The credibility of the issuer's climate transition strategy to reach its targets?

☒ The level/type of independent governance and oversight of the issuer's climate transition strategy (e.g. by independent members of the board, dedicated board sub-committees with relevant expertise, or via the submission of an issuer's climate transition strategy to shareholders' approval).

☒ If appropriate, the materiality of the planned transition trajectory in the context of the issuers overall business (including the relevant historical datapoints)?

☒ The alignment of the issuer's proposed strategy and targets with appropriate science-based targets and transition pathways that are deemed necessary to limit climate change to targeted levels?

☐ The comprehensiveness of the issuer's disclosure to help investors assess its performance holistically?

Overall comment on this section:
Sustainalytics has evaluated Taiwan Cement Corporation's transition governance, strategy, decarbonization targets, and intentions to report on transition progress and finds Taiwan Cement Corporation to be aligned with the recommendations of the Climate Transition Finance Handbook 2023.

Section 3. Detailed Review

1. USE OF PROCEEDS

Does the review assess:

☒ the environmental/social benefits of the project(s)?

☒ whether those benefits are quantifiable and meaningful?

☐ for social projects, whether the target population is properly identified?

Does the review assess if the issuer provides clear information on:

☐ the estimated proceeds allocation per project category (in case of multiple projects)?

☐ the estimated share of financing vs. re-financing (and the related lookback period)?

Overall comment on this section:
Sustainalytics is of the opinion that the Taiwan Cement Corporation Green Financing Framework is credible and impactful and aligns with the four core components of the Green Bond Principles 2021 and Green Loan Principles 2023. The eligible categories for the use of proceeds – i) Alternative Fuels & Materials – Circular Economy, ii) Circular Economy Adapted Products, Production Technologies and Processes, iii) Energy Efficiency, iv) Pollution Prevention and Control, v) Sustainable Water and Wastewater Management, vi) Renewable Energy, vii) Clean Transportation, viii) Green Buildings and ix) Environmentally Sustainable Management of Living Natural Resources and Land Use are aligned with those recognized by the applicable principles. Sustainalytics considers that the investments in the project categories are expected to lead to positive environmental impacts and the activities under the use of proceeds project categories to be credible from a transition perspective.

2. PROCESS FOR PROJECT EVALUATION AND SELECTION

Does the review assess:

☒ whether the eligibility of the project(s) is aligned with official or market-based taxonomies or recognised international standards? Please specify which ones.

☒ whether the eligible projects are aligned with the overall sustainability strategy of the issuer and/or if the eligible projects are aligned with material ESG-related objectives in the issuer's industry?

☒ the process and governance to set the eligibility criteria including, if applicable, exclusion criteria?

☒ the processes by which the issuer identifies and manages perceived social and environmental risks associated with the relevant project(s)?

☒ any process in place to identify mitigants to known material risks of negative social and/or environmental impacts from the relevant project(s)?

Overall comment on this section:
TCC has established a Green Finance Committee (the "Committee") which is responsible for the project evaluation and selection process in accordance with eligibility criteria listed in the Framework. The Committee consists of representatives from the Finance, Corporate Sustainability, Operation departments of the Company and is headed by the CEO. The Committee will meet quarterly to review and monitor eligible green projects and facilitate managing of any future updates to the Framework. TCC makes use of its existing sustainability and risk management framework to assess and mitigate any potential environmental and social risks associated with eligible green projects. Additionally, the Company will ensure that the eligible projects adhere to all the applicable national and international laws and regulations for all project evaluation and selection decisions made under the Framework.
Sustainalytics considers this to be in line with the market practice.

3. MANAGEMENT OF PROCEEDS

Does the review assess:

☒ the issuer's policy for segregating or tracking the proceeds in an appropriate manner?

☒ the intended types of temporary investment instruments for unallocated proceeds?

☒ Whether an external auditor will verify the internal tracking of the proceeds and the allocation of the funds?

Overall comment on this section:
TCC's Treasury Team will be responsible for the management and allocation of proceeds to the eligible projects. The Company will manage the proceeds on an aggregate basis for multiple green finance instruments on a portfolio basis. TCC will track the proceeds quarterly using a green financing register. TCC intends to allocate all the proceeds within 3 calendar years 36 months of issuance. Pending full allocation, unallocated proceeds will be used for repayment of outstanding indebtedness or temporarily invested in cash and cash equivalents or any other liquid marketable investments according to the Company's treasury management policy. Further, TCC has confirmed to Sustainalytics that it will exclude carbon-intensive assets or activities associated with temporary allocation of proceeds under repayment of indebtedness.
Sustainalytics considers this to be in line with the market practice.

