

2026 台積電氣候績效報告

TSMC Climate Performance Assessment Report

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Key Takeaways

Taiwan Climate Action Network (TCAN) evaluated Taiwan Semiconductor Manufacturing Company's preparedness for the climate transition plan, which will be mandatory next year according to the FSC's regulation. Based on the IFRS S2 framework, TCAN focusing on five key areas: **Target Setting, Climate Risks and Opportunities, Climate Engagement, Capital Expenditure and Decarbonization Strategy, Governance and Accountability.**

1. Target Setting

TSMC's announced targets include 2050 net-zero emissions for global operations, zero emissions growth in 2025, a return to 2020 GHG levels and RE60 by 2030, and RE100 by 2040. The company further states that it will use 2025 as the reference year and submit an SBTi-aligned plan in 2026, aiming to meet absolute Scope 1, 2 and 3 reduction requirements before 2035. These commitments are important, but the company's current emissions trajectory and interim plans do not yet demonstrate credible alignment with its long-term net-zero ambition.

Three gaps are most material. First, World Benchmarking Alliance (WBA)'s climate benchmark for the global 2,000 largest companies finds that TSMC's near-term and long-term targets for Scopes 1, 2 and 3 are not yet sufficiently aligned with a 1.5 degrees Celsius pathway, and the sectoral pathway used for target-setting has not been recognized as 1.5 degrees Celsius compatible. Second, TSMC's own 2025 goal requires product-level GHG intensity to fall 10% from 2020 levels, yet 2024 product-level GHG intensity was 19% higher than in 2020. Third, the Self-determined Reduction Plan submitted under Taiwan's carbon-fee framework appears inconsistent with the 2030 commitment: Taiwan-site Scope 1 and 2 emissions would only decline to 12.47 million tCO₂e by 2030, far above the 2020 level of 9.47 million tCO₂e.

2. Climate Risks and Opportunities

TSMC estimates that transition-risk costs, including energy-saving and GHG-reduction facilities, renewable electricity, renewable-energy certificates and carbon credits, would amount to around 1% of revenue. However, if the company does not continue decarbonization management, financial impacts under global carbon-pricing trends could rise to 2-3% of revenue. This means credible implementation of net-zero commitments is financially beneficial and should be supported by shareholders.

The current risk analysis remains too limited. TSMC recognizes that slower decarbonization could reduce orders and revenue if the company fails to meet key customer expectations, but it has not fully analyzed this risk. TechInsights' comparison of Intel 18A and TSMC 2nm indicates that advanced-node manufacturing emissions depend not only on process complexity but also heavily on the grid carbon intensity of the production site. Even with higher manufacturing burden from backside power delivery, Intel 18A produced in Oregon could show lower per-die CO_{2e} than TSMC 2nm produced in Taiwan because of cleaner electricity. TechInsights also expects Taiwan's grid carbon intensity in 2028 to remain more than twice that of Ireland or Oregon; if both products reached 90% yield, Taiwan-made TSMC 2nm emissions could be 47% higher.

Major customers including NVIDIA, AMD, Apple, Microsoft and Google are strengthening Scope 3 and product-carbon-footprint management across supply chains. AMD has also set a 2030 target to reduce supplier carbon intensity by 25% from 2024 levels. If these expectations become procurement or supplier-scorecard criteria, TSMC's fab-level electricity mix and product carbon footprint could affect order allocation and pricing power. TSMC should therefore move beyond aggregate Scope 2 disclosure and provide node-, fab- and product-level carbon-footprint data.

3. Climate Engagement

TSMC's Public Policy Participation Guidelines identify climate policy alignment as a principle. The company states that it shares climate goals, sustainability practices and net-zero progress with suppliers, trade associations and non-profit organizations, and that it promotes supply-chain decarbonization through environmental, climate, water and fluorinated-GHG policies. It also states that it will adjust engagement strategies when participating organizations are inconsistent with its climate goals.

