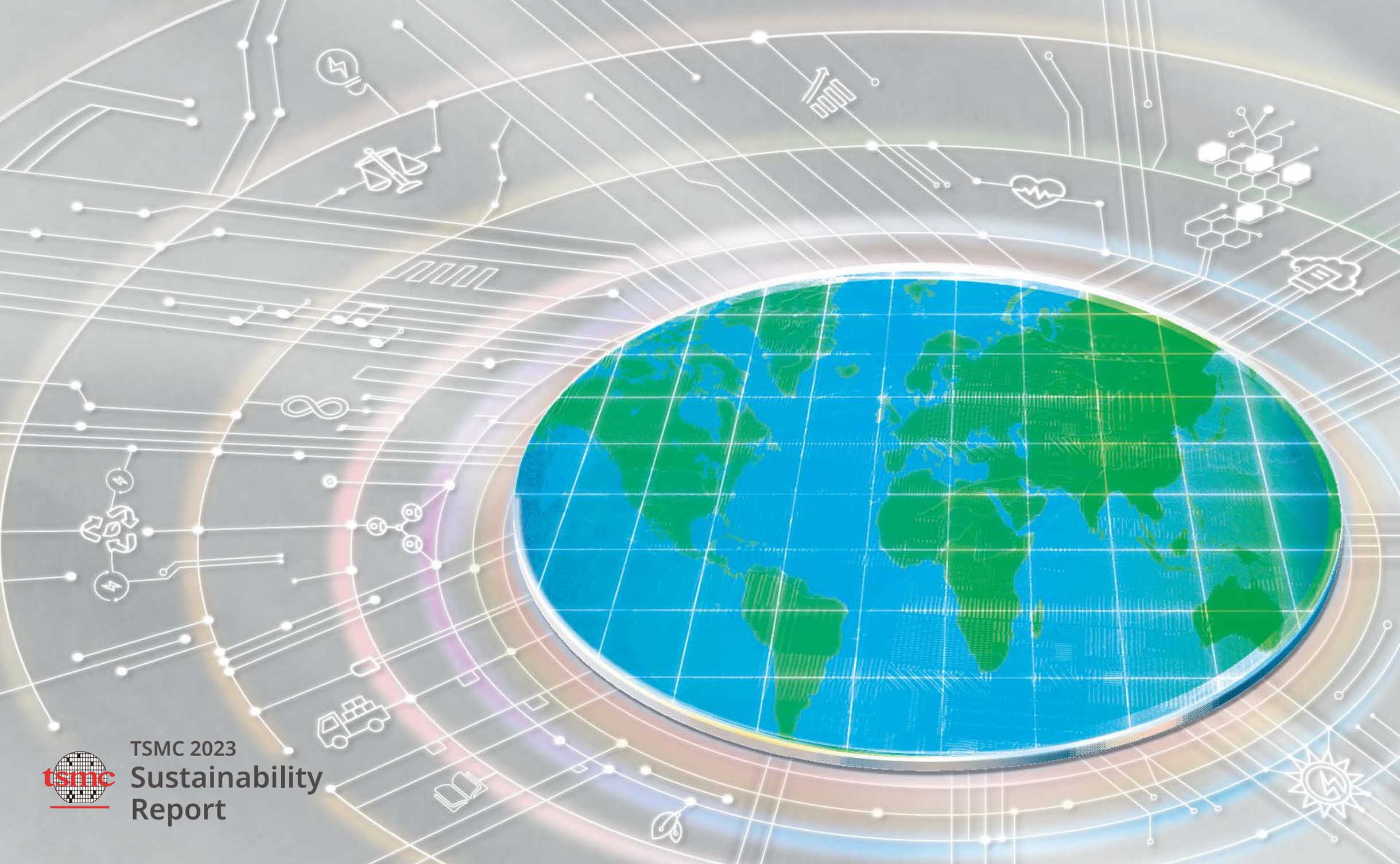


TSMC 2023 Sustainability Report

Contents

One Wafer, One World

Innovation drives TSMC's continuous growth.
Each wafer carries the promise of future prosperity,
creating a blueprint for sustainable common good around the world.

As a responsible global corporate citizen,
TSMC partners across sectors to invest resources,
achieve harmony between technology, nature, and humanity.
Gathering every ounce of positive energy,
spreading like the ripples in a pond,
TSMC changes the world for the better.

Letter from the ESG Steering Committee Chairperson

At TSMC, we believe in the value of "Common Good." TSMC employees around the world have deeply embedded our sustainability principles in every aspect of the company's operations, making TSMC a driving force for a better world.

Looking back at the past year, the Annual 2023 Global Climate Report published by the U.S. National Oceanic and Atmospheric Administration (NOAA) reported that 2023 was the hottest year in the historical record. We cannot ignore the impact of climate change, and we can expect that as global warming continues, climate change will impact our ecosystems and communities.

Companies are playing an increasingly critical role as they carry out environmental commitments and drive low-carbon transformation around the world. TSMC is committed to achieving net-zero emissions through continued investment in a wide range of green initiatives and innovative energy-saving and carbon-reducing technologies. Every year, we boldly set more ambitious goals and take action to meet the challenges of climate change.

In 2023, TSMC accelerated its execution of RE100, aiming to achieve its goal 10 years ahead of schedule. By 2040, the company's manufacturing sites will use 100% renewable energy, steadily moving towards the goal of net-zero emissions by 2050. Overseas sites have already fully adopted renewable energy, and we will continue to carry out the right environmental conservation actions for each site. We have issued a "Biodiversity Statement" with the goal of achieving net-zero deforestation, no net loss of nature and biodiversity, and a net positive impact on nature and biodiversity by 2050. Through regular and ongoing transparent disclosures, we work with stakeholders from all sectors to step into a sustainable future together.

The 28th Climate Change Conference of Parties (COP28) was the first global stocktake since the signing of the Paris Agreement, which revealed that we need greater, faster, and longer-lasting controls on greenhouse gas emissions. TSMC is more sharply focused on driving operational models with low environmental impact, and integrates resources through a dedicated green manufacturing organization to thoroughly execute projects on climate and energy, water stewardship, circular resources, and air pollution control. At the same time, we have established a responsible semiconductor supply chain and are steadfast supporters of our suppliers' continuous improvements in carbon management and climate risk response capabilities.

This year, TSMC also carefully revised its "Human Rights Policy," responding to the UN General Assembly's resolution in 2022 stating that the right to a clean, healthy, and sustainable environment is a basic human right. We have incorporated environmental rights into one of our six human rights commitments and further supported multiple international standards and guidelines on women and children, disclosed human rights management policies, and extended human rights protection to a wider range of stakeholders beyond employees and the supply chain. In the spirit of embracing innovation and change, TSMC is committed to creating an inclusive workplace where everyone can feel at ease, and to serving local communities through the TSMC Education and Culture Foundation and TSMC Charity Foundation.

TSMC strives to make contributions towards human well-being and the natural environment. I am proud of the changes brought about by TSMC employees in the past year, and I believe that TSMC's sustainable actions will ripple outwards and make an impact.

> **"I believe that TSMC's sustainable actions will ripple outwards and make an impact.**

Mark Liu
Chairman and ESG Steering Committee Chairperson
Chairman Mark Liu officially retired on June 4, 2024

Letter from the ESG Committee Chairperson

The World's political, economic, and natural environments have been going through great changes in recent years under the impact of extreme weather events, geopolitical conflict, and post-pandemic transformation to the supply chain and ways of work. The latest Global Risks Report, issued by the World Economic Forum, points out that in the next decade, environmental issues will continue to dominate the global risk landscape. These risks, along with the trends of multipolar international competition and the development of artificial intelligence (AI), underscore the importance of rebuilding trust. TSMC strives to integrate technology with sustainable development, joining hands with stakeholders to advance together towards prosperity and growth.

In 2023, TSMC continued to lead the industry with successful volume production of our enhanced 3-nanometer technology, N3E, and brought 11,895 innovative products through 288 distinct process technologies to life for our customers, powering the unceasing progress of technology and society. We leveraged AI to realize intelligent precision manufacturing, optimized workflows and operations efficiency, and supported our customers' success with high-quality production. We also broadened our global talent deployment, expanded industry-university collaboration projects, and galvanized innovation from the inside out, cultivating semiconductor talents in both quantity and quality.

In addition to extending our roadmap for advanced technologies, TSMC also acted on its net-zero commitment, announcing that we plan to reach our RE100 target ahead of time by 2040. Responding to the consensus at COP28 on transitioning away from fossil fuels, we carried out 822 energy conservation projects and established a Zero Waste Manufacturing Center. Furthermore, we led our supply chain towards sustainable transformation in 2024, pioneering a Supplier Environmental Information Digital Platform, and inviting suppliers to participate for joint purchases of renewable energy. We disclosed our efforts in green manufacturing in our first Climate and Nature Report, deepening our influence on the industry.

Besides fulfilling our environmental responsibilities, TSMC demonstrated its concern for human rights in 2023 with the establishment of a Human Rights Working Group with the Board of Directors at the highest level of governance, and published the company's first Human Rights Report. In addition, to strengthen our culture of diversity, equity, and inclusion, TSMC continued to support female talent at all stages of their careers, established Employee Resource Groups (ERGs) for under-represented groups, and extended concern for DEI and human rights to our supply chain. We created a zero-incident workplace, offered a wide variety of activities to promote physical and mental health, and continued to to connect the Company with external resources to ensure the health and safety of workers.

In the spirit of "leave no one behind", TSMC proactively published the UN SDGs Action Report for a third consecutive year, disclosing our progress towards Sustainable Development Goals (SDGs), and drove a variety of public welfare projects through the six core services of the TSMC Education and Culture Foundation and the TSMC Charity Foundation. In 2023, we integrated our environmental profit and loss and our social impact to publish our first Sustainability Impact Valuation Report, systematically evaluating resources invested and outcomes produced, and weighing the changes that TSMC has brought to the entire value chain in terms of externalities.

Transparency is a key principle in carrying out ESG. Through different themed ESG reports, we maintain stakeholders' trust, and uncover opportunities to improve our sustainability governance. Looking ahead, TSMC will continue to forge a culture of ESG among all employees through the ESG AWARD, link executive compensation with ESG results, and accelerate our sustainability momentum. We will continue to stay ahead of global ESG initiatives and trends, and keep creating shared value for the environment and society with the spirit of "Driving Positive Change" at the center of our efforts.

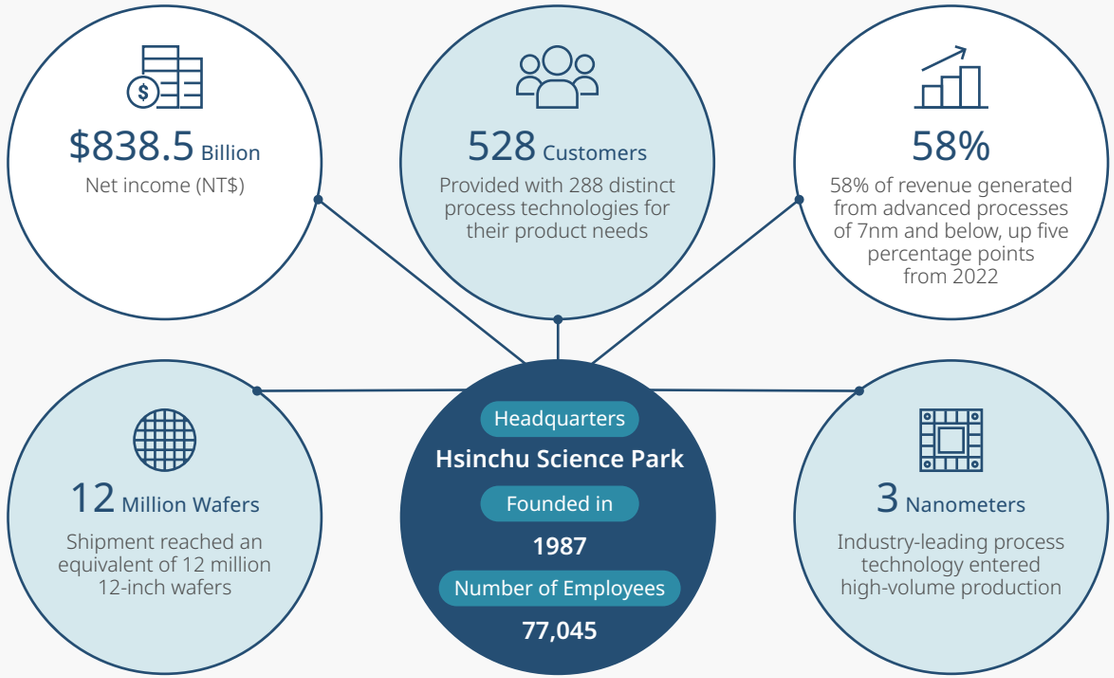
> **"TSMC strives to integrate technology with sustainable development, joining hands with stakeholders to advance together towards prosperity and growth.**

Lora Ho
Senior Vice President and ESG Committee Chairperson

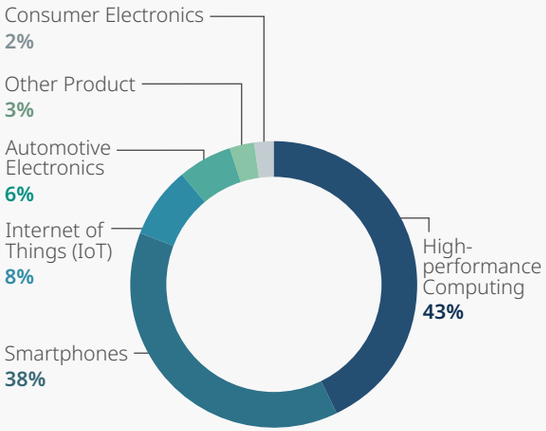
About TSMC

As the trusted long-term provider of technology and capacity in the global logic IC industry, TSMC is committed to pursuing innovation and social progress. In the face of global economic developments and the emergence of generative AI applications, the Company upholds its Trinity of Strengths: "Technology Leadership, Manufacturing Excellence, and Customer Trust" by continuously strengthening services and expanding R&D capabilities. TSMC strives for industry-leading achievements while embracing a responsible business ethos, actively engaging with stakeholders including employees, shareholders/investors, customers, suppliers/contractors, government/industry associations, and society. TSMC aims to integrate ESG into the operations to create shared value for a sustainable future.

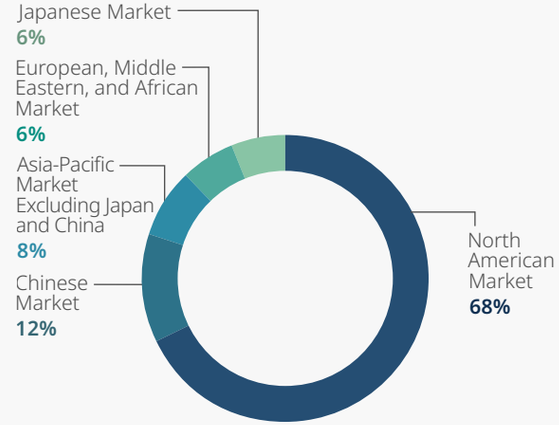
In Taiwan, TSMC has established four 12-inch wafer Gigafab® facilities, four 8-inch wafer fabs, and one 6-inch wafer fab. The Company possesses a network of overseas fabs, including TSMC (Nanjing), TSMC (China), TSMC Washington, LLC, TSMC Arizona, and the JASM facility in Kumamoto, Japan. TSMC also operates subsidiaries or offices in the United States, Europe, Canada, Japan, South Korea, and other countries. In 2023, the Company announced the establishment of the European Semiconductor Manufacturing Company (ESMC) in Germany, aiming to offer customers timely access to technical and business services.



Revenue Share by Product Platform



Revenue Share by Customer Headquarters Location



Innovation Value

Semiconductors drive the continuous evolution of technology and have significantly transformed the way humans live, learn, and work. Semiconductor technology plays a key role in enabling innovations in communications, data processing, environmental protection and energy conservation, medical care, smart homes, smart transportation, entertainment, and many other areas. Through the five major technology platforms including High-performance Computing (HPC), Smartphone, Internet of Things (IoT), Automotive, and Digital Consumer Electronics (DCE), TSMC provides comprehensive and competitive logic process technologies, specialty technologies, IPs, and packaging and testing technologies to help customers accelerate their product innovation, and continue to contribute to economic growth, environmental protection, and sustainable social progress.

Technology Development Focuses

- Continue to drive semiconductor scaling for both logic and specialty technologies
- Continue to expand specialty technology offerings
- Continue to advance and expand TSMC 3DFabric™ technology offerings

Innovations for Sustainability

TSMC continues to advance semiconductor technologies and services, enabling customers to unleash more than 11,890 chip innovations in 2023. These innovations make products more advanced, capable, intelligent, energy-efficient, and safer, greatly increasing the quality of life and helping to build a sustainable society for the common good.

Benefits to Customer Product Innovation

- Boost product computing power
- Increase product energy efficiency
- Enable smaller form factor
- Provide greater chip design flexibility

Five Technology Platforms

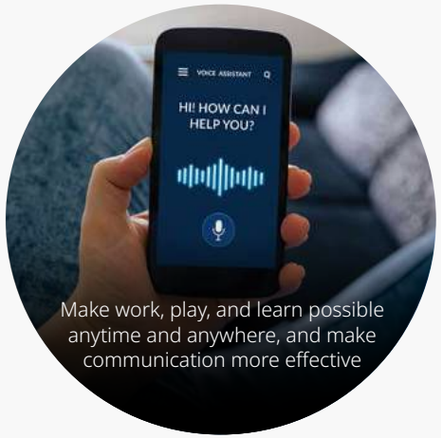
High-performance Computing

Enable 5G, artificial intelligence (AI), cloud, and data centers for transferring and processing vast amounts of data anywhere and anytime

HPC supports powerful AI-driven technology that trains complex predictive models on data center servers and makes CPUs/GPUs faster and more accurately to perform simulations and analysis. It also identifies solutions and optimizes resources via early warning systems that aid in mitigating extreme climate disasters.

- Central Processing Unit (CPU)
- Graphics Processor Unit (GPU)
- Field Programmable Gate Array (FPGA)
- Server CPU
- Artificial Intelligence/ Machine Learning (AI/ML) Accelerator
- Network Processing Unit (NPU)
- High-speed Networking Chip, etc.

Smartphone



Make work, play, and learn possible anytime and anywhere, and make communication more effective

The integration of neural processing units (NPUs) in smartphones has significantly enriched their Edge AI capabilities. With NPUs, smartphones can perform complex on-device AI tasks such as natural language processing, image recognition, and predictive analytics. This enables faster response times and improved privacy and allows for more personalized experiences.

- Application Processors (AP)
- Baseband
- RF Transceivers
- Wireless Local Area Networks (WLAN)
- CMOS Image Sensor (CIS)
- Near Field Communication (NFC)
- Bluetooth
- Global Positioning System (GPS)
- Ultra-wideband (UWB), etc.

Internet of Things

Empower innovations for AIoT and accelerate digital transformation to make a more convenient and greener living, and to improve healthcare quality

Intelligent IoT has the potential to revolutionize industries, improve efficiencies, reduce waste and loss, and enhance the quality of life for individuals. For example, ultra-low power RAIN RFID tag chips are known to have delivered significant social benefits as they enabled timely global distribution of critical medical resources like vaccines to those in need during the COVID-19 pandemic (Photo: Courtesy of Impinj).

Customer Products/Applications

- Microcontroller Unit (MCU)
- Application Processors (AP)
- Baseband
- RF Transceivers
- Wireless Local Area Networks (WLAN)
- CMOS Image Sensors (CIS)
- Near Field Communication (NFC)
- Bluetooth
- Embedded Flash Memory
- Radio Frequency Identification, (RFID), etc.

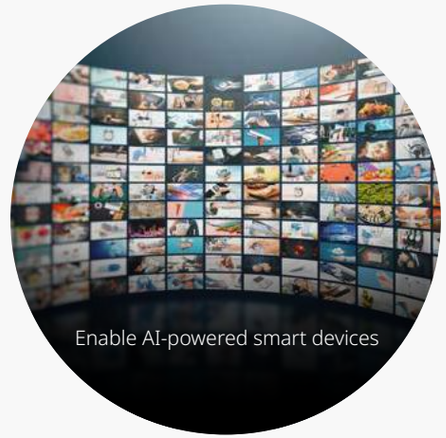
Automotive

Make vehicles, including hybrid/electrical cars, safer, smarter, and greener

The automotive industry is going through fundamental transformations that will make electric vehicles increasingly eco-friendly, AI-enabled advanced driver-assistance systems (ADAS) safer, and autonomous driving a reality. AI facilitates to optimize battery performance, manage energy consumption, and detect potential hazards, improving road safety.

- Microcontroller Unit (MCU)
- Baseband
- RF Transceivers
- Wireless Local Area Networks (WLAN)
- CMOS Image Sensors (CIS)
- Near Field Communication (NFC)
- Bluetooth
- Embedded Flash Memory
- Radio Frequency Identification, (RFID), etc.

Digital Consumer Electronics



Enable AI-powered smart devices

AI-enabled digital consumer electronics have transformed people's lives, allowing for optimized automation, connectivity between devices, and user experiences. For example, many smart digital TVs (DTVs) now come equipped with voice recognition technology and picture quality (PQ) enhancement. Continuous innovations in DCE will pave the way for further AI advancements that make modern living more immersive and enriched.

- Microcontroller Unit (MCU)
- Baseband
- RF Transceivers
- Wireless Local Area Networks (WLAN)
- CMOS Image Sensors (CIS)
- Near Field Communication (NFC)
- Bluetooth
- Embedded Flash Memory
- Power Management ICs
- Timing Controllers (T-CON), etc.

Sustainability at TSMC

Economic

5,846 Million
R&D expenditures accounted for 8.5% of the revenue (US$)

100%
Patent approval rate near 100% in the U.S., better than any other top 10 patent holder

1.86 Trillion
Output value (NT$) and 272,000 jobs generated in Taiwan

11,895 Products
Fabricated for 528 customers through manufacturing excellence

94%
Customer trust and satisfaction rate

Environmental

RE100
Accelerated the goal of using 100% renewable energy for global operations to 2040

830 GWh
Additional energy saved through 822 energy-saving measures

12%
Replacement of water resources with reclaimed water in Taiwan fabs

96%
Waste recycle rate around the world

99%
Reduction rate of volatile organic gases

Social

2,596,322
People received training

239.8 Billion
Total compensation and welfare for TSMC employees around the world (NT$)

6,133
Employees recruited worldwide

1,031,433
Beneficiaries of social engagement programs

1.454 Billion
Invested into social engagement (NT$)

Sustainability Stories

TSMC's sustainability story is a vital part of its pursuit of sustainable development that aspires to act as a catalyst for positive social change. Together with stakeholders, the Company aims to continuously exert this influence.

Dedicated to becoming an Innovation Pioneer, TSMC strengthens its innovation capabilities to enhance quality, competitiveness, customer trust, and satisfaction, while maintaining industry leadership. Operating as a Responsible Purchaser, the Company deepens cooperation with the supply chain, systematizes carbon emission management, and helps suppliers fortify their operational resilience, driving industry upgrades. Embracing its role as a Practitioner of Green Power, TSMC harnesses cutting-edge process technologies to contribute to global energy conservation, strive for water-positive status and a circular economy, and dedicate itself to environmental stewardship through technological innovation.

Meanwhile, TSMC unleashes the potential of its workforce through a culture of diversity and inclusion, offering competitive compensation, benefits, and robust career development programs. By strategically cultivating its global talent pool, the Company aims to position itself as an Admired Employer while ensuring comprehensive workplace safety by incorporating Artificial Intelligence (AI) technology and upgrading protective equipment.

Beyond pursuing business growth, TSMC actively addresses diverse social issues through the TSMC Education and Culture Foundation and the TSMC Charity Foundation. By actively listening to, supporting, and empowering target groups, the Company promotes various charitable projects aligned with the United Nations' Sustainable Development Goals, catalyzing the power to change society and creating shared value for all.

Innovation Management

Strengthen Interdisciplinary Innovation Momentum

TSMC inaugurated the " Production Equipment Component Energy Monitoring System," accurately monitoring power usage efficiency. This system supported four component improvement plans for EUV lithography machines, with an estimated annual electricity saving of 940,000 kWh

→ Learn more

TSMC launched long-term campus collaboration programs featuring "Course Collaboration, Industry-academia Collaboration, and Career Guidance," with a total investment of NT$774 million throughout the year. This program reached over 10,000 undergraduate and graduate students, enriching the semiconductor talent pool

→ Learn more

Product Quality

Drive Quality Competitiveness through Innovation

TSMC pushed the boundaries of EUV exposure technologies, overcoming production challenges with four groundbreaking innovations: "Perfect Ratio for Composites, Innovative Double Layer Composite Technology, Wet Angstrom-grade Thick Etching Self-calibration Technology, Measurement Exclusive Automated Design System." These efforts culminated in the successful development of the " High-Transparency EUV Photomask Protective Film," increasing the light transmittance by 12% and securing three patents

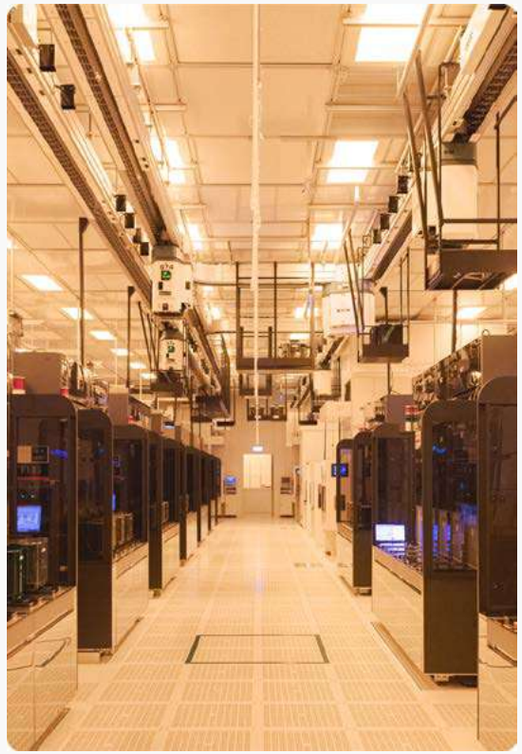
→ Learn more

Customer Relations

Deepen Customer Trust and Satisfaction

TSMC continued to optimize "TSMC-Online™" by introducing three innovative features: " standard operation interface, personalized workspace, and intelligent guidance service," improving system usability. Additionally, TSMC created 10 instructional videos to assist customers obtain information more efficiently

→ Learn more



Sustainable Supply Chain

Collaborate with Suppliers to Bolster Operational Resilience

TSMC leveraged the "Supplier Environmental Information Data Platform" to establish functionalities for collecting and analyzing supplier environmental data, and identifying carbon emission hotspots. Additionally, TSMC devised carbon reduction plans totaling 900,000 metric tons for major emissions contributors, continuously enhancing its carbon reduction efforts

→ Learn more

In the "Renovate to Innovate" project, TSMC aided suppliers in identifying production line anomalies and establishing procedural management and contingency mechanisms for abnormal events. This led to a 93.5% reduction in abnormality rates in a single supplier's factory for the year, bolstering supply chain resilience

→ Learn more

Climate and Energy

Aid Global Energy Conservation through Advanced Processes

In TSMC's relentless pursuit of net-zero emissions by 2050, the Company collaborated with customers to conserve energy across industry and society through innovative technologies. By 2030, each kWh used in TSMC's production will save 4.28 kWh globally, with high-performance computing chips achieving a 6.8 kWh reduction per kWh, advancing energy-efficient information and communications technology (ICT), according to estimates by the Industrial Technology Research Institute (ITRI)

→ Learn more

Water Stewardship

Generate Positive Benefit through Water Restoration

Through the "Diverse Water Supply Integration Platform," TSMC kept track of water usage while increasing the replacement rate of reclaimed water. JASM, for example further advanced water conservation projects, successfully restoring approximately 2 million cubic meters of groundwater by integrating conservation ponds with a rainwater collection system, thereby promoting a water-positive impact

→ Learn more

Circular Resources

Create Circular Resources and Regenerative Value

Through resource integration and enhanced verification efficiency, TSMC Taiwan fabs obtained the highest-level UL 2799 platinum certification, marking a pioneering achievement in the global semiconductor industry

→ Learn more

In collaboration with suppliers, TSMC improved waste activated carbon regeneration technology, applying it across all TSMC Taiwan fabs. Furthermore, partnering with the Ministry of Environment, we developed a leasing model, establishing a circular procurement business approach that replaces purchasing, marking another milestone in circular resources

→ Learn more

Air Pollution Control

Upgrade Technology to Manage Potential Risks in Real-time

TSMC improved control equipment with source segregation and multi-stage treatment technologies. By introducing "Low NO_x Mean Temperature Combustion Technology," the Company reduced nitrogen oxide emissions by 60%. Additionally, "Real-time Air Pollution Monitoring Technology" was used to shorten detection time from one week to one minute, enabling continuous monitoring for prompt identification of pollution sources. This optimized treatment processes, mitigating risks of exposure to acidic and alkaline gases for on-site personnel taking samples

→ Learn more

Diversity and Inclusion

Foster an Inclusive Culture to Unleash Talent Potential

As part of the Company's commitment to creating an equitable and inclusive workplace, TSMC hosted the first "Diversity and Inclusion Campaign" to raise employee awareness of diversity and inclusion. Meanwhile, we offered the "Mentoring Her Bootcamp" to support the development of female talent and increase female representation in management roles, empowering women to pursue their career aspirations

→ Learn more

Talent Development

Nurture Talent to Flourish

Through competency-based learning modules, diverse and flexible learning approaches, and training and development programs tailored to various job levels, TSMC supported continuous learning for employees. Introducing the " Team Development Discussion (TDD)" program enabled TSMC to craft customized training plans, execute learning and skill-building activities, and enhance organizational development capabilities

→ Learn more

Social Impact

Elevate Sustainable Value through Collaborative Partnerships

With a long-term dedication to addressing diverse societal concerns, TSMC drove numerous charitable projects through the TSMC Education and Culture Foundation and the TSMC Charity Foundation. The company listened to, supported, and empowered target groups across six core strategies while employing the Impact Reporting and Investment Standards (IRIS+) framework to gauge the effectiveness of the longstanding "Teach and Learn Program" and "vocational empowerment projects." This ensured that input resources effectively addressed issues, aligned with the United Nations Sustainable Development Goals, and consistently amplified TSMC's social impact

→ Learn more

Talent Attraction and Retention

Establish a Global Talent Pool

TSMC recruited talent worldwide, bringing in fresh perspectives into the Company. Through competitive compensation and benefits, TSMC attracted, nurtured, and retained talent

→ Learn more

Promoting work-life balance, TSMC promoted a lifestyle where "every day is a sports day," raising employee awareness of diverse sustainability issues. TSMC introduced the ISO 20121 Event Sustainability Management Systems into our sports events for the first time, further elevating ESG benefits

→ Learn more

Occupational Safety and Health

Ensure Comprehensive Workplace Safety

TSMC employed AI technology to improve the accuracy of health risk classification and promoted safety, health, and wellness projects. Additionally, in collaboration with R&D units, TSMC adopted measures to control chemical risks at the source

→ Learn more

In partnership with suppliers, TSMC expanded the range of personal protective equipment to include 52 new models of comfortable and convenient gear, ensuring both employees and contractors had access to suitable equipment, fostering a friendly and safe workplace

→ Learn more

Awards, Recognitions, and Ratings

Dow Jones Sustainability Indices (DJSI)
- Dow Jones Sustainability World Index for the 23rd consecutive year

MSCI ESG Indexes
- MSCI ACWI ESG Leaders Index component
- MSCI ESG Research – AAA Ratings
- MSCI ACWI SRI Index component
- MSCI ACWI Islamic Index component
- MSCI Emerging Markets ESG Leaders Index

ISS ESG
- "Prime" Rated by ISS ESG Corporate Rating

FTSE4Good Index
- FTSE4Good Emerging Index component
- FTSE4Good All-World Index component
- FTSE4Good TIP Taiwan ESG Index component

World Benchmarking Alliance (WBA)
- SDG 2000 – The 2,000 Most Influential Companies

UL Solutions
- Platinum Rating for UL 2799 Waste Recycling Standard

Alliance for Water Stewardship, AWS
- "Platinum" Class Certification for the 4th consecutive year

CommonWealth Magazine
- Talent Sustainability Award

Corporate Knights & As You Sow
- 2023 Carbon Clean 200™ List

The Financial Times and Statista
- Asia-Pacific Climate Leaders 2023

Forbes
- 2023 World's Best Employers

FORTUNE
- 2023 World's Most Admired Companies

Morningstar
- The Best Sustainable Companies to Own in 2023

Sustainalytics
- Company ESG Risk Ratings: Low ESG Risk – Semiconductor Industry

Taiwan Stock Exchange
- Top 5% in Corporate Governance Evaluation of Listed Companies for the 9th consecutive year

Institutional Investor Magazine
- Most Honored Company (Technology/ Semiconductors) – All-Asia
- Best Overall ESG (Technology/Semiconductors) – 1st Place (buy-side and sell-side) – All-Asia

Taiwan Institute of Sustainable Energy
- Taiwan Top 10 Sustainability Exemplary Awards for the 8th consecutive year
- Corporate Sustainability Report Awards
- Circular Economy Leadership Awards
- Information Security Leadership Awards
- Supply Chain Leadership Awards
- Sustainable Water Management Leadership Awards
- Climate Leadership Awards

Sustainable Business Practices

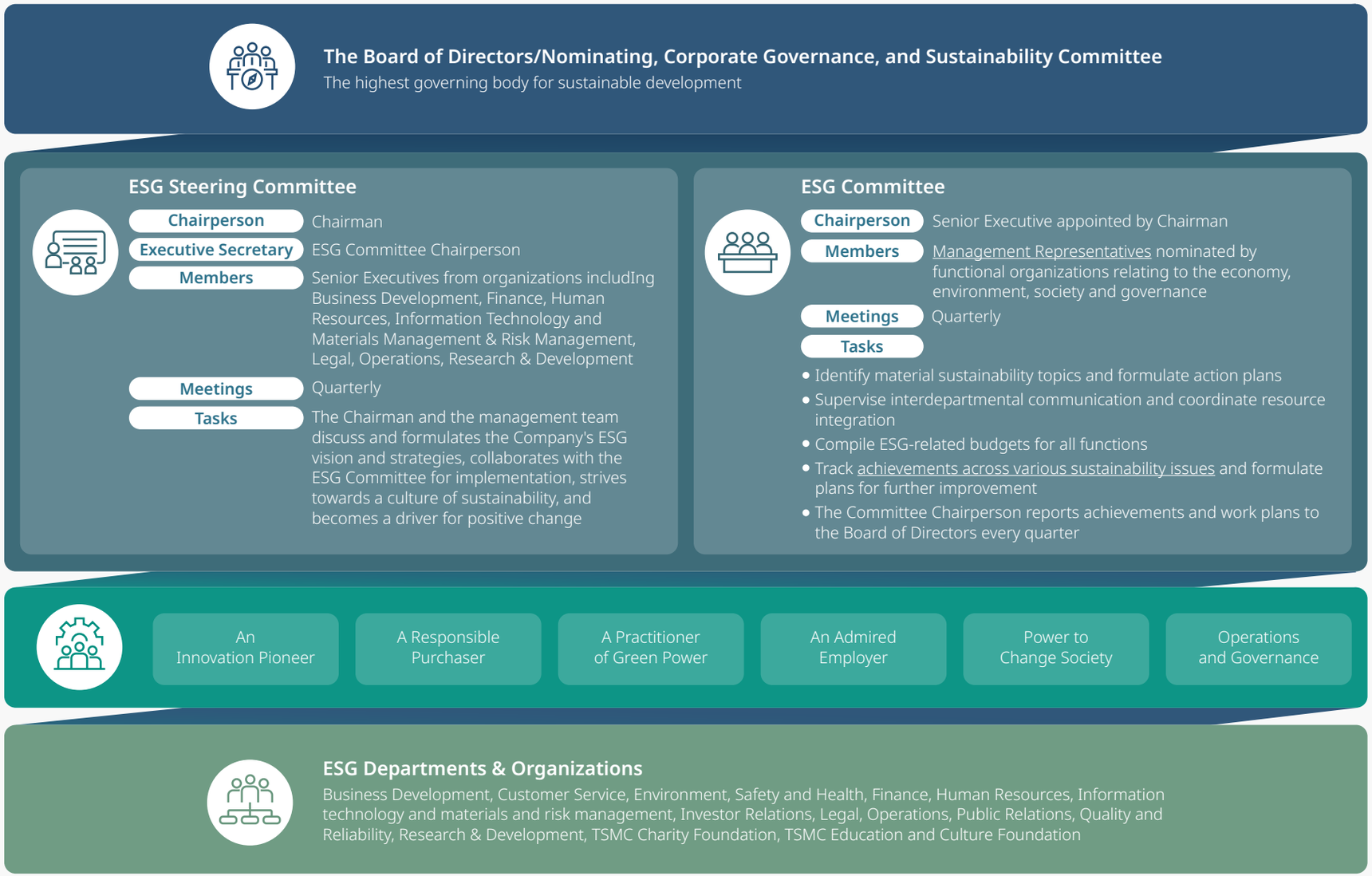
ESG Implementation Framework

Aligned with its vision to "Uplift Society," TSMC upholds its ESG Policy as the paramount guideline for sustainable development. The "ESG Matrix," set by TSMC founder Dr. Morris Chang, delineates TSMC's ESG scope. Within this Implementation Framework, TSMC ensures sustainability governance across its core business of IC foundry services through the five ESG directions and by leveraging its influence. TSMC continually enhances its six key sustainability management abilities, collaborating to create value together with stakeholders including employees, shareholders/investors, customers, suppliers/contractors, government/industry associations, and society.

ESG Management Platform

TSMC oversees its sustainable development efforts through the Board of Directors/Nominating, Corporate Governance, and Sustainability Committee. It has established two key management platforms: the ESG Steering Committee and the ESG Committee. The Chairman of the Board leads the ESG Steering Committee, while the Chairperosn of the ESG Committee acts as the Executive Secretary. Together with the management team, they conduct quarterly reviews of ESG issues relevant to the Company's operations. They then establish mid-to-long-term development strategies and goals for each sustainability issue in line with the vision and mission outlined in the TSMC ESG Policy.

The ESG Committee carries out resolutions from the ESG Steering Committee, pools resources across departments, and instructs the ESG Department, the responsible organization, and representatives from various management sectors to jointly identify material issues relevant to TSMC's operations and stakeholders' concerns. The ESG Committee assembles task forces for each issue, linking competitive advantages and core functions to formulate strategies, targets, and action plans. Every quarter, the Chairperson of the ESG Committee reports to the Board of Directors' Nominating, Corporate Governance, and Sustainability Committee on the progress of ESG initiatives and future plans for their feedback and advice. In 2023, the ESG Committee oversaw the progress of 75 sustainability projects and continued to host the ESG AWARD to cultivate a companywide ESG culture. This ensures full integration of ESG strategies into TSMC's daily operations, aligning actions with global sustainability trends and embodying the ESG vision to "Uplift Society."



Dr. Y. J. Mii

Senior Vice President,
Research & Development

We actively nurture innovative talents, encourage colleagues to tackle challenges, and collaborate to develop world-leading semiconductor technologies. By assisting clients in realizing innovation, TSMC brings about a sustainable and brighter future for the world.

Dr. Michael Wu

Vice President, Research &
Development/Platform Development

Technology leadership is one of the key cornerstones enabling TSMC's continuous growth. We are committed to fostering an environment that is open and innovative, as well as diverse and inclusive, and promoting digital excellence within the R&D organization to unleash employees' full potential and achieve the goal of corporate sustainability.

Dr. Kevin Zhang

Senior Vice President, Business Development and Overseas Operations Office

As we enter the AI era, semiconductor technology is the core of innovation for AI products and applications. We are committed to establishing meaningful partnerships with global customers, developing sustainable technology blueprints, jointly developing more powerful and energy-efficient products, and ultimately fostering a brighter society.

Sylvia Fang

Vice President, Legal and General
Counsel/Corporate Governance Officer

The core value of Integrity drives TSMC to uphold the highest standards of corporate governance, professional ethics, and risk management, while also considering the interests of all stakeholders, in pursuit of sustainable business operations.

Y.P. Chyn

Senior Vice President, Operations
and Overseas Operations Office

Starting from its core values of environmental sustainability and green manufacturing, TSMC develops cutting-edge technologies and implements intelligent digital management. Together with its partners, it strives to build a future of net-zero sustainability.

Ray Chuang

Vice President, Operations/
Fab Operations I

By employing intelligent precision manufacturing, TSMC enhances global production efficiency and quality. Simultaneously, we are dedicated to sustainable development, fostering efficient and sustainable manufacturing environments, and implementing ecological sustainability measures such as energy conservation and reducing carbon emissions.

Note: Ordered according to the sequence of sustainability roles for which responsible

Dr. L.C. Lu

TSMC Fellow and Vice President, Research & Development/Design & Technology Platform

TSMC's OIP 3DFabric alliance assists customers in achieving higher levels of 3D IC integration. Through innovative collaboration within an ecosystem focused on advanced packaging design methodologies, it fosters continuous improvement in system performance while maintaining sustainable energy efficiency.

Lora Ho

Senior Vice President, Human Resources

In response to the TSMC's global expansion, creating a diverse and inclusive environment is crucial to our talent vision. We respect differences, allowing colleagues to unleash their potential, ignite team enthusiasm, and ultimately realize sustainable talent development for both the company and the industry.

Dr. Jun He

Vice President, Quality and Reliability and Operations/Advanced Packaging Technology and Service

TSMC is fully committed to quality excellence, investing in a comprehensive quality culture and continuously innovating quality capabilities. We work closely with customers and suppliers to achieve high-quality products, driving prosperity and growth across the industry.

Dr. Cliff Hou

Senior Vice President, Europe & Asia Sales/Technology Development

In an era of rapid change, TSMC continues to innovate while upholding the core value of Customer Trust. We strengthen supply chain resilience, actively expand our global presence, and provide advanced technology and capacity. Deepening customer cooperation, we aim to achieve customer success together and create win-win outcomes.

J.K. Lin

Senior Vice President, Information Technology and Materials Management & Risk Management/ Chief Information Security Officer

TSMC is committed to driving a positive industry cycle, constructing a green and responsible supply chain, and extending ESG principles to more suppliers. This ensures that the ESG DNA is pervasive, advancing towards the goal of net-zero emissions by 2050 and embracing a future of sustainable well-being.

Note: Ordered according to the sequence of sustainability roles for which responsible

Dr. Arthur Chuang

Vice President, Operations/Facility

Through green manufacturing initiatives such as constructing low-carbon green buildings, enhancing energy-saving and carbon-reduction measures, promoting resource recycling, developing low-carbon technologies, and implementing smart management practices, TSMC's Facility Division aims to establish a sustainable operating environment.

Dr. T.S. Chang

TSMC Fellow and Vice President, Operations/Advanced Technology and Mask Engineering

TSMC incorporates environmental sustainability factors into the process of researching and developing advanced processes. We integrate innovative energy-efficient components, deepen low-carbon manufacturing capabilities, enhance energy efficiency in new fabs, and continue to strive for sustainable development.

Y.H. Liaw

Vice President, Operations/Fab Operations II

TSMC is dedicated to promoting low-carbon transformation and advancing towards net-zero sustainability. Guided by a green mindset, we drive technological innovation and digital transformation, while expanding green influence through cross-border, cross-disciplinary collaboration.

Dr. F.C. Tseng

Chairman, TSMC Education and Culture Foundation

The TSMC Education and Culture Foundation focuses on youth development, educational collaboration, and arts and culture promotion as its main pillars of work. Committed to achieving the United Nations Sustainable Development Goals, it calls on young people to support sustainable living and drive positive social cycles.

Sophie Chang

Chairperson, TSMC Charity Foundation

The TSMC Charity Foundation encourages volunteers to provide long-term professional services and collaborates with governments and businesses to take action in addressing the needs of rural areas. With TSMC's comprehensive ESG efforts, we continue to connect with frontline efforts.

Wendell Huang

Vice President, Finance and Chief Financial Officer/Spokesperson

Despite ongoing industry uncertainty, TSMC continued to provide long-term returns for investors through its strong financial performance, sustainable dividend policy, and sound corporate governance, accelerating customers' product innovation and driving a more sustainable society through technology.

Note: Ordered according to the sequence of sustainability roles for which responsible

2023 ESG Reporting to the Board of Director

2023 Achievements

- Accelerated the target of achieving 100% renewable energy usage in global operations to the year 2040 in response to the 2050 net-zero emissions blueprint. At the same time, continued to enhance performance in green manufacturing
- Pioneered a groundbreaking model for domestic Joint Procurement of Renewable Energy Project, fostering a low-carbon supply chain. TSMC's advocacy for diversity, inclusion, and human rights has further bolstered ESG development across the Company's supply chain
- Prioritized the advancement of female talent at every career stage, amplified support for the Employee Resource Group, and orchestrated a series of diverse, inclusive activities to cultivate an open, welcoming workplace environment
- Expanded global industry-academia collaborations and actively promoted STEM education and science literacy
- Implemented AMAZING IDEAS winning projects from past ESG AWARDs and introduced the ESG ENTHUSIASTIC PROMOTION AWARD in the 4th ESG AWARD to cultivate a vibrant global ESG community
- Utilized sustainability reports as ESG management tools, updating the Climate and Nature Report while continuing to publish the UN SDGs Action Report and Materiality Analysis Report, thereby enhancing sustainability disclosures and transparency

2024 Work Plans

- Enhance process production efficiency, continue to procure renewable energy, expand the use of recycled water and resources, and fulfill TSMC's commitment to net-zero emissions
- Provide guidance to suppliers in developing carbon reduction plans, promote digital management of carbon emissions information, and enhance suppliers' sustainability management capabilities
- Update the Diversity, Equity, and Inclusion Statement and use the Human Rights Policy as a guideline to extend human rights protection throughout the value chain
- Continue to establish collaborative education programs at various stages to cultivate semiconductor and STEM talents
- Collaborate with cross-sector partners to promote rural care, elderly support, arts and culture accessibility, and education empowerment, thus constructing a robust social support network
- Release the inaugural Human Rights Report and publish the Sustainability Impact Valuation Report, integrating social impact and environmental cost-benefit analyses

2023 ESG Steering Committee

Achievements

- Reviewed the 2050 Net Zero target and progress in related action plans, and supported renewable energy purchases by the supply chain to accelerate RE100 progress
- Published the Biodiversity Statement, setting the targets of net zero deforestation, no net loss of nature and biodiversity, and net positive impact by 2050
- Amended the Human Rights Policy to support human rights-related standards and expand the scope of stakeholders
- Implemented sustainable development, and continued to align with global sustainability standards, management trends and best practices to set TSMC's ESG goals
- To energize the Company's sustainability culture, drove the 4th ESG AWARD, attracting 3,166 sustainability proposals from employees and organizations, increasing nearly 68% from the previous year
- Set and supervised the Company's sustainability-related budgets and financial controls, consolidated ESG resource needs, and distributed resources according to plan

2023 ESG Committee

Achievements

- Enhanced the Company's sustainability efforts by increasing recycled water usage and developing innovative air pollution testing and controlling technology; inaugurated Taiwan's first Zero Waste Manufacturing Center which aims to boost internal waste recycling rates and resource utilization; established the biodiversity taskforce to conduct biodiversity assessment and create action plans
- Made significant strides in climate change mitigation, achieving net-zero emissions in scope 1 and scope 2 at TSMC overseas operations; expanded its onshore wind farm power supply, increasing the proportion of renewable energy usage from 40% to 60% by 2030, and proposed 822 energy-conservation programs, resulting in a total reduction of 800 GWh in electricity consumption
- Implemented robust sustainable supply chain management practices by requiring raw material and equipment suppliers to participate in the CDP Supplier Carbon Disclosure Project; promoted the use of renewable energy and the 1+N Carbon Management Project within the Company's supply chain and published the ESH Bluebook on Fab Construction to enhance safety management during contractor construction
- Addressed salient human rights issues through due diligence and policy formulation; designed and distributed the Supply Chain Human Rights Supplemental Questionnaire; promoted human rights management with suppliers, and for the first time, mandated that suppliers establish diversity and inclusion policies as an annual target
- Implemented a series of new employee caring measures, including the establishment of Global Family@tsmc and Accessibility@tsmc, aimed at providing support and unlocking employee potential
- Actively engaged with social dynamics through the TSMC Education and Culture Foundation and TSMC Charity Foundation. These efforts translate TSMC's commitment into tangible actions for societal well-being

Materiality Analysis and Stakeholder Engagement

In compliance with the Global Reporting Initiative (GRI) 3: Material Topics 2021 of the GRI Universal Standards 2021 and the European Sustainability Reporting Standards (ESRS) distributed by the World Economic Forum (WEF) and European Financial Reporting Advisory Group (EFRAG) for the Corporate Sustainability Reporting Directive (CSRD), TSMC has established the TSMC Dynamic and Double Materiality (TDDM) methodology. The TDDM is based based on the Double Materiality principle of Impacts, Risks, and Opportunities (IRO) to integrate the three dimensions of Stakeholder Concern, Impact on Organizations and Impact on Sustainability. TDDM methodology sorts the priority and importance of ESG issues based on the level of communication, growth, and impact to determine a materiality matrix and serve as a basis for advancing the company's sustainable management and improve communication with stakeholders. Please refer to the latest TSMC Materiality Analysis Report for further details.

TSMC conducts materiality analysis every two years. In 2023, a total of 1,693 stakeholders and over 200 TSMC executives/colleagues responsible for promoting sustainability participated in the materiality analysis. The company considered the result of the surveys on Stakeholder Concerns, Impact on Organizations and Impact on Sustainability, and identified 14 material issues, which were reported to the Board of Directors after confirmation by the ESG Committee. In addition to setting long-term goals for the year 2030 and monitoring achievements, TSMC has further integrated the Enterprise Risk Management (ERM) process to identify risk factors, risk trends, impact, and the probability of occurrence to plan ESG strategies and gain insights on its sustainability impact in terms of opportunity and risk.

The TSMC Dynamic and Double Materiality (TDDM) method and the process and results of the materiality analysis in 2023 were verified by DNV Business Assurance Co. Ltd., an independent third party. The top five material issues were Sustainable Supply Chain, Climate and Energy, Talent Attraction and Retention, Talent Development, and Innovation Management, leading TSMC to implement four major trends in sustainable development.

As the GRI Universal Standards 2021 moved Human Rights issues to GRI 2: General Disclosures 2021, TSMC moved "Business and Human Rights" material issues to the Operations and Governance chapter. Meanwhile, considering the multifaceted nature of human rights issues and their importance to corporate sustainability, TSMC expects to issue its first Human Rights Report in 2024 to describe the company's human rights policies and commitments, due diligence process, mitigation and remedial mechanisms, and long-term goals. For more information, please see the latest TSMC Human Rights Report.

Exert industry influence and lead the supply chain to respond to the challenges of net zero and human rights

Implement a green manufacturing blueprint to transform from low-carbon to a comprehensive decarbonization pathway towards net zero emissions

Create a diverse, equitable, and inclusive workplace and utilize global talents to support the growing momentum of the Company

Reinforce the core value of technology leadership, support customers' success, and make changes for society

Process for Determining Material Issues

Dynamic Materiality

Double Materiality

Step 1
Identify ESG Issues

- Governance **6** issues
- Economy **4** issues
- Environment **5** issues
- Society **6** issues

Step 2 Communicaton
Stakeholder Concerns

6 Types
Stakeholders

1,693
Stakeholders participated

Step 3 Growth
Impact on Operations

4 Dimensions
Defining the Company's values or operating Impact

233
Participated executives and colleagues

Step 4 Imapct
Impact on Sustainability

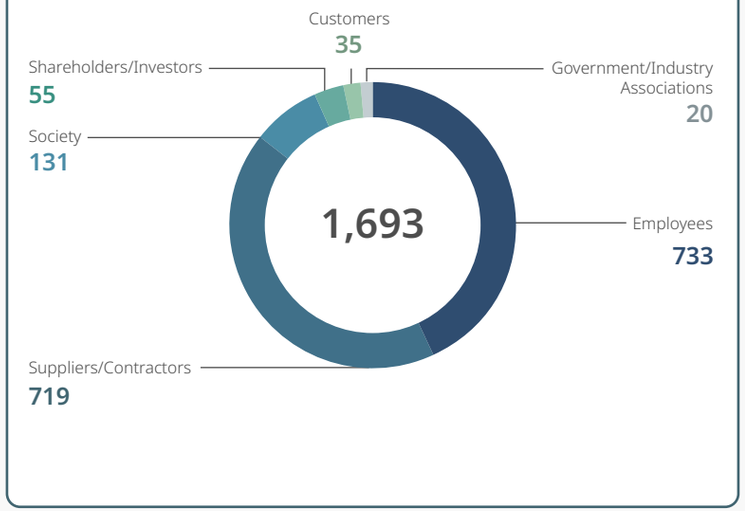
20
Positive & negative impacts on the economy, environment, and people, including impacts on their human rights

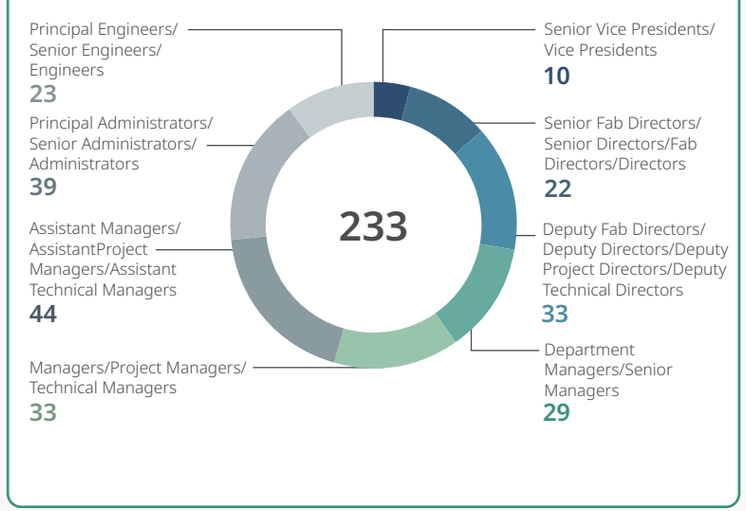
53
Participated executives and colleagues

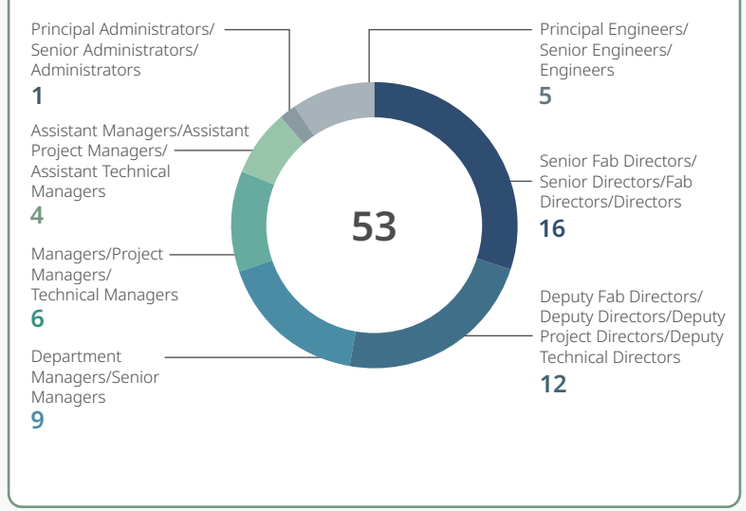
Step 5
Define Material Issues

- Internal/external consultant confirmation
- Senior executive review
- Report to the Board of Directors

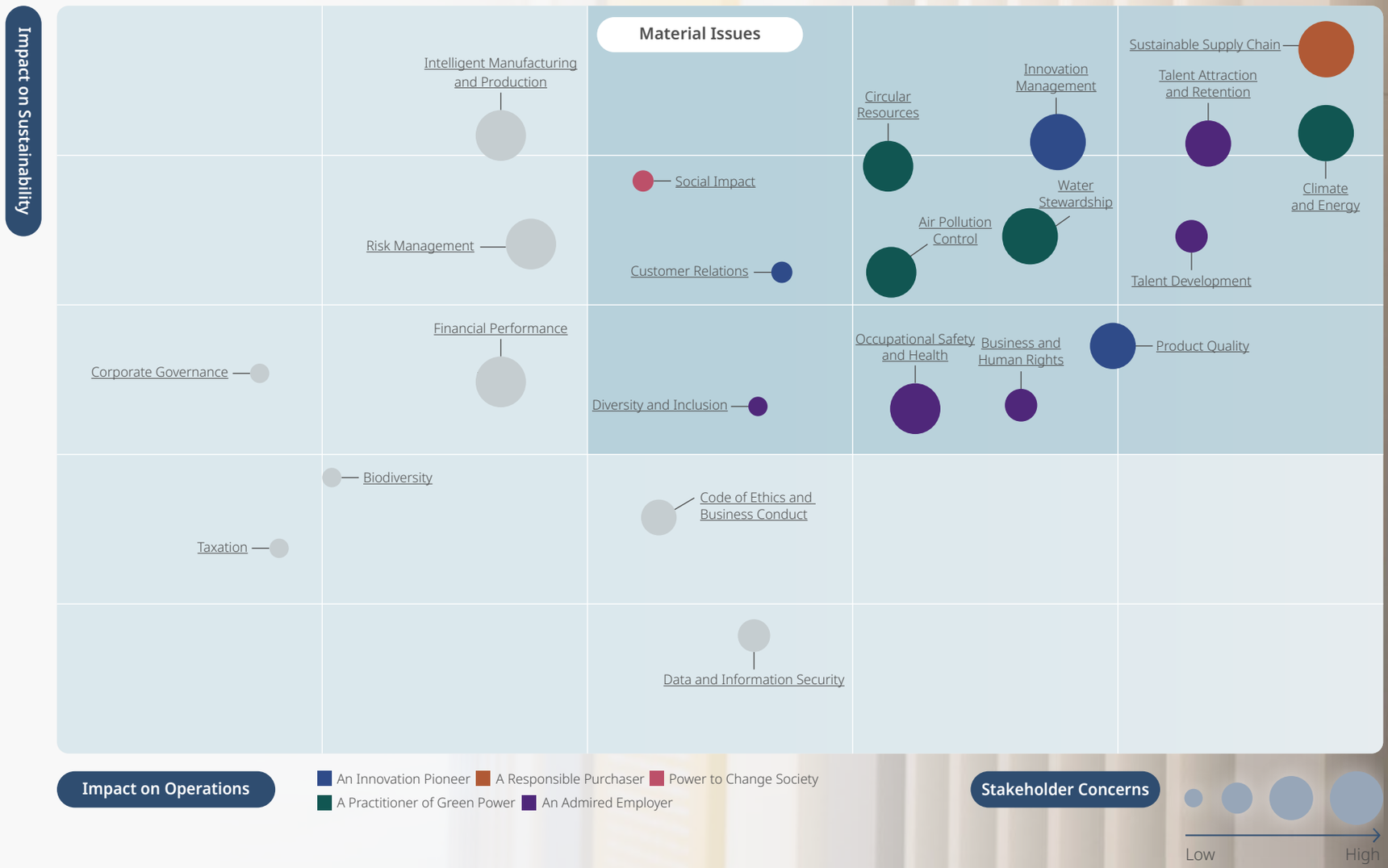
- Understand stakeholder concerns
- Plan a sustainability strategy map
- Reinforce external communication effectiveness
- Identify positive and negative impacts
- Compile and disclose the sustainability report







TSMC Materiality Matrix



Material Issues and Value Chain

Sustainability Roles	Material Issues	GRI-specific Topics	SASB Standard	Upstream Note 1	TSMC Operation Note 2		Downstream Note 3	Revenue Growth	Customer Satisfaction	Employee Cohesion	Operational Risks
				Procurement Stage	Wafer Fabrication	Packaging/ Testing	Customer Use				
An Innovation Pioneer	Innovation Management	Indirect Economic Impact and Energy	TC-SC-410a.2		✓	✓	✓	✓	✓	✓	
	Product Quality	Customer Health and Safety	TC-SC-410a.1	✓	✓	✓	✓	✓	✓		✓
	Customer Relations	Customer Privacy			✓	✓	✓	✓	✓		
A Responsible Purchaser	Sustainable Supply Chain	Procurement Practices, Supplier Environmental Assessment, Supplier Social Assessment	TC-SC-440a.1	✓				✓			✓
A Practitioner of Green Power	Climate and Energy	Energy, Emissions, Economic Performance	TC-SC-110a.1, TC-SC-110a.2, TC-SC-130a.1	✓	✓	✓	✓	✓	✓		✓
	Water Stewardship	Water and Effluents	TC-SC-140a.1	✓	✓	✓					✓
	Circular Resources	Emissions			✓	✓					✓
	Air Pollution Control	Waste	TC-SC-150a.1	✓	✓	✓					✓
An Admired Employer	Diversity and Inclusion	Diversity and Equal Opportunity			✓	✓				✓	
	Talent Attraction and Retention	Economic Performance, Market Presence, Labor/Management Relations, Diversity and Equal Opportunity	TC-SC-330a.1		✓	✓		✓		✓	
	Talent Development	Training and Education			✓	✓		✓		✓	
	Occupational Safety and Health	Occupational Safety and Health	TC-SC-320a.1, TC-SC-320a.2	✓	✓	✓				✓	✓
Power to Change Society	Social Impact	Economic Performance, Indirect Economic Impact			✓	✓				✓	

Note 1: Upstream boundaries are raw materials, equipment, and related services purchased by TSMC
Note 2: TSMC Operations boundaries are wafer fabrication and packaging/testing services offered by TSMC
Note 3: Downstream boundaries are customer products manufactured by TSMC
Note 4: "✓" signifies the issue has real impact on this stage or that the issue is a spotlight issue

Material Issues and Risk Management

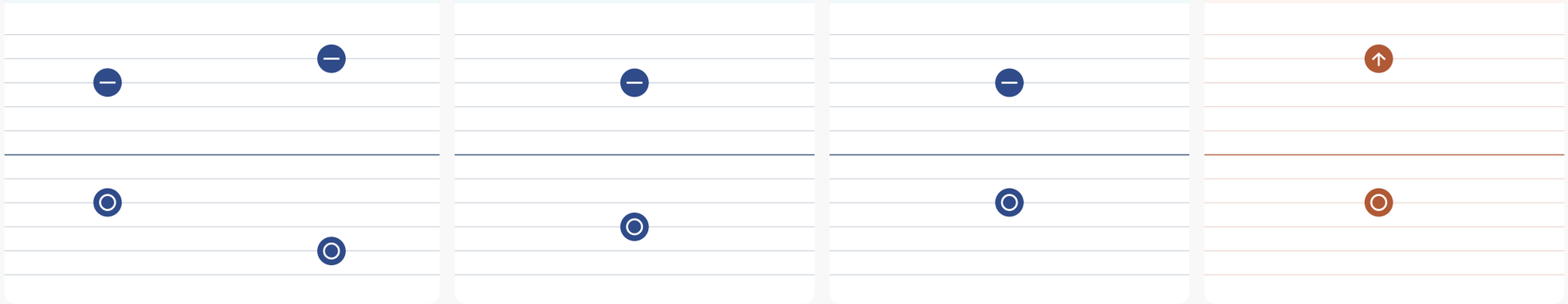
Material Issues	Innovation Management		Product Quality	Customer Relations	Sustainable Supply Chain
Risk Aspects/Type	**Failure to foresee changes in technologies or develop innovative technologies**	**Patent Protection - R&D results unprotected due to lack of patent**	**Challenges to product quality and yield**	**Customers cannot acquire necessary technology service**	**Concentrated sourcing and suppliers noncompliant with TSMC or regulatory requirements**
Risk Evaluation and Mitigation Measures	• Advanced processes involve increasingly complex technologies, higher production costs, and more complicated supply chains. The Company's competitive edge and market share could suffer if we are unable to identify technological changes and develop new technologies • Please refer to Innovation Management in this report	• TSMC protects R&D results with patents to ensure we remain technology leaders in the industry and to protect the operational freedom of TSMC and our global customers. Inadequate patent protection could impact TSMC's technological competitiveness • Please refer to Innovation Management in this report and 6.3 Risk Management in the 2023 Annual Report	• Wafer quality control grows increasingly difficult as products become more complex. Inability to detect defects could incur a loss to our customers and impact company reputation • If defects remain undetected in raw materials, it could lead to scrapping the final product, impacting customers and operations • Please refer to Product Quality in this report	• If customers do not understand TSMC's technology offerings, they may seek an alternative foundry suppliers' solution • TSMC collects customers' technology requests through irregular and regular review meetings. In 2023, there were >994 wafer technologies and >149 advanced packaging technologies available to customers • Please refer to Customer Relations in this report	• Disruptions in the supply chain (for raw materials or equipment) will impact Company operations and our commitments to customers • Please refer to 6.3 Risk Management in the 2023 Annual Report and Sustainable Supply Chain in this report

Risk Aspects/Type: Strategy, Operation

Likelihood and Trend: Upwards, Sideways, Downwards

Likelihood: Almost Certain, Likely, Possible, Unlikely, Rare

Impact: Catastrophic, Major, Moderate, Minor, Insignificant



Material Issues and Risk Management

Material Issues	Climate and Energy	Water Stewardship	Circular Resources	Air Pollution
	Operational impact from climate disasters, increasing GHG emissions, regulations against GHG emissions, and other requirements **Power shortage or outage**	**Water shortage or suspension, and environmental impact from wastewater**	**Supplier failure to properly handle waste, polluting the environment**	**Environmental impact from pollutant emissions**
Risk Aspects/Type Strategy Operation				
Risk Evaluation and Mitigation Measures	• Increasing demands from stakeholders to increase usage of renewable energy could increase costs and, if demands are not met, fab construction progress and customer orders could be impacted • Please refer to Climate and Energy in this report • Unstable power supply will limit production capacity and impact company operations, and its ability to meet customer demand • Please refer to Climate and Energy in this report	• Unstable water supply will limit production capacity, impacting its ability to meet customer demand • Anomalies in effluents will pollute the environment and negatively impact company reputation • Please refer to Water Stewardship in this report	• Waste management vendors failing to handle waste in compliance with regulations may subject TSMC to liabilities for waste cleanup and environmental recovery, impacting company reputation • Please refer to Circular Resources in this report	• Improper use or failure of air pollution control equipment could result in excess emissions, penalties from the authorities, and impact on company reputation • Please refer to Air Pollution Control in this report
Likelihood and Trend Upwards Sideways Downwards	Almost Certain Likely Possible Unlikely Rare			
Impact	Catastrophic Major Moderate Minor Insignificant			

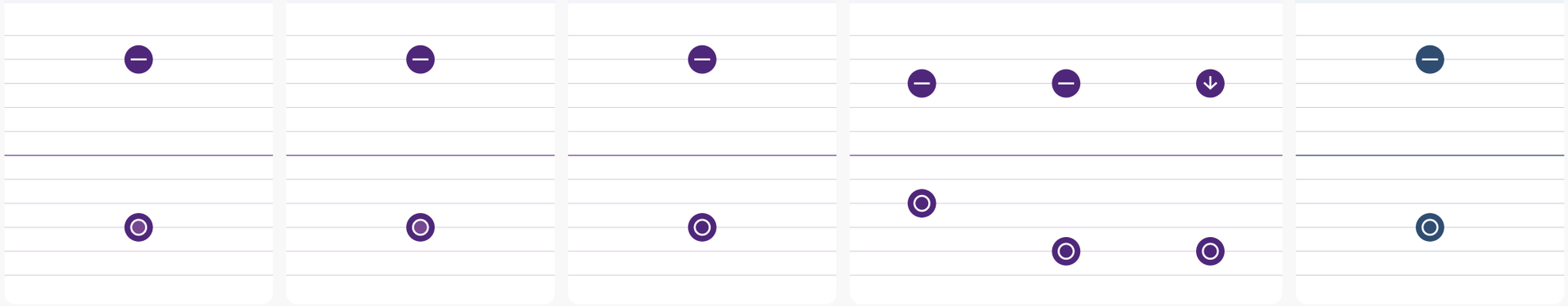
Material Issues and Risk Management

Material Issues	Diversity and Inclusion	Talent Attraction and Retention	Talent Development	Occupational Safety and Health			Business and Human Rights
	Failure to uncover TSMC employees' full potentials	Failure to attract or retain a sufficient number of high quality talents when needed	Talents failing to progress with evolving landscapes	Earthquakes or fires	Occupational injuries, occupational diseases, and chemical hazards	Pandemic	Failure to protect the human rights of TSMC employees and suppliers
Risk Aspects/Type (Strategy, Operation)	Strategy, Operation	Strategy, Operation	Strategy, Operation	Strategy, Operation	Strategy, Operation	Strategy, Operation	Strategy, Operation
Risk Evaluation and Mitigation Measures	• The Company's understanding of society and grasp of various aspects of the market may suffer if the mix of employees is unable to reflect the current social landscape, further impacting the Company's competitive advantage • Please refer to Diversity and Inclusion in this report	• Company operations could suffer from failure to attract and retain a sufficient number of high-quality talents when needed • Please refer to Talent Attraction and Retention in this report	• The Company's competitive advantage and growth momentum will suffer if talents fail to progress with evolving landscapes • Please refer to Talent Development in this report	• Earthquakes and fires could damage the Company's equipment and result in disrupted operations and financial losses	• Employees could suffer from injuries and diseases due to non-compliance with safety guidelines	• Cluster infections of pandemic could result in disrupted operations	• Company reputation, customer's interests, employee morale, and talent recruitment could suffer from the lack of proper protection for the human rights of its employees and suppliers • Please refer to Business and Human Rights and Sustainable Supply Chain in this report
				• Please refer to Occupational Safety and Health in this report and 6.3 Risk Management in the 2023 Annual Report			

Likelihood and Trend (Upwards, Sideways, Downwards)

Likelihood: Almost Certain / Likely / Possible / Unlikely / Rare

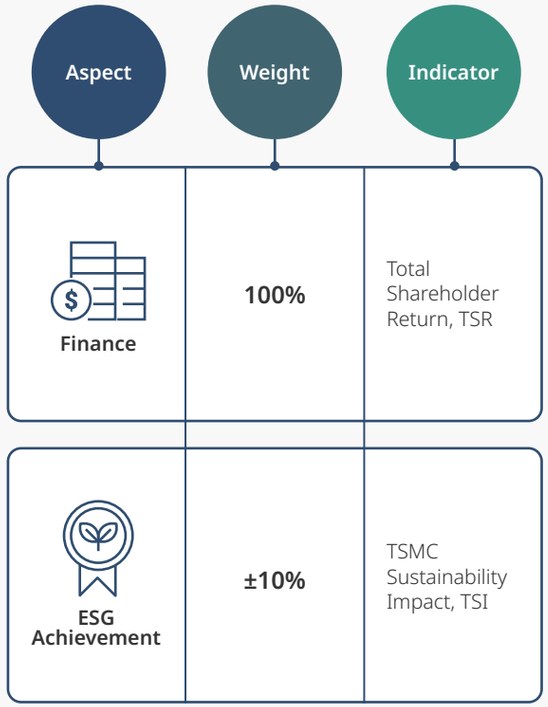
Impact: Catastrophic / Major / Moderate / Minor / Insignificant



Executive Compensation ESG Indicator

TSMC provides Employee Restricted Stock to executives, with a maximum of 110% of their eligible shares each year. 100% of the calculation is based on the company's relative performance to Total Shareholder Return (TSR). The Compensation and People Development Committee adjusts the eligible shares within a range of ±10% based on the company's annual ESG achievement, which is defined as the TSMC Sustainability Impact (TSI), linked to the 18 long-term goals for 2030 of TSMC's material issues to determine the number of Employee Restricted Stock Awards received by the executives.

The Linkage to the Employee Restricted Stock and Performance Evaluation



Sustainability Roles	Material Issues	Sustainability Impact Indicator	2030 Goals	2023 Targets and Achievements[Note]
An Innovation Pioneer	Innovation Management	Number of undergraduate and graduate students developed through industry-academia collaboration	>35,000 students	>10,000 students – Achieved
		Number of female high-school students participating in STEM programs	>30,000 students	– NEW
	Product Quality	Cases of product recalls due to safety concerns	0	– NEW
	Customer Relations	Customer trust and satisfaction rate	>90%	>90% – Exceeded
A Responsible Purchaser	Sustainable Supply Chain	Percentage of suppliers' carbon emissions reduction	30%	– NEW
		Percentage of global local sourcing for indirect raw materials	67.5%	– NEW
		Ratio of tier 1 suppliers setting Diversity, Equity and Inclusion policies or statements	100%	– NEW
A Practitioner of Green Power	Climate and Energy	Percentage of renewable energy used at all TSMC fab operation sites	60%	12% – Missed target
	Water Stewardship	Reduction in unit water consumption (L/12-inch equivalent wafer mask layer)	30%	2.7% – Missed target
	Air Pollution Control	Reduction in unit air pollutant emissions	65%	58% – Missed target
	Circular Resources	Waste recycling rate	100%	– NEW
An Admired Employer	Diversity and Inclusion	Women in management	>20%	>14% – Exceeded
		Percentage of women among newly-hired fresh graduates technical professionals	>30%	>25% – Exceeded
	Talent Attraction and Retention	Rank of the Sustainable Engagement in the Employee Engagement Survey	Top 25%	Top 75% – Missed target
	Talent Development	Annual average hours of learning for employees	100 hours	75 hours – Exceeded
	Occupational Safety and Health	Incident rate per 1,000 employees	<0.2	<0.2 – Exceeded
Power to Change Society	Social Impact	Cumulative hours of volunteer service	600,000 hours	– NEW
		Cumulative amount of Matching Donations	7,000,000 NTD	– NEW

Note: Please refer to each chapter for progress and information

Exceeded | Achieved | Missed target

Stakeholder Communication

Employees

Concerned with the continued growth and success of the Company as well as meaningful work, a safe and healthy workplace, competitive compensation and welfare, opportunities to grow, and work-life balance

106
Silicon Garden Meetings (Labor-management meetings)

4,911
Cases handled through internal communication channels

The fourth TSMC ESG AWARD ceremony

Concern Issues

- Diversity and inclusion
- Talent attraction and retention
- Social impact
- Talent development
- Ethics/regulatory compliance
- Risk management

Communication Channels

- Employee Opinion Survey on Company Core Values, Employee Engagement Survey/once every two years
- Employee trainings/annually
- Silicon Garden Meeting (labor-management meeting)/quarterly
- Communication meetings for various levels of managers and employees, e.g. the executive communication meeting, skip-level and communication meetings in individual functions or divisions/quarterly
- Human Resources Business Partner Team/as needed
- Ombudsman system, whistleblower reporting system, irregular business conduct reporting system, and sexual harassment investigation committee/as needed
- Corporate intranet (myTSMC), internal emails, and other announcement channels (such as promotional posters at facilities), TSMC eSilicon Garden Stories/as needed
- Employee suggestion channels, such as the Fab Caring Circle, Employee Opinion Box, Wellness Center, wellness website, employee PIP & IT Security mailbox and hotline, etc./as needed

Focus Areas	Responses from TSMC
Expect the Company to make more contributions to society and advance towards sustainable development	• Strengthened internal communication through 106 Silicon Garden Meetings and 4,911 opinion exchanges to let colleagues understand the Company's prospects
Expect the Company to build a diverse and inclusive workplace, and unleash the potential of talents	• Hosted the inaugural Diversity and Inclusion Campaign, with a turnout exceeding 1,150 individuals • Supported the establishment of employee resource groups: Women@tsmc, Global Family@tsmc, Accessibility@tsmc, aimed at promoting self-realization among employees • Organized various courses to enhance respect and inclusion awareness, with a 97% completion rate for the training program on Understanding TSMC's Human Rights Policy, Cultivating a Friendly Workplace, and Combating Sexual Harassment
Hope to maintain a balance between work, family, and personal life, thus achieving mutual growth	• Launched the TSMC ChildCare Benefit Program 2.0 to support employees' work-life balance
Hope to have more opportunities to participate in diverse ESG activities and achieve sustainable actions	• Leveraged the TSMC ESG AWARD as a platform to promote sustainable thinking and action, and expanded the event to overseas subsidiaries. A total of 3,166 sustainable innovation proposals were collected • Provided paid volunteer leave to facilitate employees' participation in volunteer services, broadening social engagement
Look forward to gaining the latest regulatory updates and compliance guidelines, i.e., zero tolerance for corruption, conflict of interest avoidance, etc	• Provided the Annual Ethics and Compliance Training Course, with a total of 73,034 TSMC and subsidiary employees completing the training course • Designated employees and managers were provided with online courses covering anti-trust compliance, insider trading prevention, and export control compliance
Expect to understand risk management processes, methods, and tools to enhance risk management capabilities	• The first-ever Risk Management Summit and Risk Awareness Culture Survey were held, with 704 executives and 34,111 colleagues participating respectively • Issued risk management newsletters and conducted online training courses, engaging a total of 72,635 employees

> The Company consistently improves maternity leave benefits and promotes a more supportive workplace. As a mother of two, I deeply feel the support, which grants me additional time to recuperate and take care of my family. This initiative ensures that mothers receive fair and equitable treatment in their roles

Hui-ling Ma
TSMC Employee

Shareholders/ Investors

Concerned with the investment value of TSMC including market prospects, competition, growth strategy, overseas expansion, profitability, dividend policies, shareholder returns, and sustainability performance

497
Institutional investors

367
Conferences and meetings

2023 TSMC Annual General Meeting

Concern Issues

- Financial performance
- Risk management
- Talent attraction and retention
- Innovation management
- Climate and energy
- Water stewardship

Communication Channels

- General shareholders' meeting/annually
- Annual Reports, Sustainability Reports, Theme Reports (UN SDGs Action Reports, Materiality Analysis Reports, Sustainability Impact Valuation Report, Climate and Nature Report, Human Rights Report), and U.S. Securities and Exchange Commission Form 20-F/annually
- Earnings conference/quarterly
- Domestic and overseas broker conferences/as needed
- Face-to-face meetings, video conference calls and telephone conference call/as needed
- Major announcements on the Market Observation Post System, and corporate press releases on the Company's website/as needed

Focus Areas	Responses from TSMC
Long-term profitability	• Despite short-term margin headwinds, TSMC continues to believe it can achieve its long-term financial targets of: (1) gross margin of 53% and higher and (2) ROE of 25% and higher
Impact of geopolitics and macroeconomic environment on the business, and TSMC's response	• Communicated the impact of macroeconomic downturn and customers' inventory correction on semiconductor demand in investor conferences
Overseas investment operation risk and challenges in talent recruitment	• Communicated the latest status of overseas fab projects and talent recruitment in investor conferences
The impact of AI-related opportunities on semiconductor demand, and technology development and competitive advantage	• Communicated the AI-related opportunities, strategy, and technology development in investor conferences
Response to climate change and renewable energy use	• In 2023, TSMC announced an acceleration of its RE100 sustainability timetable, moving its target for 100% renewable energy consumption for all global operations forward to 2040 from 2050. TSMC also raised its 2030 target for company-wide renewable energy consumption to 60% from 40%
Water resource risks and replacement with reclaimed water	• Continue to collaborate with the government on water reclamation plant projects

> At Fidelity International, we fundamentally believe that companies that are managed sustainably will outperform in the long run. Therefore, understanding a firm's approach to sustainability is an integral part of Fidelity's investment process. Through our ongoing engagements with TSMC, we have been impressed to discover a solid commitment to integrating sustainability into its business and growth plans, setting specific targets, regular reviews and providing thorough disclosures. Actions like these enable us to deliver sustainability outcomes alongside long-term value creation for our clients.
>
> **Terence Tsai**
> Analyst & Portfolio Manager
> Fidelity International

Customers

Concerned with TSMC's technology development and production planning, including fulfillment of customer capacity demand, product quality, comprehensive protection of proprietary customer information, assisting customers with successful production application and gaining time-to-market advantage

100
Quarterly assessment meetings

1,500
Management-level customer meetings


TSMC's customer service team offers educational training courses

Concern Issues

- Innovation management
- Product quality
- Customer relations
- Risk management

Communication Channels

- Customer satisfaction survey/annually
- Business and technology assessment/quarterly
- Customer meetings/as needed
- Customer visits/audits/as needed

Focus Areas	Responses from TSMC
Technology development schedules and plans	• Offered 994 process technologies and 149 advanced packaging technologies in line with TSMC's technology roadmap
Product quality	• Continued perfecting production technologies and product quality. Reduced engineering defects per one million 12-inch wafers to 25% of 2019 level
Capacity planning and production information	• In 2023, the monthly browsing rate of the upgraded TSMC-OnlineTM exceeded 50,000 visits, providing access to comprehensive technology and production information services
Business resilience and continuity management	• A total of 16 audit sessions were conducted by customers regarding the Business Continuity Plan, resulting in TSMC achieving an average audit score of 96 points

> TSMC is the leader in advanced process technology, and possesses solid experience and a high level of integrity as well as sense of responsibility for the semiconductor industry.
>
> **NXP Semiconductors N.V.,**

Suppliers/ Contractors

Concerned with the development of new process technologies, improving product quality, environmental, safety and health (ESH) regulations, ethics and regulatory compliance, and information security; desire to strengthen and deepen partnerships for sustainable supply chain management

218
Supplier audit and communication meetings

194
Suppliers participated in the Supply Chain ESH Training Forum

Concern Issues

- Sustainable supply chain
- Ethics/regulatory compliance
- Product quality
- Occupational health and safety
- Climate and energy

Communication Channels

- Supplier Code of Conduct promotion/annually
- Supplier Sustainability Management Self-Assessment Questionnaire (SAQ)/annually
- Supply chain environment, safety and health training/annually
- Sustainable Supply Chain Environment, Safety and Health Forum/annually
- Carbon reduction follow-up meeting with major emission contributors/every two months, semiannually
- Supplier meetings/as needed
- On-site support and audit/as needed
- Supply Chain Employee Grievance Channel/as needed
- Supply Online 360 Global Responsible Supply Chain Platform/ as needed

TSMC presents the Supplier Environmental, Safety and Health Excellence Award

Focus Areas	Responses from TSMC
Look forward to enhancing sustainability resilience and growing together with TSMC	• The TSMC Supplier Sustainability Academy launched a total of seven programs consisting of 80 courses, totaling 2.2 million visits
Anticipate staying abreast of ethics and regulatory compliance to establish a foundation for sustainable management	• All tier 1 suppliers signed the Supplier Code of Conduct related provisions (completion rate 100%) • Distributed the "Supply Chain Human Rights Supplemental Questionnaire" to promote the awareness of diversity, equity and inclusion (DEI) to the supply chain
Expect to enhance sustainability risk management capabilities and improve raw material quality	• 70 significant suppliers underwent third-party supplier audits on sustainability risks by RBA-certified institutions, with 39 follow-up audits completed • Ten suppliers received consultation on process advancement and quality improvement
Expect to establish effective environmental safety and health management mechanisms	• Held the "Sustainable Supply Chain Environment, Safety and Health Forum," along with various consulting courses and diversity-themed workshops, empowering suppliers in sustainable operations • Continued to enhance ESH and loss prevention capabilities in the supply chain and commended outstanding suppliers. In 2023, Scientech Corp's Hukou plant was given the Supplier Environment, Health and Safety Excellence Award, and Shiny Chemical Industrial Co's Yong'an plant was given the Supplier Environmental, Health and Safety improvement Award
Hope to cultivate carbon emission management capabilities and achieve a green and low-carbon supply chain	• Assisted ten suppliers in implementing energy-saving practices, resulting in the identification of 42 potential energy-saving solutions • Required 135 raw material and equipment suppliers to participate in CDP supplier carbon disclosure project • Collaborated with major emission contributors to develop specific carbon reduction plans, with the aim of achieving a cumulative reduction of 900,000 metric tons by 2030

> We are honored to receive the 2023 "TSMC Supplier Excellent Performance and Green Manufacturing Award" in recognition of our achievements in electronic chemical recycling. We are eager to sustain our collaboration to advance toward additional milestones in resource sustainability.
>
> **Chih-chuan Tsai**
> President
> Chang Chun Petrochemical Co., Ltd. Under Chang Chun Group

> Reducing carbon emissions presents both challenges and opportunities. We are dedicated to closely partnering with TSMC to execute carbon reduction policies and progress resolutely, ensuring steady advancement along this path.
>
> **Chi-fa Sun**
> Vice President
> Shiny Chemical Industrial Co., Ltd.

Government/ Industry Associations

Concerned with process technology and industry development, talent attraction and retention, net zero emissions, water stewardship, supply chain management, overseas investments, and regulatory revision trends

46 Government Administrations

106 Associations

Concern Issues

- Innovation management
- Corporate governance/regulatory compliance/risk management
- Talent attraction and retention
- Climate and energy/circular resources/water stewardship
- Air pollution
- Sustainable supply chain management

Communication Channels

- Industry association communication platforms/monthly
- Official correspondence and visits/as needed
- Offer industry experience and advice, and give keynote speeches/as needed
- Conferences (e.g., briefings, public hearings, symposia, seminars, meetups)/ as needed

The Taiwan Semiconductor Industry Association announces its shared commitment to achieving net-zero emissions through voluntary reductions

Focus Areas	Responses from TSMC
Industry development/Intellectual property/Trade secret protection	• Gave introduction on advanced process technology to the US Patent Office. Spearheaded IP strategy alliances for the industry's supply chain and helped to formulate IP laws amendments and provide suggestions • Participated in industry promotion associations and trade associations to provide for the charitable sharing of trade secret registration and intelligent management insights to the public
Corporate governance, regulatory compliance, and risk management	• Participated in seminars on the latest export control regulations and conducted industry practice exchange • Enhanced the disclosure of risk management information, including risk appetite statements, sensitivity analysis and stress testing, and top emerging risks
Global talent deployment and cultivation	• Facilitated domestic and international industry-academia collaboration projects to nurture top semiconductor talent • Engaged in discussions with representatives from industry, government, and academia in the US, Japan, and Germany on issues concerning semiconductor industry development and talent cultivation
Renewable energy/carbon credit transactions/circular resources/ water stewardship	• Collaborated with the Energy Administration and the Bureau of Standards, Metrology, and Inspection to initiate the "Green Power Distribution Sandbox Program," garnering industry recognition and participation • Participated in the initial transactions on the Taiwan Carbon Solution Exchange and invested in funds related to global nature-based carbon credits to bolster the development of the carbon credit market • Launched the Zero Waste Manufacturing Center and collaborated with five suppliers to recycle approximately 200 metric tons of waste liquid into reusable energy • Expanded the utilization of reclaimed water at TSMC sites in Southern Taiwan Science Park, increasing daily usage from 6,500 cubic meters to nearly 50,000 cubic meters
Response, suggestion, and promotion of environmental protection related regulations	• Represented the Taiwan Semiconductor Industry Association in discussions with the Ministry of Environment concerning amendments to subsidiary laws of the "Climate Change Response Act" and "Air Pollution Control and Emissions Standards for the Semiconductor Industry," promoting positive industry development
Supply chain sustainability and environmental safety and health management improvement	• Organized various workshops, trainings, and interactive courses on sustainability and ESH topics to create a responsible supply chain

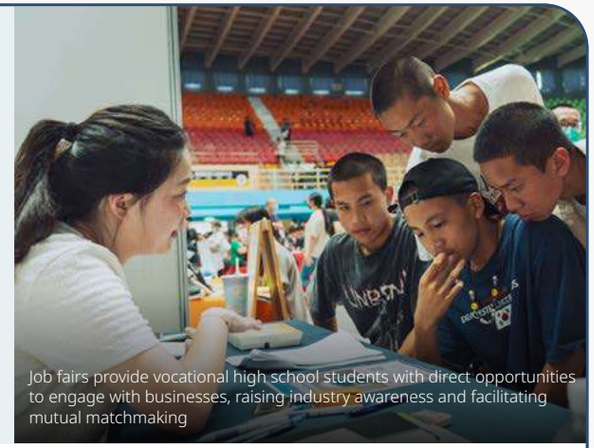
> TSMC continues to promote innovation in semiconductor process technology. After analysis by our professional team, their semiconductor-based ICT Enabling Technology will make significant contributions to global carbon reduction.
>
> **Edwin Liu**
> President
> Industrial Technology Research Institute

Society

- Concerned with the integration of industry, government, academia, and volunteer services, and the construction of a social support system for rural areas encompassing education, health, and environment faciliated by the TSMC Charity Foundation
- Concerned with the resources for education and arts offered by the TSMC Education and Culture Foundation to cultivate well-rounded talents for the new era

690
Charity partners

216
Charity programs


Job fairs provide vocational high school students with direct opportunities to engage with businesses, raising industry awareness and facilitating mutual matchmaking

Concern Issues

- Social impact

Communication Channels

- Volunteer activities and services/quarterly
- Volunteer cadre meetings/ 15 volunteer activities a week
- Project collaboration and visit/as needed
- Sponsorship of charity projects and educational projects/as needed
- "Sending Love" charity platform/as needed
- TSMC Education and Culture Foundation and TSMC Charity Foundation websites/as needed
- ESG website, ESG Newsletter, ESG mailbox and social media (Facebook and LinkedIn)/as needed

Focus Areas	Responses from TSMC
Foster youth, promote popular science education, support rural students and empower teachers, cultivate literary and advance the arts	• In 2023, the TSMC Education and Culture Foundation invested NT$118.24 million, focusing on three service strategies: Cultivating Young Generation, Promote Educational Collaboration, and Promoting Arts and Culture, aimed at fostering societal well-being and building a foundation in arts and education. Ongoing programs include the TSMC Journeys of Female Scientists, nurturing future female scientific talents; the Udreamer Project, attracting 180 groups of youth to collectively address sustainability issues. The company organized the 1st TMSC Penmanship Competition to develop calligraphy arts and advance the Chinese Opera on Campus Program and the TSMC Theatre. Also held the 20th Hsin-Chu Arts Festival and attracted 52,252 visits, boosting cultural appreciation
Empower rural communities to bridge vocational education and employment gaps, provide care for the elderly and establish social support networks, advocate for environmental conservation, and minimize resource waste	• In 2023, the TSMC Charity Foundation invested NT$256.72 million, focusing on rural empowerment with TSMC volunteers through three service strategies: Empower Education, Care for the Elderly, and Protect the Environment. The foundation offered popular science education alongside vocational exploration workshops and job fairs, integrating education with practical skills. In addition to financially assisting disadvantaged families, it also collaborated with medical and social welfare institutions through the Network of Compassion to strengthen eldercare service. Furthermore, seven charitable organizations and 240 rural schools received operational support from the Foundation's Public Welfare Green Energy Project. Through the energy-saving techniques and ecological conservation experience sharing from TSMC, the foundation continued to reinforce environmental awareness

“

The TSMC Charity Foundation organized a high school and vocational school job fair to show students and parents a promising blueprint for the future, providing more diverse options and opportunities beyond further education.

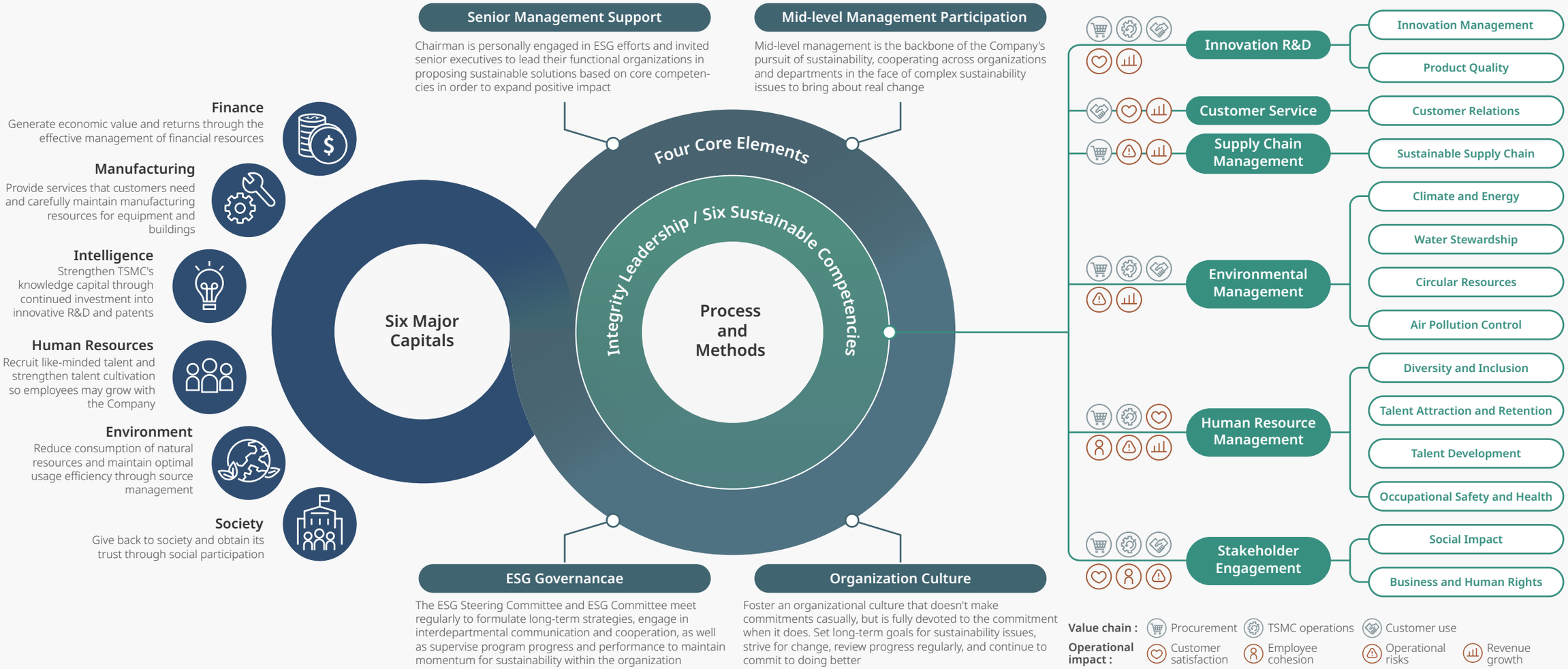
Fu-yuan Peng, Director
General of the K-12 Education Administration, Ministry of Education

The TSMC Education and Culture Foundation initiated the Udreamer Project to motivate youth to step out of the classroom and into society, learning and growing through practice.

Steven Yang
Founder and CEO of Canopy Impact Investment

Sustainability Impact

TSMC integrates six major capitals, four core elements, and six sustainable management competencies to cultivate its trinity of strengths: Technology Leadership, Manufacturing Excellence, and Customer Trust. The Company continues to drive technological innovation, foster the success of customer products, and fuel profitable growth. Additionally, TSMC plays a pivotal role in driving output value in the semiconductor industry, generating both direct and indirect job opportunities while prioritizing the respect of human rights and ensuring the health and safety of its workforce. Furthermore, TSMC champions green innovation, enhancing resource efficiency and safeguarding natural ecosystems and biodiversity. By dedicating corporate resources and encouraging employee participation, TSMC expands its initiatives for common good. TSMC holds itself to a high standard of ESG performance, aiming to create tangible positive impact for stakeholders while mitigating negative impact. Through a Profit and Loss (P&L) mindset, the Company strives to build long-term value by establishing a sustainability impact management framework rooted in triple bottom line (TBL) principles and evaluate its contribution to the broader value chain from an external perspective, embodying its ESG vision to "Uplift Society."



TSMC draws upon globally recognized methodologies such as the Natural Capital Protocol, Social & Human Capital Protocol, and ISO 14008: 2019 Monetary Valuation of Environmental Impacts and Related Environmental Aspects. Through a Sustainability Impact Pathway derived from causal relationships by converting all positive impacts (values) and negative impacts (costs) into monetary values, beginning from the direct and indirect impacts of upstream procurement, TSMC operations, and customer use. This approach facilitates stakeholder communication and aims to drive economic growth, reduce environmental resource depletion, uphold human rights, promote diversity and inclusion, and ultimately enhance societal well-being, generating positive change. For further details, please refer to the TSMC 2023 Sustainability Impact Valuation Report.

	Sustainability Impact Pathway					Sustainable Value	
Cause of the Impact	Material Issue[Note 1]	Output Metric[Note 2]		Impact on well-being	Impacted Stakeholders	Indicators	Impact Level
Upstream procurement	Sustainable Supply Chain	• Payment to Suppliers for Procurement	PI5478	• Procurement demand driving industry supply and demand relationships	Society	Supply Chain Output Value Driven by TSMC	●●●●●●●●
				• Procurement demand creating supply chain job opportunities	External employee[Note 3]	Supply Chain Employee Compensation	●●●●●○○○
				• Risks of forced labor resulting in loss of freedom and risks to physical and mental health for workers	External employee	Risk of Human Rights Violations-Forced Labor	●●○○○○○○
				• Risks of child labor resulting in loss of access to quality education and future income	External employee	Risk of Human Rights Violations-Employment of Child Labor	●○○○○○○○
				• Environmental impact of GHG emissions derived from supply chain production processes	Environment	GHG Emissions from the Supply Chain	●●●○○○○○
				• Environmental impact of air pollution emissions derived from supply chain production processes	Environment	Air Pollution Emissions from the Supply Chain	●●●●○○○○
		• Effectiveness of Supplier Consultation	PI6065	• Assisting suppliers in energy-saving to avoid environmental impact from GHG emissions	Environment	Energy-saving Consultation for the Supply Chain	●●○○○○○○
			PI6065	• Assisting suppliers in water-saving to avoid environmental impact from water resource scarcity	Environment	Water-saving Consultation for the Supply Chain	●○○○○○○○
			PI6065	• Assisting suppliers in waste reduction to avoid environmental impact from waste generation	Environment	Waste Reduction Consultation for the Supply Chain	●○○○○○○○
TSMC operations	Finance Performance	• Net Revenue	FP1301	• Assisting customers in product success and providing returns to investors	Customers/ Shareholders/ Investors	Net Revenue	●●●●●●●○
		• Depreciation and Amortization	FP9462	• Driving technological development in industries and generating revenue for suppliers	Suppliers	Depreciation and Amortization	●●●●●●●○
		• Taxes	FP5261	• Supporting government initiatives for infrastructure expansion and social welfare	Government, Society	Taxes	●●●●●●○○
	Climate and Energy	• GHG Emissions	QI1479	• Changes in GHG concentrations driving global warming	Environment	GHG Emissions from TSMC Operations	●●●●○○○○
		• Use of Renewable Energy (Self-generated)	QI2496	• Changes in GHG concentrations mitigating global warming	Environment	Benefits of Using Renewable Energy	●●●○○○○○
		• Use of Renewable Energy (Purchased)	QI3324	• Changes in GHG concentrations mitigating global warming	Environment	Benefits of Using Renewable Energy	●●●○○○○○
		• Effectiveness of Energy-saving Measures	QI6697	• Changes in GHG concentrations mitigating global warming	Environment	Benefits of Promoting Energy-saving Measures	●●●○○○○○
	Water Stewardship	• Water Consumption	QI0263	• Changes in water resource availability intensifies water usage pressure in nearby communities	Environment	Water Resource Consumption from TSMC Operations	●○○○○○○○
		• Use of Reclaimed Water	QI1927	• Changes in water resource availability prevents water usage pressure in nearby communities	Environment	Benefits of Using Reclaimed Water	●○○○○○○○
		• Effectiveness of Water-saving Measures	QI4015	• Changes in water resource availability prevents water usage pressure in nearby communities	Environment	Benefits of Promoting Water-saving Measures	●●○○○○○○
		• Wastewater Discharge	QI0386	• Changes in pollutant concentrations in water bodies leading to health and ecological impacts	Environment	Wastewater Discharge from TSMC Operations	●●○○○○○○
	Air Pollution Control	• Air Pollution Emissions	—	• Changes in air pollution concentrations in the atmosphere leading to health and ecological impacts	Environment	Air Pollution Emissions from TSMC Operations	●●○○○○○○
	Circular Resources	• Waste Disposal	QI6192	• Air pollution and GHG emissions from incineration and landfill	Environment	Waste Disposal from TSMC Operations	●●○○○○○○

Indicators : Social externalities | Environmental externalities | Gross value added **Impact level :** ● Positive impact ● Negative impact

Sustainability Impact Pathway						Sustainable Value	
Cause of the Impact	Material Issue[Note 1]	Output Metric[Note 2]			Impact on well-being	Impacted Stakeholders	Indicators	Impact Level
TSMC operations	Talent Attraction and Retention	• Employee Compensation and Benefits		OI4724	• Increased happiness and purchasing power from compensation above the living wage	Internal employee[Note 3]	Compensation Balancing Quality of Life	●●●●●●○○
		• Employee Support Programs		OI2742	• Work-life balance improvement through paid leave and family-friendly support	Internal employee	Support for Life and Family	●○○○○○○○
		• Incidents of Workplace Sexual Harassment		OI9077	• Medical costs and loss of future well-being resulting from physical and mental injuries	Internal employee	Sexual Harassment	●○○○○○○○
	Talent Development	• Employee Training and Development		OI7877	• Enhanced professional skills and employability through training	Internal employee	Training Benefits for Employee Future Income	●●●○○○○○
	Diversity and Inclusion	• Gender Pay Gap		OI1855	• Gender disparities in high-paying positions resulting in the occupational segregation	Internal employee	Equal Opportunity	●●●●○○○○
	Occupational Safety and Health	• Employees with Improved Health Management		OI4061	• Lifestyle and health improvements through health education	Internal employee	Employee Health Management	●●○○○○○○
		• Occupational Accidents Involving Employees	OI3757	OI6525	• Physical and mental impact of workers and healthcare expenditure	Internal employee	Employee Occupational Accidents	●○○○○○○○
		• Occupational Accidents Involving Contractors	OI3757	OI6525	• Physical and mental impact of workers and healthcare expenditure	External employee	Contractor Occupational Accidents	●○○○○○○○
	Social Impact	• Social Investments		OI1619	• Promotion of local community relations and improvement of life quality	Society	Value of Social Investments	●●●○○○○○
Customer use	Innovation Management	• Benefits of Energy-efficient Products		PI7623	• Assisting customers in product energy efficiency to avoid and mitigate environmental impacts from GHG emissions	Customers, Environmental	Energy-efficient Product Design	●●●●○○○○

Indicators : Social externalities | Environmental externalities | Gross value added **Impact level :** Positive impact | Negative impact

Note 1: In response to the "GRI Universal Standards 2021" which moved human rights issues to "GRI 2: General Disclosures 2021," and considering the multifaceted nature of human rights issues and its importance to corporate sustainability, TSMC incorporates "Business and Human Rights" as an integral part of its operations and governance. The inputs and outputs of this issue are reflected in related material issues.

Note 2: Impact Reporting & Investment Standards (IRIS) is a standardized framework developed by the Global Impact Investing Network (GIIN) for measuring the environmental, social, and economic performance of enterprises. It enhances the comparability of impact investments.

