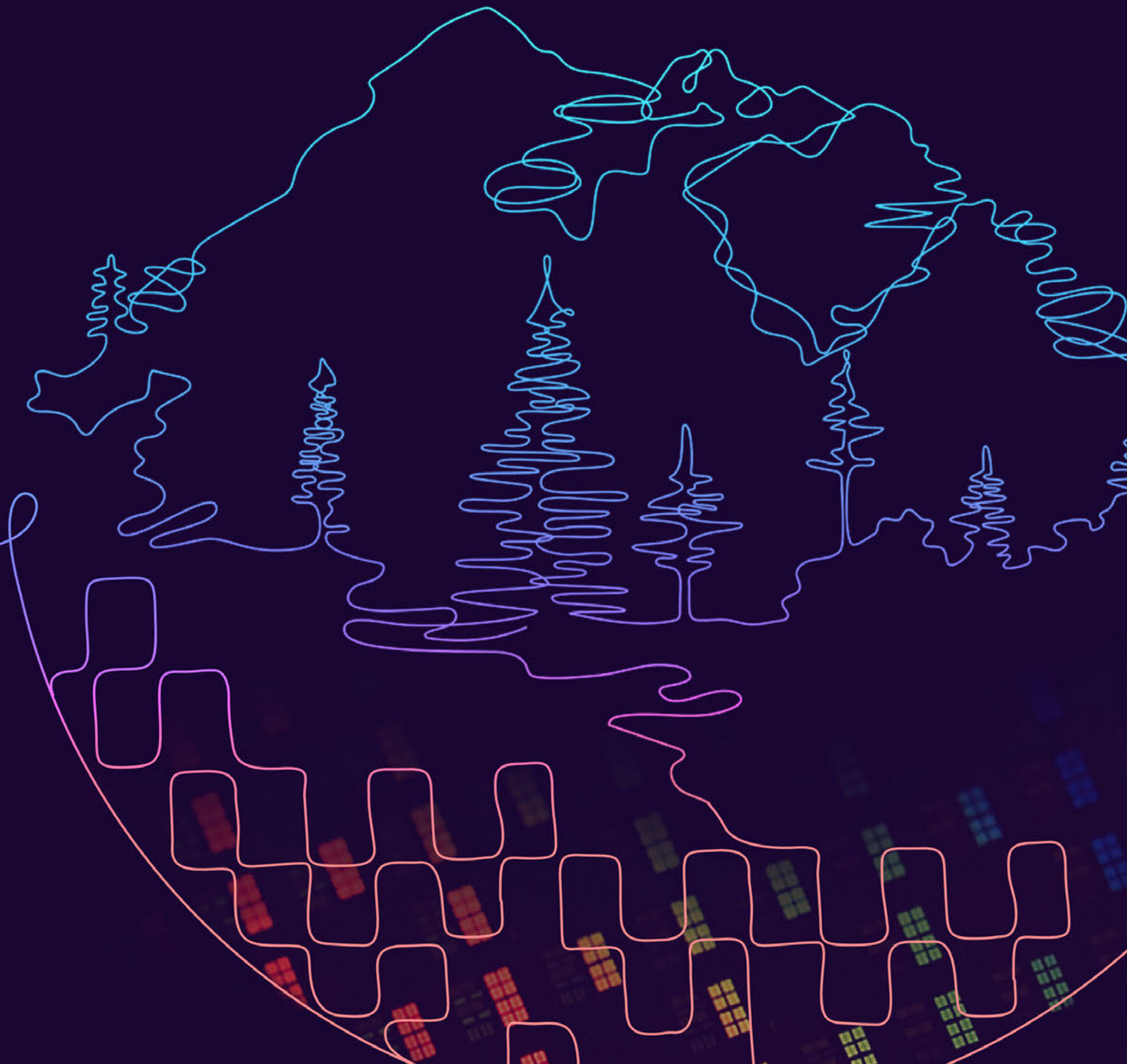
TSMC 2021 Sustainability Report



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Connect Sustainability with Innovation

Innovation is the foundation that keeps TSMC growing.

High-performance computing propels humanity to a future with AI
Smartphones breaks the limitation of time and space and bridge us with the cloud and to freedom
Advanced automotive electronics carry our imagination to the infinite world of mobility
IoT ushers in the era of smart cities and industrial 4.0

ESG is in the DNA of every TSMC employee

TSMC uses concrete action to connect people with people and with nature to welcome beautiful change
With an infinite stream of innovative technology solutions,
TSMC strives to achieve sustainability and connect to a future of common good



Letter from the ESG Steering Committee Chairperson

Over the past two years, COVID-19 has continued to impact our world while the threat of extreme climate conditions has steadily increased. As a key player in the global semiconductor supply chain, TSMC has the responsibility of working with industry partners to take continuous action with regard to ESG (Environmental, Social and Governance) issues.

Our vision is to uplift society and we link TSMC's core advantages with the United Nations' Sustainable Development Goals (SDG), integrating five ESG development focal points including "Drive Green Manufacturing," "Build a Responsible Supply Chain," "Create a Diverse and Inclusive Workplace," "Develop Talent," and "Care for the Disadvantaged." Since 2019, the ESG Steering Committee has integrated cross-organizational resources and strengths, formulated long-term goals, and reviewed the implementation of these goals. In 2021, in addition to focusing on improving the industry's core capabilities, we also continued to implement corresponding sustainable practices. We now integrate sustainability target results into the compensation structure for senior executives, integrate SDGs into both the organizational culture and employees' daily tasks, and actively respond to concerns raised by stakeholders both inside and outside the company.

We firmly believe that corporate growth and the natural environment can coexist prosperously, and we implement green practices to ensure this. In 2021 TSMC further committed to actively implement emission reduction measures and optimize related sustainable actions. The Company set a short-term goal of achieving zero emission growth by 2025, a medium-term goal of returning to 2020 emissions level by 2030 and a long-term goal of reaching net zero emissions by 2050. In 2021, we also released our first Taskforce on Climate-Related Financial Disclosures (TCFD) Report, promoting climate adaptation and mitigation management through governance, strategies, risk management, metrics and targets, becoming an industry pioneer in disclosing information in related fields. We hope that by expanding our green influence, we will drive the industry to move towards low-carbon sustainability.

Over the past two years COVID-19 has continued to threaten our lives. Throughout this time, TSMC has not only remained resilient in protecting employee health and safety and maintaining normal operations, we have also extended our expertise and resources to support global pandemic prevention efforts. In 2021, during a period when the epidemic situation in Taiwan was deteriorating, we happily did our part to support the country by successfully purchasing 5 million doses of BNT (BioNTech) 162b2 vaccine and donating them to the Center for Disease Control (CDC) of the Ministry of Health and Welfare with the support of the government. At the same time, we also continued to offer support overseas, including India, helping them deal with overburdened local medical facilities.

At TSMC respect for human rights is regarded as a universal value. In 2021, in order to provide migrant workers with a decent work environment and to create a responsible supply chain, we issued the statement Supply Chain Partners Should Ensure Protection of Human Rights During the COVID-19 Pandemic so that our subsidiaries and supply chain partners carry out anti-pandemic measures in an appropriate fashion. The statement addresses four major areas: personal freedoms, how migrant workers are informed of anti-pandemic measures, handling of accidents and casualties, and dormitory management.

At TSMC, ESG means driving positive environmental and societal change. We work diligently to integrate the ESG ethos into our daily operations with the aim of sustainable development, formulating systematic management strategies, implementing related measures and reviewing action plans. We also rely on all our employees to champion their work while having the courage to posit innovative ideas. On our road to sustainability, TSMC not only strives to fulfill its role as a responsible corporate citizen, we also look forward to working with partners and stakeholders from all walks of life to create a sustainable future.



Mark Liu
Chairman and ESG Steering Committee Chairperson



Letter from the ESG Committee Chairperson

The year 2021 was a year of global upheaval as the world faced the COVID-19 pandemic, war, and political instability. As a global citizen, we have shared the impact of these changes.

The year 2021 was also a year of growth for TSMC. Benefitting from the strong demand for advanced process technologies from 5G mobile networks and high-performance computing, TSMC was able to achieve record high revenue for the 12th consecutive year. As COVID-19 continued to ravage the world, TSMC launched the COVID-19 global epidemic prevention program to protect colleagues, suppliers and contractors working in TSMC fabs and ensure normal operations at our global wafer fabs. In 2021, TSMC shipped 14.2 million 12-inch equivalent wafers and realized 12,302 product innovations for our customers, providing humanity a safer and more convenient lifestyle. TSMC also supported the Sustainable Development Goals proposed by the United Nations with tangible actions and has remained steadfast to our five ESG directions.

In terms of "Green Manufacturing", in 2021, TSMC updated our Climate Change Statement to include a commitment to Net Zero Emissions by 2050, invested NT$28.9731 billion into environmental protection, and successfully promoted 780 innovative programs for energy conservation, water conservation, and waste reduction. TSMC also achieved the target of net zero emissions from energy consumption at all overseas subsidiaries for the fourth consecutive year and responded to Taiwan's drought in the first half of 2021 with outstanding water management capabilities, ensuring that our production capacity was unaffected. In addition, we are currently building a Zero Waste Manufacturing Center to realize a low-carbon business model and circular economy.

As for "Build A Responsible Supply Chain," in 2021, TSMC continued to strengthen supplier sustainability through the Supply Online 360 global responsible supply chain management platform and the TSMC Supplier Sustainability Academy, promoting EP&L across the supply chain and uncovering opportunities to lower our impact on the environment. In 2021, TSMC also became the first semiconductor company in Taiwan to release the Supplier Transportation Management White Paper. Our efforts in the supply chain also included safety and health support and training to all critical high-risk suppliers and helping suppliers establish long-term sustainability targets. To increase climate resiliency across the supply chain, TSMC also joined the CDP Supply Chain Program.

In terms of "Create a Diverse & Inclusive Workplace," in 2021, TSMC introduced 8,536 job opportunities across the world and drew on our Human Rights Policy and Diversity and Inclusion Statement to develop Women@tsmc, an employee resource group aimed at achieving equality in the workplace. Looking ahead, TSMC will continue to make timely responses to employee needs and suggestions through the Engagement Survey and other diverse reporting channels to support employee work-life balance . For "Develop Talent," TSMC adopted the 70-20-10 rule to empower employees and cultivate talents for the future. TSMC also continued to expand university programs such as the Semiconductor Programs, Advanced IC Design Program, and University Research Center as well as the TSMC Journeys of Female Scientists Lectures for female high school students in an effort to cultivate the next generation of STEAM professionals. In terms of "Care for the Disadvantaged," the TSMC Education and Culture Foundation and TSMC Charity Foundation have long been investing in this area by tapping into the power of our employees' volunteer services. We consulted the impact principles of the London Benchmark group and evaluated the impact of all social participation programs along the two dimensions of "depth" and "type" to create a strong foundation of common good for social progress.

As the Chairperson of the ESG Committee, I look forward to strengthening and expanding our sustainable actions to bring about innovative breakthroughs. The Sustainability Report that we compile each year keeps pace with global sustainability trends and has become a guide for organizations to continue advancing their ESG efforts. We expanded our information disclosure and external communications and continued to accumulate our ESG intellectual property. In addition to the existing EP&L Report and TCFD Report, TSMC also released, for the first time this year, Materiality Analysis Report and the UN SDGs Action Report.

Sustainability is a journey without end. TSMC is the only semiconductor company in the world to be selected for the Dow Jones Sustainability Index (DJSI) for 21 consecutive years. As the company continues to grow, we find ourselves with growing responsibilities as well. We will continue to hold true to our ESG vision to uplift society as we strive on forward with steadfast resolve.



Lora Ho
Senior Vice President
and ESG Committee
Chairperson



About TSMC



Headquarters
Hsinchu Science Park

Founded in
1987

Number of Employees
over 65,152

Facing global turmoil brought by the COVID-19 pandemic as well as developments in the semiconductor industry, TSMC continues to strengthen services, R&D, and capacity while staying true to our four core values of Integrity, Commitment, Innovation, and Customer Trust. As a trusted technology and capacity provider to the global logic IC industry, TSMC also continues to invest in customer growth; in 2021, we increased capital expenditure to US$30 billion. At the same time, strong customer demand for industry-leading advanced processes and specialty process technologies helped TSMC achieve a consolidated income of NT$1,587.42 billion, a 18.5% increase from 2020. TSMC also remains committed to business philosophy and collaborates with employees, shareholders/ investors, customers, suppliers/ contractors, the government, and society to create sustainable value for the economy, environment, and society.

30 billion
Capital expenditure, up from US$17 billion in 2020 (US$)

12 Years
Record high revenues for 12 consecutive years

535 Customers
Used 291 distinct process technologies and manufactured 12,302 different products for 535 customers

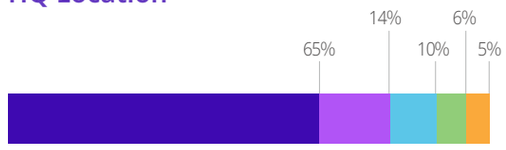
$596.54 billion
Net income; 15.2% increase from 2020 (NT$)

26%
Accounting for 26% of the worldwide semiconductor market excluding memory, up 2 percentage points from 2020

50%
50% of TSMC's wafer revenue came from advanced manufacturing processes – defined as geometries of 7nm and smaller, up 9 percentage points from 2020

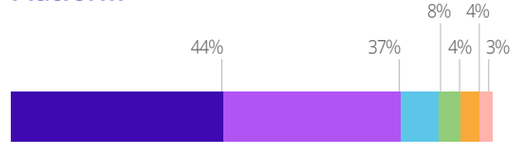
TSMC has fabs, subsidiaries or offices throughout Taiwan, North America, Europe, Japan, Mainland China, South Korea, and other countries to offer real-time services and technical support to customers around the world.

Revenue Percentage by Customer HQ Location



- North America
- Asia Pacific excluding Japan and Mainland China
- Mainland China
- Europe, Middle East, and Africa
- Japan

Revenue Percentage by Product Platform



- Smart Phones
- High Performance Computing
- Internet of Things
- Automotive Electronics
- Consumer Electronics
- Other Products

Innovation Value

Innovations for Sustainability

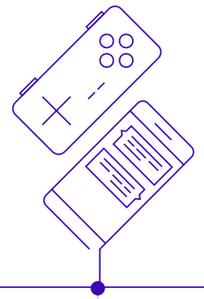
TSMC continues to advance semiconductor manufacturing technologies and services to enable our customers to unleash more than 12,300 chip innovations in 2021. These innovations make products more advanced, capable, intelligent, energy-efficient, and safer, allowing us to greatly increase quality of life and move towards a sustainable well-being society.

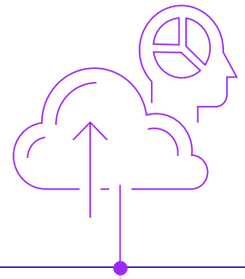
Technology Development Focuses

- 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

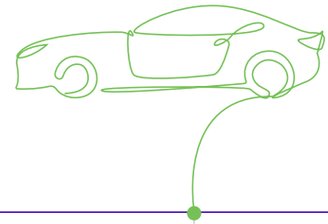
Benefits to Customer Product Innovation

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











Customer Product/ Applications	**Make communication more effective and work, play, and learn anytime and anywhere**	**Enable 5G, Artificial Intelligence (AI), cloud, and data centers for transferring and processing vast amounts of data anywhere and anytime**	**Empower innovations for artificial intelligence of things (AIoT) and accelerate digital transformation to make a more convenient and greener living, and improve health care quality**	**Make vehicles, including hybrid/ electrical cars, safer, smarter, and greener**	**Enable AI-powered smart devices**
	• Application Processors (AP), • Baseband • RF Transceivers • Wireless Local Area Networks (WLAN) • CMOS Image Sensor (CIS) • Near Field Communication (NFC) • Bluetooth • Global Positioning Systems (GPS), etc.	• 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.	• 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.	• Microcontroller Unit (MCU) • Baseband • RF Transceivers • Wireless Local Area Networks (WLAN) • CMOS Image Sensor (CIS) • Near Field Communication (NFC) • Radar • Ethernet Switches • Power Management ICs, etc.	• Microcontroller Unit (MCU) • Baseband • RF Transceivers • Wireless Local Area Networks (WLAN) • CMOS Image Sensor (CIS) • Near Field Communication (NFC) • Bluetooth • Embedded Flash Memory • Power Management ICs • Timing Controllers (T-CON) for Smart 8K/4K Digital TV (DTV) • 4K Streaming Set-top Box (STB) / Over-the-top (OTT) • Digital Single-lens Reflex (DSLR) Devices, and so on.
Technology Platforms	Smartphone	High Performance Computing	Internet of Things (IoT)	Automotive	Digital Consumer Electronics

Sustainability at TSMC

Economic

$1.3 trillion
Generated NT$1.3 trillion in output value and 224,000 jobs in Taiwan (NT$)

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

1
Leading the world in 3nm process risk production to empower the next-generation technology products

$16.2 trillion
Market capitalization (NT$)

20%
Driving innovation by investing US$4,465,000,000 in R&D, a 20% increase from 2020

Environmental

0
Announced to reach Net Zero Emissions by 2050

98.4%
98.4% reduction rate of volatile organic gases

1
Number 1 in the global semiconductor industry as well as in Taiwan with the largest LEED-certified building area

14.9%
Reduced unit water consumption by 14.9% (Base year: 2010)

1
Received the highest UL 2799 platinum rating for zero waste to landfill

Social

$164.9 billion
Total compensation and welfare handed out to TSMC employees around the world, a 17% increase from 2020 (NT$)

$5.09 billion
Invested into social engagement (NT$)

2.24 million
Number of certificates awarded to employees for completing TSMC training programs

891,962
Beneficiaries of social engagement programs

>6,500
Over 6,500 students from top universities and graduate institutes around the world that participated in TSMC's diverse industry-academia cooperation programs

Awards, Recognitions, and Ratings

Member of Dow Jones Sustainability Indices Powered by the S&P Global CSA

Dow Jones Sustainability Indices (DJSI)

- Dow Jones Sustainability World Index for the 21st consecutive year
- Dow Jones Sustainability Emerging Markets Index

2021 MSCI ESG Leaders Indexes Constituent

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

Corporate ESG Performance Prime Rated by ISS ESG

ISS ESG

- "Prime" Rated by ISS ESG Corporate Rating

TERRA CARTA

Terra Carta Seal

- The Sustainable Markets Initiative

FTSE4Good

FTSE4Good Index

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

World Benchmarking Alliance

World Benchmarking Alliance (WBA)

- SDG 2000 – The 2,000 Most Influential Companies

CommonWealth Magazine

- Excellence in Corporate Social Responsibility Award – Large cap – First Place

CDP A LIST 2021 WATER

Carbon Disclosure Project (CDP)

- 2021 CDP Supplier Engagement Leaderboard
- Water Security A Ratings
- Climate Change B Ratings

ALLIANCE FOR WATER STEWARDSHIP

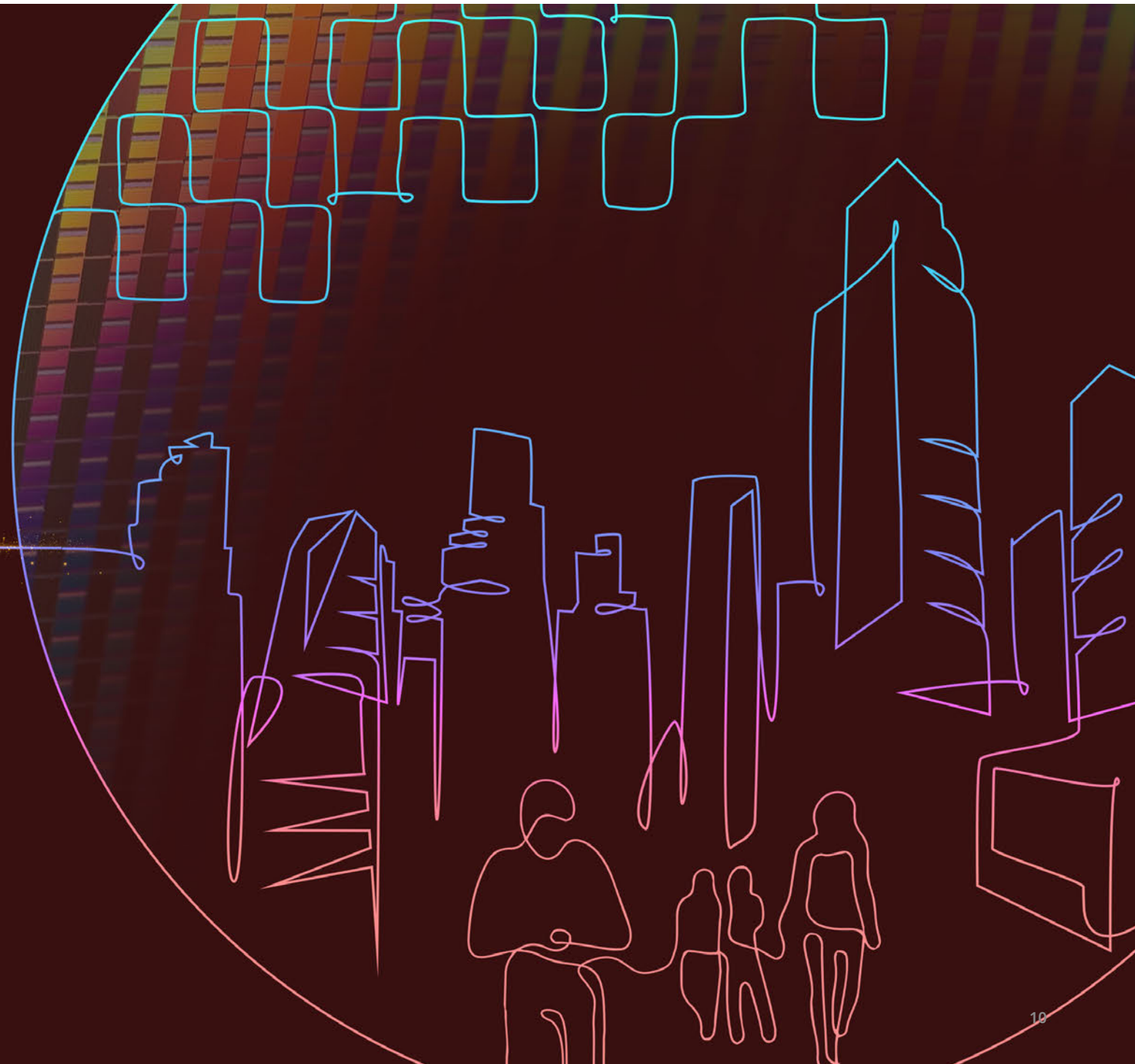
Alliance for Water Stewardship (AWS)

- "Platinum" class certification — Fab 5, Fab 12A, Fab 12B, Advanced Backend Fab 3

Sustainalytics	• Company ESG Risk Ratings: Low ESG Risk – Semiconductor Industry
TIME Magazine	• TIME100 Most Influential Companies 2021
Corporate Knights	• Global 100 Most Sustainable Corporations
Taiwan Institute of Sustainable Energy	• The Most Prestigious Sustainability Awards – Top Ten Domestic Corporates – for six consecutive years • Sustainability Action Awards – Gold Award • Best Sustainability Report Award • English Report – Gold Award • Circular Economy Leadership Award • Information Security Leadership Award • Supply Chain Leadership Award
Institutional Investor Magazine	• Most Honored Company (Technology/Semiconductors) – All-Asia • Best Overall ESG (Technology/Semiconductors) – First Place (buy-side and sell-side) – All-Asia

Taiwan Stock Exchange	• Top 5% in Corporate Governance Evaluation of Listed Companies for seven consecutive years
Corporate Knights & As You Sow	• 2021 Carbon Clean 200™ List
Environmental Protection Administration, Executive Yuan, R.O.C.	• National Enterprise Environmental Protection Award
FORTUNE	• 2021 World's Most Admired Companies
Cheers	• Ranked Number One in Top 10 Most Admired Companies to Young Generations for five consecutive years
Forbes	• World's Best Employers 2021

ESG Feature Stories



First Semiconductor Company to Adopt Energy-Efficient Measures in Advanced Manufacturing Equipment Worldwide 11

Launch Supplier Fire Protection Personnel Project to Improve Supply Chain Resilience 12

Build a Diverse and Inclusive Workplace 13

Cultivate New-Generation STEAM Talent 14

Relief Efforts for Global Pandemic Prevention against COVID-19 15

First Semiconductor Company to Adopt Energy-Efficient Measures in Advanced Manufacturing Equipment Worldwide

ESG Directions
Green Manufacturing

TSMC is committed to creating a sustainable semiconductor supply chain. Since the power consumption of the process manufacturing equipment accounts for over 50% of the Company's energy use, and the number of advanced manufacturing equipment increases every year, TSMC launched 365 action plans under the Energy Conservation Action Project for Next-generation Fab Tools in 2021. 159 action plans have been verified and applied to 119 advanced manufacturing tool models for 5mn process manufacturing and 3nm process manufacturing in the future. Moreover, the program introduced high-efficiency parts and energy-saving designs in 17 energy-intensive components and successfully saved 400 GWh of electricity in a year.

The New Generation Equipment Energy Conservation Program holds over 100 meetings every year in search of opportunities and innovative mindsets for equipment energy conservation. TSMC is engaged in-depth with the design of energy-conserving modules for advanced manufacturing equipment with the top six power-consuming equipment suppliers and provides implementation guidelines. Also, through regular technical review meetings, TSMC repeatedly validates the green benefits of the solutions. The energy-saving specifications are incorporated in the standards for new equipment purchases as well. As the first semiconductor company to drive the adoption of energy conservation measures in advanced manufacturing equipment among equipment suppliers, we strive towards the sustainability goal of saving energy by 20% on average for each machine by 2030.

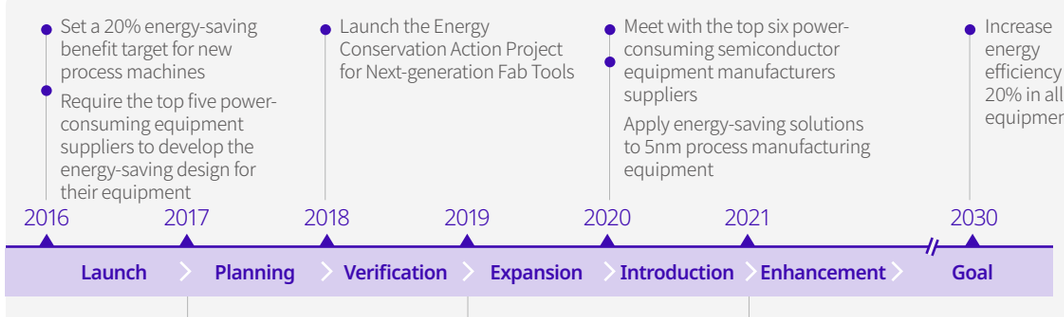
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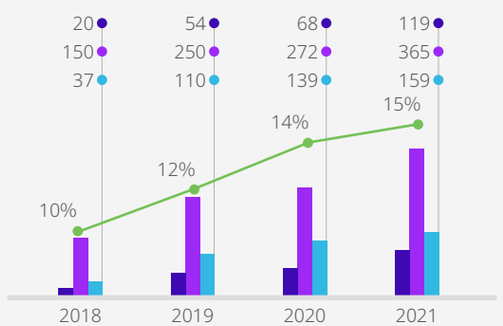
400 GWh of electricity is saved

TSMC is committed to practicing green manufacturing. We will continue to develop innovative energy-conserving designs in partnership with our equipment suppliers and adopt them in new manufacturing equipment in the future to optimize energy efficiency.

Chen-Bin Lin
Director of Intelligent Engineering Center at TSMC

Milestones and Results of the Energy Conservation Action Project for Next-generation Fab Tools







TSMC collaborates with equipment suppliers in the continuous development of green semiconductor manufacturing equipment and the production of sustainable products under high energy efficiency.

Launch Supplier Fire Protection Personnel Project to Improve Supply Chain Resilience

ESG Directions

Responsible Supply Chain

TSMC strives to improve supply chain resilience. To reduce the risk of supply chain interruption caused by fires, TSMC has created the "Supplier Fire Protection Sustainability Management Mechanism," which advises and inspects supplier fire protection systems by standards exceeding local codes. In 2021, TSMC further activated the Supplier Fire Protection Personnel Project for critical suppliers and suppliers that have shown room for improvement in fire protection audits conducted in previous years. Each supplier plant has one staff dedicated to fire protection management. TSMC offers resources and technologies to all fire protection dedicated personnel, who will receive a capability grading, training, and training result evaluation.

In addition to the fire protection dedicated personnel project, TSMC also consolidated its experience from years of on-site inspections and counseling centered on the "Supplier Fire Protection Sustainability Management Mechanism" into learning materials available in Supply Online 360. Suppliers can download materials such as the disaster prevention management form and fire protection designs from the platform. By referring to TSMC practices, suppliers can improve their management capabilities more efficiently. TSMC also ensures all fire prevention and fire extinguishing equipment at our suppliers functions properly through in-depth audits, on-site inspections on fire extinguishing equipment and fire prevention management practices.

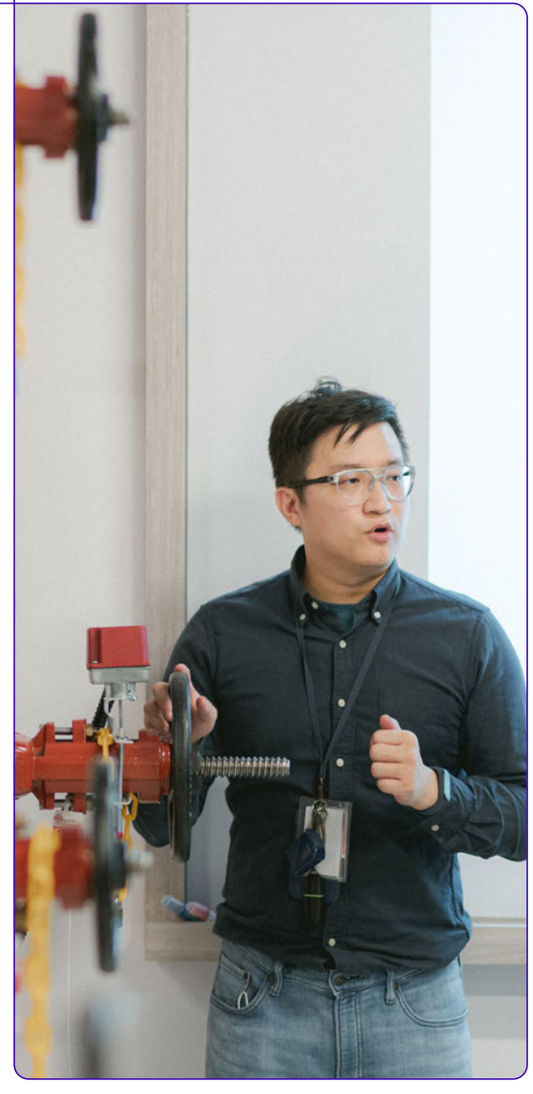
In 2021, 48 dedicated staffs of suppliers that didn't meet the criteria for Grade 3 in the professional capability grading all completed training. The percentage of trainees in Grade 3 and Grade 4 has increased from 58% to 82%. In 2022, TSMC plans to collaborate with academic partners. By offering teaching materials applicable to all industries, professional instructors, and teaching equipment that supports practical training, the Company will continue to improve supply chain resilience as a globally trusted provider of technologies and manufacturing capacity.

> I appreciate that TSMC offers counseling and assistance through its expert teams. In addition to sharing risk management experience in high-tech semiconductor foundries, TSMC also held practical training sessions for supplier fire protection dedicated personnel. It helps enhance the overall fire protection of the plant and disaster prevention self-management capabilities and reduces fire risks for the company.
>
> **Chao Kuan-Chun**
> President of Wonik Quartz Taiwan Co., Ltd.

91
Suppliers took part in the project

2021 Supplier Fire Protection Personnel Project Implementation Results

Item	Project Details	Results
Dedicated personnel to fire protection management	• Requested 91 suppliers to designate a dedicated single-point liaison for plant fire protection management and participate in professional capability grading and training.	✓ 91 suppliers have designated 106 dedicated personnel for a total of 106 plants.
Course planning and evaluation	• Training courses for the fire protection personnel planned by TSMC - On-site lessons on fire extinguishing equipment and operational training - Fire extinguishing equipment maintenance - Fire protection management system - Explosion-proof electrical equipment and fire stopping	✓ Supplier fire protection dedicated personnel is equipped with professional capabilities as follows: - The person is familiar with the function and operation of the fire extinguishing equipment in the plant - The person is capable of planning for fire extinguishing equipment maintenance - The person is familiar with fire compartmentation and fire stopping techniques - The person is familiar with explosion-proof electrical equipment and construction
Effectiveness	• Held two sessions of "Fire Protection Personnel Operational Training"	✓ Conducted a test to evaluate the learning effectiveness of the trainees by the criterion of 90 points. ✓ The percentage of trainees in Grade 3 and Grade 4 increased from 58% to 82%.



TSMC enhances supply chain resilience by sharing its experience in fire protection management through the "Supplier Fire Protection Sustainability Management Mechanism."

Build a Diverse and Inclusive Workplace

ESG Directions
Diverse and Inclusive Workplace

To fulfill our commitment to our Diversity and Inclusion Statement, the Company treats its workforce as the most important asset and is committed to empowering more than 60,000 employees globally to unleash their full potential in the right roles. In supporting employees to balance family life and career development, TSMC offers a welfare system that is better than legal requirements and has established four preschool for fabs in Taiwan. In 2021, TSMC launched the TSMC Child Care Benefit Program, extending maternity leave from 8 weeks to 12 weeks and paternity leave from 5 days to 10 days. It also increased maternity subsidy from NT$1,000 to NT$10,000 per child and organized Holiday STEAM camps to support the growth of TSMC babies. In 2021, the number of TSMC newborns accounts for 1.7% of newborns nationally in Taiwan, setting a new record exceeding the 1.5% from the previous year.

In support of female employees, TSMC established the Women@tsmc Employee Resource Group (ERG). The association aspires to connect female colleagues and enable them to realize their full potential in the pursuit of personal growth and achievements.

1.7%
TSMC babies account for 1.7% of the newborns nationally in Taiwan

"Employees are important assets to TSMC. They are also the driving force of industrial upgrading and social development. We strive to foster a diverse and inclusive work environment that integrates people from different backgrounds. By strengthening collaboration through mutual understanding, acceptance and respect, we will create a better and brighter future for TSMC together.

Connie Ma
Vice President of Human Resources, TSMC

"It is a huge challenge for first-time moms as they bring home their newborns from the postpartum nursing center. The adapting and learning process requires considerable time and energy. The "TSMC Child Care Benefit Program" has extended maternity leave to 12 weeks. It gives me time to properly adjust my life, physical and mental well-being, and make childcare arrangements when I return to work. I hope that the Company can develop more flexible work schedules so that employees can more easily achieve work-life balance.

Catherine Chang
TSMC Employee

"The childcare benefits the Company offers help dual-income families a lot especially during the adaptation period after the newborn was brought home from the postpartum nursing center. The paternity leave allows me to fulfill my responsibilities caring for the family. In the meantime, my wife and I look forward to participating in the Company's Holiday STEAM Camp with our children. We also hope that the Company can plan activities for children of all ages, and we can accompany our children along the way.

Kevin Chu
TSMC Employee



Dedicated to supporting employees to attain work-life balance, TSMC has established kindergartens for four fabs in Taiwan.

Cultivate New-Generation STEAM Talent

ESG Directions
Develop Talent

To enhance the quality of talent in Taiwan, TSMC is dedicated to youth incubation, the potential realization of diversified education, and caring for the disadvantaged communities lacking educational resources. The Company strives to achieve SDG4 of ensuring quality education by providing students in all educational stages development opportunities within and outside the scope of formal education, as well as learning resources linked to industry practices.

For university and graduate students and teachers, TSMC collaborates with schools in Taiwan and overseas in launching university programs primarily focused on "industry-academia collaboration," "course collaboration," and "career guidance." We are committed to the cultivation of next-generation semiconductor talent through the support of teacher recruitment, mentoring programs, lectures, competitions, scholarships, and groundbreaking industry-academia collaborative research programs. TSMC also offers its production capacity to top university students and teachers worldwide for them to turn their IC designs into actual chips.

For students currently in the nine-year compulsory education system, TSMC Education and Culture Foundation and TSMC Charity Foundation jointly allocate educational resources to encourage them to explore their potential. Striving to achieve equal access to education and empower children with STEAM capabilities, we have held Chemistry Camps for high school students, occupational training, science tours specifically for female students, and learning companion programs and tours for elementary and junior high school students.

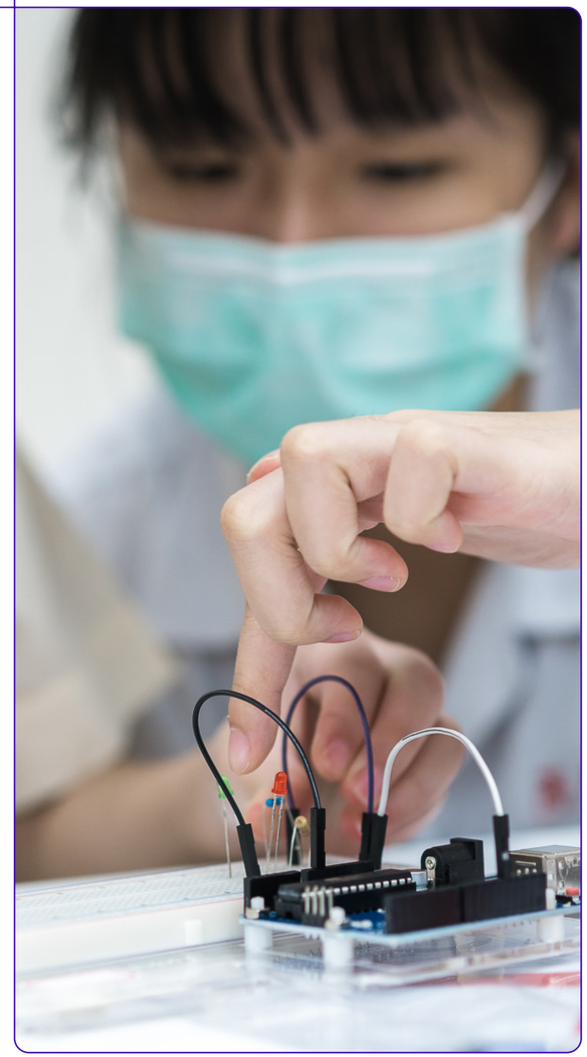
> In addition to training students to exert creativity and complete IC designs independently, the University Shuttle Program effectively bridges students with the industry and further introduces our efforts to the world.
>
> **Shen-Iuan Liu**
> Distinguished Professor at the Department of Electrical Engineering, National Taiwan University

572 million
An annual expenditure of NT$ 572 million is dedicated to talent cultivation

TSMC Dedicates Educational Resources for Students in All Educational Stages to Cultivate New-Generation STEAM Talent

Junior High School and Elementary Schools	High Schools	University Students	Graduate Students	Academic Research
• Volunteer Services • Teach and Learn Program — Teachers Training in Reading • Sponsor the Exhibition Hall "The World of Semiconductors" to the National Museum of Natural Science • Support the Teach for Taiwan organization through regular employee donations • TSMC Little Baseball Hero Support Program • Sponsor Emei Junior High School KIST Education • TSMC Science and Aesthetics Tours	• TSMC Youth Theater Project • TSMC Journeys of Female Scientist Lectures • Vocational Training Program • Support the Junyi Academy through regular employee donations [Note] • TSMC Cup- Competition of Scientific Short Talk • Sponsorship of Science Camps • TSMC Youth Calligraphy and Literature Competitions	• Scholarships for outstanding yet economically disadvantaged students • TSMC Semiconductor Programs • Hsien-Yung Pai Literature Lectures • Big Data and Cloud Technology • TSMC X Microsoft Careerhack Competition • TSMC Youth Dream Building Project	• TSMC Ph.D. Scholarship • University Research Center • National Academy for Key Fields of Research	• Industry-Academia Joint Development Project • University Shuttle Program

Note: Junyi Academy Foundation offers free online learning materials for elementary school, junior high school, and high school students.



TSMC doubles down on holding Journeys of Female Scientist Lectures, offering female students diverse learning opportunities in technology.

Relief Efforts for Global Pandemic Prevention against COVID-19

ESG Directions
Care for the Disadvantaged

In 2021, TSMC allocated NT$ 4.26 billion to support global efforts against COVID-19 pandemic. Our endeavors include vaccine donations, sponsoring university medical research on pandemic prevention and control, and providing relief through TSMC Charity Foundation in healthcare, rural education, and care for the disadvantaged.

> Adequate testing capacity is the key to COVID-19 pandemic control and prevention. We're grateful for TSMC Charity Foundation's timely donation of contactless testing stations to the NTUH medical team when most needed.
>
> **Ming-Shiang Wu**
> Superintendent of National Taiwan University Hospital

4.26 billion
An annual expenditure of NT$4.26 billion was dedicated to global pandemic prevention

Comprehensive Medical Resources

Vaccines
Donated five million doses of BNT (BioNTech) 162b2 vaccine to the Taiwan Centers for Disease Control to distribute to vaccination facilities across Taiwan for public use.

Medical kits
Offered 25,000 medical kits that include PPEs to unions and associations for nurses and social welfare institutions.

Oxygen generators
Donated 1,400 oxygen generators to the Taiwan Centers for Disease Control and county/city governments to distribute to hospitals and hotels that are used as respite centers, as well as some oversea countries such as India at the peak of the pandemic.

Contactless testing stations
Donated ten contactless testing stations that effectively prevent workers from contact with the virus and reduce the risk of infection. The testing efficiency has been accelerated by 119%, further contributing to the national testing capacity.

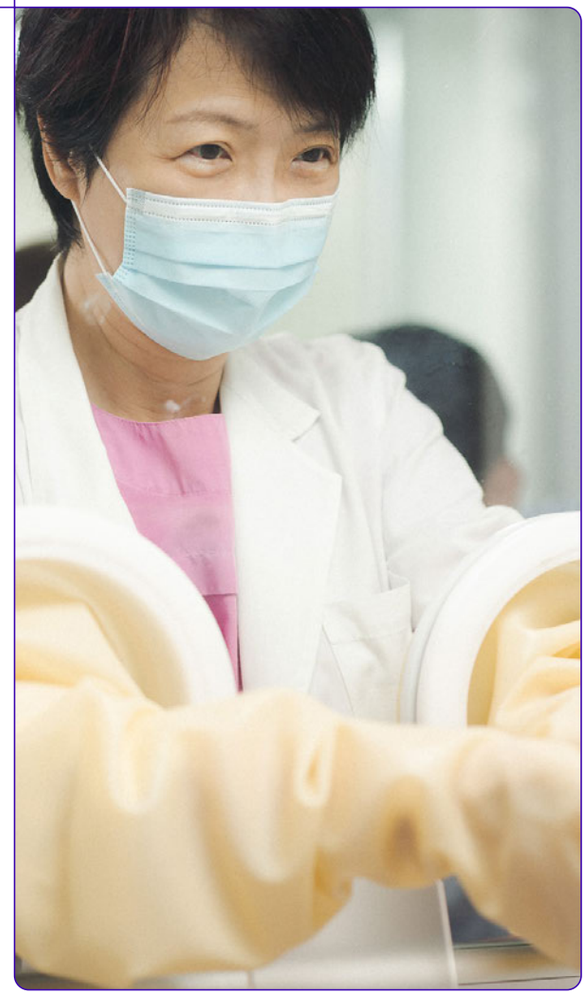
Undisrupted Education in Rural Areas

Remote learning equipment
1,680 laptops and tablets
1,000 IP sharers and wireless Internet equipment

Online learning resources for teachers and students
2,000 remote learning material packages for popular science
400 annual subscriptions to the online learning platform "Class One," offering teachers access to online training during the pandemic.

Caring for the Disadvantaged

Food packages
Delivered 2,000 prepared meals to elders at 12 social welfare institutes in collaboration with 1919 Food Bank.
Offered 3,000 boxes of food to rural locations caring for disadvantaged children.



TSMC Charity Foundation donated contactless testing stations to protect medical staff and enhance testing capacity.

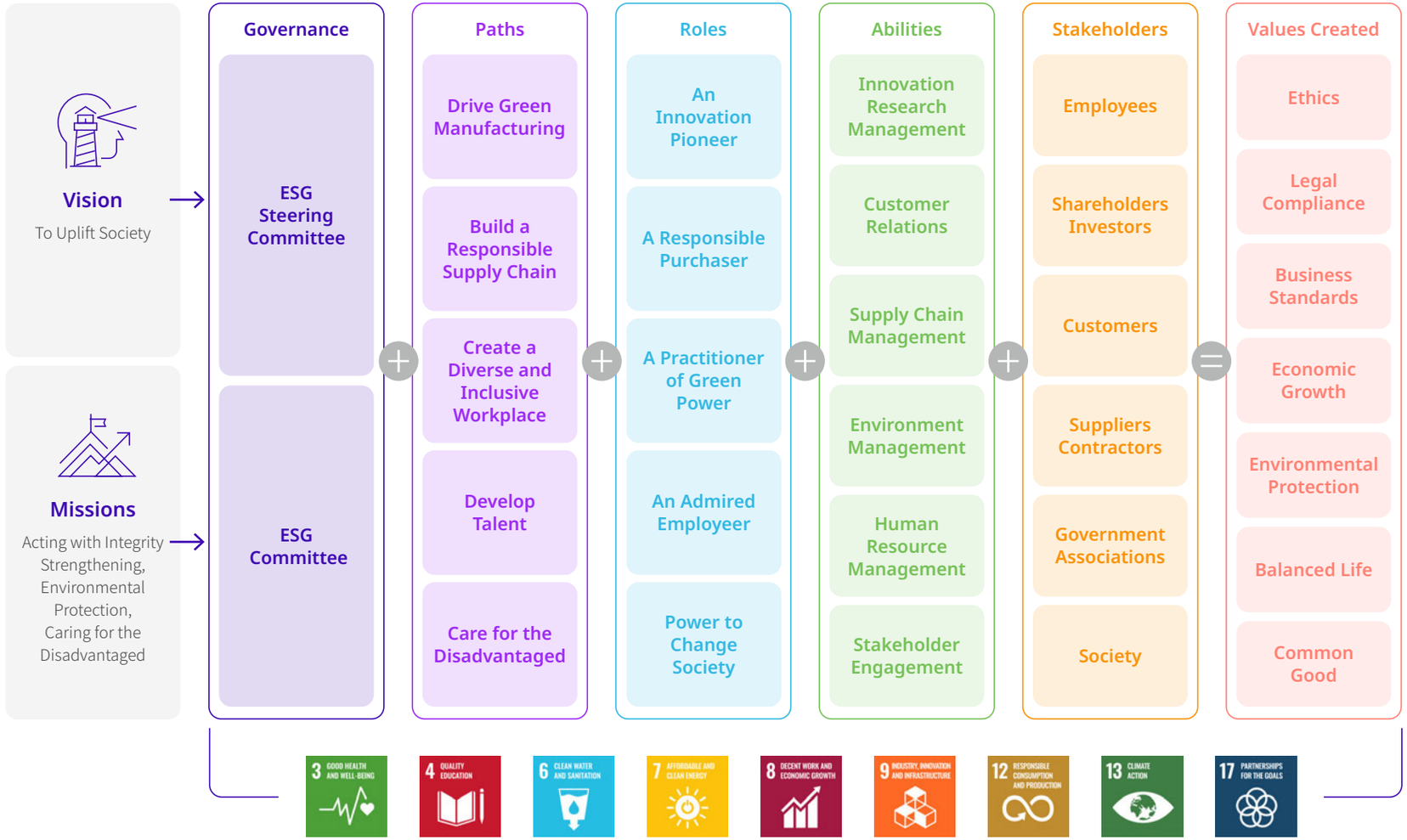
Sustainable Business Practices



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ESG Implementation Framework

With uplifting society as our vision, the TSMC ESG Policy, serves as the foremost guiding principle for our sustainable development. The ESG Matrix set by TSMC's Founder, Dr. Morris Chang clearly defines TSMC's ESG scope. Based on the vision of "Uplift Society," TSMC implements sustainability governance effectively in its core business of dedicated IC foundry services through its ESG Implementation Framework. TSMC actively develops positive relationships with all stakeholders including employees, shareholders/ investors, customers, suppliers/contractors, and society to create value through common good.



ESG Management Platform

In accordance with the vision and mission of the TSMC ESG Policy, TSMC employs the ESG Steering Committee and ESG Committee as a management platform to align with global trends in sustainable development and corporate growth. TSMC takes tangible action on our sustainability mindset and continues to create value for stakeholders.

Chairman Mark Liu serves as the Chairperson for the ESG Steering Committee and Senior Vice President Lora Ho serves as the executive secretary for the ESG Committee. Together with senior executives from various fields, Chairman Liu and Senior Vice President Ho review ESG topics relevant to TSMC operations, set mid-to-long-term development directions and goals, and align UN SDGs with the Company's core competencies to develop a blueprint for ESG. The board of directors supervises progress towards sustainable development and the Chairperson of the ESG Committee reports to the board of directors each quarter about ESG achievements and future plans.

ESG Steering Committee

Chairperson	Chairman
Executive Secretary	ESG Committee Chairperson
Members	Senior Executives from Information Technology and Materials Management & Risk Mgt, Business Development, Legal, Human Resources, Research & Development, Operations, Finance, TSMC Education & Culture Foundation and TSMC Charity Foundation
Meetings	Quarterly
Tasks	Chairman Liu and the management team discuss and formulates the Company's ESG vision and strategies, colloborates with the ESG Committee for implementation, strives towards a culture of sustainability, and becomes a driver for positive change.

ESG Committee

Chairperson	Senior executive appointed by Chairman Liu
Members	Management representatives nominated by functional organizations relating to the economy, environment, society, and governance
Meetings	Quarterly
Tasks	• Identify pressing sustainability topics and formulate action plans • Supervise interdepartmental communication and coordinate resource integration • Compile ESG-related budgets for all functions • Track achievements across various sustainability issues and formulate plans for further improvement The Committee Chairperson shall report achievements and work plans to the Board of Directors every quarter



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 open and innovative environment for research and development to create maximum value by unleashing employees' potential, and to realize the goal of corporate sustainability.



Dr. Kevin Zhang

Senior Vice President, Business Development

The semiconductor is at the core of modern technological innovation and continues to drive the advancement of our lives. We are committed to building meaningful partnerships with our customers around the world, developing a sustainable technology roadmap, and together, we provide eco-friendly products that are more powerful and more energy-efficient.



Dr. Y.L. Wang

Vice President, Operations/Fab Operations I

Digital transformation and AI have brought revolutionary changes to wafer fabrication. TSMC will continue to use innovative technologies and advanced processes to offer high-quality and sustainable products that can satisfy customer demands and benefit all people.



Sylvia Fang

Vice President, Legal and General Counsel/Corporate Governance Officer

TSMC's core value is integrity, committing us to reach the highest corporate governance standards, conduct business with accountability and transparency, and appropriately balance the interests of all our stakeholders.

Note: Listed in the order of chapters that senior executives are responsible for

The ESG Committee is tasked with carrying out resolutions from the ESG Steering Committee and is equipped for vertical integration and horizontal connections to facilitate interdepartmental communication and resource allocation. The ESG Committee instructs the ESG Department, the responsible organization, and inter-organizational management representatives to identify sustainability topics relevant to TSMC operations that stakeholders are concerned about. The ESG Committee will assemble task forces, formulate strategies, targets, and actions plans, and convene quarterly meetings to track progress and performance for sustainability issues to ensure that ESG strategies are fully implemented into the daily operations of TSMC.





Dr. L.C. Lu

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

Based on the comprehensive infrastructure of Open Innovation Platform®, we collaborate with alliance partners to continuously research and develop innovative design solutions through Design Technology Co-Optimization (DTCO), and enable customer's rollout of products with optimum performance & energy efficiency.



Connie Ma

Vice President, Human Resources

As TSMC is heading for another stage of substantial growth, we would continue to implement the business philosophy of open-style management system and to foster a diverse and inclusive workplace, so that employees can enjoy their work, grow with the company, and share the fruits of success.



J.K. Lin

Senior Vice President, Information Technology and Materials Management & Risk Management

TSMC is working with suppliers to pave a new path to sustainability by building a low-carbon supply chain together, ensuring labor rights, strengthening business ethics, and reducing ESH risks. We aim to take the lead in ESG actions and drive our responsible supply chain to become even better.



Dr. Jun He

Vice President, Quality and Reliability

TSMC is fully dedicated to quality. With our quality culture that is always pursuing excellence and our consistently evolving quality capabilities, we work with customers and suppliers to achieve high-quality products and facilitate sustainable prosperity in the industry.



Lora Ho
Senior Vice President, Europe & Asia Sales

In the era of rapid change and uncertainty, TSMC uphold the "Customer Trust" core value, continuously strengthen customer collaboration, and elevate customer partnerships. We expect ourselves to be the critical enabler of customer success and achieve the win-win objectives together with our customers.



Y.H. Liaw
Vice President, Operations/Fab Operations II

TSMC is resolute in maintaining our commitment to strengthening environmental protection. We aim to facilitate green manufacturing through innovative mindsets, collaborate with suppliers to achieve green action, and actively introduce renewable energy to lower our impact on global climate change and become a stabilizing force for environmental sustainability.



Dr. Arthur Chuang
Vice President, Operations / Facility

Striving to become the benchmark of eco-friendly companies in the semiconductor industry, TSMC is dedicated to developing a sustainable operational environment, pursuing the best pollution prevention technologies, and developing a renewable circular economy.



Dr. T.S. Chang
TSMC Fellow and Vice President, Operations/Advanced Technology and Mask Engineering

TSMC cares about environmental protection. We've introduced energy-efficient designs to advanced processes and optimized raw material usage through innovative ideas like source management and reduction, which will be applied to future facilities as well to expand our carbon reduction and waste reduction efforts as part of our contribution to a sustainable society.



Wendell Huang
Vice President, Finance and Chief Financial Officer / Spokesperson

TSMC is committed to achieving excellent financial performance, implementing sound corporate governance, and bringing long-term profitable growth to investors. At the same time, we set challenging ESG goals, and go out of our way to actively respond to stakeholder needs and expectations.



Sophie Chang
Chairperson, TSMC Charity Foundation

TSMC has a lot of ESG ideas that span a wide scope. So long as we are able to contribute to society, the TSMC Charity Foundation will remain on the frontlines to promote and share our experiences to help more people begin their journey towards sustainability.



Dr. F.C. Tseng
Chairman, TSMC Education and Culture Foundation

The TSMC Education and Culture Foundation never faltered in the face of the COVID-19 pandemic. By adopting innovative mindsets and with the help of technology, we were able to continue injecting new life into the fields of education and culture, guiding younger generations and the public through this challenging time.

Note: Listed in the order of chapters that senior executives are responsible for

2021 ESG Reporting to the Board of Directors

Achievements

- Formulated an incentive program that ties the compensation of senior executives and key talents to shareholder interests and ESG (environmental, social, and governance) achievements
- Increased purchase of renewable energy, supported carbon-neutral natural gas, continued to develop green equipment and machines, and announced the strategies and goals for Net Zero Emissions by 2050 to combat climate change
- Leveraged the Sustainability Report as an ESG self-management tool, continued to align with global sustainability standards and management trends, and compiled our first TCFD Report
- Continued to strengthen energy conservation, GHG reduction, water conservation, and pollution reduction in suppliers by asking for mid-to-long term reduction goals and concrete actions toward such goals to achieve a low-carbon supply chain
- Published an announcement declaring that "Supply Chain Partners Should Ensure Protection of Human Rights During the COVID-19 Pandemic" to create a dignified workplace
- Carried out the winning proposal from the first ESG Award and went on to the host the second ESG Award to encourage sustainability and innovation in the organization and among employees

2022 Work Plans

- Continue to enhance the performance of green manufacturing, achieve a low-carbon value chain, and steadily move towards net zero emissions
- Extend manufacturing standards from TSMC to the supply chain and work with suppliers to create an eco-friendly green supply chain
- Cultivate a diverse and inclusive culture, training programs, and related measures as well as develop Women@tsmc
- Expand the TSMC University Collaboration Programs and TSMC STEM for High School Girls Program to continue fostering semiconductor and STEM professionals

2021 ESG Steering Committee

Achievements

- Explored global ESG trends, evaluation standards, and corporate best practices to achieve sustainable development
- Announced net zero emission strategies and pathways, formulated milestones and concrete action plans, committed to achieving Net Zero Emissions by 2050, and reviewed plans for stakeholder communication
- Deepened ESG culture at TSMC and launched the second ESG Award, attracting 1,257 sustainability proposals from employees and organizations, a 60% increase from the first ESG Award
- Reviewed ESG-related budgets and expenses and took stock of resource demands and implementation plans for ESG-related dimensions

2021 ESG Committee

Achievements

- Strengthened communication of sustainability messages by complying with the TCFD Recommendations and SASB Standards ahead of regulatory requirements for the Sustainability Report and adding an ESG FAQ section
- Carried out green manufacturing by continuing to promote source reduction for chemicals, building a water reclamation plant and zero waste center, developing the first System of Waste Intelligent Fast Track, and receiving the highest platinum rating for zero waste to landfill in compliance with UL2799
- Mitigated climate change impacts with 400 GWh saved from 159 energy conservation plans proposed by the the Energy and Carbon Reduction Committee and 17,044 arbors and 277,898 shrubs planted through the "Plant a Tree Program"
- Facilitated sustainable development in the supply chain by carrying out the second stage of the On-site Contractor Personnel Support Program, publishing the White Paper on Supplier Transportation Management, and implementing the supplier EP&L Program and low-carbon value chain management approaches
- Developed and promoted online courses and a survey system for TSMC Human Rights Policy and Implementation
- The TSMC Education and Culture Foundation and the TSMC Charity Foundation have actively supported fostering our young generation, promoting arts, culture, and education, and assisted students in remote areas as well as the disadvantaged to bring positive change to society

Materiality Analysis and Stakeholder Communication

In 2021, TSMC published the first Materiality Analysis Report to formally build up know-how in ESG management. Materiality analysis is an important directive for compiling the Sustainability Report, formulating long-term sustainability goals, and communicating with stakeholders. TSMC developed a methodology for materiality analysis in compliance with GRI Standards and the AA 1000 Accountability Principle: 2018. The methodology also integrates stakeholder concerns and sustainable management requirements for TSMC to identify material ESG issues.

Starting in 2021, TSMC changed the frequency of materiality analysis from once every year to once every three years. TSMC continues to observe changing trends in ESG topics and track progress toward long-term sustainability goals. The next materiality analyses will be conducted in 2024. Before then, TSMC will continue to collect and respond to stakeholder feedback and suggestions through diverse communication channels and facilitate ESG strategies and commitments through the ESG Committee.

The latest materiality analysis was completed at the end of 2021. A total of 206 TSMC managers and colleagues and 1,082 stakeholders participated in discussions and analysis of the identification, prioritization, and validation of material issues. Changes made to material issues from 2020 include the addition of three issues: Business Continuity Management, Biodiversity, and Diversity & Inclusion. TSMC also integrated Climate Change and Energy Management into Climate and Energy and changed the names of Product Quality, Customer Service, Supplier Sustainability Management, Waste Management, and Social Participation to Product Quality and Safety, Customer Relations, Sustainable Supply Chain, Circular Resources, and Social Impact, respectively. The changes were made to correspond with the spirit and significance of issue management. In the end, TSMC selected a total of 23 ESG issues as the basis for materiality analysis.

Results from the materiality analysis, the Company's ESG policies, ESG focus areas, and long-term sustainability goals were considered before TSMC finally confirmed 14 material issues of significance that should be prioritized for disclosure and long-term goals. Biodiversity is a potential material issue at TSMC; related practices and achievements will be disclosed in the sustainability report.

AA 1000 AccountAbility Principle

Process for GRI Materiality Analysis

Methodology

Inclusivity / Materiality / Responsiveness / Impact

Identify: Identify Issues →

23
ESG Issues

ESG issues relevant to TSMC were identified through global sustainability standards (GRI Standards, ISO 26000, UN Global Compacts, RBA, SDGs, and SASB), sustainable investing indices (DJSI, CSP, MSCI ESG Index, and TCFD, etc.) TSMC development goals and stakeholder communication. In 2021, TSMC identified 119 relevant issues and finalized 23 ESG issues after discussions with different departments and senior executives.

Prioritize: Analyze Issues →

1,288
Survey participants

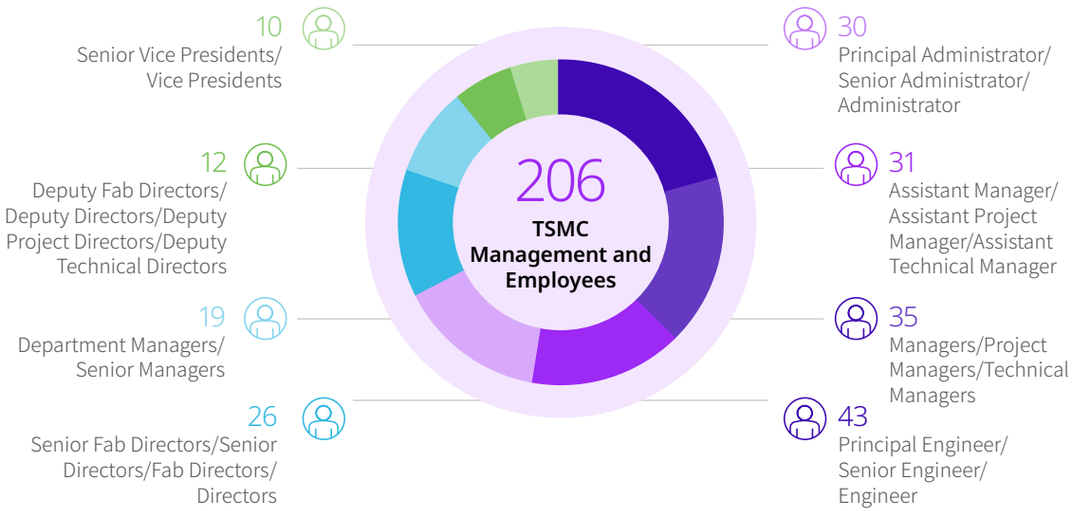
In addition to the 1,082 stakeholders that participated in the survey, a total of 206 senior vice presidents, vice presidents, and senior fab directors/ directors, led by ESG Committee Chairperson/Senior Vice President Lora Ho, evaluated the impact of various issues on operations (revenue growth, customer satisfaction, employee loyalty, and operational risks), integrating internal and external perspectives to identify the importance and impact of each ESG issue.

Confirm: Material Issues

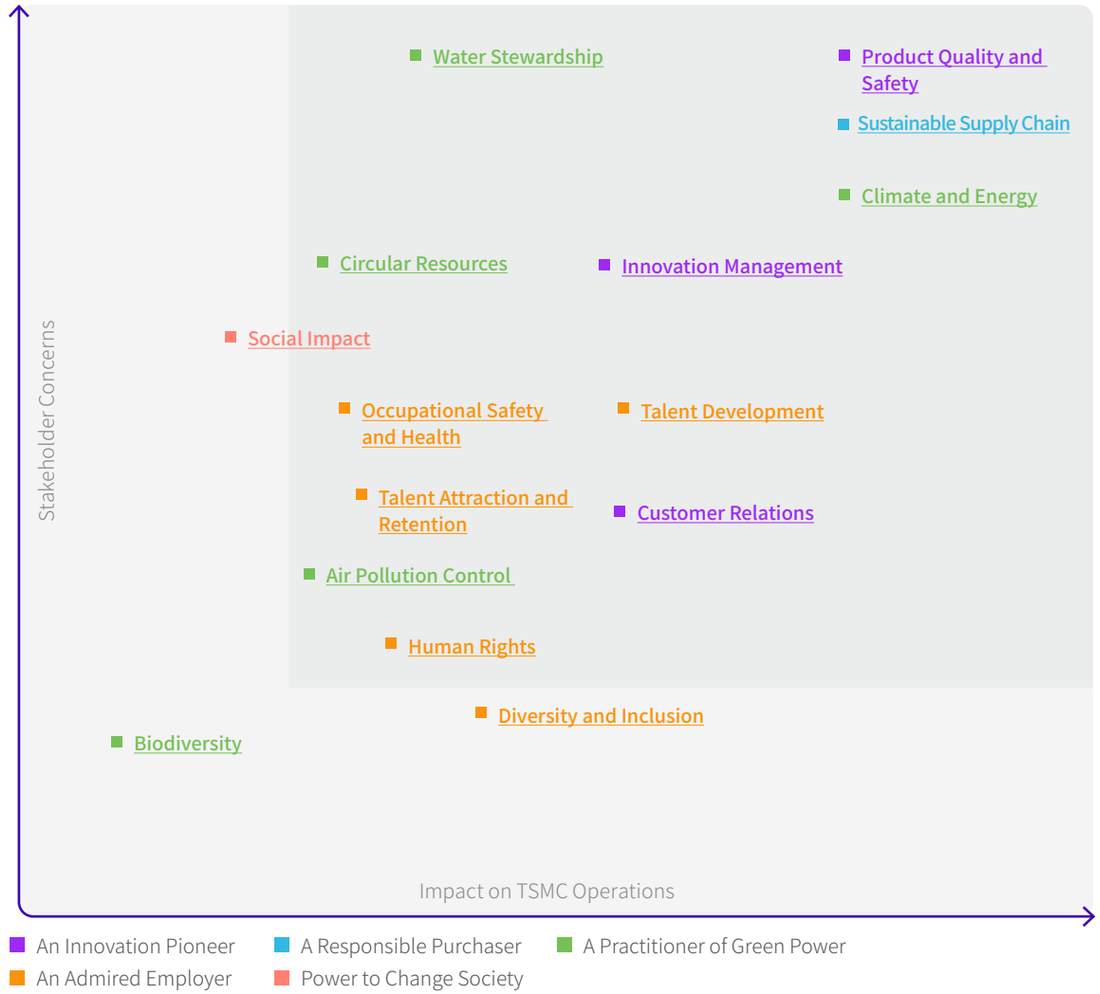
14
Material Issues

The ESG Committee confirmed 14 material ESG issues based on the results of the materiality analysis. The ESG Committee also evaluated the scope of impact of all ESG issues on the upstream, TSMC operations, and downstream of TSMC's value chain to identify 24 material issues relevant to TSMC according to GRI Standards, identifying and disclosing internal information, data, and management directives.





TSMC Materiality Matrix



Note: Corporate governance, risk management, ethics, regulatory compliance, financial performance, taxation, and information security issues are classified under General Disclosures by GRI and are generally result-oriented. The above issues will, therefore, not be represented in the materiality matrix but relevant information will be regularly disclosed in the Company's annual report, Company website, Sustainability Report, ESG website and ESG Newsletter

Material Issues and Value Chain

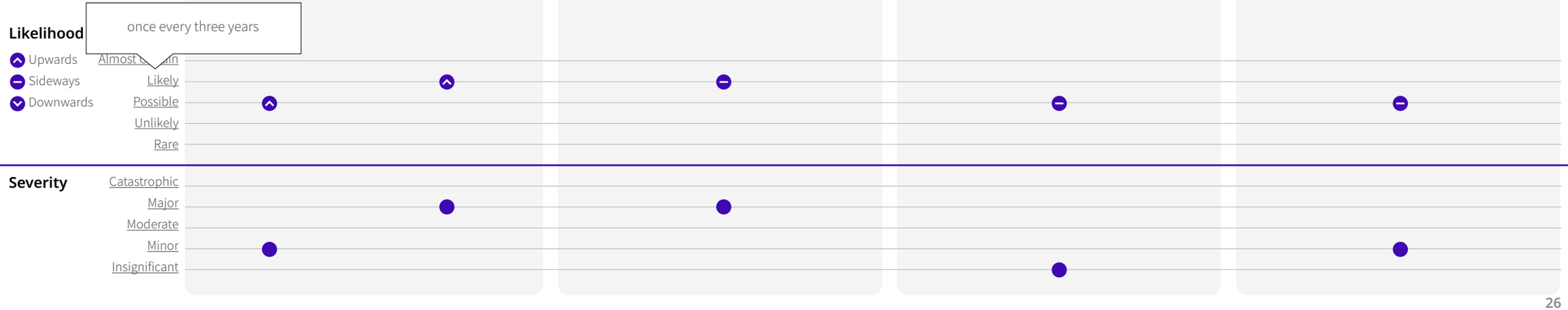
Sustainability Roles	Material Issues	GRI-specific Topics	SASB Standards	Upstream[Note 1]	TSMC Operations[Note 2]		Downstream[Note 3]	Operational Impact			
				Procurement Stage	Wafer Fabrication	Packaging/ Testing	Customers Use	Revenue Growth	Customer Satisfaction	Employee Cohesion	Operational Risks
An Innovation Pioneer	Innovation Management	Indirect Economic Impact & Energy	TC-SC-410a.2		✓	✓	✓	✓	✓	✓	
	Product Quality and Safety	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 & Effluents and Waste	TC-SC-140a.1	✓	✓	✓					✓
	Air Pollution Control	Emissions			✓	✓					✓
	Circular Resources	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			✓	✓		✓		✓	
	Human Rights	Labor/Management Relations, Non-discrimination, Freedom of Association and Collective Bargaining, Child Labor, Forced or Compulsory Labor & Human Rights Assessment		✓	✓	✓				✓	
	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 & Local Communities			✓	✓				✓	

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: "Customer Use" boundaries are customer products manufactured by TSMC
Note 4: "V" signifies the issue has real impact on this stage or that the issue is a spotlight issue

Material Issues and Risk Management

	Innovation Management		Product Quality & Safety	Customer Relations		Sustainable Supply Chain
Risk Aspects/ Type Strategies Operations Hazards	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 rate	TSMC production capacity cannot be fully utilized	Customer 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 shall protect R&D results with patents to ensure we remain technological leaders in the industry and to protect the operational freedom of TSMC and our clients across the world. Inadequate patent protection could impact TSMC's technological competitiveness Please refer to "Innovation Management" in this report and "6.3 Risk Management" in the 2021 Annual Report	Wafer quality control grows increasingly difficult as products become more complex. Inability to detect defects could incur a loss to our clients and impact Company reputation If defects remain undetected in raw materials, it could lead to scrapping the final product, impacting customers and Company operations Please refer to "Product Quality & Safety" in this report	If TSMC is unable to timely address customers' product issues, it may lead to idle capacity in TSMC. Please refer to "Customer Relations" in this report	If customers are not aware of TSMC's technology offering, customers may seek for alternative foundry suppliers' solutions.	Disruptions in the supply chain (for raw materials or equipment) will impact Company operations and our commitment to customers Please refer to "6.3 Risk Management" in the 2021 Annual Report and "Sustainable Supply Chain" in this report
Likelihood and Trend Upwards Sideways Downwards	Almost Certain Likely Possible Unlikely Rare					
Severity	Catastrophic Major Moderate Minor Insignificant					

	Climate and Energy	Water Stewardship	Circular Resources	Air Pollution Control
Risk Aspects/ Type Strategies Operations Hazards	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	Suppliers failing to properly handle waste will pollute the environment	Environmental impact from pollutant emissions
Risk Evaluation and Mitigation Measures	Increasing demands from stakeholders to increase usage of renewable energy could increase Company costs and, if demands are not met, fab construction progress and customer orders might be impacted Please refer to "Climate and Energy" in this report Unstable power supply will limit production capacity and impact Company reputation Customer's trust could decline and result in fewer orders Please refer to "Climate and Energy" in this report	Unstable water supplies will limit production capacity, TSMC will therefore be unable to satisfy customer demands 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 cause competent authorities to request TSMC to share 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



Risk Aspects/ Type

- Strategies
- Operations
- Hazards

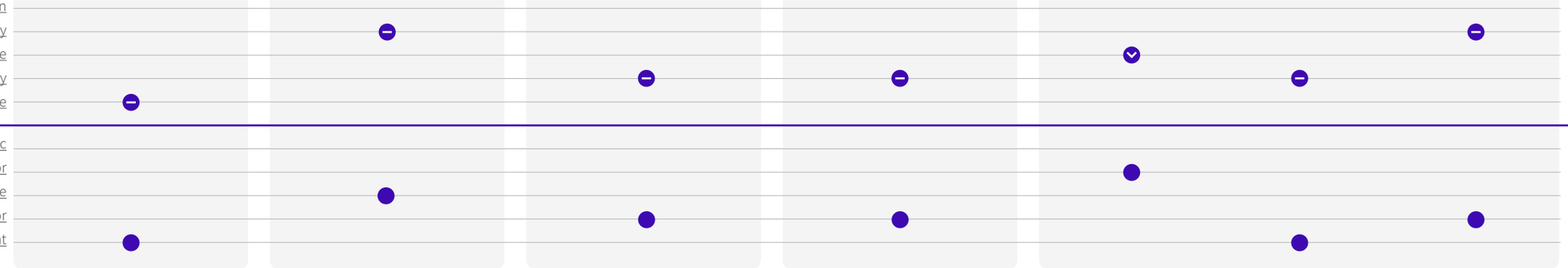
Risk Evaluation and Mitigation Measures

Diversity and Inclusion	Talent Attraction and Retention	Talent Development	Human Rights	Occupational Safety and Health
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	Failure to protect the human rights of TSMC employees and suppliers	Earthquakes or fires / Occupational injuries, occupational diseases, and chemical hazards / Pandemic
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 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	Company reputation, employee morale, and talent recruitment could suffer from the lack of proper protection for the human rights of our employees Company reputation and customer's interests could suffer from the lack of proper protection for the human rights of supplier's employees Please refer to "Human Rights" and "Sustainable Supply Chain" in this report	Earthquakes and fires could lead to damages to Company equipment or supplier equipment and result in disrupted operations and financial losses Employees could suffer from disabling injuries if they do not follow proper safety guidelines Cluster infections of pandemic inside the Company could result in disrupted operations Please refer to "Occupational Safety and Health" in this report and "6.3 Risk Management" in the 2021 Annual Report

Likelihood and Trend

- Upwards
- Sideways
- Downwards

Severity



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

64
Labor-management meetings

4,437
Cases handled through internal communication channels

Engagement

- Intra-organizational engagement and work meetings/daily
- Communication meetings at all levels/quarterly
- Labor-management meetings/quarterly
- Fab Caring Circle, Employee Opinion Box, and Ombudsman System/as needed
- Organizational climate survey/annually
- Professional ethics and human rights training/annually
- Employee core values survey and employee survey/ biannually

Issues

- Company's long-term development
- Talent recruitment, cultivation, and retention measures
- Diversity and inclusion
- Social impact
- Professional ethics and regulatory compliance



TSMC builds four kindergarten at Taiwan facilities to ensure employee feel safe and care in the workplace.

Focus Areas	Responses from TSMC
• Company growth, success and contribution to the society	• Strengthened internal communication channels to help colleagues learn more about the Company's future prospects
• Company global product capacity expansion, digital transformation and work efficiency	• Promoted digital transformation and continued to strengthen smart manufacturing with further integration with mobile applications, IoT, AI, and big data to develop a new generation of smart factories
• Gender equality and women potential unleashing in the Company	• Organized a training program on "TSMC's Human Rights Policy: Say No to Sexual Harassment and Build up a Friendly Workplace!"
• More ESG activities and social participation opportunities for employees	• Launched the TSMC Child Care Benefit Program to support work-life balance
• Work-life balance and individual growth	• Organized Women@tsmc to encourage women at TSMC to pursue their career goals and achieve self-growth
• Latest regulatory updates relevant to job functions, i.e., zero tolerance of corruptions, recusal to avoid conflict of interest, etc.	• Provided an "Annual Ethics and Compliance Training Course" (mandatory 0.5 hour online course) covering various important regulatory compliance topics and a total of 59,366 (99.9% completion rate) employees (including employees in subsidiaries) completed this training course

> Starting from my pregnancy, the Company offered a series of events to help new parents. Employees can also enroll their kids at TSMC kindergarten and feel assured that their beloved ones are in good hands.

Kelly Huang
TSMC Employee

Shareholders/ Investors

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

305
Institutional investors

210
Conferences and meetings

Engagement

- General shareholders' meeting/annually
- Investor conference/quarterly
- Domestic and overseas brokerage conferences/as needed
- Face-to-face meetings, video conference calls, and telephone conference calls/as needed
- Annual Report, Sustainability Report, and Form 20-F with the U.S. Securities and Exchange Commission/annually
- Major announcements on the Market Observation Post System/as needed

Issues

- Financial performance
- Innovation management
- Risk management
- Climate and energy



2021 TSMC Annual General Meeting

Focus Areas	Responses from TSMC
• Capital risk and long-term profitability	• With the support of strong operating performance and future growth potential, TSMC has been providing positive returns to investors for 13 consecutive years • Distributed cash dividends on a quarterly basis. Shareholders of TSMC common shares received a total of NT$10.25 cash dividend per share in 2021
• Technology development and competitive advantage	• Continued to communicate recent technology developments at the quarterly investor conferences
• Supply-demand dynamics in the industry and changes in the competitive environment • Impact of the international political and economic landscape on the business environment and corresponding measures	• In 2021, through quarterly investor conferences and 210 investor meetings, TSMC communicated with its investors on growth strategies and profitability and expressed its opinions on changes in the business environment
• Climate change responsive measures and supplier management	• Published the TCFD Report, committed to achieving Net Zero Emissions by 2050, and required 100% of high-electricity consumption suppliers to acquire ISO 14064-1 GHG emissions certification

> Understanding the sustainability profiles of companies in our investment universe is an important part of our investment process at Fidelity. Active engagement with TSMC on sustainability-related issues helps us yield insights that allow us to make better investment decisions on behalf of our clients.

Priyanshu Bakshi
Portfolio Manager & Analyst
Fidelity Management & Research (Hong Kong) Limited

Customers

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

99
Quarterly assessment meetings

1,200
Customer meetings

Engagement

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

Issues

- Innovation management
- Product quality and safety
- Customer Relations
- Information security



TSMC spares no efforts in helping customers, enabling products to rapidly progress from design to volume production.

Focus Areas	Responses from TSMC
Technology development schedules and plans	Offered 894 process technologies and 98 advanced packaging technologies in line with the technology roadmap
Product quality	Continued perfecting production technologies and product quality. Reduced engineering deficiencies per one million 12-inch wafers to 55% of 2019
Capacity planning and production information	TSMC-Online ™ provides real-time design, engineering, and backend assistance services to help customers quickly access comprehensive and real-time information
Information transparency and information protection	Established an automatic information security management system with ISO/27001 certification; Fab 14B and Advanced Backend Fab 2 received ISO/IEC 15408 certifications for facility safety

> TSMC and MediaTek are long-term partners. We share the same philosophy of integrity and relentlessly contribute to the supply chain improvements in areas from technology quality to environmental protection, carbon reduction, and human rights and safety. We're leading the industry suppliers to achieve both business growth and environmental sustainability and create a green semiconductor supply chain.
>
> **MediaTek**

> TSMC's attitude of working collaboratively with customers to develop creative solutions to challenging problems is remarkable and stems fundamentally from their "excellence in customer service" DNA.
>
> **Broadcom**

Suppliers/Contractors

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

111
Supplier audit & communication meetings

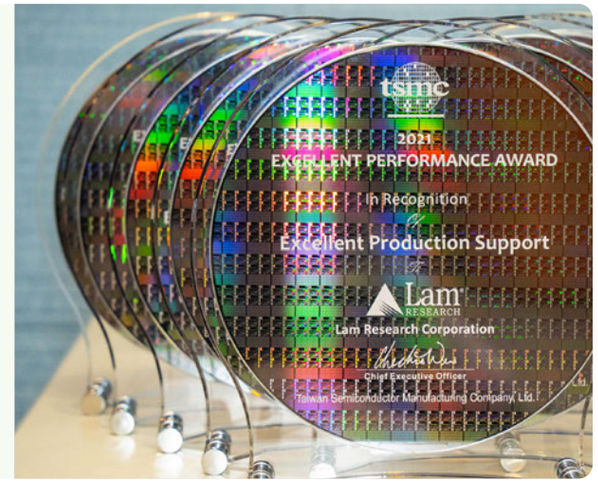
201
Suppliers participated in the Supply Chain ESH Training Forum

Engagement

- Supply Chain ESH Training Forum/annually
- Supply Online 360 Global Responsible Supply Chain Platform/as needed
- On-site support & audit/as needed
- Supplier meetings/as needed
- Supplier Information Security Association Meeting/monthly

Issues

- Sustainable Supply Chain
- Ethics and regulatory compliance
- Product quality and safety
- Occupational safety and health
- Information security



TSMC presents the 2021 Excellent Performance Award to outstanding suppliers.

Focus Areas	Responses from TSMC
• Sustainable actions and consistent improvement	• Built Supply Online 360, a global supply chain management platform; established online TSMC Supplier Sustainability Academy with 25 lessons on Supplier Code of Conduct now available online
• TSMC regulations on ethics and the supplier code of conduct	• All tier 1 suppliers signed the Supplier Code of Conduct and complied with business ethics (completion rate: 100%)
• Quality of raw materials	• 36 critical suppliers completed third-party supplier audits on sustainability risks by RBA-certified institutions; ten suppliers received consultation on process advancement and quality improvement
• Effective ESH management mechanisms	• Continued to enhance ESH and loss prevention capabilities in the supply chain and commended outstanding suppliers; in 2021, outstanding suppliers were MGC Pure Chemicals Taiwan and Sunlit Fluo & Chemical Co.
• Information security compliance, assessment results, and experience sharing	• Published four issues and over 200,000 copies of the Supply Chain Security Newsletter

“As a reliable materials supplier, Chang Chun continues to provide eco-friendly processes and product services in the hopes of taking on a more important role in TSMC's sustainable supply chain.

Tsai Chih-Chuan
President of Chang Chun Petrochemical Co., Ltd.

“We will continue providing raw materials that can help industries and people. We will fulfill our role as a critical supplier to TSMC and dedicate ourselves to fulfilling SDG programs.

Kazumasa Maruyama
Director of New Functional Materials Division
Shin-Etsu Chemical Co., Ltd.

Government/ Industry Associations

Concerned with the development of advanced process technologies, ESG actions, overseas investments, and environmental regulations revision trends; sharing of occupational safety and health management experience and discussions on regulations

43
Government Administrations

78
Associations

Engagement

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

Issues

- Innovation management
- Climate and energy
- Water stewardship
- Regulatory compliance
- Occupational safety and health



TSMC joins the Taiwan Climate Partnership and declares carbon reduction goals, introducing net zero actions into the supply chain

Focus Areas	Responses from TSMC
• Matters relating to TSMC's investment in Japan	• Founded a subsidiary, JASM (Japan Advanced Semiconductor Manufacturing, Inc.), in Kumamoto Prefecture, Japan. Facility construction will begin in 2022 with production before the end of 2024
• Additional energy consumption and renewable energy usage in new facilities	• Committed to Net Zero Emissions by 2050 and Zero Growth in Emissions by 2025
• Additional water consumption and reclaimed water usage in new facilities	• Commenced construction of the TSMC Water Reclamation Plant in Southern Taiwan Science Park and made plans to introduce domestic reclaimed water as a water source; the reclaimed water plant is slated to be in commission in 2022
• Compliance with environmental regulations	• Represented the Taiwan Semiconductor Industry Association in discussions with the EPA on reasonable and viable air pollutant emission standards and GHG Reduction and Management Act for the semiconductor industry
• Improvement in supply chain ESH management	• Held three ESH Experience-sharing Workshops and one Supplier Emergency Response Drill and asked suppliers to set goals for energy conservation, carbon reduction, fire prevention, occupational safety and health, and emergency response

> TSMC is taking an industry-leading role by setting an ambitious net zero goal, and through aggressive carbon reduction and deep supply chain engagement, they are playing a crucial role in driving the sector toward a net-zero future.