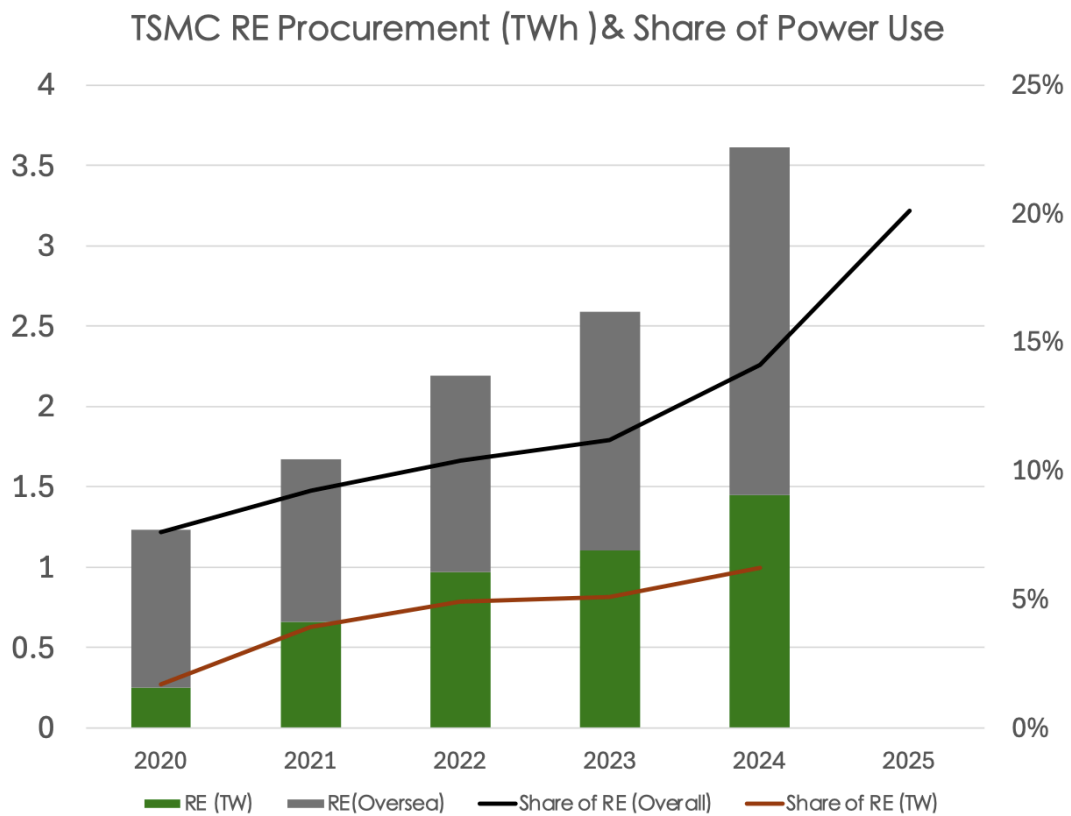
However, InfluenceMap's LobbyMap assessment still characterizes TSMC's climate-policy engagement as "very low engagement." TSMC receives an overall climate-policy engagement score of C, an organizational score of 62%, and an engagement-intensity score of only 7%. This suggests that TSMC is not assessed as a clear obstruction to climate policy, but that publicly available evidence of proactive advocacy remains limited. Although much of the LobbyMap analysis is based on information before 2021, recent renewable-energy controversies in Taiwan, including 2025 renewable-energy legislative debates and delays in the offshore wind 3-3 selection mechanism, have not been accompanied by clear public positions from TSMC or its associations. Under IFRS S2, a credible transition plan should disclose climate-policy engagement goals, policy positions, engagement outcomes, and management of trade-association alignment.

4. Capital Expenditure and Decarbonization Strategy

TSMC's 2025 Annual Report discloses NT\$1.27 trillion in major capital expenditure, primarily for production facilities, research and development, and manufacturing equipment. Energy-conservation investment was about NT\$2.139 billion and GHG-reduction investment about NT\$7.294 billion. On a narrow basis, climate- and energy-related investment therefore totaled NT\$9.433 billion, or only 0.74% of annual major CapEx. Even including resource-conservation investment such as water, broad climate-transition investment reached about NT\$20.659 billion, or only 1.62% of CapEx. Compared with WBA's estimate that climate-transition CapEx accounts for about 7% of total CapEx among the global 2,000 largest companies, TSMC's disclosed share appears too low for a company whose growth depends on energy-intensive advanced manufacturing.

Renewable energy procurement is a decisive factor in determining whether TSMC's decarbonization pathway is aligned with a 1.5°C scenario, and it requires a more granular implementation plan. TSMC renewable-energy use rose from 7.6% in 2020 to 20.1% in 2025, and overseas manufacturing sites and offices have achieved 100% renewable-energy use for eight consecutive years through renewable electricity and certificates. Yet this global average may mask a domestic gap. Based on TSMC 2024 disclosures, roughly 60% of renewable-energy use appears to occur overseas and 40% in Taiwan. If overseas sites are already at 100%, Taiwan main fabs may still be at only around 6.2% renewable electricity. Since Taiwan facilities account for most electricity demand, Scope 2 emissions and advanced-node production, the relevant transition indicator is not the global average alone, but the renewable share of Taiwan fabs.