4. REPORTING

Does the review assess:

☒ the expected type of allocation and impact reporting (bond-by-bond or on a portfolio basis)?

☒ the frequency and the means of disclosure?

☒ the disclosure of the methodology of the expected or achieved impact of the financed project(s)?

Overall comment on this section:
The Company commits to report on the allocation of proceeds and the corresponding impact on its website on an annual basis, starting one year after issuance, until the maturity date. full allocation.
The allocation report will include: i) the amount of the net proceeds of the outstanding green finance instruments, ii) the amount of net proceeds allocated to the eligible projects, iii) the share of financing versus refinancing, iv) the balance of unallocated proceeds, and v) a list of eligible green projects financed including a description of the projects and their geographical distribution, where feasible; subject to confidentiality considerations.
Where feasible, TCC intends to align its impact reporting with the ICMA Harmonised Framework for Impact Reporting. The Company's impact reporting will include relevant indicators including alternative raw materials or fuels used, percentage reduction in carbon intensity in CO2 emission intensity, annual energy savings in MWh/GWh and GJ/TJ (other energy savings), annual GHG emissions reduced/avoided in tonnes of CO2e.
Sustainalytics consider this in line with the market practice.

Section 4. Additional Information

Useful links *(e.g. to the external review provider's methodology or credentials, to the full review, to issuer's documentation, etc.)*

Analysis of the contribution of the project(s) to the UN Sustainable Development Goals:

Additional assessment in relation to the issuer/bond framework/eligible project(s):

ABOUT ROLE(S) OF INDEPENDENT REVIEW PROVIDERS AS DEFINED BY THE GBP

i. Second-Party Opinion: An institution with environmental expertise, that is independent from the issuer may issue a Second-Party Opinion. The institution should be independent from the issuer's adviser for its Green Bond framework, or appropriate procedures, such as information barriers, will have been implemented within the institution to ensure the independence of the Second-Party Opinion. It normally entails an assessment of the alignment with the Green Bond Principles. In particular, it can include an assessment of the issuer's overarching objectives, strategy, policy and/or processes relating to environmental sustainability, and an evaluation of the environmental features of the type of projects intended for the Use of Proceeds.

ii. Verification: An issuer can obtain independent verification against a designated set of criteria, typically pertaining to business processes and/or environmental criteria. Verification may focus on alignment with internal or external standards or claims made by the issuer. Also, evaluation of the environmentally sustainable features of underlying assets may be termed verification and may reference external criteria. Assurance or attestation regarding an issuer's internal tracking method for use of proceeds, allocation of funds from Green Bond proceeds, statement of environmental impact or alignment of reporting with the GBP, may also be termed verification.

iii. Certification: An issuer can have its Green Bond or associated Green Bond framework or Use of Proceeds certified against a recognised external green standard or label. A standard or label defines specific criteria, and alignment with such criteria is normally tested by qualified, accredited third parties, which may verify consistency with the certification criteria.

iv. Green Bond Scoring/Rating: An issuer can have its Green Bond, associated Green Bond framework or a key feature such as Use of Proceeds evaluated or assessed by qualified third parties, such as specialised research providers or rating agencies, according to an established scoring/rating methodology. The output may include a focus on environmental performance data, the process relative to the GBP, or another benchmark, such as a 2-degree climate change scenario. Such scoring/rating is distinct from credit ratings, which may nonetheless reflect material environmental risks.

Disclaimer

About Sustainalytics, a Morningstar Company

Sustainalytics, a Morningstar Company, is a leading ESG research, ratings and data firm that supports investors around the world with the development and implementation of responsible investment strategies. For more than 30 years, the firm has been at the forefront of developing high-quality, innovative solutions to meet the evolving needs of global investors. Today, Sustainalytics works with hundreds of the world's leading asset managers and pension funds who incorporate ESG and corporate governance information and assessments into their investment processes. Sustainalytics also works with hundreds of companies and their financial intermediaries to help them consider sustainability in policies, practices and capital projects. With 17 offices globally, Sustainalytics has more than 1500 staff members, including more than 500 analysts with varied multidisciplinary expertise across more than 40 industry groups.

For more information, visit www.sustainalytics.com

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