Dexter Galvin
Global Director, Corporations & Supply Chains
CDP

Society

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;

Concerned with the support for remote education and the disadvantaged, Network of Compassion, Public Welfare Green Energy Project, and Cherish Food Program provided by the TSMC Charity Foundation

325
Charity partners

179
Charity programs

Engagement

- Volunteer services/at least once per week
- TSMC LinkedIn/as needed
- TSMC Education & Culture Foundation and TSMC Charity Foundation websites/as needed
- Sending Love charity platform/as needed
- Project cooperation and visits/as needed
- TSMC ESG Newsletter/monthly
- TSMC iCharity Platform

Issues

- Social Impact



Ecological volunteers of Fab 12B gives a tour to students, educating them about protecting our trees.

Focus Areas	Responses from TSMC
• Young generation cultivation, educational collaboration, arts and culture promotion	• In 2021, the TSMC Education and Culture Foundation invested NT$87.79 million to support diverse education programs and arts & culture programs with our three cornerstones: Young Generation Cultivation, Educational Collaboration, and Arts and Culture Promotion. To encourage young people to spotlight the 17 UN SDGs, TSMC hosted the TSMC Youth Dream Building Project in 2021, revolving around the theme of SDGs. A total of 67 universities and 122 teams of students participated in the competition.
• Measures in response to social issues and major events (e.g., COVID-19), volunteer services, and investments into environmental education	• In 2021, the TSMC Charity Foundation supported various epidemic prevention measures and devoted funds, resources, and volunteers to target four charity projects: Caring for Elders Living Alone, Promoting Filial Piety, Taking Care of the Disadvantaged, and Environmental Protection to attempt to close the urban-rural divide and improve the financial situation and living conditions of the disadvantaged. A total of 10,664 volunteers served over 26,357 hours. Donations exceeded NT$236.98 million

> We're grateful that the TSMC Charity Foundation realized that remote schools needed better lighting. Now students have a better environment for reading that also conserves energy.
>
> **Huang Wei-che**
> Tainan Mayor

> I'd like to thank the TSMC Education and Culture Foundation for hosting the TSMC Journeys of Female Scientist Lectures and showing me potential pathways and professions in the industry. The hands-on experience also strengthened my understanding and curiosity for science.
>
> **Student**
> National Tainan Girls' Senior High School

Sustainability Impact

TSMC aims to drive economic growth and reduce the depletion of environmental resources to further advance social welfare and exert influence across the economy, environment, and society. TSMC believes in leading with integrity, and has developed the Triple Bottom Line (TBL) to serve as the sustainability impact management framework based on the Company's six major capitals, four core elements, six sustainable management competencies, and Environmental Profit and Loss (EP&L) valuation model to evaluate TSMC's externalities and social costs as well as measure the contribution of the company's overall value chain's to society. For more details, please refer to Sustainability Impact Valuations.

Six Major Capitals

Finance
Generate economic value and returns through the effective management of financial resources

Manufacturing
Provide services that customers need and carefully maintain manufacturing resources for equipment and buildings

Intelligence
Strengthen our knowledge capital through continued investment into innovative R&D and patents

Human Resources
Recruit like-minded talent and strengthen talent cultivation so employees may grow with the Company

Environment
Reduce consumption of natural resources and maintain optimal usage efficiency through source management

Society
Give back to society and obtain its trust through social participation

Process and Methods

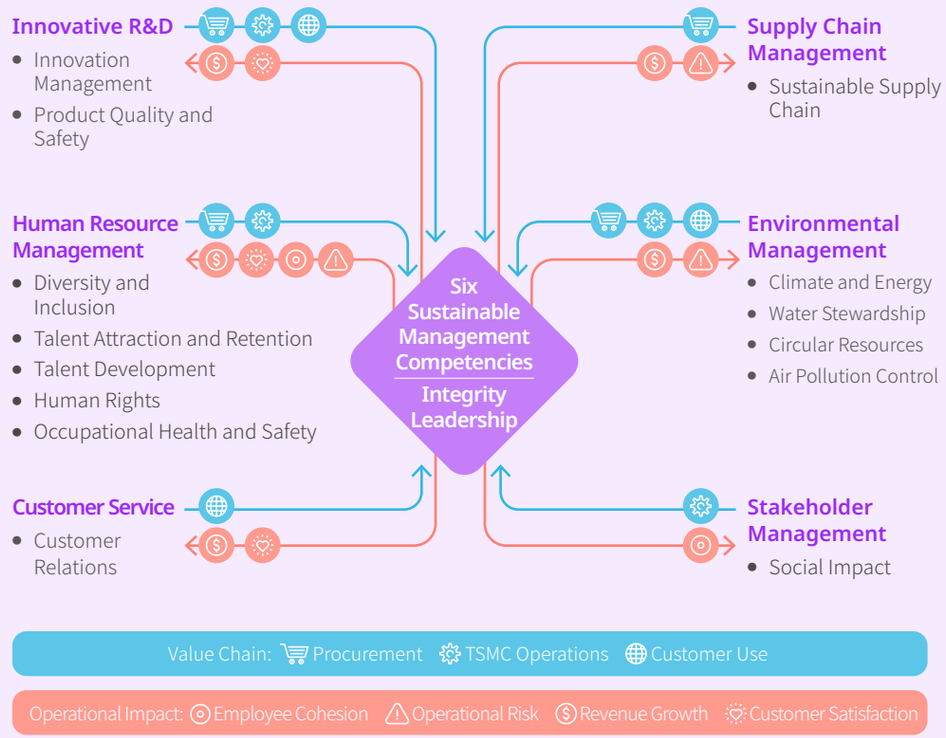
Four Core Elements

Senior Management Support
Chairman Dr. Mark Liu is personally involved in ESG efforts and has invited senior executives to lead their functional organizations in proposing sustainable solutions based on core competencies in order to expand positive influence

Mid-level Management Involvement
Mid-level management is the backbone of the Company's pursuit of sustainability, cooperating across organizations and departments in the face of complex sustainability issues to bring about real change

ESG Governance
The ESG Executive Committee and ESG Committee meet regularly to formulate long-term strategies, engage in interdepartmental communication and cooperation, supervise program progress and performance, and maintain momentum for sustainability within the organization

Organization Culture
Foster an organizational culture that doesn't commit casually, but devotes fully to the commitment when it does. Set long-term goals for sustainability issues, strive for change, review progress regularly, and continue to commit to doing better.



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For the economic dimension, in 2021 TSMC generated NT$1,587.4 billion in operating revenue, booked NT$422.4 billion in depreciation and amortization, issued NT$265.8 billion in cash dividends, and created an output value of NT$1,332.3 billion in the supply chain through procurement. TSMC not only helped customers succeed and suppliers become more sustainable, but also offered good returns to its investors. In the social dimension, TSMC paid NT$258.5 billion in taxes and payroll, supported our government in expanding infrastructure and social welfare, improved quality of life, and drove economic growth. While cultivating an advantage in our core business, TSMC also continued to generate 260,000 job opportunities and NT$214.1 billion in payroll through the supply chain. Volunteer services from TSMC also created NT$34.3 million in social benefits, while occupational injuries resulted in NT$16.8 million in social costs. In the environmental dimension, environmental footprints and resource consumption generated from production processes or when delivering services resulted in an environmental cost of NT$16.2 billion and NT$14.3 billion, respectively.

Sustainable Value

Unit: NT$ Million

		Impact Trend	Impacted Stakeholders
Economic	Cash Dividend	↗	Investor
	Net Income	↗	Investor
	Operating Revenue	↗	Customer
	Depreciation & Amortization	↗	Supplier
	Supply Chain Output Value Driven by TSMC	↗	Supplier
Environmental	Environmental Impact of the Supply Chain Note 1&2	↗	Community, Supplier
	Greenhouse Gases Note 1	↗	Government, Community
	Air Pollution Note 1	↗	Government, Community
	Waste Note 1	↗	Government, Community
	Effluents Note 1	↗	Government, Community
	Water Consumption Note 1	↗	Government, Community
Social	Occupational Injury Note 3	↗	Employees, Government
	Taxes	↗	Government
	Employee Compensation	↗	Employees
	Supply Chain Employee Compensation Note 4	↗	Supplier
	Corporate Volunteers Note 5	↘	Community

Impact

- Stable returns & dividend for investors
- Assist customers with application and success of products
- Generate output value and encourage transformation in the semiconductor supply chain
- Protect our natural capital through EP&L
- Generate taxes and social benefits for the government
- Create job opportunities and employee benefits

Positive Impact

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

Negative Impact

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

Note 1: Environmental Profit and Loss (EP&L) presented in this section is 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 2021 annual report. For the EP&L methodology, please refer to the TSMC 2021 Environmental Profit and Loss (EP&L) Report.

Note 2: EP&L of the supply chain includes only tier 1 suppliers which had more than three transactions with TSMC in 2020 and with amounts exceeding NT$ten million. A total of 1,061 suppliers meet the criteria. Their environmental impact is then calculated through Environmentally Extended Input Output (EEIO) analysis.

Note 3: Value of Occupational Injury = Cost of Occupational Injury + Medical Expenses + Amount TSMC is Willing to Pay to Prevent Occupational Disasters

Note 4: Supply Chain Employee Compensation = Procurement amount is input into the EXIOBASE 2 database and calculated using relevant compensation coefficients based on the supplier's industry and location

Note 5: Corporate Volunteer Value = Volunteer Service Hours * Average TSMC Employee Income

Impacted Stakeholders: Investor | Customer | Supplier | Community | Government | Employees

History Data (2018~2021)

Sustainability Impact Valuation

TSMC has comprehensively evaluated the direct and indirect impacts from the value chain and established a Sustainability Impact Strategy Map derived from causal relationships from an outside-in perspective. The map converts all potential external costs and values from upstream procurement, TSMC operations, and customer use into monetary values to construct a tool to manage sustainability impact.

In the upstream procurement stage, 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 output value, job opportunities, and income created from TSMC's procurement demands as well as the resulting economic growth and improvements in living conditions. To address supply chain sustainability issues, TSMC is actively promoting a responsible supply chain, using environmentally extended input-output (EEIO) analysis to identify environmental hot spots in the supply chain and evaluating raw material suppliers with Life Cycle Assessment (LCA) to identify the environmental impact from production and service processes. TSMC aims to collaborate with suppliers to uncover opportunities for change and growth to help drive sustainable transformation in the industry.

In the TSMC operations stage, TSMC is using the GVA (gross value added) approach to assess the positive impact generated for stakeholders by our operations. Such positive impact may include equal employment opportunities, competitive compensation and benefits, cash dividends, taxes, depreciation and amortization, and others. TSMC also continues to apply environmental profit and loss (EP&L) to evaluate social costs and negative impacts generated from energy/resource consumption and pollution from the production process to then mitigate our environmental impact by working on creating positive impact through renewable energy, reclaimed water, and circular economy.

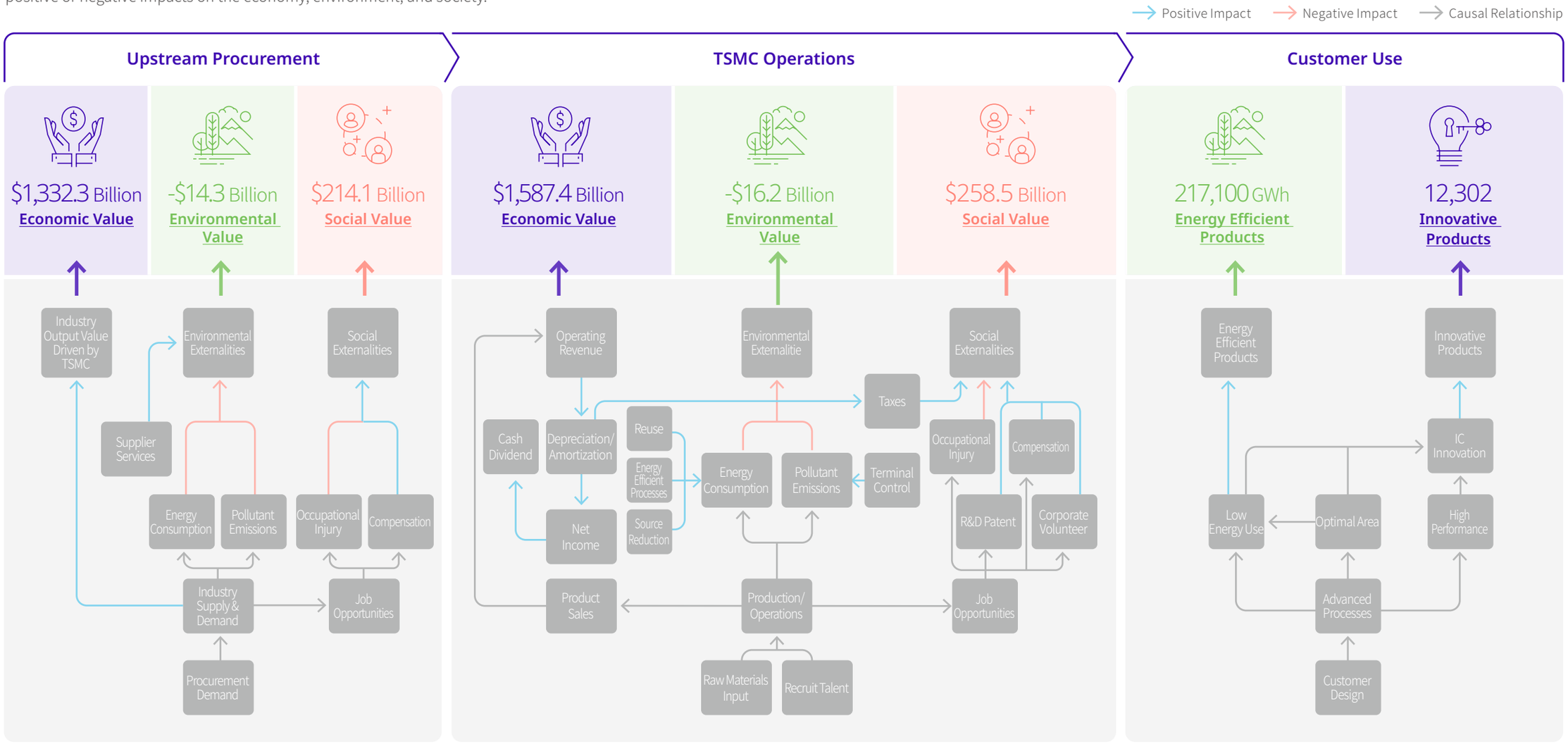
In the customer use stage, TSMC continues to develop world-leading energy-efficient semiconductor technologies to help customers produce advanced, energy-efficient products and facilitate the evolution of energy-saving ICT technologies and product applications to fulfill our commitment to green manufacturing both internally and externally. The Industry, Science and Technology International Strategy Center conducted a model analysis based on global energy consumption, GDP, and the number of electronic products, and found that TSMC effectively facilitates global energy conservation by continuing to innovate semiconductor technologies to realize smart applications for a wide range of electronic products.



TSMC hopes to drive economic growth, reduce consumption of environmental resources, and further enhance social welfare to realize cross-domain ESG influence.

Sustainability Impact Strategy Map

The TSMC Sustainability Impact Strategy Map employs the concept of performance management to connect predicted results in value chain activities with causality among driving factors. We then apply the concept of P&L to identify positive or negative impacts on the economy, environment, and society.



Note: The "Strategy Map" is derived from the Balanced Scorecard, a performance management tool researched and developed by Robert S. Kaplan and David P. Norton in the late 1990s. The Balanced Scorecard connects goals with driving factors to serve as a tool for management

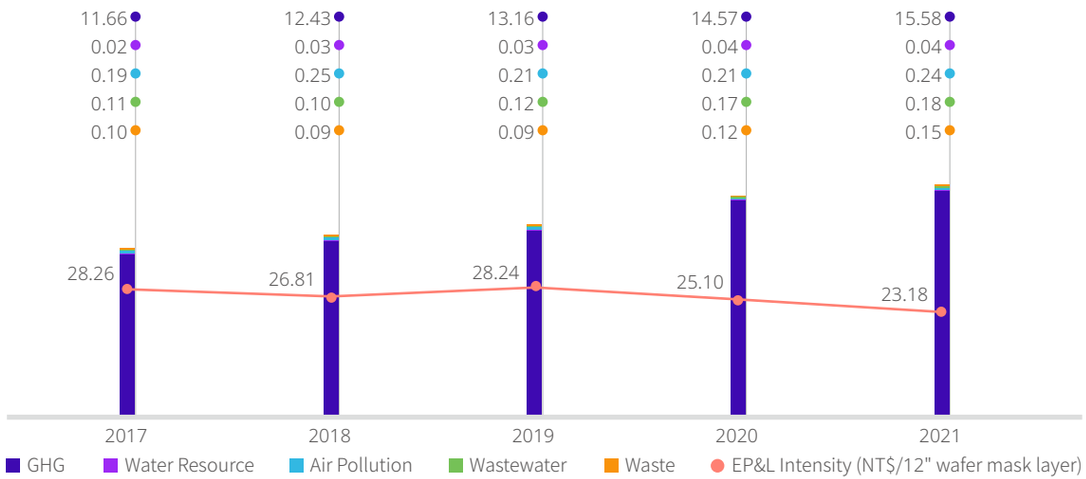
TSMC is dedicated to reducing environmental and social impacts and introduced EP&L in 2018 to evaluate environmental externalities and resulting social costs created from the production process. In 2019, TSMC further applied EP&L to the upstream supply chain, converting the environmental impact generated from product life cycles into external social costs, identifying significant environmental impact factors to formulate improvement measures and reduce the environmental externalities and social costs generated from TSMC procurement.

In 2021, EP&L analysis showed that TSMC experienced a minor increase in environmental externalities generated from production and operations, which is mainly caused by a growing demand for energy, water, and raw materials from the increasing number of new manufacturing facilities and evolution of advanced process technologies. GHG emissions from TSMC facilities are the primary source, accounting for 96% of TSMC's total environmental externalities, which also include air pollution, wastewater, and incineration/burial of waste. Across the supply chain, TSMC conducted an environmental hotspot analysis of 1,149 tier 1 suppliers and found that chemical suppliers are the largest source of environmental externalities from the supply chain, accounting for 50%. We further inspected 73 critical raw material suppliers and found that sulfuric acid, developers, and ammonia solutions generated the largest number of environmental externalities out of all raw materials.

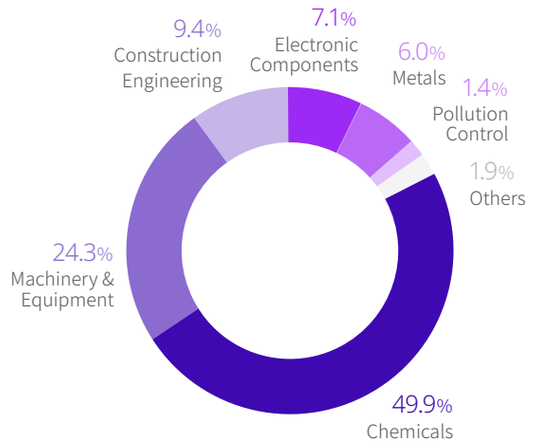
TSMC continues to promote innovative green practices to continue reducing the environmental impact of production processes in our facilities. In 2021, we successfully reduced environmental externalities per unit product by 8% from 2020, mainly by significantly lowering GHG emissions. We also witnessed a significant increase in waste from various environmental externalities per unit product. Unfortunately, this is caused by new advanced processes and expanding capacity: developing new processes and maintaining stable yield rates are challenging, which has led to an increase in demand for raw materials and a significant increase in waste. TSMC has already built the world's first Zero Waste Manufacturing Center, which will be operational starting in 2023. The Center can effectively increase the recycling rate of chemical waste liquid and achieve a circular economy model to reduce environmental externalities. For sustainable supply chain management, TSMC is employing environmental audits to help suppliers identify potential risks and ways to improve. In 2021, TSMC inspected 54 suppliers and mainly uncovered chemical leaks to storm drains and failure to establish a GHG inventory and management system. TSMC has requested all suppliers to establish a management system as well as reduction goals for energy, water, and GHG emissions to reduce environmental impact. We aim to collaborate with suppliers to build a green, low-carbon supply chain to exert a positive influence on society. For more details, please refer to the TSMC 2021 Environmental Profit and Loss (EP&L) Report.

Environmental Externalities Trends

Unit: NT$ billion



Environmental Hotspot Analysis of the Supply Chain



↓8%
Reduction in environmental externalities per unit product (Base year: 2020)

1,149
Tier 1 suppliers analyzed for environmental hotspots

48 → 73
Critical raw material suppliers that underwent inspections (Base year: 2020)

Carry Out the UN Sustainable Development Goals

In 2022, TSMC published the first TSMC UN SDGs Action Report. In line with the reporting framework developed by the GRI, the report details how TSMC supports the 2030 Agenda for Sustainable Development through five principles of disclosure: Plans, Commitments, Actions, Progress, and Collaboration. Under the leadership of ESG Steering Committee Chairman Mark Liu, TSMC continued to spotlight nine SDGs: SDG 3 (Good Health and Wellbeing), 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), SDG 13 (Climate Action), and SDG 17 (Partnership for the Goals). TSMC has also deployed 23 ESG programs and 45 measurable long-term goals for 2030 to effect change through real action.

ESG Directions

Drive Green Manufacturing
Implement green production, 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 operation and manufacturing standards

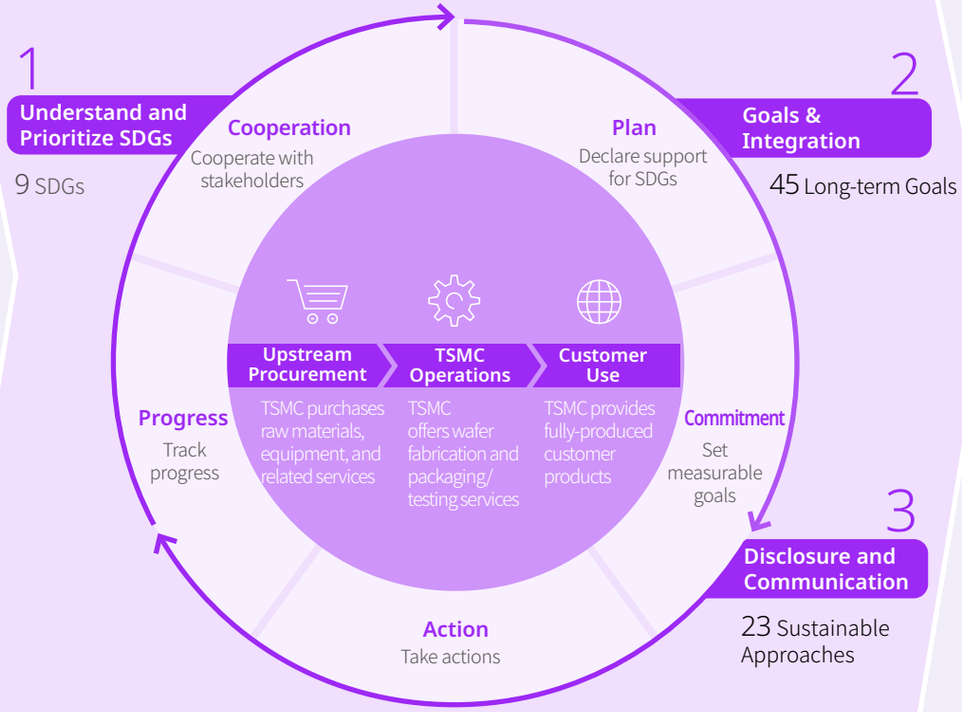
Create a Diverse and Inclusive Workplace
Establish a safe and healthy workplace that respects human rights and and and unleashes employees' full potential

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 Disadvantaged
Aggregate resources to deploy educational, cultural and social programs that reduces inequality and uphold the common good

Process & Reporting

TSMC identifies the link between SDGs, the five sustainability roles, and value chain stages through the following three steps: Understand & Prioritize SDGs, Goals & Integration, and Disclosure and Communication. Long-term goals and action plans are then formulated accordingly.



TSMC Sustainability Roles

An Innovation Pioneer
TSMC focuses on developing our primary business as a dedicated pure-play IC foundry and service provider. TSMC continues to expand the R&D scale and use innovation to pave the way for global technological development. As a leader in the global semiconductor industry, TSMC is committed to manufacturing high-quality, energy-efficient, and sustainable products to enable our customers to achieve product innovation and success.

A Responsible Purchaser
TSMC strives for sustainable management and responsible purchases. We ask our suppliers to make advancements in the following areas: technology, quality, delivery, environmental protection, human rights, safety, and health. We also take climate risks into consideration, actively trying to strengthen our climate resilience so that we can develop a low-carbon, sustainable semiconductor supply chain.

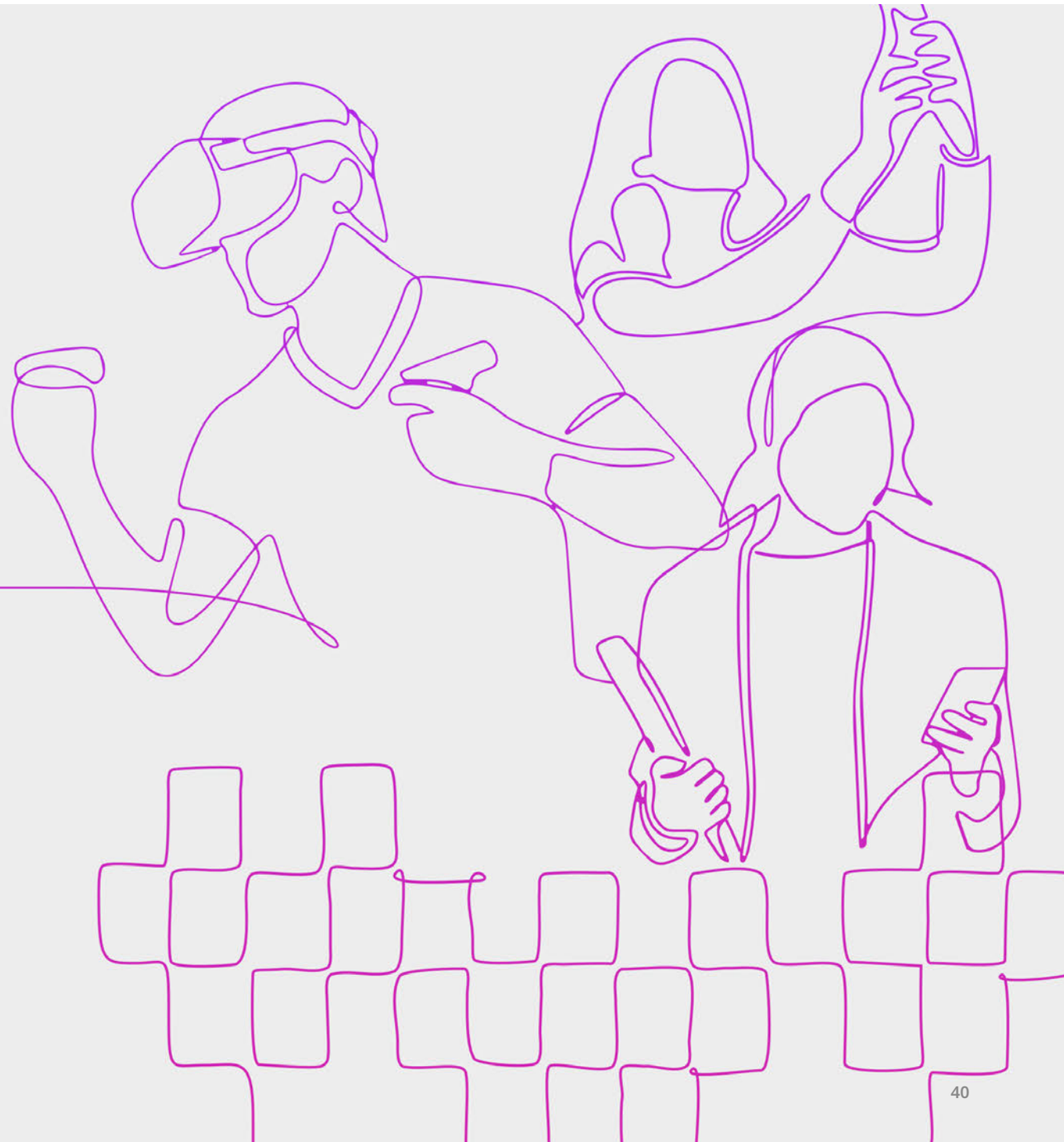
A Practitioner of Green Power
Striving to realize our belief in co-existence and shared prosperity with the environment, TSMC is actively developing and applying innovative green technologies to climate and energy, water stewardship, circular resources, and air pollution control to roll out a comprehensive action plan for sustainability so that TSMC can become the global benchmark for green corporations.

An Admired Employer
TSMC remains committed to the core value of Commitment and strives to foster a diverse and inclusive culture as well as an open-style management system to attract and retain talents of different backgrounds and professions. We offer competitive compensation and benefits as well as a safe and fun workplace for growth. It is our mission to become a company that our employees can be proud of.

Power to Change Society
With a sustainable vision to "better society," the TSMC Education and Culture Foundation and the TSMC Charity Foundation have galvanized internal and external resources to spotlight the following areas: cultivate our youth, rural education, and support arts, culture, and the environment. We also care for the disadvantaged as well as seniors living alone to build a strong foundation for society through common good.

An Innovation Pioneer

TSMC focuses on developing our primary business as a dedicated pure-play IC foundry and service provider. TSMC continues to expand the R&D scale and use innovation to pave the way for global technological development. As a leader in the global semiconductor industry, TSMC is committed to manufacturing high-quality, energy-efficient, and sustainable products to enable our customers to achieve product innovation and success.



>8,800/ >20,000

Over 8,800 patent applications globally/ Over 20,000 trade secrets registered

894/98

TSMC was able to provide customers with 894 process technologies and 98 advanced packaging technologies in line with its technological roadmap

100%

Develop the ability to analyze 100% of Carcinogenic, Mutagenic and Reprotoxic substances and help all of the suppliers that supply materials with potential risks to develop the same capabilities

Innovation Management | Product Quality and Safety | Customer Relations

Innovation Management

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Technology Leadership Continuous investment in advanced technology development to maintain TSMC's technology leadership in the semiconductor industry		
Maintain TSMC's technology leadership and invest 8.5% of revenue R&D expenses annually	**Maintain TSMC's technology leadership and invest 8.5% of revenue into R&D expenses annually** **3nm process technology in volume production**	**3nm process technology in risk production** ✓ Target: 3nm process technology in risk production
Intellectual Property Protection Patent protection: Continue to strengthen patent portfolio by keeping patent applications in sync with the Company's R&D resources to ensure all research achievements are fully protected Trade secret protection: Strengthen business operations and intellectual property innovation through trade secret registration and management which documents and consolidates the TSMC competitive trade secret applications		
Over 80,000 global patents granted Note 1	**Exceed 6,600 global patent applications**	**Submitted over 8,800 global patent applications** ↑ Target: >5,500
Over 200,000 trade secret registrations Note 2	**Exceed 25,000 trade secret registrations**	**Register over 20,000 trade secret** ✓ Target: >20,000
	Share TSMC's trade secret registration mechanism with 6 companies Note 3 NEW	
	Assist 2 companies to successfully build a trade secret registration and management system Note 3 NEW	
Industry-Academia Collaboration Enhancement Note 4 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 of semiconductor talents		
Cultivate more than 8,000 undergraduate and graduate students globally through university programs that deepen industry-academia collaboration	**Cultivate over 5,500 undergraduate and graduate students globally through university programs to enhance industry-academia collaboration**	**Launched a variety of industry-academia collaboration projects, including the comprehensive semiconductor programs on device integration, manufacturing process and equipment engineering, internship programs, cooperative education, and various contests ; the number of undergraduate and graduate students involved globally reached 6,500** ↑ Target: 3,500 people

Note 1: In the wake of adjustments made to the patent portfolio plan for leading technologies and the continuous expansion of R&D investment, the annual target for the number of global patent applications in 2021 was exceeded, and the long-term goal for 2030 is adjusted accordingly

Note 2: The long-term goal for 2030 is adjusted based on a comprehensive assessment considering the growth trend in the number of trade secret registrations in the past years, the anticipated momentum for the Company's innovation in technical and commercial trade secrets, and the Company's advocacy on the development of environmental-friendly and energy-saving green trade secrets

Note 3: Companies targeted for collaboration in the first phase will be suppliers that work closely with TSMC in technology, green manufacturing, and critical materials

Note 4: In compliance with the Company's development strategies, the sustainable goals for "industry-academia collaboration enhancement" are adjusted accordingly, and the segment has been moved to this chapter from "Talent Attraction and Retention"

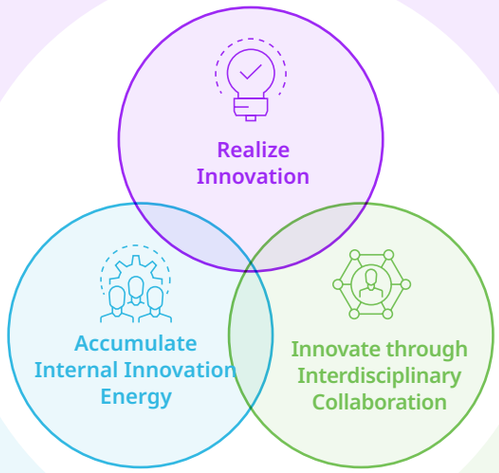
↑ Exceeded ✓ Achieved — Missed Target

In response to the rapidly evolving semiconductor industry, TSMC has been striving to build an innovative workplace that inspires innovation since its establishment. In the face of challenges imposed by competitors and advanced process technologies in 2021, TSMC continued to enhance the Company's leading technological competitive advantages through an internal incentive scheme for innovation. TSMC encourages its employees to carry out various innovations to boost vitality for organizational innovation. Meanwhile, the Company also fuses innovative thinking into its interdisciplinary innovation collaborations, including product innovation with customers, technical talent innovation and cultivation with research institutions, and innovative green industrial chain build-up with suppliers.

Innovation Management Framework

- Technology Leadership
- Sustainable Products
- Intellectual Property Protection
  - Comprehensive Patent Management Mechanism
  - Trade Secret Protection
- Intelligent Precision Manufacturing

- Innovation Cases
  - Using STOP & FIX to Strengthen Mechanisms for Handling Unusual Events
  - CIS Applications Innovation
  - Digital Transformation of Customer Audits
  - Energy & Water Conservation from Advanced Tools
  - MAU Humidifier System Installation for Cleanroom Energy Saving
  - Launch of Hydrofluoric Acid Waste Regeneration System
  - Intelligent Waste Management Procedure with Full Traceability
  - Development of High-Efficiency Central Scrubber
  - Using Handheld Acoustic Imaging Cameras to Reduce Fire Alarms



- Idea Forum
  - Operations
  - R&D
  - Quality and Reliability
  - Corporate Planning Organization
  - Finance
- Total Quality Excellence and Innovation Conference (TQE)
- ESG AWARD

- Open Innovation Platform®
- Collaboration with World-class R&D Institutes
- Industry-Academia Collaboration
  - University Research Center
  - Industry-Academia Joint Development Project
  - University Shuttle Program
  - National Academy for Key Fields of Research
- Course Collaboration
  - Semiconductor Programs
  - Information Technology Talent Cultivation in Partnership with Major International Businesses
- Career Coaching
  - TSMC Ph.D. Scholarship
  - TSMC X Microsoft Crareerhack Competition

Technology Leadership

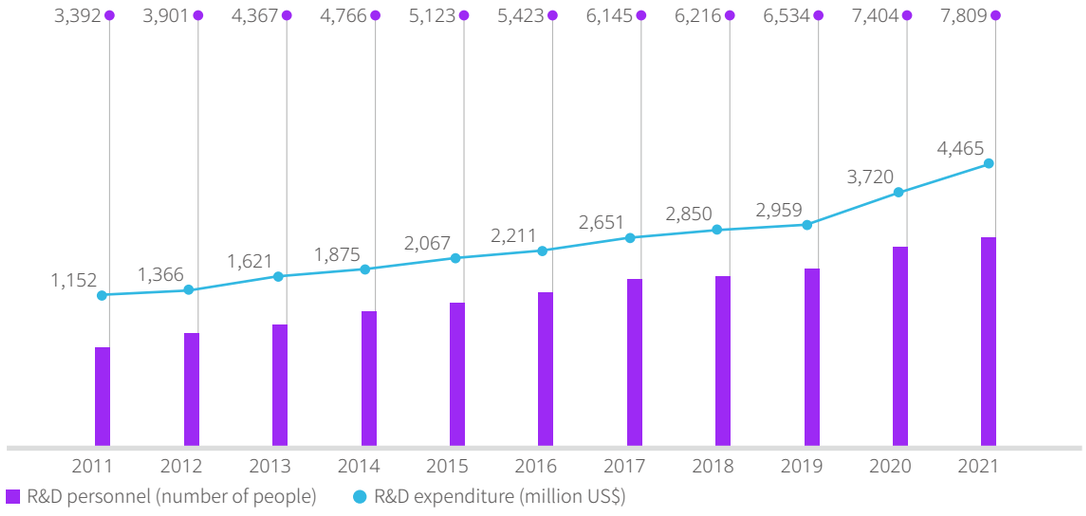
In 2021, TSMC continued to enlarge its scale of research and development with an investment of US$4,465 million, which compared to last year was a 20% growth in R&D expenditures, amounting to 7.9% of total revenue[Note 1]. As for R&D's manpower, it increased 5% to 7,809 in 2021compared to 2020, achieving a level that equals or exceeds the R&D investment of many other leading high-tech companies.

Faced with the continuous challenge to significantly scale up semiconductor computing power every two years, thereby extending Moore's Law, the Company has focused its R&D efforts on contributing to customers' product success by offering first-to-market, combined leading-edge technologies and design solutions. In 2021, the Company started risk production of 3nm technology, the sixth generation platform to make use of 3D transistors, while continuing the development of 2nm, the leading-edge technology in the semiconductor industry today. Furthermore, the Company's research efforts pushed forward with exploratory studies for nodes beyond 2nm.

In 2021, TSMC maintained strong partnerships with many world-class research institutions, including SRC (Semiconductor Research Corporation) in the U.S. and IMEC (Interuniversity Microelectronics Centre) in Belgium. The Company also continued to expand research collaboration with leading universities throughout the world for two grand purposes: the advancement of semiconductor technologies and the nurturing of human talent for the future.

Note: Benefiting from growing demands for semiconductors, TSMC's revenue growth is higher than the R&D expenditure growth which thus is slightly under 8.5% in 2021

Continuous Investment in R&D





TSMC continues to strengthen our research and development momentum to bolster our leading edge in technology.

Technology Leadership and Innovation

CMOS Logic Technologies

2019

- 5nm FinFET technology led the foundry to successfully entered risk production
- 7nm FinFET plus technology entered volume production and led the world to deliver customer products to market in high volume

2020

- Industry-leading 5nm process technology entered volume production

2021

- 3nm technology successfully entered risk production

Specialty Technologies/ Interconnect & Packaging Technologies

2019

- Completed process validation for System on Integrated Chips (SoIC®), an innovative wafer-level package technology
- Achieved High-volume production of Gen-4 Integrated Fan-Out Package on Package (InFO-PoP) for mobile processor packaging
- Successful qualification of Gen-5 InFO-PoP advanced packaging technology for mobile applications and Gen-2 Integrated Fan-Out on Substrate (InFO-oS) for HPC applications
- Developed 40nm Bipolar-CMOS-DMOS (BCD) technology–unique in the industry–offering leading edge 20-24V HV devices with full compatibility to 40nm ultra-low-power platform and integration of resistive random access memory (RRAM), in turn, enabling low power, high integration, and small footprint for high-speed communication interface in mobile applications
- Developed 28nm embedded flash (eFlash) for high-performance mobile computing and high-performance low-leakage platforms, which achieved technical qualification for automobile electronics and micro controller units (MCU)
- Developed the latest generation of CMOS image sensors of sub-micron pixel for mobile applications and embedded 3D metal-insulator-metal (MiM) high-density capacitors for global shutter and high dynamic-range sensor applications
- The world's first 7nm automotive platform

2020

- Accomplished process validation of SoIC® for both chip-on-wafer (CoW) and wafer-on-wafer (WoW) stacking using micron-level bonding-pitch processes with promising electrical yield and reliability results
- Entered high-volume manufacturing of InFO-PoP Gen-5 packaging for mobile application processors and successfully qualified InFO-PoP Gen-6 for mobile applications with enhanced thermal performance
- Developed InFO-oS Gen-3, which provides more chip partition integration with larger package size and higher bandwidth
- Expanded the 12-inch BCD technology portfolio on 90nm, 55nm and 22nm in 2020, targeting a variety of fast growing applications for mobile power management ICs with various levels of integration
- Achieved technical qualification of 28nm eFlash to support automobile electronics and MCU applications
- Entered volume production of CMOS image sensors technology, with shrunk sub-micron pixel size and sensors meeting automotive grade reliability compliance
- Began production of 28nm RRAM technology as a low-cost solution to support the price-sensitive IoT market
- Achieved technical qualification of 22nm magnetic random access memory (MRAM) technology to successfully volume-produce MRAM and received the Flash Memory Summit 2020's Best of Show award for the most innovative AI application

2021

- Qualified the fifth generation chip on wafer on substrate (CoWoS®) with record-breaking Si interposer area up to 2,500 mm^2, 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 BCD technology portfolio on 90nm, 55nm, 40nm and 22nm, targeting diverse mobile power management ICs applications with different integration levels
- Maintained stable high yield and achieved technical qualification of 28nm eFlash for consumer electronics grade and automobile electronics grade-1 applications
- Achieved 13% pixel size scaling down on Quad Phase Detection (QPD) CMOS image sensors structure for the mobile imaging market.
- Entered volume production of 28nm and 40nm RRAM as a low-cost solution for the price sensitive IoT market

Process Technology	Product Application	Innovation / Breakthrough	Customer Success
4nm Fin Field-Effect Transistor (FinFET) (N4) Technology	5G, High performance computing	Led the industry to start risk production for customer products	Led the industry to deliver advanced products
5nm FinFET Plus (N5P) Technology	5G, High performance computing	Led the industry to start volume production for various customers' products	Introduced products with industry-leading performance and energy efficiency
6nm FinFET (N6) Technology	5G, High performance computing, Consumer electronics	Widely adopted in mobile, high performance computing, and consumer electronics products	Introduced products with industry-leading performance and energy efficiency
N12e™ Technology	AI-enabled Internet of Things (IoT) edge computing, Consumer electronics	Introduced new ultra-low-leakage extreme high threshold voltage (eHVT) devices	Introduced edge AI-products with industry-leading power efficiency to prolong their battery life
N6 Radio Frequency (N6 RF) Technology	5G, True wireless stereo (TWS), WiFi, Digital TV/Set-Top Box (STB)Wireless IoT	Completed development for customer product tape-outs scheduled for 2022	Introduced products with industry-leading RF performance and cost-effectiveness
22ULL Embedded Magnetic Random Access Memory (MRAM) Technology	Microcontroller (MCU), Wearable devices	IPs completed qualification for over one million cycles endurance and reflow capability. This technology demonstrated automotive Grade-1 capability and has started volume production for customer wearable products for several years	Introduced leading low-power-consumption MCU to extend battery life for wearables
12-inch 90nm Bipolar-CMOS-DMOS (BCD) Plus Technology	Smartphones, Wearable devices	Passed qualification, helped customers complete new tape-outs and started volume production for this technology	Introduced products with industry-leading performance and energy efficiency
CMOS Image Sensor (CIS) Technology	Smartphones	Helped customers gain market leadership by introducing the world's smallest pixel size products	Led the industry to deliver advanced products
TSMC-SoIC® (System on Integrated Chip) for 3D Silicon Die Stacking Technologies	High performance computing	Successfully demonstrated Chip on Wafer (CoW) technology with good electrical performance on heterogeneous integration of SRAM with logic on a customer product	Introduced products with industry-leading performance and energy efficiency
CoWoS®-S (Chip on Wafer on Substrate with Silicon Interposer) Technology	High performance computing	Featuring a new embedded deep trench capacitor (eDTC) option and an interposer up to three-reticle size, this technology was qualified to enable more logic and high band width memory (HBM) integration for customers' high performance computing applications	Led the industry to deliver advanced products

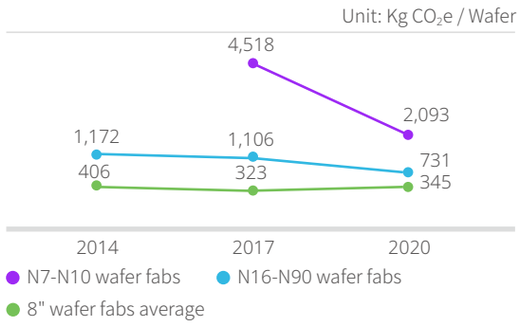
5G 5G mobile communications
High performance computing
Consumer electronics
AI-enabled Internet of Things (IoT) edge computing
True wireless stereo (TWS)
WiFi
Digital TV/Set-Top Box (STB)Wireless IoT
Microcontroller (MCU)
Wearable devices
Smartphones

Sustainable Products

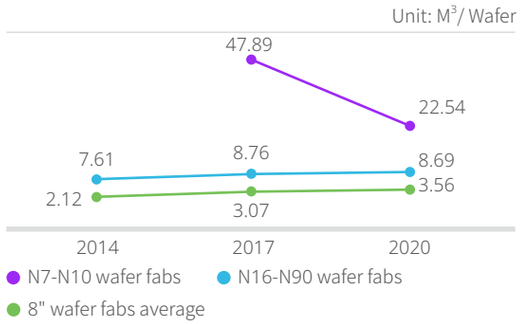
With a sustainable mindset, TSMC is dedicated to reducing environmental impact throughout all phases of our product life cycle, from raw material manufacturing and transportation to product manufacturing, testing, and assembling. TSMC makes continuous efforts during manufacturing processes to reduce greenhouse gas emissions, save energy and resources, prevent pollution, minimize waste, and manage hazardous substances. The Company also requires and offers guidance for suppliers to join its consistent endeavors in reducing carbon footprint, water footprint, and other environmental footprints from semiconductor products. In terms of the application of products, TSMC's chips manufactured for customers are widely adopted in a variety of fields including computers, communications, consumer electronics, industrial applications, electric vehicles, servers, and data centers. Through consistent advancement in manufacturing technologies, TSMC continues to drive progress for modern society, further contributing to global energy conservation, faster and more convenient life with mobile communication services, and enhanced health and safety for all mankind.

Every three years, TSMC conducts assessments on product life cycle, water footprint, and carbon footprint. Assessment results are verified by a third party through the acquirement of ISO 14040, ISO 14046, and ISO 14067 certification. The wafer product life cycle assessment results in 2021 show that among the 16 indicators, "mineral, renewable and fossil resource depletion" and "water resource depletion" are more significant in the upstream raw material stage, accounting for approximately 75%. The other 14 indicators are mainly in the manufacturing stage, accounting for about 53-84%; and transportation accounts for less than 2%, and the impact is relatively small. Meanwhile, the product carbon and water footprints for all TSMC technology nodes are trending down. For example, the carbon footprint and water footprint per unit wafer from advanced TSMC fabs (7nm to 10nm) in 2020 dropped by 54% and 53%, respectively, from 2017. In fabs of mature process technologies including 16nm and above, the carbon footprint per unit wafer in 2020 dropped by 38% from 2014. The water footprint per unit wafer, however, increased due to fluctuations in production and the extra water resources required to reduce air pollution. For more information on TSMC water conservation measures, please refer to Water Stewardship in this report.

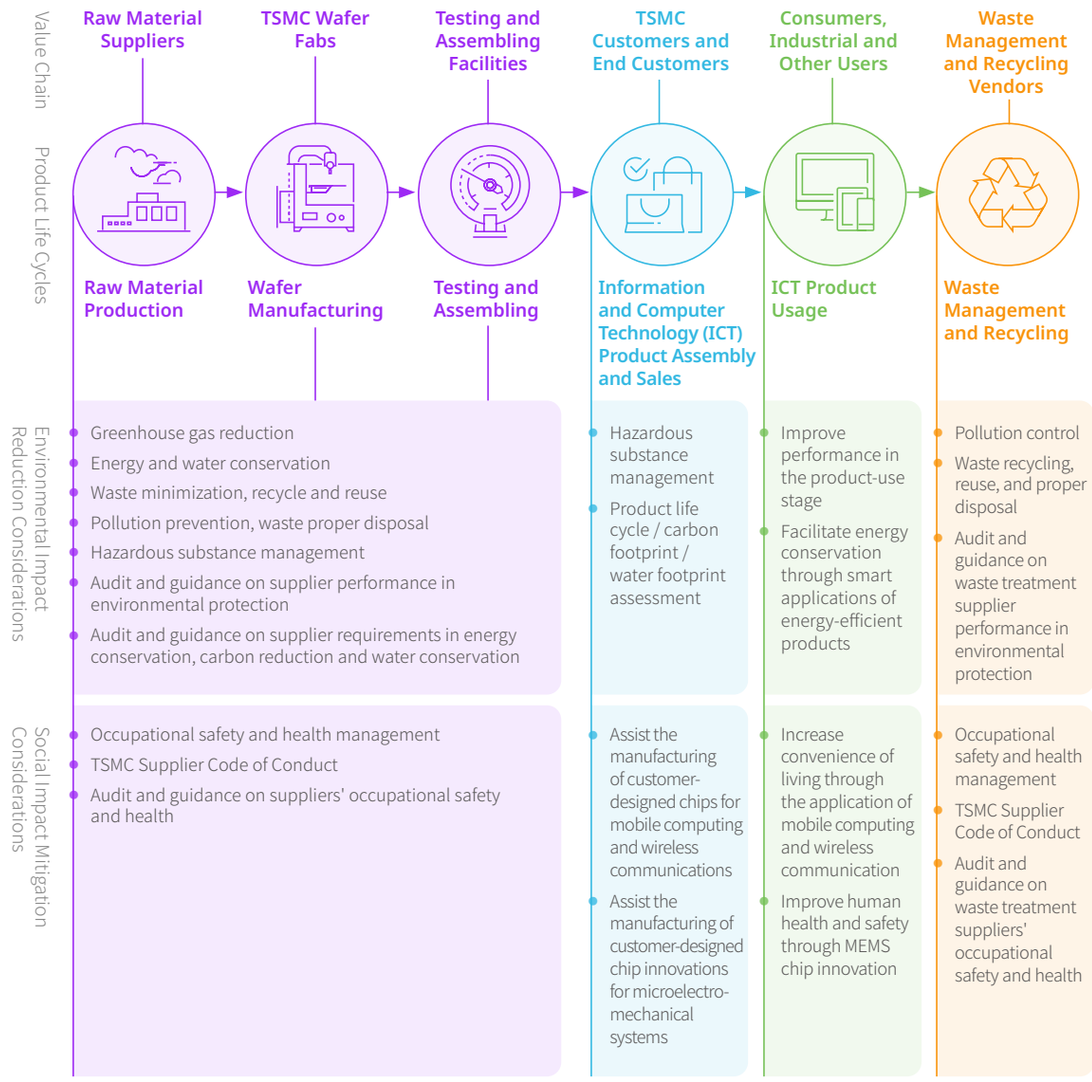
TSMC Product Carbon Footprint



TSMC Product Water Footprint



Environmental/Social Impact Considerations for TSMC Product Life Cycles



• TSMC Continues to Advance Technology to Unleash Customer Innovation

Semiconductors are transforming many key industries, including information and communication, transportation, education, health care, entertainment, and agriculture, with greater computing power and better energy efficiency through many innovations and breakthroughs. These advancements of electronics will bring more positive impact to our lives. As a trusted dedicated semiconductor foundry service provider, TSMC continues to deliver industry-leading, next-generation semiconductor technologies, as well as offers comprehensive specialty technologies and leading 3D chip stacking and packaging services, to help customers unleash different types of innovation and deliver more advanced, capable, energy-efficient, and affordable electronic products.

» Collaborate with Customers to Deliver Innovative DNA Sequencing Chips that Help Quickly Identify COVID-19 Variants

One noteworthy example was our collaboration with Thermo Fisher Scientific to deliver its next-generation DNA sequencer - the Ion Torrent Genexus System - which has supported researchers in quickly identifying variants of the COVID-19 virus, including the first case of the Omicron variant, contributing enormously to understanding the epidemiology and controlling the pandemic.

Leveraging Thermo Fisher Scientific's innovative and super-fast sequencing technology together with TSMC's industry-leading CMOS MEMS manufacturing technology, which greatly reduces signal noise of sensors, the Ion Torrent Genexus Integrated Sequencer offers faster, easier to use, and more flexible Next Generation Sequencing (NGS) solutions.

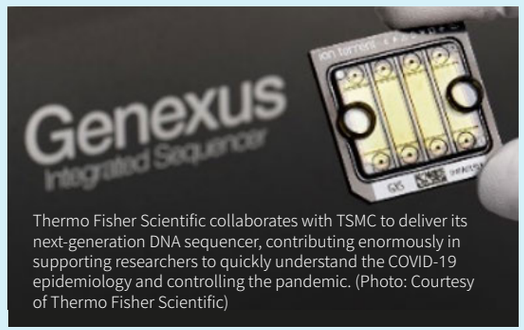
The Ion Torrent Genexus Integrated Sequencer ("the sequencer") is the industry's first NGS solution that automates the specimen-to-report workflow. Combining its Ion Torrent Genexus Purification System and intelligent design of highly sensitive assays, the whole system takes only two touch points and ten minutes of hands-on time to sequence billions of base pairs in-house with high accuracy, and deliver results within a single day, a significant improvement compared to the weeks previously required. The sequencer can run up to 16 COVID-19 samples simultaneously with its innovative Ion Torrent GX5 chip manufactured by TSMC, greatly reducing the cost and time. All these features enable researchers to quickly turn their focus to interpreting results, thus helping research institutes swiftly identify COVID-19 variants like Omicron and improving the ability of governments and international organizations to predict the virus' evolution and control the pandemic effectively.

In addition to COVID-19 virus sequencing, the Ion Torrent platforms with TSMC chip manufacturing solutions also play an important role in the analysis of cancer and inherited disease testing, as well as human reproductive health. By making them easier to use, and generate results more flexibly and quickly, these more affordable, breakthrough sequencing solutions mark a big step forward for accelerating life sciences research, improving patient diagnosis, and delivering the promise of precision medicine at the community level, and will continue to bring significant clinical, economic, and societal impact going forward.

In total, TSMC deployed 291 distinct process technologies, and manufactured more than 12,300 products for 535 customers in 2021 to continue to bring significant contributions to the advancement of modern society.

Collaborate with Customers to Deliver Innovative DNA Sequencing Chips that Help Quickly Identify COVID-19 Variants

Customer Product	Product Innovation & Breakthrough	Impact on Society	TSMC's Role
• Thermo Fisher Scientific next-generation DNA sequencer - the Ion Torrent Genexus System	• The industry's first NGS solution that automates the specimen-to-report workflow • Takes only two touch points and ten minutes of hands-on time to complete DNA sequencing with high accuracy and delivers genomic results within a single day • Cost-effective as it can run up to 16 samples simultaneously with its innovative Ion Torrent GX5 chip manufactured by TSMC	• Enables researchers to quickly identify variants of the COVID-19 virus variants, contributing enormously to the understanding of the epidemiology and control of the pandemic • Plays an important role in the analysis of cancer and inherited disease testing, as well as human reproductive health • Accelerates life sciences research, improving patient diagnosis and delivering the promise of precision medicine at the community level	• Provides industry-leading CMOS MEMS manufacturing technology that greatly reduces signal noises of sensors, contributing significantly to the accuracy of DNA sequencing • Dedicates a professional engineering team to help Thermo Fisher Scientific unleash its product innovation



Thermo Fisher Scientific collaborates with TSMC to deliver its next-generation DNA sequencer, contributing enormously in supporting researchers to quickly understand the COVID-19 epidemiology and controlling the pandemic. (Photo: Courtesy of Thermo Fisher Scientific)

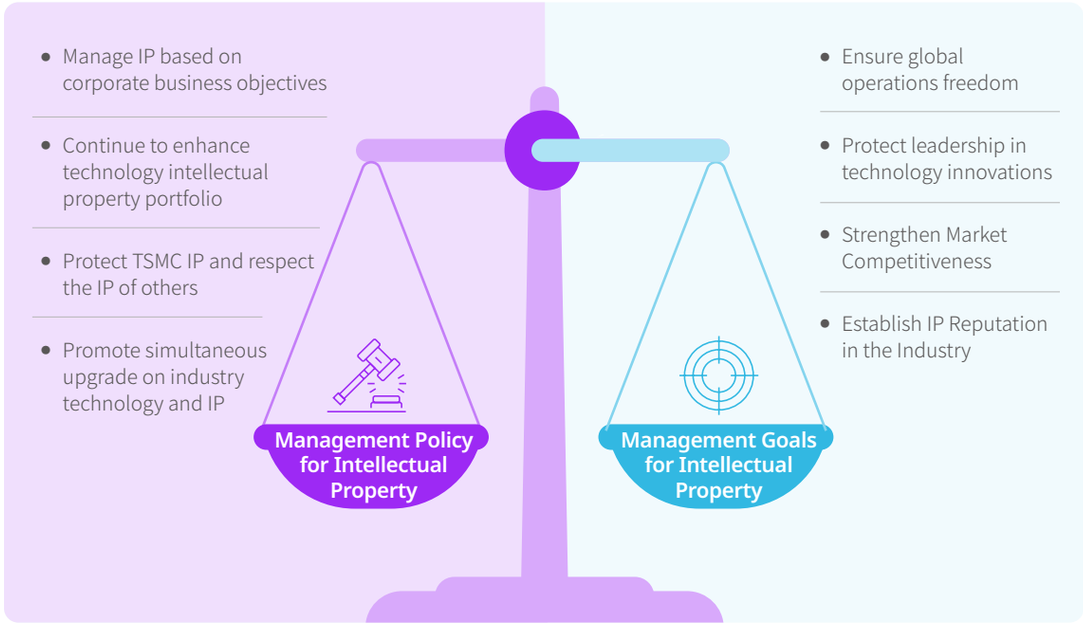
Intellectual Property Protection

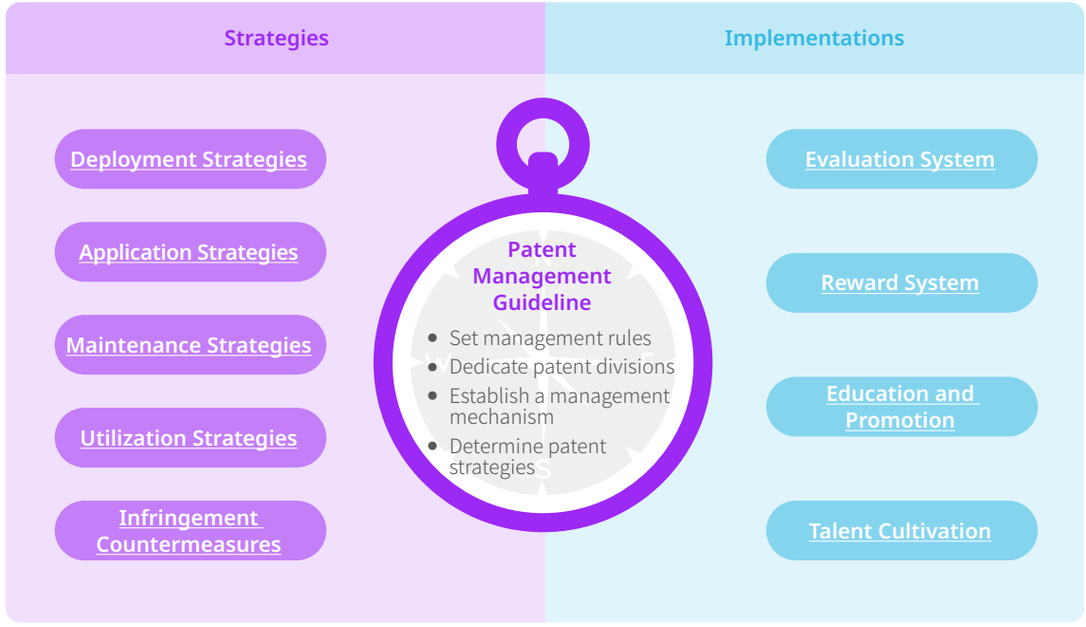
In accordance with TSMC's business development and R&D plans, we have been protecting R&D innovation and operation development by way of utilizing patents and trade secrets as dual tracks protection, and strengthening Company's Trinity of Strengths of "Technology leadership, Manufacturing excellence, and Customer trust," so as to fulfill the company's ESG vision. To ensure technology leadership, TSMC's IP and R&D teams work closely throughout each step from the beginning of technology planning to risk production and volume production. Such teamwork enables TSMC to build an IP portfolio for each generation's critical innovative technology ahead of schedule, including the latest 3nm and 2nm process technologies, to ensure the Company's technology leadership in the semiconductor industry. In manufacturing excellence, TSMC secure critical information such as capacity planning, manufacturing process management, and intelligent operation related information as trade secrets with rigorous protection measures; we also actively apply patents for manufacturing technology with strategic value to secure the Company's competitive advantage obtained through manufacturing excellence and quality assurance. In maintaining customer trust, TSMC protects confidential information concerning the Company and its customers while maintaining strategic leadership in the global patent ranking. The effort translates into business success and ensures the freedom of TSMC's operations around the world, and increases customer trust and strengthen partnership.

Comprehensive Patent Management Mechanism

TSMC's comprehensive patent management system includes: Patent management strategies, such as Global patent deployment, Exploratory invention mining, Patent portfolio expansion, and Patent exploitation and exercise; and Patent management rules, such as Tier-based IP evaluation, Patent competition rewards, Educational patent promotion, and Patent professional training.

TSMC established technological patent road maps by way of innovative patent strategy, strict management and risk-control measures; analyzed and monitored competitors by using intelligent patent maps; conducted core technology mining through invention workshops; expanded patent families on key technologies; filed and maintained patents by tier-based management; diversified exploitation of patent assets; and further enhanced patent protection through quality control on patent applications and continued to construct massive global patent portfolio with high quality.





TSMC classifies the patent cases by tiers and utilizes the tier-based control mechanism to manage the entire patent application process and expand the patent family, which maximizes patent protection and resource utilization efficiency. Meanwhile, TSMC's diverse reward system encourages innovation and improves invention quality. A wide range of IP promotion activities are launched to educate employees with better knowledge of IP laws. IP professional training programs are also available for the IP team to enhance their professional management capabilities. In 2021, TSMC held several events to promote patents. Over 2,000 TSMC employees participated in twenty-one in-house training sessions where they received assistance for inventions and proposals for valuable patents. The Patent Week event was launched along with eight seminars, the annual TSMC Patent Campaign received 3,306 invention propos
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of industrial technology and intel dual property rights for the vision of improving sustainability for our society.

Adhering to a vision of improving sustainability for our society, TSMC continues to simultaneously promote upgrading of industrial technology and intellectual property rights. Through interacting with intellectual property agencies and judicial courts, co-working with industrial institutes to develop technologies and generate intellectual property outputs, cooperating with research institutes as an intellectual property strategic alliance, and participating in law amendments of intellectual property related laws and providing industrial policy advice, TSMC assists in establishing a sound patent protection environment and implement our corporate social responsibility for sustainable operations.

Trade Secret Protection

TSMC is the first among the industry to introduce a trade secret registration system and the Golden Trade Secret Award. Over the past nine years, the Company has been advancing our trade secret management methods to implement intellectual property strategies, enhance the Company's competitive advantages, encourage the vibrant company culture of innovation, and achieve TSMC's four corporate sustainability visions.

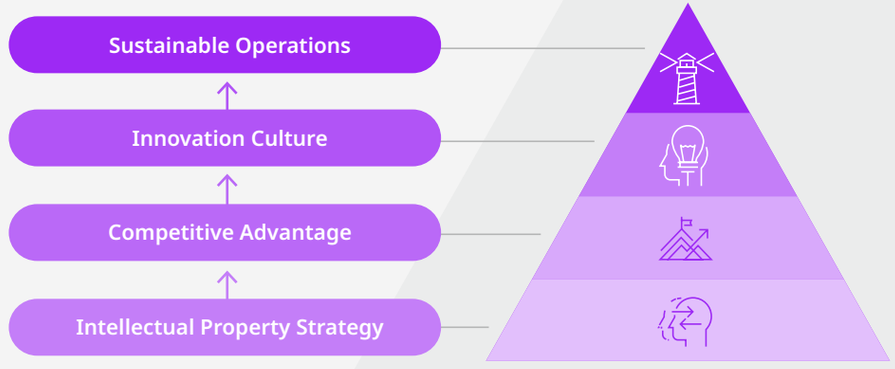
With the trade secret registration system, TSMC keeps a record of the Company's versatile technology inventions and innovations, a treasured component for patent mining. The system keeps technical trade secrets in two fields where TSMC enjoys competitive advantages: technology leadership and manufacturing excellence. It also supplements the patent management system at the heart of TSMC's intellectual property management. Furthermore, advanced technology including intelligent automation and artificial intelligence are integrated into the system to enable intelligent trade secret registration management.

The Golden Trade Secret Award initiated in 2013 is another key tool serving to implement innovation. The reward system with a rigorous evaluation process identifies important registration cases and effectively facilitates an innovative culture. As of 2021, a total of 1,919 Golden Trade Secret Awards have been awarded to 5,155 employees. 25,134 employees took part in the registration of 160,172 technical or commercial trade secrets.

Patent Achievements with Quality and Quantity in 2021

Patent Applications	Patents Granted	Patent Quality
>8,800 Over 8,800 global patents applications	>5,100 Over 5,100 global patents issued	100% Highest allowance rate for U.S. patent applications at 100% among the top 10 patentees
↑3rd Ranked third among U.S. Patent Applicants, securing the best record for two consecutive years	↑4 th Ranked fourth among U.S. Patentees, setting a new company record	
1st Ranked first among Taiwan Patent Applicants for six consecutive years	1st Ranked first among Taiwan Patentees for a second year consecutively	

TSMC's Vision of Trade Secret Management Innovation



An Intelligent Automation (IA) and Artificial Intelligence (AI) Powered Intelligent Trade Secret Management System

Integrated with Human Resources System

TSMC's trade secret registration system is integrated with the Company's human resources system and automatically updates employees' registration information in their personnel file. This serves to highlight employees' contributions to TSMC's technological innovations and is an important indicator for supervisors to consider for performance evaluation and promotion.

Connected to Contract Management System

TSMC's trade secret registration system is connected to its contract management system, reminding employees involved in technology development and transfer to register the relevant trade secrets in a timely fashion.

Intelligent Reminder Function

The trade secret system automatically compares employees' trade secret registration records and reminds them to complete the registration process in a timely manner.

AI Chatbot Support

TSMC's trade secret AI chatbot works 24/7 to provide instant replies to support employee trade secret registration and protection queries, thereby enhancing employee trade secret competency.



Real Time Data Visualization Analysis

The use of advanced information analysis software in TSMC's system to visualize trade secret registration data provides employees with real-time updates and precise data on the quantity of registrations, allowing them to understand their registration status and adjust their registration strategies more efficiently and effectively.

Keyword Analysis

Analyze technology keywords from previous trade secret registration data to compile and uncover technology development trends.

Technology Cluster

Systematically categorize and annotate registered cases with technology family relation to identify technology clusters.

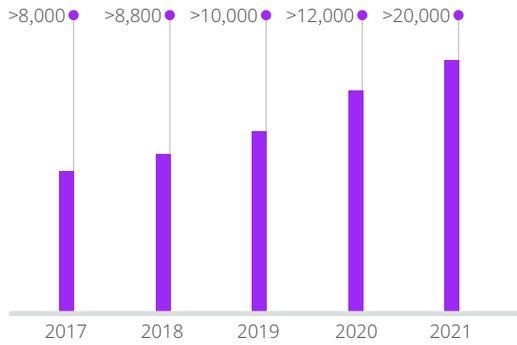
Innovation Talent Pool

Analyze Golden Trade Secret award winners' backgrounds to generate an "innovation talent pool" for TSMC's talent development planning and strategic management.

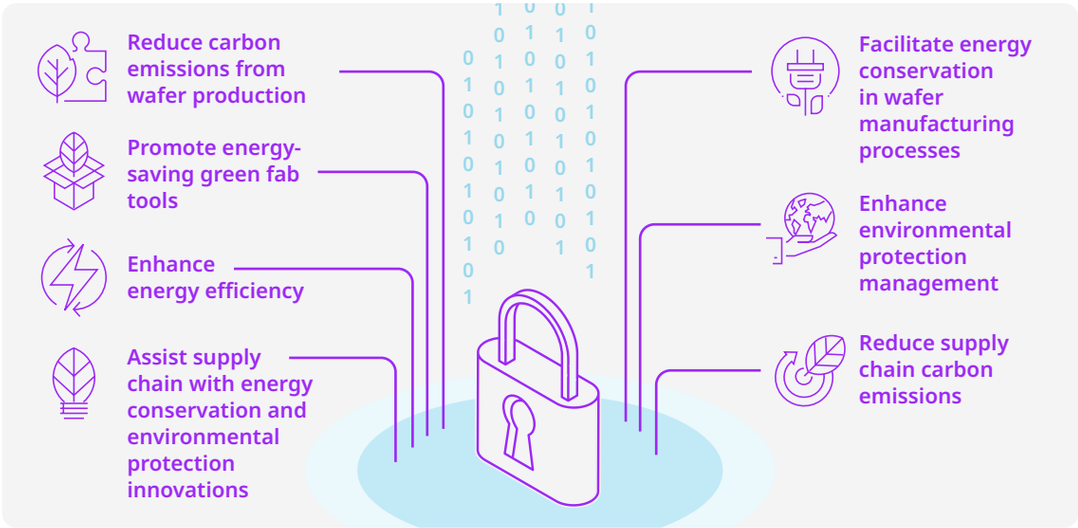
- **First Green Trade Secret Award Celebrates Advancement in Eco-Friendly Technologies**

Green manufacturing is among TSMC's five ESG directions. To make steady progress toward the goal of Net Zero Emissions by 2050, TSMC launched the first Green Trade Secret Award in 2021. The Green Trade Secret Registration Section was also introduced to encourage inventions and innovations that can specifically contribute to increasing resource utilization efficiency and circular economy in relation to climate change, energy management, water management, waste management, and air pollution control.

Number of Trade Secrets Registered Each Year



Seven Key Contributions Rewarded in the Green Trade Secret Registration Section

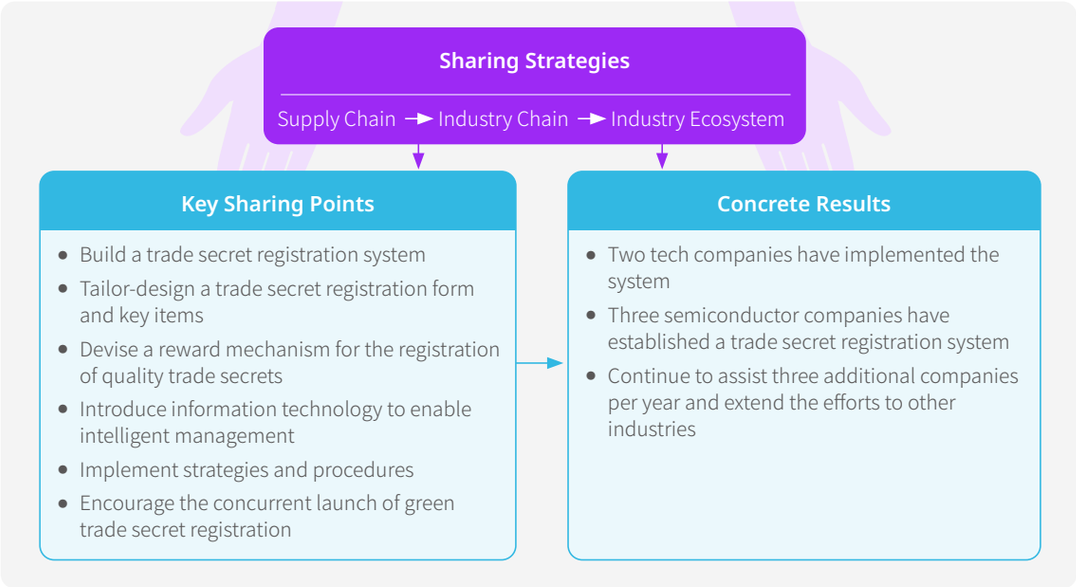


- **Transparent and Open Trade Secret Management System Enhances the Soft Power in Sustainable Supply Chain**

To improve the IP management capabilities throughout the supply chain, TSMC launched the Supply Chain Trade Secret Management Sharing project in 2021. Initially, the pro bono service project selects strategic partners in the supply chain that shares TSMC's vision in intellectual property protection. By sharing global IP management trends, TSMC helps its suppliers increase trade secret management effectiveness and encourages them to promote a culture of sustainable development and innovation, hence increasing technical quality and capabilities. To further extend TSMC's influence from the supply chain to the industry chain, the Company also generously shares our know-how and practical experiences in trade secret management with the Taiwan Semiconductor Industry Association and Taiwan Association for Trade Secrets Protection, aiming to enhance the industry's awareness and effectiveness on trade secret management.

As of the end of 2021, TSMC has helped two technology companies successfully adopt a trade secret registration system through course sharing. Three semiconductor companies completed their trade secret registration system with TSMC's help and are currently advocating for the launch of the system in 2022. In the future, TSMC sets out to assist at least three companies per year with the establishment of a trade secret management system. To substantially contribute to the protection and management of trade secrets domestically and globally, TSMC also plans to gradually reach further outside of the semiconductor industry to encourage universal adoption of green trade secret registration and intelligent management.

Supply Chain Trade Secret Management Sharing Implementation Framework



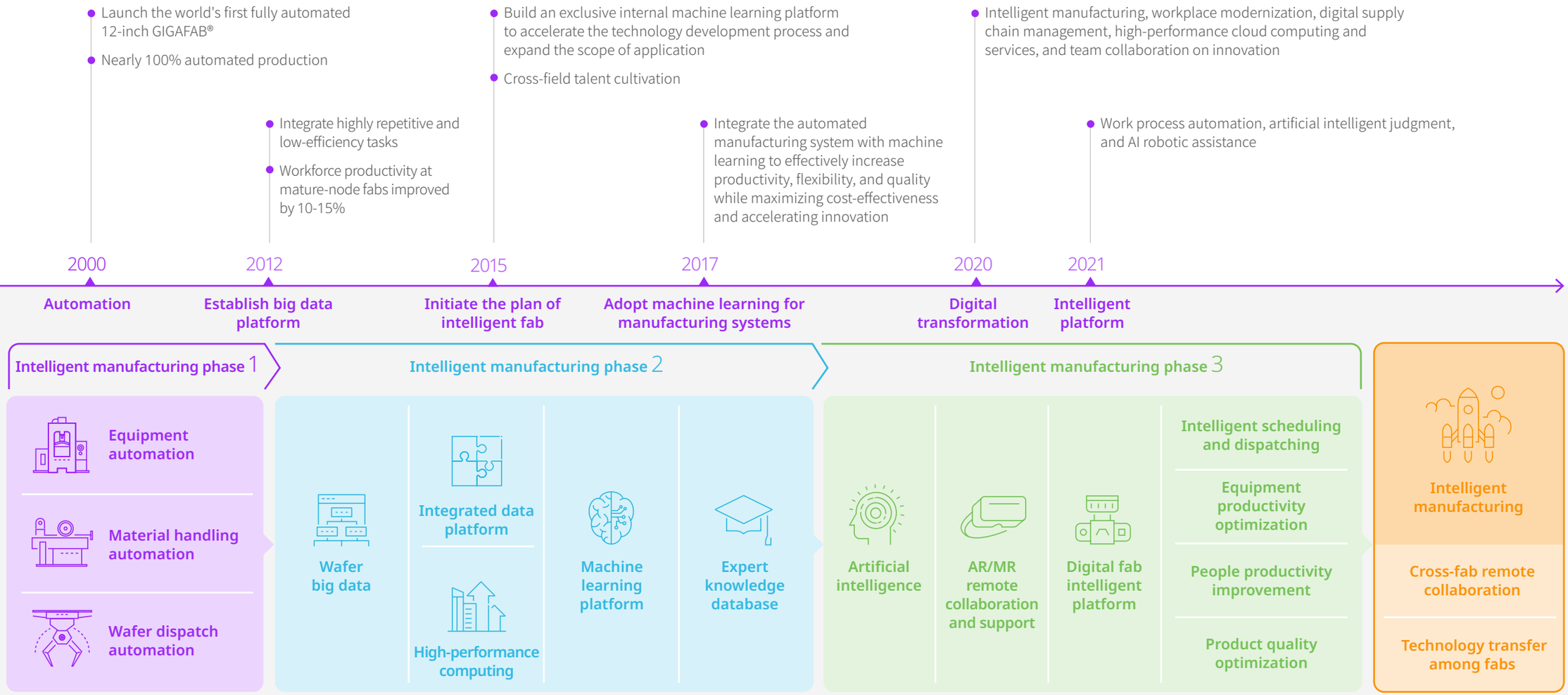
Intelligent Precision Manufacturing

As the world's leading semiconductor foundry service provider, TSMC has achieved intelligent manufacturing through three phases. In the first phase, TSMC converted to a fully automated manufacturing model that covers manufacturing equipment, material transfer, and wafer processing dispatch. Secondly, with big data for wafer production and the integrated data platform completed, the Company successfully established an intelligent manufacturing expert knowledge database thanks to the introduction of machine learning and high-performance computing. In the third phase, we focused our efforts on artificial intelligence and digital transformation. Following the introduction of Digital Transformation and Digitized Fabs in 2020, TSMC remained committed to the work process automation in 2021. The Company has leveraged the artificial intelligent technology and intelligent robotic assistance to make improvements in three primary fields including intelligent scheduling and dispatching, equipment and people efficiency enhancement, and product quality optimization, resulting in abnormal lots process efficiency by 30 to 40%.

In terms of intelligent scheduling and dispatching, TSMC continues to expand the capacity of GIGAFAB®s, each of which involves hundreds of millions of combinations. Having considered all production constraints, TSMC strives to improve our AI algorithm to get the best scheduling result in less than three minutes. While processing nearly 10 million dispatching orders per day, the AI algorithm also ensures that the capacity of the Intelligent Automated Material Handling System (AMHS) can meet customer's expectations and delivery dates. To improve manufacturing equipment and people efficiency, TSMC has developed an AI Process Control Platform to ensure the consistency of tool matching and process stability in manufacturing. Over 1,000 AI models have been deployed to import and process the big data in manufacturing and quickly generate optimal parameters. By offering diversified product efficacy, TSMC is able to meet customer-requested specifications. When it comes to optimizing product quality, the smallest defect can result in inferior products due to the increasingly reduced line width in advanced manufacturing processes. To ensure prime product quality for our customers, TSMC has adopted intelligent auto-detect classification, which can enhance the accuracy of visual inspection through Deep Learning.

Looking to the future, TSMC will continue to implement digital transformation to enable rapid technology transfer among fabs and talent collaboration across different regions and times zones via cloud tools. The Company will strive to create a global manufacturing model that injects innovation vitality into the semiconductor manufacturing industry and become customers' long-term trusted partner.

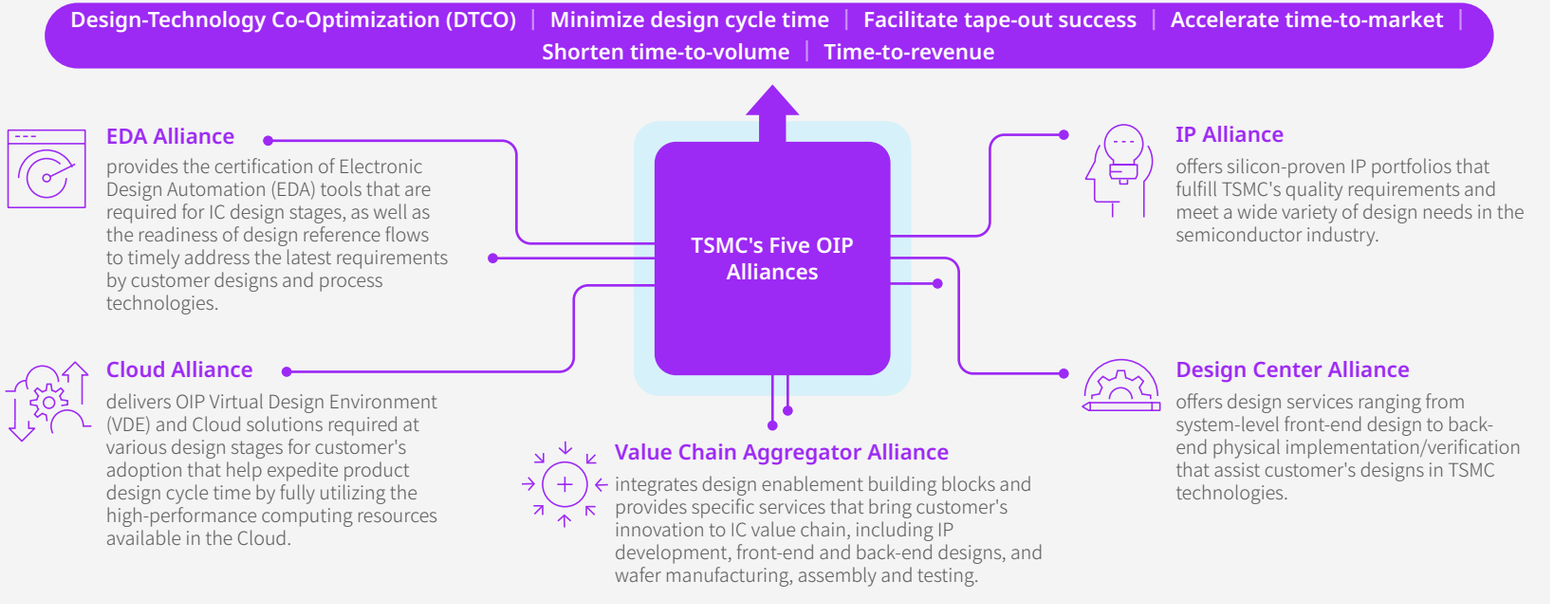
Development History of Intelligent Precision Manufacturing



Open Innovation Platform®

TSMC's Open Innovation Platform® (OIP) empowers continuous innovation for a comprehensive design infrastructure in the semiconductor design community by infusing TSMC process technologies in its OIP partners' products & services. Since the inception of OIP in 2008, TSMC has been collaborating with its alliance partners to offer continuous innovative design enablement solutions, which provide the foundations to reinforce TSMC's core values of Manufacturing Excellence, Technology Leadership, and Customer Trust, for the ultimate goal of supporting customer success.

In 2021, TSMC held its online Technology Symposium and OIP Ecosystem Forum to stay connected with worldwide customers and ecosystem partners, marking the tenth anniversary of its annual OIP Ecosystem Forum since 2011. TSMC and OIP partners have shared collaborated ecosystem solutions through DTCO to support the optimization of Power, Performance and Area (PPA) in customer products. The Company has worked closely with these OIP partners to expand its libraries and silicon IP portfolio to more than 40,000 IP titles and provide more than 38,000 technology files and over 2,600 process design kits (PDKs), from 0.5-micron to 3-nanometer, to support customer designs using TSMC's industry-leading process technology for the applications of High Performance Computing, Mobile, Automotive, and IoT. These combined efforts have helped customers accelerate innovation for their differentiated products that fuel consistent growth in global technology development.



> Through the industry's most comprehensive and vibrant ecosystem, TSMC has been able to help our customers achieve next-generation silicon design and deliver best possible outcomes with our OIP partners' collaborative power.
>
> **Dr. L.C. Lu**
> TSMC Fellow and Vice President of Design and Technology Platform at TSMC

• Comprehensive Ecosystem Design Solutions

During the OIP Ecosystem Forum in 2021, TSMC introduced a comprehensive set of the latest design solutions jointly with its OIP ecosystem partners for platforms of Mobile, High Performance Computing (HPC), Automotive and IoT, as well as TSMC 3DFabric™.

To recognize the outstanding support and collaborative achievements of our OIP ecosystem partners, TSMC announced the 2021 OIP Partner of the Year Awards to celebrate excellence in accelerating semiconductor innovation.