Note 3: External employees refer to employees of suppliers or contractors, while internal employees refer to employees of TSMC.

Note 4: Environmental and social externalities of the supply chain are primarily assessed for Tier 1 suppliers with transactions occurring three times or more in a single year and amounts exceeding NT$10 million. A total of 1,131 suppliers met the criteria. Considering the industry characteristics and procurement amounts, the Input-Output Model is used to calculate economic benefits, job creation, and salary income resulting from the supply chain's demand-driven effects, as well as associated environmental impacts and human rights risks. This method analyzes potential opportunities and risks in the supply chain based on industry statistics, rather than actual events, with coefficients sourced from The Report on Input-Output Statistics (DGBAS, 2020), EXIOBASE 2, UNICEF, and Walk Free database.

Note 5: Environmental externalities are the monetary assessment of possible external impacts from TSMC's purchasing and production. For the costs and economic benefits arising from the implementation of environmental protection projects, please refer to Environmental Cost in TSMC's 2023 Annual Report.

Note 6: Considering differences in economic conditions across countries, valuation coefficients are revised based on Purchasing Power Parity-adjusted Gross National Income (GNI) per capita and aligned to the currency value as of the year 2017, accounting for inflation and exchange rate factors. The methodology follows OECD (2012) and PwC UK (2015) guidelines.refer to Environmental Cost in TSMC's 2023 Annual Report.

Note 7: For further information on sustainability impact methodology and analysis results, please refer to the TSMC 2023 Sustainability Impact Valuation Report.

Historical Data (2019~2023)

Positive Impact

Unit : NT$ Million

Monetary Value	Impact Level
>1,000,000	●●●●●●●●
500,000 - 1,000,000	●●●●●●●○
100,000 - 500,000	●●●●●●○○
50,000 - 100,000	●●●●●○○○
10,000 - 50,000	●●●●○○○○
1,000 - 10,000	●●●○○○○○
100 - 1,000	●●○○○○○○
0 - 100	●○○○○○○○

Negative Impact

Unit : NT$ Million

Monetary Value	Impact Level
<−1,000,000	●●●●●●●●
−500,000 - −1,000,000	●●●●●●●○
−100,000 - −500,000	●●●●●●○○
−50,000 - −100,000	●●●●●○○○
−10,000 - −50,000	●●●●○○○○
−1,000 - −10,000	●●●○○○○○
−100 - −1,000	●●○○○○○○
0 - −100	●○○○○○○○

Impact Assessment and Management Practices

Upstream Procurement

TSMC leverages its leadership position in the global semiconductor industry to improve the technology and capability of local suppliers. TSMC employs an input-output model to assess social and environmental externalities arising from its procurement activities. In 2023, TSMC created an output value of NT$1,860.3 billion in the supply chain through procurement, generated 270,000 job opportunities, and NT$199 billion in payroll through the supply chain. However, the environmental footprint and risks of human rights violations generated by the supply chain also brought potential social costs of NT$15.6 billion. To ensure the sustainable operations of the supply chain, TSMC conducts hotspot analyses to pinpoint industries and regions with significant impacts. These insights are then integrated into procurement strategies and supplier selection criteria. Through consultation and goal setting, TSMC collaborates with suppliers to identify opportunities for process optimization and environmental footprint minimization. Furthermore, TSMC conducts assessments on critical raw materials, with over 120 types analyzed by the end of 2023, continuously exploring opportunities for improvement and driving sustainable transformation of the industry.

TSMC Operations

TSMC uses a Gross Value Added (GVA) approach to assess the positive impact generated for stakeholders by operations. Such positive impact may include net operating profit, taxes, depreciation and amortization, etc. In terms of social value, TSMC utilizes methodologies such as Impact-Weighted Accounts (IWA) from Harvard Business School and the Impact Statement approach from the Value Balancing Alliance (VBA) to assess the positive impact on employees through fair employment opportunities, compensation and benefits that balance quality of life, and the future returns generated from training. TSMC also applies willingness to pay (WTP) and value transfer method to evaluate the social cost and benefits of occupational injury and health promotion initiatives. Meanwhile, the Company continues to employ environmental profit and loss (EP&L) to measure the negative impacts resulting from energy and resource consumption and pollutant emissions during the production process, and assess the environmental benefits generated by implementing energy-saving measures, deploying renewable energy sources, and reusing water resources.

In 2023, TSMC generated NT$2,161.7 billion in operating revenue, created Gross Value Added (GVA) of NT$1,129 billion for stakeholders through taxes, depreciation and amortization, and cash dividends. TSMC not only helped customers succeed, supported the government in expanding infrastructure and social welfare, but also offered good returns to its investors. In the social dimension, TSMC offered a total compensation of NT$181.6 billion, well above the living wage, and enhancing employees' happiness and purchasing power. A comprehensive talent training program and career planning have improved employee competitiveness, resulting in a NT$7.4 billion increase in salary growth benefits. TSMC's and its employees' contributions to charitable activities generated NT$1.5 billion in social value. Diversified health promotion activities brought NT$190 million in health improvement benefits. However, the gender pay gap has resulted in a potential compensation cost of NT$36 billion. Occupational accidents and sexual harassment also resulted in NT$56.2 million in physical and mental impact and medical costs for employees and society. In the environmental dimension, environmental footprints and resource consumption generated from production processes resulted in an environmental cost of NT$21.7 billion. To mitigate the environmental impact, TSMC proactively drives green manufacturing by creating a positive impact through source reduction, energy conservation in the manufacturing process, circular economy, and end-point control. These initiatives collectively created NT$2.8 billion in environmental benefits.

Customer Use

TSMC continues to develop world-leading energy-efficient semiconductor technologies to help customers produce advanced, energy-efficient products and facilitate the evolution of energy-saving ICT technologies and product applications. The Industry, Science and Technology International Strategy Center (ISTI) conducted a model analysis based on global energy consumption, GDP, and the number of electronic products, and found that by 2030, for every kWh of power used in production, TSMC can help save 4.28 kWh of power for other industries and households worldwide. It is estimated that from 2020 to 2030, this assistance in energy conservation globally could increase from 16,900 GWh to 235,400 GWh and will generate a positive impact of NT$2,136 billion. TSMC facilitates global energy conservation by continuing to innovate semiconductor technologies to realize smart applications for a wide range of electronic products. TSMC deployed 288 distinct process technologies and manufactured 11,895 products for 528 customers in 2023 to continue to bring significant contributions to the advancement of modern society.

TSMC continues to bring significant contributions to the advancement of modern society

Carry Out the UN Sustainable Development Goals

Adhering to the principle of "Leaving No One Behind," TSMC actively pursues SDGs through the "ESG Implementation Framework." Referring to the "SDG Impact Standards for Enterprises" published by the United Nations Development Programme (UNDP), TSMC establishes impact measurement methods by aligning the four core elements of Strategy, Management Approach, Transparency, and Governance with the management of material issues. In 2024, the Company is set to publish its first Sustainability Impact Valuation Report, aiming to expedite the achievement of the SDGs.

TSMC follows the "Integrating the Sustainable Development Goals into Corporate Reporting: A Practical Guide", jointly issued by the Global Reporting Initiative (GRI) and the United Nations Global Compact, to identify SDGs pertinent to the Company. It aligns with disclosure frameworks defined by the GRI and "Support the Goals", detailing action outcomes across five dimensions: Plans, Commitments, Actions, Progress, and Suppliers. This strategy integrates both internal and external resources to maximize sustainability impact, demonstrating the Company's steadfast support for the United Nations' 2030 Agenda for Sustainable Development.

In 2023, guided by the ESG Steering Committee, TSMC continued to focus on nine sustainability goals, advancing 23 ESG actions and 57 measurable long-term goals for 2030. These efforts align with SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). TSMC continued to incorporate sustainable innovations through technology, fostering environments conducive to scientific, technological, and innovative advancements. The company aims to promote inclusive technological transformation, bridge the digital divide, strengthen stakeholder collaboration, and implement concrete measures to achieve common good and advance SDG 17 (Partnerships for the Goals). For further information, please refer to the "2023 TSMC UN SDGs Action Report".

ESG Directions

Drive Green Manufacturing
Implement clean production and innovate high-efficiency semiconductor technologies to mitigate climate change and pursue sustainable development

Build a Responsible Supply Chain
Collaborate with suppliers and contractors to promote sustainable operations and manufacturing standards

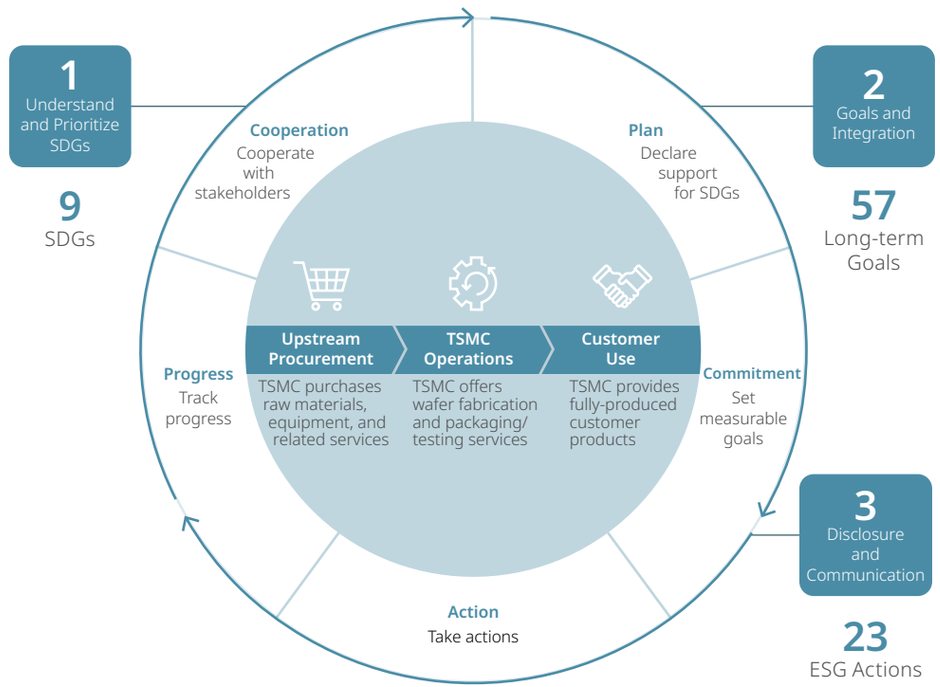
Create a Diverse and Inclusive Workplace
Establish a safe and healthy workplace that respects human rights and unleashes employees' full potential

Develop Talent
Support career development and collaborate with academia to develop STEAM (Science, Technology, Engineering, Art and Mathematics) programs that cultivate talent

Care for the Underprivileged
Aggregate resources to deploy educational, cultural and social programs that promote equity and uphold the common good

Process and Reporting

TSMC identifies the link between SDGs, the five sustainability roles, and value chain stages through three steps. Long-term goals and action plans are then formulated accordingly.



TSMC Sustainability Roles

An Innovation Pioneer
As the world's largest dedicated IC foundry, TSMC works with customers to accelerate and unleash innovation through its pioneering business model and robust R&D capabilities to drive infinite possibilities in technological progress and sustainable developments through the ubiquitous semiconductor

A Responsible Purchaser
TSMC is committed to responsible purchasing and works closely with supply chain partners on technology, quality, delivery, human rights, and environmental protection. In the face of serious climate change challenges, the Company will further strengthen green innovation and climate resilience and strive to create a low-carbon semiconductor supply chain

A Practitioner of Green Power
TSMC aspires to be a world-leading benchmark organization in environmental protection and actively integrates green management into daily operations. The Company applies innovative technologies to climate and energy, water management, circular resources, and air pollution control, promoting a comprehensive range of sustainable actions to strengthen environmental protection and act on our firm belief in prospering with the earth's ecosystem

An Admired Employer
TSMC values its commitment to employees and works to foster a humanistic workplace culture with open communications. The Company is dedicated to promoting a diverse, inclusive, safe, and fun workplace where employees can continue to learn. TSMC also provides competitive compensation and welfare, striving to be a company that employees can be proud of

Power to Change Society
Committed to uplifting society, the TSMC Education and Culture Foundation and TSMC Charity Foundation focus on the changing social landscape and its needs. The two foundations integrate and invest internal and external resources to empower young students of all ages, care for remote areas and the disadvantaged, elderly people living alone, and foster art and cultural literacy to lay the foundation for a society with common good, beauty, and kindness

An Innovation Pioneer

"As the world's largest dedicated IC foundry, TSMC works with customers to accelerate and unleash innovation through its pioneering business model and robust R&D capabilities to drive infinite possibilities in technological progress and sustainable developments through the ubiquitous semiconductor."

>8,700 / >100,000
Patent applications globally/ trade secrets registered

283
Innovative testing methods developed for quality and reliability to enhance product, technology and quality

994 / 149
Provide customers process technologies/advanced packaging technologies

- Innovation Management
- Product Quality
- Customer Relations

Innovation Management

Maintain Technology Leadership

Continuous investment in advanced technology development to maintain TSMC's technology leadership in the semiconductor industry

Protect Intellectual Property

Patent protection: Strengthen quality and quantity driven patent management, apply early for patents on next-generation process technologies, and expand the patent protection network to maintain TSMC's technology leadership

Trade secret protection: Strengthen business operations and intellectual property innovation by recording, consolidating, and utilizing trade secrets with competitive corporate advantages through trade secret registration and management

Enhance Industry-academia Collaboration

Link academic institutions in Taiwan and overseas by investing resources in university programs based on a long-term mechanism for interaction to cultivate the next-generation semiconductor talent

2030 Goals	2024 Targets	2023 Achievements
Maintain TSMC's technology leadership and invest 8.5% of revenue into R&D expenses annually	2nm process technology (N2) enters risk production	✓ Enhanced 3nm process (N3E) entered volume production Target: 3nm process technology in volume production ✓ Maintained TSMC's technology leadership and invested 8.5% of revenue into R&D expenses annually[Note 1] Target: 8.5%
Over 80,000 global patent applications	Exceeds 8,500 global patent applications	✓ Submitted over 8,700 global patent applications Target: >7,500
Over 200,000 trade secret registrations	Exceeds 60,000 trade secret registrations	✓ Registered over 40,000 trade secrets Target: >40,000
	Shares TSMC's trade secret registration mechanism with eight companies	↑ Shared TSMC's trade secret registration mechanism with 23 companies Target: 8
	Assists six companies to successfully build a trade secret registration and management system	↑ Assisted seven companies to successfully build a trade secret registration and management system Target: 6
	Exceeds 500 green trade secret registrations	✓ Registered over 500 green trade secret registrations Target: >500
Cultivate more than 35,000 undergraduate and graduate students globally through university programs that deepen industry-academia collaboration[Note 2]	Cultivates more than 17,000 undergraduate and graduate students globally through university programs that deepen industry-academia collaboration between 2021 and 2024	✓ Cultivated up to 12,677[Note 3] undergraduate and graduate students globally through university programs that deepen industry-academia collaboration between 2021 and 2023 Target: 10,000 people
Introduce STEM workshop for female high school students with over 3,000 participated NEW	Introduces STEM workshop for female high school students with over 2,500 participated NEW	✓ Cultivated up to 11,670 undergraduate and graduate students globally through university programs to enhance industry-academia collaboration Target: 8,000 people

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Since 2014, TSMC has consistently set new revenue and R&D expense records every year. In 2023, R&D expenses amounted to US$5,846 million, 3.1 times more than 2014, 8.5% of total revenue in 2023. For historical data on revenue and R&D expenses, please see Continuous Investment in R&D

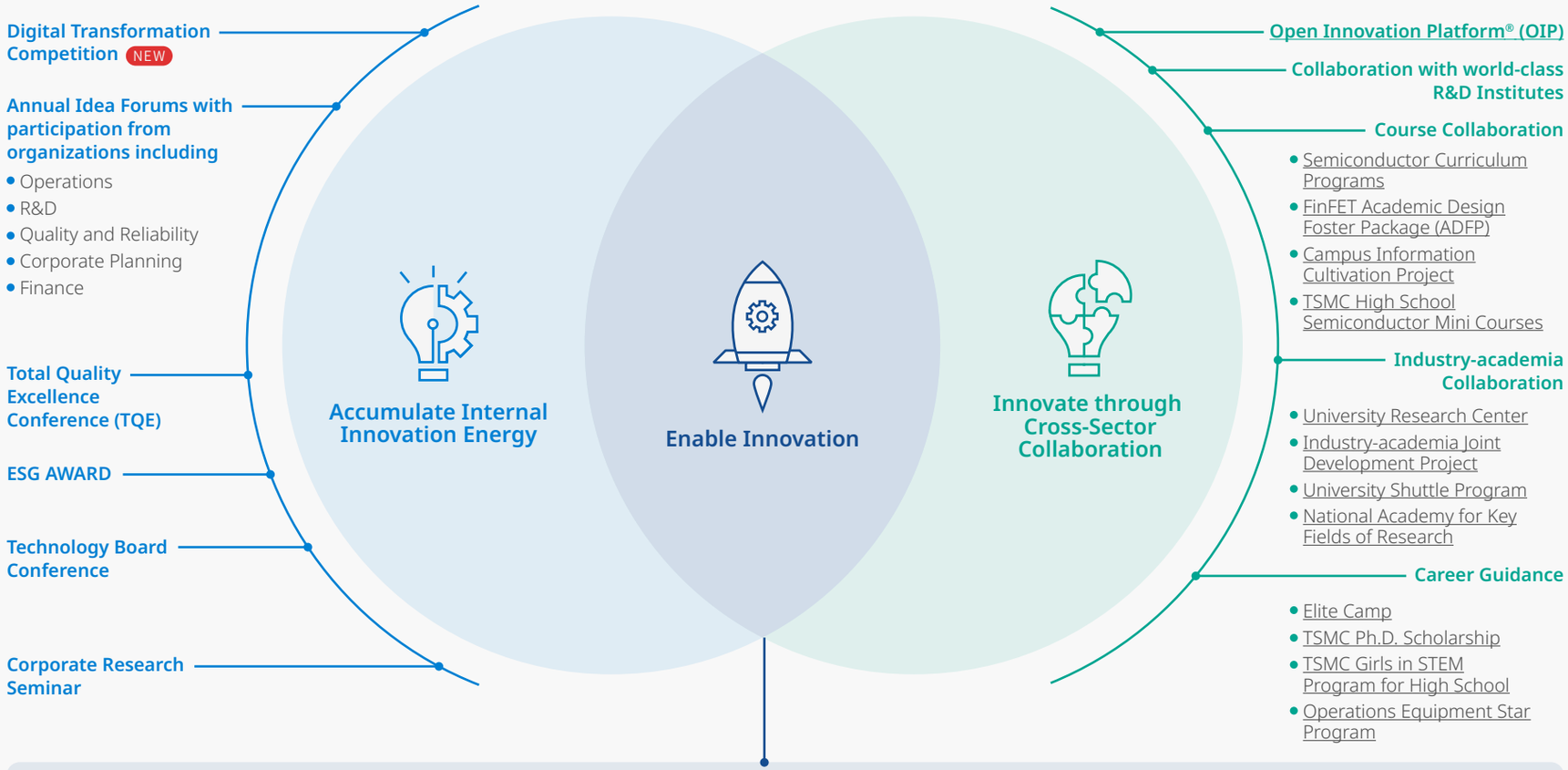
Note 2: Industry-academia collaboration projects include various academic programs, internships, and cooperative education programs

Note 3: As the cumulation of the number of participants can better exhibit the resources invested by TSMC in talent cultivation and benefits, the target for the number of participants in the current year was canceled in 2024

Starting from the innovative business model of being everyone's foundry, Dr. Morris Chang founded the global-first dedicated IC foundry, which has significantly reduced the entry barrier for the semiconductor industry and given rise to a thriving fabless IC design industry. Since its establishment in 1987, innovation has always been the basis of growth. From business models to technical breakthroughs, TSMC continues to seek outstanding performances in all aspects. Meanwhile, it actively cultivates the innovation culture through Technology Symposium, proposal competitions, Total Quality Excellence Conference (TQE), and other internal sharing and exchange systems to establish a work environment that encourages innovative thinking and provides incentives to employees for implementing innovative proposals. In 2023, TSMC organized the first digital transformation competition and encouraged employees to utilize digital transformation technologies to enhance the Company's competitive strength and inspire digitized, automated, and intelligent innovations to continue maintaining its leading position in the everchanging era.

In response to the emerging AI technologies, TSMC accelerated its science exploration and technology innovation and constantly improved its overall operating capacity and efficiency. In 2023, its N3E technologies successfully entered the volume production and the Company created the N2 technical development baseline, with the risk production scheduled for 2024. In addition, TSMC formed cross-industry collaboration with customers, suppliers, industry, and academia, including products, technical talent, and green innovation, in response to the rapid changes in the semiconductor industry to remain consistently devoted to innovation.

Innovation Management Framework



Intelligent Precision Manufacturing

Technology Leadership

Intellectual Property Protection

- Comprehensive Patent Management Mechanism
- Trade Secret

Innovation Cases

- Development of High Transmittance EUV Pellicle Wins Three Patents
- Introduce New Generation Low-temperature Polyimide to Upgrade Environment-friendly Materials
- HPC Technology Platform That Saves 6.8 kWh for every kWh of Power Consumption
- Optimized the High-gravity Rotating Packed Bed to Improve the IPA Reduction Rate by 70%
- Innovative Real-time Air Pollution Monitoring Technology Acquires Gas Concentration Data in One Minute

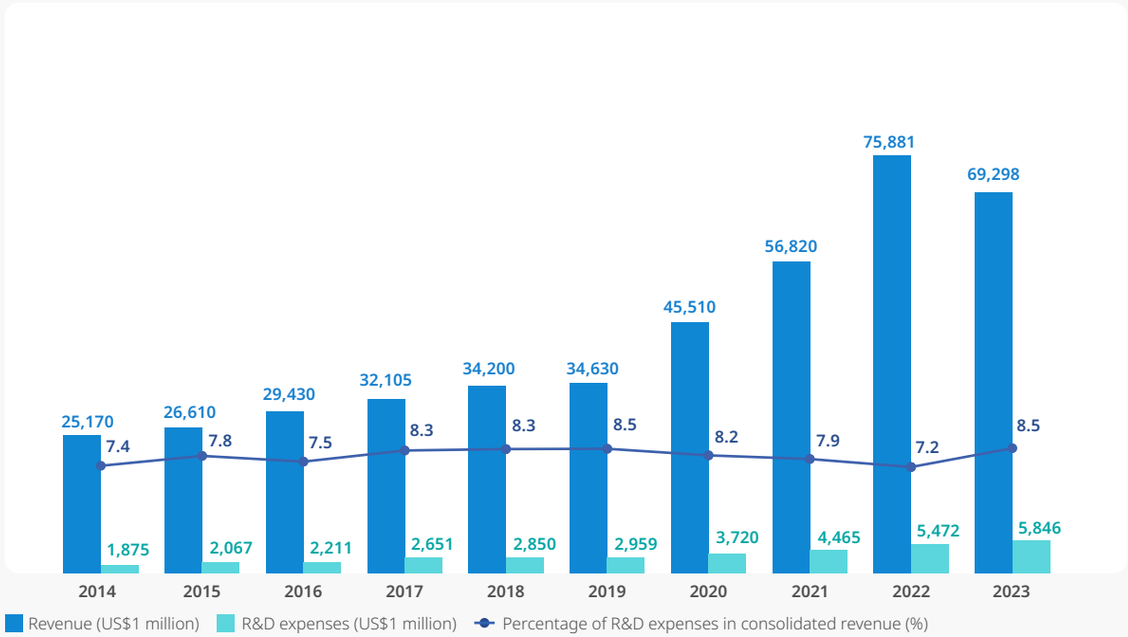
Maintain Technology Leadership

In 2023, TSMC continued to increase R&D investments, with annual R&D expenses accounting for 8.5% of total revenue; its investment scale is equivalent to the world-class technology enterprises. Facing the challenge to significantly improve semiconductors' computing capacity every two years under Moore's Law, TSMC's R&D organization provides customers with advanced technologies and design solutions to contribute to their products' success. In 2023, TSMC completed the N2 development baseline and continued to improve its yield; meanwhile, it also developed the A16 process; as compared with the N2 process, the A16 process will further provide speed and density advantages.

In the future, TSMC will continue to conduct exploratory research into advanced technology innovation. In addition to CMOS logic technology, TSMC is also developing a wide range of semiconductor technologies to meet customer demands on SoCs for mobile and other applications. The existing scope of application includes integrated interconnect and packaging solutions, microcontrollers, AI edge computing, etc.

In 2023, TSMC continued to work closely with world-class research institutes such as the Semiconductor Research Corporation (U.S.), Interuniversity Microelectronics Centre (Belgium), and expanded its research collaboration with world-leading universities to achieve advances in semiconductor technologies and talent cultivation for the next generation.

Continuous Investment in R&D



TSMC's global Research Development Center

Technology Leadership and Innovation

CMOS Logic Technologies

2021

- Pioneered the industry's first 3nm technology in risk production

2022

- Pioneered the industry's first 3nm process technology in high volume production
- N3E, the enhanced 3nm technology, successfully entered risk production

2023

- Pioneered the industry's first enhanced 3nm process technology, N3E, in volume production

Specialty Technologies/ Interconnect and Packaging Technologies

2021

- Qualified the fifth-generation chip on wafer on substrate (CoWoS®) with record-breaking Si interposer area up to 2,500 mm2, which can accommodate at least two SoC logic and eight high bandwidth memory (HBM) chiplet stacks
- Successfully qualified InFO-PoP Gen-7 for mobile applications with enhanced thermal performance
- Initiated high-volume manufacturing of InFO-oS Gen-3, which provides more chip partition integration with larger package size and higher bandwidth
- Expanded the 12-inch Bipolar-CMOS-DMOS (BCD) technology portfolio on 90nm, 55nm, 40nm, and 22nm processes, targeting diverse mobile power management applications with different integration levels
- Achieved 13% pixel size scaling down on Quad Phase Detection (QPD) CMOS image sensors structure for the mobile imaging market
- 28nm and 40nm RRAM entered volume production as a low-cost solution for the price-sensitive IoT market
- Maintained stable high yield and achieved technical qualification of 28nm eFlash for consumer electronics grade and automobile electronics grade-1 applications

2022

- Received CoWoS®-S certification for Gen-3 HBM, silicon interposer now contains sub-micron routing layers and integrated capacitors (iCap) so that various chiplets such as SoC, HBM can be placed on it
- Successfully qualified InFO-PoP Gen-8 for mobile applications with enhanced thermal performance; launched R&D for next generation InFO PoP, which will introduce backside redistribution layer
- Successfully qualified InFO-oS Gen-4, which provides more chip partition integration with larger package size and higher bandwidth
- Optimized quality factors of 5V components on 55nm BCD targeting power switches for portable devices; continued to expand 40nm, 22nm, and 0.13 micron BCD technologies to meet automotive market demands
- Successfully risk-produced the world's smallest voltage domain global shutter CMOS image sensor chip with 3-wafer stack technology for near infrared and security cameras market
- Prepared 22nm RRAM for volume production as a low-cost embedded non-volatile memories solution for price-sensitive IoT markets
- 28nm eFlash entered volume production, which can support mobile HPC and high-performance low-leakage platforms

2023

- Received the CoWoS®-S certification for the 3.3x sized mask layer silicon substrate, which can integrate multiple SoCs and Gen-3 HBM and possesses the Gen-2 deep trench capacitor (DTC), to prepare for the production of HPC products of customers
- Successfully integrated multiple heterogeneous SoC and package stacking of the integrated fan-out multi-chips with package-on-package (InFO-M-PoP) and had mass production in wearable device-related products
- InFO-oS Gen-5 passed the certification, which provides more chip partition integration with a larger package size and higher bandwidth
- Expanded 0.13 micron and 90nm BCD technologies to meet automotive market demands; 0.13 micron 45V components have entered the stage of reliability certification. 55nm BCD was successfully introduced for mass production and further provided diverse components for high-performance and low-power consumption mobile devices
- Pioneered the risk production of lateral overflow integration capacitor (LOFIC) image sensor technology, which has a high dynamic range that can be applied to customers' image sensing of high-end mobile phones and advanced driving assistance system
- Began volume production of 22nm RRAM as a low-cost embedded non-volatile memories solution for price-sensitive IoT markets

Technology Leadership and Innovation in 2023

Semiconductor technology innovation profoundly impacts various aspects of human life. Applications like 5G mobile communication and HPC enhance convenience and quality of life. The sustainable application of semiconductor technology also contributes to energy efficiency in end products, leading technology and civilization toward a low-carbon sustainable future.

Process Technology	Product Application	Innovation/Breakthrough	Customer Success
3nm Fin Field-Effect Transistor (FinFET) (N3) technology	5G, HPC	Entered its second year of volume production	Led the industry to deliver most advanced products
3nm FinFET Enhanced (N3E) technology	5G, HPC	Started volume production	Led the industry to deliver the most advanced products
3nm FinFET Plus (N3P) technology	5G, HPC	Industry's most advanced and mature FinFET transistor technology	Led the industry to deliver the most advanced products
4nm FinFET Plus (N4P) technology	5G, HPC	Started volume production	Introduced products with industry-leading performance and energy efficiency
12nm FinFET Compact Plus (12FFC+) N12e™	Ultra-low power Internet of Things (IoT)	Compared to its previous generation of N22 technology, the innovative N12e™ technology can achieve >50% power saving	Led the industry to deliver the most advanced products
5nm FinFET Automotive (N5A) technology	Automotive	Led the industry with 5nm logic technology, offering Automotive Grade Reliability and an Automotive Design Enablement Platform	Enabled customers to develop the industry's most advanced ADAS SoC (System-on-Chip)
N6 radio frequency (N6 RF) technology	5G, True wireless stereo (TWS), Wi-Fi 7 connectivity/Digital TV/Set-Top Box (STB), Wearable devices	Received multiple customer product tape-outs	Introduced products with industry-leading RF performance and cost-effectiveness
16nm FinFET Compact (N16FFC) MRAM (Magnetoresistive Random-access Memory) Technology	New automotive zonal control of electrical/electronic architecture (EEA) for software-defined vehicles, High-end industrial controllers	Passed AEC-Q100 Grade-1 reliability qualification	Introduced industry-leading high-performance microcontroller unit (MCU) for automotive and industrial applications
CMOS Image Sensor (CIS) technology	Automotive	Continued to help customers gain market leadership by introducing the world's smallest pixel size products	Led the industry to deliver advanced products with the world's highest dynamic range in performance
TSMC-SoIC® (System on Integrated Chip) Chip-on-Wafer (CoW) technology and CoWoS®-S integration	HPC	Led the industry to integrate 3D Si stacking (SoIC) and CoWoS®-S into a single, compact new system chip with improved performance significantly	Led the industry in product performance and energy efficiency
Chip on Wafer on Substrate with Redistribution Layer Interposer, CoWoS®-R technology	HPC	Led the industry to start volume production of HPC products with better signal integrity	Led the industry to deliver advanced products

5G 5G mobile communications | HPC | Ultra-low power Internet of Things (IoT) | Automotive | True wireless stereo (TWS) | Wi-Fi 7 connectivity/Digital TV/Set-Top Box (STB) | Wearable devices | New automotive zonal control of electrical/electronic architecture (EEA) for software-defined vehicles | High-end industrial controllers

Advance Technology to Unleash Customer Innovation

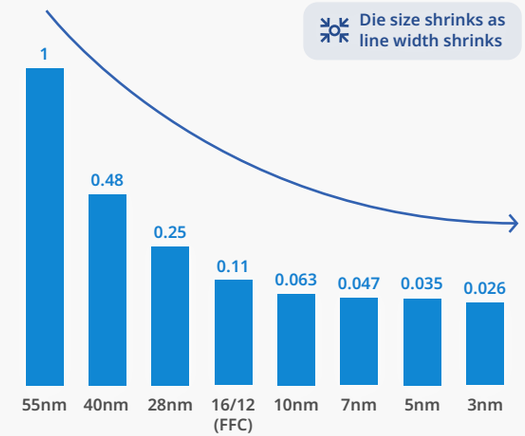
Innovation is the foundation for TSMC's growth. The power brought by innovation not only drives the Company to maintain its leading position in technology, but also innovative breakthroughs in various industries, thereby solving the challenges of human society and technological and societal advancements. As the trusted semiconductor foundry service provider, TSMC is committed to technology leadership by continuously introducing new generation process technologies with higher chip density and lower power consumption, and providing diverse and comprehensive specialty technologies, as well as 3D chip stacking and packaging services to realize a wide spectrum of chip innovations. In 2023, TSMC deployed 288 distinct process technologies and manufactured over 11,890 products for 528 customers, creating more advanced, powerful, energy-efficient, and affordable electronic products that drive modern society's progress. In 2023, TSMC invited 48 emerging customers to participate in the Innovation Zone at its Technology Symposium, showcasing their innovative technologies and products that will help improve future human life, including power-efficient AI chipsets, automotive controllers, gallium nitride (GaN) power modules, energy-harvesting controllers, and medical sensors. The attendee-voted Demo of the Year Award expanded from North America to Europe for the first time, fueling the world with endless innovation momentum.

Leading RFID Tag Chips to Advance a Smarter, More Sustainable World

In 2023, TSMC continued to empower its customers with innovation. Partnering with Impinj, TSMC utilized its leading 65-nanometer process technology to assist in delivering the next-generation Impinj M800 series RAIN RFID tag chips, which successfully entered the global IoT market. The new Impinj M800 series tag chips have excellent features such as high readability and low power consumption, which help to reduce the size and environmental impact of RAIN RFID tags attached to everyday items. Compared to the previous generation Impinj M700 series, the M800 series increases the number of dice per wafer by 25%, while reducing energy consumption by 30%, thereby reducing the carbon footprint of Impinj products and creating a smarter and more sustainable world through everyday items such as food packaging, car parts, and parcels and postal items that use RAIN RFID technology.

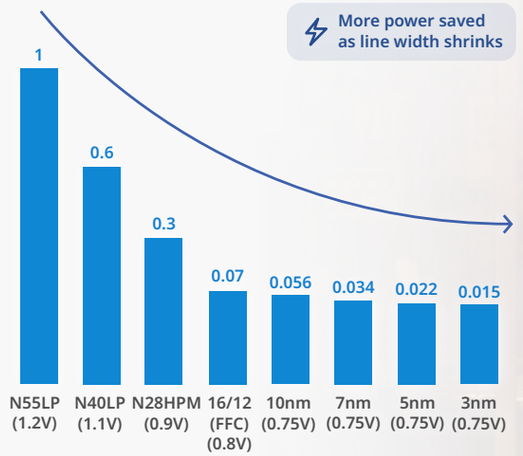
Impinj's innovative tag chips can be used to track medical supplies and equipment, ensuring that critical healthcare assets are in the right place at the right time and their priority delivery; for example, during the COVID-19 pandemic, Impinj tag chips helped hospitals accurately track and trace medical devices and pharmaceuticals such as vaccines, pills, vials, and syringes, and provide information on dosage, expiration date, and recall, which highlights the value that technology can bring to society. In addition, Impinj tag chips also create a positive impact on environmental sustainability. Taking applications in the food industry as an example, the use of Impinj M800 series tag chips can help improve inventory accuracy and avoid the overproduction or overstocking of perishable goods such as food. For the apparel industry, Impinj tag chips attached to products can help track and trace each stage of the product life cycle, reducing carbon emissions and facilitating circular economy. With the launch of the new-generation RAIN RFID technology, it will further improve supply chain logistics efficiency, help save transportation costs and cut carbon emissions, and drive supply chain upgrades and sustainable development.

Comparison of Chip Die Size on Different Technologies



Note: The logic chip/SRAM/IO (input/output) ratio, whcih affect die size and power consumption, was re-aligned

Comparison of Chip Total Power Consumption on Different Technologies



Note: The logic chip/SRAM/IO (input/output) ratio, whcih affect die size and power consumption, was re-aligned

TSMC Works with Customers to Unleash Innovation

Impinj M800 series RAIN RFID tag chips attach to items, providing a unique identifier and enabling readers to determine the item's identity, location, and authenticity (Photo courtesy of Impinj)

Customer Product
Impinj M800 series RAIN RFID tag chips (M830 and M850)

Product Innovation & Breakthrough

- 30% lower power consumption over Impinj M700 series tag chips
- Improved tag readability
- Energy harvest using electromagnetic waves
- 25% more die per wafer over Impinj M700 series tag chips
- Tighter radio-frequency stability
- Wider tuning range

TSMC's Role

- Provide industry-leading 65nm process technology to deliver optimal performance and power benefits
- Establish a dedicated team to provide customized technology to improve product reliability and reduce unit cost

Impact on Society

Optimizes logistics management and achieve efficient operations via low-power, real-time tracking tag reading to create a win-win for both the environment and society

Protect Intellectual Property

In response to the global development strategy, to fulfill TSMC's vision of sustainable operations, the Company seeks to strengthen its three competitive advantages—Technology Leadership, Manufacturing Excellence, and Customer Trust - by protecting technological innovations and proprietary information through two approaches: patents and trade secrets. TSMC's IP and R&D teams enable TSMC to build an IP portfolio for each generation's critical innovation ahead of schedule, including the latest 3nm and 2nm process technologies, to ensure the Company's technology leadership in the semiconductor industry using intellection property assets. In manufacturing excellence, TSMC applies measures to secure critical information such as capacity planning, manufacturing process management, and information related to intelligent operations in the form of trade secrets while also actively applying for patents for manufacturing technology with strategic value to enhance the Company's competitive edge. In maintaining customer trust, TSMC maintains strategic leadership in the global patent ranking while protecting confidential information concerning the Company and its customers. These efforts translate into business success, ensuring the freedom of operations around the world and strengthening partnerships with customers.

TSMC Patent History

Groundwork Era

- Formulated patent application management standards and procedures

Growth Era

- Optimized the patent management with a digital management system
- Promulgated incentives to encourage innovative patent output
- Provided on-site trainings to advocate awareness of IP protection

Exponential Growth Era

- Aligned patent goals with R&D investment and set patent output targets based on the technology roadmap
- Expanded patent family and built a strategic global IP portfolio
- Established a comprehensive patent management mechanism
- Upgraded the patent management system with AI for entire prosecution cycle
- Created IP promotions and multiple awards for the annual ceremony

Patent Applications	>8,700	global patent applications
	2nd	place among U.S. patent applicants
	1st	place among Taiwan patent applicants for eight consecutive years
Patents Granted	>6,000	worldwide patents granted and the only Taiwanese company in the U.S. top 100
	3rd	place among U.S. patentees
	1st	place among Taiwan patentees for four consecutive years
Patent Quality	100%	U.S. patent allowance rate near 100% and ranked 1st among top 10 patentees

1987 – 1st U.S. patent application filed in 1987 approved in the following year

1998 – The number of U.S. patent applications in a single year exceeded 500 in 1998

2011 – The number of U.S. patent applications in a single year broke through exceeded 1,000 in 2011; TSMC entered the top 50 U.S. patent application/grant rankings

2015 – Ranked first in the semiconductor manufacturing group for IEEE's Patent Power Scorecard 2015

2016 – TSMC entered the top 10 U.S. patent grant ranking

2019 – The number of U.S. patent applications in a single year exceeded 3,000; TSMC entered the top10 U.S. patent application ranking

2021 – The first company to receive the highest certification of Taiwan Intellectual Property Management System (TIPS) certification (AAA)

2022 – TSMC entered the top 10 U.S. patent application and ranked No.2 for two consecutive years; TSMC entered the top 10 U.S. patent grant and ranked No.3 for two consecutive years; Listed in the Clarivate Global Top 100 Innovators and LexisNexis Global Top 100 Innovation Momentum for three consecutive years

2023

Process Advances

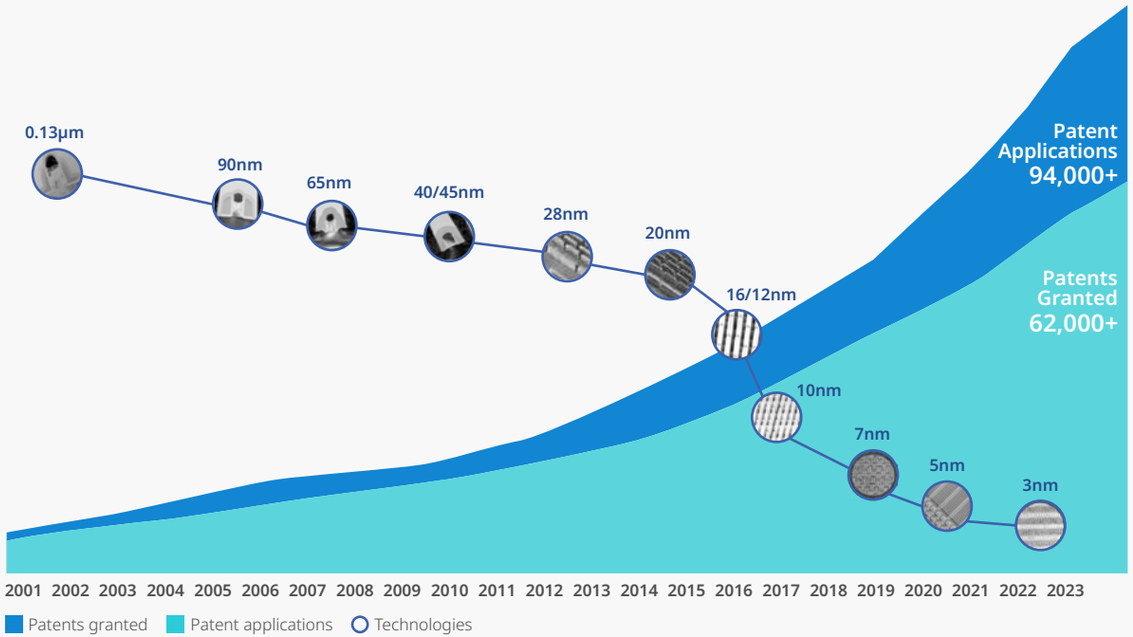
3-micron | 0.18-micron | 0.13-micron | 90nm | 65nm | 40/45nm | 28nm | 20nm | 16/12nm | 10nm | 7nm | 5nm | 3nm

Comprehensive Patent Management Mechanism

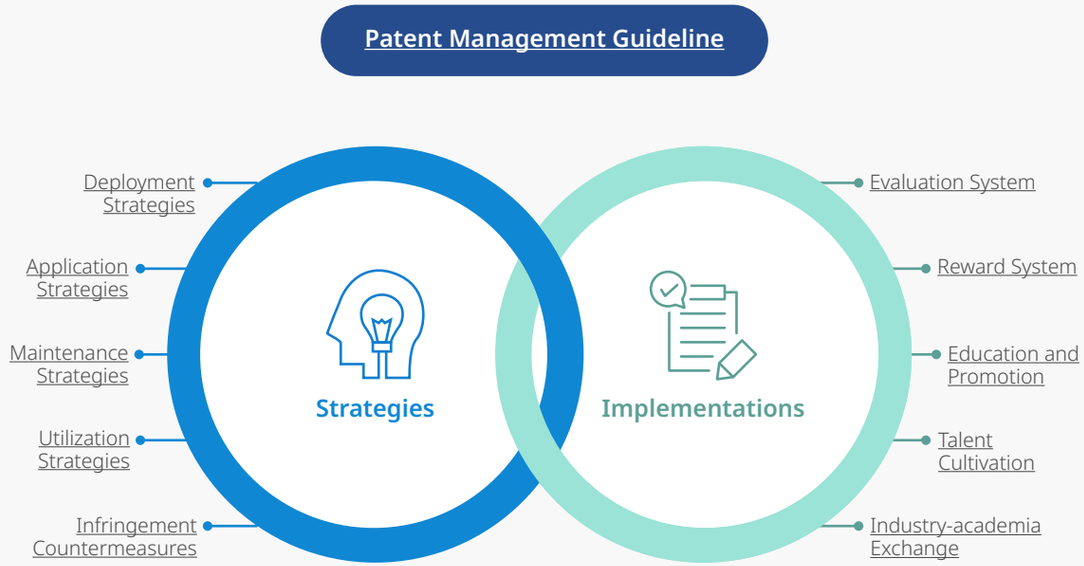
TSMC achieved the IP management goals by adopting four major IP management policies to implement its patent strategy and protection through the comprehensive patent management system, including the full patent strategy and patent management systems, and maps out short-, mid-, and long-term patent blueprints using innovative patent strategies and diverse risk control; meanwhile, it monitors and evaluates competitive information by patent map navigation, hosts advanced invention workshops to uncover innovations in core technologies, and makes arrangements for emerging key technology proposals with strategic values in advance. Furthermore, TSMC expands the patent family by targeting key technologies, manages patent prosecutions by invention tiers, and sets patent filing goals based on annual R&D investments. TSMC's average patent/RD spend productivity from 2020 to 2022 was 1; that is, one U.S. patent application was produced by every US$1 million of R&D investments, with a performance more favorable than the industry. The patent team has also designed a range of incentive systems, including awards for patent invention submission and an annual IP award ceremony. The Prolific Inventor Award recognizes employees who have received over 100 U.S. patents during their employment at TSMC. As of 2023, there have been 160 Prolific Inventor Award recipients, one of whom holds over 1,600 U.S. patents. A total of 594 U.S. patents have been issued from 434 employee inventors who received the New Inventor Award in 2023. In 2023, the patent team also launched a series of patent campaigns, including the Annual Patent Competition, from 1,772 invention submissions; 102 on-site education and training sessions to help employees ideate valuable patents; and the Online Patent Quiz, which saw the participation of around 2,200 employees.

In addition, TSMC continues to promote industry technology and IP upgrades and has been invited to attend the annual technology forum organized by the US Patent Office for ten consecutive years to give speeches on advanced semiconductor technologies and assist patent examiners in grasping patent technologies to strength the review quality and efficiency. Meanwhile, it also directed the IP strategy alliances for the industry's supply chain. TSMC also helps formulate and amend IP laws and provides suggestions on industry policies to help create a robust patent protection landscape.

Exploratory R&D Patent Applications



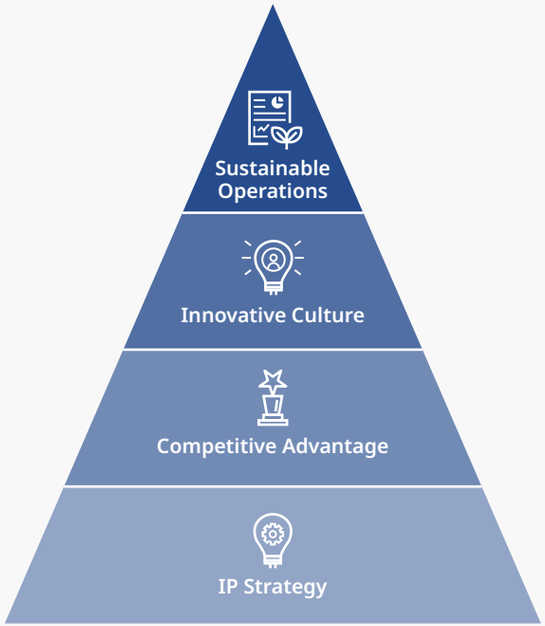
TSMC Patent Management Mechanism



Trade Secret

Trade secrets are technology or business innovations that contribute to the enhancement of corporate competitive strength that should be kept confidential. Driven by its four visions - IP Strategy, Competitive Advantage, Innovative Culture, and Sustainable Operations - TSMC adopts the registration and incentive systems to further improve its corporate operation and IP innovations. TSMC's trade secrets have been evolving with the times, with more than 340,000 trade secrets registered cumulatively as of 2023. TSMC also launched the Trade Secret Intelligent Management Version 2.0 – Innovation Talent Scouting Online Merge Offline Service (ITS OMO) to actively cultivate outstanding talents of trade secrets and inspire technical and sustainable innovations.

TSMC's Vision of Trade Secret Management Innovation



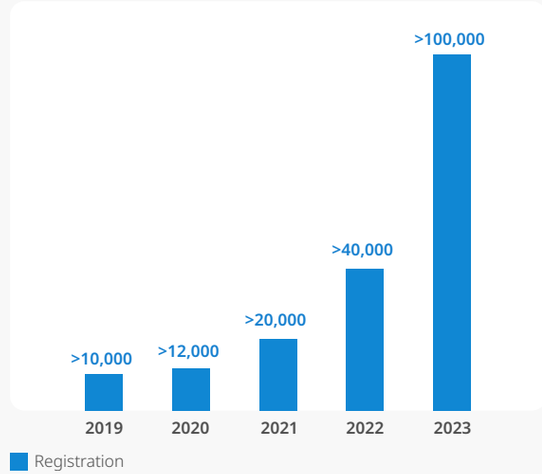
Trade Secret Awards Motivate Employees' Innovations

From 2013 to the end of 2023, 348,503 trade secrets were registered with TSMC cumulatively, and over 38,000 participating employees participated in the registrations. In 2023, the total number of trade secret registrations in a single year exceeded 100,000 cases for the first time, demonstrating incredible innovation capacity and potential. To recognize such fruitful registration achievements, TSMC presented Annual Golden Trade Secret Award to encourage outstanding inventions and innovations. As of 2023, a total of 2,738 Golden Trade Secret Awards were granted to 6,762 employees. In 2023, the "Best Contribution Award for Trade Secret Growth" and "Best Contribution Award for Trade Secret Proliferation" were specially presented to vice presidents to recognize their outstanding performance in their leadership of the R&D and manufacturing teams. Meanwhile, TSMC awarded the "Trade Secret Intelligent Management Version 2.0 Project Best Partner Award" to the IT director and fab director for their contributions in developing innovative talent and elevating the quality and quantity of trade secret registrations.

Green Intellectual Properties Creates Co-prosperity with the Industry and the Environment

Green manufacturing is a bedrock for TSMC's sustainable operations. Through the promotion of a dedicated "Green Trade Secret Registration Section," TSMC encourages employees to develop more trade secrets that advance environmental protection technologies related to Climate and Energy, Water Stewardship, Circular Resources, and Air Pollution Control. In 2023, there were a total of 633 green trade secret registrations. The registrants were employees from not only facility organizations responsible for energy and water conservation but also from R&D and manufacturing departments, a rich and diverse assortment of green trade secrets. To provide incentives for green innovations, TSMC launched the "Green Trade Secret Award" and awarded 13 awards to a total of 62 employees in 2023; by recognizing employees' innovation achievements, TSMC hopes that the green innovative culture continues to be deeply rooted in TSMC's daily operations.

Trade Secret Registrations in Past Years

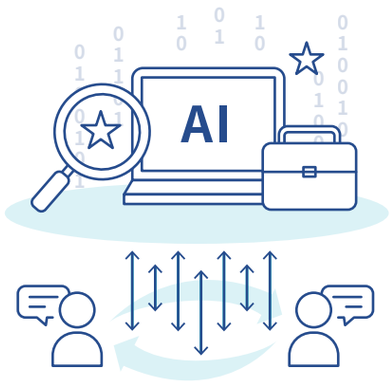


Trade Secret Milestones

Case Study

Trade Secret Intelligent Management Version 2.0 Innovation for Talent Development

To develop prospective talent and enhance the innovative quality and quantity of our trade secrets, TSMC launched the Trade Secret Intelligent Management Version 2.0: Innovation Talent Scouting Online Merge Offline Service (ITS OMO) in 2023. TSMC successfully piloted the program in Fab 12B, Fab 15A, and Fab 15B. Eighteen inventors with innovative potential, selected by a talent scouting artificial intelligence (A.I.) system, received one-on-one mentorship from six colleagues with multiple Golden Trade Secret Awards serving as "Golden Coaches." In the future, the service will be implemented in other departments and fabs selected based on the system's analysis, and TSMC expects to develop 100 inventors with innovative potential annually. In addition, TSMC continues to develop its "Trade Secret Intelligent Management Strategy Center" to inspire innovations and implement intelligent management for trade secrets, so the targets of benefit generation and fraud prevention can be achieved.



Online

A.I. Talent scouting system

Analyze and identify departments with innovative potential and prospective inventors who have not received the Golden Trade Secret Award based on the trade secret registration innovation indices and inventor innovative indices

Offline

One-on-one exclusive mentorship

Select colleagues who have received multiple Golden Trade Secret Awards to be Golden Coaches to provide one-on-one mentorship for prospective inventors based on the registrations to improve innovation capacity

"

The one-on-one mentorship provided by Coaches to inventors created more diverse innovation thinking, allowed the consideration of solutions from different perspectives, and further increased the scope of contributions, optimizing the content of the registered trade secrets.

Chi-Yang Lin
potential inventor of the pilot project

Intelligent Precision Manufacturing

Intelligent precision manufacturing is the core of TSMC to realize manufacturing excellence. TSMC deployed the Global Manufacturing and Management Platform to ensure the implementation of four major strategies: Global One-fab Manufacturing, Machine Learning-based Process Control, Manufacturing Agility and Quality, and Maximum Productivity. By doing so, it ensures consistent operating efficiency and product quality and becomes a reliable technology and production capacity provider in the global semiconductor industry in the mid-to-long-term. In response to the global deployment of TSMC and challenges arising from global climate change and energy consumption, in 2023, TSMC further enhanced the operation of Precise Process Control, Consistent Manufacturing, and Optimize People Efficiency to continue injecting growing momentum for intelligence production.

For Machine Learning-based Process Control, TSMC continued to reinforce the process capacity of its advance packaging fabs. Comprehensive production history is available for inquiries and failure analysis from wafers to dies in the backend packaging process, and intelligence detection, intelligence diagnosis, self-feedback, and other system functions are established to minimize human error to realize precision process control. For Manufacturing Agility and Quality, it introduced a new tool testing platform and improved the testing efficiency of over 2,800 new tools in the 3nm process. Meanwhile, simultaneously comparing over thirty quality defense systems, TSMC set the same tool parameters and quality specifications for control to ensure the consistent setting and tool performance, which enhanced operating efficiency and improved the cycle timetable for new tools to be put into mass production. For Global One-fab Manufacturing, TSMC deployed the cross-sector Global Manufacturing and Management Platform that is beneficial for communication and cooperation to complete the 32 intelligence system development of the fab process, covering fabs in Taiwan and abroad, which effectively increased productivity.

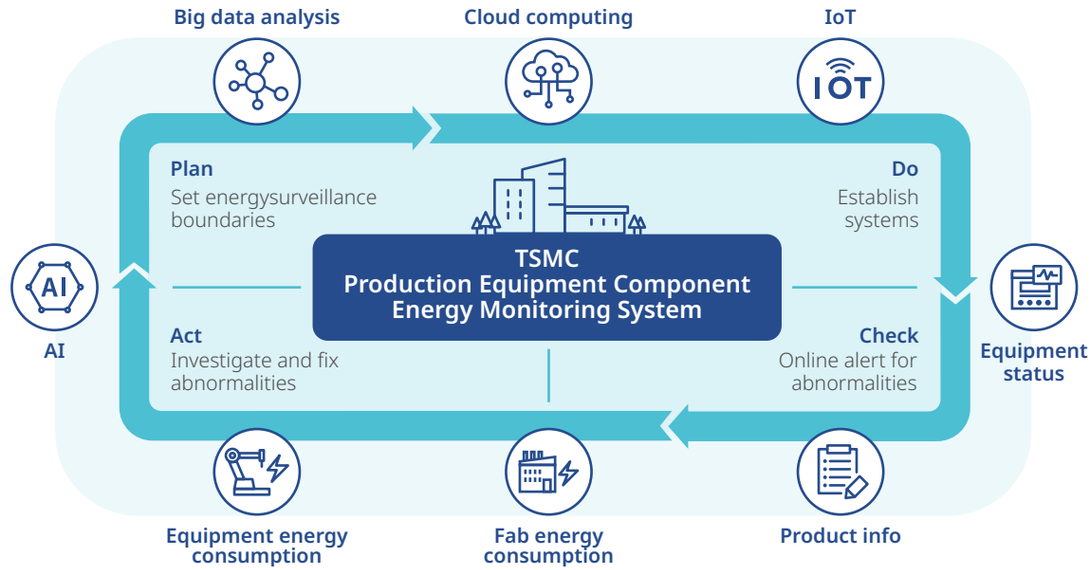
Comprehensive production history of wafer-to-die

12" GIGAFAB® - Manufacturing Excellence

Case Study

Precision Monitors the Power Consumption of Production Equipment Components to Save 0.94 Million kWh

To improve the energy efficiency of production equipment components, TSMC build its Production Equipment Component Energy Monitoring System in 2023. It utilized IoT technologies to integrate cross-sector information for a platform of transparent information. The system analyzes and calculates the efficiency indicators by adopting Big Data for cross-tool and cross-unit power consumption details to identify whether the tools have circumstances such as an increase in power consumption or poor power conversion rate due to aging, effectively grasping power efficiency and changes in trends. It is also capable of calculating the energy-saving benefits for tool repair and maintenance and component improvements. EUVs, the most advanced semiconductor Lithography (LIT) tool, for example, the equipment department completed the acceptance of four component improvement plans through the Production Equipment Component Energy Monitoring System in 2023, which passed the energy-saving management plan certification under the Total ESH Management of TSMC, saving a total of 0.94 million kWh of power. In the future, the Production Equipment Component Energy Monitoring System will continue to be introduced to global fabs to implement green manufacturing.



Open Innovation Platform

In today's rapidly evolving global technology landscape, Artificial Intelligence (AI), High Performance Computing (HPC), Autonomous Driving, and Mobile Devices are major areas continuously driving the advances of semiconductor industry, influencing people's perception, affecting usage models in computing as well as its potential new applications. TSMC has been enabling innovation through its Open Innovation Platform® (OIP) that encompasses Electronic Design Automation (EDA) alliance, Intellectual Property (IP) alliance, Design Center Alliance (DCA), Cloud Alliance, Value Chain Alliance (VCA) and 3DFabric™ Alliance. The Company collaborates closely with all OIP partners, integrating the cross-industry expertise, accelerating the creation of innovated solutions to meet the customer's technical requirements. As a result, these partnerships have facilitated to realize differentiated new values that are brought by their implementation of products & services.

TSMC hosted the OIP Ecosystem Forum in 2023, celebrating 15 years of collaboration and innovation with OIP partners. As the industry shifts toward embracing 3D IC and system-level innovation, the need for industry-wide collaboration has become even more essential. Since the inception of OIP, TSMC has establised an entirely new paradigm of collaboration. Through the development of Design Technology Co-Optimization (DTCO), we jointly deliver solutions with OIP partners, bringing together the creative thinking of customers and alliance partners to lower design challenges and accelerate product design turnaround time to the market in the face of ever-increasing demands and semiconductor design complexity. Along with the advancement of silicon process technology, TSMC has been actively improving power, performance, and area (PPA) in customer chip level products. OIP ecosystem is also expanding its scope to memory, substrate, testing, manufacturing, and packaging integration,enabling a broader range of collaboration model towards System Technology Co-Optimization (STCO) for elevating customers' products performance and power efficiency.

TSMC's OIP ecosystem has been making continuous improvement over the past 15 years with over 110 partners across six alliances to help customers navigate design challenges in leading-edge logic processes, advanced 3D IC chip stacking solutions, and specialty technologies such as analog, RF (radio frequency), and silicon photonics. As of 2023, TSMC's IP Alliance has grown from 25 partners to 39. Those partners have been working closely together to expand libraries and silicon IP portfolio from 1,500 to more than 73,000 IP titles, supporting a wide range of design applications. The same applies to the EDA alliance with more than 48,000 technology files and over 3,400 process design kits from 0.5 micron to 2 nanometer. Together with certified EDA tools & features, these deliverables help to timely support customer's latest innovation in semiconductor designs.

Furthermore, TSMC hosted three 3DFabric Alliance Workshops in 2023 at domestic and overseas locations to share 3DFabric technology applications and the 3Dblox Standard to enhance design efficiency, discuss 3D IC design challenges and ways alliance partners can collaborate to address them by developing solutions to improve system level design productivity. Through the accomplishments achieved by the OIP partnership, helping TSMC's customers to overcome technological obstacles and create innovative products that have fostered the relentless growth of the global technology trend.

TSMC's Six OIP Alliances

TSMC brings together the creative thinking of customers and partners across the diverse OIP alliances, with the goal of reducing design barriers and improving first-time silicon success, minimizing design cycle time, accelerating time-to-market, and shortening time-to-volume and time-to-revenue.

2023 Major Achievements of TSMC's Six OIP Alliances

IP Alliance

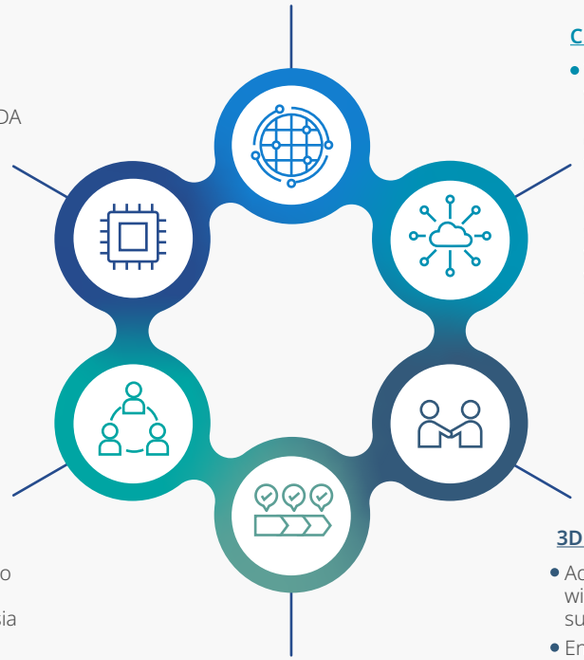
- Enabled IP partners to build up N3E and N3P IP to strengthen TSMC's IP portfolio
- Added additional IP Alliance members in analog IP and foundation IP
- Enabled a 3DFabric test chip process for IP partners to validate their 3D IC IP

EDA Alliance

- Released six Design Reference Flows through collaborations with major EDA Alliance partners
- Certified EDA tools for the following technologies: N2, N3E, N3P and 3DFabric

Cloud Alliance

- The first time to collaborate with two Cloud Alliance members to utilize Cloud's dedicated HPC infrastructure to effectively accelerate the physical analysis of mechanical stress and simulations on multiple chips without sacrificing accuracy, while ensuring high-quality 3D IC designs



Design Center Alliance

- Added three new partners to expand design service support for customers in Asia and European regions

3DFabric™ Alliance

- Added three new partners with expertise in EDA, IP, and substrate for collaboration
- Enhanced 3Dblox features to support system prototyping and design reuse

Value Chain Alliance

- Flexible ASIC (Application Specific Integrated Circuit) Service model from design-in to mass production, enable 900+ fabless customers, system customers and 3D Fabric business
- Enable customer adoption in advanced technology by the first N3 CoWoS test chip

Comprehensive Ecosystem Design Solutions

At the 2023 TSMC Technology Symposium and OIP Ecosystem Forum events, a set of design solutions was unveiled jointly with OIP alliance partners, to address the market demands for mobile, high-performance computing (HPC), automotive and IoT applications. To recognize the outstanding support and collaborative achievements of TSMC's OIP ecosystem partners, the Company granted 15 awards to EDA partners, six awards to IP partners, one award to Cloud partner, and one award to 3DFabric Alliance partner. The respective awards were granted for their contributions to accelerating semiconductor innovation according to specific collaboration areas in 2023.

Advanced Technology

- Comprehensive 3nm family offers N3E, N3P and N3X with improvements in both speed and density
- Major N3E & N3P EDA tools are certified, and IPs are ready for customer's adoption
- N3AE (Auto Early) leverages N5A design rule and learning, with pull-in schedule to enable early automotive design start
- N2 nanosheet technology offers full-node performance and power benefits with major EDA tools and foundation IPs are ready for design start

Analog Cell

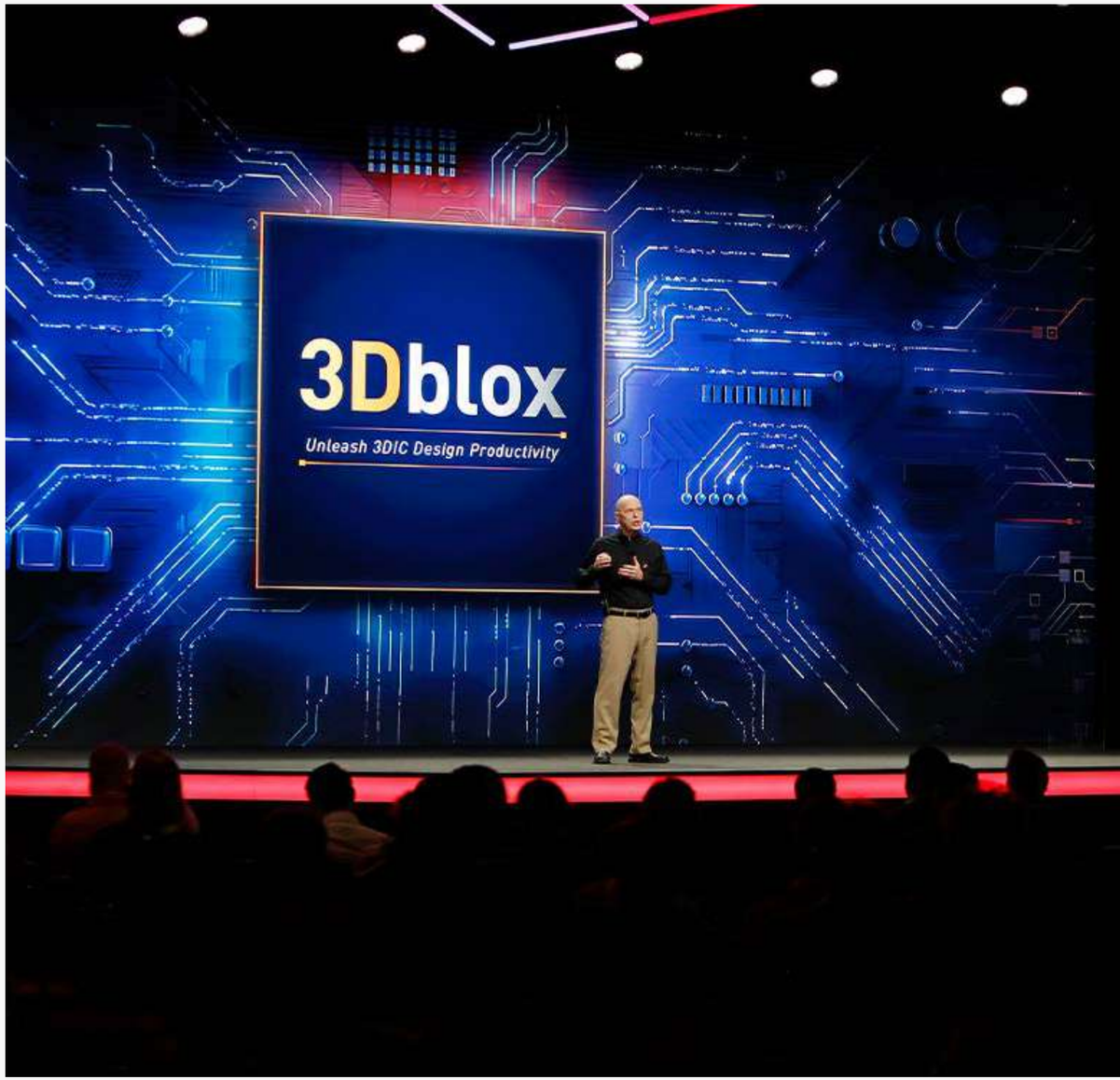
- Analog cell with structured layout and better yield that boosts analog design productivity
- Parameterized cells are offered with flexible transistors to facilitate migration and improve productivity
- Full analog migration coverage from N40 to N2 will be enabled
- EDA tools are ready to support analog migration

3DFabric™ Alliance

- Collaborates with new partners to lower 3DIC design barrier and accelerate adoption of ecosystem solutions
- Facilitates multi-way collaboration among partners in design enablement and productivity improvement

3Dblox Standard

- New EDA 3D IC integration hubs comprehend 3DFabricTM and 3Dblox Standard design language to execute die and package implementation and multi-physics analysis
- EDA tools are ready to support 3Dblox Standard
- TSMC 3DFabric™ Kit includes design flows, technology files and documentation that supports designs for 3DFabric™ technologies of CoWoS®, InFO, and TSMC-SoIC®



2023 TSMC OIP Ecosystem Forum

Enhance Industry-academia Collaboration

The semiconductor industry in Taiwan represents a crucial position in the global semiconductor supply chain, leveraging its comprehensive industry value chain and leading wafer manufacturing technologies. Facing international competition and increasingly complicated process development, the industry has increased the demand and expectations for finding the right talents. Talent development is a part of the five TSMC ESG directions, and TSMC has been diligently working on long-term campus collaboration programs based on three areas - Course Collaboration, Industry-academia Collaboration, and Career Guidance – to develop semiconductor talent.

Course Collaboration refers to the collaboration between TSMC and multiple universities and high schools for semiconductor-related courses, including Semiconductor Curriculum Programs, the Academic Design Foster Package (ADFP) for FinFET, Campus Information Cultivation Project, and TSMC High School Semiconductor Mini Courses to provide students with semiconductor knowledge close to the industry and implement the connection between learning and applying.

Industry-academia Collaboration includes the University Research Center, Industry-academia Joint Development Project, TSMC University Shuttle Program, National Academy for Key Fields of Research, and multiple projects to work with the industry and academic sectors in jointly developing future talent.

TSMC's Career Guidance covers the Elite Camp, TSMC Ph.D. Scholarship, TSMC Girls in STEM Program for High School, and Operations Equipment Star Program. The Company hopes to give students further insight into the future trends and development of the semiconductor industry through a wide range of events to broaden their horizons and improve their interest in investing in the semiconductor field and, in turn, improve the key talent traits and R&D capacity of the semiconductor industry in Taiwan.

TSMC University Collaboration Programs

Course Collaboration

Semiconductor Curriculum Programs

In 2019, TSMC worked with domestic universities to launch Semiconductor Curriculum Programs. Six majors are offered, including components/integration, processes/modules, equipment engineering, advanced packaging, intelligent manufacturing, and advanced circuit design, which define professional knowledge and capacity for semiconductor talents and the blueprint of programs

FinFET Academic Design Foster Package (ADFP)

In 2022, TSMC launched the ADFP for the N16 process to assist universities in upgrading their advanced circuit design education and bridge the gap between job skills and education

Campus Information Cultivation Project

In 2020, TSMC promoted comprehensive digital transformation. The Company worked with schools to develop information education and attract excellent students to join the digital transformation of semiconductor manufacturing, creating its talent ecology system

TSMC High School Semiconductor Mini Courses

Starting out from the perspective of popular science education, TSMC launched the Semiconductor in Our Life in 2022 by adopting a blended learning model to help students better understand the importance of semiconductors in daily life and in technological development

Industry-academia Collaboration

University Research Center

In 2013, TSMC collaborated with four Taiwan national universities in establishing the University Research Center to encourage university professors and students to come up with innovative semiconductor research projects and commit to developing advanced technologies, actively cultivating semiconductor research talent

Industry-academia Joint Development Project

In 2005, TSMC launched the Industry-academia Joint Development Project to encourage professors to conduct research on advanced semiconductor technologies and provide opportunities for students to participate and learn from practical experiences and, in turn, join the semiconductor industry

University Shuttle Program

Provide a physical chip validation platform to assist university faculties and students worldwide in transforming IC designs into physical chips free of charge and validate designs, applications, and terminal performances

National Academy for Key Fields of Research

In 2022, TSMC took on a greater role in supporting six universities in Taiwan to establish their own National Academy for Key Fields of Research and continued to provide funding to support cutting-edge research and talent cultivation for the semiconductor industry

Career Guidance

Elite Camp

In 2011, TSMC started to organize the Elite Camp to improve students' understanding of the importance of the semiconductor industry, create an open platform to facilitate the interaction between the academic sector and the industry sector and encourage student participants to work in the doctoral-degree research in the semiconductor field

TSMC Ph.D. Scholarship

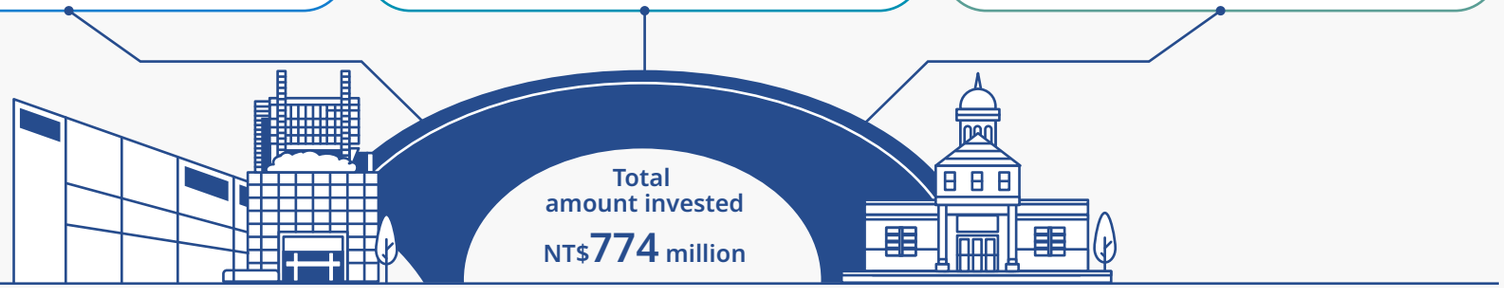
TSMC launched a Ph.D. Scholarship in 2020 as an incentive for elite students to pursue doctoral degrees in scientific specialties related to the field of semiconductors to continue promoting the development of advanced technology and manufacturing excellence

TSMC Girls in STEM Program for High School

In 2020, TSMC hosted the TSMC Journeys of Female Scientist Lectures and held career lectures titled Lean in and Achieve a Better Version of Yourself to allow female students to learn the challenges and fun in the science field to serve as the backup forces of the semiconductor industry

Operations Equipment Star Program

Operations Equipment Star Program launched by the Facility and Human Resources Organizations won the recognition of AMAZING IDEAS under the TSMC ESG AWARD in 2022, and the project was initiated in 2023 to help students in vocational high schools understand the practical knowledge and skills for semiconductor equipment field



Course Collaboration

Semiconductor Curriculum Programs

TSMC worked with Taiwan domestic universities to launch Semiconductor Curriculum Programs to build a solid foundation of scientific principles. In 2023, National Chung Cheng University, Fengchia University, Yuan Ze University, and Chung Yuan Christian University were added as TSMC's partners. There was a total of 13 schools that work with the Company for up to 44 cooperating programs, and over 6,300 students have enrolled in those programs. TSMC also worked with eight universities and assigned the Company executives to teach two courses at those schools, Semiconductor Technology – Process & Equipment and Semiconductor Intelligent Manufacturing Systems, providing students insight into the latest knowledge and practice. There were over 950 students enrolled in 2023. TSMC has made internal training resources available to students enrolled in TSMC Semiconductor Curriculum Programs at various universities and students can visit the TSMC Newcomer Training Center to study. In 2023, the Company also expanded its collaboration to non-partner schools to foster future talent.

FinFET Academic Design Foster Package (ADFP)

To foster alignment between educational design environment and cutting-edge semiconductor technologies, TSMC has launched the Academic Design Foster Package (ADFP) based on its 16nm FinFET technology. This initiative aims to assist universities in enhancing their Very-Large-Scale IC (VLSI) design education, facilitating transition from conventional planar processes to FinFET technology in collaboration with its OIP ecosystem Partners. As of 2023, ADFP has been successfully granted to 105 universities worldwide, with over 186 professors authorized to integrate it into their courses, benefiting students of more than 2,000 attendance. In conjunction with the TSMC University Shuttle Program for N16 and N7 processes, the Company aims to evolve it into a global talent incubation platform for FinFET design, dedicated to both education and research.

Campus Information Cultivation Project

TSMC realized smart fabs and modernized workflow through AI, Cloud Native, and other technologies, driving the comprehensive digital transformation. To pioneer in information education, TSMC cooperated with the Department of Computer Science of National Yang Ming Chiao Tung University to launch the three-credit Cloud Native Software Development and Best Practices post-graduate program. As of 2023, two sessions were conducted through the efforts of 62 executives of IT organizations and employees, and 257 students participated in the programs. The Cloud Native program was introduced to the National Taiwan University in September 2023 for the fall semester.

TSMC High School Semiconductor Mini Courses

To inspire high school students' interest in science and semiconductors, TSMC collaborates with university professors and high school teachers in developing the semiconductor mini course Semiconductor in Our Life to enrich students' basic semiconductor knowledge by adopting a blended teaching model. As of 2023, the mini courses were introduced to ten high schools, and there were 512 participants in total. In 2023, TSMC organized the first high school summer camp and invited the Semiconductor Mini Courses students to the camp. The camp offered lectures on industry advanced processes and prospects, and group workshops were also performed to nurture teamwork capacity and improve students' learning will and self-efficacy. TSMC also launched the Trainer Program, which offers two sessions of in-person training workshops each year to improve the teaching quality of high school teachers.

Industry-academia Collaboration

University Research Center

To encourage the academic sector to invest in advanced semiconductor research, TSMC worked with National Taiwan University, National Cheng Kung University, and National Tsing Hua University to establish graduate institutes that are committed to developing cutting-edge technologies in semiconductor materials, components, materials, processes, and chip design, and foster semiconductor researchers. As of 2023, a total of 295 professors and over 3,871 top students have joined the research centers to continue promoting the progress of semiconductor technologies and innovations. TSMC collaborated with eight world-leading universities abroad, launching international research projects to provide drivers for the development of semiconductor technologies.

Industry-academia Joint Development Project

TSMC worked closely with multiple renowned universities in Taiwan for various industry-academia projects to encourage university professors to participate in emerging semiconductor components, processes, materials, equipment, packaging technologies, IC designs, and other semiconductor research fields. In 2023, the Company added two new topics, Green Manufacturing and Circular Economy, and Special Process Technology to work on, and launched 296 industry-academia joint development projects, with 245 professors from ten Taiwan universities and 19 overseas universities participated. Since 2013, these industry-academia joint development projects have resulted in 286 patent applications in the U.S.

> "Through the effective teaching of the TSMC instructors, we were able to observe the machine structure and operate it in practice, which has been very helpful for us to apply what we have learned in the future.
>
> **Shu-Wen Yang**
> A Graduate Student in the Department of Mechanical Engineering at Taiwan National Central University

Case Study

Release the Resources of Newcomer Training Center to Accelerate Industry-Academy Connection

To encourage students to join the semiconductor industry after graduation, corporate trainers at TSMC's Newcomer Training Center designed two courses, Semiconductor Technology - Process and Equipment and Semiconductor Intelligent Manufacturing Systems. They were made available for students in the Semiconductor Curriculum Programs to study for free in 2022. In 2023, the scope was further expanded to science and engineering-related departments at four non-partner schools. Professional insights from corporate trainers at the Newcomer Training Center and the opportunity for hands-on practice with real tools enable students to integrate theory into practice and learn about the latest semiconductor processes and tools. At the end of 2023, a cumulative 42 sessions were offered at the Newcomer Training Center, assigning 1,398 executives to teach those courses and helping 3,011 students pass academic and skill certification, contributing to the talent cultivation of the industry.

TSMC's "Newcomer Training Center" additionally offers courses to university students, strengthening the competitiveness of semiconductor talent

University Shuttle Program

In 2023, TSMC worked with professors and students from 18 of the world's top universities through the University Shuttle Program to realize IC circuit designs and validate the performances. Universities in Japan joined the program for the first time, expanding TSMC's scope of global talent cultivation. In 2023, 57 papers were published on 5G and wireless communication, high-speed wireline communication, electron components, electrical engineering, AI, safety applications, radar applications, and IoT, with 16 of those papers being published in esteemed journals or at renowned conferences such as the IEEE Journal of Solid-State Circuits and the International Solid-State Circuits Conference (ISSCC), often touted as the IC Design Olympics.

> On the path to the shrine of wisdom, I extend my deepest appreciation to the companionship of TSMC's University Shuttle Program, and I hope to provide mutual support in the fields of talent cultivation and electron component innovations to jointly contribute to the semiconductor industry in the future.
>
> **Ya-Chin King**
> professor of the Department of Electrical Engineering and Institute of Electronic Engineering, College of Electrical Engineering and Computer Science, National Tsing Hua University

> I appreciate TSMC's University Shuttle Program that provides abundant chip manufacturing resources and allows me to learn comprehensive knowledge of chip design and offline procedures, so I can quickly get up to speed after joining the company.
>
> **Yun-Han Lee**
> master's student at the National Taiwan University, currently a Design and Technical Platform engineer

National Academy for Key Fields of Research

To support the Ministry of Education's National Key Fields Industry-University Cooperation and Skilled Personnel Training, since 2022, TSMC has been supporting National Taiwan University, National Cheng Kung University, National Tsing Hua University, National Yang Ming Chiao Tung University, National Sun Yat-sen University, and National Chung Hsing University to establish semiconductor or key technology graduate institutes. In 2023, TSMC continued to invest at least NT$200 million in funding to support cutting-edge semiconductor research, and it also plans to launch a scholarship to encourage students who wish to join the research in the semiconductor field and cultivate top R&D talent.

Key Academic Collaborators and Research Topics in 2023

National Taiwan University	University of California, Los Angeles
National Tsing Hua University	University College Dublin
National University of Singapore	University of Texas at Austin

Note: Universities are listed in alphabetical order

Career Guidance

TSMC Ph.D. Scholarship and Elite Camp

To continue improving the overall semiconductor industry technologies, science researchers with doctoral degrees are necessary and important assets. TSMC launched a Ph.D. Scholarship as an incentive for elite students to pursue doctoral degrees in scientific specialties related to the field of semiconductors and nurture science researchers with doctoral degrees. In 2023, 32 additional students received the scholarship. As of 2023, 107 Ph.D. students have benefited from the scholarship, and two of them have already obtained a Ph.D. degree. Also, the Elite Camp encouraged students to pursue Ph.D., with 84 students participated in 2023 and the overall program satisfaction rate had reached to 90% or above.

TSMC Girls in STEM Program for High School

TSMC actively cultivates female semiconductor talent and inspires female students' interest in the science field for them to pursue tech careers through the promotion of the TSMC Girls in STEM Program for High School, with 3,627 female students participated in 2023. The TSMC Education and Culture Foundation also launched the 7th Female Scientist Journey, attracting 1,387 female students to participated in 19 semiconductor education-related activities. TSMC also continued to hold career lectures titled Lean in and Achieve a Better Version of Yourself. Apart from introducing the trends in the semiconductor industry, the lectures also invited female employees and alumni to share information on their workplace and work content in the tech field, encouraging female students to dare to challenge themselves. In 2023, lectures for ten schools were completed, with a total of 2,240 female students participated, fostering more female talent in the technology sectors.

> During the career lecture, I remembered that I was always curious and enthusiastic about science experiments in high school. Through sharing experiences and encouraging students to pursue their dreams and deem STEM as their career goal, I hope to jointly facilitate technology development with TSMC in the future.
>
> **Li-Jin, Hong**
> alumna of Sheng Kung Girls' High School and currently the executive of the 3D IC Integration Division

Operations Equipment Star Program

To cultivate semiconductor equipment and tool upgrade, and facility expertise talent, TSMC launched the "Operations Equipment Star Program" in 2023 and collaborated with three technical and vocational high schools to help students understand work related semiconductor equipment and facilities during the studying stage and cultivate their practical skills required to become equipment and facility engineers through scholarship/fellowship, corporate visits, and seminars, expanding the talent pool of the industry and hoping that they will join the semiconductor field to drive the technology development together. 111 students received the scholarships in 2023.

TSMC organizes the seminar for the Equipment Starlight Program at Hualien Industrial Vocational Senior High School

Product Quality

Enhance Quality Culture

Promote continuous improvement programs to enhance the internal quality culture

Encourage local suppliers to participate in Taiwan Continuous Improvement Awards (TCIA) to strengthen quality culture and competitiveness within local supply chain

2030 Goals	2024 Targets	2023 Achievements
Generate up to NT$20 billion in value from improvement projects and involve outstanding projects in Taiwan Continuous Improvement Awards (TCIA)	Generate NT$15 billion in value from improvement projects and involve at least six outstanding projects in TCIA	✓ Generated more than NT$14 billion in value from improvement projects Target: NT$14 billion
		↑ Involved 9 outstanding projects in TCIA Target: 6 projects
Encourage major local raw materials suppliers[Note 1] to participate in TCIA, with 60% advancing to finals; among them, wafer manufacturing raw materials suppliers have a 100% participation rate, and advanced packaging raw materials suppliers have 75%	Encourage major local raw materials suppliers to participate in TCIA, with 20% advancing to finals; among them, wafer manufacturing raw materials suppliers have a 100% participation rate, and advanced packaging raw materials suppliers have 60%	– Note 2 14% of major local raw materials suppliers advanced to the finals of TCIA Target: 20%
		– Note 2 74% of wafer manufacturing raw materials suppliers participated in TCIA Target: 100%
		✓ 60% of advanced packaging raw materials suppliers participated in TCIA Target: 60%

Improve Quality Capability

Develop innovative testing methods to enhance product, technology and production quality

Develop a cumulative total of 3,000 innovative testing methods for quality and reliability[Note 3]	Develop 290 innovative testing methods for quality and reliability	↑ Developed 283 innovative testing methods for quality and reliability Target: 278

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | – Missed target

Note 1: Major local raw materials suppliers are those that meet at least one of the following conditions: 1. accounted for 85% of purchasing expenses; 2. single-source supplier; 3. ongoing trading orders are placed each quarter and applied to critical processes; major raw materials suppliers and back-end packaging materials suppliers were renamed wafer manufacturing raw material suppliers and advanced packaging raw material suppliers

Note 2: As suppliers invested in production capacity restoration in the post-pandemic era, their participation resources and intention were affected; TSMC will continue to provide consultations to suppliers to improve their participation intention and quality of proposal

Note 3: Starting from 2021

Product Quality

Enhance Sustainable Chemicals Management

Develop hazardous substance analysis capabilities in chemical laboratories to ensure occupational health and safety (OHS)

Strengthen management for hazardous substances to improve green manufacturing

Realize Quality Application

Complete quality and reliability certification for advanced process technologies, specialty process technologies, and wafer-level packaging technologies in the design and development stage based on the Company's technology roadmap to ensure quality and safety without any concerns

2030 Goals	2024 Targets	2023 Achievements
Develop the ability to analyze 100% of carcinogenic, mutagenic, and reprotoxic (CMR) substances and help suppliers supplying materials with potential risks develop the same capabilities[Note 4]	Develop the ability to identify and analyze 100% of CMR substances and helped 100% of suppliers supplying materials with potential risks to develop the same capabilities	✓ Developed the ability to identify and analyze 100% of CMR substances and helped 100% of suppliers supplying materials with potential risks to develop the same capabilities Target: 100%
Replace 100% of N-methylpyrrolidone (NMP) (Base year: 2016)	Replace 100% of NMP used for etching processes in the overseas fabs TSMC (China), TSMC (Nanjing), and TSMC Washington, LLC	— Note 5 71% replacement completed in the etching process in overseas subsidiaries' fabs Target: 100%
No processes involving perfluoroalkyl substances (PFASs) that have more than four perfluorinated carbons	Replace 100% of photoresists containing PFHxA (Perfluorohexanoic Acid) related substances in VisEra	— Note 6 Replace 14% of photoresists containing PFHxA related substances in VisEra Target: 36%
Complete quality and reliability certification for advanced process technologies, specialty process technologies, and wafer-level packaging technologies in the design and development stage based on the Company's technology roadmap	Complete quality and reliability certification for advanced process technologies, specialty process technologies, and wafer-level packaging technologies per the R&D targets	✓ Completed quality and reliability certification for enhanced N3E process technology, 22nm embedded MRAM IP, TSMC-SoIC® stacking technology
Zero cases of product recall by customers due to safety concerns NEW	Zero cases of product recall by customers due to safety concerns	Zero cases of product recall by customers due to safety concerns NEW

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

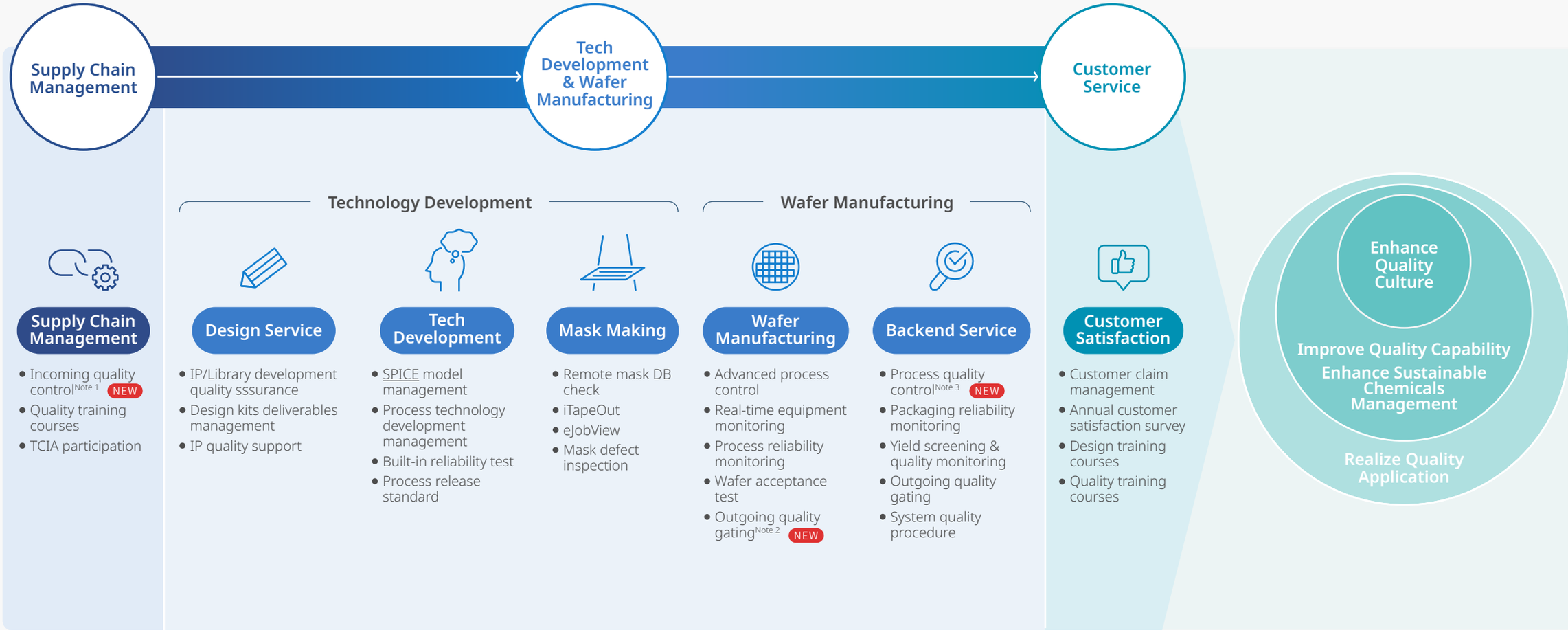
Note 4: In response to developments in process technologies, all materials with potential risks supplied by new suppliers must pass CMR testing

Note 5: In 2023, the NMP replacement progress was affected due to the poor capacity utilization and the delay in the supply of suppliers; a full replacement is expected to be completed in 2024

Note 6: Because one customer of VisEra requires additional verification for alternative photoresists, the completion time for 100% substitution will be extended to 2025

TSMC spotlights the quality standards of all operational aspects and advanced technology development, wafer manufacturing, customer service, and supply chain management. In 2023, it further introduced the Mandala Chart to include the spirit of continuous improvement in daily work and provide outstanding semiconductor manufacturing services. In 2023, TSMC's Quality and Reliability Laboratories introduced a total of 283 innovative testing methods to facilitate technology development. In addition, aligning with the global manufacturing strategy and arrangements, TSMC continued to adopt the Best Known Method (BKM) to support suppliers in improving the quality of raw materials and creating a resilient raw material supply chain to respond to geopolitical situations, shortage of supplies, and other challenges.

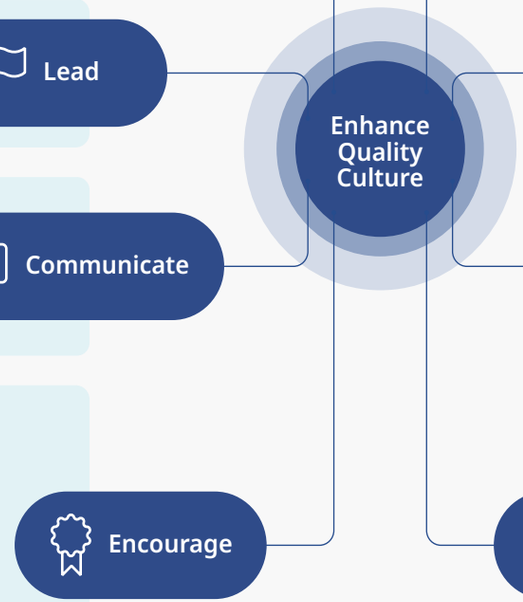
TSMC Quality Management System



Note 1: Optimize the chemical tank truck cleaning procedures to improve efficiency and reduce chemicals required for cleaning, ensure steady supply of raw materials, and assist in the smooth progress of domestic and overseas fab expansions
Note 2: Develop digital transformation tools that are used in the wafer shipping quality assurance operation and realize remote quality management by improving the skills of operating personnel through lecturing and practices
Note 3: Find the best process parameters through the design of experiments to solve the edge defect issue of SoIC chips and improve the yield

Enhance Quality Culture

TSMC is committed to promoting a quality culture of Constant Advances and Continuous Improvement. To actively root quality thinking in daily operations and lay a foundation for long-term success and sustainable development, TSMC introduced the Mandala Chart in 2023 to expand the initial six aspects to eight aspects: Define, Lead, Communicate, Encourage, Select, Integrate, Coach, and Drive. TSMC hosts company-wide training programs, competitions, and relevant promotional activities to drive cross-organizational learning and collaboration and enhance employees' problem-solving skills. Over 12,000 projects were submitted in 2023, generating more than NT$14 billion in value.



Define

Develop the Quality Policy to define three quality core values
- Internal/external customer satisfaction
- Quality is the responsibility of every employee
- Strive for excellence

✓ Post communication materials on the homepage of the online Quality Academy platform and in offline offices to improve employees' understanding

Lead

- Initiate a Quality Forum to encourage employees to drive quality innovations

✓ **2,969** employees participated

Communicate

- Create the Quality Academy platform to inspire innovative thinking
- Design quality posters to strengthen accurate quality awareness

✓ The Quality Academy recorded a click-through rate of **235,209** persons

Encourage

Establish a hierarchy to promote continuous improvement activities
- Suggestion Award
- Continuous Improvement Team (CIT) competition
- Total Quality Excellence Conference (TQE)
- Taiwan Continuous Improvement Awards (TCIA)

✓ Accumulated **7,866** projects with an award reaching **NT$13.88 million**

✓ Held the first TQE participated by TSMC's organizations worldwide; the Rising Star category and Talent Cultivation category were added to facilitate quality innovations

✓ **15** fabs organized the CIT competition

✓ Received **7** Golden Awards, **2** Silver Awards, and **2** Best Innovation Awards

Select

- Launched the CIT Outstanding Engineer program to build a talent pool of improvement experts
- Set up the Continuous Improvement Team (CIT) / Design of Experiments (DOE) Judge system to reinforce the application of quality tools, statistics, and innovative methods and improve project quality

✓ TSMC has awarded a total of **1,504** CIT Outstanding Engineer Awards

✓ Cultivated **106** CIT judges and **16** DOE judges

Drive

- Drive quality improvement and refinement through internal, customer, and third-party audits

✓ Quality management system certified by third-party audit every year

Integrate

- Add quality culture courses to new employee orientation to improve the awareness of new employees in terms of quality and corporate core value

✓ Over **16,147** employees completed quality culture courses

Coach

- Held case studies to guide employees to reflect and take improvement measures
- CIT/DOE Judges assist employees in using quality tools to solve problems and executing the Continuous Improvement Project

✓ Communicate on **four** quality cases to improve employees' quality awareness and avoid the recurrence of mistakes

✓ Provided mentorship to **89** persons for improving the Continuous Improvement Project

✓ Achievements in 2023

Promotion Structure of Continuous Improvement Activities

Cross-industry

Taiwan Continuous Improvement Awards (TCIA)

A nationwide competition guided by the Bureau of Foreign Trade, Ministry of Economic Affairs, and organized by the Corporate Synergy Development Center, and it is a symbolic cross-industry improvement case exchange platform

Company-wide

Total Quality Excellence Conference (TQE)

The conference has been organized for 31 consecutive years and is the TSMC's longest running competition. Winning cases will have the opportunity to represent TSMC to participate in TCIA

Fabs

CIT Competition

TSMC's fabs organize the CIT competition and select the winning cases to participate in company-wide TQE

Individual

Suggestion Award

Encourage employees to submit premium proposals based on themes and explore quality improvement opportunities in their work; the award is the most popular award item

2023 TQE-Winning Cases

Quality Improvement

Increase yield of image sensors

Yield increased by 26%

- Develop a new process to improve the photoelectric conversion efficiency
- Optimize the film process to improve white pixel

Production Capacity Improvement

Improve the spike-annealing process

Improved the utilization by 83%

- Optimize the gas flow ratio of the process
- Perform a detailed disassembly analysis to shorten the transmission and production time

Cost and Production Support

Automation of the human-machine cooperation fab

Task assignment precision increased by 20%

- Customize the automated production scheduling to reduce the waste of crucial production capacity

Process and Efficiency Improvement

Optimize tank truck cleaning procedures

Reduced the number of days for tank truck cleaning by over >65%

- Establish standardized truck cleaning procedures that vertically apply to suppliers and horizontally apply to all materials

STOP & FIX

Improve the liquid leakage risk of green hydrogen units

Zero liquid leakage for over 1 year

- Establish a temperature and pressure monitoring system
- Ultrasonic NDT for weld bead each year
- Improve the design of the electrolytic cell to solve the problem

ESH and Green Corporation

Self-reduction of ammonia gas

Reduced ammonia gas emissions by 63%

- Adjust the source emission model
- Optimize the parameters of the processing equipment

Design of Experiment

Improve the quality of thin film deposition process

Improved the uniformity of film thickness by 45%

- Redesign the parts of the process tools and resolve the issue of poor efficiency in reactants mixing

Quality Audit

Audit method innovation

Carried out the comprehensive health check for the facility quality monitoring system

- Propose a scenario audit method to elaborate the storyline, and analyze the risk to identify suspicious points

NEW

Talent Cultivation

Optimize the new employee training system

New employee satisfaction reached 100%

- Replace old online courses with new
- Establish a Vocabulary Definition and Q&A Database
- Launch advanced physical courses

NEW

Rising Star

Intelligent Scheduling of Photolithography

Idle time of tools reduced by 32%

- Time-bucket based optimization model of mask scheduling
- Dynamic estimation of process time
- Strategically select the production route

Assistant Engineer and Module Associate Engineer

Improve the maintenance efficiency of equipment

Estimated annual benefit reaches NT$26 million

- Introduce the auto-control module
- Design a dual-axis sliding track platform
- Utilize image modules and algorithm

Outstanding Proposals from Direct Labor

Improve the safety for work at height

Reduced the time of work at height by 100 hours per year

- Develop the emergency wheel with self-rotation functions to save energy for carts
- Produce trailer connecting rods to keep a safety distance between trailers

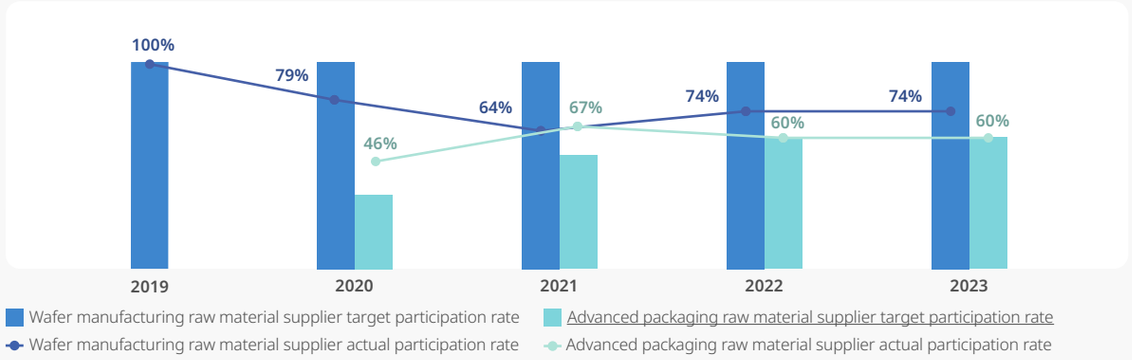
TSMC optimizes new employee training mechanisms through advanced physical courses

TSMC is committed to quality improvement. Apart from promoting internal continuous improvement activities, it is also a long-term participant of TCIA. By participating in the competition, TSMC exchanges practical knowledge on quality improvement with peers from other industries and accelerates the advancement of local industries. In 2023, TSMC received seven Gold Awards, two Silver Awards, and two Best Innovation Awards at TCIA, setting a record for TSMC. To strengthen the supply chain, TSMC also encourages major local raw materials suppliers to participate in TCIA. As suppliers invested in production capacity restoration in the post-pandemic era, their participation resources and intentions were affected. However, TSMC still ensured that 74% of wafer manufacturing raw material major suppliers and 60% of advanced packaging raw materials suppliers were able to participate in the competition. A total of 14% of major local raw materials suppliers advanced to the finals and won one Gold Award, seven Silver Awards, and one Bronze Award. TSMC announced the list of winners on its corporate website to encourage suppliers to continue to improve.