The disclosed 7.3 GW of renewable power purchase agreements also needs more careful scrutiny. If the portfolio is approximated as 2 GW of offshore wind at a 43% capacity factor and 5.3 GW of solar PV at a 14% capacity factor, annual generation would be about 14.04 TWh. Relative to TSMC 2025 electricity use of about 28.76 TWh, that would cover around 48.8% of electricity demand, below the RE60 threshold.



By 2030, demand may exceed 42 TWh kWh because of 2nm production, advanced packaging, AI/HPC demand and new fabs. In that case, RE60 would require more than 25 TWh of renewable electricity. Even if the existing 7.3 GW PPA portfolio is delivered on schedule, TSMC could still face a shortfall of more than 10 TWh, roughly equivalent to more than 3 GW of additional offshore wind generation.

Energy efficiency is another credibility gap. TSMC’s goal is to double energy efficiency five years after mass production for each process technology, but by the fifth year of 5nm mass production in 2024, efficiency had improved by only 0.6 times, leaving a 0.4-times gap. Product-level energy use fell from 40.5 kWh per 12-inch-equivalent mask layer in 2023 to 37.1 kWh in 2024, but remained 39% above the 2020 level of 26.7 kWh. The Self-determined Reduction Plan also relies too heavily on low-additionality measures such as LED replacement: lighting represents only about 2.5% of semiconductor fab electricity use, but lighting replacement accounts for about 10% of listed measures, while process equipment represents roughly 50% of power use but only 2.6% of the measures.

5. Governance and Accountability

For TSMC, climate governance is no longer simply a matter of an ESG organization chart, a sustainability committee, or periodic board briefings. The structural risk facing the semiconductor sector is that advanced-node expansion increases electricity demand; electricity sourcing directly shapes product carbon footprints; and access to sufficient renewable electricity affects customer procurement, supplier ratings and external benchmarks. Board oversight should therefore move beyond target disclosure and emissions inventories to direct accountability for low renewable-energy use in Taiwan, missed energy-efficiency targets, insufficient climate-transition CapEx, and the quality of the autonomous reduction plan.

WBA finds that TSMC has established a board-level sustainability governance structure but still needs to disclose more clearly whether members of the highest governance body have climate-transition-relevant expertise, such as academic qualifications, professional training, relevant experience, technical knowledge, professional background or recent active engagement with relevant organizations. The Transition Pathway Initiative (TPI) rates TSMC's management quality at Level 5, "Transition Planning and Implementation," reflecting a relatively complete management architecture across risk identification, targets, board oversight, remuneration links, scenario analysis, internal carbon pricing and reduction-action disclosure. Nonetheless, TPI also identifies remaining gaps: the role of offsets or negative-emissions technologies is unclear; TSMC has not committed to cease high-carbon asset or product-related CapEx; future CapEx alignment with long-term decarbonization goals is not disclosed; and climate-policy positions have not been shown to be consistent with trade associations.

TCAN Recommendations

TCAN urges TSMC to strengthen the following aspects of its transition plan:

1. Align interim targets with SBTi and the net-zero commitment.

TSMC should accelerate SBTi-aligned target-setting for absolute Scope 1, 2 and 3 reductions. It should publish a year-by-year 2025-2035 reduction pathway, identify responsible decision-makers, disclose verification mechanisms, and avoid using offsets as a substitute for real emissions reductions. The pathway should explain how the company will close the gap between its 2030 return-to-2020 commitment and the autonomous reduction plan currently disclosed for Taiwan sites. It should also clarify how intensity indicators will be used without obscuring absolute emissions growth, and how annual deviations will trigger management action.

2. Close the domestic renewable-energy gap and make RE60 bankable.

TSMC should move beyond global renewable-energy totals and disclose a year-by-year, region-by-region and project-level renewable-electricity procurement plan. The plan should specify grid-connection schedules, expected generation from the 7.3 GW PPA portfolio, the portion available to Taiwan fabs, and the additional procurement required to reach RE60 under realistic 2030 electricity-demand scenarios. Because Taiwan fabs carry the company main Scope 2 exposure and advanced-node capacity, Taiwan-site renewable-electricity use should be treated as the core performance indicator. The company should also disclose how renewable power will be allocated across nodes, customers and fabs if supply remains constrained.

3. Reset energy-efficiency delivery and strengthen the autonomous reduction plan.

TSMC should review why the 5nm energy-efficiency target was not met, establish node-level electricity, kWh per mask layer and energy-per-wafer-pass KPIs, and work with ASML and other key equipment suppliers on high-consumption hotspots. The autonomous reduction plan should shift from low-additionality measures toward process equipment, EUV systems and fab utilities. TSMC should also disclose the expected abatement from each major measure, the investment required, the implementation timeline and the governance owner. This would allow investors to assess whether the plan can deliver material reductions rather than a collection of small facility upgrades.