Advanced Technology

3nm (N3)
- Continue with full-node scaling trend to offer the most advanced foundry technology in both PPA and transistor technology
- Complete platform support for both mobile and HPC applications, as well as the offering of design solutions through DTCO
- Complete certifications for EDA tools

4nm (N4)
- Facilitate easy migration from N5 for customers to obtain the benefit of chip area reduction
- Complete certification for EDA tools

5nm (N5)
- Complete certification for EDA tools
- Design solutions and ecosystem are ready and have been applied to real customer production chips



Automotive Technology Platform

16nm , 7nm , 5nm
- 16nm and 7nm Automotive Design Enablement Platform (ADEP) with design solutions and ecosystem are ready and have been applied to real customer production chips
- 5nm ADEP is under development to support comprehensive automotive design solutions and ecosystem



RF Technology Platform

6nm, 16nm , 22nm, 28nm, 40nm, 0.13um
- Comprehensive RF technology portfolio, from 0.13um to 6nm, are available to support general RF, millimeter Wave (mmWave), and RF frontend products
- RF enhancements for 16nm mmWave and 6nm sub-6GHz are available to achieve DTCO
- Collaborate with EDA partners to provide robust RF PDKs and design flows to customers



N12e™ Process and Design Enablement

N12e™
- Enhanced voltage scaling to support 0.4V operation with corresponding design solutions for IoT devices to further reduce power consumption
- Low Vdd design solutions are ready for customer adoption



3DFabric™

TSMC-SoIC® ,InFO, CoWoS®
- TSMC-SoIC® (System on Integrated Chips) for 3D chip stacking, and InFO (Integrated Fan-Out) & CoWoS® (Chip on Wafer on Substrate) for 2.5D advanced packaging are to support customer innovation in system design
- EDA tools, IP, and packaging solutions are ready to address customer needs from system integration, design, and verification for 2.5D/3D packages and multiple chips, to final system verification

Industry-Academia Collaboration Enhancement

TSMC values universities as important partners. Over the years, TSMC has been dedicating resources to universities in Taiwan and overseas under a mechanism for sustained interaction in three primary aspects: industry-academia research collaboration, course collaboration, and career coaching. Through university programs, TSMC encourages more professors to join the research front of cutting-edge semiconductor technologies focusing on the most advanced semiconductor devices, manufacturing processes, materials technologies, semiconductor manufacturing, engineering science, and specialty technologies that are related to the electronics industry. On the other hand, TSMC makes continuous efforts to cultivate technical talent for the semiconductor industry by offering a wide variety of channels for students to obtain knowledge and practical experience. By 2030, the estimated number of students involved in TSMC's global university programs will reach 8,000.

Since the launch of university research centers in 2013, TSMC has been working with university professors on advancing semiconductor research and industrial technology development. In 2021, TSMC dedicated over NT$462 million to various research projects and industry-academia collaboration programs in 28 universities in Taiwan and overseas. Furthermore, the TSMC University Shuttle Program enables university professors and students globally to verify the performance of their designs in application. TSMC also strongly supports the establishment of the National Academies for Key Fields of Research in 2021. In the following decade, TSMC will allocate funds to support forward-looking semiconductor research and faculty recruitment.

Meanwhile, TSMC actively gets involved in talent cultivation through course collaboration with domestic universities. Since 2019, over 2,200 students have registered to join the semiconductor programs. To shorten the industry-academia gap, TSMC took the initiative to invite industry partners and TSMC managers to collaborate with professors on course design and lecturing. In 2021, TSMC university program launched three courses on intelligent manufacturing, semiconductor manufacturing processes and tools, and big data and cloud applications. A total of 1,200 students have been benefited from the courses.

In cultivating talent through career coaching, TSMC offers students opportunities to learn more about the semiconductor industry through a variety of programs including the summer internship program, contests, workshops, and career seminars. A total of 2,700 students have been benefited from the courses.

TSMC University Collaboration Programs

462.76 million	>6,500	28	16
Total investment (NT$)	Number of beneficiaries	Number of domestic and overseas universities involved	Number of courses given

Industry-Academia Collaboration

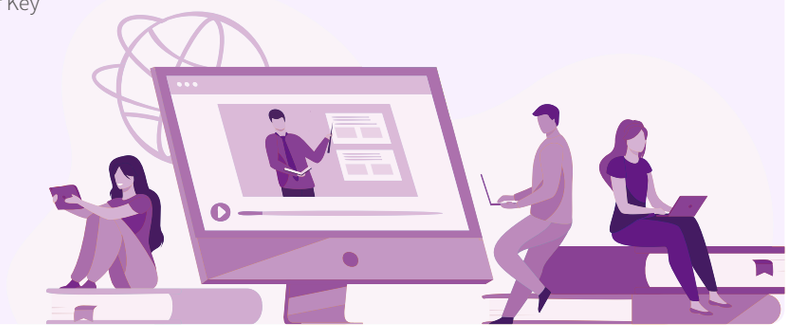
- University Research Centers
- Industry-Academia Joint Development Project
- University Shuttle Program
- National Academy for Key Fields of Research

Course Collaboration

- Semiconductor Programs
- Information Technology Talent Cultivation in Partnership with Major Universities

Career Guidance

- TSMC Ph.D. Scholarship
- TSMC x Microsoft Careerhack



Industry-Academia Collaboration

• University Research Centers

TSMC has established research centers in collaboration with National Yang-Ming Chiao Tung University, National Taiwan University, National Cheng Kung University, and National Tsing Hua University. Research funds are allocated to encourage professors and students to actively propose groundbreaking semiconductor research projects aimed at developing leading-edge technologies in semiconductor devices, materials, manufacturing processes, and IC design. Meanwhile, the research centers are talent incubators for the semiconductor industry. By 2021, over 230 professors and 3,200 top students specializing in electronics, physics, chemistry, chemical engineering, and mechanical engineering have been involved in the research endeavors at the research centers. In addition, TSMC allocated budgets to collaborate with ten top universities overseas through university research centers, forming international research partnerships to carry out specific research projects.

> The summer internship at TSMC helped me learn about the work content and environment in advance. In the future, I can achieve further personal growth and figure out how to apply academic skills to the work upon joining the workforce.
>
> **Chun-Ge Lai**
> Graduate student at the Institute of Communications Engineering, National Yang-Ming Chiao Tung University

• Industry-Academia Joint Development Project

Through collaboration programs at universities, TSMC encourages professors to focus on the study of the most advanced technologies pertinent to the semiconductor industry. Students interested in the field are offered opportunities to learn from practical experience, hence joining the workforce in the semiconductor industry in the future. In 2021, a total of 125 professors at nine universities in Taiwan and 16 universities overseas initiated 118 industry-academia joint development projects with TSMC. The projects have yielded over 190 U.S. patent applications.

> When I first joined the fab, everything was new to me. With the senior colleagues' guidance and help, I began to learn from different parts to manufacturing tools cleaning. It was very rewarding.
>
> **Jia-Cheng Hua**
> Student of the Department of Electrical Engineering, National Chin-Yi University of Technology

• National Academy for Key Fields of Research

In 2021, in the wake of the enactment of the National Key Fields Industry-University Cooperation and Skilled Personnel Training Act by the Ministry of Education in Taiwan, TSMC was committed to supporting the establishment of national academies at National Yang-Ming Chiao Tung University, National Taiwan University, National Cheng Kong University, and National Tsing Hua University, bridging corporate resources with the research capacity of universities. In the following decade, TSMC will sponsor at least NT$100 million annually to support forward-looking research on semiconductor technologies, faculty recruitment, and scholarships for outstanding students. TSMC strives to provide incentives to attract talent to join the semiconductor industry and to cultivate high-end research talent in Taiwan.

• University Shuttle Program

In 2021, TSMC's University Shuttle Program helped professors and students of 15 top universities globally turn IC designs into actual chips, solidifying theories and research discussed in class into tangible results. The research projects in 2021 focused on 5G and wireless transmission, high-speed wired transmission technology, biotechnology, artificial intelligence, memory applications, the Internet of Things and energy-saving technologies, automotive electronics, and radar applications for drones. In 2021, a total of 100 academic papers were published, 27 of which were in reputable academic journals like the IEEE Journal of Solid-State Circuits (JSSC) and the IEEE International Conference on Solid-State Circuits (ISSCC), a prestigious conference known as the "Olympics of IC design."

> TSMC University Shuttle Program gave me a chance to take part in the manufacturing processes comprehensively from IC design to layout, simulation, and tape-out. I was able to experience the actual industrial practices in advance.
>
> **Kang-Lun Chiu**
> Ph.D. student at the Institute of Electronics, National Yang-Ming Chiao Tung University

Key Academic Collaborators and Research Direction in 2021



Course Collaboration

• Semiconductor Programs

TSMC launched the TSMC Semiconductor Program at National Tsing Hua University in 2019 aiming to raise the competencies of semiconductor talent in Taiwan and attract more brilliant students to join the industry. Following the launch, TSMC extended the program to other universities in 2020. In 2021, the semiconductor programs were also launched in National Central University and National Sun Yat-sen University. The programs encompass five primary fields of study: Device/Integration, Process/Module, Equipment Engineering, Intelligent Manufacturing, and Forward-looking IC Design. Over 2,200 students have registered to take courses under the programs.

In addition to launching semiconductor programs, TSMC also dispatched employees to give lessons for two courses, "Advanced Manufacturing Technologies and Tools" and "Intelligent Manufacturing," in partnership with several universities. The courses aims to equip students with knowledge of the most advanced manufacturing tools and industry practices, hence bridging the gap between education and industry practices. In 2021, a total of 750 students took the courses.

• Information Technology Talent Cultivation in Partnership with Major International Businesses

For students to grasp the latest development in information technology and equip them with practical information technology skills, TSMC took the initiative in 2021 to invite seven global information technology companies to develop a 12-week theme-based course, "Big Data and Cloud Technology," launched in six universities. The course offers students insights into cloud infrastructure and the theory and practice of AI applications based on the varying expertise and experience of Hewlett Packard Enterprise (HPE), VMware, Cisco, Oracle, SAS Institute Taiwan, Red Hat, and Splunk. Nearly 500 students completed the course.

Career Guidance

• TSMC Ph.D. Scholarship

Fostering Ph.D.-level scientific research talent is key to the sustained advancement of the semiconductor industry. TSMC launched a Ph.D. Scholarship in 2020 as an incentive for elite students to pursue doctoral degrees in scientific specialties related to the semiconductor field. The program consists of three pillars: scholarship, mentorship, and internship. An annual subsidy of NT$500 thousand issued for a maximum of five years offers Ph.D. students financial support. After attaining the degree, they can directly join the semiconductor industry or become an educator to cultivate more talents. As of 2021, a total of 49 Ph.D. students have benefited from the scholarship.

• TSMC x Microsoft Careerhack

Amidst the tide of globalization and digital technology, information technology talent is now the most valuable resource to the enhancement of industry competitiveness. To expand the pool of existing talent and cultivate more outstanding semiconductor talent, TSMC has been the pioneer in Taiwan's domestic semiconductor industry to collaborate with Microsoft Taiwan in launching the Careerhack competition. First introduced in 2020, the Careerhack competition is a combination of in-person workshops, technical training courses, and a hackathon. It enables the semiconductor industry, software industry, and academia to interact and exchange with each other on the topic of industry practices and new information technologies. In an effort to bridge the industry and academia, the winner and runner-up enjoy priority in job interviews or internship opportunities. A total of over 900 students participated in the competition in 2021. Due to the COVID-19 pandemic, nearly 100 students who were shortlisted for the finals joined the activity online.

Case Study

TSMC STEM for High School Girls Program

To encourage high school girls to pursue science, technology, engineering, and mathematics, TSMC Education and Culture Foundation launched TSMC Journeys of Female Scientist Lectures for the second consecutive year. In 2021, TSMC held career lectures titled Lean in and Attain a Better Version of Yourself aimed at inspiring students' interests in STEM as they learn about the unique strengths and capabilities of women as well as in-depth information on TSMC and the semiconductor industry. More than 700 participants joined the journey. In 2022, TSMC will continue to hold a series of events under the TSMC Journeys of Female Scientist Lectures to encourage female students to choose STEM as their career goals, strengthening female presence in the technology sector in the long run.



TSMC holds career lectures titled Lean in and Attain a Better Version of Yourself for high school girls to learn about the semiconductor industry.

Product Quality and Safety

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Enhance Quality Culture Promote continuous improvement programs to enhance the internal quality culture Encourage local suppliers to participate in Taiwan Continuous Improvement Award (TCIA) to strengthen quality culture and competitiveness within TSMC's local supply chain		
Generate up to NT$20 billion in value from improvement projects and involve outstanding projects in TCIA	**Generate NT$13 billion in value from improvement projects and involve at least 6 outstanding projects in TCIA**	**Generated more than NT$12 billion in value from improvement projects** ✓ Target: NT$12 billion
		Involved 8 outstanding projects in TCIA ↑ Target: 5 projects
Encourage 100% of major local raw materials suppliers and 75% back-end packaging materials suppliers to participate in TCIA with 60% of them to advance to the finals Note 1	**Encourage 100% major local raw materials suppliers and 60% back-end packaging materials suppliers to participate in TCIA, with 20% of them to advance to the finals**	**64% of major local raw materials suppliers to participate in TCIA** — Target: 100% Note 2
		67% of back-end packaging materials suppliers to participate in TCIA ↑ Target: 50%
		16% of raw materials and backend packaging material suppliers advanced to the finals of TCIA — Target: 20% Note 2
Improve Quality Capability Develop innovative testing methods to enhance product, technology, and production quality Note 3 NEW		
Develop a cumulative of 3,000 innovative testing methods for quality and reliability	**Develop 265 innovative testing methods for quality and reliability**	**Developed 254 innovative testing methods for quality and reliability** NEW

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 orders in each quarter

Note 2: Due to the impact of the COVID-19 pandemic, some suppliers were unable to join the competition but still participated online as part of the audience

Note 3: The Quality and Reliability Lab launches innovative testing methods each year to continue bolstering TSMC's quality capabilities; this indicator is added in 2021 and will be tracked annually

↑ Exceeded ✓ Achieved — Missed Target

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Improve Quality Capability Develop hazardous substance analysis capabilities in chemical laboratories to ensure occupational safety and health (OHS)[Note 4] Strengthen management for hazardous substances to improve green manufacturing			
Develop the ability to analyze 100% of CMR (Carcinogenic, Mutagenic, and Reprotoxic) substances and help the suppliers that supply materials with potential risks develop the same capabilities[Note 5]	**Develop the ability to analyze 100% of CMR substances and help 100% of the the suppliers that supply materials with potential risks to develop the same capabilities**	**Developed the ability to analyze 100% of CMR substances and help 100% of the the suppliers that supply materials with potential risks to develop the same capabilities** Target: 100%；20% of the suppliers that supply materials with potential risks	↑ Note 6
N-methylpyrrolidone (NMP) 100% replacement (Base year: 2016)	**Reduce the use of NMP by 95%**	**Reduced the use of NMP by 75%** Target: 95%	— Note 7
No process involves Perfluoroalkyl Substances (PFASs) that have more than 4 carbons	**VisEra will collaborate with suppliers for the Photoresist Substitute Program to replace 50% of PFHxA substances**	**VisEra has selected substitutes for all photoresists containing PFHxA-related substances(total 41) and launched production line testing**	✓
Realize Quality Application Complete quality and reliability certification for advanced process technologies, specialty process technologies, and wafer-level package process 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 package process 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 package process per the R&D targets**	**Completed quality and reliability certification for 4nm process technology, 40nm embedded RRAM IP, and larger scale InFO and CoWoS® technologies**	✓

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

Note 5: The definition of "major suppliers" in the 2020 report is different from "major local raw material suppliers". To avoid confusion, the term was renamed as "the suppliers that supply materials with potential risks" in 2021

Note 6: In 2021, TSMC strengthened management strategies, requiring the suppliers that supply materials with potential risks to list CMR substances as mandatory items in Certificate of Analysis

Note 7: Reduction of NMP usage is limited to facilities in Taiwan. Since the substitute chemicals affected product yield in several sites, formula testing and adjustments were necessary. TSMC subsidiaries will proceed with chemical substitution in 2021

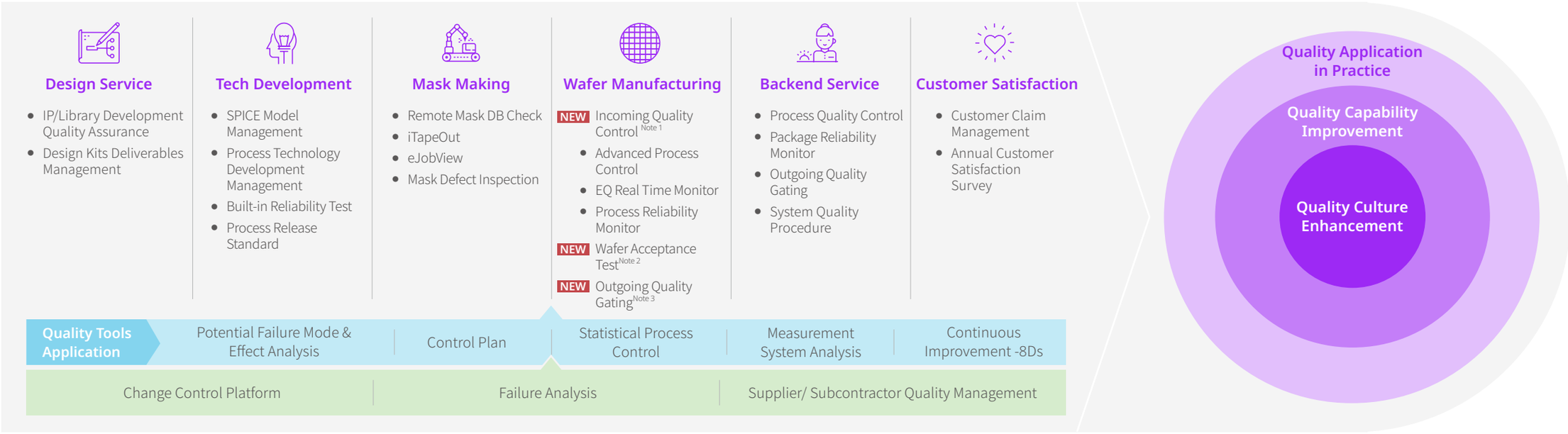
↑ Exceeded ✓ Achieved — Missed Target

TSMC is dedicated to delivering outstanding semiconductor foundry services to our customer's full satisfaction. The Quality and Reliability Organization spotlights quality standards of all operational aspects and collaborates with internal organizations to continue advancing the quality management system as we strive toward the goal of zero defects. To bolster advanced quality analysis capabilities, TSMC has established Quality and Reliability Laboratories across the globe. Starting from technology development to product application, TSMC has adapted quality control measures such as material characteristics analysis, micropollutant analysis, and failure analysis for returned products, establishing a highly efficient defense system for product quality control.

In response to growing and rapidly evolving demands, in 2021, TSMC's Quality and Reliability Laboratories launched a total of 254 innovative testing methods to facilitate technology development and ensure meeting commitments to customers for device characteristics, process yield, and product reliability. In 2021, the Quality and Reliability Organization set up a new advanced chemical laboratory to enhance continuous quality monitoring of raw materials. This helped R&D organizations make significant material innovations and provide services to enhance the technologies in the industry supply chain. TSMC also assisted suppliers to upgrade technologies and transform them into the semiconductor supply chain, thereby cultivating a more comprehensive local industry chain.

To better allocate resources and increase operational efficiency, the Quality and Reliability Organization established the AI Team in 2021 to accelerate digital transformation in areas of raw materials management, statistical process control (SPC), metrology, and laboratory analysis through integrating inter-departmental resources and centralized management. Use of machine learning to identify correlation has enabled intelligent quality defense and remote management of manufacturing quality, which helped overcome the impact of the COVID-19 pandemic and make seamless quality control across worldwide fab network a reality, further injecting drive for sustainable development in TSMC.

Quality Management System



Note 1: Established a dedicated laboratory of incoming quality control for photoresist materials, and greatly increased analysis efficiency with division of labor based on specialization
Note 2: Optimized parameters for wafer acceptance tests, increasing testing accuracy through more accurate control over changes in electric currents
Note 3: Formulated a comprehensive recycling process and guideline for cushion materials to mitigate materials shortages and realize a circular economy

Achievements of Cross-Functional Collaborations with the Quality and Reliability Organization in 2021

Quality and Reliability Organization

Customer Service

- Reduced cases of problematic engineering quality or poor reliability to 55% of the level in 2019 for every million 12-inch wafers shipped

Business Development

- Optimized document management system to enhance technology development efficiency with customer

General Affairs and Management

- Supported Corporate Information Technology Organization to join TCIA and win the Gold Award

Research and Development

- Collaborated to complete quality and reliability certification for 4nm process technology, 40nm embedded RRAM IP, and larger scale InFO and CoWoS® technologies

Operations

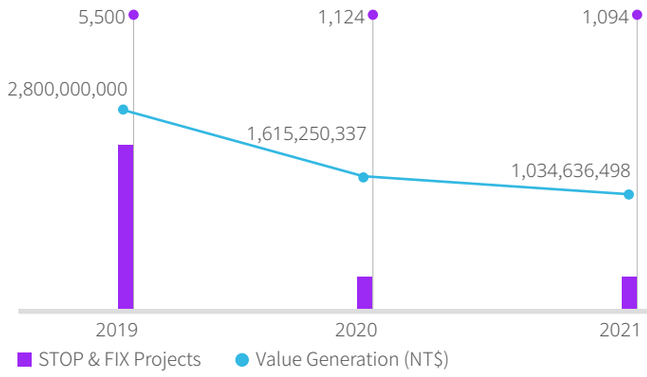
- Advanced statistical approaches and quality tools to increase in-house defect detection rate by 16%

Quality Culture Enhancement

Quality is the cornerstone of sustainable development for TSMC. To advance product quality and increase customer satisfaction, TSMC is committed to cultivating a quality culture that engages all TSMC employees, encourages colleagues to strive for excellence, drives cross-departmental observation and learning, and enhances their innovative and problem-solving abilities. In 2021, the Quality and Reliability Organization held company-wide conferences such as the Total Quality Excellence and Innovation Conference (TQE) and quality audit symposium to keep sparking innovation in quality systems and tools.

In 2021, TSMC enters its 29th year of hosting the TQE conference. In pursuit of perfection, TSMC launched the Quality Academy platform in September 2021 where integrated the existing Case Sharing with Quality Activity, Quality Tool, Quality Publication, Quality Expert sections to facilitate discussion on quality among employees, bolster quality awareness, and inspire more innovative ideas. As of December 2021, the Quality Academy has received over 22,000 views. In 2021, employees submitted over 8,500 improvement projects and generated over NT$12 billion in value. To encourage employees to take initiative in preventing abnormal quality or outdated operations, TSMC launched a new theme - STOP & FIX - in 2019 to collect and share improvement projects every year. By the end of 2021, the STOP & FIX projects have generated over NT$5.4 billion in value.

STOP & FIX Achievements



$5,449,886,835
Total Estimated Value (NT$)

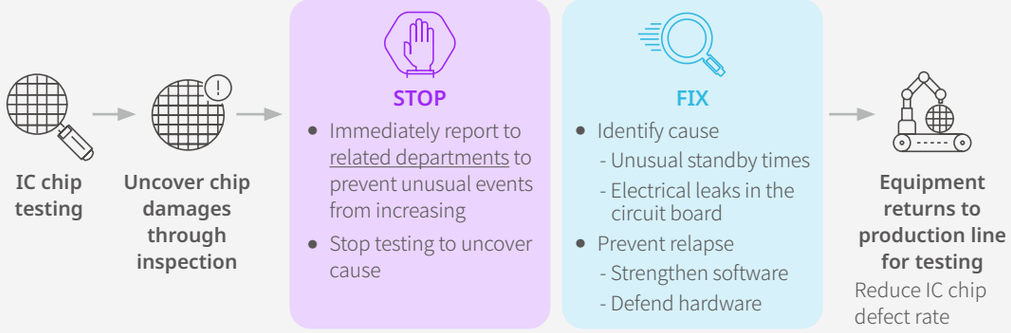
7,718
Total Projects

Case Study

Using STOP & FIX to Strengthen Mechanisms for Handling Unusual Events and Reduce IC Chip Defect Rate

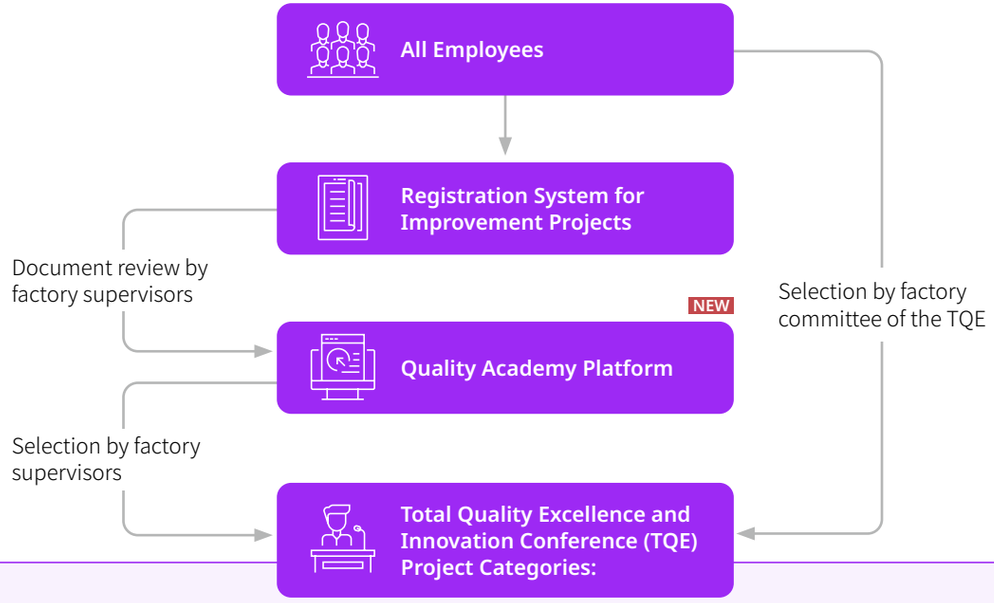
In 2019, TSMC launched a new theme - STOP & FIX - to encourage employees to take initiative in preventing abnormal quality or outdated operations. TSMC continues to promote a quality culture where all employees can "uncover unusual events and correct accordingly" through educational training, posters, competitions, and sharing of outstanding improvement projects.

In 2021, the Testing Operation Division found that IC chips were being damaged by testing equipment. Upon closer inspection, the Division realized that damages were caused by unusual standby times and electrical leaks in the circuit board. They brought up the strategy of "strengthening software and defending hardware" and used self-developed software to force the circuit board to discharge power before and after testing. They also introduced a self-developed high-voltage detection system to monitor high voltages to ensure that there are no electrical leaks in the circuit board. In the meanwhile, abnormal detection items were added to the equipment maintenance checklist to ensure electrical leakages. Their efforts successfully increased testing quality, reduced IC chip defect rate, and ensured customers were able to launch products on time. The project received first place at the 2021 TQE conference for the STOP & FIX category.



Company-Wide Quality Culture

500	>6,700	NT$11.8M
Average of outstanding projects recognized each year	Projects recognized as of 2021	Cash prize



Note: In 2021, TSMC introduced a new platform – the Quality Academy – that integrates Case Sharing, Quality Activity, Quality Tool, Quality Publication, Quality Expert sections.

2021 TQE-Winning Cases

Production Capacity Improvement
Increase capacity for CIS products

1. Develop capacitor components with FinFET structures to expand surface area
2. Improve the linearity of capacitors

Achieved 20% capacity utilization after volume production

Quality Improvement
Increase yield for photosensitive products

1. Optimize wafer grinding and reduce light spots in videos and images
2. Improve process parameters to reduce damages to silicon wafers and white pixel noise

x 5	19%	30%
Reduced light spots by 5X in videos and images	Reduced white pixel noise	Increased yield

Cost and Production Support
Adjust machine programs to increase gas utilization rate

1. Innovative three-step process to strengthen performance of gas cleaning
2. Optimize program parameters for the season layer and reduce uneven gas distribution
3. Health management and early warnings for machines

65%	60%	$360 million
Reduced electricity bills	Reduced micropollutants	Estimated Benefit (NT$)

Process and Efficiency Improvement
Advanced Packaging Technology and Service billing forecast process re-engineering

1. Develop algorithms to make appropriate inferences
2. Build quick forecasting processes to reduce operational times
3. Build an integrated billing forecast platform

Boosted data accuracy, data integrity	83%	$5 million
	Slashed process time	Estimated Benefit/ year (NT$)

ESH and Green Corporation
Reduce hydrogen chloride levels in air pollution and reduce the frequency of repairs for machines

1. Upgrade machines that produce high-concentration hydrogen chloride such as enhancing hydrogen chloride removal capabilities by installing atomizing nozzles on local scrubbers
2. Connect the facility monitoring system with the cell phone alert system to achieve real-time monitoring

88%	571 hours	$17 million
Reduced hydrogen chloride	Saved working hours/ month	Estimated Benefit/ year (NT$)

STOP & FIX
The great leap forward of testing quality

1. Develop software to discharge residual energy
2. Abnormal detection items were added to the equipment maintenance checklist

0%	$87.7 million
IC chip defect rate lowered to 0%	Estimated Benefit/year (NT$)

Assistant Engineers
Mitigate clogged pipelines to increase machine repair efficiency

1. Remove the bent sections of the pipelines, preserve the straight sections, and ensure consistent diameter sizes
2. Ensure that the pipelines are non-stick and do not clog by using opening holes and anti-corrosive coatings
3. Reorganize the exhaust gas emissions systems to make it safer and more convenient for repair personnel to enter and exit

0%	40%	$1.2 million
Reduced pipeline flow alerts	Reduced machine repair times	Estimated Benefit/ year (NT$)

Outstanding Proposals from Direct Labor
Perfect the management system for wafer cassettes

1. Develop management reports to ensure the gate-keeping mechanism is systematic
2. Automatic inspection mechanism ensures manual operations are correct
3. Establish a monitoring system to regularly replace cassettes to avoid exceeding the cleaning deadline

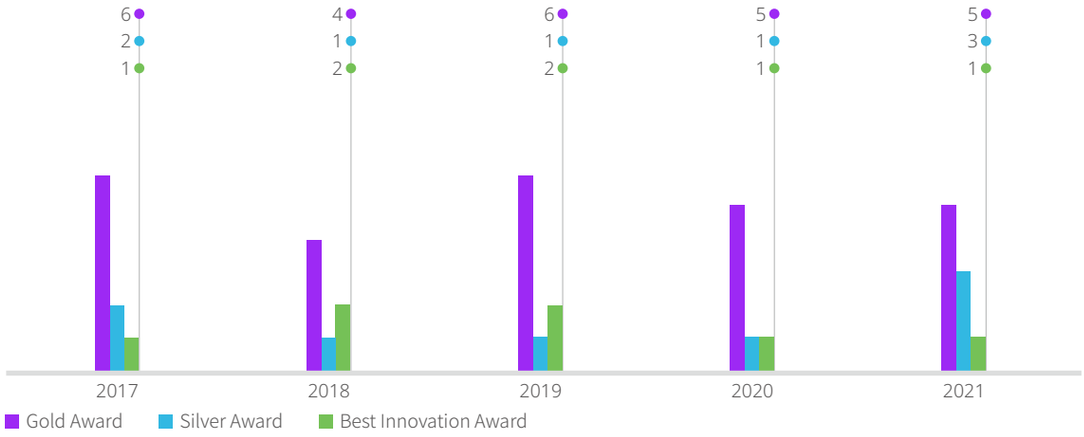
Increased wafer cassette cleaning efficiency	0	$50 million
	Contamination in wafer cassettes	Estimated Benefit/ year (NT$)

In addition to cross-functional learning within the Company, TSMC is also a long-term participant of the Taiwan Continuous Improvement Award (TCIA). By participating in the competition, TSMC exchanges practical knowledge on quality improvement with peers from other industries and facilitates the advancement of all local industries. Employees are also encouraged to learn from other companies, which sparks innovation in problem-solving. In 2021, TSMC received five Gold Awards, three Silver Awards, and one Best Innovation Award at TCIA. In addition to Operations Organization, the Corporate IT Organization, as a first-time participant, also received the Gold Award at TCIA, a reflection that quality culture at TSMC is carried out in the daily works of administrative and management organizations.

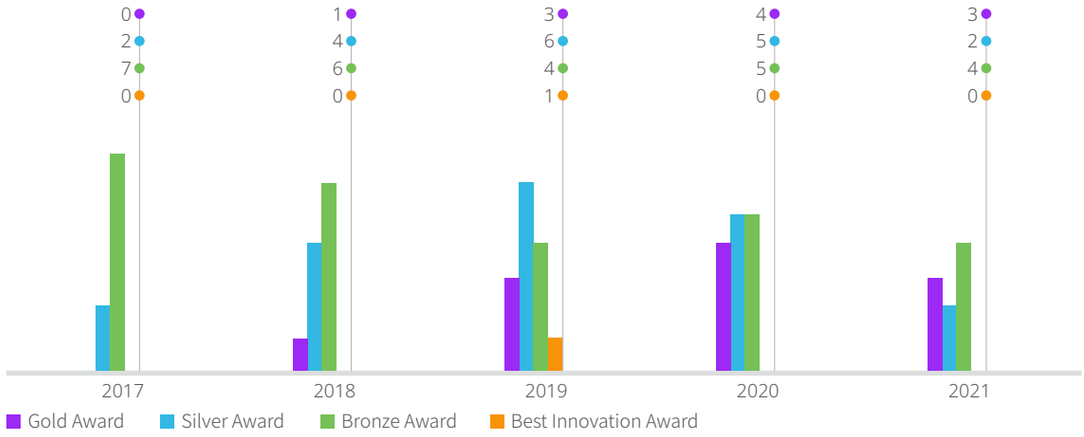
In line with our beliefs of strengthening the supply chain, TSMC also encourages suppliers to participate in TCIA. In compliance with COVID-19 prevention measures, some suppliers were unable to join the TCIA competition in 2021. The Quality and Reliability Organization promptly adjusted the strategies and ensured that 64% of major local raw materials suppliers and 67% of backend packaging materials suppliers were able to participate in the competition. Suppliers that were unable to join the competition were invited to attend online sharing sessions after the competition where TSMC quality experts provided consultations remotely. In addition to encouraging suppliers to join the TCIA competition, TSMC also helps suppliers with their submissions. In 2021, a total of 16% of TSMC suppliers advanced to the finals and won three Gold Awards, two Silver Awards, and four Bronze Awards. TSMC has announced the list of winners on its corporate website to encourage suppliers to continue innovating and advancing their practices.

To deepen our sustainability impact, in 2021, the Quality and Reliability Organization launched two interactive courses - "Problem Solving Using 8D & 3L5W" and "A Guide to Process Change Notification" - and two common courses - "Proper Procedure for New Material or Supplier Introduction" and "Basic Quality Tools" on the TSMC Supplier Sustainability Academy to share our quality tools and methodology with suppliers and the public for free, sowing the seeds of positive change.

TSMC Track Record of Participating in TCIA



TSMC Supplier Track Record of Participating in TCIA



2021 TCIA-TSMC Winning Cases

Gold Award & Best Innovation Award — In pursuit of perfect quality of automotive chips!

9.4%	Reduced the use of sulfuric acid and waste generation	610million
Increased yield		Estimated Benefit/year(NT$)

Gold Award — Advanced logistics enhance production capacity of 8-inch wafers

83.8%	38.8%	5,000
Increased total transmission throughput	Reduced cross-fab transfer time	Benefited people/day

Gold Award — Breaking the bottleneck in production capacity by increasing oxide deposition productivity

8.1%	79million
Increased daily productivity	Estimated Benefit/year(NT$)

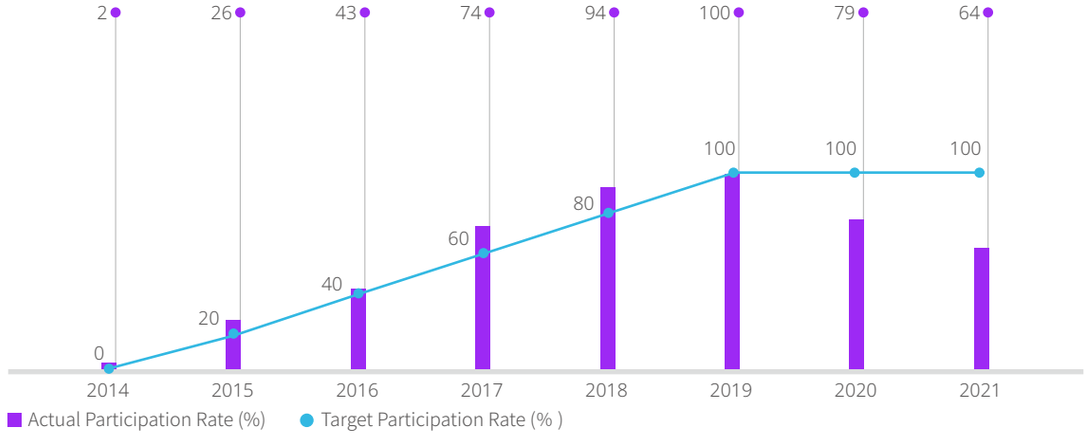
Gold Award — Expand diffusion process capacity

14.4%	75%	250million
Increased capacity	Conserved energy	Estimated Benefit/year(NT$)

Gold Award — Automatically compile financial reports for more efficient strategic analysis

94%	150x	20million
Increased operational efficiency	Increased the number of completed customer income statements	Estimated Benefit/year(NT$)

Percentage of Major Local Raw Materials Suppliers Participating in TCIA



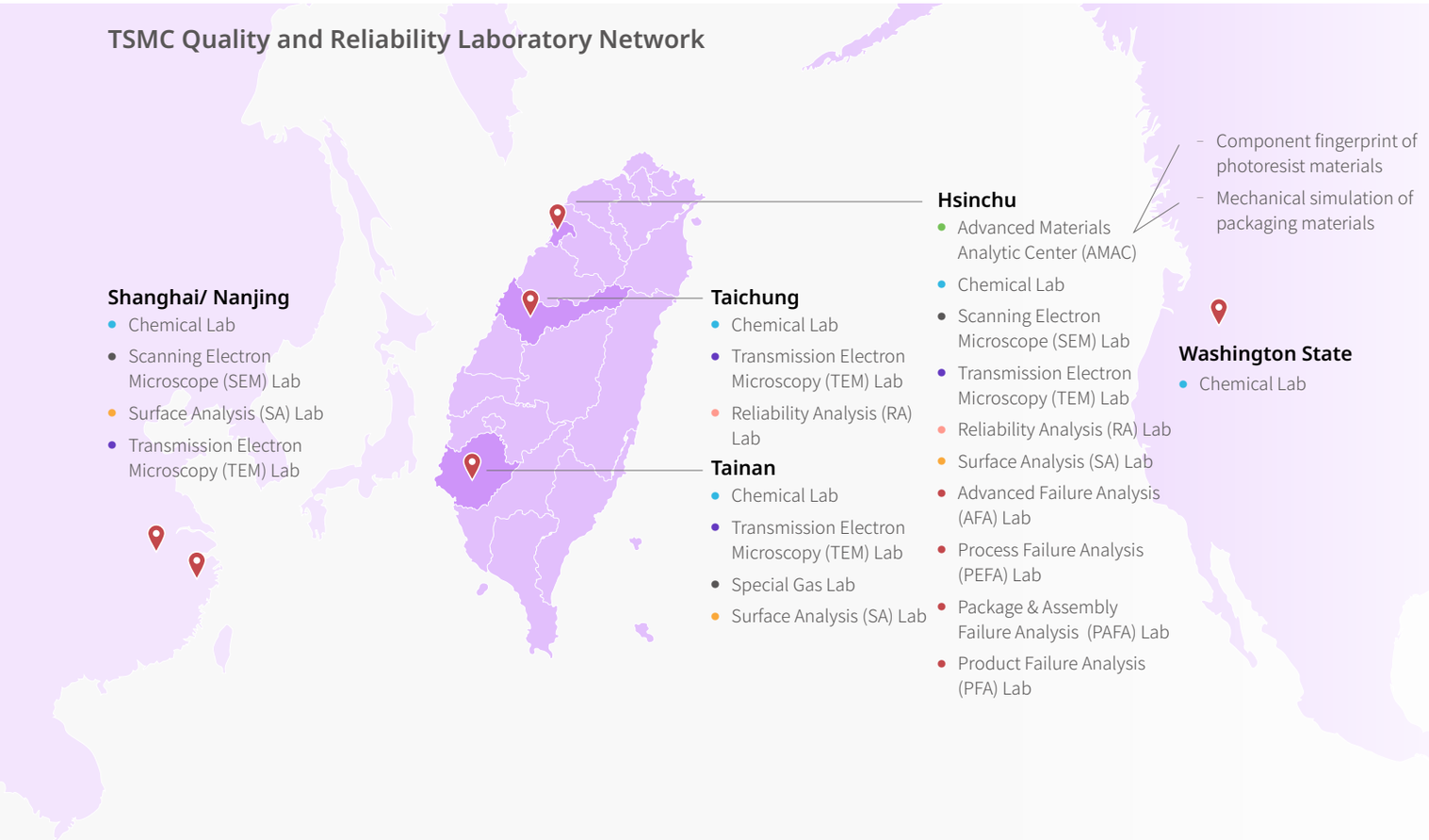


In 2021, TSMC participates in the TCIA competition to much success

Quality Capability Improvement

With the goal of satisfying customers, TSMC's quality and reliability laboratories have been dedicated to perfecting, researching, and developing testing methods. In 2021, the Laboratories proposed 254 innovative testing methods while ensuring that device characteristics, process yield, and product reliability all comply with customer demands and standards. From device, packaging to system level, TSMC continues to minimize quality risks in customer products and maintains strict monitoring of raw material stability and safety acquired from the upstream or through recycling, aiming to realize our vision of being a green, safe, and healthy workplace. In addition to applying quality capabilities to innovate our primary business, TSMC is also dedicated to developing energy-saving testing methods for quality and reliability. In 2021, the Quality and Reliability Organization made progress on wafer-level electro-migration testing method, and achieved shorter testing times and reduced energy consumption by optimizing qualification processes. The methods have been gradually introduced to mature manufacturing process for pilot testing. In 2022, TSMC will continue innovating to realize more eco-friendly testing methods.

TSMC Quality and Reliability Laboratory Network



Sustainable Strategies from the Quality and Reliability Laboratory

Chemical Lab	– Accelerate replacement rate of hazardous substances and help new TSMC facilities with designs for discharging Substances of Very High Concerns (SVHC)
Advanced Materials Analytic Center (AMAC)	– Develop the ability to analyze 100% of CMR substances and facilitated source management in suppliers – Evaluate and select technologies and materials for advanced processes
Surface Analysis (SA) Lab	– Develop processes with low energy consumption and high capacity; increase utilization efficiency of EUV energy – Select eco-friendly materials and replace in processes
Reliability Analysis (RA) Lab	– Complete reliability certification for the latest advanced processes, special processes, and wafer-level packaging processes
Advanced Failure Analysis (AFA) Lab	– Accelerate advanced process development, yield improvement and products DPPM reduction learning curve (reliability point of view) – Apply for domestic and foreign patents through innovation and invention
Process Failure Analysis (PEFA) Lab	
Package & Assembly Failure Analysis (PAFA) Lab	
Product Failure Analysis (PFA) Lab	
Transmission Electron Microscopy (TEM) Lab	– Continue to promote industry-academia cooperation programs

To continue tracking where materials with potential risks end up, TSMC has established mechanisms for screening CMR materials and continued building 100% inspection capability in 2021. In addition to self-management, TSMC incorporated hazardous substance management regulations in TSMC Supplier Sustainability Standard, and provided training, auditing and guidance to suppliers to enhance their hazardous substance management capabilities. In 2021, TSMC strengthened management strategies, requiring the suppliers that supply materials with potential risks to list CMR substances as mandatory items in Certificate of Analysis, enabling TSMC to achieve target ahead of time. Furthermore, the Quality and Reliability Organization assisted VisEra in setting up inspection capability for hazardous substances to enhance corresponding monitoring and control capability. At the same time, the Quality and Reliability Organization provided state of art material analysis and applied the best knowledge management method to assist the capacity expansion of new raw material production lines or new suppliers with quality fundamental to optimize the balance between quality and capacity. In 2021, TSMC actively promoted CMR screening technologies in major international conferences to strengthen the overall supply chain control capability. Meanwhile, TSMC again collaborated with the Semiconductor Equipment and Materials International (SEMI) to host the third Strategic Materials Conference in Taiwan to share the win-win strategy for technology and sustainable development in TSMC and industrial wide topics to elevate the competitiveness of the local supply chain.

The Quality and Reliability Organization also worked with manufacture teams for the recycling and reuse of chemical acids and successfully achieved several impurity improvements in recycling chemical acids, and enabled several recycling chemicals to achieve the quality level for electronic grade in 2021. In 2022, the Quality and Reliability Organization will continue sharing its technical knowledge to assist chemical suppliers in developing further recycling and reuse projects and will work with operations to implement engineering validation for recycling chemicals to achieve TSMC's quality requirements and the sustainable goal of friendly environment.

Management of Hazardous Substances

TSMC has always aimed to avoid entirely or minimize the use of hazardous substances that may affect human health or pollute the environment. The Corporate Environment, Safety and Health Division and fab Industrial Safety and Environmental Protection Department are responsible for ensuring that the storage, transportation, use, and disposal of any hazardous materials that cannot be replaced are compliant with regulations as well as TSMC's own ESH requirements to guarantee the health and safety of all workers, prevent pollution to the environment, and ensure that products do not contain restricted hazardous substances. TSMC complies with all ESH regulations during the production stage. All products produced for customers are also in full compliance with the EU Restriction of Hazardous Substances Directive (EU RoHS), EU Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (EU REACH), other international regulations, and customer regulations on restricted hazardous substances.



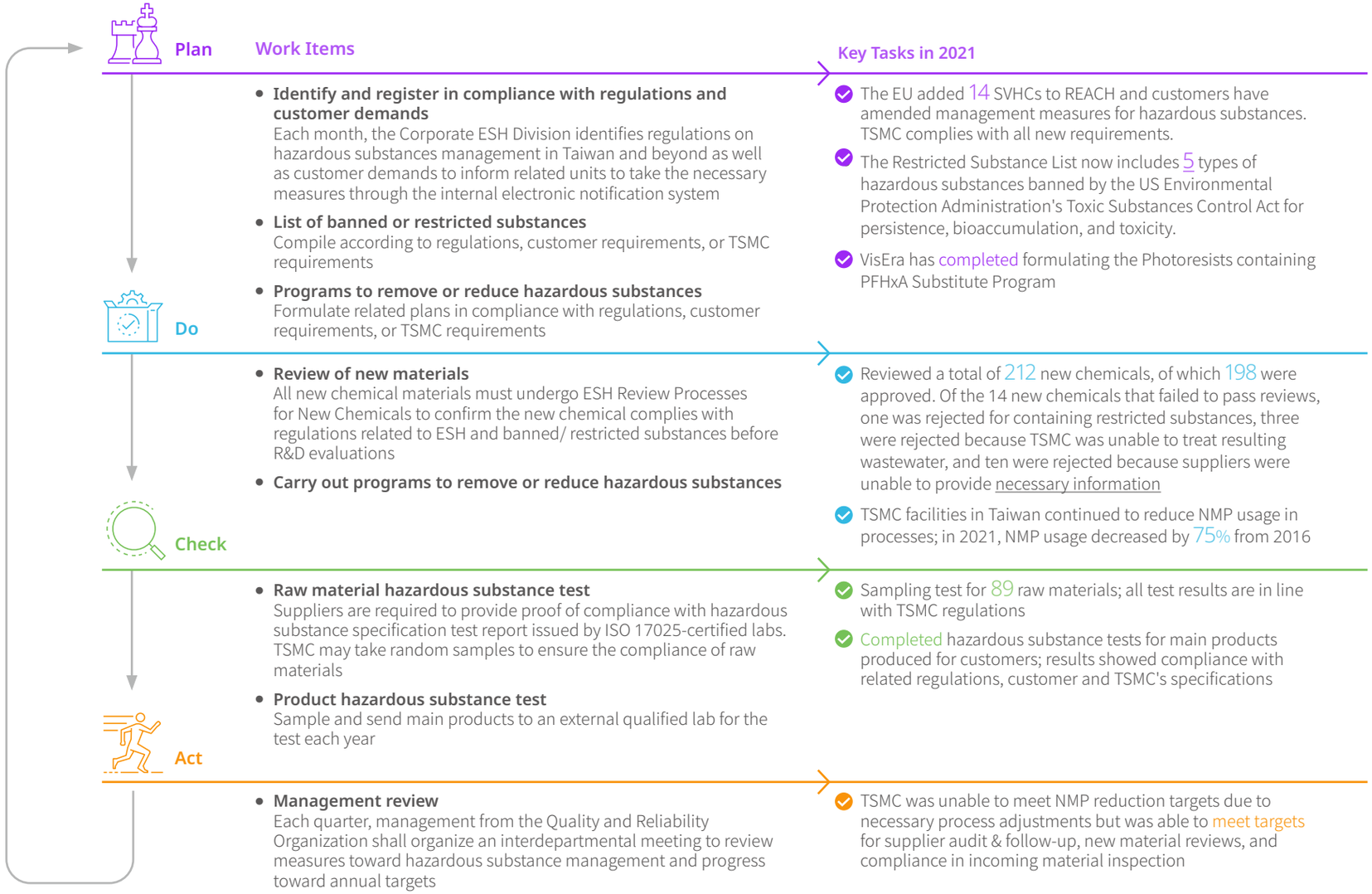



The Quality and Reliability Laboratories strive to innovate in testing methods to support technology development.

Perfluoroalkyl substances (PFASs) break down very slowly in the environment and may damage the human body. As such, in 2006, TSMC started a Photoresist Substitute Program targeting PFASs as well as long-chain PFASs. By early 2021, photoresists used in TSMC processes were completely free from PFASs with eight or more perfluorocarbon chains. Existing and developing advanced processes were also completely free from PFASs with more than four perfluorocarbon chains. Only some of the photoresists used by VisEra still contain PFASs with more than four perfluorocarbon chains, which is the six-carbon perfluorohexanoic acid (PFHxA). Starting from 2020, VisEra has started to evaluate replacements for 41 photoresists containing PFHxA. In 2021, VisEra selected replacement materials and started evaluating the replacement materials. It is estimated that the replacements will be fully deployed by the end of 2023.

Management of hazardous substances at TSMC is based on the QC 080000 Hazardous Substance Management System Requirement and strives for continuous improvement by utilizing the management model of PDCA. All facilities, upon official launch, acquire third-party certification. In 2021, TSMC added two new facilities: Fab 18 and Fab 16.

PDCA for Hazardous Substance Management



Quality Application in Practice

During the technology development stage, the Quality and Reliability Organization helps customers design superior product reliability into their products. In 2021, the Quality and Reliability Organization worked with R&D in advanced logic, specialty, and advanced packaging technologies throughout development and qualification stages. For advanced logic technology, the Quality and Reliability Organization in 2021 successfully certified technology quality and reliability for risk production of 4nm FinFET, an enhanced version from 5nm; for specialty technologies, completed IP qualification of 40nm embedded RRAM (resistive random access memory). In high voltage technologies, the Quality and Reliability Organization qualified second generation 0.5μm 650V GaN. In addition, TSMC's advanced packaging solutions enabled system improvement of the wafer level process by integrating the frontend wafer process and the backend chip packaging. In 2021, the Quality and Reliability Organization successfully qualified larger scale InFO and CoWoS® technologies for HPC products and to provide better system level integration through heterogeneous chip package interaction.

Stepping into the production stage, the Quality and Reliability Organization collaborates with Operations to establish real-time defense systems with advanced statistical methods and quality tools to ensure consistent quality products. In 2021, TSMC had no major product recalls. Meanwhile, TSMC continued to optimize quality control mechanisms and increase tool level detection rate by 18%, allowing it to uncover product defects as early as possible. By strengthening the accuracy of defense systems, TSMC has improved its in-house detection rate by 16%. This helps prevent quality events affecting customers and mitigate environmental impacts by reducing resource consumption for wafer remanufacturing and waste from end-of-life product.

The effectiveness of TSMC's quality management system is verified by third-party audit in compliance with IATF 16949:2016 and IECQ QC 080000:2017 requirements. In 2021, TSMC's four backend Fabs also acquired the certification of American National Standards Institute ANSI/ESD (Electrostatic Discharge) S20.20 standard for the first time. TSMC has also collaborated with our customers on quality and reliability testing to reduce product defect rates and mitigate risks of product returns. In 2021, the Quality and Reliability Organization provided diverse courses to customers, sharing technical knowledges of dynamic voltage stress, burn-in, and screening, aiming to help global customers enhance competencies in quality control as well as strengthen trust and partnerships with TSMC.

Grounded in the consistent dedication to quality culture, innovative quality capabilities, and quality applications that align with market demands, TSMC collaborates closely with customers and suppliers to achieve excellence in product and service quality.

Development Focus of Quality Application Value Chain



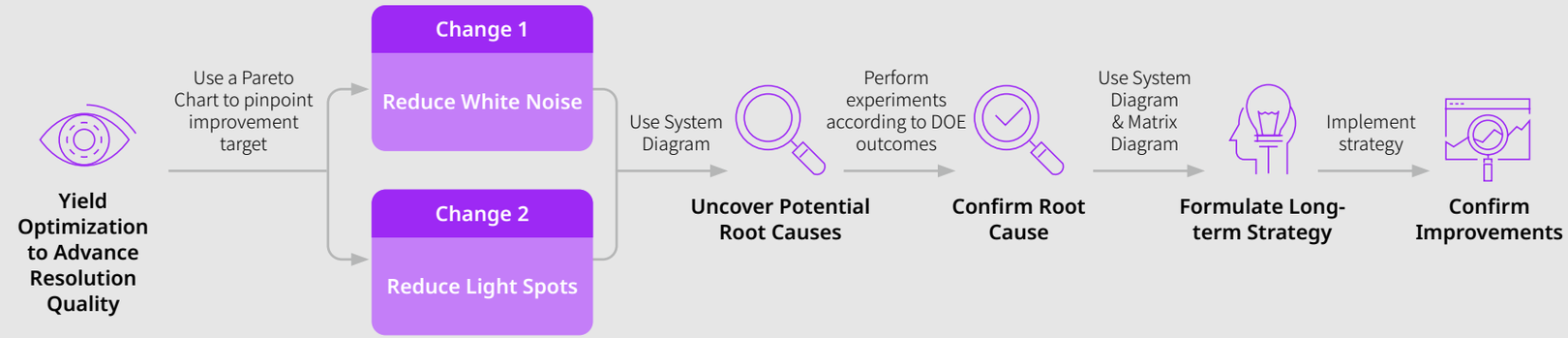
Case Study

Capitalize on Quality Tools to Increase Product Y S Applications

With smartphones trending towards having multiple cameras, high resolutions, HD, the CMOS image sensors (CIS) market is also growing and developing. TSMC has spent many years dedicated to developing scaling high-res image sensors. In 2020, Fab 14A successfully mass produced super-resolution, small pixel photosensors. Since then, Fab 14A has went on, in 2021, to use CIS theory analyses and quality tools such as Pareto Charts, System Diagrams, Design of Experiments, and Matrix Diagrams to uncover methods for optimizing process parameters, parts replacement, and adjusting maintenance times. Fab 14A continues to overcome challenges in new processes and has been able to ultimately improve yield by 30%. The IC chip's photography functions have also been drastically improved and can now achieve ultra-high resolutions, giving our customers a time-to-market advantage in the CIS market.

Matrix Diagram uses binary arrays to find the relative cause, the nature of the problem, and the form of the problem

Improvement Flow



5X

Wafer grinding process was drastically improved and ridges on the edge have been drastically reduced, which reduces the source of wafer edge deficiencies and drastically reduces light spots by 5X in videos and images

19%

Deep reactive-ion etching was drastically improved and TSMC was able to adjust process parameters and reduce damages to silicon wafers through design of experiments, successfully reducing white noise by 19%

30%

Reduced light spots and white noises, with yield increased by 30%

Customer Relations

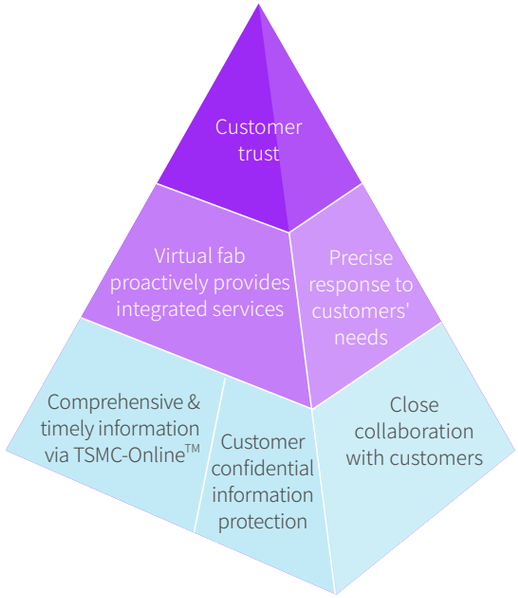
Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Precise Response Provide excellent customer service through close collaboration with customers and customer meetings/surveys on a regular basis to understand and respond to their requirements and feedback			
Maintain a customer satisfaction rating of over 90%	**Maintain a customer satisfaction rating of over 90%**	**Customer satisfaction rating of 83.9%**[Note 2] Target: >90%	—
Reduce cases of problematic engineering quality to 50% of the level in 2019 for every million 12-inch wafers shipped[Note 1]	**Reduce cases of problematic engineering quality to 55% of the level in 2019 for every million 12-inch wafers shipped**	**Reduced cases of problematic engineering quality to 55% of the level in 2019 for every million 12-inch wafers shipped** Target: 70% of the level in 2019	↑
Virtual Fab Provide comprehensive information in a timely manner to ensure the success of customer's products; strengthen processes and systems to protect customer product information to the highest standard			
Provide >1,200 wafer manufacturing and process technologies and >170 advanced packaging technologies in line with the TSMC technology roadmap	**Provide >932 wafer manufacturing and process technologies and >107 advanced packaging technologies in line with the TSMC technology roadmap**	**Provided >894 wafer manufacturing and process technologies and >98 advanced packaging technologies in line with the TSMC technology roadmap** Target: 860 wafer manufacturing and process technologies and 85 advanced packaging technologies	↑
Pass customer product information security audit with no major flaws	**Pass customer product information security audit with no major flaws**	**Passed customer product information security audit with no major flaws** Target: No major flaws	✓

Note 1: In 2021, cases of problematic engineering quality have been reduced to meet the 2030 Goal. As such, the 2030 Goal for reducing cases of problematic engineering quality or poor reliability has been adjusted from 60% to 50%

Note 2: Please refer to the section on "Precise Response" for reasons that the goals were not achieved

↑ Exceeded ✓ Achieved — Missed Target

Customer trust is a core value integral to TSMC. We believe that TSMC's competitiveness hinges on how competitive our customers are and in becoming a long-term and trusted partner that is critical to their success. To create an optimal customer service experience, TSMC has assembled a committed professional team, which is a dedicated coordination liaison, to provide timely assistance in design support, mask making, wafer manufacturing, and backend services. TSMC also commits to protecting proprietary customer information to the highest standards to develop long-term partnerships with our customers and collaborate with them to gain time-to-market advantage.

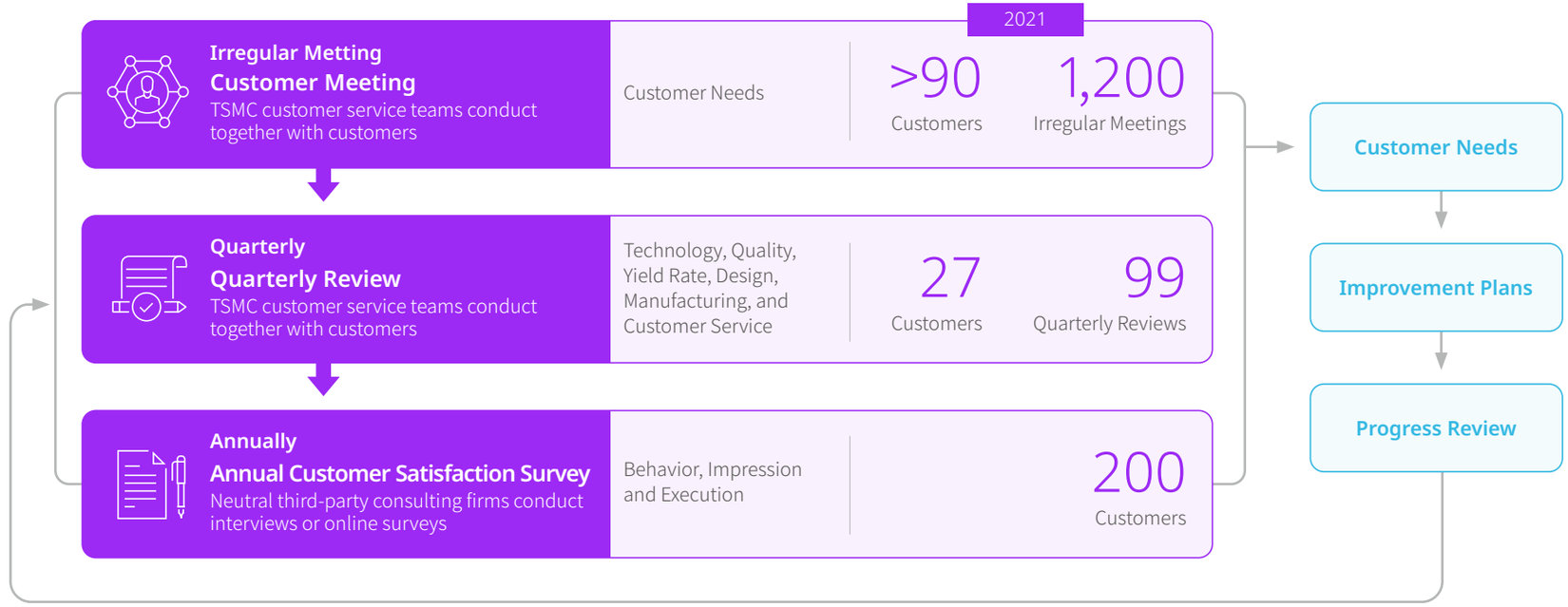


Precise Response

TSMC cares about customer relationships and believes that customer feedback and opinions are important foundations for advancing customer relationships. To better satisfy customer demands, the TSMC customer service team learns about customer's future expectations and feedback on the performance of business behavior, technology, quality, yield, design support, manufacturing, customer relations, and customer services through various channels including irregular meetings, quarterly reviews, and annual satisfaction surveys. By regularly reviewing, analyzing, and proposing corresponding measures for improvement, TSMC has developed a comprehensive protocol for responding to customer demands that continues to deepen our relationship with customers. In 2021, TSMC held more than 1,200 online and face-to-face meetings with over 90 customers, 99 quarterly reviews with 27 customers, and annual satisfaction surveys with nearly 200 customers.

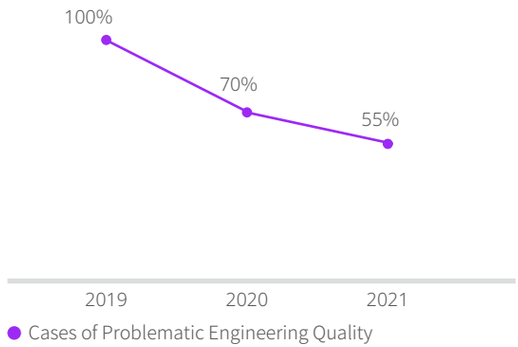
In 2021, customer satisfaction dipped to a relative low point. The primary reason for the drop in customer satisfaction was the surging demand for electronic products due to the COVID-19 pandemic and acceleration in digital transformation, meaning that production capacities for customers were not fully

Various Communication Channels for Customers

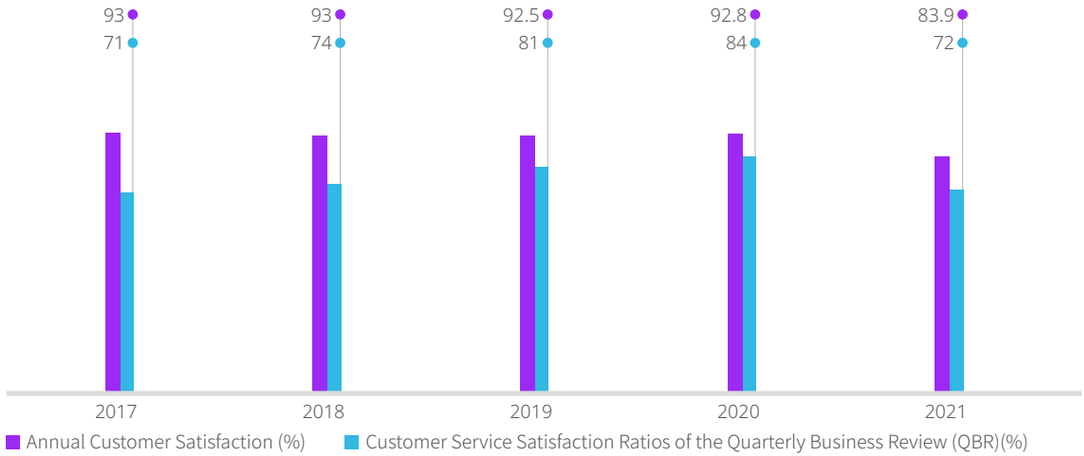


fulfilled. In response to the rapidly changing market demands, TSMC is working closely with customers to satisfy customer demands through the addition of new capacities and evolving ways of allocating existing capacities. In addition, TSMC continues to strengthen manufacturing process technologies, using STOP & FIX to prevent and mitigate quality events. This allows us to deliver wafer products with higher yield rates and further alleviate our customers, growing capacity demands. In 2021, cases of problematic engineering quality or poor reliability for every million 12-inch wafers shipped was reduced to 55% of the level in 2019, exceeding our annual goal of 70% and achieving our 2030 Goals ahead of time.

Cases of Problematic Engineering Quality for Every Million Wafers Shipped



Annual Customer Satisfaction

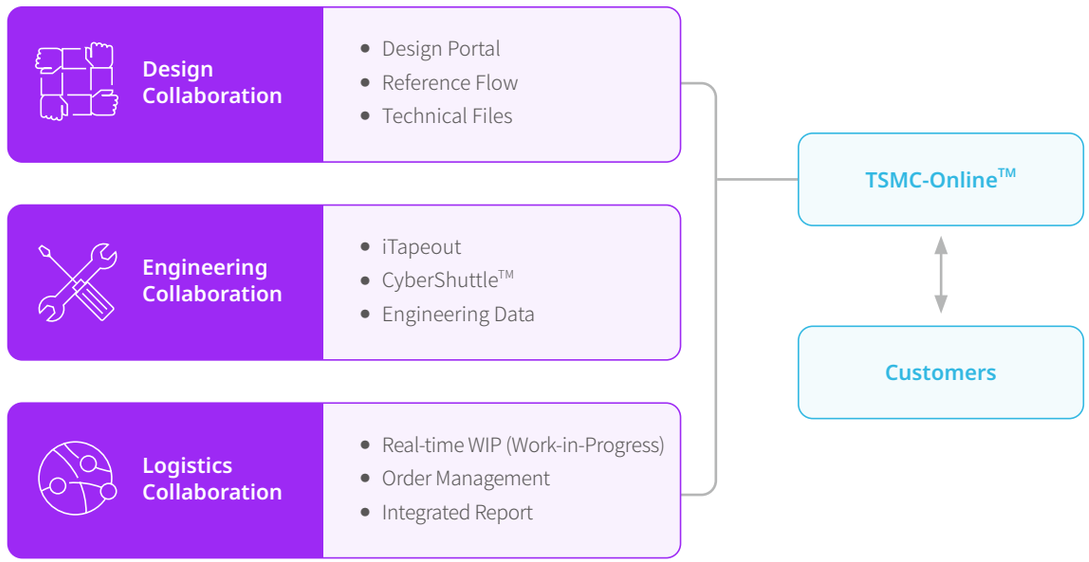


Note: Figures for the 2021 customer satisfaction ratings are from TSMC fabs in Taiwan and its overseas subsidiaries.

Virtual Fab

Real-time interaction and information exchange as well as comprehensive protection for proprietary customer information are critical for TSMC to build customer trust. For real-time interaction and information, customers have 24-7 access to important information on design, engineering, and logistics through TSMC-Online™. It also allows customers to create customized reports according to their management requirements to increase wafer management efficiency. In 2021, to further enhance our customer's user experience, we continued to optimize the system framework for TSMC-Online™ to ensure the system is able to update while simultaneously offering uninterrupted service.

For design integration, TSMC-Online™ delivers the latest, comprehensive, and accurate information during the design stage to help customers quickly complete product designs; for engineering

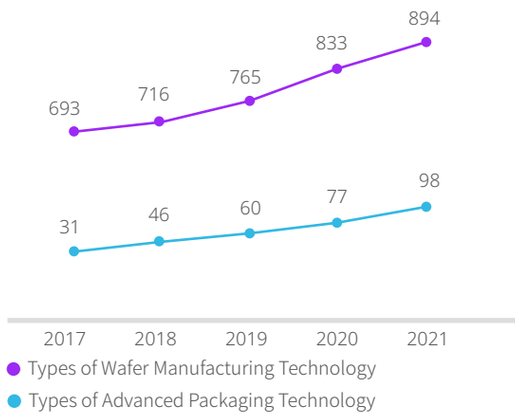


integration, TSMC offers information on wafers, yields, electrical analysis, quality, and reliability to help customers improve product performance; and for logistics, TSMC proactively delivers related information from order placement to delivery to ensure that customers have access to real-time knowledge of order status. Through TSMC-Online™, customers can manage comprehensive product manufacturing information on a real-time basis in a "virtual fab," and help customers achieve product success. In 2021, there were over 400,000 logins to our TSMC-Online™ system and 65,000 technical file downloads.

In 2021, to support our customers' diverse product demands, TSMC offered customers over 890 wafer fabrication technologies and over 90 advanced packaging technologies and, in doing so, also provided 12,000 technical files for customers to design and develop new products. In terms of Proprietary Information Protection for customers, TSMC complies with international regulations and standards and has already obtained ISO 27001 certification, an international standard for information security management. TSMC has also established an Information Protection Policy and SOP to ensure that only authorized persons can access or save engineering and production information for specific customers. In 2021, to help customers accelerate product certification, TSMC obtained ISO/IEC 15408 IT security certification for Fab 14B and Advanced Backend Fab 2, achieving the highest security standard for product safety and proprietary customer information protection, and is now ready to receive and fulfill orders for high-security products.

TSMC strongly believes that continuous innovation and highest-quality products and services are key factors for maintaining customer satisfaction. As a trusted technology and capacity provider in the global logic IC industry, TSMC will continue to be service-oriented and bring maximum benefits to our customers so that the Company can become a long-term important partner that customers can trust and rely on for success.

Types of Technology for Customers



Note: Figures for types of technology are from TSMC fabs in Taiwan and its overseas subsidiaries

Case Study

Create a Win-Win Situation with Digital Transformation of Customer Audits

To meet the demands of terminal customers, auditing is an essential step before volume production. Due to the impact of COVID-19 pandemic, customers are no longer able to take international business trips. To ensure our customer's products can receive immediate certification, TSMC has overcome the time and space limits of traditional on-site audits. In 2020, the Company capitalized on digital transformation to develop a virtual auditing technology that complies with TSMC safety standards and proprietary information protection and uses different forms of remote conferencing and sharing tools to serve as a customer auditing platform. Even if customers are unable to travel to TSMC in time for audits, our virtual auditing technology can ensure that the audit will be conducted on schedule for volume production.

In 2021, TSMC further introduced a "mixed reality" technology to enhance virtual auditing technologies. In addition to the existing remote information sharing, customers can also use a head-mounted wearable device that will display the insides of TSMC fabs for "real-time production line audits," achieving the same effects as traditional on-site audits but saving our customers the energy and time consumed by long-distance travels. This can further effectively reduce time to volume production and help us earn our customers' trust.

As of the end of 2021, TSMC and customers have successfully completed 30 remote audits, accelerating time-to-market of new products and creating a win-win partnership.



"Virtual Audit" to enable real time audit of production Fab remotely

TSMC Delivers Unrivalled Manufacturing Flexibility

>13M

2021 total managed capacity reached over 13M 12-inch wafer equivalents

Technologies

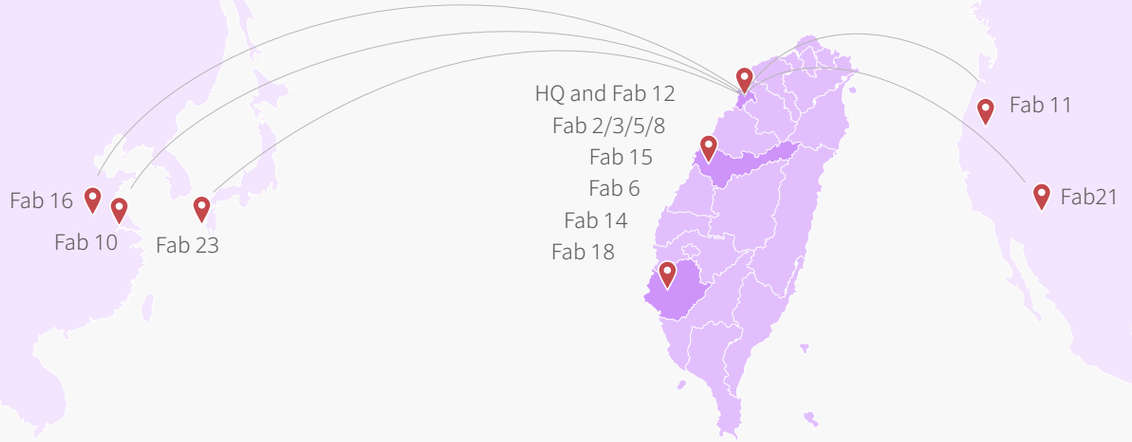
2021	291
2020	281
2019	272

Customers

2021	535
2020	510
2019	499

Products

2021	12,302
2020	11,617
2019	10,761




Fab 2


Fab 3


Fab 5


Fab 6


Fab 8


Fab 10


Fab 11


Fab 12


Fab 14


Fab 15

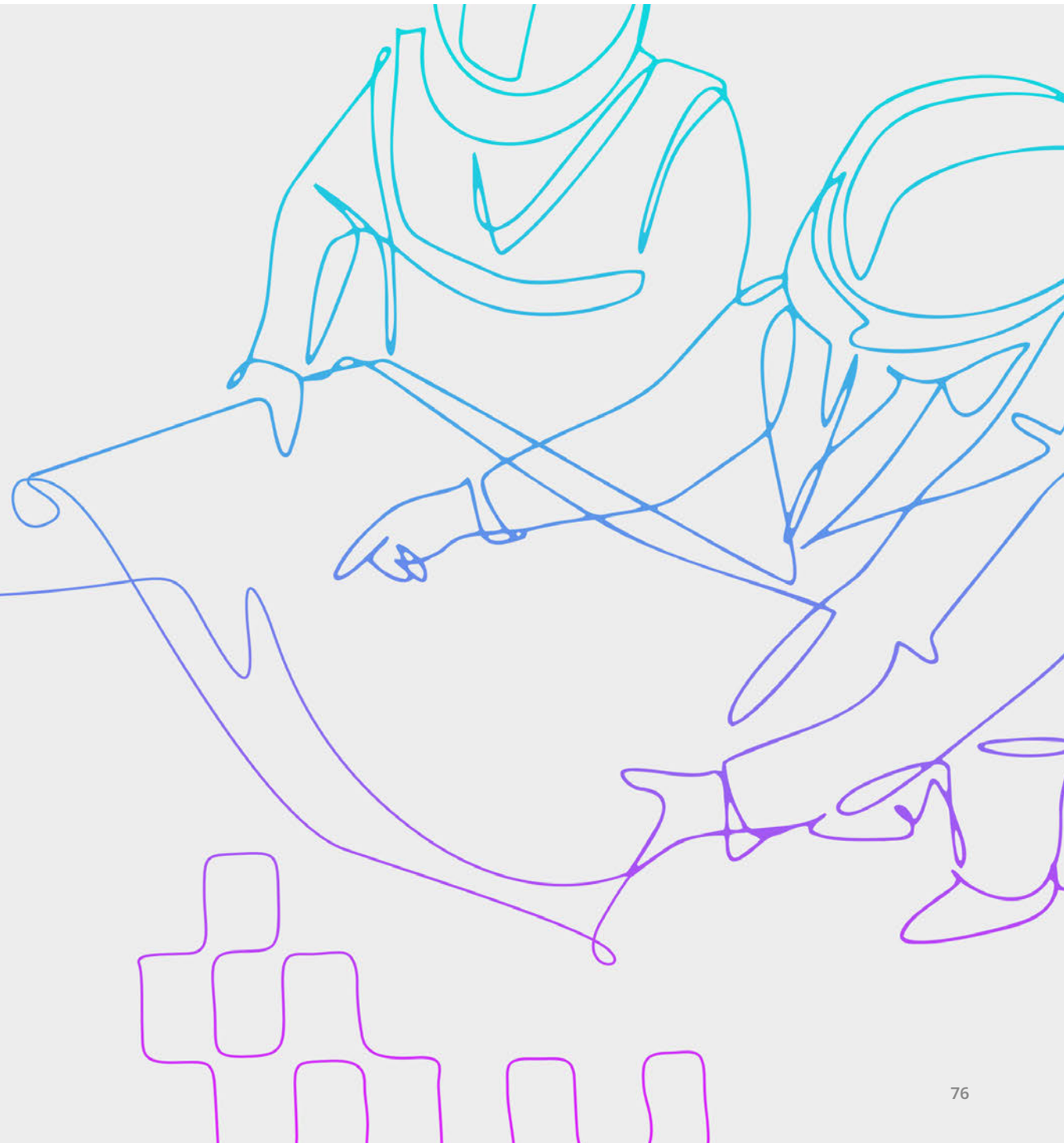

Fab 16


Fab 18

	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	28	69	24	61	43	44	22	73	77	29	5	5
Customers	69	143	58	155	157	166	40	143	250	159	17	14
Products	1,078	1,424	284	1,185	1,838	1,536	436	1,070	2,259	1,304	44	39

A Responsible Purchaser

TSMC strives for sustainable management and responsible purchases. We ask our suppliers to make advancements in the following areas: technology, quality, delivery, environmental protection, human rights, safety, and health. We also take climate risks into consideration, actively trying to strengthen our climate resilience so that we can develop a low-carbon, sustainable semiconductor supply chain.



100%

Committed to the responsible sourcing of minerals and purchases only conflict-free minerals

340 GWh

Cumulative energy conserved by suppliers with TSMC's support

>200,000

Certificates awarded for completing the annual TSMC Supplier Sustainability Academy program

Sustainable Supply Chain

Sustainable Supply Chain [Note 1]

Strategies & 2030 Goals	2022 Targets	2021 Achievements
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		
Ensure 100% Tier 1 suppliers [Note 2] complete the Sustainability Management Self-Assessment Questionnaire	**Ensure 100% Tier 1 suppliers complete the Sustainability Management Self-Assessment Questionnaire**	**100% Tier 1 suppliers completed the Sustainability Management Self-Assessment Questionnaire** ✓ Target: 100%
Ensure 100% critical suppliers receive Code of Conduct audits by RBA-certified agencies every 3 years [Note 3]	**Ensure 60 critical suppliers receive third-party audits**	**A total of 36 critical suppliers completed third party supplier audits and annual completion rate is 60%** — [Note 4] Target: 60 critical suppliers
Ensure 980 critical high-risk suppliers receive S.H.A.R.P. audits at a pace of 100 suppliers a year NEW	**Ensure 100 critical high-risk suppliers receive S.H.A.R.P. audits**	**Completed S.H.A.R.P. Audits of 86 Critical Suppliers** NEW
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
Continue to diversify production plant sites and assess new suppliers; develop 145 multi-source supply solutions (Base year: 2018)	**Develop 130 multi-source supply solutions for raw materials**	**Developed 109 multi-source supply solutions** ↑ Target: 105
Ensure a cumulative total o145 local raw materials suppliers receive consultation on process advancement and quality improvement (Base year: 2016)	**Ensure ten local raw material suppliers receive consultation on process advancement and quality improvement, reaching a cumulative total of 65 suppliers**	**Ten suppliers received consultation on process advancement and quality improvement, reaching a cumulative total of 55 suppliers** ✓ Target: 10 suppliers this year, 55 in total
Ensure a cumulative total of 300 raw materials suppliers [Note 5] participate in the annual emergency response drill (Base year: 2016)	**Ensure a cumulative total of 150 suppliers participate in the annual emergency response drill**	**21 raw materials suppliers participated in the annual emergency response drill, reaching a cumulative total of 132 suppliers** ↑ Target: 130 in total

↑ Exceeded ✓ Achieved — Missed Target

Note 1: In 2021, TSMC adjusted the strategies for this subject from Sustainability Risk Management and Local Procurement Optimization to Improving Sustainability Risk Management and Promoting Green and Low-carbon Supply Chains to follow the Company's direction for supply chain management

Note 2: Tier 1 suppliers: Suppliers trading directly with TSMC with more than three orders per year, with order amount exceeding NT$5 million. In 2021, 1,065 suppliers met the criteria.