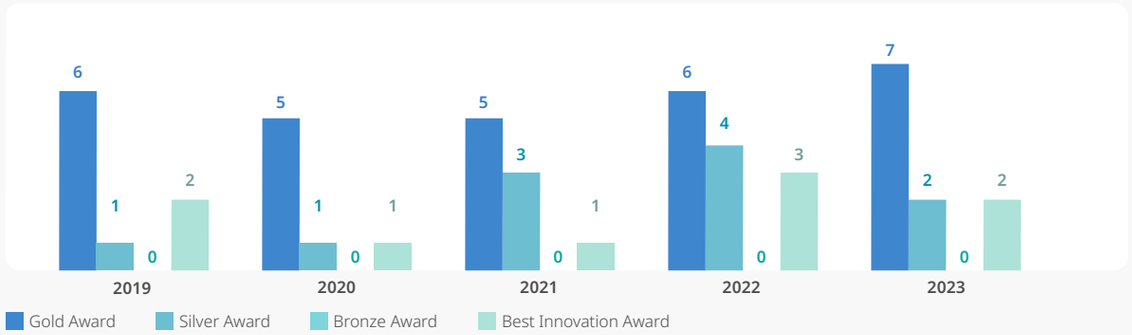
2023 TCIA-TSMC Winning Cases

Theme	Improvement benefit			
Improve EUV pellicle transmittance (concurrently won the Best Innovation Award)	12%	EUV light penetration rate increased	1.3 Billion (NT$)	Estimated improvement benefit reaches
Improve the yield for IoT chips	>70%	Yield loss reduced	70%	Reduced the fluorine-containing GHG consumption
Improve the crucial process for automotive chips	70%	Number of manual operations by personnel was reduced	15%	Monthly working hours of personnel were reduced
Optimize the production cycle of the advanced process	35%	Production cycle improved by approximately	143 Million (NT$)	Estimated improvement benefit reaches
Improve the efficiency of in-tool transmission for products	25%	Reduced the time of in-tool transmission of products		
Smart transformation of old fabs	6.2%	Number of wafers produced by tools increased		
New breakthrough in production capacity by smart fabs (concurrently won the Best Innovation Award)	2.6%	Number of wafer output from tools in the 12-inch fab's bottleneck units per hour increased		

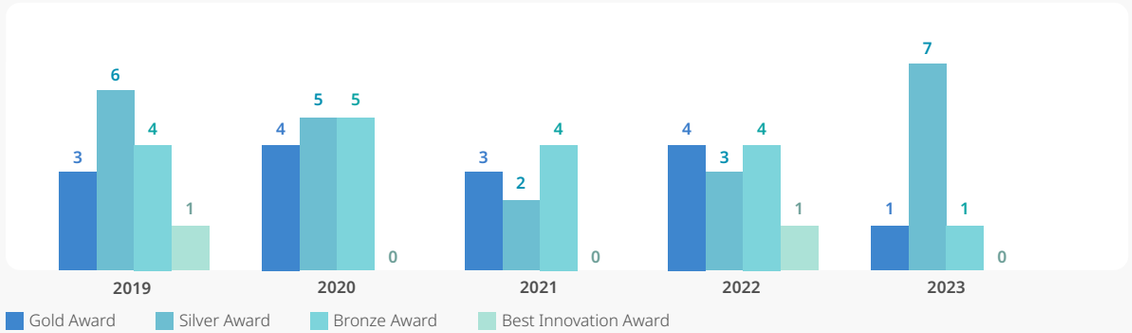
TSMC Supplier Track Record of Participating in TCIA



TSMC Track Record of Participating in TCIA



Percentage of Major Local Raw Materials Suppliers Participating in TCIA

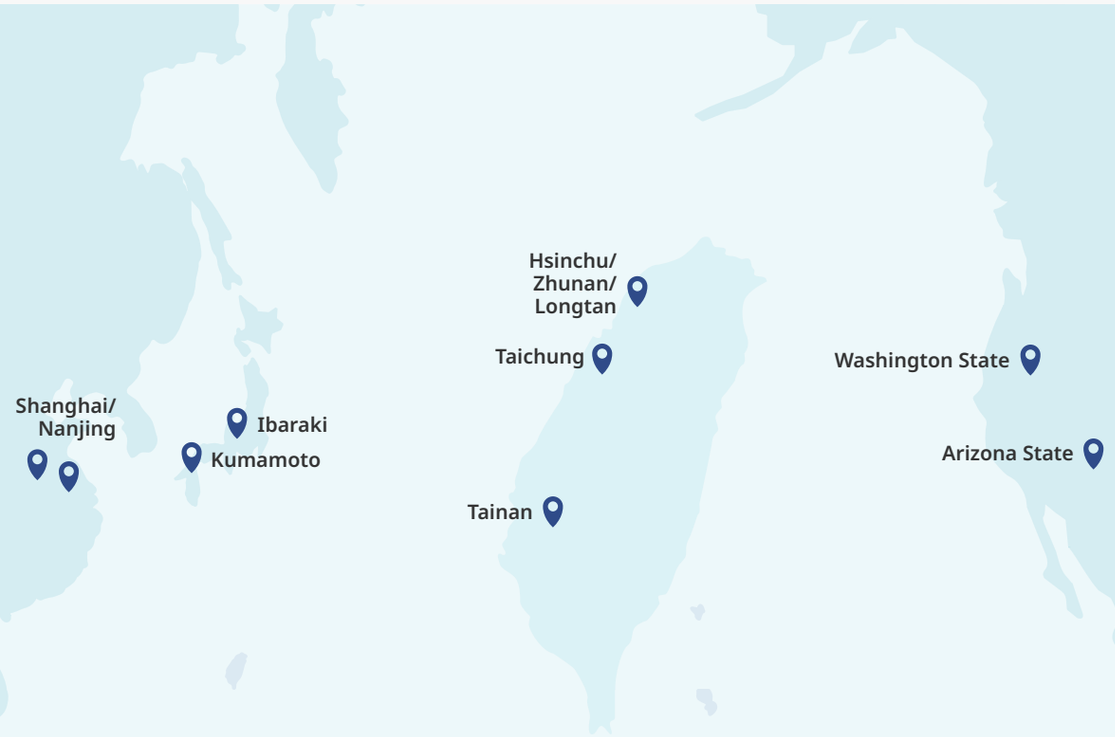


Improve Quality Capability

Quality capability is crucial to technology leadership. TSMC is dedicated to perfecting R&D testing methods. In 2023, the laboratories introduced 283 innovative testing methods while ensuring that device characteristics, process yield, and product reliability comply with customer demands and standards to continue to minimize quality risks. The high-performance and energy-saving Reliability Evaluation Method optimized the parameters and conducted the testing directly through the tool in the production line. Apart from saving energy by 99%, personnel may quickly fix problems and accelerate customer product innovation and time-to-market. In addition, in response to the global manufacturing strategies and arrangements, the demand for HF, a crucial material for the process, surged. TSMC collaborated with suppliers to use waste from fertilizer manufacturing for HF production to produce HF without affecting the quality of the process and create recycling values while expanding the production capacity of raw materials and building a firm and environmental raw material supply chain.

To achieve sustainable operations, TSMC is dedicated to talent cultivation and local industry support. In 2023, it has exchanges with experts and scholars from Harvard University and Taiwan National Cheng Kung University to launch multi-year projects that carry out experiments, evaluation, and research focusing on machinery features and stress behaviors of semiconductor materials to accelerate the advanced packaging technology R&D progress, stabilize the production line quality, and drive technological innovations. Meanwhile, to improve the competitiveness of the local supply chain, TSMC collaborated with SEMI (Semiconductor Equipment and Materials International) to organize the fifth Strategic Materials Conference in Taiwan, where domestic and foreign experts were invited to share the latest material technology. TSMC also participated in the Electronic Specialty Gas and System meeting in Arizona (US), to share the importance of technical targets and quality management with the local supply chain.

TSMC Quality and Reliability Laboratory Network



Sustainable Strategies from the Quality and Reliability Laboratories

Advanced Materials Analytic Center (AMAC)	• Develop the ability to identify and analyze 100% of CMR substances and improve source management in suppliers • Evaluate and select technologies and materials for advanced processes • Provide an analysis and technology exchange platform to strengthen suppliers' analytical capabilities
Chemistry Lab	• Accelerate the replacement of hazardous substances and help new TSMC facilities with designs for discharging Substances of Very High Concern (SVHCs) • Verify the quality of materials recycled and reused at TSMC to ensure that they meet requirements for advanced processes and promote green manufacturing • Verify the quality of alternative materials in response to TSMC's replacement of substances with high GWP NEW
Surface Analysis (SA) Lab	• Develop low-power consumption and high-capacity processes to increase the EUV energy efficiency • Select eco-friendly materials and replace in processes • Develop equipment consumables, reducing costs and extending consumable life by three times
Reliability Analysis (RA) Lab	• Complete reliability certification for the most advanced processes, specialty processes, and wafer-level packaging processes • Develop efficient and energy-saving reliability evaluation method NEW
Advanced Failure Analysis (AFA) Lab **Process Failure Analysis (PEFA) Lab** **Packaging & Assembly Failure Analysis (PAFA) Lab** **Product Failure Analysis (PFA) Lab** **Scanning Electron Microscope (SEM) Lab**	• Accelerate advanced process development, yield improvement, and product DPPM reduction learning curve (reliability point of view) • Apply for domestic and foreign patents through innovation and invention • Donate tools to universities and provide training on how to operate and maintain equipment to cultivate tech talent
Transmission Electron Microscopy (TEM) Lab	• Continue to promote industry-academia cooperation programs • Apply digital transformation and automatic data processing to increase efficiency

Enhance Sustainable Chemicals Management

To track the flow of materials with potential risks, TSMC's Advanced Materials Analytic Center (AMAC) has established mechanisms for screening CMR materials and expands the scope based on its technology roadmap to ensure the safety of employees and supply chain. In 2023, the AMAC screened 20 new semiconductor materials and developed the ability to identify and analyze all CMR substances. Meanwhile, TSMC has been actively establishing a safety protection network to introduce sustainable chemical management methods to subsidiaries, including helping VisEra strengthen protection for high-risk materials by sharing measures such as substitutes for high-risk chemicals, protection gear, and regular workplace assessments. TSMC also incorporated hazardous substance management regulations in the TSMC Supplier Sustainability Standards and continued to provide training, auditing, and guidance to suppliers. In 2023, TSMC helped suppliers of materials with potential risks to develop capabilities to detect CMR substances.

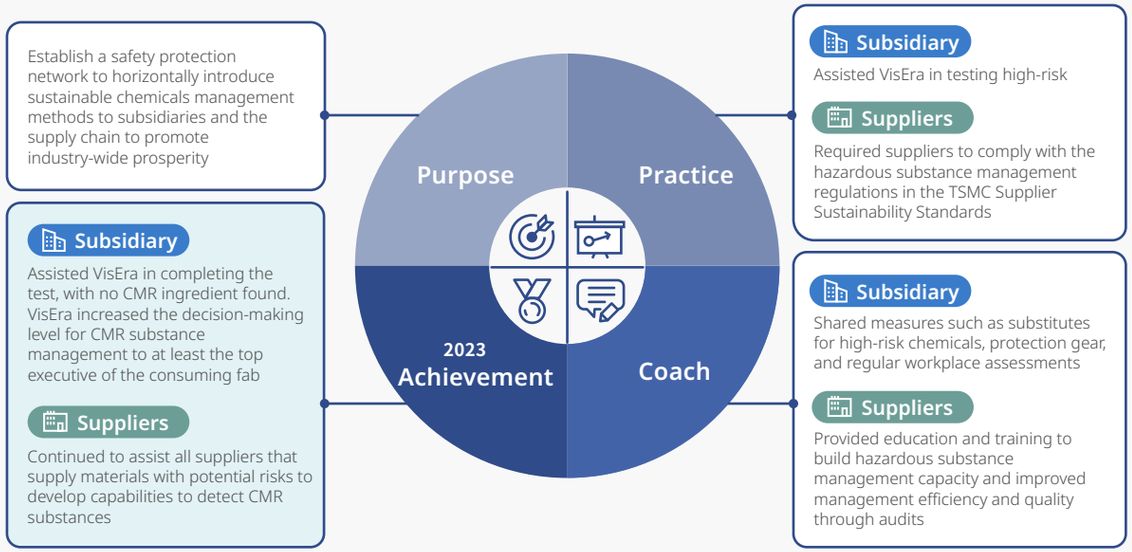
In compliance with the TSMC Environmental Policy and TSMC Safety and Health Policy, TSMC is committed to implementing sustainable chemical management. TSMC has always aimed to avoid or minimize the use of hazardous substances. The related business unit is responsible to ensure that the storage, transport, use, and disposal of any irreplaceable hazardous materials are compliant with domestic and foreign regulations, as well as the ESH requirements of customers and TSMC. After the Corporate ESH Division and the Industrial Safety and Environmental Protection Departments have ensured the health and safety of all workers and the prevention of waste from polluting the environment, such materials can only be used with consent from VP-level executives of related divisions or departments.

Regarding NMP commonly used in industrial and semiconductor processes, TSMC launched an industry-first replacement program in 2016. In 2022, TSMC was able to reduce NMP usage at all Taiwan facilities by 97.2%. The NMP replacement program was introduced to overseas locations; initially, TSMC estimated to achieve the 100% reduction target by the end of 2023; however, the testing progress for the replacement procedures was delayed due to poor production capacity and the postponed supply of suppliers. TSMC expects to replace all NMP use at overseas locations in 2024.

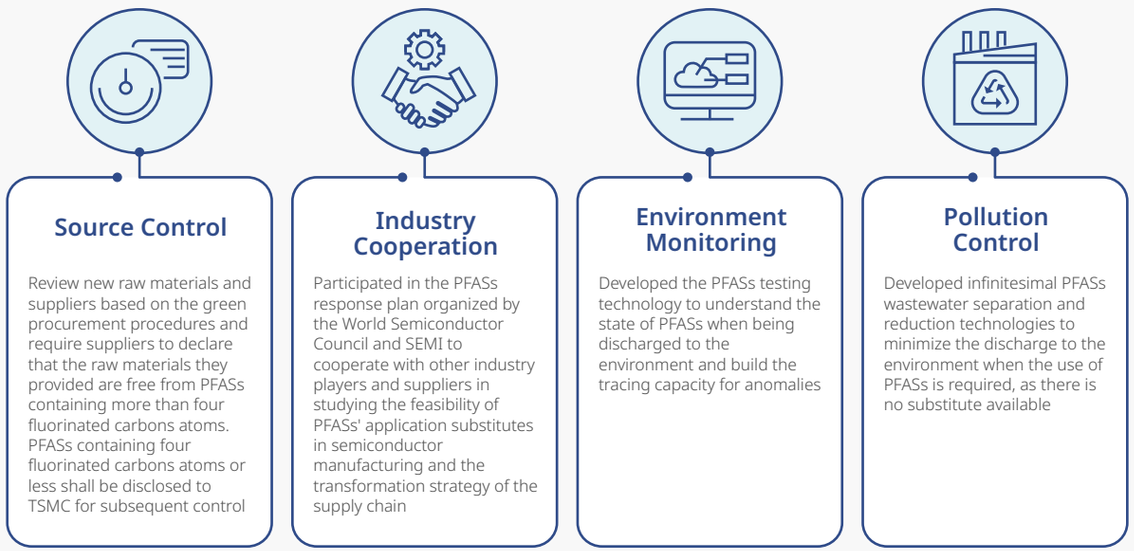
Also, Polyfluoroalkyl Substances (PFASs) are commonly used in industrial and consumer products because they are resistant to oil, water, and dirt. However, as PFASs are toxic, bio-cumulative, persistent, and have long moving distances that cause harm to the human body and environment, countries have promulgated laws for control. In response to the international trend, apart from replacing long-chain PFASs that have higher hazards, with short-chain PFASs or non-PFASs in accordance with past evaluations, TSMC also adopted source control, intra-industry cooperation, environment monitoring, pollution control and other countermeasures to mitigate environmental impacts.

To reinforce sustainable chemical management, TSMC obtained the certification of the QC 080000 Hazardous Substance Process Management System in 2006. The Company strives for improvements by utilizing the PDCA (plan, do, check, action) model for the compliance with regulations and the requirements of customers regarding hazardous substance control for process and products. All the TSMC fabs, upon official launch, acquire third-party certification.

CMR Substance Management Assistance Highlights



TSMC's PFASs Management Strategy



PDCA Cycle for Sustainable Chemicals Management

Plan

Identify and register in compliance with regulations and customer requirements

Each month, the Corporate ESH Division identifies regulations on hazardous substances management in Taiwan and beyond as well as customer requirements to inform related units to take the necessary measures and track progress through the internal electronic notification system

List of banned or restricted substances

Compile according to regulations, customer requirements, or TSMC requirements

Hazardous substance replacement programs

Formulate related plans in compliance with regulations, customer requirements, or TSMC requirements

- The EU added **11** SVHCs to REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals) and customers have amended management measures for hazardous substances; TSMC complied with **all** new requirements
- Participated in the World Semiconductor Council and SEMI's PFASs initiatives to discuss countermeasures NEW

Do

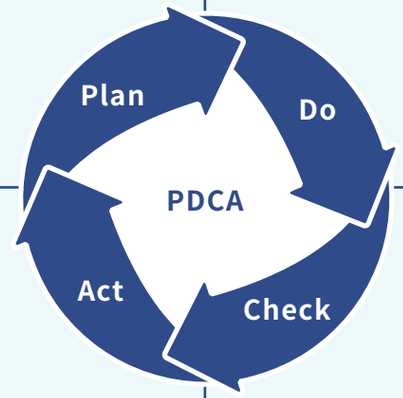
New material review

All new chemical materials or changes to existing materials are subject to review by the Corporate ESH Division and Industrial Safety and Environmental Protection Departments of the fabs to confirm the new chemical complies with ESH regulations before R&D evaluation

Implement hazardous substance replacement programs

Overseas subsidiaries continue to conduct NMP replacement program in wet etching processes; Subsidiary VisEra Technologies Ltd. continues PFHxA related materials replacement project

- Reviewed a total of **181** new chemicals, of which **118** were approved; of the **44** new chemicals that failed to pass reviews, **one** was rejected for containing substances highly hazardous to human health, **one** was rejected because the proper waste handling could not be guaranteed, and **42** were rejected because suppliers were unable to provide necessary information or there were no requirements for an assessment; additional **19** are still being reviewed
- Overseas subsidiaries continued to reduce the use of NMP in wet etching processes; now with **71%** completion
- Subsidiary VisEra Technologies Ltd. continues PFHxA related materials replacement project NEW



Check

Raw material hazardous substance test

Suppliers are required to provide proof of compliance with hazardous substance specification test report issued by ISO17025 certified labs. TSMC may take random samples to ensure the compliance of raw materials

Product hazardous substance test

Sample and send main products to external ISO17025 certified labs for testing every year

Environmental Measurement

Developed ability to screen PFASs levels in water by referring to US EPA 537.1, enabling the regularly monitoring of effluents from various fabs

- Official launch of X-ray Fluorescence Spectrometer for detection of hazardous substances in raw materials to improve sampling efficiency
- Completed random sampling tests for **127** raw materials; all test results were in line with TSMC specifications
- Completed hazardous substance tests for main products; results showed compliance with relevant regulations and customers' and TSMC's specifications including **235** PFASs materials
- Regular monitoring water releasing in all fabs and more PFASs tests for suspicious raw materials NEW
- Developing PFASs test technologies, enabled for **30** PFASs detection NEW

Act

Management review

Each quarter, management from the Quality and Reliability Organization shall organize an interdepartmental meeting to review measures on hazardous substance management and progress toward annual targets

- Met the targets for suppliers audit and corrective actions tracking; follow-up new material inspection; and compliance with incoming material inspection

Actions in 2023

Realize Quality Application

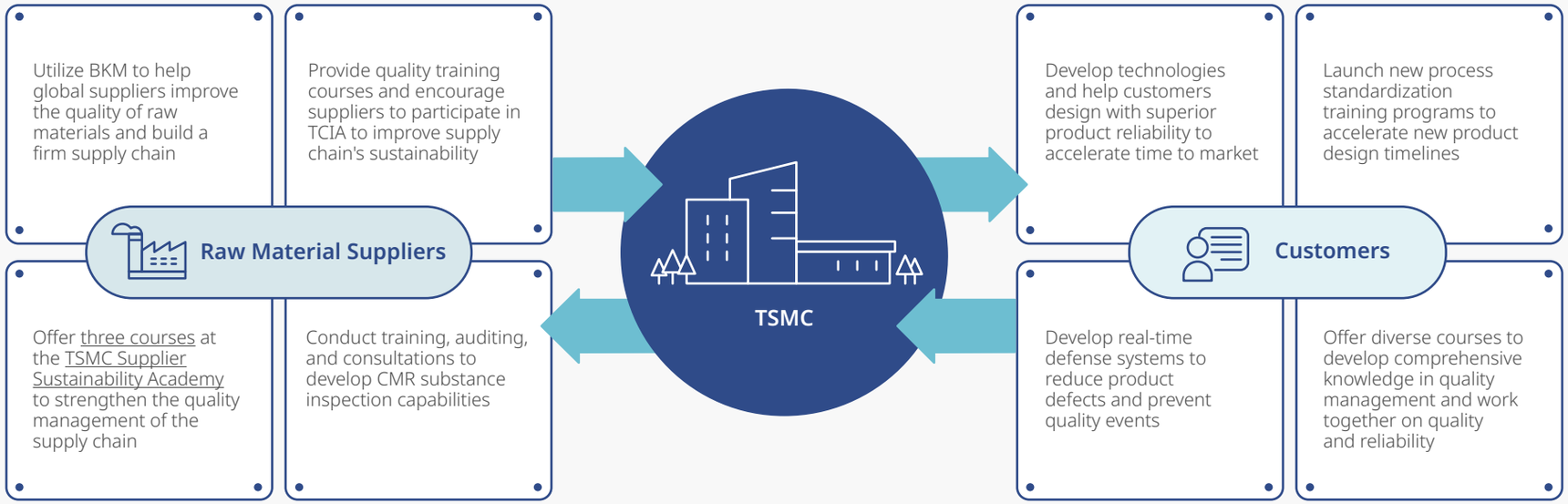
TSMC shows its commitment to quality in technology, manufacturing, and services. For quality in technology, TSMC helps customers design products with superior reliability. In 2023, TSMC completed quality and reliability certification for the enhanced N3E process, enhanced 22nm embedded MRAM IP, TSMC-SoIC® stacking technology, which stacks chip on wafer (CoW). For more details, please refer to 5.3.6 Quality and Reliability of the TSMC 2023 Annual Report.

For quality in manufacturing, the Quality and Reliability (Q&R) Organization collaborates with operational organizations to establish and continuously improve real-time defense systems using advanced statistical methods and quality tools. The Quality and Reliability Organization and TSMC's fabs also work together on enhancements for automotive product quality improvement, including design rule implementation and migration to Automotive Quality System 2.0. This covers process capability requirements to tighten in-line and wafer acceptance testing in fabs and the handling of maverick wafers and lots. Q&R also provides dedicated resources for field/line return analysis and timely physical failure analysis (PFA) for process improvement to meet automotive customers' stringent defective parts per million (DPPM) requirements.

In terms of service quality, as advanced processes become more complex, TSMC provides standardized training courses on new process design flow to help customers become familiar with them. In 2023, TSMC assisted eight new customers and 700 individuals in completing training on the N3E process, accelerating product design schedules and successful chip tape-out. In addition, to reduce product defects and risks of product returns, TSMC offers diverse courses to customers, sharing technical knowledges on high-voltage stress, burn-in, and screening. In 2023, TSMC shared quality-related information with 13 customers and worked closely on quality and reliability testing to ensure stable production lines and strengthen partnerships.

Thanks to qualification in technology development and innovative applications in semiconductor manufacturing services, as well as its continuous quality improvement culture introduced to suppliers and customers, TSMC had no product recalls initiated by customers due to safety concerns in 2023. Meanwhile, a third-party audit verified the effectiveness of TSMC's quality management systems in compliance with IATF 16949 and IECQ QC 080000 requirements. TSMC's advanced packaging testing fabs also continued to pass the certification of the American National Standards Institute ANSI/ESD (Electrostatic Discharge) S20.20 standard.

Development Focus of Quality Value Chain



TSMC develops efficient and energy-saving reliability evaluation method

Case Study

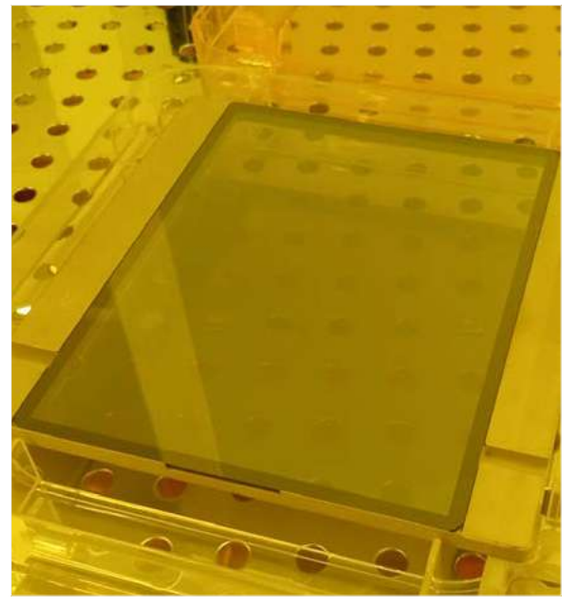
Development of High Transmittance EUV Pellicle Wins Three Patents

In response to the increasing demands for chips with 5nm node or below, EUV lithography has become an essential technology. In particular, reducing the EUV pellicle thickness and improving the transmittance can save the energy consumption of the EUV scanner and, in turn, improve the capacity. However, when the EUV pellicle becomes thinner, there may be thickness deviation, oxidation, and rupture risks. To ensure the technology leadership, in 2023, the Fab 3 Process Integration Department and EBO EUV Pellicle Project Department initiated a project to develop four major innovative concepts and technologies to break through the production bottleneck.

In terms of materials, TSMC added a layer of protection material by adopting the Perfect Ratio for Composites and the Innovative Double Layer Composite Technology to reduce the oxidation of pellicles and reduce the risk of uneven transmittance caused by oxidation. For manufacturing, TSMC added an angstrom-level control system before solvent etching by adopting the Wet Angstrom Level Thick Etching Self-Calibration Technology to adjust the time required for etching on a rolling basis during the process based on the deviation of tools to realize automated calibration, reduce the variation of thickness, and improve the stability of pellicle. For quality control, TSMC successfully developed the Customized Automated Measurement to replace manual operation with automated systems, avoiding the risk of rupture caused by mis-operation and improving the measurement quality.

In 2023, TSMC successfully introduced high-transmittance EUV pellicle into mass production, and the relative EUV transmittance was improved by 12%; thus, TSMC won three international patents, as well as the Golden Award and the Best Innovation Award under TCIA, realizing quality and technical innovations.

Innovative concepts/technologies		Improvement benefits	Achievement
Material	• Perfect Ratio for Composites • Innovative Double Layer Composite Technology	Reduce pellicle oxidation and improve transmittance	Introduced high-transmittance EUV pellicle into mass production
Manufacturing	• Wet Angstrom Level Thick Etching Self-Calibration Technology	Reduce the variation of thickness, and improve the stability of pellicle	Improved the relative EUV transmittance by 12% Won 3 global patents
Measurement	• Customized Automated Measurement	Avoid the risk of rupture caused by mis-operation	Achieved Gold Award and Best Innovation Award under TCIA



TSMC develops high-transmittance EUV pellicle, realizing quality and technical innovations

Customer Relations

React with Precise Response

Provide excellent customer service through close collaboration with customers and regular customer meetings/surveys to understand their requirements and respond to their feedback

Establish Virtual Fab Service

Provide comprehensive information promptly to ensure the success of customer's products; strengthen processes and systems to ensure that customer product information receives protection of the highest standard

2030 Goals	2024 Targets	2023 Achievements
Maintain a customer trust and satisfaction rating of over 90%[Note]	Maintain a customer trust and satisfaction rating of over 90%	✓ Customer trust and satisfaction rating of 94% Target: >90%
Reduce cases of problematic engineering quality to 20% of the level in 2019 for every one million 12-inch wafers shipped	Reduce cases of problematic engineering quality to 30% of the level in 2019 for every one million 12-inch wafers shipped	↑ Reduced cases of problematic engineering quality to 25% of the level in 2019 for every one million 12-inch wafers shipped Target: 30% of the level in 2019
Provide >1,200 wafer manufacturing and process technologies and >170 advanced packaging technologies in line with the TSMC technology roadmap	Provide >1028 wafer manufacturing and process technologies and >153 advanced packaging technologies in line with the TSMC	↑ Provided >994 wafer manufacturing and process technologies and >149 advanced packaging technologies in line with the TSMC technology roadmap Target: 994 wafer manufacturing and process technologies and 147 advanced packaging technologies
Pass customer product information security audits with no major flaws	Pass customer product information security audits with no major flaws	✓ Passed customer product information security audits with no major flaws Target: No major flaws

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note: To comprehensively evaluate the customer relations management, TSMC included the customer trust indicator in 2023, and the Company adjusted its long-term goal to "maintain a customer trust and satisfaction rate of over 90%"

Consistent innovation in technologies and the provision of highest quality are the keys to gaining customer trust. TSMC's vision is to become the world's largest and most advanced dedicated IC design and manufacturing service provider. To provide the optimal customer service experience, TSMC assembled service teams dedicated to customers to facilitate communication and coordination with customers. The Company also keeps implementing digital transformation and enhanced the TSMC Online™ user experience. In 2023, the customer trust and satisfaction rate reached 94% as TSMC provides premium technologies and services to improve the competitiveness of customer product, achieving a win-win situation.

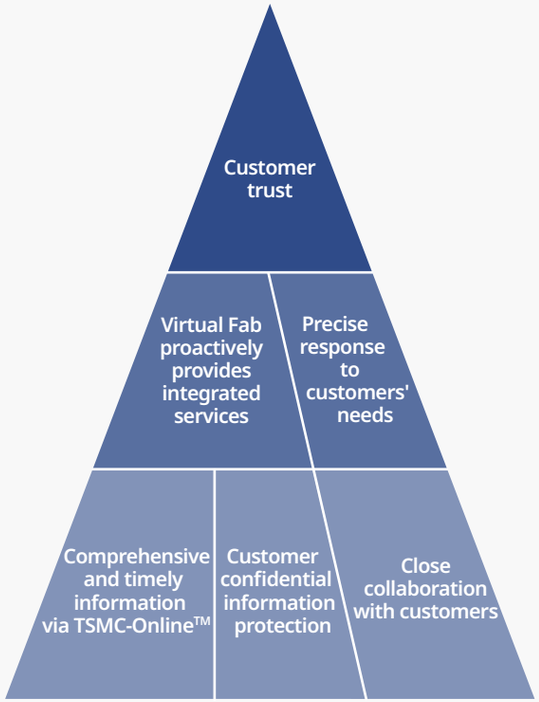
Precise Response

TSMC values customers' feedback and considers it as a reference to continuously improve service quality. The customer service teams obtain customers' needs and opinions through annual surveys, quarterly evaluations, and irregular meetings, and regularly reviews and analyzes them to propose improvement plans, strengthen the partnership between both sides. In 2023, TSMC conducted the annual trust and satisfaction survey with more than 200 customers and held over 100 quarterly evaluation meetings with more than 30 customers, hosting more than 1,500 online and offline meetings for the managerial level.

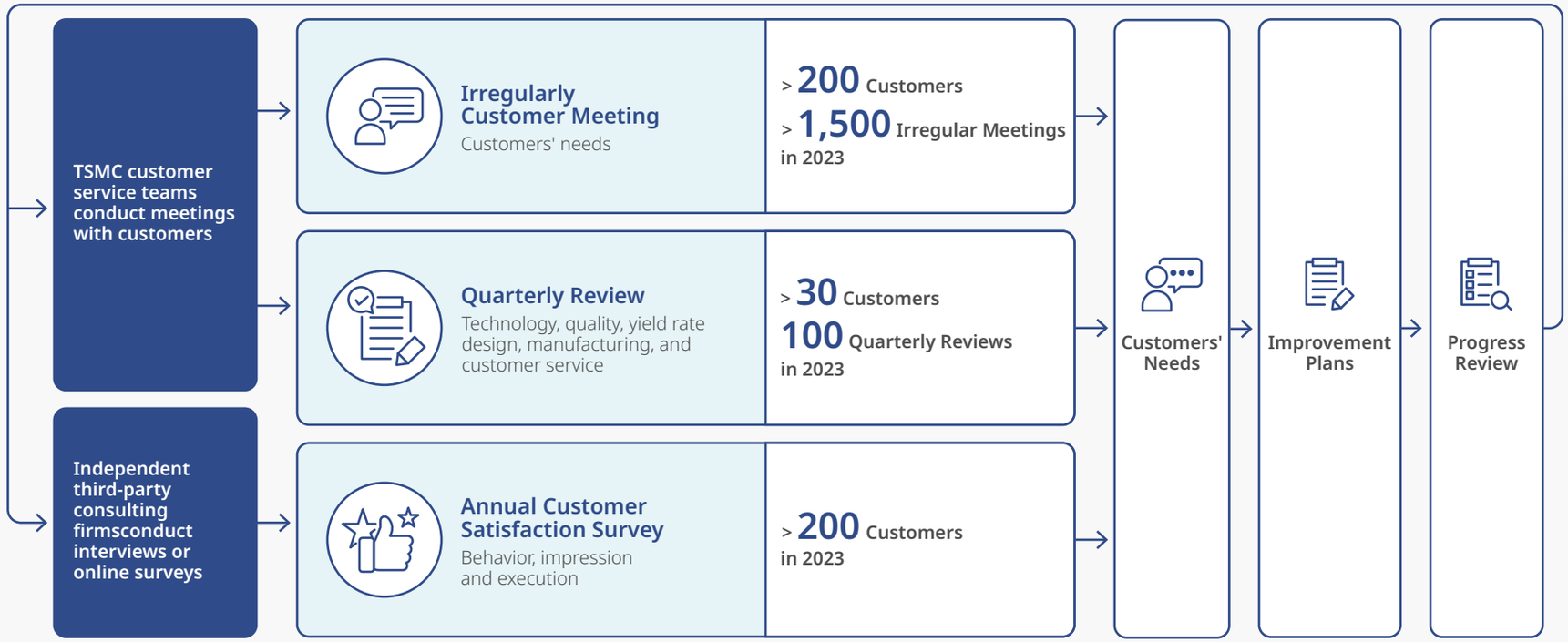
TSMC continues to collaborate closely with customers and achieved 91% customer satisfaction rate in 2023. To comprehensively measure the performance of customer relations management, TSMC adjusted the "customer satisfaction rate" to "customer trust and satisfaction rate" in 2023 and adopted a long-term goal to maintain an over 90% customer trust and satisfaction rate. In addition, TSMC is also advancing manufacturing technologies to achieve better quality and yield. In 2023, cases of engineering quality problem for every one million 12-inch wafers shipped were reduced to 25% of the level in 2019, exceeding the annual target of 30%. As such, the Company continued to strive for the long-term goal of 20% by 2030.

Effective communication is a management highlight for the customer relations of TSMC. To precisely understand customers' demand for the provision of diverse and comprehensive solutions, TSMC's customer service teams worked with domestic and overseas organizations to organize customer communication skill seminars. Through case discussions and exercises, the seminars will help the customer service teams master the crucial requirements of customers and respond effectively to improve the interaction quality. A total of five seminars were held in 2023 with 284 participants. Over 90% of participants agreed that the program can effectively improve the effects of customer communications and improve employees' daily work efficiency.

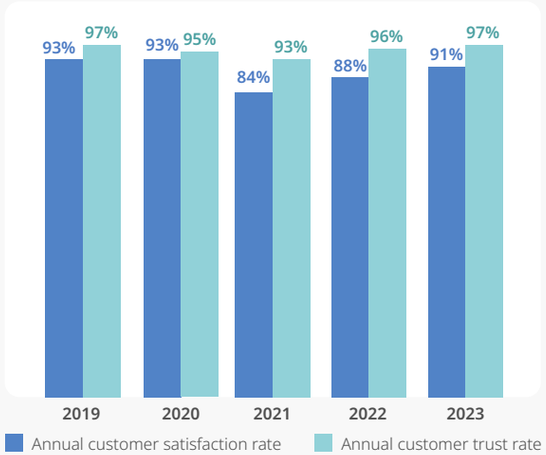
Customer Service Strategy



Various Communication Channels for Customers

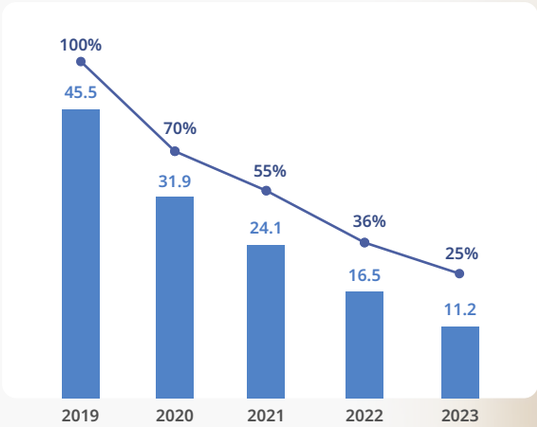


Annual Customer Trust and Satisfaction



Note: Figures for customer satisfaction rate include TSMC fabs in Taiwan and overseas subsidiaries

Cases of Problematic Engineering Quality for Every Million Wafers Shipped



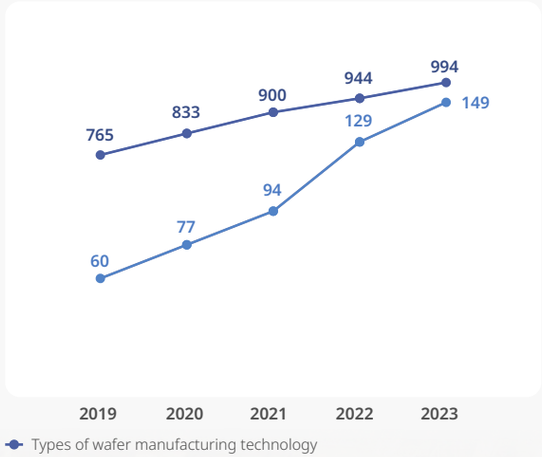
Virtual Fab

In response to the constant evolution of semiconductor designs and process technologies, TSMC upgraded TSMC-Online™ by adhering to the vision of Everyone's Foundry to allow customers to easily obtain and manage information related to wafer fabrication. In 2023, the monthly browsing rate of TSMC-Online™ exceeded 50,000 times, employing innovative digital collaboration to help improve the convenience and efficiency of the system.

In 2023, to accommodate the technology development roadmap and support diverse product demands from customers, TSMC provided over 994 wafer manufacturing technologies and over 149 advanced packaging technologies for customers. The Company also implements customer confidential information protection by complying with international regulations and standards and obtaining ISO 27001 certification, the international standard for information security management. TSMC has also implemented its Information Protection Policy and SOP to provide customers with the highest level of protection, just like their own factories, to protect customer interests.

TSMC is committed to delivering products of the highest quality and pursuing innovative, collaborative models based on the core value of Customer Trust and by adhering to customer-oriented services. As a trusted technology and capacity provider in the global logic IC industry, TSMC deems customers' success as TSMC's success to jointly create a sustainable operations in the future.

Types of Technology for Customers



Note: Figures for customer satisfaction rate include TSMC fabs in Taiwan and overseas subsidiaries

Case Study

TSMC Upgrades the User Experience of TSMC-Online™ to Serve as the Best Assistant for Customers in Product Management

To create the best customer service experience and allow customers to gain the information easily, TSMC continued to optimize TSMC-Online™. The User-centered Design (UCD) was introduced to reorganize the system structure. Through three new methods, including standard operation interface, personalized workspace, and intelligent guidance service, the convenience and execution efficiency of the system were improved to provide customized TSMC-Online™ experience.

Meanwhile, in response to the increasingly complicated semiconductor technologies and commercial models, TSMC provides services within the scope of product design, mask fabrication, wafer fabrication, and 3DFabric™. To help new customers rapidly understand the operations of different services, TSMC produced 10 tutorial videos for three service categories, introducing the service platform systems and operating models in detail to reduce the barrier to use.

In 2023, the survey results from 325 questionnaires regarding the TSMC-Online™ revision showed that the Company received over 6 out of 7 points positive rating. Over 70% of customers said that the revision has totally updated the users' experience, making it much more efficient to obtain information. Users can be fully familiar with the new operating interface within just one week.

Customer Feedback

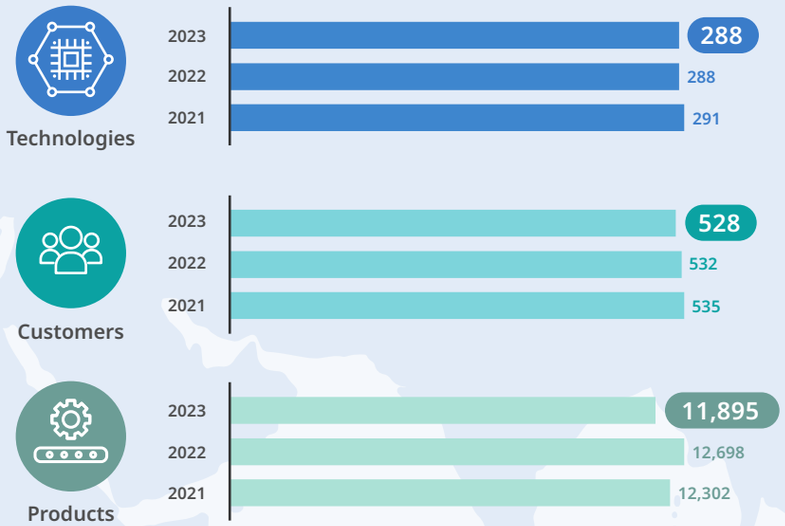
> **The new interface structure is clear, and the instructions are accurate, which allow me to rapidly find the information I need.**

> **The tutorial video is very useful, so I can easily learn how to use the system!**

TSMC Delivers Unrivalled Manufacturing Excellence

>16 Million

2023 total managed capacity reached over 16 million 12-inch wafer equivalents



	Fab 2	Fab 3	Fab 5	Fab 6	Fab 8	Fab 10	Fab 11	Fab 12	Fab 14	Fab 15	Fab 16	Fab 18
Technologies	22	61	24	49	42	42	22	74	80	30	11	10
Customers	60	118	59	151	159	148	34	135	259	182	47	25
Products	890	1,147	284	1,045	1,899	1,503	395	993	2,281	1,319	159	159

A Responsible Purchaser

98%

Response rate of the invited suppliers participated in CDP, with an average score of B-

2.2 Million

TSMC Supplier Sustainability Academy users

20 TWh

Pioneers joint procurement renewable energy program

> TSMC is committed to responsible purchasing and works closely with supply chain partners on technology, quality, delivery, human rights, and environmental protection. In the face of serious climate change challenges, the Company will further strengthen green innovation and climate resilience and strive to create a low-carbon semiconductor supply chain.

Sustainable Supply Chain

Sustainable Supply Chain

Improve Sustainability Risk Management

TSMC requires all suppliers to adhere to the TSMC Supplier Code of Conduct, taking actions to improve labor rights, safety and health, environmental protection, business ethics, and the efficiency of the management system; the Company has also taken the initiative to help suppliers continue to improve their core capabilities to reduce risks of disruption to business operations

2030 Goals	2024 Targets	2023 Achievements
Ensure 100% of tier 1 suppliers[Note1] stipulate Diversity, Equity and Inclusion policy or statement NEW	Ensure 40% of tier 1 suppliers stipulate Diversity, Equity and Inclusion policy or statement NEW	—
Annually ensure 100% of tier 1 suppliers[Note 1] complete the Sustainability Management Self-Assessment Questionnaire	Ensure 100% of tier 1 suppliers complete the Sustainability Management Self-Assessment Questionnaire	✓ 100% of tier 1 suppliers complete the Sustainability Management Self-Assessment Questionnaire Target: 100%
Ensure 100% significant suppliers[Note 2] receive Code of Conduct audits by RBA-certified agencies every year[Note 3]	Keep asking 70 significant suppliers receive third-party audits	✓ A total of 70 significant suppliers completed third-party supplier audits with an annual completion rate of 100% Target: 70 significant suppliers
Ensure 980 sessions of S.H.A.R.P. audits toward high risk significant suppliers at a pace of 120[Note 4] sessions a year	Keep asking 110 sessions of S.H.A.R.P. audits toward high risk significant suppliers	↑ Completed 148[Note 5] sessions of S.H.A.R.P. audits toward high risk significant suppliers Target: 100 sessions
Ensure a cumulative total of 300 raw materials suppliers[Note 6] participate in the annual emergency response drill (Base year: 2016)	Ensure a cumulative total of 210 raw materials suppliers participate in the annual emergency response drill	✓ 29 raw materials suppliers participated in the annual emergency response drill, bringing the cumulative total to 190 Target: Cumulative total 190
Ensure a cumulative total of 1,500 suppliers[Note 6] participate in the Environmental Safety and Health (ESH) training programs (Base year: 2016)	Ensure a cumulative total of 1,300 suppliers participate in the ESH training programs	↑ 194 suppliers participated in the ESH training programs, bringing the cumulative total to 1,154 Target: Cumulative total 1,050

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Tier 1 suppliers: Suppliers trading directly with TSMC with more than three orders per year, with order amounts exceeding NT$5 million. In 2023, 1,291 suppliers met the criteria. To comply with the questionnaire applicability, TSMC prioritized the 1,131 suppliers after excluding warehousing suppliers and suppliers that are no longer trading, etc.

Note 2: Significant Supplier: Suppliers accounting for the top 85% of the purchasing expenses or of a single-source purchase, or suppliers recognized as significant by TSMC after assessing multiple risk indicators, including the suppliers' market shares, inventory levels and characteristics, and potential environmental, social, and governance negative impact risks

Note 3: In response to field audits are no longer restricted by the epidemic, the long-term goal of achieving a completion rate of 100% every three years has been changed to an annual completion rate of 100%

Note 4: TSMC strengthened the supplier counseling function and conducted audits and assessments for new suppliers and suppliers with newly built factories. The sessions of S.H.A.R.P. audits will be increased from 100 to 120

Note 5: In response to the development of special process technologies and safety and health enhancement projects, 25 additional audits were conducted on relevant suppliers

Note 6: Mainly involving suppliers in Taiwan

Sustainable Supply Chain

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2030 Goals	2024 Targets	2023 Achievements
Ensure 100% high risk significant suppliers complete Safety and Health consultation	Ensure 100% high risk significant suppliers complete Safety and Health consultation	✓ Ensure 100% high risk significant suppliers complete Safety and Health consultation[Note 7] Target: 100%
Increase global local sourcing – 67.5% for indirect raw materials[Note 8] NEW	Source 63.6% of indirect raw materials locally NEW	—
Increase Taiwan local sourcing – 68% for indirect raw material[Note 9]	—	↑ Sourced 64.8% of indirect raw materials locally Target: 62.5%
Increase Taiwan local sourcing – 60% for spare parts locally	Source 41.0% of spare parts locally	— [Note10] Sourced 37.0% of spare parts locally Target: 44.5%
Continue to diversify production plant sites and assess new suppliers; develop 185 multi-source supply solutions (Base year: 2018)	Complete the development of 155 multi-source supply programs	✓ Completed the development of 145 multi-source supply programs Target: 145 programs
Ensure a cumulative total of 145 local raw materials suppliers receive consultation on process advancement and quality improvement (Base year: 2016)	Ensure a cumulative total of 85 local suppliers receive consultation on process advancement and quality improvement	✓ Ten suppliers received consultation on process advancement and quality improvement, bringing the cumulative total to 75 Target: 10; cumulative total 75
Supplier due diligence on responsible mineral sourcing: 100% of the minerals used are sourced responsibly	Supplier due diligence on responsible mineral sourcing: 100% of the minerals used are sourced responsibly	✓ 100% responsible mineral sourcing Target: 100%
Audit a cumulative total of 30 suppliers (≧ 3 suppliers per year) for due diligence on responsible mineral sourcing	Complete audits on ≧ 3 suppliers for due diligence on responsible mineral sourcing	✓ Completed audits on 3 suppliers for due diligence on responsible mineral sourcing Target: ≧ 3 suppliers

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 7: In 2022, TSMC audited 100 high risk significant suppliers, among which four suppliers scored below 70 (suppliers with an audit score below 60 will have their qualification revoked) for Safety and Health and had received consultation; guidance has been completed in 2023

Note 8: To strengthen local supply chain resilience, enhance the local economy, and reduce carbon emissions during transportation, TSMC has expanded the goal scope for indirect raw materials local sourcing globally, focusing on TSMC's major operational production fabs (TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and TSMC Washington, LLC)

Note 9 : In response to the new goal of increasing the proportion of global local sourcing of indirect raw materials, this goal will be merged with it in the next year

Note 10: In 2023, the proportion of spare parts in advanced process increased compared to previous years. However, the localization of spare parts in advanced process is still in the development stage, so the annual target has not been reached

Sustainable Supply Chain

Promote Green and Low-carbon Supply Chains

TSMC continues to reduce its environmental impact and external costs, mitigate the effects of climate change and resource depletion by leading suppliers in establishing reduction targets on power and water consumption, waste generation, and carbon emissions, propelling the sustainable development of supply chains

2030 Goals	2024 Targets	2023 Achievements
Reduce supplier[Note 11] carbon emissions by 30% from what they would be in the absence of action (i.e., Business as Usual (BAU) scenario)	Reduce supplier carbon emissions by 4% comparing to BAU scenario	NEW Reduced supplier carbon emissions by 2% comparing to BAU scenario
Suppliers invited to participate in CDP in the year should achieve an average score of B and a response rate of 95%	Suppliers invited to participate in CDP in the year should achieve an average score of B- and a response rate of 98%	↑ Suppliers invited to participate in CDP[Note 12] in the year achieved an average score of B- and a response rate of 98% Target: average score of C and a response rate 85%
Ensure 100% of high energy consumption suppliers[Note 13] receive ISO 14064 GHG Emission verification (Base year: 2021)	Ensure 88% of high energy consumption suppliers receive ISO 14064 GHG Emission verification	↑ 84% of high energy consumption suppliers received ISO 14064 GHG Emission verification Target: 70%
Provide consultation on power reduction for suppliers[Note 6] and reduce energy consumption by a total of 1,500 GWh (Base year: 2018)	Reduce supplier energy consumption by a cumulative total of 900 GWh	↑ Reduced supplier energy consumption by a cumulative total of 810 GWh Target: 550 GWH
Provide consultation on water reduction for suppliers[Note 6] and reduce water consumption by a cumulative total of 150 million metric tons[Note 14] (Base year: 2020)	Reduce supplier water consumption by a cumulative total of 50 million metric tons	↑ Reduced supplier water consumption by a cumulative total of 42.58 million metric tons Target: 30 million metric tons
Reduce waste production among local major suppliers[Note 15] by 42% (Base year: 2014)	Reduce waste production among local major suppliers by 40%	↑ Reduced waste production among local major suppliers by 39% Target: 35%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 11: The suppliers are raw material suppliers, including silicon wafers, bulk gases, bulk chemicals and other chemical suppliers

Note 12: Suppliers invited to participate in CDP in 2023: A total of 135 suppliers of raw materials and equipment met the top 75% of procurement categories and expenditures

Note 13: High energy consumption suppliers: Suppliers in Taiwan whose energy consumption at a single site >5 GWh/year

Note 14: As the sharing of TSMC's excellent water conservation measures has produced comprehensive benefits in recent years, the 2030 goal has been raised from 35 million tons to 150 million tons

Note 15: Mainly focusing on suppliers in Taiwan producing 80% of the waste in raw materials. Calculation formula: A/(A+B)(%); A: waste reduced by the factory in that month (metric tons); B: waste produced by the factory in that month (metric tons)

TSMC expands the responsible governance model to supply chain management. In 2023, TSMC referred to the Due Diligence Guidance for Responsible Business Conduct issued by the Organization for Economic Cooperation and Development (OECD) to improve its four guiding principles: Management and Commitment, Identification and Assessment, Mitigation and Improvement, and Communication and Cooperation. TSMC continued to uphold two main strategies to build a sustainable supply chain: Improving Sustainability Risk Management and Promoting Green and Low-carbon Supply Chains. The Company required suppliers to adhere to the TSMC Supplier Code of Conduct and carried out the first human rights and DEI (Diversity, Equity, Inclusion) inventory for Tier 1 suppliers, encouraged them to establish DEI-related policies or statements, and included it in the long-term goal of TSMC. Meanwhile, the company reinforced its local sourcing management to expand the scope of goal for raw material local sourcing globally. In addition, TSMC joined hands with the supply chain to reduce the environmental impact, prompting suppliers to set reduction targets for power reduction and water consumption, waste generation, and carbon emissions, and improve the climate resilience. In 2023, TSMC launched the Joint Procurement of Renewable Energy Project, 1+N Carbon Management Project, Environmental Recycled Box, and multiple projects to strive for the net zero emissions goal.

Supplier Sustainability Management Organization

Building a responsible supply chain is one of the Five TSMC ESG Directions. To implement the sustainable development of the supply chain, the ESG Steering Committee has formulated the ESG vision and strategies, and the ESG Committee implements such decisions. The Materials Management Organization and the Corporate ESH (Environment, Health, and Safety) Division have established a dedicated unit, including Responsible Supply Chain ESG Management Team, Supply Chain Sustainability Program Team, and Supply Chain ESH Management Team, to implement various ESG actions and audit management of suppliers, for which the scope covers Fabs in Taiwan and overseas subsidiaries, and the ESG Committee Chairperson shall regularly report to the Board on the supply chain performance, supplier ESG programs and risk management progress.

Four Guiding Principles of Sustainable Supply Chain Management

Management and Commitment

TSMC requires suppliers to comply with the TSMC Supplier Code of Conduct and the DEI spirit and extend the scope of management to their upstream suppliers; meanwhile, the company improves the sustainability awareness of its procurement buyers and internal colleagues to enhance the sustainability guidance capacity

Identification and Assessment

TSMC formulates the cooperation standards for new suppliers, performance and risk evaluation, selection and management practices to ensure that the suppliers comply with the standards in all aspects, and relevant countermeasures are established separately

Mitigation and Improvement

Invest resources in factory construction plans during the suppliers' factory construction stage and improve suppliers' resilience through on-site audits, improvement consultation, regular follow-ups, and energy-saving and carbon reduction recommendations

Communication and Cooperation

Conduct supplier engagement through Supply Online 360, TSMC Supplier Sustainability Academy, Supply Chain Employee Grievance Channel, and diversified methods to bring joint improvement via mutual communication

Improve Sustainability Risk Management

To reduce the operating risks of the supply chain, TSMC strictly evaluates, selects, and guides suppliers. The company establishes sustainable management systems, procedures, and countermeasures to continuously drive suppliers to improve their sustainable performance and enhance the supply chain resilience, thereby preventing possible losses and minimizing potential impacts and effects. TSMC actively communicates and cooperates with its upstream suppliers to expand its sustainable influence.

Improvement in Supplier Sustainability Management

Supplier Code of Conduct and Diversity and Inclusion

As a member of the Responsible Business Alliance (RBA), TSMC has established its Supplier Code of Conduct according to RBA's Code of Conduct. All new suppliers shall execute the Code to gain the qualification for cooperation. TSMC requires Tier 1 suppliers to comply with the Code of Conduct while encouraging them to ask their upstream suppliers, contractors, and service providers to adopt the same Code in their practices and management.

In 2023, TSMC took the initiative to promote the awareness of Diversity, Equity and Inclusive (DEI) to the supply chain. For the first time, the issues of supply chain DEI was included in TSMC's long-term goal. The company also had its first suppliers obtain the Women-owned Businesses certificate, demonstrating its commitment to creating a sustainable supply chain with DEI spirit. Meanwhile, TSMC performed an inventory of Tier 1 suppliers' current status regarding eight types of human rights and the DEI topic. In accordance with the Human Rights Risks in Business Operations compiled under the United Nations Development Programme (UNDP), TSMC selected issues related to the operating risks, designed and distributed the Supply Chain

Human Rights Supplemental Questionnaire to further grasp the progress of the supply chain on human rights and DEI topic.

Supplier Management Workforce Training Program

The supplier management workforce serves as TSMC's primary interface with suppliers and holds a critical role in driving improvements in their sustainability efforts. To improve supplier management workforce 's understanding of supplier management and carbon disclosure, TSMC organized a supplier sustainability audit course and two sessions of online CDP Supply Chain Program course in 2023. All employees who participated in the sustainability audit course completed the training to enhance the awareness and capabilities of supplier audits.. By offering the CDP Supply Chain Program course, TSMC has strengthened its ability to lead suppliers, resulting in a response rate of the year achieved 98% to the CDP. TSMC estimates to launch Supply Chain Carbon Management, Corporate Carbon Inventory and Disclosure, Product Carbon Footprint, and DEI courses in 2024 to further improve the sustainability knowledge and capacity required by supplier management workforce and consolidate the partnerships with suppliers.

Supplier Selection and Assessment

New Supplier Collaboration Evaluation

To ensure that cooperations with suppliers are just, transparent, and compliant with the code of ethics, TSMC implements the new supplier collaboration evaluation. Prior to any collaboration, it is necessary to conduct assessments such as the Dun and Bradstreet Business Credit Reports and Natural Person Judicial Records to ensure the business capacity and ethical conduct of suppliers. Meanwhile, TSMC requires suppliers to execute the TSMC Ethics and Supplier Code of Conduct Compliance Statement to ensure the legality and legitimacy of their business activities. In addition, TSMC also entered into the Supplier Agreements and Electronic Transaction Declaration with suppliers to protect both parties' benefits and ensure smooth cooperation. TSMC improves the quality and sustainability of the supply chain through the new supplier collaboration evaluation to lay a solid foundation for long-term development.

Supplier Performance Evaluation

Once a supplier is qualified, TSMC carries out the supplier performance evaluation based on five major aspects of Quality, Cost, Delivery, Service, and Sustainability (QCDSS) by different raw material categories. Relevant units rate Key Suppliers quarterly, convene the rating discussion meeting bi-annually, and conclude the rating at the end of each year. The ratings are provided to the units of TSMC for reference, and the company provides feedback to suppliers in terms of items of appraisal or improvement.

Payment Practice

TSMC values the payments to all our partners. To avoid any delay in payments, TSMC strictly manages and controls the process of different stages, including procurement requirements, procurement orders, delivery, acceptance, payment requisition, and payment, and continues to improve its practices based on the feedback received from stakeholders. The company ensures the payments are completed as scheduled through the investigation of the reason for delays, regular follow-ups, and proposing substantial improvement measures. In 2023, TSMC made payments according to the agreements between both parties. For information on other accounts payable, please refer to 6.1 Financial Overview in TSMC's 2023 annual report.

Supplier Sustainability Audit

Course	Form	Achievement
• Introduce the Supplier Management Guidelines by way of workshops • On-site audit skills and case study • Case exercise and report sharing	Physical **Participants** 56 participants	• Enhance the awareness and capability of TSMC auditors/inspectors on supplier sustainability management • 56 participants completed the training, among which 38 and 18 participants obtained the inspection and auditor qualification, respectively

CDP Supply Chain Program

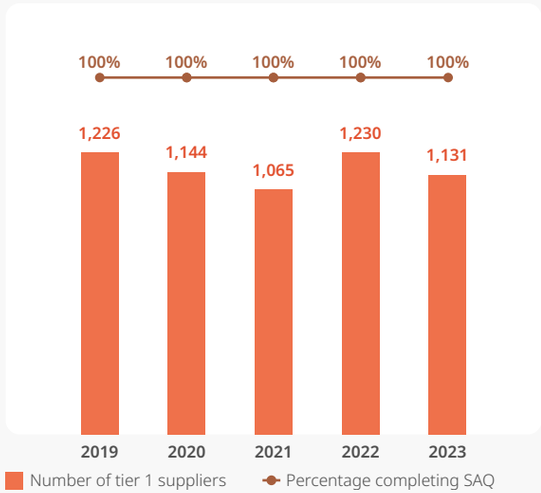
Course	Form	Achievement
• Benefits of participating in CDP Supply Chain Program • Benefits of Environmental information disclosure • Suppliers' CDP targets and requirements • Disclosure process and Q&As	Online **Participants** 40 participants	• Help procurement workforce learn the knowledge and necessity of environmental information disclosures • With the active communications via procurement workforce, the response rate of suppliers' CDP questionnaires increased from 81% in 2022 to 98% in 2023

QCDSS	Quality	Cost	Service	Delivery	Sustainability
The Materials Management Organization		✓	✓	✓	✓
Advanced Analysis and Material Center	✓				
Nanometer Material Center	✓				
Corporate ESH Division					✓

Supplier Risk Assessment, Selection, and Management Practices

To gain an in-depth understanding of the status of supply chain development and mitigate potential risks, TSMC formulated the Supply Chain Three-phase Risk Assessment and Selection and implemented management practices accordingly. According to the survey results of the 1,131 Self-Assessment Questionnaires (SAQ) from Tier 1 suppliers in Phase 1, for Ethical Risk Elements, 7% of suppliers do not have an anonymous reporting channel for ethical problems or violations. For Safety and Health, 5% of suppliers have not reviewed their health and safety management system via internal audits. Regarding Fire Protection Equipment Design, 1% of suppliers had not established a monthly fire protection equipment inspection and maintenance plan. Apart from the existing SAQ items, TSMC added Biodiversity and Human Rights Risks and Management in 2023 to expand the risk assessment aspects of suppliers.

Self-Assessment Questionnaire Results



According to the assessment results in 2023, there were 579 significant suppliers (362 significant suppliers in Tier 1 (with the procurement amount accounting for 85%) and 217 significant suppliers in non Tier 1 who are smelters), among which 86 were high risk significant suppliers. Suppliers with potential risks all implemented improvement plans, and TSMC did not stop cooperating with any supplier due to substantial and negative effects. Regarding the audit deficiencies of high risk significant suppliers, corrective and preventive measures were provided, and TSMC continued to track up to the closure. Furthermore, to keep abreast of the operating status of significant suppliers in non Tier 1, TSMC also requires suppliers to provide due diligence documents to ensure there is no risk of human rights infringement and environmental damage.

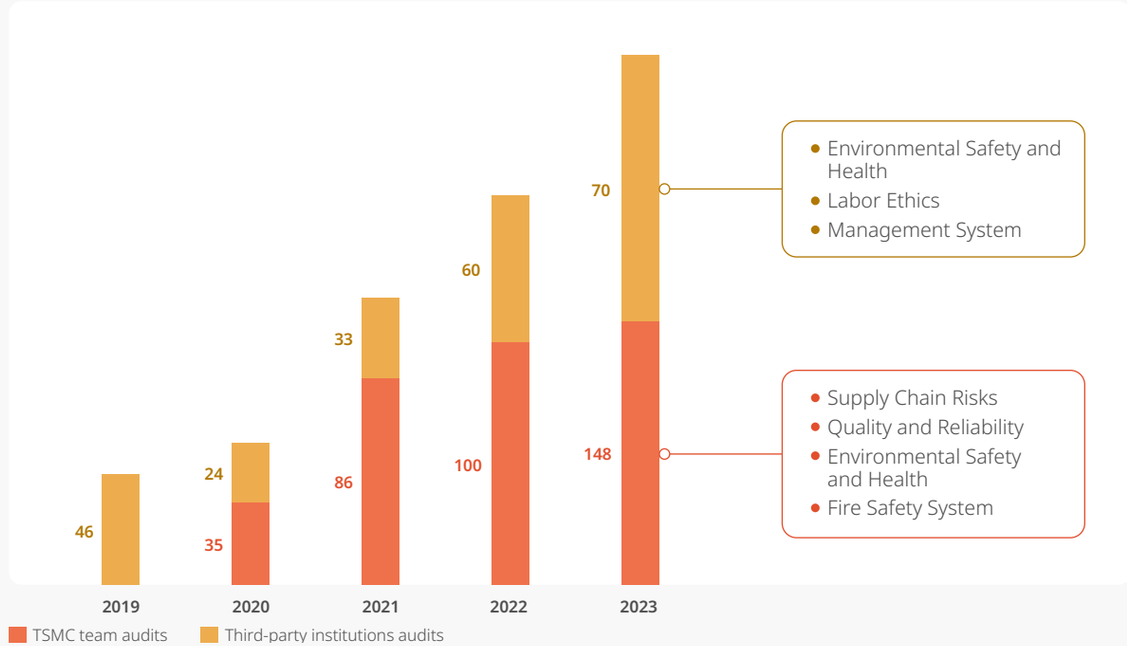
Supplier Audit and Consultation Program

Audit Implementation and Continuous Improvement

After identifying risks using the Supplier Risk Assessment Form, TSMC conducts on-site or remote audits focusing on the six major categories of Supply Chain Risk, Quality and Reliability, Environmental Safety and Health, Fire Safety System, Labor Ethics, and Management System through its Supplier Healthiness Assessment Rectification Program (S.H.A.R.P.) to determine potential risks and opportunities. TSMC requires suppliers to propose improvement plans and schedules and to be regularly counseled and monitored on their progress. TSMC launched a Supplier Healthiness Assessment Rectification Program (S.H.A.R.P.) for high risk significant suppliers in an effort to ensure continuous operations and enhance the sustainability of the supply chain and risk management. The Supply Chain Sustainability Project Team and the Supply Chain ESH Management Team formed the audit team to carry out a comprehensive health inspection together with a third-party institution. The content of the audit compiled the audit items for suppliers from different fields of TSMC. Six major categories were adopted as the core to continue improving and advancing with a commitment to improve suppliers' capacity and resilience. In addition, the Company has further extended audit projects such as focus consultation, the New Factory Construction Plan, and the Maintain the Old as the New project to constantly strengthen suppliers' self-management awareness and improvement ability. In 2023, TSMC conducted 218 audits for high risk significant suppliers (148 audits by TSMC and 70 audits by third-party Institutions) according to the Supplier Sustainability Standard and RBA standards to properly track the risk status of the suppliers and improve their operational sustainability. By these actions, TSMC can ensure stable materials supply and services, provide a safe and healthy workplace, and minimize environmental and social impact.

TSMC's expert team visits the supplier's factory to examine the operating status of the nitrogen generator

S.H.A.R.P.



Supply Chain Three-phase Risk Assessment and Selection

Phase 1 All Suppliers

Based on the business relationship between TSMC and suppliers, conduct investigations and analyze the categories of supplier products and services (direct and indirect raw materials, equipment, facilities, and outsourcing vendors, etc.) and their locations. Use major criteria to screen out the Tier 1 qualified suppliers and require them to examine their own performance on business, environment, society, governance, sector-specific, commodity-specific, country-specific, and sustainability and potential risks through SAQ

Individual Management Practices

All suppliers shall execute the TSMC Supplier Code of Conduct and comply with TSMC's risk management requirements to build continuous operation capacity

Phase 2 Significant Suppliers

Based on the results of the tier 1 suppliers SAQ investigation, significant suppliers will be screened based on the comprehensive risk indicators such as "accounting for 85% of procurement expenditures, single procurement source or market share evaluation, product inventory level and characteristics, potential environmental, social, and governance negative impact risks," and they will be included in the annual audit candidate list

Individual Management Practices

Significant suppliers need to complete the SAQ survey and be included in the list of annual audit candidates. Even if suppliers with audits completed are not included as the audit target for the following year, TSMC continues to track their improvement practices

Phase 3 High Risk Significant Suppliers

Identify high risk significant suppliers via the Risk Assessment Form, for which the aspects considered include whether their business, environment, society, governance, sector-specific/ commodity-specific, country-specific, and sustainability have the risk of potentially negative impact. On-site, remote, or document audits are also performed to ensure all risks are under control and improved

Individual Management Practices

Understand the actual risk status through on-site (including re-audit and focus consultation), remote, or document audits and propose corresponding improvement measures within the prescribed period according to the audit results

Supplier Risk Assessment Form

Aspect	Content
Business	Suppliers trading directly with TSMC with more than three orders per year, with order amounts exceeding NT$5 million that fulfill the requirements for suppliers accounting for the top 85% of the purchasing expenses
Environmental Protection	Wastes, wastewater, stationary pollution sources, and toxic chemical management measures defined in environmental protection regulations
Safety and Health	Suppliers' fab safety and health risks, number of employees, use of chemicals, dangerous machinery and equipment management, and dangerous workplaces, etc.
Fire Protection	Suppliers' fab fire risks, fab area, high-risk production tools, and public hazardous control multiples, etc.
Society	Material anomalies and law/requirement violation records, labor and human right risks management (i.e., avoiding discrimination, lengthy working hours, and the provision of maternity protection, etc.)
Governance	Avoid corruption, bribery, infringement, conflicts of interest, and revenge. Focus on fair trade, privacy, identity confidentiality, information disclosure, and other ethical elements in the TSMC Supplier Code of Conduct
Industry	Conflict minerals, supply chain resilience, industry risks
Product	Product risks, quality and reliability, process technologies, management systems, transportation logistic models, and other risks
Region/Country	Risk identification taking into account geopolitics, conflicts, natural disasters, and climate change
Sustainability	Acquisition of ISO certifications, achievements related to carbon reduction and water conservation, and climate risks

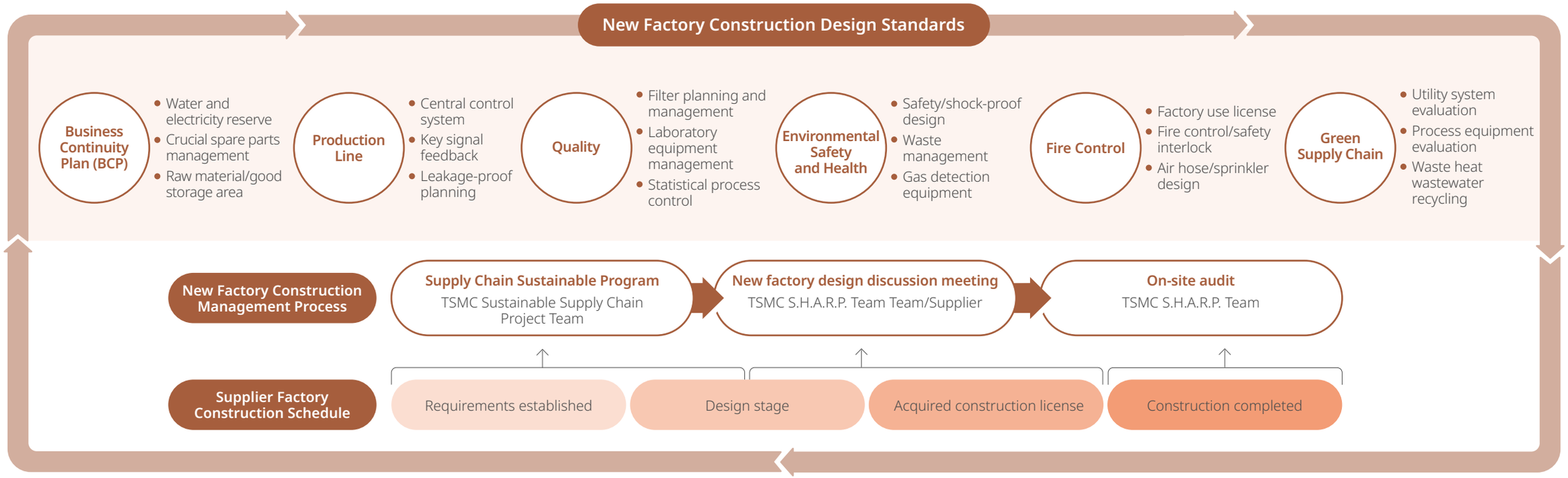
Case Study

Suppliers' New Factory Construction Plan for Supply Chain Upgrade and Carbon Reduction

To ensure the quality of factories/production lines of suppliers, TSMC formulated new factory construction management processes to include its requirements during factory design to avoid the cost of changes arising from non-compliance with the standards, and it complies with the stage operations of the factory construction schedule. Through status check via questionnaires, discussions, and on-site audits after the construction completed, TSMC ensured that suppliers implemented the new factory design directions. TSMC completed 11 factory audit sessions in 2023, and has completed a total of 31 sessions since 2021.

TSMC formulated the design standards for new factory construction according to governmental regulations, Best Known Method (BKM), and audit experiences and examined the application each year to ensure that the standards are aligned with the practical applications. The design standards formulated in 2023 cover the six major aspects, including the BCP, Production Line, Quality, Environmental Safety and Health, Fire Control, and Green Supplier Chain, and TSMC participates when suppliers' factory construction requirements are established. From design to construction license acquisition stages, TSMC leads the new factory upgrades and ensures compliance with requirements through on-site audits after the completion.

In addition, TSMC progressively introduced energy-saving plans into the six major aspects for new factory design standards in 2023 and replaced aluminum alloy with fiberglass reinforced plastic in cooling water towers during the factory design stage of total 25 factories, which is estimated to reduce carbon by 4,866 tons/year, cooperating with suppliers to implement net zero.



2023 High Risk Significant Suppliers Audits and Areas for Improvement

Auditors

TSMC S.H.A.R.P. Team and RBA-certified Third-Party Institutions

Audit Sessions

218
sessions toward high risk significant suppliers

Audit Methods

197
on-site sessions

21
remote sessions

	Distribution of Audit Violations	Major Audit Findings	Improvement Results of TSMC Suppliers
Supply Chain Risks	20% / 65% / 15%	• Unexpected suspension and quality anomaly without comprehensive countermeasures • Lack of systems and personnel management mechanisms for critical parts and components, and there is no safety inventory management • Fail to perform the inventory for parts and components based on the importance of the process and the availability difficulty	✓ Establish a comprehensive internal failure analysis, emergency response procedures and exercises, and customer reporting system within the deadline ✓ Have dedicated personnel manage crucial parts and components and establish a regular review system and the corresponding safety inventory for different items ✓ Establish a companywide part and component inventory list and include delivery date and change frequency into consideration
Quality and Reliability	14% / 67% / 19%	• Poor planning and design related to the production line installation resulted in quality issues • There are no monitoring points and control plan established for the detailed parts of product manufacturing • Inappropriate production line process management resulted in variation risks	✓ Reinforce the preventive maintenance (PM) management procedures and examine the poor design points of all processes (i.e., chemical residual, pollution source management, corrosion management, and leakage risks) ✓ Perform total check for the accuracy of the specification of all quality nodes and the corresponding processes ✓ Confirm the non-compliance part of relevant procedures and forms and make corrections to ensure process consistency
Fire Safety System	6% / 34% / 60%	• Poor fall risk management as there are no comprehensive fall prevention measures • No interlock device or appropriate protective cover or shield is installed for equipment with clamping risks • Personnel failed to wear personal protective equipment accurately	✓ Install lifeline, guard bars, and anchor points, and personnel shall wear safety belts that are hooked the entire time ✓ Install physical protective measures and implement regular inspections to ensure effectiveness ✓ Establish personal protective equipment and the list of corresponding operations and re-perform education and training
Environmental Safety and Health	11% / 48% / 41%	• Explosion-proof electric apparatus and explosion-proof pipes are not used for the electrical equipment in the explosion-proof zone • No firestops in the destroyed area of fire zone or incorrect construction method • For the fire alarm system test, the speakers are not connected and have no sound	✓ Examine all electrical equipment in the explosion-proof zone and use accurate explosion-proof electrical apparatus and certified construction methods ✓ Conducted a factory-wide inspection and filled the openings passing through the fire zone with firestops according to the certified construction method ✓ Check and repair the disconnected circuit of speakers and add the broadcasting function test on the fire inspection checklist
Labor Ethics	4% / 23% / 73%	• There are no remedial regulations for child labor exploitation in place • There are no policies related to the prohibition on whistleblower retaliation in place	✓ Establish remedial regulations to handle cases of child labor exploitation ✓ Establish policies related to the prohibition of whistleblower retaliation and implement the internal whistleblowing system
Management System	8% / 92%	• There are no risk management processes for identification, assessment, monitoring, control, communication, and update in place • There are no document and record control processes in place	✓ Establish comprehensive risk management processes to use in identifying, assessing, and reducing/mitigating/controlling risks of labor ethics and environmental safety and health ✓ Establish document and record control processes and specify appropriate access levels to protect privacy

Priority findings[Note 1] Major findings[Note 2] Minor findings[Note 3]

Note 1: Priority findings may present higher risks of production halt, life, serious illegal affairs, or systematic failure. For example: lacking a response mechanism for an unexpected halt in production lines, environmental pollution, hiring child labor, or forced labor

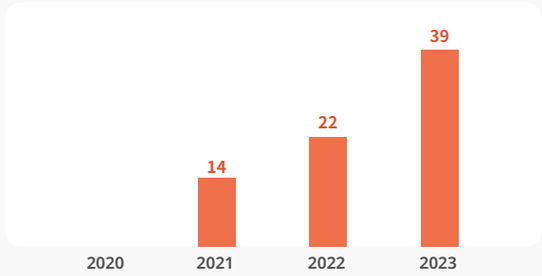
Note 2: Major findings refer to significant differences between implementation and proper ESH procedures, such as daily operations not adhering to ESH procedures

Note 3: Minor findings refer to risks other than priority or major violations, such as incomplete training records or incomplete ESH procedures

Re-audit and Focus Consultation Projects

To reinforce the improvement achievements of the six major categories, including Supply Chain Risks, Quality and Reliability, Environmental Safety and Health, Fire Safety System, Labor Ethics, and Management Systems, TSMC helps suppliers improve their achievements through re-audit and focus consultation projects. Short-, medium-, and long-term improvement plans are launched to solve the problems from previous audits. In addition, the focus consultation was implemented to address the important issues such as unexpected failures, standardization of filter and consumables management. Meanwhile, Suppliers were required to formulate a business Continuity Plan (BCP), conduct regular drills, and formulate contingency measures to minimize the potential risks of emergencies. A total of 39 re-audits were completed in 2023.

Number of Suppliers Re-audited Over the Years



Supplier Re-audit Process and Results

Summarize Findings from the Previous Audit

- The process quality is unable to align with the process node evaluation requirements of TSMC
- The preventive repair and maintenance and quality control system are not comprehensive
- Emergency response rules and exercises are incomplete
- Crucial parameters that affect the suspension of production lines lack control

Arrange for Re-audit

Pre-communication

- Improvements in the findings from the previous audit were not as expected, so an improvement consensus was reached with the suppliers
- Focus consultation direction was explained on-site to make sure all levels employee of suppliers understand the target in order to implement improvement measures

General Rules for Re-audits

- Implement a regular tracking mechanism to set up and review operating procedures
- Provide consultation and ensure the operational standards comply with suppliers' needs

Improvement Result in 2023

- Alter the design to align with the process development
- Enhance 18 preventive repair and maintenance quality management systems
- Establish SOP for emergency anomalies of products and services and add five event learning items
- Improve 16 management systems to ensure the stable operation of production lines

Improvement in Suppliers' Resilience and Capacity

To improve suppliers' resilience and sustainability, TSMC actively performed supplier engagement through diverse channels, including the organization of forums, workshops, education and training, online and offline programs, audit and guidance, Supply Online 360, TSMC Supplier Sustainability Academy, and grievance channel. The Company shares ESG resources with suppliers to reinforce the cooperation to achieve stable and firm partnerships.

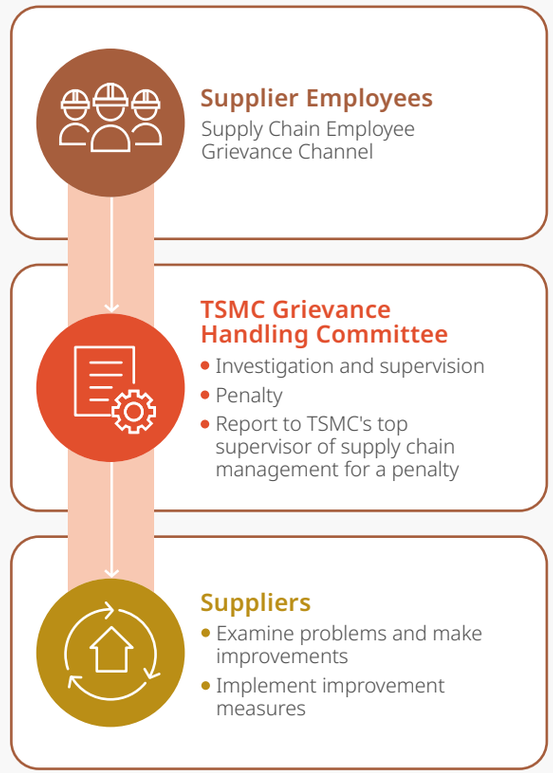
TSMC Supplier Sustainability Academy

Based on the operating and manufacturing experiences, TSMC has planned seven major programs with 80 courses that are launched in the TSMC Supplier Sustainability Academy for suppliers and general citizens to learn free of charge. As of 2023, 2.2 million people have used these resources. To enforce green practices throughout the supply chain and create a diverse and friendly environment, "the Enterprise Carbon Inventory" course is included in the compulsory courses for Tier 1 suppliers, and DEI-related courses are also planned to be added. In addition, TSMC further connected the internal contractor construction management system of its fabs worldwide, offered an online work permit application process, and controlled the construction qualification for high-risk operation suppliers to minimize potential industrial safety risks. In 2023, it also planned 10 online courses based on the "TSMC Contractor ESH Bluebook" to reduce the time and cost to travel for physical courses; the courses are expected to be fully released in 2024.

Suppliers' Reporting Procedure

TSMC values people above all else and has established a Supply Chain Employee Grievance Channel on Supply Online 360 that is available to all employees of suppliers and offers protection for them. The grievance channel keeps whistleblowers' identity and case-related information confidential and builds a more inclusive work environment for the supply chain. In 2023, there were nine reported cases, of which three were on-site operation questions, three were labor issues, one was a remuneration-related dispute, and one had incomplete information. TSMC verified with the whistleblowers immediately after the reports, appointed responsible units to make arrangements, and required suppliers to make improvements according to the TSMC Supplier Code of Conduct.

Reporting Procedure



Improvement in the Management of the Supply Chain on Environmental Safety and Health

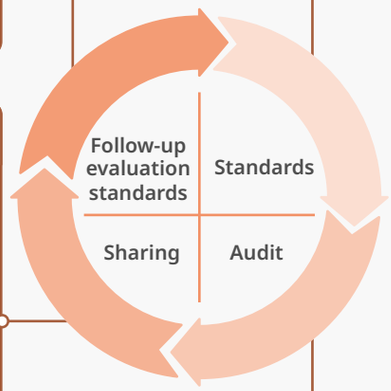
TSMC established four major steps, including Standards and System Establishment, Audit and Violations Tracking, and Consultation and Training and Supplier Follow-up Consultation, to improve the self-management capacity of suppliers on environmental safety and health. In 2023, the Company organized the "Sustainable Supply Environment, Safety and Health Forum," multiple counseling courses, and workshops with diverse topics, and also adopted the tabletop exercise for the first time in the Fire Response Workshop. Through hands-on teaching, group discussion, and practice by professional lecturers, the self-management capabilities and learning performance of suppliers are optimized. In addition, to improve suppliers' ESH and carbon inventory capacities, TSMC established interactive courses on common shortcomings in ESH and relevant improvement measures as well as product carbon footprint to provide learning opportunities for suppliers through the TSMC Supplier Sustainability Academy, empowering their low-carbon operations.

Supplier Follow-up Consultation

- Significant supplier focus consultation
- Follow-up evaluations for high-fire-risk suppliers
- Supplier Senior Executice Environmental, Safety and health (ESH) Improvement Program NEW

Standards and System Establishment

- Constantly update the Supplier Code of Conduct and Sustainability Standards
- Supplier leadership commitment to the Code of Conduct and Sustainability Standards
- Introduce fire protection and ESH design to new factories
- Establish supplier ESH risk matrix NEW
- Establish GHG inventory Guidelines NEW



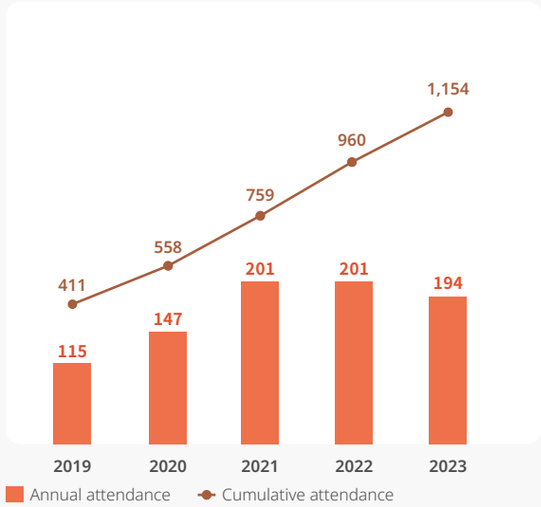
Consultation and Training

- ESH Workshop
- Fire Response Tabletop Exercise Workshop NEW
- Fire Protection Autonomous training
- Supplier Carbon Inventory Workshop
- ESH common flaw and improvement workshop NEW
- Supplier Product Carbon Footprint Inventory Workshop NEW
- Sustainable Supply Chain Environment, Safety and Health Forum
- Fire Safety Practice and Operational Training
- Emergency Response Observation
- Energy Saving and Carbon Reduction Guidance

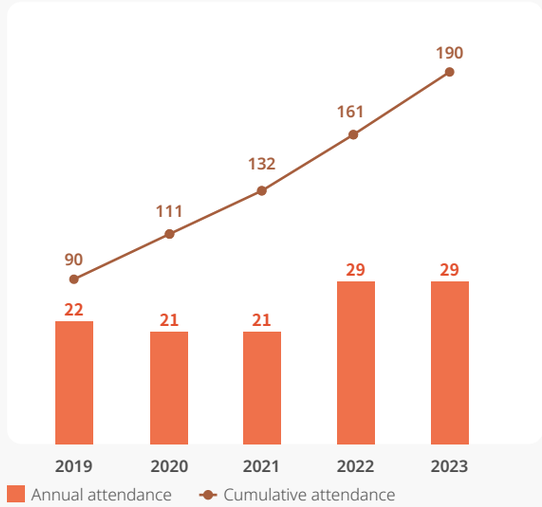
Audit and Violations Tracking

- Supplier ESH/fire protection audit
- Violations mitigation and follow-up
- Supplier abnormal event project audit NEW

Number of Suppliers Participating in ESH Training



Number of Suppliers Observing TSMC Annual Emergency Response Drills



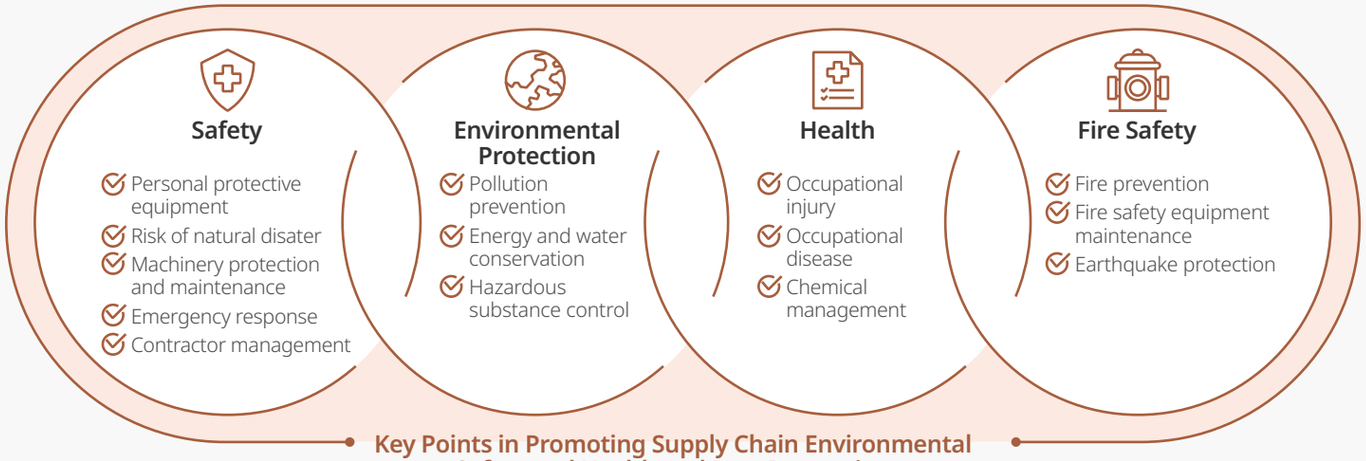
TSMC's lecturer provides the training of supplier improvement program

Achievement of ESH and Loss Prevention Capability Guidance in 2023

	Sustainable Supply Environment, Safety and Health Forum	Supplier EHS Workshop	Fire Response Tabletop Exercise Workshop NEW	Fire Protection Practice and Operational Training	Fire Protection Autonomous Training	Emergency Response Observation	Supplier Carbon Inventory Workshop	Energy Conservation and Carbon Reduction Consultation	Supplier Senior Executive Environmental, Safety and Health (ESH) Improvement Program NEW
Target	Reinforce suppliers' operational resilience by promoting the supply chain net zero campaign, ESH improvement, and fire control sharing sessions	Improve suppliers' self-management capacity in ESH	Guide suppliers to carry out a tabletop exercise to save resources and create diverse exercise scenarios	Allow suppliers to possess fire control and protection planning capacity and improve their fire control management	Allow suppliers to possess fire control and protection planning capacity and improve their fire control management	Learn the response and disaster relief methods of TSMC and improve suppliers' emergency response	Guide suppliers to accurately identify the sources and data of carbon emissions from fabs and devise improvement measures to attain reduction goal	Determine energy conservation opportunities and provide them to suppliers to improve energy conservation	Analyze suppliers' reasons for deficiencies, strengthen the support of their senior management for environmental safety and health, provide guidance to establish active performance indicators for safety, and perform on-site audits to understand the effects after carrying out the focus consultation
Content	• Net zero directors, carbon inventory results, and future carbon reduction work of the supply chain • Analysis of suppliers' ESH audit results and future practices • Fire event discussion and learning • Management practice sharing of suppliers on ESH and carbon reduction	• Interpretation of provisions under the Supplier Sustainability Standard • Chemical-proof protective equipment selection and waring description	• Introduction to tabletop exercises • Tabletop exercise • Group report on exercises	• Introduction to fire on solar panel and EVs • Fire alarm system and basic principles • Practical training	• Suppliers engaging fire protection engineers to implement the on-site fire exercise of employees • TSMC's fire specialist provides on-site assistance and guidance	• Magnitude 6 earthquake evacuation and earthquake damage evaluation exercise • Magnitude 6 earthquake combined disasters exercise • Exchange and discussion	• Description of GHG inventory • Description of the inventory report system	• Current energy status inventory • Energy-saving key diagnosis and measurement • Provide energy-saving recommendations and plans	• Audit, survey, and analysis • Interview and communication with the senior management of suppliers • Provide training for suppliers to establish active safety indicators for safety
Participants	117 suppliers, 357 people Raw material suppliers	52 suppliers, 57 people Suppliers with risks of high exposure to chemicals	51 suppliers, 60 people Large factories with over 200 employees and high-fire-risk suppliers	40 suppliers, 49 people Raw material suppliers and high-fire-risk suppliers	10 suppliers, 141 people Raw material suppliers and high-fire-risk suppliers	29 suppliers, 29 people Raw material suppliers and high-fire-risk suppliers	24 suppliers, 28 people Suppliers who have not obtained the ISO 14064 GHG verification certificate	10 suppliers Raw material suppliers	17 suppliers, 29 people Raw material suppliers

Suppliers People

Key Points in Promoting Supply Chain Environmental Safety and Health and Loss Prevention



Key Points

- Establish a supplier ESH risk matrix
- Establish digital services for suppliers' new factories[Note]
- Establish an interactive course on common shortcomings in ESH and relevant improvement measures
- Carbon inventory integration
- Establish carbon inventory guidelines
- Collaborate with the government to guide suppliers in GHG and carbon footprint inventory

2016
- Supplier consultation (ESH training/emergency response observation)

2019
- Supplier consultation
- Supplier on-site audit

2020
- Supplier consultation and power conservation
- Fire safety system training and exercises
- Sharing common supplier violations
- Consultation on reducing energy and water consumption
- Continuous participation or observation of the emergency response drills

2021
- Supplier Fire Protection Personnel Project
- Consultation topic: RBA 7.0
- Exercises - Fire safety system exercises
- On-site evaluations to follow up on supplier improvement
- Participating in tabletop exercises for emergency response
- Introduction of energy conservation standards to new supplier factories
- New supplier water reduction targets
- Suppliers with high energy consumption to receive ISO 14064 verification

2022
- Audit and guide suppliers by applying standards superior to RBA specifications
- Improve on-site personnel's response and operational capabilities
- Share ESH case studies to pass on supply chain experience
- Increase the number of suppliers participating in TSMC emergency response drills
- Promote self-training and emergency response drills

2023

2024
- Strengthen suppliers' ESG management abilities
- Launch supplier overseas audit
- Supplier public danger items inventory and on-site risk evaluation
- Organize supplier fire response organization and procedure workshop
- Supplier consultation and fire response drills
- Supplier consultation on water conservation
- Establish digital services for suppliers' new factories

Note: TSMC established digital services for suppliers' new factory construction in 2023. Based on the internal resource sequence, the Company will integrate digital services in 2024 for continuous implementation

Supply Chain Technical Quality Improvement

TSMC actively worked with suppliers to examine and solve production capacity insufficiency, qualify defects, process improvement, and other issues. Under the collaboration between the Materials Management, Quality and Reliability, Operation, and relevant business units, TSMC facilitated the introduction of advance process instruments, improved the quality of materials and products, and supported the technical development of local suppliers to jointly create the win-win benefits.

Procurement Arrangement of Main Raw Materials

TSMC has formulated procurement management actions for main materials, and it collaborates with suppliers in five major areas: supplier distribution, diverse material sources, quality control, local procurement, and sustainable operations. To solve insufficient production capacity, quality defects, and other potential supply chain risks, TSMC adjusted the global market deployment, developed diverse material sources, and increased localized procurement to improve the supply chain resilience. Furthermore, suppliers are required to incorporate sustainability into their operational considerations in accordance with the TSMC Supplier Sustainability Standard. TSMC also collaborates with suppliers to facilitate advanced material R&D, process innovation, quality improvement, and practices related to energy-saving and carbon reduction. For more information, please refer to 5.3.5 Raw Material and Supply Chain Management in the 2023 annual report.

Key Management Actions for Main Raw Materials

Main Raw Materials Management Dimension	Silicon Wafers	Process Chemicals	Photolithography Materials	Gases	Grinding Fluid, Grinding Pad, Diamond Discs
Key Suppliers	6 suppliers	12 suppliers	7 suppliers	9 suppliers	7 suppliers
Diverse Sources of Materials	✓			✓	
Quality Control	✓	✓	✓		✓
Local Procurement		✓		✓	✓
Sustainable Operations	✓	✓	✓	✓	✓

Challenges and Solutions of Supply Chain Management Activities in 2023

Promote Constant Upgrade of Local Supply Chains

To build a highly effective and competitive semiconductor industry chain, TSMC promotes local procurement at all production sites. Its procurement can be divided into six categories: equipment, spare parts, raw materials, facility services, IT, and goods. TSMC has also set up independent procurement organizations for TSMC subsidiaries, including TSMC (China), TSMC (Nanjing), and TSMC Washington, LLC. We also assist local suppliers to improve technology and quality and reduce costs and carbon emissions. Apart from setting the localization targets of different locations, it also combines the localization data of different places for the calculation of the global fab indicators, allowing the global supply chain to upgrade at the same time.

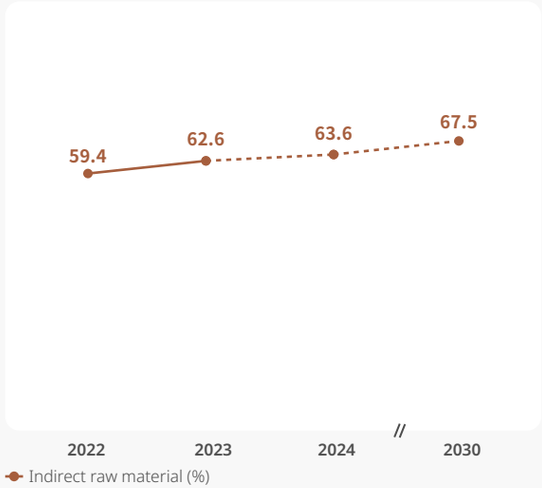
Global Fab Supply Chain Management Action

Setup Procurement Targets
Continue to promote or maintain the local procurement percentage to achieve long-term goals

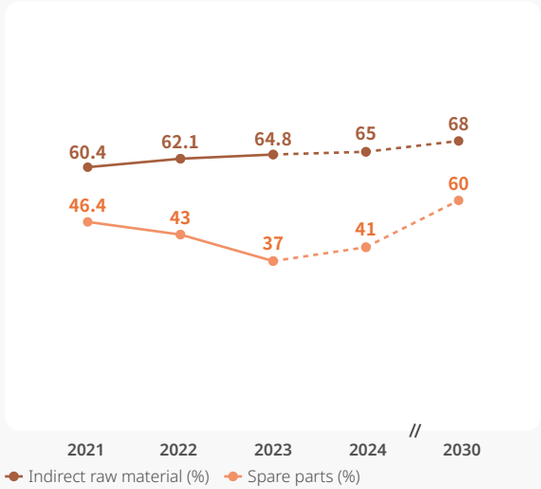
Improve Technical Quality
Actively improve the technology and quality of suppliers for critical equipment, spare parts, and raw materials to improve local procurement volume

Invitation for Factory Establishment
Invite suppliers from different countries to establish production, R&D, and training units at TSMC's production sites

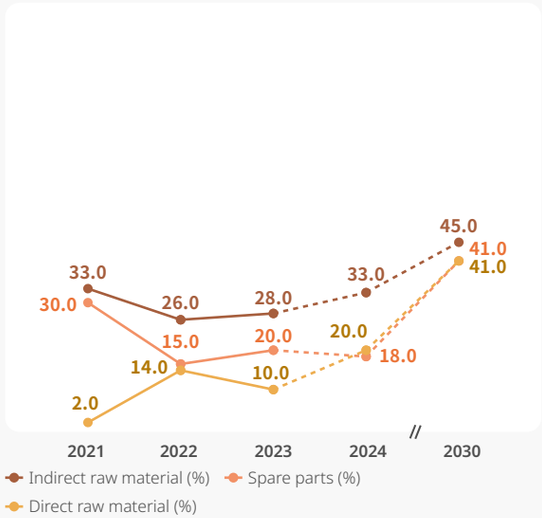
Percentage of Local Sourcing, Global



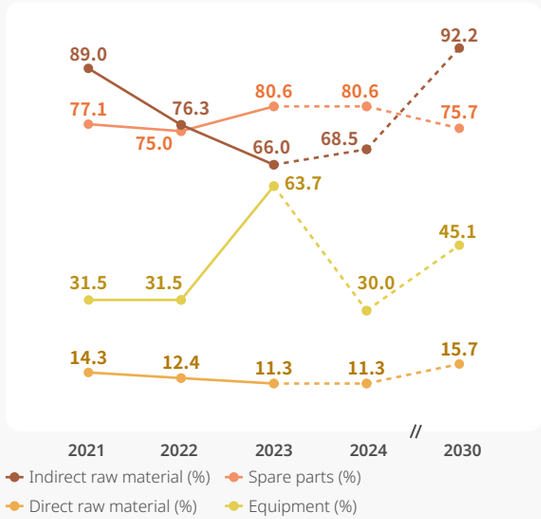
Percentage of Local Sourcing, Taiwan



Percentage of Local Sourcing, China



Percentage of Local Sourcing, US[Note]



Note: The mass production fab of the US operation is TSMC Washington, LLC

TSMC promotes constant upgrade of local supply chains

Case Study

Maintain the Old as the New Project Established Procedural Management that Allows the Reduction Rate of a Single Supplier's Anomalies to Achieve 93.5%

Improving supply chain resilience is the foundation of TSMC's sustainable management of the supply chain. To strengthen the effects of the four major implementation directions, TSMC further focuses on the top 20 carbon emission suppliers with bulk chemical fabs and select target suppliers to initiate the Maintain the Old as the New Project through the on-site audit and evaluation results, including production line equipment maintenance quality, maintenance and repair systems, and anomaly frequency so as to improve suppliers' response capacity to anomalies.

The Maintain the Old as the New Project figures out the issue points of frequent anomalies on the production lines of suppliers and helps suppliers to establish the production line repair and maintenance process. TSMC also regularly follows up on their improvement progress and guides suppliers to establish procedural management systems with the overall processes from the occurrence of anomaly to the closure of repair. In 2023, the single fab of a single bulk chemical supplier was selected for piloting, allowing the number of anomalies that occurred to its production lines to reduce from 520 times in 2021 to 26 times, representing an anomaly reduction rate of 93.5%. Meanwhile, the procedural management allows the repair personnel to better analyze and grasp the repair conditions, which not only improved the anomaly elimination capacity but also shortened the operating time; the average repair hours reduced from 13.8 hours in 2021 to 8.2 hours. In the future, TSMC will continue to increase the target suppliers under the Maintain the Old as the New Project to expand from bulk chemical to bulk gas suppliers, reinforce operating resilience, and mitigate the risks of production line suspension and shipping of suppliers.

TSMC carries out the supplier audit to continue to solidify the supply chain resilience

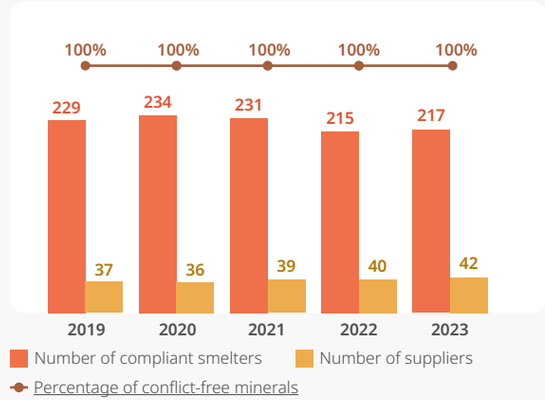
Responsible Minerals Sourcing

Complying with Rule 13p-1 of the U.S. Securities Exchange Act of 1934 promulgated by the U.S. SEC, TSMC ensures that human rights, health, and the environment in mineral production areas are not violated by purchasing conflict-free raw materials from reliable sources. The Company has adopted legal compliance measures, including the establishment of a due diligence framework following the Model Supply Chain Policy for a Responsible Global Supply Chain of Mineral from Conflict-Affected and High-Risk Areas published by the OECD. At the same time, TSMC is one of the staunchest supporters of the RMI and GeSI. The Company adheres to the RMAP promulgated by such organizations, requiring suppliers to procure conflict-free raw materials.

TSMC requires suppliers to comply with the responsible minerals sourcing policy and sign the statement of responsible minerals for products containing tantalum, tin, gold, and tungsten. Since 2017, TSMC has also disclosed the source smelter for the cobalt used in its products to clients. In 2023, cobalt was formally added to the Supplier Management Standard to ensure that suppliers comply with the sourcing policy. Since 2021, TSMC has audited three suppliers of tantalum, tin, gold, and tungsten annually, ensuring that suppliers formulate and implement conflict-free minerals management processes and conduct due diligence on upstream suppliers. For the latest disclosure documents, please visit TSMC's official website or the US SEC website.

Responsible Minerals Management Process

Conflict-free Minerals Due Diligence



Note: Figures from Tier 1 Suppliers of TSMC fabs in Taiwan, TSMC Washington, LLC, TSMC (China), TSMC (Nanjing), and VisEra

Promote Green and Low-carbon Supply Chains

TSMC continues to improve the ratio of renewable energy consumption and is committed to reducing the carbon emissions within its own operation scope. At the same time, TSMC actively collaborates with its supply chain to reduce carbon emissions, continuously implementing five major dimensions: Create Transparency, Optimize for CO_2, Engage Suppliers, Push Ecosystems, and Enable Your Organization. In 2023, it further required major emission contributors to propose substantial carbon reduction plans expected to be implemented before 2030 to achieve the goal of net zero emission by 2050 through supply chain decarbonization.