Note 3: Critical suppliers: Suppliers accounting for top 85% of the purchasing expenses or of a single source of purchase, or suppliers recognized as critical by TSMC after assessing multiple risk indicators, including the suppliers' market share, inventory levels, and other characteristics; set annual goal as 60 suppliers site

Note 4: Due to safety measures put in place to prevent the spread of COVID-19, TSMC lowered the target number for on-site audits in 2021

Note 5: Mainly focused on suppliers based in Taiwan

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Ensure a cumulative total of 1,500 suppliers [Note 5] participate in the Environmental Safety and Health (ESH) training program (Base year: 2016)	Ensure a cumulative total of 900 suppliers participate in the ESH training program	A cumulative total of 759 suppliers participated in the ESH training program Target: 680 in total	↑
Ensure 100% critical high-risk suppliers complete Safety and Health consultation [Note 6]	Ensure 100% critical high-risk suppliers complete Safety and Health consultation	100% critical high-risk suppliers completed Safety and Health consultation Target: 100%	✓
Promote Green and Low-carbon Supply Chains Continued to reduce environmental impact and its external cost and minimize the effects of climate change and resource depletion by leading suppliers in establishing reduction targets on power and water consumption, waste generation, and carbon emission, propelling the sustainable development of supply chains			
Increase local sourcing [Note 7] - 64% for indirect raw materials - 60% for spare parts	Source 60.5% of indirect raw materials locally Source 50% of spare parts locally	Sourced 60.4% of indirect raw materials locally Sourced 46.4 % of spare parts locally Target: 60.5% / 50%	— Note 8 — Note 8
Provide consultation on power reduction for suppliers [Note 5] and reduce energy consumption by a total [Note 9] of 1,500 GWh (Base year: 2018)	Reduce supplier energy consumption by a cumulative total of 430 GWh	Reduced supplier energy consumption by a cumulative total of 340 GWh Target: 320 GWh	↑
Provide consultation on water reduction for suppliers[Note 5] and reduce water consumption by a cumulative total of 35 million metric tons (Base year: 2020)	Reduce supplier water consumption by a cumulative total of 20 million metric tons	Reduced supplier water consumption by a cumulative total of 19.71 million metric tons Target: 4.5 million metric tons	↑
Ensure 100% high energy consumption [Note 10] suppliers receive ISO 14064 Greenhouse Gas Emission verification [Note 11]	Ensure 55% high energy consumption suppliers receive ISO 14064 Greenhouse Gas Emission verification	51% high energy consumption suppliers received ISO 14064 Greenhouse Gas Emission verification Target: 50%	↑
Reduce waste production among local major suppliers [Note 12] by 35% (Base year: 2014)	Reduce waste production among local major suppliers by 32%	Reduce waste production per unit among local major suppliers by 31% Target: 30.4%	↑

Note 6: In 2020, TSMC audited 33 critical high-risk suppliers, among which five suppliers scored below 70 for Safety and Health and had received consultation in 2021, having made necessary improvements and passing follow-up assessments

Note 7: Mainly focused on suppliers based in Taiwan, which is the main operation region of TSMC

Note 8: For indirect raw materials and spare parts, since the proportion of advanced packaging increased, the quality requirement became stricter. Currently, suppliers in Taiwan have not been able to meet TSMC requirements, and since TSMC had to increase inventory levels due to COVID-19, it missed the annual local sourcing target

Note 9: The cumulative total of power reduced included the existing achievement of past efforts and the newly achieved reduction results

Note 10: Definition for high energy consumption suppliers: Suppliers in Taiwan whose energy consumption at a single site exceeds 5 GWh per year

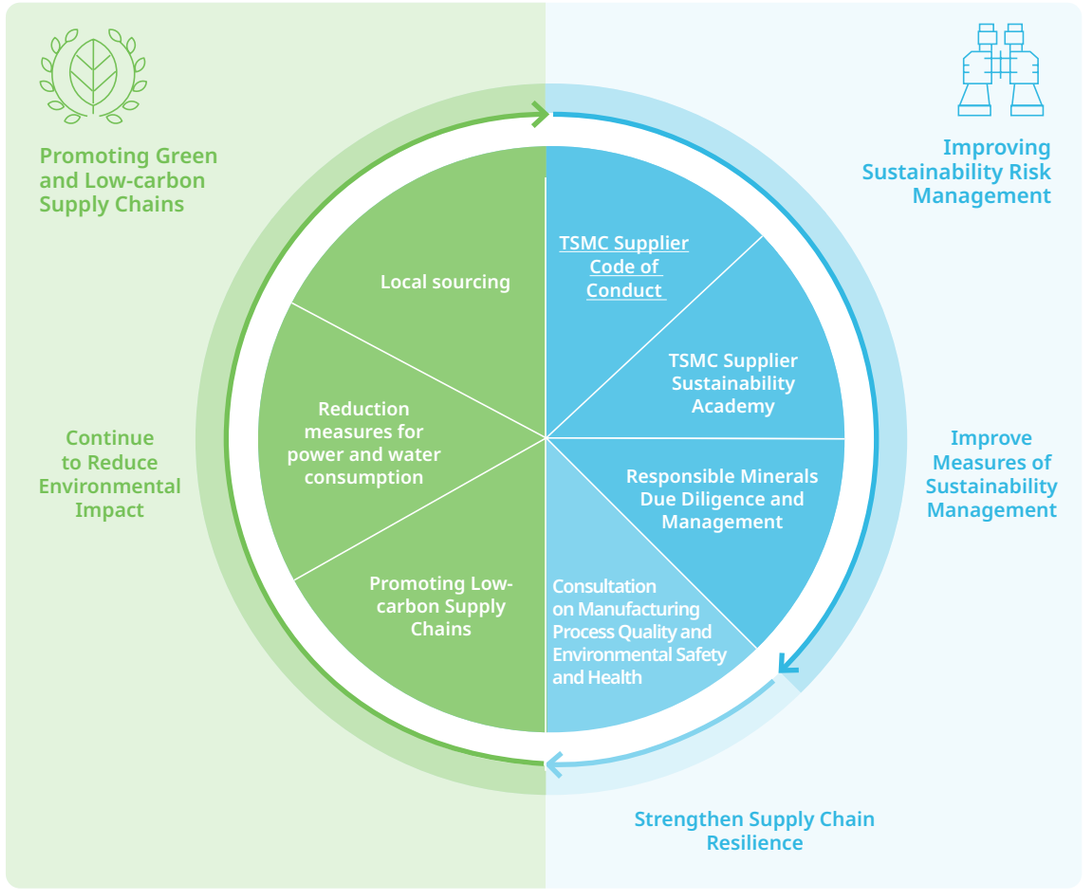
Note 11: ISO 14064-1 is one of the sub-standards of ISO 14064. In 2021, it will be described as the official name of the ISO 14064 series of standards.

Note 12: 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 the underlying month (tons); B: waste produced by the factory in the underlying month (metric tons).

↑ Exceeded ✓ Achieved — Missed Target

TSMC is dedicated to building an environmentally and socially responsible operation model, exerting influence towards sustainability as the global leader of the semiconductor industry. In 2021, TSMC re-structured the guidelines for Supplier Sustainability Management to respond to current trends in supply chain sustainability and previous years' management experience, changing to two main strategies - Improving Sustainability Risk Management and Promoting Green and Low-carbon Supply Chains. The Company continued to require suppliers to adhere to the TSMC Supplier Code of Conduct in operations, taking actions to improve safety in the workplace, dignity for labor, ethical operations, and comprehensive protection of the environment, and continued to reduce risks of disruption to business operations. Additionally, to answer the calls for green manufacturing, TSMC has taken the initiative to reduce the environmental impact of supply chains, prompting suppliers to set reduction targets for power and water consumption, waste generation, and carbon emission. TSMC aims to mitigate climate change's impact on society and lay the foundations for sustainable development for supply chains.

Supplier Sustainability Management Framework



Improve Sustainability Risk Management

Improve Measures of Sustainability Management

TSMC worked closely with supplier partners through the four guiding principles: Compliance guidance, Risk Assessment, Audit Participation, and Continuous Improvement, to urge suppliers to continue improving, commit to values, and take the initiative to promote sustainable practices to their upstream suppliers. To prompt common growth among supplier partners worldwide, TSMC established the global responsible supply chain management platform, Supply Online 360. It serves as an integrated communication channel with all suppliers, propelling tangible change with virtual data monitoring and bringing sustainable semiconductor supply chain practices into reality.

Four Guiding Principles of Sustainable Supply Chain Management

Compliance Guidance

Suppliers comply with the TSMC Supplier Code of Conduct and extend the scope of management to their upstream suppliers

Risk Assessment

Suppliers determine the level of Code compliance via Sustainability Self-Assessment Questionnaire or Sustainability Risk Assessment by the TSMC Team

Audit Participation

Critical Suppliers are audited by RBA-certified third-party institutions or the TSMC Supplier Healthiness Assessment Rectification Program team, conducting on-site audits

Continuous Improvement

Suppliers implement improvement measures according to the audit results and receive relevant consultation or follow-up evaluation

• Code Compliance

As a member of the Responsible Business Alliance (RBA), TSMC sets up its Supplier Code of Conduct according to RBA's Code of Conduct. 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 practices and management. New suppliers must sign the TSMC Supplier Code of Conduct to be eligible for partnership.

Supply Chain Three-phase Risk Assessment

Phase 1
For the preliminary assessment, examine the category and source the origin of all products based on the business relations TSMC has with the suppliers to analyze potential risks

Phase 2
Define the Supplier Risk Matrix and the management measures according to the SAQ results by Tier 1 Suppliers, the resilience of the supply chain, and the trading amount

Phase 3
For critical high-risk suppliers in the Matrix whose management is more urgent, TSMC conducts on-site audits to identify the actual risk status and provides constant consultation to reduce risks

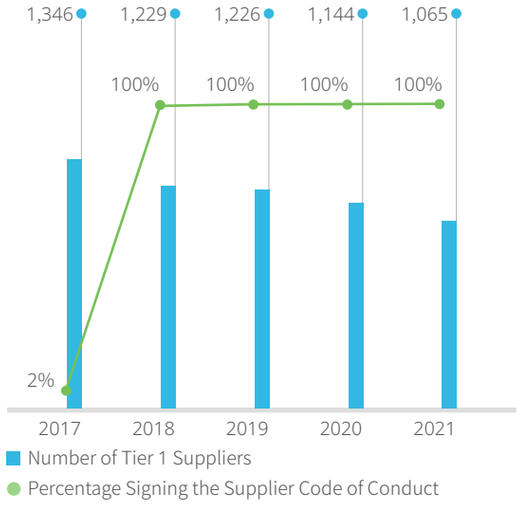
• Risk Assessment

To have an in-depth understanding of the current status of supply chain development and potential risks, TSMC conducts a three-phase risk assessment in supplier management, identifying the improvement measures required for the suppliers according to supplier classification.

First, TSMC investigates and analyzes all suppliers it has businesses with and requires Tier 1 Suppliers to conduct Self-Assessment Questionnaire (SAQ) to evaluate their performance on sustainability. In 2021, Tier 1 Suppliers in Taiwan, where TSMC headquarters is located, completed 1,065 SAQs, in which the five major categories of the TSMC Supplier Code of Conduct are covered. The assessment results show that, for the Labor category, suppliers often lack management rules for the work environment. For Health, Safety and Environmental Standards, 7% of the suppliers did not conduct identification for risks of operations in confined spaces and environmental protection laws. For the Code of Business Ethics, SAQ results show that 17% of the suppliers do not have a management system for business ethics.

TSMC categorizes critical suppliers according to indicators such as procurement expenses, product criticality, and business relations with TSMC and determines the risk levels based on SAQ results and supplier records of priority incidents. Using the two dimensions, criticality and risk levels, TSMC establishes a Supplier Risk Matrix that classifies suppliers annually. Such classification is then used in determining exclusive management measures to effectively understand the supply chain's overall risk. In 2021, TSMC included two new categories in the SAQ for raw materials suppliers, Supply Chain Risk Management and Process Reliability. Suppliers that scored below 70 have to receive on-site audits to ensure the supply chain's resilience.

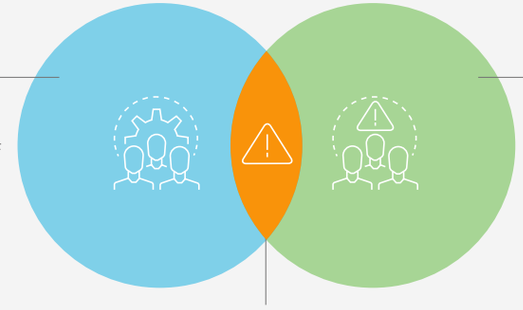
Self-Assessment Questionnaire Results



Critical High-risk Suppliers Assessment Process

Tier 1 Suppliers
Suppliers trading directly with TSMC with more than three orders per year, with order amount exceeding NT$5 million

Critical Suppliers
Suppliers accounting for the top 85% of the purchasing expenses or of a single-source purchase, or suppliers recognized as critical by TSMC after assessing multiple risk indicators, including the suppliers' market share, inventory levels, and other characteristics



High-risk Suppliers
Determined according to SAQ results and priority incident records

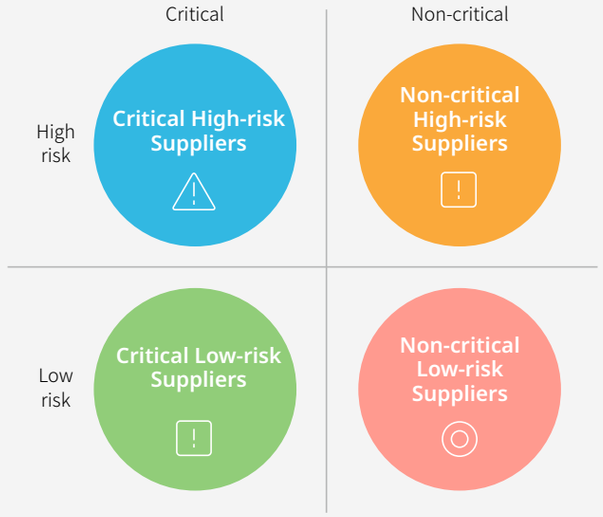
Critical High-risk Suppliers
On-site Audits

• Audit Participation and Continuous Improvement

After identifying risks using the Supplier Risk Matrix, TSMC conducts on-site or remote audits focusing on the six major categories: Supply Chain Risks, Quality and Reliability, Environmental Safety and Health, Fire Safety System, Labor Ethics, and Management System, which was added in 2021, to enhance supply chain resilience. In the audits, TSMC looks for potential risks and ways to improve them, requires suppliers to propose improvement plans and schedules, and assigns the TSMC S.H.A.R.P. Team to follow up on improvements regularly. The Company constantly updates benchmark practices in the six major categories and prompts the continuous improvement of the supply chain by conducting topical consultations and follow-up evaluations. In 2021, TSMC conducted 122 on-site audits of Critical High-risk Suppliers, including 15 follow-up evaluations, to properly track the risk status of the suppliers and improve their operational sustainability. By doing so, TSMC can ensure stable materials supply and services, provide a safe and healthy work environment for workers, and reduce environmental and social impact.

Problems and Challenges	TSMC Consultation Measures	2021 Performance
Records of supplier/ contractor employees working at TSMC sites for seven consecutive days	• Monthly review on whether supplier/contractor employees work at TSMC sites for seven consecutive days	✓ The new online badge application system automatically generates monthly reports; any workers working for seven consecutive days would trigger an alert requiring adjustments

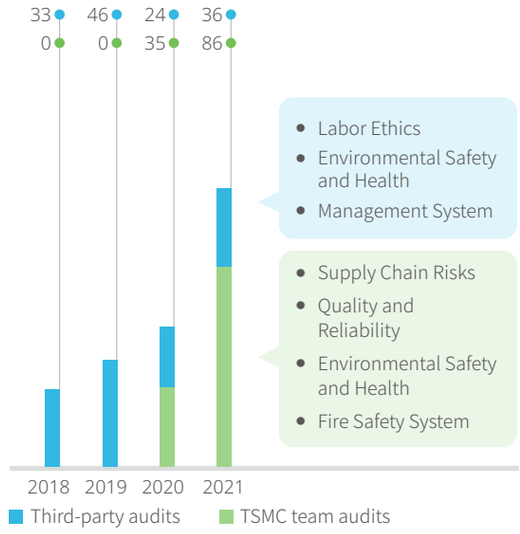
TSMC Supplier Risk Matrix, Classification and Management Measures



Supplier Classification and Management Measures	Critical High-risk Suppliers	Critical Low-risk Suppliers	Non-critical High-risk Suppliers	Non-critical Low-risk Suppliers
Signing the TSMC Supplier Code of Conduct	✓	✓	✓	✓
Risk Assessment via SAQ	✓	✓	✓	✓
Completion of the TSMC Supplier Code of Conduct Program of the Supplier Sustainability Academy	✓	✓	✓	
On-site Audit	✓			

Risk Level △ High ! Medium ◎ Low

TSMC Supplier Healthiness Assessment Rectification Program



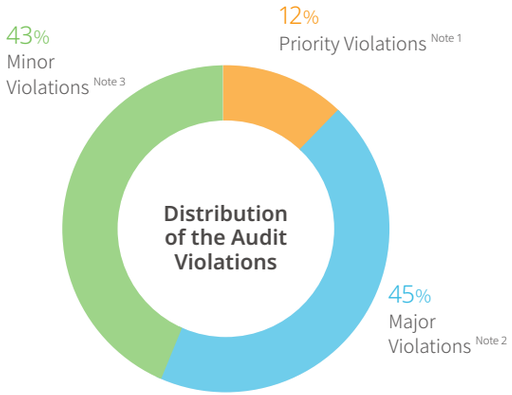
2021 Critical High-risk Suppliers Audits and Areas for Improvement

On-site Audit

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

Suppliers Audited Factories of 122 Critical High-risk Suppliers, including 15 follow-up evaluations

Audit Methods 97 on-site audits and 25 remote audits conducted virtually

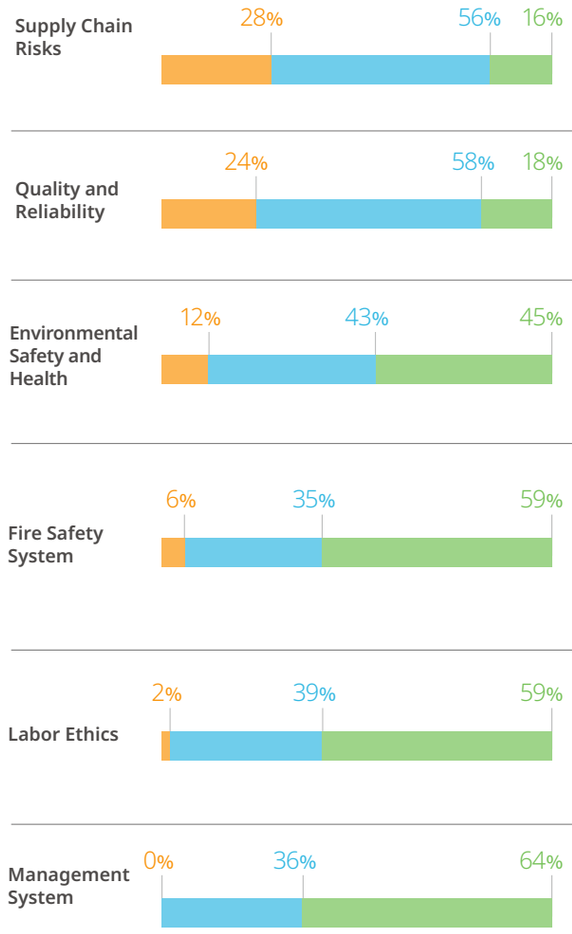


Note 1: Priority violations may present higher risks of production halt, life, serious illegal affairs, or systematic failure. For example: lacking response mechanism for an unexpected halt in production lines, environmental pollution, hiring child labor, or forced labor

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

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

Category/ Distribution of the Audit Violations



Major Violations Audited

- Fail to establish multiple sources or safety stock for raw materials or finished goods
- Lack of water and electricity backup plans in response to climate change
- Fail to manage the inventory of critical parts and components
- Fail to establish a regular equipment maintenance mechanism
- Fail to implement abnormality management
- Fail to establish a stormwater drainage protocol and lack separated sewage systems for rainwater and wastewater
- Fail to fully recognize ergonomic risks
- An incomplete list of confined spaces
- Fail to establish an effective fire safety management system
- Fail to comply dire safety equipment with relevant regulations and TSMC requirements
- Fire safety equipment lacking maintenance
- New employees have to pay for pre-employment physical exams, which violated the zero-cost requirement stipulated in the TSMC Supplier Code of Conduct
- Fail to establish protocols to prevent retaliation and protect the whistle blower's identity
- Fail to communicate the TSMC Supplier Code of Conduct requirements to the upstream suppliers

Key Achievements of TSMC Suppliers

- Established and verified multiple sources for raw materials and finished goods, and have safety stock in place
- Established water and electricity backup plans and compiled the plans in advance when building new production lines
- Created a management system of critical parts and components
- Established a regular equipment maintenance mechanism and a maintenance log
- Established a platform for documenting abnormalities, properly investigate the root causes and prevent recurrences
- Established a stormwater drainage protocol and ensure separated sewage for rainwater and wastewater
- Established a control list and protocols for ergonomic risks
- Established a compliant list of confined spaces
- Assigned designated fire safety management personnel
- Implemented management rules for hot work and fire safety equipment
- Set up compliant fire safety equipment and received expert consultation from TSMC
- Established checklists for fire safety maintenance and organized fire safety equipment drills
- Ensure employers pay costs of employment of employees
- Established a whistleblower protection mechanism and strictly forbid retaliation
- Required and supervised upstream suppliers to adhere to the TSMC Supplier Code of Conduct

TSMC values people above all else and establishes a public reporting channel for supplier employees on Supply Online 360. This offers protection for supplier employees, extends and deepens TSMC's management practices, and builds a more inclusive workplace for the supply chain. In 2021, a total of nine reports were collected, among which five were erroneous claims, and four involved business disputes and unfair treatment and pay. TSMC has required the suppliers reported to adhere to the TSMC Code of Conduct immediately. To expand the availability of the reporting channel, TSMC invites base-level employees of the suppliers during supplier audits to communicate and informs them of the purposes and operation of the supplier employee reporting channel. In 2021, TSMC completed interviews with more than 360 supplier employees.

Reporting Procedure



Case Study

TSMC Supplier Sustainability Academy Systematically Shares Experiences to Drive Supply Chain Excellence

TSMC supply chains have a global reach. Therefore, TSMC set up the TSMC Supplier Sustainability Academy on the Supply Online 360 platform to improve supplier capabilities. As a pioneering open-source educational platform for industry peers in Taiwan, the Academy produces and puts out educational animation videos on the cloud platform, systematically sharing TSMC manufacturing and operational experiences with suppliers. TSMC designates mandatory courses for the suppliers to ensure effective learning. Furthermore, the Academy is available for the general public to register and access, promoting the common good in society. In 2021, TSMC Supplier Sustainability Academy was connected to the construction management system for internal contractors, moving the contractor badge application process online and imposing stricter qualification requirements for high-risk operations to reduce potential construction safety risks. Please refer to the section Digitizing Contractor Training Programs at a 100% Completion Rate for further information.

External Collaboration - Expanding Sustainability Impacts

Intending to improve supply chain capabilities, the TSMC Supplier Sustainability Academy continues to provide diverse training courses and seeks to expand influence. In 2021, TSMC invited non-semiconductor industries, including the medicine, electrical engineering, chemicals, machining, transportation, food, and textile industries, to use the training materials via the Corporate Synergy Development Center (CSD). TSMC also showcased the Academy resources at SEMICON Taiwan 2021, which TSMC co-hosted with SEMI, exerting influence on TSMC suppliers, the upstream suppliers, and beyond.

92%
Required Tier 1 suppliers to complete the training program on the TSMC Supplier Code of Conduct; the completion rate was 92%

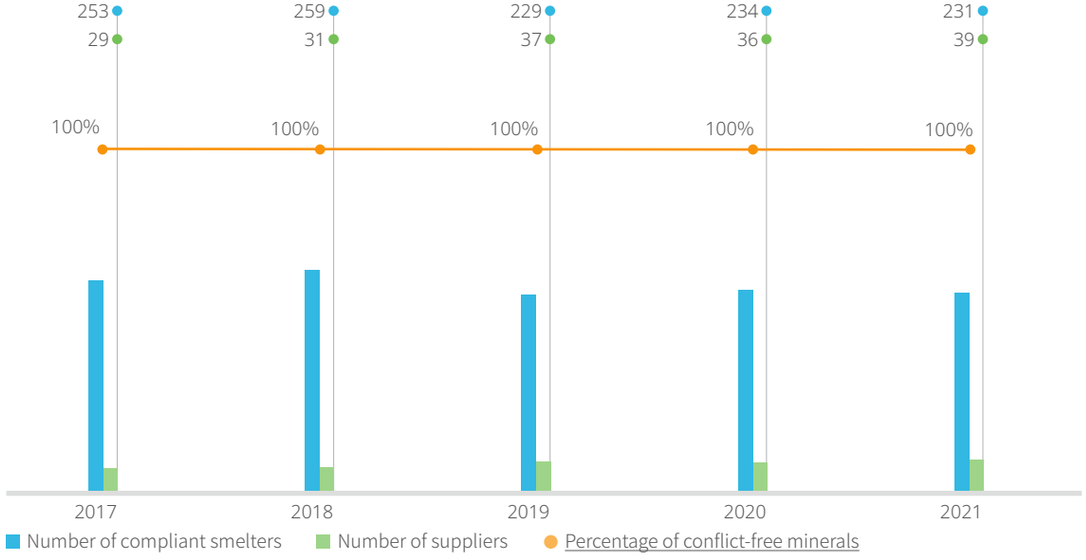
210
Tier 1 suppliers have adopted the TSMC Supplier Sustainability Academy as the training program for 210 of their suppliers

200,000 People
A cumulative total of over 200 thousand people completed the training program, with a satisfaction rating of 4.8 (highest score: 5)

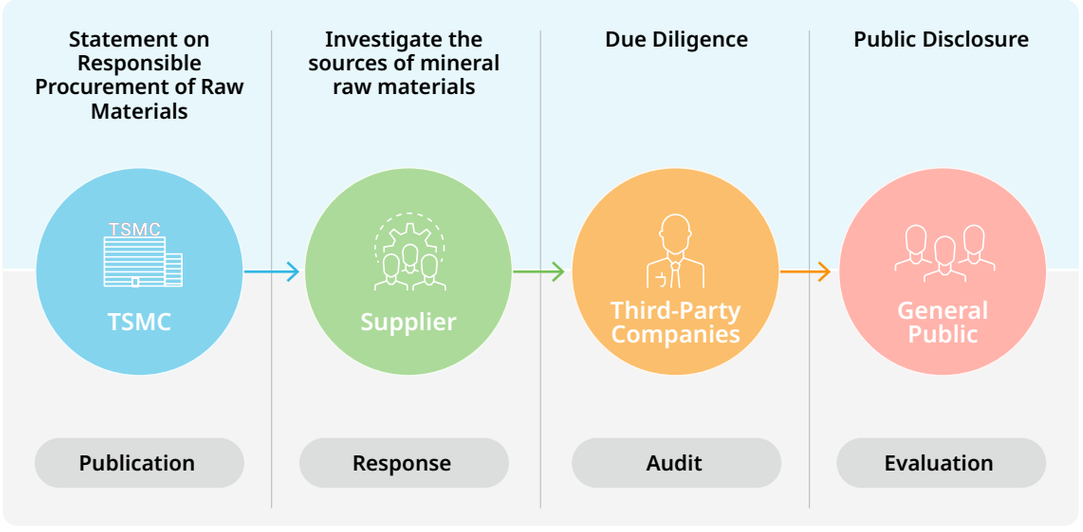
Responsible Minerals Sourcing

TSMC supports sourcing conflict-free raw materials as a practice of humanitarianism and compliance with the ethical code of the society. Based on such beliefs, TSMC incorporated a series of industry benchmark practices into its compliance measures, including establishing 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 Organization for Economic Cooperation and Development (OECD). Meanwhile, TSMC is an RBA member and one of the staunchest supporters of the Global e-Sustainability Initiative (GeSI). The Company adheres to the Responsible Minerals Assurance Process (RMAP), requiring suppliers to procure conflict-free raw materials. TSMC requires suppliers to comply with 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 smelters for the cobalt used in TSMC products to the clients. In 2021, TSMC audited at least three suppliers of tantalum, tin, gold, and tungsten annually, ensuring that these suppliers formulate and implement Conflict-free Minerals Management Processes and conduct due diligence on upstream suppliers. For the latest TSMC disclosure documents, please visit TSMC's official website or the US Securities and Exchange Commission website.

Conflict-free Minerals Due Diligence



Responsible Minerals Management Process



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

Strengthen Supply Chain Resilience

Through practical leadership examples and detailed requirements, TSMC propels suppliers to progress together with the Company. TSMC works with suppliers to build a workplace with dignity and ethics, offering consultations on capacity expansion, process and quality advancement, as well as implementing safety and health management rules for the work environment. Using various auditing and consultation methods, TSMC forms a close and comprehensive partnership with suppliers to maintain a supply chain that is resilient against disruption.

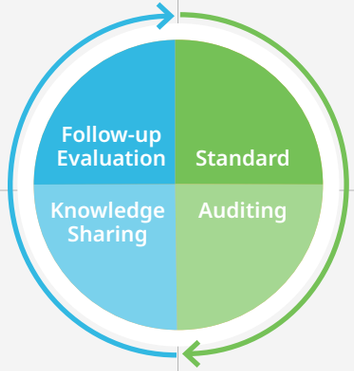
• Improve Environmental Safety and Health and Loss Prevention Capabilities of the Supply Chain

TSMC ensures sustainable supply chain management on environmental safety and health with four separate steps - establishing standards and systems, auditing and follow-ups, consultation and training, and supplier follow-up consultation. In 2021, consultation and training were the priorities of the year. TSMC offered training courses and visited supplier sites for consultation. Furthermore, the Company included environmental safety and health as indicators of the comprehensive supplier evaluation, recognizing suppliers with awards. The 2021 Supplier Environmental Safety and Health Best Performance Award went to MGC Pure Chemicals Taiwan, while the Supplier Environmental Safety and Health Improvement Award went to Sunlit Fluo & Chemical. In the future, TSMC will continue its suppliers' leadership in improving the performance on environmental safety and health, fire safety, and emergency response.

Sustainable Management of the Supply Chain on Environmental Safety and Health

Supplier Follow-up Consultation
- Follow-up evaluations for high-risk suppliers
- Remote and on-site follow-up evaluations for suppliers

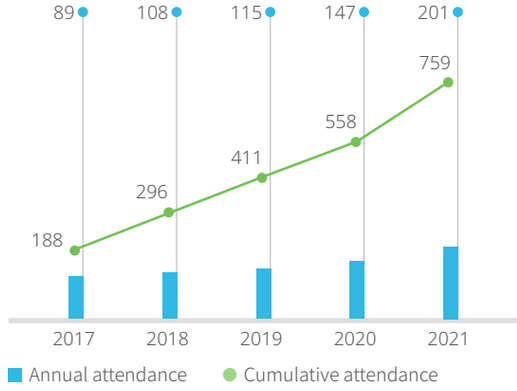
Standards and Systems Establishment
- Constantly update Supplier Code of Conduct and Sustainability Standards
- Supplier leadership commitment to the Code of Conduct and Sustainability Standards
- Introduce fire safety and environmental safety & health to new factories
- Establish designated fire safety management personnel



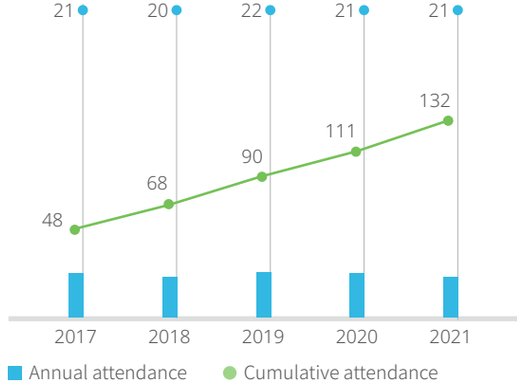
Consultation and Training
- Experience-sharing on energy conservation and carbon reduction
- Violation cases and improvement for sustainability audits
- Fire safety drills
- Participation or observation of the emergency response dills
- On-site diagnosis and consultation for energy conservation and carbon reduction

Audit
- Supplier ESH/fire safety audit
- Violations mitigation and follow-up
- Auditor training, strengthening auditing capabilities

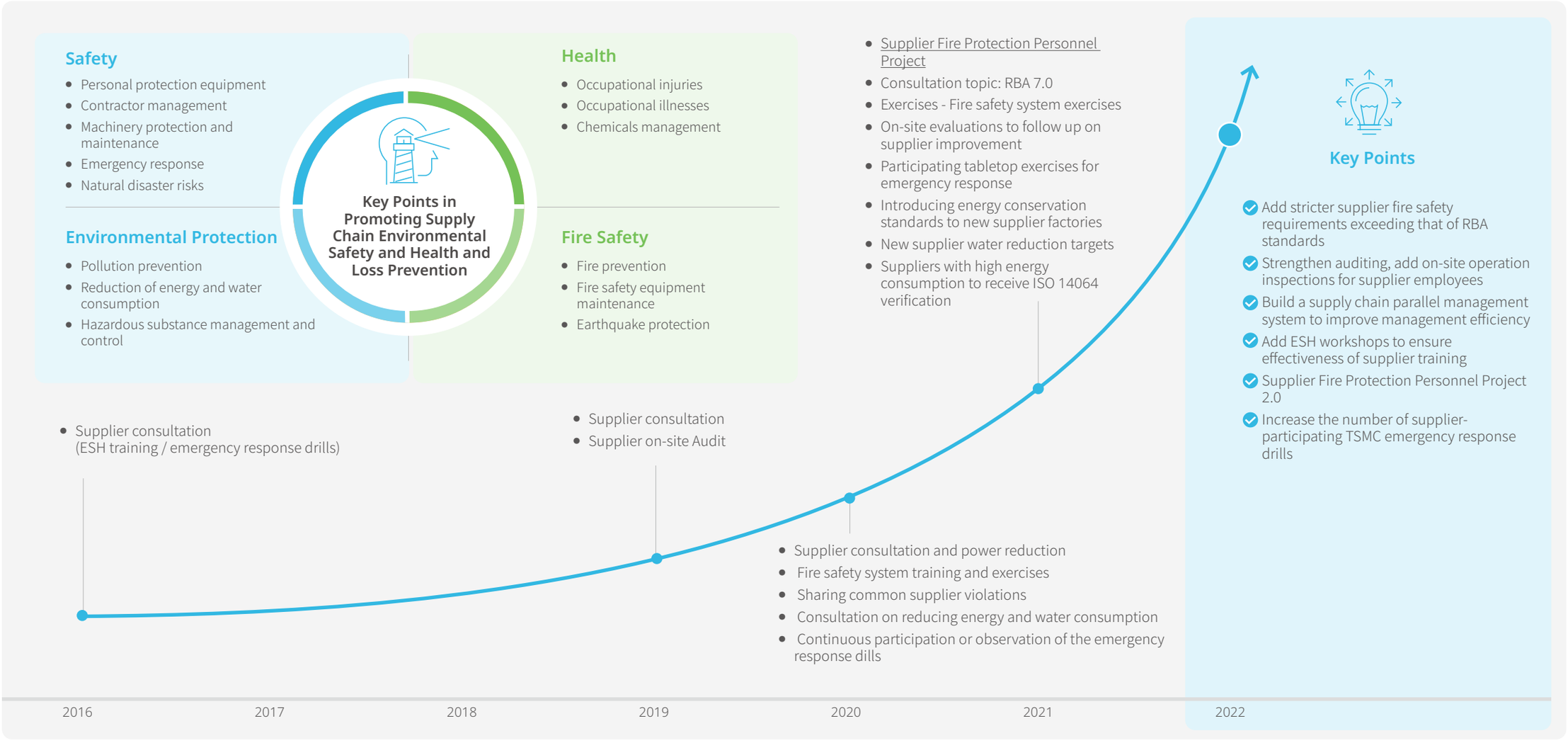
Number of Suppliers Participating in the ESH Training Programs



Number of Suppliers Observing TSMC Annual Emergency Response Drills



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



Problems and Challenges	TSMC Consultation Measures/Number of Suppliers		2021 Performance
Suppliers lack awareness of climate change and environmental safety and health	• Organize workshops exchanging practices and experiences on Environmental Safety and Health	201	✓ Required company leadership of the suppliers to recognize the impact of climate change, sharing TSMC experiences on power and water conservation, environmental safety and health, and fire safety. TSMC provided case studies on common violations in sustainability audits and improvement recommendations. In 2021, a total of 298 participants from 201 suppliers attended these workshops
Suppliers lack awareness of emergency response and fire safety	• Participation or observation of the emergency response drills	21	✓ For the sixth consecutive year, TSMC required raw materials suppliers to participate in or observe the annual emergency response drills, tabletop exercises, and fire safety drills, to enhance environmental safety and health, fire safety, and emergency response capabilities among the suppliers. In 2021, a total of 21 suppliers participated
Percentage of imported high-level spare parts for several advanced processes is still too high, as local suppliers lack critical technologies **The parts of specific advanced machinery have to be sent abroad for repair and maintenance, which affects production schedules**	• Assemble a team of experts to provide consultation for local suppliers, offer technical support, and assist in certification, ensuring that supplier technology progresses in steps with TSMC business needs	7	✓ Provided consultation for developing 141 spare parts for advanced processes
Capacity insufficient to meet advanced process requirements	• Production line expansion and process advancement	10	✓ New factories supplied sufficient amount of raw materials upon volume production, meeting TSMC quality requirements ✓ Assisted new suppliers to establish the Best Known Method (BKM) for quality insufficiency improvement
Measurement technology insufficient to meet advanced process requirements	• Add analytical instruments • Introduce advanced instruments	9	✓ Zero return of goods ✓ Assisted new suppliers to increase the detection threshold ✓ Assisted new suppliers to acquire the capability for IC material analysis
The supply chain lacks emergency response capabilities and may lead to disruption risk in supply	• Publish Supplier Transportation Management White Paper • Require raw materials suppliers to formulate specific regulations on vehicles, drivers, and management of transportation operations	121	✓ Required raw materials suppliers to sign the compliant statement of Supplier Transportation Management White Paper ✓ Organized Seminar on Supplier Transportation Management, attended by 354 people from 121 suppliers ✓ Added courses relevant to TSMC Supplier Transportation Management White Paper on the TSMC Supplier Sustainability Academy platform, providing training materials for supplier transportation service providers

Promote Green and Low-carbon Supply Chains

Continue to Reduce Environmental Impact

TSMC is committed to mitigating the impact of climate change and resource depletion; the Company conducts an annual Supplier Environmental Profit and Loss (EP&L) assessment to quantify the impact. In 2021, TSMC inspected 30 raw materials suppliers, prompting suppliers to investigate their carbon emissions and follow up on key indicators, including the suppliers' performance of meeting their reduction targets of energy and water consumption, waste generation, and carbon emission. TSMC also requires suppliers to receive external verification for their greenhouse gas emissions.

• Promote Constant Upgrade of Local Supply Chain

TSMC's main production site is located in Taiwan. Its procurement can be divided into six categories: equipment, spare parts, raw materials, facility services, IT, and goods. Besides promoting local sourcing in Taiwan, TSMC also set up independent procurement organizations for TSMC subsidiaries, including TSMC (China), TSMC (Nanjing), and WaferTech. Such organizations extend the TSMC global supply chain, which helps local suppliers improve technology and quality, reduce costs and carbon emissions to build a highly effective and competitive semiconductor industry chain.

2021 Supply Chain Management Activities From Taiwan Fabs

Set procurement targets
Increase or maintain the percentages of local sourcing to meet long-term goals

Improve technology quality
Proactively improve the technology and quality of critical equipment, spare parts, and raw materials and increase local sourcing

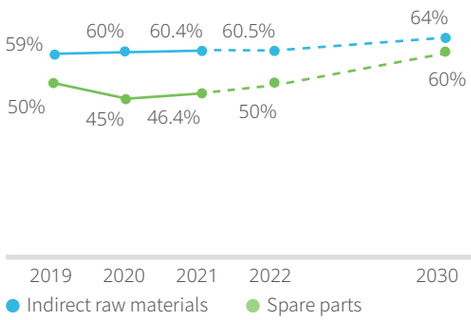
Invite international companies to set up factories in Taiwan
Invite foreign suppliers to set up manufacturing, R&D, and training sites in Taiwan

• Promote Low-carbon Supply Chains

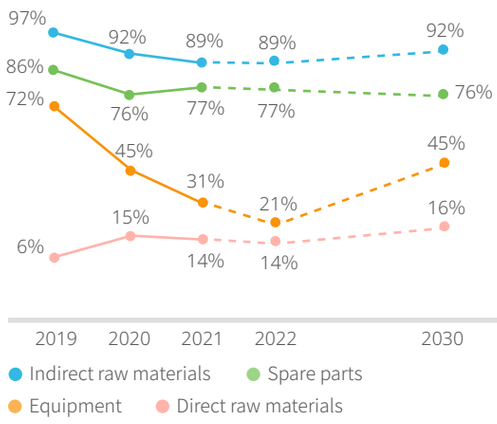
In 2021, TSMC declared that the Company will achieve Net Zero Emissions by 2050. Since the supply chain plays a critical role in TSMC's roadmap to Net Zero Emissions, the Company will continue to lead suppliers in improving low-carbon operating capabilities. TSMC's supply chain carbon emission management working group signed a Memorandum of Understanding with the CDP to collaborate on supply chain climate change and water resource initiatives. With comprehensive data collection and analysis, TSMC expects to publish the reduction targets for the supply chain in 2022 to push forward sustainability efforts.

In 2021, TSMC continued to require and assist suppliers to improve their performance in making the supply chain greener. The annual total of energy reduction reached 130 GWh, and the accumulative total reached 340 GWh (base year: 2020). The annual total of water reduction reached 17.58 million metric tons, and the cumulative total reached 19.71 million metric tons (base year: 2020). Additionally, 51% of the high energy consumption suppliers received ISO14064 verification. TSMC also required suppliers to introduce energy conservation assessments when building new factories. The waste production per unit among major waste-producing suppliers reduced by 31%, exceeding the annual target of 30.4%.

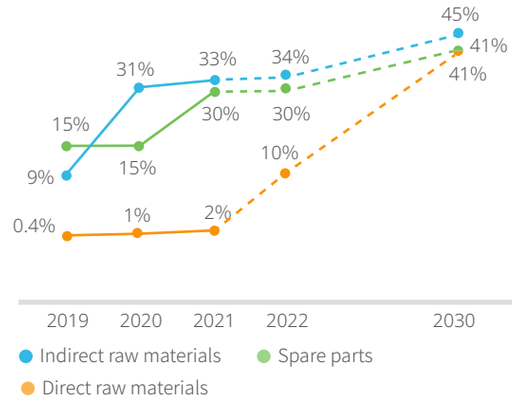
Percentage of Local Sourcing in Taiwan



Percentage of Local Sourcing in the US

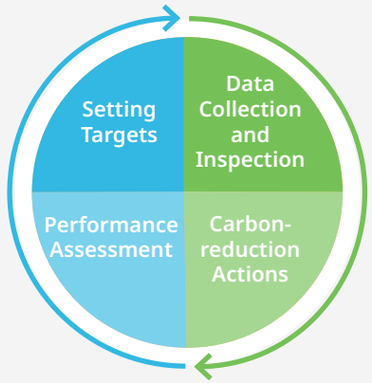


Percentage of Local Sourcing in China



TSMC complies with the Energy Conservation and Carbon Reduction program put forth by the Industrial Development Bureau, MOEA, encouraging eligible suppliers to participate in the efforts to establish an energy consumption baseline by the Foundation of Taiwan Industry Service. The goal is to identify opportunities to conserve energy and reduce carbon emission at factory sites. In 2021, 18 suppliers participated in the program, identifying 37 cases of potential energy conservation via document evaluation and on-site diagnosis. TSMC has actively provided improvement recommendations, contributing to energy conservation and carbon reduction among suppliers to achieve Net Zero Emissions of the value chain by 2050.

Four Directives of Low-carbon Supply Chain Management

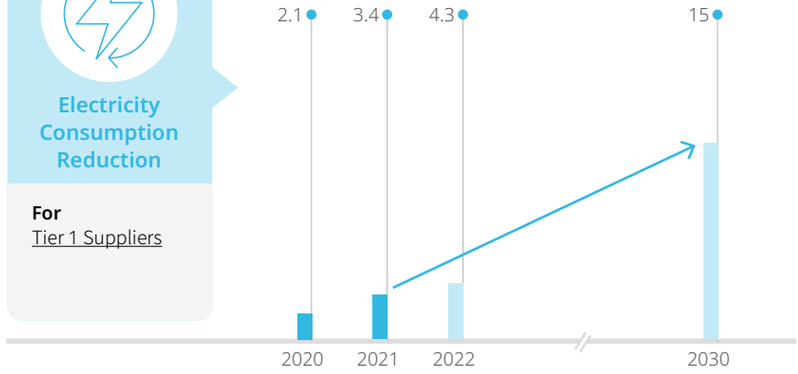


Targets and Achievements of Suppliers' Efforts to Reduce Energy and Water Consumption, Waste, and Carbon Emission

Electricity Consumption Reduction

For
Tier 1 Suppliers

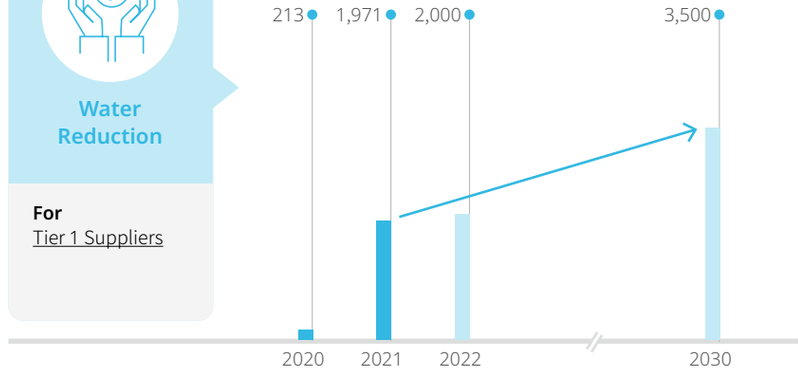
Cumulative total of energy consumption reduced (100 GWh)



Water Reduction

For
Tier 1 Suppliers

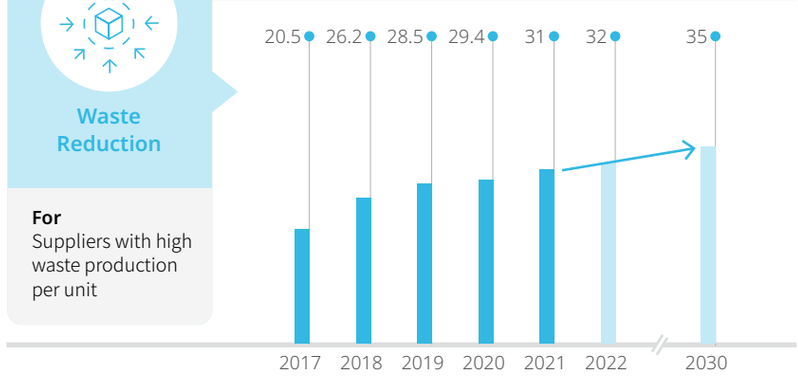
Cumulative total of water consumption reduced (10,000 metric tons)



Waste Reduction

For
Suppliers with high waste production per unit

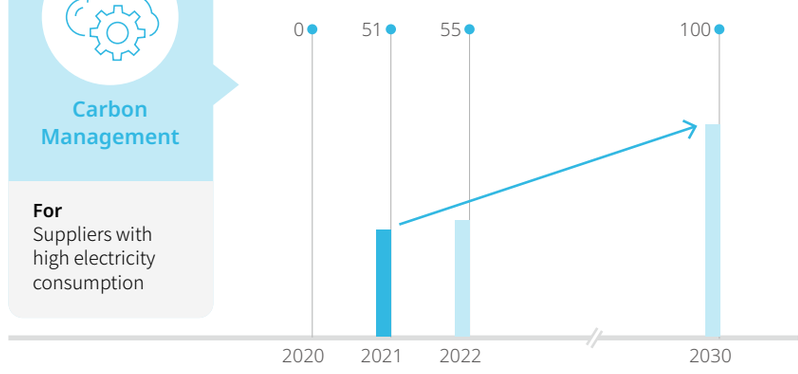
Reduction rate (%)



Carbon Management

For
Suppliers with high electricity consumption

Percentage of ISO 14064 verification (%)



A Practitioner of Green Power

Striving to realize our belief in co-existence and shared prosperity with the environment, TSMC is actively developing and applying innovative green technologies to climate and energy, water stewardship, circular resources, and air pollution control to roll out a comprehensive action plan for sustainability so that TSMC can become the global benchmark for green corporations.



1

Leads the global semiconductor industry with 94% reduction in F-GHGs

95%

Achieved a 95% waste recycling rate for 7 consecutive years and a burial rate of less than 1% for 12 consecutive years

54%

Reduced the unit air pollutant emissions by 54% (Base year: 2015)

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

Climate and Energy

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Strengthen Climate Resilience Develop climate change response and measures to reduce the impact of climate risks			
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	✓
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			
Reduce unit GHG emissions 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[Note 1]	**Reduce unit GHG emissions (metric ton of carbon dioxide equivalent ($MTCO_2e$)/12-inch equivalent wafer mask layer) by 6%**	**Reduced unit GHG emissions (metric ton of carbon dioxide equivalent ($MTCO_2e$)/12-inch equivalent wafer mask layer) by 27%** Target: 20% (Base year: 2010)	↑
		Reduced unit environmental externalities[Note 2] **by 18% (NT$/12-inch equivalent wafer mask layer)** Target: 8% (Base year: 2010)	↑
Use Renewable Energy Continue to purchase renewable energy and install solar-energy power systems to achieve target of 100% renewable energy use			
Starting from 3nm new fabs, renewable energy accounts for more than 20% of energy consumption and the purchasing of renewable energy to increase annually to achieve 40% renewable energy company-wide[Note 1]	**Continue to use renewable energy and achieve 10% of renewable energy in TSMC and overseas sites use 100% renewable energy**	**Used 1,670 GWh of renewable energy and Renewable Energy Certificates (REC); TSMC overseas sites used 100% renewable energy**[Note 3]**; accounting for 9.2% of TSMC's power consumption** Target: 9% of TSMC power consumption and 100% of power consumption in overseas sites	↑
Increase Energy Efficiency Plan and implement new energy-saving measures each year to increase energy efficiency			
Save 5,000 GWh between 2016 and 2030 through new energy-saving measures	**Save 700 GWh in 2022 and 3,100 GWh cumulatively**	**700 GWh energy saved, and cumulatively saved 2,400 GWh** Target: 500 GWh; 2,200 GWh	↑
Double energy efficiency after five years of volume production for each process technology[Note 4]	**Increase energy efficiency of 5nm process technology 0.4 times higher in the 3rd year of volume production**	**Increase 10nm and 7nm process technologies energy efficiency 1.5 times higher in the 5th year of volume production; increase 5nm process technology energy efficiency 0.2 times higher in the 2nd year of volume production** Target: Double the 10nm and 7nm process technologies energy efficiency in the 5th year of volume production; increase 5nm process technology energy efficiency 0.2 times higher in the 2nd year of volume production	✓

Note 1: In response to Net Zero Emissions by 2050 as a long-term target, TSMC sets GHG Emissions to Return to the 2020 level by 2030 as a milestone, and increases the percentage of renewable energy used up to 40% company-wide by 2030. The base year was adjusted from 2010 to 2020

Note 2: Unit environmental externalities is no longer a strategic target because 95% of environmental externalities are from GHG emissions, therefore, they are fundamentally the same. See "Sustainable Products" and "Sustainability Impact" for related measures

↑ Exceeded ✓ Achieved — Missed Target

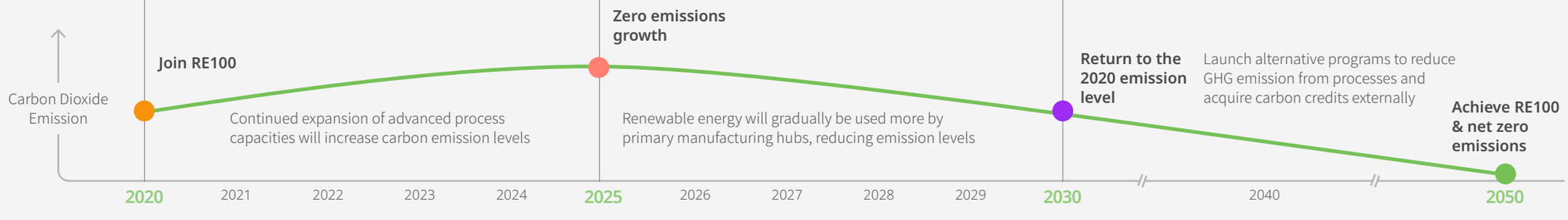
Note 3: Definition of Renewable Energy Use: Use renewable energy and purchase renewable energy certificates and carbon credits produced by renewable energy

Note 4: Energy efficiency is the product equivalent per kWh of power (12-inch equivalent wafer mask layer/kWh)

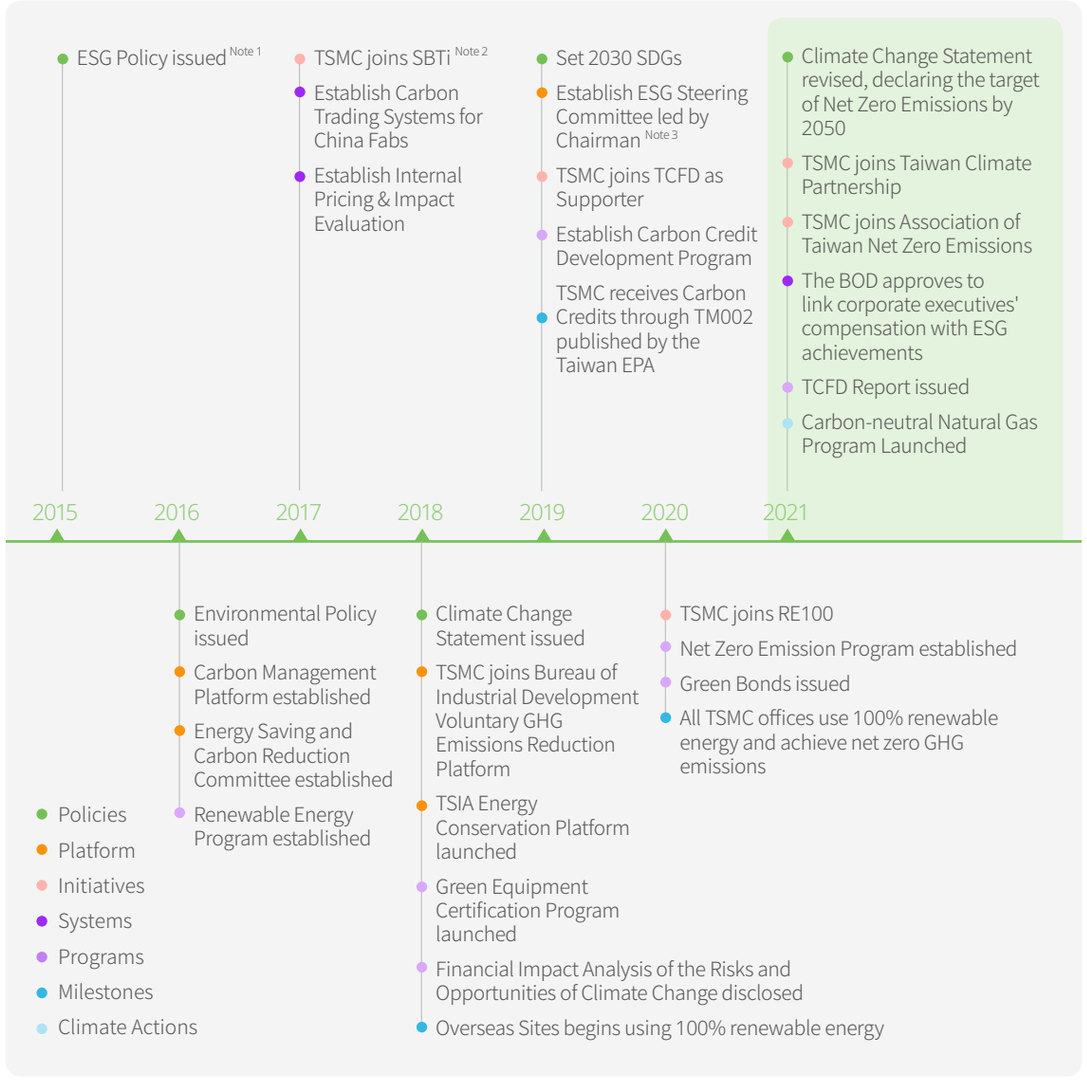
As the world's largest provider of semiconductor technologies and capacity, we are keenly aware of our responsibility to local and global environments. After joining the RE100 initiative, we decided to further our commitment by announcing our target of Net Zero Emissions by 2050. We believe that the use of renewable energy is a critical strategy to achieve net zero emissions. Considering the current landscape and development trends of Taiwan's renewable energy market, future demands of semiconductor products, TSMC's own capacity growth, and continued implementation of the best GHG reduction practices, we plan to achieve zero growth in carbon emissions by 2025 and to start decreasing carbon emissions from there on out. In 2030, we aim to restore carbon emissions to the 2020 level. In 2050, we aim to achieve net zero emissions in not just TSMC but also our entire value chain. By optimizing gas usage in manufacturing processes, introducing exhaust gas abatement equipment and decarbonized energy, enhancing existing energy efficiency, expanding resource recycling, selecting low-carbon-footprint materials, developing energy-efficient equipment, and practicing other green actions, TSMC is gradually progressing towards the net zero emissions target.

Roadmap to Net Zero Emissions

	Zero Emissions Growth by 2025	2030 GHG Emissions back to 2020 Levels	Net Zero Emissions by 2050
Scope1 Direct Emissions from Processes	• Install equipment with F-GHG reduction technologies • Develop nitrous oxide reduction equipment • Use carbon-neutral natural gas	• Install equipment with nitrous oxide reduction technologies • Develop alternative programs to reduce GHG emissions from processes	• Launch alternative programs to reduce GHG emissions from processes
Scope2 Indirect Emissions from Energy Usage	• Use renewable energy • Increase energy efficiency of existing processes • Develop next-generation energy efficient tools • Recycle thermal energy from process tools	• Increase use of renewable energy • Introduce next-generation energy efficient process tools • Recycle the H_2 from EUV lithography process	• Use 100% renewable energy • Increase next-generation energy efficient process tools
Scope3 Indirect Emissions from the Value Chain	• Conduct carbon inventory and offer consultations for energy conservation and carbon reduction • Request suppliers to set targets, formulate management strategies, and develop technologies • Develop a zero-waste manufacturing center and launch a recycling program for electronics-grade chemicals	• Ask suppliers to use renewable energy • Introduce electronics-grade chemicals recycled from waste chemicals • Optimize delivery schedules and use low-carbon transportation vehicles	• Use low-carbon raw materials • Collaborate externally for carbon reduction and carbon negative programs



Milestones of Responses to Climate Change



Strengthen Climate Resilience

In 2021, extreme climates intensified around the world and many countries suffered from various climate disasters. Taiwan also suffered from the worst drought in 70 years during the first half of 2021. By seeking multiple alternative water sources and improving water efficiency, TSMC was able to successfully defend against the impact and operational losses produced by climate disasters to ensure uninterrupted production. In the face of worsening extreme climates, TSMC continues to evaluate disaster factors such as floods, droughts, heatwaves, strong winds, heavy rain, etc. to establish the Climate Physical Risk Adaptive Actions Standards and continue strengthening resiliency against climate disasters.

Identify Climate Risks

To uncover potential risks and opportunities, TSMC follows the Task Force on Climate-related Financial Disclosures (TCFD) recommendations and refers to research from international institutes to evaluate climate change risks and opportunities cross-functionally. In 2021, TSMC ranked the risks and opportunities identified by relevant organizations in the Climate Change Risk and Opportunity Workshop on issues such as policy, legal, market, technology, reputation, and physical risk, and also promoted low-carbon transformation and climate adaptation through four directions of governance, strategy, risk management, metrics and targets, including committing to net zero emissions, using renewable energy and carbon-neutral natural gas, building TSMC Tainan Science Park Reclaimed Water Plant, planning and building green buildings, and implementing energy-saving, carbon-reduction and water-saving projects, actively investing in energy-saving product development and raising the elevation of building foundations to further drive the development of the green semiconductor industry chain and achieve environmental sustainability.

In September 2021, TSMC issued its first TCFD Report which spotlights three major risks: net zero emission trends, the impact of drought on TSMC operations, and impact on corporate reputation. Considering environmental changes internally and externally and in reference to disclosure methods adopted by companies in Taiwan and beyond, TSMC conducted a quantified financial assessment of impact from the three major risks and developed four major management strategies in response. The four major management strategies are mitigation, adaptation low-carbon products and services, and carbon reduction in the supply chain and they are aimed at minimizing the operational and financial impact from climate change and strengthening the organization's climate resilience.

Note 1: Renamed TSMC Corporate Social Responsibility Policy as ESG Policy since 2021.

Note 2: Science Based Targets Initiative (SBTi) is jointly established by the Carbon Disclosure Project, We Mean Business Coalition, UN Global Compact and World Wildlife Fund. The initiative provides companies with a clearly-defined path to reduce emissions in line with the Paris Agreement goals. TSMC pledged to set a science-based target in 2017.

Note 3: Renamed CSR Executive Committee as ESG Steering Committee since 2021.

TCFD

Category	Corporate Management Strategies and Actions	2021 Enforcement Report
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 - 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	✓ The ESG Steering Committee is comprised of senior executives from various TSMC organizations and formulates long-term 2030 goals and development strategies for climate change and renewable energy. In 2021, the Committee decided to commit and announce the Net Zero Emissions by 2050 target. See "ESG Management Platform" for more information ✓ The executive secretary of the ESG Steering Committee delivered quarterly reports to the Board on sustainable development strategies and achievements, including green manufacturing performance, renewable energy procurement, and net zero emission targets and strategies, which received the Board's support ✓ The Energy Saving and Carbon Emission 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 team based on their achievement on energy conservation targets and innovative ideas ✓ The chairperson of the RM Steering Committee gave an annual report to the Audit Committee on 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 499 energy saving measures across eight major categories, saving an additional 700 GWh in 2021. See Increase Energy Efficiency for more information ✓ See Climate Change Risk and Opportunity Matrix for more information on how response measures were formulated and enforced according to interdepartmental discussions on climate risks and opportunities
	• Assess the potential financial and operational impact on TSMC from major climate risks and opportunities	✓ See TSMC TCFD Report for more information on how TSMC completed a qualitative assessment on the financial impact of major climate risk and opportunities and implemented quantitative assessment on the financial impact of major climate risk and opportunities
	• Conduct scenario analysis and assess SBT(Science-Based Target) and net zero emission targets and actions	✓ Based on the SSP1-1.9 scenario set forth by the Intergovernmental Panel on Climate Change (IPCC) AR6, TSMC analyzed climate risks in production and formulated climate change strategies and mitigation measures while also striving toward net zero emission targets
Risk Management	• Use the TCFD framework to develop a process for identifying climate risks • Formulate response measures based on the risks/opportunities identified and prioritized • Integrate climate risk identification and assessment in the Enterprise Risk Management (ERM) process	✓ Evaluated the qualitative and quantitative financial impact of major climate-related risks/opportunities discussed in the TCFD workshop by related departments ✓ Reported assessment results of the climate risks/opportunities and response plans to the ESG Committee Chairperson ✓ See 6.3 Risk Management for more information
Matrics 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 14064-1 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 risks of Scope 1 emissions were reduced effectively because of consistent carbon reduction actions; the risks of Scope 2 indirect GHG emissions due to electricity consumption and the risks of Scope 3 due to supplier indirect emissions continue to increase. See Greenhouse Gases (GHG) Inventory for more information
	• Set climate change management targets and review progress & 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 Best Practices for more information

Climate and Energy Strategies, Goals, and Outcomes

Risk Type	Risks/ Opportunities	Key Response Measures
Transition 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 emission trends 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 emission 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 Emission Reduction Committee Build a green factory, obtain green building licenses, and share experiences with external parties
	Impact on Company reputation/ image	Insist on green manufacturing and green innovation and use transparent disclosure to enhance the company's green reputation
Physical Risk	Floods Droughts Higher natural disaster insurance premium Increase resilience against natural disasters	Assess flood and drought risks at fabs and formulate and carry out risk mitigation measures Establish a comprehensive water monitoring system and emergency response processes and hold regular drills
	Rising temperature Drive low carbon manufacturing	Implement carbon reduction actions through the Energy Saving and Carbon Reduction Committee

Drive Low-Carbon Manufacturing

With the net zero emissions commitment, TSMC reviews overall carbon reduction efforts by looking at the annual GHG inventory results to formulating the emission reduction strategies accordingly. In 2021, direct emissions from processes accounted for 13% and were primarily from F-GHGs and nitrous oxide processes; indirect GHG emissions from purchased energy accounted for 50%; and indirect GHG emissions from the value chain accounted for 37%, which were primarily from producing raw materials, energy related activities in the upstream, and transportation.

In 2021, TSMC continued to establish industry best practices for GHG reduction. We replaced a total of 3400 local F-GHG and nitrous oxide scrubbers with new ones and started using carbon-neutral natural gases to effectively reduce emissions by 4.7 million metric tons CO_2e and F-GHG emissions per unit product by 10% from 2020. We also continue to construct green factories with green building certificates, implement energy-saving projects for process tools and facility equipment, and increase the use of renewable energy to effectively reduce GHG emissions by 2.2 million metric tons CO_2e and GHG emissions per unit product by 6% from 2020. In 2021, TSMC continued to strengthen guidance to suppliers and helped them formulate GHG inventory and carbon reduction targets, achieving 0.18 million metric tons CO_2e reduction from raw material production and transportation as we work together to strive towards net zero emissions.

GHG Reduction Standard Practices

Scope 1
Direct GHG Emissions

Processes that use F-GHGs and nitrous oxide

- Optimize gas quantity used in production
- Substitute high global warming potential (GWP) fabrication gases
- Install Point-of-Use abatement equipment for F-GHG and nitrous oxide
- Use carbon-neutral natural gas

100%	Introduce optimized process parameters in accordance with the manufacturing specifications by the Intelligent Engineering Center
100%	Apply optimized carbon reduction technology – remote plasma dissociation of nitrogen trifluoride (NF_3) to all 12-inch fabs
100%	Apply nitrogen trifluoride (NF_3)/ octafluorobutane (C_4F_8) to 6-inch and 8-inch fabs
3,285	Install equipment with new F-GHG and nitrous oxide reduction technologies
94%	Replace 104 existing tools with fluorinated gas processes; installation rate: 94%
1	First in Taiwan to use carbon-neutral natural gas. Our facilities in Taiwan have had zero carbon footprints and we have been able to reduce emissions by 0.24 million metric tons CO_2e

Scope 2
Indirect GHG Emissions (From Purchased Energy)

Energy usage

- Build Green buildings
- Increase energy efficiency
- Use energy-saving & low-carbon emission designs in next-generation process tools
- Purchase renewable energy

1	TSMC led the global semiconductor industry with the largest LEED-certified building area; three buildings received green building certification in 2021, bringing TSMC's total to 37 LEED-certified buildings and 25 EEWH-certified buildings.
499 Measures	Energy efficiency of advanced technologies led industry peers[Note 1]; carried out 499 energy-saving measures over 8 major categories and saved 700 GWh, equivalent of 350,000 metric tons CO_2e
1	The world's only semiconductor company to launch energy-saving programs for next-generation semiconductor fab tools; completed energy-saving programs on 119 models and saved 400 GWh electricity
1,670 GWh	In addition to using 100% renewable energy for global offices, TSMC also purchased 1,670 GWh of renewable energy around the whole world, accounting for 9.2%

Scope 3
Indirect GHG Emissions (Value Chain)

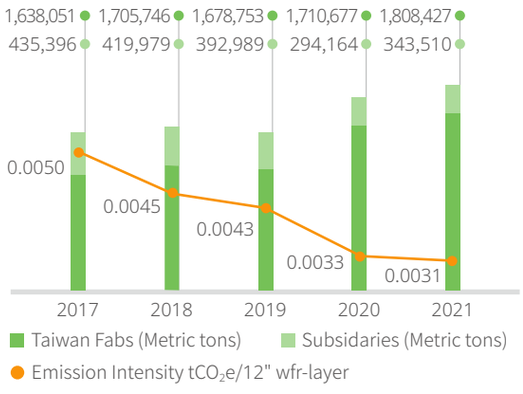
Raw material production, energy-related activities upstream, and transportation

- Supplier required to obtain external verification
- Reduce carbon footprint from raw materials
- Optimize delivery schedules

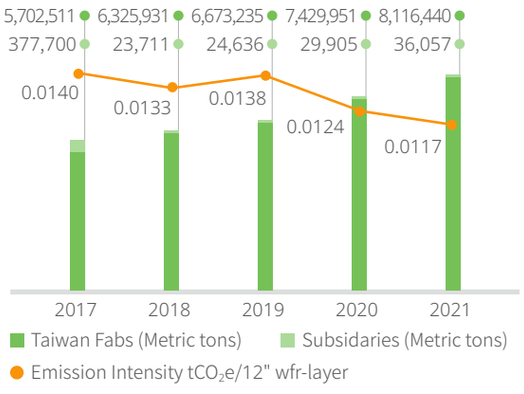
51%	High Energy Consumption Suppliers[Note 2] must pass GHG emissions inventory and third-party verification; 51% of suppliers have been verified
65,000 Metric Tons	High Energy Consumption Suppliers were asked to set annual targets and implement real energy-saving actions; in 2021, TSMC suppliers conserved 130 GWh and reduced 65,000 metric tons CO_2e
17,848 Metric Tons	Improved the delivery schedule for process tools and replaced air freight with ocean freight, reducing 17,848 metric tons CO_2e

Note 1: Figures from Joint Steering Committee (JSTC) report of the World Semiconductor Council
Note 2: High Energy Consumption Suppliers are suppliers that use >5 GWh/year in a single facility

Scope 1 GHG Emissions

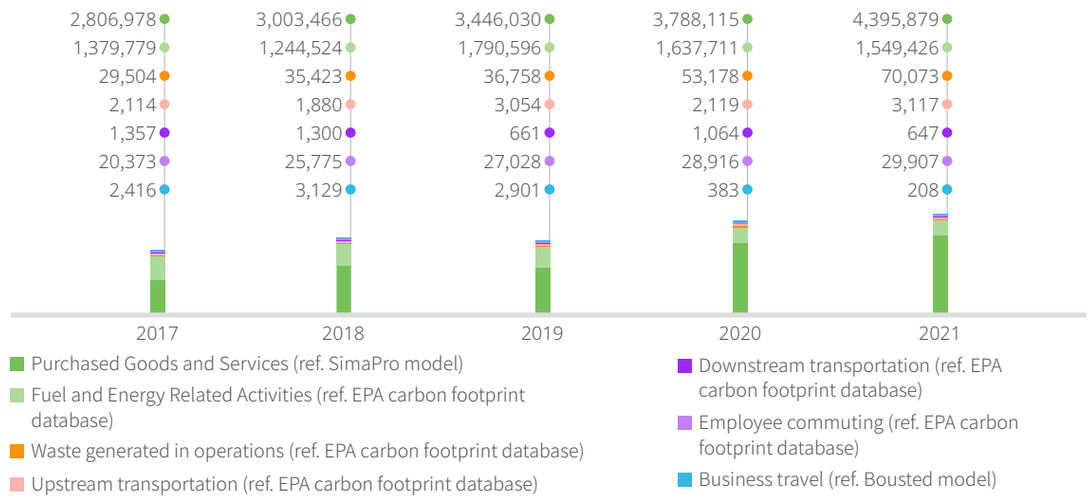


Scope 2 GHG Emissions



Scope 3 GHG Emissions

Unit: Metric Tons



Note 1: GHG emissions data for Scope 1 and Scope 2 comes from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra

Note 2: In order to maintain the data consistency of the 2020 follow-up greenhouse gas inventory and reduction targets, the Scope 1 inventory data has been changed to 2020 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gases Inventories since 2020

Note 3: Scope 3 GHG emissions only includes TSMC fabs in Taiwan

Note 4: Emission factor based on data released in 2021 by the Bureau of Energy stating that 0.502 kg of CO_2e/ kWh, where 1 kg of CO_2e equals 6,805 kJ.

Use Renewable Energy

Purchase Renewable Energy

In 2021, TSMC announced the Net Zero Emissions by 2050 target and we believe that expanding our use of renewable energy will be a critical action to achieve the target. With full support from the Board and the management team, TSMC was able to invest in purchasing renewable energy and increased the 2030 Sustainable Development Goal from "25% renewable energy for fabs and 100% renewable energy for non-fab facilities" to "40% renewable energy for all TSMC fab operation sites around the world" to expand our use of renewable energy continuously.

As Taiwan is currently in the early stages of developing renewable energy, TSMC and related departments of MOEA, Taipower, the Chinese National Federation of Industries, Allied Association for Science Park Industries, Taiwan Semiconductor Industry Association, and renewable energy companies remain in close communications to discuss how to close the gap with regulations and practices. In 2020, TSMC first received renewable energy from solar plants and onshore wind farms. In 2021, TSMC collaborated with more onshore wind farms, increasing renewable energy usage in Taiwan fabs from 250 GWh to 660 GWh, which is a 160% yearly increase. We also signed a renewable energy purchase agreement for 0.3 GW, which can increase 750 GWh of green energy each year. As of the end of 2021, we have signed renewable energy purchase agreements for 1.6 GWh cumulatively, which will reduce approximately 2,600,000 metric tons of carbon emissions each year and achieved the target of "100% renewable energy used in global offices."

In addition to renewable energy actions taken for Taiwan facilities, TSMC has been purchasing renewable energy and RECs in the countries with comprehensive regulations and ample supply, aiming to completely offset carbon dioxide emissions from the power used in locations around the world including the United States, Canada, Europe, China, Japan, and Korea; 2021 marks the fourth consecutive year that TSMC has achieved zero carbon emissions from power consumption in overseas subsidiaries.

25→40%
Use 40% renewable energy for all TSMC fab operation sites by 2030

4 consecutive years
Zero carbon emissions for electricity in overseas subsidiaries

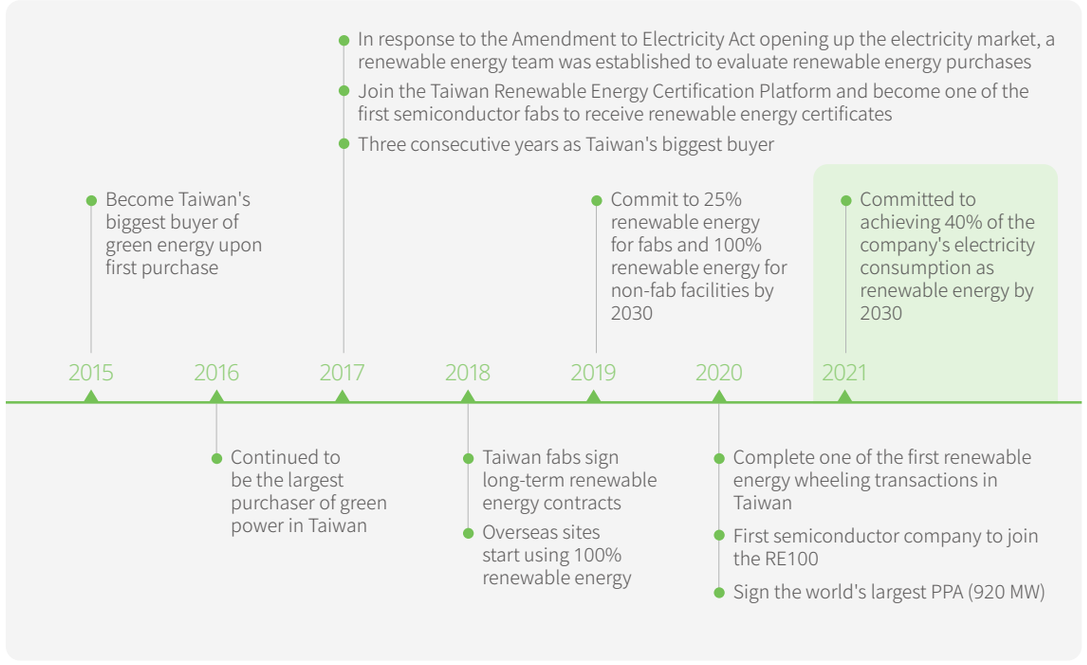
100%
Percentage of renewable energy used in global offices

Renewable Energy Systems

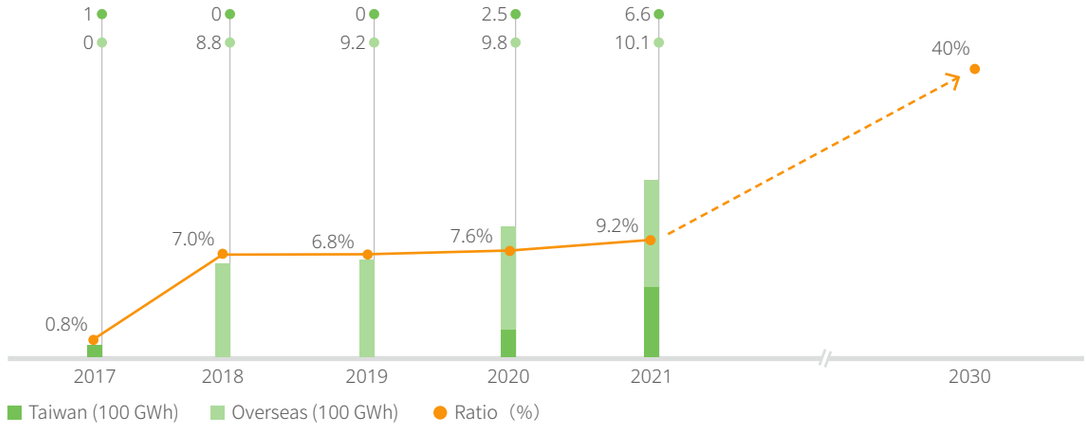
In addition to purchasing renewable energy, TSMC has also installed solar panels in TSMC facilities to produce carbon-free renewable energy for our own fabs. In 2021, 231 kWp of solar panel capacity was installed and has already provided 4.88 GWh, reducing carbon emissions by 2,449 metric tons (the equivalent of annual carbon absorbed by 210,000 trees); in 2022, an additional 200 kWp of solar panel capacity will be installed, which can generate up to 5.2 GWh of electricity.

In 2021, Fab 18 Phase 1 installed photovoltaic modules developed by NTUST on the office driveway canopy covers. The solar panel modules use a low-cost reflective material behind the solar panel for secondary energy generation and heat penetration reduction to increase power generation efficiency and minimize energy consumption of air conditioning, which achieves energy saving and carbon reduction.

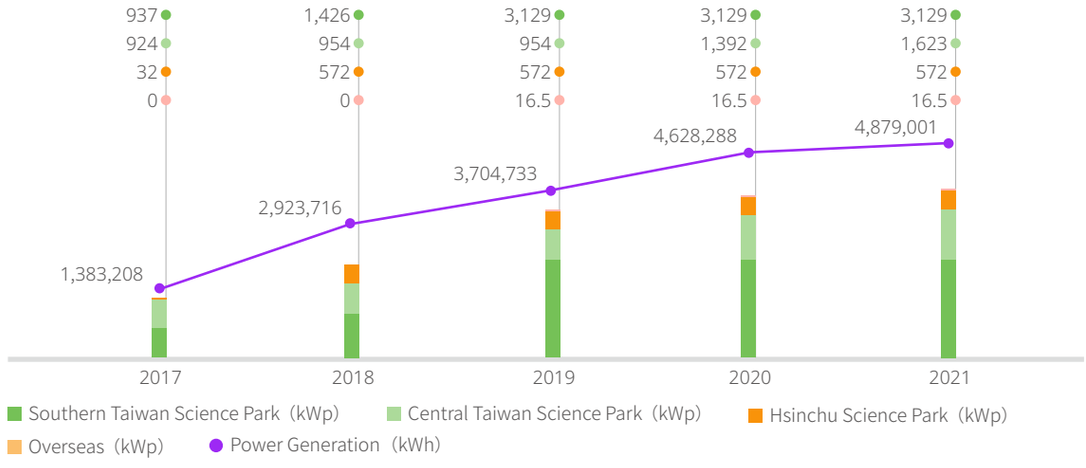
TSMC Renewable Energy Development Timeline



TSMC Renewable Energy Consumption and Ratio



TSMC Renewable Energy Installed Capacity & Power Generation

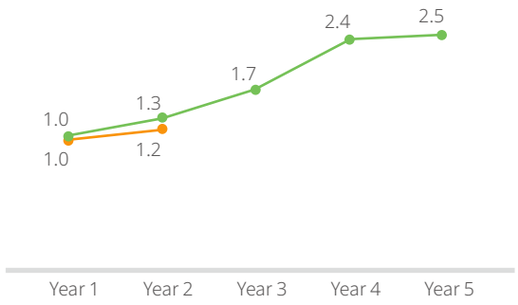


Increase Energy Efficiency

TSMC is dedicated to optimizing energy efficiency for processes and, in 2021, we continued to expand energy conservation efforts. In addition to seeking ways to save more energy in existing facilities, we also collaborated with equipment suppliers to develop new energy saving programs. Over 159 energy saving programs have been verified and introduced into new facilities. In 2021, TSMC was able to increase energy efficiency of 10nm and 7nm and above process technologies in the fifth year of volume production by two times and energy efficiency for 5nm processes have also achieved a 20% increase in energy efficiency by just the second year of volume production, meeting our 2021 Target.

In 2021, TSMC consumed a total of 19,190 GWh in energy; with electricity accounting for 94.2%, natural gases for 5.7%, and diesel for approximately 0.1%. Electricity is the main energy used to power TSMC' s manufacturing equipment and fab systems. Natural gas is used in the treatment of process air exhaust in order to extremely reduce the direct emission of F-GHGs and volatile organic compounds. Diesel is not used directly in production, but to run emergency power generators and fire pumps during emergencies, power outages, or during annual maintenance. The percentage of natural gases continues to increase every year as we install more preventive equipment to reduce air pollutants and GHG emissions. As for electricity, our conservation efforts have paid off and we've been able to overcome the high energy demands of new processes to bring electricity consumption down from last year.

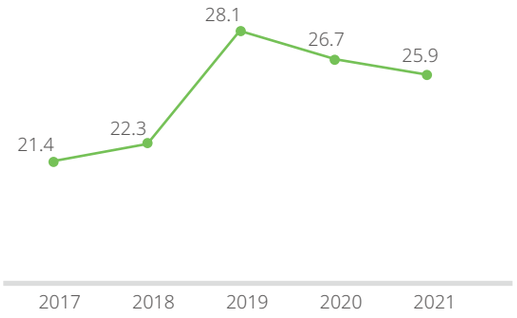
Energy Efficiency of 10mm, 7nm & 5nm Process Technologies



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, WaferTech, TSMC (China), TSMC (Nanjing) and VisEra
Note 3: Energy Efficiency only includes electricity use

Unit Product Energy Consumption

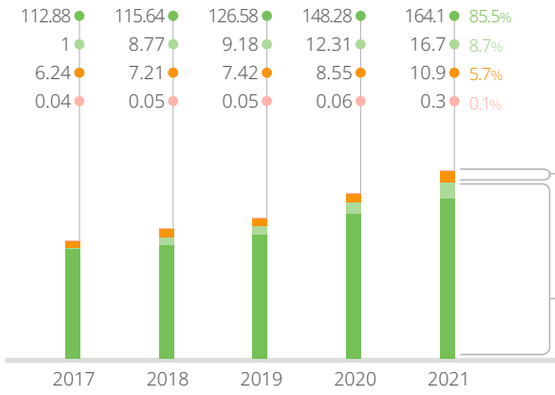
Unit: kWh/12-inch equivalent wafer mask layer



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

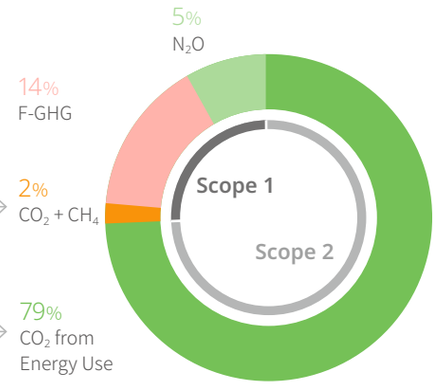
Total Energy Consumption

Unit: 100 GWh



Note 1: 1 cubic meter of natural gas=10.5 kWh of electricity; 1 kWh= 3,600 kilojoules
Note 2: Figures from TSMC fabs in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing), 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

GHG Emissions from Manufacturing Processes



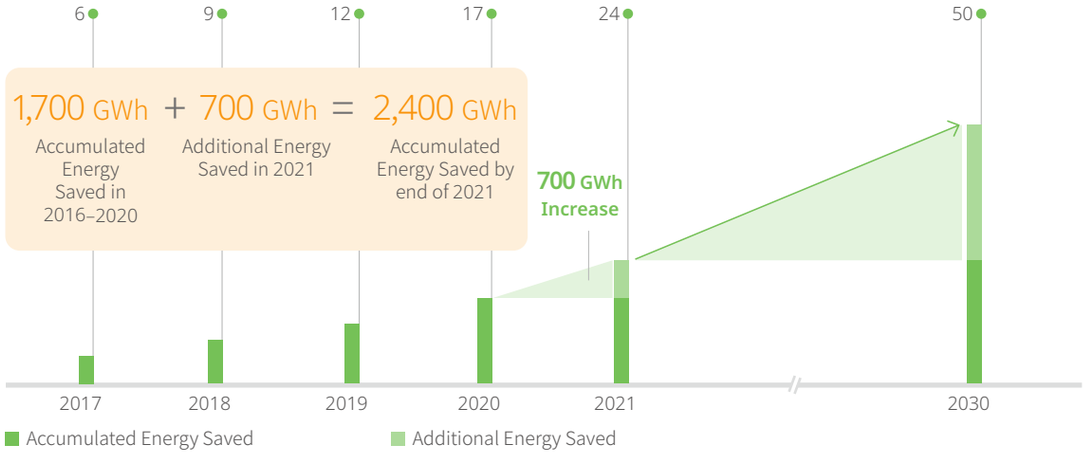
Expand Energy-saving Measures

In 2021, TSMC's Energy Saving and Carbon Reduction Committee attempted to explore opportunities to save energy by defining five major energy conservation teams for different process technologies to conserve energy from manufacturing equipment and fab facilities. The five teams are the advanced processes R&D team, 12-inch wafer fab team, advanced backend and 8-inch wafer fab team, EUV (extreme ultraviolet lithography) team, and facility team. In 2021, Fab 18B also joined the ranks to conserve energy. Through a series of training courses, the Energy Saving and Carbon Reduction Committee shared case studies on existing energy conservation programs in facilities, measured and calculated energy conservation outcomes, and explained system registration and forms to help new facilities quickly learn about certification standards by local governments so they can begin taking action. In addition, the Energy Saving and Carbon Reduction Committee also actively complied with energy conservation programs for manufacturing equipment and facility systems in various facilities, rolling out existing measures to other facilities as well, and establishing measures as the standard for new facilities.