Create Transparency

In 2023, TSMC required 135 raw material and equipment suppliers to participate in the CDP Supply Chain Program and carried out five sessions of CDP basic and advanced courses to help suppliers improve the response quality, with a total of 394 participants in the training. Meanwhile, TSMC cooperated with the external consultant to organize one session of a whole-day onsite course to provide in-depth CDP guidance to Taiwan-based suppliers, with a total of 69 participants.

Finally, 132 suppliers completed the CDP questionnaires with a response rate of 98%. According to the results of the questionnaire analysis, 92% of suppliers have included climate change topics in their consideration for corporate business strategies (85% in 2022), 99% have conducted GHG inventory or estimation (93% in 2022), 71% have set emission reduction targets, 77% of suppliers have provided scope 3 emissions data in 2023 (51% in 2022), and 29 has joined RE100 or acquired approved SBT (i.e., Science Based Targets), accounting for 50% of the total procurement amount.

By analyzing the carbon emission distribution of supply chain, TSMC identified the top 20 major emission contributors with high carbon emission percentages and required them to obtain third-party verifications for the ISO 14064-1 GHG inventory and ISO 50001 energy management system of designated production sites and ISO 14067 product carbon footprint of designated raw materials. At the end of 2023, the acquisition ratio of ISO 14064-1, ISO 14067, and ISO 50001 was 82%, 10%, and 42%, respectively. To integrate the data demand for TSMC supplier plant-level GHG survey, life cycle assessment (LCA), environmental profit or loss (EP&L) study, and various environmental analyses, improve the data quality of carbon emission inventory, and reduce the burden on suppliers to report the data, TSMC established the carbon inventory guidelines in 2023 for suppliers' reference and developed the Supplier Environmental Information Data Platform for data collection, aggregation and analysis, setting a foundation for the implementation of net zero actions.

Optimize for CO_2

By improving materials efficiency and decreasing the amount of raw material used in the manufacturing process, TSMC can reduce carbon emissions in the supply chain. In 2023, TSMC continued to lower the consumption of bulk chemicals with a significant proportion of TSMC raw material use-related carbon emissions to reduce GHG released during the raw materials manufacturing stage through reducing time span, extending use, replacing, and skipping stations. Meanwhile, TSMC innovated the HOCl Conversion System to reduce the consumption of sodium hypochlorite (NaOCl) and collaborated with suppliers to use waste from fertilizer manufacturing as raw material for hydrogen fluoride (HF) production, quality and achieving carbon reduction. In addition, even though the carbon emissions from the upstream and downstream transportation merely account for 1% of TSMC's overall carbon emissions, TSMC keeps reducing the transportation carbon emissions of the supply chain through the improvement in cargo delivery scheduling, replacing air transportation with sea transportation, and promoting local procurement.

Five Approaches to Promote Low-carbon Supply Chains

Create Transparency

Collaborate with suppliers to improve the quality and transparency of carbon emissions data in the supply chain

- Suppliers are required to participate in the CDP Supply Chain Program
- Establish a Supplier Environmental Information Data Platform that integrates data collection, analysis, and management functions to improve the carbon emission data quality of the supply chain

Optimize for CO_2

Focus on lowering carbon emissions and continue to optimize the Company's manufacturing and procurement strategies

- Improve the usage efficiency of chemicals with a significant proportion of carbon emissions to decrease consumption and facilitate the reduction of carbon emissions in the supply chain
- Introduce products with a low carbon footprint
- Promote local sourcing to lower transport emissions

Engage Suppliers

Include carbon emissions in audits and collaborate with suppliers to minimize carbon emissions

- Demand and guide suppliers to elevate their green performance through the Supplier Sustainability Standard, including the implementation of energy, carbon emissions, water conservation, waste reduction, and other environmental management
- Cooperate with suppliers to develop energy-saving tools and equipment and electric-grade recycled chemicals
- The CDP rating is included in the suppliers' performance evaluation

Push Low-carbon Ecosystems

Participate in industry collaborations and initiatives on low-carbon topics

- Promote 1+N Carbon Management Project to integrate resources available and accelerate the net zero transformation of the supply chain
- Promote the Renewable Energy Joint Procurement Project to mitigate the threshold for suppliers to adopt renewable energy

Establish Internal Carbon Reduction Mechanisms

Establish an internal carbon reduction mechanism in the Company and increase carbon reduction incentives

- Established a cross-department supplier energy-saving guiding team to exchange TSMC's experiences with suppliers
- Create a systematic reward mechanism

Engage Suppliers

In 2023, TSMC amended its Supplier Code of Conduct to require suppliers to track and document their significant scope 3 emissions categories apart from scope 1 and scope 2 GHG emissions, and also formulate and publicly disclose reduction targets for these scope 3 categories. To improve carbon reduction incentives, TSMC included the supplier's CDP rating in items of consideration for the sustainability aspect in the supplier performance evaluation to urge them to improve their carbon management achievements. In the same year, suppliers who were required to participate in CDP obtained an average grade of B-, exceeding the initial target of C. TSMC requires and assists suppliers to improve their sustainability performance. In 2023, the annual total energy reduction reached 280 GWh, and the accumulative total reached 810 GWh. The annual total water reduction reached 13.5 million metric tons, and the cumulative total reached 42.58 million metric tons. Additionally, the waste production among major waste-producing suppliers was reduced by 39%, and 84% of the high-energy consumption suppliers received ISO 14064-1 verification. TSMC requires suppliers to introduce energy-saving evaluation when building new plants.

TSMC works with suppliers to develop energy-saving tools or equipment. In 2023, TSMC introduced an efficient cooling tower fan, renovated the compressed dry air (CDA) system cooling mechanism, and utilized the modular design in the hot DI water circulation system for wafer cleaning tools. It also convened regular meetings with major emission contributors and encouraged them to propose carbon reduction plans. In 2023, a total of 900,000 metric tons of carbon reduction plans were proposed, and the plans cover energy transition, energy-saving, reduction in direct GHG emissions, circular economy, and carbon credits.

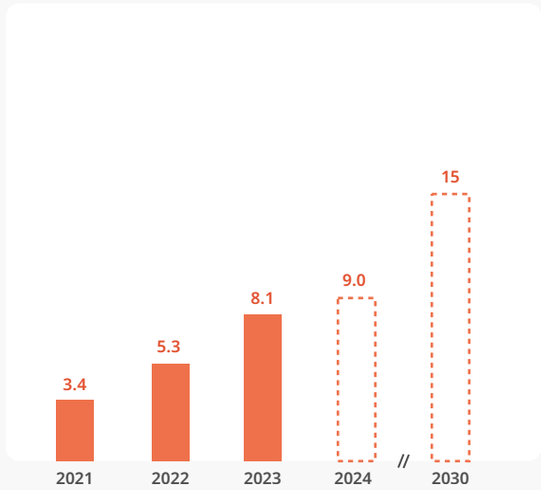
In addition, in response to the growth in production capacity, to solve the excessive use of raw material packaging materials, TSMC cooperates with suppliers to create the Environmental Recycled Box, which can reduce carbon emissions by an average of 0.38 kilograms per use and can reduce waste by more than 20,000 cartons each year. The boxes are expected to be provided to more suppliers in 2024, and TSMC have currently with ten suppliers who promised to use the Environmental Recycled Boxes. The used boxes will be cleaned and sanitized by sheltered workshops to create employment opportunities for people with disabilities. In the future, TSMC plans to expand the application scope of the Environmental Recycled Box and invite more suppliers to use it to achieve the double benefits of waste and carbon reduction and care for the disadvantaged.

TSMC requires and assists suppliers to improve their sustainability performance

Targets and Achievements of Suppliers' Efforts to Reduce Energy and Water Consumption, Waste, and Carbon Emission

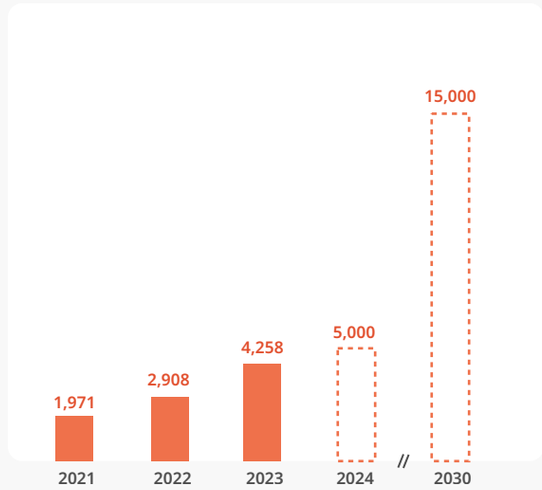
Cumulative Total Energy Consumption Reduced

Unit: 100 GWh

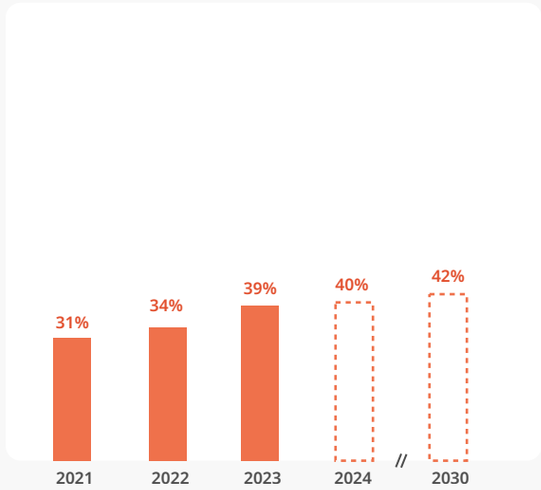


Cumulative Total Water Consumption Reduced

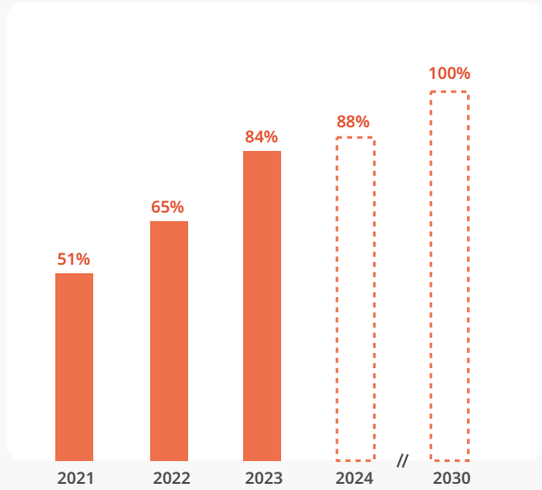
Unit: 10,000 metric tons



Waste Reduction Rate



Percentage of ISO 14064 Verification



Case Study

The Supplier Environmental Information Data Platform Integrates Information on 429 Factories to Improve Environmental Management Capacity

To fully grasp the carbon emission status of suppliers, effectively allocate carbon reduction resources, and optimize emission reduction benefits, TSMC developed its Supplier Environmental Information Data Platform in 2023, which is connected to Supply Online 360, to establish environmental data collection and analysis and management functions for supplies for the benefit of identifying carbon hot spots and finding major emission contributors and raw materials. In 2023, it compiled information on over 429 factories (targeting 500 by 2024) and information on 131 kinds of raw materials (targeting 200 by 2024) further integrated the 900,000-ton carbon reduction plan from major emission contributors to improve the carbon emission management capacity of TSMC's supply chain.

The Supplier Environmental Information Data Platform integrates the previous surveys related to supply chain environmental analysis, which were dispatched by TSMC. It adopts online digital platform to reduce the burden due to email exchange. Corresponding questionnaires are distributed to survey targets after screening, they are divided into two types: factory questionnaire and product questionnaire. Suppliers provide the environmental information on factories that produce TSMC's products via the factory questionnaires, including plant-level carbon inventory results, energy, water resources and green energy consumption, achievements and plans of energy-saving and carbon reduction projects, air pollution and wastewater indicators, and waste output and its treatments. Product questionnaires collect information related to products, including net weight, supply volume, carbon footprint value, main composition, and product transportation methods and distance. To control data quality, TSMC cooperated with the external consultants to perform an inventory of tricky questions that may easily have easily have incorrect responses and design automatic logic debugging/error notice features and required suppliers to upload supporting document.

To provide a comprehensive understanding of the supplier's data, the Supplier Environmental Information Data Platform is able to conduct various hot spot analysis based on the country, company, product, carbon emission scope, and power consumption to find the critical emission sources and targets and, in turn, formulate countermeasures and plan for optimal allocation of carbon reduction resources. In 2024, TSMC will continue to upgrade its platform functions, reinforce the carbon reduction progress follow-up and management of major emission contributors, and continue to develop automatic product carbon footprint calculation, AI-powered data verification, and other functions to accelerate carbon reduction progress.

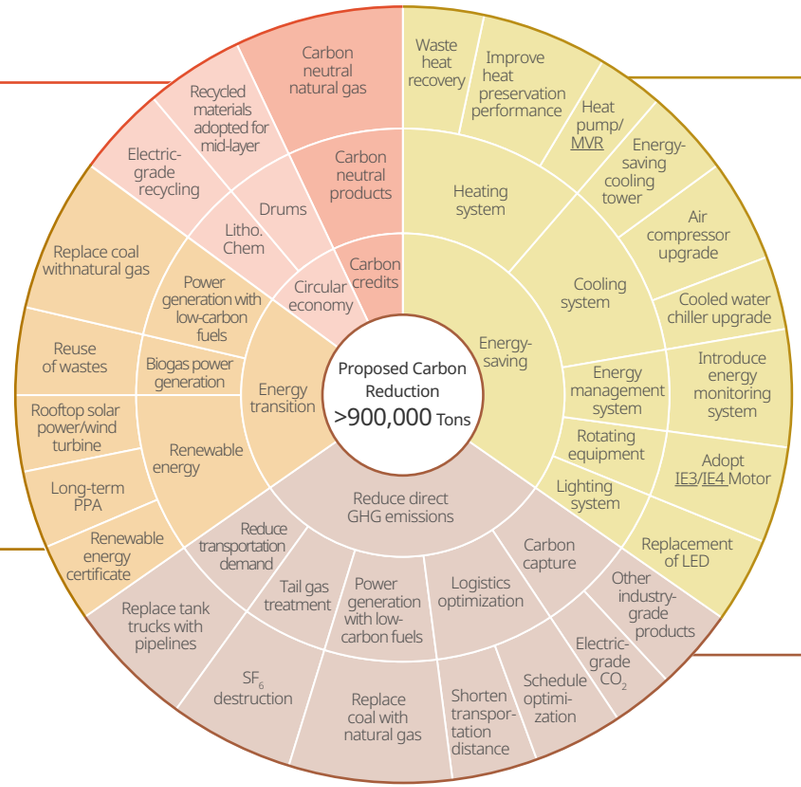
Major Emission Contributors Carbon Reduction Program Profile

Circular Economy and Carbon Credits

- Create a closed circulation (Lithographic chemicals and packaging material)
- Procure low-carbon/carbon neutral products (carbon neutral natural gas and green hydrofluoric acid)

Energy Transition

- Use low-carbon energy (self-installed/purchased green energy, electrification, power generation with waste)



Energy-saving

- Fully examine power consumption/energy consumption equipment (heating, cooling, rotating, and lighting)

Reduce Direct Emissions

- Low-carbon fuels/carbon capture (coal-to-gas and CO_2 recycling and reuse)
- Reduce transportation requirements (replace tank trunks with pipelines and nearby transportation)

Push Low-carbon Ecosystems and Establish Internal Carbon Reduction Mechanisms

TSMC is dedicated to creating a sustainable semiconductor supply chain. In 2023, the Company participated in SEMI semiconductor climate consortium SCC activities to establish industry guidelines for scope 3 reporting . Meanwhile, to help suppliers in purchasing renewable energy, TSMC created the first Renewable Energy Joint Procurement Program. Suppliers who intend to purchase renewable energy will be provided with complete services from electricity consumption assessment to power transfer. TSMC signed a long-term renewable energy PPA with the renewable energy developer with a total of 1 TWh annually or a total of 20 TWh for 20 years for TSMC and suppliers to procure, which mitigates the threshold for suppliers to adopt renewable energies and facilitates the development of the domestic renewable energy industry in Taiwan. To enhance its supplier's low-carbon transformation capabilities, TSMC also introduced the 1+N Carbon Management Project in 2023. As the leading company with integrated resources from industry, government, and counselor, TSMC assists suppliers to accelerate the launch of GHG inventories, product carbon footprint calculation, energy management system implementation, energy-saving opportunity identification, and net zero pathway setting. TSMC has assisted over 30 suppliers through the 1+N project in implementing 48 sustainability and carbon management projects, and it urges suppliers to invite their upstream supply chain to commence carbon reduction actions.

In addition, TSMC's Corporate ESH Division and Facility Division cooperated with external energy-saving experts to establish an expert team to help suppliers explore the energy-saving opportunities and introduce TSMC's energy-saving experience. In 2023, it provided guidance to 10 suppliers and suggested 42 energy-saving proposals. It is estimated that the full implementation of such proposals would save electricity by 25 GWh/year and reduce carbon emissions by 12,500 tons. In 2022, TSMC's Materials Management Division started to organize ESG friendly matches, which invited and encouraged suppliers to propose ESG ideas with sustainability benefits. Suppliers' ESG proposals were also evaluated, and suppliers with excellent proposals were recognized. In 2023, 52 suppliers participated in making proposals, and six of them responded to TSMC's ESG AWARD and organized their internal ESG AWARD. TSMC combined the awarding system with the carbon reduction thinking to reach out to the supply chain to realize the mission of a responsible supply chain.

TSMC's 1+N Carbon Management Project kick-off meeting

Case Study

Introduce New Generation Low-temperature Polyimide to Upgrade Environment-friendly Materials

Enhance Sustainable Chemicals Management is one of the major strategies to realize product quality. It includes the zero use of NMP and PFASs in its sustainability goals and further extends to the raw material production stage of suppliers. TSMC developed a new generation of low-temperature polyimide by supporting a supplier. Not using hazardous chemicals, NMP and PFASs, it managed to produce low-temperature polyimide of high hardness, high strength, and chemical resistance that comply with process requirements. In 2020, it was introduced into TSMC's N5 process. In 2023, TSMC adopted the formula design with the cross-linker to optimize and satisfy the material requirements of the photolithography process, and it provided guidance to suppliers to jointly create factories using green raw materials, realizing the of quality and environmental benefits.

The success in the upgrades of environmental materials came from years of efforts of TSMC and the supplier. In 2019, TSMC established a cross-department material expert team to carry out the Design Of Experiment (DOE) based on different polymer formulas. Through continuous improvement in the Certificate of Analysis (CoA) of suppliers' materials and Incoming Quality Control (IQC), it accelerated the production and development of new materials. TSMC selected materials required for the process specifications by guiding the supplier, and the use of NMP and PFASs can be fully avoided, and the instability and impurity pollution were improved, allowing the suppliers to produce high-quality low-temperature polyimide without hazardous chemicals. In 2023, it was introduced into TSMC's N2 advanced process. TSMC is committed to improving the green manufacturing capacity of suppliers and creating a sustainable supply chain.

TSMC provides guidance to suppliers to jointly create factories using green raw materials

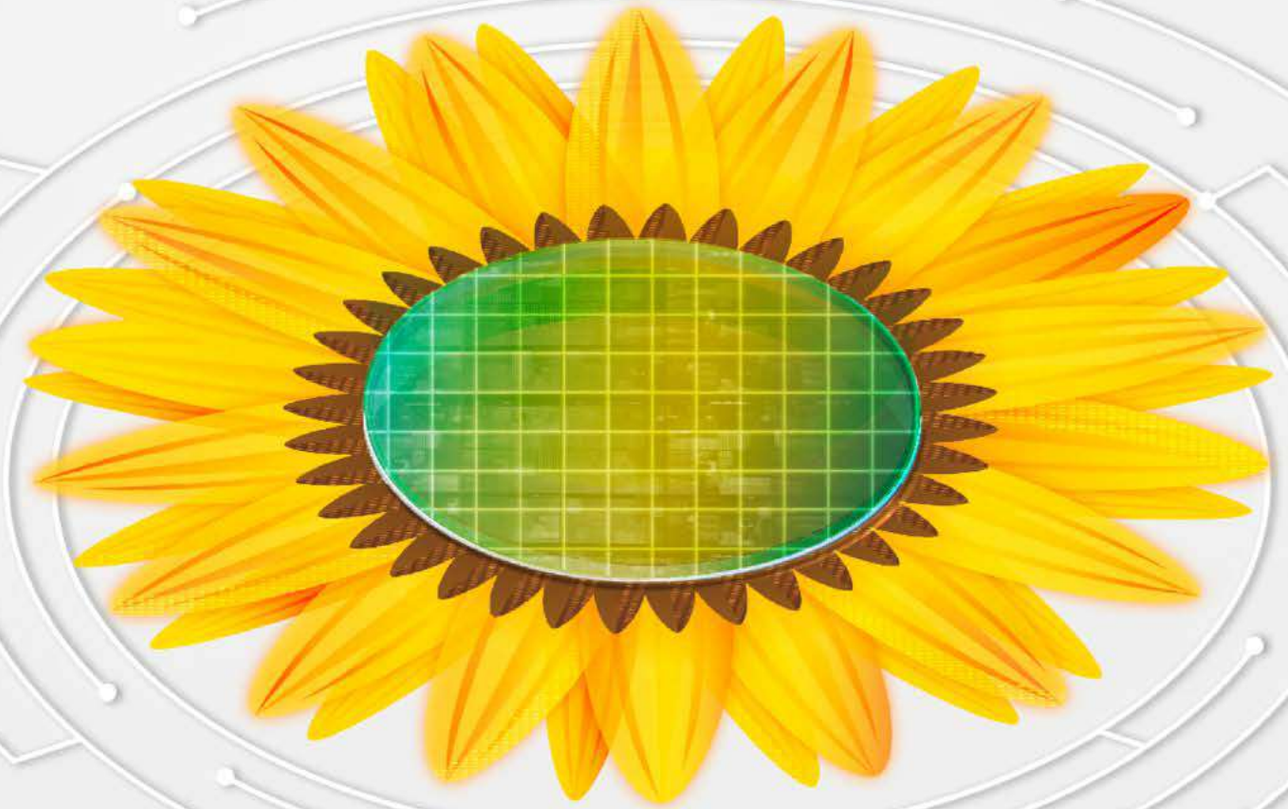
A Practitioner of Green Power

"TSMC aspires to be a world-leading benchmark organization in environmental protection and actively integrates green management into daily operations. The Company applies innovative technologies to climate and energy, water stewardship, circular resources, and air pollution control, promoting a comprehensive range of sustainable actions to strengthen environmental protection and act on our firm belief in prospering with the earth's ecosystem."

32%
Taiwan in-house resource recycling rate

286.35 Million m^3
Water reclaimed by the overall recycling system increased by 33%

0
Abnormal occurrence in air pollution control equipment



- Climate and Energy
- Water Stewardship
- Circular Resources
- Air Pollution Control

Climate and Energy

Strengthen Climate Resilience

Develop climate change response and measure to reduce the impact of climate risks

Drive Low-carbon Manufacturing

Continue to use best available technology to reduce emissions of greenhouse gases (GHG) and become an industry leader in low-carbon manufacturing

Use Renewable Energy

Continue to purchase renewable energy and install solar-energy power systems to achieve target of 100% renewable energy use

Increase Energy Efficiency

Plan and implement new energy-saving measures each year to increase energy efficiency

2030 Goals	2024 Targets	2023 Achievements
0 days of production interruption due to climate disasters	0 days of production interruption due to climate disasters	✓ 0 days of production interruption due to climate disasters Target: 0 days
Reduce unit GHG emissions by 30% compared to the base year (metric ton of carbon dioxide equivalent ($MTCO_2e$)/12-inch equivalent wafer mask layer) by 30%, and restore GHG emissions to the 2020 level (Base year: 2020)	Reduce unit GHG emissions (metric ton of carbon dioxide equivalent ($MTCO_2e$)/12-inch equivalent wafer mask layer) by 10% (Base year: 2020)	— Note 1 Increased unit GHG emissions (metric ton of carbon dioxide equivalent ($MTCO_2e$)/12-inch equivalent wafer mask layer) by 31% Target: 9% (Base year: 2020)
Starting from 3nm new fabs, renewable energy accounts for more than 20% of energy consumption and the purchasing of renewable energy increases annually to achieve 60%[Note 2] renewable energy company-wide	Continuously procure renewable energy to achieve 13% of the total electricity consumption of the entire company coming from renewable sources, and ensure that all overseas subsidiaries use 100% renewable energy	— Note 3 TSMC overseas sites used 100% renewable energy[Note 4]; accounting for 11.2% of TSMC's total electricity consumption Target: TSMC overseas sites used 100% renewable energy; accounting for 12% of TSMC's total power consumption
Cumulative energy-saving rate reaches 18% between 2016 and 2030 through new energy-saving measures	15% cumulative energy-saving rate	✓ Cumulative energy-saving rate reached 14% Target: 14%
Double energy efficiency after five years of volume production for each process technology[Note 5]	Energy efficiency of 5nm process technology doubles in the 5th year of volume production	— Note 1 Energy efficiency of 5nm process technology was 0 times higher in the 4th year of volume production Target: 0.7 times higher

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Under the effects of global economic developments, the capacity utilization of TSMC in 2023 was less favorable than expected. Unit GHG emissions and the production volume of the mass production of the 5nm process technology in the 4th year failed to achieve the annual target. TSMC will continue to invest resources to implement energy-saving actions and improve energy consumption efficiency

Note 2: TSMC actively adopts renewable energies and aims to increase the energy consumption of all operations from 40% to 60% by 2030 to facilitate the realization of the sustainable environment goals

Note 3: Due to the introduction progress of TSMC Arizona, the energy consumption is not aligned with the estimated value, and the ratio of renewable energy consumption of the Company failed to reach the annual target

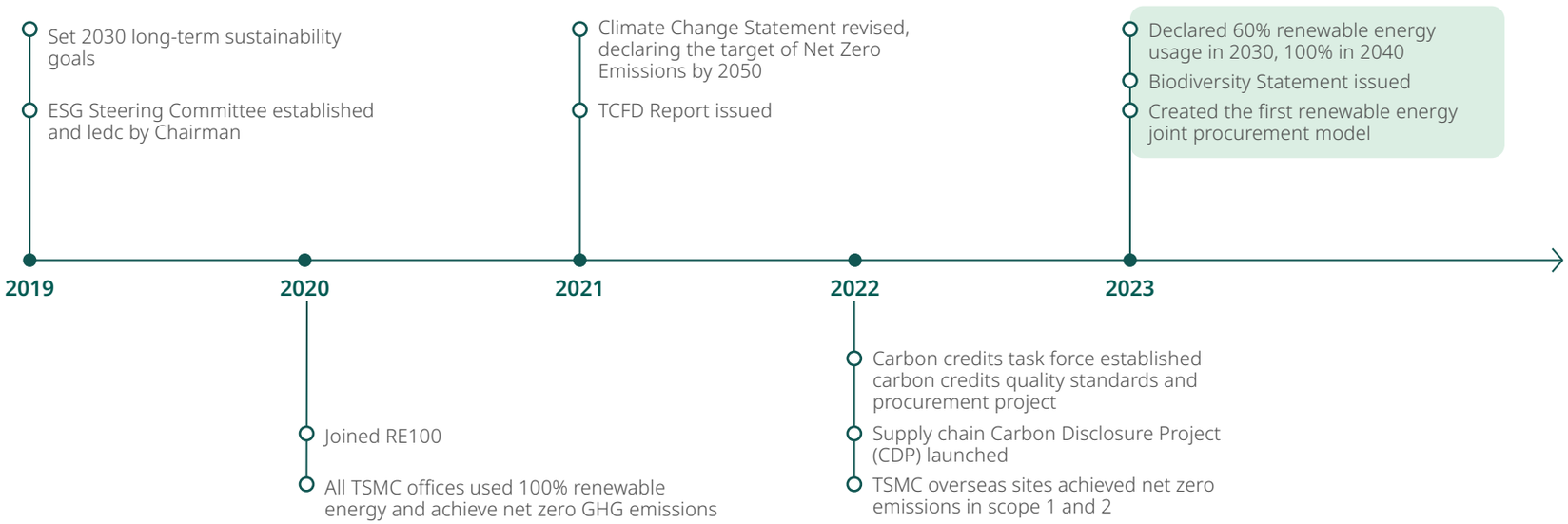
Note 4: Definition of renewable energy use: Purchased renewable energy, self-generated renewable energy, renewable energy certificates, and carbon credits produced by renewable energy

Note 5: Energy efficiency is the product equivalent per kWh of power (12-inch equivalent wafer mask layer/kWh)

TSMC is committed to reaching Net Zero Emissions by 2050, has drawn its Roadmap to Net Zero Emissions, and actively uses renewable energy. In 2023, its overseas sites continued to reach net zero emissions in scope 1 and 2. In 2023, it announced the acceleration of its RE100 progress, bringing forward the goal of using 100% renewable energy for the global operations from 2050 to 2040, and increasing the proportion of renewable energy used in all operations from 40% to 60% by 2030 to facilitate the realization of the sustainable environment goals. The company created the first renewable energy joint procurement model in Taiwan and continued to empower the operating management of itself and the supply chain.

In 2023, TSMC established the Green Manufacturing Department to comprehensively promote various sustainable action projects. Meanwhile, it keeps close attention to international trends and focuses on the Global Cooling Pledge proposed. Apart from continuing the implementation of GHG reduction standard practices, it further initiated the low global warming potential gas substitution project; with the optimized use of gases alongside the advanced process, it is estimated to reduce the consumption of hydrofluorocarbons (HFCs) by nearly 30%. In addition, in light of the impacts of extreme weather on the ecological environment, TSMC responded to the UN Convention on Biological Diversity by issuing its Biodiversity Statement in 2023, and establishing an biodiversity taskforce to work with stakeholders to promote ecology conservation. The Company also issued the first Climate and Nature Report to commit to achieving a balance between technologies and ecology and moving towards net zero sustainable development.

Summary of Response Measures for Climate Change



Note: Science Based Targets Initiative (SBTi) is an international initiative organization that encourages companies to set an absolute greenhouse gas (GHG) emission reduction target that is in line with the Paris Agreement goals with a yearly reduction of 4.2 %. TSMC is committed to developing science-based reduction targets in 2017, and as the global demand for chips has drastically increased in recent years, the CAGR of TSMC's capacity exceeds 10%. However, as the supply from the renewable energy market in the Company's main manufacturing site was insufficient, reaching SBTi requirements poses a challenge in the short-term. Taking business growth and development trends in carbon reduction into account, TSMC will put zero growth in emissions for 2025 as the main target, and assess to fulfill SBT requirements in mid- and long-term targets in 2026.

Strengthen Climate Resilience

According to the Global Risk Report, four structural factors- climate change, demographic bifurcation, technology acceleration, and geostrategic shifts- are forming new global risk scenarios. Environmental risks continue to account for the highest ratio in the top ten global risks in the next decade, including the top four extreme weather events, critical change to Earth systems, biodiversity loss and ecosystem collapse, natural resource shortage, the tenth pollution, showing that strengthening the prevention capacity for climate disasters is the key to sustainable corporate operations. TSMC complied with the climate rick adaptation standards to find potential crisis and opportunities through regular and systemized risk assessment and evaluation, mitigate potential impacts of climate disasters, and improve the climate resilience of the organization. In 2023, the Company successfully achieved its target of zero production interruptions.

TSMC increases the use of renewable energy

Identify Climate Risks and Opportunities

TSMC holds the climate change rick and opportunity workshop every two years. Based on the identification results of the workshop in 2022, TSMC continued to improve its GHG reduction actions in 2023 by focusing on the top three climate risks and top three opportunities. It established the Green Manufacturing Department to integrate the resources and improve the project achievements regarding energy-saving/carbon reduction, water management, and resource circulation. In addition, it procures carbon credits by expanding the use of renewable energy and complying with the internal carbon credits quality standards for voluntary emissions reductions. In the same year, TSMC initiated the water saving rice carbon credit development project, formulated the methodology for water saving rice, encouraged farmers to implement water saving farming to generate carbon credits, and participated in the first batch of transactions of TCX in Q4 to support the development of the domestic carbon credit market. It participated in investments in global funds related to natural carbon credits and, in turn, caused carbon dioxide removal, improved ecology conservation, and facilitated local employment. In terms of supply chain management, TSMC improved the climate resilience of itself and the supply chain by improving the carbon management and climate risk resilience of suppliers. See the 2023 TSMC Climate and Natural Report for qualitative assessment methods and results on the financial impacts of risks and opportunities.

TSMC builds green factories and obtains green building licenses

Climate and Natural Risks/Opportunities and Response Strategies

Category	Risk / Opportunities	Key Response Measures
Transitional Risk	⚠ GHG restrictions and carbon taxes/carbon levy ✦ Participate in renewable energy programs ✦ Participate in carbon trading markets	• Set ambitious carbon reduction targets: commit to zero carbon emissions from global operations by 2050 • Assemble a renewable energy task force to work with related associations and government agencies to accelerate the development of renewable energy and actively seek to purchase green energy • Work with associations to propose suggestions to the government about building a carbon credit market
	⚠ Net Zero Emissions ✦ Receive rewards from the public sector for offsetting carbon reductions ✦ Develop low-carbon products and services; Increase energy efficiency in customer products	• Map out the Company's Net Zero Emissions roadmap, formulate Net Zero Emissions strategies, and enforce related measures • Continue carrying out GHG reduction actions and participate in government carbon offset programs for carbon reduction to earn carbon credits • Implement long-term plans for purchasing carbon credits • Continue investing in R&D resources to develop energy-saving products
	⚠ EIA commitment ✦ Promote water efficiency and diversification	• Diversify water sources and start using reclaimed water • Strengthen water resource management and apply for AWS (Alliance for Water Stewardship) certification
	⚠ Uncertainty in new energy saving/carbon reduction technologies ✦ Improve plant energy efficiency	• Promote energy saving and carbon reduction actions and track facility outcomes every quarter through the Energy Saving and Carbon Reduction Committee • Build green factories, obtain green building licenses, and share experiences with external parties
	⚠ Impact on company reputation/image ✦ Enhance company reputation	• Stick to green manufacturing and green innovation. Enhance the Company's green reputation through transparent disclosure
	⚠ Disclosure requirements for biodiversity information NEW	• Establish an biodiversity taskforce to conduct biodiversity-related assessments and develop action plans
Climate Opportunities	⚠ Floods (TSMC operations) ⚠ Floods (supply chain) ⚠ Droughts (TSMC operations) ⚠ Droughts (supply chain) ✦ Increase resilience against natural disasters	• Assess flood and drought risks at fabs and formulate and carry out risk mitigation measures • Ask suppliers to evaluate the flood and drought risks of their operational facilities and implement risk reduction actions • Establish a comprehensive water monitoring system and emergency response processes and hold regular drills
	⚠ Rising temperature ✦ Drive low carbon manufacturing	• Establish the Energy Saving and Carbon Reduction Committee, led by senior executives to reduce greenhouse gas emissions

TSMC Climate and Nature Management Framework

Category	Corporate Management Strategies and Actions	2023 Execution Summary
Governance	The Board will regularly review risks and opportunities related to climate change • ESG Steering Committee: TSMC's top organization in climate change management. Chaired by the Chairman of TSMC with the chairperson of the ESG Committee serving as executive secretary. The Committee reviews TSMC's climate change strategies and goals every quarter and reports to the Board of Directors • ESG Committee: Senior executives appointed by the chairman serve as committee chairs, reviewing TSMC's climate change strategies and goals quarterly, and reporting on the progress and plans related to climate issues to the Board of Directors • Energy Saving and Carbon Reduction Committee: The Energy Saving and Carbon Reduction Committee is the Company's management organization for taking action on climate change risk and opportunity. It is chaired by the vice president of fab operations. Every quarter, this Committee formulates management plans, reviews implementation status, and discusses future plans • Risk Management Steering Council: The Risk Management Steering Council briefs the audit committee each year on the ever-changing risk environment facing TSMC, the focus of the Company's enterprise risk management, and risk assessment and mitigation efforts, including climate change issues	✓ Announced the acceleration of the sustainability progress under RE100, moving forward the goal of using 100% renewable energy for global operations from 2050 to 2040, and inreasing the renewable energy consumption of all operations from 40% to 60% by 2030 NEW ✓ Issued its Biodiversity Statement to commit to achieving Zero Deforestation, No Net Loss, and Net Positive Impact on nature and biodiversity by the year of 2050 NEW ✓ The Energy Saving and Carbon Reduction Committee defined five major energy conservation teams based on different process technologies to conserve more energy from production equipment and fab facilities. As an incentive for the energy conservation teams, the Committee rewards them based on the achievement of energy conservation targets and innovative ideas ✓ The Chairperson of the RM Steering Committee gave an annual report to the Audit and Risk Committee on net zero transition, water resources, energy risks, natural disasters, regulations, and other topics related to climate change
Strategies	Organize interdepartmental discussions and identify short, mid, and long-term climate risks and opportunities	✓ Planned and carried out 822 energy-saving measures across eight major categories, saving an additional 830 GWh. See Increase Energy Efficiency for more information ✓ Completed the Dependency and Impact on Nature and Biodiversity Assessment for deeper insights into interactions between operations and local environments, analyzing locations of facilities and emission of pollutants. See the 2023 TSMC Climate and Natural Report for more information NEW ✓ Installed photovoltaic (PV) systems for organizations serving disadvantaged communities and schools in remote townships through TSMC Charity Foundation's public welfare green energy project; in 2023, it performed installation at an additional seven locations. See Renewable Energy Systems for more information
	Assess the potential financial and operational impact on TSMC from major climate risks and opportunities	✓ See the 2023 TSMC Climate and Natural Report for more information on how TSMC completed a qualitative assessment of the financial impact of major climate risks and opportunities and implemented a quantitative assessment of the financial impact of major climate risks and opportunities
	Conduct scenario analysis and assess SBT (Science-Based Target) and net zero emission targets and actions	✓ For transitional risks, it referred to the World Energy Outlook 2022 published by IEA in 2022 and selected the future carbon price analyzed by adopting the Net-Zero Emissions by 2050 Scenario and Stated Policies Scenario to serve as the evaluation basis for the impact of the carbon pricing mechanism at its locations in different countries ✓ For physical risks, it utilized the sixth assessment report of the Intergovernmental Panel on Climate Change to estimate long-term climate change in the future by adopting the latest Global Climate Model and adopting Shared Socioeconomic Pathway to include GHG emissions of different social and economic conditions in the assessment
	Assist suppliers in enhancing awareness and capacity to address climate risks, and develop and implement specific carbon reduction measures NEW	✓ Convened a carbon reduction meeting with the senior management of suppliers with significant emissions and visited the facilities of suppliers for energy-saving consultation ✓ Organized small-class carbon inventory workshops and produced online enterprise GHG inventory and product carbon footprint courses ✓ Created the first Renewable Energy Joint Procurement Model to secure stable renewable energy prices for suppliers and subsidiaries
Risk Management	Use the TCFD framework to develop a process for identifying climate risks	✓ Evaluated the qualitative and quantitative financial impact of major climate-related risks/opportunities discussed in the TCFD workshop by related departments
	Formulate response measures based on the risks/opportunities identified and prioritized	✓ Reported assessment results of the climate risks/opportunities and response plans to the ESG Committee Chairperson
	Integrate climate risk identification and assessment in the Enterprise Risk Management (ERM) process	✓ See 6.3 Risk Management in TSMC's 2023 Annual Report for more information
Metrics and Targets	Set management metrics related to climate change	✓ Established the following as climate change performance indicators: GHG emissions per unit product, amount of renewable energy purchased, total electricity saved, improved production efficiency, and days of production interruption due to climate disasters. See Climate and Energy Strategies, Goals, and Outcomes for more information
	Through ISO 14064 annual inventory and disclosure of greenhouse gas emissions, review the impact on the company's operations, and assess the risks of scope 1, 2 and 3 and their mitigation strategies	✓ Based on carbon inventory and evaluation results, the consistent carbon reduction actions have effectively reduced risks of scope 1 emissions, the risks of scope 2 indirect GHG emissions due to electricity consumption and the risks of scope 3 due to the continual increase of supplier indirect emissions. See more on Drive Low-carbon Manufacturing
	Set climate change management targets and review progress and performance	✓ Set climate change and energy management goals for 2030 in accordance with climate change performance indicators for senior executives to regularly review implementation performance. See Climate and Energy Strategies, Goals, and Outcomes and GHG Reduction Standard Practices for more information

Drive Low-carbon Manufacturing

TSMC is committed to implementing green manufacturing. It reviews its overall carbon reduction efforts through the GHG inventory results certified by a third party annually and revises the emission reduction strategies. In 2023, the Company's total GHG emission was 1,940,000 MT CO_2e, an increase of 2%, and per unit product emissions saw a 31% increase from last year, primarily due to the capacity utilization being lower than expected caused by global economic cycles. In particular, direct emissions from scope 1 processes, such as F-GHGs and nitrous oxide processes, accounted for 8%; indirect GHG emissions in scope 2 from electricity use, which was the major emission source, accounted for 53%; indirect GHG emissions from the value chain in scope 3 accounted for 39%, mainly from upstream activities related to raw materials production, energy, and transportation. TSMC will continue to implement energy-saving measures and improve energy efficiency.

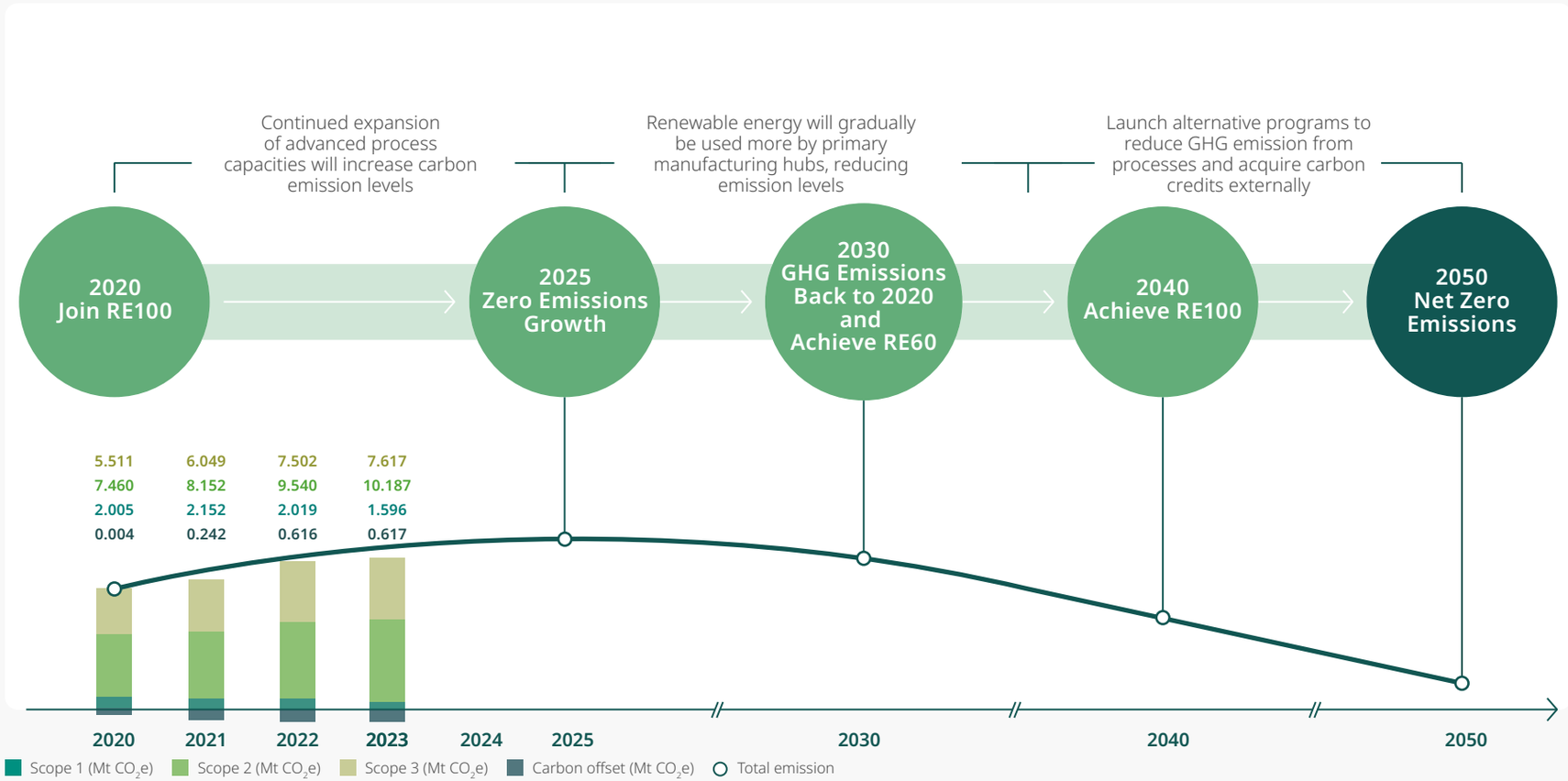
TSMC focuses on the development of international trends and actively implements industry-leading best practices for GHG reduction. It ramped up replacements and installed over 1,260 local scrubbers on the manufacturing end, used carbon-neutral natural gases to reduce the direct emissions of 330,000 MT CO_2, constructed five new green factories with green building certificates, implemented 822 energy-saving projects for tools and equipment, and increased the use of renewable energy. It also promoted the internal carbon pricing mechanism by adopting the carbon fee recognition monthly to serve as the indicator for the estimation of daily reduction measures and include this in decision-making evaluation for new fab investments. As for reduction actions for scope 3, TSMC reinforced its cooperation with suppliers with significant emissions, encouraged them to propose substantial carbon reduction plans, and implemented five approaches: create transparency, optimize for CO_2, engage suppliers, push ecosystems, and enable your organization to facilitate the low-carbon transition of its supply chain to realize Net Zero Emissions by 2050.

Product Carbon Footprint

TSMC is committed to reducing the carbon footprint at every stage of its operations, including the manufacturing and transportation of raw materials, product manufacturing, testing, and packaging. It conducts a product carbon footprint assessment every three years and has obtained ISO 14067 third-party certification. According to the assessment results in 2021, TSMC continued to promote GHG reduction practices and improved resource efficiency and further developed its supplier environmental information digital platform to enhance the carbon management capacity of its supply chain. An analysis is made by collecting and integrating the environmental data of suppliers' factories and products to fully comprehend the carbon emissions of suppliers, assist them in formulating carbon reduction strategies, and jointly improve environmental sustainability.

The life cycle of TSMC's product carbon footprint ranges from the extraction of raw materials to shipment. Through continues improvement in process technology and efficiency, TSMC helps customers innovate in various smart application fields and promotes global energy conservation. According to the evaluation of TSMC's various technology platforms' contribution to global energy conservation by the Industrial Technology Research Institute's International Strategy Development for Industries in 2023, every kWh of power used in production for HPC-related semiconductor products can help save approximately 6.8 kWh of power globally, demonstrating the implementation of green manufacturing from the inside out.

Roadmap to Net Zero Emissions

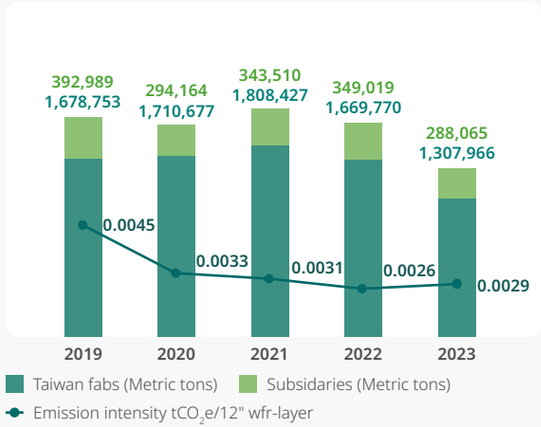


GHG Reduction Standard Practices

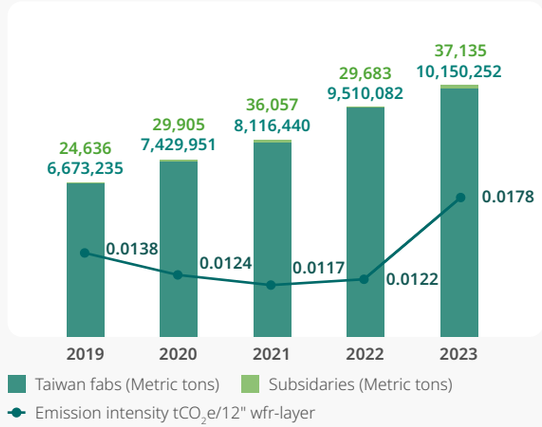
Scope 1 Direct GHG Emissions Processes that use F-GHGs and nitrous oxide	Scope 2 Indirect GHG Emissions (From Purchased Energy) Energy usage	Scope 3 Indirect GHG Emissions (Value Chain) Raw material production, energy-related activities upstream, and transportation
• Optimize gas quantity used in production • Low Global Warming Potential Gas Substitution Project • Install Point-of-Use abatement equipment for F-GHG and nitrous oxide • Use carbon-neutral natural gas	• Build green buildings • Increase energy efficiency • Use energy-saving & low-carbon emission designs in next-generation process tools • Purchase renewable energy	• Supplier required to obtain external verification • Reduce carbon footprint from raw materials • Participate in CDP Supply Chain Program • Optimize delivery schedules
100% Introduce optimized process parameters in accordance with the manufacturing specifications by the Intelligent Engineering Center	**1** TSMC led the global semiconductor industry with the largest LEED-certified building area; five buildings received green building certification in 2023, bringing TSMC's total to 44 LEED-certified buildings and 29 EEWH certified buildings	**84%** High energy consumption suppliers[Note2] must pass GHG emissions inventory and third-party verification; 84% of suppliers have been verified
100% Apply optimized carbon reduction technology – remote plasma dissociation of nitrogen trifluoride (NF_3) to all 12-inch fabs	**822** Energy efficiency of advanced technologies led industry peers[Note1]; carried out 822 energy-saving measures over eight major categories and saved 830GWh, equivalent of nearly 410,000 metric tons CO_2e	**139,000 Metric tons** Guided suppliers to set annual targets and implement real energy-saving actions; in 2023, TSMC suppliers conserved 281 GWh and reduced 139,000 metric tons CO_2e
100% Apply nitrogen trifluoride (NF3)/octafluorobutane (C_4F_8) to 6-inch and 8-inch fabs	**1** The world's only semiconductor company to launch energy-saving programs for next-generation semiconductor fab tools; completed 217 energy-saving programs with an accumulation of 900 GWh electricity saved	**98%** Invite material and equipment critical suppliers[Note3] to disclose carbon reduction targets and progress with a response rate of 98%
1,260 Install equipment with new F-GHG and nitrous oxide reduction technologies	**100%** In addition to using 100% renewable energy for global offices, TSMC also purchased 2,590 GWh of renewable energy around the whole world, accounting for 11.2% total power consumption	**16,000 Metric tons** Improved the delivery schedule for process tools and replaced air freight with ocean freight, reducing 16,000 metric tons CO_2e
96% Replace 30 existing tools with fluorinated gas processes; installation rate: 96%		
1 First in Taiwan to use carbon-neutral natural gas. The facilities in Taiwan have had zero carbon footprints and TSMC has been able to reduce emissions by 0.33 million metric tons CO_2e		

Note 1: Figures from Joint Steering Committee (JSTC) report of the World Semiconductor Council
Note 2: High Energy Consumption Suppliers: Suppliers that use >5 GWh/year in a single facility
Note 3: Definition of material and equipment critical suppliers: Suppliers accounting for the top 85% of material and equipment purchasing expenses

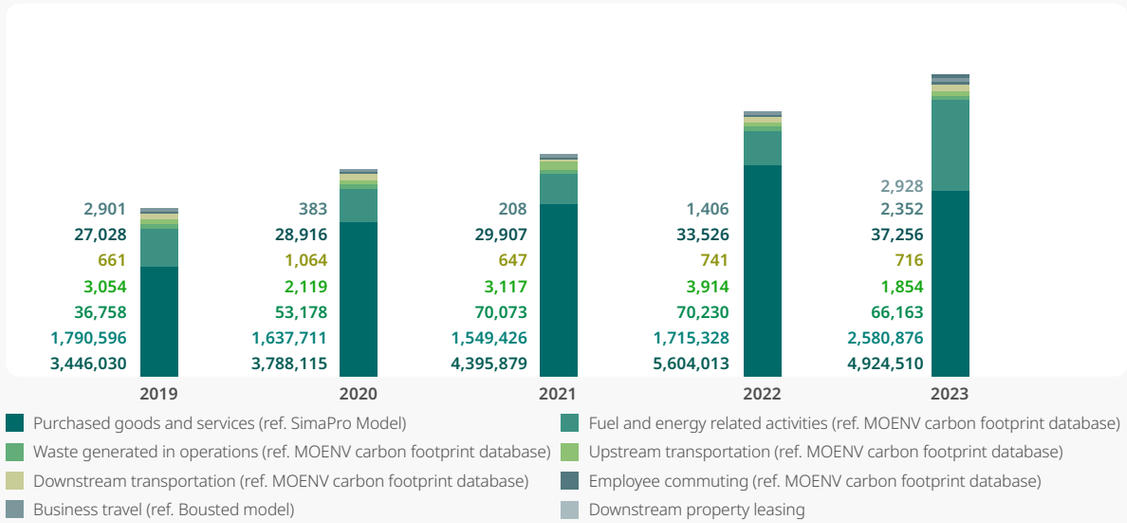
Scope 1 GHG Emissions (CO_2, tons)



Scope 2 GHG Emissions (CO_2, tons)



Scope 3 GHG Emissions (CO_2, tons)



Note 1: GHG emissions data for scope 1 and scope 2 include TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, and VisEra
Note 2: The scope 1 inventory data has been changed to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gases Inventories since 2020
Note 3: From 2023, GHG emissions data for scope 3 include TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, and VisEra
Note 4: Emission factor based on data released in 2023 by the Bureau of Energy stating that 0.495 kg of CO2e/ kWh, where 1 kg of CO2e equals 6,805 kJ

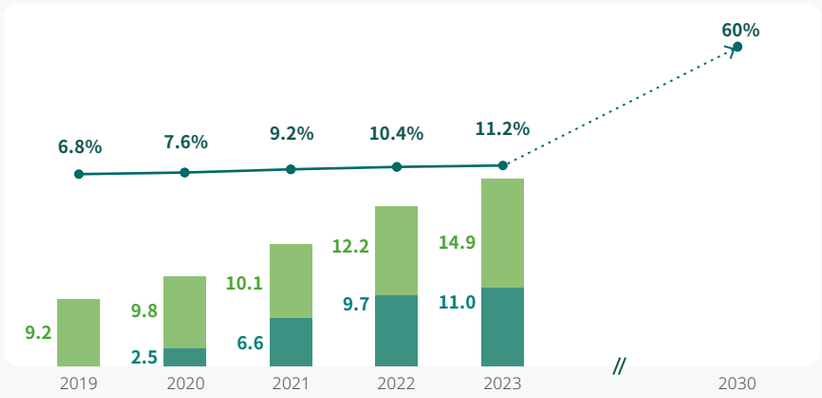
Use Renewable Energy

To achieve the commitment to Net Zero Emissions by 2050, TSMC actively adopts the use of renewable energy. With support from the Board and management team, it announced the acceleration of its RE100 progress, bringing forward the goal of using 100% renewable energy for global operations from 2050 to 2040, and increasing the proportion of renewable energy used in all operations from 40% to 60% by 2030 to facilitate the realization of the sustainable environment goals. Meanwhile, it continued to increase power supply from onshore wind farms, increased renewable energy usage to 1,100 GWh, and maintained 100% use of renewable energy in global offices. In addition, TSMC has been purchasing renewable energy, Renewable Energy Certificates (RECs), and carbon credits in countries with comprehensive regulations and ample supply to offset 100% of carbon emissions from power used in overseas locations. 2023 marks the sixth consecutive year that TSMC has achieved zero carbon emissions from power consumption in overseas subsidiaries.

Regarding renewable energy acquisition, the Company has signed on 3.1GW of renewable energy through PPAs by the end of 2023,which can reduce around 4.7 million metric tons of carbon emissions each year. In 2023, TSMC also initiated the supply chain renewable energy procurement project, which provides comprehensive services from power consumption assessment to power wheeling to suppliers with an intention to purchase renewable energy. Also, the Company promised a long-term purchase volume with a term of 20 years to secure stable power prices. By doing so, it not only reinforced the carbon reduction action forces of the local supply chain but also improved the matching opportunities with renewable energy developers. The Company estimates that it will further plan for aquavoltaics and agro-photovoltaics in 2024 to facilitate the diverse development of renewable energy.

In addition, to allow fabs to effectively make use of renewable energy, TSMC participated in the piloting of the green power allocation sandbox project organized by the Ministry of Economic Affairs and Taipower Company. The renewable energy purchased may be allocated flexibly based on the use requirements of fabs to to avoid the situation of insufficient or excessive renewable energy in various factory areas caused by the monthly difference in electricity generation of power plants, maximizing the value-in-use of renewable energy.

Renewable Energy Consumption and Ratio



60%
Renewable energy used by all TSMC operation sites by 2030

Six Consecutive Years
Zero carbon emissions from power consumption in overseas subsidiaries

100%
Renewable energy used in global offices

Renewable Energy Development Timeline

- **2019**: Committed to 25% renewable energy for fabs and 100% renewable energy for non-fab facilitie by 2030
- **2020**: Completed one of the first renewable energy wheeling transactions in Taiwan, purchasing 12.3 GWh of renewable energy
- **2020**: First semiconductor company to join the RE100
- **2020**: Signed the world's largest PPA (920 MW)
- **2021**: Committed to achieving 40% of the Company's electricity consumption as renewable energy by 2030
- **2022**: Established diverse supply of renewable energy by including a small-scale hydroelectric station and start supply in December
- **2023**: Brought forward the 2050 target of 100% renewable energy coverage in the company to 2040
- **2023**: Promised 60% renewable energy coverage in 2030
- **2023**: Pioneered supply chain renewable energy joint procurement model


TSMC increases the use of renewable energy

Renewable Energy Systems

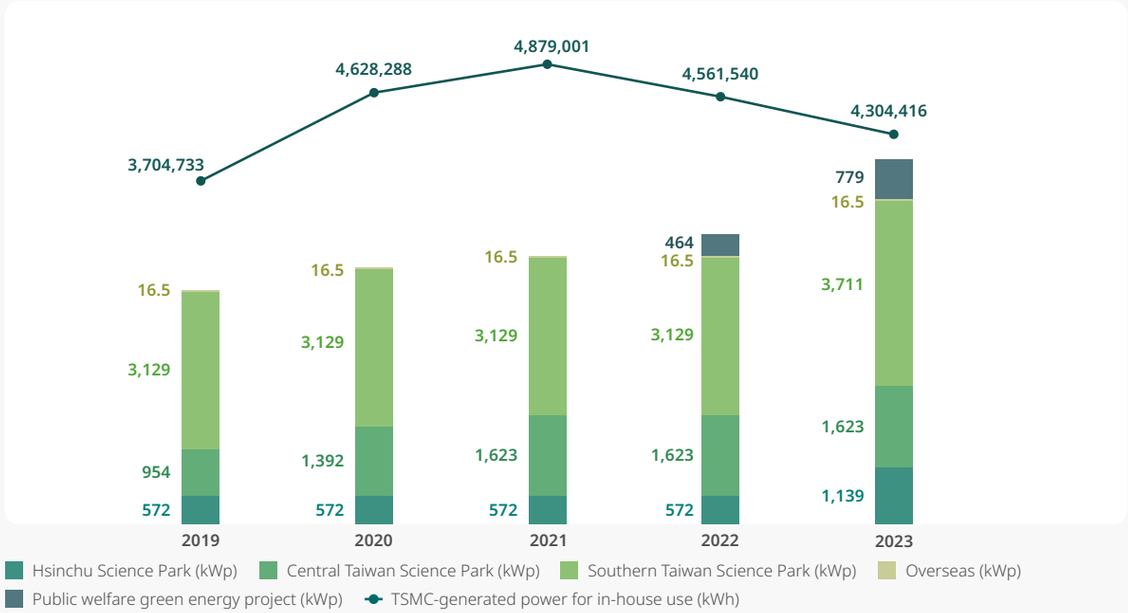
In addition to purchasing renewable energy, TSMC installed solar panels in TSMC fabs to produce carbon-free renewable energy for itself. In 2023, TSMC's solar panel installation capacity was 1,149 kWp, providing 4.30 GWh in electricity and reducing carbon emissions by 2,131 metric tons. Due to the amount of sunlight and partial damage to solar panels, the total power generation and carbon dioxide volume failed to achieve the estimated value. TSMC has initiated the solar power panel repair project, and it is estimated to expand the solar installation capacity to 1,500 kWp, with a power generation capacity up to 5.00 GWh.

In 2023, TSMC promoted its public welfare green energy project to install PV systems for social welfare organizations and schools in remote townships by engaging the Division of Facility and subcontractors through the cooperation between the TSMC Charity Foundation, governmental agencies, and universities/colleges and gave back all earnings from power rebates to organizations and schools to create a circulation of environmental friendliness and common benefits. As of 2023, the Company has provided an installed capacity of 315 kWp across seven additional locations and generated 0.329 GWh in electricity, and it gave back NT$1.641 million from rebates generated by the project.

Increase Energy Efficiency

In response to the increase in energy consumption arising from the evolving advanced process technologies, TSMC established its Green Manufacturing Department to manage the Net Zero Center, Zero Waste Center, and Water Resource Center, established its green manufacturing management platform to integrate energy-saving, resource circulation, water recycling, and other sustainable actions, and assisted the five major energy conservation teams to implement energy-saving projects. Through the Energy-saving Annual Award, it awarded energy-saving awards to fabs and teams with excellent performance (i.e., Fab 15A received Industry GHG Reduction Excellent Enterprises from the Industrial Development Administration for five consecutive years, and the EUV Team developed the energy-saving standby model of CO_2 laser machines) and encouraged employees to roll out innovative proposals to create energy-saving opportunities and enlargeits green impacts.

TSMC Renewable Energy Installed Capacity and Power Generation for In-house Use



Note: Due to the amount of sunlight and partial damage to solar panels, the total power generation and carbon dioxide volume in 2023 failed to achieve the estimated value

Three Major Centers of the Green Manufacturing Department

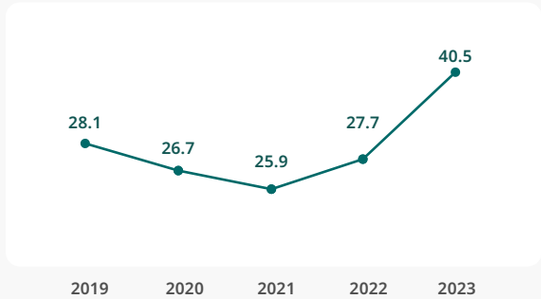
Net Zero Center
Responsible for developing and introducing innovative energy-saving technologies and managing the implementation achievements of energy-saving/carbon reduction measures

Zero Waste Center
Recycle and reuse waste to expand circular economic benefits

Water Resource Center
Coordinate water consumption in fabs and manage the Reclaimed Water Plant

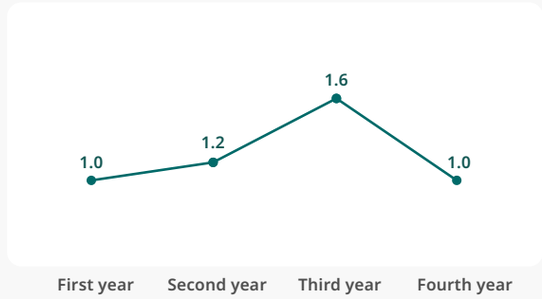
Unit Product Energy Consumption

Unit: kWh/12-inch equivalent wafer mask layer



Note 1: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, and VisEra
Note 2: Diesel and natural gas aren't used for production and excluded from calculations here

Energy Efficiency of Process Technologies



Note 1: Standardized baseline for energy efficiency is the values taken from the first year of volume production
Note 2: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, and VisEra

In 2023, TSMC consumed a total of 24,700 GWh in energy, with purchased electricity accounting for around 93.7%, natural gases accounting for 6.2%, and diesel accounting for 0.1%. Due to the impact of global economic cycles and lower-than-expected production capacity, the energy efficiency of 5nm volume production failed to achieve the annual target. The Company will continue to expand its energy-saving actions and invest resources to improve energy efficiency.

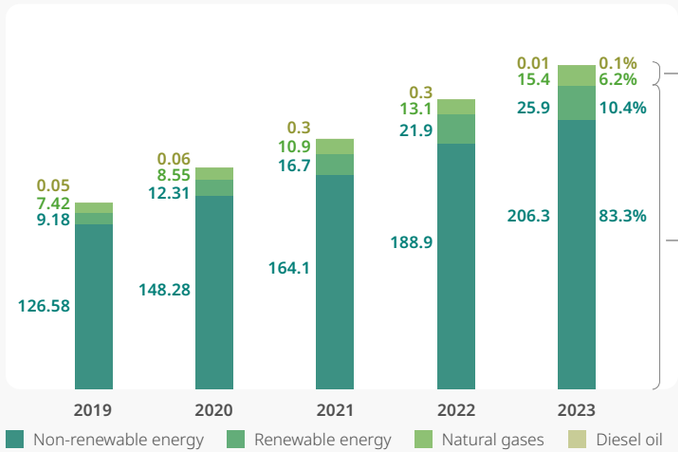
Expand Energy-saving Measures

TSMC continues to make efforts to explore energy-saving opportunities. In 2023, TSMC implemented 822 energy conservation measures across eight categories, achieving a 14% energy-saving rate and conserving 830 GWh in electricity. Energy conserved in 2023 is the equivalent of reducing 410,000 metric tons of carbon emissions and saving NT$1.98 billion in energy costs. The reduced carbon emissions also decreased the potential social cost of carbon by NT$590 million. As of 2023, the energy conservation action project for next-generation fab tools launched in 2018 has validated and applied 217 energy-conservation programs to hundreds of types of advanced process tools and conserved 900 GWh in energy through the cross-fab rollout of energy conservation measures. In 2023, the carbon capture and utilization development program was launched to accelerate the pace of net zero transition.

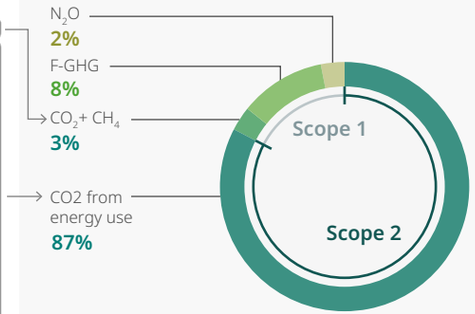

TSMC introduces high-efficient cooling tower fan

Total Energy Consumption

Unit: 100 GWh



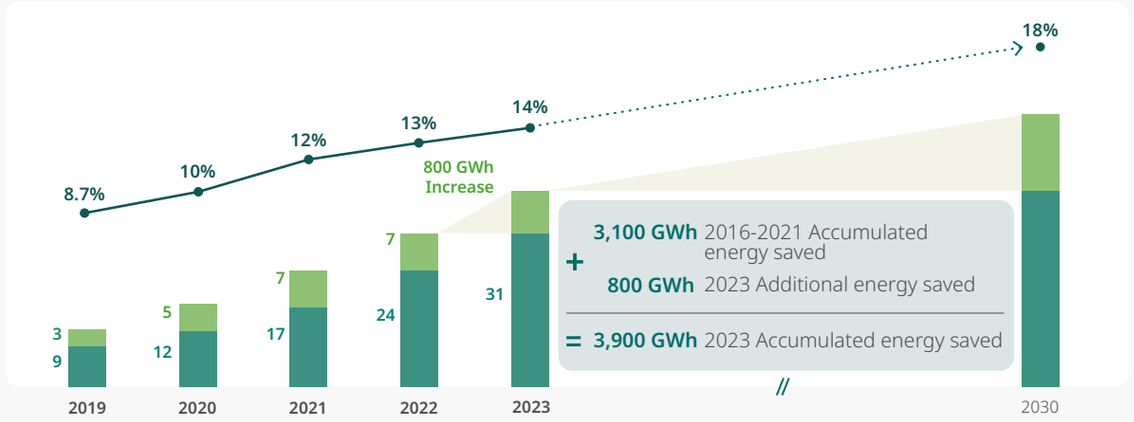
GHG Emissions from Manufacturing Processes



Note 1: 1 cubic meter of natural gas = 10.5 kWh of electricity; 1 liter Diesel Fuel = 8,400(kcal) = 35.16(MJ); 1 kWh = 3,600 kilojoules
Note 2: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, and VisEra
Note 3: GHG emissions from fabrication processes include only direct emissions (scope 1) and indirect emissions from using electricity (scope 2)
Note 4: The total amount of renewable energy include solar energy, wind energy, thermal energy, and hydroelectric energy

TSMC Cumulative Energy-saving Targets

Unit: 100 GWh



Note: 1kWh = 3,600 kilojoules

Five Major Energy Conservation Teams Continue to Innovate

Advanced Processes R&D Team

Targets (including existing and future tools)

- 3nm/2nm

Mission

- Develop energy-efficient components
- Optimize programs
- Compile tool specification

Achievements from Key Programs in 2023

- Developed and applied the hot water recycling system for wafer cleaning tools 2.0 at Fab 12B and saved **24,000** metric tons of pure water and **380,000** kWh of power
- Initiated the low global warming potential gas substitution project; with the optimized use of gases alongside the advanced process, it is estimated that the consumption of hydrofluorocarbons (HFCs) will be reduced by nearly **30%**

12-inch Wafer Fab Team

Targets (including existing and future tools)

- 12-inch wafer fabs (incl. overseas fabs)

Mission

- Replace & upgrade equipment with low energy efficiency
- Optimize programs

Achievements from Key Programs in 2023

- Completed the energy-saving and heat-reducing two-stage project targeting pipeline heating devices for advanced process tools to save **44.61 million** kWh of electricity and reduce **22,000** tons of carbon emissions per year

Advanced Backend and 8-inch Wafer Fab Team

Targets (including existing and future tools)

- Backend fabs and 8-inch wafer fabs (incl. overseas fabs)

Mission

- Replace & upgrade equipment with low energy efficiency
- Compile specification for new tools in backend fabs

Achievements from Key Programs in 2023

- Compressed dry air system cooling mechanism improvement saved **80%** of the chilled water consumption

EUV Team

Targets (including existing and future tools)

- EUV tools

Mission

- Optimize programs
- Develop energy-efficient components

Achievements from Key Programs in 2023

- Replaced the energy-saving pump of EUV tools and adopted the energy-saving model of the CO_2 laser machine, effectively reducing the power consumption by approximately **5%**

Facility Team

Targets (including existing and future tools)

- Shared facilities not used for production

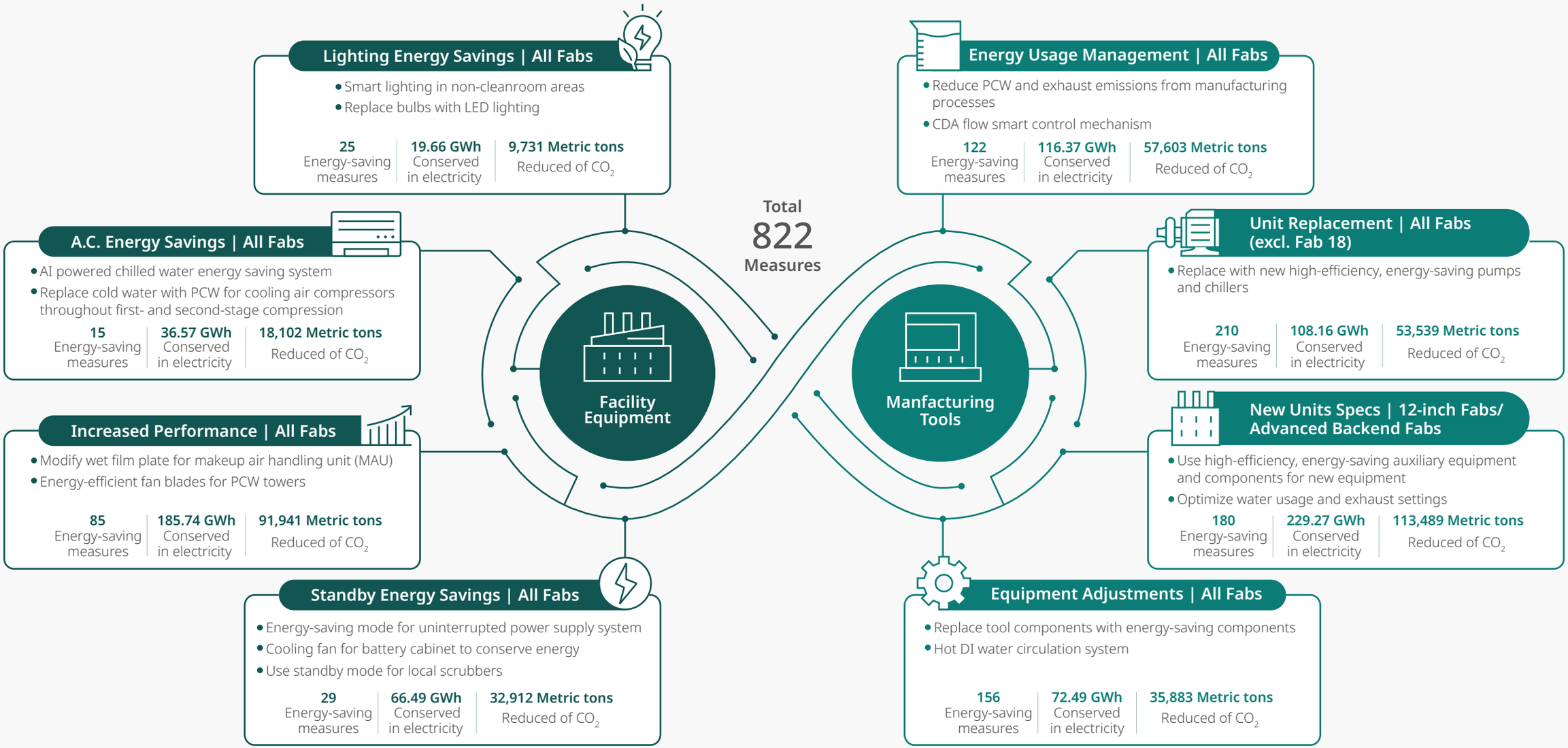
Mission

- Upgrade equipment with lowenergy efficiency
- Develop smart energy conservation system

Achievements from Key Programs in 2023

- Developed a high-efficiency cooling tower fan to reduce energy consumption, and the average energy-saving rate reached **13%**
- Introduced low energy consumption and high-efficiency local scrubbers, and the GHG reduction rate reached **95%**

Energy Conservation Measures



Note: CO2e factor is 0.495 kg/kWh; 1kWh = 3,600 kilojoules

Strengthen Nature and Biodiversity Protection

TSMC cares about environmental sustainability. It fulfilled its commitments to reinforce environmental protection through its ESG Policy, Climate Change Statement, and Environmental Policy. Meanwhile, it is also an avid supporter of the UN Convention on Biological Diversity and SDGs. The Company issued its own Biodiversity Statement in 2023 which guides its principles of implementing green manufacturing, promoting afforestation projects, promoting ecological restoration, cooperating with the supply chain, supporting natural carbon sink research, and promoting natural and environmental education in alignment with SDGs. It commits to cooperation with stakeholders for ecological conservation to mitigate environmental impacts on its operations and the value chain.

Apart from its efforts in implementing green manufacturing, TSMC added new cooperating units for the Plant A Tree Program in 2023 and expanded the scope of afforestation and ecological restoration to include Taoyuan City, Hsinchu City, Miaoli County, Taichung City, and Tainan City. The Company planted 84,500 trees and 471,147 shrubs, expanding afforested areas to over 11 hectares. It also organized family planting activities on Arbor Day, Earth Day, and World Environment Day, with 336 colleagues and family members participating, to pass down the sustainable environmental protection spirit. For environmental education, subsequent to the receipt of the initial Environmental Education Facilities Accreditation by Fab 15 from the Environmental Protection Administration in Taiwan, TSMC implemented the spirit of co-prosperity between corporate operations and the environment/ecology. Tainan Science Park Reclaimed Water Plant was put into use in 2022, which firstly created the use of industrial reclaimed water in the semiconductor process, and it received the Environmental Education Facilities Accreditation as TSMC Tainan Science Park Reclaimed Water Plant – Environmental Education & Learning Park at the end of 2023 to provide environmental education services to schools and the public and expand the scope and efficacy of friendly environments. See the 2023 TSMC Climate and Natural Report for more information on nature and biodiversity protection practices.

Case Study

HPC Technology Platform That Saves 6.8 kWh for Every kWh of Power Consumption

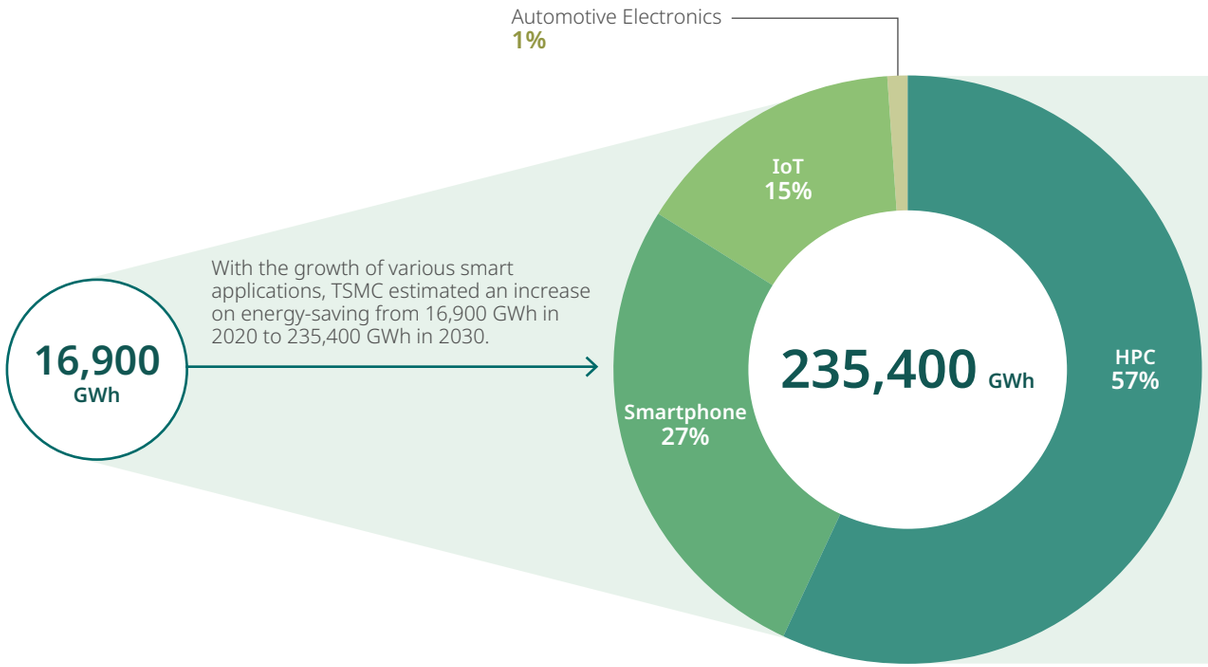
TSMC is committed to the efficacy of advanced processes and the realization of six major smart applications that, in turn, assist other industries and households in saving energy. In 2023, estimated with reference to the R&D achievements, every kWh of power used in the production of TSMC can help save approximately 4.28 kWh of power for other global industries and households by 2030. ISTI further assessed the contributions of TSMC's technical platforms on global energy-saving and discovered that HPC contributes the most to global energy-saving, accounting for approximately 57%, followed by smartphones, IoT, and automotive electronics, accounting for 27%, 15%, and 1%, respectively. Every kWh of power used in production for HPC-related semiconductor products can help save approximately 6.8 kWh of power based on the estimated power consumption of TSMC in 2030 for continuing to improve energy-saving efficacy.

Applications and Energy-saving Contributions of TSMC's Technical Platforms

Energy-saving Effect

Platform/Ratio of Energy-saving Contributions

Benefitted Smart Application



Smart Manufacturing
Improve production efficiency, accelerate the development of new products, and acknowledge timely supply chain schedules via the IoT

Smart Agriculture
Improve precision agriculture and automated management to reduce food waste

Smart Energy
Introduce smart power grids for real-time connection to energy supply and power demand to improve power generation efficiency

Smart Building
Combine building software and remote control to enhance resource use efficiency through data analysis and control systems

Smart Transportation
Optimize transportation control systems, smart logistics, and mobile Internet

Smart Services
Reinforce e-commerce, online banking, and Internet connection operating systems

Water Stewardship

	2030 Goals	2024 Targets	2023 Achievements
Manage Water Resource Risks Enforce climate change mitigation policies; implement water conservation and water shortage adaptation measures	Reduce unit water consumption[Note 1] by 30% (L/12-inch equivalent wafer mask layer) (Base year: 2010)	Reduce unit water consumption by 2.7% (L/12-inch equivalent wafer mask layer) (Base year: 2010)	Note 2 Increased unit water consumption by 25.2% (L/12-inch equivalent wafer mask layer) Target: Reduce unit water consumption by 2.7% (Base year: 2010)
Develop Diverse Water Sources Develop water reclamation technologies; continue to practice water conservation and use reclaimed water during manufacturing	>60% replacement of water resources with reclaimed water[Note 3]	14% replacement of water resources with reclaimed water	↑ 12% replacement of water resources with reclaimed water Target: 5% ✓ The second water reclamation plant located in Anping, Tainan started supplying water on March 20, 2023 Target: Continue to collaborate with the government to complete the second water reclamation plant located in Anping, Tainan
Develop Preventive Measures Improve the efficiency of water pollution control and removal of water pollutants	Water pollution composite indicator reduction rate of >60%	Water pollution composite indicator reduction rate of 60%	↑ Water pollution composite indicator reduction rate of 63% Target: Water pollution composite indicator reduction rate of 56%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Unit water consumption = unit tap water consumption

Note 2: Under the effect of global economic circulation, the capacity utilization of TSMC in 2023 was less favorable than expected, resulting in an increase in unit water consumption, and it failed to achieve the annual target. TSMC will continue to implement process water conservation and the use of reclaimed water

Note 3: Replacement of water resources = consumption of reclaimed water/(consumption of reclaimed water + consumption of tap water)

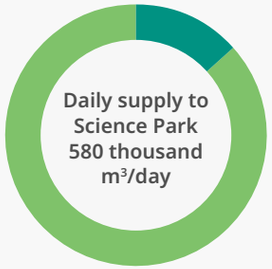
The environmental impacts caused by climate change are becoming increasingly severe, and the demand for the cleanliness of water used in the advanced processes continues to rise. It is TSMC's responsibility to make the most of water resources and maximize their benefits. For the best use of water resources, TSMC implements three strategies: water resource risk management, diversification of water resources, and development of prevention and control technologies. In 2023, the Company established its Green Manufacturing Department – Water Resource Center to comprehensively grasp the water consumption management and increase the water consumption efficiency through the Diverse Water Supply Integration Platform, and it worked with the government to develop reclaimed water technologies. Tainan Anping Reclaimed Water Plant was completed and put into use in 2023, which can supply 62,500 m^3 of recycled water daily for use in semiconductor processes to reduce the consumption of tap water through replacement. In addition, TSMC also promoted water conservation engineering at Japan Advanced Semiconductor Manufacturing, Inc. (JASM), restoring 2,000,000 m^3 of groundwater in 2023 to achieve Water Positive benefits and promote sustainable development.

Manage Water Resource Risks

To facilitate sustainable environmental development, TSMC's Facility Development established the Green Manufacturing Department – Water Resource Center to be responsible for water resource management strategies and diverse water consumption planning. TSMC evaluates the water risk levels by using the Water Risk Atlas from the World Resources Institute (WRI). According to the evaluation results in 2023, TSMC (China) was rated as high risk, due to regional water quality differences; TSMC facilities in Taiwan, TSMC (Nanjing) and VisEra were rated as medium-to-low risk; TSMC Washington, LLC was rated as low risk. TSMC mitigated the impact of environmental risks during the construction period of the facility through elevated foundations, installed floodgates, and applied existing

TSMC Water Consumption in Three Science Parks

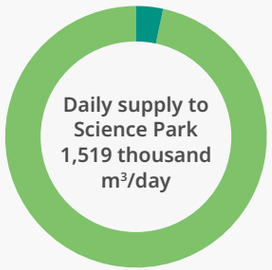
Hsinchu Science Park



Service reservoir | Baoshan Reservoir, Second Baoshan Reservoir

Water consumption
70 thousand m³/day
12.0%

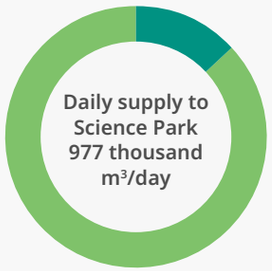
Central Taiwan Science Park



Service reservoir | Liyutan Reservoir, Deji Reservoir

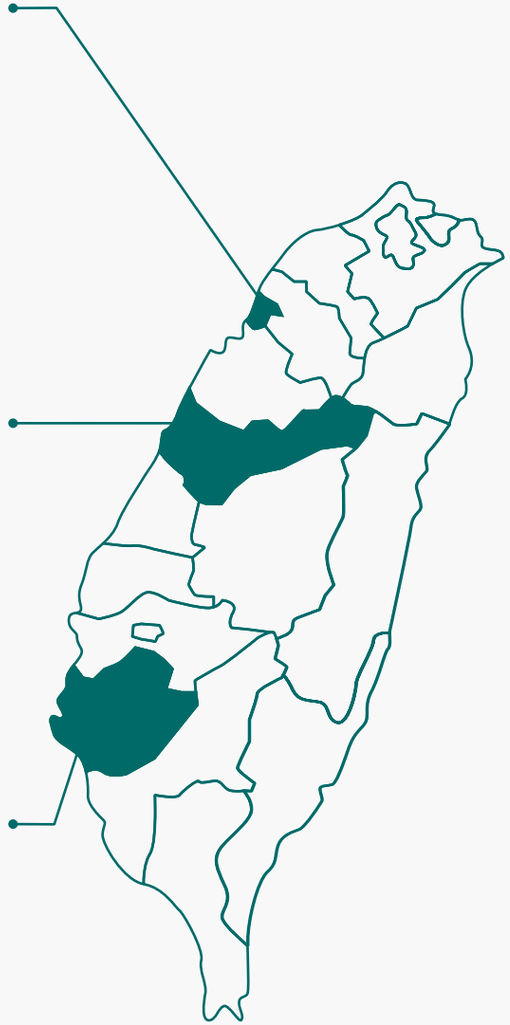
Water consumption
55 thousand m³/day
3.6%

Southern Taiwan Science Park



Service reservoir | Nanhua Reservoir, Zengwen Reservoir

Water consumption
129 thousand m³/day
13.2%



Resource: Water Resources Agency, Ministry of Economic Affairs

Drought Contingency Measures

Government		TSMC
Water signal from the Water Resource Agency (WRA)	Government response measures	TSMC response measures
Blue Normal water levels	• Stable supply and demand	• Monitor WRA reservoirs supply for TSMC fabs • Host drills regularly
Green Fairly severe	• Farmers encouraged to suspend farming	• Drought Emergency Response Tea in operation • Check water resources and water truck capacity • Spontaneously save water by 5%
Yellow First stage	• Reduce water pressure at specific times • Suspended irrigation water in certain areas	• Reduce water consumption by 7% • Water truck drills
Orange Second stage	• Reduce water supply to industrial users by 5-20%	• Activate water trucks • Reduce water consumption by 7-20%
Red Third stage	• Water rationing by district	

recycling systems and wastewater treatment measures to the facility. By the time the newly built facility became operational, it already possessed outstanding flood protection and process water recycling rate, which allowed water resources to be comprehensively utilized and managed.

To effectively manage and control the water resources in its facilities, TSMC implements water management according to the Alliance for Water Stewardship (AWS) sustainable water management standard. In 2023, the Hsinchu plant (Fab 5, Fab 12A, Fab 12B, and Advanced Backend Fab 3) and the Tainan plant (Fab 6, Fab 14A Phase 7, Fab 14B Phases 5 and 6) underwent annual verification, while the Taichung plant (Fab 15A and Fab 15B) undergoes re-certification every three years. All plants maintained a platinum-level performance, committed to achieving optimal water resource utilization efficiency.

Integrate Water Supply Information to Comprehensively Manage Water Consumption

In 2023, TSMC improved the interface of its internal water resource platform, Water Map, and upgraded it to the Diverse Water Supply Integration Platform. Apart from maintaining the functions and continuing to improve the water recycling rate, it further incorporates diverse water usage information to enhance the operation and supply of water quality and quantity in the reclaimed water plant, comprehensively grasping and managing water usage within the facility. For water shortage, TSMC adopted response measures in compliance with the "TSMC Water Supply Shortage Crisis Management C.I." based on the drought monitoring signals issued by the Water Resources Agency.

Multiple Water Supply Integration Platform

It tracks the water levels, establishes water quality and water volume monitoring points in the facility, and integrates the water consumption direction, flow, and recycling and reuse mechanism in accordance with the water balance chart and calculates the recycling rate, discharge rate, and water consumption of each water-consuming unit to serve as the basis for promoting energy-saving measures. Meanwhile, it monitors the water quality/water volume/water consumption, and the real-time quality of pure water supply of the reclaimed water plant to strengthen the operation of the reclaimed water plant.

WRI Risk Identification

Overall WRI Risk Index	TSMC Assessment	TSMC Assessment Results	TSMC Response Measures
Frequency • Water risk • Decreasing underground water levels • Interannual variation • Seasonal variation • Drought • Flood risks • Tsunami risks	Flood risk	Low risk: 1 Facility	**Facility design** • Elevate facility • Install flood gates
Quality control • Coastal erosion • Untreated water bodies	Water risk	Mid-to-low risk: 18 Facility	**Water management** • Establish emergency response procedures • Develop diverse water sources • Recycle and reuse water • Set water pollution composite indicator
Regulation and reputation • Drinking water quality • Sanitary conditions • Sustainable investment index	Water quality risk	High risk: 1 Facility	

Note: In 2023, Advanced Backend Fab 6 were rated as medium-to-low risk; and TSMC (Nanjing) were rated as medium-to-low risk

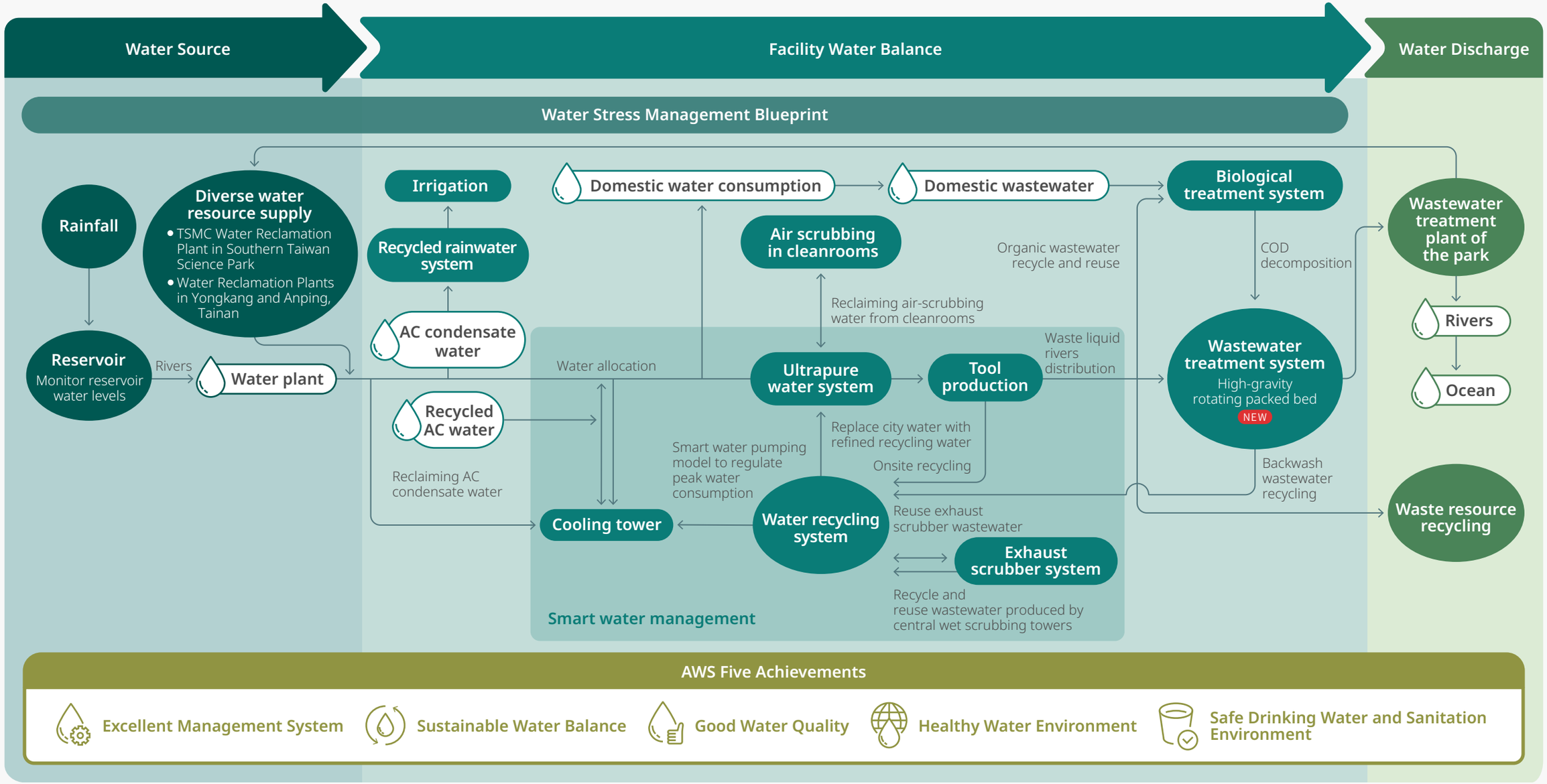
Case Study

JASM Water Conservation Engineering, Restored Groundwater of Approximately 2,000,000 m^3

The basic concept of Water Positive is to generate a water volume through restoration that is more than water consumed. In 2023, it promoted water conservation engineering in the neighborhood of JASM. By installing conservation pods and a rainwater reclamation system, rainwater seeps into the groundwater level for conservation. Meanwhile, in response to the winter fallow of farms, the Company worked with private groups to introduce river water from the midstream of Shirakawa River in Kumamoto into idle farms to restore groundwater. In 2023, it conserved and restored groundwater of approximately 2,000,000 m^3, implementing the sustainable circulation of water resources.

Conservation pond of the water conservation engineering at JASM

Water Balance and Supply Chain Environmental Relationship



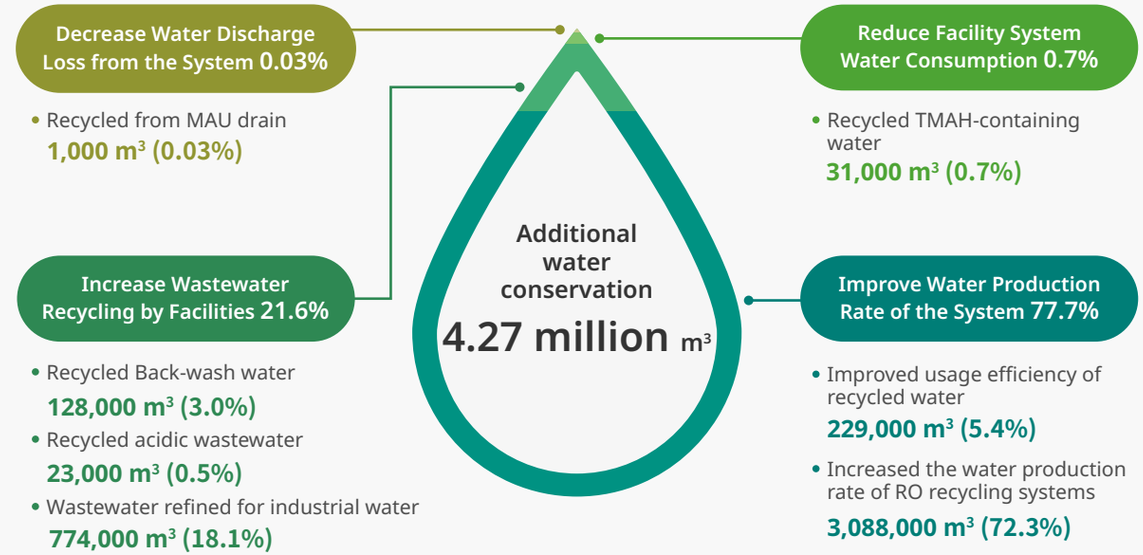
Strengthen In-house Water Reclamation and Water Use Efficiency

TSMC continues to implement various water-saving measures. In 2023, the additional water conservation was 4.27 million m^3, and water reclaimed by the overall recycling system reached 286.35 million m^3, representing an increase of 33% compared with 2022. The wafer unit consumption was 176.4 liter per 12-inch equivalent wafer mask layer, representing an increase of 25.2% from the 140.9 liter per 12-inch equivalent wafer mask layer of the base year (2010), which failed to achieve the annual target, primarily due to the increase in the unit product consumption resulting from the effect of global economic circulation and the capacity utilization less favorable than expected. Wastewater unit discharge was 132.8 liter per 12-inch equivalent wafer mask layer. TSMC adheres to the concept of sustainable utilization of water resources and will continue to improve efficiency for use of water resources and decrease wastewater discharge.

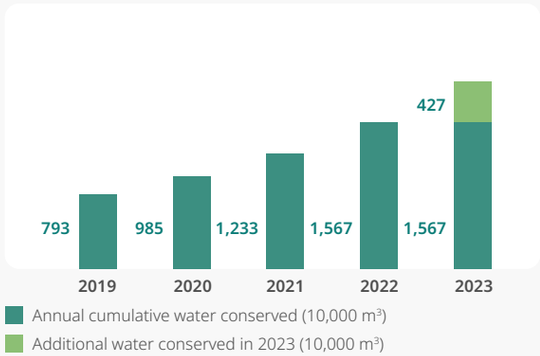
Product Water Footprint

TSMC conducts a product water footprint assessment survey every three years, with the assessment covering raw material manufacturing and transportation, product manufacturing, testing, packaging, and other stages; the Company passed the ISO 14046 third-party assurance to improve water resource management within the company and its supply chain. TSMC's product water footprint is divided into water consumption and water quality indicators. According to the results in 2021, TSMC continued to minimize the water resource consumption of facilities during production while improving the utilization rate of reclaimed water and enhancing water pollution control and removal of water pollutants. For supplier management, it amended the TSMC Supplier Code of Conduct and added that suppliers shall assess the water shortage and flood risks of their business locations, promote energy-saving and water recycling measures, and have emergency response measures and training for water shortage and flood in the hope of leading the supply chain to jointly reduce product water footprint and improve climate resilience; see Sustainable Supply Chain for more information.

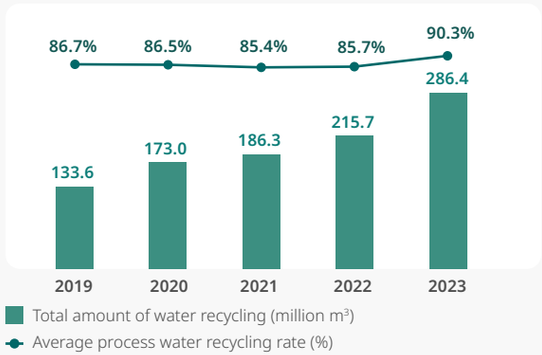
Water-saving Measures and Achievements in 2023



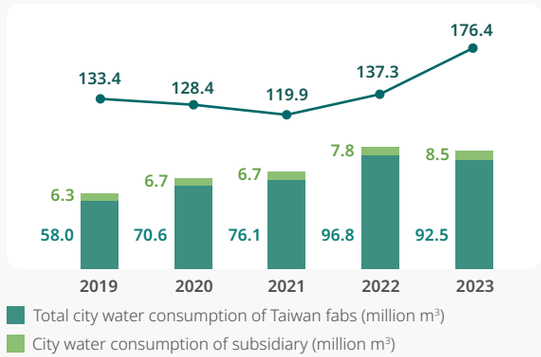
Annual Water Conservation



Water Recycling and Usage Efficiency

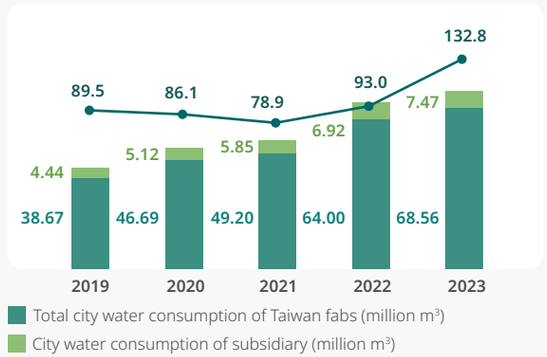


City Water Consumption and Water Consumption per Wafer-layer



Note: Figures from TSMC fabs in Taiwan, TSMC Washington, LLC, TSMC (China), TSMC (Nanjing) and VisEra

Wastewater Discharge per Unit



Note: Figures from TSMC fabs in Taiwan, TSMC Washington, LLC, TSMC (China), TSMC (Nanjing) and VisEra

Develop Diverse Water Sources

TSMC actively develops water reclamation technologies to advance water efficiency. In March 2023, Tainan Anping Reclaimed Water Plant, under the collaboration of TSMC and the government, was formally put into use, together with the water supply of TSMC Tainan Science Park Reclaimed Water Plant and Yongkang Water Resource Recycling Center, a cumulative 12.61 million m^3 of reclaimed water was supplied in 2023, equivalent to the carrying capacity of 630,000 water drills. Furthermore, TSMC initiated the Hsinchu and Kaohsiung Reclaimed Water Plant Projects; in 2023, a tender was conducted for the reclaimed water engineering for the Hsinchu Industrial Park, and the contract for the Kaohsiung Qiaotou City Reclaimed Water Plant was signed, and construction commenced. Through continuously expanding the application scope of reclaimed water and responding to the supply of reclaimed water, the Company is able to achieve 100% use of reclaimed water for its new facilities in Hsinchu Industrial Park and Kaohsiung to achieve over 60% replacement rate of water with reclaimed water in 2030.

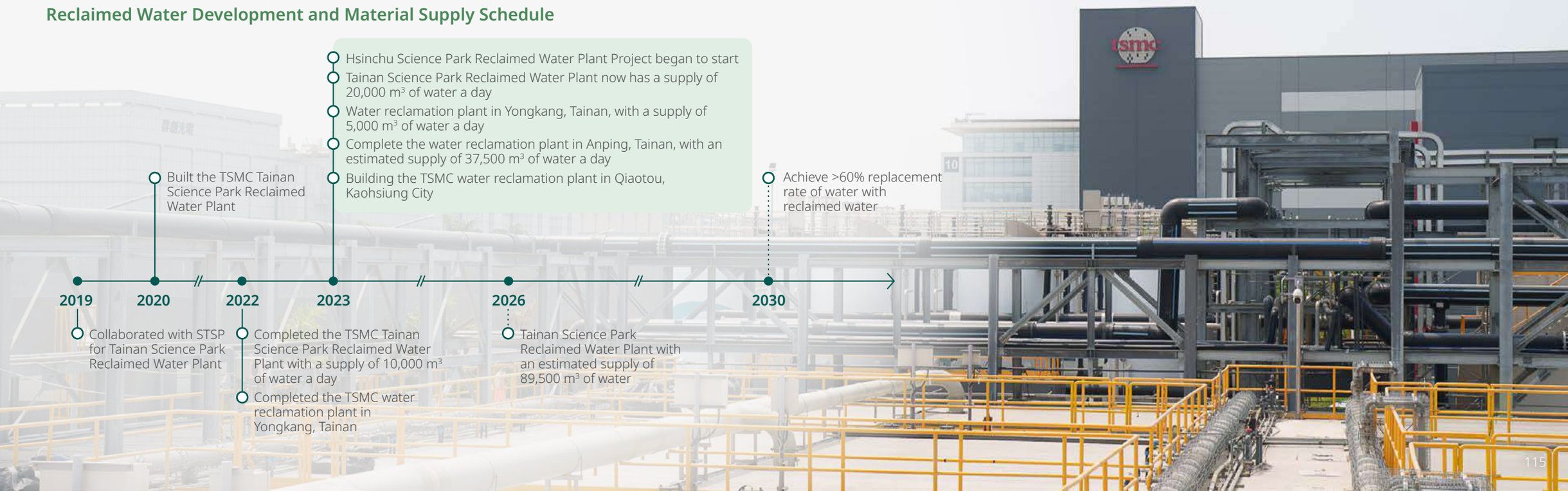
To implement the use of diverse water resources, TSMC also participated in the seawater desalination plant construction projects promoted by the Water Resources Agency, in Hsinchu and Tainan in 2023 and subscribed for approximately 45,000 m3/day of desalinated seawater as available water supply. After the completion of seawater desalination plants and the commencement of water generation, it may further reduce the Company's operating risks under extreme weather to implement the sustainable water circulation management.

Develop Preventive Measures

TSMC actively implemented wastewater resource management. TSMC has developed 38 separation systems based on the composition and concentration of wastewater for treatment, recycling, and reuse. For wastewater that cannot be recycled and reused, it constantly improved its water quality improvement technologies, including the membrane bioreactor system, HOCl conversion system, and the High-gravity Rotating Packed Bed technology, to duly process the wastewater before discharging it to the water treatment plant of the park. They allow control equipment to maintain the optimal stability for operations; wastewater treatment systems are equipped with backup designs and alarm systems that can maintain the water of effluents above the baseline of stability in general and can turn on the backup equipment immediately upon any system malfunction for the benefit of continual operations in order to achieve the management target of zero failure in control equipment. There was no sewage discharge anomaly in TSMC's Facilities in 2023.

As advanced processes have evolved and increased the use of organic chemicals, TSMC reinforced its capacity to remove pollutants from water through the membrane bioreactor system. In 2023, the membrane bioreactor system was put into use in Fab 12B Phase 8, Fab 18A, and Fab 18B, and Fab 15B completed the optimized adjustments to its system operation. The average COD concentration levels reduced from 151.5 ppm to 116.3 ppm, and the water pollution composite

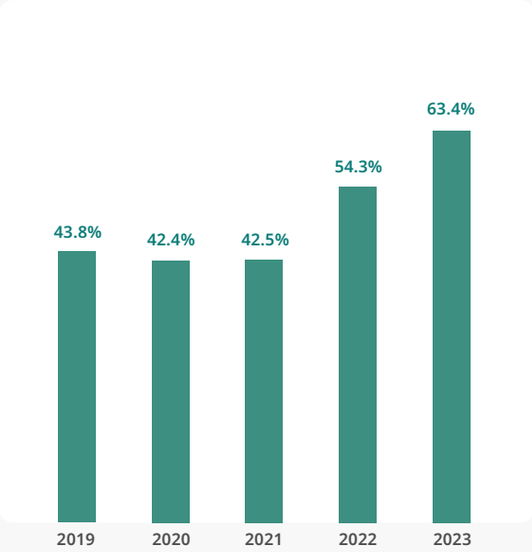
Reclaimed Water Development and Material Supply Schedule



indicator reduction rate achieved 63%, which was more favorable than the annual target of 56%; the discharge concentration of TMAH reduced from 3.75 ppm to 2.48 ppm, mitigating potential effects of the operations on the environment.

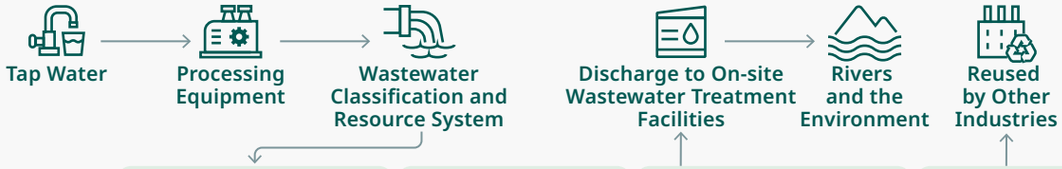
In addition, the high-gravity rotating packed bed was introduced into Fab 15B to use gas stripping technologies in removing IPA in COD, which improved the reduction rate by 70%. The treatment of NH4-N wastewater was tested in Advanced Backend Fab 6 to utilize the high-speed centrifugation generated by the high-gravity rotating packed bed to increase the specific surface area of action, increase the mass transfer efficiency to better combine with sulfuric acid and transform into ammonium sulfate after entering into the absorption tower; it is estimated that the removal of NH4-N may reach 95%, and the ammonium sulfate output would be 773 kg daily.

Water Pollution Composite Indicator Reduction Rates



Note: Figures from TSMC fabs in Taiwan

Wastewater Classification and Resource System



	38 Different Types of Liquid Classified	9 Recycling Systems	13 Types of Wastewater Treatment	8 Products Recycled
Hydrofluoric (HF) Acid Wastewate	• HF acid wastewater (2 types) • Ozone-containing HF acid wastewater • Manufacturing process scrubbing water	• Hydrofluoric (HF) acid wastewater • Local scrubber wastewater recycling	• Chemical coagulation treatment of HF acid • HF (including ammonia) treatment • Biological treatment of HF	• Calcium fluoride • Fluorite cryolite
Acidic, Caustic, and Organic Wastewater	• Deionized water • Ozone-containing deionized water • Acidic wastewater (2 types) • Ozone-containing acidic wastewater • Caustic wastewater • Ozone-containing caustic wastewater • TMAH wastewater • Organic wastewater (2 types)	• Acidic wastewater recycling • Ozone-containing acidic wastewater recycling • Caustic wastewater recycling • Caustic wastewater upcycling • Organic wastewater recycling	• Acidic and caustic wastewater treatment • NH_4-N wastewater treatment and recycling • TMAH liquid waste recycling • Biological treatment system for organic wastewater	• Ammonium sulfate • TMAH
CMP Wastewater	• Electroplating wastewater • CMP wastewater (2 types) • Copper-containing CMP wastewater • Cobalt-containing CMP wastewater	• Chemical coagulation recycling of CMP wastewater • Copper-containing CMP wastewater upcycling	• CMP wastewater treatment • Copper-containing CMP wastewater treatment • Cobalt-containing CMP wastewater treatment	• Silicon aluminum oxid
High-concentration Liquid Waste	• Other wastewater (16 types) • Waste sulfuric acid • Waste copper sulfate • Cobalt-containing liquid		• Waste-H_2SO_4 reclamation • Copper-containingel ectroplating wastewater recycling • Cobalt-containing electroplating wastewater recycling	• Sulfuric acid • Copper bar • Cobalt bar

Case Study

Optimized the High-gravity Rotating Packed Bed to Improve the IPA Reduction Rate by 70%

TSMC continues to use innovative technologies to improve water pollution prevention and control. TSMC worked with suppliers to optimize the high-gravity rotating packed bed equipment; after the organic waste liquid was concentrated by reverse osmosis, the High-gravity Rotating Packed Bed was used for gas stripping to convert IPA from liquid to gas and then decomposed through a heat storage-type incinerator, effectively improving the reduction of IPA by 70%. The waste heat generated from the decomposition can be used to provide energy for the high-gravity rotating packed bed, saving over 50% of energy. The equipment was introduced into Fab 15B in 2023, which reduced the COD concentration levels from 300 ppm to 114 ppm and through waste heat recycle, 3.41 million kWh of power is saved annually, and reduced carbon by 1,735 metric tons, facilitating sustainable environmental development.

TSMC works with suppliers to optimize the high-gravity rotating packed bed equipment to improve the IPA reduction rate

Circular Resources

Promote Source Reduction

Promote waste reduction by source separation and require vendors to provide low chemical consumption equipment

Enhance Circular Economy

Collaborate with vendors to develop new waste recycling technology to increase the amount of waste recycled and reused

Strengthen Audit and Guidance

Enhance vendor capabilities in self-management and implementing resource recycling through audits, guidance, and tracking with applied technologies

2030 Goals	2024 Targets	2023 Achievements
Outsourced unit waste disposal per wafer[Note 1] ≦ 0.50 (kg/12-inch equivalent wafer mask layer)	Outsourced unit waste disposal per wafer ≦1.17 (kg/12-inch equivalent wafer mask layer)	— Note 2 Outsourced unit waste disposal per wafer ≦1.17 (kg/12-inch equivalent wafer mask layer)
Develop multiple types of electronic-grade chemicals for resource recycling within TSMC	In-house resource recycling rate≧33%	↑ Develop electronic-grade Cyclopentanone, 32% In-house resource recycling rate Target: ≧28%
Reduce CO_2 emissions from waste treatment to 2020 emission levels	Promote three projects to reuse instead of incinerate	✓ Promote three projects to reuse instead of incinerate and reduce carbon emissions by 694 metric tons Target: three projects
100% Waste recycle rate NEW	Waste recycling rate 96% NEW	—
All waste treatment vendors shall acquire ISO 14001 or other international EHS management certification[Note 3]	88% of waste treatment vendors shall acquire ISO 14001 or other international EHS management certifications	↑ 87% of waste treatment vendors shall acquire ISO 14001 or other international EHS management certifications Target: 86%
All waste treatment vendors shall finish building the System of Waste Intelligent Fast Track (S.W.I.F.T.)[Note 4]	35% of waste treatment vendors shall finish building the System of Waste Intelligent Fast Track (S.W.I.F.T.)	↑ 29% of waste treatment vendors shall finish building the System of Waste Intelligent Fast Track (S.W.I.F.T.) Target: 20%
Increase percentage of excellent and good waste treatment vendor evaluation results to 90%	Increase percentage of excellent and good waste treatment vendor evaluation results to 88%	↑ Increase percentage of excellent and good waste treatment vendor evaluation results to 86% Target: 82%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Outsourced waste refers to wastes disposed of or reused based on the application of a company with approval from the competent authority of the industry

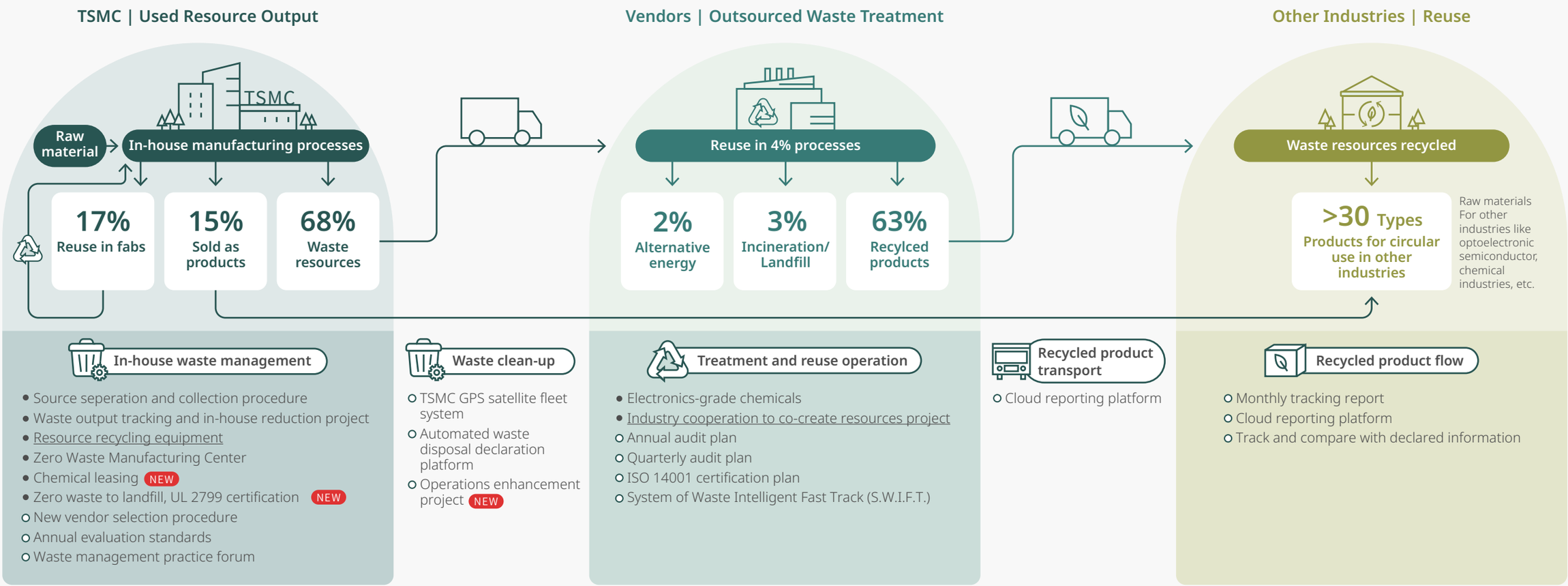
Note 2: In 2023, the outsourced unit waste disposal per wafer failed to reach the target due to the reduction in the production capacity utilization rate, tool cleaning in advanced TSMC fabs, and the demand for testing the yield of wafers. TSMC will continue to promote the reduction of raw materials, the increase in in-house resource recycling equipment, and the promotion of recycling and testing electronic-grade chemicals in the hope of achieving the long-term target in 2030

Note 3: TSMC requires waste treatment vendors to obtain at least ISO 14001 or ISO 45001 certifications as the basis for standardized management. Waste treatment vendors include waste treatment and recycling vendors. Government-owned enterprises, public-to-private enterprises, wholesale and retail industry, items exempted from online reporting, and timber waste and lubricant waste vendors not included in the aforementioned vendors

Note 4: Only include TSMC-certified waste treatment vendors that have been working with TSMC for three years

As a long-term reliable technology and production capacity provider, TSMC aims to become the global eco-friendly benchmark. Through the three major strategies of source reduction, circular economy, and audit guidance, the Company upholds the management principles of "minimizing waste, maximizing resource ecycling, and optimizing vendor management." In 2023, the Company's waste recycling rate reached 96% while its facilities in Taiwan increased to 97%; the landfill rate was less than 1% for 14 consecutive years, and the rate dropped below 0.05% for the first time in 2023. Furthermore, it obtained the platinum rating for zero waste to landfills (UL 2799), making it the first in the global semiconductor industry to do so. In the same year, it established the Green Manufacturing Department - Zero Waste Center, and the Zero-waste Manufacturing Center at CTSP was formally put into commission in December to continue improving the benefits of the circular economy. In addition, TSMC has been improving vendors' self-management ability. Besides providing consultation for waste treatment vendors to introduce the System of Waste Intelligent Fast Track (S.W.I.F.T.) to comprehensively prevent illegal dumping, TSMC initiated the waste clean-up improvement project 2.0 for waste clean-up vendors, required the vendor's supervisor to follow the vehicles for self-audits, and strengthened the quality and safety during the clean-up to create a sustainable environment.

TSMC Waste Life Cycle Management Procedure 2.0



○ Waste treatment vendor management project

914,963 Metric tons Recycled waste ÷ **949,851 Metric tons** Total waste production in 2023 = **96%** 2023 Waste recycle rate[Note 1]

96% Recycled waste 914,963 Metric tons

		General waste	Hazardous waste
63%	Recycled materials	602,117	237,981	364,136
17%	Reused in fabs	159,846	0	159,846
14%	Converted to products and sold	132,940	100,631	32,309
2%	Recycled energy (auxiliary fuel)	19,836	17,120	2,716
0.023%	Others[Note 2]	224	223	1

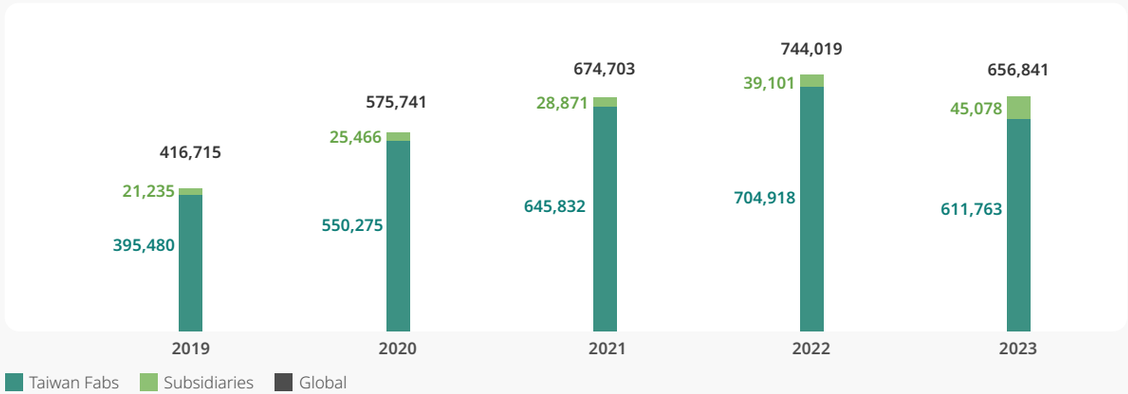
4% Non-recyclable waste 34,888 Metric tons

4%	Incineration	33,990	29,951	4,039
	Landfill	898	553	345

Note 1: The data scope covers TSMC facilities in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Arizona, TSMC Washington, LLC, JASM, and VisEra
Note 2: Includes 29 metric tons chemical leasing, 194 metric tons in Zero Waste Manufacturing Center, one metric ton electronic-grade chemicals

Outsourced Waste

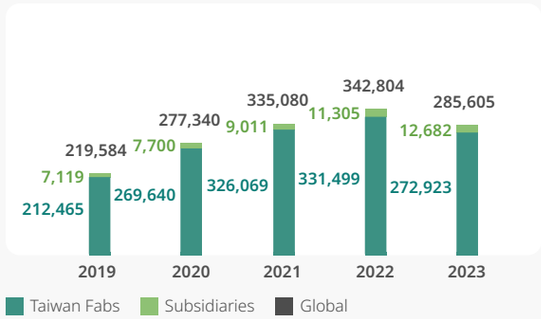
Unit: Metric tons/year



Note: Includes chemical leasing, Zero Waste Manufacturing Center, electronic-grade chemicals

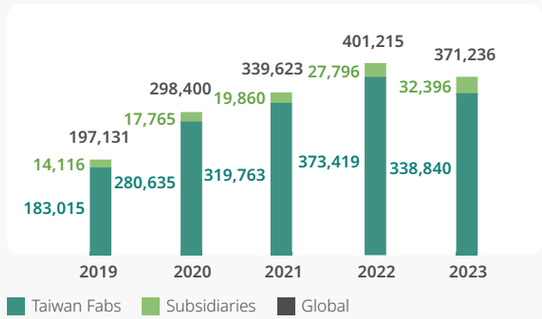
Outsourced General Waste

Unit: Metric tons/year



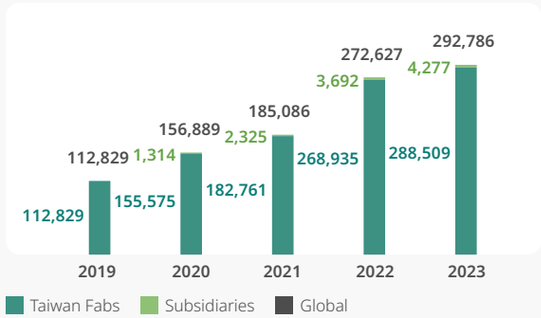
Outsourced Hazardous Waste

Unit: Metric tons/year



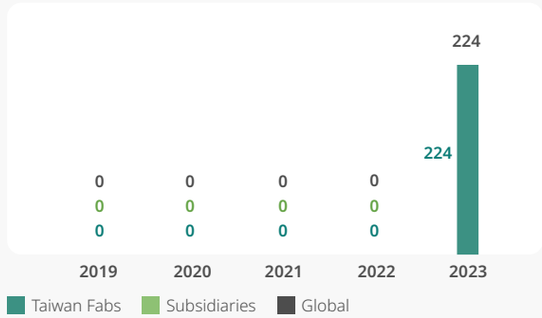
In-house Recycled Resources

Unit: Metric tons /year



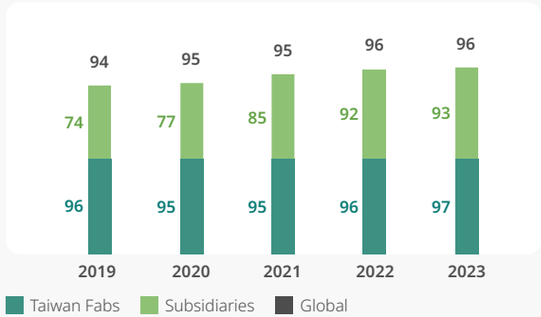
Other Measures[Note]

Unit: Metric tons/year



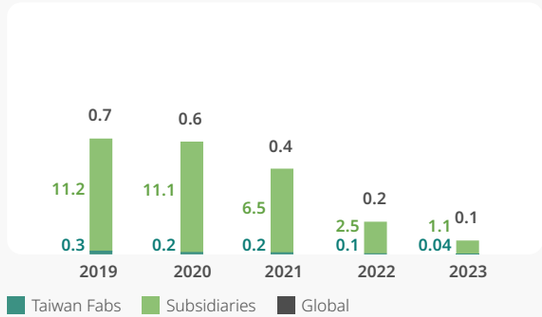
Waste Recycling Rate

Unit: %



Percentage of Waste Sent to Landfills

Unit: %



Promote Source Reduction

TSMC is committed to implementing source reduction to minimize waste. The consumption of raw materials and output of wastes increased in response to the expansion of facilities and the development of advanced processes. To mitigate its environmental impact, TSMC's Waste Management Task Force, including facility, process, supply management, and resource circulation management units, utilizes the Plan-Do-Check-Act (PDCA) management cycle through the unit waste production management system. A reduction target is set at the beginning of each year, including process streamlining countermeasures, reduction of chemical use time and quantity, extended use cycles, and chemical substitutes. Regular meetings are held to examine the implementation progress and effectiveness to reinforce the voluntary management system. A total of 202 manufacturing equipment waste reduction projects were initiated in 2023, resulting in a total reduction of over 20,000 metric tons of waste. One of the widely used chemicals in the semiconductor production process is sulfuric acid for wafer cleaning. TSMC adjusted the acid discharge mode of the sulfuric acid and hydrogen peroxide mixture during the cleaning process. They confirmed that the production capacity and yield were not affected through the process unit, while the plant operations unit continuously monitored the system load. At the same time, the resource recycling management unit and waste treatment vendor worked closely together to closely monitor the quality of the waste sulfuric acid. This reduced the amount of sulfuric acid waste generated by cleaning each 12-inch wafer by 20%. In 2023, TSMC used the "smart copy" technique to reduce sulfuric acid waste in Taiwan by a total of about 1,200 tons.

TSMC Waste Reduction Management Mechanism

Data Inventory and Planning
Conduct cross-fab and cross category comparison analysis on waste to plan for reduction projects and annual goals

Experiments and Operation
Conduct experiments and trials on reduction plans

Continuous Improvement
Review gap between performance and target and improve deficiencies and solve anomalies

Control and Measurement
Control raw material usage, waste output and measure concentration

Waste Reduction Measures and Results in 2023

Manufacturing Equipment Waste Reduction >2 Metric tons

Chemical use time/flow reduction	66
Process simplification solution	82
Life cycle extension of chemicals	38
Chemical alternatives	7
Others	9

+

In-house Recycling Equipment >280,000 Metric tons

Copper-containing/cobalt-containing liquid waste electrolysis	2
Ammonium sulfate waste crystallization	1
Silicon-containing liquid waste filter press dehydration	1
Sulfuric acid liquid waste reclamation	1
Hydrofluoric acid waste regeneration	1

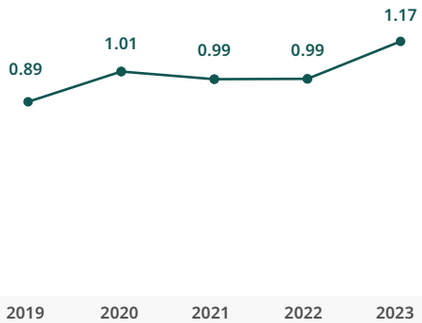
=

>300,000 Metric tons
Reduced waste

208
Introduced waste reduction measures

Outsourced Unit Waste Disposal per Wafer Trend

Unit: Kg/12-inch equivalent wafer mask layer



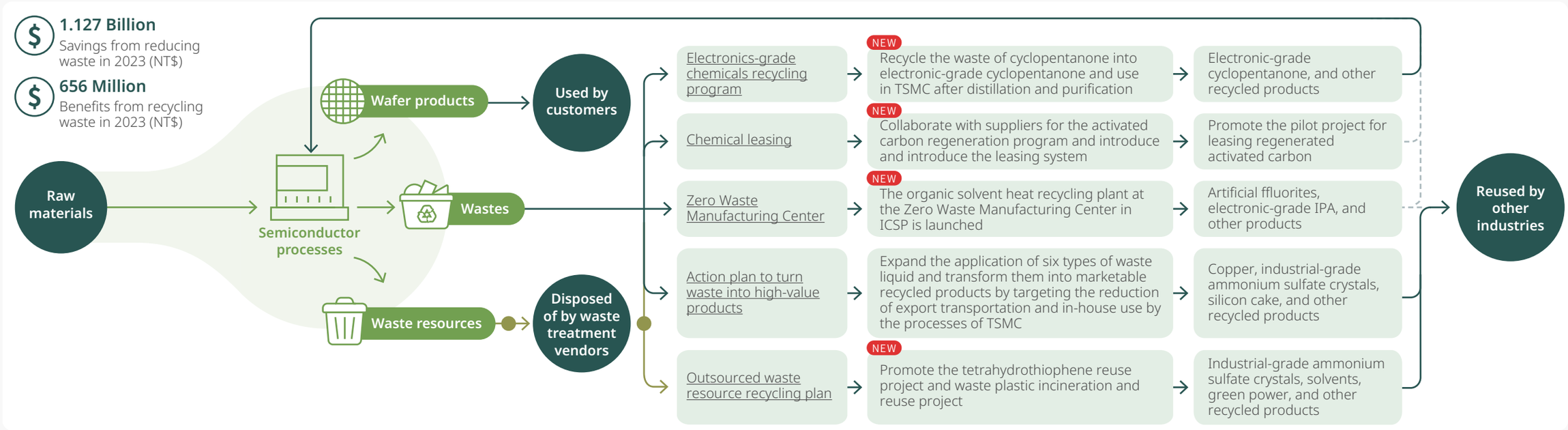
Enhance Circular Economy

To realize zero waste, TSMC had active innovations in recycling and reuse technologies. Through the action plan to turn waste into high-value products, resource recycling equipment was installed in the Taiwan fabs to recycle sulfuric acid, copper sulfate, cobalt sulfate, ammonium sulfate, HF acid, and silicon-containing waste liquid into recycled products. In 2023, TSMC promoted six facility recycling projects, and over 1/3 (over 280,000 metric tons) of waste was recycled and transformed into 180,000 metric tons of recycled products for internal use or sale, creating nearly NT$1.2 billion of benefits from resource circulation. In December 2023, the Zero Waste Center Manufacturing Center at CTSP was formally put into use. TSMC worked with five vendors to initiate waste solvent recycling, sludge reuse, electronics-grade chemicals recycling, and other resource recycling programs. Approximately 200 metric tons of waste liquid was recycled via outsourced incineration into usable energy; it is estimated that the monthly treatment quantity may reach 3,500 metric tons in the end of 2024. The Company also planned to establish the Zero Waste Center Manufacturing Center in STSP and Hsinchu Science Park to expand circular economic effects.

Regarding the electronic grade chemical recycling program, in 2023, for the first time, TSMC joined forces with suppliers to recycle cyclopentanone waste into electronic-grade cyclopentanone that meets TSMC's quality specifications and introduced it into the fabs for reuse, raising the value of its closed-loop recycling model. Meanwhile, it worked with the Resource Circulation Administration, Ministry of Environment, for the first chemical leasing business model to encourage vendors to improve their resource recycling technologies. TSMC also established a circular procurement system based on leasing instead of purchasing. In particular, the activated carbon regeneration program further became the pilot project for domestic chemical leasing to drive the industry toward a better future.

Furthermore, TSMC also implemented a cross-industry outsourced waste recycling plan. In 2023, three projects were launched to transform waste incineration into recycling and reuse, including guiding incineration vendors to obtain power generation certificates, reproduction of tetrahydrothiophene waste liquid as raw materials for the dyeing and finishing industry after hydrogen peroxide removal and distillation, and recycling of waste plastic packaging materials as plastic raw materials and solid recovered fuel through sorting and optimizing. The Company plan to remake the molecular sieves into water absorbents for steel industry and deploy anaerobic digestion test to all T-site facilities in 2024 to reduce the amount of incineration and landfill. TSMC promoted circular economy practices by posting posters, providing online training courses, and hosting 32 lectures in 2023 for over 10,000 employees to learn about waste reduction and segregation. Also TSMC de-labeled, broke, cleaned, crushed, and granulated used wafer cassettes to form recycled plastic particles and remade them into limited-edition business cardholders made from 100% recycled materials as gifts for the TSMC ESG AWARD event in 2023, allowing employees to incorporate the concept of resource recycling into their daily lives.

Practices for Circular Economy



Case Study

TSMC Taiwan Fabs First in Global Semiconductor Industry to Jointly Obtain UL 2799 Certification

To magnify the impact of its efforts to create a circular economy, the "UL 2799 Taiwan fab joint certification plan" was launched to challenge the conventional approach of single factory certification. The effort to combine review items and data of fabs was recognized by UL Solutions, and the process was shortened from three years to nine months. TSMC's Taiwan fabs became the first semiconductor facilities in the world to obtain the highest platinum rating for UL 2799 certification in October. In the future, it will continue to facilitate the certification acquisition of its global fabs and subsidiaries and share its waste resource management experiences with external parties to work with the industry chain to create sustainable circulation.

UL Solutions invites TSMC to share its waste resource management experiences

Innovative Chemical Leasing Model for Circular Procurement Through Chemical Leasing

TSMC has worked with its suppliers on the regeneration methods of used activated carbon and used it in its fabs in Taiwan in 2023. To maximize resource utilization, the Company left the traditional procurement practices of the linear economy by collaborating with Taiwan's Ministry of Environment to develop a leasing model. To achieve the goal of sustainability, the chemical leasing model allows related suppliers to own the whole process, from the production of materials to the recycling of used materials. The life cycle of chemicals is prolonged through the "usership instead of ownership" circular procurement model, as demonstrated by the chemical leasing model of activated and reactivated carbons. In 2023, the activated carbon regeneration program became the pilot domestic chemical leasing project and served as a reference for the Ministry of Environment to develop laws on chemical leasing, progressing towards resource sustainability.

TSMC works with suppliers to promote the pilot project of chemical leasing through activated carbon

Strengthen Audit Guidance

To fulfill its responsibility for waste disposal and management, in addition to implementing a circular economy, TSMC uses a dedicated GPS satellite waste transport fleet system to monitor the waste transport process. In 2023, TSMC further promoted the waste transport operation improvement project 2.0, requiring that from departure to completion, all waste transport drivers must have a company supervisor to confirm the safety inspection, compliance with driving behavior, and operational methods, strengthening the management of the waste transport process. At the same time, 14 waste transport vendors with more than 30 employees engaged in potential risk transportation operations must obtain ISO 45001 management system verification by the end of 2023, with a 100% completion rate, to enhance their transportation safety awareness and culture. In addition, TSMC conducted on-site audits of 57 waste clean-up vendors, inspected 100% of tank trucks and sludge clean-up trucks, and mitigated 32 deficiencies.

For waste treatment vendors, TSMC implemented the waste treatment vendor sustainability enhancement project, which has three stages of management processes. First, document reviews and on-site inspections were conducted across six dimensions to elect excellent vendors and ensure compliance in waste treatment, facilities, and on-site operations. Approved vendors then enter the second stage, with eight dimensions evaluated during annual audits to find risk and improvement opportunities. Regular guidance is provided to track the implementation progress. The third stage involves annual audits that serve as the replacement assessment standards for vendors. In 2023, TSMC conducted on-site audits of 71 waste treatment vendors, reaching an audit ratio of 100% and mitigating 130 deficiencies. The percentage of excellent and good vendors increased from 80% in 2022 to 86% in 2023. 87% of waste treatment vendors obtained ISO 14001 certification, and all of them are expected to obtain the certification by the end of 2030.

In addition, TSMC implemented intelligent waste management in 2020, and 29% of waste treatment vendors have completed the establishment of an intelligent waste tracking system in 2023. TSMC also continued to optimize system functions and introduced the application programming interface (API), under collaboration with the Ministry of Environment, to connect to the declaration function. The function allows waste treatment vendors to directly submit the declaration data to save time for manual input and declaration by entry and reduce the anomalies caused by human errors. TSMC will continue to promote the digital transition of vendors to improve management efficiency through automated and smart technologies and jointly realize green innovations.

TSMC collects real-time liquid-level data of waste management vendors' bucket to remotely track

Waste Treatment Vendor Sustainability Enhancement Project

Vendor Selection six Main Aspects

- Environmental safety & health department
- Purchasing department
- Waste management section

- Safety/health management
- Waste control
- On-site facilities
- Violation assessments
- License
- Corporate scale and reputation

Vendor Inspection eight Main Aspects

- Industrial safety and environmental protection
- Waste management section

- Waste management
- Wastewater management
- Air pollution prevention
- Fire safety management
- Safety/health management
- Maintenance records
- Emergency response
- Operating management

Annual Evaluation three Main Aspects

- Environmental safety & health department
- Waste management section
- Purchasing department
- Legal department

- Waste flow control and compliance with management requirements
- Corporate scale and reputation
- Operation record

Waste Clean-up Improvement Project 2.0 for the Improvement in Vendor's Operational Safety Management

Before Clean-up | Vendor Selection

- Establish a standardized selection procedures to examine the qualification of vendors
- Establish personnel and vehicle certification systems to ensure the familiarity of personnel with the operations and the vehicle specifications

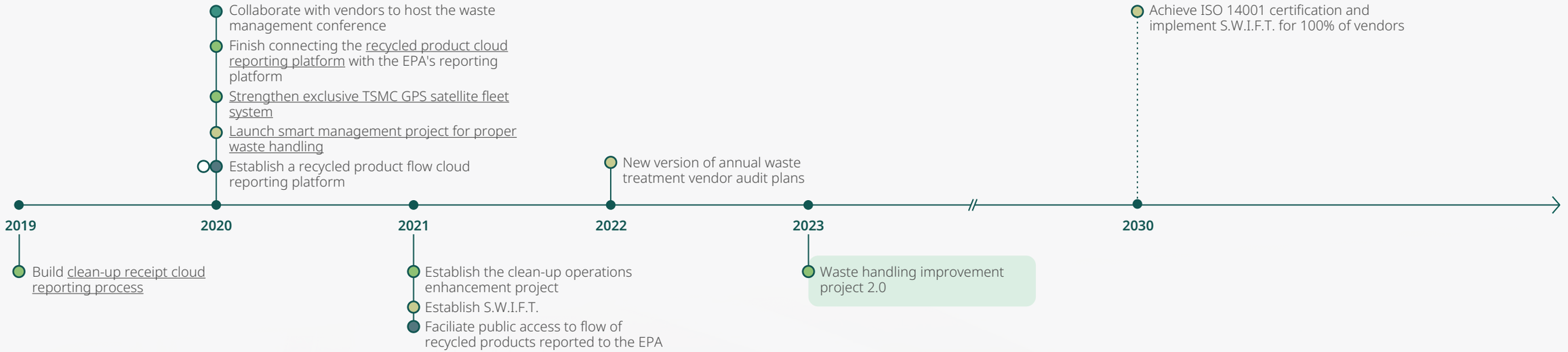
During Clean-up | Operation Observation

- Examine the compliance of the on-site tank truck operations based on document data, vehicle specifications, and operating procedures
- Require the vendor's supervisor to follow the vehicle for self-audits to reinforce the management during the clean-up processes NEW

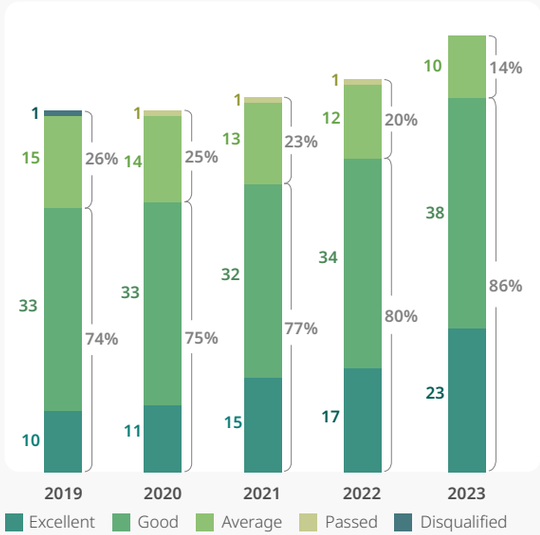
After Clean-up | Annual Audit

- Fully examine the management and operations of vendors through annual audits
- Combine the annual education and training plans of personnel with the annual inspection plans of tank trucks and strengthen accident case promotion and self-inspections of tank trucks

TSMC Waste Treatment Vendor Management Milestones

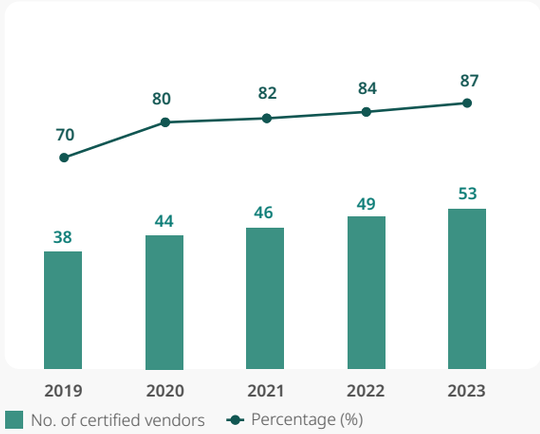


2023 Waste Treatment Vendor Evaluation Results



Note: The total score is 100 points: greater than 90 points are excellent; 80-89 Points are good; 70-79 points are average; 60-69 points are passed; less than 60 points are disqualified

ISO-certified Waste Treatment Vendors



Waste Treatment Vendor Audit and Guidance Results in 2023

	Deficiencies Rate/Cases	Legal Compliance	On-site Environment Operational Improvement	Establishing Regulations & Procedures
Waste Management	42% | 55	• Amend waste disposal contracts to comply with laws and regulations • Correct false declarations • Add due diligence requirements • Establish a non-filming alert mechanism for systems to comply with laws and regulations	• Correct erroneous labels in waste storage areas • Improve waste storage environment	
Safety and Health Management	24% | 31	• Formulate operational environment monitoring items and frequency based on the hazards and level of risk exposure and arrange special health inspections	• Improve the global harmonization system labeling and safety data sheet content compliance for chemicals on site • Raise awareness for wearing PPE equipment and optimize protection equipment for operations and safety • Implement hazardous machinery and equipment inspection records	• Formulate PPE requirements for different workstations
Wastewater Management	16% | 21	• Adjust the scope of operations in the water pollution prevention and control plan to comply with on-site practices • Require dedicated personnel to have review training to comply with laws and regulations	• Implement equipment maintenance according to the water pollution control measure plan • Enforce wastewater meter readings and records • Improve discharge point and wastewater pipeline signs	
Air Pollution Management	9% | 12	• Correct operational parameters / handling quantity in stationary pollution sources operating permit to comply with on-site practices • Require dedicated personnel to have review training to comply with laws and regulations	• Enforce the fixed pollution source record-taking • Establish sampling facility inspection and maintenance specifications • Improve the on-site air pollution pipeline labeling	
Safety Certificate Management	5% | 6	• Increase the certificates for first-aid/ occupational safety supervisors and arrange review training to comply with the number of persons stated in laws and regulations		
Fire Safety Management	3% | 4		• Enforce inspection and replacement of fire protection equipment	
Emergency Response Management	1% | 1			• Establish an emergency response device inspection system

Air Pollution Control

Adopt Best Available Technology

Adopt the Best Available Technology to control the pollutants emitted from TSMC operations and minimize environmental impact

Strengthen Monitoring for Air Pollution Control Equipment

Leverage backup systems and dual-track management, along with pollutant monitors, to ensure that the equipment works as intended and to prevent abnormal occurrences

2030 Goals	2024 Targets	2023 Achievements
Reduce the unit air pollutant emissions by 65% (Base year: 2015)	Reduce the unit air pollutant emissions by 58%	— Note 1 Reduced the unit air pollutant emissions by 50% Target: 58%
Reduction rate of volatile organic gases: >99%	Reduction rate of volatile organic gases: >98.6%	✓ Reduction rate of volatile organic gases: 99% Target: >98.6%
Report <1 abnormal occurrence in air pollution control equipment Note 2	Report <1 abnormal occurrence in air pollution control equipment	✓ Reported 0 abnormal occurrences in air pollution control equipment Target: <1

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: The capacity utilization of TSMC in 2023 was less favorable than expected due to the effect of global economic circulation; the unit air pollutant emissions failed to achieve the annual target. The Company will continue to invest resources to minimize environmental impact by adopting the best feasible technologies

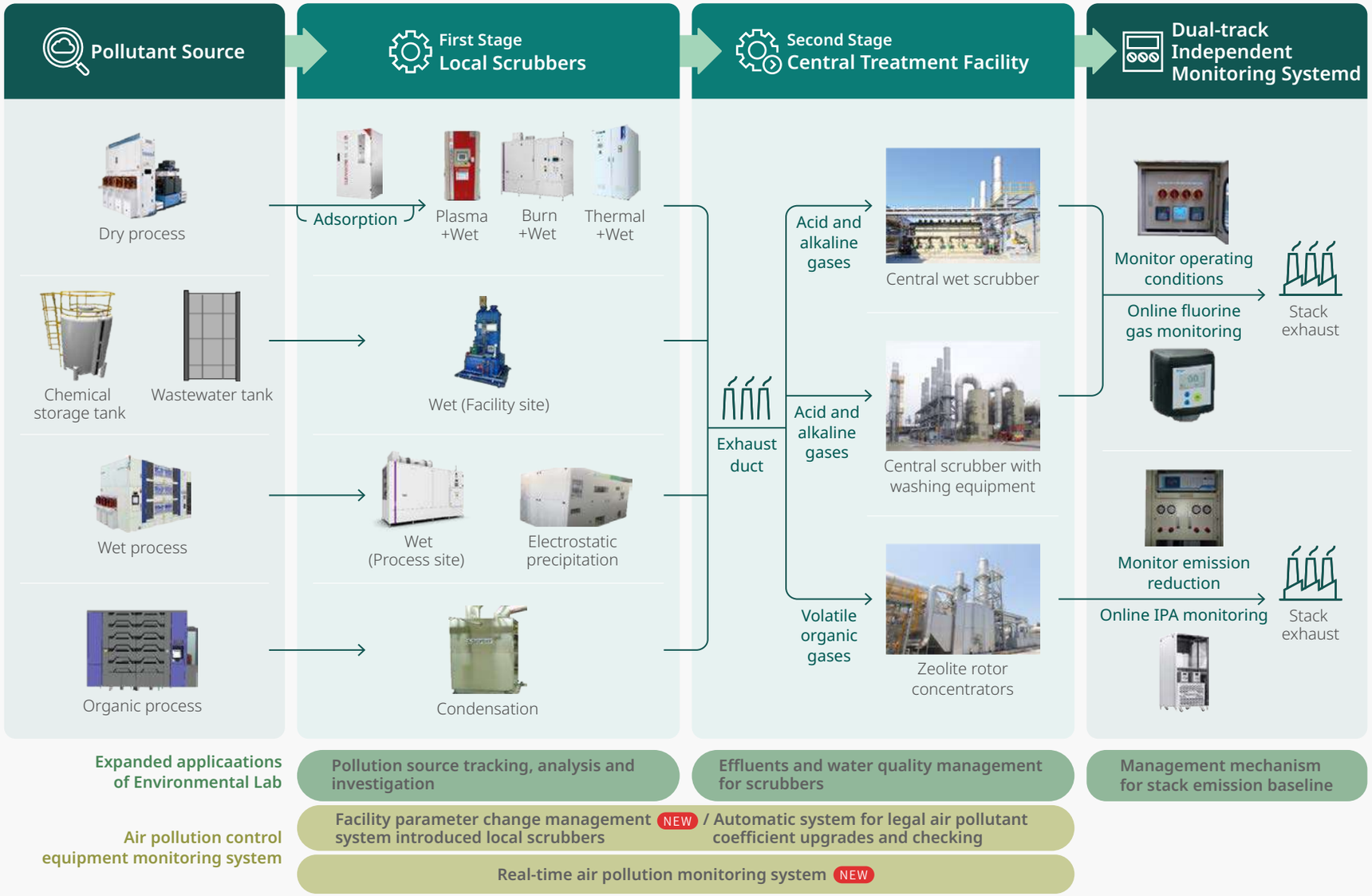
Note 2: Abnormal occurrence in air pollution control equipment indicates abnormal air pollution caused by no replacement for broken equipment or unable to fix or cease within 24 hours

TSMC is committed to air pollution control and has adopted the emission source classification method and multi-phase Best Available Technology (BAT) to enhance the performance of pollution control. In 2023, the reduction rate of volatile organic gases reached 99%. To continue optimizing the quality of air emissions, the Company upgraded its local burning scrubbers, developed and introduced the low NO_x mean temperature combustion technology, and reduced NO_x emissions by 65% each year. In addition, TSMC also actively improved its air pollution test efficiency. It developed the innovative real-time air pollution monitoring system in 2023 to rapidly measure gases; the time required for data analysis was shortened from one week to one minute. Meanwhile, continual monitoring replaced the single-entry sampling used in the past to keep abreast of and dispose of abnormal pollution sources, improve air pollution control efficacy, and realize environmental friendliness.

Adopt Best Available Technology

Acid, alkaline, and volatile organic gases are the major air pollutants produced by the semiconductor industry. To improve emission efficiency, TSMC employs two approaches - classification and reduction of emission from sources and strengthened management of terminal prevention facilities to achieve BAT with the multi-phase system and mitigate environmental impacts. Exhaust gases are separated based on their properties - toxic, corrosive, flammable, perfluorocarbon greenhouse gases, and highly concentrated pollutants. The gases are introduced to high-efficiency local scrubbers for processing. The gases with low concentrations will then be sent to central scrubbers for rinsing and neutralization. Depending on their boiling points, volatile organic gases may be sent to condensation-type scrubbers first and then to zeolite rotor concentrators for adsorption.

Air Pollution Control Procedures



Different Types of Local Scrubbers

Process	Semiconductor Fabrication	Target Pollutant	Control Technologies	Equipment	Reduction Rate	Real-time Parameter Monitoring
Dry process	Epitaxial dry etching	Corrosive gases	Burn-wet ($PM_{2.5}$ reduction equipment testing)		>99%	• Natural gas flow • Oxygen flow • Circulating water flow • Inlet pressure
		Perfluorocarbons	Burn-wet (Large-capacity)			
	Dry etching	Corrosive gases Perfluorocarbons Flammable gases	Plasma-wet		>95%	• Current amperage • Circulating water flow • Inlet pressure
	Thin film Diffusion Sputtering	Corrosive gases Perfluorocarbons Flammable gases Hydrochloric acids Particulate matters	Thermal-wet with chemical dosing		>95%	• Reactor temperature • Circulating water flow • pH value • Inlet pressure
			Thermal-wet with chemical dosing (Add high-efficiency spray device)		Hydrochloric acids >87% Particulate matters >86%	
	Ion implantation sputtering epitaxy	Toxic gases	Adsorption		>95%	• Pressure difference of local scrubber • Inlet pressure
	Thin film	Nitrous oxide (N_2O)	High-temperature thermal+wet $PM_{2.5}$ reduction equipment testing		>90%	• Reactor temperature • Circulating water flow • Inlet pressure
Wet process	Wet etching	Corrosive gases Organic gases	Wet + chemical dosage (Process site)		>95%	• Differential pressure of local scrubber • Circulating water flow • Inlet pressure • pH value
		Alkaline gases $PM_{2.5}$	Wet electrostatic precipitation		>90%	• Inlet pressure • Corona voltage • Corona current
Organic process	PR stripping	High boiling point organics	Condensation		Specific high boiling point organics >95%	• Differential pressure of local scrubber • Condensation temperature
Storage tanks	Chemical Storage tank	Corrosive gases	Wet + chemical dosage (Facility site)		>95%	• Differential pressure of local scrubber • pH value • Circulating water flow • Inlet pressure
	Wastewater tanks	Acid and alkaline gases				

Source Reduction and Management - High Efficiency Local Scrubbers

In response to the continual evolution of advanced process technologies, the New Tool & New Chemical Review Committee evaluates the hazards of new processes and chemicals on ESH through a two-stage review. The first stage primarily confirms risks related to new chemicals and establishes a control system, and the second stage confirms the effect of emissions on the environment to determine the separation treatment and the selection of local scrubbers. In 2023, the committee conducted 404 reviews for 141 new tools and 263 new chemicals.

To reduce thermal NO_x generated from local burning scrubbers, TSMC worked with suppliers to upgrade the equipment structure in 2023 to reduce the reaction temperature for decomposing nitrous oxide by using CH_4 as the reducing agent while using nitrogen to reinforce the gas mixing effect to bring the overall combustion chamber to a mean temperature and avoid high temperature in partial areas, effectively reducing 60% of NO_x emissions. In addition, a three-year high-efficiency spray devices plan was implemented to improve the efficiency of air pollution prevention facilities and promote environmental sustainability for thermal-wet local scrubbers in existing scrubbers in 2021; 874 scrubbers were upgraded as of 2023, the completion rate was 100%.

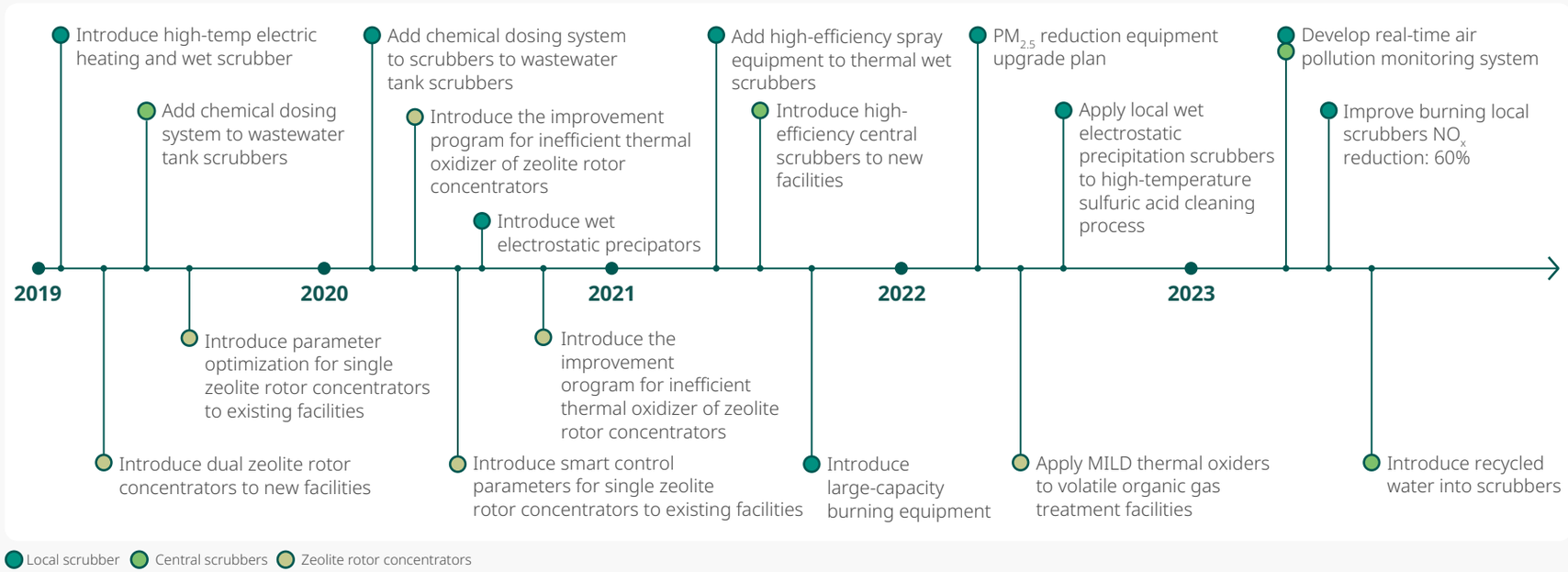
Strengthen Management of Terminal Prevention Facilities - Central Scrubbers

After the first-stage treatment, the exhaust gases undergo second-stage treatment: acid/alkaline gases are channeled to central treatment facilities for scrubbing and acid/alkali neutralization to remove pollutants. Exhaust gases from wet processes that emit large amounts of acid/alkaline gases are sent to a two-step scrubbing - central scrubber connecting washing tower - to improve pollutant removal. After the launch of the STSP Reclaimed Water Plant, TSMC sites in

Southern Taiwan Science Park introduced reclaimed water into air pollution control equipment to reinforce the removal effect, and the real-time water consumption is monitored via the Diverse Water Supply Integration Platform to improve water quality management.

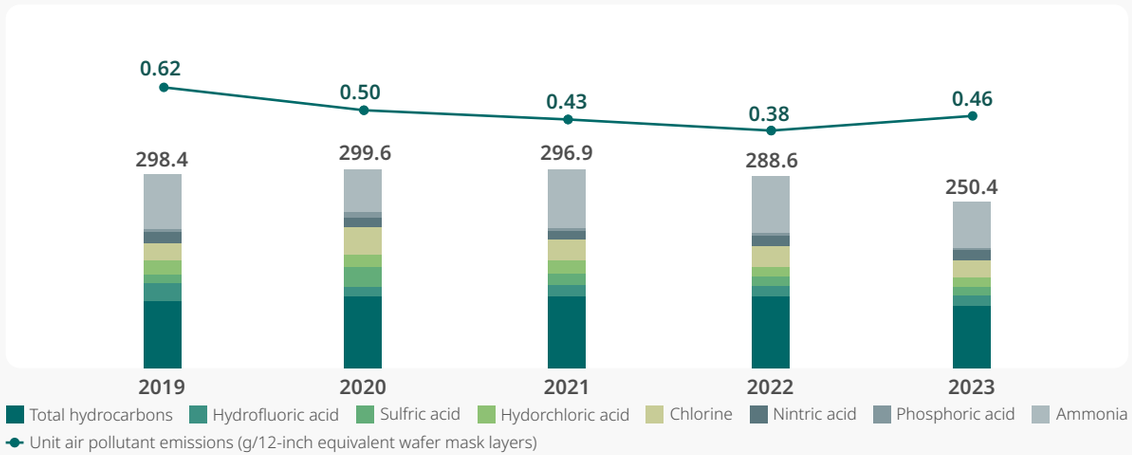
In terms of volatile organic compounds, TSMC has implemented a "low-efficiency zeolite single-rotor replacement plan" in its existing factories and introduced a "zeolite concentration double-rotor system" in its new factories to enhance pollutant removal efficiency through the series connection of double rotors. In 2023, all facilities reduced volatile organic gases by 99%, and the Company continued to make improvements. In addition, when concentrated gases adsorbed by rotors enter thermal oxidizers, pyrolysis can remove volatile organic gas pollutants but may also produce NO_x pollutants. In 2023, new Fab 18 Phase 8, Fab 20, Fab 22, and Advanced Backend Fab 6B introduced the low-NO_x burner, which was included as a standard design; the burner uses MILD thermal oxidizers and combustion flow field control technologies to reduce NO_x emissions, improving environmental friendliness.

Timeline of Air Pollution Prevention Systems



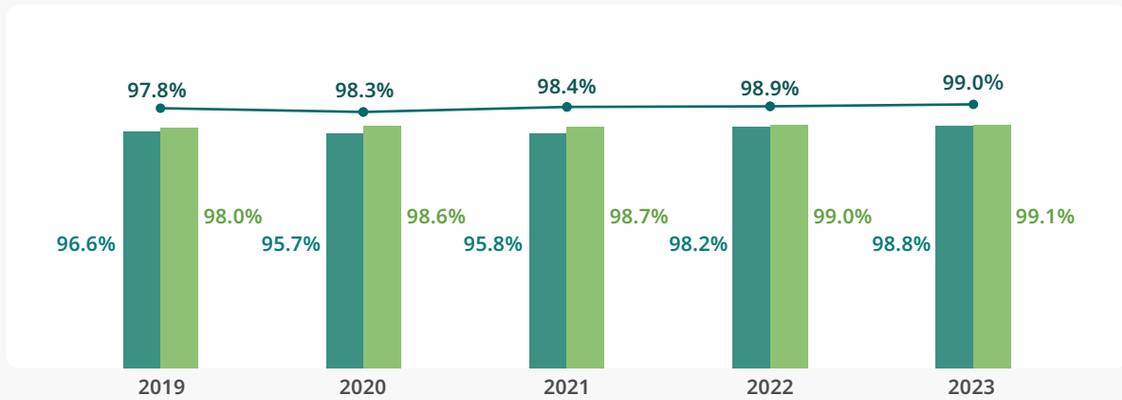
Historical Emissions and Emissions Per Unit of Production

Unit: ton/year



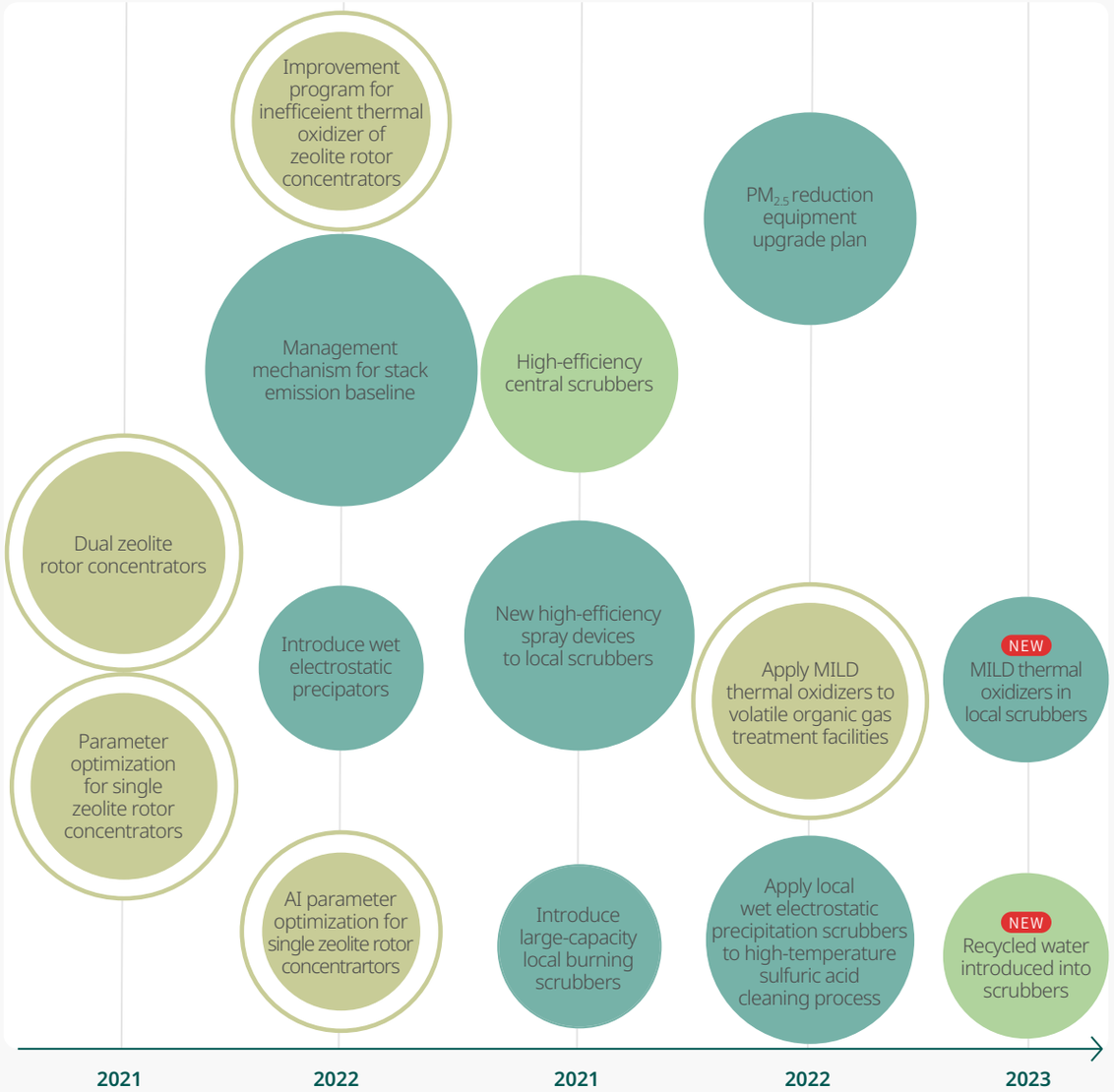
Note: TSMC air pollutant emissions are reported in accordance with local laws and regulations

Historical Volatile Organic Gas Reduction Rates



Note: The data scope covers TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra. TSMC Washington, LLC is not required toinclude reduction information in accordance with local regulations

Prevention Technology Feasibility and Reduction Effectiveness Evaluation



Note 1: Size of the bubble indicates the technology's reduction efficiency
Note 2: Single circle indicates local/central scrubbers; double circles indicate zeolite rotor concentrators

Environmental Lab Improves Control Effects

TSMC is dedicated to reducing air pollution emissions, and it controls air emissions, effluents, and surrounding environment monitoring via the Environmental Lab. The number of test items increased in 2023; NO_x, CO_2, and chlorine tests were added for stacks, and GHG removal efficiency testing technologies were developed for local scrubbers. Meanwhile, the Company investigated the source of emissions; it sampled central scrubber exhaust ducts to confirm the source of abnormal exhaust gas emissions. Then, TSMC investigates upstream process tools to clarify special gases and emission properties and improve the efficiency of control equipment and coverage. In 2023, 3,131 exhaust ducts, sub-ducts, and equipment units were sampled, 39 stacks exceeding the emission volume under internal control were treated, and major pollution sources were found for nine emission source investigations; by doing so, the Company adjusted the parameters of control equipment to allow optimal operations.

To better grasp test data and make improvements, TSMC established the air pollution/water pollution electronic and anomaly follow-up platform in 2023 to integrate data and automated analysis through the platform and minimize the errors that may arise from human judgments. Based on abnormal data, the platform sends instant notices to relevant units for processing to optimize the improvement efficiency and implement the comprehensive management of pollution control. In addition, a PFAS test for effluents was added in 2023, with a total of 30 test items, and the water quality is tested on a quarterly basis in accordance with the effluents and water quality management for scrubbers to ensure the stable operation of air pollution control equipment.

Three Applications of Environmental Lab

Air Emission	• Manage emission stacks • Increase variety of pollutants sampled • NO_x, CO_2, and chlorine tests NEW • GHG removal efficiency test NEW • Air pollution/water pollution electronic and anomaly follow-up platform NEW
Effluents	• Manage effluents and water quality for scrubbers • PFASs test NEW • Air pollution/water pollution electronic and anomaly follow-up platform NEW
Surrounding Areas	• Monitor surrounding areas with air quality vehicles • Build stationary monitoring stations around

Strengthen Monitoring of Air Pollution Prevention Equipmeant

Apart from strengthening the reliability of air pollution control equipment operating systems, the Company deployed automatic monitoring systems - total hydrocarbon monitors and online IPA/online fluorine gas monitors - to control monitoring data and actual emission levels to prevent flaws or losses due to human error. It adopted the automatic system for legal air pollutant coefficient upgrades and inspection, facility parameter change management system, and facility monitoring and data collection system to monitor facility parameters and effectively control the accuracy of reported information. In 2023, process advances and plant expansion requirements resulted in local scrubbers with complicated control parameters. TSMC updated the facility parameter alteration management system to include the crucial control parameters in the alteration management, allowing the automatic audits of parameter settings of over 30,000 scrubbers, and the accuracy reached 100%.

To ensure the optimal operating status of control equipment, all equipment adopted the N+1 rule, and they must have at least one backup system. Meanwhile, a dual-track independent monitoring system is introduced, and an anomaly alert system is set to allow the Facility Division and Industrial Safety and Environmental Protection Division to perform emergency repairs or initiate backup systems to minimize the risk of losses, together with the UPS, and to achieve zero failure in control equipment. In 2023, there was no air pollution control equipment anomaly, or punishment or expenses due to the violation of the Air Pollution Act.

Case Study

Develop the Low NO_x Mean Temperature Combustion Technology to Reduce 60% of Emissions

To improve air emission quality, the Company rolled out a nitrogen oxide (NO_x) reduction program for the operation of air pollution control equipment. After working with suppliers to optimize the VOC control equipment burner for the reduction of 65% NO_x, TSMC further carried out the upgrade for local burning scrubbers. Volatile organic compounds (VOCs) and perfluorinated compounds (PFCs) are byproducts of wafer manufacturing. Local scrubbers mainly use pyrolysis to remove VOCs and PFCs. However, this process also causes dinitrogen (N_2) to react with oxygen (O_2) in the air and produce thermal NO_x. To reduce the temperature required for pyrolysis reaction and avoid partial high temperature, TSMC used CH_4 as the reducing agent to reduce NO to N_2 and CO_2 to reduce the NO_x output and utilized N_2 as the carrier gas for compression to improve the gas mixing effect in the chamber, reduce partial high-temperature areas, increase the temperature of low-temperature areas, and low an even temperature of the reaction chamber, optimizing the processing efficiency of special gases and reducing the use of fuels.

In 2023, TSMC conducted the upgrade and introduction test of local burning scrubbers and successfully reduced 60% of NO_x emissions, and the scrubber was included as a standard design for new fabs. Meanwhile, TSMC studied the possibility of connecting the central scrubber and washing tower for a second treatment to reduce the generation of NO_x.

TSMC upgrades its local burning scrubbers to reduce NO_x emissions

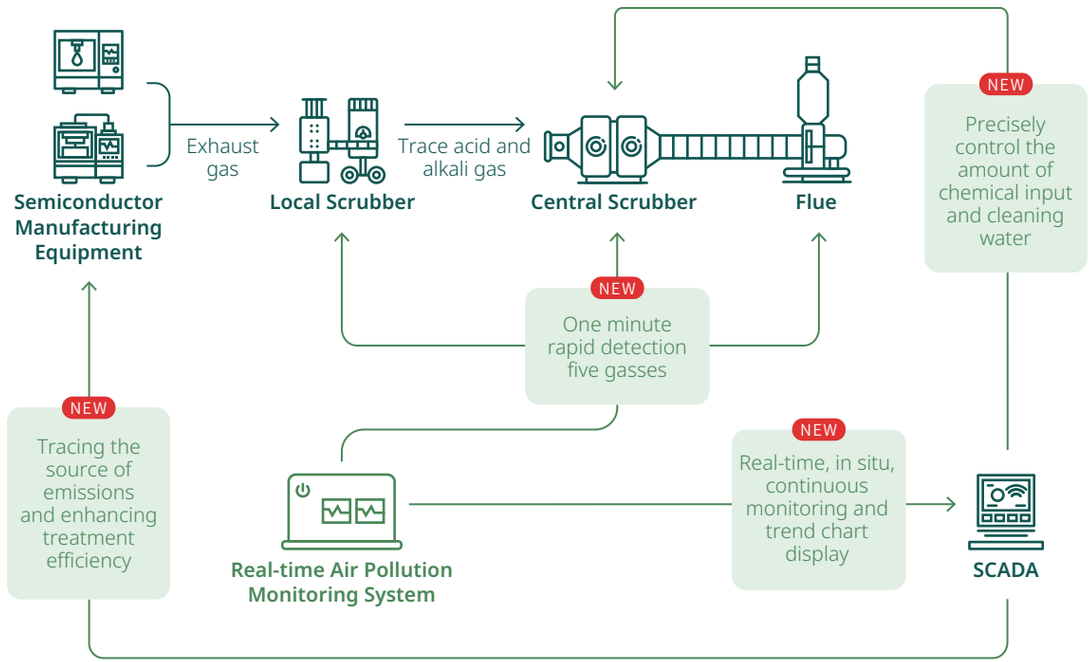
Case Study

Innovative Real-time Air Pollution Monitoring Technology Acquires Gas Concentration Data in One Minute

The stack inspection, emission source investigation, and local scrubber efficiency verification of facilities used manual sampling and analysis in the past, and the sampling and testing procedures were complicated. In light of the increasingly stringent environmental regulations, TSMC imposed volume control on acid gas emissions and included the emission concentration of a single stack for control. To rapidly understand the pollution status and improvement achievements of stacks, TSMC developed its real-time air pollution monitoring system to apply the AC resonate solid and gas sensor technology in producing real-time acid/alkaline emission sensors. The special electrode structure can sense the physical signals of gases and test ammonia, hydrofluoric acid, hydrochloric acid, sulfuric acid, and nitric acid gases, with the data acquisition time shortened from one week to one minute. In addition, different from the ability to merely present data from a single point of time through manual sampling, the real-time air pollution monitoring system can concurrently connect to the online real-time monitoring system to present data trends via continuous monitoring and charts. Except for the timely discovery of abnormal pollution sources, it is able to evaluate the optimal dose of agent input based on the gas emissions and particle pollutant status of stacks, precisely adjust the acid/alkaline value and conductivity, and control the volume of cleaning water, which optimized the treatment procedures, duly utilized agent resources, and minimized the risks of contacting acid/alkaline gases during sampling by on-site operating personnel.

In 2023, the real-time air pollution monitoring system was introduced into Fab 2, Fab 5, Fab 15A, Fab 18A and Fab 18B. TSMC also continues to assess the feasibility and benefits of applying the sensor to monitor chlorine, fluoride, nitrogen oxides, and other gases and continues to implement air pollution reduction to strive toward zero emissions.

Real-time Air Pollution Monitoring System Benefits



TSMC develops a real-time air pollution monitoring system to optimize testing efficiency

An Admired Employer

"TSMC values its commitment to employees and works to foster a humanistic workplace culture with open communications. The Company is dedicated to promoting a diverse, inclusive, safe, and fun workplace where employees can continue to learn. TSMC also provides competitive compensation and welfare, striving to be a company that employees can be proud of."

Top 25%
Total compensation amongst industry peers

85.4 hours
Annual average hours of learning in employees increased by 23%

106,924
Beneficiaries of health-promotion programs for contractors

- Diversity and Inclusion
- Talent Attraction and Retention
- Talent Development
- Occupational Safety and Health

Diversity and Inclusion

	2030 Goals	2024 Targets	2023 Achievements
Establish an Open-Style Management System Fulfill Core Values and Business Philosophy and continue to shape an inclusive culture	Rank in the top 25% for Diversity and Inclusion; the rank is determined by comparing results from the Employee Engagement Survey[Note 1] against the Global High Performance Companies Norm	–	Note 2 Not achieved top 50% for Diversity and Inclusion; the rank is determined by comparing results from the Employee Engagement Survey against the Global High Performance Companies Norm Target: top 50%
Unleash the Potential of Diverse Talent Provide resources to support diverse talent to grow and flourish	Women in management: ≧ 20%	Women in management: ≧15%	↑ Women in management: 14.1% Target: 14%
	Women account for 30% of all newly-hired fresh graduates technical professionals	Women account for 26% of all newly-hired fresh graduates technical professionals	↑ Women account for 28.4% of all newly-hired fresh graduates in technical professionals Target: 25%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | – Missed target

Note 1: The Employee Engagement Survey is issued once every two years and will be issued next in 2025. For the 2023 Employee Engagement Survey, please refer to Employee Commitment

Note 2: Despite not meeting the target for 2023, there was a 3% improvement compared to the previous result in 2021. TSMC remains committed to advancing various diversity and inclusion projects

TSMC cultivates an inclusive workplace through an open-style management system. By nurturing diverse management and employee portfolios, TSMC unleashes the potential of the talent. The Company introduced TSMC People Vision in 2023 and updated Diversity, Equity and Inclusion Statement in 2024, responding TSMC's core values and business philosophy, thereby creating a win-win situation for the growth of both talent and the Company.

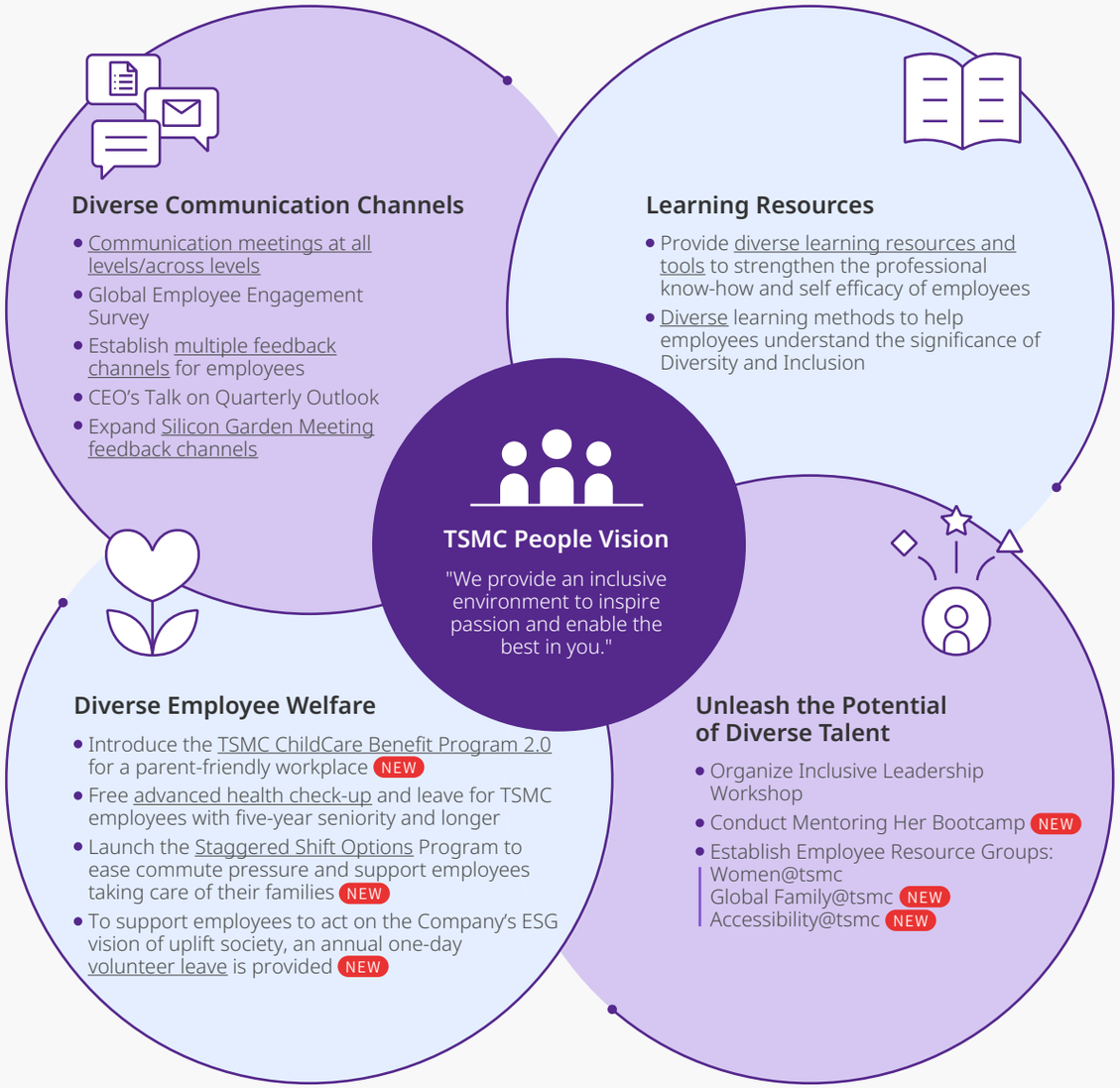
Establish an Open-Style Management System

Based on the TSMC Core Values, as well as the Business Philosophy personally written by Founder Dr. Morris Chang, the Company cultivates a communicative environment that carries out commitments and actions for talent nurturing, development, and retention, and its global workforce is empowered to leverage their strengths in the right roles. In TSMC's 2023 Employee Engagement Survey, the score for diversity and inclusion reached 86%, up 3% from the previous results.

Diversified Workforce

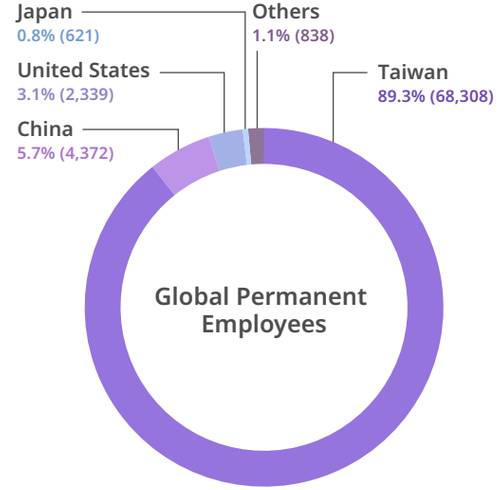
TSMC is dedicated to creating a diverse, equitable, and inclusive workplace that fosters collaboration among employees from varied cultural backgrounds, professional domains, and life experiences, thus enhancing the Company's innovation and competitiveness. Guided by the principle of meritocracy, TSMC ensures impartial treatment of all employees in recruitment and promotion, prohibiting discrimination based on gender, age, disability, religion, race, ethnicity, nationality, political affiliation, sexual orientation and etc. In 2023, as part of its global deployment strategy, TSMC proactively strengthened local talent recruitment and development initiatives while extending its talent acquisition efforts to Japan, the US, Europe, and Southeast Asia. Its global workforce reached 77,045 employees, global permanent employees representing 48 nationalities, with over 98% originating from Taiwan, China, the United States, and Japan. Geographically, 89.5% of employees are based in Taiwan, 6.9% in Asia (including China, Japan, and South Korea), 3.5% in North America, and the remainder in Europe. Moreover, TSMC supports the employment of individuals with disabilities, reflecting its commitment to a diverse workplace environment.

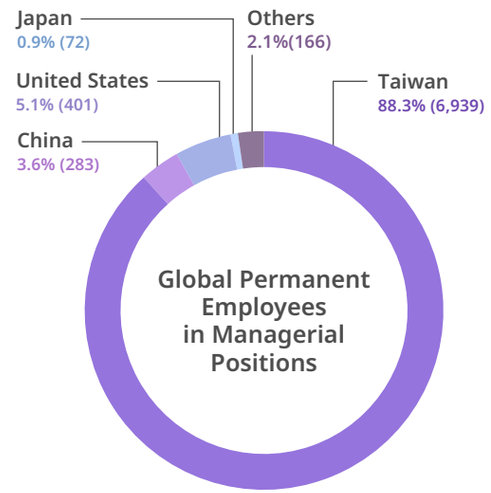
The Four Areas of Diversity and Inclusion



Distribution of Global Permanent Employees by Nationality in 2023

Unit: People





Global Workforce Structure in 2023

Category		Male	Female	Total
Global Employees - Employment Contracts	Permanent Employees Note 1	50,338 (65.8%)	26,140 (34.2%)	76,478 (99.3%)
	Temporary Employees Note 2	331 (58.4%)	236 (41.6%)	567 (0.7%)
Global Employees - Employment Types	Full-time Employees	50,443 (65.8%)	26,264 (34.2%)	76,707 (99.6%)
	Part-time Employees	226 (66.9%)	112 (33.1%)	338 (0.4%)
Permanent Employees - Position	Managers	6,756 (85.9%)	1,105 (14.1%)	7,861 (10.3%)
	Professionals	29,008 (78.8%)	7,799 (21.2%)	36,807 (48.1%)
	Assistants	8,048 (87.1%)	1,187 (12.9%)	9,235 (12.1%)
	Technicians	6,526 (28.9%)	16,049 (71.1%)	22,575 (29.5%)
Permanent Employees - Education	Ph.D.	2,616 (88.8%)	330 (11.2%)	2,946 (3.9%)
	Master	28,623 (78.5%)	7,826 (21.5%)	36,449 (47.7%)
	Bachelor	14,764 (65.4%)	7,816 (34.6%)	22,580 (29.5%)
	Other Higher Education	2,100 (34.2%)	4,032 (65.8%)	6,132 (8.0%)
	High School	2,235 (26.7%)	6,136 (73.3%)	8,371 (10.9%)
Permanent Employees - Age	18 - 30	17,381 (70.5%)	7,266 (29.5%)	24,647 (32.2%)
	31 - 50	29,877 (63.6%)	17,066 (36.4%)	46,943 (61.4%)
	51+	3,080 (63.0%)	1,808 (37.0%)	4,888 (6.4%)
Permanent Employees - Work Location	Taiwan Fabs and VisEra	45,075 (65.8%)	23,385 (34.2%)	68,460 (89.5%)
	Asia Note 3	3,289 (62.2%)	2,001 (37.8%)	5,290 (6.9%)
	North America	1,941 (72.8%)	727 (27.2%)	2,668 (3.5%)
	Europe	33 (55.0%)	27 (45.0%)	60 (0.1%)

Note 1: Permanent employees refer to those who have signed contracts with no fixed term, as defined according to the GRI Standards
Note 2: Temporary employees are those who have signed fixed-term contracts
Note 3: Asia includes Shanghai, Nanjing, Japan, and South Korea

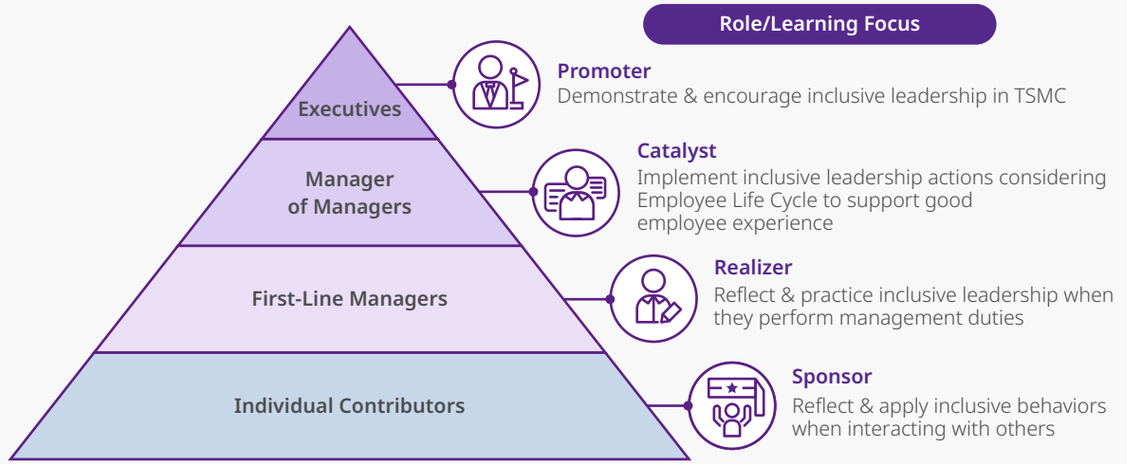
Raise Awareness of Diversity and Inclusion

Employee Resource Groups (ERGs) are employee-led voluntary groups comprising members who share similar identities, affiliations, backgrounds, or experiences and who come from under-represented groups. To fulfill TSMC People Vision and cultivate a diverse and inclusive workplace, TSMC facilitated the establishment of three ERGs between 2022 and 2023: Women@tsmc, Global Family@tsmc, and Accessibility@tsmc, each focusing on gender, race/nationality, and disabilities, respectively. TSMC invited all employees, regardless of their backgrounds, to participate if they are interested in and supportive of these issues.In 2023, the Company further collaborated with these three ERGs and the R&D D&I Committee to launch the first Diversity and Inclusion Campaign. This event, coinciding with international celebrations and festivities, aims to provide engaging employee experiences, heighten awareness of diversity and inclusion, and foster self-realization in the workforce.

Additionally, TSMC continues to promote the Inclusive Leadership Workshop, where real-life examples are discussed and action plans are formulated to help management raise awareness of unconscious bias, fostering a diverse and inclusive workplace. At the same time, the Unconscious Bias course equips employees with the skills to identify and address biases, enabling them to apply what they have learned to work and life. In 2023, 96 sessions concerning diversity and inclusion were offered, and was attended 2,600 times cumulatively.

TSMC hosts its inaugural Diversity and Inclusion Campaign, assisting employees in self-realization

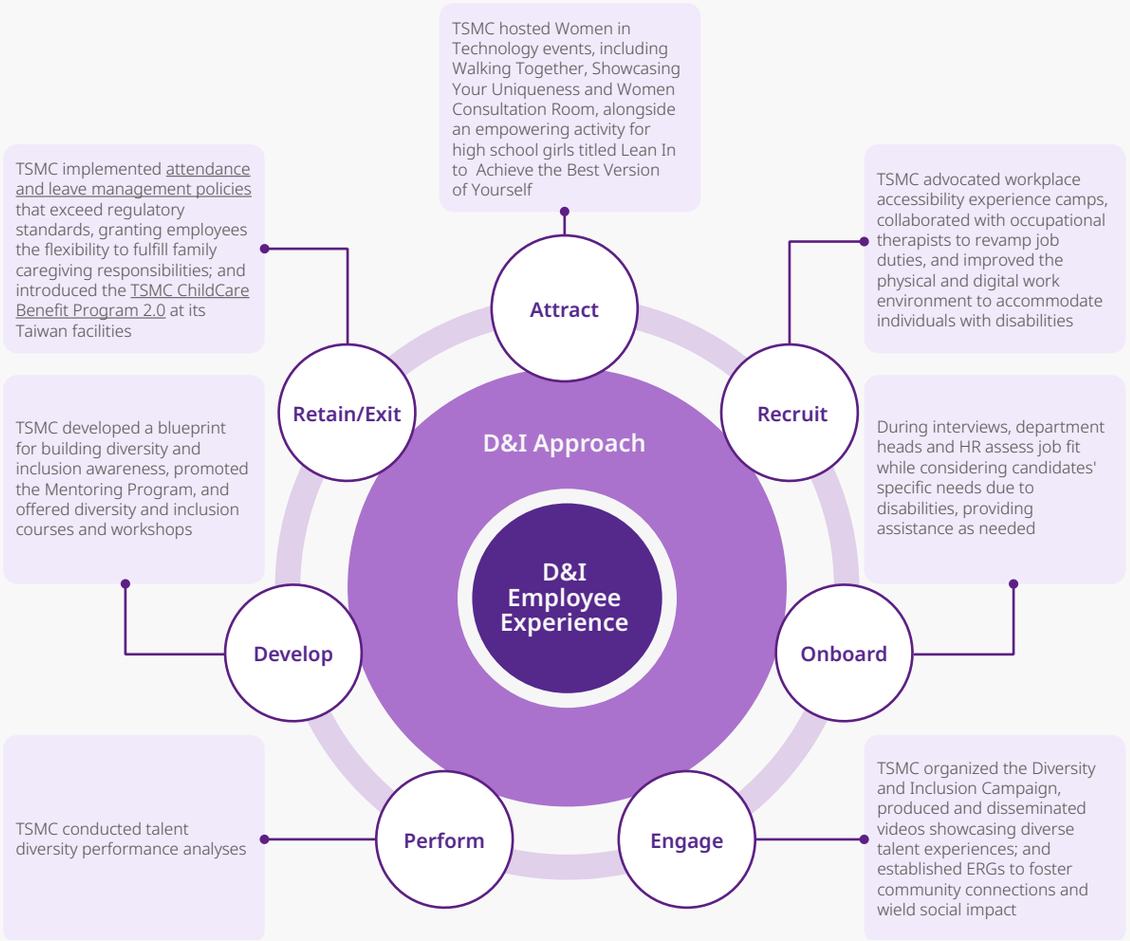
Inclusive Leadership Learning Structure



Unleash the Potential of Diverse Talent

In 2023, TSMC designed, planned, and integrated a range of diversity and inclusion initiatives based on Gallup's Employee Experience framework. These initiatives feature the various stages of the employee career journey: attraction, recruitment, onboarding, engagement, performance, development, and retention/exit, aimed at cultivating a supportive workplace.

Create Diverse and Inclusive Employee Experience



Case Study

Mentoring Her Bootcamp Empowers Women's Career Development

TSMC is dedicated to supporting the development of female talent and increasing the proportion of women in managerial positions. In collaboration with HR departments, Women@tsmc introduced the Operations Female Caring & Mentoring Program. This program targeted female engineers and assistant managers, with 281 participants identified through an interest survey. Mentors were selected from managers and assistant managers based on nominations or enthusiasm for supporting colleagues, without gender restrictions.

To enhance the quality and efficiency of mentorship, TSMC conducted four Mentoring Her Bootcamp sessions in the second quarter of 2023. Prior to these sessions, mentors were required to complete designated self-study courses. The bootcamp focused on four key themes essential for mentees: leadership, work-life balance, positive energy, and competence. Seasoned speakers provided practical insights and enriching mentorship skills employing ice-breaking activities and guided conversation techniques to facilitate trust-building and communication between mentors and mentees.

Mentors exchange insights from the course and communication techniques during the bootcamp

These sessions attracted 91 participants from 20 units in total, aiming to empower female talents to achieve work-life balance and pursue career aspirations under the guidance of experienced mentors.

Designated Self-Study Course Content

Description	Sub-Courses
Leadership Utilize female leadership traits for vertical management and effective collaboration with peers and across divisions.	• Strategies for Female Leadership • Vertical and Lateral Management • Essential Competencies for the Future Workplace • How Managers Engage in Challenging Conversations
Work-life Balance Aid female employees with solid management of performance amidst demanding work schedules and societal pressures, thus achieving desired outcomes.	• Alignment of Personal Values with Work • Time Management and Lifestyle Planning • Addressing Job Burnout • Establishing Boundaries in the Workplace
Positive Energy Learn to handle heavy workloads and stress positively, examine work achievements, build happiness, and exert positive influence in teams.	• Qualities of Female Leadership • Finding Fulfillment in Work • Self-Motivation Techniques • Stress and Emotion Management
Competence Enhance competence through diverse perspectives, develop tailored learning plans to bolster skills, and overcome challenges in the workplace.	• Eliminating Bias • Success Strategies for Women in the Workplace • Enhancing Learning Abilities • Identifying Work Patterns and Increasing Productivity

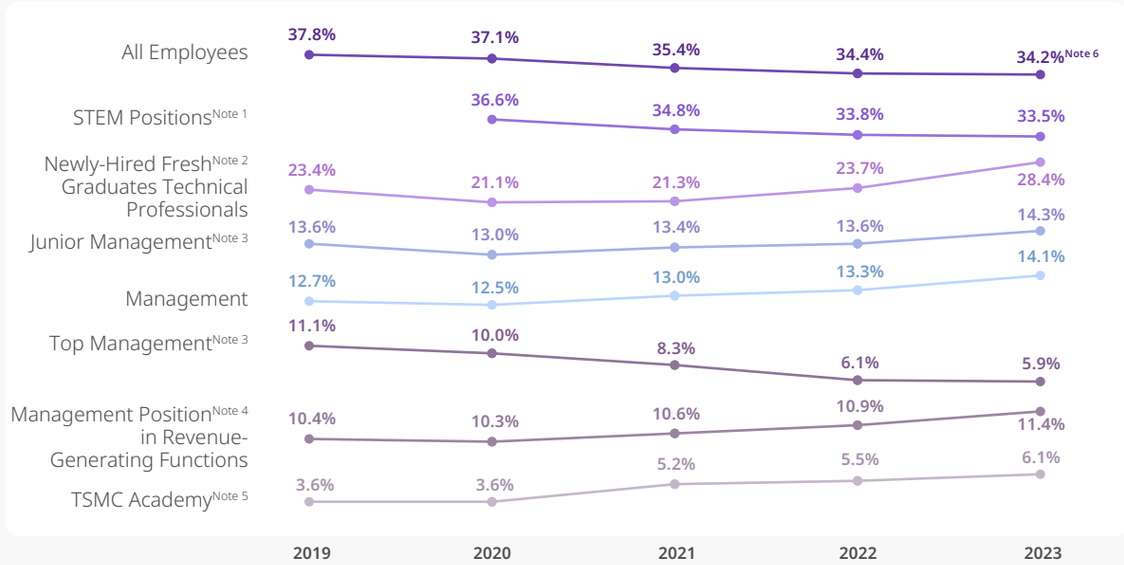
TSMC continues to unlock talent potential and actively boosts workforce diversity. In 2023, the number of women in STEM positions reached 24,436, constituting 33.5% of the permanent workforce. Among newly recruited technical professionals, females represented 28.4%. Moreover, female managers comprised 14.1%, contributing to a culture of workplace diversity.

Compensation Ratio by Gender

Region/Subsidiary	Position	2019	2020	2021	2022	2023
Taiwan	Managers	0.95:1	0.97:1	0.97:1	0.97:1	0.97:1
	Professionals	0.93:1	0.93:1	0.93:1	0.93:1	0.92:1
	Assistant	0.97:1	0.97:1	0.93:1	0.91:1	0.92:1
	Technicians	1.13:1	1.13:1	1.14:1	1.15:1	1.18:1
China	Managers	0.94:1	0.96:1	1:1	0.96:1	1.11:1
	Professionals	0.89:1	0.88:1	1:1	0.99:1	1.04:1
	Assistant	0.88:1	0.91:1	1.14:1	1.19:1	1.12:1
	Technicians	1.05:1	1.11:1	1.16:1	1.13:1	1.11:1
North America, Europe, Japan, Korea[Note]	Managers	0.95:1	0.94:1	0.97:1	0.93:1	0.93:1
	Professionals	0.79:1	0.78:1	0.82:1	1.03:1	1.02:1
	Assistant	-	-	-	0.97:1	0.92:1
	Technicians	-	-	-	0.96:1	0.86:1
VisEra	Managers	0.72:1	0.71:1	0.69:1	0.69:1	0.71:1
	Professionals	0.86:1	0.86:1	0.85:1	0.91:1	0.87:1
	Assistant	1.03:1	1.06:1	1.18:1	1.18:1	1.17:1
	Technicians	1.13:1	1.03:1	1.04:1	1.05:1	1.01:1
TSMC Washington, LLC	Managers	0.84:1	0.75:1	0.79:1	0.80:1	0.87:1
	Professionals	0.91:1	0.83:1	0.87:1	0.82:1	0.83:1
	Assistant	0.91:1	0.91:1	0.93:1	0.95:1	0.93:1
	Technicians	0.99:1	1:1	1.02:1	1:02:1	1.04:1

Note: From 2018, statistics for Japan, North America, and Europe have been changed from individual statistics to consolidated statistics

Percentage of Female Employees



Note 1: STEM positions include R&D, operations, Q&R, information technology, and information security employees, and other units

Note 2: Newly-hired fresh graduates technical professionals include all newly-hired technical professionals with less than one year of recognized experience

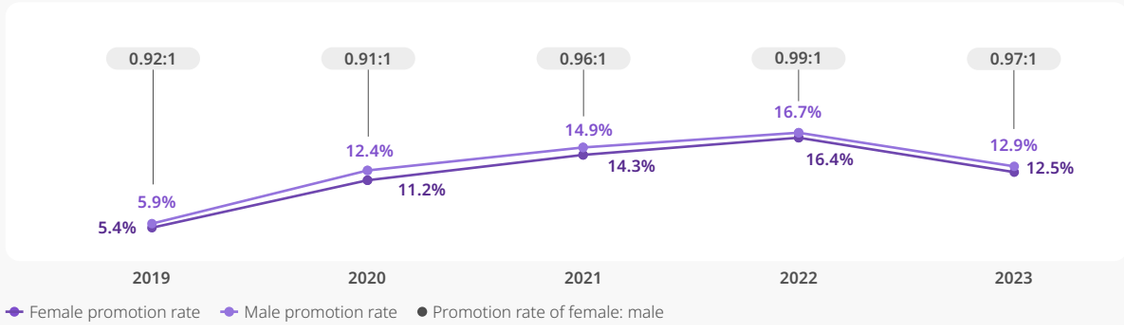
Note 3: Junior management positions include first-line managers while top management positions include Vice Presidents and higher

Note 4: Management positions in revenue-generating functions include managers of R&D, operations, Q&R, sales, and other units

Note 5: TSMC Academy members with outstanding achievements, insights, or breakthroughs in specific fields or experts with outstanding contributions to TSMC

Note 6: The percentage of female employees declined in 2023 because new-hires were mainly engineers and there was a significantly lower number of female engineers compared with male engineers in the labor market

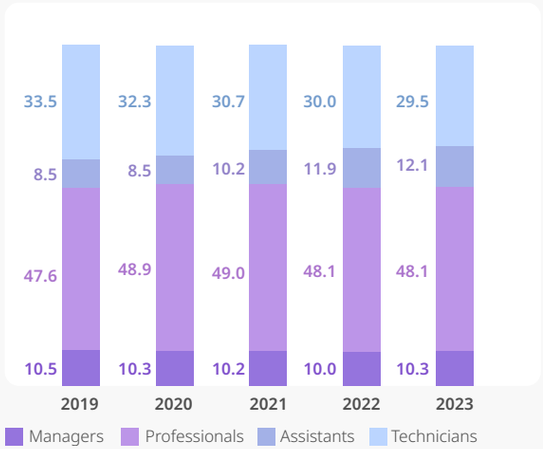
Promotion Rate by Gender



Percentage of All Employees

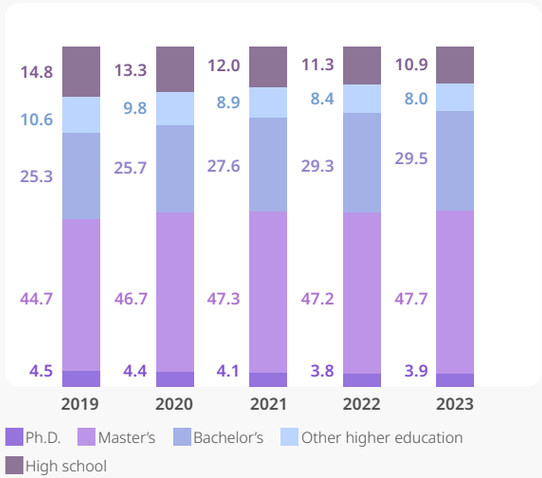
Position

Unit: %



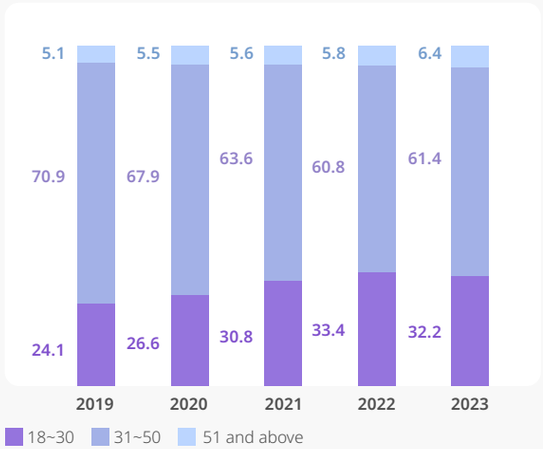
Education

Unit: %



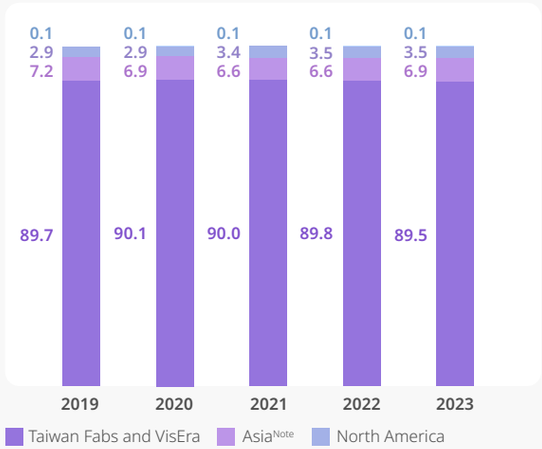
Age

Unit: %



Work Location

Unit: %



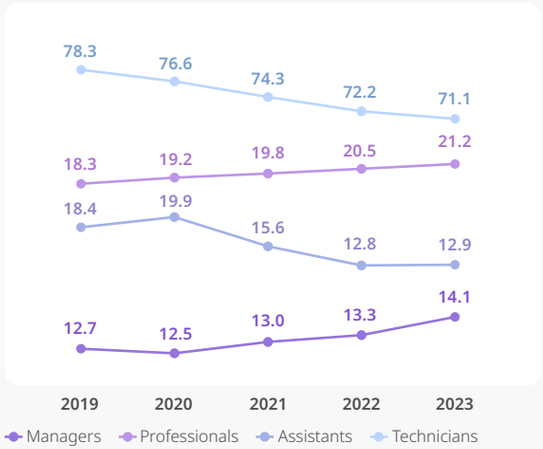
Note: Asia includes Shanghai, Nanjing, Japan, and South Korea

Indian colleagues from Global Family@tsmc draw blessing symbols of Diwali with Chinese brushes to create unique Spring Festival couplets

Percentage of Female Employees

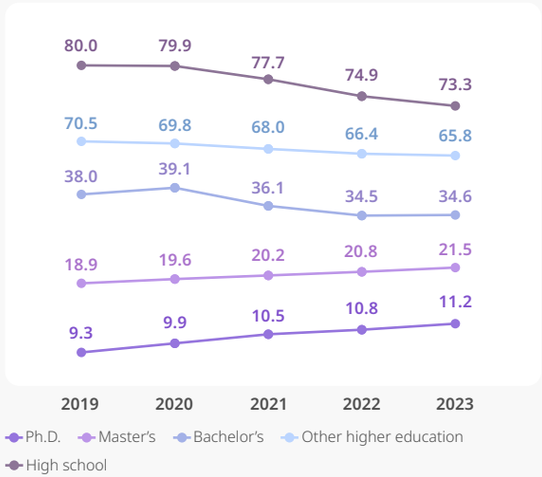
Position

Unit: %



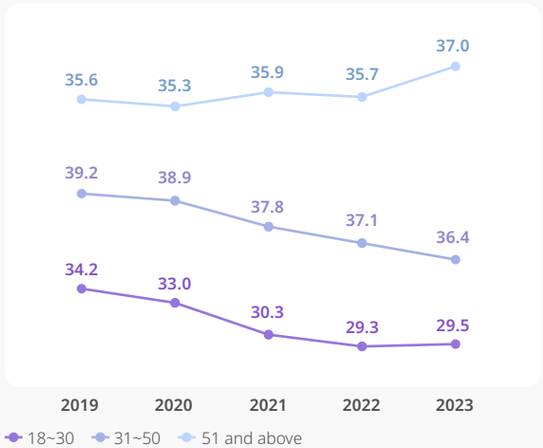
Education

Unit: %



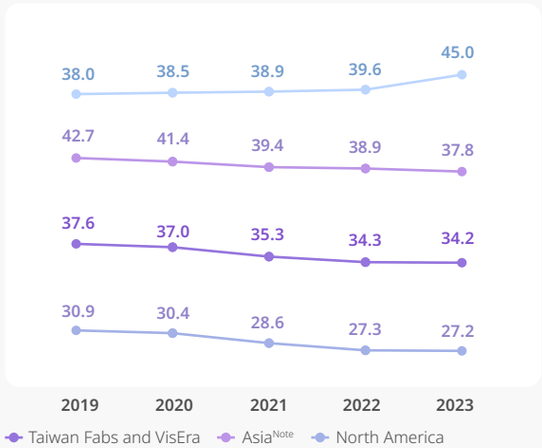
Age

Unit: %



Work Location

Unit: %



Note: Asia includes Shanghai, Nanjing, Japan, and South Korea

Women@tsmc supports the Female Leadership and Innovation Panel Discussion, encouraging innovation in the semiconductor industry

Talent Attraction and Retention

Fulfill the "Commitment" Core Value

Offer employees quality jobs and strengthen employee commitment

2030 Goals	2024 Targets	2023 Achievements
Conduct Core Values Survey[Note 1] every two years to reinforce core values	—	—
• Ensure that over 95% of employees are fully committed to their work	• Ensure that over 95% of employees are fully committed to their work	—
• Ensure that over 95% of employees are willing to continue working for TSMC in the next five years	• Ensure that over 95% of employees are willing to continue working for TSMC in the next five years	—
Conduct Employee Engagement Survey every two years to reinforce core values; Rank in the top 25% for Sustainable Engagement; rank is determined by comparing results from the Employee Engagement Survey against the Global High-Performance Norm	—	— Rank in the top 75% for Sustainable Engagement; rank is determined by comparing results from the Employee Engagement Survey[Note2] against the Global High-Performance Norm Target: 75%
Maintain top 25% among industry peers in total compensation	Maintain top 25% among industry peers in total compensation	✓ Maintained top 25% among industry peers in total compensation Target: top 25%
Less than 10% total turnover rate[Note 3]	Less than 10% total turnover rate	— Total turnover rate: 3.7% Target: 5~10%
Less than 10% new hire (<1 year) turnover rate	Less than 14% new hire (<1 year) turnover rate	↑ New hire turnover rate (<1 year): 8.9% Target: ≦14.5%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: The Core Values Survey, formerly known as the Employee Engagement Survey in previous reports, refers to the same biennial survey. The forthcoming survey is slated for 2024, while findings from the 2022 survey are accessible in the Fulfill the Commitment Core Value section

Note 2: Implementation of relevant improvement programs was guided by the key drivers derived from the 2023 Employee Engagement Survey and the analysis findings of the Sustainable Engagement category. Further details are available under Employee Engagement

Note 3: In light of the prevailing job market conditions in 2023, the overall turnover rate declined compared to prior years. Effective from 2024, the target for the overall turnover rate has been revised to not surpass 10%

As TSMC navigates through technological advancements and the rise of a new generation of talent, it remains steadfast in the commitment to advancing cutting-edge process technologies while nurturing, recruiting, and retaining talent to drive innovation across development, manufacturing, and customer service. This strategy supports global expansion and sustains competitive advantages. In 2023, TSMC recruited 6,133 new employees worldwide and created 3,394 high-quality job opportunities. By providing competitive compensation, superior benefits, and a safe and healthy work environment, TSMC aims to boost employee engagement and foster belonging. Through new employee care measures, TSMC helps them adapt to their new working life and harness their strengths while curbing turnover rates.