In 2021, TSMC carried out 499 energy-saving measures across eight different categories and was able to conserve 700 GWh in energy consumption, the equivalent of 350,000 metric tons of carbon emissions. The energy savings translated into NT$1.75 billion of actual financial savings and external carbon costs reduced from lower carbon emissions were around NT$530 million.

15-year Energy-saving Targets

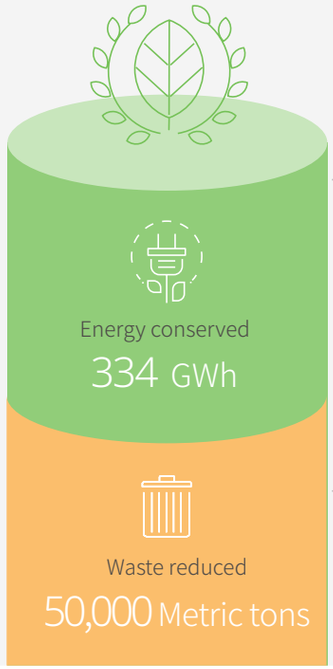
Unit: GWh



Encourage Innovative Energy Saving Measures

TSMC encourages employees to actively dedicate themselves to green innovation, and the Energy Saving and Carbon Emission Reduction Committee also gives out Energy Conservation Model Awards and Energy Conservation Innovation Awards according to the teams' success with energy conservation targets and innovative ideas. The Senior Vice President of Operations upped the rewards and now gives out special awards to outstanding energy saving measures proposed by various facilities every six month to incentivize employees to come up with innovative ideas and take action. In 2021, the Senior Vice President of Operations rewarded 15 outstanding proposals that reduced waste and conserved energy in tools and facility affairs. These proposals will conserve an estimated 330 GWh in energy and reduce 50,000 metric tons of waste in the future.

Outstanding Energy Saving Measures from 2021



New Designs for Tool Operations (3 measures)

216 GWh

Case study: Modified wet film installed to MAUs saves 42 GWh each year

Optimize Program Settings (6 measures)

92 GWh

Case study: Smart compression dry airflow control system saves 38.9 GWh each year

Use High-efficiency/Energy Efficient Components (2 measures)

26 GWh

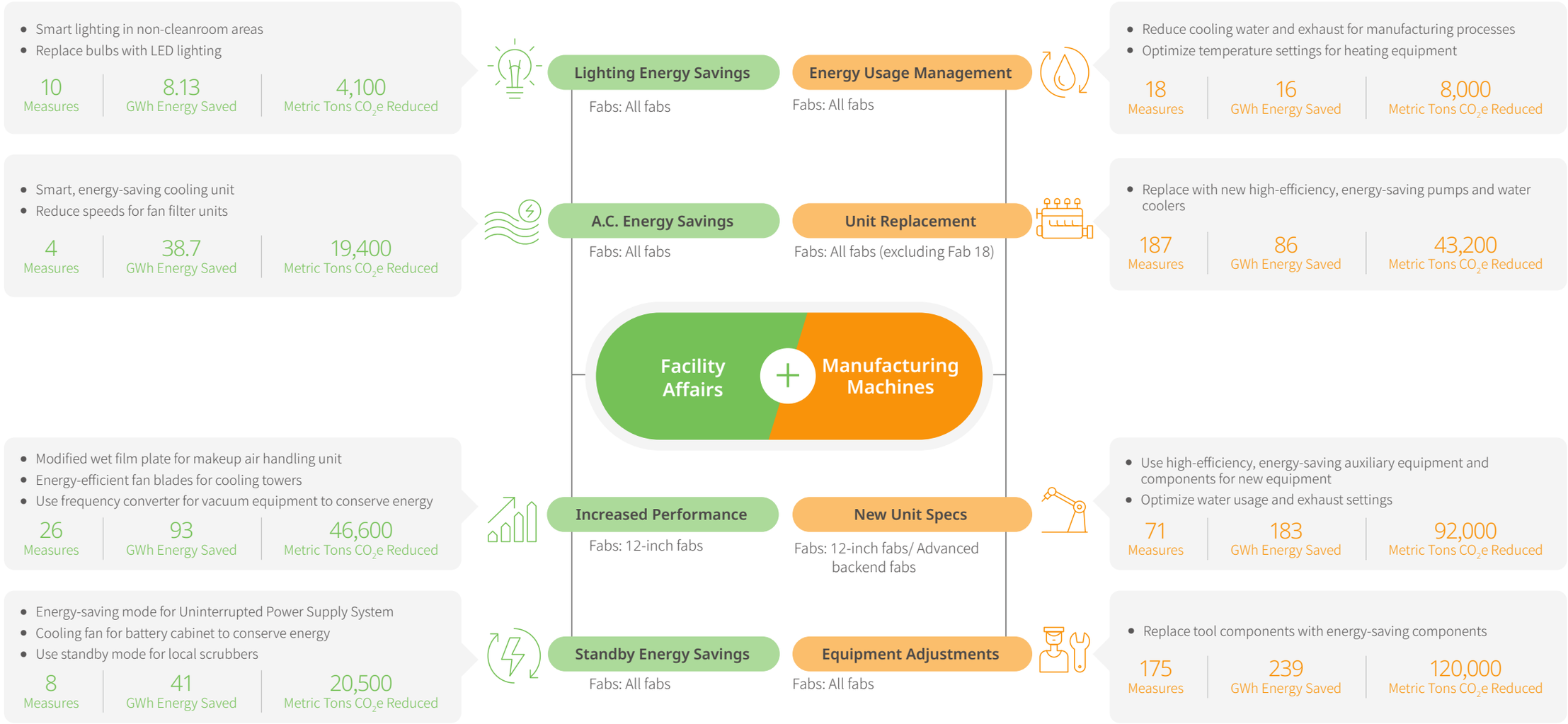
Case study: Recirculation Type Water Heater saves 15 GWh each year

Reduce Usage/Recycle and Reuse Waste (4 measures)

around 50,000 metric tons

Case study: Hydrofluoric acid waste regeneration system, which can convert hydrofluoric acid waste into high-purity cryolite, reduces 46,000 metric tons of waste

Energy Conservation Measures



- Smart lighting in non-cleanroom areas
- Replace bulbs with LED lighting

10	8.13	4,100
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Reduce cooling water and exhaust for manufacturing processes
- Optimize temperature settings for heating equipment

18	16	8,000
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Smart, energy-saving cooling unit
- Reduce speeds for fan filter units

4	38.7	19,400
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Replace with new high-efficiency, energy-saving pumps and water coolers

187	86	43,200
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Modified wet film plate for makeup air handling unit
- Energy-efficient fan blades for cooling towers
- Use frequency converter for vacuum equipment to conserve energy

26	93	46,600
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Use high-efficiency, energy-saving auxiliary equipment and components for new equipment
- Optimize water usage and exhaust settings

71	183	92,000
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Energy-saving mode for Uninterrupted Power Supply System
- Cooling fan for battery cabinet to conserve energy
- Use standby mode for local scrubbers

8	41	20,500
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

- Replace tool components with energy-saving components

175	239	120,000
Measures	GWh Energy Saved	Metric Tons CO_2e Reduced

Note: Carbon dioxide emission is 0.502 kg CO_2e/kWh

In addition to energy saving measures, TSMC is also building factories with green building certification, reducing energy and material consumption throughout the construction stage and beyond, strengthening the building's climate resilience, and adding eco-friendly designs. In 2021, Fab 18 Phase 1 office, Fab 18 Phase 2 facility, and Fab 18 Phase 3 facility received LEED certifications; TSMC now has a total of 37 LEED gold or above certifications. Fab 18 Phase 1 office and Fab 18 Phase 2 facility also received EEWH certifications; TSMC now has a total of 25 EEWH certifications. In 2021, the Architecture and Building Research Institute, MOI commissioned the Taiwan Green Building Council to host an award for outstanding green buildings. TSMC led other Taiwanese corporations in the award with five TSMC buildings recognized by the awards.

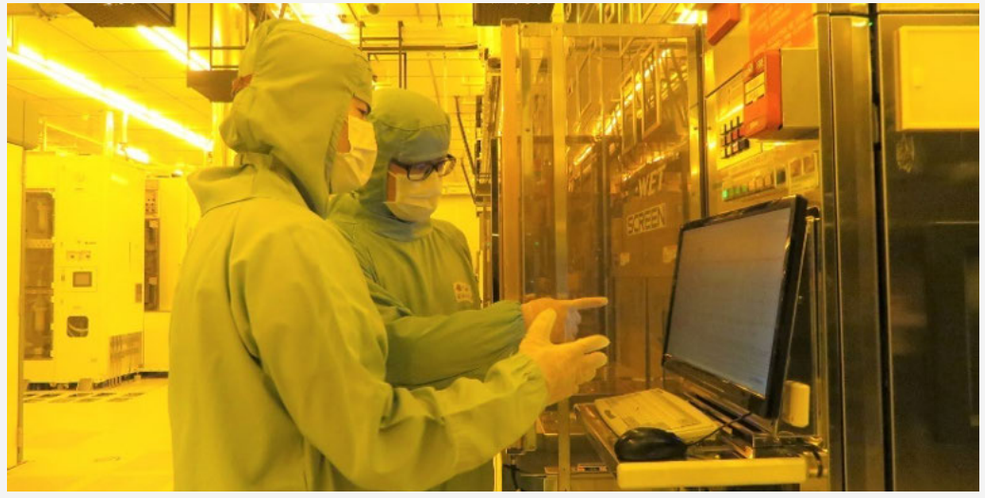
TSMC Built Certified Green Buildings

LEED	1	Number 1 in the global semiconductor industry with the largest LEED-certified building area; number 1 most LEED-certified company in Taiwan	37	All 12-inch fabs are LEED gold certified or above (3 platinum & 34 gold)
EEWH	1	Largest EEWH-certified building area in Taiwan	5	Outstanding Green Building
	25	All 12-inch fabs are EEWH certified (20 platinum, 4 gold & 1 silver)		
Green Factory	1	Most green factory building certifications in Taiwan	13	Green factories
Exceptional Smart Building	1	Most smart buildings in Taiwan	5	Smart buildings with diamond certification

Case Study

Enhanced Energy Efficiency: Energy & Water Conservation from Advanced Process Tools

TSMC is using innovative thinking to enhance energy efficiency. In addition to developing the Water Saving Control System for FOUP Cleaning Tools, TSMC implemented "Tool Parameter Optimization" and "New Technology Integration" strategies to continue exploring the water and power saving opportunities for advanced process tools. In 2021, the Intelligent Engineering Center designed six action plans to save water and conserve energy at the 12-inch wafer GIGAFAB® facilities in Taiwan, effectively saving over 10 million metric tons of pure water and 110 GWh of electricity, aiming to save 28 million metric tons of pure water and 1,100 GWh of electricity by 2030.

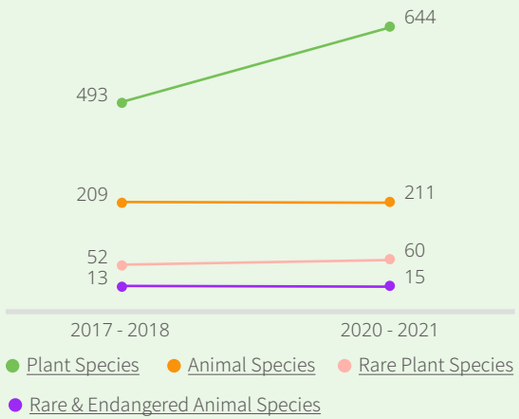


Reducing water usage in processes through interpreting and optimizing tool parameters.

Launched TSMC Plant a Tree Program to Strengthen Biodiversity Protection & Collaboration

TSMC is dedicated to environmental sustainability and continues to follow through with various environmental protection practices. When building new plants, TSMC aims to reduce environmental impacts by planting trees, conserving existing trees and plants, and transplanting the plants to other areas according to Taiwan's EIA mechanism. Starting from 2006, all new TSMC plants and offices have been designed and accredited in accordance with U.S. Green Building Council and Taiwan Green Building Council standards. We've also started to gradually introduce biodiversity concepts and practices, creating an eco-friendly habitat at TSMC facilities through multilayered green landscapes and diversified biological/ environmental management as part of our dedication to UN SDG 15: Protect and maintain sustainable use of terrestrial ecosystems and ensure biodiversity.

Plant & Animal Species in TSMC Fabs from the On-site Ecological Survey



With our long-term efforts, the number of fireflies at Tainan facilities increased 5-fold in the past three years, growing from 200 fireflies in 2019 to 1,050 fireflies in 2021. In 2020, TSMC further replicated the habitat recovery experience to fabs in Hsinchu and Taichung and is already witnessing the emergence of a few fireflies by monitoring water quality, adjusting flora in the region, and controlling lighting at night. From April 2020 to March 2021, TSMC conducted a second On-site Ecological Survey, which revealed that TSMC's sites boast a rich array of plants and animals: 211 animals such as palm civets; 15 rare and endangered wild animals such as the brown shrike; and 644 plant species, including 60 rare plants such as Drypetes littoralis, Cryptocarya elliptifolia, Dehaasia incrassata, Golden Bolly Gums, etc.

Using the three ecological parks in Northern, Central, and Southern Taiwan as bases, TSMC is extending this green power outwards, launching the TSMC Plant a Tree Program in 2021. On March 12, Arbor Day, TSMC held tree planting ceremonies in Taoyuan City, Hsinchu City, Taichung City, and Tainan City and then connected the ceremonies online. We also got 500 TSMC volunteers, city government departments, and elementary students that TSMC volunteers have been reading with to participate and plant their trees of hope as we wish for a more sustainable green future for our next generation. As of December 2021, TSMC has planted 17,044 arbors and 277,898 shrubs across 16.3 hectares, mitigating dust pollution in urban areas and creating a healthier urban environment that is better for living. In 2022, we will further focus on our coastlines to strengthen sand-binding along shores and mitigate dust pollution to have a greater green influence on society.



TSMC Plant a Tree Program



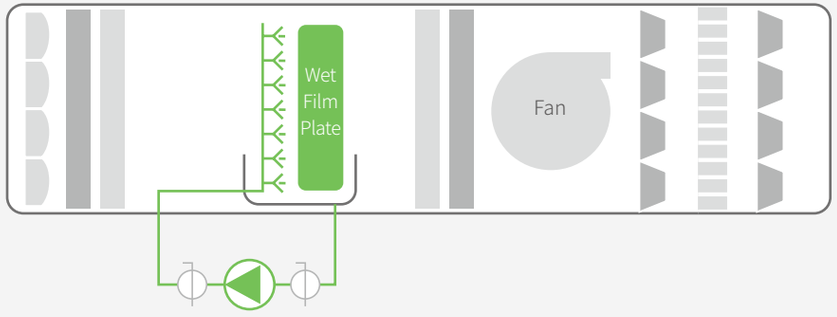
Nanyuan Ecological Park in Shimen Reservoir, Taoyuan

Case Study

Install Additional A.C. Humidifier Systems for Cleanrooms and Save 42 GWh in Energy

Dedicated to energy efficiency, TSMC has added modified wet films for large makeup air units (MAU) installed in cleanrooms. The MAUs act as a humidifier system that can strengthen rinsing effects and reduce 80% energy consumption from water pumps. In 2021, we further expanded the program and installed modified wet films to 190 MAUs, saving 42 GWh in energy and taking real action to implement green manufacturing.

The MAU humidifier system uses water as the transmission medium. Water pumps pressurize the water through specific spray nozzles that create small, fine water particles of a certain diameter. The system uses mass transfer, dissolution, and collision to remove micro-pollutants in the air and ensure the quality of airflow entering cleanrooms. Traditional humidifier systems are limited by A.C. unit sizes and are unable to hold rinsing water. Pumps for rinsing water account for 20% of the energy used by cleanroom A.C. units to transport air and water. To increase energy efficiency, TSMC worked with suppliers to co-develop a modified wet film that can be curved to absorb micro-pollutants from outside air, hold outside air for longer, increase humidity surfaces for airflow, and achieve the same effects. Rinsing water pumps can also be downgraded from 50 horsepower to 10 horsepower, reducing about 80% of energy usage and achieving benefits of energy conservation.



Retrofit → **Benefits**

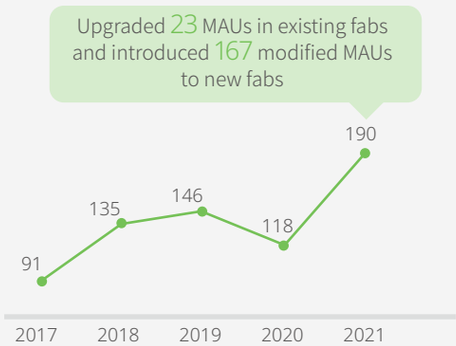
By changing wired packing to wet film plate, a large area of water film is formed while fine water mist attaches to the surface of wet film panels to increase micro-pollutants absorption and improve scrubbing performance. The design reduces power required to circulate and pump rinsing water, which has reduced energy consumption by 80% and achieved energy saving benefits.

80%
Energy Saved

42 GWh
Electricity Saved in 2021

Cleanroom MAU Upgrade Program

Unit: No. of MAUs





Installing the modified wet film reduces the rinsing water pump's energy consumption by 80%

Water Stewardship

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Manage Water Resource Risk Enforce climate change mitigation policies, implement water conservation and water shortage adaptation measures			
Reduce unit water consumption (liter/12-inch equivalent wafer mask layer) by 30% (Base year: 2010)	**Reduce unit water consumption (liter/12-inch equivalent wafer mask layer) by 16%**	**Reduced unit water consumption (liter/12-inch equivalent wafer mask layer) by 14.9%** Target: 9%	↑
Develop Diverse Water Sources Develop water reclamation technologies; continue to practice water conservation and use reclaimed water during manufacturing			
Increase more than 60% replacement of water resources with reclaimed water Note 1	**Complete the TSMC Tainan Science Park Reclaimed Water Plant and begin water supply**	**TSMC Tainan Science Park Reclaimed Water Plant is under construction and will start supplying water in 2022**Note 2 Target: Complete the TSMC Tainan Science Park Reclaimed Water Plant and begin water supply	—
Develop Preventive Measures Improve the efficiency of water pollution prevention and removal of water pollutants Note 3			
Water pollution composite indicator 50% above effluent standards	**Water pollution composite indicator reduction rate of 45%**Note 4	**Water pollution composite indicator reduction rate of 42.5%**Note 5 Target: 44%	—

Note 1: TSMC is actively working with the government to progress the water reclamation projects. In 2021, the replacement rate of reclaimed water increased from 30% to 60% in 2030

Note 2: Water supply works for the TSMC Tainan Science Park Reclaimed Water Plant was delayed as the government is still developing their reclaimed water supply system. The water plant is slated for operations and water supply in 2022

Note 3: The scope of water pollution projects and figures include TSMC fabs in Taiwan and VisEra

Note 4: TSMC increased the use of cobalt sulfate for advanced processes. As such, starting from 2022, TSMC will be listing cobalt into the water pollution composite indicator

Note 5: Failed to meet target because we were unable to complete some COD mitigation works due to the pandemic. In 2022, TSMC will be deploying the rotating packed bed technology to reduce COD levels

↑ Exceeded ✓ Achieved — Missed Target

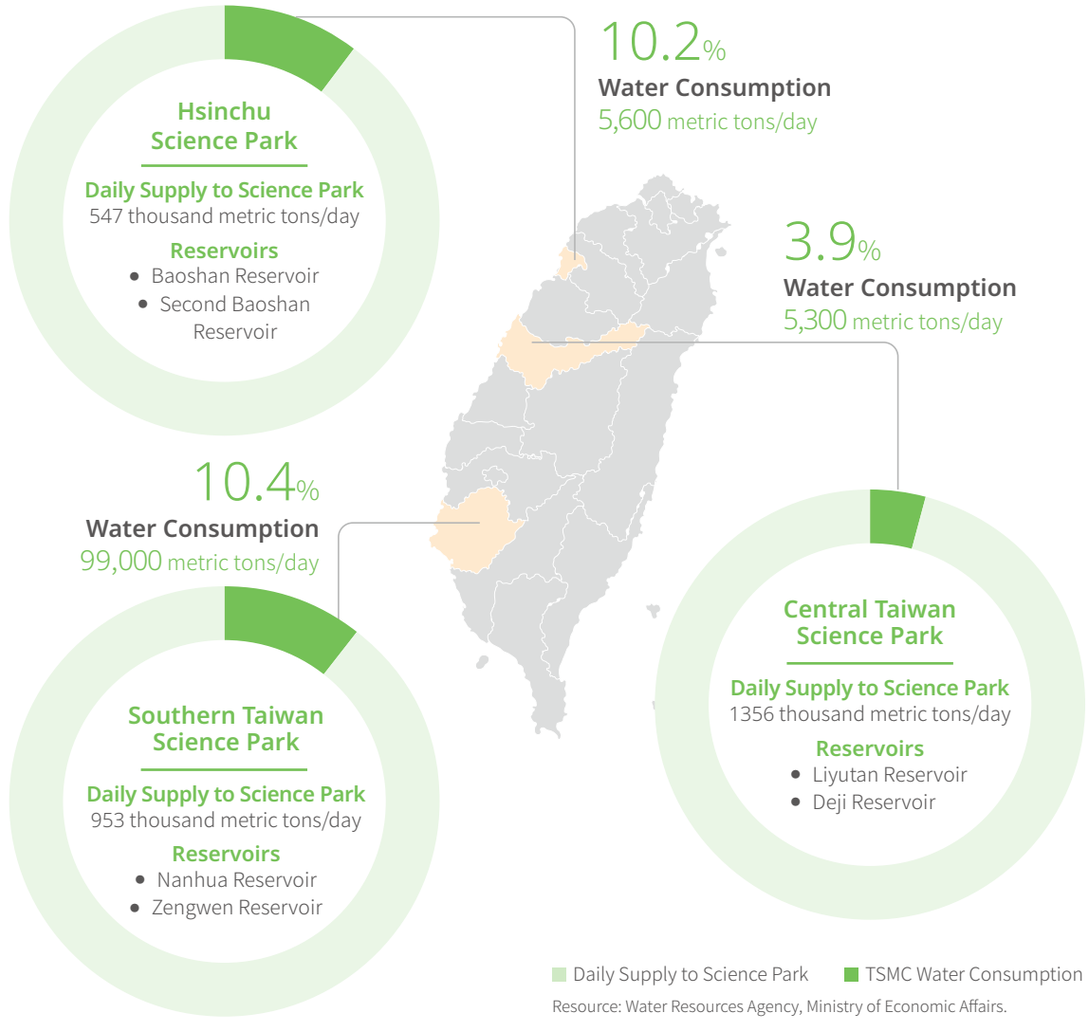
Throughout the drought, TSMC remained compliant with drought alerts issued by the Water Resources Agency and adopted necessary measures in accordance with the protocol of TSMC Water Supply Shortage Crisis Management C.I. As such, TSMC was able to maintain facility operations and production as usual even throughout the worst stages of the drought. In regard to long-term water management strategies, TSMC is adopting the AWS standards to strengthen the three major strategies of "managing water resource risks, developing diverse water sources, and developing preventive measures" to ensure sustainable action towards water recycling.

Drought Contingency Measures

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 Team 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	• Activate water trucks • Reduce water consumption by 7-20%

Note: When necessary, adopt related response measures in compliance with the TSMC protocol of TSMC Internal Control Procedures for Low Water Supply Crisis Management

TSMC Water Consumption Rate in Three Science Parks



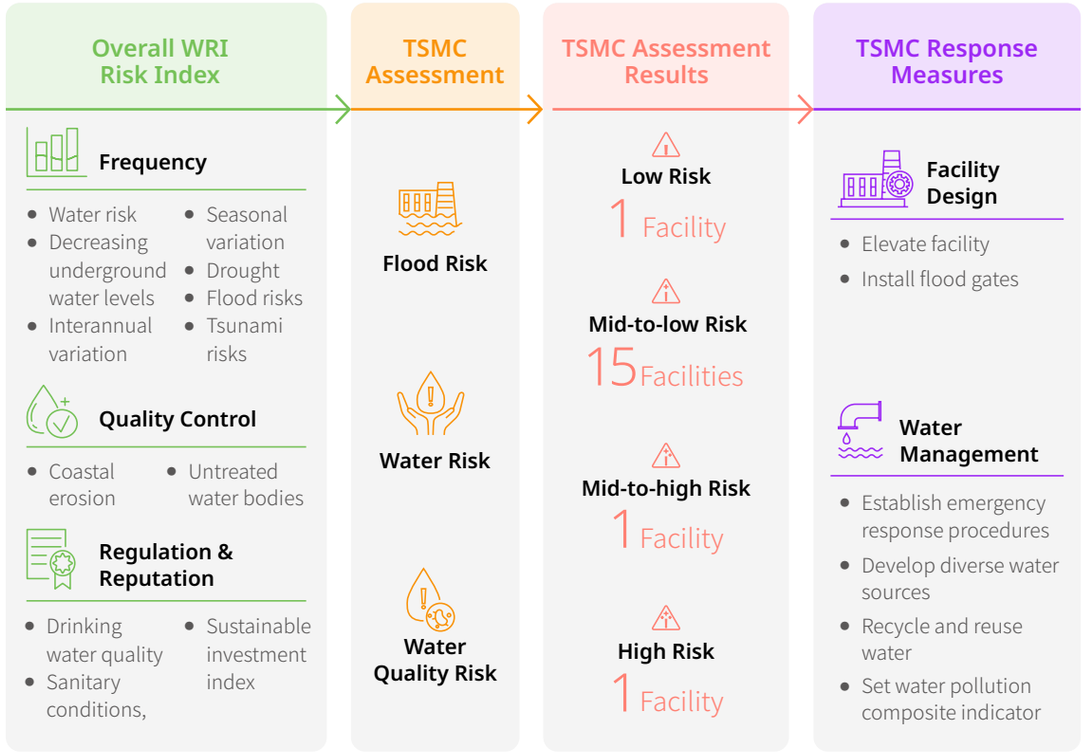
Resource: Water Resources Agency, Ministry of Economic Affairs.

Manage Water Resource Risk

Assess Water Risks: Strengthen Facility Design & Water Management

In 2022, TSMC once again adopted the Water Risk Atlas from the World Resources Institute (WRI) to evaluate water risk levels in areas with TSMC facilities and yielded the same results as last year: TSMC facilities in Taiwan and VisEra were both rated medium-to-low risk while WaferTech was rated low risk. TSMC (China) and TSMC (Nanjing) were rated high and medium-to-high risk as regional water quality differences requires them to first refine water, thereby increasing wafer unit water consumption. TSMC will continue to carry out the two measures of facility design and water management to reduce impact from water risks.

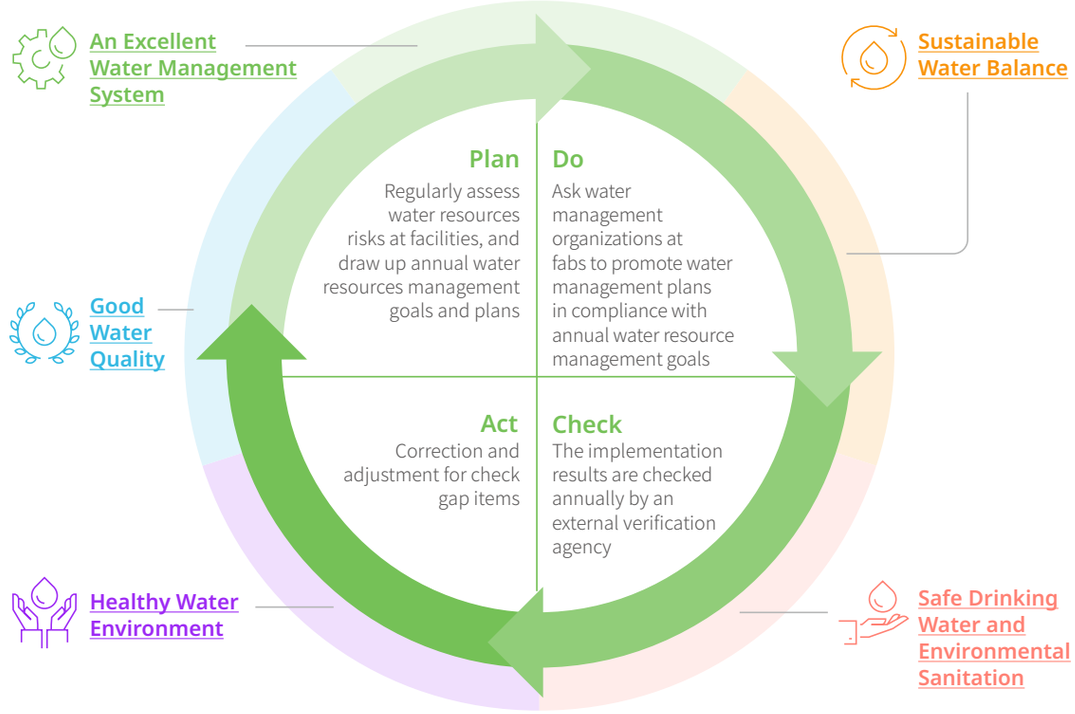
TSMC WRI Risk Identification



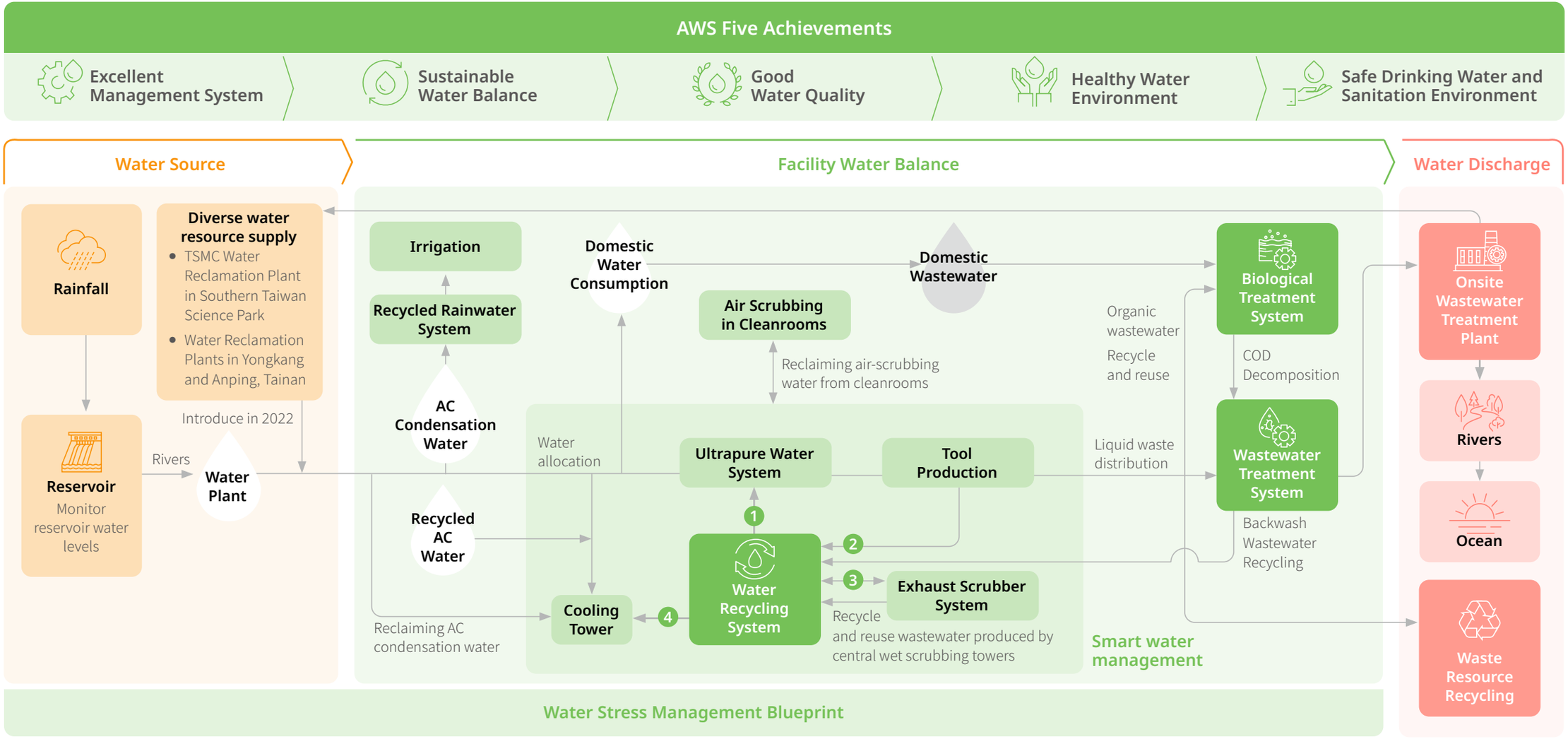
Effective Water Management with AWS

TSMC is employing AWS standards to achieve sustainable water management and deploying long-term fab matching water management strategies with the "AWS Blue Book" to obtain AWS certification across more fabs through the PDCA model. Following TSMC's record-breaking evaluation scores from AWS and platinum certifications to Fab 6, Fab 14B, Fab 15A, and Fab 15B, TSMC facilities in HSIP such as Fab 12A, Fab 12B, Fab 5, and Advanced Backend Fab 3 also received AWS certification, showing TSMC's dedication to optimize the use of water resources and move towards environmental sustainability.

AWS Water Management Model



Water Balance and Supply Chain Environmental Relationship

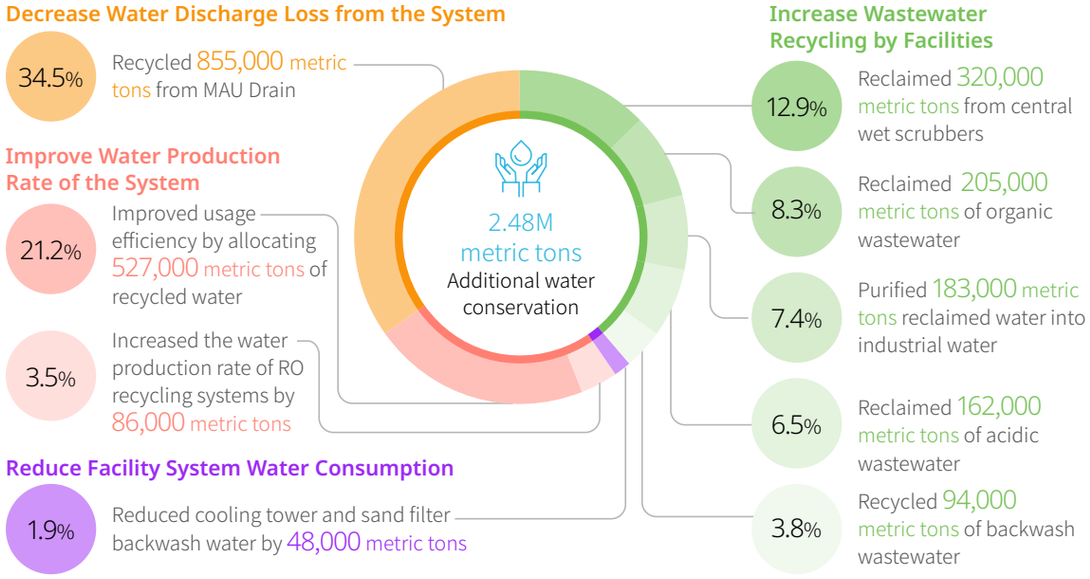


Strengthen In-house Water Recycling and Water Use Efficiency

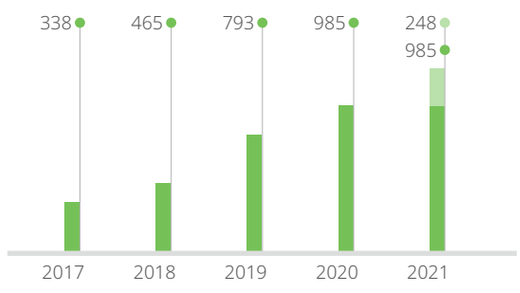
In 2021, wafer unit water consumption continued to increase due to stricter requirements for clean water from advanced processes and the opening of new facilities. TSMC continued to promote the four major water conservation measures of "Reduce Facility System Water Consumption, Increase Wastewater Recycling of Facilities, Improve Water Production Rate of the System, and Decrease Water Discharge Loss from the System" in an attempt to uncover opportunities to save water and achieve maximum water conservation. In 2021, TSMC was able to achieve stable water supply for fabrication processes by implementing water conservation measures.

The water recycling system conserved a total of 2.48 million metric tons of water and we achieved our annual goal for wafer unit water consumption: wafer unit water consumption was reduced to 119.9 (liter/12-inch equivalent wafer mask layer), a 14.9% reduction from the 140.9 (liter/12-inch equivalent wafer mask layer) in 2010, the base year; wafer unit wastewater discharge was also reduced to 78.9 (liter/12-inch equivalent wafer mask layer), an 8% reduction from the previous year, indicating that TSMC's water conservation measures are effective in increasing water recycling and reducing wastewater discharge.

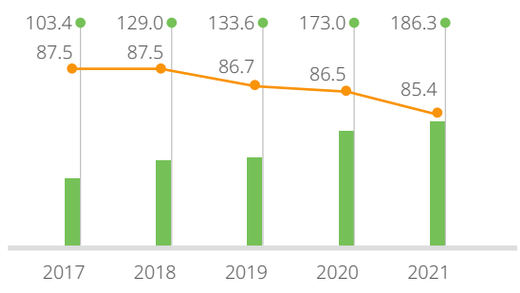
Water Conservation Measures & Achievements in 2021



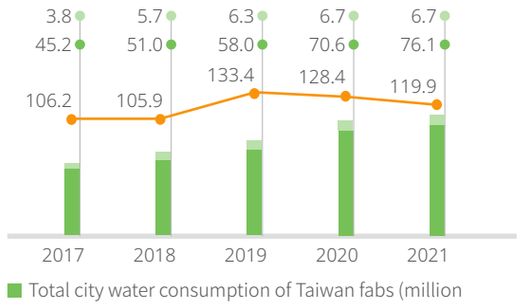
Annual Water Conservation



Water Recycling and Usage Efficiency

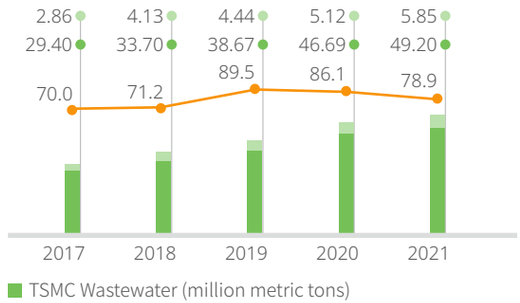


City Water Consumption and Water Consumption per Wafer-Layer



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

Wastewater Discharge per Unit Product



Note: Figures from TSMC facilities in Taiwan, WaferTech, TSMC(China), TSMC(Nanjing) and VisEra

Develop Diverse Water Sources

Actively Develop Industrial Wastewater Recycling Technologies

TSMC adopts a two-pronged approach to strengthen water usage efficiency: develop diverse water sources & water conservation. In order to capitalize each drop of water, TSMC has been devoted to developing water recycling technologies, collaborating with government agencies to develop domestic wastewater recycling processes and industrial wastewater recycling technologies in compliance with tap water standards. Unfortunately, water supply works for the TSMC Tainan Science Park Reclaimed Water Plant was delayed as the government is still working on their reclaimed water supply system. Right now, water supply is slated for Q3 of 2022, which will help reduce demands for tap water, making 2022 the start of water reclamation for TSMC.

In addition, to maximize water usage efficiency, TSMC will continue to cooperate with the government's water recycling projects and accelerate the city government's plans to purify water for industrial usage.

Milestones in Water Reuse

Procurement of Tenders and Project Collaboration

- Collaborate with partner firms for the establishment of water reclamation plant
- Participate in the promotion of reclaimed water in Taiwan with the Construction and Planning Agency of the Ministry of Interior, the Water Resources Agency of the Ministry of Economic Affairs, and the Water Resources Bureau of the Tainan City Government

Construct Water Reclamation Plant and Supply Water

- Construct domestic water reclamation plant and supply water
- Construct industrial water reclamation plant and supply water

2019

- Collaborate with Southern Taiwan Science Park Management Department to build the TSMC Tainan Science Park Reclaimed Water Plant
- Commence construction of water reclamation plant in Yongkang, Tainan

2020

- Construction contract signed for TSMC Tainan Science Park Reclaimed Water Plant
- Wastewater supply network & construction of the Tainan Science Park Reclaimed Water Plant

2021

- Supply 5,000 metric tons/day of water from the water reclamation plant in TSMC Tainan Science Park Reclaimed Water Plant
- Supply 5,000 metric tons/day of water from the water reclamation plant in Yongkang, Tainan

2022

- Increase water supply to 10,000 metric tons/day
- Supply TSMC with 5,000 metric tons/day of water
- Supply TSMC with 10,000 metric tons/day of water

2023

- Increase water supply to 20,000 metric tons/day
- Increase water supply for TSMC to 9,500 metric tons/day
- Supply TSMC with 10,000 metric tons/day of water

2024

Supply 67,000 metric tons/day of water in total from the Tainan Science Park Reclaimed Water Plant

- Supply 20,000 metric tons/day of water
- Supply TSMC with 9,500 metric tons/day of water
- Increase water supply for TSMC to 37,500 metric tons/day





Note: Water supply schedule and water supply volume for 2021 and thereafter are calculated from reclaimed water consumption contracts between TSMC and government departments (Southern Taiwan Science Park Administration and Tainan City Government)

- Water reclamation projects
- TSMC Tainan Science Park Reclaimed Water Plant
- Water Reclamation Plant in Yongkang, Tainan
- Water Reclamation Plant in Anping, Tainan

Develop Preventive Measures

Water Pollution Composite Indicator

In 2021, the water pollution composite indicator reduction rate was 42.5%, which failed to meet our 2021 target of 44%. The main reason was the increased IPA usage for advanced processes that led to increased COD emissions and the pandemic delaying mitigation works. In 2022, TSMC will continue to build a COD treatment system in the hopes of reducing COD concentration in effluents. In addition, due to the increased usage of cobalt sulfate for advanced processes, TSMC also continues to expand the cobalt sulfate treatment system using resin adsorption to achieve effluent standards; cobalt was also added to the water pollution composite indicator in 2022.

Reduce Pollutant Concentration in Effluents

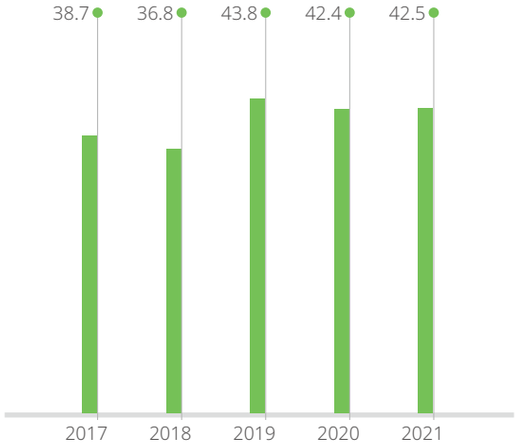
In response to evolving fabrication processes and increased use of organic chemicals, TSMC has introduced the membrane bio-reactor system to strengthen water pollutant treatment capabilities. In 2021, average COD concentration levels were reduced to 180ppm and TMAH effluent concentrations were reduced to 5.5ppm, mitigating the possible impact of TSMC operations on the environment. In 2022, TSMC plans to apply the high agravic rotating bed technology in Fab 15B to reduce IPA concentration in wastewater and continue improving the quality of our environment.

Wastewater Classification and Resource System

TSMC has developed 38 distribution systems based on the composition and concentration of wastewater from fabrication for wastewater classification and resource management. The distribution systems can effectively reduce pollutants, increase water recycled rate, and serve as a strong foundation for the circular economy. In 2021, TSMC developed the Cryolite Reaction System and applied the system to Fab 15B, creating a move towards the circular economy and advancing recycling technologies for local circular economy industries.

Water Pollution Composite Indicator Reduction

Unit: %



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	9 Products Recycled
Hydrofluoric (HF) Acid Wastewater	• 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 acid wastewater	• Calcium fluoride • Fluorite • Cryolite NEW
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 • NH4-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 slurry
High-concentration Liquid Waste	• Waste sulfuric acid • Waste copper sulfate • Cobalt-containing liquid • Other wastewater (16 types)		• Waste-H2SO4 reclamation • Copper-containing electroplating wastewater recycling • Cobalt-containing electroplating wastewater recycling	• Sulfuric acid • Copper bar • Cobalt bar

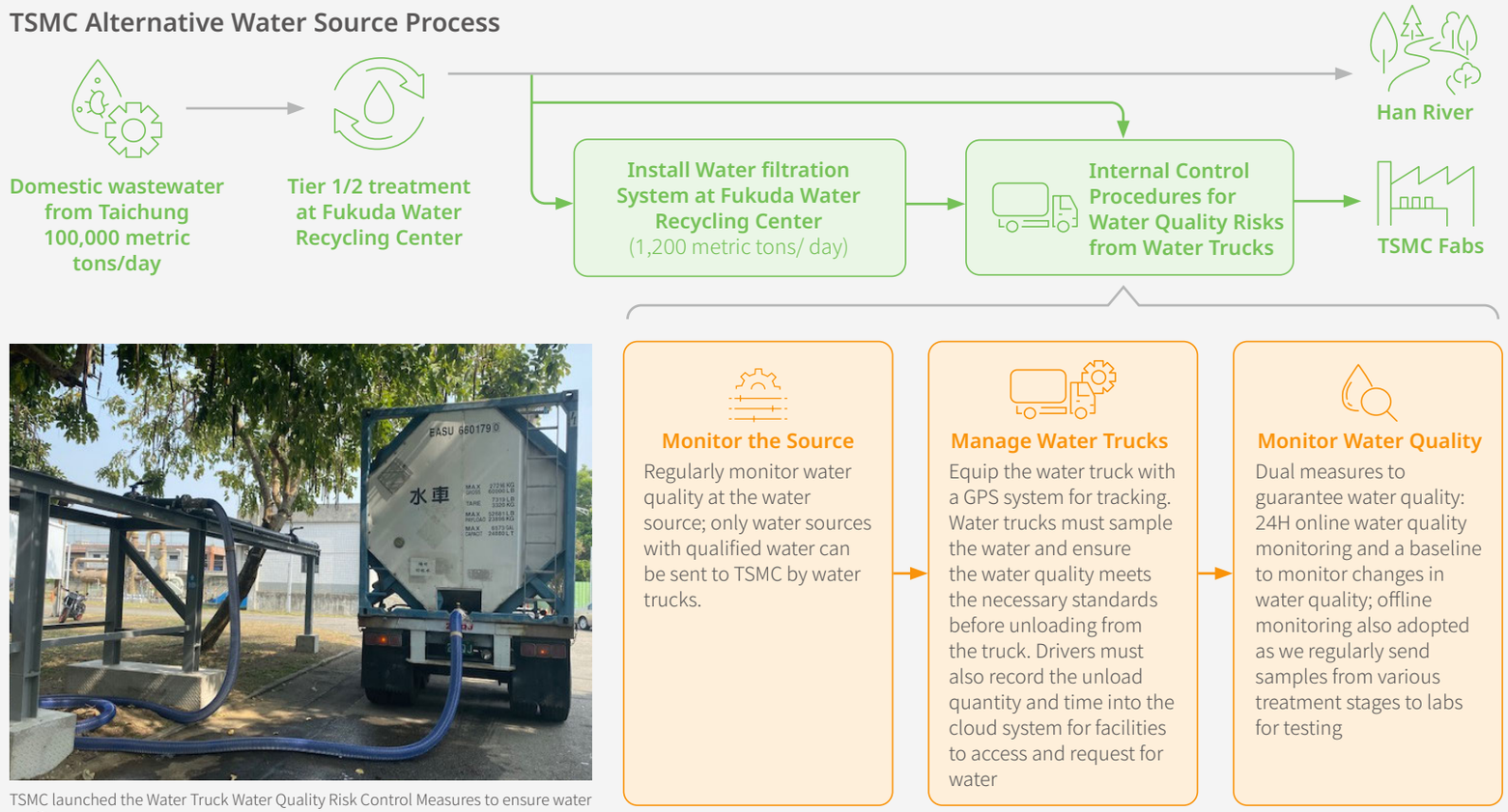
Case Study

Transform Effluents into Alternative Water Source and Strengthen Value for Water Reclamation

In 2021, TSMC actively sought for alternative water sources in an effort to combat the drought in Taiwan. Having considered distance, water supply, and available space on site, TSMC decided to collaborate with the Fukuda Water Recycling Center, collecting discharged recycled water from the center for reuse at TSMC facilities, thereby reducing our tap water consumption.

The Fukuda Water Recycling Center has a surface area of 13.6 hectares and is the largest domestic wastewater recycling center in Taichung, processing an average of 100,000 metric tons of wastewater each day. Originally, the Fukuda Water Recycling Center would discharge recycled water into the Han River. In April 2021, TSMC installed a water-intake and water filtration system to collect and filter recycled water. To monitor water quality, TSMC also formulated the Water Truck Water Quality Risk Control Measures and three processes: "monitoring the source, managing water trucks, and monitoring water quality" to ensure that water quality from alternative sources meets the standards for wafer products and strengthen the value of recycled water. After the drought alert was lifted, TSMC kept the water-intake on site for the public to benefit society.

TSMC Alternative Water Source Process



TSMC launched the Water Truck Water Quality Risk Control Measures to ensure water quality.

Circular Resources

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Source Reduction Promote waste reduction by source separation and require vendors to provide low chemical consumption equipment		
Outsourced unit waste disposal per wafer ≦ 0.50 (kg/12-inch equivalent wafer mask layer)	**Outsourced unit waste disposal per wafer ≦ 0.99 (kg/12-inch equivalent wafer mask layer)**	**Outsourced unit waste disposal per wafer 0.99 (kg/12-inch equivalent wafer mask layer)** ↑ Target: ≦ 1.15
Circular Economy Collaborate with vendors to develop new waste recycling technology to increase the amount of waste recycled and reused		
Develop multiple types of electronic-grade chemicals for resource recycling within TSMC **Reduce CO_2 emissions from waste treatment to 2020 emission levels** NEW	**In-house resource recycling rate ≧ 23%**	**In-house resource recycling rate: 22%** ✓ Target: ≧ 22%
Audit and Guidance Enhance vendor capabilities in self-management and implementing resource recycling through audits, guidance, and tracking with applied technologies[Note 1]		
All waste treatment vendors shall acquire ISO 14001 or other international EHS Management certification[Note 2] **All waste treatment vendors shall establish a smart system for tracking waste** NEW	**84% of waste treatment vendors shall acquire ISO 14001 or other international EHS Management certifications**	**82% of waste treatment vendors have acquired ISO 14001 or other international EHS Management certifications** ✓ Target: 82%

Note 1: In addition to existing auditing guidance and evaluations, we are also using applied technologies to strengthen tracking performance and intensity to help enhance vendor capabilities in self-management and implementing resource recycling

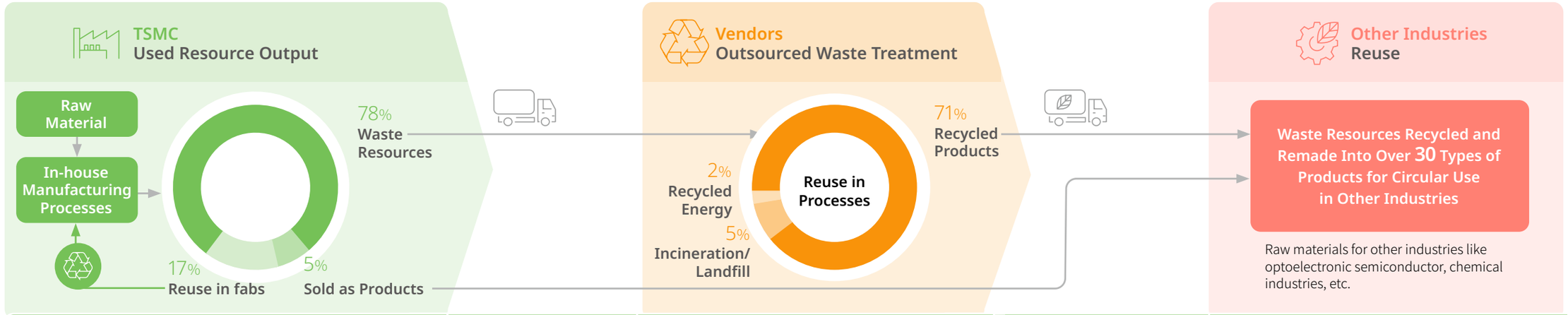
Note 2: TSMC requires waste treatment vendors to at least acquire ISO14001 or ISO45001 certifications as the basis for standardized management. Waste treatment vendors include waste treatment and recycling vendors. Government-owned enterprises, public-to-private enterprises, items exempted from online reporting, and timber waste and lubricant waste vendors, are exceptions to the aforementioned vendors

↑ Exceeded ✓ Achieved — Missed Target

As TSMC continues to develop advanced processes and expand capacities, waste production has increased simultaneously due to the complexity of new process development, demands for reliable yield rates, and increasing demands for raw materials. In order to reduce the environmental impact of TSMC operations, TSMC is actively implementing the management principle of "minimizing waste, maximizing resource recycling, and optimizing vendor management" through the three major facets of "Source Reduction, Circular Economy, and Audit and Guidance" and working with vendors to ensure resource sustainability.

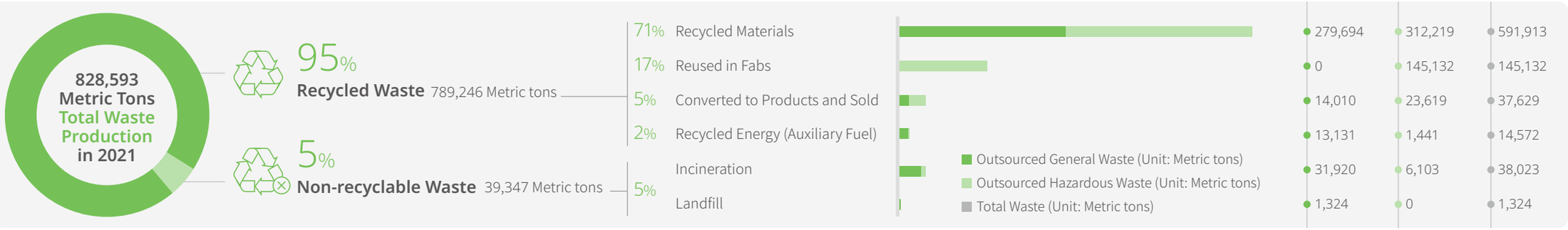
In 2021, outsourced unit waste disposal per wafer achieved annual targets and exceeded achievements in 2020 by a small margin through the implementation of source reduction and the resource recycling strategy of the Action Plan to Turn Waste into High-Value Products despite the continued expansion of Fab 18 Phases 4&5. Waste recycling rate reached 95% for the seventh consecutive year and the percentage of waste sent to landfills has remained at less than 1% for twelve consecutive years. Fab 12 Phases 1 & 2 also obtained UL2799, the highest platinum rating for zero waste to landfill. In addition to TSMC's pursuit for perfection internally, we have also assisted 82% of our waste treatment vendors with ISO14001 certification. In 2021, we introduced the System of Waste Intelligent Fast Track (S.W.I.F.T.) and the Recycled Product Cloud Reporting Platform, which were integrated with reports submitted to the Environmental Protection Administration to gain insight into our vendor's waste treatment and resource recycling statuses, allowing us to prevent illegal waste disposal and together create a sustainable environment.

TSMC Waste Life Cycle Management Procedure 2.0



In-house Waste Management	Waste Clean-up	Treatment and Reuse Operation	Recycled Product Transport	Recycled Product Flow
• Source separation and collection procedure • Waste output tracking and in-house reduction project • Resource recycling equipment • Zero-Waste Manufacturing Center • New vendor selection procedure • Annual evaluation standards • Waste Management practice forum	• TSMC GPS satellite fleet system • Automated Waste Disposal Declaration Platform • Operations Enhancement Project NEW	• Electronics-Grade Chemicals Recycling Project • Industry Cooperation to Co-Create Resources Project • Annual audit plan • Quarterly audit plan • ISO 14001 certification plan • System of Waste Intelligent Fast Track (S.W.I.F.T) NEW	• Cloud reporting platform	• Monthly tracking report • Cloud reporting platform • Track & compare with declared information NEW

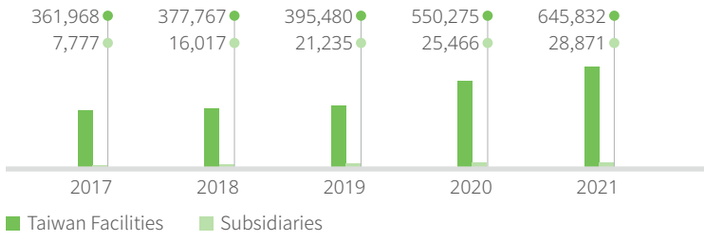
• Waste treatment vendor management project



Note 1: Figures from TSMC fabs in Taiwan
Note 2: Data is compiled based on waste disposal declaration data and the processing capacity of in-house resource recycling facilities

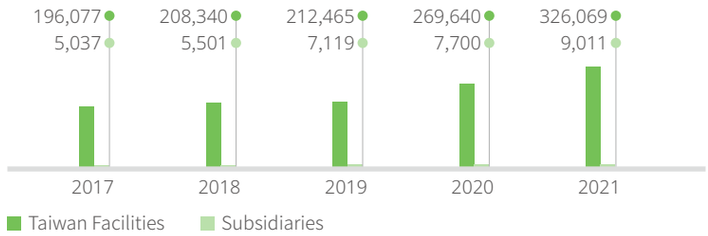
Outsourced Waste

Unit: Metric tons/ year



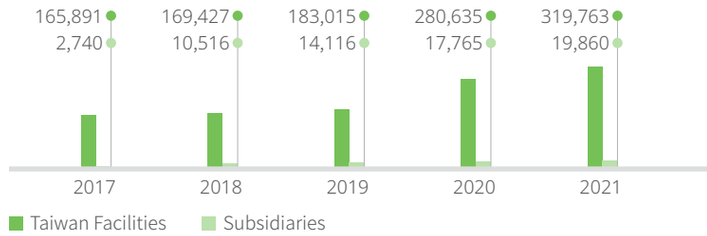
Outsourced General Waste

Unit: Metric tons/ year



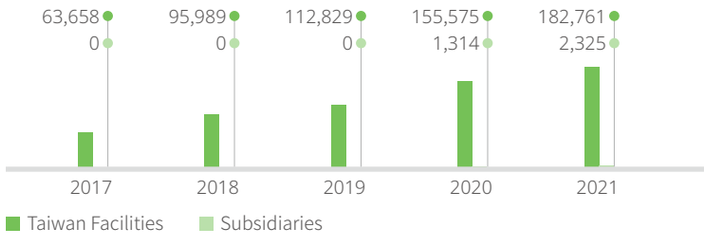
Outsourced Hazardous Waste

Unit: Metric tons/ year



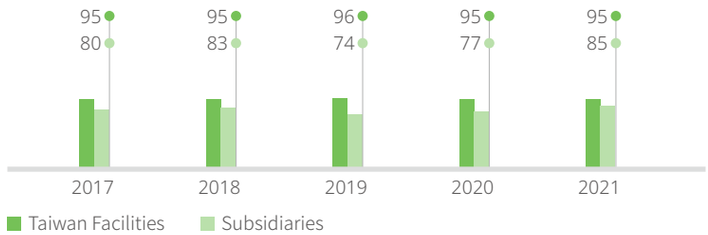
In-house Recycled Resources

Unit: Metric tons/ year



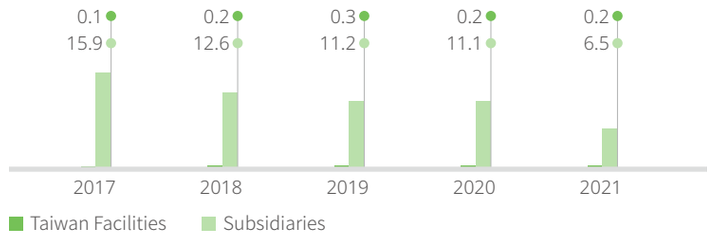
Percentage of Recycled Waste

Unit: %



Percentage of Waste Sent to Landfill

Unit: %



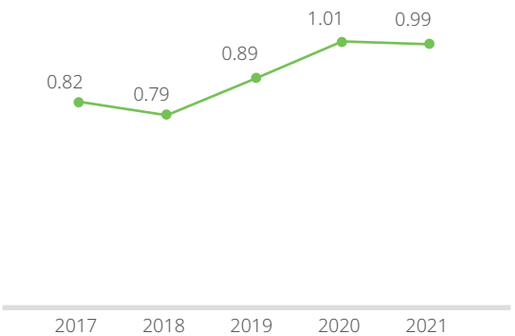
Source Reduction

The management strategy for resource recycling at TSMC spotlights source reduction. We attempt to reduce our use of resources at the production source and, after raw materials undergo our fabrication processes, we prioritize reusing internally to ensure that the raw material has been fully used and recycled, thereby delaying waste production. TSMC is implementing source reduction strategies through the Waste Management Task Force. At the beginning of the year, the Task Force formulates measures, conducts experiments, and tests measures out in related facilities and production lines to reduce various waste. We are utilizing the management cycle of Plan-Do-Check-Act (PDCA) to strengthen voluntary management mechanisms. In 2021, TSMC was able to reduce over 40,000 metric tons of waste in total and fulfill our commitment to source reduction with a three-pronged approach.

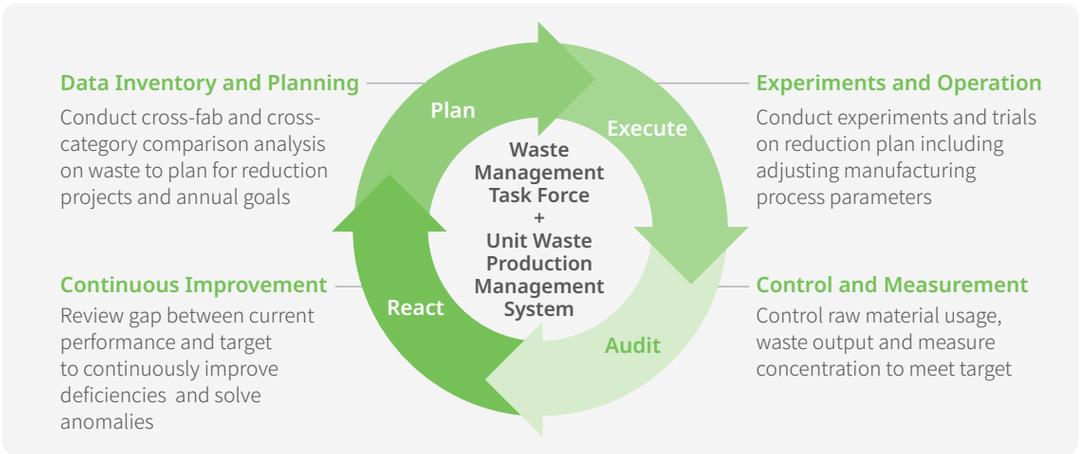
In 2021, TSMC released the TSMC Supplier Transportation Management White Paper on Supply Online 360 in the hopes of working with suppliers to manage and control materials from the source, ensure minimal packaging, and evaluate the viability of using recycled materials for packaging or reusing packaging materials. This approach achieves dual benefits of source reduction and resource recycling as it not only reduces packaging waste but also reproduces recycled materials into products and prevents incineration. In addition, as we are nearing the completion of various projects such as the Zero Waste Manufacturing Center and Electronics-Grade Chemicals Recycling Project, TSMC continues to exemplify commitment to fulfilling 2030 Goals of outsourcing less than 0.5 kg of unit waste disposal per wafer. We are also promoting the management principle of "minimizing waste, maximizing resource recycling, and optimizing vendor management" to facilitate waste reduction in our upstream supply chain and the reuse of wafer cassettes in our downstream packaging and testing facilities to ensure our partners are implementing source reduction strategies.

TSMC Outsourced Unit Waste Disposal Per Wafer Trend

Unit: Kg/12-inch equivalent wafer mask layer



TSMC Waste Reduction Management Mechanism



Waste Reduction Measures and Results in 2021

Manufacturing Equipment Waste Reduction > 40,000 metric tons

- 149 cases — Chemical use time/flow reduction
- 53 cases — Process simplification solution
- 47 cases — Chemical alternatives
- 5 cases — Life cycle extension of chemicals
- 5 cases — Maintenance schedule extension
- 7 cases — Introduction of high-temperature process

+

In-house Recycling Equipment > 180,000 metric tons

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

= In 2021, TSMC reduced over 220,000 metric tons of waste

= In 2021, TSMC implemented a total of 272 waste reduction measures into related facilities

Case Study

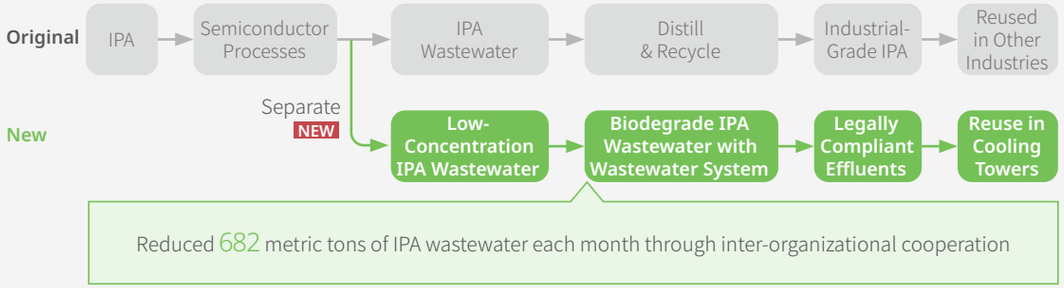
Capitalize on Inter-Organizational Cooperation & Smart Copy across Facilities to Increase Benefits of Source Reduction

Without compromising our excellent product quality, we have been discussing projects for simplifying processes and extending the life cycle of chemicals and equipment maintenance to target source reduction. To expand the scope of our source reduction measures, we are utilizing inter-organizational cooperation to treat IPA wastewater so that it can be reused in cooling towers. We are also capitalizing on the Smart Copy approach to roll out ways to reuse hydrofluoric acid to new processes in other facilities.

Inter-Organizational Cooperation Leads to a Monthly IPA Wastewater Reduction of 682 Metric Tons

In 2021, TSMC discovered, through the Unit Waste Output Management System, that the total amount of IPA wastewater produced at Fab 18A and Fab 15B is higher than that of mature processes. Upon analysis, we realized that advanced processes require the use of IPA and deionized water to prevent the structure from collapsing when spin-drying wafers, which produces a large quantity of relatively low-concentration IPA wastewater. To reduce IPA wastewater effluents, TSMC launched an inter-organizational discussion and experiment involving the Processes, Equipment, and Facility Division and was able to successfully separate relatively low-concentration IPA wastewater from existing wastewater systems. The separated IPA wastewater is then biodegraded to produce effluents that can be reused by cooling towers. This has the dual effects of reducing our monthly IPA wastewater reduction by 682 metric tons as well as water conservation and reducing energy consumption by reducing outsourced distillation treatments.

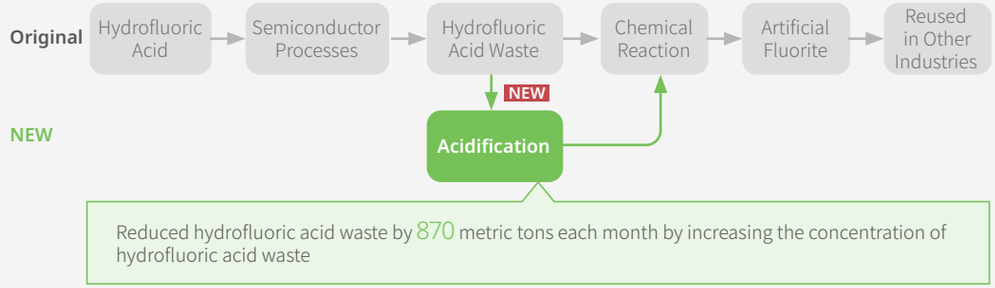
Optimize IPA Wastewater Treatment



Smart Copy across Facilities Leads to a Monthly Hydrofluoric Acid Wastewater Reduction of 870 Metric Tons

In 2021, to increase the yield rate of advanced processes, Fab 18A and Fab 15B introduced a process of back rinsing wafers with hydrofluoric acid. Originally, the hydrofluoric acid could only be used once before disposal into the wastewater tank. To fulfill our commitment to green manufacturing, we used the Smart Copy approach to replicate the circulatory mechanism of adding acid from mature processes and was able to successfully develop an automatic concentration adjustment system exclusive to hydrofluoric acid. We increase the concentration of recycled hydrofluoric acid so that it can be reused again, increasing the number of times that hydrofluoric acid can be used, thereby reducing 870 metric tons of hydrofluoric acid wastewater monthly.

Optimize Hydrofluoric Acid Wastewater Treatment



Circular Economy

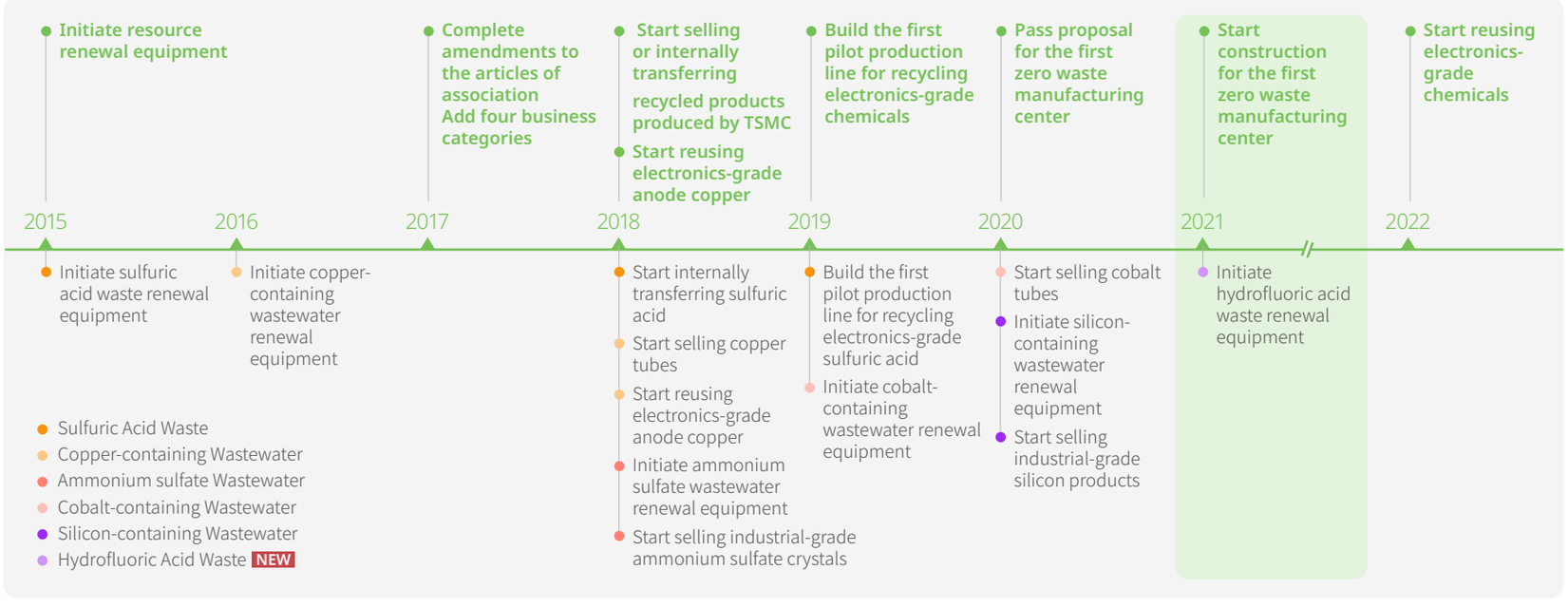
In addition to source reduction, TSMC is also dedicated to promoting a circular sustainable resource project, facilitating the Action Plan to Turn Waste into High-Value Products, building the Zero Waste Manufacturing Center, testing the Electronics-Grade Chemicals Recycling Project, and expanding the Industry Cooperation to Co-Create Resources Project. Resource sustainability and renewal is the cornerstone of TSMC's circular economy strategy and we hope to become a company that practices waste reduction, net zero emissions, and a circular economy.

The Action Plan to Turn Waste into High-Value Products reproduces sulfuric acid, copper sulfate, ammonium sulfate, and silicon-containing wastewater into renewed resources for in-house reuse or sale to related industries. In 2021, Taiwan facilities renewed a total of 180,000 metric tons of resources and created over NT$700 million in value from recycling resources. TSMC also successfully developed the first ever Hydrofluoric Acid Waste Regeneration System which can convert hydrofluoric acid waste into high-purity cryolite. We expanded the emerging circular economy model and have started building the Zero Waste Manufacturing Center, which will be operational in 2023. We also conducted pilot testing for the Electronics-Grade Chemicals Recycling Project, which can hopefully reproduce wastewater into electronics-grade chemicals to be reused in productions lines by 2025, thereby reducing environmental impact from mining.

In 2021, TSMC worked with manufacturers across industries and conceived the Industry Cooperation to Co-Create Resources Project. The Project has allowed TSMC to successfully recycle rather than bury 3 types of waste, e.g., reproducing construction surplus soil from facility repairs into lean concrete as well as recycling and reproducing quartz glass into construction materials and art. We were also inspired by our success with recycling electronic-grade copper materials to collaborate with vendors to reproduce quartz disks as quartz rings; we believe the quartz rings will be ready for applications in semiconductor processes in 2022, cutting our landfill rate in half from 0.2% to 0.1%. In 2021, TSMC has laid the foundation for the implementation of waste life cycle management procedure 2.0. Fab 12 Phases 1& 2 both obtained UL 2799, the highest platinum rating for zero waste to landfill, and we are planning for all Taiwan facilities to obtain UL 2799 in 2023 and all subsidiaries in 2025, which will bring us to a new milestone in resource sustainability.

In addition, TSMC continues to evaluate resource recycling projects such as using pyrolysis to create oil products or solid fuel from plastic waste. This can reduce incineration rates, increase recycling rate, and is in line with TSMC's EP&L management model where we actively try to reduce the environmental footprint and impact of our waste treatment as we strive towards net zero emissions.

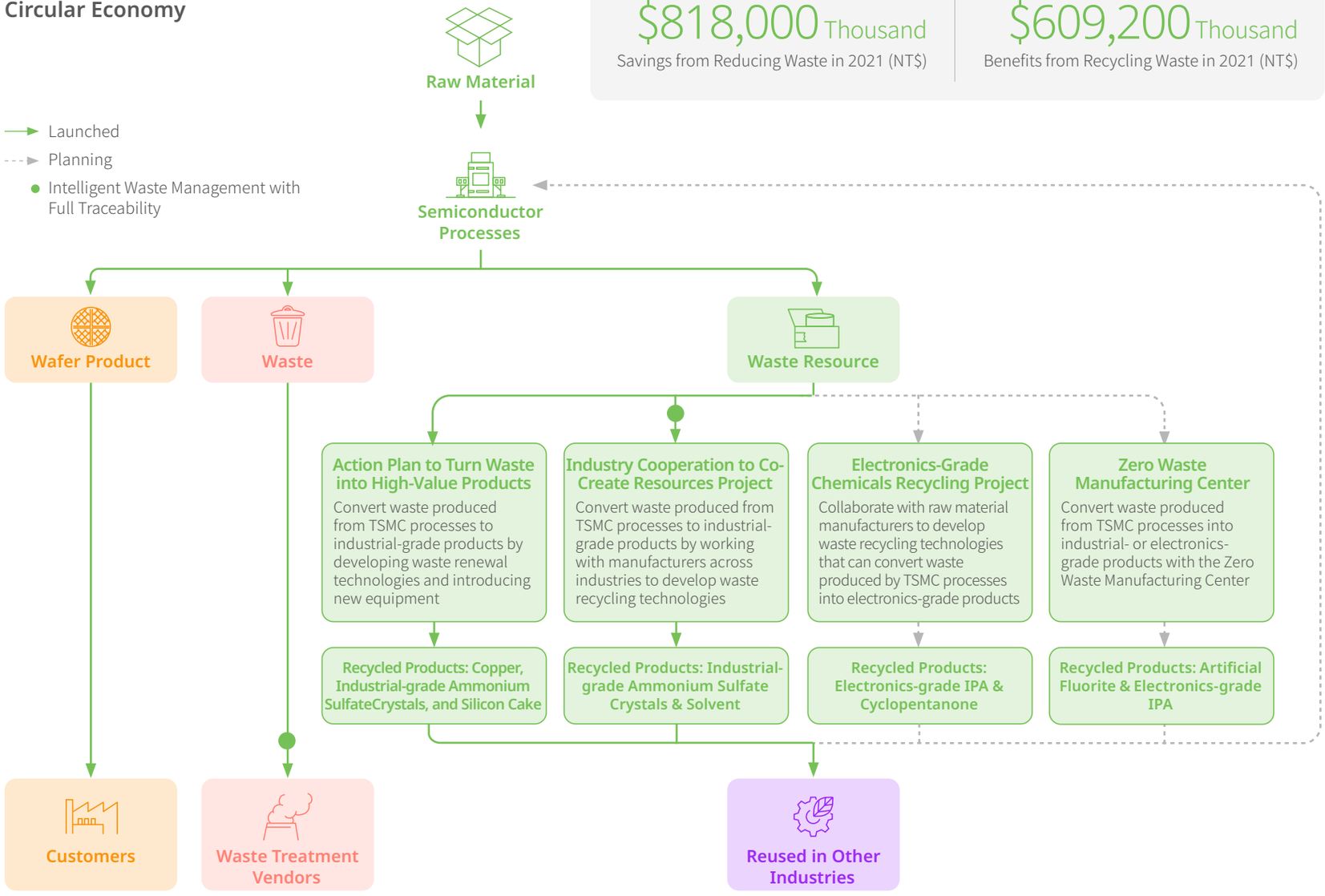
Circular Economy Milestone



TSMC Aspires to be a Practitioner of Circular Economy

$818,000 Thousand
Savings from Reducing Waste in 2021 (NT$)

$609,200 Thousand
Benefits from Recycling Waste in 2021 (NT$)



Case Study

Hydrofluoric acid wastewater produced by wafer processing and cleaning processes was originally outsourced for waste treatment. To reduce risks from mishandling by outside waste treatment vendors and enhance the reuse value of hydrofluoric acid waste, TSMC collaborated with suppliers to conduct research on hydrofluoric acid waste recycling technology and high-purity cryolite technology, overcoming various challenges of software design, hardware/ equipment, and operations throughout the testing process. After repeated testing and verification, we successfully launched TSMC's first Hydrofluoric Acid Waste Regeneration System in 2021, converting hydrofluoric acid wastewater into high-purity cryolite, which can be used as a high-quality fluxes required for electrolysis in the aluminum industry, thereby enhancing the regeneration technology of the domestic circular economy industry. TSMC plans to implement this system in advanced process fabs in 2023, with the expectation that it will reduce outsourced hydrofluoric acid waste by about 46,000 metric tons and create a benefit of more than NT$400 million per year.



TSMC Hydrofluoric Acid Wastewater Synthesis Cryolite System Filter Press Equipment

8 measures for clean-up personnel training & management
6 measures to improve auto safety

Audit and Guidance

While committed to source reduction and achieving a circular economy, TSCM also takes full responsibility of waste clean-up, treatment, and flow. We track the entire waste clean-up process through our GPS Satellite Fleet System and request that our waste clean-up vendors comply with the Supplier Transportation Management White Paper. We're also implementing the Waste Clean-up Vendor Operations Enhancement Project to promote three major management protocols for waste-clean-up, operations, and post-departure across the 4 dimensions of company operations, management of clean-up personnel, specification certification for vehicles, and operational processes.

In 2021, TSMC conducted on-site audits at 42 waste clean-up vendors and completed 14 mitigation measures for 100% of tank trucks and sludge clean-up trucks. TSMC is also demanding clean-up vendors to obtain ISO 45001 management system certificates and 78% of clean-up vendors have already obtained the necessary certification. In 2023, we aim to increase that percentage to 100%.

In regards to waste treatment vendors, TSMC is implementing the Waste Treatment Vendor Sustainability Enhancement Project. Starting with new vendor selection, TSMC conducts document review and on-site operational inspections across six dimensions to carefully choose outstanding vendors to work with. We then conduct on-site inspections comprised of eight dimensions and 166 inspections items for qualified vendors that pass

Manage & Control the Operational Processes of Waste Clean-Up Vendors through the Waste Clean-up Vendor Operations Enhancement Project

Before Clean-up

Vendor Selection Process

- Establish a standardized selection process to evaluate vendor qualifications
- Establish a certification system for clean-up personnel and vehicles to ensure operator competence and vehicle specifications

During Clean-up

Observe tank trunk operations

- Observe tank truck operations on-site and review documents, vehicle specifications, and processes to evaluate operational compliance

After Clean-up

Annual Vendor Audit

- Conduct comprehensive evaluation of waste clean-up vendor management through annual audits
- Strengthen awareness through examples of accidents and enforcing autonomous tank truck inspections through annual training plans for clean-up personnel and annual inspection plans for tank trucks

Manage & Control the Operational Processes of Waste Treatment Vendors through the Waste Treatment Vendor Sustainability Enhancement Project



the selection process. Lastly, vendor replacement is carried out based on the three dimensions stipulated in the Annual Inspection for Waste Treatment Vendors. In 2021, TSMC audited 56 waste treatment vendors on site, reaching a 100% inspection rate, and 127 deficiencies were mitigated. The percentage of vendors evaluated as "excellent" and "good" has continued to increase from 36% in 2015 to 77%. The percentage of vendors certified for ISO14001 increased to 82% and we plan to increase that percentage to 100% in 2025.

To strive for excellence, in addition to on-site audits and assisting vendors obtain certification, TSMC is also replacing manual inspections with systematic management of suspicious activities through auto-detection and reporting by introducing automated smart technologies as we move full-speed ahead towards intelligent waste management with full traceability. To further enhance supplier sustainability and expand the scope of influence of the green supply chain, TSMC launched interactive online courses on waste management on the TSMC Supplier Sustainability Academy platform, which is available for our supply chain and the public.



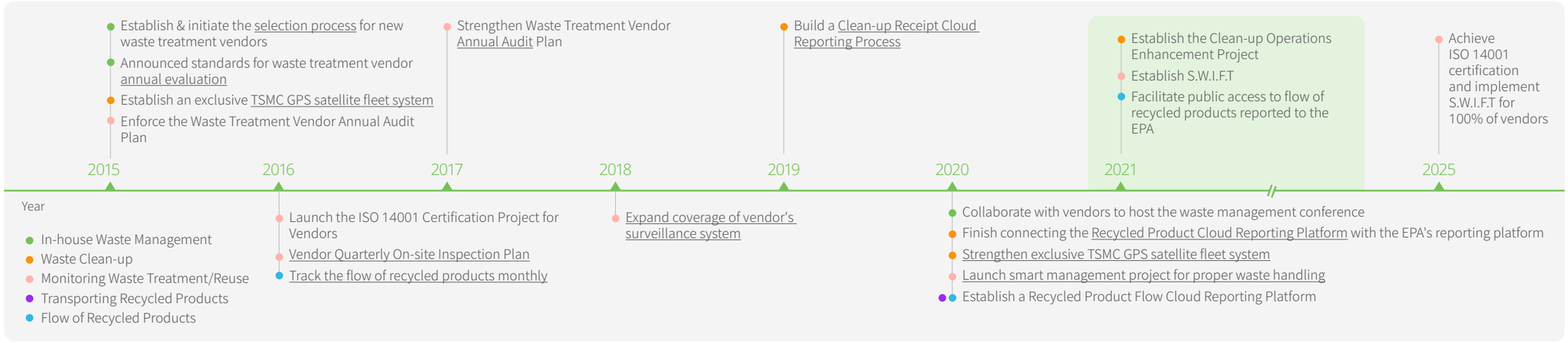
On-site inspections to select new waste treatment vendors

Waste Treatment Vendor Audit and Guidance Results in 2021

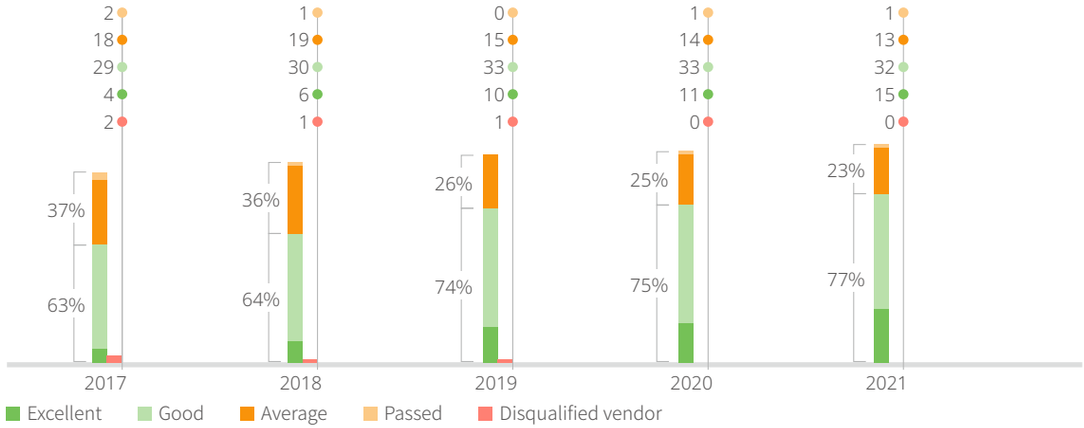


	Percentage of Deficiencies	Number of Deficiencies	Legal Compliance	Onsite Environment/ Operational Improvement	Establishing Regulations & Procedures
Waste Management	45%	57	• Add due diligence requirements • Amend waste disposal contracts to comply with laws and regulations • Correct erroneous declarations	• Correct erroneous labels in waste storage areas • Ensure local waste storage area and management is consistent with license	
Safety and Health Management	30%	38	• Increase employees with first response/ occupational safety supervisor certificates to meet legally mandated quotas	• Enhance personal safety protection – raise awareness about wearing PPE equipment and optimized protection equipment for operations and safety	• Formulate workspace monitoring items & frequencies based on hazard and risk exposure levels • Formulate a Hazard Communication Management Plan
Wastewater Management	17%	21	• Adjust the scope of operations in the water pollution prevention & control plan to comply with on-site practices	• Upgrade equipment to collect water from emergency shower stations • Enforce wastewater meter reading & records • Stabilize water quality and strengthen water quality control	
Air Pollution Management	9%	11	• Correct operational parameters/handling quantity to comply with on-site practices	• Enforce record keeping for equipment operations	• Add internal repair & maintenance plans to the license

TSMC Timeline for Waste Treatment Vendor Management

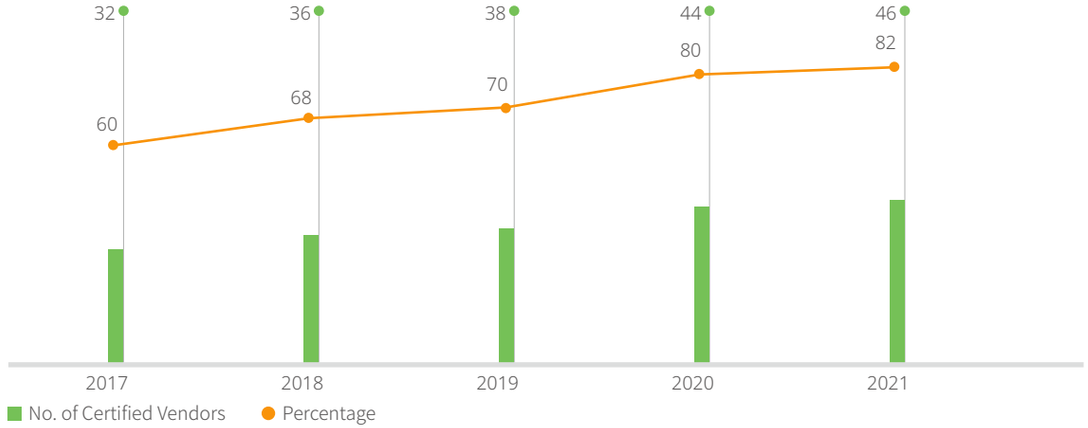


2021 Waste Treatment Vendor Evaluation Results



Note: The total score is 100 points: ≧ 90 points is "excellent"; <90 points "good" ≧ 80 points; <80 points "average" ≧ 70 points; <70 marks "pass" ≧ 60 marks; <60 indicates the elimination of manufacturers

ISO-certified Waste Treatment Vendors



Case Study

Integrate Digital Transformation for the Common Good - Perfecting the Intelligent Waste Management Procedure with Full Traceability

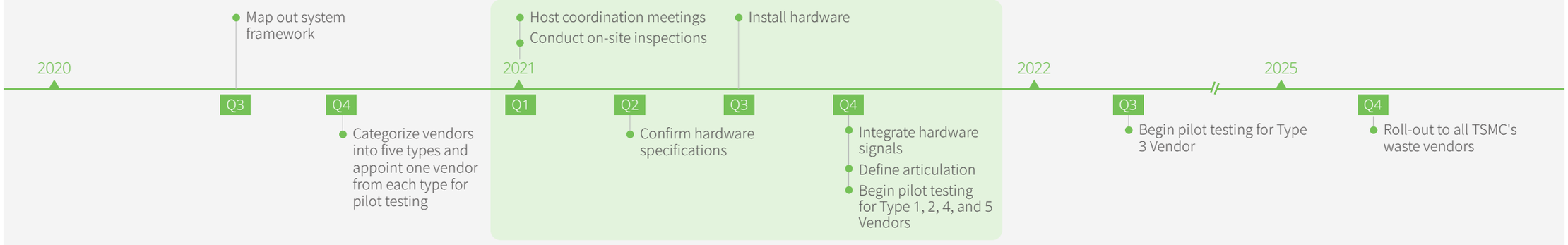
For the effective management of proper waste handling, TSMC finished building the System of Waste Intelligent Fast Track (S.W.I.F.T) in 2021 and selected vendors from 5 different types of waste treatment for pilot testing. We introduced AIoT mechanisms at five critical checkpoints and intend to roll-out the system to all waste treatment vendors in 2025, which will allow us to increase storage and treatment inspections by 65 fold and reduce 13,000 manual inspection hours each year. During the same time, TSMC will be using S.W.I.F.T to track recycled products after they leave TSMC facilities. In addition to quarterly on-site inspections of sales receipts and online inspections via the Recycled Product Cloud Reporting Platform, TSMC further collaborated with the EPA in 2021 to launch a function for institutional organizations to search how outsourced waste is treated and for reuse organizations to search the flow of their products, strengthening tracking and control over recycled products.

TSMC continues to strengthen full traceability management of three outsourced areas of waste clean-up, treatment, and recycled product transport and flow and is also actively promoting digital transformation among waste clean-up vendors. In 2021, TSMC launched the online receipt application for real-time delivery and convenient documentation. TSMC also simultaneously conceived the Digitalization of Proper Handling Documents which we plan to launch in 2022. The digitalization project is estimated to conserve 320,000 papers each year, creating value towards the common good of the environment.



TSMC can track waste storage and treatment remotely by collecting data on waste liquid levels from waste treatment vendor tanks

Milestones for System of Waste Intelligent Fast Track (S.W.I.F.T)



Air Pollution Control

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Best Available Technology Adopt The Best Available Technology to control the pollutants emitted from TSMC operations and minimize environmental impact		
Reduce the unit air pollutant emissions by 60% [Note 1] **(Base year: 2015)**	**Reduce the unit air pollutant emissions by 56%**	**Reduced the unit air pollutant emissions by 54%** ↑ Target: 45%
Reduction rate of volatile organic gases > 98% [Note 2]	**Reduction rate of volatile organic gases > 98.6%**	**Reduction rate of volatile organic gases > 98.4%** ↑ Target: >96%
Strengthen the 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		
Report <1 abnormal occurrence[Note 3] **in air pollution control equipment**	**Report <1 abnormal occurrence in air pollution control equipment**	**Reported 0 cases of abnormal occurrences to the supervising authorities** ✓ Target: <1

Note 1: The 2030's goal for air pollutant emission reduction has already reached in 2021, thereby, TSMC increased the 2030 Goal from 50% to a 60% compared to the base year

Note 2: 2030 goal for reduction rate of volatile organic gases has reached in 2021, thereby, TSMC increased the 2030 Goal from 98% to 99% of reduction compared to the base year

Note 3: The target in 2022 will be adjusted from "Abnormal Occurrences Reported to the Authorities" to "Unexpected Events In Air Pollution Prevention Equipment" for fully effective air pollution management. According to local regulations, an equipment failure must be reported to the authorities within 1 hour or remediate within 24 hours

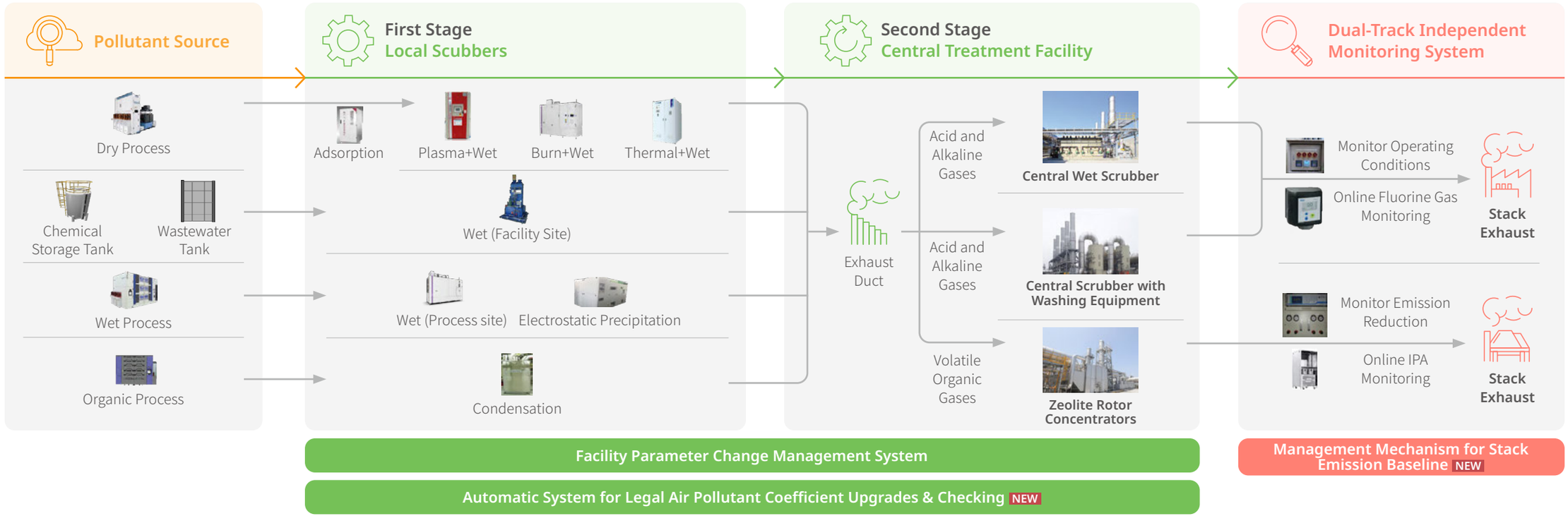
↑ Exceeded ✓ Achieved — Missed Target

TSMC is committed to air pollution control and has adopted "separation emission sources" method and multi-phase BAT to enhance performances of pollution control equipment. We are also actively monitoring and managing the total emissions levels from pollution control systems and aiming for concentration levels from stack emissions to be lower than regulatory standards to achieve the emission reduction goal. TSMC continues to practice green manufacturing by enhancing the performance and control measures for air pollution systems. In 2011, the unit air pollutant emissions and reduction rate of volatile organic gases both reached 2030 goals ahead of schedule.

Best Available Technology

For acid and alkaline gases, TSMC uses two strategy,"effective reduction of emission from sources" and "strengthened management of terminal prevention facilities", to achieve Best available technology (BAT) controls air pollution at the source. Thereby enhancing treatment efficiency of exhaust gases. In the first stage of source separation, TSMC separates pollutants based on their properties. Toxic gases, corrosive gases, flammable gases, perfluorocarbon greenhouse gases, and other acid/alkaline gases will go to the high-efficiency local scrubbers for treatment before entering the central scrubber while the waste gases containing low concentrations of inorganic acid/alkaline gases will go directly to the central scrubber, which is the last-stage of the pollution control equipment for the air pollution removal. For the volatile organic gases, the engineers determine whether the condensing local treatment equipment are required by looking at its boiling point. Then, the exhaust gases will go into the zeolite rotor concentrators for two-stage adsorption, effectively reducing the emission levels.

Air Pollution Control Procedures



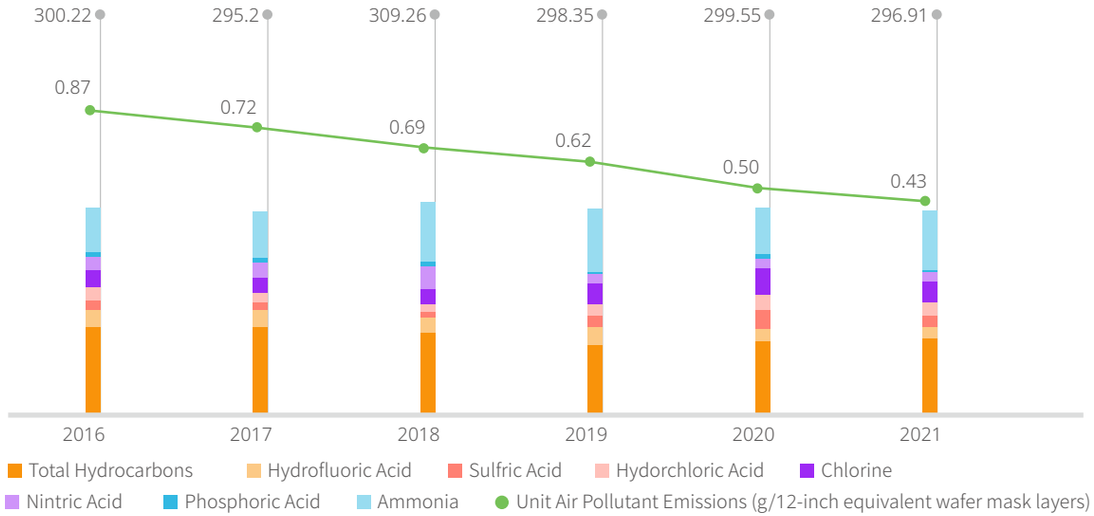
Source Reduction & Management - High-Efficiency Local Scrubbers

As advanced processes continue to evolve, we also aim to control air pollution from new processes and chemicals. New Tool and New Chemical Review Committee at TSMC evaluates the impact of new tools and chemicals on safety, the environment, and health. TSMC adopts eight different types of local scrubbers to pre-treat high-concentration exhaust based on their pollutant properties. The eight different local scrubbers include the thermal-type, the burn-type, the plasma-type, the wet+chemical dosage-type, the adsorption-type, the condensation-type, and the wet-type of local scrubbers. In 2021, TSMC conducted 403 reviews for 191 new tools and 212 new chemicals. In addition, TSMC installed high-efficiency spray devices to the thermal + wet scrubbers. The spray was applied to Fab 15B for testing. The test showed a 87% and 86% reduction in hydrochloric acid gases and derivative particulate matters, respectively, further reducing the load on the central scrubbers.

TSMC also continues to improve existing equipment to enhance performances. In 2021, TSMC introduced a large-capacity (2,500 liter/ minute) burn-type scrubber to the Fab 12B. The burn-type scrubber not only reduced pollutants by over 95% but also was able to reduce thermal loss by 38% through its centralized high-temperature treatment mechanism. Furthermore, it reduced the required surface area by 37%, and pipeline installation fees/ maintenance labor by 50%. As such, the new burn-type scrubber has now been listed as a standard for new facilities in the future.

Total Emission and Air Pollutants Emissions per Unit of Production

Unit: Metric tons



Note 1: TSMC air pollutant emissions were reported in accordance with local laws and regulations

Note 2: Air pollutant emissions include the total emissions of eight gases: hydrocarbons (THC), sulfric acid (H_2SO_4), hydorchloric acid (HCl), nintric acid (HNO_3), hydrofluoric acid (HF), phosphoric acid (H_3PO_4), chlorine (Cl_2), and ammonia (NH_3)

Local Scrubbers Categories

Process	Semiconductor Fabrication	Target Pollutant	Control Technologies	Equipment	Reduction Rate	Real-time Parameter Monitoring
Dry Process	Epitaxial Dry Etching	Corrosive Gases	Burn-Wet		>99%	• Natural gas flow • Oxygen flow • Circulating water flow • Inlet pressure
		Perfluorocarbons	Burn-Wet NEW (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	Thermal-Wet		>95%	• Reactor temperature • Circulating water flow • pH value • Inlet pressure
		Hydrochloric Acids Particulate Matters	Thermal-Wet NEW (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		>90%	• Reactor temperature • Circulating water flow • Inlet pressure
Wet Process	Wet etching	Corrosive Gases Organic Gases	Wet + ChemicalDosage (Process Site)		>95%	• Differential pressure Of local scrubber • Circulating water flow • Inlet pressure • pH value
		Sulfuric Acid (H_2SO_4)	Electrostatic Precipitation		>95%	• 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 Wastewater tanks	Corrosive Gases Acid and Alkaline Gases	Wet + ChemicalDosage (Facility Site)		>95%	• Differential pressure Of local scrubber • pH value • Circulating water flow • Inlet pressure

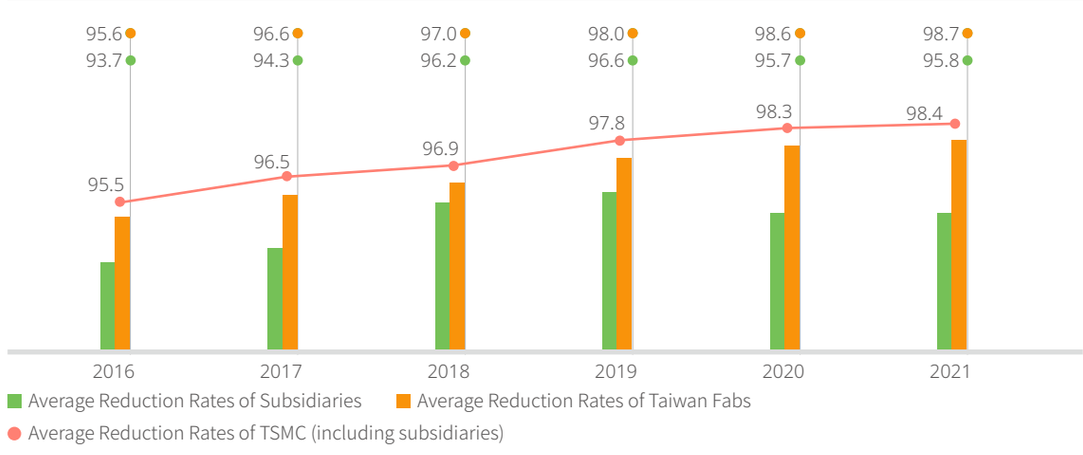
Strengthen Management of Terminal Prevention Facilities - Central Scrubbers

After first-stage treatment, the exhaust gases undergo second-stage treatment: acid and alkaline gases are channeled into scrubber in central treatment facilities while volatile organic gases are channeled to zeolite rotor concentrators for adsorption and burning. To enhance the scrubber efficiency, the Facility Division collaborated with the Industrial Technology Research Institute to design a high-efficiency central scrubber, which was first introduced to Fab 18B in 2021, and enhance the reduction efficiency of acid and alkaline gases to 40%.

In terms of volatile organic gases, TSMC continues to carry out the Low-efficiency Single Zeolite Rotor facilities. New facilities started utilizing the dual zeolite rotor concentrator, which has already been installed to Fab 18B in 2021 and will be installed to Fab 12 Phase 8, Advanced Backend Fab 6, and other facilities in 2022. In addition, TSMC will apply smart control parameters to the zeolite rotor systems. Concentration level at the inlet, temperature, air flow, and other external parameters are imported into the tool so that it can adjust the optimal burning temperature, desorption temperature, rotor rotation, and other operating parameters. In 2021, the reduction rate of volatile organic gases reached 98.4%. Due to the continued increase in removal efficiency, the total air pollutant emissions have not increased with the addition of new facilities.

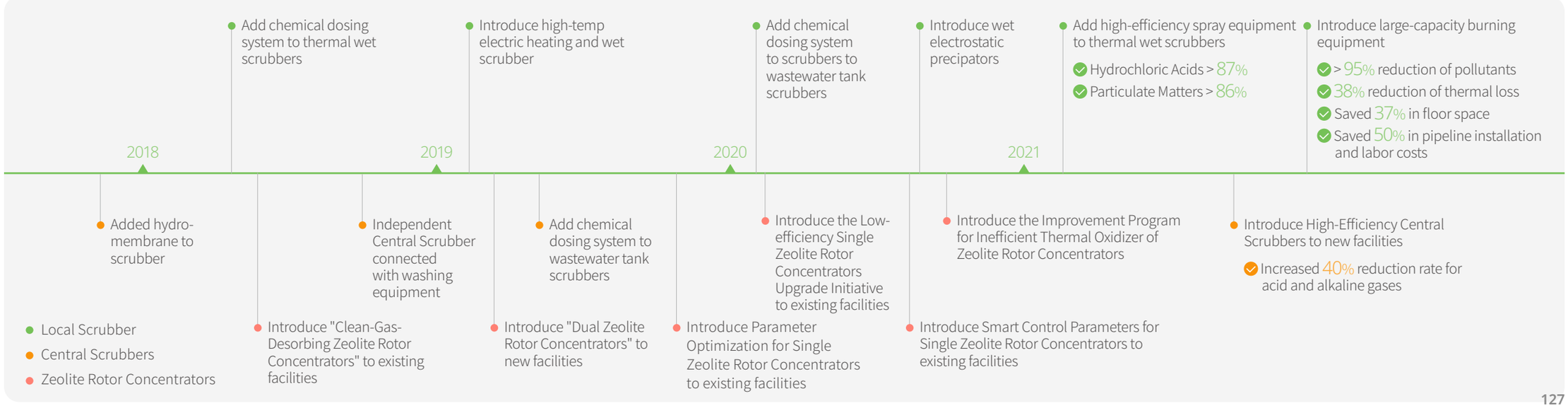
Exhaust gas treated by the first zeolite rotor through adsorption and burning is sent through the second zeolite rotor for concentration and then returned the first zeolite rotor for treatment again. The repeated process achieves reduction rate of up to 99.5%

Annual Reduction Rate of Volatile Organic Gases



Note: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra. Data excludes WaferTech as there is no total hydrocarbon monitor to provide any record of reduction rates.

Timeline for Air Pollution Prevention Systems

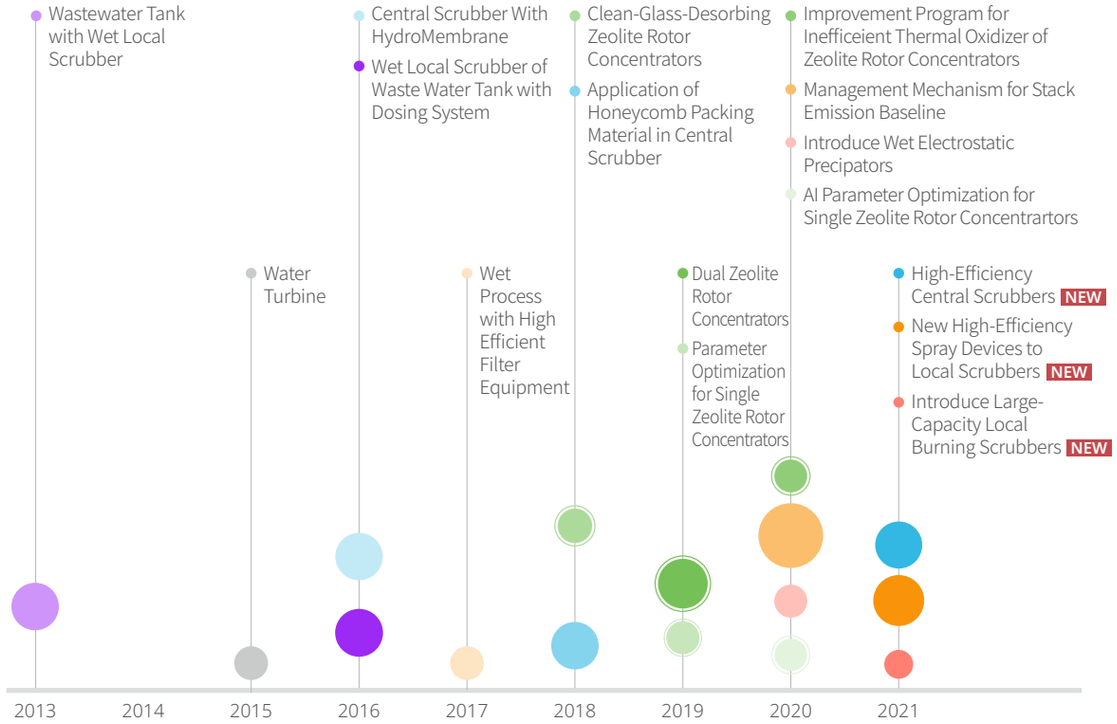


Environmental Laboratory to Drive Innovation for Prevention Technologies

TSMC is dedicated to reducing air pollutant emissions and continues to practice green manufacturing with concrete actions. In order to ensure TSMC's air pollution prevention facilities remain highly efficient, the Environmental Laboratory was established to further strengthen stack emission monitoring and management measures. The Environmental Laboratory monitors and collects emission concentration levels from TSMC facilities across Taiwan and sets emission concentration levels for various pollutants to be stricter than regulatory standards. The Environmental Laboratory then uses baseline management to identify stacks that exceed TSMC's emission concentration standards for confirmation at the source. For stacks with higher concentration levels of acid and alkaline gases that exceed TSMC's emission standards, TSMC has a program to install the High-Efficiency Local Scrubber to increase reduction rate of the target pollutants. TSMC also has a Renovation Program for Air Pollution Prevention Equipment to replace the central scrubbers and other last-stage air pollution control equipment that have reached the end of their life cycles. For stacks with volatile organic gases that exceed TSMC's emission standards, TSMC has an Improvement Program for Inefficient Thermal Oxidizer of Zeolite Rotor Concentrators to convert or replace the Regenerative Thermal Oxidizer into Direct-fired Thermal Oxidizer. In 2021, 43 stacks exceeded baseline concentration standards and TSMC was able to mitigate and verify mitigation outcomes for 21 stacks. TSMC regularly monitors and seeks to upgrade any stacks that fail to meet reduction standards. Facilities teams also communicate with other facilities teams to share and exchange experiences to accelerate the timeline for the upgrades.

In addition to implementing reduction measures and increasing reduction efficiency, the Environmental Laboratory has introduced air quality monitoring vehicles that travel to different facilities to monitor air quality on site and compile long-term records to show changes in air quality over the long run. Their records will serve as reference when TSMC is formulating air quality monitoring policies to continue strengthening the development of air pollution control technologies.

Prevention Technology Feasibility & Reduction Effectiveness Evaluation



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

Environmental Laboratory Regularly Monitors & Tracks All Stacks for Emissions Lower Than Regulatory Standards



Mission of Environmental Laboratory

Strengthen pollutant monitoring and management for stacks, drive innovative technologies for pollutant treatment, and aim for stack emissions to align with surrounding background values

1. Monitor and collect stack emission concentration levels for TSMC facilities in Taiwan
2. Formulate a baseline standard for pollutant emission concentration levels
3. Implement mitigation measures for stacks emitting concentration levels over TSMC's baseline standards and track mitigation outcomes
4. Continue to improve and protect the environment

Air quality monitoring vehicle monitors air quality for areas surrounding TSMC facilities

Strengthen Monitoring of Air Pollution Prevention Equipment

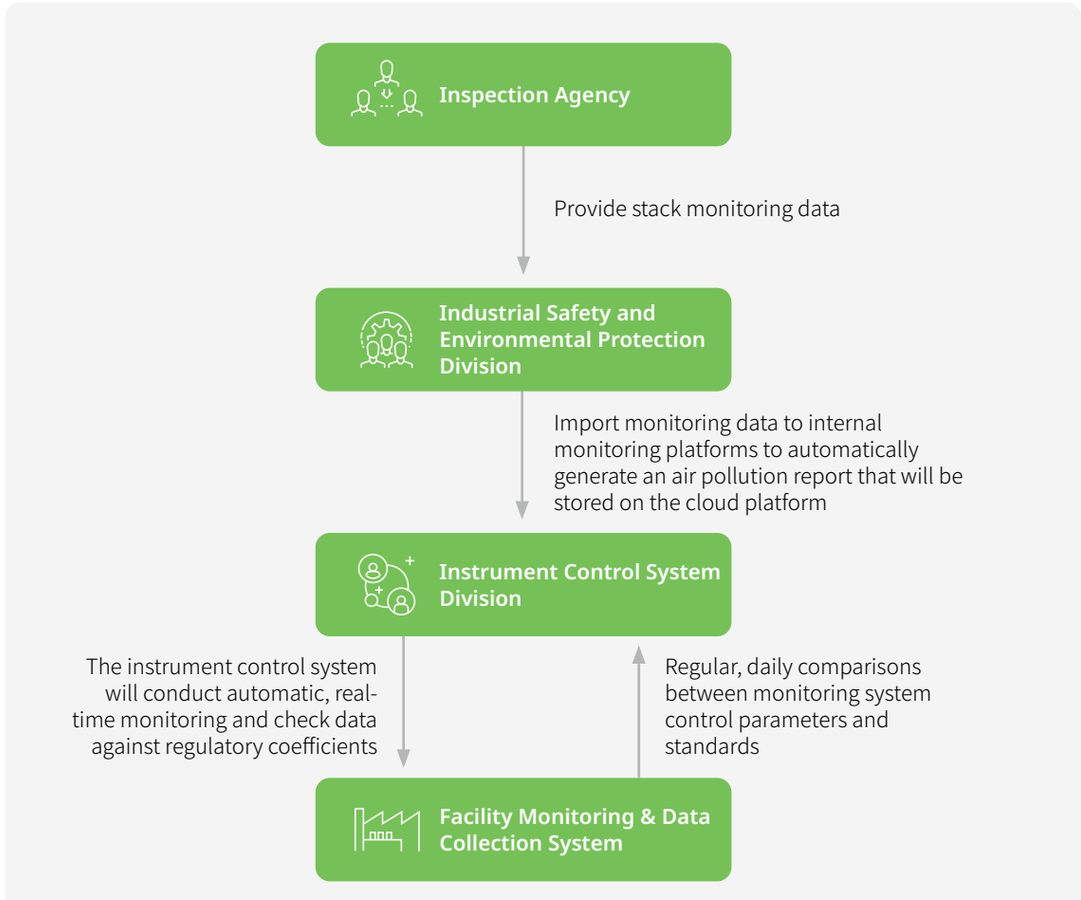
TSMC is actively enhancing the treatment efficiency of the control equipment as well as regularly monitoring and reporting emissions data in compliance with Taiwan and overseas regulations, TSMC is also installing automatic pollutant monitoring systems for all stacks. The systems include a hydrocarbon monitor, online IPA monitor, and online fluorine gas monitors, which were first installed in Fab 12A in 2018 and then, gradually, Fab 12B, Fab 14A, Fab 14B, Fab 15A, Fab 15B, and Fab 18A. Through rigorous control of monitoring data and accuracy as well as effective, real-time monitoring of actual emission levels, TSMC achieved zero abnormal air pollution events in 2021.

In addition, to ensure air pollution treatment facilities remain at optimal efficiency for operations all-year around, TSMC adopts the N+1 rule where all equipment must have at least one backup system. TSMC also has an Uninterrupted Power Supply System to help fulfill the management target of zero failure in control equipment. All control equipment is also equipped with a Dual-track Independent Monitoring System that allows the Facility Division and Industrial Safety and Environmental Protection Division to simultaneously check the equipment's status and its related operational parameters. The Dual-track Independent Monitoring System is equipped with a comprehensive alert system. Once the system or the equipment becomes ineffective or fails, both the Facility Division and the Industrial Safety and Environmental Protection Division can independently monitor, conduct emergency repairs, or launch backup systems.

TSMC faces a growing demand for fab facility equipment as a result of rapidly evolving processes. In 2021, the Facility Division, Industrial Safety and Environmental Protection Division, and Instrument Control System Division worked together to build an Automatic System for Legal Air Pollutant Coefficient Upgrades & inspection, where a third-party inspection agency will regularly conduct stack inspections and then hand over the data to the Industrial Safety and Environmental Protection Division to update and import the information to the internal monitoring platform, which will then automatically generate air pollution reports that will be stored to cloud platforms. The air pollution reports will then be read by the Facility Parameter Change Management System[Note] and Facility Monitoring and Data Collection System daily for automatic comparison and inspection. Compared to past air pollution reports compiled manually, the new automatic reports saved 60% of working time while preventing erroneous report to the government agencies as well as preventing data loss. This effectively increases the accuracy and reliability of TSMC reports to government agencies.

Note: TSMC's 12-inch fabs first adopted the Facility Parameter Change Management System in 2020. The system automatically compares parameters to standard parameters at a fixed time each day to ensure that preventive facilities are operating on optimal parameters and effectively control operational parameters of treatment facilities

Automatic System for Legal Air Pollutant Coefficient Upgrades & Checking



Case Study

Increase Reduction Rate of Acid and Alkaline Gases by 40% with Development of High-Efficiency Central Scrubber

TSMC is actively enhancing the efficiency of terminal prevention facilities and is collaborating with the Industrial Technology Research Institute to launch the Central Scrubber Optimization Program to optimize pollution treatment capabilities and tower structure for an added front filter and self-clean function that will help extend the period between maintenance and reduce any risks that may arise from switching in between prevention facilities. In 2020, TSMC completed design and testing for High-Efficiency Central Scrubbers. In 2021, TSMC successfully introduced the High-Efficiency Central Scrubber to Fab 18B Phase 4 and increased the reduction rate of acid and alkaline gases by 40%. We plan to introduce High-Efficiency Central Scrubbers to Fab 18B Phases 5 & 6 in 2022 and will be making it a standard prevention facility in all future facilities. For existing facilities, we will continue to optimize the tower structure to enhance emission treatment efficiency.



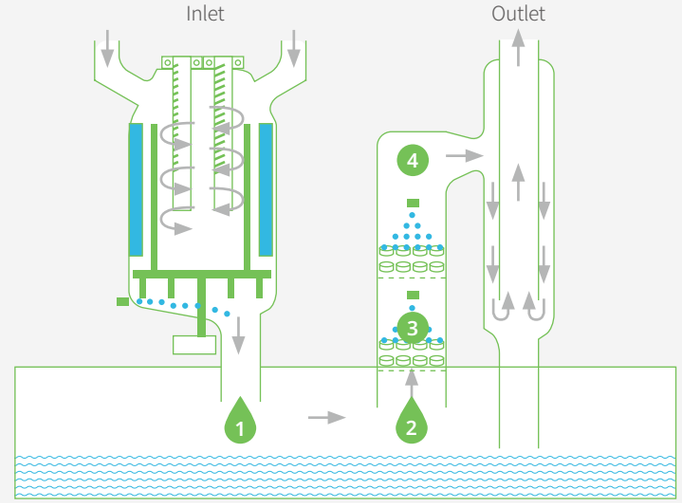
Central Scrubber

Reduction Rate of Hydrochloric Acid and Particulate Matters Increase by 87% & 86% with New Air Pollution Prevention Facilities

In order to enhance the efficiency of source reduction, TSMC is working with vendors to improve performances of existing local scrubbers, especially thermal wet scrubbers that target exhaust gases from boiler tubes as DCS and chlorine used in boiler tubes create hydrogen chloride and large amounts of particulate matters within the facility. As such, we developed high-efficiency spray devices that uses high-speed air to vaporize liquid droplets and reduce the diameter of particulate matters. This will increase the contact surface between liquid droplets and pollutants, allowing it to coagulate into a larger solid particulate matter that can then be intercepted by scrubber sprays for enhanced treatment efficiency.

In 2021, TSMC conducted pilot testing and introduced high-efficiency spray devices to Fab 15B, increasing the reduction rate of hydrochloric acid and particulate matters by 87% and 86%. We plan to introduce the high-efficiency spray device to Fab 18B in 2022 and will be making it a standard system for new facilities. For existing facilities, we will be carrying out a three-year upgrade plan to ensure total emissions do not increase with the addition or expansion of facilities.

Increase Air Pollution Reduction Rate by Upgrading Local Scrubbers



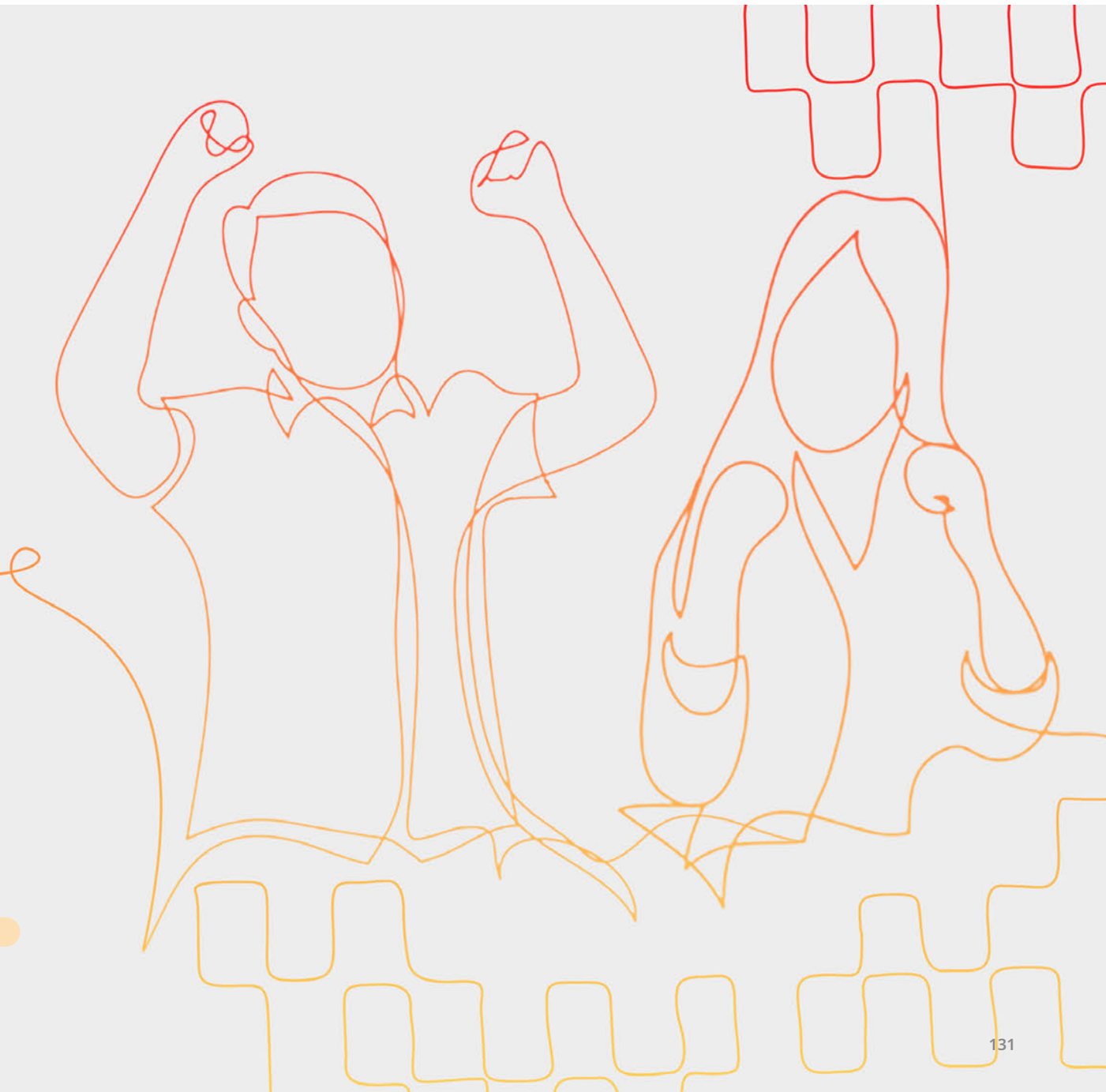
Mitigation Items

1 2 3 Add high-efficiency spray device to reduce droplet diameter and, thereby, expand contract surface with pollutant

4 Add a scrubber spray to intercept particulate matters and enhance treatment efficiency

An Admired Employer

TSMC remains committed to the core values of Commitment and strives to foster a diverse and inclusive culture as well as an open-style management system to attract and retain talents of different backgrounds and professions. We offer competitive compensation and benefits as well as a safe and fun workplace for growth. It is our mission to become a company that our employees can be proud of.



4x

The average total compensation for direct employee is four times the minimum monthly wage in Taiwan

8,536

New high-quality job opportunities around the world

100%

All employees and contractors passed safety and health training programs for operational qualifications

Diversity and Inclusion | Talent Attraction and Retention | Talent Development | Human Rights | Occupational Safety and Health

Diversity and Inclusion

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Establish an Open-style Management System Fulfill Core Values and Business Philosophy and continue to shape an inclusive culture		
Rank in the 75th percentile for Diversity and Inclusion; rank is determined by comparing results from the Engagement Survey[Note] against the WTW Global High Performance Norm NEW		
Unleash the potential of Women@tsmc Provide resources to support Women@tsmc to help them grow and flourish		
Women in management: ≧ 20% NEW	**Women in management: ≧ 14%**	**Women in management: 13%** ↑ Target: 12.5%
Ensure women account for 30% of all newly hired technical professionals NEW	**Ensure women account for 25% of all newly hired technical professionals**	**Ensured women account for 21.3% of all newly hired technical professionals** ↑ Target: 21%

Note: The Engagement Survey is issued once every two years and will be issued next in 2023. For results from the 2021 Engagement Survey, please refer to the section on Strengthen Employee Commitment in Talent Attraction and Retention

↑ Exceeded ✓ Achieved — Missed Target

TSMC's Diversity and Inclusion Statement proposes that the composition of TSMC employees should reflect current demographics. We should bolster the Company's competitive advantage and facilitate sustainable development with diversity in our management and employees. TSMC is actively fostering a diverse work culture and creating an inclusive workplace to cultivate future semiconductor professionals so that the industry may benefit from the full potential of global talents.

Establish an Open-style Management System

With respect to the Business Philosophy written and published by TSMC Founder - Morris Chang, TSMC hopes to apply an open-style management system to respond to social development trends and actively foster a diverse and inclusive environment. TSMC established the Diversity and Inclusion Team in 2021 to continue working on the four areas of Diverse Communication Channels, Learning Resources, Employee Welfare, and Unleashing Female Potential. We hope to prove our commitment and actions to fostering talents, cultivating talents, and retaining talents as we fulfill our core values.

Establish an Open-style Management System



TSMC has implemented an open-style management system designed to keep all lines of communication open. Employees openly cooperate with one another, while treating each other with honesty and sincerity. Everyone welcomes constructive criticism and is willing to seek improvement. This management style allows all opinions to be expressed before a final decision is made. Once a decision is made, everyone works together to achieve the set goal.

The Four Areas of Diversity and Inclusion

- Communication meetings at all levels/ across levels
- A global Engagement Survey that regularly and systematically compiles employee opinions
- Establish multiple channels for employees to voice their feedback and respond to employee demands and suggestions as soon as possible

Diverse Communication Channels

- Provide diverse learning resources and tools to strengthen the professional know-how and self-efficacy of our employees
- Diverse learning methods to help employees understand the significance of Diversity and Inclusion

Diverse Employee Welfare

- Launched the TSMC Child Care Benefit Program to support employees balancing family life and work NEW
- Free advanced health check-ups & leave for TSMC employees with five-year seniority and longer NEW
- Upgrade the Service Award to recognize employees' service and contributions to the company NEW

Learning Resources

- Organize an Inclusive Leadership Workshop NEW
- Found the Women's Employee Resource Group NEW

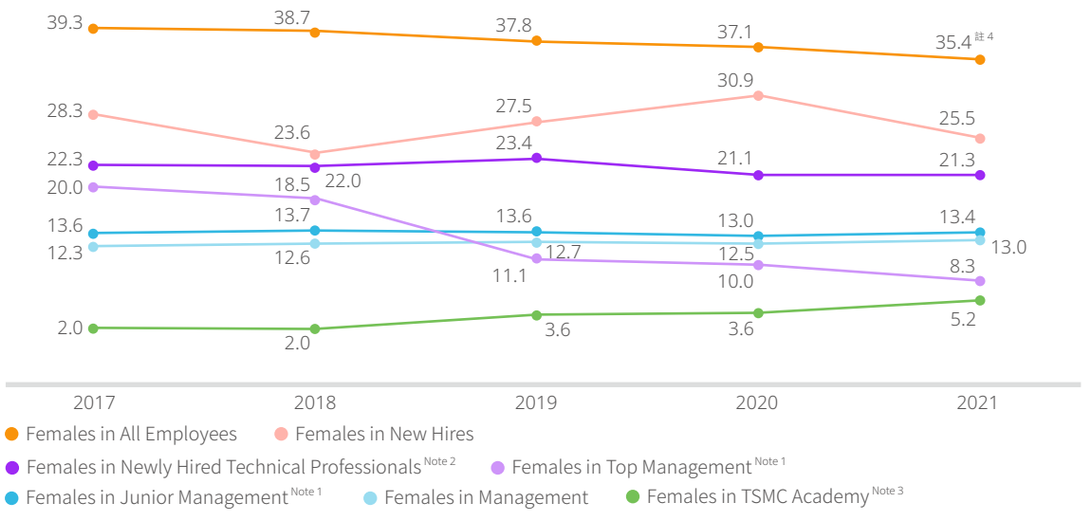
Unleashing Female Potential

Unleash Female Potential

In 2021, TSMC organized three Inclusive Leadership Workshops and established the Women's Employee Resource Group - Women@TSMC to offer female employees a platform to support each other, strengthen the network of female employees at TSMC, and encourage them to pursue their career goals and self-growth. In 2022, TSMC will continue to organize the Inclusive Leadership Workshop and also introduce a series of courses on Diversity and Inclusion, lectures related to Diversity and Inclusion, and female forum activities. We will also be extending the reaches of talent cultivation to the TSMC STEM for High School Girls Program to cultivate future semiconductor professionals.

Percentage of Female Employees

Unit: %



Note 1: Junior management positions include first-line managers while top management positions include Vice Presidents and higher

Note 2: Newly Hired Technical Professionals include all newly hired technical professionals with less than one year of recognized experience

Note 3: TSMC Academy members with outstanding achievements, insights, or breakthroughs in specific fields or experts with outstanding contributions to TSMC

Note 4: Percentage of female employees has been decreasing in the past five years because as we are increasing capacity, the majority of new hires are engineers but there is a significantly lower number of female engineers than male engineers in the labor market

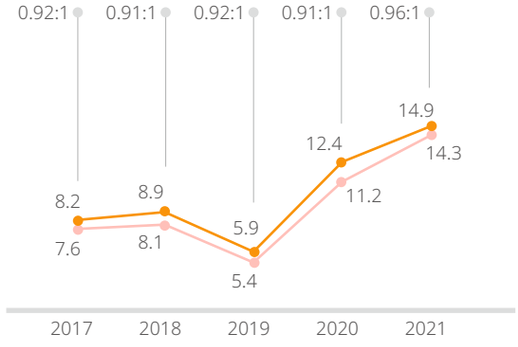
Compensation Ratio by Gender

Region/ Subsidiary	Position	2017	2018	2019	2020	2021
Taiwan	Managers	0.93:1	0.99:1	0.95:1	0.97:1	0.97:1
	Professionals	0.96:1	0.93:1	0.93:1	0.93:1	0.93:1
	Assistants	1.09:1	0.98:1	0.97:1	0.97:1	0.93:1
	Technicians	1.18:1	1.14:1	1.13:1	1.13:1	1.14:1
China	Managers	0.96:1	0.96:1	0.94:1	0.96:1	1:1
	Professionals	0.87:1	0.89:1	0.89:1	0.88:1	1:1
	Assistants	0.95:1	0.93:1	0.88:1	0.91:1	1.14:1
	Technicians	1:1	1.07:1	1.05:1	1.11:1	1.16:1
North America, Europe, Japan, and South Korea Note	Managers	-	0.88:1	0.95:1	0.94:1	0.97:1
	Professionals	-	0.78:1	0.79:1	0.78:1	0.82:1
Japan	Managers	0.57:1	-	-	-	-
	Professionals	0.83:1	-	-	-	-
North America	Managers	0.82:1	-	-	-	-
	Professionals	0.73:1	-	-	-	-
Europe	Managers	1.98:1	-	-	-	-
	Professionals	0.9:1	-	-	-	-
VisEra	Managers	0.78:1	0.79:1	0.72:1	0.71:1	0.69:1
	Professionals	0.88:1	0.87:1	0.86:1	0.86:1	0.85:1
	Assistants	0.89:1	1:1	1.03:1	1.06:1	1.18:1
	Technicians	1.05:1	1.04:1	1.13:1	1.03:1	1.04:1
WaferTech	Managers	0.8:1	0.79:1	0.84:1	0.75:1	0.79:1
	Professionals	0.81:1	0.83:1	0.91:1	0.83:1	0.87:1
	Assistants	0.9:1	0.87:1	0.91:1	0.91:1	0.93:1
	Technicians	1.08:1	1:1	0.99:1	1:1	1.02:1

Note: Before 2018, statistics of Japan, North America, and Europe were calculated separately. From 2018, statistics of Japan, North America, and Europe are calculated collectively

Promotion Rate by Gender

Unit: %

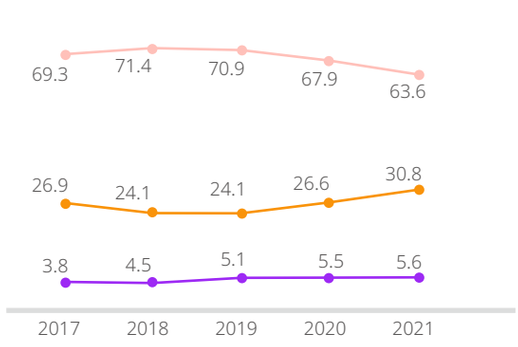


Promotion Rate of Male | Promotion Rate of Female | Promotion Rate of Female : Male

Note: Data from 2017 does not cover VisEra or WaferTech

Age

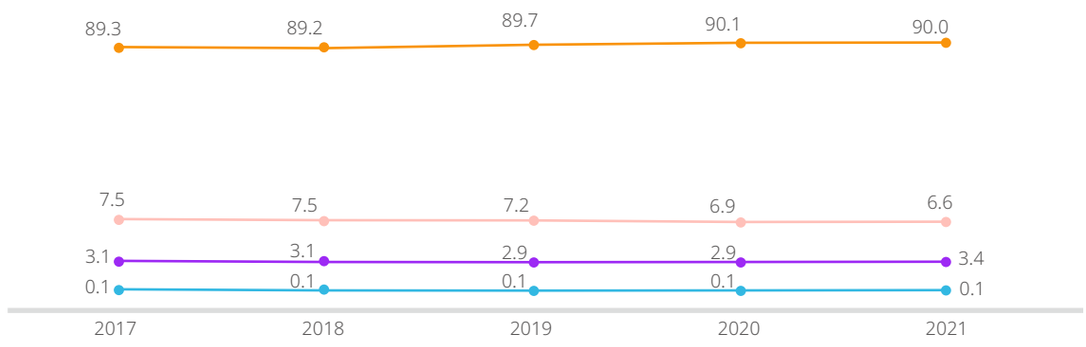
Unit: %



18~30 | 31~50 | 50+

Work Location

Unit: %

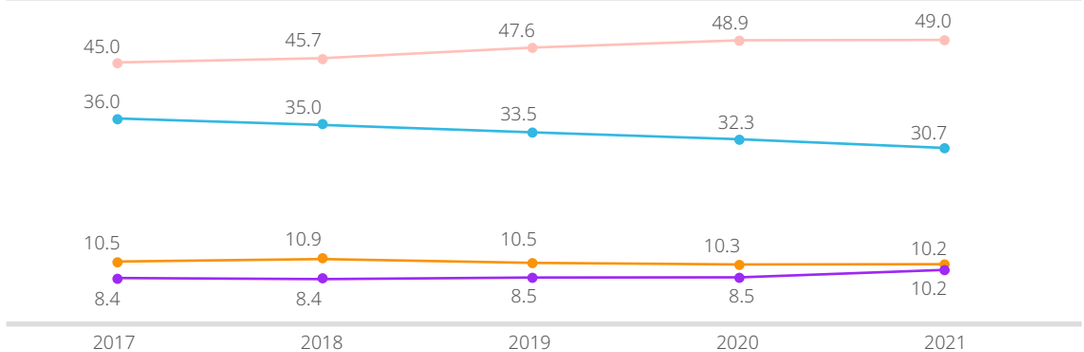


Taiwan | Asia[Note] | North America | Europe

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

Position

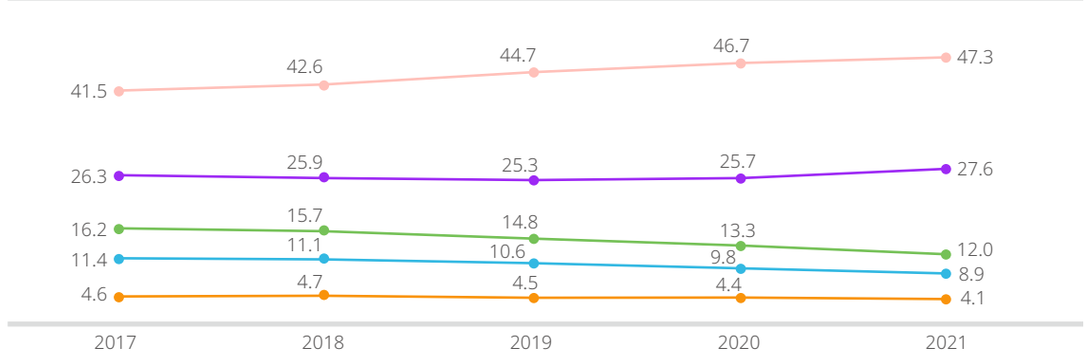
Unit: %



Managers | Professionals | Assistants | Technicians

Education

Unit: %



Ph.D. | Master | Bachelor | Other Higher Education | High School

Talent Attraction and Retention

Strategies & 2030 Goals [Note 1]	2022 Targets	2021 Achievements	
Fulfill the "Commitment" Core Values Offer employees quality jobs and strengthen employee commitment			
Conduct an Employee Core Value Survey 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 willing to continue working for TSMC in the next five years	• 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	For more details, please refer to "Strengthen Employee Commitment" in this section Target: Reinforce core values based on the 2020 Employee Core Values Survey results, conduct the 2021 [Note 2] Employee Engagement Survey to increase employee engagement, and strive towards TSMC's commitment to sustainability	✓
Conduct an Employee Engagement Survey every two years to reinforce core values • Rank in the 75th percentile for Sustainably Engaged; rank is determined by comparing results from the Engagement Survey against the WTW Global High Performance Norm NEW		Ranked in the 75th percentile for Diversity and Inclusion; rank is determined by comparing results from the Engagement Survey against the WTW Global High Performance Norm NEW Target: 50th percentile in the issue of Sustainably Engaged	–
Maintain position above 75th percentile among industry peers in total compensation	Maintain position above 75th percentile among industry peers in total compensation	Maintained position above 75th percentile among industry peers in total compensation Target: 75th	✓
Maintain total turnover rate between 5%–10%	Maintain total turnover rate 5%–10%	Total turnover rate: 6.8% Target: 5%~10%	✓
Less than 10% new hire (< 1 year) turnover rate	Maintain less than 15% new hire (< 1 year) turnover rate	New hire turnover rate (<1 year): 17.6% [Note 4] Target: ≦ 15%	–

Note 1: In response to materiality analysis results and development strategies in 2021, we have made adjustments to parts of the content for this strategy and sustainable target

Note 2: The Employee Engagement Survey is issued once every two years and will be issued next in 2023. For results from the 2021 Employee Engagement Survey, please refer to the section on "Strengthen Employee Commitment" in "Talent Attraction and Retention"

Note 3: The following targets have been moved to "Talent Development" due to adjustments in development strategies: "Fill over 50% of vacancies through internal transfers" and "Fill over 75% of manager positions through internal promotions"

Note 4: For more details, please refer to "Maintain Healthy Turnover Rate"

↑ Exceeded ✓ Achieved – Missed Target

As the global semiconductor industry flourishes, TSMC has been welcoming accelerated growth in recent years as well. To meet global customer demands, TSMC continues to develop advanced technologies and expand production capacities in Taiwan but is also building factories in overseas locations such as the U.S., China, Japan, etc. We have, therefore, dedicated much of our efforts to talent recruitment, development, and retention. TSMC commits to providing quality job opportunities to employees. This entails competitive compensation, welfare programs better than statutory requirements, and a safe and healthy workplace. We hope this can encourage employee commitment and engagement with the Company as well as attract and retain more talents to sustain the Company's long-term development.

Fulfill the "Commitment" Core Values

Fulfill Core Values

TSMC's four core values of integrity, commitment, innovation, and customer trust were defined by TSMC Founder Dr. Morris Chang. Chairman Mark Liu and CEO Dr. C.C. Wei expect all TSMC employees to uphold the four core values, reinforcing Company business philosophy and visions through internal company websites, meetings, lectures, publications, and various communication channels. We also organize an Employee Core Values Survey every two year to listen to employee feedback, evaluate the efficacy of employee communication, and ensure that employees are growing with the Company.

When it comes to talent attraction and retention, TSMC has always believed in "putting the right people with shared visions and values in the right positions.""Shared visions" means that all employees share the same vision and mission; "shared values" mean that all employees abide by the same core values and code of conduct; and "right people in the right positions" means that the Company is dedicated to helping employees unleash their full potentials in the right positions.

Strong Talent Pool

TSMC has remained true to the four core values and has always strived to be a Company that employees can be proud of. In 2021, Cheers Magazine ranked TSMC as No. one in the Top Ten Most Admired Companies to Young Generations for the fifth consecutive year. In 2021, TSMC hired 12,683 new employees around the world. As of the end of 2021, TSMC had a total of 65,152 employees, including 65,133 regular employees and 19 temporary workers that were about to become regular employees. There were also 307 contractors and 94 contractors signed for projects and short-term support omitted from our total employee count.

• Recruitment Criteria

Abiding by the guidelines of "shared visions and values" and the basis of Diversity and Inclusion, TSMC does not discriminate against candidates because of their gender, religion, race, nationality, or political affiliation. TSMC prioritizes character and capability over professional skills when assessing candidates. All candidates must undergo rigorous selection criteria and interviews for a comprehensive evaluation before they are welcomed on board.

• Recruitment in Taiwan

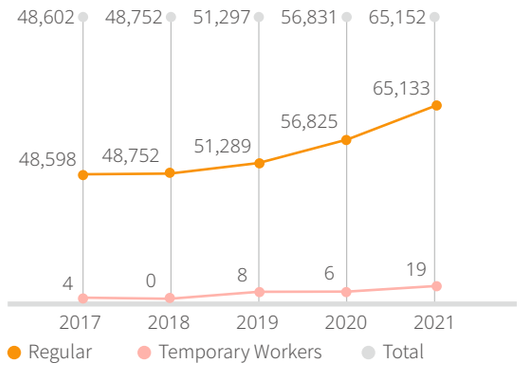
Recruitments at global branches are mainly through local hiring. However, in the principal place of business, Taiwan, we must consider technological development and diversity. Therefore, in addition to the recruitment of professionals and recent graduates, overseas special professionals are listed as a recruitment focus as well.

» Strengthen Internship Program

In 2021, TSMC's DNA Internship Program, which revolves around the following three targets: Develop, Navigate, and Advance Offer, offered diverse learning activities and actual project involvement such as lectures, courses, workshops to give interns the opportunity to explore themselves and learn about the semiconductor industry and related technologies. Outstanding interns are given an advance offer to TSMC upon graduation, contributing to the success of both the students and the Company.

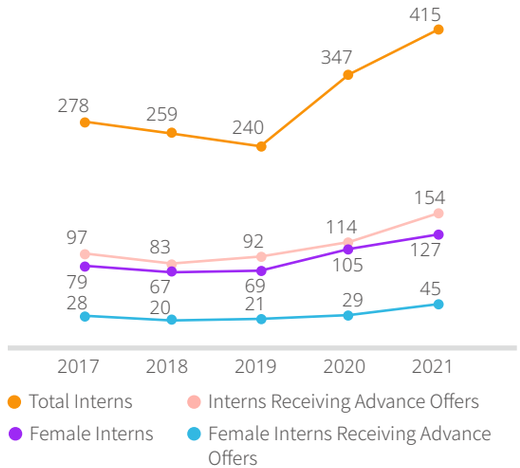
TSMC Employees (Global)

Unit: People



Interns Receiving Advance Offers - Taiwan

Unit: People



In 2021, TSMC welcomed 415 interns through the DNA Internship Program, of which 31% (127 interns) were female students. After the internship, 154 interns were evaluated as outstanding and received advance offers, accounting for 37% of total interns. Among them, 29% were women.

» Disabled Employees

In compliance with local regulations, TSMC has hired a total of 413 employees with mild or moderate disabilities and 100 employees with severe disabilities. In 2021, VisEra also provided vacancies for disabled candidates. However, due to the nature of job vacancies, VisEra received a dearth of suitable applicants, leading to its failure to meet the 1% requirement, and has paid subsidies according to legal requirements.

• Overseas Recruitment for Special Experts

To sustain the Company's diversified talent pool and recruit talents in special fields, TSMC continues to recruit overseas talents around the world. In terms of industry-academia cooperation, TSMC has maintained close contacts with MIT, Stanford University, UC Berkeley, Tokyo University, and other prestigious universities around the world in recent years to incubate top research talents and ensure early engagement with global talents for future recruitment. In addition to recruiting experienced semiconductor professionals in key cities in the U.S., we are also expanding our scope to India, Canada, Japan, and Europe.

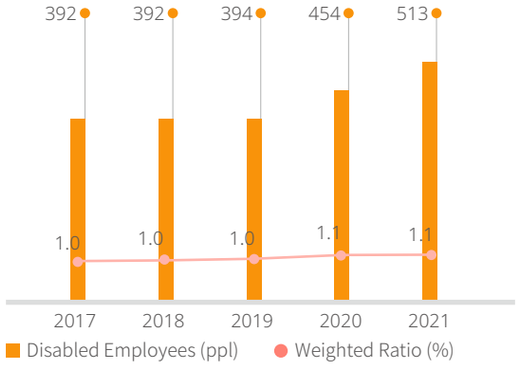
» Manage Risks from Foreign Employees

TSMC is evaluating potential risks from recruiting overseas talents in accordance with SASB standards. In consideration of trade secret protection and related international laws, TSMC has also established a protocol for sensitive hiring and related risk evaluations that will be used in the recruitment process to effectively manage potential risks that comes with recruiting overseas talents. When carrying out protocols or risk evaluations, regulatory compliance is always the priority. TSMC's recruiting team will have to verify the identities of all candidates and must comply with related regulations for visas, work permits, and other applications to ensure that the Company and employees are both compliant with government regulations and prevent any potential risks from materializing.

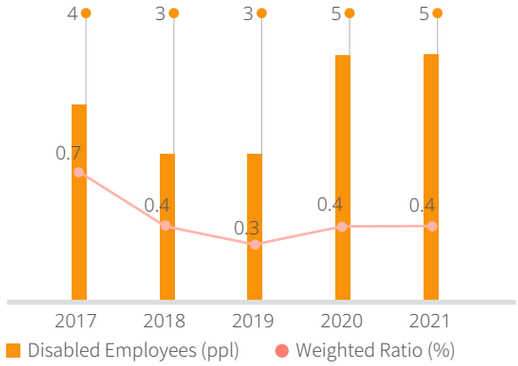
» Assimilate Foreign Employees

To help foreign employees quickly adapt to the new environment, TSMC offers assistance for relocation and settlement (including couples housing, education for children, etc.) as well as exclusive newcomer orientation and subsidies for learning Chinese and rewards for receiving Chinese certificates to encourage foreign employees to assimilate into the workplace and environment of Taiwan. In addition, TSMC also invites foreign employees and their families to join an exclusive community and holds cultural festivals to increase communication and exchanges.

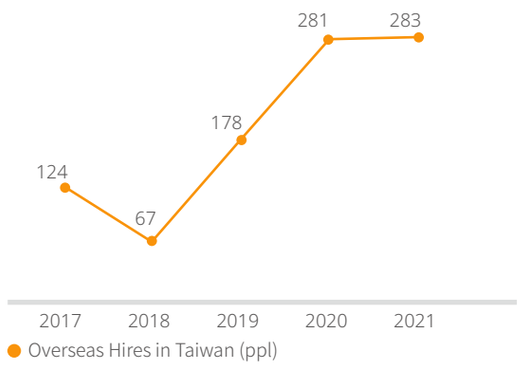
Disabled Employees - Taiwan



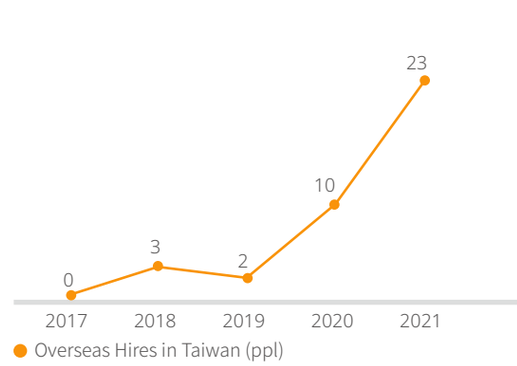
Disabled Employees - VisEra



Overseas Hires in Taiwan



Overseas Hires in Taiwan - VisEra



Case Study

Support Program for Employees from Arizona Training in Taiwan

In 2021, TSMC welcomed over 600 new employees from the Arizona facility to Fab 18 for an 18-month training and launched the Employee Support Program to help employees-in-training adapt better to work and life in Taiwan:

(1) Before the employee-in-training arrived in Taiwan, TSMC employed the services of a senior therapist familiar with American culture to host online communication sessions and help mentally prepare the employees. This includes 3 sessions on cultural adaptation. A total of 118 people participated in the focus group while 62 people participated in one-on-one counseling services to reduce cultural impacts.

(2) While employees-in-training were in quarantine after arriving in Taiwan, TSMC designated personnel to follow up with them regularly and offered workout equipment to support body and mind health.

(3) Health Center professionals offer full-time health consultations and assistance for seeking medical attention.

Strengthen Employee Engagement

In 2021, TSMC introduced the Engagement Survey, created using WTW's High Performing Employee Experience Model as a blueprint, to systematically learn about our employees' experiences at work and analyze our advantages and opportunities to formulate improvement measures. The survey covered TSMC facilities in Taiwan as well as overseas subsidiaries. Only VisEra, because of its different industrial background, was not included in the survey. We received a total of 55,491 responses, of which 93% were valid.

TSMC's long-term goal is to be in the 75th percentile for the issues of Diversity and Inclusion and Sustainably Engaged based on the WTW Global High Performance Norm for the 2030 Engagement Survey. According to the 2021 Engagement Survey results, TSMC employees agree that the Company is highly competitive, can quickly respond to market dynamic, and is able to provide innovative products and services to create value for customers. TSMC employees also commend the Company's ability to make swift decisions and agree that we should continue pursuing improvements in working processes or organizational efficiency. At the same time, TSMC will strive to make improvements in the following three areas based on survey results:

1. 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.
2. Management is responsible for unleashing employee potential and ensuring that employees are enjoying their work, learning, and growing so that they can feel engaged and have a sense of accomplishment.
3. In addition to cash incentives, we also recommend managers use non-financial incentives to motivate and retain talents.

Competitive Compensation Packages

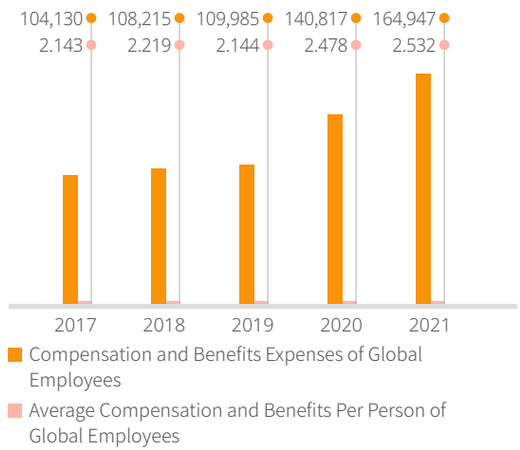
TSMC provides competitive compensation packages to attract and retain the best talents as well as reward employee performance and encourage long-term contribution. Our packages include a base salary, allowance, employee cash bonuses, and profit-sharing schemes. The total compensation of an employee is determined based on individual expertise, job responsibility, performance, commitment to long-term contribution, and the Company's operations and profit. In recent years, TSMC has continued to grow in revenue and profit. We have increased total compensation and benefits for employees from around NT$104.1 billion to NT$164.9 billion between 2017 and 2021, and average compensation and benefits for every employee from NT$2.14 million to NT$2.53 million during the same period.

In 2021, TSMC's revenue and profits reached new record high yet again. The cash bonus and profit-sharing scheme allocated for Taiwan facilities were valued at NT$71.2 billion. TSMC also adjusted the salary structure by converting some variable compensation into fixed compensation for all formal employees in Taiwan facilities in 2021. After the adjustment, the base salary of each employee has been raised by 20% to increase the monthly disposable income of entry level employees. In addition to salary structure changes, the annual salary adjustment for 2021 also commenced as planned.

The total compensation for TSMC employees includes base salary, allowances, cash bonuses, and the profit-sharing scheme. In 2021, the average total compensation for a newly graduated TSMC engineer with a master's degree was higher than

Compensation and Benefits Expenses

Unit: NT$ million

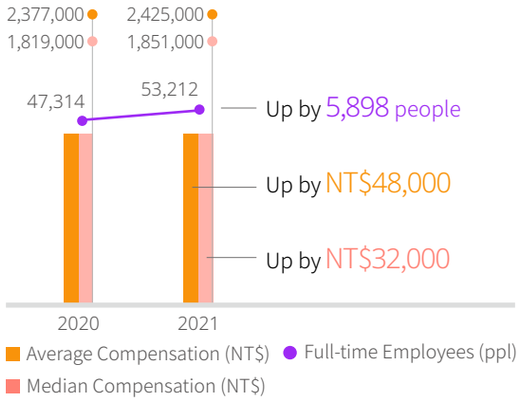


NT$2 million in Taiwan facilities. The average total compensation for direct laborers was higher than NT$1 million, which is four times the minimum monthly wage in Taiwan. In 2021, TSMC facilities in Taiwan experienced year-on-year growth in number of employees, average compensation, and median compensation (as shown in the table below).

• Bonus

The incentive program of TSMC facilities in Taiwan is implemented over a period of 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 the annual cash bonus or long-term one to three-year schemes. In 2021, the median total compensation of TSMC employees around the world (excluding pension and other benefits) was around NT$2.06 million, which is 1/194 of the CEO's total compensation. Considering the differences in compensation structure across countries, the data of median annual compensation is based on the actual amount paid to full-time employees with full-year seniority.

Average and Median Compensation



Note: In compliance with regulations set forth by the Taiwan Stock Exchange, 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 with 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

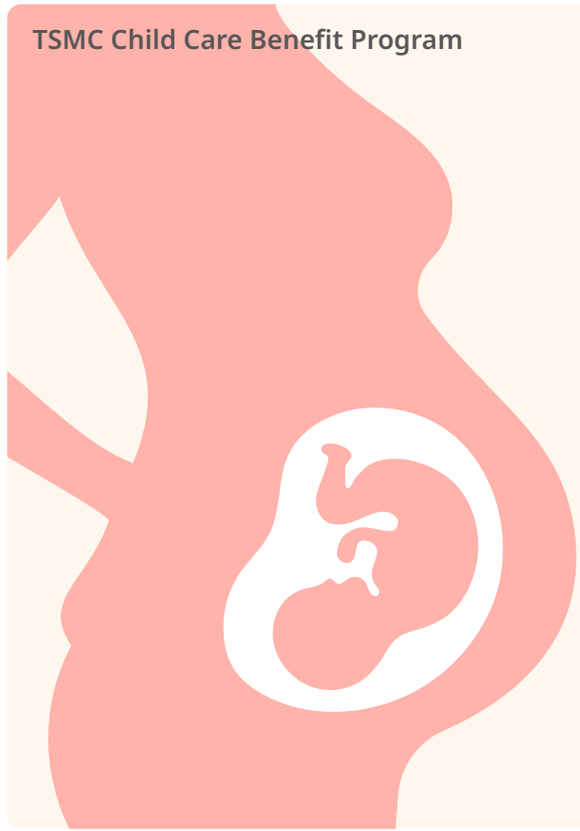
• Corporate Officer Shareholding Guidelines

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 Corporate Officer Shareholding Guidelines in 2020. The required value for Chairman, CEO, and other corporate officers' holding of TSMC shares is proportional to their annual base salary (18 times for Chairman and CEO, 9 times for other officers in Taiwan, and 3 times for overseas officers). Officers shall fulfill the required value within three years of appointment. Officers keep the required value for the entire period of employment. Furthermore, to attract and retain corporate executives and to link their compensation with shareholder interests and Environmental, Social, Governance (ESG) achievements, TSMC established the Employee Restricted Stock Awards Rules in 2021.

• Parental Benefits

After childbirth, TSMC employees can apply for unpaid leave in accordance with local laws and regulations. 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 2021, TSMC amended the Work Rules and will be launching the TSMC Child Care Benefit Program starting in 2022 to further support employees achieve a better work-life balance.

TSMC Child Care Benefit Program



The maternity/paternity allowance for each TSMC baby has been increased from NT$1,000 to NT$10,000

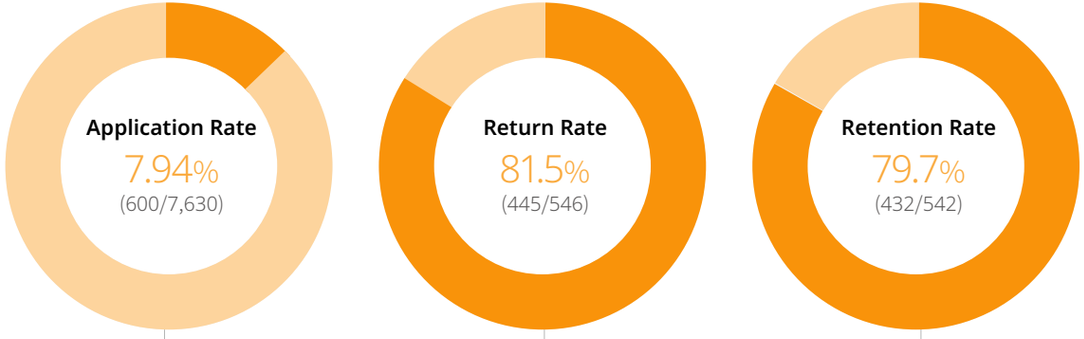
Paid maternity leave has been increased from the legally required 8 weeks to 12 weeks

Employees can take 10 days of paternity leave within one year of their partners giving birth

Launched a weekend science camp that is great for families and can facilitate family interactions and bonds

In 2021, a total of 600 employees in TSMC's Taiwan facilities and VisEra applied for unpaid parental leave. We expected 546 employees to return from their parental leaves in 2021, a total of 445 employees returned on time or ahead of time, which is an 81.5% return rate. As for the retention rate after returning, of the 542 employees that returned in 2020, a total of 432 remain at TSMC as of the end of 2021, which is a 79.7% retention rate (refer to the chart below).

Unpaid Parental Leave in TSMC's Taiwan Facilities and VisEra - Application, Return, and Retention Rate



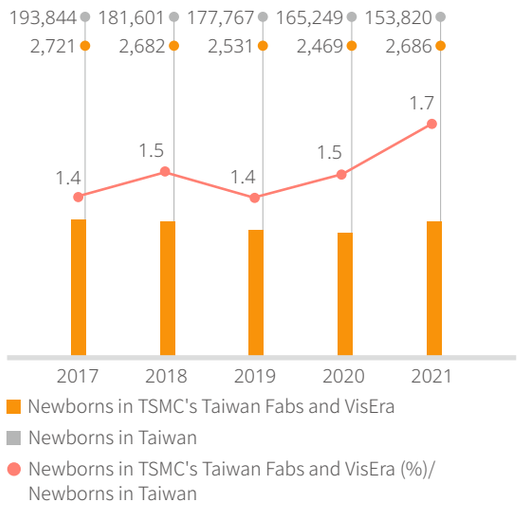
	Application Rate	Return Rate	Retention Rate
♂	3.4%	78.3%	81.3%
♀	18.8%	82.6%	79.2%
Employees that met unpaid parental leave criteria in 2021	♂ 5,425 ♀ 2,205	♂ 143 ♀ 403	♂ 128 ♀ 414
Employees that applied for unpaid parental leave in 2021	♂ 186 ♀ 414	♂ 112 ♀ 333	♂ 104 ♀ 328
Employees that returned to work from unpaid parental leave in 2020			
Employees that returned to work from unpaid parental leave in 2020 and are still in service at the end of 2021			

In 2021, the number of employees in TSMC's Taiwan facilities and VisEra aged between 20 and 64 accounted for 0.38% of Taiwan's population of the same age group. During the same time, the numbers of employee's newborns was 2,686, which was 1.7% of the total number of newborns in Taiwan, an example of our outstanding benefits mitigating the impact of sub-replacement fertility in Taiwan.

• Solid Pension System

TSMC's employee pension system includes the Defined Benefit Plan under the Taiwan Labor Standards Act, the Defined Contribution Plan under the Taiwan Labor Pension Act, as well as the regulations of labor laws in overseas regions. In addition to statutory contributions, we commission professional accountants and consultants annually to conduct precise calculations of our Company's pension fund, to assure sufficient funding for employee pension payments in the future.

Newborns in TSMC's Taiwan Facilities and VisEra

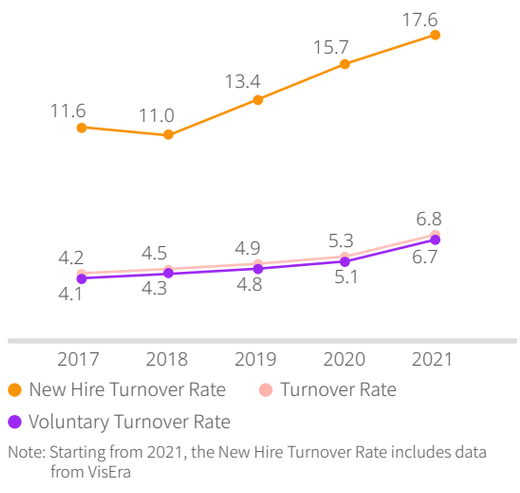


Maintain Healthy Turnover Rate

To ensure talent mobility and long-term growth, TSMC believes that a healthy employee turnover rate should be between 5% and 10%. In 2021, the turnover rate was 6.8%, a 1.5% increase from 2020 but still within the targeted range. The major causes for the increase were competitive labor markets as a result of rapid development in the high-tech industry and TSMC's mass recruitment accompanied by increased new hire turnover rate of 17.6%.

Historical Turnover Rates

Unit: %



Note: Starting from 2021, the New Hire Turnover Rate includes data from VisEra

Talent Development

Strategies & 2030 Goals [Note 1]	2022 Targets [Note 1]	2021 Achievements
Equip People with Future Capabilities Build a talent pool based on TSMC Capability Model		
Fill over 80% [Note 2] of manager positions through internal promotions	Fill over 80% of manager positions through internal promotions	Filled over 82.5% of manager positions through internal promotions ↑ Target: ≧ 75%
Fill over 50% [Note 2] of vacancies through internal transfers	Fill over 50% of vacancies through internal transfers	Filled over 57.6% of vacancies through internal transfers ↑ Target: ≧ 50%
90% completion of the talent pipeline within 3 years for fab directors/directors NEW	Review 80% of the talent pipeline for fab directors/directors	Reviewed 79% of the talent pipeline for fab directors/directors NEW
Unleash Learning Momentum Offer diverse learning resources to facilitate self-learning in employees		
Achieve an annual average of 100 hours of learning in employees NEW	Achieve an annual average of 50 hours of learning in employees	Achieved an annual average of 48.9 hours of learning in employees NEW
		Self-learning accounted for 68% of learning programs designed for the specific needs of organizations ↑ Target: ≧ 50%
		More than 50,000 visits to self-learning resources ✓ Target: ≧ 50,000

Note 1: In response to materiality analysis results and development strategies in 2021, we have made adjustments to parts of the content for this strategy and sustainable target

Note 2: The following targets have been moved from "Talent Attraction and Retention" due to adjustments in development strategies: "Fill over 50% of vacancies through internal transfers" and "Fill over 75% of manager positions through internal promotions"

↑ Exceeded ✓ Achieved — Missed Target

Talent Development at TSMC aims to ensure that employees can progress with changing times to support the Company's long-term growth but also fulfill lifelong learning in employees.

Equip People with Future Capabilities

TSMC attaches great importance to the early development of employee potential and actively seeks to fill the talent pipeline. We want to ensure that there are suitable candidates that can support the Company's rapid growth for any new positions or appointments. In 2021, TSMC reviewed 79% of the talent pipeline for fab directors/directors.

Checking talent pipeline also allowed us to have systematic and detailed discussions regarding talent development plans to ensure alignment with the Company's operational demands and a robust talent pool. For example, the New Manager Program was completed 2,000 times, and students were able to advance to the next position in 2021. The Operation Engineers Training Committee (OETC) also plans trainings for engineers at different jobs and levels, builds capability stages and learning roadmaps, and provides courses in regulations, technology, management, and personal effectiveness. The annual number of participants exceeded 30,000, which effectively nurtured future talents.

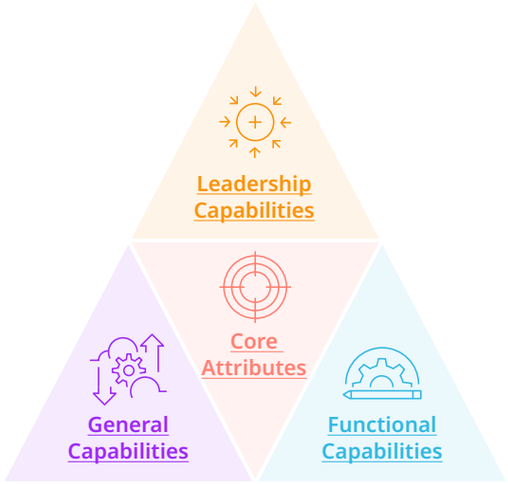
Based on the "TSMC Capability Model," employees' specific development needs are integrated and implemented through "70-20-10 Rule", that is, experience learning (70%), feedback and guidance (20%) and education and training (10%). Please refer to the next page for "70-20-10 Rule".