Fulfill the Commitment Core Value

Culture Refresh

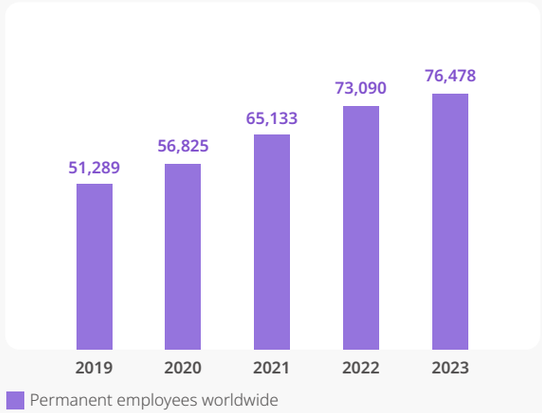
TSMC initiated the Culture Refresh Program in 2023 to foster a deeper comprehension of the Company's core values, including Integrity, Commitment, Innovation, and Customer Trust. Over 150 case discussion workshops were conducted globally by the end of 2023 aimed at deepening employees' understanding of the Company's core values. TSMC intends to expand this program to all employees worldwide in 2024, with managers leading cross-regional and cross-generational discussions to align mutual understanding of the core values furthermore.

Additionally, TSMC will conduct a Core Values Survey in 2024, and based on the results, propose and implement enhancement initiatives. As described in the core value of Commitment, TSMC will continue working to create a good workplace for current and prospective employees.

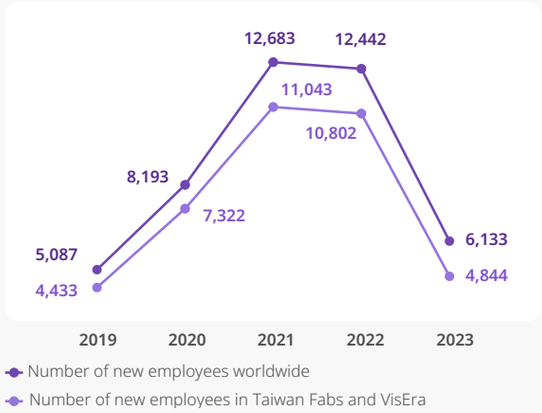
Strong Talent Pool

TSMC is committed to becoming a company that employees can take pride in. As of 2023, the global workforce totaled 77,045 individuals, consisting of 76,478 permanent employees and 567 temporary employees in terms of employment contracts. When considering employment type, there were 76,707 full-time employees and 338 part-time employees.

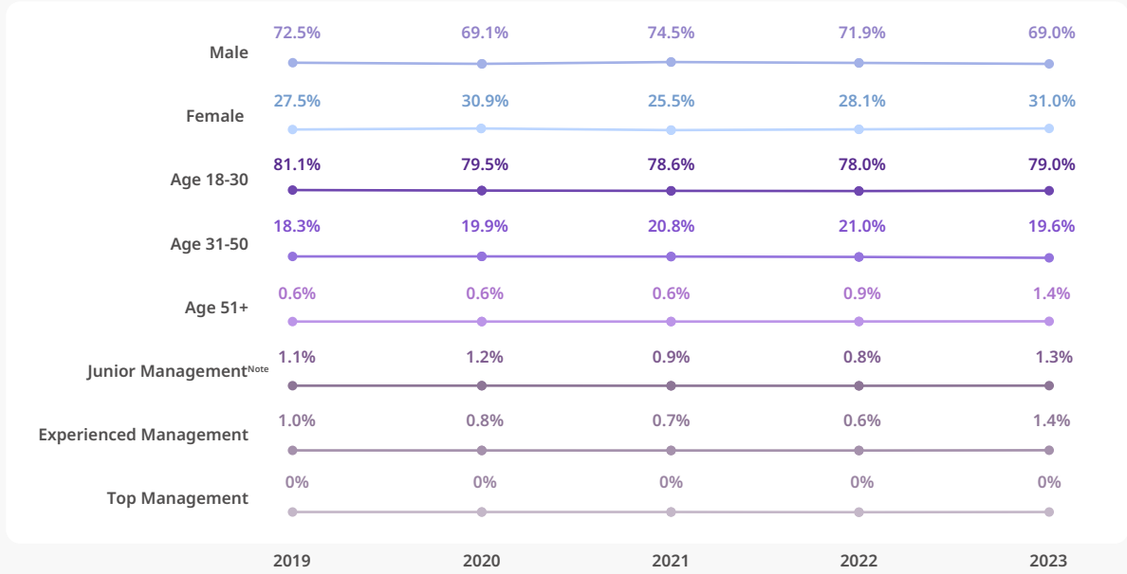
Number of Permanent Employees Worldwide



Number of New Employees



Ratio of New Employees - by Management level, Gender and Age



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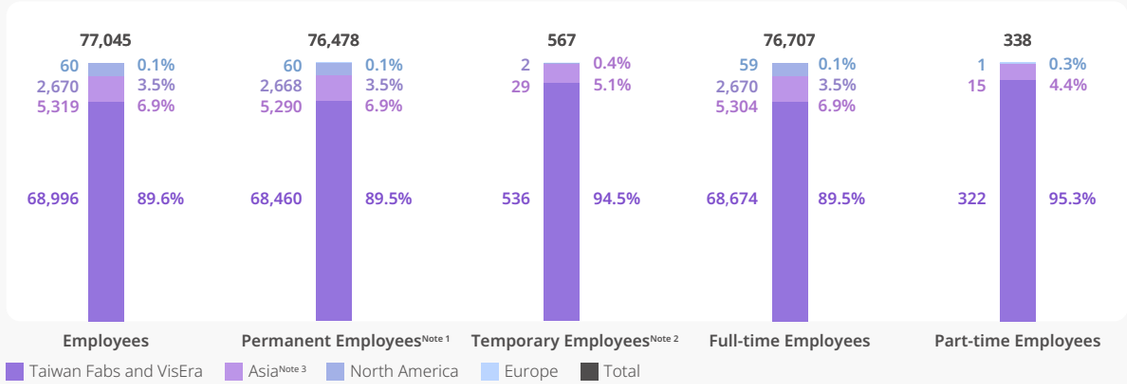
Workforce Type Distribution - by Work Location



Note 1: Permanent employees refer to those who have signed contracts with no fixed term, as defined according to the GRI Standards
Note 2: Temporary employees are those who have signed fixed-term contracts
Note 3: Asia includes Shanghai, Nanjing, Japan, and South Korea

Strengthening Diversity in Talent Recruitment

Adhering to the principle of "shared vision and values," TSMC grounds its recruitment practices in diversity and inclusion, ensuring equitable treatment irrespective of gender, religion, ethnicity, nationality, or political affiliation. Selection criteria prioritize character and competence, with professional skills closely following. TSMC predominantly recruits locally for its global talent needs. However, at its primary operational hubs in Taiwan, as well as at VisEra Technology Co., factors such as technology development and diverse talent requirements mandate the inclusion of overseas specialists in recruitment initiatives alongside professionals and recent graduates.

• Annual Women's Career Seminar

TSMC is dedicated to boosting the representation of women among newly-graduated fresh graduates recruits for technical positions. In 2023, we hosted Walk Together and Show Your Uniqueness women's career-sharing event. Female employees were invited to share their professional journeys and discoveries of their unique strengths to inspire more talented women to pursue careers in STEM fields. A total of 111 female master's and doctoral students participated. Furthermore, the event included some interactive board games to facilitate discussions among employees and students on workplace issues faced by women, promoting diverse exchanges and learning opportunities. The career-sharing event also empowered students to redefine and affirm their self-worth, showcasing professionalism and confidence.

• Global Internship Program

TSMC's Summer DNA Internship Program revolves around Develop, Navigate, and Advance Offer, providing interns with diverse learning resources and growth opportunities. In line with globalization trends, all the program activities and courses in 2023 were bilingual. Additionally, an internal dedicated website was launched for the first time, offering interns ample online resources for self-directed learning and a deeper understanding of the program. When the summer intern program ended, exceptional interns had the chance to receive an advance offer and join TSMC upon graduation. In 2023, 672 students participated in the program, including 219 females, representing 32.5% of the total. Following the internship, 232 interns (approximately 35% of the total) received outstanding performance evaluations from their supervisors and received advance offers, with females comprising 38% of the group.

• Disabled Employees

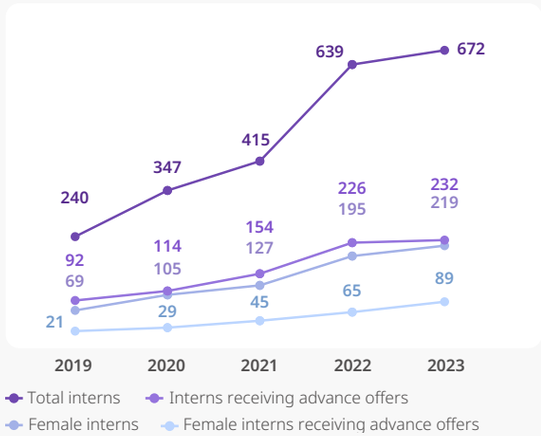
TSMC continues its commitment to hiring individuals with disabilities. In 2023, TSMC conducted four information sessions for disability recruitment and collaborated with school resource centers and government employment service centers to engage with disabled students with potential. Meanwhile, the Company launched the inaugural Accessible Workplace Experience Camp, where occupational therapists participated in the recruitment process and assisted in job redesign to facilitate the swift adaptation of disabled interns to the workplace, thus enhancing their working skills. In 2023, TSMC employed 489 individuals with mild to moderate disabilities and 104 with severe disabilities. After adjusting for disability employment weighting, the proportion of employees with disabilities stood at 1.0%. Although TSMC's subsidiary VisEra shares the same commitment, its nature of work hindered it from reaching the 1% target for the year, resulting in the payment of shortfall subsidies to meet legal regulation.

In addition, in 2023, a total of eight information sessions were held by managers and HR to cover the topics of Accessibility-friendly Workplace, Attitudes for Working with Employees with Disabilities, and Interaction Skills with Employees with Disabilities to deepen employees' respect for workers with disabilities and to create a diverse and inclusive work culture. Meanwhile, TSMC initiated the Accessibility-friendly Workplace Optimization project, conducting accessibility assessments across 20 office locations, inviting external experts in accessible architecture regulation to optimize accessibility in facilities' office areas, and assessing the needs of employees with disabilities to ensure the effectiveness of improvements in the working environment. If physical environment modifications are not feasible, auxiliary tools will be provided to ensure candidates with disabilities have a more equitable and comfortable working experience.

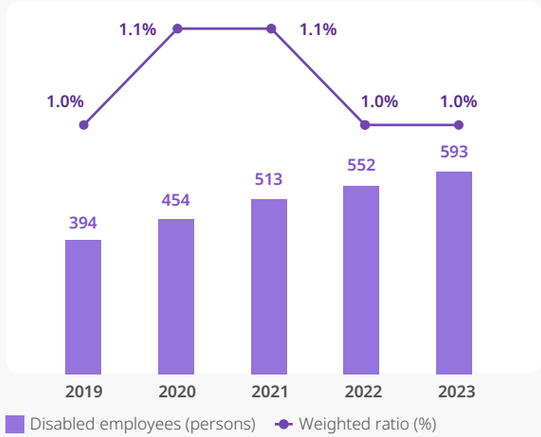
• Assimilate Foreign Employees

In 2023, TSMC employed 1,303 foreign nationals, comprising 1.7% of the global workforce, with newly hired foreign employees representing 4.0%. To expedite their assimilation into the workplace, TSMC offers relocation support, exclusive newcomer orientation, subsidies for learning Chinese, and rewards for receiving Chinese certification. Additionally, TSMC extend invitations to foreign employees and their families to join dedicated clubs like the Formosan Cultural Club and the India Cultural Study Club. Collaborating with TSMC employee resource group, Global Family@tsmc, the Company hosts various celebrations and festivals, such as Thanksgiving for the US and Diwali for India, fostering cross-cultural exchanges and understanding.

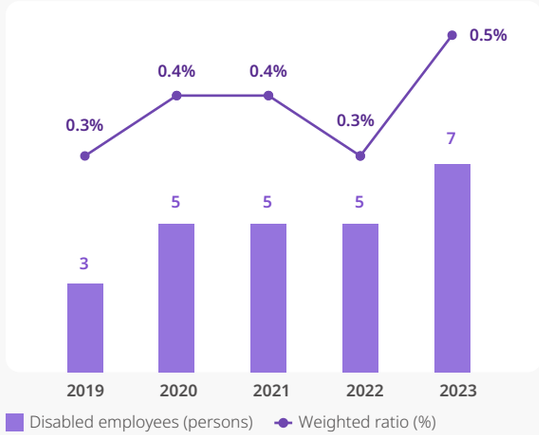
Interns Receiving Advance Offers in Taiwan Fabs and VisEra



Disabled Employees – Taiwan



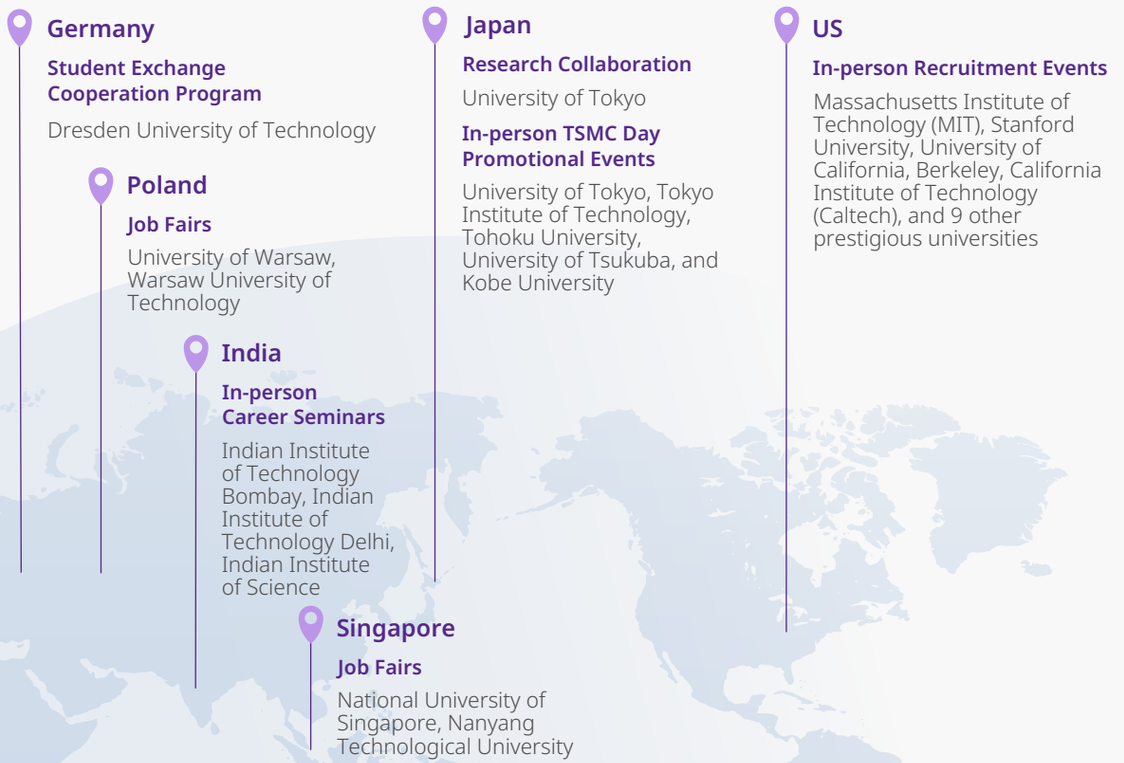
Disabled Employees - VisEra



- Global Top-tier Professionals and Campus Recruitment

In pursuit of talent diversity, TSMC extensively recruits specialized professionals worldwide. In 2023, TSMC participated in local job fairs in Poland and Singapore, recruiting IT talents from Poland and promoting the summer internship program to overseas talents in Singapore. Excellent interns received advance job offers upon program completion, encouraging them to join TSMC following graduation. Moreover, through campus recruitment events in the US and Germany, TSMC conducted on-site interviews to engage with local talent. In the US, the Company held recruitment briefings and Taiwanese alumni gatherings to facilitate close interaction with students by introducing semiconductor industry developments and offering TSMC recruitment information and career counseling sessions. In Asia, in-person TSMC Day promotional events in Japan provided a platform for local executives and students to deepen their understanding of TSMC. The collaborations with the University of Tokyo aims to cultivate top-tier graduate students and introduce TSMC internships opportunities to them. Additionally, in India, TSMC ran in-person career seminars on the semiconductor industry to collect students resume. The Company supplemented this effort with online interviews, actively recruiting semiconductor and IT talents from India to join TSMC.

Overview of Overseas Campus Recruitment in 2023

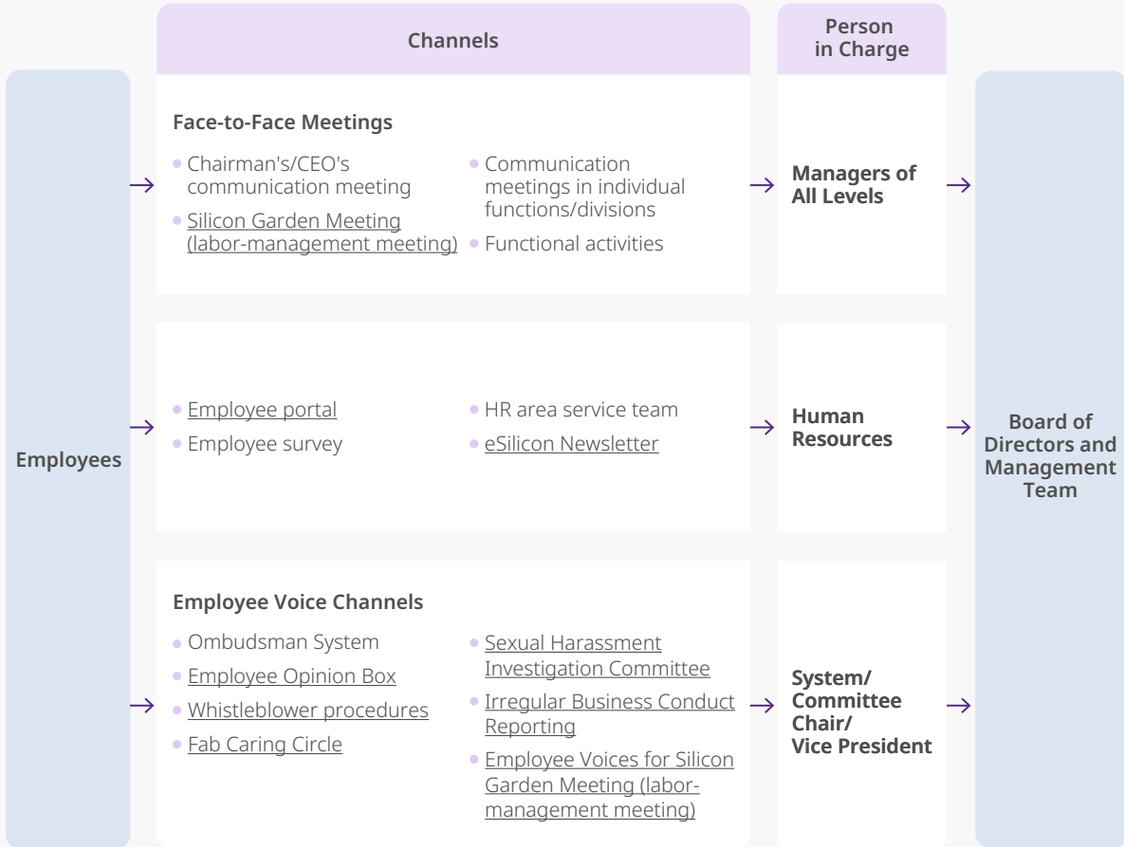


Enhance Employee Engagement

Two-Way Communication Channels

TSMC values employees' opinions and rights, establishing robust communication channels to encourage employees to offer suggestions, which serve as essential references for improving management practices. Furthermore, the Company enhances interaction and communication between management and employees, fostering a sense of belonging and cohesion among employees towards the Company.

Internal Communications



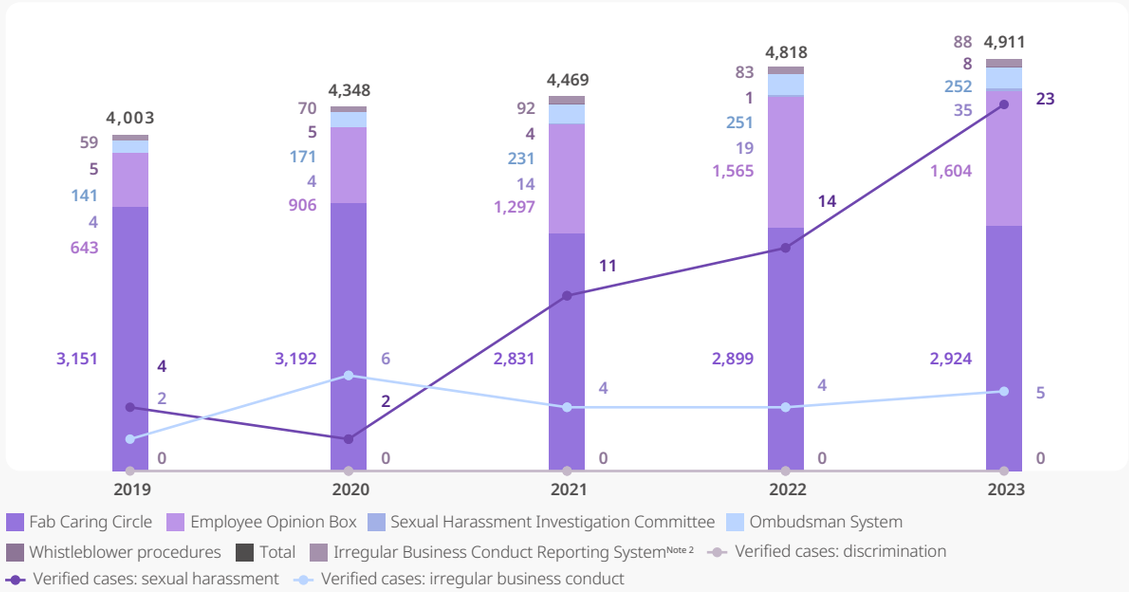
Employee Voice Channels

In 2023, TSMC addressed 4,911 instances of employee feedback and grievances. This included 35 cases handled by the Sexual Harassment Investigation Committee, 252 cases processed through the Ombudsman System, 8 cases reported via the Whistleblower procedure, and 88 cases filed under the Irregular Business Conduct Reporting system. Each case was promptly handled, responded to, and monitored with confidentiality.

Among them, the Sexual Harassment Investigation Committee verified 23 cases, resulting in disciplinary actions such as job reassignment or dismissal for those implicated in misconduct, depending on the severity. Additionally, support programs, including psychological counseling, were extended to complainants. Moreover, in TSMC's annual sexual harassment prevention courses, notable attention was given to promoting and educating awareness of sexual harassment behavior and the newly introduced Power-abused Sexual Harassment Prevention Act in 2023. Employees were reminded of potential punitive damages to deter similar conduct.

Furthermore, there were five cases where ethical misconduct was substantiated through investigations. Employees who violated the Ethics Code (or relevant regulations) were disciplined, including affecting annual performance or dismissal, based on the severity of their actions. TSMC remains committed to promoting ethical standards through educational training programs. In 2023, the Annual Business Ethics and Regulatory Compliance Course (including Personal Data Protection Act-related contents) was completed by 73,034 individuals, achieving a 100% completion rate.

Cases Reported through Employee Voice Channels



Note 1: The figures for Ombudsman System, Sexual Harassment Investigation Committee, Irregular Business Conduct Reporting System, and Employee Opinion Box cover all TSMC facilities, while the figure for Fab Caring Circle covers only TSMC's Taiwan fabs

Note 2: Cases reported through the Irregular Business Conduct Reporting System are from external parties and internal employees

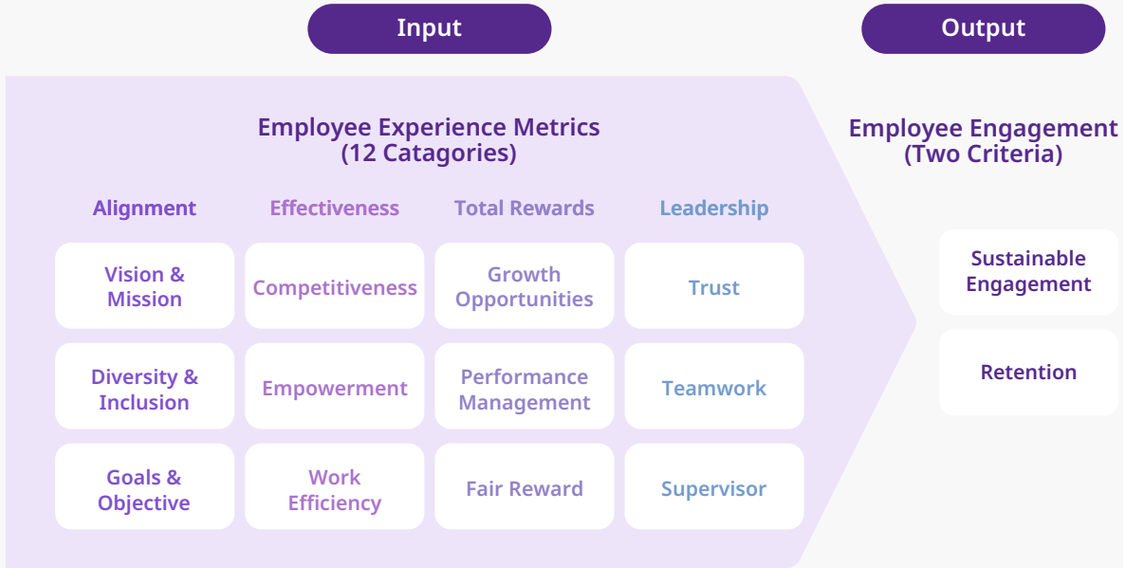
Respecting Employees' Freedom of Association, Regular Labor-Management Meetings

TSMC upholds the freedom of association for all employees while providing various channels for voicing opinions. Compliant with regulations, our Taiwan facilities host quarterly Silicon Garden Meetings (labor-management meetings), attended by corporate representatives and employee-elected delegates. In 2023, 24 Silicon Garden Meeting units convened, covering operations, research and development, and support organizations, representing 88% of the Company's global workforce. During these routine gatherings, company representatives update employee counterparts on operational status while employee representatives relay collected feedback, fostering bilateral communication on issues of concern. Any amendments to work rules affecting employee rights necessitate approval from employee representatives. TSMC is confident that the fair conduct of Silicon Garden Meetings can enhance communication between management and employees.

Employee Engagement

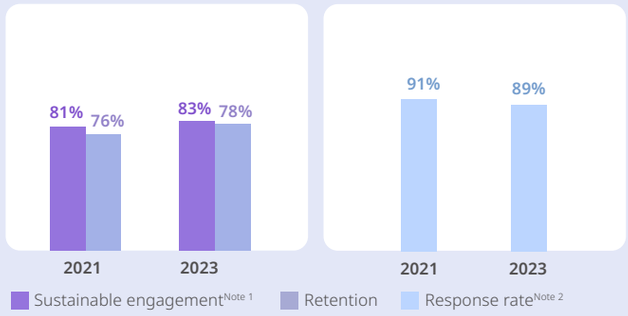
TSMC is rooted in a human-centered corporate culture. In line with the High Performance Employee Experience Model, the Company has conducted an Employee Engagement Survey biennially since 2021. This structured approach assesses employees' work experiences and identifies corporate strengths and opportunities across four core dimensions: Alignment, Effectiveness, Total Rewards, and Leadership, encompassing 12 categories. In 2023, the survey covered permanent employees (including both direct and indirect labor) at TSMC's Taiwan facilities and subsidiaries worldwide, excluding VisEra due to industry disparities. With a total of 65,123 respondents, the survey achieved an 89% effective response rate. The survey revealed significant improvements in nine out of the 12 categories compared to 2021, underscoring employees' confidence in TSMC's competitiveness, leadership vision, and service delivery.

Employee Engagement Model



TSMC aims to position itself among the top 25% of companies in the Global High Performance Companies Norm with respect to Sustainable Engagement in the 2030 Employee Engagement Survey. While Sustainable Engagement increased by 2 percentage points in the 2023 survey compared to the 2021 survey, it still falls short of the top 25%. In line with research by the University of Oxford, TSMC has incorporated the three subjective dimensions of Job Satisfaction, Meaning and Purpose at Work, and Workplace Affect into the employee survey. The 2023 survey results indicate that all indicators either remained stable or improved from the previous survey.

Sustainable Engagement Analysis Results



Employee Engagement Survey and University of Oxford Workplace Wellbeing Dimension Comparison Table

Outcome Indicators	2021	2023
Job Satisfaction	76	80
Meaning and Purpose at Work	93	93
Positive Workplace Affect– Happiness	86	87
Negative Workplace Affect– Stress	80 Note 3	82

Items for Improvement	Implemented Measures
Establish an open-style management system and foster a workplace of mutual respect. Encourage employees to speak up and encourage management to be open to suggestions and make appropriate responses	• **Open Communication:** Organized CEO communication meetings and quarterly filming of CEO Quarterly Outlook videos to enhance employees' understanding of corporate operations; expanded the scope of labor-management meetings by introducing Silicon Garden Meetings • **Flexibility:** Adjusted minimum leave hours to 2 hours and implemented the program of Staggered Shift Options • **Diverse and Inclusive Environment:** Established three employee resource groups, conducted Diversity and Inclusion Campaigns, organized Inclusive Leadership Workshops, and initiated the TSMC ChildCare Benefit Program
Unleash employees' potential, allowing them to enjoy work, learn, and grow continuously to feel a great sense of belonging and achievement	• **Learning Resources:** Added online learning resources and updated the New Manager Learning Program • **Performance Management and Development System:** Expanded performance distribution and deepened talent development through diverse learning resources
In addition to cash rewards, non-monetary incentives are also used to motivate and retain talent	• **Non-Monetary Rewards:** Enhanced cancer medical coverage and introduced a new Dependent Voluntary Insurance Plan • **Retention:** Conducted WeCare Surveys for new employees, implemented the Buddy Program, and introduced retention plans for specific groups

Note 1: This was calculated as the percentage of respondents who chose "agree" or "tend to agree" on a five-point scale
Note 2: Response rate = Number of actual respondents / Number of expected respondents
Note 3: The score has been reversed, where a higher score indicates a lower level of perceived stress

Compensation and Benefits

Provide Competitive Compensation Packages

TSMC provides competitive compensation packages to attract and retain the best talent, as well as reward employee performance and encourage long-term contribution. Besides referring to market information on selected benchmark companies and compensation survey reports, the Company also reviews market information on compensation data for the whole industry for competitiveness analysis to develop the most effective compensation strategies.

TSMC's compensation package includes a base salary, allowances, cash bonuses, and profit-sharing schemes. In 2023, the average annual compensation of a newly graduated TSMC engineer with a master's degree at Taiwan fabs and VisEra was higher than NT$2 million. The average compensation of direct laborers was higher than NT$1 million, which is four times the minimum monthly wage in Taiwan. In contrast to the previous year, the number of full-time employees in Taiwan facilities displayed a consistent annual increase in 2023. However, the average and median compensation were subject to fluctuations influenced by operational circumstances and alterations in the composition of the workforce.

In addition to cash compensation, starting from 2022, regular employees of TSMC and its 100%-owned subsidiaries may participate in the Global Employee Stock Purchase Program. TSMC offers a 15% stock purchase subsidy to encourage colleagues to purchase company stock and participate in the Company's long-term success. A total of 70% of colleagues worldwide participate in the program.

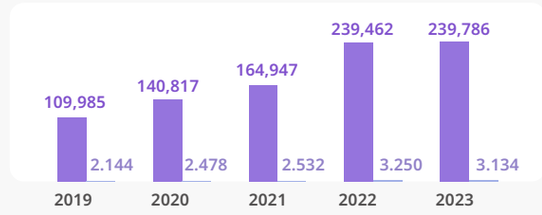
The Company has increased total compensation and benefits for employees from around NT$110 billion to NT$239.8 billion between 2019 and 2023, and average compensation and benefits per employee from NT$2.14 million to NT$3.13 million during the same period. According to the Employee Engagement Survey conducted in 2023, 84% of colleagues believe that the Company provides reasonable overall rewards and compensation. This result is better than that of global high-performance companies (66%) and high-tech companies (61%) participating in the Willis Towers Watson survey, indicating that besides offering competitive compensation in the market, TSMC's rewards are also recognized by colleagues as being reasonable.

In 2023, TSMC's revenue and profits continued to grow steadily. The cash bonuses and profit-sharing schemes allocated for Taiwan fabs were valued at NT$100.2 billion, and the annual salary adjustment also took place as planned.

- Reward Programs

The incentive program for TSMC facilities in Taiwan is implemented over two years. Cash bonuses are paid quarterly to provide timely incentives, and profit-sharing is paid annually in the following year to encourage long-term service and continuous contribution. The incentive programs of overseas regions are designed in consideration of local cultures and markets and are given out through annual cash bonuses or long-term one- to three-year schemes. In 2023, the median total compensation of TSMC employees globally (excluding pension and other benefits) was approximately NT$2.5 million, which was 1/219 of the CEO's total compensation. The median of the CEO's annual total compensation percentage increase and the annual average total compensation percentage increase was around - 1:1.

Compensation and Benefit Expenses



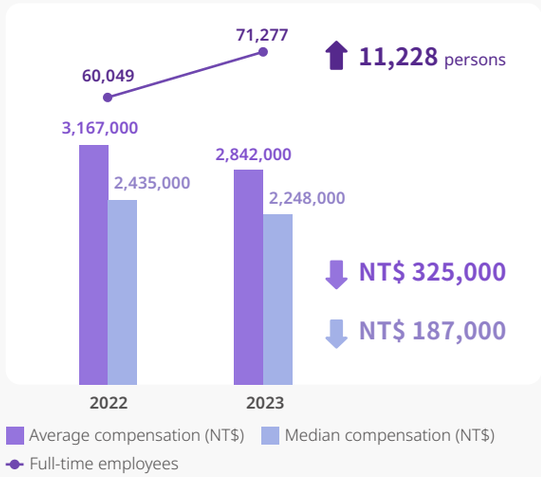
- Corporate Officer Shareholding Guidelines

TSMC believes that the long-term ownership of company shares by corporate officers helps align their interests with those of all shareholders; therefore, the Company formulated the Corporate Officer Shareholding Guidelines in 2020. The required value for the Chairman, CEO, and other corporate officers' holding of TSMC shares is proportional to their annual base salary. Officers shall achieve the required value within three years of their appointment and maintain the required value for the entire period of their employment.

- The Linkage to the Executive Compensation and Performance Evaluation

The compensation of TSMC's CEO and Vice Presidents is governed by the Company's bonus policy, which covers the achievement of both corporate operational goals and personal annual objectives. Corporate goals include financial indicators and non-financial indicators. Personal annual objectives include operational goals and ESG achievements. The Employee Restricted Stock Awards provided has a vesting period of three years (for details, please refer to 4.6.1 Status of Employee Restricted Stock on page 86-91 in the Company's 2023 Annual Report). The corporate performance indicators are the relative total shareholder return (TSR) of the company compared to the TSR of the S&P 500 IT Index, with the company's ESG achievements as a modifier. Through these two clear quantitative indicators, we strengthen management's long-term and continuous creation of shareholder value while improving ESG performance, which strongly correlates with the Company's overall performance.

Average and Median Compensation



Note: In compliance with Taiwan Stock Exchange regulations set, TSMC started, in 2020, to disclose the number of full-time employees in non-executive positions, their average and median compensation, as well as respective differences in compensation from the previous year. The numbers are calculated in accordance with the regulations of the Taiwan Stock Exchange, which excludes executive officers (managers) and employees eligible for exemption. For those not employed by the Company for a full year, the data is prorated, and the profit-sharing amount is on a profit-year basis, therefore part of the compensation data is projected

Provide Comprehensive Benefits

- Maternity Benefits

TSMC provides lactation rooms to support the breast milk collection needs of female employees. Besides providing parental leave in accordance with local laws and regulations for employees after childbirth, the Company also offers a comprehensive leave management system so that employees have flexibility in making use of their vacation days to take care of their children. In 2023, a total of 7,421 employees in Taiwan and VisEra were eligible for unpaid parental leave, constituting 10.8% of employees. Among them, 641 employees applied for unpaid parental leave, with an expected return-to-work figure of 653 for the entire year. Out of these, 557 employees expected to return to work either on schedule or in advance, resulting in a return to work rate of 85.3%. As for the retention rate after returning, of the 589 employees who returned to work in 2022, a total of 508 remained at TSMC as of the end of 2023, achieving an 86.2% retention rate.

In 2023, the number of employees in TSMC's Taiwan fabs and VisEra aged between 20 and 64 accounted for 0.45% of Taiwan's population of the same age group. During the same time, the number of employees' newborns was 2,463, which was 1.8% of the total number of newborns in Taiwan, an example of the Company's outstanding benefits in mitigating the impact of sub-replacement fertility in Taiwan.

- TSMC ChildCare Benefit Program 2.0

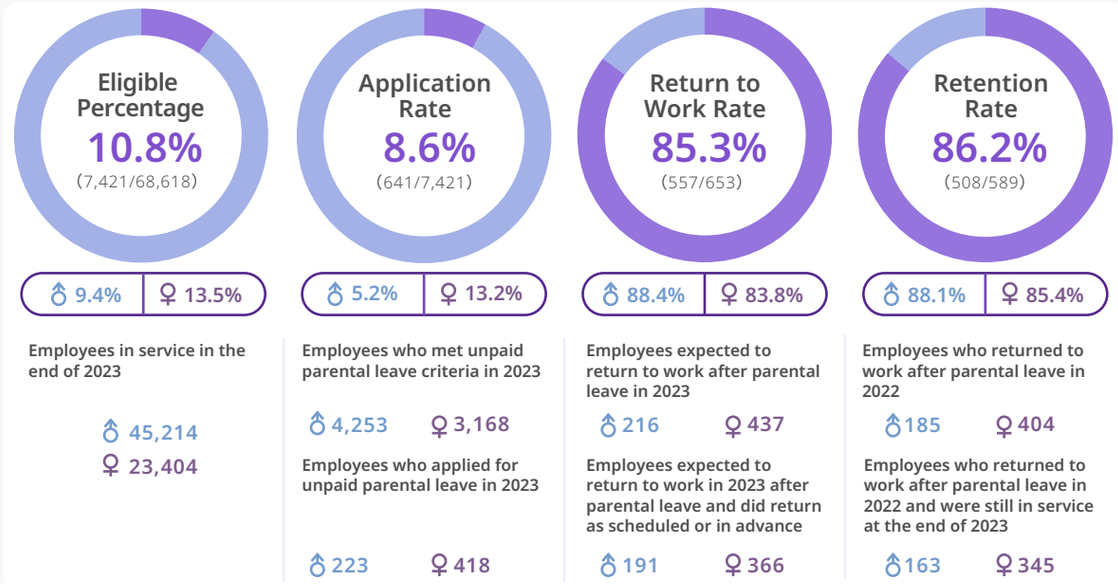
To bolster support for employees with family responsibilities, TSMC introduced the ChildCare Benefit Program 2.0 at its Taiwan facilities in 2023. This initiative offers resources tailored to four stages: pregnancy, childbirth, the period before the child turns one, and the period from ages two to six, aiming to create a family-friendly workplace that promotes parenthood.

- TSMC Kindergarten: A Reassuring Anchor for Parent Employees

TSMC is committed to helping employees balance their family responsibilities and career growth. Across the facilities in Hsinchu, Taichung, and Tainan, we have set up four kindergartens capable of accommodating 528 children. These establishments provide a safe and enriching learning environment for the employees' preschool-aged children. Moreover, we offer childcare services from 7 a.m. to 8 p.m., aligning with employees' work schedules to ensure that the employees can focus on their work without worries.

TSMC Kindergartens prioritize four pillars in the specialized programs: theme-based science education, immersive food and agricultural education, life-oriented language education, and interactive parenting education, all aimed at unlocking children's learning potential. These programs are designed to satisfy curiosity and exploration in children, laying a solid foundation for their learning and character development. Childcare services were extended in 2023, opening enrollment to the children of TSMC subsidiaries and affiliates following children of TSMC employees, contributing to the well-being of the community.

Unpaid Parental Leave in TSMC's Taiwan Fabs and VisEra - Eligible Percentage, Application, Return to Work, and Retention Rate



- Foster a Fitness-friendly Workplace

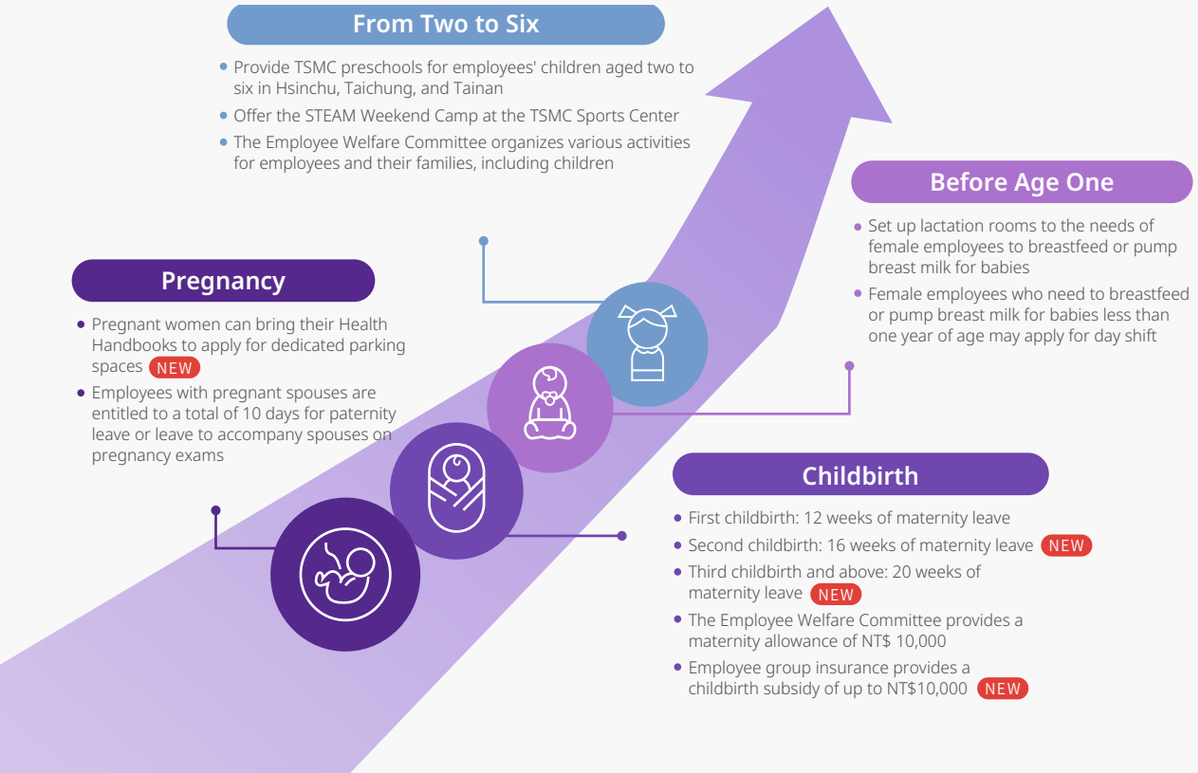
Prioritizing the physical and mental well-being of employees, TSMC fosters teamwork and a sports culture through annual sporting events and facilities such as gyms, sports courts, and aerobics studios. Certified as an iSports Enterprise by the Ministry of Education's Sports Administration for two consecutive years, the Company hosts the annual Sports Season, featuring ball games, fun competitions, and mini fun runs. In 2023, the introduction of new events, including three e-sports competitions and a 3-on-3 women's basketball tournament, led to a record-high participation, up 23% annually.

Besides the Sports Season, TSMC advocates for an "Every Day is a Sports Day" lifestyle. The Virtual Walking Challenge encourages teams to form across organizations and regions to cultivate exercise habits. In 2023, 1,712 teams registered—up 12% annually—with a total walking distance of 3,755,586 kilometers, marking a 20% annual rise. TSMC also invites nutrition and sports experts to share diet and exercise insights through live streaming events, and promotes nutritious meal boxes. The Company has instituted the BMI Achievement Award to motivate employees to reduce abnormal lipid, blood pressure, and blood sugar levels and actively pursue health goals.

- Solid Pension System

TSMC offers a defined benefit pension plan in compliance with Taiwan's Labor Standards Law and has established a Labor Pension Fund Supervisory Committee. Since July 1, 2005, the Company has provided a defined contribution plan under the Labor Pension Law while instituting employee retirement regulations based on local laws in overseas operational locations. The supervisory committee holds quarterly meetings as required by law to oversee pension affairs and deposit funds into pension reserves according to individual retirement plans. Meanwhile, annual pension actuarial assessments are conducted by actuarial consulting firms to meet disclosure requirements for listed companies, ensuring adequate pension allocations to protect employees' future retirement benefits. For specific contribution rates and amounts, please refer to the Appendix Financial Statement section of the TSMC 2023 Annual Report.

TSMC ChildCare Benefit Program 2.0



From Two to Six

- Provide TSMC preschools for employees' children aged two to six in Hsinchu, Taichung, and Tainan
- Offer the STEAM Weekend Camp at the TSMC Sports Center
- The Employee Welfare Committee organizes various activities for employees and their families, including children

Before Age One

- Set up lactation rooms to the needs of female employees to breastfeed or pump breast milk for babies
- Female employees who need to breastfeed or pump breast milk for babies less than one year of age may apply for day shift

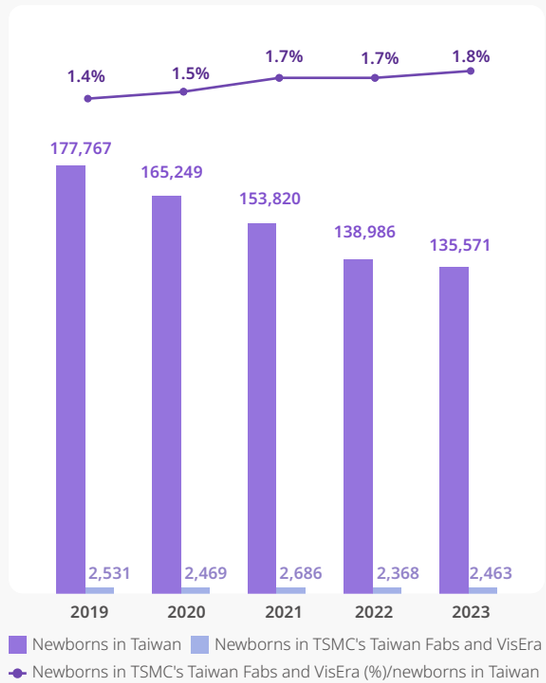
Pregnancy

- Pregnant women can bring their Health Handbooks to apply for dedicated parking spaces NEW
- Employees with pregnant spouses are entitled to a total of 10 days for paternity leave or leave to accompany spouses on pregnancy exams

Childbirth

- First childbirth: 12 weeks of maternity leave
- Second childbirth: 16 weeks of maternity leave NEW
- Third childbirth and above: 20 weeks of maternity leave NEW
- The Employee Welfare Committee provides a maternity allowance of NT$ 10,000
- Employee group insurance provides a childbirth subsidy of up to NT$10,000 NEW

Newborns in TSMC's Taiwan Fabs and VisEra



Pension Contributions and Reserve Status

Pension Plans

TSMC Approach

Defined Benefit Plans

- In Taiwan facilities and VisEra, pensions are calculated based on employees' years of service and average salary for the last six months before retirement, in accordance with the Labor Standards Law. The pension contribution amount is remitted to the Labor Pension Fund Supervisory Committee, which deposits it in a dedicated account at the Bank of Taiwan under the committee's name

Defined Contribution Plans

- In Taiwan facilities and VisEra, employee retirement regulations are established according to the Labor Pension Act, and funds are contributed to individual pension accounts at the Bureau of Labor Insurance
- Overseas subsidiaries also contribute funds at a specific rate of total monthly salaries of local employees to pension management entities

Pension Reserve Status in 2023

Defined Benefit Plans

- Taiwan facilities and VisEra contribute 2% of total monthly employee salaries to the Employee Pension Fund
- As of the end of 2023, the fair value of plan assets for Taiwan facilities was NT$ 8,737.84 million. In accordance with the above regulations, the amount recognized as expenses by TSMC in 2023 was NT$281.39 million. The amount to be contributed in the future as required by law has been accounted for as an accrued pension liability, totaling NT$ 9,257.22 million as of the end of 2023
- As of the end of 2023, the balance in the old labor pension system reserve account at VisEra was NT$ 3,211,820

Defined Contribution Plans

- In Taiwan facilities, funds were contributed at 6% of employees' monthly salaries to their individual labor pension accounts. The total pension contributed by all global entities, including overseas subsidiaries, recognized as expenses in 2023, amounted to NT$5,365,458,000

Fresh Employee Assimilation and Retention

Fresh Employee Assimilation Program

In 2023, TSMC continued its efforts to integrate fresh employees into the workplace and boost retention rates through its orientation program. Courses focused on workplace dynamics, communication, and stress management, with in-person sessions on Success Strategies for Fresh Employees and online lectures on Workplace Soft Skills for Generation Z for employees who had been employed for more than four months and less than one year. The former offered insights into adjustment techniques for recent graduates joining the workforce, with 100 sessions and 3,209 participants, averaging a 95-point post-course rating. The latter, featuring six psychological counselors, addressed stress adaptation, growth mindset, and workplace challenges, attracting 10,182 employees and achieving a 94-point effectiveness rating.

New Employee Support Initiative

In June 2023, TSMC launched the WeCare Survey in multiple languages, allowing new employees worldwide to participate voluntarily. AI HR robot Bonnie provides real-time push notifications on practical information based on responses to the monthly survey, offering positive feedback and encouragement to newcomers. This human-machine collaboration not only lends proactive support but also eases the workload for HR staff and enhances response efficiency. By the end of 2023, 152,407 responses had been collected.

Build a Multigenerational Team

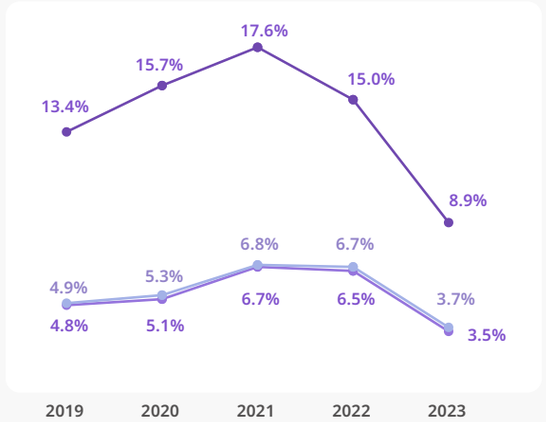
Over 10% of TSMC's new employees are from Generation Z. To better understand their needs and assist in their development, TSMC introduced a series of team leadership courses. Vice presidents, fab and division managers, department and section managers were invited to participate. The courses covered understanding Generation Z employee characteristics, communication, and leadership skills. Through discussions and simulated management scenarios, the management was empowered to effectively motivate Generation Z and enhance team communication, creating a diverse and inclusive environment. In 2023, 621 individuals participated, with an average post-course rating of 97 points.

Maintain Healthy Turnover Rate

In 2023, influenced by external job market conditions, the overall employee turnover rate was 3.7%, down 3.0 percentage points from 2022. The turnover rate for employees within their first year was 8.9%, a decrease of 6.1 percentage points from 2022. TSMC continues to implement newcomer orientation training and support measures to retain outstanding talent and foster mutual growth.

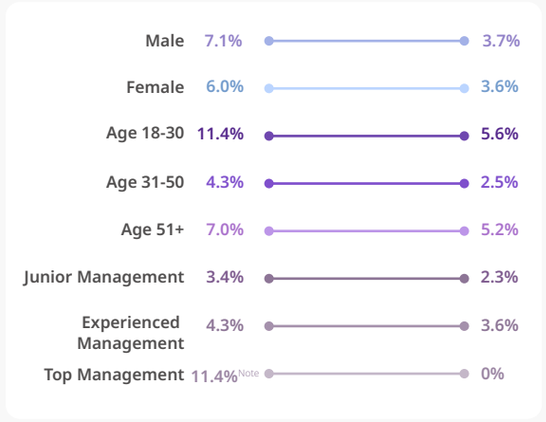
In 2023 TSMC hosts Walk Together and Show Your Uniqueness female's career-sharing event

Historical Turnover Rates



Note: Starting from 2021, the new hire turnover rate (<1 year) includes data from VisEra

Turnover Rate - by Management Level, Gender and Age



Note: TSMC's turnover rate calculation includes retirements. In 2022, the turnover rate for top management was 11.4%, with all departures attributed to the retirement of four top management

Case Study

Promoting Sustainable Sports Day to Elevate ESG Benefits

TSMC prioritizes employee health and promotes a lifestyle where "every day is a sports day." With the lifting of COVID-19 restrictions, the Company resumed hosting its physical sports event in 2023 and introduced ISO 20121 Event Sustainability Management Systems for the first time. This initiative advances ESG practices across six dimensions: green energy, eco-friendly consumption, waste and carbon reduction, advocacy, recycling, and safety management. It improves sustainability of event management measures and shares the experience of organizing sustainability activities. To raise participants' awareness of various sustainability issues, ESG booths were installed at the event, with 16 vendors participating to promote environmental conservation and social care. Besides the sports event, TSMC is considering expanding the application of ISO 20121 to family days, sports seasons, and other events while encouraging other corporate partners and suppliers to join in, thereby scaling up the reach of sustainability impact.


TSMC's adoption of ISO 20121 for the Sports Day raises the event's sustainability benefits

Talent Development

Equip Employees with Future Capabilities

Prepare employees with skills needed for the future and build a talent pipeline

Unleash Employees' Potential and Innovation

Enable self-learning and create positive impact to the Company and society

2030 Goals	2024 Targets	2023 Achievements
Fill over 80% of manager positions through internal promotions	Fill over 80% of manager positions through internal promotions	Filled 88.2% of manager positions through internal promotions Target: ≧ 80%
Fill over 50% of vacancies through internal transfers	Fill over 50% of vacancies through internal transfers	Filled 63.8% of vacancies through internal transfers Target: ≧ 50%
95% completion of the talent pipeline within three years for fab directors/directors	Review 95% of the talent pipeline for fab directors/directors	Reviewed 96.3% of the talent pipeline for fab directors/directors Target: 80%
Achieve an annual average of 100 hours of learning in employees	Achieve an annual average of 90 hours of learning in employees	Achieved an annual average of 85.4 hours of learning in employees Target: 75 hours

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | Exceeded | Achieved | Missed target

TSMC realizes its people vision by integrating both internal and external resources to offer employees with challenging, meaningful, and enjoyable works. It encourages employees to continue learning and leveraging their strengths, unlocking boundless opportunities. Anchored on the TSMC Talent Development Model, two primary strategies were set: Equip Employees with Future Capabilities and Unleash Employees' Potential and Innovation. Through competency-driven learning modules and diverse and adaptable learning approaches, complemented by tailored training and development schemes across various job tiers, employee potential is translated into tangible capabilities, facilitating comprehensive talent pipeline management. This empowers employees to pursue lifelong learning with goals, plans, and discipline, bolstering their competitiveness and enabling them to grow with the Company.

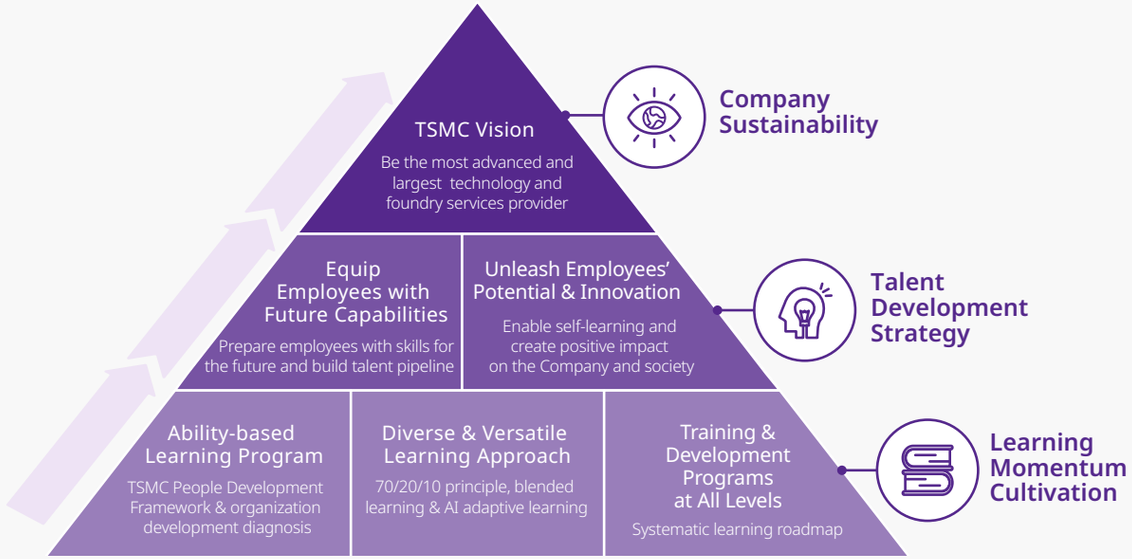
Equip Employees with Future Capabilities

Proactive development of employee capabilities and effective talent pipeline management are pivotal for driving TSMC's operational growth. To equip engineers with essential competencies across different career stages, the Operations organization's Engineer Training Committee has established a phased learning roadmap. This strategy encompasses diverse courses covering regulations, technology, management, personal effectiveness, and more. Targeting a total of 50,442 individuals, the training sessions achieved a 100% participation rate, with attendance figures of over 711,278 in 2023.

For TSMC's talent pipeline, the New Manager Program integrates the 70-20-10 rule with blended learning to assist newly appointed junior managers in smoothly transitioning into their roles. With 985 target participants in 2023 and a turnout of 98%, this program saw a total attendance of 7,800. Divisional heads play a pivotal role in bridging the gap between top management and junior staff. To ensure that newly appointed division managers understand their roles and their evolving managerial responsibilities within their first year, TSMC combines internal trainer and external trainer sessions with practical management scenarios and uses diverse learning methods to accelerate the development of four critical management competencies: effective team leadership, decision-making and risk management, talent development and empowerment, and innovation. As of 2023, 153 newly appointed division managers from the R&D and Operations organizations have completed their training.

In addition, the completion rate of the Fab Director and Department Head Talent Pipeline Inventory, launched in 2022, reached 96.3% in 2023. To strengthen the adaptability of mid-to-senior-level executives to cross-regional and cross-functional work for handling complex and dynamic tasks, TSMC has also launched Senior Manager Learning and Development Program.

TSMC Talent Development Model

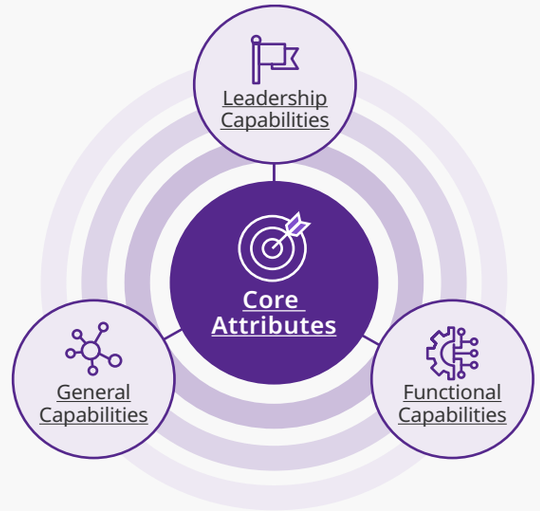


This initiative aims to assist future leaders in developing a macroscopic perspective, focusing on key issues that can positively impact the organization.

Ability-Based Learning Modules

TSMC tailors learning modules to match the job responsibilities and professional demands of its workforce, establishing the TSMC Capability Model. This model defines functional capabilities according to the characteristics of each organization, developing employees' essential general capabilities and leadership capabilities. These are divided into two categories: managing work and managing people/organization, further divided by difficulty into basic, intermediate, and advanced tiers. Concurrently, it integrates organizational development diagnostics to provide a range of learning and development programs.

TSMC Capability Model



TSMC actively equips employees with future capabilities through innovative thinking

Diverse and Versatile Learning Approach

Aligning with the 70-20-10 rule, TSMC cultivates three primary avenues: Experiential Learning, Feedback and Coaching, and Education and Training. A blended learning approach equips employees with resources for learning and development, encouraging them to apply newfound insights to both professional and personal spheres, synergistically enhancing job performance and individual competencies.

70-20-10 Rule

Blended Learning Approach

Dual-track Development of Management and Professional Technical Skills

Implemented a diverse and comprehensive personnel development framework, reinforcing a dual-track system for managerial and technical professional positions, enabling employees to develop according to their characteristics and expertise

Internal Promotions, Transfers, and Rotations

- **88.2%** of manager positions were filled through internal promotions
- Transfer and rotation rates for managers and professionals were **33.5%** and **32.1%**, respectively
- **63.8%** of job vacancies were filled through internal transfers
- Internal transfers reached **21,841**

Buddy System

6,133 new employees benefited from the Buddy Program, accelerating their understanding and adaptation to the corporate culture, with continuous feedback and advice provided during their employment

Mentor System

Encouraged employees to learn from outstanding senior colleagues, with mentors offering work or personal adaptation guidance

Performance Feedback and Development

Provided various performance feedback and development tools, enabling employees to set goals and update their progress at any time through Goal Management and Individual Development Plan. Managers can provide real-time feedback, guidance, and recognition; Performance Management and Multi-sourced Feedback also contribute to continuous improvement and career development. In 2023, the completion rate for eligible employee performance evaluations during the evaluation period reached **100%**

Learning Programs

- Offered diverse learning resources for leadership, functional, and general capabilities based on employees' roles and expertise.
- Conducted **7,018** physical courses
- Conducted **10,653** online courses
- Participation reached **2,596,322** instances
- The average learning hours per employee reached **85.4** hours

Training and Development Programs at All Levels

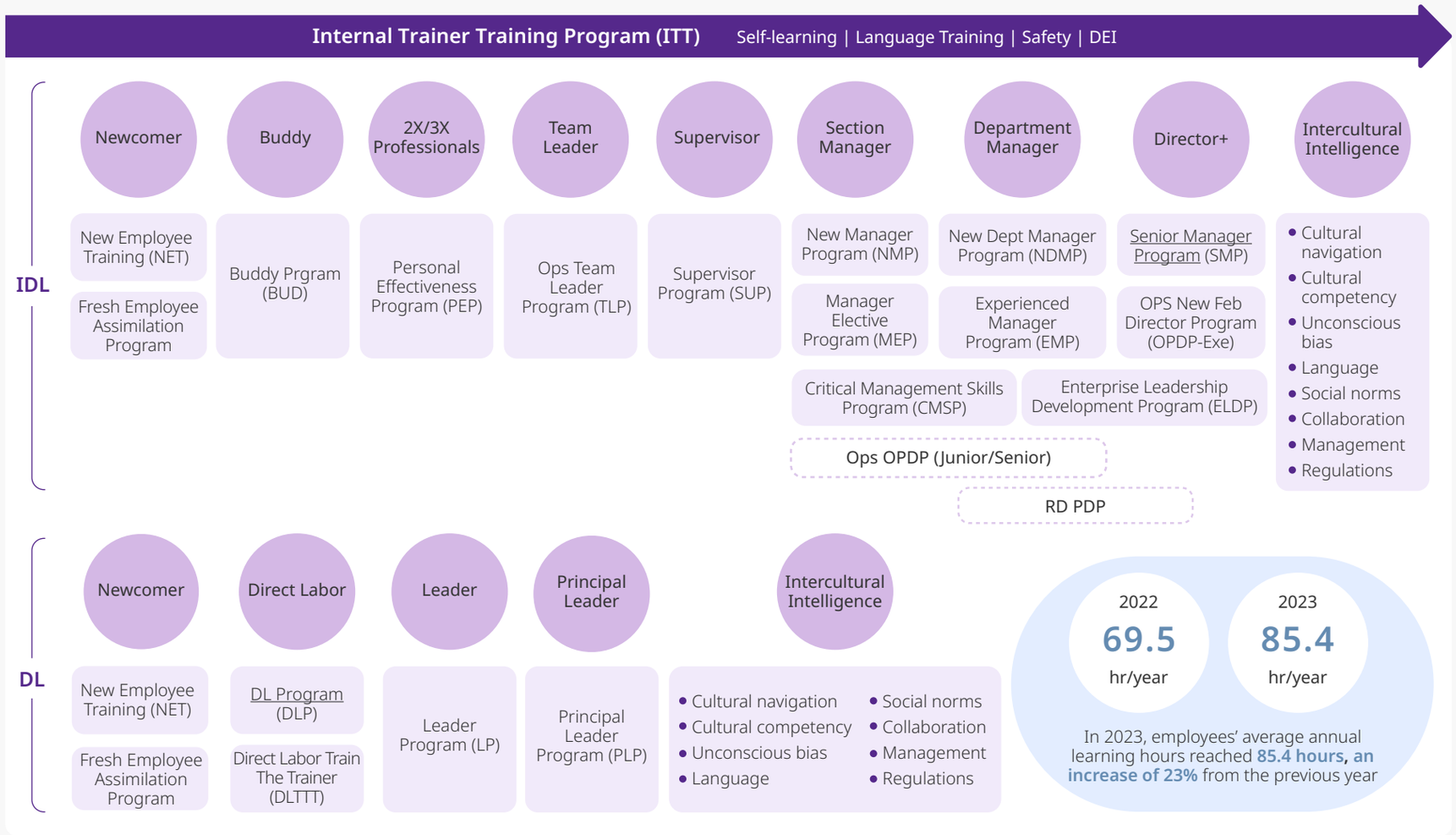
TSMC implements comprehensive talent development programs guided by the TSMC Capability Model. New hires begin with New Employee Training, which acquaints them with the Company's vision, mission, core values, pertinent regulations, and available resources. Through the Newcomer Training Center, they rapidly grasp fundamental semiconductor knowledge and skills. Following six months of training, they engage in the Fresh Employee Assimilation Program to learn appropriate work attitudes and enhance communication, teamwork, and stress management skills. Additionally, they may opt for the Personal Effectiveness Program to address individual or job-specific needs, honing skills such as project management, presentation techniques, and upward reporting. Upon advancement to managerial roles, employees enroll in the New Manager Program to acquire essential frontline managerial competencies, encompassing the topics of roles and mindset, talent recruitment, performance interviews, open management, etc., and supplement this with the Managerial Elective Program to continually refine their managerial abilities. Furthermore, programs like the Experienced Manager Program and Senior Manager Program are available to support employees in advancing their careers.

Unleashing Employees' Potential and Innovation

TSMC is dedicated to offering diverse learning programs tailored to both individual and organizational needs. Leveraging physical and online courses, as well as internal and external learning resources, the Company aims to enhance employee self-worth while boosting their job performance, generating positive impacts for both the Company and society. In 2023, employees' average annual learning hours reached 85.4 hours, an increase of 23% from the previous year. Total training expenses amounted to NT$887 million, with an average training cost per employee of approximately NT$11,604, down 12% annually.

TSMC employs the Kirkpatrick Model's four levels of evaluation to validate training effectiveness. In 2023, all courses organized by the Organizational Planning and Development Division passed the Response Evaluation (Level 1) with an average course recommendation rating of 96 points. In terms of course effectiveness, most internally conducted training programs reached Learning Evaluation (Level 2) or Behavior Evaluation (Level 3), allowing participants to understand and apply what they learned in their work. Outcome Evaluation (Level 4) was used for employee performance management and development systems, demonstrating training benefits through metrics such as internal employee promotions and transfers.

Corporate L&D Program



Kirkpatrick Model

Level 1 Response Evaluation

After the class, participants evaluate the course content design, trainers, administrative services, and satisfaction with the overall course benefits

Achievements in 2023

96 points
Course recommendation rating

Level 2 Learning Evaluation

The effectiveness of trainees' learning is assessed via tests, practice, exercises, homework, action plans, etc.

100%
Completion rate of post-training assessments for operational organization certification training (e.g. the completion rate of operational organization certification in advanced process plants and shifts)

97.5 points
Average score of post-training assessments (e.g. courses organized by the Organizational Planning and Development Office)

Level 3 Behavior Evaluation

After training, supervisors and colleagues of the trainees observe whether the trainees have applied the newly acquired knowledge to their work

100%
Completion rate of training using the learning blueprint training program (e.g. Learning roadmap training program organized by the Operation Engineer Training Committee)

68%
Participation growth rate in innovation awards: 68% (e.g. TSMC ESG AWARD)

Level 4 Outcome Evaluation

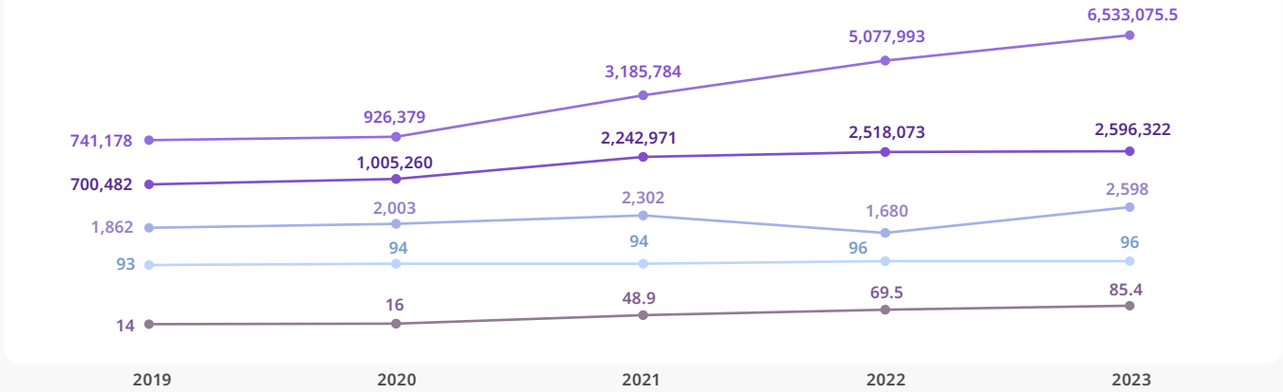
Business benefits of training

88.2%
Filled 88.2% of manager positions through internal promotions

63.8%
Filled 63.8% of job vacancies through internal transfers

94%
Customer trust and satisfaction index

Historical Training Index



Note: Starting in 2022, certified internal trainers who obtained repeated certifications are counted only once

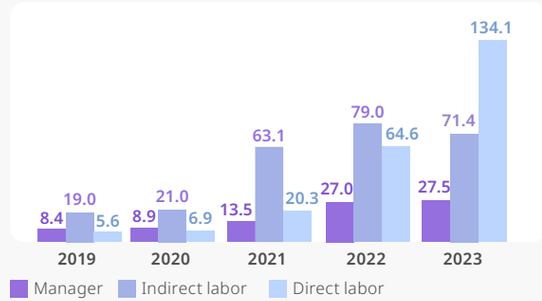
6,533,075.5
Total Training Hours in 2023

2,596,322
Participants Completed Training in 2023

2,598
Certified Internal Trainers in 2023

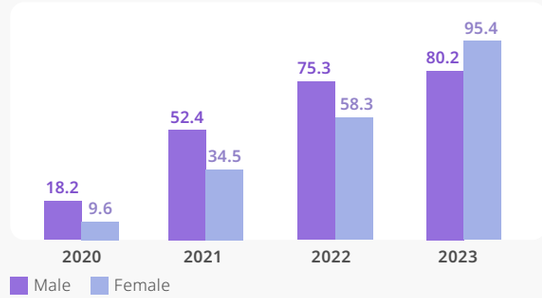
Average Training Hours per Person - by Job Function

Unit: Hours



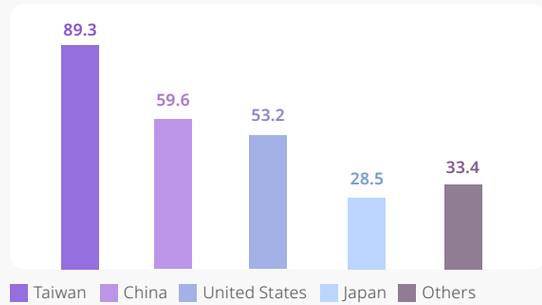
Average Training Hours per Person - by Gender

Unit: Hours



Average Training Hours per Person - by Nationality

Unit: Hours



Diverse Learning Resources and Channels

To bolster employees' professionalism and promote self-directed learning, TSMC prioritizes skill development. The Company offers a range of resources, such as online micro-learnings, audiovisual book presentations, thematic articles, and special broadcasts, accessible to employees through internal learning manuals and external platforms. In 2023, TSMC launched a total of 800 related courses, while the Organizational Planning and Development Division employed data analysis to identify trending topics and proactively disseminated course information to employees. Furthermore, customized learning resource bundles were provided to address organizational development needs. In 2023, employee participation surpassed 194,937 instances, with an accumulated learning time of 89,795 hours.

TSMC is dedicated to expanding its global operation model and cultivating talents. To improve employees' English proficiency, the English Learning Program was continuously rolledout in 2023. This program includes classroom business English workshops, live-streamed online English webinars, English e-learning resources, one-on-one consultations, and English proficiency assessments. These learning tools enable employees to learn at their convenience, enhancing their international perspective and business English proficiency. In 2023, over 139 classroom and online webinar were conducted, providing access to more than 180 self-paced English learning resources. With total participation exceeding 72,116 instances, the cumulative English learning time reached 58,227.5 hours, resulting in an average course satisfaction of 95 points.

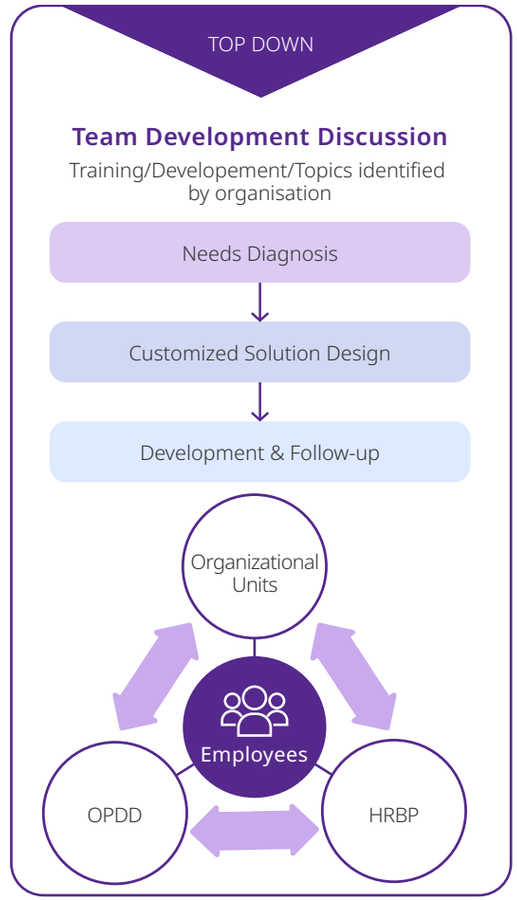
TSMC is dedicated to promoting a fun workplace where employees can continue to learn

Case Study

Customized Training Programs to Enhance Organizational Learning and Development Capability

In 2023, TSMC implemented the Team Development Discussion (TDD) pilot program to strengthen the professional capabilities of its employees in meeting specific learning or development needs. This initiative involves collaboration between the Organizational Planning and Development Division, various organizational units, and Human Resources Business Partners (HRBPs) to conduct needs assessments, develop customized solutions, and execute learning and skill development activities. For instance, the Critical Management Skills Program (CMSP) integrates theoretical foundations and practical experiences from both external consultants and internal trainers. It utilizes organizational challenges faced in the past as teaching materials, providing participants with management skill training courses tailored to meet business needs and enabling them to directly apply what they have learned to their work. In 2023, six organizations participated, with an overall course recommendation rating of 97 points. Starting in 2024, the TDD program will be officially expanded company-wide. Its operational mechanism will follow the annual performance management and development schedule, collecting annual development needs or issues from each organization in March and September, facilitating the coordinated planning of customized training and development programs.

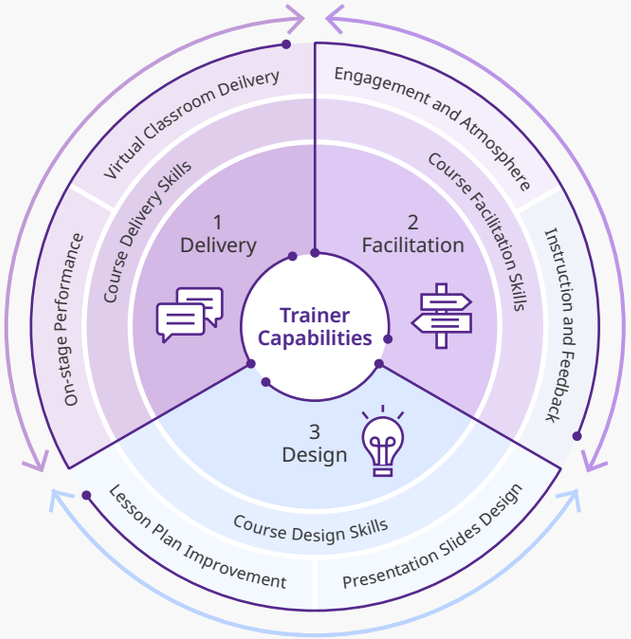
Execution Process of the Team Development Discussion Program



Cultivate Internal Trainer & Excellent Trainer Award

Talent is the key to boosting TSMC's competitiveness, with internal trainers playing a pivotal role by sharing their personal knowledge and experience to nurture talent within the Company. The TSMC Excellent Trainer Award, now in its 17th year, actively encourages excellent employees to impart their expertise, annually recognizing internal trainers who exhibit exceptional teaching effectiveness. In 2023, TSMC had 2,598 internal trainers who mentored over 360,000 participants. To fortify their instructional prowess and sustain the dissemination of knowledge and experience, TSMC empowers trainers through the Internal Trainer Training Program. This program hones three fundamental teaching competencies: "Delivery" to eloquently convey professional knowledge and embody a poised demeanor; "Facilitation" to effectively steer learners' thought processes and ignite their enthusiasm for learning; and "Design" to refine trainers' presentation designs and systematize course content. Since its inception in August 2023, the training program has conducted 17 sessions, engaging 375 participants and garnering an average course satisfaction of 96 points.

Internal Trainer Training Program



2,598
internal trainers

360,000
mentored participants

> I aspire to ignite my colleagues' passion for learning by leveraging my enthusiasm for education and expertise through innovative teaching methods, finding fulfillment in the process.
>
> **C.S. Shiue**
> Awardee of the TSMC Excellent Trainer Award

> The most rewarding aspect of being a trainer is witnessing my colleagues gain benefits from learning and apply their newly acquired knowledge to their work, thereby growing together with the Company.
>
> **Jeff Chiu**
> Awardee of the TSMC Excellent Trainer Award

> People play a crucial role in the company's growth and multinational operations, and internal trainers are the key persons to unleash the potential of colleagues.
>
> Lora Ho, TSMC Senior Vice President of Human Resources

Occupational Safety and Health

Promote Safety Culture

Advocate for a humanistic safety culture, manage safety risks, and establish an intrinsically safe working environment

Provide Comprehensive Health Management

Prevent occupational diseases and promote comprehensive health management for employees

Build Internal - external Alliance

Collaborate with external parties to establish a safer working environment across the supply chain

2030 Goals	2024 Targets	2023 Achievements
Incident Rate per 1,000 Employees: <0.20	Incident Rate per 1,000 Employees: <0.20	↑ Incident Rate per 1,000 Employees: 0.156 Target: <0.2
Disabling Injury Frequency Rate (FR): <0.3	Disabling Injury Frequency Rate (FR): < 0.4	↑ Disabling Injury Frequency Rate (FR): 0.35 Target: <0.4
Disabling Severity Rate (SR): <3	Disabling Severity Rate (SR): <4	— Note 1 Disabling Severity Rate (SR): 4 Target: <4
0 cases of occupational disorders caused by exposure to chemicals	0 cases of occupational diseases caused by exposure to chemicals	✓ 0 cases of occupational diseases caused by exposure to chemicals Target: 0
Employees with abnormal blood lipids, blood pressure, and blood sugar: ≦11%, 13.5% and 2.5%	Employees with abnormal blood lipids, blood pressure, and blood sugar: ≦11%, 13.5% and 2.5%	↑ Employees with abnormal blood lipids, blood pressure, and blood sugar: 9.8%, 11.5%, 1.9% Target: <11%, 13.5%, 2.5%
Employees with reported high stress levels: <9%	Employees with reported high-stress levels: <9%	↑ Employees with reported high stress levels: 6.4% Target: <9%
Assist all high-risk contractors[Note 2] to obtain ISO 45001 certification for occupational safety and health management system	Assisted 90% of high-risk contractors to obtain ISO 45001 certification for occupational safety and health management system	↑ Assisted 80% of high-risk contractors to obtain ISO 45001 certification for occupational safety and health management system Target: 75%

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

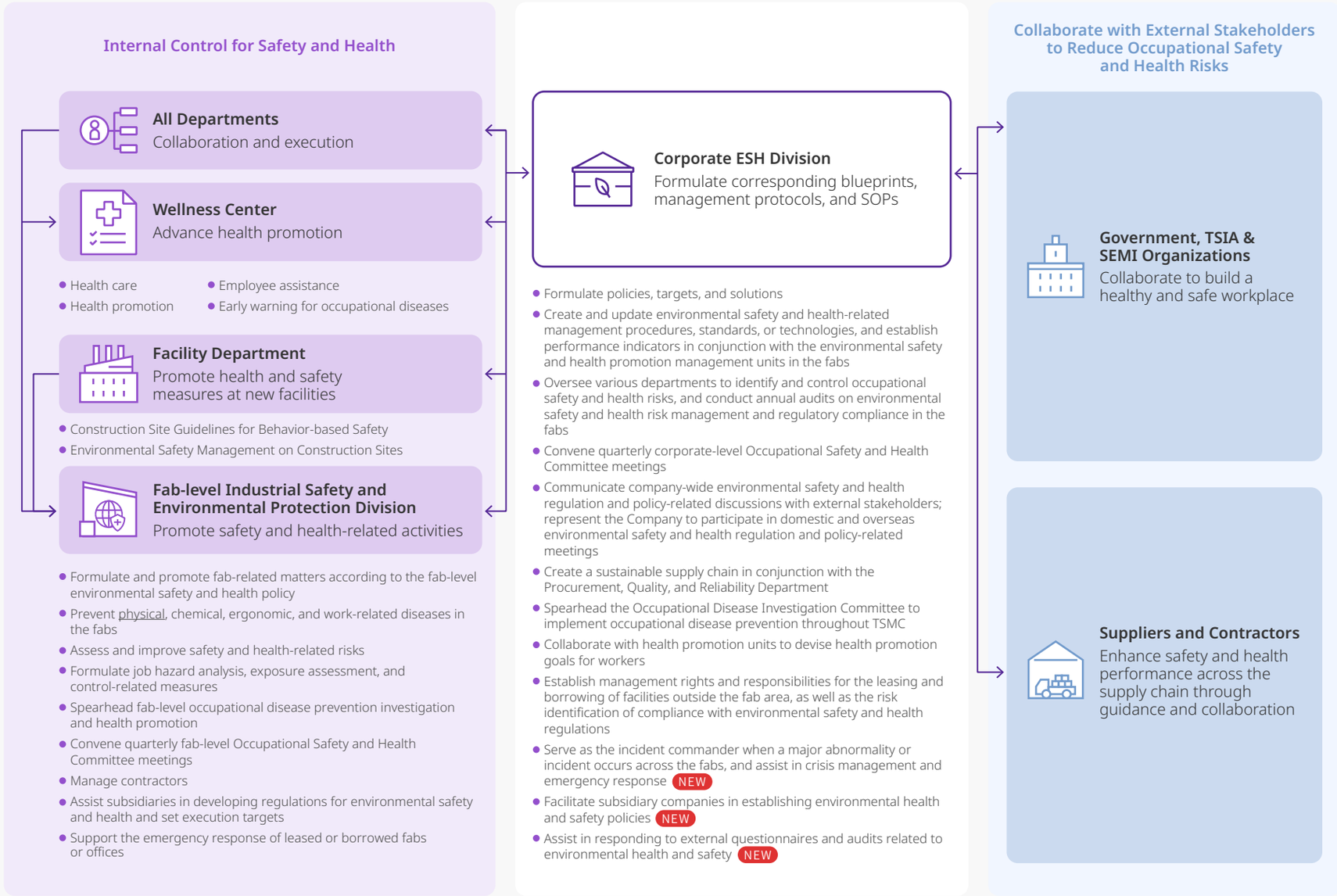
Note 1: The disabling severity rate failed to achieve the target primarily due to a number of employees with collision or pinch injuries requiring longer leave for recovery; for detailed data and description, please see "Statistical Analysis of Disabling Injuries among Employees"

Note 2: The number of contractors engaged in high-risk operations increases each year, and TSMC will continue to offer assistance

Through a clear division of labor between various organizations within the Company, TSMC promotes safety and health at all levels to comprehensively improve the health of workers. All fabs and subsidiaries including TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, and VisEra have all obtained ISO 45001 occupational safety and health management system certification. At the same time, fabs in Taiwan apply for separate TOSHMS certifications, where workers are requested to observe the management regulations through the management system. For new fabs, ISO 45001 certification is obtained within 18 months from tools entering the fabs for installation. TSMC collects labor representatives' recommendations and feedback through company-level and fab-level Occupational Safety and Health Committee meetings to commit to realizing a healthy workplace free of safety incidents.

TSMC complies with laws and regulations related to occupational safety and health and moves toward a friendly, diverse, and inclusive workplace with sustainable safety and health management. Internally, it continued to promote safety and health improvement projects and cooperated with the R&D organization to control risks from new technology's early development stage. In 2023, TSMC cultivated safety culture seed personnel for each organization through the "Safety Moment" course and added new safety and health feedback channels, for which the Director of the Corporate ESH Division is responsible for response and execution of necessary investigations and improvements. TSMC launched new chemicals education and training for the environmental safety and health seed personnel of the R&D organization and regularly organized seminars for the safety design of new-generation EUV tools to learn the risks of new tools in advance. Meanwhile, it introduced AI technologies to improve the accuracy of health risk classification and promoted mental health improvement activities. Externally, it actively worked with the industry, government, and academic sectors and suppliers/contractors to jointly prevent and minimize the impact of occupational disasters and improve the safety and health of the workplaces for the industry. In 2023, the Contractor ESH Bluebook on Fab Construction was issued, and TSMC invested resources to protect the health and well-being of laborers so as to strive towards the target of "zero safety incidents."

Internal Control for Safety and Health



Safety and Health Measures

Measures	Safety and Health Efforts in 2023	SPI Indicator[Note1]	Taiwan Fabs	Overseas Fabs	VisEra
Regulatory Updates	• Kept up to date with the latest regulations, tracked compliance in all fabs, and issued **12** changes to safety and health regulations • In response to demands for overseas expansion, a regulatory update system was introduced covering the regulatory databases of U.S. federal/state laws and Japanese laws	✓	✓	✓	✓
Safety and Health Education	• All TSMC workers have completed hazard notification/education. Training records are digitalized for record-keeping to comply with safety and health regulations and emergency response needs. Those performing hazardous operations have obtained licenses to operate in compliance with relevant laws [Note 2] • Added three professional operating practice courses, covering the joint locking method for gas pipelines, power consumption safety and electroscope measurement, and LOTO (Lock out, Tag out) practices to improve the professional functions of safety and health engineers; relevant teaching materials for the training were introduced to a cloud platform for management NEW • The TSMC Contractor ESH Bluebook was developed into 25 interactive online courses, which were launched in the TSMC Supplier Sustainability Academy. **10** courses were completed in 2023, covering matters of notice for fabs, wall demolition operation, high-pressure water cutting operation, matters of notice for general operations, tool operating requirements, electroplax opening operations, welding operations, overhead operations, supply transportation, and hand tool usage requirements; the remaining courses will be completed by 2025 NEW	✓	✓	✓	✓
Hazard Identification and Assessment	• Conducted workplace hazard identification, safety and health management plans, workplace analysis, workplace observation and operational safety analysis, and health management analysis for employees and contractors. All identified risks were classified into different risk levels for future management, tracking, and monitoring to control, prevent, or reduce hazards and risks; **9,959** cases of hazard assessment were carried out [Note 3]	✓	✓	✓	✓
Procurement Management	• Continued to improve chemical procurement management. Chemicals used by chemical analysis instruments were managed under repair and maintenance contracts in the past. To fully track the collection and use of chemicals, all chemicals used by chemical analysis instruments were TSMC material numbers for management NEW	✓	✓	✓	✓
Change Management	• Completed **6,074** cases of change management with **zero** related incidents	✓	✓	✓	✓
Chemical Management[Note 4]	• All new chemicals underwent safety review processes before entering facilities. In 2022, **231** chemicals were evaluated and introduced with **zero** related incidents and without introducing any IARC group 1 carcinogens • Organized new chemicals education and training for the R&D organization to control risks from the source. The R&D organization was recommended to prioritize the use of green chemicals for R&D tests; a total of **240** persons participated in the environmental safety and health seed personnel training NEW • Introduced the i-SDS Chemical Safety Data Sheet System to identify risks of compounds by using the database system for chemicals and mixed for use in response to process development NEW	✓	✓	✓	✓
Tool Management	• Evaluated and introduced **145** new tools with **0** related incidents • Regularly organize seminars with the R&D organization and equipment and tool suppliers for new-generation ECU tools to learn their risks before adoption by TSMC and formulate countermeasures NEW	✓	✓	✓	✓
Contractor Management	• Contractors engaged in a total of **622,280** constructions in the fabs, of which **87,187** were high-risk operations, which comply with management requirements • In 2023, the number of contractors entering/exiting TSMC daily was **50,567** persons [Note 5], to improve the effectiveness safety and health management, TSMC regularly hosted Communication Meetings for ESH Supervisors of Contractors to commend outstanding contractors, supervisors, and industrial safety personnel • TSMC examined the construction management status of contractors and amended the TSMC Contractor ESH Bluebook to help contractors further understand safety and health codes	✓	✓	△ Note	✓
Compliance Audit	• Internal audits revealed **2,345** shortcomings, which were corrected within the specified time	✓	✓	✓	✓
Emergency Response	• Created a cross-fab CCTV platform in Taiwan and a smartphone application for emergency evacuation roll call. In the event of an emergency, other fabs can obtain real-time information on the disaster area via the CCTV monitor screen and assist in providing emergency response resources; meanwhile, employees can use the smartphone application to report their locations to shorten the time of the roll call	✓	✓	✓	✓

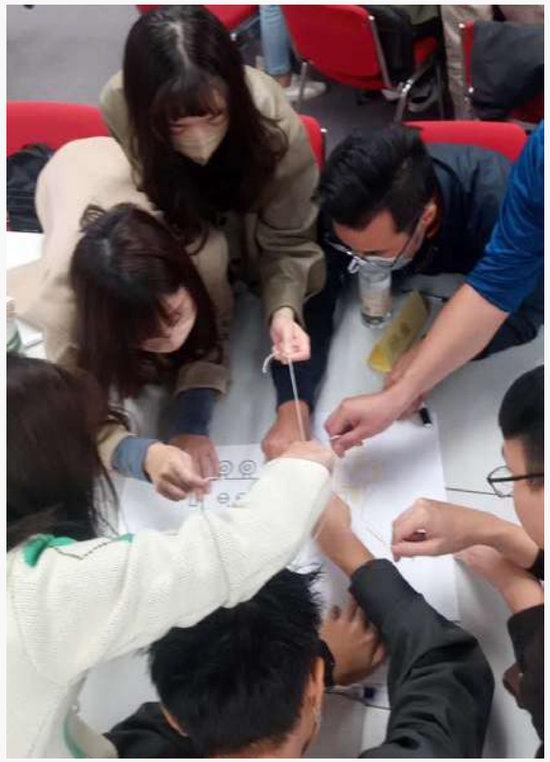
Note 1: TSMC adopts the Safety Performance Index (SPI) to quantitively manage and supervise safety and health performance
Note 2: 2023 Training Statistics: Trainees include both employees and contractors
Note 3: Hazard Identification and Assessment: Foster a safety culture where employees and the Company protect each other and encourage employees to speak up and offer suggestions for occupational safety. Classification management and tracking are used to control, prevent, or reduce hazards to cultivate a friendly and safe workplace
Note 4: TSMC Chemical Management Procedures
Note 5: The calculation scope of contractors covers fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra and covers the number of persons from contractors who enter fabs in Taiwan for new fab construction
Note 6: △ refers to compliant; the number of persons from contractors is calculated as set out in Note 5, excluding the number of contractors for the construction areas of overseas fabs

Promote Safety Culture

TSMC creates people-oriented, safe workplaces, follows health and safety measures in compliance with the Safety and Health Policy, reinforces safety measures for work environments through potential hazard identification, assessment, risk control, and uses the Safety Performance Index (SPI) to track the performance of safety and health. An analysis of employee disabling injury statistics showss that most injuries are caused by insufficient safety awareness and failure to implement management regulations. To help employees value safe behavior, TSMC enhanced its safety culture by adopting three work highlights: Reinforce Employees' Day-to-day Safety Awareness, Strengthen Safety Communication, and Develop Safety Awareness Training. Apart from updating monthly safety and health posters and printed literature and producing quarterly safety and health animations, TSMC also communicated daily safety and health precautions with indirect laborsto improve the safety awareness. In addition, the Industrial Safety and Environmental Protection Department designed the "Safety Moment" course, which invited a domestic safety and health expert to speak to safety culture seed personnel of all organizations and improve their capabilities with practical and interactive scenarios; 3 sessions were completed with 75 participants. Leveraging digital technology to promote safety culture, an AI chatbot will be launched on the safety and health AI website in 2024 to answer a variety of health and safety questions from employees in real time. In addtion, a smartphone APP application was developed to provide more channels to meet employees' need for safety information.

Safety Performance Index

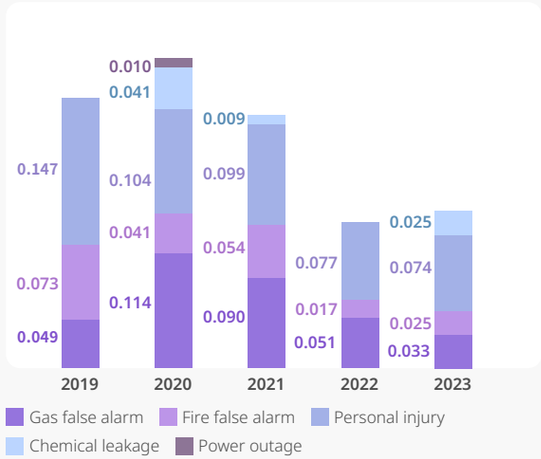
TSMC Safety Performance Index (SPI) is classified into four levels, including active and passive indices. The active indices encourage employees to participate in health and safety activities, while the passive index shows the number of safety-related failures, false alarms, etc. In 2023, blue-light indices (excellent) decreased by 5.6% from 2022 to 80.1%, and the green-light (favorable) indices increased by 3.3% from 2022, which was reflected in the increase in false alarms from 17 incidents in 2022 to 19 incidents in 2023. The incident rate per 1,000 employees increased to 0.156 from 0.145 in 2022, and the number of deficiencies found in internal audits increased from 2,279 cases to 2,345 cases. When a false alarm occurs, in addition to applying the 3L5W (Three-Legged Five Whys) Tool to conduct an investigation, the Company also interviews relevant personnel, analyzes and inspects the equipment, and tests the materials using the false alarm reporting and investigation procedure. Relevant documents and records are checked, or the scene is reconstructed to identify the direct, indirect, and fundamental cause of the incident to actively discover improvement opportunities and prevent similar incidents from occurring again.



Group exercise in the Safety Moment course

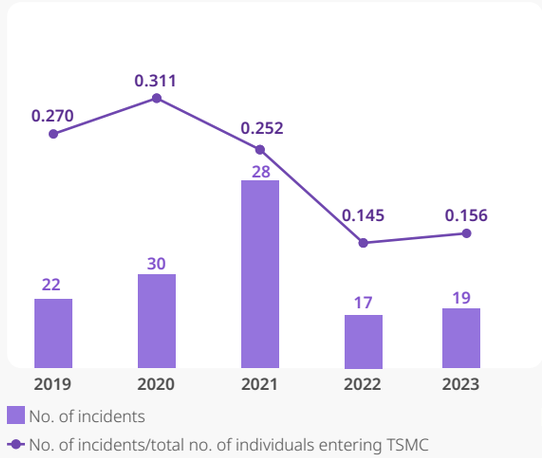
Historical Incidents by Type

Unit: Number of Incidents/% Per Thousand Employees



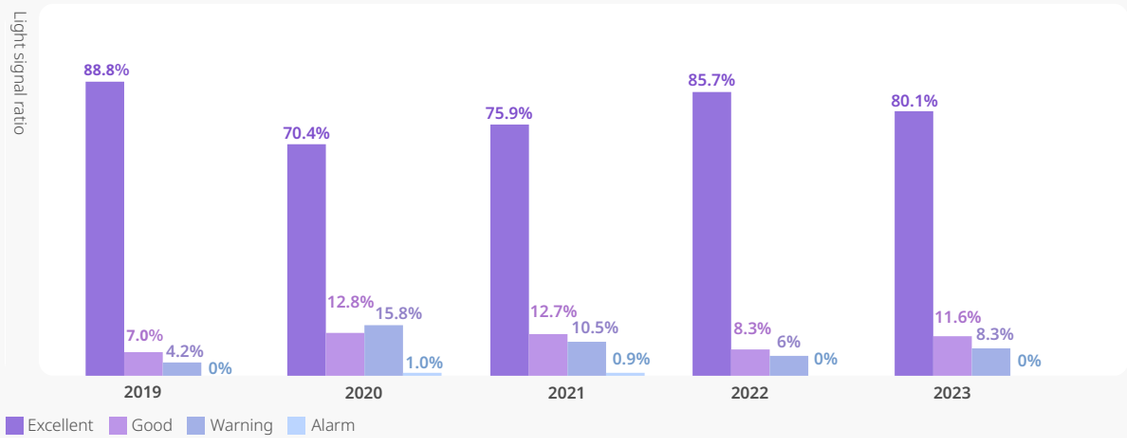
Note: Historical incidents by type per thousand individuals entering TSMC include employees and contractors. Employee calcu lation includes all fabs; contractor calculation includes fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, TSMC Japan 3DIC R&D Center and VisEra

Historical Incidents and Incident Rate per 1,000 Employees



Note: Starting from 2020, the incident rate per thousand individuals entering TSMC includes employees and contractors. Employee calculation includes all fabs; contractor calculation includes fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, TSMC Japan 3DIC R&D Center and VisEra

Safety Performance Indicator



Note: Data includes fabs in Taiwan, TSMC (China), TSMC (Nanjing), TSMC Japan 3DIC R&D Center, TSMC Washington, LLC and VisEra

False Alarm Improvement Highlights in 2023

Reduce Fire Alarms

There were **three** false fire alarms in 2023; **two** were electric apparatus-induced fires caused by component issues in lithium battery charges for electrical hand tools, and **one** was caused by incompatible materials placed together in outdoor storage

Improvement Measures

- Established a hand tool battery charging station with centralized management and install temperature monitoring. When the temperature is higher than 35oC, the fan will turn on automatically for heat dissipation. Added a time control relay for hand tool chargers to turn off the power at a fixed time at night
- Hand tools, chargers, and lithium batterie are inspected by a specialist from the Electrical and Instrument Section of the Facility organization each year, and may only be used after passing the inspection with a qualified label for power consumption equipment (annual inspection) attached
- The warehouse appoints a designated person to control access to the waste storage area; waste generated from the clean room shall be registered; waste is placed in color-coded resealable bags based on their classification to adequately collect waste generated from tool repair and maintenance

Reduce Gas Alarms

In 2023, **four** gas leakage incidents were caused by on-site workers who failed to duly comply with the valve locking methods or SOP. In all **four** incidents, the special gas was shut down immediately after the early warning gas alarm was triggered, and did not leak into the environment to cause personnel casualties or environmental pollution

Improvement Measures

- Require on-site operating personnel to re-participate in the pipeline valve operation training to strengthen compliance with the SOP and increase operation familiarity
- After inquiries with experts and suppliers of vacuum coupling radius seals (VCR), standard locking procedures for VCR joints were established. TSMC expects to carry out education and training for Facility personnel and on-site operating personnel

Reduce Chemical Leakage Alarm

There were **three** incidents of false chemical pipeline/drum leakage in 2023; **two** were leakages caused by insufficient time for venting due to the chemical reactions arising from the mixed liquid inside the waste liquid (water) tank, and **one** resulted from defective valves in a chemical waste liquid tank, causing chemicals to reflow back to tools under installation.