Unleash Learning Momentum

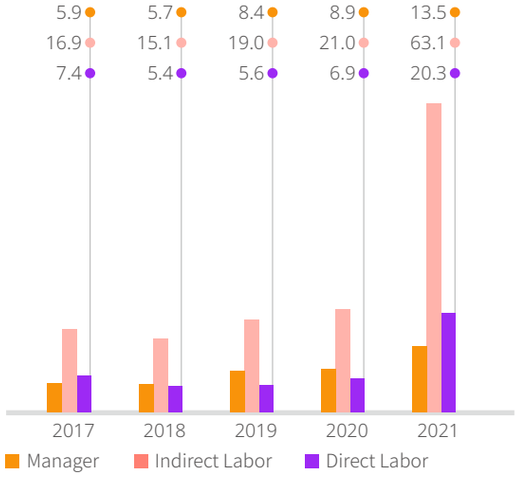
TSMC offers a wealth of classroom trainings and online courses. We've also produced livestream webinars that align with our employees' work and life. The diverse offering of learning resources mean that employees can choose the best learning methods for them to help them enhance their performance at work and fulfill their self-worth.

TSMC measures the outcome with four levels of evaluation - reaction, learning, behavior, and results - based on the Kirkpatrick Model. In 2021, TSMC conducted reactive evaluations for all courses. We evaluated course design, lecturers, administrative services, and overall satisfaction level. Employees gave a score of 94 for overall satisfaction level. A total of 1.59 million participants completed over 5,400 online courses and completed learning evaluations. Behavioral evaluations were conducted for 4% of the training courses. The majority of on-the-job training organized at the organization level completed learning and behavioral evaluations, while outcome evaluations are built into the employee performance management and development system.

TSMC Capability Model

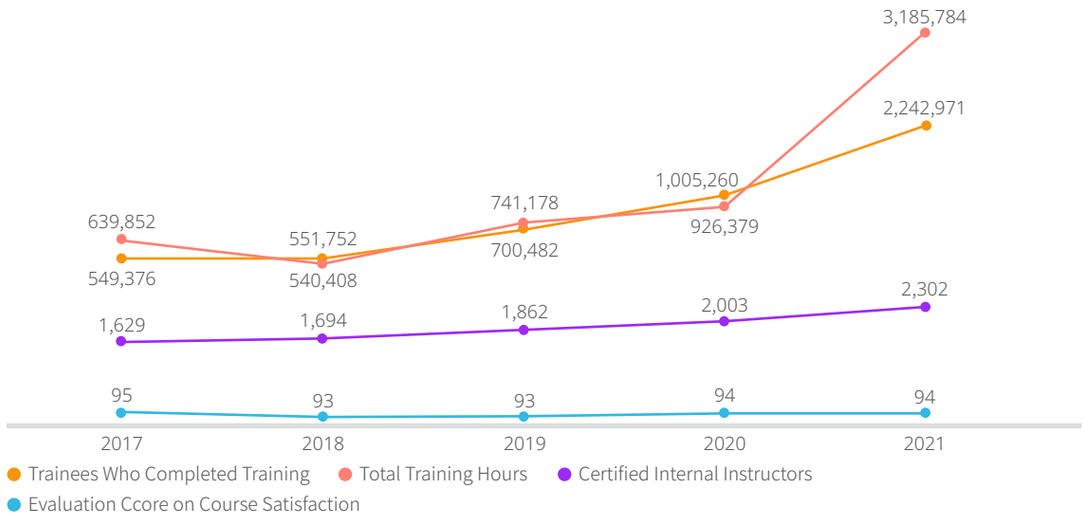


Average Training Hours per Employee



Note: Data collection in 2021 covers historical data from TSMC's learning platform. As we completed data integration for related learning systems and launched the Newcomer Training Center at TC-Site, the average employee training hours have increased significantly

Historical Training Index



70-20-10 Rule



70% Experience Learning

Dual career ladder system for both management and technical talents

- For the technical track, the TSMC Academy selected one Outstanding Fellow, one Senior Fellow, and five Academicians in 2021, including the youngest female Academician ever elected since the TSMC Academy was established ten years ago

Internal promotions, transfers, and rotations

- Internal transfer and rotation empower employees to arrange and plan personal careers and develop diverse capabilities, while promoting internal talent mobility and passing on organizational knowledge
- Filled over 82.5% of manager positions through internal promotions
- Internal transfers & rotations between management and technicians were 40% and 38.2%, respectively
- Filled over 57.6% of vacancies through internal transfers
- Achieved 100% internal transfer completion rate with 22,792 employees transferred to new positions



2021 TSMC Academy Ceremony

Transfers and Rotations in 2021

Outbound \ Incoming		Taiwan			Overseas	Total
		Hsinchu Site	Taichung Site	Tainan Site		
Taiwan	Hsinchu Site	7,813	297	1,256	18	9,384
	Taichung Site	300	1,867	725	73	2,965
	Tainan Site	468	229	7,475	17	8,189
Overseas		25	3	53	2,173	2,254
Total		8,606	2,396	9,509	2,281	22,792

20% Feedback and Guidance

Buddy System

- New employees are able to understand and quickly adapt to the TSMC culture with the help of the Buddy system. The appointed buddy can continue to offer feedback and suggestions to the employee

Mentor System

- Employees are encouraged to learn from other senior employees. Mentors can offer guidance on work or help adapt to TSMC to ensure employees' continuous growth

Performance Management and Development

- Managers and colleagues are encouraged to continuously discuss and plan performance and development, and conduct performance reviews at mid-year and year-end

10% Education and Training

- Based on the Individual Development Plans (IDP)
- Different training roadmaps for leadership and functional capabilities are provided for employees in different positions. At the same time, TSMC also provides a series of training courses on leadership and functional and general capabilities
- Hosted 1,344 classroom trainings
- Offered over 5,400 online courses

Note: In Taiwan, Hsinchu Site includes Fab 2, Fab 5, Fab 3, Fab 8, HQ, Fab 12A, R&D Center, Fab 12B, Advanced Backend Fab 1, Advanced Backend Fab 3, and Advanced Backend Fab 6; Taichung Site includes Fab 15A & B and Advanced Backend Fab 5; and Tainan Site includes Fab 6, Fab 14A & B, and Fab 18. Overseas areas include TSMC (Nanjing), TSMC (China), WaferTech, TSMC Arizona Corporation, and other overseas subsidiaries

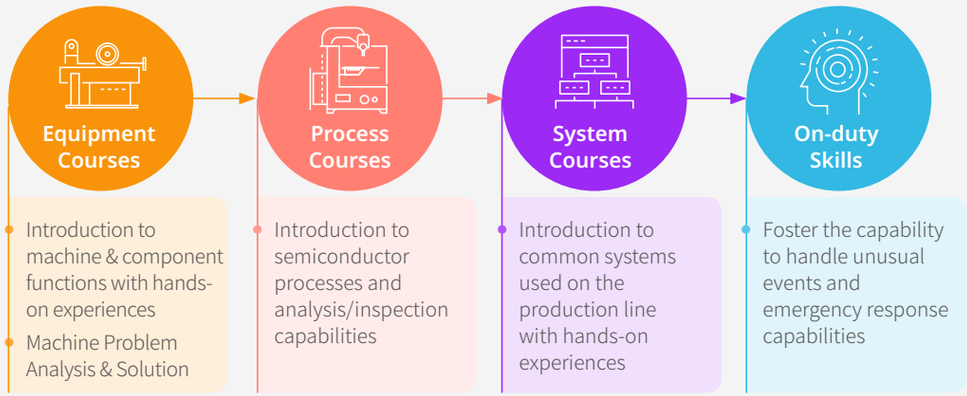
Case Study

TSMC Newcomer Training Center

To cultivate the next generation of young semiconductor professionals, in 2021, TSMC opened the Newcomer Training Center at TC-Site so that new employees can quickly learn about fundamental semiconductor knowledge, the logical thinking behind semiconductor production lines, how people communicate on the production line, and work safety in a safe learning environment, with hands-on experiences and instructions from lecturers. The training can also help new employees cultivate capabilities for independent thinking and self-learning as well as familiarize them with the Company's core values so that they can better assimilate into the corporate culture.

In 2021, the Newcomer Training Center trained over 2,000 TSMC employees with shortening the time for independent work by about 10%. They are now contributing to the Company's success in their own roles, continuing to advance their individual capabilities and grow with the Company.

Four Main Courses at Newcomer Training Center







The Newcomer Training Center helps new TSMC employees understand their work in a safer and more efficient way

Cultivate Internal Instructors & Excellent Instructor Award

Talent is a critical component of TSMC's success, and internal instructors, by sharing their knowledge and experiences, are important drivers for fostering talents within the Company. Established 15 years ago, the Excellent Instructor Award has been recognizing excellent internal instructors each year and encouraging other outstanding employees to join the ranks of our instructors and share their knowledge and experience for more efficient education.

In 2021, TSMC employees were trained over 160,000 times cumulatively with the help of over 2,000 internal instructors. At the awards ceremony, CEO Dr. C.C. Wei presented awards to outstanding internal instructors to commend their contributions to the Company's growth.



The 2021 TSMC Excellent Instructor Award Ceremony

Human Rights

Strategies & 2030 Goals [Note]	2022 Targets	2021 Achievements
Enforce the TSMC Human Rights Policy Raise awareness of human rights in employees and enforce the Responsible Business Alliance (RBA) Code of Conduct		
In all factories that implement the Validated Assessment Program (VAP) of the Responsible Business Alliance, the "Human Rights Related Issues" are maintained at a zero-missing level NEW	**In all factories that implement the Validated Assessment Program (VAP) of the Responsible Business Alliance, the "Human Rights Related Issues" have reached the zero-missing level**	**Maintained 100% e-voting at labor-management meetings in all Taiwan facilities** ✓ Target: 100%
Optimize training and management systems to support zero sexual harassment, zero workplace bullying, work hour management to prevent overworking, labor rights of those with disabilities, and proprietary information protection NEW	**Organize a training program on "Say No to Workplace Harassment & Workplace Bullying and Personal Data Protection"** **- > 95% employees complete training programs** **- 100% passing rate in post-class tests** **Compile annual plans for each year between 2023 to 2030** NEW	**No material regulatory violations (penalty: > NT$1 million)** ✓ Target: No material regulatory violations (penalty: > NT$1 million) **Organized a training program on "TSMC Human Right Policy: Say No to Sexual Harassment and Build Up a Friendly Workplace"** ✓ Target: Strengthen employee understanding of the TSMC Human Rights Policy and ensure it is applied into the workplace through full employee engagement in online courses **The completion rate was > 98%** ↑ Target: 95% **100% passing rate in post-class tests** ✓ Target: 100%

Note: In response to materiality analysis results and development strategies in 2021, we have made adjustments to parts of the content for this strategy and sustainable target

↑ Exceeded ✓ Achieved — Missed Target

Adhering to the TSMC core values, TSMC supports the Universal Declaration of Human Rights and internationally recognized human rights. TSMC abides by local laws and regulations in all countries and regions where we operate and treat our employees with dignity and respect.

Enforce TSMC Human Rights Policy

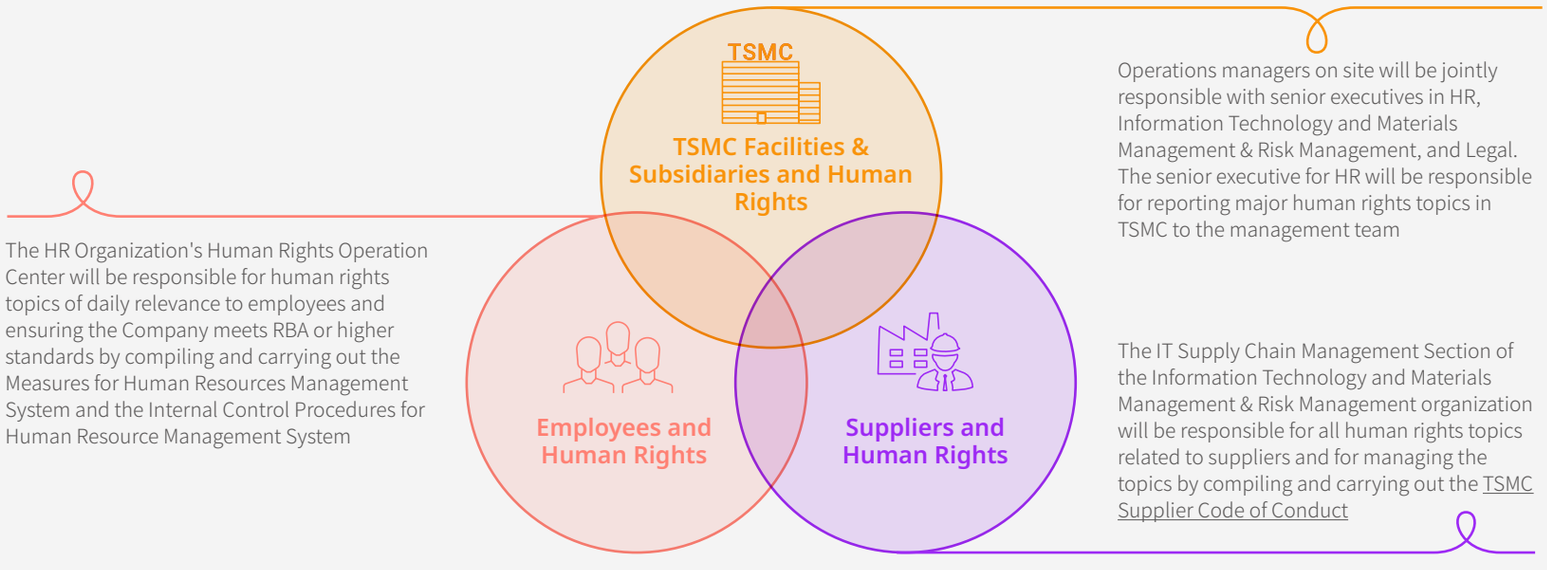
The TSMC Human Rights Policy is the highest guiding principle for human rights governance at TSMC. The TSMC Human Rights Policy offers clear guidelines for all human rights matters of concern. We've also adopted an action plan that is consistent with RBA standards to ensure that all employees are treated fairly and with dignity.

Human Rights Protection Training

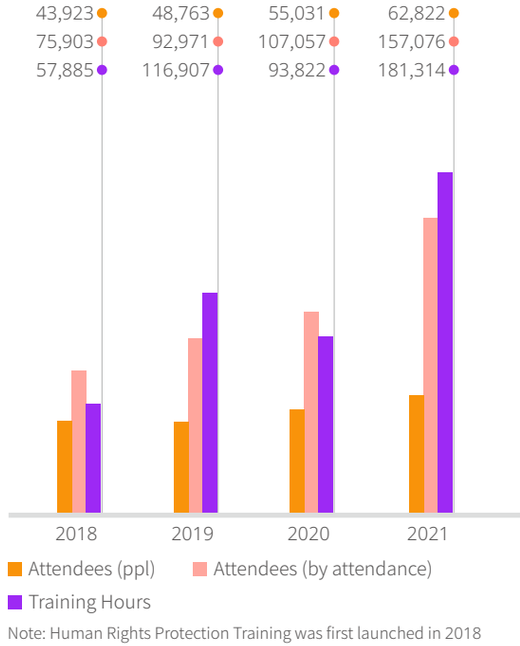
In 2021, TSMC launched a wide range of human rights protection training programs on facility ESH, emergency response, first-aid training, and a friendly workplace. TSMC offered a total of 181,314 training hours to 62,822 employees, which is 96% of all TSMC employees. We counted a total of 150,000 attendees at the human rights protection training programs.

Furthermore, TSMC launched the training course" TSMC Human Right Policy: Say No to Sexual Harassment and Build-Up a Friendly Workplace" with 59,804 employees participated in the training and the passing rate for post-class test was 100%.

TSMC Human Rights Management System



Human Rights Protection Training



Note: Human Rights Protection Training was first launched in 2018

Risk Assessment & Management

As a full member of the Responsible Business Alliance (RBA), TSMC will conduct due diligence in compliance with the RBA Code of Conduct to ensure that TSMC either meets or exceeds the standard.

TSMC uses the RBA SAQ as a template to identify practices, risks, and management systems in internal operations bearing the highest, labor, health and safety, environmental, and moral hazards. In 2021, all TSMC facilities in Taiwan scored 88 or more on the SAQ, which qualifies as "low risk" (85 or higher is considered low risk). To comply with customer requests, TSMC also commissioned a third-party institute to carry out the RBA VAP for seven TSMC facilities. In 2021, all seven facilities received full marks on the VAP. The complete audit report will be disclosed to customers and related stakeholders on RBA-Online.

	Taiwan																Subsidaries			
	Corporate HQ	Fab 2	Fab 3	Fab 5	Fab 6	Fab 8	Fab 12A	Fab 12B	Fab 14A	Fab 14B	Fab 15A	Fab 1 5B	Fab 18	Advanced Backend Fab 1	Advanced Backend Fab 2	Advanced Backend Fab 3	Advanced Backend Fab 5	VisEra	TSMC (China)	TSMC (Nanjing)	WaferTech
SAQ 2021	◎ 95.6	◎ 92.6	◎ 92.0	◎ 92.2	◎ 92.2	◎ 92.2	◎ 92.6	◎ 92.7	◎ 92.3	◎ 92.7	◎ 93.5	◎ 93.4	◎ 91.6	◎ 94.0	◎ 93.7	◎ 95.2	◎ 91.1	◎ 90.5	◎ 93.2	◎ 91.3	◎ 88.7
VAP 2016-2018	–	200	200	200	200	200	193.3	200	182.4	200	200	200	200	200	200	200	–	–	200	–	200
VAP 2019	–	–	200	200	200	200	200	–	–	200	200	–	–	–	–	–	–	–	–	196.5	–
VAP 2020	–	–	–	–	–	–	–	200	–	–	–	–	–	–	–	–	–	–	–	–	–
VAP 2021	–	–	–	200	–	–	200	–	Scheduled in 2022	200	200	200	200	–	–	200	–	–	–	–	–

SAQ Assessment Scores(2021) ◎ Low Risk (≥ 85) ⓘ Medium Risk (≥ 65 & <85) ⚠ High Risk (<65)

Human Rights Policy Concerns and Practices in 2021

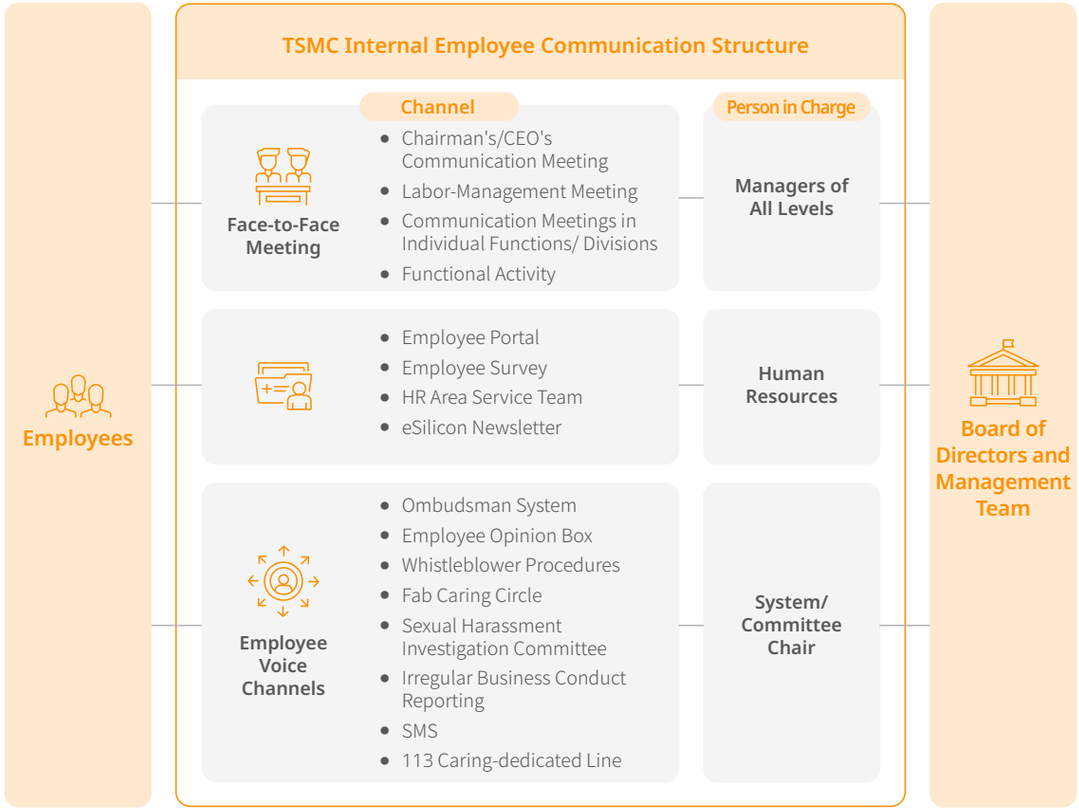
Target Group | High-risk Employees

Topics/Target Group	Targets and Actions	Risk Assessment	Mitigation Measures	Remedies	Reporting Channels
Safe, Healthy, and Harassment-free Workplace All employees • Please refer to "Occupational Safety and Health" for more information on special hazards & health management • Top 5% of employees with the highest level of stress recorded from the employee health survey • 11 incidents verified by the Sexual Harassment Investigation Committee	• Formulate OSH Management Procedures and establish the Employee Health Management Program Meeting and Occupational Disease Investigation Committee	• Investigate whether there are any occupational diseases from chemical exposure • Increase voluntary participation rate for non-statutory employee health plans	• Quarterly meetings on occupational health management held by senior executives to manage and control the five major safety hazards of occupational diseases across departments • Advanced medical imaging checks every five years for new employees and non-management employees • Follow-up with employees with top 5% stress levels by therapists and counseling services	• Immediate transfer from original post • Provide ample medical support • Provide compensatory leave and subsidies according to laws and regulations	Occupational Disease Investigation Committee & Employee Voice Channels
	• Formulate Sexual Harassment Prevention Policies and establish the Sexual Harassment Investigation Committee	• Case inquiry by the Sexual Harassment Investigation Committee and Ombudsman	• Offered classes to prevent harassment and bullying	• Make necessary position or work station changes depending on the situation • For severe cases, the offender will be punished according to the TSMC Employee Reward and Punishment Measures	Sexual Harassment Investigation Committee
Non-discrimination & Equal Employment Opportunity New employees, Indigenous peoples, women, migrant workers, contract employees, disabled workers , etc. 0	• Declare principles of non-discrimination in the TSMC Recruitment Interview Internal Control Procedures and offer Recruitment & Selection training courses and suggestions/ reminders to hiring supervisors	• Eliminate discrimination in the workplace in compliance with Internal Control Procedures starting from recruitment	• A total of 676 managers completed the Recruitment & Selection training course in 2021	• Violations to the non-discrimination principle by management shall be punished according to internal policies on rewards and punishment • Recruitment Division shall reinvite candidates into the interview process	Irregular Business Conduct Reporting System
Prohibit Forced Labor and Child Labor New employees 0	• Comply with regulations on freely chosen employment in the RBA Code of Conduct • Establish Recruitment & Hiring Measures to declare that TSMC does not employ forced labor and employees under the age of 18. The Company will also detail employee rights, duties, and benefits in the Offer Letter to maintain fair and transparent employee relations	• Inquire candidate regarding willingness-to-work during interview • Candidates must provide proof of identification for verification	• Complied with legal regulations for recruitment and hiring to prohibit child labor and forced labor	• Risk prevention through regular VAPs (Validated Assessment Program) and SAQs from the RBA Code of Conduct • If there is any evidence of forced labor, supervisors will be required to make the necessary improvements and restitute the rights to which employees are entitled	Irregular Business Conduct Reporting System
Working Time All employees Please refer to "Occupational Safety and Health" for more information the risks from overworking	• Formulate Management Measuresfor Working Hours Procedure and build an Attendance Record System and Overtime System	• Understand employee work hours through reporting channels, facility-level communication meetings, and management systems • TSMC must first obtain employee consent for overtime requests and provide overtime pay or compensatory leave	• Managed and analyzed employee timesheets and provided early warnings to facility supervisors on work hour management • Overall employee compensation is higher than the minimum wage and industry peers	• If there is any evidence of forced labor, supervisors will be required to make the necessary improvements and restitute the rights to which employees are entitled	Employee Voice Channels
Encourage Work-Life Balance All employees/ Employees in need 0	• Provide a variety of activities and clubs to enrich the concept of work-life balance • Employees	• Examine participation rates	• Collaborated with members of the TSMC Employee Welfare Committee and activity organizers to promote activities and encourage participation	• Conduct questionnaires to make improvements in the future	Employee Voice Channels
	• Offer childcare services & educational support/ services	• Increase quota for TSMC childcare facilities	• Optimized pay structure and offered an additional 7 days of paid leave to attract and retain outstanding kindergarten teachers • Strengthened STEAM education at the TSMC kindergarten	• Move up the date to draw lots for the use of child care facilities. This will allow those who did not draw a slot to have adequate time to find other childcare facilities • Offer competitive compensation and benefits to kindergarten teachers	Employee Voice Channels
Responsible Mineral Sourcing All suppliers 0	• Require suppliers to comply with and sign the TSMC Statement on Responsible Sourcing of Minerals for products containing tantalum, tin, gold, and tungsten	• Establish a due diligence framework in compliance with the Model Supply Chain Policy for a Responsible Global Supply Chain of Minerals from Conflict-Affected and High-Risk Areas by the OECD	• Suppliers of products containing tantalum, tin, gold, and tungsten must collaborate with more than one compliant smelter	• Suppliers will be asked to terminate sourcing if there is evidence of sourcing from non-compliant mines	Reporting Channels for Supply Chain Employees

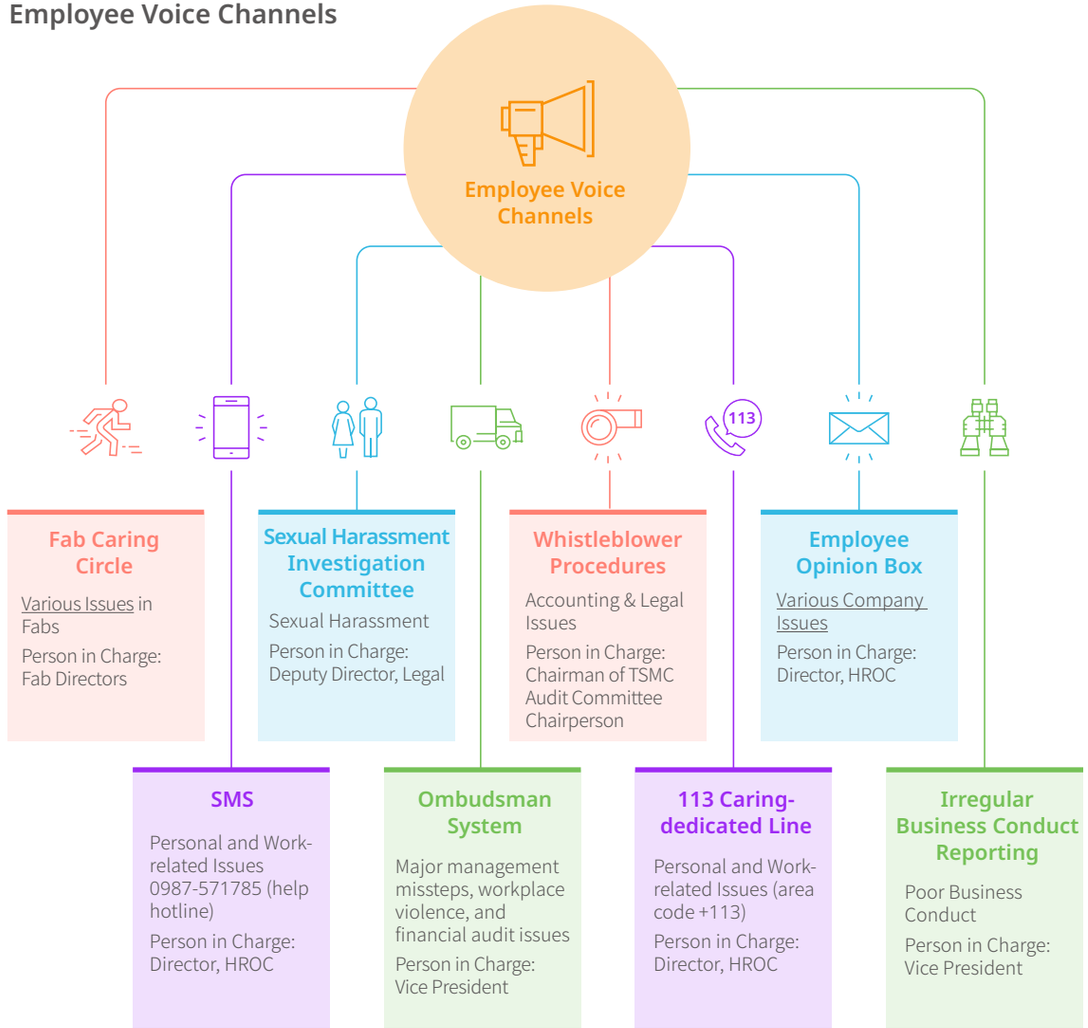
Employee Voice Channels and Case Management

TSMC values employee opinions and interests. To protect the human rights of employees, TSMC has constructed a robust system for employee feedback, including the Ombudsman System managed directly by a senior executive appointed by the CEO, the whistleblower procedures, and the Irregular Business Conduct Reporting System available to external parties on the TSMC website.

Internal Communications Structure



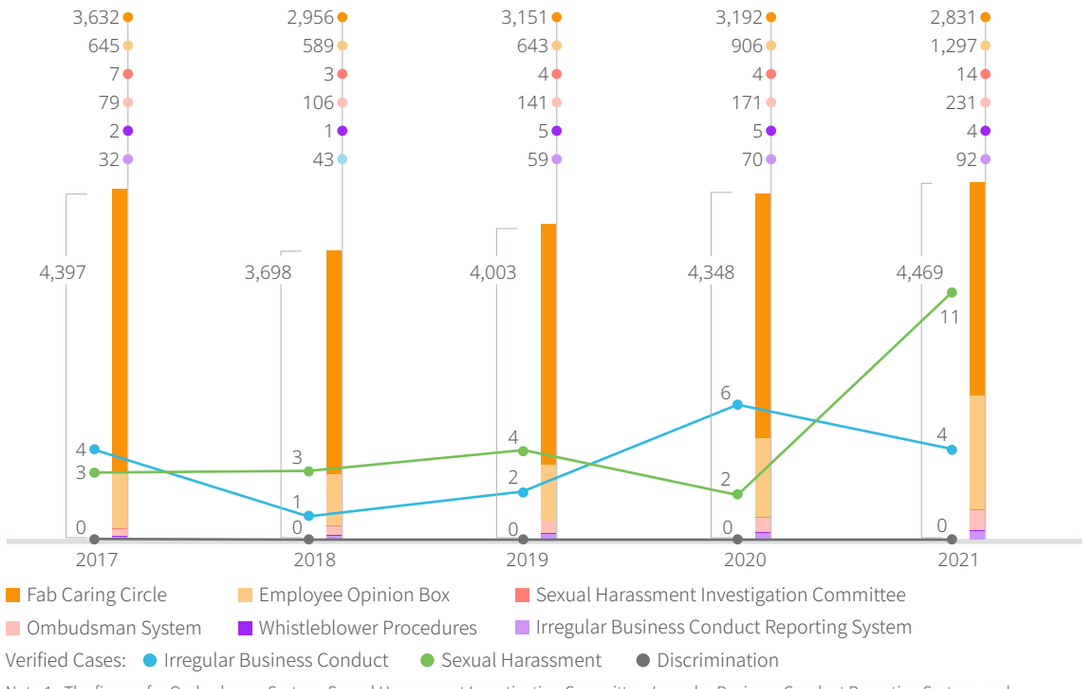
Employee Voice Channels



Note: Cases reported via 113 Caring Hotline and SMS are handled by designated people and directed to other voice channels

In 2020, TSMC's internal communication channels handled a total of 4,469 cases of employee opinions and complaints, including 14 through the Sexual Harassment Investigation Committee, 231 through the Ombudsman System, 4 through the whistleblower procedures, and 92 cases through the Irregular Business Conduct Reporting System. All cases reported by employees are processed and addressed immediately and confidentially.

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 facilities

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

- In 2021, the Sexual Harassment Investigation Committee verified 11 cases of sexual harassment; the perpetrating employees were punished according to the severity of the situation. As the cases involved unwanted attention and verbal/physical harassment, TSMC has added a section on the different forms of sexual harassment and what constitutes sexual harassment in the 2021 sexual harassment prevention courses.

- There were four violations of business ethics and all employees have been punished or dismissed in compliance with Company regulations. TSMC continues to advocate important business ethics concepts in related courses. In 2021, 59,366 employees (99.9% completion rate) participated in the annual business ethics and regulatory compliance training.

Freedom of Association and Labor-Management Meetings

TSMC continues to enforce an open-style management system, offer diverse internal communication channels, and respect employees' freedom of association. TSMC facilities in Taiwan are also regularly hosting labor-management meetings in compliance with local laws and regulations. TSMC management appoints a representative to explain recent developments in TSMC operations to employee representatives. At the meetings, management and employee representatives discuss topics of concern to employees in an attempt to strengthen communication between management and employees.

According to local laws and regulations, labor representatives for labor-management meetings serve a four-year term and must be reelected after the term. TSMC first introduced e-voting in 2018 at TSMC facilities in TC-Site to elect labor representatives. As of the end of 2021, labor representative elections at all TSMC facilities in Taiwan are conducted through e-voting. We will continue to use e-voting to encourage employee engagement.

Long-term Commitment

TSMC is striving for progress to the 2030 Sustainable Goals, which includes all factories that implement the Validated Assessment Program (VAP) of the Responsible Business Alliance, the "Human Rights Related Issues" have reached the zero-missing level as well as better governance and training on zero sexual harassment, zero workplace bullying, work hour management, human rights of disabled employees, and proprietary information protection. TSMC will be launching a new training program on "Say No to Workplace Harassment & Workplace Bullying and Proprietary Information Protection" to educate management and employees about human rights. TSMC will also be assembling a task force of experts to inspect processes and advise better practices for a concrete work plan on annual human rights protection plans from 2023 to 2030.

Occupational Safety and Health

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Promote Safety Culture Advocate for a humanistic safety culture, manage safety risks, and establish an intrinsically safe working environment		
Incident Rate per 1,000 Employees: <0.20	**Incident Rate per 1,000 Employees: <0.2**	**Incident Rate per 1,000 Employees: 0.252** — Note 3 Target: <0.2
Disabling Injury Frequency Rate (FR): <0.3	**Disabling Injury Frequency Rate (FR): <0.4**	**Disabling Injury Frequency Rate (FR): 0.38** ↑ Target: <0.4
Disabling Severity Rate (SR): <3	**Disabling Severity Rate (SR): <4**	**Disabling Severity Rate (SR): 7** — Note 4 Target: <4
Comprehensive Health Management Prevent occupational diseases and promote comprehensive health management for employees		
0 cases of occupational disorders caused by exposure to chemicals	**0 cases of occupational disorders caused by exposure to chemicals**	**0 cases of occupational disorders caused by exposure to chemicals** ✓ Target: 0
Employees with abnormal blood lipids, blood pressure, and blood sugar: ≦ 11%, 13.5% & 2.5% Note 1	**Employees with abnormal blood lipids, blood pressure, and blood sugar: ≦ 11%, 13.5% & 2.5%** Note 1	**Health Promotion Program Participation Rate: 73.7%** ↑ Target: ≧ 53%
Employees with reported high stress levels: <9% Note 1	**Employees with reported high stress levels: <9%** Note 1	
Internal-External Alliance Collaborate with external parties to establish a safer working environment across the supply chain		
Assist all high-risk contractors Note 2 **obtain ISO 45001 certification for occupational safety and health management system**	**Assist 65% of high-risk contractors to obtain ISO 45001 certification for occupational safety and health management system**	**Assisted 65% of high-risk contractors to obtain ISO 45001 certification for occupational safety and health management system** ✓ Target: 65%

Note 1: Considering the original indicator, Health Promotion Program Participation Rate, can not fully represent the health of TSMC employees, starting from 2022, TSMC will be introducing physiological and psychological indicators for this dimension. The physiological indicators are the abnormal rate of blood lipids, blood pressure, and blood sugar of employees; the psychological indicator is percentage of employees with reported high stress levels. See Health Indicators and Health Risk Management for more information

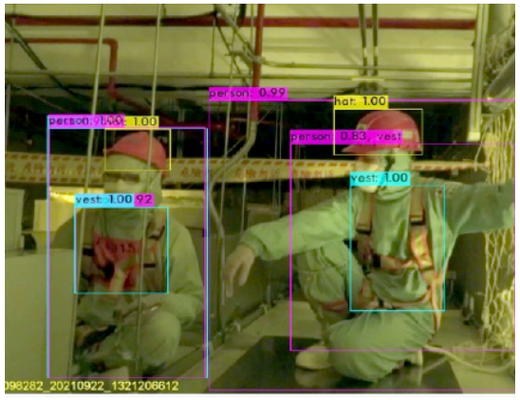
Note 2: High-risk contractors are contractors engaged in high-risk operations; TSMC continues to have new vendors that are considered as contractors engaged in high-risk operations each year and will therefore continue to offer assistance in this area

Note 3: Missed target for incident rate per 1,000 employees. See Safety Performance Index for mitigation measures

Note 4: Missed target for disabling severity rate. See Statistical Analysis of Disabling Injuries for mitigation measures

↑ Exceeded ✓ Achieved — Missed Target

TSMC believes in cultivating an intrinsically safe workplace through a humanistic safety culture and facilitating physical and psychological health as well as a healthy work-life balance in employees and vendors. As TSMC continues to expand facilities in Taiwan and overseas, we will collaborate with stakeholders to reduce occupational safety and health risks in the workplace. In 2021, TSMC added three new fabs in facilities in Taiwan: Fab 12B Phase 8, Fab 18B Phases 1 to 3, and Advanced Backend Fab 6. TSMC plans for the aforementioned fabs to receive ISO 45001 certification for occupational safety and health in 2022. Other existing fabs and subsidiaries (TSMC (China), TSMC (Nanjing), WaferTech, and VisEra) have already received ISO 45001 certification. Also, in response to the COVID-19 pandemic, TSMC's Disease Prevention Committee continues to, according to the severity of the pandemic, adjust preventive measures, organize employees and vendors to work in groups and at different times, and prevent COVID-19 from spreading by rapidly responding to confirmed cases to ensure TSMC can maintain operations as usual.



Hazard Analysis for Ceiling Maintenance - Using AI to detect if workers are wearing safety helmets and safety harnesses

In 2021, with rising production capacity, the number of contractors visiting TSMC subsequently set a new record, climbing from 39,470 people/day in 2020 to 48,602 people/day, making TSMC the most visited semiconductor company in Taiwan. To ensure the occupational safety of vendors, TSMC started working with the Department of Management Information System at National Chung Hsing University to develop AI Hazard Analysis technology, which was then tested on the clean room ceiling maintenance work at Fab 15A. The AI Hazard Analysis technology uses existing 4G cameras originally used for emergency response and integrates big data, smart algorithms, and machine learning to successfully monitor high-risk workspaces with smart analysis functions. When the system identifies unsafe behavior or environments, it can be reported to the TSMC personnel responsible for the construction and the Emergency Response Center so that they can immediately ask contractors to make corrections. Contractors can only continue working upon verification of mitigation measures to prevent objects from colliding and falling from the clean room ceiling and resulting in occupational disasters. TSMC plans to begin introducing the Hazard Analysis technology in 2022.

Internal Control for Safety and Health

All Departments
Work with other departments to implement all safety- and health-related activities

Wellness Center
Responsible for health advocacy

- Health Care
- Assistance for employees
- Health advocacy
- Early warnings for occupational diseases

Facility Development NEW
Responsible for promoting health and safety measures at new facilities

- Construction Site Guidelines for Behavior-based Safety
- Environmental Safety Management on Construction Sites
- Construction Site Epidemic Prevention & Management

Fab-level Industrial Safety and Environmental Protection Division
Promote safety- and health-related activities

- Workplace risk inspection
- Chemical exposure assessment
- Noise and non-ionizing radiation protection
- Ergonomic engineering management
- Foundry-level Occupational Safety and Health Committees
- Contractor management
- Fab-level occupational disease prevention
- Assist subsidiaries in developing regulations for occupational safety and health and set performance targets
- Assist leased or borrowed fabs or offices during emergency responses

Corporate ESH Division

Construct corresponding blueprints, management protocols, and SOPs

- Establish policies, targets, and plans
- Find and introduce new technologies, information on new hazards or occupational safety and health risks, and new management procedures to audit safety and health performances
- Convene the company-level Occupational Safety and Health Committee
- Hold safety and health discussions with external stakeholders
- Demand contractor compliance with TSMC ESH standards and build a sustainable supply chain
- Spearhead the Occupational Disease Investigation Committee to carry out occupational disease prevention throughout TSMC
- Define responsibilities for leased facilities and ensure ESH regulations of the are complies with risk identification

Collaborate with External Stakeholders to Reduce Occupational Safety and Health Risks

Government, TSIA & SEMI Organizations
Collaborate to build a healthy and safe workplace

Suppliers and Contractors
Improve safety and health across supply chain through guidance and collaboration

Promote Safety Culture

TSMC cares about global safety and health issues. In 2021, the pandemic put a pause on some of the offline training and courses on occupational safety and health. As such, TSMC offered the courses online and upgraded the one-time offline course to a rolling online training to strengthen memorization of occupational safety and health content and instill safety culture into the workplace. In 2021, the Facility Development Division assembled a new unit in response to TSMC's growing number of facilities: Construction Site Behavior and Environment Unit. The new unit aims to strengthen implementation of safety management at TSMC construction sites and increase safety on construction sites.

Safety and Health Measures

Following the TSMC Safety and Health Policy, TSMC implemented the following health and safety measures and used the Safety Performance Index (SPI) to track performances. The Occupational Safety and Health Committees at the fab level and at the corporate level will regularly report safety and health efforts to labor representatives on a monthly and quarterly basis, respectively. In 2021, in response to the growing number of facilities and to quickly familiarize new employees in occupational safety and health, TSMC established a learning map for occupational safety and health personnel at the fab level to help them learn systematically and pass on TSMC's professional know-how and experience.

Safety and Health Measures

Measure 1: Hazard Identification

- To establish a friendly workplace, TSMC production and fab employees are encouraged to identify risks in work behaviors and environments. We have therefore set up an electronic Risk Book that will classify risks with a risk matrix model into high, medium, and low impact levels based on scale of impact and risk characteristics. Any high-risk items need to be corrected immediately to medium or low risk
- Employees submitting hazard identifications must have already completed risk assessment training and can identify routine work, non-routine work, and other occupational accidents as hazards
- In 2021, TSMC completed 18,596 cases hazard analysis; 31.95% were medium risk and 67.86% were low risk

Measure 2: Health and Safety Programs

- In order to optimize our workplace, TSMC requires all production and fab divisions to compile division targets and programs to improve health and safety in the workplace. Medium- or high-risk items identified in Measure 1 require mitigation measures to ensure that all medium- and high-risk items can be reduced to low-risk items
- In 2021, TSMC completed 1,370 health and safety management programs and have categorized them based on impact level; 29.6% is under Level A management, 19.7% is under Level B management, and 50.7% is under Level C management [Note]

Measure 3: On-site Observation

- Production and fab workers observed health and safety programs, work behaviors, and the workplace in Measure 2 to evaluate risks; they then verified whether programs could effectively reduce risk levels or tried to find ways to improve
- In 2021, TSMC completed 4,469 observations over health and safety operations and have categorized operations based on the impact level; 31.93% is under Level A management, 7.34% is under Level B management, and 60.73% is under Level C management

Measures 4: Job Safety Analysis

- To ensure construction safety, production and fab divisions must conduct safety analysis on construction tasks and construction sites before construction commences
- In 2021, TSMC completed safety analysis for 850 construction tasks and have identified 89 high-risk operations (relating to confined spaces, live-line working, hot work, and cutting gas or chemical pipelines) and 761 general operations

	Impact Level	Management Plan
Level A	Can prevent or significantly reduce risks of major injuries requiring hospitalization, e.g., crush injuries, exposure to chemicals, and occupational diseases	• List target, detailed plan, and budget • Closing report must include proof of change
Level B	Can significantly reduce potential safety and health risks of equipment of the same type and can be applied to all facilities	• List target, detailed plan, and budget • Closing report must include proof of change
Level C	Can significantly reduce the chance of injury among unit personnel	• Closing report must include proof of change

Note: A, B, and C classifications

Measure		SPI	Taiwan Fabs	Overseas Fabs	VisEra
Regulatc	health regulations design stage. We are el from abroad	✓	✓	○ Note 1	✓
Standard Manager Procedur	and health	✓	✓	✓	✓
Safety ar Educatio	d related training. d emergency with related laws aded into an ter TSMC premises oyees completed	✓	✓	✓	✓
Hazard Identific Assessm	management gement analysis. toring to control,	✓	✓	✓	✓
Change Manager		✓	✓	✓	✓
Chemica Manager	valuated and carcinogens	✓	✓	✓	✓
Tool Mar		✓	✓	✓	✓
Contract Manager	-Pressure	✓	✓	✓	✓
Compliar	ected within the	✓	✓	✓	✓
Emerger Respons	roll call will receive ght into roll calls fire drills, helping the fire brigade	✓	✓	✓	✓
Occupati Preventi	abs for roll-out in	○	✓	✓	✓

Note 1: Comp... to overseas fabs currently under construction

Note 2: 2021 Training Statistics; trainees include both employees and contractors

Note 3: See "Digitalized Learning Map with 111 Professional Courses for Occupational Safety and Health Personnel" for more information

...ure where employees and the company protect each other and encourage employees to speak up and offer suggestions for occupational safety. We use classification management and tracking to control, prevent, or reduce hazards to cultivate a friendly and safe workplace

Note 5: TSMC Chemical Management Procedures

✓ Completed
○ Ongoing

Case Study

Digitalized Learning Map with 111 Professional Courses for Occupational Safety and Health

To raise awareness for occupational safety and health, TSMC is actively cultivating occupational safety and health professionals to lead TSMC employees in fostering a friendly and healthy workplace. In 2021, TSMC created a digitalized learning map for occupational safety and health personnel and drafted three-stage tracks for both theory and practices according to job responsibilities. The learning map contained 111 required courses on safety and health, environmental protection, and emergency response. With systematic learning as well as the sharing of know-how and experiences, TSMC aims to quickly familiarize new employees with their job responsibilities, advance their professional know-how, and improve the organization's safety performance. In 2021, 189 occupational safety and health personnel with three years of experience or less completed the learning map.

The digitalized learning map for occupational safety and health personnel separates learning targets into three stages: The first stage contains 27 courses and 123 training hours; after the first stage, trainees are capable of performing daily responsibilities. The second stage contains 50 courses and 251 training hours, after the second stage, trainees are capable of identifying hazards and managing risks. The third stage contains 34 courses and 261 hours, after the third stage, trainees are equipped with professional knowledge and know-how.

1 **Establish required courses for each level of the Industrial Safety and Environmental Protection Divisions**
Take stock of responsibilities and functions

2 **Select professional deputy managers and seed teachers**
Selected certified and professional lecturers

3 **Compile/produce professional training materials**
Compile lesson plans/ teach

4 **Introduce a digital platform**
Build a digital library for employees to attend classes and take tests, with comprehensive records of the learning map

Responsibilities & Professional Skillset of Occupational Safety and Health Personnel

Safety
- Equipment Safety
- Chemicals
- Hazard Identification
- Change Management
- Equipment Inspection
- Personal Protective Equipment
- Contractor Operations Management
- High-Risk Operations
- Hazardous Workplace
- Hazardous Machines and Equipment
- Incident Investigation
- Performance Evaluation

Environment
- Pollution Prevention (Air/water/waste/ toxins)
- Toxic Substances
- Regular Assessments
- Operational Reporting
- Green Procurement
- Energy Saving & Carbon Emission Reduction
- Life Cycle
- Carbon & Water Footprints

ESH
- Regulations/Standards
- Management System
- Training and Education
- Audits

Health
- Exposure Assessment
- Environmental Assessment of Workplace
- Radiation
- Protection of Expecting Mothers
- Occupational Diseases & Injuries
- Ergonomic
- Hearing Protection
- Precision Operations
- Infectious Disease Prevention
- Special Health Examination

Emergency Environment
- Scenario Analysis
- Emergency Response Training
- Emergency Response Drill
- Equipment Maintenance
- Incident Management
- Public Hazardous Materials/ Fire Safety Inspection Reporting
- Fire System
- Loss Control
- Gas Detection
- Earthquake Monitoring

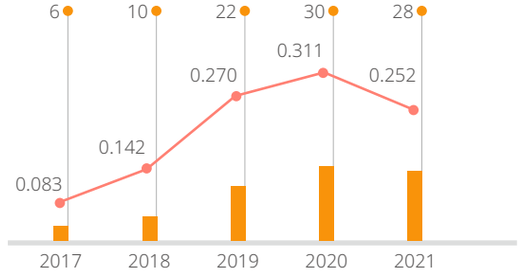
Safety Performance Index

The TSMC Safety Performance Index (SPI) is classified into four levels and two subtypes - active index and passive index. The active index encourages employees to participate in health & safety programs and raise suggestions for safety improvements while the passive index shows the number of safety-related failures, false alarms, etc. In 2021, blue-light indicators (outstanding) were increased by 5.5% from 2020 to 75.9%; any facilities that failed to reach "outstanding" were given on-site support.

TSMC also plans to amend the Safety Performance Index in 2022 to add new items to both the active and passive indexes. For the active index, TSMC will give points to facilities that voluntarily suggest mitigation measures for unsafe behaviors and environments. For the passive index, TSMC will be deducting more points from facilities making the same mistakes again. In 2021, TSMC intended to issue safety culture questionnaires in selected facilities but was forced to delay safety culture experts' trips to Taiwan for the questionnaire and interviews due to the global pandemic and local border control regulations. We plan to issue and analyze the safety culture questionnaire and enforce mitigation measures for real outcomes in 2022.

In 2021, TSMC expanded existing facilities and, despite rising numbers of on-site contractors and employees, we were able to reduce the number of false alarms from 30 cases in 2020 to 28 in 2021; incident rate per 1,000 employees also went down from 0.311 to 0.252. Upon investigation with the 3L5W (Three-legged Five Whys) tool, we discovered that the incidents included 10 false alarms of gas leaks, 11 injuries, 6 early fire warnings, and 1 chemical leak warning.

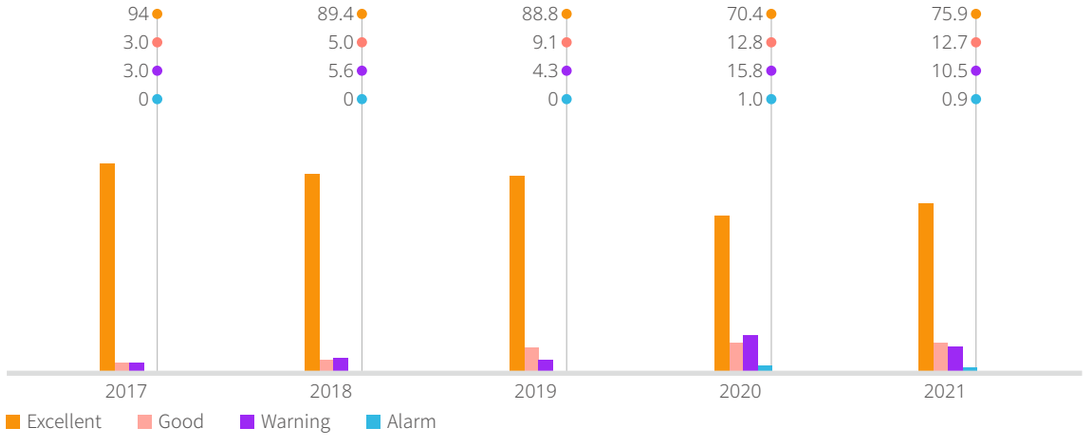
Historical Incidents



Note: Starting from 2020, the incident rate per thousands of individuals entering TSMC includes employees from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra; and contractors working at TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra

Safety Performance Index Chart

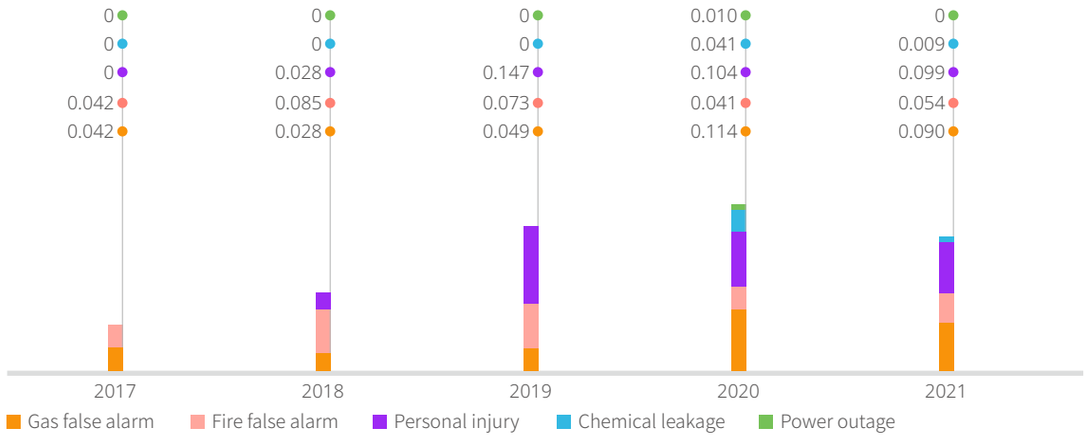
Unit: %



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

Historical Incidents by Type

Unit: Number of Incidents/% Per Thousand Employees



Note: In 2021, the incident rate by type per thousands of individuals entering TSMC includes employees from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra; and contractors working at TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra

Improvement Highlights in 2021

Reduce Gas Alarms

In ten cases of early warnings, the specific gases were turned off immediately after the warning signals. The gases were then channeled to treatment facilities through wind ducts and therefore there were no actual gas leaks, injuries, or pollution to the environment. Analysis of historical gas warnings revealed main causes to be: failure to comply with gas tank replacement processes and using the wrong material for gaskets for strong oxidizing gases that lead to leaks from overheating during high-speed rotations.

Mitigation Measures

- Strengthen operator compliance with SOPs and increase operator proficiency: Record gas tank changes with 5G cameras to strengthen operator awareness and to give insight into the operation in the event of unusual events. Regularly conduct on-site training and certification on changing gas tanks. When conducting on-site vendor audits, check that all gas tank joints sent back to the vendor have been cleaned.
- Determine the appropriate gasket material, life cycle, and acceptable quality based on gas properties and list the information into the Chemical Procurement Regulations.
- Re-evaluate the standard process for changing gas tanks of different pressure levels and the gas leaks.

Reduce Fire Alarms

Of the six fire alarms, four were caused by cast resin transformers with old components and one was caused by pump leaks on a tool using pyrophoric gases, i.e., hazardous gases were leaked from cracks on old components.

Mitigation Measures

- To enhance management protocols, starting from 2022, TSMC will be replacing 363 old cast resin transformers within the next five years.
- In 2021, to mitigate gas leakages, TSMC introduced the use of handheld acoustic imaging cameras.

Reduce Chemical Leaks

One case of chemical leak due to careless handling by a forklift contractor.

Mitigation Measures

- Strengthen contractor training and safety awareness.

Reduce Injuries

(continued to the next page)

Case Study

Use Handheld Acoustic Imaging Cameras to Effectively Reduce Fire Alarms

TSMC is actively seeking appropriate technologies, equipment, and methods as better options for the time-consuming ultrasonic leak detector that is easily affected by background noise interference. In 2021, TSMC collaborated with experts from the Safety and Health Technology Center (SAHTECH) to perfect methodologies for measurement by introducing a new industrial acoustic imaging camera to check for pipeline airtightness after installation and confirm that there are no leaks. With this methodology, TSMC uncovered 152 deficiencies and made the necessary corrections early on. The methodology is now listed into standard procedures to prevent false alarms from gas/fire alarms.

Before



Required operators to detect all possible sights of leakage, making it time- and labor-consuming. Ultrasonic leak detector is also susceptible to noise interference

After



The screen display can scan an entire area, which is fast and convenient. Acoustic imaging cameras can also filter background noises

(continued from the previous page)



Reduce Injuries

Employees:
Investigation reveals that historical employee injuries were largely reoccurring incidents. In 2022, TSMC amended the SPI to encourage employees to report unsafe environments and require supervisors to strengthen awareness and inspection of unsafe behaviors. Reoccurring negligence of the same unsafe behaviors or environment will lead to more points being deducted than the first offense.

Contractors:
Majority of contractor injuries were from failure to comply with SOPs.

Mitigation Measures

- Establish an SOP for tool maintenance, write the process slogan into safety training materials, and complement with online training videos.
- The Industrial Safety and Environmental Protection Department has listed crush prevention regulations as one of the monthly audit items. To raise employee awareness, the Department will conduct on-site inspections to confirm that all crush prevention tools are used and that pneumatic actuators are closed properly and thoroughly .
- Establish a certification system for operators and supervisors to increase operational safety. Operators and supervisors must complete training and receive certification to carry out the operations.
- Injuries shall be reported at the quarterly corporate Occupational Safety and Health Committee meeting, monthly fab Occupational Safety and Health Committee meeting, and weekly unit occupational safety coordinator meeting for review and to formulate mitigation measures to strengthen facility managers' awareness of employee safety.

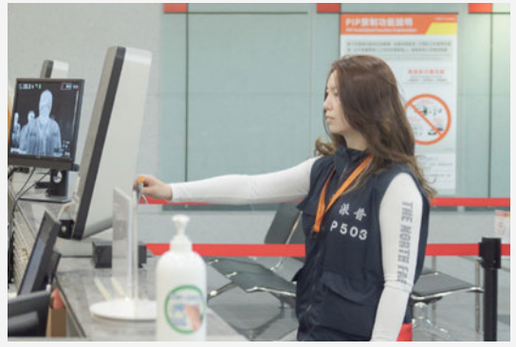
- Starting from December 2021, TSMC introduced online training courses for contractors to strengthen safety awareness and ensure safe operations among contractors. The course system automatically checks for training records and contractor qualifications and informs the contractor to take refresher training each year. TSMC will revoke access to TSMC sites for contractors that fail to complete their training.

Case Study

All Contractors Completed Digital Contractor Training Program

With the large increase in number of contractors came the increase in high-risk operations as well, rising from 28,758 operations in 2020 to 32,880 operations in 2021. To reduce incident rates and ensure contractors entering TSMC premises are fully aware of operational risks, TSMC has been facilitating the digital transformation of occupational safety and health training by introducing new online interactive courses about occupational safety and health, high-risk operational rules training, and introduction to high-risk operations on the TSMC Supplier Sustainability Academy. All contractors are asked to take refresher courses annually and training records will be added to the access control system and work order application system to maintain a full understanding of contractor eligibility. Pilot testing for contractor training ends in December 2021 and will be formally launched in 2022.

For contractors engaging in high-risk operations, TSMC will be bringing all high-risk operation training courses online and simplifying the contractor license application process so that new contractors do not have to wait in line but will receive the contractor license directly after completing their training. In December 2021, TSMC selected three facilities: Fab 2 & Fab 5, and Fab 6 for testing. A total of 592 contractors completed high-risk operation training courses online and TSMC was able to reduce 15 offline courses.



Training records are now linked to access control systems to comprehensively monitor contractor eligibility

Statistical Analysis of Disabling Injuries

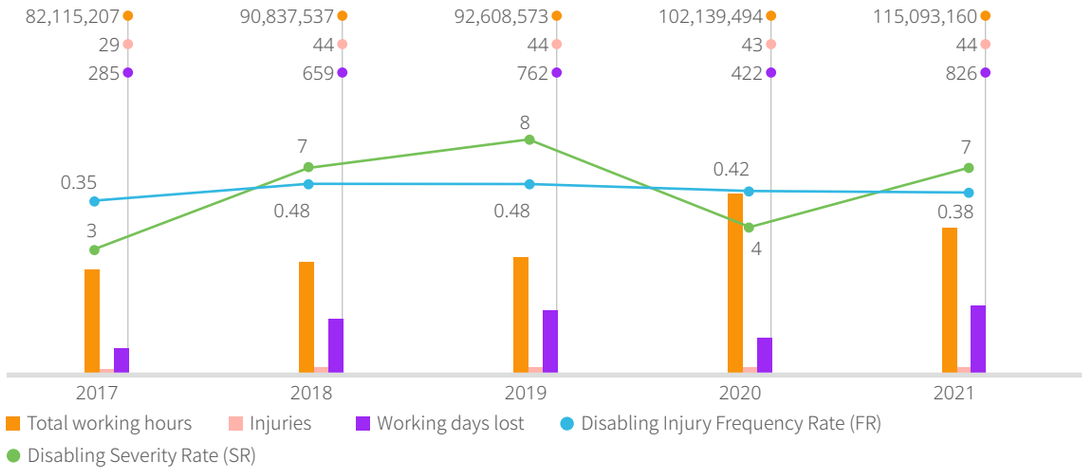
Disclosure of occupational accidents is in accordance with the Occupational Safety and Health Act and important disabling injury indicators issued by the Global Reporting Initiative which uses Disabling Severity Rate (SR) and Disabling Injury Frequency Rate (FR) as primary indicators. In 2021, there were 44 disabling injuries among employees with 826 working days lost. Of the 44 disabling injuries, 25 were men with 417 working days lost and 19 were women with 409 working days lost. Men suffered from a higher number of work-related disabling injuries and working days lost than women. The highest percentage of male injuries were crush injuries from failure to comply with SOPs when performing equipment maintenance. See Improvement Highlights in 2021 for details on preventing crush injuries in the future.

In 2021, the majority of female injuries were from falling or collisions that mainly occurred while transporting cleanroom trolleys at 6" and 8" fabs due to poor trolley route designs or accidental collision for failure to notify people ahead.

Collision Mitigation Measures

1. Design fixed and mobile shelf locations and design fixed trolley routes to reduce collisions from unclear route conditions. Trolley storage location is also listed as an important inspection item for safety and health enforcement
2. Occupational physicians visited on-site to point out areas at risk of collision and TSMC has made the necessary corrections
3. Each quarter, promote crush injury prevention at the coordination meeting with the Production Division
4. Continue the Smooth Road Project and reward employees for reporting unsafe environments
5. Continue installing mirrors at collision-prone areas or areas reported by employees as unsafe

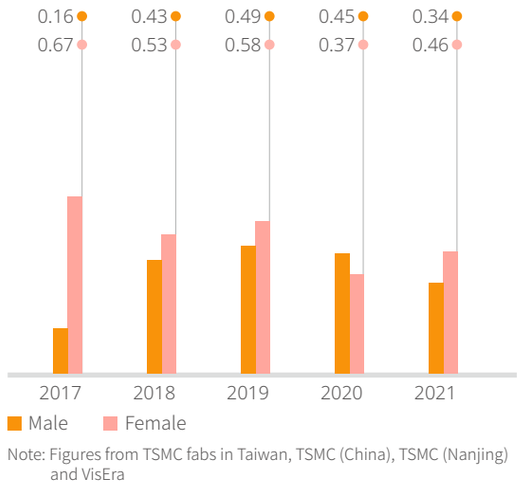
Total Working Hours, Injuries, and Working Days Lost [Note 1]



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 due to various reasons are not considered as work injuries

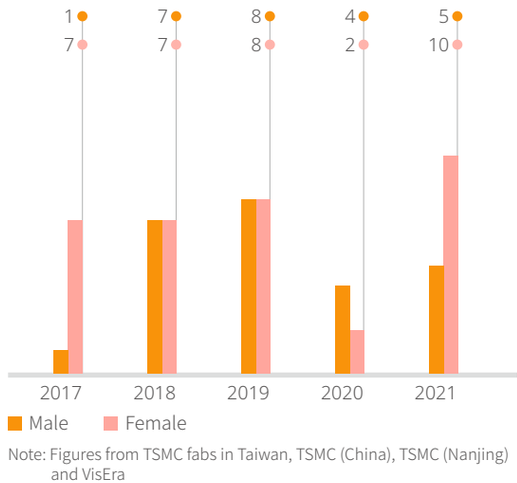
Note 2: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and VisEra

Disabling Injury Frequency Rate by Gender



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

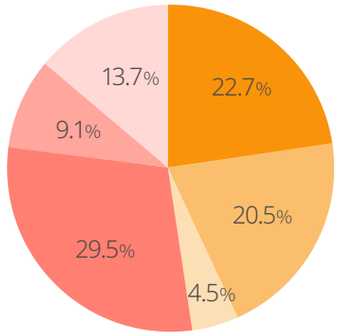
Disabling Severity Rate by Gender



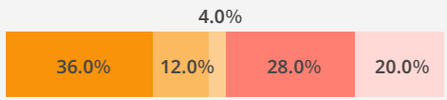
Note: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing) and VisEra

In 2022, there were 30 non-work-related injuries. The majority, 17 injuries, were from falling and accounted for 443 working days lost. The second highest injury was sprains, 6 injuries, and accounted for 57 working days lost.

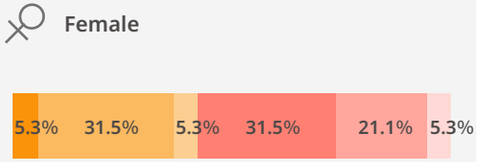
Disabling Injury Frequency Rate by Injury



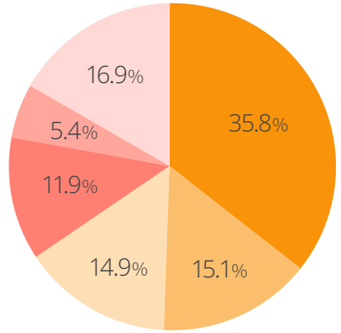
Male



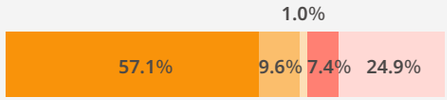
Female



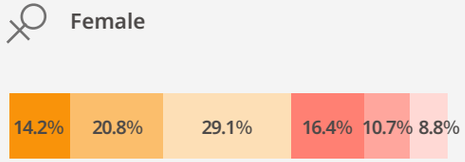
Disabling Severity Rate by Injury



Male

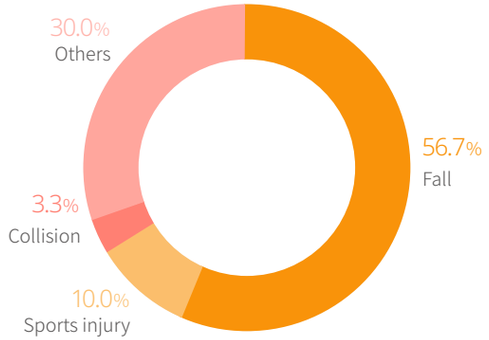


Female



Crush | Fall | Ergonomic Injuries | Collision | Cut, Scrape, Puncture | Others

Non-work-related Injuries





TSMC builds an intrinsically safe workplace and requires employees to carry out management rules.

Cause Analysis and Prevention for Falls

Analysis

14 Falls

From Personal Reasons

From personal reasons: misstep in the stairways, not paying attention when walking, tripping when getting out of a car, or tripping over chairs or others, etc.

Mitigation Measures

Raise awareness and remind employees to pay attention to personal safety

3 Falls

At Work

From wet floors in the workplace

Mitigation Measures

Immediately report any wet floors to cleaning staff for professional treatment to reduce risks of employees falling

Comprehensive Health Management

TSMC's comprehensive health management plan strives to prevent occupational diseases, facilitate personal health among employees, and achieve work-life balance by controlling health risks in the workplace and safeguarding our employees' physical and psychological health.

Prevent Occupational Diseases

TSMC has remained committed to building a safe and healthy workplace where each task is assessed with risk identification to uncover five major potential risks: chemical, physical, ergonomic, biological, and social/psychological, and to design preventive measures accordingly.



TSMC implements measures to prevent occupational diseases and promote employee health.

Prevention Measures against Occupational Diseases & Achievements

Ergonomic
On-site visits with occupational physicians

Existing Measures

- Arranged occupational physicians to visit loading sites at TSMC fabs in Taiwan and requested feedback
- Streamlined ergonomic risk assessment form for employees to quickly identify risk levels
- Used computerized ergonomic risk assessment systems to identify operations with high ergonomics risks
- Helped health centers conduct health surveys and track employees who applied for pain relief patches, and reached out to and arranged meetings with occupational physicians for employees on leave for musculoskeletal pains

Achievements

- 15 on-site visits from occupational physicians with 16 suggestions for a single facility, including adjusting the transport distance of wafer cassette rinsing machines, lighting for work stations, etc. All necessary changes were made with a 100% completion rate and shared with other facilities
- Computerized assessments were conducted for 18 employees with above- or below-average height. Office chairs were raised and foot mats provided to maximize comfort levels. Employee satisfaction reached 100%
- 161 employees were impacted by soreness and participated in the ergonomic risk exposure survey. Upon assessment from occupational physicians, 14 of the 161 employees were suspected to be impacted by ergonomic risk factors and received support in the form of adjusted work duties
- Employees affected by soreness were cross-checked with the computerized ergonomic risk assessment system. None were found to be working in areas or potential areas of ergonomic risks

Chemical
Establish exposure assessment model to manage the use of chemicals

New Measures in 2021

- Upgraded system for reviewing chemical safety information from vendors. As TSMC is building facilities abroad, we compiled differences between hazard classifications and chemical safety information charts from Taiwan, China, the U.S., and Japan so that employees around the world have access to information safety charts at all times
- Re-evaluated chemical work stations involving manual labor at 144 laboratories to confirm that there are zero risks of chemical exposure
- Established the Upgrade Program for Cleanroom Glove Allergy Surveys and a chemical-resistant standard for gloves used for different chemicals. Analyzed plausible allergens and reviewed processes and storage methods to prevent future allergies

Existing Measures

- Chemical Management: See TSMC Chemical Management Procedures for more information
- First Taiwan semiconductor company to introduce the EU EN 14175-3 (Requirements for Fume Cupboards) and establish standards for fume cupboards inside laboratories

Achievements

- All chemicals were assessed as low risk and the safety information for all chemicals used at TSMC is 100% accurate
- Confirmed that all chemical-related tasks in 144 laboratories are performed inside fume cupboards with zero health risks to operators
- Gloves were reviewed, analyzed, and confirmed to be free from any allergens suspected by occupational physicians. Also reviewed glove use for different tasks and now offer multiple glove brands in consideration of employee allergies
- Installed new fume cupboards in compliance with fume cupboard standards
- 0 cases of occupational disorders caused by chemical exposure

Social/Psychological

Advance the Cerebrovascular and Cardiovascular Disease Prevention and Management Program

New Measures in 2021

- Offered occupational leave to employees with medium/high health risks in Taiwan facilities for free advanced imaging examinations, to help them prevent cerebrovascular or cardiovascular diseases

Existing Measures

- Used health management system integrated with latest employee health check-ups and working hours to evaluate health risks; in addition to informing employees, TSMC also reminded supervisors and HR reps to adjust workload for said employees
- Combined with the working hour system for risk control, if the employee's working hours are abnormally overtime, the system will automatically remind employees, supervisors and HR representatives

Achievements

- 2,138 employees from Taiwan facilities completed advanced imaging examinations; 44 employees require medical attention for further treatment
- Managed 4,168 employees and tracked monthly for cases of excessive workloads or workloads over doctor recommendations

Biological

Track CDC updates to provide employees with the latest health information

Existing Measures

- Continued to track communicable epidemics domestically and abroad and establish preventive/response measures for notifiable epidemics; 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 5,794 high-risk cases in compliance with COVID-19 control measures
- Effectively managed a total of 82 cases of notifiable epidemics and non-notifiable epidemics to contain the spread
- Distributed 576 disease prevention toolkits to employees going on business trips

Physical

Better identification of physical hazards in the environment

New Measures in 2021

- Established baseline data and risk map for strong magnetic field and non-ionizing radiation levels for all lab equipment

Existing Measures

- Developed measurement system for ionizing radiation levels to monitor the radiation protection of all equipment, maintain a record of non-ionizing radiation levels of all relevant equipment, ban individuals with cardiac pacemakers from operating such equipment and warn before hiring
- Process equipment is tested for non-ionizing radiation levels every six months

Achievements

- Conducted special eye test on one operator whose results were normal
- No cases of radiation exposure
- All equipment tested normal for non-ionizing radiation levels

Case Study

TSMC's COVID-19 Protection Network Safeguards Employee's Health & Safety in the Workplace

In response to the global COVID-19 pandemic, TSMC's Disease Prevention Committee continued to update disease prevention measures to effectively control the pandemic at Taiwan facilities and overseas subsidiaries, ensure employee health, and maintain business as usual.

In 2021, there was a single case of cluster infection with three confirmed cases at an office in a TSMC facility. The Disease Prevention Committee immediately convened an Emergency Response Team to investigate the infection. The Team referred to NHCC suggestions and immediately initiated the four steps to control COVID-19 cluster infections, expanded the list of contact, and immediately adopted quarantine measures and rapid testing kits for all employees on the same floor. The Team also quickly started disinfecting the space and collaborating with medical institutes to test all employees and contractors working on the same floor. After that, the Team then followed up with confirmed employees for a list of people they came in contact with for future reference and offered support in the form of COVID-19 related information and daily life support. After a 14-day observation period, the Team effectively halted the pandemic from spreading without other employees contracting COVID-19. During this time, TSMC maintained business as usual and the production wasn't interrupted.

After the cluster infection, TSMC launched large-scale drills in Taiwan facilities for confirmed cases to strengthen disease prevention awareness and capabilities in employees. TSMC also established a COVID-19 survey which asks employees to report their temperatures each day. The records are then linked to their personal information, e.g., office floor, seating, roommates or cohabitants, transportation, meetings attended, and dining. The time it takes to complete the COVID-19 survey was reduced from an average of two hours in 2020 to 15 minutes in 2021 and it allows us to quickly compile a list of close contacts to more effectively carry out subsequent prevention plans.

TSMC's COVID-19 Testing Stations



Employees scan their national ID cards to register



Employees waiting in line to get tested

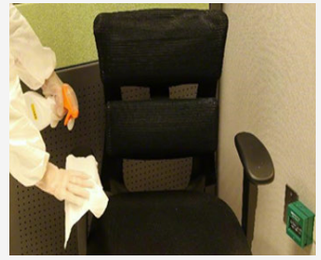


Positive pressure COVID-19 testing stations

TSMC Disinfecting the Workplace



Office disinfection



Office disinfection



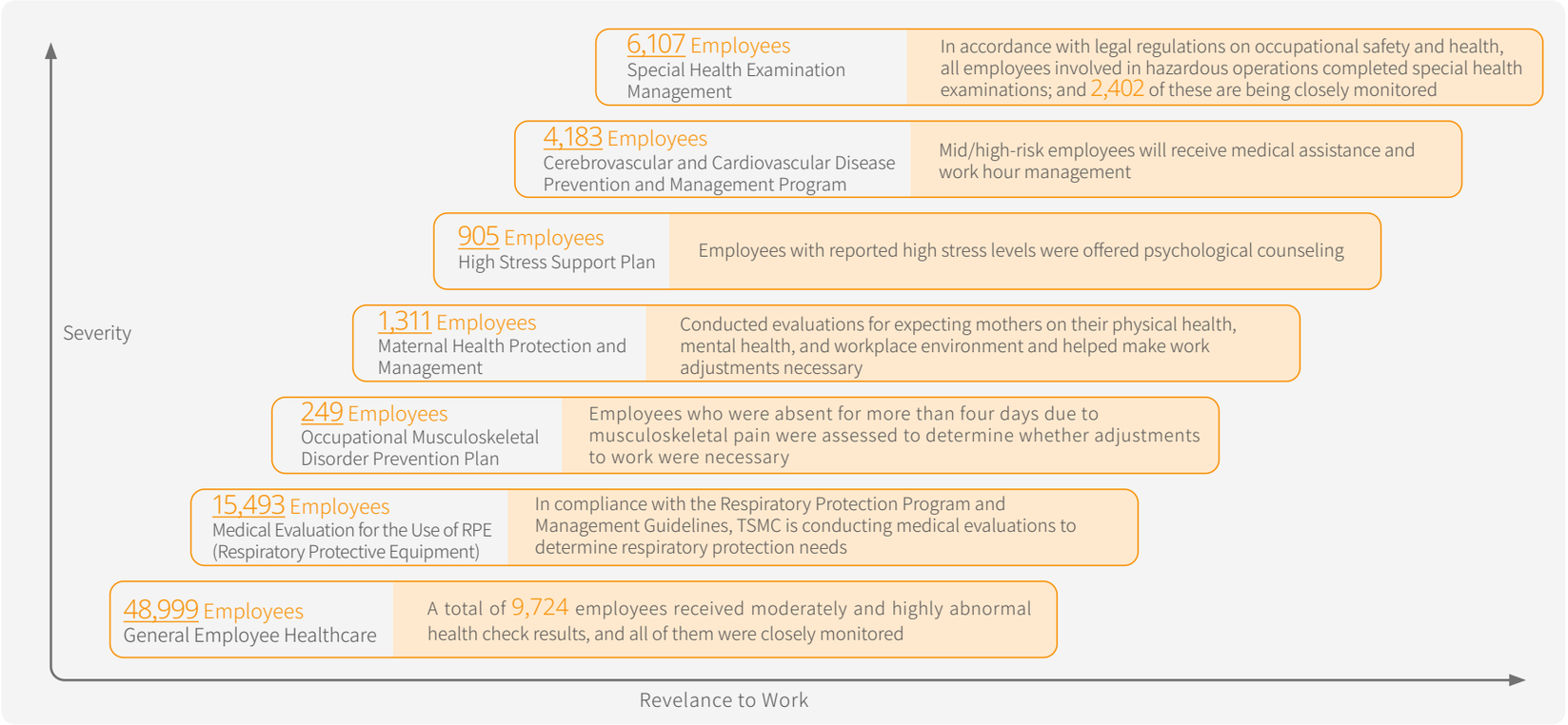
Public area disinfection

Health Indicators and Health Risk Management

TSMC's occupational health risk management plan covers both occupational hazards and personal health. TSMC complies with legal regulations on occupational safety and health as well as job characteristics and health risk matrices to regularly analyze employee health risks. The top three issues in 2021 were special health examination management, cerebrovascular and cardiovascular disease prevention and management, and high stress Support Plan.

In terms of special health examination management, we analyzed employee health examination results and found no individuals with unusual work-related conditions. As for the cerebrovascular and cardiovascular disease prevention and management program and high stress support plan, TSMC has referred to the WHO's top ten causes of death and discovered that cerebrovascular and cardiovascular diseases are one of the top causes of death and disabilities. High blood lipids, high blood pressure, and high blood sugar are highly related to cerebrovascular and cardiovascular diseases. When combined with long-term stress, fatigue from work, or sleep disorders, patients may be more susceptible to cerebrovascular and cardiovascular diseases. After discussions with occupational physicians, TSMC decided that starting from 2022, the health program participation rate, an existing indicator in our comprehensive health management plan, will be replaced with two indicators: the physiological indicators are the abnormal rate of blood lipids , blood pressure, and blood sugar of employees; the psychological indicator is percentage of employees with reported high stress levels. The two new indicators will serve as important bases for monitoring employees in the long run and planning mitigation measures. TSMC also referred to the incident rate of high blood lipids, high blood pressure, and high blood sugar levels in Taiwan, issued by the Ministry of Health and Welfare, as well as the age of TSMC employees and health examination data over the past three years to set 2022 targets and 2030 goals, the abnormal rates of blood lipid, blood pressure, and blood sugar should not exceed 11%, 13.5%, and 2.5%, respectively. The other new target is to contain percentage of employees with reported high stress levels to <9%. TSMC continues to make rolling changes to sustainable development goals to further take care of our employees' physical and psychological health.

Occupational Health Risk



Comprehensive Health Care

TSMC offers employees a supportive environment, a variety of health care programs, and events to promote and maintain employee health.

Health and Wellness Programs in 2021

114,406 Participants

- **Cancer Screening:** 21,080 employees received fecal occult blood test, mammography, breast ultrasound/gynecologic ultrasounds, or Pap smears
- **Clinics Services:** 17,893 outpatients, including employees, family members, vendors, and visitors
- **Health Promotion Programs:** 75,433 人 participants joined online health speeches, Health Quiz, the Weight Control Competition, consultations, health lectures, virtual walking challenge, health check-ups, healthy diets, etc.

Sports Center

175,357 Users

- Employees are encouraged to exercise regularly. TSMC Sports Centers and all TSMC facilities come with gyms, aerobics classrooms, and multifunctional ball courts to provide employees and dependents with swimming, yoga, and spinning exercise classes

Assistance for Employees

3,316 Users of the free consulting service

- TSMC has a long-term partnership with professional psychologists, lawyers, and accountants to provide employees with free consulting services and help employees deal with mental and physical stress

Case Study

Virtual Walking Challenge - 14,550 Employees Walked 1,029,825 kilometers

TSMC cares about employee health and promotes a lifestyle where 'every day is sports day.' As such, we decided to host a one-month virtual walking challenge where we used applications to design competitions, allowing us to bypass pandemic restrictions. We also worked with health centers and the Service Integration Department to launch health quiz, healthy lunch boxes, live-streamed lectures on healthy diets/working out, and other events promoting health that were well received by our colleagues.

We carefully designed progressive milestones from 10km to 18km for the virtual walking challenge to make it easy for employees to complete the challenge during breaks, allowing less active employees to also join in the fun, experience the sense of accomplishment from working out, and subsequently develop regular habits of working out. In 2021, the virtual walking challenge attracted 1,455 teams comprised of 14,550 employees. They completed a total of 1,029,825km, which is around 1,373,100,000 steps and the equivalent of 26 laps around Earth and 2,004 laps around Taiwan. The total number of walking hours was 205,965 hours and participants burned a total of 64,014kcal.



Members from the TSMC Jogging Club assembled their own team: 99% - Mr. Guan No.1 to participate in the Virtual Walking Challenge

> The challenge motivated me to get active and encouraged me to run my heart out after work. The best incentive is health itself.
>
> **Chu Yih-Chin**
> TSMC Employee

Internal-External Alliance

As a leader in the global semiconductor industry, TSMC recognizes its obligations of creating a healthy workplace together with its vendors and contractors. In 2021, TSMC largely used online meetings to collaborate with business partners, other industries, the government, and academia because of the COVID-19 pandemic. We hoped to share our experiences in promoting safety and health as well as reducing risks in the workplace with vendors and contractors even under the persisting pandemic.

Work with External Parties to Optimize Work Environment

TSMC regularly attends the Joint Steering Committee ESH Working Group of the World Semiconductor Council on behalf of the Taiwan semiconductor industry to conduct exchanges with overseas peers on occupational safety and health as well as risk control measures. In 2021, the ESH Working Group was held online to reduce risks from public gatherings, overcome space and time limitations, and share experiences on managing a safe and healthy workplace.

TSMC also collaborated with the Occupational Safety and Health Administration, MOL and Institute of Environmental and Occupational Health Sciences, NYCU to compile materials for advanced in-service education on introduction to risk assessment and management theories and practices. In 2022, we plan to conduct training and drills in Northern, Central, and Southern Taiwan to advance hazard identification and problem-solving abilities among occupational health managers to build a safe and healthy workplace.

Raise Contractor's Hazard and Health Risk Awareness

Contractors under high risk of chemical exposure were identified through analyses of chemical exposure risk and the frequency/nature of their operations. 3% of contractors were identified as high risk bearers and TSMC has been committed to reducing their risks of occupational diseases from chemical exposure. In 2021, contractors registered a higher Disabling Injury Frequency Rate (FR) and Disabling Severity Rate (SR) than in 2020. See Safety Performance Index for information on mitigation measures.