Improvement Measures

- Re-examined the design of the waste liquid (water) tank and considered the venting, temperature control, and safety interlocking design based on the maximum failure mode and inherent safety, and incorporated the design new fab design standards
- Performed an inventory of the temperature changes from reaction with treatment chemicals in chemical drums and sent the monitoring data to the Monitoring Room of the Facility

Reduce Injuries

Nine injuries occurred in 2023; **three** to employees and **six** to contractors. The injuries were primarily caused by personnel's unsafe conduct, such as lack of safety awareness or failure to follow SOPs

Improvement Measures

- Amended the TSMC Contractor ESH Bluebook, required the use of construction machines and tools that comply with the safety design, and a safety check is performed before entering TSMC. In addition, the use of forklifts, heavy lifting, and other matters of notice were added to the Bluebook, and a transportation plan must be proposed for the transportation of large materials, which may only be moved into the fab after passing review. The Bluebook was converted into an audiobook and included in the safety and health courses of the TSMC Supplier Sustainability Academy
- Added warning notice/marking at fab loading docks specifying that personnel at the lower part of docks may not enter the docking area during operations
- To address pinch injuries caused by defective hydraulic pistons, TSMC purchased 275 labor-saving tension meters that passed the safety certification. TSMC expects to complete the procurement, establish standardized operating methods, and complete training for relevant personnel in 2024. The abovementioned tension meters passed safety load certification and can prevent breakage leading to injuries. Closed shackles for hanging may also avoid injuries and hazards due to unhooking
- Continued to develop AI hazard identification technologies and improve workplace operational safety. In 2023, TSMC collected videos of high-risk places and high-risk operations, scenario simulations, and identification learning. The assessment of the AI identification technology system is expected to be completed in mid-2024, integrated with existing image equipment and introduced to all fabs

Statistical Analysis of Disabling Injuries Among Employees

Disclosure of occupational accidents is based on the Occupational Safety and Health Act and important disabling injury indicators issued by the Global Reporting Initiative (GRI), which uses Disabling Severity Rate (SR) and Disabling Injury Frequency Rate (FR) as primary indicators. In 2023, there were 48 disabling injuries among employees, with 534 workdays lost. Of these, 31 cases of disabling injuries among men resulted in the loss of 414 workdays, and 17 cases of disabling injuries among women resulted in the loss of 120 workdays. The employee injury rate was 0.07%. Men suffered from a higher number of work-related disabling injuries and lost workdays compared with women. The types of injuries were mostly pinch injuries mainly caused by the accidental fall of or collision with fab tools due to poor route design, loss of balance, poor communication for two-person jobs, or failure to follow OP when performing tool repair and maintenance; the disabling injuries of women were mainly caused by accidental collisions when using trolleys.

Improvement Measures

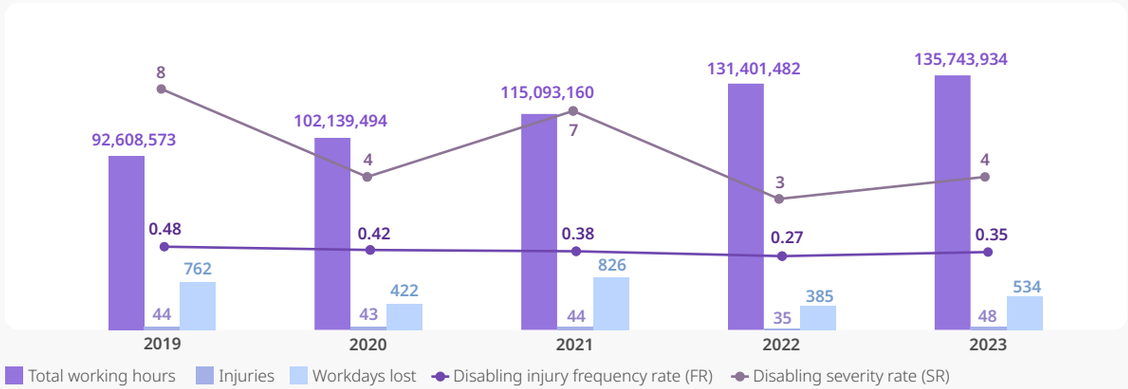
Improvement in pinch injuries by fab tools and trap and pinch injuries during loading

Continued to reinforce education and training before the repair and maintenance of fab tools, and included pinch injury prevention and loading operations in the annual safety and health education and training course. Personnel who have not completed such training may not participate in such operations. Continued to introduce assistive devices (i.e., labor-saving tension meters to mitigate the risk of pinch injuries). In 2024, TSMC will study potential risk behaviors during tool repair and maintenance through on-site observation, design promotional animations and posters based on the observation results and display on TV walls at each fab for promotion.

Improvement in sprain and collisions

Mostly caused by colleagues using trolleys in 6" and 8" fabs. Trolley routes and placement locations continue to be planned according to the operations involved; reflectors are installed in areas prone to collisions, and colleagues who voluntarily report incidents are rewarded. In 2024, video teaching materials will be used in the quarterly communication meetings to promote preventive safety awareness, and themed lectures will be offered to improve learning effects.

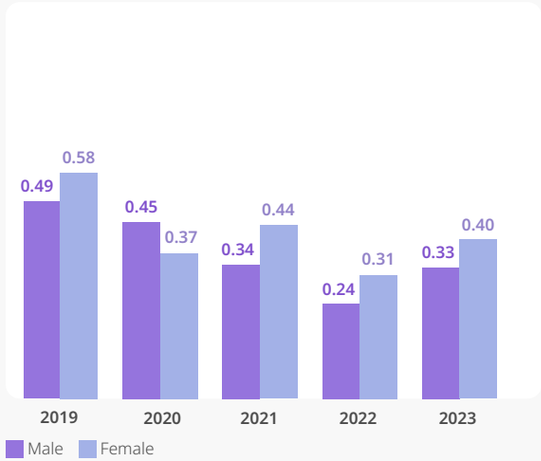
Total Working Hours, Injuries and Working Days Lost



Note 1: According to the Occupational Safety and Health Act, Disabling Injury Frequency Rate (FR)/Disabling Severity Rate (SR) are defined as any diseases, injuries, disabilities, or deaths of workers caused by buildings, machinery, equipment, raw materials, materials, chemicals, gases, vapors, dust, etc., at the place of duty, or as a result of work activities, or due to other occupational causes. Other unrelated injuries in the workplace such as falling in the cafeteria or parking lot are not considered work injuries

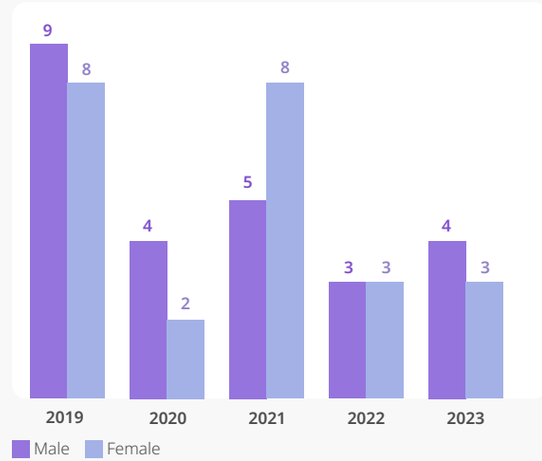
Note 2: Data includes fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra

Disabling Injury Frequency Rate by Gender



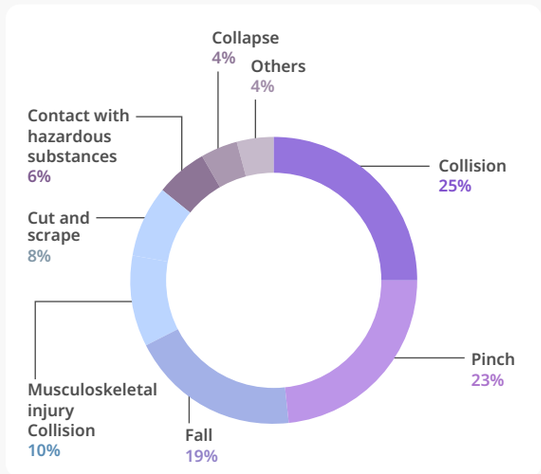
Note: Data includes TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and VisEra

Disabling Severity Rate by Gender

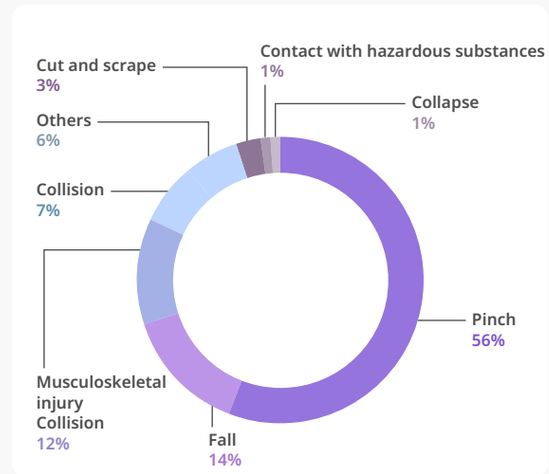


Note: Data includes TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and VisEra

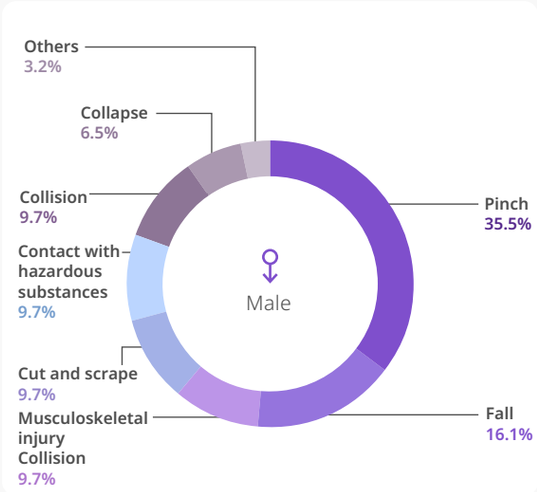
Disabling Injury Frequency Rate by Injury



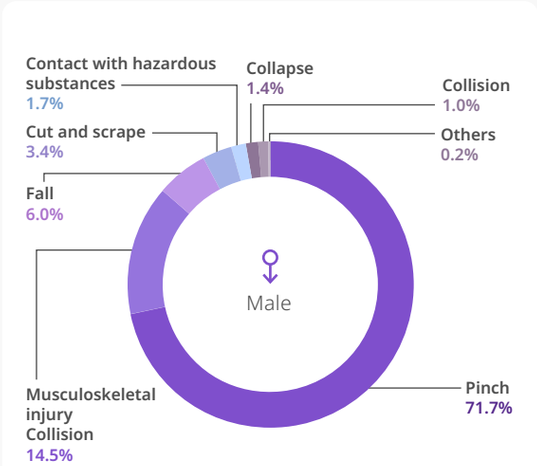
Disabling Severity Rate by Injury



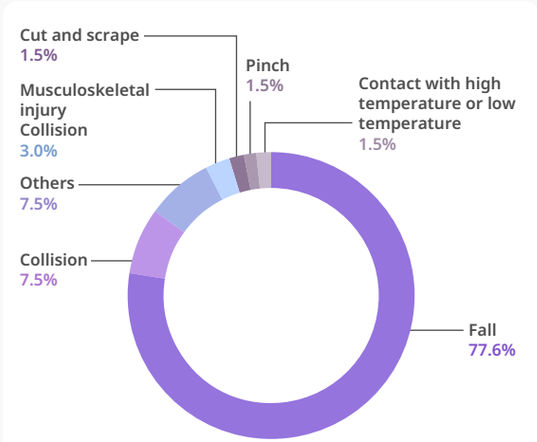
Male Disabling Injury Frequency Rate by Injury



Male Disabling Severity Frequency Rate by Injury

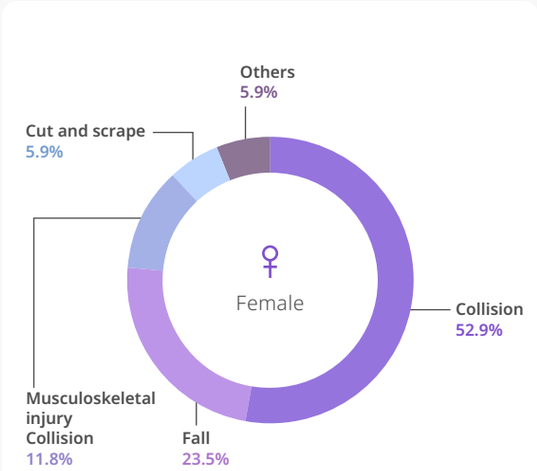


Non-work-related injuries

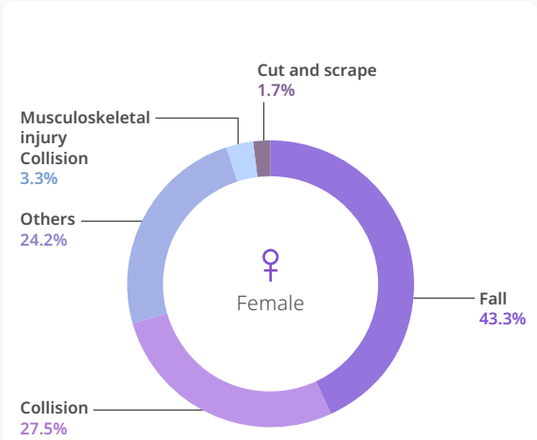


In 2023, 67 non-work-related injuries occurred, resulting in the loss of 1,757 workdays. Fall injuries accounted for the highest proportion (77.6%) with 52 occurrences, resulting in a loss of 1,291 days; 30 incidents were falls caused by personal reasons such as missteps on stairs, not paying attention while walking or exiting vehicles in the parking lot, or tripping over chairs or other people. Another 19 were falls during physical exercise. Three falls were caused by environmental factors, mostly uneven or wet ground, and improvements have been completed. For non-work-related injuries, TSMC continued to improve the promotion of safety awareness through themed posters, animations, and e-mails to remind employees to value personal safety.

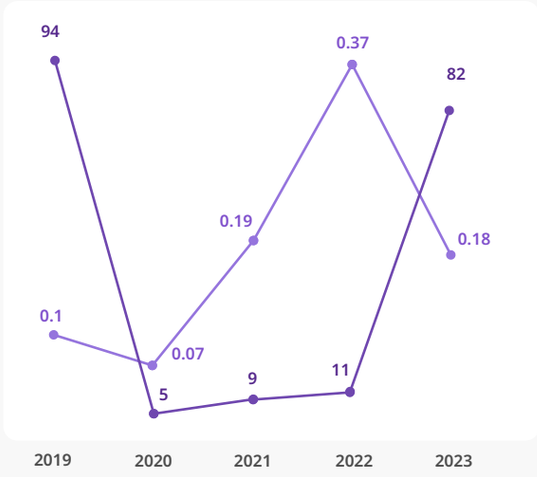
Female Disabling Injury Frequency Rate by Injury



Female Disabling Severity Frequency Rate by Injury



Disabling Injuries Among Contractors at TSMC's Worksites



Note: Data includes TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and VisEra

Statistics on Disabling Injuries Among Contractors at TSMC's Worksites

In 2023, the contractor disabling severity rate (SR) was higher compared to 2021, primarily due to the death of a contractor's driver who was sent to the hospital due to a collision with a tanker truck at the weigh station in front of a TSMC guard post, resulting in a loss of 6,000 workdays. In response, TSMC re-examined all weigh stations and route arrangements of all fabs, added signs indicating a speed limit of 20km/hr. in fabs, as well as additional speed limit reminders and communication on speed regulations delivery drivers enter fabs. For tanker truck filling areas or loading docks with frequent chemical transportation, vehicles are required to turn on hazard warning lights when parking outside of a parking space to ensure the safety of surrounding traffic and pedestrians.

Provide Comprehensive Health Management

TSMC creates a supportive and safe work environment that covers mental and physical health employee care, health risk management, occupational disease prevention, health check-ups, and worker health promotion. In 2023, TSMC invested NT$400 million to care for employees' physical and mental health. Fabs in Taiwan and China are equipped with 24-hour Wellness Center, exceeding regulatory requirements, and employing 159 occupational health professionals. In Taiwan fabs, occupational health physicians provided 1,891 hours of on-site services. TSMC also continues to encourage employees to adopt a healthy lifestyle, organizes sports walking, weight loss, and health education seminars, adopts working hour control for high-risk health groups, and promotes occupational disease prevention. At the same time, it further utilized AI technologies to carry out risk classification for advanced health check-up reports to provide timely and appropriate care and medical assistance and minimize the occurrence of major illness. In 2023, TSMC marked World Mental Health Day on October 10 by offering a variety of mental health improvement activities to help improve employees' mental well-being.

Health Check-up

- Physical examinations for **6,059** new employees
- Annual regular health check-ups for **58,772** people
- Special hazardous operation health check-up for **5,527** people
- Special hazardous operation health check-up exceeding regulatory requirements for **6,700** people
- Health check-up for **393** resident overseas employees
- Manager health check-ups for **4,292** people
- Employee health check-ups for **48,440** people
- **41,504** people received self-paid health check-ups at fabs
- Free four-cancer screening for **2,883** construction site contractors

Health Risk Management

- General and special operation health checkup report tracking abnormal conditions for **26,872** people
- Respiratory assessment for **21,291** people
- Maternal health management for **672** people
- Post-injury/illness reinstatement evaluation for **542** people
- Domestic and overseas business trip pandemic prevention for **616** people

Health Promotion

- Held online health walk challenges and weight control competitions, which saw the participation of **16,136** and **7,054** people, respectively. Healthy diets for nearly **100,000** healthy meals provided per month
- Held health expert lectures to share sports/sleep/nutrition-related topics and provided individual consultation for **15,093** participants
- Provided sports arenas, gyms, aerobics classrooms, ball courts, and diverse courses for **400,000** employees and their families

Employee Care

- 24-hour emergency medical treatment and follow-up for **675** people
- Provided **3,627** employees with psychological/legal/financial consultation services
- Cared for **1,194** individual employees who had mental stress after health check-ups
- Provided **1,185** employees who came to Taiwan for training with health management and medical care assistance
- **19,914** visits to dental clinics in Taiwan and China

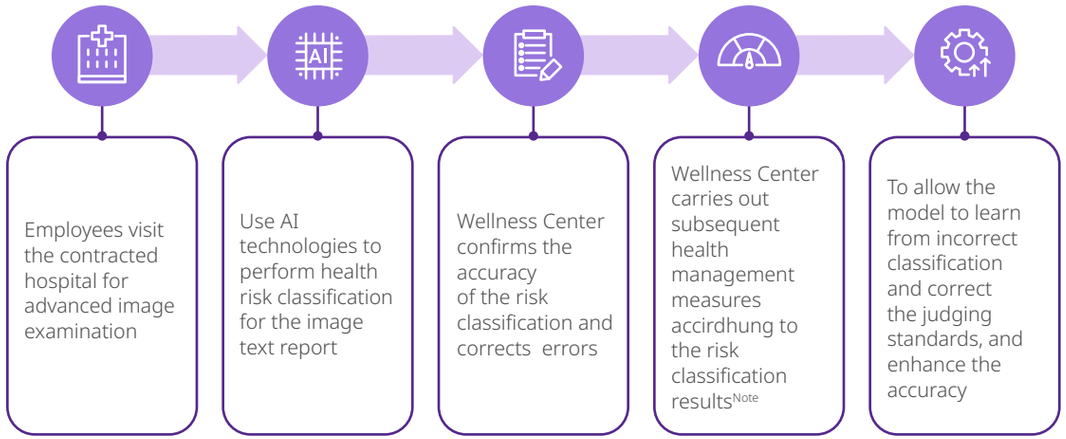
Occupational Disease Prevention

- Physical/chemical exposure disease prevention and grading management of special hazard operation personnel for **3,194** people
- Prevention and management of cerebral and cardiovascular diseases for **5,842** people
- Prevention and management of ergonomic musculoskeletal diseases for **232** people
- Biological disease prevention for **9,375** people

Case Study

Introduced AI Technologies to Improve the Classification Function for Employees' Health Data

TSMC began providing relevant advanced health check-up for cancers and cerebrovascular disease in 2022 to help employees discover problems and obtain treatment earlier. In 2023, 13,203 people received health check-ups, and examination reports exceeded 60,000 entries. To minimize time needed to read examination reports and to help high-risk employees receive necessary treatment in a timely manner, Wellness Center introduced AI technologies to analyze 22,062 reports that have not been classified manually in 2023. Through auto-recognition and classification of Chinese and English keywords in the image reports, the operating time was significantly reduced from nearly one month to three days, and the accuracy rate of the health risk classification improved from 91% to 97.5%. By doing so, TSMC successfully helped employees with abnormal conditions discover major illness in the early stages and enabled the employee to receive treatment by providing health education, follow-up and care, work adjustment, and assistance with leave; employees are able to return to work after appropriate rest. TSMC expects to apply analysis results in its health risk evaluation model and the planning of physical and mental health management plans to help employees find problems early and care for their health.



Note: For anomalies classified above moderate health risk, one-on-one sessions with a nursing practitioner will be conducted for follow-up and care, and employees will be reminded of the re-examination and treatment according to the timetable recommended by physicians; work will be adjusted based on the requirements

Case Study

World Mental Health Day Activities to Improve Employees' Physical and Mental Health

TSMC is committed to creating a work environment of physical and mental balance and improving employees' mental health. To boost employees' vitality and sense of happiness and improve their resilience to stress, TSMC observed World Mental Health Day on October 1, 2023 and launched a series of mental health improvement activities. Breaking away from one-way promotions, TSMC organized interactive health education activities, including online positive thinking lectures, a physical stress-relief workshop, and special online sleeping/positive thinking sessions (English), and management stress relief courses. It also launched the "Pay It Forward" sharing activity, in which provided employees with exclusive e-cards to check in on each other, improving their sense of happiness at the workplace. 4,505 people participated in the series of activities; employees also provided positive feedback through online questionnaires, and the overall recommendation level reached 9.4 (out of 10). In 2024, TSMC expects to expand the promotion by way of "World Mental Health Month" to strengthen workplace mental health care of its employees.

"Pay It Forward" activity promotion poster

Care for the Health of Contractors and Partners

TSMC actively cares for the safety and health of contractors at new fab construction sites. In 2023, the Company continued to promote health improvement activities and cancer screening services at construction sites. It provides healthy work environments to contractors and partners through five major healthcare actions: Vaccination/Blood Donation, Health Management System, Follow-up Care System, On-site Physician Service, and Free Worksite Health Check-ups.

Care for the Health of Contractors and Partners

Vaccination/ Blood Donation	• Work with local hospitals and clinics to organize flu and COVID-19 vaccinations; 152 persons were vaccinated • Cooperate with construction contractors and blood donation center in Kaohsiung to organize blood donation NEW	
Free Health Check-ups in the Construction Area	• Extend from construction sites to fabs; 9 sessions were organized, benefitting 2,657 persons • If precancerous lesions or cancer are discovered, the on-site medical team will assist contractors and partners to seek medical treatment	
Health Management System	• Use the "health management system for high-risk construction groups" to identify personnel with high health risk • Integrate access control and work orders to monitor personnel work status and the construction location	
Follow-up Care System	• The care team evaluates the type of work and work environment of personnel and visit the site to care for personnel with high-health risks • Provide care for middle-aged and elderly workers and temporary workers, measure blood pressure, and promote health education	
On-site Physician Service	• On-site health service by occupational health physicians; 47 sessions were organized, benefitting 822 persons • Provide professional services for the four major labor health protection plans	

Prevent Occupational Diseases

TSMC collaborated with occupational disease physicians and external experts to uncover five major potential risk factors for occupational diseases (chemical, physical, ergonomic, biological, and social/mental) in accordance with the Occupational Disease Risk Identification Procedures and designed preventive measures accordingly to build a healthy and safe work environment for workers.

Occupational Disease Preventive Measures for Workers and Achievements

Ergonomic

Continued to work with occupational physicians to reduce hazards of operating sites and enhance user-friendly office spaces

New Measures in 2023

- Promoted office ergonomic engineering and provided appropriate assistive devices
- Introduced a new and appropriate international professional evaluation and identification checklist
- Established an occupational disease physician visit e-platform to preserve records and pass down experiences

Achievements

- Provided **five** assistive devices that comply with ergonomic engineering design to employees, including computer stands, external screens, and wireless keyboards and mice
- Introduced new ergonomic identification system indicators to increase the scope of evaluation aspects and elaborated classification, allowing the classification to be more aligned with the actual conditions and cover various operations
- Established **67** site visit observation records and improvement achievements

Existing Measures

- Arranged occupational physicians to visit loading sites at TSMC fabs in Taiwan
- Used computerized ergonomic risk assessment systems to identify operations with high ergonomics risks
- Conducted health surveys and tracked employees who applied for pain relief patches, and reached out to and arranged meetings with occupational physicians for employees on leave for musculoskeletal pains
- Analyzed departments where many people in the same unit have applied for leave due to muscle aches to determine if operations involved ergonomic risks
- Standardized the operating method of packaging tools and expanded the operating spaces to minimize the probability of personnel having inappropriate operating posture

Achievements

- Arranged **nine** occupational physician on-site visits, achieving a **100%** improvement completion rate
- Employees affected by soreness were cross-checked with the computerized ergonomic risk assessment system; none were found to be working in areas with ergonomic or potential ergonomic risks
- **168** employees were impacted by soreness and participated in the ergonomic risk exposure survey; two employees were assisted with suspected ergonomic risk factors to make work adjustments
- **Four** people continued to use pain relief patches to treat body aches in the same location; an evaluation by an occupational physician determined that the illness was unlikely to be work-related, and the Wellness Center provided health education to help mitigate their discomfort
- The Bureau of Labor Insurance recognized **one** established case of ergonomic occupational disease. TSMC standardized procedures and added accurate operation descriptions for packaging tools and promotional posters to improve employees' safety awareness

Chemical

Implement chemical source control and continue to reduce the exposure risks of manual chemical operations

New Measures in 2023

- Executed the overall compliance confirmation of laboratories every **two** years and optimized laboratory safety and health teaching materials
- Improved the exposure risks of employees' manual chemical operations
- Examined the applicability of personal protective equipment each year to ensure that employees choose the correct protective equipment based on the use characteristics and occaision

Achievements

- Audited **180** laboratories, and all of them complied with laboratory safety and health management requirements; designed interactive laboratory teaching materials and optimized education and training to improve employees' learning results
- Formulated the Manual Chemical Operation Exposure Blueprint and sought replacement opportunities for central supply, automation, bottle-for-bottle, and other operations.. As evaluated, there are **14** opportunities to reduce the risk of contact, which are expected to be improved in 2024
- Examined the applicability and effectiveness of personal protective equipment each year. **52** qualified protective equipment was added for employees to collect for use in 2023

Existing Measures

- Chemical management: Please refer to TSMC's chemical management procedure
- Based on the analysis of chemical exposure risk and the frequency/nature of the operation, approximately **4%** of the contractors may be exposed to high health risk substances; TSMC observes such operations and assesses the risks
- Continued to arrange occupational physicians to assist contractors in the fabs to conduct on-site surveys and identify chemical exposure risks in the workplace
- Requested contractors with abnormal special health check-up results to voluntarily report them to TSMC

Achievements

- Confirmed that **10** work sites where contractors may be exposed to high health risk substances comply with safety and health management regulations; in addition, the sites are equipped with good ventilation and protective equipment is worn by workers; hence, there are no exposure concerns
- Ensured that the personnel working inside TSMC fabs did not have any health concerns about chemical exposure
- Received **0** cases of unusual results for special health check-ups
- **0** cases of occupational diseases caused by exposure to chemicals

Social/Mental

Enhance the the cerebral and cardiovascular disease prevention and management program

Existing Measures

- Flagged those with advanced health check-up as a high-risk group and actively managed their medical treatment and work hours
- Offered occupational leave to employees with medium/high health risks in Taiwan and Nanjing facilities for free advanced health check-up, to help them prevent cerebral and cardiovascular diseases
- Used the health management system integrated with the latest employee health check-ups and work hours to evaluate health risks; in addition to informing employees, supervisors and HR were reminded to adjust workloads for said employees
- If the employees exhibit abnormalities over time, the system will automatically remind employees, supervisors, and HR via e-mail

Achievements

- In total, **13,203** employees in the Taiwan fabs received advanced imaging examinations, of which **2,338** were classified as moderately or highly abnormal. Employees were helped to receive re-examination and health education based on the degree of their abnormality. Of these, **535** people who refused re-examination were given health guidance via physician interviews, telephone interviews, or written reviews. Furthermore, **104** people were required to limit work hours or adjust work content according to the doctor's order, and work distribution was facilitated
- Work hours of employees were tracked every month to manage **5,067** people with medium/high health risks, and make sure that they comply with the doctor's orders. Health guidance was arranged for **1,059** people through approaches such as doctor's interviews, telephone interviews, or written reviews, and other traditional risk factor health guidance. In total, work hours or work content adjustment was implemented for **244** persons

Biological

Track CDC updates to provide employees with the latest health information

Existing Measures

- Continued to track communicable diseases domestically and abroad and establish preventive/response measures for notifiable diseases; the Disease Prevention Committee continued to develop COVID-19 countermeasures and reporting mechanisms based on changes in the COVID-19 pandemic
- Continued to enforce reporting mechanism for non-notifiable diseases and provided up-to-date information on seasonal flu and dengue fever
- Briefed and provided disease prevention toolkits to employees on business trips to areas with disease outbreaks

Achievements

- Handled **8,667** high-risk cases in compliance with COVID-19 control measures
- Effectively managed a total of **92** instances of notifiable diseases and non-notifiable diseases to contain the spread
- Distributed **616** disease prevention toolkits to employees going on business trips

Physical

Better identification of physical hazards in the environment

New Measures in 2023

- Install an automated outdoor heat hazard risk alert system

Achievements

- Convert temperature or humidity monitoring signals into heat hazard risk indices and risk level; when the heat hazard reaches level two or above, SMS and e-mails are automatically dispatched, and prevention measures are initiated

Existing Measures

- Developed a measurement system for ionizing radiation levels, established a full-time control mechanism for radiation sources, and restricted individuals with pacemakers from operating such equipment
- Process equipment is tested for non-ionizing radiation levels every half-year

Achievements

- There were **0** cases of radiation exposure
- Completed special eye examination for **one** precision tool operator, and the examination result was normal
- Non-ionizing radiation measurement results showed electric field and magnetic field strength were far below the ACGIH TLV standard, and all items were norma

Case Study

Added 52 Material Numbers for Protective Equipment of Various Sizes to Improve the Protection

TSMC is committed to establishing a people-oriented, equal, diverse, and friendly workplace. To avoid safety issues caused by wrong sizes of personal protective equipment and ensure employees and residential contractors can select adequate protective equipment to achieve optimal protectione, safety and health departments and the Procurement Department jointly established the TSMC personal protective equipment evaluation processin 2023 and added 52 material numbers/items for comfortable and convenient protective equipment for TSMC's workers to flexibly select for use through examination of qualification certificates, fitting by on-site workers, and collection of opinions and feedback. In 2024, TSMC will continue to investigate the requirements of on-site workers, provide guidance for suppliers to customize small-sized protective equipment, and cooperate with experts/scholars and the Institute of Labor, Occupational Safety And Health, Ministry of Labor, to design protective equipment with sizes suitable for Asian people so as to lead contractors and suppliers to jointly invest in positive improvement cycles for operating environments and strive to create a friendly and safe workplace.

Head

Issue Found Before Improvement

The head circumference of the protective helmet is too big, which may block vision and may not effectively prevent collision injuries

After Improvement

- Added small-sized protective helmets in 2023
- Added the head circumference width regulators for protective helmets in 2024

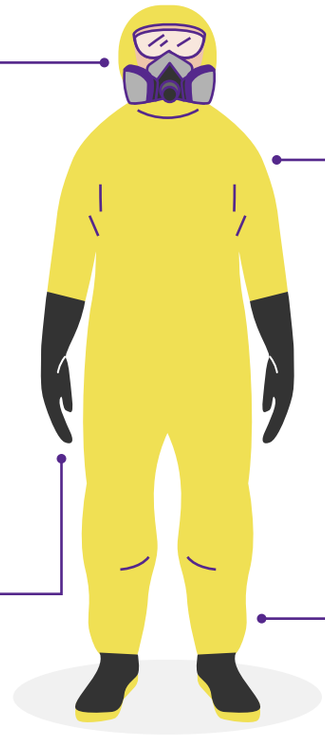
Body

Issue Found Before Improvement

Protection suits that are too long cause the risk of injuries due to falling and tripping of females or small-sized employees

After Improvement

- Added small-sized protective suits in 2023



Hands

Issue Found Before Improvement

Protective gloves that are too large made female employees unable to effectively use hand tools

After Improvement

- Added small-sized protective gloves in 2024

Legs

Issue Found Before Improvement

Protective boots that are too big result in the risk of injuries due to falling and tripping of employees

After Improvement

- Added small-sized protective boots in 2024

Building Internal-external Alliances

With uplifting society as its vision, TSMC proactively cooperated with business partners and industry, governmental, and academic sectors to promote occupational safety and health in the hope of exerting its influence as a leader to create safe work environments for physical and mental health that prevent occupational diseases and occupational disasters for workers, establishing an example for the industry.

Work with Industry Associations to Build a Healthy and Safe Work Environment

TSMC joined the ESH Working Group Joint Steering Committee of the World Semiconductor Council on behalf of Taiwan's semiconductor industry to exchange information on safety and health-related risk control measures with various industry players. In 2023, TSMC continued to explore the substitution and disposal methods for high-health risk chemicals or persistent organic pollutants. At the same time, TSMC is eager to share its experience in promoting a safe and healthy workplace. It actively provides management approaches for skin protective equipment to the industry sector for reference. TSMC served as an expert committee member and speaker on skin protective equipment for the for the Occupational Safety and Health Administration, Ministry of Labor, to advocate the legislation on skin protective equipment management and help other enterprises with chemical-related operations to select adequate protective equipment to protect worker safety. TSMC was invited by the Occupational Safety and Health Administration to be a speaker on skin protective equipment selection and share practical

Construction Site Management Process and Mechanism

TSMC establishes a construction site safety management organization with contractors, construction site Occupational Safety and Health Committee, and Safety Management Center. At the start of each construction project, TSMC adopts a three-level management system and PDCA circular model to jointly establish a safe construction environment and protect labor safety. New construction sites comply with regulatory requirements and maintain high standards in safety management. Contractors are required to submit a Construction Safety Protection Plan before each construction project, as well as discuss and review safe construction steps through the Safety Management Center and contractor meetings. In particular, before implementing six high-risk operations, contractors are required to assign dedicated personnel to conduct a pre-construction inspection and full-time supervision to ensure construction safety. In 2023, TSMC continued to hold the "new project contractor operation safety improvement meeting", inviting TSMC's long-term contractors to participate in the meeting for dialogue and to create a safety cultureof full participation. Furthermore, it required contractors' management teams to commit to the primary goal of reducing the risk of occupational risks in fab construction sites and reinforcing the implementation of safety management. A total of two improvement meetings were held, with a total of 387 participants.

The Occupational Safety and Health Administration invites TSMC to be a speaker on skin protective equipment selection and share practical experiences

Case Study

Two Major ESH Bluebooks Protect the Safety and Health of Contractors Internally and Externally

TSMC continues to maintain its technology leadership, andin response to production capacity expansion, the scale of its supply chain also continues to grow. To ensure the operational safety of contractors and partners accessing fabs of TSMC and new constructions, TSMC published the TSMC Contractor ESH Bluebook in 2020, which generally applies to wafer fabs and advanced backend fabs, and may be shared across industries. 25 online interactive courses were also designed and launched in the TSMC Supplier Sustainability Academy. In addition, to ensure the smooth progress of factory construction, TSMC started to formulate SOPs and officially published the Contractor ESH Bluebook on Fab Construction to assist contractors in preventing operating risk and implementing safety and health measures through easily understandable descriptions with both illustration and text. Through the formulation and application of the two major bluebooks, TSMC comprehensively protects the safety and health of in-house and external contractors and partners.

Highlight and Achievements of the 2023 Contractor ESH Bluebook on Fab Construction

Simplification

- Standardized the new construction operation safety and health manage-ment procedures
- Organized 28 sessions of bluebook communication meetings to extensively collect opinions and establish a safety consensus

- Completed nine major chapters and **91** operational management-related items to establish consistent operating standards

Deeply Rooted Development

- Fully adopted to the in-house education and training courses; contractors also carried out internal education and training
- Promoted the introduction to the Bluebook to improve the environmental safety and health awareness of contractors
- Management personnel of contractors are required to pass the Bluebook Management Position Certification Exam before entering the site for supervision and management

- **954** education and training sessions were held, and **23,293** persons participated in the training
- **167** certification exam sessions were held, and **2,856** management personnel of contractors passed the certification

Continuous Optimization

- Continued to collect feedback on usage and amend the content to facilitate the mutual communication between TSMC and contractors
- In 2024, TSMC plans to continue holding Bluebook Communication Meetings for Contactors and update content on a rolling basis to comply with regulations and international safety operating standards

- Received **1,468** feedback question-naires; **94%** of them expressed that the Bluebook is beneficial for understanding the environmental safety and health requirements related to the operations, and **90%** of them were willing to voluntarily recommend the Bluebook to work partners

"TSMC's ESH Bluebook on Fab Construction sets the standard for construction suppliers and selflessly shares it with other industries sectors for the common good.

Member of the Occupational Safety and Health Administration, Ministry of Labor

The content of the bluebook is rich, and it displays the complicated regulations with easily understandable illustrations and text, which made it easier to grasp and implement safety operations.

AVP Yi-Cheng Chiu, Fu Tsu Construction Co., Ltd.

Construction Site Safety Management for Contractors

Safety Management

Existing Measures

- Completed and published the Contractor ESH Bluebook on Fab Construction. The content is divided into **nine** major chapters, totaling **91** operational management-related items, which will be used as an operational guideline for enhancing construction safety in Taiwan

New Measures in 2023

- New construction sites across Taiwan organized **six** joint toolbox meetings, with a total of **2,690** participants, to collect feedback from contractors and find management blind spots for improvement
- Launched the aerial work platform class; construction sites may choose excellent construction staff to participate in the class; **48** persons completed the training and obtained certificates
- Organized the competition of excellent forklift and skid loader drivers for new construction sites; **24** persons received the award
- Organized joint emergency response exercises for new construction sites; there were **597** participants

Safe Behaviors

Existing Measures

- For the six high-risk operations, the main contractor and the Safety Management Center will dispatch personnel to oversee the entire process and mitigate risks through intensive supervision
- Promoted labor health to improve workplace safety. In 2023, TSMC cared for **106,924** persons; for high health risk workers, the Company reminded them to avoid high-temperature operations and be aware of their body conditions before work and during operations at all times

New Measures in 2023

- The new construction site at Hsinchu Science Park was first to implement the crane and forklift green list classification system; the crane error rate and the forklift error rate were reduced by **79%** and **33%**, respectively
- Identified high-risk suppliers based on abnormal injuries that occurred in the past two years and formulated exclusive safety management plans. TSMC observed, audited, and guided **1,729** operations to reach an operation safety observation qualification rate of **98%** or above; no abnormal injuries have occurred since
- Awarded the Annual Management Improvement Award to the supplier who improved the most in terms of error rate for encouragement

Safe Workplace

Existing Measures

- For improvement in environmental risks, TSMC continued to implement the construction site safety facility improvement team proxy system to urge contractors to implement self-management. In 2023, there were **66** proxy cases; the proxy rate declined from 20% in 2021 to **7%**
- Carried out safety inspections of high-risk tools by professional personnel to ensure they were safe before entering the fab and using the tools
- Continued heat hazard prevention measures by using the heat indices measurement system to monitor indoor and outdoor environmental temperatures at all times

New Measures in 2023

- Added standard safety equipment for heavy construction machines and speed limiters for forklifts. Also improved forklifts safety by marking danger areas with red warning lights, and assistance by guiding personnel; installed on **162** vehicles
- Encouraged contractors to optimize the safety devices before construction equipment enters the fab (e.g., install panoramic cameras for excavators or reduce the blind spot within the rotation radius); the installation was performed for **108** vehicles
- Added the air pollution facility environmental monitoring platform that is connected to the aerosol alert and sprinkling system to **fully** suppress dust

Power to Change Society

66,348
Participants in promoting arts and culture

14,772
TSMC volunteers accumulated 51,431 service hours

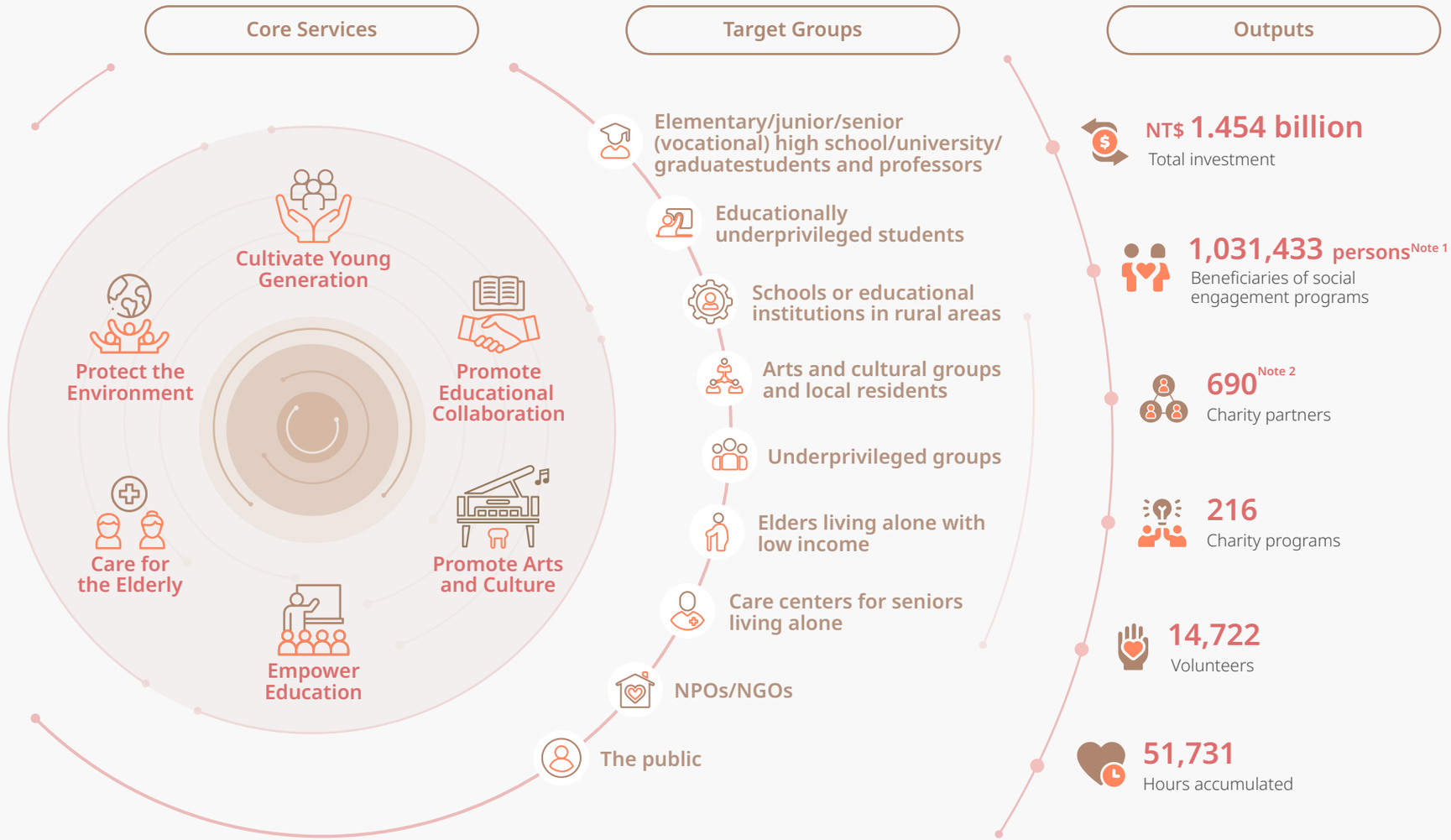
112,260
Seniors benefited from care for senior living alone

"Committed to uplifting society, the TSMC Education and Culture Foundation and TSMC Charity Foundation focus on the changing social landscape and its needs. The two foundations integrate and invest internal and external resources to empower young students of all ages, care for remote areas and the disadvantaged, elderly people living alone, and foster art and cultural literacy to lay the foundation for a society with common good, beauty, and kindness."

Social Impact

Guided by its ESG Policy, TSMC strives to realize its vision of Uplifting Society by addressing a range of societal issues such as urban-rural resource disparities, equal rights in youth and female education, and civic scientific and humanistic literacy. Utilizing its expertise and resource, TSMC implements ESG strategies, contributing to the United Nations Sustainable Development Goals (SDGs). To systematically analyze and monitor the overall effectiveness of resource investments, TSMC employs the impact principles outlined in the Business for Societal Impact (B4SI) framework. This involves assessing the depth (connection, improvement, transformation) and types (behavioral or attitudinal change, skills or personal effectiveness, and quality of life or well-being) of the impact on beneficiaries resulting from these investments.

In 2023, TSMC continued its collaboration with universities and academic research institutions worldwide to expand semiconductor-related courses, foster industry-academia collaboration, and provide career guidance, for the advancement of social sustainability with a robust support network. Through partnerships with the TSMC Education and Culture Foundation and the TSMC Charity Foundation, TSMC established connections with industry, government, and academia to support underprivileged communities and social welfare organizations. The TSMC Education and Culture Foundation focuses on empowering youth, guiding female students to explore the field of science, and enriching their understanding of the humanities. Concurrently, it leverages educational institutions to boost teachers' competence, nurture students' abilities, and cultivate artistic and cultural literacy. Meanwhile, the TSMC Charity Foundation is dedicated to enhancing rural education and promoting technical and vocational employment. The Company mobilizes employees to participate in volunteer services, forging links with campuses and industry partners to address rural challenges, optimize environmental conservation.

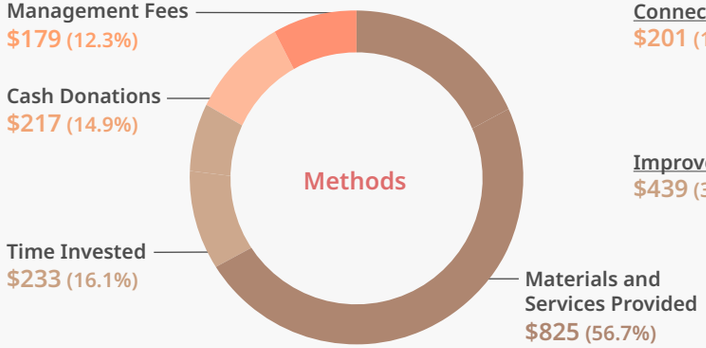


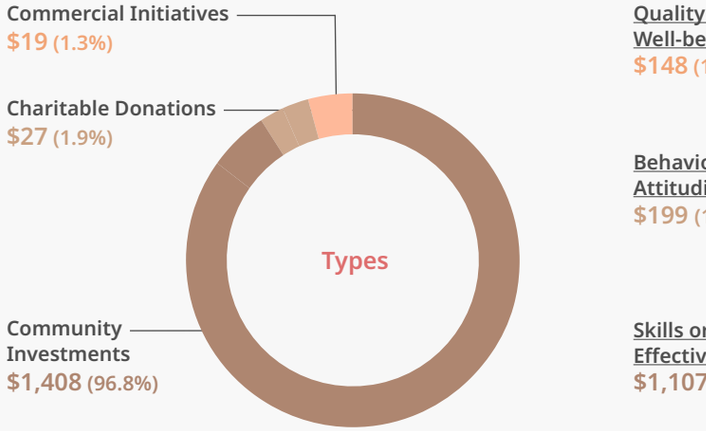
Note 1: The number of beneficiaries from social engagement has been reduced compared to the amount in 2022, mainly because the TSMC Education and Culture Foundation Arts and Culture programs have resumed physical activities in 2023
Note 2: The number of charity partners is higher than the amount in 2022, mainly because the TSMC Charity Foundation held the Vocational Expo in 2023 and the number of corporate units expanded

In 2023, TSMC, in collaboration with the two foundations, enlisted a total of 14,772 volunteers contributing 51,431 hours, and committed over NT$1.445 billion in social engagement activities, benefitting 1,031,433 people. Besides listening to, supporting, and empowering target groups through diverse philanthropic projects guided by TSMC's six core services, TSMC's core focus and business strategy are also leveraged to promote diverse industry-academia cooperation programs across different learning stages. The predominant form of resource investments was Materials and Services Provided, constituting 57% of the total amount. Resources were primarily directed towards Community Investments, comprising 97% of the total, with the aim of strengthening ties with local communities rooted in the core business. Regarding the UN SDGs, resource investments in the year primarily targeted SDG 4 (Quality Education), accounting for 65.6%, followed by SDG 17 (Partnerships for the Goals), accounting for 14.9%, at. Additionally, attention was given to SDG 3 (Good Health and Well-being), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure) and SDG 13 (Climate Action).

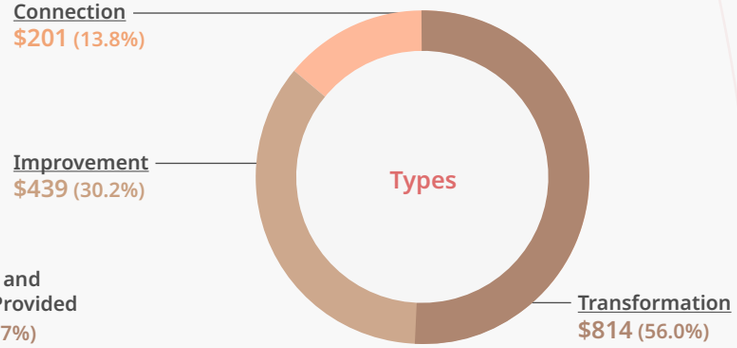
Inputs

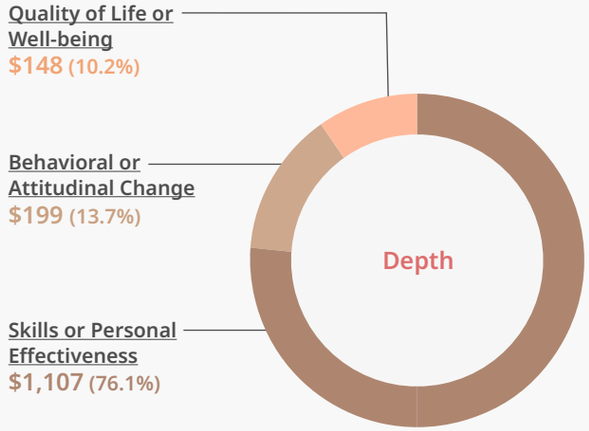
NT$ 1.454 billion
Total investment





Impact





Vision: Build a Society of Common Good

$86 (5.9%) Good Health and Well-Being	$63 (4.3%) Industry, Innovation, and Infrastructure
$994 (68.4%) Quality Education	$57 (3.9%) Climate Action
$37 (2.6%) Affordable and Clean Energy	$217 (14.9%) Partnerships for the Goals

Unit: NT$ million

In 2023, TSMC further integrated the Impact Reporting and Investment Standards (IRIS+) developed by the Global Impact Investing Network (GIIN) with the five dimensions of the Impact Management Project (IMP) - Who, What, How Much, Contribution, and Risk. Regarding project outcomes, the Company utilized IRIS metrics to analyze project impact, ensuring that resource investments effectively address issues and align with the UN SDGs. TSMC applied this assessment methodology for the first time to its longstanding Teach and Learn Program and Vocational Skills Empowerment Program, laying the foundation for optimizing various action plans and expanding social impact. For detailed analysis results, please refer to the 2023 TSMC Sustainability Impact Valuation Report.

The TSMC Education and Culture Foundation - Teach and Learn Program

Who

Teachers

Students

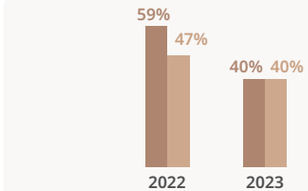
What

- Disparities in educational opportunities and quality
- Improvement needed in students' reading literacy

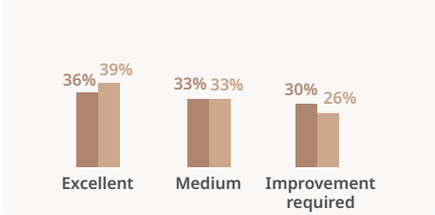
How Much

Provide teaching support, empower educators, and design diverse learning materials to cater to student needs

Growth Rate of Participants Individuals Trained (PI2998)



Effects of Participating in the Teach and Learn Program on Literacy Skills (PI9024)

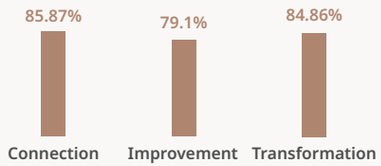


Contribution

Impact Survey

90%
Teachers indicated that the Teach and Learn Program contributed to their professional growth

109
An in-depth survey on the impact of teachers participating in the Teach and Learn Program



Risk

- Unsatisfactory test scores may lead to increased pressure on teachers
- Teachers may not fully utilize instructional materials

The TSMC Charity Foundation - Vocational Training Project

Who

Students

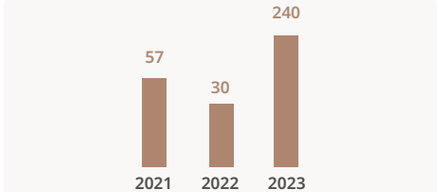
What

- Lack of employment testing and matching resources
- The concept of career appropriate development needs to be strengthened

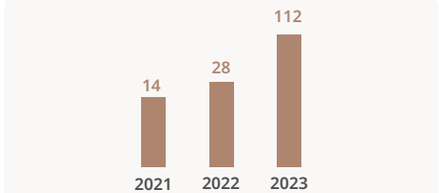
How Much

Collaborate with industry partners, cultivate youth employment skills, and align with industry-academia workforce demands

Vocational/Technical Training (PI8836)



Job Placements (PI9465) Unit: Person

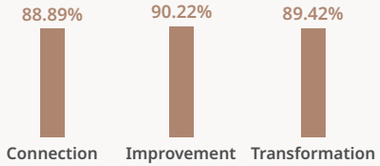


Contribution

Impact Survey

92%
Students indicated the Vocational Training Project helps them adapt to the workplace

90
An in-depth survey on the impact of students participating in the Vocational Training Project



Risk

- The location of job vacancies may cause students to move out for employment
- Students need to adapt the actual working environment after employment

Education and Culture Foundation

Cultivate Young Generation

Hold educational events; provide diversified educational platforms

Promote Educational Collaboration

Cooperate with educational organizations to narrow the gap in educational resources

Promote Arts and Culture

Hold art festivals to foster local art groups

2030 Goals	2024 Targets	2023 Achievements
Ensure the number of overall youth competition event participants is higher than that of the previous year	Ensure the number of overall youth competition event participants is higher than that of the previous year	↑ Youth competition events attracted a total of 8,033 participants, up by 5,645 participants from 2022 Target: The number of youth event participants is higher than that of the previous year
Hold ≧ 30[Note 1] popular semiconductor activities with ≧ 3,000[Note 1] participants annually	Hold ≧ 30 popular semiconductor activities with ≧ 2,000 participants annually	↑ Held 25 TSMC Journeys of Female Scientists Lectures, with 1,561 participants Target: Hold ≧ 20 popular semiconductor science activities with ≧ 1,000 participants
Invest ≧ NT$40 million[Note 1] in resources annually	Invest ≧ NT$35 million[Note 1] in resources annually	↑ Invested NT$42.57 million Target: Invest ≧ NT$33 million in resources annually
Continue to cooperate with educational organizations and invest ≧ NT$30[Note 1] million in resources	Continue to cooperate with educational organizations and invest ≧ NT$25 million in resources	↑ Invested NT$29.08 million Target: Invest ≧ NT$15 million in resources annually
Sponsor ten local talented artists or art groups	Sponsor ten local talented artists or art groups	↑ Sponsored 13 local groups, 4 International groups Target: Sponsor ten local talented artists or art groups
≧ 3,000[Note 1] participants for Chinese in-person opera activities	≧ 2,000[Note 2] participants for Chinese in-person opera activities	↑ Chinese in-person opera activities > 5,160 participants Target: ≧ 1,500 participants for Chinese in-person opera activities
Ensure the annual number of beneficiaries for arts and cultural events is ≧ 25,000 people[Note 1]	Ensure the annual number of beneficiaries for arts and cultural events is ≧ 20,000 people[Note 2]	↑ Arts and cultural events > 66,348 participants[Note 3] Target: Ensure the annual number of beneficiaries for in-person arts and cultural events is ≧ 15,000 people

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: The long-term goals had an upward adjustment as TSMC expects that the investment and the growth rate of participants will continue to grow in 2030 according to the implementation results in recent years

Note 2: The goal has been revised to be not only limited to offline promotion as both offline and online activities are adopted

Note 3: The number of people who participated in offline arts and cultural activities surged in 2023 as compared to prior years as Youth Whispers and the markets at Hsin-Chu Art Festival received warm welcome from citizens

Cultivate Young Generation

- Cultivate Science and R&D Talents
- Create a Stage for Young Aspirants

Promote Educational Collaboration

- Organize and Optimize the Journey of Aesthetic/Science Education
- Continue to Empower Teachers in Remote Townships
- Promote Experimental Education from Literature
- Set Up Scholarships, Expand the Industry's Horizons

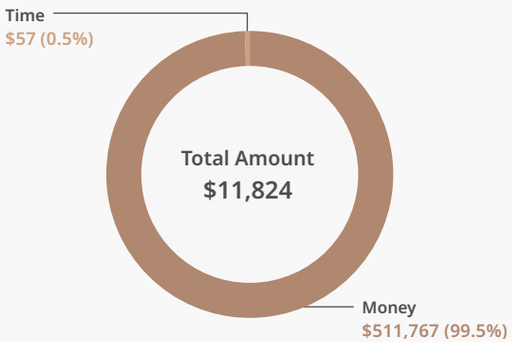
Promote Arts and Culture

- Organize Arts and Cultural Events
- Facilitate the Inheritance of Chinese Opera
- Sponsor Cultural Broadcasting Programs
- Hold TSMC Lectures

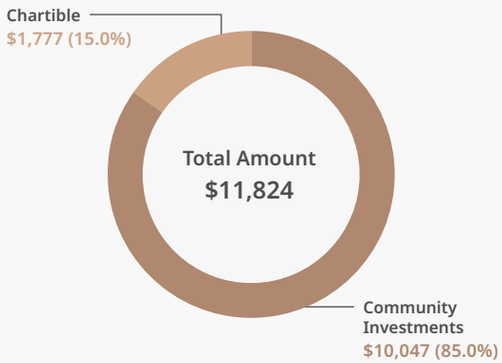
The TSMC Education and Culture Foundation is committed to becoming the force to uplift society, with three main strategies "Cultivate Young Generation", "Promote Educational Collaboration", as well as "Promote Arts and Culture" facilitating the Common Good of society. In 2023, the Foundation invested copious resources and collaborated with partners to organize semiconductor popular science activities. It also encouraged female high school students to join the field of science, invited employees to mentor young students to pursue their dreams, and organized programs such as Chinese Opera on Campus courses and Peking opera art lectures. A total of NT$118.24 million was invested in 2023. For more information about the events and the sponsorships, please refer to the official website of the TSMC Education and Culture Foundation.

TSMC Education and Culture Foundation Contributions

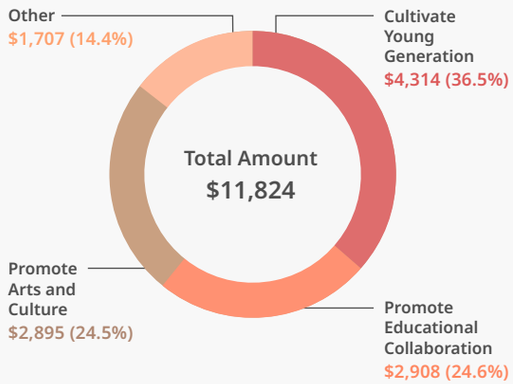
What We Contributed



How We Contributed

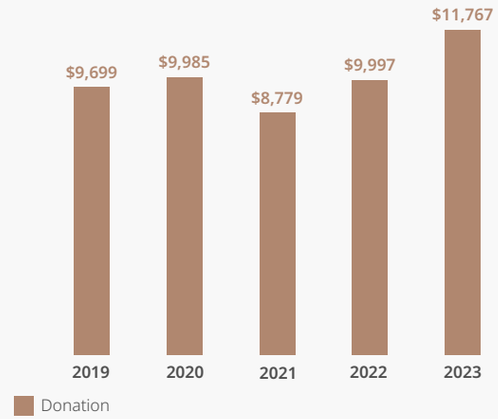


Focuses of Contributions



Donation by the TSMC Education and Culture Foundation

Unit: NT$ ten thousand



Note: The basis of time calculation is the number of volunteer hours x average hourly salary; the calculation of hours only includes the time spent by TSMC volunteers participating in the Journeys of Female Scientists Lectures and Marie Curie Chemistry Camp

Cultivate Young Generation

What We Want to Solve

Domestic education often lacks literature, art, science, and exploration courses. As a result, students do not have a holistic education that integrates technology and humanities and thus lack the comprehensive skills required for future talents

How We Respond

Organize competitions, science camps, lectures, and proposal competitions for senior high school and college students to inspire their interest in science and develop their cultural qualities. At the same time, the aim is to boost their self-confidence, insight, and problem-solving capabilities

Our Actions

- Cultivate Science and R&D Talents
- Create a Stage for Young Aspirants

Cultivate Science and R&D Talents

Organize TSMC Journeys of Female Scientists

The TSMC Education and Culture Foundation collaborated with the National Museum of Natural Science to hold the TSMC Journeys of Female Scientists, inviting students from eight girls senior high schools and four comprehensive high schools in Taiwan in 2023. The event allows female students to explore the mystery of science through three major activities of guided tour, science workshop, and panel discussion. Meanwhile, schools in different areas were arranged to participate in different sessions of the guided tour of the World of Semiconductors Exhibition Hall and the TSMC Museum of Innovation. Semiconductor science knowledge workshops were also organized to guide students to explore semiconductor design, manufacturing, and applications, promoting communication and interaction among students. In addition, a symposium for female scientists was held, inviting outstanding female scientists and engineers from TSMC to share their academic experiences and career journeys, encouraging students to broaden their scientific horizons and enhance their willingness to learn. In 2023, a total of 1,387 people participated. The event began in 2020, and 23 events have been held still now, with 3,312 participants.

> With the semiconductor science workshop, I learn about the installation methods of wires, resistance, and LED and the operating model of the background programs.
>
> **Taipei First Girls High School Student**

◀ The Foundation improves students' enthusiasm toward science by hands-on science practices

▼ Female scientists and scholars share their experiences to encourage students to join STEM

▼ The Foundation inspires students' interest in the semiconductor industry through in-depth guided tours of the exhibition halls

Sponsor Three Major Science Camps

The TSMC Education and Culture Foundation has been a long-term sponsor of Wu Chien Shiung Science Camp, Wu Ta-You Science Camp, and Marie Curie Science Camp to actively cultivate domestic young science talents. In 2023, Wu Chien Shiung Science Camp continued to promote science education and cultivate science elites as its goals and invited five science giants, including Academician, Yuan-Tseh Lee and Nobel Prize winner, Member of the National Academy of Sciences, Venkatraman Ramakrishnan to share their achievements in science with students to expand their international horizons, attracting 142 students and 20 high school teachers to participate in the event. Marie Curie Science Camp used"Way to Sustainability: Carbon Neutral and Net Zero" as the theme to inspire students' interest in learning science through the combination of science experiment teaching and practice experiences, visiting advanced research institutions and enterprises, and scholars' lecturers, attracting 120 high school/ vocational high school students and 25 junior high school/high school teachers to join the camp. In addition, Wu Ta-You Science Camp adopted Great Development of Space Astronomy" as the topic and invited 16 outstanding domestic and foreign astronomers, including NASA/JPL MEP Scientist Dr.Jeng Yen and NASA Science Deputy Administrator/New Horizons Principal, Dr. Alan Stern, as lecturers. A total of 93 students in science-related departments from Taiwan, China, Hong Kong, and Malaysia were attracted to participate in the lecture, advanced technology introduction, forum, and creativity competition. In 2023, the TSMC Education and Culture Foundation also invited nine engineers from the Company to share their educational background and work experience with attendees from Marie Curie Science Camp through the TSMC X Science Club Lunch forum to encourage more students to join science-related industries.

▼ Dr. Wei-Hsin Sun leads students to explore the mystery in astronomy

Academician Yuan-Tseh Lee ▼ expands students' horizons in science through a sharing lecture

◀ Students explore science through hands-on experiments

Teams shortlisted in the initial review visit TSMC ▶ to see the wastewater treatment system

Create A Stage for Young Aspirants

Promote the TSMC Udreamer Project

The 8th TSMC Udreamer Project was held in 2023 and used "Plant A Seed of Dream" as its theme to encourage participants to care for sustainability issues and be brave in taking actions. The proposals contained different aspects, including international education and care, popular science promotion for special students, the launch of a satellite in South America,etc. A total of 180 teams of 559 students from 62 universities registered. In the end, nine teams, comprising 24 participants, were shortlisted to win a total prize of NT$3 million. Fifteen TSMC employees were invited to mentor, provide assistance and give guidance to students during the Udreamer journey for a period of nine months. Apart from the competitions, in response to SDG 15 Life on Land and care for biodiversity, the TSMC Education and Culture Foundation also organized a pilot project during the proposing period and invited popular botany science writer Rui-Ming Wang to be the representative of Udreamer Project and turned his dream into the curation of Tropical Rainforest Plant Culture Park and arranged the ecological tour in the botanical garden, lectures, and the plant market fair to allow citizens to learn the troppical rainforest in Taiwan through vision, touch, and smell. The pilot project has attractined 4,856 people.

Writer, Rui-Ming Wang, explains tropical rainforests in Taiwan ▼

> I appreciate the TSMC Education and Culture Foundation for organizing the TSMC Udreamer Project that provides resources for us to return to our hometown and implement ideas.
>
> **Winner for the eighth TSMC Udreamer**

▼ Teams shortlisted in the selected entries improve their proposals through workshops

Continue to Organize Calligraphy and Literature Competition

The TSMC Education and Culture Foundation has long been organizing literature, arts, and cultural competitions. TSMC Youth Literature Award had its 20th anniversary in 2023, showing that the seeds of literature spread by the Foundation have sprouted and blossomed into beautiful flowers. Apart from the proposal competition, Online Book Exhibition of Previous Award Winners, Rising Sun Awards, and Documentary of Portraits of TSMC Youth Literary Writer were also organized. The competition in 2023 received 1,742 entries, and there were 13,752 proposals cumulated over the years.

To deeply root the aesthetic education, the TSMC Education and Culture Foundation promoted the TSMC Calligraphy and Seal-carving Competition to develop calligraphy arts and organized the 1st TSMC Penmanship Competition to encourage students and transform the ordinary act of writing Chinese by hand into beautiful art, elevating the practicality of handwriting to an artistic level. To promote the culture of penmanship, the Foundation invited calligraphers to give two sessions of talks in Taipei and Kaohsiung. The talks enabled the public to appreciate the technique and aesthetics of handwriting, and to experience the fun of handwriting. The 1st competition received great responses with 4,824 entries, and 223 entries were selected for the final stage. In the end, 109 entries were selected for awards and exhibited at the Yun Yun-Suan Memorial Museum. A total of 1,976 audiences were attracted to appreciate the artworks.

◀ The work wins first prize by Yi-Ching Wei, sixth grade student at Chang Ping Elementary School, New Taipei City

▼ Dr. F.C. Tseng, Chairman of the TSMC Education and Culture Foundation, and the short story winner

Sponsor Mr. Hsien Yung Pai Literature Lectures

The TSMC Education and Culture Foundation has long dedicated itself to the promotion of classic Chinese literature. In 2023, it collaborated with the Department of Chinese Literature the Center of General Education, and the Center for Language Education at the National Tsinghua University to organize and exclusively sponsor "Mr. Hsien Yung Pai Literature Lectures – Culture Memory and Rebuilding (Taiwan)" and inviting Professor Hsien-Yung Pai, Hwai-Min Lin, Yuan-Pu Chiao, An-Chi Wang, Hai-Min Wei, and other domestic and foreign scholars and experts to give special classes with Taiwanese Literature as the basis and guide young students in appreciating dramas, films and television programs, and adapted literation works. The lectures have attracted 3,331 participants in total. The classes over the years were produced into videos and uploaded to the NTHU Open Course Ware and the TSMC Education and Culture Foundation's YouTube channel for the public. From 2019 to 2023, the videos have been viewed 180,982 times.

The Foundation joins hands with National Tsing Hua University to invite Hsien-Yung Pai to give a lecture ▼

Writer Hsien-Yung Pai shares his classic work-Crystal Boys ▶

Promote Educational Collaboration

What We Want to Solve

Schools in remote townships in Taiwan are faced with long-term shortage of teachers and educational resources, resulting in low academic achievement among students. Students from underprivileged homes are trapped by financial circumstances, hence they are unable to explore and turn their lives around

How We Respond

Collaborate with educational organizations from both the private and public sectors to expand curriculum development and promotion, as well as assist in the training of teachers in remote townships to improve the learning motivation and effectiveness of underprivileged students. Scholarships are also provided for disadvantaged students to reduce their financial burden

Our Actions

- Organize and Optimize the Journey of Aesthetic/ Science Education
- Continue to Empower Teachers in Remote Township
- Promote Experimental Education from Literature
- Set Up Scholarships, Expand The Industry' s Horizons

Organize and Optimize the Journey of Aesthetic/Science Education

To close the urban-rural gap and improve the learning interest of elementary schools students in remote areas, the TSMC Education and Culture Foundation organized the Journey of Aesthetic Education and the Journey of Science to bring elementary school students in remote areas to visit the National Palace Museum, art Museums, and science and astronomy museums, benefiting over 80,000 students over the years. In 2023, the events were further optimized, the Art Guidance and Experience Workshop was added to the Journey of Aesthetic Education, apart from visiting exhibition halls. Artists were invited to guide senior elementary school students in experiencing and learning historical artifacts, drawings, and architecture. The Popular Science and Experience Workshop was added to the Journey of Science to guide students in exploring the world of science and improve their basic science knowledge.

▼ Children from remote townships learn semiconductors from Popular Science and Experience Workshop

The Foundation cultivates children's aesthetic from remote townships through Art Guidance and Experience Workshop ▶

Continue to Empower Rural Teachers and Children

The TSMC Education and Culture Foundation launched the Teach and Learn Program in 2021 to provide teaching proposals with academic and theoretical basis and comprehensive learning achievement evaluation mechanism. Through course preparation, observation, and discussion, and teacher empowerment workshops, the program helps teachers improve their teaching capacity in reading and writing by observing the learning performance of students and teaching discussions. In addition, digital technologies were adopted to actively extend the empowerment workshop from offline to online to eliminate the restrictions on locations and facilitate the teaching improvements. In 2023, in the hope of becoming the great support for teachers of small schools in remote areas, the Foundation expanded the joint course-preparation group and invited teachers who participated in the program to exchange teaching methods and to develop teaching proposals that cater to teachers' needs.

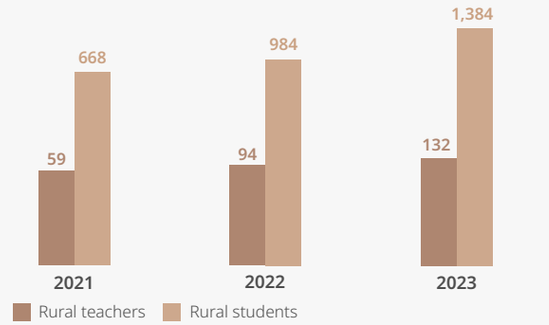
In 2023, a Chinese character recognition test was conducted on 1,379 students participated in the program, and the results showed that the ratio of Improvement Required is lower than those who did not join the program and the ratio of Excellent is slightly higher than students who did not participate in the program.

> Thanks to the contribution of the TSMC Education and Culture Foundation, my teaching became more efficient and avoided solidification of errors. The teaching methods were implemented on every part of learning and living routine for first-grade students, and made learning better and easier for both teachers and students.
>
> **Mei-Yi Hsieh**
> Teacher at the Wanda Branch, Chin Ai Elementary School, Nantou County

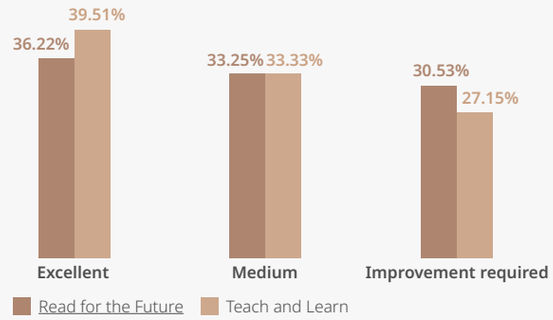
Rural teachers improve their teaching capacity through teacher empowerment workshops ▶

The overall participation in the Teach and Learn Program

Unit: person



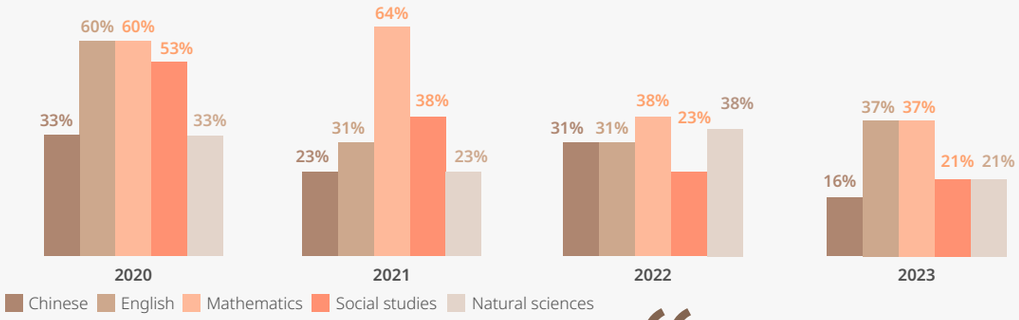
Effects of participating in the Teach and Learn Program on literacy skills



Promote Experimental Education from Literature

To exert cross-sector influences, the TSMC Education and Culture Foundation cooperated with the Cheng Zhi Educational Foundation for the fourth year to assist Emei Bilingual Junior High School in experimental education. Diverse teaching methods and tools were introduced to improve the learning achievements and attract students from other counties/cities to enroll across districts. In addition, the third TSMC Youth Literature Camp was organized in 2023. Renowned writers were invited to guide 70 students from junior high schools in Taoyuan, Hsinchu, and Miaoli to appreciate literature, and passing down the experience of creation. Meanwhile, university students with a passion for literature were recruited for the first time the camp as mentors to accompany the students and help with their learning. Teachers and students from Emei Bilingual Junior High School were also invited to participate in arts and cultural performances to enrich their arts and literature knowledge.

Emei Bilingual Junior High School Comprehensive Assessment Program for The Students - Ratio of Grade C Students



▼ Students from Emei Bilingual Junior High School participate in the arts and cultural event and experience face painting

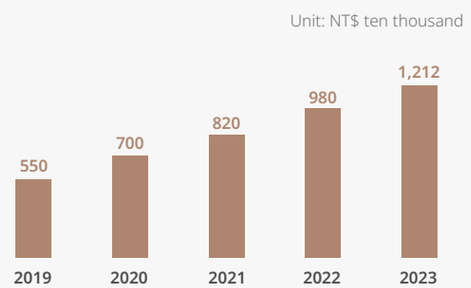
◀ Students from Emei Bilingual Junior High School exhibit their literature creativity at the achievement presentation for the TSMC Youth Literature Camp

> I sincerely appreciate that the TSMC Education and Culture Foundation provided a space to free our souls. Thanks to all partners who participated in the program; you turned literature into scenery and transformed it into happiness. Thanks to you, I see the best part of literature.
>
> **Hsing-Jie Ling**
> Instructor of the TSMC Youth Literature Camp

Set Up Scholarships and Expand the Students' Horizons

The TSMC Education and Culture Foundation strives to support outstanding students with economic disadvantages and sponsors the Sunrise Program of National Tsing Hua University, the Sunflower Program of National Central University, the Cheng Start Program of the National Cheng Kung University, Southern Star Program of National Sun Yat-sen University, and the Chia Star of Chiayi Program of the National Chung Cheng University, allocating NT$12.12 million of scholarships to 101 students. To expand the horizons of sponsored students and improve their knowledge about TSMC, the Foundation invited sponsored students from Cheng Kung University, Nation Chung Cheng University and National Sun-Yat-seng University to visit TSMC. A special lunch meeting has been arranged for them to lunch with Dr. F.C. Tseng, Chairman of the TSMC Education and Culture Foundation and managers who are alumni of the three universities. They shared their learning and work experience and encouraged students to constantly improve themselves. Apart from the scholarships, the Foundation provided 25 laptop computers to freshman students, providing summer internship opportunities at TSMC for five scholarship recipients to expand their career vision. To send Foundations' blessing, pens engraved with the names of the graduating students of the year were presented to graduated scholarship students.

TSMC Education and Culture Foundation Scholarship/Sponsorship Chart



> I learned a lot from the experience shared by seniors and the visit to the wastewater processing system in the fab. Through the guided tour at TSMC Museum of Innovation, I learned more about semiconductor applications. I really appreciate the TSMC Education and Culture Foundation for arranging the visit.
>
> **Recipient of the Cheng Star Program Scholarship**
> National Cheng Kung University

▼ The Foundation sets up scholarships to support outstanding students

The Foundation grants pens engraved with graduates' names to encourage outstanding students ▶

Promote Arts and Culture

What We Want to Solve

Improve predicaments faced by domestic art groups such as inadequate resources, loss of audience and heritage, and foster the public's interest in traditional arts and cultural activities to popularize the art and make it an integral part of life

How We Respond

Apply digital technology to organize high-quality offline and online arts and cultural activities, sponsor exceptional domestic art groups, provide a performance stage, as well as organize rich, diverse programs and activities to raise the public's interest in art appreciation and Chinese opera

Our Actions

- Organize Arts and Cultural Events
- Facilitate the Inheritance of Chinese Opera
- Sponsor Cultural Broadcasting Programs
- Hold TSMC Lectures

Organize Arts and Cultural Events

Hsin-Chu Art Festival Spreads Seed for Two Decades

To cultivate and improve the arts literacy of the public, the TSMC Education and Culture Foundation continued to organize the Hsin-Chu Art Festival in Hsinchu, Taichung, and Tainan. Each year based on the theme of the year, the Festival presented different performances including traditional opera, classical music, history lectures, and children drama Young artists and group from Taiwan and abroad were invited to perform on the Festival Stage. In 2023, the Hsin-Chu Art Festival has been held for 20 years. The theme for the year was "the Hymn to the Youth". The Foundation cooperated with the Hsinchu City Government and a local opera group to organize drama performance training workshops and dance theatre for potential students, and featured markets on weekends were also arranged to allow the public to learn arts by integrating arts into daily life. Meanwhile, for the first time, violinist, Yu-Chien Tseng and the Berlin Philharmoniker were invited to perform in Hsinchu. Music masterclasses were organized for students with a music foundation, and Music Seed Program education events were organized for general and rural students. In addition, four Chinese classic poetry lectures were held to guide students and the public to appreciate the beauty of poetry from the Tang Dynasty and classical music; a total of 47 events were held, attracting 52,252 participants.

▲ Young students perform drama in the outdoor at TSMC's Hsin-Chu Art Festival

▲ Students from music classes learn the technique at the music masterclass

▲ People participate in the Chinese classic poetry lecture to appreciate classic literature

Facilitate the Inheritance of Chinese Opera

Chinese Opera on Campus Program

To actively promote the heritage of Chinese opera, the TSMC Education and Culture Foundation works with outstanding domestic opera companies and universitie ,and provides rich learning resources to cultivate young students in the next generation to pass down the legacy. In 2023, in addition to sponsor Guoguang opera's performance at TSMC Hsinchu Art Festival, the Foundation continued to promote its "Chinese Opera on Campus Program". Incorporating three core aspects: Chinese opera knowledge, opera script appreciation and analysis, and Peking opera performance demonstration and teaching into the program, the Foundation launched the 3rd year elective Perking opera courses at National Tsing Hua University and National Tunghai University. Outstanding instructors from Taiwan theatre and Peking opera groups were invited to guide 115 students to experience in-depth on the beauty of opera performances and providing new momentum for the inheritance of Peking opera.

▲ Students from National Tunghai University experience "walking on stilts" in the Peking opera courses

TSMC Theatre

The TSMC Education and Culture Foundation launched TSMC Theatre Campus Program in Hsinchu in 2021, and the program was further expanded to Taichung and Tainan in 2023. Guoguang Opera Company, Contemporary Legend Theatre, and Taiwan Kunqu Opera Theatre were invited to organize the "TSMC Theatre" at National Yang Ming Chiao Tung University, National Tunghai University, and National University of Tainan. The program included guided introductions to Peking opera and Kunqu opera, performances, and lectures. Guided introductions and actors' live demonstrations led students to experience the beauty of traditional Kunqu opera and Peking opera. Apart from faculties and students, in 2023, the Foundation also invited students from 23 high schools and community citizens from sites where TSMC operates to the campus for opera appreciation. Over 1,620 people participated and enriched their cultural literacy.

> The guided introduction worked in concert with the performance of actors. By seeing in person after listening to the explanations, I understand better the plot and the performance methods of opera.
>
> **Student**
> National Tunghai University

▼ The community enjoys the beauty of opera through TSMC Theatre

◀ The Foundation invites local high school students and community citizens to enter the campus to appreciate opera

Sponsor Cultural Broadcasting Programs

Tales from Chinese Opera

In 2023, the TSMC Education and Culture Foundation continued to collaborate with IC Broadcasting Company to launch the opera broadcasting program Tales from Chinese Opera. An-Chi Wang, Director of Guoguang Opera Company, and Shih-Lung Lo, Associate Professor of the Department of Chinese Literature of National Tsinghua University, were invited to host and share classic opera stories each week by adopting the viewpoint of the new era and a lively story-telling method, gaining well recognition over the three years after the program was launched. Internet community was used to reach out more people and guide the young generation to learn the beauty of traditional opera. In 2023, the program was nominated by the Golden Bell Awards, and 1,081,010 people listened to the online program.

Yi-Yun Hsin Talks About the Classic Fu Genre

The TSMC Education and Culture Foundation is committed to promoting Chinese culture and has continued sponsoring the Chinese classic lecture radio program by Professor Yi-Yun Hsin. He has taught classics such as the Analects, Zhuangzi, Mozi, Laozi, and Poetry since the launch of the program. In 2023, the Foundation continued to invite Professor Hsin to produce "Yi-Yun Hsin Talks About the Classic of Fu" Online Lectures to lead audiences to learn the historical meaning in the dynasty. In 2023, diverse channels were also adopted to promote the Chinese classic lecture radio program to reach out more people. The program attracted a total of 548,169 listeners.

Academician Yu-Shan Wu speaks at TSMC Lectures ▶

Hold TSMC Lectures

The TSMC Education and Culture Foundation launched the TSMC Lectures in 2014 to promote Chinese and Western humanistic philosophy. Each year, famous humanists and historians are invited to guide citizens to seize the charm of culture and history and expand their international viewpoint. In 2023, in response to international political events, Professor Yu-Shan Wu, an academician and a distinguished research fellow of the Institute of Political Science at Academic Sinica, was invited to hold three sharing lectures to examine the Ukraine-Russia War from the perspectives of historical development, conflicts in reality, and international facts and how Taiwan can learn the way to survive from the war; a total of 936 participants were attracted to the lectures.

The Foundation leads the public to explore the charm of literature and history through TSMC Lectures ▼

Charity Foundation

Empower Education[Note 1]

Integrate multiple learning resources, explore career, and collaborate across industries partners to unleash the potential of rural students in an attempt to cultivate professional skills, and promote employment

Care for the Elderly[Note 1]

Through the cooperation of medical institutions and social welfare organizations, we aim to enhance the accessibility of elder care service in rural areas

Protect the Environment

Partnering with corporates and university volunteers, we engage in environmental education, waste reduction initiatives, and support energy-saving for campuses and institutions

2030 Goals	2024 Targets	2023 Achievements
20,000+ hours[Note 3] of educational volunteer[Note 2] every year	20,000+ hours of educational volunteer[Note 3] every year	↑ 30,268 hours in educational volunteer reading Target: 9,000+ hours
At least NT$18 million in annual donations to underprivileged people	At least NT$18 million in annual donations to underprivileged people	↑ NT$18.46 million[Note 4] in donations Target: at least NT$15 million
Benefit 50,000+ children[Note 3] in rural areas	Benefit 32,000+ children[Note 3] in rural areas	↑ 31,133 children[Note 5] in rural areas benefited Target: 5,000+ children
Promote filial piety education in 120 educational institutions[Note 1]	Promote filial piety education in 80 educational institutions	↑ Promoted filial piety education in 71 educational institutions Target: 70 educational institutions
Serve seniors living alone 80,000 times[Note 3] every year via the Network of Compassion	Serve seniors living alone 50,000 times[Note 3] every year via the Network of Compassion	↑ Services offered 112,260 times[Note5] Target: 12,000 times
400,000 meal deliveries via the Network of Compassion	340,000 meal deliveries via the Network of Compassion	↑ Meals delivered 336,277 times Target: 330,000 times
Benefit individuals 100,000+ times every year via the Cherish Food Project	Benefit individuals 50,000+ times every year via the Cherish Food Project	↑ Benefited individuals 44,344 times Target: 42,000+ times
Offer environmental protection-related volunteer services at least 1,200 times every year	Offer environmental protection-related volunteer services at least 1,200 times every year	↑ Volunteer services offered 1,105 times Target: 1,000+ times
Install solar panels for 6 social welfare institutions every year	Install solar panels for 6 social welfare institutions every year	↑ Solar panels installed for 7 institutions Target: 6 institutions
Change LED light tubes for 240 elementary schools every year	Change LED light tubes for 240 elementary schools every year	✓ LED light tubes changed for 240 elementary schools Target: 240 elementary schools

Applicable to all TSMC fabs around the world | Applicable to TSMC fabs in Taiwan and other specific fabs | Only applicable to TSMC fabs in Taiwan | ↑ Exceeded | ✓ Achieved | — Missed target

Note 1: Starting from 2023, the TSMC Charity Foundation shifted its original strategic focus on Empower the Rural Community, Care for the Elderly, Promote Filial Piety, and Protect the Environment to Empower Education, Care for the Elderly, and Protect the Environment, to systematically cater to the needs of rural areas and regions where resources are relatively scarce. Going forward, the promotion of filial piety will take the form of activities held as part of action plans and projects and will no longer be listed as the Foundation's long-term target starting from 2024.

Note 2: As the services rendered spanned varied themes such as storytelling, popular science education and career exploration, the goal "volunteer hours by storytelling volunteers" was renamed "volunteer hours by Education Empowerment volunteers" in 2023.

Note 3: Given the effective execution of activities in recent years, continuous increase in both contributions and project partners is projected in 2030; the long-term target has been adjusted accordingly.

Note 4: Includes donations from TSMC volunteers and internal and external donations by courtesy of the Sending Love Forward project; excludes repairs and other goods

Note 5: Due to the increase of project partners, the growth of beneficiaries has surpassed the projected target.

Empower Education

- Instill Science Education and Job Exploration Education
- Offer Expedited Job Matching and Exploration
- Empower the Underprivileged by Providing Supportive Resources

Care for the Elderly

- Integrate Smart Medical Technologies and Strengthen Healthcare

Protect the Environment

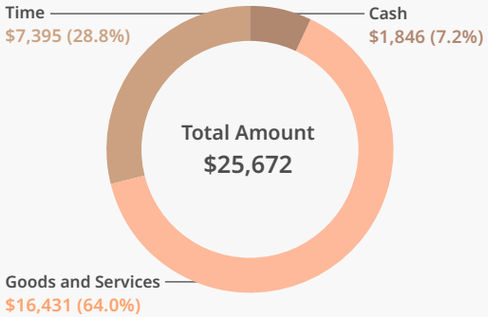
- Promote Public Welfare Green Energy and Facilitate Sustainability Initiatives
- Promote Energy-saving Concepts and Boost Conservation Awareness

The TSMC Charity Foundation continues its work of providing frontline volunteer services to address the needs of society. To empower rural areas, the Foundation developed three strategies—Empower Education, Care for the Elderly and Protect the Environment—to build support systems and partner with local governments and institutions, bringing resources from cross industries, and establish government-industry-academia collaboration.

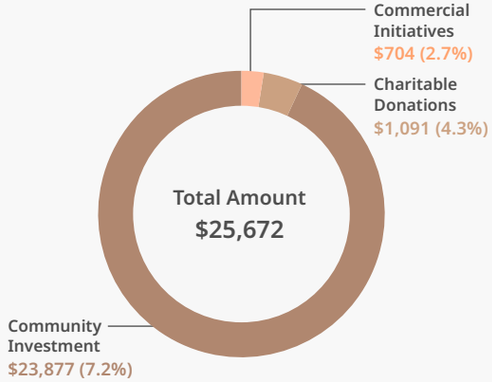
In 2023, the Foundation devised education empowerment strategies based on different stages of learning for pupils in rural areas and provided economic and household resources for support. To care for the elderly, efforts were made to bring together various parties in the medical and social welfare systems to care for senior citizens in remote locations; and with the implementation of the Public Welfare Green Energy Project, the Foundation protected the environment by providing minority groups engaged in energy-efficient and power generation practices with rebates to help them stabilize their operation, and offered volunteer services to promote environmental sustainability and raise awareness about conservation. In 2023, the beneficiaries of various projects reached 435,488 people, with 62,719 donations made. For more information about the Foundation's projects and the current state, please visit the TSMC Charity Foundation website.

TSMC Charity Foundation Contributions

What We Contributed[Note 1]

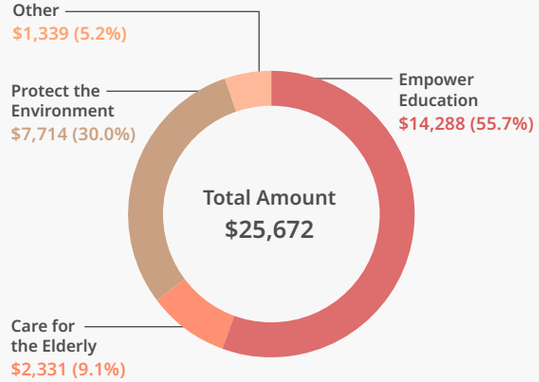


How We Contributed[Note 2]

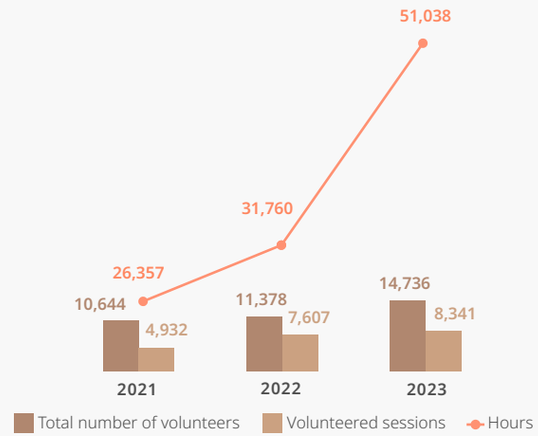


Focuses of Contributions[Note 3]

Unit: NT$ ten thousand



Total Number of Volunteers[Note4], Number of Volunteered Sessions, Volunteered Hours



Note 1: Corporate volunteer value equals volunteer hours multiplied by the average hourly wage of TSMC employees in 2023; calculation of hours only includes the time spent by TSMC volunteers participating in the Women in Science tour and science camp

Note 2: In accordance with the definitions of the Dow Jones Sustainability Index (DJSI), events are classified under Commercial Initiatives, Charitable Donation and Community Investment; all of the contributions are shown in the monetary unit of New Taiwan Dollar (NT$)

Note 3: In accordance with the Foundation's efforts at strategic integration in 2023, the contributions made to the promotion of filial piety are counted towards the drive to advance Education Empowerment

Note 4: Volunteers participating in the Foundation's volunteering activities include TSMC's current employees, former employees, retired employees, family members of employees, employees of partner corporations, and students under University Social Responsibility (USR) programs

Empower Education

What We Want to Solve

Due to insufficient social resources in rural areas, students do not have access to a complete range of learning opportunities and day-to-day living support. These circumstances create barriers to their adaptive development, exacerbate poverty and disparity in education, and increase the hidden costs of forced job transitioning as a result of career path mismatch

How We Respond

Raise funds to support minority families; integrate government-industry-academia resources; craft multi-phase empowerment strategies and corresponding action plans; work with businesses to organize job matching and empowerment camps and job exploration fairs; and provide vocational high school students with employment opportunities and assist them in career development

Our Actions

- Instill Science Education and Job Exploration Education
- Offer Expedited Job Matching and Exploration
- Empower the Underprivileged by Providing Supportive Resources

Instill Science Education and Job Exploration Education

Introducing Diverse and Innovative AI-powered Learning

The TSMC Charity Foundation volunteers continue to visit primary schools and after-school institutions in remote areas to offer storytelling activities, help with basic subject-oriented studies, and provide diverse study subjects to expand students' horizons. In keeping with current AI trends and in response to the emphasis on technological education placed by the 2019 Curriculum Guidelines stipulated by the K-12 Education Administration of the Ministry of Education, TSMC volunteers tap into their various areas of expertise to promote popular science education. In 2023, the Foundation organized fun AI education solutions and programming workshops utilizing cutting-edge tech tools, including ChatGPT, to help students strengthen their science and information application skills through hands-on exercises.

Exploring Career Clusters and Adaptive Development

With the World of Jobs, Road to Employment website built by the TSMC Charity Foundation and through collaboration with TSMC volunteers and university student clubs focused on providing services to rural areas, the Foundation makes resources available to students regardless of where they live. Through job exploration workshops, online career interest quizzes and career vlogs of a hundred professionals, students are able to explore their personal traits and expand their career horizons. To help junior high school students in rural areas make plans for adaptive career development, the Foundation in 2023 worked with Catholic St. Joseph Technical High School to organize the first Parent-child Exploration Workshop for Vocational Skills and Career.

Mother and child work through a career exploration quiz together, finding common ground in the process ▲

Fab 15B volunteers lead a session on self-exploration and future development in a gamified setting ▶

◀ A junior high school student's first attempt at wood planning, supervised by a senior high school student from Catholic St. Joseph Technical High School

Popular science AI programming education

35 AI education events	1,093 Elementary school pupils
33 Elementary schools/ curriculum supplementary	2,500 Packages of popular science materials distributed

Career exploration activities for elementary school pupils

10 Exploration events	155 Elementary school pupils

Vocational Education Exhibition for junior high schools in Pingtung County

3,400 Visits	1,531 Students	727 Teachers

World of Jobs, Road to Employment website

100,000 times
Career vlogs viewed

The Foundation also participated in the Vocational Education Exhibition for junior high schools in Pingtung County and introduced the Career Potential Exploration Quiz, sharing the latest employment trends from the industry's perspective with teachers and helping build a supportive environment where students may pursue higher education in a general or technical high school.

▲ R&D volunteers instruct children from rural areas in using a bottle to conduct an energy-efficient power generation experiment

"

TSMC volunteers have brought AI education into schools, greatly enhancing future technology and life skills for children.

Hu Dingfan
Principal
Ruixing Elementary School in Hsinchu County

During nearly 350 hours of AI volunteer service around Taiwan, we could see that children put down their phones to feel the joy, which encourage our team so much.

Grace Yi
TSMC volunteer

We are grateful to the Foundation for introducing corporate training, allowing us to develop teaching plans for children. Through our first-time service on the mountain, we have also grown a lot ourselves!

Student
University Social Responsibility Program

TSMC Participating Units

TSMC storytelling volunteer, Corporate Planning Organization, Corporate Information Technology, Advanced Packaging Technology and Service, Legal, Quality & Reliability, R&D Yield Excellence Program, Product Engineering/Product Derivative Technology Development Division/E-Beam Operation Division, Fab 2 & Fab 5, Fab 12A, Fab 12B, Fab 18B, Fab 15B, Fab 14A, Fab 14B, Fab 3, Intelligent Engineering Center, Intelligent Manufacturing Center

Cooperating Units

104 Job Bank, Industrial Technology Research Institute, Pingtung County Government, National JiaDong Senior Agricultural Vocational School, National Taiwan University, K-12 Education Administration, MOE, Catholic St. Joseph Technical High School and Career Creator Co., Ltd.

Offer Expedited Job Matching and Exploration

Strengthen Vocational Training to Create an Instant Workforce

Since 2020, the TSMC Charity Foundation has organized the Dynamic Vocational Training Project. Inviting businesses from various industries to pitch in through corporate networks, the Foundation has built an expedited vocational talent matching program that takes anywhere from 8 to 30 hours to complete. The Foundation encourages vocational high school students in rural areas to tap into their technical advantage by seeking employment first, as this would bring financial security. With work experience accumulated, those who wish to continue their studies can do so. Expanding its collaboration in 2023, the Foundation partnered with five corporations to provide vocational high school students with hands-on instruction. Those who pass the training sessions can directly receive letters of appointment, landing jobs upon graduation.

Dynamic Vocational Training Project

68	122
Offer letters delivered	Vocational high school students trained

Job Fair for Senior High and Vocational High School Students

376	12,000 visits
Collaborated with businesses	3,200 instances of preliminary job matching

The lecturer from Panasonic Taiwan leads students to dismantle a coffee machine ▼

Students from National Shui-Li Vocational High School of Commerce and Industry take culinary lessons from the Chef ▲

The First Job Fair for Vocational High School Students

To let more vocational high school students gain intimate knowledge about a variety of industries and enhance their employment competitiveness, the TSMC Charity Foundation, along with six municipal and county governments across Taiwan and around a hundred enterprises in the manufacturing, services, technology and financial industries, joined hands in 2023 to organize a Job Fair for Senior High and Vocational High School Students. More than 7,000 job openings were offered and each student on average could interact with three businesses. Career exploration workshops were also held for students to explore their career interests and direction of development.

▼ Students from the Affiliated Senior High School of NCNU participate in housekeeping training under the supervision of LDC Hotels & Resorts staff

Vocational high school students learn about an industry through the guidance of a human-resources officer ▲

"

With the learning from school, the Dynamic Vocational Training Project helped on accumulating practical experience in the workplace.

Student
National Shuili Senior Vocational School of Commerce and Industry

---

It was a precious opportunity to interact with many companies at once, and I am grateful for joining a well-known brand today!

Student
Job fair in Pingtung

Through the job fair, not only can companies find suitable technical talent, but it also allows more young students to know our brand.

Sammi
Deputy Manager
Happy Recome Co., Ltd.

Cooperating Units

SEMI, 104 Job Bank, Panasonic Taiwan Co., Ltd., DFI HOME FURNISHINGS TAIWAN LIMITED (IKEA), HO TAI DEVELOPMENT Company Limited (Daikin Industries General Agent), LDC Hotels & Resorts Group , Howard Resort Xitou., Pingtung County Government, Kaohsiung City Government, Yunlin County Government, New Taipei City Government, Taitung County Government and Tainan City Government

Empower the Underprivileged by Providing Supportive Resources

Adopt Varied Measures to Create Robust Learning Environment in Rural Areas

The TSMC Charity Foundation takes the initiative to bring much-needed resources for learning to rural areas by bringing resources to rural areas for teacher empowerment, setting up dedicated accounts to subsidize students for stable schooling, providing online teaching resources to schools and volunteer services, reducing learning barriers and improving the quality of education. Through the School of Future Competencies, the Foundation has funded six schools in remote areas, designed online games to pique students' interests, and cultivated students' autonomous learning and problem-solving skills. The Foundation has also continued to donate computers and tablets and set up internet connections and IT classrooms to strengthen digital technology application among teachers and students and boost learning efficiency.

▼ FAB 14 volunteers provide pupils in after-school institutions with learning resources

▼ TSMC volunteers improve children's learning outcomes through an digital education platform

▼ Intelligent Manufacturing Center volunteers in the process of matching education teams to help teachers in after-school institutions learn how to cultivate children's problem-solving skills

Provide Financial Support and Promote Filial Piety to Maintain a Close-knit Family

To assist students or families who are economically underprivileged or face major mishaps in improving their lives, the Foundation has created a donation platform to expand the involvement of society and corporate employees' in charitable causes.

Addressing the risks of vulnerability of family support systems, the Foundation continues to collaborate with the Filial Piety Resource Center under the K-12 Education Administration of the Ministry of Education, integrating the concept of filial piety into diverse educational activities and building a bridge for communication, understanding, and interaction between generations.

TSMC volunteers also sporadically organize charity concerts, charitable purchases of agricultural produce from remote areas or charity sales, supporting the stable operation of rural households and social welfare and education institutions through purchase and consumption.

◀ Fab 8 volunteers raise supplies through garden parties to help underprivileged families

▼ Filial piety workshop improves interaction between parents and children

◀ Parents and children enhance their bond by painting each other's faces

TSMC i-Charity platform

NT$ 71.68 million
Donations reaching

62,351
Participants

The Cherish Food Project

150
Underprivileged groups

74,471
Beneficiaries

NT$10,000 Per Household program

291
Donors

NT$ 410,000
Donations reaching

45 families
Benefiting

Promoting filial piety

71
Promotional events organized

"The TSMC volunteers provide an interactive and new learning experience with enthusiasm and positive attitude, which bring surprises and changes to both the students and teachers!

Wei Wen-li
Afterschool teacher
Church of St. Joseph in Wufeng

We appreciate TSMC volunteers for their years of support, providing hot meals and homework guidance for the children after school, gradually enhancing the atmosphere of self-directed learning.

Tseng Sheng-yi
Professor
Fu Jen Catholic University

Seeing the children's smiles makes me feel fulfilled. I want to let them know that they are not forgotten, encouraging them to strive for dream and become a thankful adult in the future.

Lee Teng-yen
TSMC volunteer

TSMC Participating Units

Fab 2 & Fab 5, Fab 8, Fab 12A, Fab 12B, Fab 14A, Fab14B, Fab 15B, Intelligent Manufacturing Center, Product Engineering/Product Derivative Technology Development Division/E-Beam Operation Division, TSMC storytelling volunteer

Cooperating Units

Taiwan Basegarden Baseball Development Association, Design For Change Taiwan, Junyi Academy, Taiwan Indigenous Baseball Development Association, Association of Literacy Education, and Teaching for Taiwan

Care for the Elderly

What We Want to Solve

As Taiwan's elderly population increases rapidly, the needs of healthcare and long-term care are growing every year, creating an ever greater burden on welfare services and society. In regions where resources are scarce and in remote areas that lack service locations, access to resources is relatively difficult. Moreover, due to structural change of families in Taiwan, today there are more seniors living alone, who may experience a range of health hazards arising from the feeling of loneliness and lack of care and companionship over an extended period of time

How We Respond

Build the Network of Compassion system to bring together medical and social welfare institutions, effectively allocate long-term care resources, and extend services to the fields of home health care and companionship. Organize health activities for communities, make long-term care services more prevalent and local, and help seniors maintain physical and mental health

Our Actions

- Integrate Smart Medical Technologies and Strengthen Healthcare

Integrate Smart Medical Technologies and Strengthen Healthcare

The TSMC Charity Foundation continues to utilize the Network of Compassion to collaborate with 15 professional healthcare systems and service locations to establish supportive resources, alleviate the shortage of caregivers, and provide elderly individuals with comprehensive care. The Foundation also partnered with National Yang Ming Chiao Tung University and Taipei Municipal Gandau Hospital to build a smart fitness club for senior citizens, using smart AI workout apparatus to evaluate seniors' health and give exercise prescriptions with the assistance of professional trainers. A variety of academic resources and health services have also been introduced to enhance the quality of health services for seniors.

Apart from augmenting healthcare services, TSMC volunteers engage in frontline caregiving services, accompanying the elderly to promote health, harvesting and selling agricultural produce for rural elderly farmers, and launching fundraising and donation programs to help institutions regularly acquire resources to care for the elderly. In 2023, they called on retired employees to join the volunteer team, continuing to cultivate their sense of self-worth and contribute to society through volunteering.

▼ Retired TSMC employees voluntarily assist community seniors in using smart equipment that can precisely evaluate their health

▲ Fab 3 volunteers bring daily living supplies to seniors living alone

▼ Fab 8 volunteers celebrate Christmas with senior citizens living in Miaoli Center for Seniors

> Through interaction, the TSMC volunteers inject vitality and warmth into the lives of elderly people living alone.
>
> **Mu Ying-hui**
> Director
> Huashan Social Welfare Foundation

> Thanks to the companion of TSMC volunteers, we have the motivation to achieve two hours of exercise, and our bodies have become healthier.
>
> **General Zhang**
> Resident
> Hsinchu Veterans Home

> After the epidemic, fulfilling our promise to meet with the elderly again, we realized that bending down to listen and slowing down to feel is really warm.
>
> **Hong Si-han**
> TSMC volunteer

Network of Compassion

20
Social welfare agencies in building care and service systems

14
Medical systems and service locations

336,277 times
Meals delivered

Smart fitness club for seniors

26
Participation senior citizens

14
Volunteers and exercise instructors trained

TSMC Participating Units

Fab 3, Fab 8, Fab 12A, Fab 12B, Fab 14A, Fab 14B, Fab 15A, Fab 15B, Human Resources, Materials Management, Intelligent Manufacturing Center, Product Engineering/Product Derivative Technology Development Division/E-Beam Operation Division, Quality & Reliability

Cooperating Units

- Network of Compassion: 15 medical and social welfare institutes
- Smart Fitness Club for Senior Citizens: National Yang-Ming Chiao Tung University and Taipei Municipal Gandau Hospital

Protect the Environment

What We Want to Solve

Climate change impacts the natural environment, threatens specific species, and tests whether vulnerable groups have stable support systems in place to cope with environmental disasters, energy inequalities, or nutritional deficiencies

How We Respond

Combine our concern for the environment, ecology, and society and join forces with the government, industry, and academia to help minority groups in effectively managing resources, reducing energy consumption, and developing renewable energy. Promote environmental and energy-saving education through volunteer services

Our Actions

- Promote Public Welfare Green Energy and Facilitate Sustainability Initiatives
- Promote Energy-saving Concepts and Boost Conservation Awareness

Promote Public Welfare Green Energy and Facilitate Sustainability Initiatives

Social welfare institutions and rural schools not only need to raise funds that come in regularly, but also face the issue of high electricity bills caused by old appliances that use more energy. To alleviate their financial pressure, the TSMC Charity Foundation planned the Public Welfare Green Energy Project in 2019 and launched it in 2020, working with local governments to install solar photovoltaic systems on the rooftops of social welfare institutions. This initiative helps to reduce monthly electricity expenses, and the income from selling electricity can serve as a long-term and stable source of operational funds for the institutions, making each unit of green energy more socially valuable. As of now, a total of 16 solar power plants have been built, with total estimate electricity sales reaching NT$5.04 million.

Additionally, the Foundation has commissioned students from vocational colleges who come from relatively underprivileged backgrounds to assist in installing LED energy-saving light tubes in rural schools. Apart from providing brighter study spaces for teachers and students, underprivileged students can also accumulate technical knowledge and practical experience, and receive compensation for their efforts.

◀ The Foundation installs solar panels on the rooftops of Tuku Elementary School in Yunlin

▲ Kun Shan University volunteers replace LED energy-saving lamps for rural primary schools

◀ National Formosa University volunteers replace LED energy-saving lamps for rural primary schools

Solar energy generation project

7
Solar power plants were built

NT$ 2.86 million
With electricity sale rebates reaching

LED Light Up Taiwan project

240
Installing LED energy-saving light tubes

NT$ 7.2 million
Saving in electricity bills year-round

> The LED light tubes not only save electricity and improve lighting, but also protect the students' eyes.
>
> **Weng Mei-hui**
> Nurse
> Dongxing Elementary School in Pingtung County

The revenue from selling solar panels provides stable support for social welfare institutions, and the panels installed on the roof also significantly reduce indoor temperatures in the summer, making the residents happy!

Liao Qi-hua
Superviso
The Rose Day Care Center in Yunlin County

Cooperating Units

Kun Shan University, National Taipei University of Technology, National Huwei University of Science and Technology, and Ming Chi University of Technology

Promote Energy-saving Concepts and Boost Conservation Awareness

The TSMC Charity Foundation cooperates with food companies to promote the Cherish Food Project to reduce food waste. The Foundation also actively fosters Energy-Saving, Ecology, and Guided Tour volunteers, who utilize their expertise to share energy conservation technologies and ecological conservation experience and continuously promote knowledge about environmental sustainability. The Energy-Saving volunteer team consists of TSMC engineers, who use advanced instruments to assist schools in assessing areas where improvement is needed and enhancing energy efficiency, while teaching students in rural areas about energy-saving and water-saving concepts and measures. TSMC employees who have a keen interest in ecological environmental issues band together to form the Ecology volunteer team. Through diverse guided tours and interactive games held at the ecological education areas within the premises and Jacana Ecological Education Park, Ecology volunteers guide students and the general public to learn about biodiversity. Their efforts increase environmental education teaching capabilities. Guided Tour volunteers, also consisting of TSMC employees, share how semiconductors change technology and our lives, inspiring students in rural areas to explore the topic and broadening their horizons.

TSMC Participating Units

Advanced Packaging Technology and Service, Corporate Planning Organization, Quality & Reliability, Fab 12A, Fab 15B, Fab 6, Intelligent Manufacturing Center, Facility

Cooperating Units

Jacana Ecological Education Park, National Museum of Natural Science and Taichung Metropolitan Park

> From beach cleaning in the past to now, TSMC volunteers teach us how to clean the invisible garbage in the sea. I feel a great sense of accomplishment in making the ocean clean!
>
> **Student**
> Jianguo afterschool in Tainan City

> The Qigu Coastal Plant Park was originally a salt flat, but after more than 10 years of effort and the participation of TSMC volunteers, it has become a successful demonstration green area. It can encourage more enterprises to invest.
>
> **Zhu Jianming**
> Chief of the Forest and Natural Conservation Section of the Agriculture Bureau

> It is important to cultivate a learning interest in energy, and we seek to strengthening the next generation's implementation of energy conservation and carbon reduction.
>
> **Hsu Chia-Lin**
> TSMC volunteer

An energy-saving volunteer interacts with children in a game to share energy-saving knowledge ▼

Corporate Planning and Organization volunteers instruct children in the significance of biodiversity ▶

Facility volunteers on an outing with his child on a holiday, plant a tree to help reduce carbon emissions ▶

Guided Tour Volunteers

426 / 1,704 hours
Semiconductor education services offered

Energy-saving Volunteers

59 / 590 hours
Energy-efficiency check services offered

Ecology Volunteers

398 / 1,592 hours
Ecological tour services offered

Fab Environment Volunteers

328 / 2,624 hours
Environmental energy-saving education services offered

USR Volunteers

320 / 2,560 hours
Changing LED energy-saving light tubes offered

Operations and Governance

Corporate Governance

TSMC advocates and acts upon the principles of operational transparency and respect for shareholder rights. We believe that the basis for successful corporate governance is a sound and effective Board of Directors. In line with this principle, TSMC Board of Directors delegates various responsibilities and authority to three Board Committees, Audit and Risk Committee, Compensation and People Development Committee, and Nominating, Corporate Governance and Sustainability Committee. Each Committee's chairperson regularly reports to the Board on its activities and recommendations.

Board Responsibilities and Composition

Inheriting the spirit of TSMC's Founder, Dr. Morris Chang's philosophy on corporate governance, under the leadership of Chairman Dr. Mark Liu and CEO & Vice Chairman Dr. C.C. Wei, TSMC's Board of Directors takes a serious and forthright approach to its duties and is a dedicated, competent and independent Board.

TSMC's Board of Directors consists of ten distinguished members with a great breadth of experience as world-class business leaders or professionals. We deeply rely on them for their diverse knowledge, personal perspectives, and solid business judgment. The ten directors are Chairman, Dr. Mark Liu; CEO & Vice Chairman, Dr. C.C. Wei; Dr. F.C. Tseng; Dr. Ming-Hsin Kung (Representative of National Development Fund of Executive Yuan ("NDF")) as well as six Independent Directors: Sir Peter L. Bonfield; Ms. Kok-Choo Chen; Mr. Michael R. Splinter; Mr. Moshe N. Gavrielov; Mr. Yancey Hai; and Dr. L. Rafael Reif.

The ten members of the Board of Directors represent diverse range of perspect, including a complementary mix of skills, experiences, and backgrounds such as that from the industry, academia, and in law. These professionals include citizens from Taiwan, Europe and the U.S., one of whom is female. The six Independent Directors constitute 60% of the Board, and there is no marital or is within the second degree of kinship relationship between or among the Directors. As such, the Board of Directors carries independence.

Nomination and Election Directors

TSMC has established the "Guidelines for Nomination of Directors" that set out the procedures and criteria for the nomination, qualification and evaluation of Director candidates to be nominated by the Board of Directors, and provide that "Nominating, Corporate Governance and Sustainability Committee" will propose independent director candidates to the Board of Directors. The independence of each Independent Director candidate is also considered and assessed under relevant law. Directors shall be elected pursuant to the candidate nomination system. The tenure of office for Directors shall be three years. Under relevant law, in which TSMC was incorporated, any shareholders holding one percent or more of our total outstanding common shares may nominate their own candidate to stand for election as a Board member. This democratic mechanism allows our shareholders to become involved in the selection and nomination process of Board candidates. The final slate of candidates is put to the shareholders for voting at the relevant annual shareholders' meeting. The Company aims to have at least one female director to serve on the Board.

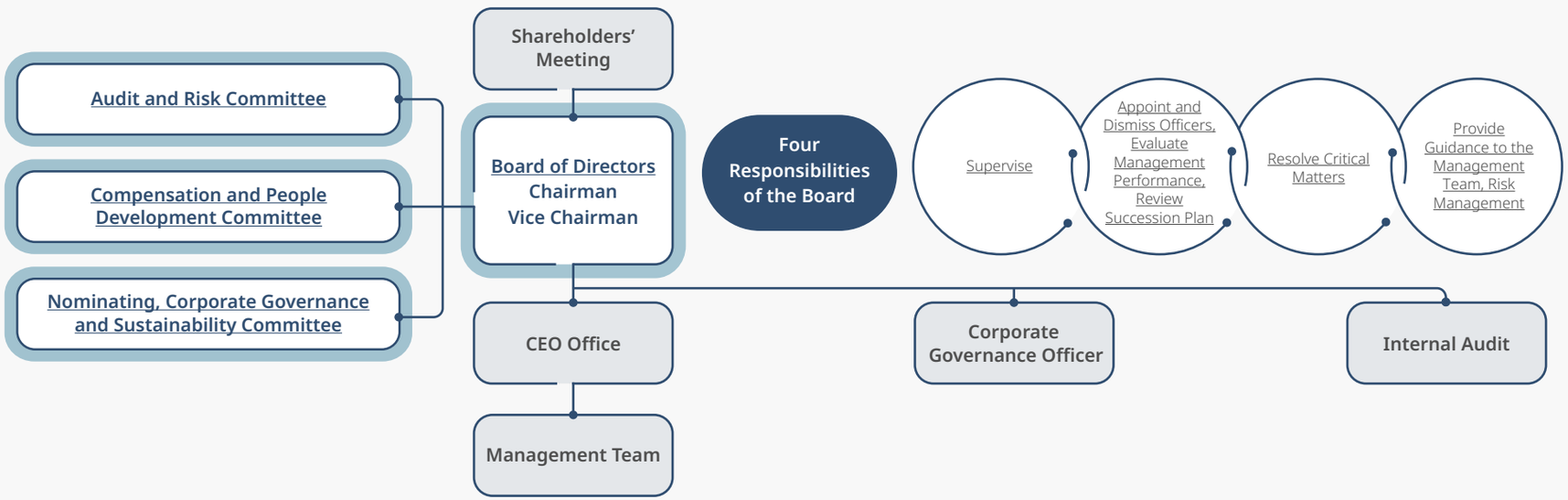
Functional Committees Responsibilities and Composition

The Audit and Risk Committee assists the Board in fulfilling its oversight of the quality and integrity of the accounting, auditing, reporting, and financial control practices, as well as risk management of the Company. Under R.O.C. law, the membership of the Committee shall consist of all independent directors. The Committee also engaged a financial expert consultant in accordance with the rules of the U.S. Securities and Exchange Commission.

The Compensation and People Development Committee assists the Board in discharging its responsibilities related to TSMC's compensation and benefits policies, plans and programs, in the evaluation and compensation of TSMC's directors of the Board and executives, and the review of the pipeline planning of the Company's senior executives to ensure the long-term sustainability of the Company. Currently, the Committee consists of the Chairman of the Board and all six Independent Directors. The Chairman of the Board and the Chief Executive Officer are invited by the Committee to attend all meetings and are excused from the Committee's discussion of their own compensation.

The Nominating, Corporate Governance and Sustainability Committee assists the Board in selecting candidates for nomination to be elected as independent directors to the Board, building diversified and professional board, and advising on corporate governance and sustainability matters. Currently, the Committee consists of the Chairman of the Board and all six Independent Directors.

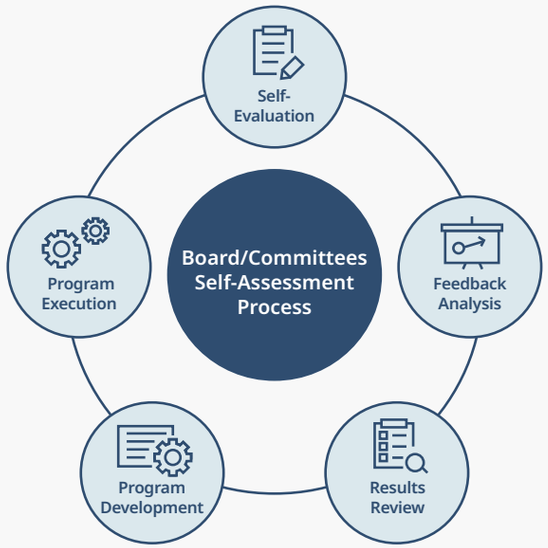
Governance Structure



Note: Ten new TSMC Board of Directors were elected at TSMC's Annual Shareholders' Meeting on June 4, 2024. Please refer to www.tsmc.com for the biographical details of the Board of Directors

Board and Functional Committees Performance Assessment

Each year, TSMC conducts regular Board performance self-evaluation in form of written questionnaires for the Board, individual directors, and the Audit and Risk Committee. In 2023, the Compensation and People Development Committee, as well as the Nominating, Corporate Governance and Sustainability Committee, were also included in the self-evaluations. For the results of each performance assessment, please refer to "3.2.5 Board of Directors' Performance Evaluation Implementation Status" in the Company's 2023 Annual Report.



For more details of "Corporate Governance", please refer to TSMC's 2023 Annual Report and www.tsmc.com.

Risk Management

TSMC adopts a balanced risk-reward management approach to optimize business returns while considering the holistic impact on corporate sustainability. TSMC's "Risk Management Policy", approved by the Board of Directors and signed off by the Chairman, affirms the commitment to a proactive and robust risk management system in assisting TSMC in making risk-based decisions that fulfill its ESG vision and deliver sustainable value for the company and stakeholders. Adhering closely to the ISO 31000: 2018 Risk Management System and the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management – Integrated Framework, TSMC's Enterprise Risk Management (ERM) framework was established to provide a systematic approach to risk management.

The TSMC Board of Directors and management team are involved in risk management-related reporting meetings and oversight systems to ensure the implementation of risk management practices in business decisions and operations. The Board of Directors is responsible for the governance of risk and has authorized the Audit and Risk Committee to review TSMC's ERM framework. Regarding the governance structure, the Risk Management Steering Committee, Risk Management Executive Council, Risk Management Taskforces, and Risk Management Division construct the management team and report key risks and management effectiveness to the Audit and Risk Committee every six months. The Chairman of the Audit and Risk Committee also reports the current risk profile and control measures to the Board of Directors every six months.

To implement the "Risk Management Policy," TSMC continued to enhance its risk management framework, processes, systems, and tools, and upgraded the internal risk management website, consolidating and providing various risk management resources in 2023. Furthermore, TSMC hosted its inaugural Risk Management Summit and conducted a Risk Awareness Culture Survey for the first time, and continued to issue risk management newsletters, conduct tabletop exercises at the Central Crisis Command Center, and organize online risk management training courses to foster a company-wide culture and mindset that prioritizes risk awareness. For details on risk management, please refer to 6.3 Risk Management in TSMC's 2023 Annual Report.

Risk Management Initiatives and Execution Achievements in 2023

Item	Risk Management Summit NEW	Risk Awareness Culture Survey NEW	Risk Management Newsletter NEW	Tabletop Simulation Exercises at the Central Crisis Command Center	Online Risk Management Training Courses NEW
Goal	Strengthen management levels and cross-departmental risk communication	Evaluate TSMC's risk management strategy / framework, leadership, accountability system, and risk communication to enhance risk awareness culture	Advocate and share the achievements of risk management initiatives and external risk management case studies	Strengthen crisis response management processes and decision-making	Enhance employees' core knowledge and capabilities in risk management
Achievements	**704** supervisors participated	• **30,411** colleagues participated • **87%** Online survey response rate	Issued **3** risk management newsletters	**32** members of the Central Crisis Command Center participated	• **72,635** colleagues participated • **98%** Course participation rate

Ethics and Regulatory Compliance

Ethics

"Integrity, commitment, innovation and customer trust" are TSMC's core values. As the cornerstone of "Integrity," TSMC established its "TSMC Ethics and Business Conduct Policy" ("Ethics Code") to be the guide for operating TSMC's business and to form a robust culture of integrity. At the same time, by establishing the "Supplier Code of Conduct" and "Supplier Sustainability Standards," and providing supplier training through TSMC Supplier Sustainability Academy online courses and Sustainable Supply Chain ESH Forum, TSMC extends its core value of Integrity into its supply chains and to enable suppliers to demonstrate business with integrity behavior. In addition, TSMC publishes its "TSMC Anti-Corruption Commitment" on the TSMC website to emphasize TSMC's commitment to its core value of Integrity.

TSMC established the "Complaint Policy and Procedure for Certain Accounting & Legal Matters", making multiple reporting channels available for internal and external voices, and accepting anonymous reports. All reported incidents collected from these reporting channels are properly recorded, confidentially investigated, well traced, and enhancements to TSMC practices are made where applicable. TSMC keeps individual identities confidential and prohibits any retaliation on any individual who in good faith reports a suspected violation or participates in an investigation. Furthermore, TSMC has established an Ethics Committee that oversees the implementation of TSMC Ethics Compliance Activities and investigations and disciplinary actions for reported incidents. The committee holds a meeting every quarter and may hold additional meetings as needed. In 2023, five incidents were verified upon investigation and determined for disciplinary action by the Ethics Committee.

Regulatory Compliance

TSMC operates in many countries. To ensure that every business activity is in compliance with applicable governing legislation, laws, regulations and regulatory expectations, TSMC has conducted a sequence of regulatory inventory check, regulatory monitor and update, regulatory identification, regulatory compliance review, policy and procedure formulation or update, compliance training and promotion, to closely monitor domestic and foreign government policies and regulatory developments that could materially impact TSMC's business and financial operations to enhance its regulatory compliance system.

2023 Achievements

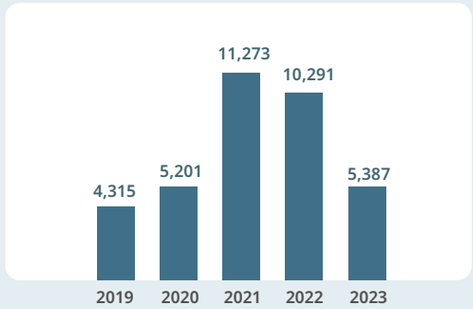
Ethics and Regulatory Compliance

- Regulatory Compliance: In 2023, TSMC did not receive any reports related to insider trading, money laundering, or other finance, accounting or antitrust matters, nor did TSMC receive any complaints concerning breach of customer privacy and loss of customer data, or any material regulatory violations (where a fine exceeds NT$1 million), including non-monetary sanctions.
- More information related to TSMC ethics and regulatory compliance, please refer to the 3.5 Ethics section and 3.6 Regulatory Compliance section of TSMC 2023 Annual Report.

Raining and Conflict of Interest Declaration

Ethics Training Course for Newcomers (Online program)

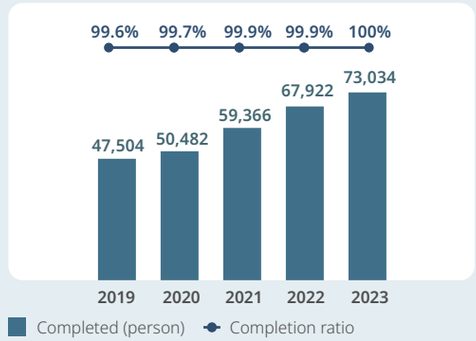
- New employees in Taiwan sites (including contractors)



Note : The course completion period is from January 1, 2023 to December 31, 2023

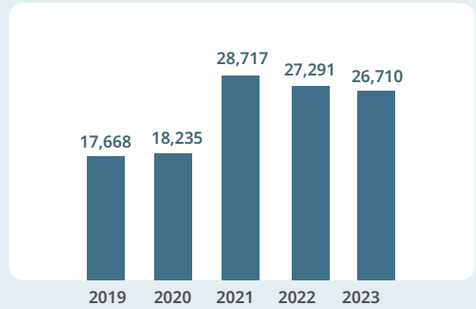
Annual Ethics and Compliance Training Course (Online program)

- All employees



Conflict of interest declaration / Declaration of Compliance with the Ethics Code

- New employees, the designated managers or employees according to the Ethics Code



Financial Performance

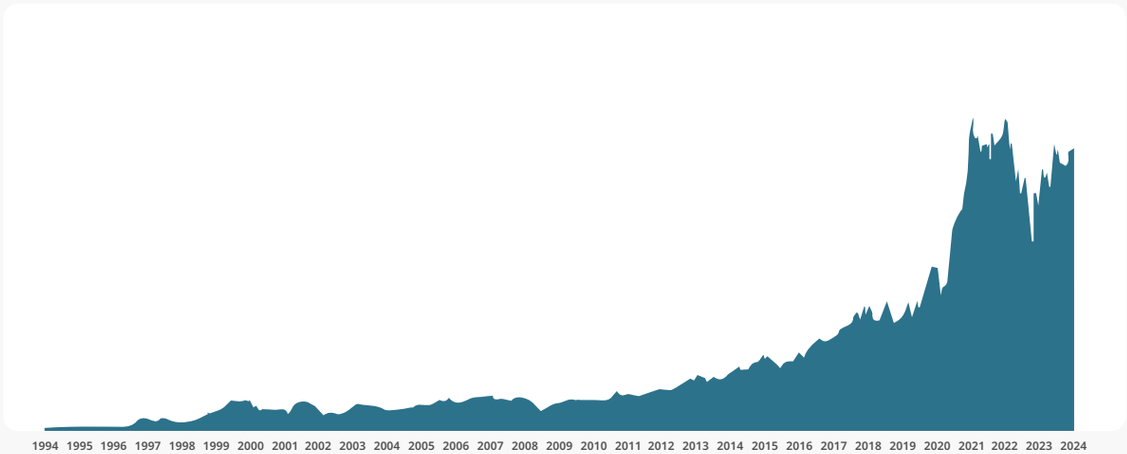
TSMC believes prudent business plans, disciplined capital management and good financial performance can help create long-term economic value and build a solid financial foundation. 2023 was a challenging year for the global semiconductor industry as weakening global macroeconomic conditions and higher inflation and interest rates prolonged the semiconductor inventory adjustment cycle. In a challenging year like 2023, TSMC's strong financial foundation allowed the Company to continue to execute its corporate sustainability plans, and to give back to all its stakeholders, including shareholders/investors, employees, customers, suppliers/contractors, government/industry associations, society, and others.

TSMC views transparency and timeliness of financial information as the key factors to facilitate better communication with investors, and strengthen their confidence in the Company's long-term investment value. Therefore, TSMC sets clear and measurable strategic financial objectives, in addition to regular disclosures of its latest financial results, and stays on track to deliver results that are aligned with its long-term financial targets.TSMC is a key enabler of AI applications, and the surge in AI-related demand supports the Company's strong conviction on energy-efficient computing. Thus, the value of TSMC's technology position is increasing. Based on the long-term growth outlook, from 2021 to 2026 the Company expects (1) its long-term revenue growth, in US dollar terms, to be 15% to 20% CAGR, (2) its long-term gross margin to be 53% and higher, and (3) ROE to be 25% and higher across the cycle.

Given the funding requirements to address the business growth opportunities, and the need to maintain a solid financial foundation, since 2020, TSMC has issued a total of NT$385.7 billion in NT dollar denominated and US$17.5 billion in US dollar denominated corporate bonds, with favorable pricing terms. After the bond to issuances, TSMC continues maintain the semiconductor industry's highest credit ratings.

Market Capitalization

Unit: NT$ Trillion



Four Strategies to Increase Long-term Investment Value

Continue to invest in technology leadership

13.7%
CAGR in R&D investment
2014 - 2023

7.7%
CAGR in R&D headcounts
2014 - 2023

Provide excellent manufacturing services and capacity support

16 Million
Total capacity exceeded 16 million 12"-equivalent wafers in 2023

12.1%
CAGR in capital expenditures
2014 - 2023

Pursue revenue and market share growth

13.2%
CAGR in net revenue
2014 - 2023

28%
Of the world's semiconductor excluding memory output value produced in 2023

Maintain or improve profitability and investment returns

16.1%
CAGR in net income
2014 - 2023

27%
Average ROE
2014 - 2023

2.8 Trillion
Cumulative cash dividends (NT$)
2014 - 2023

Since the Company went public in 1994, TSMC has been profitable every year and TSMC's market capitalization has been growing steadily. As of December 31, 2023, TSMC's market capitalization reached NT$15.6 trillion, or US$507.2 billion.

TSMC's solid financial performance enables the Company to distribute profits to shareholders in the form of cash dividends. In 2023, TSMC's Board of Directors approved the increase in quarterly cash dividend twice – from NT$2.75 to NT$3.00 per share in in May, and further raised to NT3.50 per share in November. Therefore, TSMC's shareholders received a total of NT$11.25 per share in cash dividends in 2023, and will receive at least NT13.5 per share in 2024. From 2004 to 2023, TSMC has paid out a total of NT$2.8 trillion, or US$90.8 billion, in cash dividends.

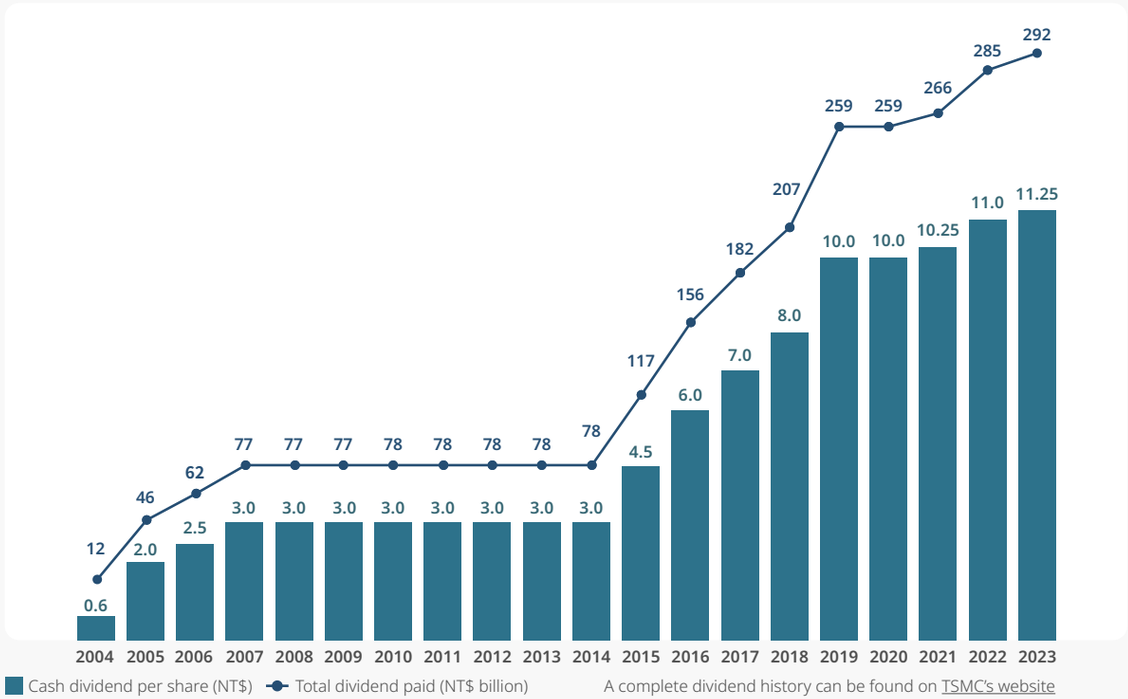
In the future, TSMC intends to maintain a sustainable quarterly cash dividend, and to distribute the cash dividend each year at a level not lower than the year before.

AA-
Standard & Poor's (S&P) Ratings

Aa3
Moody's Ratings

twAAA
Taiwan Ratings

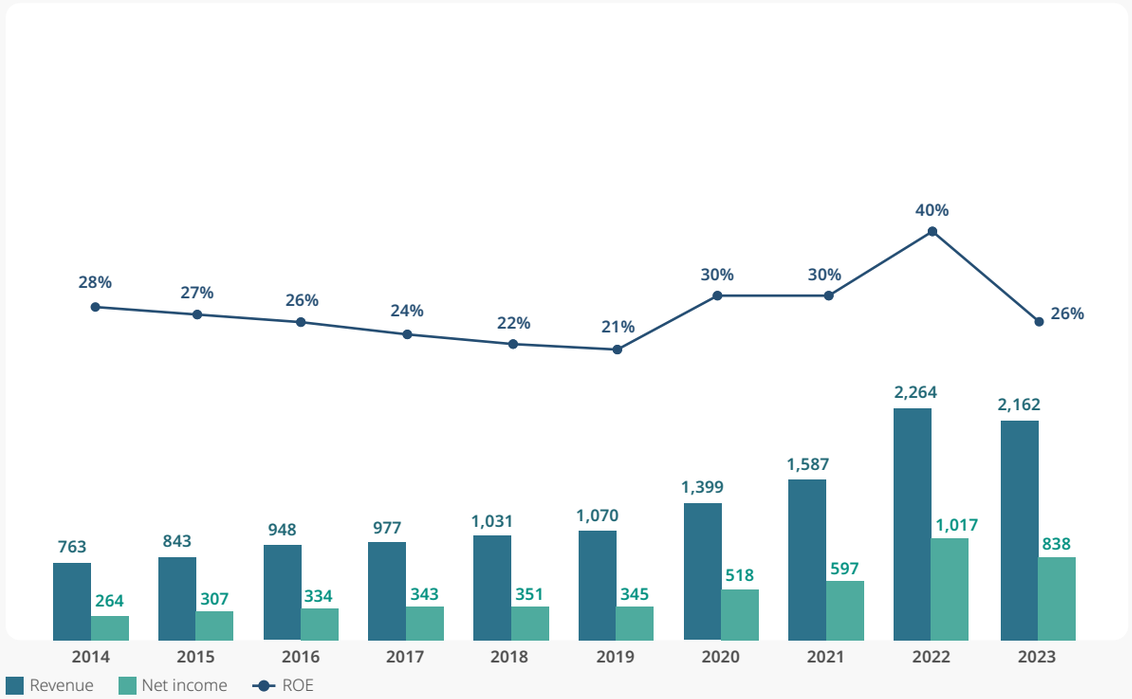
Cash Dividend



A complete dividend history can be found on TSMC's website

Financial Performance

Unit: NT$ Billion



Tax

TSMC supports the government in formulating laws and regulations that encourage enterprise innovation and foster economic growth. The Chief Financial Officer reviews and approves the Company's tax policy annually, committing to transparency and sustainable development.

Tax Policy

- Act at all times in compliance with the spirit and the letter of all applicable tax laws and regulations in the jurisdictions in which we operate.
- Conduct inter-company transactions on an arm's length basis and in accordance with the internationally accepted transfer pricing guidance published by the OECD.
- Be transparent in financial reporting, make disclosures in accordance with applicable regulations and reporting requirements.
- Do not use tax havens or tax structures whose sole purpose is tax avoidance.
- Do not transfer value created to low-tax jurisdictions.
- Develop strong, mutually respectful relationships with tax authorities based on transparency and trust.
- Always consider tax as a part of major business decisions.
- Analyze the operating environment and assess tax risk through a corporate management mechanism.

Tax Risk Management

TSMC is subject to tax laws and regulations in various jurisdictions in which it operates or conducts business. Any unfavorable changes in tax laws and regulations in these jurisdictions could increase the Company's effective tax rate and have an adverse effect on its operating results. In order to effectively manage tax risks, TSMC follows internal control processes, identifies, assesses, and manages tax risks from regulatory changes and its business transactions, accounts for them appropriately, and implements and monitors controls over them. Tax risk management is incorporated in TSMC's enterprise risk management (ERM) program. The risk management organization annually briefs TSMC's Audit and Risk Committee on the ever-changing risk environment, the key points of TSMC's ERM, and risk assessment and mitigation efforts. For more details on risk management, please refer to the "Risk Management" section in TSMC's 2023 Annual Report.

Tax Governance

The ultimate responsibility for taxation management for TSMC and its subsidiaries rests with the Chief Financial Officer, who delegates day-to-day responsibility to the Controller. A team of qualified and experienced tax professionals supports the Controller to meet TSMC's tax obligations. In addition, TSMC also leverages external tax service providers for complementary expertise.

TSMC's Audit and Risk Committee is delegated by the Board to oversee the quality and integrity of the accounting, auditing, reporting, and financial control practices of the Company through periodic review of certain major matters, including accounting policies and procedures, internal control systems, legal compliance, and corporate risk management, etc. Among these, tax compliance is included as part of the Company's legal compliance.

Stakeholder Engagement and Management of Tax Issues

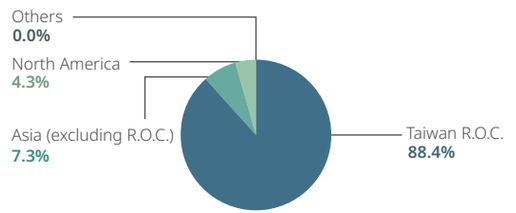
TSMC proactively communicated and exchanged information with tax authorities through visits, addressing international tax reform trends and domestic tax issues, to establish a sound tax environment. TSMC participated in conferences held by tax-related organizations to stay abreast of international tax trends, in order to manage tax risks and enhance competitiveness.

Effective Tax Rate

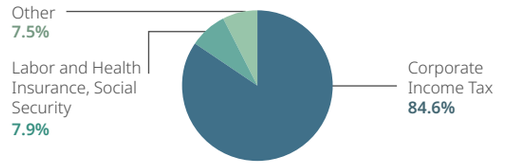
In 2023, TSMC's effective tax rate and cash tax rate were 14.4% and 16.3%, respectively. For the last two years, the average effective tax rate and cash tax rate were 12.7% and 11.6%, respectively, both of which were lower than the industry average effective tax rate of 13.96% and cash tax rate of 13.82% based on S&P Global 2024 CSA Handbook in the "Semiconductors and Semiconductor Equipment" industry group, and also lower than Taiwan R.O.C. statutory tax rate of 20%. This was primarily due to a five-year tax exemption for capital investments made in previous years, and tax credits for research and development expenditures and the purchase of machinery or equipment for advanced manufacturing processes according to regulations under the R.O.C. Statute for Upgrading Industries and Statute for Industrial Innovation.

NT$ 189.0 Billion	In 2023, TSMC's total tax payments on a cash basis worldwide were NT$189.0 billion.
>90%	In 2023, over 90% of TSMC's revenue and profit before tax were generated from its business operations in Taiwan. Meanwhile, over 90% of its income tax payments were also made to the Taiwan R.O.C. government.
1	Based on data provided by Taiwan Economic Journal (TEJ) database, TSMC was the largest corporate income tax payer among all public listed companies in Taiwan in 2023.
14.4%	TSMC's 2023 income tax payment in Taiwan represented 14.4% of total corporate income taxes collected by the R.O.C. government.[Note 1]

2023 Tax Breakdown[Note 2]



NT$189.0 Billion



Income Tax Paid - 159.9 Billion (NT$)

Taiwan R.O.C.	98.4%	Asia (excluding R.O.C.)	1.0%
North America	0.6%	Other	0.0%

Profit Before Tax - 979.2 Billion (NT$)

Taiwan R.O.C.	95.0%	Asia (excluding R.O.C.)	3.1%
North America	-0.8%	Other	2.7%

Income Tax Accrued - 136.9 Billion (NT$)

Taiwan R.O.C.	98.2%	Asia (excluding R.O.C.)	1.2%
North America	0.6%	Other	0.0%

Note 1: Source: National Statistics, R.O.C. (Taiwan), Public Finance Statistics Database

Note 2: TSMC categorizes its profit before tax, income tax accrued, and taxes paid geographically based on the country in which TSMC and subsidiaries are located.

Information Security

TSMC adheres to its Information Security Statement as a guiding principle, actively improving information security and proprietary information protection mechanisms to honor its commitments to employees, customers, and the supply chain. Throughout 2023, TSMC continued enhancing its cyber resilience by allocating resources across ten major categories and implementing comprehensive optimization measures. Additionally, TSMC joined the Forum of Incident Response and Security Teams (FIRST) to gain timely insights into significant information security events and intelligence. This proactive approach allows TSMC to deploy response mechanisms in advance to reduce potential risks. At the same time, in partnership with Semiconductor Equipment and Materials International (SEMI), TSMC is advancing the promotion of the Specification for Cybersecurity of Fab Equipment (SEMI E187). By integrating these standards into procurement specifications for equipment vendors, TSMC strengthens information security protection from the very beginning. This effort extends the influence of information security standards throughout the supply chain, bolstering Taiwan's semiconductor industry to maintain its leading global competitiveness.

Robust Information Security Governance and Management System

TSMC's corporate information security governance is under the oversight of the Audit and Risk Committee, authorized by the Board of Directors. Sir Peter L. Bonfield, an independent director with cybersecurity expertise, serves as the Chairman. A Chief Information Security Officer (CISO) is tasked with coordinating the Company's overall information security strategy and resources. TSMC has established a dedicated information security organization (Corporate Information Security, CIS) to handle the implementation, planning, monitoring, and management of information security operations. Every six months, the CIS executives report risk management measures to the Audit and Risk Committee, including global information security trends, corporate information security policies, plans, and implementation results. The chair of the Audit and Risk Committee also reports on the effectiveness of information security supervision and risk control measures to the Board of Directors.

TSMC has also established the PIP and Risk Committee and the IT Security Committee. These committees are chaired by the CISO, with members including VP-level executives and heads of IT/Information Security-related departments. They meet regularly to review and deliberate on important information security initiatives, enhancing information security protection and management mechanisms.

Following International Standards to Ensure Progressive Information Security Management

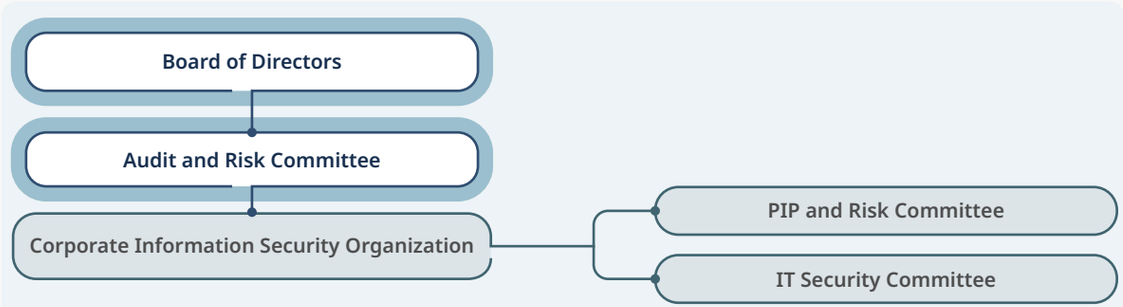
Throughout its history, TSMC has consistently met the information security requirements of both customers and third-party auditors. The Company has obtained and maintained ISO 27001 international certification for information security management and ISO 15408 certification for information security product management. Additionally, TSMC consults critical security controls from System Administration, Networking and Security (SANS) and adheres to the specifications of the U.S. Department of Defense's Cybersecurity Maturity Model Certification (CMMC). Following the Cybersecurity Framework (CSF) and Security Control Framework (SCF) established by the National Institute of Standards and Technology (NIST), TSMC strategically plans its information security development blueprint, which includes measures to enhance control over physical environments, system operations, information protection, and product security. In 2023, TSMC introduced and revised 30 information security regulations. Audits related to information security revealed no significant deficiencies, and there were no major security incidents resulting in breaches, customer information leaks, or fines. Moreover, there were no complaints from third parties or regulatory authorities regarding violations of customer data protection or loss of customer data, leading to legal action against the Company.

In 2023, TSMC continued its commitment to creating a high-quality chip manufacturing environment and ensuring proprietary information protection for customers. TSMC's Fab 14A, Fab 14B, Fab 18A, Fab 18B, and Advanced Backend Fab 6A received ISO/IEC 15408 EAL6 certification under Common Criteria (Site Certification) from the German Federal Office for Information Security (BSI). Moreover, TSMC underwent security assessments from six customers, completed security-related questionnaire assessments from 21 customers, and was invited to share security management insights with five customers. Through this collaboration, TSMC and its customers aim to elevate industry security standards and capitalize on market opportunities.

Collaborating with SEMI to Enhance Industry Chain Cybersecurity Protection and Achieve Common Good

In collaboration with SEMI, TSMC has established the SEMI Cybersecurity Committee to enhance industry-wide cybersecurity. Chaired by Dr. James Tu, Head of Corporate Information Security, the committee executes four major directions to deepen information security practices across the industry. TSMC initiated and promoted the globally recognized Specification for Cybersecurity of Fab Equipment (SEMI E187), earning the "2023 International SEMI Standards Excellence Award." Subsequently, TSMC incorporated these standards into its procurement specifications, covering four areas: operating systems, network security, endpoint protection, and security monitoring and cybersecurity auditing. A verification mechanism ensures equipment suppliers comply with the standards. Additionally, TSMC and SEMI jointly defined the "Cybersecurity Reference Architecture for Semiconductor Manufacturing Environment" to accelerate the integration and networking efficiency of manufacturing facilities. This initiative aims to create wafer fabs that combine production efficiency with robust information security defense, enhancing industry competitiveness through continuous improvement in security management, and fostering a solid information security ecosystem with industry partners.

TSMC Corporate Information Security Organization



Ten Major Categories of Key Information Security Measures

Category	Measures	Actions in 2023
Cybersecurity Control	Multilayered protection, network isolation, vulnerability scanning and patching, email and internet browsing protection, automatic detection of network threats, automatic blocking of critical alerts, and others	• Established a global cloud protection shield and implemented cloud solutions to enhance the security of the domain environment
Asset Management and Data Protection	Systematic monitoring and analysis of software and hardware assets, separation of the Company and personal device/information, patch management and vulnerability remediation, Audit Trail Maintenance, deployment of smart endpoint protection systems in office areas and others	• Implemented the "Security Certification Office Project" • Introduced the "Security Assessment Automation" (SAA) to detect over **300** key performance indicators • Fully adopted document/email labeling mechanisms for controlling confidentiality levels
Access Control	Adherence to Need-to-Know and information classification control principles to achieve sufficient authorization with minimal risks and enhanced productivity	• Continuous implementation of identity verification and authorization services, remote access control settings, and high-privilege account management
Computer Operation Security	Antivirus and malware detection, server security control, patch management and vulnerability remediation, deployment of security agent, smart endpoint protection, and others	• Added **9** security control mechanisms for semiconductor manufacturing equipment and servers in the fab areas
Personnel and Workplace Security	Establishment of a multi-layered physical security monitoring system and detection mechanisms, with security control technology integrated into the planning phase of new fab construction	• Established a centralized smart physical security monitoring platform for streamlined management • Integrated artificial intelligence for automated anomaly detection and coordinated emergency response across zones • Introduced dual-factor authentication in production areas to bolster personnel access security management • Deployed wafer cart tracking systems to monitor logistics movements effectively
Application Security	Conduct application development risk assessment and vulnerability control, implement automated checks into DevSecOps, deployment of automated scanning tools, and management of open-source software supply chains	• Strengthened risk assessment and measures within the DevSecOps platform and established performance metrics for application compliance
Cybersecurity Incident Response and Management	Coordinate through a 24-hour Cybersecurity Incident Response Center (CIRC) aimed at clarifying the root causes of cybersecurity incidents, executing improvement plans, and conducting practical drills according to incident reporting and management procedures	• Completed **25** cybersecurity incident drills in domestic and overseas facilities and expanded network disaster exercises • Continued to take out insurances for cybersecurity and lower the risk of cybersecurity incidents
Supply Chain Security	Actively implements four information security measures through establishment of standards, assessment and collaboration, advocacy, and risk management to deepen supplier information security management	• Completed information security evaluation for over **700** suppliers, with **80%** receiving a grade of A • Defined **10** basic information security requirements to enhance the security strength of the supply chain
Personnel Information Security Management, Training and Promotion	Strengthen the expertise of the information security team, personnel management, education, training, and social engineering drill. Personnel can only enter the factory premises for operations after completing the training course	• The information security team obtained **52** top international information security certifications, amounting to over **170** certifications • Over **7,000** new employees and nearly **100,000** employees from suppliers completed information security education and training courses • Produced **48** awareness posters, conducted **9** social engineering and email phishing drills reaching over 220,000 participants, and issued 2 editions of supplier information security newsletters to over **240,000** recipients • **73,467** employees completed the annual online information security refresher course • Obtained an average score of **94** for employee approval of information protection-related policies and handled **325** employee feedback reports • 0.034% of employees were found in violation of information security protection and PIP procedures and penalized according to the severity of the damage
Information Security Assessment and Risk Management	Implement information security risk assessments and automate security testing, monitor key performance indicators, and deepen external experience exchange	• Collaborated with third-party expert teams to conduct penetration testing and red team vs. blue team exercises drills to enhance the effectiveness of information security monitoring and protection. The third-party information security evaluation resulted in a scored of **98** points, higher than the industry average

Note: In 2023, the scope of performance indicators related to proprietary information protection (PIP) includes both the Taiwan facilities and all overseas subsidiaries

Business and Human Rights

Upholding the Universal Declaration of Human Rights, TSMC manages human rights issues across its operations, suppliers, contractors, and partners (customers and communities) in alignment with the Responsible Business Alliance Code of Conduct, the OECD Due Diligence Guidance for Responsible Business Conduct, and the United Nations Guiding Principles on Business and Human Rights (UNGPs) adopted by the UN Human Rights Council. In compliance with local laws at all operating locations, the Company strictly prohibits all forms of modern slavery, including child labor, human trafficking, and forced labor across its operations and supply chain. In 2023, TSMC updated and published its Human Rights Policy, broadening its human rights coverage. The Company ensures human rights protection in six major dimensions, Labour Rights, Environmental Rights, Voice & Participation, Gender Equality, Products & Services Liability, and Governance & Security, referring to the human rights risks in business operations proposed by the United Nations Development Programme (UNDP). TSMC pledges to integrate responsible business practices into policies and management systems, regularly identifies and assesses risks, and promotes preventive/mitigating measures and tracking mechanisms to create a work environment that respects human rights and treats all individuals with equity and inclusion.

Human Rights Due Diligence

Establish Policy and Governance → **Take Investigation and Action** → **Enhance Engagement and Disclosure**

Policy/Statement
Develop the Human Rights Policy

Risk Assessment
Identify potential human rights impact

Monitoring
Track the risks and the results of investigation

Governance
The Board of Directors oversees human rights issues

Mitigation
Prevent and reduce adverse effects

Communication
Reduce the human rights impacts

Salient Issues
Identify 11 salient human rights issues

Remedy
Provide and support appropriate remedies

Grievance Channel
Provide open and equitable grievance channels

TSMC's Human Rights Governance Mechanism

The TSMC Board of Directors acts as the supreme oversight body for human rights issues. The ESG Committee forms a cross-functional Human Rights Working Group, comprising departments from Corporate Sustainability, Customer Service, Environmental Safety and Health, Human Resources, Legal, Information Technology and Materials Management & Risk Management, Operations, Quality and Reliability, Research and Development. This ensures the systematic promotion of human rights management. The Human Rights Working Group regularly reports on the progress to the ESG Steering Committee, meanwhile, the ESG Committee Chairperson provides quarterly reports on human rights management efforts and outcomes to the Nominating, Corporate Governance, and Sustainability Committee under the Board.

Board of Directors/Nominating, Corporate Governance, and Sustainability Committee
The supreme governing body overseeing and committing to human rights issues

ESG Steering Committee
Oversees human rights management progress

ESG Committee
Establishes and monitors management outcomes

Human Rights Working Group
Drives efforts in human rights management
Corporate Sustainability, Customer Service, Environmental Safety and Health, Human Resources, Legal, Information Technology and Materials Management & Risk Management, Operations, Quality and Reliability, Research and Development

Salient Human Rights Issues

In line with the six human rights dimensions, TSMC has identified 11 salient human rights issues, and affected individuals, including TSMC employees, as well as employees of suppliers and contractors, and partners (including customers and communities). Considering the Human Rights Risks in Business Operations outlined by the UNDP, priority was given to distributing Workplace Human Rights Climate Survey in 2023 to operational and R&D units with the highest employee proportions to delve into workplace human rights issues, thereby enhancing management systems. In 2024, TSMC is unveiling its inaugural Human Rights Report, revealing measures and progress propelled by the Human Rights Taskforce, aligned with the UNGPs framework. For more details, please see the TSMC Human Rights Report.

Salient Human Rights Issues		Indicators	Affected Stakeholders				
			TSMC Employees	Supplier Employees	Contractor Employees	Customers	Communities
Labour Rights	Wages and Working Hours	Overtime work and overtime pay	✓	✓	✓		
	Health and Safety	Worker safety and health	✓	✓	✓		
	Terms of Employment	Extensive use of contractors or outsourced labor	✓	✓	✓		
	Workplace Discrimination	Employee discrimination, workplace diversity, and migrant worker recruitment criteria	✓	✓	✓		
Environmental Rights	Pollution and Chemicals	Impact on water resource of communities, biodiversity, and human health					✓
Voice & Participation	Privacy	Improper handling of personal data, employee/worker privacy rights	✓	✓	✓		
Gender Equality	Sexual Harassment	Workplace sexual harassment	✓	✓	✓		
	Gender Discrimination	Health/reproductive risks faced by pregnant or breastfeeding female employees	✓	✓	✓		
Services & Products Liability	Managing Hazardous Substances in Products	Harmful or risky effects on human health from product testing	✓	✓	✓	✓	
	Customer Proprietary Information and Personal Information Protection	Improper use, access, or processing of confidential customer data and personal information without the customer's consent				✓	
Governance & Security	Security	Providing safety equipment or facilities for workers in hazardous working conditions	✓	✓	✓		

Appendix

About This Report

As a responsible global corporate citizen, TSMC aligns with international sustainability standards and has been issuing non-financial reports for 25 consecutive years. In compliance with the Global Reporting Initiative (GRI), TCFD Recommendations, TNFD Recommendations, and Sustainability Accounting Standards Board (SASB) standards, TSMC utilizes the Impact Reporting and Investment Standards (IRIS+) to evaluate philanthropic projects, with the analysis results disclosed in the inaugural Sustainability Impact Valuation Report. Furthermore, through systematic communication channels, TSMC consistently gathers stakeholders' management direction through materiality analysis, transparently disclosing execution strategies, medium-to-long-term goals, implementation methods, and performance achievements. Together with stakeholders, including employees, shareholders/investors, customers, suppliers/contractors, government/industry associations, and society, TSMC drives positive change, making the annual sustainability report an essential tool for managing ESG progress.

Reporting Period

The reporting period is between January 1, 2023 and December 31, 2023. This Report, available in both Chinese and English, will be published on TSMC's ESG website in July 2024. It addresses stakeholders' material concerns and highlights TSMC's achievements across economic, environmental, social, and governance aspects.

Reporting Scope

The reporting boundary for 2023 TSMC sustainability report aligned with the consolidated financial statements, including all TSMC fabs in Taiwan, including headquarters, all wafer fabs, and back-end assembly and test facilities, as well as TSMC (China), TSMC (Nanjing), TSMC Washington, LLC, VisEra, and other subsidiaries. Any variations in the disclosure scope among the mentioned entities will be noted in the corresponding paragraphs.

Diverse Sustainability Information Disclosure

- Highlights and Videos of Sustainability Report
- Human Rights Report
- Climate and Nature Report
- ESG Website
- Sustainability Impact Valuation Report
- UN SDGs Action Report
- ESG Newsletter
- TSMC LinkedIn
- Materiality Analysis Report

Main Changes in TSMC's ESG Information Disclosure in 2023

Materiality Analysis

Adopted GRI 3: Material Topics 2021, double materiality, dynamic materiality, and sustainability impact analysis, and conducted biennially

Disclosure Scope

Expanded to include Wafer Fab 14 Phase 8 in Taiwan

Dynamic Updates

Issued a total of 48 ESG sustainability stories throughout the year, offering real-time updates on sustainability progress

Theme Reports

Released the first-ever "Human Rights Report" and "Sustainability Impact Valuation Report," developed the "Climate and Nature Report" in conjunction with TCFD and TNFD and continued to update theme reports such as "UN SDGs Action Report" and "Materiality Analysis Report"

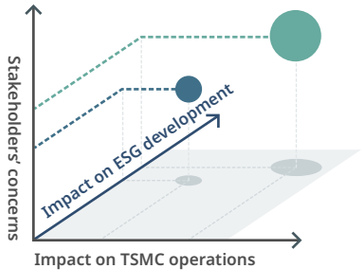
Report Compiling and Quality Management Process

Inclusivity

Communicate with stakeholders to collect reasonable expectations

Impact

ESG issues with significant impact to TSMC's operation and external sustainability development, and of stakeholders' concerns



Materiality

Identify and prioritize ESG topics and define TSMC's material issues

Responsiveness

Formulate management plan on material issues and transparently disclose the Company's action and progress

Launch Kick-off Meeting

- Deliver a comprehensive plan
- Define the main theme and content of the Report
- Establish Editing and revision guidelines
- Communicate matters requiring collaborations for audit

ESG Department

Inter-departmental Meetings

- Share new trends and approaches
- Share the annual plan for improvements
- Report case studies
- Plan the ESG Newsletter

ESG Committee Team Assigned Writer

Compile, edit, and revise in compliance with eight reporting principles set forth by the GRI, TSMC's 21 quality indicators and the SMART principle

Long-term Sustainability Goals

Review the 2030 Sustainability Goals in accordance with the SMART principles

- Specific
- Measurable
- Achievable
- Relevant
- Time-bound

Develop the six major quality checklists

Ensure compliance with 21 quality indicators

- Accuracy
- Balance
- Clarity
- Comparability
- Reliability
- Timeliness

Division-level Managers

- Confirm sustainable activities and performances by the organization
- Audit information accuracy

↓

VPs and Above Executives of TSMC Organizations

- Verify information and data

↓

Independent Verification Organization

- Preliminary and on-site paper audit by third parties
- Raise improvement items from audit findings

↓

ESG Committee Chairperson

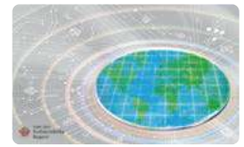
- Review and finalize report

↓

Board of Directors

- Supervise and guide

Sustainability Report

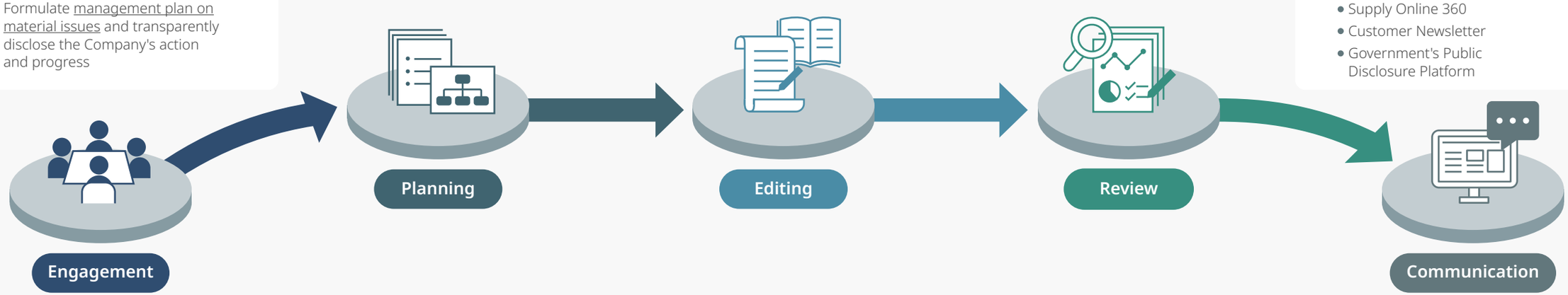


Internal Communication Channels

- EDM to all employees
- myTSMC internal Website
- myESG internal Website
- ESG AWARD Website
- ESG Steering Committee
- ESG Committee
- Inter-departmental communication meetings for ESG

External Communication Channels

- TSMC Website and ESG Website
- TSMC ESG Newsletter
- Email to stakeholders
- TSMC ESG Facebook
- TSMC LinkedIn
- Supply Online 360
- Customer Newsletter
- Government's Public Disclosure Platform



Note: For each certification, please refer to TSMC's ESG website

Report Writing Guidelines and Principles

	Standards	Certification Organization
ESG	GRI Standards TCFD TNFD SASB Index for the Semiconductor Industry AA1000 AccountAbility Principles The International Integrated Reporting Framework CDP Climate Change/Water Security The United Nations Global Compact (UNGC) The United Nations Sustainable Development Goals (UN SDGs) WEF IBC Stakeholder Capitalism Metrics	DNV Business Assurance Co. Ltd. certified this Report In compliance with the DNV VeriSustain™ Protocol, GRI Standards, and SASB Index
Financial Information	IFRSs endorsed by the Financial Supervisory Commission (FSC) with the effective dates Regulations Governing the Preparation of Financial Reports by Securities Issuers	Deloitte & Touche

Feedback

If you have any feedback, advice, or suggestion on this report or TSMC's sustainable development, please feel free to contact us. For more information about TSMC's latest sustainability practices, please subscribe to the TSMC ESG Newsletter.

Responsible Unit: ESG Committee
ESG Website: https://esg.tsmc.com/en-US/
Email: ESG@tsmc.com
Phone: +886-3-5636688
Address: 8, Li-Hsin Rd. 6, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C

Sustainability Disclosure Framework

TSMC's Sustainability Report aligns with sustainability standards/guidelines issued by the Global Reporting Initiative (GRI), AccountAbility, the International Sustainability Standards Board, the Taskforce on Nature-related Financial Disclosures, and the World Economic Forum International Business Council. By participating in international assessments by ESG rating agencies like CDP (formerly the Carbon Disclosure Project) and S&P Global, the Company fosters trust among stakeholders. Concurrently, TSMC's proactive responses to United Nations initiatives drive alignment with international trends across its various organizations, thus consistently improving sustainability management.

GRI	AccountAbility	AccountAbility	ISSB	ISSB	ISSB
GRI Sustainability Reporting Standards	AA1000 AccountAbility Principles Standard	AA1000 Stakeholder Engagement Standard	International Integrated Reporting Framework	Semiconductor Industry Indicators	TCFD Recommendations
E S G	E S G	E S G	E S G	E S G	E S G
Sustainability disclosure standards	Sustainability disclosure standards	Sustainability disclosure standards	Sustainability disclosure standards	Sustainability disclosure standards	Sustainability disclosure standards

TNFD	WEF IBC	CDP	S&P Global	UN	UN
TNFD Recommendations	Stakeholder Capitalism Metrics	Climate Change and Water Security	Dow Jones Sustainability Index, DJSI	Global Compact	Sustainable Development Goals
E S G	E S G	E S G	E S G	E S G	E S G
Sustainability disclosure standards	Sustainability disclosure standards	International ESG ratings	International ESG ratings	Industries/Specific initiatives	Industries/Specific initiatives

E Environmental S Social G Governance/Economics

Climate-related Information of Listed Companies

	Items	Execution Status
1	Description on the Board and Management's oversight and governance on climate-related risks and opportunities	See TSMC Climate and Nature Management Framework - Governance
2	Description on how the identified climate risks and opportunities impact the company's business, strategies, and finance (short, mid, long-term)	See TSMC Climate and Nature Management Framework - Strategies & Climate, Change Risks/Opportunities and Response Measures
3	Description on the impact extreme climate events and transitional actions have on finance	See TSMC Climate and Nature Management Framework - Strategies
4	Description on how the climate risk identification, assessment, and management process is integrated in the overall risk management system	See TSMC Climate and Nature Management Framework - Risk Management
5	Should scenario analysis is used to assess the Company's resilience in face of climate change risks, explanations on the scenario, parameters, hypothesis, analysis factors and major financial impacts should be provided	See TSMC Climate and Nature Management Framework - Strategies
6	Should there be transitional programs in response to managing climate-related risks, please explain the program's content and metrics and targets used to identify and manage physical and transitional risks	See TSMC Climate and Nature Management Framework - Metrics and Targets
7	Should the internal carbon pricing is used as the planning tool, the pricing mechanism should be explained	See TSMC Carbon Pricing Mechanism
8	Should climate-related targets are in place, information such as their scope of action, GHG emissions, planned timeline, and yearly achieved progress should be stated; for targets achieved through carbon offset and RECs, the source of offset amount and number of RECs should be stated	See TSMC Climate and Nature Management Framework - Metrics and Targets
9	Carbon inventory and assurance efforts	See chart on the next page

Year	Area	Scope 1		Scope 2		Assurance Institutes	Assurance Efforts
		Total Emissions (metric tons CO_2e)	Emission Intensity (metric tons CO_2e/NT$ thousand)	Total Emissions (metric tons CO_2e)	Emission Intensity (metric tons CO_2e/NT$ thousand)		
2023	The Parent Company	1,307,966	0.0006	10,150,252	0.0047	DNV	Reasonable level
	Visera	4,399	0.0006	37,135	0.0051	DNV	Reasonable level
	TSMC (China)	161,698	0.0063	0	0	DNV	Reasonable level
	TSMC (Nanging)	45,118	0.0007	0	0	DNV	Reasonable level
	TSMC Washington, LLC	76,851	0.0093	0	0	AWN	Limited level
2022	The Parent Company	1,669,770	0.0007	9,510,082	0.0042	DNV	Reasonable level
	Visera	5,845	0.0006	29,683	0.0033	DNV	Reasonable level
	TSMC (China)	187,181	0.0066	0	0	DNV	Reasonable level
	TSMC (Nanging)	46,209	0.0011	0	0	DNV	Reasonable level
	TSMC Washington, LLC	109,784	0.0107	0	0	AWN	Limited level

Note 1: Greenhouse Gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perflourocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3)

Note 2: Scope 1 (direct emissions) are emissions based on the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gases Inventories directly owned or controlled by the Company, and the calculation uses the Global Warming Potential (GWP) from IPCC's Fifth Assessment Report; scope 2 (indirect emissions) are indirect GHG emissions from purchased electricity, heat, and steam

Note 3: New additions to the 2023 emissions boundary include Fab 14 Phase 8, Fab 18 Phase 7, Fab 18 Phase 8

Participation in Industry Associations and Non-Profit Organizations[Note 1]

As a socially responsible corporation, TSMC is closely connected to society. With the aim of sustainable development and common good, TSMC works with partners and stakeholders from all walks of life to drive positive environmental and social change. TSMC participates in a variety of industry associations and public policy related nonprofit organizations to promote industry dialogue and development, as well as track key issues such as technology innovation, corporate governance, environmental sustainability, human rights, and supply chain management[Note 2]. In 2023, TSMC participated in 82 industry associations and non-profit organizations at home and abroad, with expenditures of over NT$54.09 million[Note 3]. Total expenditures in the past five years (2019~2023) were about NT$229.94 million.[Note 4, 5]

The issues covered by the industry associations and non-profit organizations which TSMC participates in are categorized as follows:

Industry Dialogue and Development

TSMC strives for the development of the semiconductor industry. Through participating in industry associations, the Company forges consensus, facilitates collaboration, defines standards, develops talents, and makes policy suggestions to the government in areas including land, water, electricity, talent, intellectual property protection, resilient societies and other areas related to the competitiveness of the industry. Industry associations that TSMC participates in to steer industry development include:

- Taiwan Semiconductor Industry Association (TSIA)
- Semiconductor Industry Association (SIA)
- SEMI
- Global Semiconductor Alliance (GSA)
- The Allied Association for Science Park Industries
- Chinese National Association of Industry and Commerce, Taiwan (CNAIC)
- Monte Jade Science & Technology Association of Taiwan
- Taiwan Electrical and Electronics Manufacturers' Association (TEEMA)
- The Center for Asia-Pacific Resilience and Innovation (CAPRI)
- Information Technology Industry Council (ITI)
- National Committee on United States-China Relations
- Greater Phoenix Chamber of Commerce

TSMC Chairman Dr. Mark Liu chaired the World Semiconductor Council for 2 consecutive years since 2021, and currently serves as director of CNAIC. Senior Vice President Cliff Hou serves as Chairman of TSIA since 2023. Senior Vice President Y.P. Chin currently serves as chairperson of TSIA's Energy Committee, Vice President Dr. Y.L. Wang currently serves as chairperson of TSIA's Industry and University Committee, Director Han-Wen Fung currently serves as chairperson of TSIA's Environment, Safety and Health Committee, and Director Dr. Cheng-Ming Lin currently serves as chairperson of TSIA's JSTC Committee. Vice President Dr. Douglas Yu currently serves as co-chair of SEMI Taiwan's Packaging & Testing Committee, Director Dr. Shih-Fen Huang serves as chairperson of SEMI Taiwan's MEMS & Sensors Committee, Director Dr. John Lin currently serves as chairperson of SEMI Taiwan's IC Committee, Director M.D. Chen currently serves as chairperson of SEMI Taiwan's Materials Committee, Director Dr. James Tu currently serves as chairperson of SEMI Taiwan's Cyber Security Committee, and Deputy Director Dr. Scott Yu serves as co-chair of SEMI Taiwan's Smart Manufacturing Committee. Senior Vice President Rick Cassidy currently serves on the board of GSA. Senior Vice President Y.P. Chin currently serves as executive director of The Allied Association for Science Park Industries, and Senior Vice President Lora Ho serves as controller of The Allied Association for Science Park Industries. Senior Vice President J.K. Lin currently serves as director of TEEMA. Vice President and General Counsel Sylvia Fang currently serves as director of CAPRI. Vice President Peter Cleveland currently serves as director of ITI.

Note 1: Non-profit organizations in the areas of charity and education are not included here. For details of TSMC's participation in the TSMC Charity Foundation and TSMC Education and Culture Foundation, please see pages 172 to 192 of this report

Note 2: By law, TSMC is not permitted to make political donations as the Company is majority owned by foreign shareholders. TSMC has always followed this legal requirement and maintained political neutrality but respects and encourages employees to fulfill their civic duty

Note 3: The five largest membership fees paid or donations made by TSMC in 2023, in descending order, are:

1) Information Technology Industry Council (ITIC) / NT$12,478,000
The United States is one of TSMC's primary markets. TSMC participates in the ITIC in the U.S. to join other global technology companies to discuss policy trends and industry standards related to technology industry development, and to communicate with the U.S. and global governments on the importance of technology to the global economy

2) Taiwan Semiconductor Industry Association (TSIA) / NT$5,906,757 TSMC participates in the TSIA to support Taiwan's semiconductor industry, develop consensus on the development of the industry through the association's activities and promote healthy growth for the sector through cooperation amid competition

3) Semiconductor Industry Association (SIA) / NT$4,860,800
TSMC participates in the SIA to join other industry members to collectively communicate with the U.S. government and highlight the importance of the semiconductor industry to U.S. economic development, national security, and global competitiveness

4) SEMI / NT$2,890,818
TSMC participates in the SEMI, which serves the manufacturing supply chain for the micro- and nano-electronics and green energy industries, including semiconductors, optoelectronics semiconductor, flat panel display (FPD), micro-electromechanical systems (MEMS) and sensors, printed and flexible electronics, photovoltaics (PV), wind energy, smart storage, green finance and hydrogen fuel cell (HFC)

5) Allied Association for Science Park Industries / NT$1,980,000
TSMC participates in the Allied Association for Science Park Industries, which serves as a conduit between government and business for promulgation of policies and communication of views. It serves the common interests of companies in Taiwan's science parks and facilitates cooperation for the stable development of science park businesses

Note 4: TSMC's expenditures of membership and donation for industry associations and nonprofit organizations between 2019 and 2023 were NT$20,338,992, NT$40,197,059, NT$44,367,769, NT$70,943,042, and 54,089,183 respectively

Note 5: In addition to the expenditures disclosed in Note 4, TSMC's government relations expenses in 2023 amounted to NT$57,994,129 with the primary expense being employee payroll. TSMC did not make any political donations in the reporting period. In the past five years (from 2019 to 2023), TSMC did not make any political donations or other spendings related to ballot measures or referendums

Technology Innovation

Technology innovation is the key driving force moving the industry and economy forward. TSMC not only cares for and invests in technology innovation and participates in the definition of technical standards, but also calls on the government and private sector to protect the results of innovation together so that it can gain appropriate economic value and encourage further innovation, creating a fair competitive environment. TSMC participates in industry associations in the area of technology innovation including:

- Epoch Foundation
- K.T. Li Foundation for Development of Science and Technology
- Taiwan Association for Trade Secrets Protection (TTSP)
- Information Technology and Innovation Foundation (ITIF)
- Global Women's Innovation Network
- Peripheral Component Interconnect Special Interest Group (PCI SIG)
- Alliance for Telecommunications Industry Solutions
- JEDEC Solid State Technology Association (JEDEC)

TSMC Chairman Dr. Mark Liu currently serves as director of both Epoch Foundation and K.T. Li Foundation for Development of Science and Technology. TSMC Vice President and General Counsel Sylvia Fang jointly founded the TTSP in 2015 and served as its chairperson for the first two terms to help promote legal reform of Taiwan's trade secret laws and regulations. Currently she is an executive director of the TTSP. Associate General Counsel Dr. F.Y. Shieh currently serves as vice chairman of TTSP.

Corporate Governance

TSMC advocates and acts upon the principles of operational transparency and respects shareholder rights. Based on strong governance foundation, TSMC believes in leadership integrity and adopts ethics, regulatory compliance, and risk management mechanisms into daily business operations. TSMC participates in industry associations in the area of corporate governance including:

- Asia Business Council
- Asian Corporate Governance Association (ACGA)
- Chinese Professional Management Association
- Association of Certified Fraud Examiners, Taiwan Chapter
- Forum of Incident Response and Security Teams (FIRST)
- RIMS, the risk management society

Environmental Sustainability

Responding to climate change and mitigating climate impact to protect our shared global environment, TSMC promotes and preserves local biodiversity, integrates green management into daily operations and continues to enhance climate and energy, water stewardship, circular resources, and air pollution control through introducing innovative green technologies. The Company's goal is to become the global standard of eco-friendly corporations. TSMC also leverages social influence, actively participates in climate-related initiative, and joins hands with all sectors of society to adopt a climate position aligned with the Paris Agreement. TSMC participates in industry associations and non-profit organizations in the area of environmental sustainability including:

- Taiwan Net Zero Emissions Association (TNZEA)
- Taiwan Climate Partnership (TCP)
- Taiwan Institute for Sustainable Energy/Taiwan Center for Corporate Sustainability (TAISE/TCCS)
- Science and Technology in Society Forum (STS forum)
- RE100
- Business Council for Sustainable Development of Taiwan (BCSD Taiwan)
- CommonWealth Sustainability Council
- SEMI Semiconductor Climate Consortium (SEMI SCC)

TSMC Chairman Dr. Mark Liu currently serves as director of STS forum. TSMC is among the first members of TNZEA, TCP, and CommonWealth Sustainability Council. Senior Vice President J.K. Lin currently serves as vice chairman of TNZEA. Senior Vice President Lora Ho currently serves as director at TCCS, and TCP.

Human Rights and Supply Chain Management

Respecting human rights and creating a respectful workplace are critical to TSMC and all suppliers. TSMC is a full member of the Responsible Business Alliance, and in addition to meeting the alliance's requirements in auditing suppliers, the company also asks suppliers to strictly comply with local regulations to safeguard human rights. TSMC requires all suppliers to comply with "Supplier Code of Conduct" in order to ensure a dignified work environment. TSMC participates in industry associations in the area of human rights and supply chain management including:

- Responsible Business Alliance (RBA)
- Responsible Minerals Initiative (RMI)

ESG Performance Summary[Note 1]

Issues		Key Indicators	2021	2022	2023
Operations and Governance	Corporate Governance	Size of the Board (HC)	10	10	10
		Number/Percentage of Non-executive Directors on the Board (HC/%)	3 / 30%	3 / 30%	3 / 30%
		Number/Percentage of Independent Directors (HC/%)	6 / 60%	6 / 60%	6 / 60%
		Number/Percentage of Executive Directors on the Board (HC/%)	1 / 10%	1 / 10%	1 / 10%
		Number/Percentage of Women on Board (HC/%)	1 / 10%	1 / 10%	1 / 10%
		Number of Board Meetings/Board Meeting Attendance (%)	6 / 100%	5 / 100%	5 / 94%
		Number of Audit and Risk Committee (ARC) Meetings/ARC Meeting Attendance (%)	7 / 100%	5 / 93%	5 / 97%
		Number of Compensation and People Development Committee (CPDC) Meetings/CPDC Meeting Attendance (%)	6 / 100%	5 / 97%	4 / 100%
		Number of Nominating, Corporate Governance and Sustainability Committee (NCGS) Meetings/NCGS Meeting Attendance (%)	—	—	5 / 97%
		Executive Compensation Linked to ESG Performance (Y/N)	Y	Y	Y
	Financial Performance	Revenue (NT$ billion)	1,587	2,264	2,162
		Net income (NT$ billion)	597	1,017	838
		Income tax expense (NT$ billion)	66	127	141
		Cash dividend (NT$ billion)	266	285	292
		R&D expenditures (NT$ billion)	125	163	182
		Capital expenditures (NT$ billion)	839	1,083	950
An Innovation Pioneer	Innovation Management	R&D expenses to revenue (%)	7.9%	7.2%	8.5%
		Global patents granted	50,506	56,693	62,711
		Registered trade secrets	160,000	240,000	341,657
		Cultivated undergraduate and graduate students globally through diverse industry-academia collaboration between 2021 and 2023			12,677
	Product Quality	Value generated from improvement projects (NT$ billion)	120	130	140
		Encourage outstanding projects in Taiwan Continuous Improvement Awards (TCIA)	8	10	9

Note 1: Figures from all Taiwan fabs and subsidiaries of TSMC. If the scope of reporting is different from the above statement, a note will be added to explain any differences in this paragraph

(continued on the next page)

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Issues		Key Indicators	2021	2022	2023
An Innovation Pioneer	Product Quality	Encourage wafer manufacturing raw materials suppliers to participate in TCIA (%)	64%	74%	74%
		Encourage advanced packaging raw materials suppliers to participate in TCIA (%)	67%	60%	60%
		Encourage major local raw materials suppliers to participate in TCIA and advanced to the finals (%)	16%	17%	14%
		New innovative testing methods for product quality and reliability	254	272	283
		Complete quality and reliability certification during the design stage for advanced processes, specialty processes, and wafer-level packaging processes in compliance with the TSMC technological roadmap	Completed	Completed	Completed
		Cases of product recall by customers due to safety concerns			0
		Develop analytical abilities for carcinogenic, mutagenic, and reprotoxic substances and assist the suppliers that supply materials with potential risks in developing such abilities (%)	100%	100%	100%
		NMP replacement rate for etching processes (%) (Base year: 2016)[Note 2]	75%	97.2%	98.6 / 71%
		Ensure that manufacturing processes are free from PFASs with more than 4 perfluorinated carbons	VisEra selected PFHxA substitutes and launched production line testing	VisEra's photoresist substitutes that do not contain PFHxA- related substances failed to pass production line testing; to select new substitute materials	Replace 14% of photoresists containing PFHxA related substances in VisEra
	Customer Relations	Customer Trust and Satisfaction (%)	88.5%	92%	94%
		Reduce cases of engineering quality problem to % of the level in 2019 for every one million 12-inch wafers shipped (%)	55%	36%	25%
		Provided wafer manufacturing and process technologies in line with the TSMC technology roadmap	900	944	994
		Provided wafer packaging technologies in line with the TSMC technology roadmap	94	129	149
		Passed customer product information security audits with no major flaws	No major flaws	No major flaws	No major flaws
A Responsible Purchaser	Sustainable Supply Chain	Tier 1 suppliers' completion rate of the Sustainability Management Self-Assessment Questionnaire (%)	100%	100%	100%
		Significant suppliers' completion rate for receiving third-party audits (by RBA-certified auditing institutions) every year(%)	60%	100%	100%
		Total number of high risk significant suppliers that have received audits for the S.H.A.R.P. Program	86	100	148
		Raw materials suppliers invited to observe the annual emergency response drill (Base year: 2016)	132	161	190
		Total number of suppliers that participated in the ESH training program (Base year: 2016)	759	960	1,154
		High risk significant suppliers that received safety and health support (%)	100%	100%	100%

Note 2: NMP replacement rates in 2021 and 2022 represent Taiwan fabs of TSMC only. The NMP replacement rates of Taiwan and overseas fabs, including TSMC Washington, LLC, TSMC(China), and TSMC(Nanjing), are 98.6% and 71%, respectively

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Issues		Key Indicators	2021	2022	2023
A Responsible Purchaser	Sustainable Supply Chain	Increase local sourcing of indirect raw materials (%)	60.4%	62.1%	64.8%
		Increase local sourcing of parts and components (%)	46.6%	43%	37%
		Diversify facilities and assess new suppliers in compliance with the multi-source program (Base year: 2018)	109	135	145
		Cumulative total of local raw materials suppliers receiving consultation on process advancement and quality improvement (Base year: 2016)	55	65	75
		Requires suppliers to conduct due diligence for responsible mining; % of legally compliant mines	100%	100%	100%
		Audit at least three suppliers for due diligence in responsible mining each year	3	5	3
		Total number of suppliers audited for due diligence in responsible mining	3	8	11
		Supplier carbon emissions reduce rate (Comparing result from the Business as Usual (BAU) situation)			2%
		Score and reponse rate of suppliers invited to participate in the CDP (Carbon Disclosure Project) in the year		C / 81%	B- / 98%
		High-energy-consumption suppliers that have received ISO14064 certification for GHG emissions (%)	51%	65%	84%
		Total energy conserved by helping suppliers (GWh) (Base year: 2018)	3.4	5.3	8.1
		Total water conserved by helping suppliers (metric tons) (Base year: 2020)	19,710,000	29,080,000	42,580,000
		Waste reduction in major waste-generating suppliers (%) (Base year: 2014)	31%	34%	39%
Practitioner of Green Power	Climate and Energy	Greenhouse gas emission (metric ton-CO_2 equivalent) (scope 1 and scope 2 market-based)	10,304,344	11,558,554	11,783,418
		Scope 1 (metric ton-CO_2 equivalent)[Note 3]	2,151,937	2,018,789	1,596,031
		Taiwan sites	1,808,427	1,669,770	1,307,966
		Subsidiaries[Note 4]	343,510	349,019	288,065
		Scope 2 (metric ton-CO_2 equivalent) (market-based)	8,152,497	9,539,765	10,187,387
		Taiwan sites	8,116,440	9,510,082	10,150,252
		Subsidiaries[Note4]	36,057	29,683	37,135
		Scope 2 (metric ton-CO_2 equivalent) (location-based)	9,196,964	10,887,145	11,466,118
		Scope 3 (metric ton-CO_2 equivalent)[Note 5]	6,049,256	7,429,158	7,616,655

Note 3: To ensure consistent data in GHG inventory and reduction goals after 2021, inventory data for scope 1 complies with the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gases Inventories starting from 2021 The base year also changes from 2010 to 2020

Note 4: Subsidarie environmental figures includes TSMC Washington, LLC, TSMC(China), TSMC(Nanjing), and VisEra

Note 5: Figures includes TSMC Washington, LLC, TSMC(China), TSMC(Nanjing), and VisEra, starting from 2023

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Issues		Key Indicators	2021	2022	2023
Practitioner of Green Power	Climate and Energy	Carbon offset (metric ton-CO_2 equivalent)	241,577	616,271	616,880
		Fluorinated greenhouse gas emission (metric ton-CO_2 equivalent)	1,369,478	1,102,353	959,642
		Reduction rate of GHG emissions per unit product compared to the base year (metric ton-CO_2 equivalent - 12-inch equivalent wafer mask layer) (%)	5%	6%	-31%[Note 6]
		Energy consumption (GWh) (including electricity, natural gas and diesel)	19,192	22,423	24,775
		Direct energy consumption (GWh) (including natural gas and diesel)	1,112	1,336	1,553
		Taiwan sites	976	1,187	1,389
		Subsidiaries[Note 4]	136	150	165
		Indirect energy consumption (GWh) (non-renewable energy)	16,409	18,895	20,630
		Taiwan sites	16,339	18,837	20,541
		Subsidiaries[Note 4]	70	58	89
		Indirect energy consumption (GWh) (renewable energy)	1,671	2,191	2,592
		Taiwan sites	656	940	1,085
		Subsidiaries[Note 4]	1,015	1,251	1,507
		Renewable energy used at all TSMC fab operation sites (%)	9.2%	10.4%	11.2%
		Renewable energy used at overseas subsidiaries (%)	100%	100%	100%
		Total energy conserved from new energy saving measures since 2016 (GWh/y)	24	31	39
		Energy efficiency after volume production - 10nm & 7nm technology	1.5 (5th year)		
		Energy efficiency after volume production - 5nm technology	0.2 (2nd year)	0.6 (3rd year)	0.0 (4th year)
		Days of production interrupted due to climate disasters	0	0	0
	Water Stewardship	Water withdrawal (million metric tons)	82.8	105.0	113.6
		Taiwan sites – nature water	76.1	96.8	92.5
		Taiwan sites – reclaimed water	0.0	0.4	12.6
		Subsidiaries[Note 4] – nature water	6.70	7.8	8.5

Note 6: Under the effects of global economic circulation, the production capacity utilization of TSMC in 2023 was less favorable than expected, resulting in unit GHG emissions failing to achieve the annual target. TSMC will continue to invest resources to implement energy-saving actions and improve energy consumption efficiency

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Issues		Key Indicators	2021	2022	2023
Practitioner of Green Power	Water Stewardship	Process water recycling rate (%)	85.4%	85.7%	90.3%
		Total water saving (million metric tons)	186.3	215.7	286.4
		Ultra-pure water usage (million metric tons)	109.5	132.1	130.9
		Tetramethylammonium hydroxide (TMAH) (ppm)Note 7	5.5	3.8	2.5
		Copper ion (Cu^{2+}) (ppm)Note 7	0.07	0.06	0.07
		Reduction % in unit water consumption (liter/12-inch equivalent wafer mask layer) (Base year: 2010)	14.9%	2.6%	-25.2%Note 8
		% of water pollution composite indicator above effluent standards (%)Note 7	42.5%	54.3%	63.4%
	Circular Resources	Outsourced unit waste disposal per wafer (kg/12-inch equivalent wafer mask layer)	0.99	0.99	1.17
		Waste recycling rate (%)	95%	96%	96%
		Taiwan sites	95%	96%	97%
		SubsidiariesNote 9	85%	92%	93%
		Waste generated (metric tons)	674,703	744,019	656,841
		Outsourced General waste generated	335,080	342,804	285,605
		Taiwan sites	326,069	331,499	272,923
		SubsidiariesNote 9	9,011	11,305	12,682
		Outsourced Hazardous Waste generated	339,623	401,215	371,236
		Taiwan sites	319,763	373,419	338,840
		SubsidiariesNote 9	19,860	27,796	32,396
		Develop multiple types of electronic-grade chemicals for resource recycling within TSMC - % of resource recycling within facilities	22%	28%	32%
		Waste treatment vendors that have obtained ISO14001 or other international EHS Management certifications (%)	82%	84%	87%
		Waste treatment vendors establishing a smart system for tracking waste (%)		9%	29%

Note 7: Figures from all Taiwan Fabs of TSMC

Note 8: Under the effects of global economic circulation, the production capacity utilization of TSMC in 2023 was less favorable than expected, resulting in an increase in unit water consumption and failing to achieve the annual target. TSMC will continue to implement water conservation and the use of reclaimed water

Note 9: Figures includes TSMC Washington, LLC, TSMC(China), TSMC(Nanjing), VisEra, TSMC Arizona, and JASM

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Issues		Key Indicators	2021	2022	2023
Practitioner of Green Power	Circular Resources	Waste treatment vendors graded as Excellent and Good (%)	77%	80%	86%
	Air Pollution Control	NO_x emissions (metric tons)	205.57	159.87	185.42
		SO_x emissions (metric tons)	39.48	37.78	40.7
		VOC emissions (metric tons)	107.7	112.9	94.4
		Reduction in air pollutant emissions per unit of production (%)	54%	59%	50%
		Reduction rate of volatile organic gases (%)	98.4%	98.9%	99%
		Number of unusual events reported in air pollution prevention equipment	0	0	0
		ISO 14001 certified sites number	24	27	27
		ISO 14001 certified sites percentage (%)	100%	100%	100%
An Admired Employer	Diversity and Inclusion	Rank for the Diversity and Inclusion determined by comparing results from the Engagement Survey against the WTW Global High Performance Norm			Missed top 50%
		Global Full-time Employees (people)	65,133	73,090	76,478
		Females in all employees (%)	35.4%	34.4%	34.2%
		Females in management (%)	13%	13.3%	14.1%
		Females in junior management (%)	13.4%	13.6%	14.3%
		Females in top management (%)	8.3%	6.1%	5.9%
		Females in newly-hired fresh graduates technical professionals (%)	21.3%	23.7%	28.4%
	Talent Attraction and Retention	Employees fully committed to their work (%)		93%	
		Employees willing to continue working for TSMC in the next five years (%)		90%	
		Goals for the Sustainable Engagement from the Engagement Survey in comparison to the WTW Global High Performance Norm	Missed top 50%		Missed top 75%
		Total compensation amongst industry peers	Top 25%	Top 25%	Top 25%
		Turnover rate (%)	6.8%	6.7%	3.7%

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Issues		Key Indicators	2021	2022	2023
An Admired Employer	Talent Attraction and Retention	New hire (<1 year) turnover rate (%)[Note 10]	17.6%	15%	8.9%
		Voluntary turnover rate (%)	6.7%	6.5%	3.5%
	Talent Development	Management positions filled through internal promotions (%)	82.5%	88.6%	88.2%
		Vacancies filled through internal transfers (%)	57.6%	57.6%	63.8%
		Reviewed the talent pipeline for fab directors/directors (%)[Note 11]	79%	69%	96.3%
		Annual average of learning hours in employees	48.9	69.5	85.4
		Employee training hours	3,185,784	5,077,993	6,533,075.5
	Occupational Safety and Health	Incident rate per 1,000 employees	0.252	0.145	0.156
		Injury frequency rate[Note 12]	0.38	0.27	0.35
		Injury severity rate[Note 13]	7	3	4
		Occupational fatalities - employees	0	0	0
		Occupational fatalities - contractors	0	0	1
		Cases of occupational disorders caused by exposure to chemicals	0	0	0
		Employees with abnormal blood lipids/ blood pressure/ blood sugar (%)		9.2% / 10.8% / 1.8%	9.8% / 11.5% / 1.9%
		Employees with reported high stress levels (%)		8.1%	6.4%
		Assist all high-risk contractors to obtain ISO 45001 certification for occupational safety and health management system (%)	65%	65%	80%

Note 10: Since 2021, the statistic of new hire (< 1 year) turnover rate included VisEra

Note 11: In 2022, the organizational structure was adjusted to meet operational needs, and 88 new organizations were established, lowering the talent pipeline's review rate

Note 12: Safety –Injury Frequency Rate=Injury Number x 1,000,000/Total hours worked
According to the Occupational Safety and Health Act, Disabling Injury Frequency Rate are defined as any diseases, injuries, disabilities, or deaths of workers caused by buildings, machinery, equipment, raw materials, materials, chemicals, gases, vapors, dusts, etc., at the place of duty, or as a result of work activities, or due to other occupational causes. Other unrelated injuries in the workplace such as falling in the cafeteria or parking lot due to various reasons are not considered as work injuries. Target has been amended according to new definition. See Statistical Analysis of Disabling Injuries for detailed information

Note 13: Safety –Injury Severity Rate=Lost Work Days x 1,000,000/Total hours worked
According to the Occupational Safety and Health Act, Disabling Injury Frequency Rate (FR)/Disabling Severity Rate (SR) are defined as any diseases, injuries, disabilities, or deaths of workers caused by buildings, machinery, equipment, raw materials, materials, chemicals, gases, vapors, dusts, etc., at the place of duty, or as a result of work activities, or due to other occupatio al causes. Other unrelated injuries in the workplace such as falling in the cafeteria or parking lot due to various reasons are not considered as work injuries. Target has been amended according to new definition. See Statistical Analysis of Disabling Injuries for detailed information

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Issues		Key Indicators	2021	2022	2023
Power to Change Society	Social Impact[Note 14]	Beneficiaries of Social Engagement Programs	891,962	2,291,030	1,031,433
		Social engagement activities invesetments (NT$ billion)	0.966	1.263	1.454
		Charity Partners	325	130	690
		Charity Programs	179	171	216
		Total participants in youth competitions	1,614	2,388	8,033
		Promotional events on semiconductor sciences	6	18	25
		Sponsor outstanding local artists or groups	12	12	13
		Educational volunteer service hours[Note15]	4,910	2,060	30,268
		Annual cash donations to the disadvantaged (NT$ million)	2,263	1,529	1,846
		Children in remote areas that have benefited from TSMC programs	5,287	6,358	31,133
		Service visits to seniors living alone by Network of Compassion	15,719	16,471	112,260
		Meals delivered by Network of Compassion	304,477	355,692	336,277
		Promote filial piety education	64	68	71
		Annual beneficiaries of the Cherish Food Program	58,862	48,143	44,344
		Volunteer service from environmental protection volunteers	794	499	1,105
		Install solar panels for social welfare institutions/year		7	7
		Replace LED light tubes for elementary schools/year		246	240

Note 14: Figures in Social Impact includes Taiwan Fabs of TSMC, TSMC(China), and TSMC(Nanjing)
Note 15: "Reading Volunteer" is renamed to "Educational Volunteer"

Independent Third Party Assurance Statement

Independent Limited Assurance Statement

Taiwan Semiconductor Manufacturing Company Ltd. ('TSMC' or 'the Company') commissioned DNV Business Assurance Co. Ltd. ("DNV") to undertake independent assurance of the 2023 Sustainability Report (the "Report") for the year ended 31 December 2023.

Our Conclusion: On the basis of the work undertaken, nothing came to our attention to suggest that the Report does not properly describe TSMC's adherence to the Principles described below. In our opinion, the Report provides sufficient information for readers to understand the Company's management approach to its most material issues and impacts.

Scope and approach

Our assurance engagement was carried out during October 2023 to April 2024. We performed our work using DNV's assurance methodology VeriSustain™ , which is based on our professional experience, international assurance best practice including International Standard on Assurance Engagements 3000 (ISAE 3000) and the Global Reporting Initiative (GRI) Sustainability Reporting Standards.

The Report is prepared with reference to the reporting principles and requirements of the Global Reporting Initiative (GRI) Standards 2021. The Report also incorporated the relative sustainability reporting guidelines, such as Sustainability Accounting Standards Board (SASB) Semiconductors Sustainability Accounting Standard and Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

We evaluated the Report using the reliability principle together with TSMC data protocols for how the data are measured, recorded and reported. The reported data in scope was against TSMC's significant Environmental, Social and Governance (ESG) issues and the 2030 sustainability commitment and the topics set forth in the GRI standards.

We understand that the reported financial data and information are based on data from TSMC's Annual Report and Accounts, which are subject to a separate independent audit process. The review of financial data taken from the Annual Report and Accounts is not within the scope of our work.

GHG verification is excluded from the scope of work, since as GHG assurance had been done under the jurisdiction of an official mechanism governed by the Authority. In this assurance, DNV did not go through it again but only refer the statement of the verification (C663859-2023-AP-TWN-TAF, 12 April 2024; C663860-2023-AG-TWN-DNV, 12 April 2024), actually it released by DNV as an approved verification body, of that official mechanism.

We planned and performed our work to obtain the evidence we considered necessary to provide a basis for our assurance opinion. We are providing a 'moderate / limited level' of assurance. The procedures performed in a limited assurance engagement vary in nature and timing from, and are less detailed than, those undertaken during a reasonable assurance engagement, so the level of assurance obtained is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. We planned and performed our work to obtain the evidence we considered sufficient to provide a basis for our conclusion, so that the risk of this conclusion being in error is reduced, but not reduced completely.

Basis of our Opinion

A multi-disciplinary team of sustainability and assurance specialists performed work at headquarters and site level. We undertook the following activities:

- Review of the current sustainability issues that could affect TSMC and are of interest to stakeholders;
- Review of TSMC approach to stakeholder engagement and recent outputs;
- Review of information provided to us by TSMC on its reporting and management processes relating to the Principles;
- Interview with selected directors and senior managers responsible for management of sustainability issues and review of selected evidence to support issues discussed. People who worked in functions for financial, legal, environment (including climate change & energy, air emission, water resource, chemical and waste management), human resource, safety, procurement, wellness, product development, information security, intellectual property, trade secret and TSMC cultural and educational foundation were chosen to interview;
- Conduct site visits to HQ in Taiwan and remote meeting with other production sites to review process and systems for preparing site level sustainability data and implementation of sustainability strategy. Sites were chosen based on materiality issues;
- Review of supporting evidence for key claims and data in the Report. Our checking processes were prioritised according to materiality, and we based our prioritisation on the materiality of issues at a consolidated corporate level;
- The regulated scheme (Climate Change Administration, Ministry of Environment Greenhouse Gas Programme as well as criteria given to provide for consistent GHG emission identification, calculation, monitoring and reporting.) as the criteria for evaluating GHG in the statement, with reference to the period DNV conducted this activity;
- Review of the processes for gathering and consolidating the data and, implemented by sampling, checking the data consolidation including,
  - where financial data had been checked by another third party,
  - where data of scope 1, 2 and 3 of GHG Emission had been verified by DNV, we tested transposition from these sources to the Report,
  - where relevant data and information had been generated from the implementation of specific certified management system, indicated the relevant specifications of the management system certification and the connection to the data and information used in the Report;
- An independent assessment of TSMC's reporting against the Global Reporting Initiative (GRI) Standards 2021;
- Due to a confidential issue, DNV was unable to assess the salary data. Therefore, the reported performance and alignment with reference standards for this topic are excluded from our scope of work;
- The verification was conducted based only on the Chinese version Report.

Our competence, independence and quality control

DNV established policies and procedures are designed to ensure that DNV, its personnel and, where applicable, others are subject to independence requirements (including personnel of other entities of DNV) and maintain independence where required by relevant ethical requirements.

This engagement work was carried out by an independent team of sustainability assurance professionals. Our multi-disciplinary team consisted of professionals with a combination of environmental and sustainability assurance experience.

DNV applies its own management standards and compliance policies for quality control, in accordance with ISO/IEC 17029:2019 – Conformity assessment, whose general principles are requirements for validation and verification bodies. Accordingly, DNV maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

Inherent limitations

All assurance engagements are subject to inherent limitations as selective testing (sampling) may not detect errors, fraud or other irregularities. Non-financial data may be subject to greater inherent uncertainty than financial data, given the nature and methods used for calculating, estimating and determining such data. The selection of different, but acceptable, measurement techniques may result in different quantifications between different entities. Our assurance relies on the premise that the data and information provided to us by TSMC have been provided in good faith. DNV expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Independent Limited Assurance Statement.

Observations

Without affecting our assurance opinion, we also provide the following observations.

The following is an excerpt from the observations and opportunities reported back to the management of TSMC.

- For providing stakeholders comparability and consistency of environment information, it is recommended to disclose information for both domestic and overseas facilities at equivalent levels of criteria, detail and scope.

Sustainability Context

The Report provides an accurate and fair representation of the level of implementation of related ESG policies and meets the content requirements of the GRI Standards 2021.

Materiality

The materiality determination process was revalidated based on survey from key stakeholders including employees, customers, suppliers / contractors, NGOs, governments, shareholders, investors, regulatory bodies, local communities and senior management of TSMC and has not missed out any significant and known material issues about the Semiconductor Sector. A methodology has been developed to evaluate the priority of these issues and identified priority issues are fairly covered in the Report. An internal assessment process for monitoring and management on a continual basis for their long-term organisational sustainability has been established.

Completeness

The Report has fairly attempted to disclose the generic disclosures and management approaches and performances of identified material topics for GRI Standards 2021. The reporting of performance and data are within the Company's reporting boundary and reporting period except for certain material topics. A system to report the performances of material topics are being established and set the internal timelines for disclosure.

Responsibilities of the management of TSMC and DNV

The Directors of TSMC have sole responsibility for the preparation of the Report. In performing our assurance work, our responsibility is to the management of TSMC; however, our statement represents our independent opinion and is intended to inform all of TSMC stakeholders. DNV was not involved in the preparation of any statements or data included in the Report except for this Assurance Statement.

DNV provides a range of other services to TSMC, in our opinion none of which constitute a conflict of interest with this assurance work.

DNV's assurance engagements are based on the assumption that the data and information provided by the client to us as part of our review have been provided in good faith. DNV expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Assurance Statement.

Accuracy and Reliability

The majority of data and information verified at the Corporate Office and sampling operational sites were found to be accurate and nothing came to our attention to suggest that reported data have not been properly collated from information reported at operational level, nor that the assumptions used were inappropriate. Some of the data inaccuracies identified during the verification process were found to be attributable to transcription, interpretation and aggregation errors and the errors have been communicated for correction.

Inclusivity

The Company has identified the expectations of stakeholders through internal mechanisms in dialogue with different groups of stakeholders. The stakeholder concerns are well identified and documented. The material topics identified through this process are reflected in the Report.

Responsiveness

The Report meets the content requirements of the GRI Standards 2021. The Report provides an accurate and fair representation of the level of implementation of related ESG policies.

The Company has adequately responded to stakeholder concerns through its policies, ESG Committee, and quarterly / annual financial report, and this is reflected in the Report.

Impact

The Company presents the impacts related to its identified material topics by measuring and monitoring impacts through appropriate performance metrics demonstrating outcomes and outputs of its value creation processes. Nothing has come to our attention to suggest that the Report does not meet the requirements related to the Principle of Impact.

DNV Business Assurance Co., Ltd.

Hsiantin Tim Kuo
Engagement Lead Verifier

C. K. Wong
Management Representative & Quality Reviewer

Taipei
27 June, 2024

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