Existing Measures

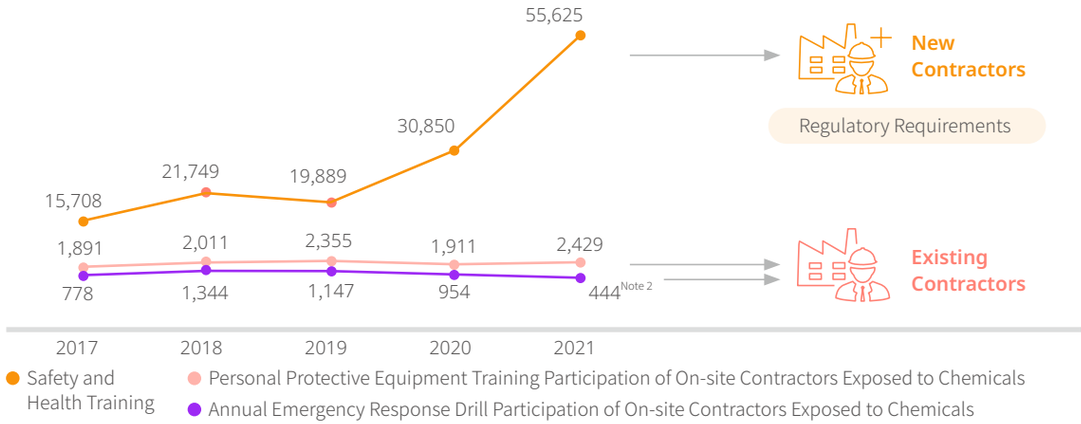
- Dispatched TSMC's occupational physicians to inspect on-site contractor operations and analyze chemical exposure risks
- Asked contractors to report any unusual results uncovered by the special health examination

Achievements

- Guaranteed zero chemical exposure risks to contractors working at TSMC
- Received 0 cases of unusual health examination results

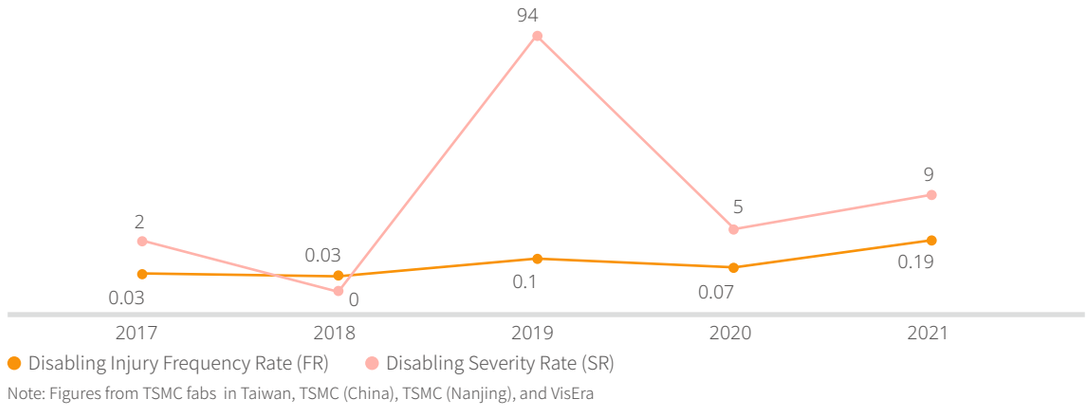
Outcomes of Contractor Training Programs

Unit : Attendees (by Attendance)



Note 1: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra
Note 2: Due to the pandemic, training was held in groups to reduce the number of emergency drills

Disabling Injuries in Contractors



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

Case Study

On-site Contractor Support Program Benefits 60,000 Drivers

Continuing the 2020 On-site Contractor Support Program, which targets three different on-site contractors: cleaning staff, cafeteria staff, and security personnel, TSMC further expanded the program in 2021 to optimize the workflow of tank truck and truck drivers by redesigning transportation routes, confirming truck schedules, and increasing parking spaces to reduce waiting times for truck drivers and increase wafer transportation efficiency by 95%. We also optimized the quality control process for incoming materials from tank trucks to reduce tank truck operation times by 50%. As of December 2021, more than 60,000 people have been benefited from this program, ensuring driver health and public transportation safety. See TSMC Optimizes Tank Truck Filling Process, Reducing Driver Duty Time by 50% and Improving Transportation Safety for more information.

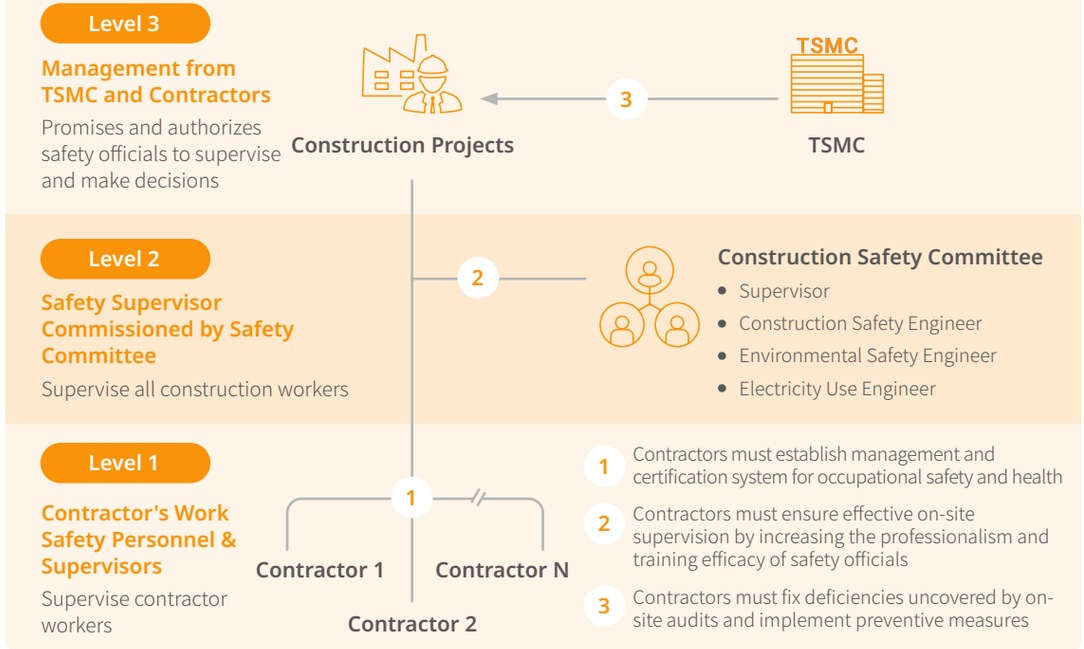


TSMC actively improves the efficiency of tank truck operations, reducing driver duty time by 50%.

Enforce "Safety First" Responsibilities and Culture at Construction Sites

To ensure construction workers' safety during fab construction and strengthen functions of construction safety and management organizations, contractors, construction site safety committees, and TSMC are collaborating in a three-level management system to guarantee construction site safety and safeguard the safety of workers. TSMC enforces construction site safety through the PDCA management framework across three dimensions of risk identification, management support, and on-site audits. TSMC also works with third-party construction safety experts to review workplace safety, analyze information, conduct on-site audits in areas we can improve on, and optimize practices for safe operations. TSMC also established a mechanism for contractor companies to practice autonomous safety management, asking their central unit for environmental protection and safety to conduct monthly on-site audits to ensure safety, adopting a top-down approach to strengthen management and ensure the contractor's frontline supervisors are personally in control of construction site safety.

Construction Site Safety Measures



Construction Site Safety Efforts



Existing Measures

- In continuation of the 170 Job Safety Analysis (JSA) items, TSMC continued to observe on-site operations and optimize safe working practices

New in 2021

- To standardize health and safety protocols for construction sites, TSMC has been compiling the ESH Bluebook on Fab Construction, which covers five major dimensions: management, safety, fire prevention, health, and environmental protection and 85 management protocols. The Bluebook will be completed in 2023
- For the 13 high-risk operations, TSMC has conducted risk evaluations based on Job Safety Analysis (JSA) and will be working with contractors to amend protection plans for high-risk operations and construction sites
- TSMC required all contractors to submit a Construction Site Safety and Protection Plan and reviewed all safe construction practices during meetings between the construction site safety committee and contractors to ensure construction site safety

Existing Measures

- TSMC continued to counsel contractors in Job Safety Analysis (JSA) to familiarize contractors with safety methodology for applications to risk management at the construction site

New in 2021

- TSMC built VR and offline training facilities and required all construction workers to complete the training to strengthen their understanding of the hazards of high-risk operations. Those in violation of safety regulations must pass the drill and tests again
- TSMC used daily Toolbox meeting to remind safe practices and hold second Toolbox meeting to explain operational risks for high-risk operations
- TSMC reviewed safety practices at the end to ensure comprehensive management over safe practices. At construction sites, TSMC also put up safety posters to remind contractors to remain safe in the workplace

Existing Measures

- TSMC invited outside experts and contractor management to report and review achievements in construction risk analysis at work safety meetings
- Heat stress prevention in summers
- Enforced pandemic preventive measures at construction sites

New in 2021

- Used infrared thermal imaging for early detection of abnormal switchboard activity to ensure electrical safety
- As there were many construction tasks each day, the construction flow coordination meeting can reduce hazards from overlapping operations and ensure safe operations and environment
- Added high-risk operation audits where work safety personnel must audit all high-risk operations including operations in confined spaces, opening switchboards, erecting and disassembling scaffolds over five meters, lifting operations, above-ceiling work, etc. Work safety personnel must confirm that the environment is safe before workers proceed with operations

Establish Construction Site Safety Management Processes through Risk Identification

TSMC requires all contractors to submit a Construction Site Safety and Protection Plan and review all safe construction practices during meetings between the construction site safety committee and contractors to ensure construction site safety. In 2021, TSMC will be compiling an ESH Bluebook on Fab Construction to standardize safety and health management processes for construction sites. We plan to require contractors to comply with Bluebook regulations after the Bluebook is announced in 2023.



Management by wandering around (MBWA) in action



Daily toolbox meeting

Ensure Safe Practices through Management Support

In 2021, TSMC continued to drive construction site safety culture - care, communication, awareness, and behavior change. For workers in violation of safety regulations, TSMC will adopt two major measures: firstly, immediate counseling in place of compulsory punishment as we aim to apply reasonable and mutual communication to help construction workers take a new look at safety guidelines on construction sites, thereby heightening their awareness in construction safety so the same violations do not happen again. Secondly, in addition to immediate counseling, practical and VR training has also been strengthened for those in violation of safety guidelines while working on one of the 13 high-risk operations so workers can undergo repeated drills and training that can hopefully correct unsafe behaviors in the workplace.

Enforce Audits to Ensure Safe Construction Sites

In 2021, TSMC introduced smart disaster prevention technology, established smart construction site management, and developed smart AI image recognition technology to issue real-time alerts for unsafe behaviors and environments so that construction site supervisors can make immediate changes. Construction sites can continue with construction after confirmation from on-site inspections. We are still developing some of the system functions and we estimate that they will be completed and launched in 2022.



VR experience facility



Safety inspector communicates with contractor workers

Natural Environment

- **Heat Stress Prevention in Summer**: As construction sites are exposed under the sun, TSMC has introduced the Wet Bulb Globe Temperature (WGBT) to measure indoor and outdoor temperatures, set up heat stress risk level signs at construction sites, and offer cooling drinks and foods such as ice water and preserved plums to remind outdoor construction workers to take breaks and drink water as necessary. In 2021, TSMC reduced heat stress by 144 cases from the previous year
- **Disease Prevention at Construction Sites**: In compliance with COVID-19 prevention measures, before entering construction sites, contractors must report their temperatures and submit a declaration of health online first. Professional contractors are also hired to perform at least three full disinfections inside and outside the construction site and check for any residual virus, monitor if disinfection processes are compliant, and ensure personnel safety



Environmental temperature monitoring to prevent heat stress



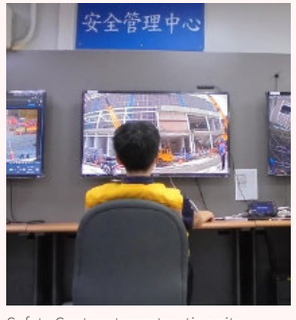
Safety Center at construction site

Construction Site Environment

- **Fire Early Warning System**: Used infrared scanner (IR scanner) for early detection of abnormal switchboard activity to ensure electrical safety
- **New Safety Early Warning & Detection Facilities and Safety Equipment**: Added visual light signals and auditory alarm signals to 88 forklifts in 2021. There were no more forklift-related crush injuries
- **Established Construction Site Safety Facility Task Force**: Shorten process lead time from seven days to one day for accelerating mitigation efforts of unsafe environments and clean-up of massive waste at construction sites. In 2021, TSMC completed a total of 131 missions and 230 inspections
- **Increased Personnel for Construction Site Safety Patrols**: In 2021, there were 715 construction site safety personnel, which is 91 more than the previous year. There is also an increased focus on inspecting high-risk operations to confirm that the workplace is safe before starting construction work.



Visual light signals on forklifts



Safety Center at construction site



Smart AI image recognition technology

Power to Change Society

With a sustainable vision to "better society," the TSMC Education and Culture Foundation and the TSMC Charity Foundation have galvanized internal and external resources to spotlight the following areas: cultivate our youth, rural education, and support arts, culture, and the environment. We also care for the disadvantaged as well as seniors living alone to build a strong foundation for society through common good.



203,814

Beneficiaries of the Youth Cultivation Program

14,083 Services

Collaborated with 15 medical and care centers, providing 14,083 services to seniors through the Network of Compassion Program

58,862 Beneficiaries

122 organizations supporting the disadvantaged regularly benefit from the Cherish Food Program, with a total of 58,862 beneficiaries

Social Impact

TSMC Education and Culture Foundation

TSMC Charity Foundation

Social Impact

In line with the TSMC ESG Policy, TSMC listens to the needs of society and responds to the United Nations Sustainable Development Goals (SDGs) by taking concrete actions to close the resource gap and achieve common good. TSMC also refers to the London Benchmark Group's (LBG) Impact Principles to examine and analyze the impact of each project from the extent of its impact (connection, improvement, change) and the type of impact (behavioral or attitudinal change, skills or personal effectiveness, quality of life or well-being) in the hopes of creating real and positive change.

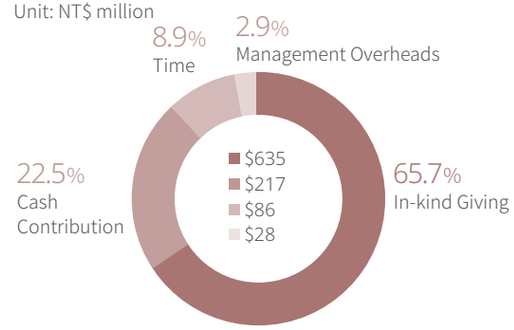
Inputs

2021 Resource Investments

966 million
Total Investment (NT$)

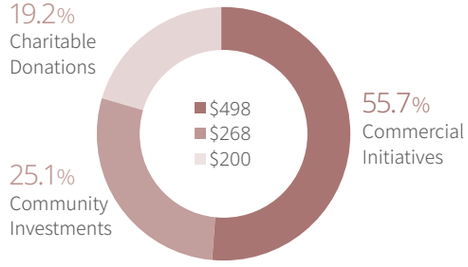
Investments

Unit: NT$ million



Types

Unit: NT$ million



Outputs

2021 Social Impact Projects KPI[Note]

14,083
Seniors Benefitted from Care for Elders

82
Recipients of disadvantaged Student Scholarships

64
Schools Promoting Filial Piety

2,064
Participants of Young Generation Cultivation

(continued on the next page)

Note: Principle of KPI Selection: Focusing on the seven major public welfare pillars, the results will present homogenous data. The KPI will also prioritize target achievement and long-term commitment

(continued from the previous page)



25,082
Participants of Arts and Culture Promotion

58,862
Beneficiaries of the Cherish Food Program

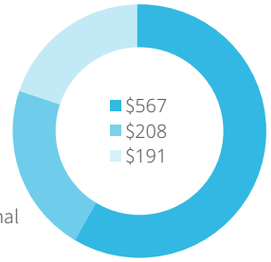
>6,500
Participants of University Programs

5,287
Children Benefitted from Remote Education Programs

Impact

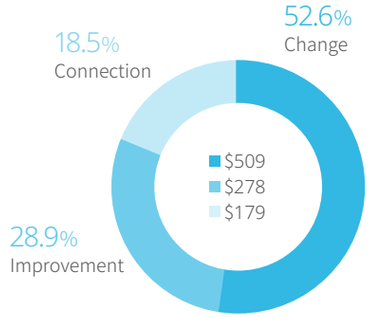
2021 Impact Distribution

Types Unit: NT$ million

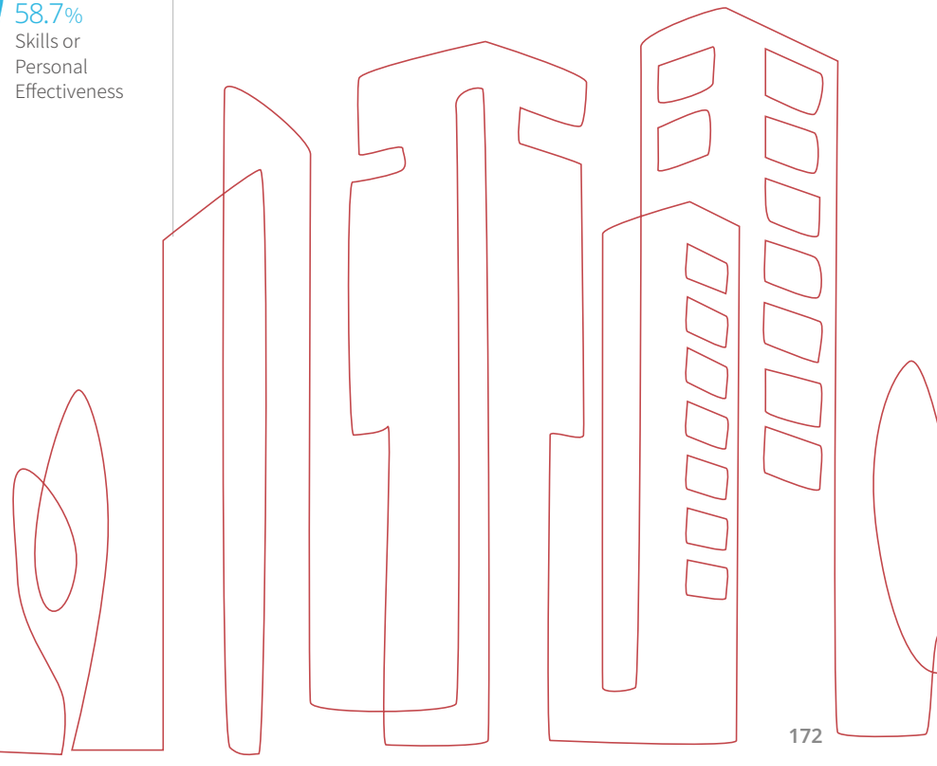


- **Behavioral or Attitudinal Change**: Help people change their behaviors to improve their personal lives, such as changing attitudes and making better choices
- **Skills or Personal Effectiveness**: Help people develop new skills or advance existing ones to open up more opportunities
- **Quality of Life or Well-being**: Help people live healthier, happier, and more comfortable life can help improve emotional health, social relationships, and health

Depth Unit: NT$ million



- **Connection**: Create opportunities for change through activities
- **Improvement**: Make a real difference in people's lives
- **Change**: Keep observing the changes that are happening



Over the years, TSMC has been investing in University Programs and providing timely assistance and resources for emergency relief, such as assistance for earthquake victims, vaccine donation, etc. TSMC has also integrated the TSMC Education and Culture Foundation and the TSMC Charity Foundation to form a social welfare network to address social problems in collaboration with stakeholders and partners.

Founded in 1987, the TSMC Education and Culture Foundation is dedicated to fostering youth development and opening up infinite possibilities for the next generation of students. TSMC collaborates with like-minded educational institutions to make the whole greater than the sum of its parts. The Foundation is also promoting arts and cultures and cultivating an appreciation for arts in Taiwan's society.

The TSMC Charity Foundation, with a mission for "long-term services," connects internal and external charity partners and galvanizes colleagues to dedicate themselves to volunteer services as well as caring for the disadvantaged, elderly people living alone, filial piety, and environmental conservation to strengthen our positive influences in society.

In 2021, TSMC and the two Foundations invested more than NT$5.92 billion in charitable activities. Due to the COVID-19 pandemic, NT$4.126 billion was used to purchase and donate vaccines to alleviate the urgent domestic demand for vaccines.

In the same year, TSMC also invested more than NT$966 million into seven major public welfare pillars, mainly in the form of "In-kind Giving," through which TSMC provides resources and services, which accounts for 65.7% of total donations. In terms of public welfare activities, TSMC continues to strengthen contributions to Commercial Initiatives.

TSMC also analyzed resources invested into achieving UN SDGs, revealing that 48.8% was invested in promoting SDG 9 (Industry, Innovation and Infrastructure), 27.7% and 17% were invested in advancing SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education), respectively.

Core Services

- Cultivate Young Generation
- Educational Collaboration
- Promote Arts and Culture
- Care for the Disadvantaged
- Care for Elders Living Alone
- Promote Filial Piety
- Environmental Protection

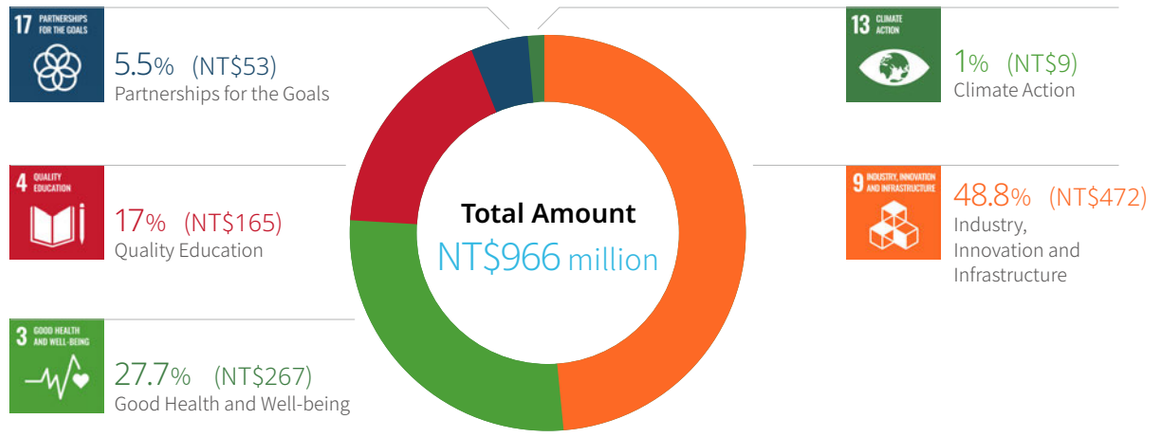
Target Groups

- High School/University Students and Professors
- Educationally Disadvantaged Students
- Schools in Rural Areas or Educational Institutions
- Arts and Cultural Groups and Local Residents
- Disadvantaged Groups
- Elders Living Alone with Low Income
- Care Centers for Seniors Living Alone
- NPOs
- The Public

Vision: Build a Society of Common Good

2021 Resource Investments by SDGs

Unit: NT$ million



TSMC Education and Culture Foundation

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Cultivate Young Generation Hold educational events; provide diversified educational platforms		
Ensure the number of overall youth competition events participants is higher than that of the previous year	**The number of overall youth competition events participants is higher than that of the previous year**	**Youth competition events attracted a total of 1,614 participants, up by 63 participants from 2020** ↑ Target: The number of youth event participants is higher than that of the previous year
Hold ≧ 10 popular semiconductor science activities with ≧ 1,000 participants annually[Note]	**Hold ≧ 10 popular semiconductor activities with ≧ 600 participants**	**Held 6 TSMC Journeys of Female Scientist Lectures, with 450 participants** ✓ Target: Hold at least 6 popular semiconductor science activities
Invest ≧ NT$30 million in resources NEW	**Invest ≧ NT$30 million in resources annually**	
Educational Collaboration Cooperate with educational organizations to narrow the gap in educational resources		
Continue to cooperate with educational organizations and invest ≧ NT$20 million in resources[Note]	**Invest ≧ NT$15 million in resources annually**	**Continued to offer scholarships at 5 universities; invested NT$8.2 million in 82 disadvantaged students** ✓ Target: Offer scholarships for disadvantaged students at five universities
		Donated NT$1.1 million in 2021 and NT$2.2 million in total between 2020-2021 ✓ Target: Continue funding the Public & Private Experimental Emei Bilingual Junior High School to support education

Note: The long-term goals have been revised as the TSMC Education and Culture Foundation expects that the investment and the growth rate of participants could reach over 30% in 2030 according to the implementation results in recent years

↑ Exceeded ✓ Achieved — Missed Target

Strategies & 2030 Goals	2022 Targets	2021 Achievements
Promote Arts and Culture Hold art festivals to foster local art groups		
Sponsor 10 local talented artists or art groups	**Continuously organize the TSMC Hsin-Chu Art Festivals and sponsor ≧ 10 talented local artists or groups annually**	**Sponsored 12 local art/cultural groups and 2 foreign musicals; organized 24 in-person events with 12,233 participants and 5 online events with 10,007 participants** ↑ Target: Continuously organize the TSMC Hsin-Chu Art Festivals and sponsor ≥ 5 talented local artists or groups annually
Ensure the annual number of beneficiaries for arts and cultural events is ≧ 15,000 people[Note]	**Organize ≧ 15 humanities lectures in college**	**Exclusively sponsored 17 Kenneth Hsien-Yung Pai Literature Lectures with a total of 2,302 participants** ↑ Target: Organize ≥ 15 humanities lectures in college
	Continuously organize ≧ 4 TSMC Lectures	**Held TSMC Lectures and invited Dr. Ming-ke Wang, an academician from Academia Sinica, to give 4 lectures, with a total of 550 participants** ✓ Target: Continuously organize ≥ 4 TSMC Lectures
	Hold in-person arts and cultural activities and benefit more than 20,000 people NEW	

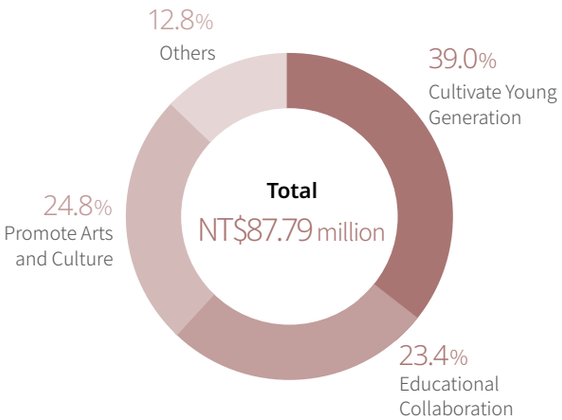
Note: The long-term goals have been revised as the TSMC Education and Culture Foundation expects that the investment and the growth rate of participants could reach over 30% in 2030 according to the implementation results in recent years

↑ Exceeded ✓ Achieved — Missed Target

The TSMC Education and Culture Foundation, established in 1998, contributed NT$87.79 million to fulfill corporate social responsibility in 2021. Based on the three pillars of "Cultivate Young Generation," "Educational Collaboration," and "Promote Arts and Culture," the Foundation held educational activities and provided diversified platforms for youth; collaborated with educational organizations from public and private sectors to narrow the urban-rural education gap; held the Art Festival and sponsored local art groups. Due to the COVID-19 pandemic, the Foundation's contributions decreased by 12% compared with that of the previous year.

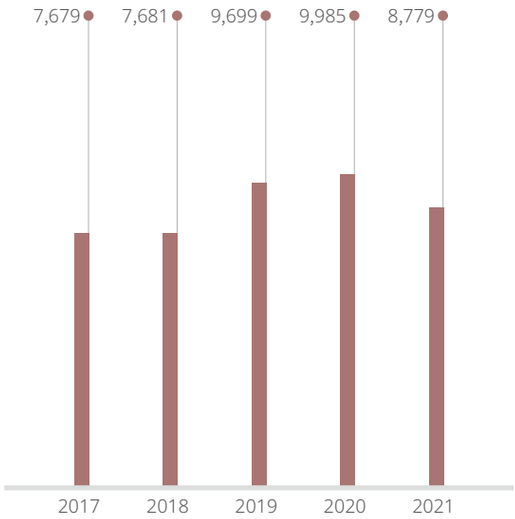
Focusing on younger generations, the TSMC Education and Culture Foundation continued to hold humanities and science competitions in 2021. In addition to cultivating literacy, these competitions led the youth to explore themselves and pursue their dreams. The Foundation also promoted high-quality artistic activities, introduced resources to local art groups, and provided platforms so that people could watch performances and enrich their appreciation for the arts. Despite the impact of the pandemic, many art events were held online but remain well-received. The Foundation continues to inject resources into society to create a good positive cycle and sustainable growth in society. For more information about the events and the sponsorships, please refer to the official website of the Foundation.

Sponsorship from the TSMC Education and Culture Foundation in 2021



Sponsorship from the TSMC Education and Culture Foundation

Unit: NT$ ten thousand





- Highlight Gender Diversity and Cultivate Female Scientists
- Establish Diversified Platforms for Youths to Undergo Self-Exploration and Deepen Humanistic Literacy

- Launch the Teach and Learn Program to support teachers to improve the literacy of rural children
- Continue to provide Scholarship and Digital Learning Equipment to Disadvantaged College Students
- Sponsor Experimental Education at Emei Junior High School in Hsinchu County to Inject Educational Resources for Arts & Culture

- Promote arts and cultural events
- Promote classical humanities

Cultivate Young Generation

What We Want to Solve

Due to the absence of literature, aesthetics, science, and self-exploration courses in Taiwan's education system, young students lack the opportunity to uncover and embody their talents

How We Respond

In 2021, the Foundation contributed a total of NT$34.7 million to hold various competitions, camps, lectures to inspire students' interest in science and the humanities as well as to guide them to explore themselves and pursue their dreams

Our Actions

- Highlight Gender Diversity and Cultivate Female Scientists
- Establish Diversified Platforms for Youths to Undergo Self-Exploration and Deepen Humanistic Literacy

Highlight Gender Diversity and Cultivate Female Scientists

Promote the TSMC Journeys of Female Scientist Lectures

In order to inspire female students' interest in science, the Foundation worked with the National Museum of Natural Science to invite students from 12 girls' senior high schools to attend the Lectures. The Lectures included a guided tour by TSMC female engineers to the World of Semiconductors Exhibition Hall, Semiconductor & science workshops, and dialogues between students and female scientists, which provided various opportunities for female students to learn about technology. The lectures attracted 450 females students in total.

12/450

A total of 450 female students from 12 high schools were invited to participate in the TSMC Journeys of Female Scientist Lectures, visiting the World of Semiconductors Exhibition and the Female Scientist Forum

> Thanks to the Lectures, I was able to know whether I am really interested in the semiconductor field, and to cross the barrier in gender and constraint to the future career path

Student from Taichung Municipal Wen-Hua Senior High School



At the Journeys of Female Scientist Lectures Program, three female scientists shared their educational and professional experiences with high school girls

Sponsor the Marie Curie High School Chemical Camp

Due to the pandemic, two science camps, the Wu Chien-Shiung Science Camp and the Wu Ta-You Taiwan Science Camp, long sponsored by the Foundation were suspended in 2021. The Marie Curie High School Chemical Camp was held as usual online.

To cultivate future scientist with advanced ideas and professional knowledge, the Foundation collaborated with the Chang Chao-Ting Memorial Foundation, sponsoring a 6-day -5-night science camp-the Marie Curie High School Chemical Camp- for 11 years since 2011. In addition to inviting top experts from Taiwan and abroad to introduce chemical sciences, the Foundation also invited outstanding enterprise leaders to give lectures on learning chemical sciences systematically. Due to the pandemic, the 2021 Marie Curie High School Chemical Camp was converted to three-day online courses and attracted 241 senior high school students to participate. The Foundation especially arranged a talk -The TSMC X Scientist Club Talk-during the camp and invited ten TSMC engineers under the age of 40 to share their educational backgrounds, work experiences, and the current industry status, which was well received by participating students.

> I'd like to thank TSMC's young engineers for sharing their work experiences and giving me insight to whether that's what I want.

TSMC X Scientist Club Talk Participant

> I didn't expect my experience to be an inspiration for young people. I would like to thank TSMC for its dedication to cultivating young people in addition to contributing to Taiwan's economy. It is very meaningful to be a part of this large family!

Eva Hsu

Manager, Research & Development-Special Tech. OPC, TSMC



TSMC's distinguished female engineer Yu-Chien Huang gives a tour of "The World of Semiconductors" to female high school students



Students from National Keelung Girls' Senior High School and Kaohsiung Municipal Kaohsiung Girls' Senior High School worked together in a semiconductor & science workshop

Establish Diversified Platforms for Youths to Undergo Self-Exploration and Deepen Humanistic Literacy

Expand TSMC Youth Dream Building Project and Encourage Youths to Focus on Environmental Sustainability

The TSMC Education and Culture Foundation has held the "TSMC Youth Dream Building Project" since 2016. In addition to inviting students from Taoyuan, Hsinchu, Miaoli, Taichung and Tainan areas, the Foundation expanded the project's scale to students nationwide in 2021. In response to TSMC's ESG values, the Foundation set the theme "UN SDGs" for the Sixth TSMC Youth Dream Building Project. A record high of 122 teams from 67 universities signed up for the project in 2021. In the end, 11 teams were selected and awarded a total of NT$3 million.

TSMC Youth Dream Building project has attracted more than 600 teams to participate from its first year to 2021. Among them, 46 award-winning teams made contributions in various areas such as regional revitalization, rural education, environmental protection, and indigenous culture, etc. Some of them even established their own social enterprises and continued to care about the issues raised in the project competition. A "STEAMING," shortlisted at the fifth Youth Dream Building project established their own company after graduation. Based on the core value of the 12-year Basic Education Curriculum Guidelines, the team integrated the literacy education concept to develop the first set of teaching material on "COVID-19" in Taiwan. The Daidai Rebag team, two-time winning team from the TSMC Youth Dream Building Project competition, also established a studio to promote environmental sustainability. Its founder and team project leader, Ms. Yujun Lin, was recognized by the Taiwan Academy of Corporate Sustainability and received the "2021 Outstanding Sustainability Youth Award."

"ibu Indigenous Youth House," the award winning team of the sixth TSMC Youth Dream Building Project



"Steaming," award winning team of the fifth TSMC Youth Dream Building Project: and their teaching materials on "COVID-19"





The judges and participaant students of the sixth TSMC Youth Dream Building Project



"Star Seeker Lab," award winning team of the sixth TSMC Youth Dream Building Project

1,022

The TSMC Youth Dream Building Project attracted 122 groups of students from 67 universities to participate in the competition, reaching 1,022 participants

Sixth TSMC Youth Dream Building Project

- 2021 July: Online orientation
- 2021 August: Registration begins
- 2021 September: Press conferences and cross-border dialogues - enable students to have an in-depth understanding of SDGs and turn issues of sustainability into concrete actions
- 2021 September: Online team meeting
- 2021 September: Dream Building Workshop - invite professionals in related fields to share experiences
- 2021 September: Registration deadline
- 2021 November: Intensive workshops and TSMC visits - assist the team to optimize proposals and understand TSMC's green manufacturing and environmental sustainability practices
- 2022 December: Final trial
- 2022 January: Initial interview
- 2022 April: Midterm sharing session
- 2022 September: Results presentation

Continue to Hold Calligraphy and Literature Contests

The Foundation encourages youth to study literature and calligraphy and offers a stage for them to shine with various artistic and cultural literacy competitions.

• Literature Competitions

The Foundation has held the TSMC Youth Literature Award for 18 consecutive years. With the theme of "Adult Formula" in 2021 to symbolize becoming an adult, the award continued to provide a dedicated platform for youth to create, discover potential talents, and ignite a passion for literature. In total, 781 submissions were received in 2021, and the total submissions over the past years reached 11,342. In addition to the literature competition, the Foundation worked with the UDN Supplement in 2021 to hold two literary activities:

- Invited 12 award-winning students to write an essay about "From a TSMC Superstar to the Next Literature Breakthrough" and published their essays on UDN Supplement.

- To raise the public's interest in litereature, the Foundation sponsored the "UDN Supplement 70th Anniversary Exhibition - Under the Starry Sky of Literature" to organize five online TSMC Youth Literature forums by inviting 10 young writers to discuss the theme "How to Measure the Boundaries of Literature." The Forums attracted 542,945 viewers in total.

In addition to the TSMC Youth Literature Award for high school students, the Foundation has held the biannual "TSMC Literature Award" since 2011 to encourage young people to write novels in Mandarin and to uncover new talents in literature writing . In 2021, the sixth "TSMC Literature Award" attracted participants from Taiwan, China, Hong Kong, Malaysia, the United States and Canada and received a record high of 171 submissions.

542,945

Hosted five online TSMC Youth Literature Forums, attracting a total of 542,945 views



Students made bamboo letters in the Chinese Character Workshop of TSMC Calligraphy and Seal-Carving Competition



Students showed their works made in the Chinese Character Workshop of TSMC Calligraphy and Seal-Carving Competition

• TSMC Calligraphy and Seal-carving Competition

The mission of the TSMC Calligraphy and Seal-Carving Competition is to promote Chinese characters education and their beauty. This competition is the only program that promotes calligraphy and seal-carving to high school students in Taiwan. With the theme of "Old School Writing," the 14th competition encouraged youth to experience the fun of writing in calligraphy brushes. It was also the first time that the Foundation collaborated with the Institute of History and Philology, Academia Sinica to provide teacher training courses. The training customized Chinese character courses for middle school teachers and solicited creative calligraphy teaching proposals from junior and senior high school teachers. It was hoped that calligraphy can therefore be promoted to the campus. In 2021, there were 422 submissions in competition, 40 teachers participating in the training, and 18 submissions of innovative teaching proposals.



Mr. Hsien-Yung Pai teaches 2 classes



At the press conference, professors teaching the Kenneth Hsien-Yung Pai Literature Lectures: Selected Classics of Chinese Culture take a group photo together

Exclusively Sponsor Kenneth Hsien-Yung Pai Literature Lectures in NTHU

The Foundation has long dedicated itself to thet humanities education by launching diverse educational projects that aim to improve young students' cultural literacy. In 2021, the Foundation invited Hsien-Yung Pai, a literary giant in Taiwanese Literature, and several scholars to give 17 classes on Selected Classics of Chinese Culture at the Center of General Education at National Tsinghua University. The classes were well received with 2,302 participants for the class. Meanwhile, in response to the 12-year Basic Education Curriculum Guidelines, the lectures were open to 100 sit-in students from senior high schools and could be accessed on the NTHU OpenCourseWare, and the TSMC Education and Culture Foundation's official website. In addition, the Foundation has completed and uploaded the video of Kenneth Hsien-Yung Pai Literature Lectures: Dream of the Red Chamber, sponsored in 2020 to the above two platforms. As of the end of December 2021, the number of viewers had reached 46,465.

> Tradition is a river that needs to flow. Only when you inject the water of culture will the river have life. When I can, I will pass the traditions on.
>
> **A Sit-in Student from Hsinchu Chien Kung Senior High School**

Educational Collaboration

What We Want to Solve

Education inequality affecting disadvantaged children and skipped-generation families in rural and less accessible areas due to a lack of digital learning resource and stable source of diversified and suitable educational resource.

How We Respond

The Foundation has long cared about education since its establishment. In 2021, the Foundation contributed NT$20.6 million and collaborated with educational organizations from both the private and public sectors, aiming to increase learning motivation of educationally disadvantaged students by providing suitable learning resource to improve their studies. In addition, in hopes of narrowing gaps in educational resources, and to respond to the New K-12 Compulsory Education Curriculum, the Foundation assisted with the development of online literacy courses and the teacher training program. Moreover, scholarships were provided to help lessen the financial burden of disadvantaged college students' when pursing higher education.

Our Actions

- Launch the Teach and Learn Program to support teachers to improve the literacy of rural children
- Continue to provide Scholarship and Digital Learning Equipment to Disadvantaged College Students
- Sponsor Experimental Education at Emei Junior High School in Hsinchu County to Inject Educational Resources for Arts & Culture

Launch the Teach and Learn Program to Support Teachers to Improve the Literacy of Rural Children

The Foundation collaborated with the Common Wealth Education Foundation and the Hwawei Ko Professor Reading Research Center at NTHU to jointly launch a five-year Teach and Learn Program in 2021. Based on the long-sponsored Hope Reading Program, 51 rural elementary schools were selected. With the profession of the Hwawei Ko Professor Reading Research Center and its integration of technology, the program provided physical workshops, proposal writing training, online consulting and systems to evaluate students' reading ability. The program helps teachers build an effective teaching system, so as to improve their teaching in reading and students' learning performance. With the program, students in rural areas can gain the confidence and ability to change their lives. In 2021, the oral comprehension and reading ability of 1,573 first grade students from 51 rural elementary schools have been tested. The results showed that up[illegible]e Foundation wi[illegible]he learning sta[illegible]

Level	Reading Ability
A	Excellent above 75% of the norm
B	Medium ability at 25 ~ 75% of the norm
C	To be strengthened ability below 25% of the norm

Continue to Provide Scholarship and Digital Learning Equipment to Disadvantaged College Students

Dedicated to assisting outstanding yet economically disadvantaged students, the TSMC Education and Culture Foundation continues to sponsor four years scholarships to 82 disadvantaged students at five universities including Sunrise Program Scholarship (National Tsing Hua University), Sunflower Program Scholarship (National Central University), Star Program Scholarship (National Cheng Kung University), South Star Program Scholarship (National Sun Yat-sen University), and Chia Star Program Scholarship (National Chung Cheng University). In 2021, TSMC contributed a total of NT$8.2 million and donated 25 laptop computers freshman recipients in the hopes of helping students focus on their studies. In addition, the Founder provided summer internship opportunities at TSMC for scholarship recipients to broaden their horizons and have experiences in the workplace.

51

Empowered more than 100 teachers in 51 rural primary schools by providing teaching resources and online support systems to enhance rural children's literacy

> The scholarship from the Foundation gives me relief from the financial pressures in college. It is a kind of gentleness bestowed on me by God!
>
> **Star Program Scholarship Recipient**

Pro[illegible]enter gives a demonstration teaching at Zhenhai Elementary School in Tainan



Sponsor Experimental Education at Emei Junior High School in Hsinchu County to Inject Educational Resources for Arts & Culture

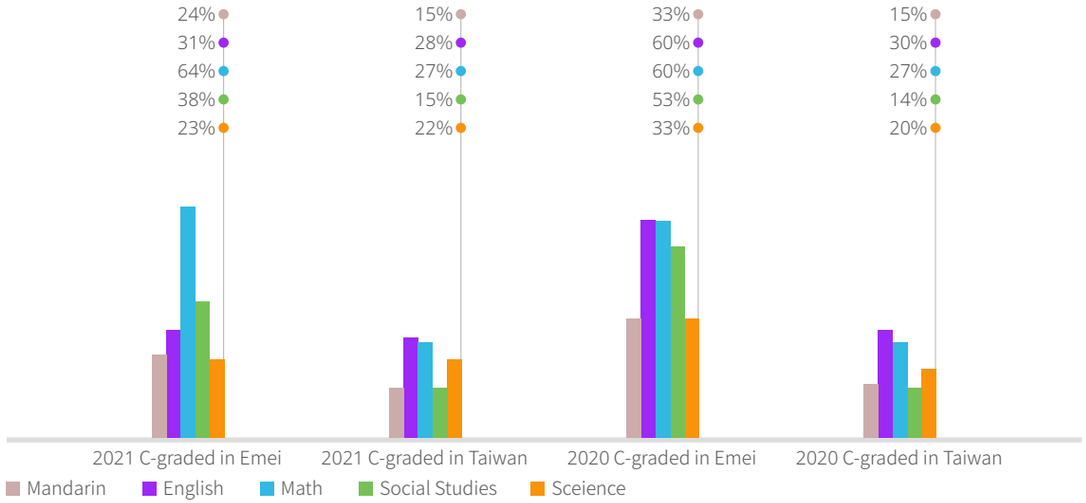
Caring about remote education in Taiwan as its long term goal, the Foundation collaborated with the Cheng Zhi Foundation to realize a shared vision of providing remote areas with equal access to educational resources. A three-year education funding sponsorship was provided to Emei Junior High School, the first KIST (Knowledge-Is-Power-Program Inspired Schools in Taiwan) school in Hsinchu County in 2020. In the second year of funding, the Foundation provided more art and cultural resources to foster literature and music literacy of Emei's students. Their score performance on the Comprehensive Assessment Program for Junior High School Students were improved in 2021. The percentage of grade "C" in subjects of Chinese, English, Social & Science decreased significantly. Recognized by the innovation on the teaching development, the school's student number increased from 39 to 52 in total.

5 universities/NT$8.2 million

- Sponsored five universities with scholarship of NT$8.2 million and 50 laptop computers; assisted 82 economically disadvantaged students with educational pursuits

Emei Junior High School's Comprehensive Assessment Program for Junior High School Students Scores in 2021

A: Excellent/ B: Adequate/ C: Unsatisfactory



Teachers and students from the Emei Junior High School visit the National Taichung Theater



Promote Arts and Culture

What We Want to Solve

Taiwan local art groups, without sufficient resources, need more stages to perform and more support from the public; meanwhile, impacted by internet entertainment media, traditional arts and culture inheritance both face critical challenges.

How We Respond

To continue to provide more resources in art and cultural education, the Foundation contributed NT$21.74 million in 2021 to organize high-quality arts and culture exhibitions and performances to support art and culture groups. Though many events were canceled or held online due to the COVID-19 pandemic, the Foundation strived to support educational, artistic, and cultural events with help from technology.

Our Actions

- Promote Art and Cultural Events
- Promote Humanities Classics

Promote Art and Cultural Events

Continue the Hsin-Chu Art Festival

Since 2003, the TSMC Education and Culture Foundation has held the Hsin-Chu Art Festival for 17 years, with a different theme for each year. Major art events are also held regularly in Hsinchu, Taichung, and Tainan. In 2021, the theme of the Hsin-Chu Art Festival was "Her Stage," the successes and life stories of female artists were introduced to the public various exhibitions and performances A total of 24 physical events and four online events were held and attracted 17,718 participants in total.

17,718
Hsin-Chu Art Festival attracted 17,718 participants in person and online

Due to the COVID-19 pandemic, parts of the art festival were held online in 2021. Physical events held successfully include the performance of "A Thousand Stages, Yet I Have Never Quite Lived" and a special exhibition on Wei Haimin that uses diverse and interactive audiovisuals to bring the audience into the six roles of Peking opera singer-actress Wei Hai-min, explore the story of her life, and trace back to Taiwan's social history time flow; the play "The Man with the Compound Eyes" adapted by the National Taichung Theater from the eponymous novel by renowned author, Wu Ming-yi utilized theatre, puppetry, symphonic music, and innovative multi-media stage technologies to replicate the realistic yet magical literary landscape, inviting the audience to learn more about the diverse peoples and culture of the island of Taiwan from different angles.

Newly Added Online Classical Music Concerts

The Eric Lu piano recital was originally scheduled to perform at the Tainan Municipal Culture Center. Due to the COVID-19 pandemic, the recital was pre-recorded at the Culture Center and presented to the audience later online. The concert attracted 1,446 online viewers in total.

To continuously promote arts and culture events during the pandemic period, the Foundation put special efforts into action by sponsoring the online concert "The Legend of Mahler" held by the National Symphony Orchestra. The concert was livestreamed and broadcasted on OPENTIX Live, the National Concert Hall's online streaming system, for 72 hours. Meanwhile, a special free access to the online concert was provided to TSMC employees for them to enjoy Mahler's music of life during the Moon Festival. The concert attracted 1,271 online viewers in total.



Students from Wenshan Elementary School in Hsinchu County at the Wei Hai-min exhibition

Scenes from "The Man with the Compound Eyes"

Promote Classical Humanities

New Broadcasting Program on Air to Innovate and Inherite the Culture of Chinese Traditional Opera

To deepen the younger generation's knowledge of Chinese traditional opera, the Foundation collaborated with IC Broadcasting company to launch a new 52-week program on Chinese opera - "Tales from Chinese Opera." The program is co-hosted by Dr. Anqi Wang, artistic director of GuoGuang Opera Company, and Dr. Shih-Lung Lo, Associate Professor of the Department of Chinese Literature at National Tsing Hua University. Each week, the program shares the story of a classic Chinese opera and also invites renowned Chinese opera actors for interviews. The program is available on the radio but also on diverse platforms such as Podcast and Spotify. As of the end of December 2021, the program has attracted 1.106 million listeners.

1.106 million

New Chinese Opera Podcast "Tales from Chinese Opera" attracted over 1.106 million listeners



Dr. Anqi Wang, artistic director of GuoGuang Opera Company, and Dr. Shih-Lung Lo, Associate Professor of the Department of Chinese Literature at National Tsing Hua University, co-host "Tales from Chinese Opera"

TSMC & GuoGuang Opera Promote Chinese Opera in Colleges

To pass down the legacy of Chinese opera, the Foundation sponsored the GuoGuang Opera's Chinese Opera on Campus program to offer courses on Chinese opera at the National Tsing Hua University and National Tunghai University for three consecutive years, starting from 2021. The courses introduce basic principles and histories of Chinese opera and also teach students how to perform on stage as well. We hope that our younger generations may resonate with Chinese opera and allow the art of Chinese opera to take root. The Foundation also held the "TSMC Theatre" at the National Yang Ming Chiao Tung University. Four classic Peking opera performances were held. In addition, a special guided introduction was arranged for students to understand more about the beauty of Peking opera. The performances attracted over 450 participants.

TSMC Lectures

The Foundation has held TSMC Lectures since 2014, and every year, invited renowned lecturers in culture and history to guide Hsinchu communities closer to culture and history, and experience the charm of philosophy. In 2021, we invited Dr. Ming-ke Wang, a research fellow from the Institute of History and Philology, Academia Sinica, for the third time. Dr. Wang gave four lectures on the topic of "Ideals, Policies, and Realities: Minorities in China," sharing his experiences conducting field research on minorities in China for over two decades, giving examples to support the significance of minorities on how human ecosystems have been shaped, and guiding the audience through the realities of minorities living under China's policies from different perspectives. The lectures drew 550 participants.



TSMC Theatre organizes four classic Peking operas at the National Yang Ming Chiao Tung University. Ms. Anqi Wang introduces the makeup process before the opera begins

> It is so moving to see these students that have never learned anything about Chinese opera to be singing, reciting, and acting better and better.
>
> **Kao Chen-Lin**
> Associate Professor of Chinese Literature at National Tunghai University

> Without the incredible support from the TSMC Education and Culture Foundation, GuoGuang Opera would not have had the opportunity to offer practicum credit courses on Peking opera at universities, and a performing program for these enrolled students to perform on stage in three years.
>
> **Chang Yu-Hua**
> Head of the GuoGuang Opera Company

TSMC Charity Foundation

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Care for the Disadvantaged We care about inequality of educational resources & emergency aid in Taiwan and offer support when necessary through storying telling, community and fab volunteer support.			
More than 10,000 hours in volunteer storytelling services each year	More than 9,000 hours in volunteer storytelling services	Volunteer storytelling services exceeded 4,910 hours[Note 1] Target: 9,000 hours	—
More than NT$18 million in annual donations to the disadvantaged each year	Donate at least NT$15 million to the disadvantaged	Donated NT$22.63 million[Note 2] to the disadvantaged Target: NT$13 million	↑
Help over 10,000 children in remote areas	Help over 5,000 children with the remote education programs	5,287 children benefitted from the rural education programs Target: 4,000 children	↑
Care for the Elderly We work with hospitals across Taiwan through the Network of Compassion [Note 3] partnership and provide a variety of medical and social welfare resources to care for senior citizens living alone			
Offer 12,000 services to senior citizens each year through Network of Compassion	Offer 12,000 services to senior citizens living alone through the Network of Compassion	Offered 15,719 services to senior citizens Target: 11,000 services	↑
Deliver 400,000 meal services to senior citizens through Network of Compassion NEW	Deliver 310,000 meal services through the Network of Compassion	Delivered 304,477 meal services to senior citizens living alone through Network of Compassion [Note 4]	NEW

Note 1: In response to the COVID-19 pandemic, volunteer activities were suspended in accordance with related polices in the first half of 2020.
Note 2: The amount included donations from TSMC volunteers and the Sending Love Forward project, which included cash donations but excluded goods donations, repair services or other donations.
Note 3: The partnership "Networking of Love" was renamed as "Network of Compassion" in 2021.
Note 4: Network of Compassion to deliver meals for the solitary elders.

↑ Exceeded ✓ Achieved — Missed Target

Strategies & 2030 Goals	2022 Targets	2021 Achievements	
Promote Filial Piety We create filial piety volunteer program and collaborate with the Ministry of Education, schools, media, and other enterprises to promote filial piety education at schools			
Promote filial piety education in 120 educational institutions	**Promote filial piety education at 65 educational institutions**	**Promoted filial piety education at 64 educational institutions** Target: 60	↑
Environmental Protection We aim to reduce waste through the Cherish Food Program. We also promote environmental protection and energy conservation through our energy-saving volunteers, eco-volunteers, and corporate volunteers			
Over 50,000 beneficiaries from the Cherish Food Program each year	**More than 42,000 beneficiaries from the Cherish Food Program**	**The beneficiaries of the Cherish Food Program reached 58,862** Target: 40,000	↑
Environment protection volunteers provide services of at least 1,200 times each year	**Environment protection volunteers provide services of 1,000 times each year**	**Environment protection volunteers served 794 times**[Note 4] Target: 1,000 times	—

Note 4: In response to the COVID-19 pandemic, volunteer activities were suspended in accordance with related polices in the first half of 2020.

↑ Exceeded ✓ Achieved — Missed Target

The TSMC Charity Foundation was established in 2017 and has since dedicated itself to four major areas: Care for the Disadvantaged, Take Care of Elderly People Living Alone, Promote Filial Piety, and Environmental Protection. In 2021, with caring for the disadvantaged and environmental protection as its main goals, TSMC's Charity Foundation worked with enterprises that share the same beliefs of uplifting society to provide students in remote areas with job training and employment opportunities. In terms of environmental protection, the TSMC Charity Foundation installed solar power generation equipment and LED light tubes for social welfare groups, responding to renewable energy and reducing the monthly electrical cost of social welfare groups. Any excess power can also be sold to fund the social welfare groups.

As the COVID-19 pandemic continued to ravage Taiwan, the TSMC Charity Foundation called on TSMC employees to join the donation project, which provided zero-contact test stations, oxygen generators, and industrial-grade protective equipment for domestic medical hospitals, supporting healthcare workers to work safely in quarantined areas. The TSMC Charity Foundation also invited other enterprises to support efforts against the COVID-19 pandemic.

>$236.98 million
Social Investment (NT$)

10,664
Volunteers

4,932
Volunteer Service Times

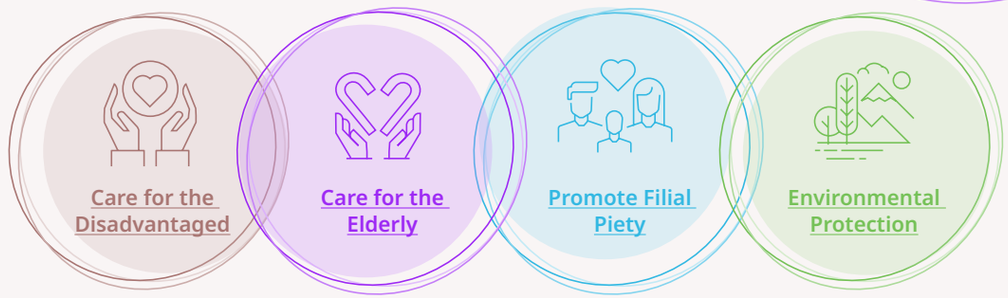
26,357
Service Hours

45,939
Donations

120,157
Beneficiaries

Note: Included cash donations, goods donations, repair services or other indirect donations, but excluded cash donations or goods from fundraising initiated by TSMC employees.

Core Engagement



- Close the urban/rural divide for education in remote areas through empowerment projects
- Offer financial support and better living spaces for higher quality of life

- The Foundation focuses on caring for seniors living alone by organizing volunteers and resources

- Work with the K-12 Education Administration, Ministry of Education, to let the seeds of filial piety sprout

- Green Charity & Cherish Food Programs - Save/create energy
- Environmental education to deepen sustainability spirits

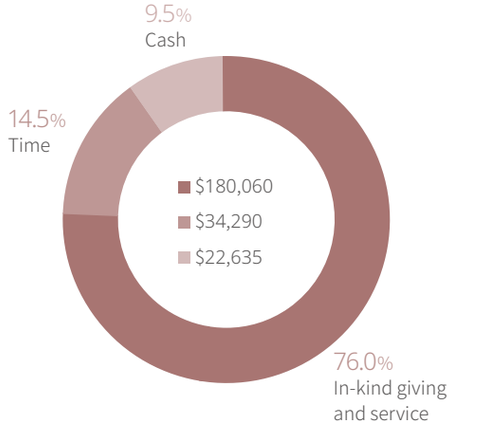
Donations by the TSMC Charity Foundation

Total (NT$)

$236.98 million

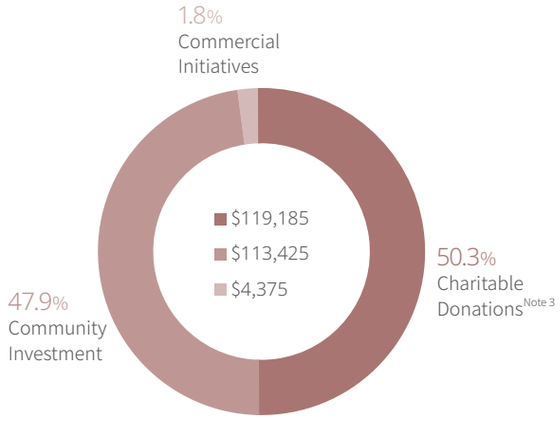
What We Donated Note 1

Unit: NT$ (Thousand)



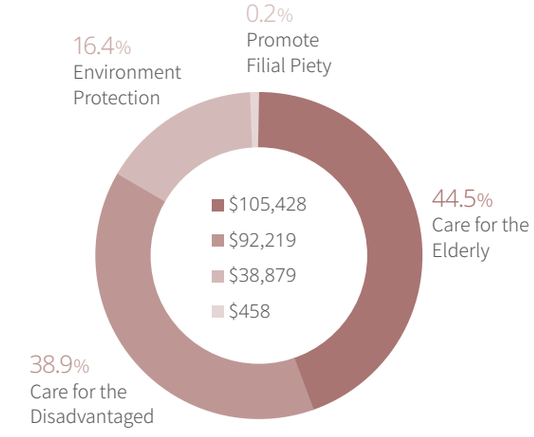
How We Donated Note 2

Unit: NT$ (Thousand)



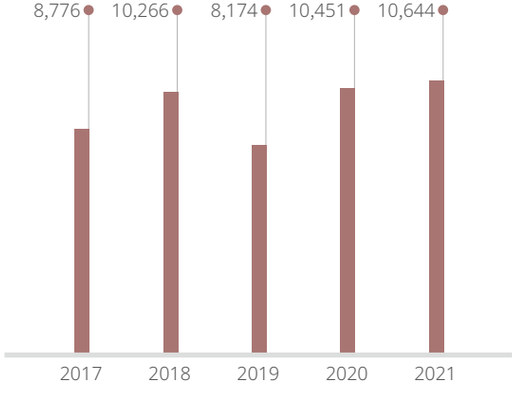
Projects We Supported

Unit: NT$ (Thousand)



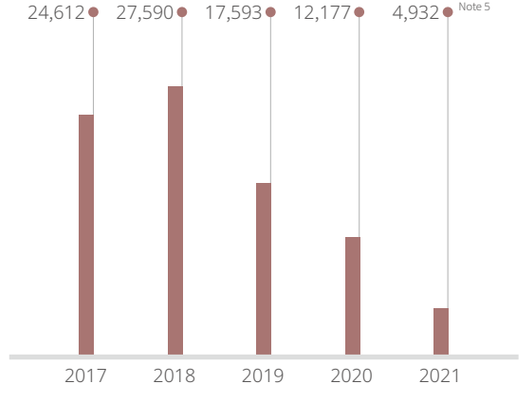
Accumulated Volunteer Headcount Note 4

Unit: Number of Volunteers



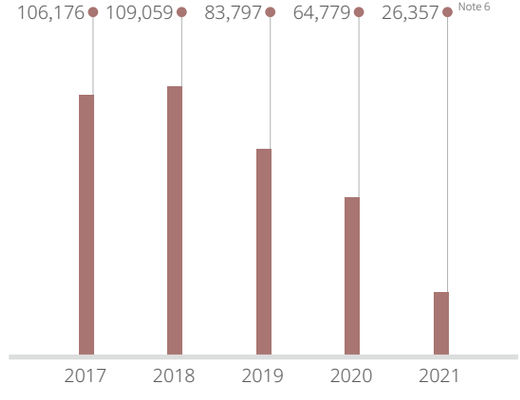
Accumulated Service Times

Unit: Person-time



Accumulated Volunteer Service Hours

Unit: Hours



Note 1: TSMC has categorized activities into cash, time, and in-kind giving (include management) according to the Dow Jones Sustainability Index and then converted all forms of donations into a monetary unit (NT$) in order to calculate their percentage; time = volunteered hours*average wages; goods & services = the monetary amount of the goods, services, and management provided by TSMC.

Note 2: TSMC has categorized donations based on the Dow Jones Sustainability Index into charitable donations, community investments, and commercial initiatives, converting all contrbution into a monetary amount (NT$) in order to calculate their percentage.

Note 3: In response to global COVID-19 prevention measures, the amounts above covered an investment of NT$98,276,000 related to emergency assistance for Covid-19 testing and medical supplies in Taiwan and abroad, accounting for 41.5% of the total annual amount.

Note 4: The number of volunteers included: TSMC employees, former employees, retired employees, family members of employees, and employees of companies who are engaged in volunteer service activities organized by the TSMC Charity Foundation.

Note 5: In the second half of 2021, TSMC suspended all on-site volunteer activities in compliance with COVID-19 prevention measures set forth by the Ministry of Health and Welfare.

Note 6: In the second half of 2021, TSMC suspended all on-site volunteer activities in compliance with COVID-19 prevention measures set forth by the Ministry of Health and Welfare.

Cultivate Young Generation

What We Want to Solve

According to statistics from the Ministry of Education in 2021, there are approximately 100,000 students and 1,172 schools in remote areas, accounting for nearly 30% of total schools in Taiwan. The TSMC Charity Foundation is committed to supporting rural students with targeted learning, comprehensive remote learning equipment, various career exploration and training courses, and ample resources for rural teachers empowerment.

How We Respond

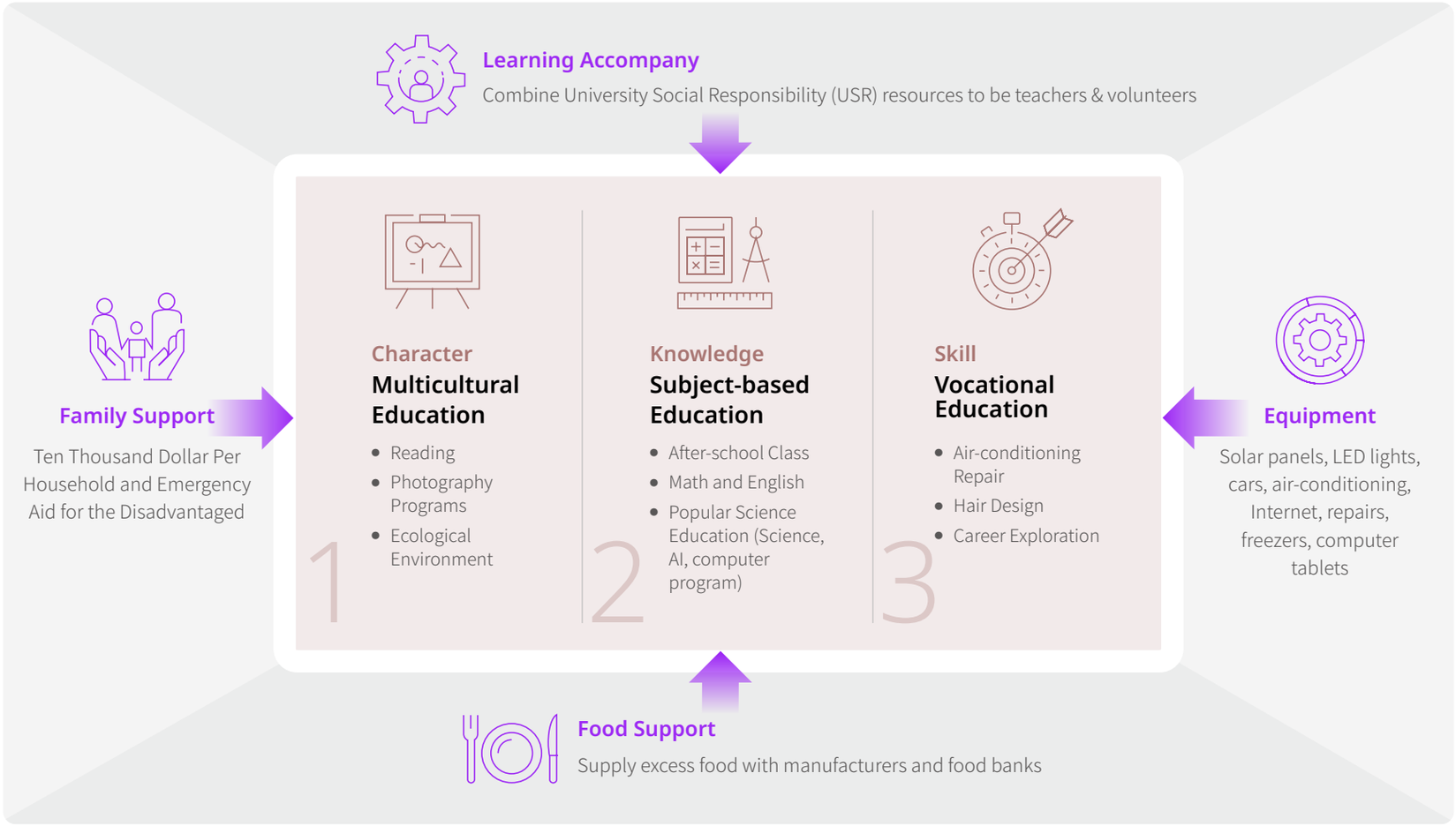
The two core objectives of the "Care for the Disadvantaged" are rural education and improving the quality of life of economically disadvantaged. In the field of rural education, the TSMC Charity Foundation joins hands with other enterprises to support students in exploring their potential and developing professional abilities through three major pillars of "Interdisciplinary Education," "Subject-based Education," and "Vocational Education." To enhance the quality of life of the economically disadvantaged, TSMC volunteers help marginalized families and families suffering from financial shock through the projects of Ten Thousand Dollar Per Household, Emergency Aid for the Disadvantaged, and Scholarship for the Disadvantaged.

Our Actions

- Close the Urban/ Rural Divide for Education in Remote Areas through Empowerment Projects
- Offer Financial Support and Better Living Spaces for Higher Quality of Life

Close the Urban/Rural Divide for Education in Remote Areas through Empowerment Projects

Three Countermeasures for Rural Education



Interdisciplinary Education — For Adaptive Development

In 2021, TSMC volunteers served at remote primary schools and non-profit after-school institutes to offer diversified learning resources and companionship such as storytelling and teaching photography. The activities aim to increase learning motivation and enjoyment from learning as well as boost their academic confidence. Volunteers also encourage students to pursue extra-curricular activities by supporting their participation in major competitions. TSMC also provides business opportunities and invites children to participate in team-oriented activities in order to develop their teamwork skills. In addition, TSMC employees make monthly donations through the TSMC i-Charity Platform, providing long-term support for non-profit organizations. Charity concerts are held every year and students in remote areas are invited to join. The proceeds from the concerts go to non-profit organizations targeting rural education.

TSMC Participating Units

TSMC Charity Foundation, Advanced Packaging Technology and Service, Central PIE Department, Special Technology Product Development Division, Quality & Reliability, Intelligent Manufacturing Center, Fab 2 & Fab 5, Analog Power & Specialty Technology Division and Storytelling Volunteers

Institutional Beneficiaries

Ruei Yuan Elementary School in Taoyuan City, Han Si Elementary School in Yilan County, 11 elementary schools in Hsinchu County, Si Wei Elementary School in Taichung City, three elementary schools in Tainan City, Holy Family for Special Education, Junyi Academy Foundation and Teach for Taiwan Education Foundation

Cooperating Units

National Tsing Hua University and National Yang Ming Chiao Tung University

79
Rural schools and after-school institues

5,287
Children benefitted

960
Storytelling volunteers

4,910 hours
Reading services

4,910	2021
5,060	2020
8,480	2019

$18.43 million
TSMC employees donated through the TSMC i-Charity Platform and internal fundraising, supporting NGOs focusing on rural education (NT$)



Volunteers from Fab 2 & Fab 5 taught children photography and graphic designing

Volunteers from the Quality & Reliability Organization arranged various after-school programs to foster imagination and creativity in children

> Thanks to TSMC, students at Datong Elementary School were able to experience such a fun way of learning through board games and were inspired to learn.

Yan-Hua Jhu
Datong Elementary School baseball team coach

> DIY activities can immerse children in learning and inspire creativity. I was touched to see the kids have so much fun!

Steven Sze Hang Poon
a volunteer from the Quality & Reliability

Subject-based Education — Paving the Way

When Taiwan raised the epidemic alert, schools and kindergartens were closed to reduce the risk of cluster infection. Before schools were closed, the TSMC Charity Foundation teamed up with a number of enterprises to deploy digital learning resources in rural schools to reduce the pandemic's impact on student learning. In addition, TSMC volunteers arranged remedial teaching by recording engaging science teaching videos and developing science materials for students to learn at home. The TSMC Charity Foundation has also worked with students from Fu Jen Catholic University and National Yang Ming Chiao Tung University to introduce AI courses and science experiments to elementary schools in remote areas. By doing so, students can learn about trends in technology and be motivated to learn more.

TSMC Participating Units

TSMC Charity Foundation, Fab 12B, Fab 15B, CPIE, Quality & Reliability and Storytelling Volunteers

Institutional Beneficiaries

Han Si Elementary School in Yilan, Jaudung Elementary School in Hsinchu County, Nan-Liao Primary School in Hsinchu City, Si Wei Elementary School in Taichung City, Ma Sing After-school Class in Changhua County, ShuangLong Elementary School in Nantou City, Shulin Elementary School in Tainan City and Songlin Elementary School, etc.

Cooperating Units

Microsoft Taiwan, LENOVO TECHNOLOGY B.V. TAIWAN BRANCH (NETHERLANDS), Alpha Networks Inc., TAIWAN MOBILE CO., LTD., MyGrain Educational Company Limited, Fu Jen Catholic University and National Yang Ming Chiao Tung University

50
Installed 50 classrooms with online remote equipment

18
Created science videos

400
Accounts for teachers to access self-empowerment learning platform

2,000
Provided boxes of science materials

1,600 / 1,000 / 80
Provided more than 1,600 second-hand computers, 1000 networking devices, and 80 tablet PCs



Employees from Special Technology Product Development Division conduct research on AI self-propelled cars and create teaching materials to scale up their volunteering services.

Storytelling volunteers hold an online science laboratory during the pandemic for children to understand science



> With online courses and volunteers' help, students in remote schools can keep learning.
>
> **Tsui-Lien Shen**
> headmaster of Si Wei Elementary School

> Science experiments program allow children to explore principles from hands-on experiences which achieve better learning performances.
>
> **W.P. Chen**
> TSMC Storytelling Volunteer

Vocational Education - Develop Skills for Livelihood

In 2021, the TSMC Charity Foundation worked with Ho Tai Development Co., Ltd. and Happy Recome Co., Ltd. to foster vocational skills, provide students in remote areas with job opportunities and career training, and help students get jobs in schools and welfare institutions, creating a win-win situation for companies, students, and welfare institutions. In 2022, the TSMC Charity Foundation expects to invite Ikea and Lohas Biotech Development Corp. to participate in its vocational education plan. In order to tap into the potential of rural students, TSMC has also partnered with the 104 Corporation to call for more than 100 professionals from different fields to share their careers in videos and set up a website called The World of Work: The Guide to Careers, empowering students to explore a wider range of careers.

“

The TSMC Charity Foundation helped students interested in becoming hair stylists and strengthened their skills to earn a living through training courses and with practice tools.

Ying-Nu Hung

Counseling director of National Tung Kang Maritime and Fishery Vocational High School

TSMC Participating Units

TSMC Charity Foundation

Institutional Beneficiaries

National Heng-Chun Industrial & Commercial Vocational High School, National Tung Kang Maritime and Fishery Vocational High School, National Chia-Tung Agricultural Vocational Senior High School and "The World of Work: The Guide to Careers" Website has been used 26,657 times.

Cooperating Units

Ho Tai Development Company Limited (Daikin Industries General Agent), Happy Recome Company Limited and 104 Corporation.

55

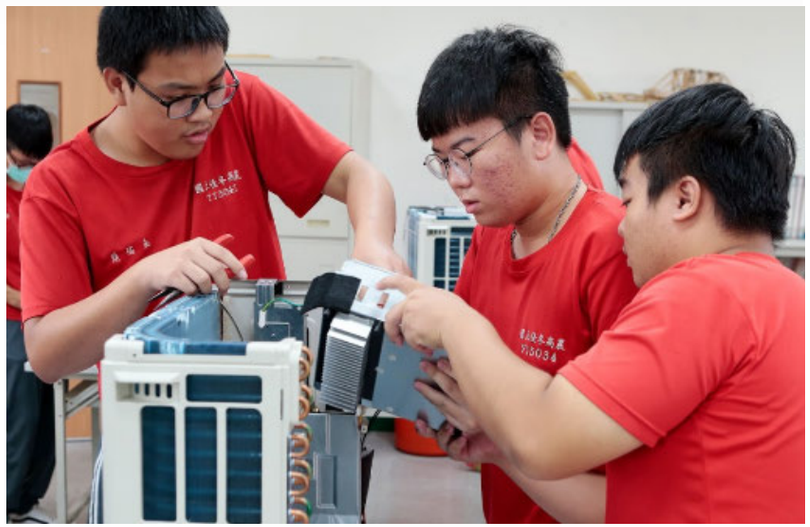
Filmed 55 professionals introducing their jobs

78

Provided skill training participated by 78 vocational students in remote areas



Hair designers from Happy Hair use the Manikin donated by the TSMC Charity Foundation to assist students from National Tung Kang Maritime and Fishery Vocational High School in practice



National Chia-Tung Agricultural Vocational Senior High School students attentively learn how to clean air conditioning from DAIKIN masters

Offer Financial Support and Better Living Spaces for Higher Quality of Life

The TSMC Charity Foundation worked with social welfare departments of the local governments to continue the Ten Thousand Dollar Per Household and Emergency Aid for the Disadvantaged projects by providing financial support to disadvantaged families and families facing big challenges. In 2021, the Foundation collaborated with local educational bureaus and schools, helping 95 economically disadvantaged students receive education through the Scholarship for the Disadvantaged program. In addition, the Foundation called for people and companies to donate through the charity fundraising platform of Sending Love Forward. In response to the pandemic, in addition to complying with the pandemic prevention norms and caring for support institutions, TSMC volunteers met disadvantaged elderly online and launched group purchases that supports non-profit organizations affected by the pandemic. In the event of natural disasters, TSMC volunteers have assisted in housing repairs by using their profession at utility services.

TSMC Participating Units

TSMC Charity Foundation, CPO, Fab 6, Advanced Packaging Technology and Service, Fab 12A, Fab 8, Quality & Reliability, Special Technology Product Development Division, Human Resources, Intelligent Manufacturing Center and Community Volunteers

Institutional Beneficiaries

Green Light of I-Link Community Care Association in Hsinchu County, Mental Disability Care Association in Tainan, Taiwan Family Care Foundation in Hsinchu County, Charity Foundation of Children in Hsinchu County, Camillus Organization, Holy Family for Special Education, Teresa Children Center, SyinLu Social Welfare Foundation, Children Are Us Foundation, Sundoor in Pingtung County, World Vision Taiwan, Earthquake-Affected households in Fuli Township and Hualien County

Cooperating Units

Social Welfare Departments at Local Governments
Local Educational Bureaus

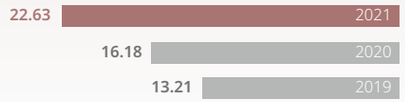
95
Scholarship for the Disadvantaged program helped 95 economically disadvantaged students

917
Community Volunteer participants provided 917 hours in service

68
Ten Thousand Dollar Per Household program helped 68 families

$4.28 million
TSMC employees donations supporting the operation of welfare institutions, medical needs and emergency aid of disadvantaged families (NT$)

$22.63 million
Donated to the disadvantaged (NT$)





Intelligent Manufacturing Center volunteers provide food packages to help families in financial difficulties due to the pandemic

> Food offerings in temples was the main source of food for after-school programs, but this has stopped as the pandemic worsened. We are grateful to TSMC for providing food as substitute support our after-school class programs and children.

Hsiao Ya
Priest of Xiushui After-school Class in Changhua County

> The pandemic has been hard on everyone. However, we still hope that society can support public welfare activities and help disadvantaged groups to go through the pandemic.

Syue-Hua Lin
Fab 12A Volunteer

Care for the Elderly

What We Want to Solve

According to information from the Ministry of the Interior, R.O.C., the number of households with elderly people living alone in 2021 was 477,000 households. By 2025, Taiwan may become a super-aged society. The number and needs of disadvantaged seniors and those living alone will continue to grow. Therefore, how to meet the needs of long-term care and provide transportation resources to caretakers and volunteers will be a focus issue.

How We Respond

The TSMC Charity Foundation works with our medical and healthcare partners to improve medical information sharing through the Network of Compassion. We offer quality and comprehensive care in an attempt to meet the demands of disadvantaged seniors.

Our Actions

- The Foundation focuses on caring for seniors living alone by organizing volunteers and resources

The Foundation Focuses on Caring for Seniors Living Alone by Organizing Volunteers and Resources

In 2021, the TSMC Charity Foundation provided vehicles for the vulnerable elderly to enhance the accessibility of medical resources in the countryside. By utilizing the Network of Compassion system during the COVID outbreak, the Foundation provided and delivered a total of 3,000 prepared frozen meals, along with warm clothing to care for the elderly. Due to this pandemic, instead of holding the annual Network of Compassion Sharing Event, the Foundation published a special magazine issue to share information between medical and nursing institutions, deploying digitalization to combat the pandemic. TSMC volunteers have been taking care of the elderly by giving daily necessities and holding outdoor activities in compliance with pandemic prevention measures. This allows the elderly living alone to connect with society and enrich their lives.

> Joining the TSMC Network of Compassion makes us more welcoming. Our staff is more enthusiastic now because of charitable activities.

Yang Cho
Superintendent of China Medical University Hospital

> Although I can't serve at agencies during the pandemic, the planning of video activities beforehand allows us to be in contact with the elders. It's great!

Ya-Ju Kuo
Fab 12B Volunteer

TSMC Participating Units

TSMC Charity Foundation, Fab 12A, Fab 8, Fab 15B, Fab 2 & Fab 5 and Fab 3

Institutional Beneficiaries

Clinic Dulan in Taitung County, Theresa Opportunity Center in Tainan County, Huashan Social Welfare Foundation, Catholic Social Service Center in Hsinchu County, Guishan Chapel of Chinese Mandarin Presbyterian Church, FuShan Catholic Church, Xin Dian Baptist Church, Chu-Tang and Wan-Feng Community Development Association in Changhua County and Lixin Social Service and Care Association in Changhua County

Cooperating Units

15 medical and social welfare institution in the Network of Compassion system

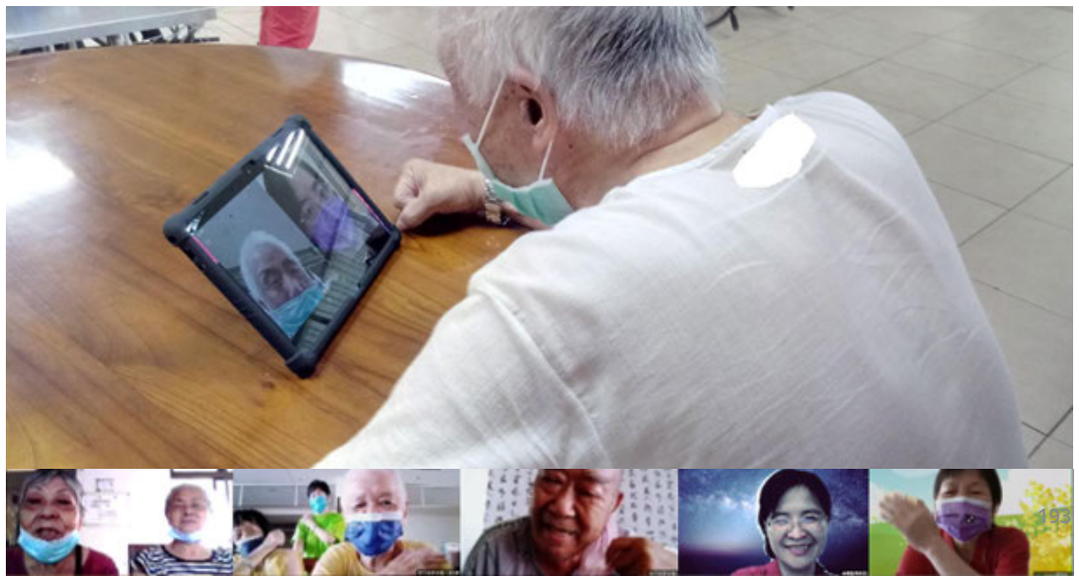
304,477
Meal delivery services

2
Helped 2 small day-care institutions purchase vehicles

15,719
Offered 15,719 services to senior citizens living alone through Network of Compassion



The TSMC Charity Foundation sets up video equipment for care institutions, allowing volunteers to care for seniors remotely



Promote Filial Piety

What We Want to Solve

The TSMC Charity Foundation encourages young people to express respect for their elders through real action. By doing so, the connections among family members and society will be strengthened.

How We Respond

The TSMC Charity Foundation works with the government, enterprises, and schools to promote filial piety by holding filial piety workshops and charity contests. These events aim to build generational mutual respect and understanding between parents and children.

Our Actions

- Work with the K-12 Education Administration to Let the Seeds of Filial Piety Sprout

Work with the K-12 Education Administration to Sprout the Seeds of Filial Piety

The TSMC Charity Foundation strives to promote filial piety and continues to host filial piety workshops and painting contests with the K-12 Education Administration, Ministry of Education in 2021. The TSMC Charity Foundation also transforms filial piety workshop contents and videos created by volunteers into public resources for educational institutes to download and use. In addition, TSMC filial piety volunteers visited schools to read related books and hold Mother's Day activities to emphasize the concept of filial piety and strengthen parent-child relationships.

TSMC Participating Units

TSMC Charity Foundation, Fab 15B, Special Technology Product Development Division and Filial Piety Volunteers

Institutional Beneficiaries

HeShing Elementary School in Hsinchu County, YongAn Elementary School in Taichung County, BeiShi Elementary School in Taoyuan County, Tuku Elementary School in Yunlin County and Shulin Elementary School in Tainan City

Cooperating Units

Education Administration, Ministry of Education

2/64

Hosted 2 Filial Piety workshops for 64 participants

1,069

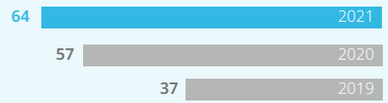
Collected a total of 1,069 outstanding works such as paintings, comics, stories and micro-movies on filial piety

> It was my first time participating in filial piety reading. I encouraged children to write what they wanted to say on their Mother's Day cards. I realized that this is how love should be vocalized!

Y.C. Chang
Volunteer from Fab 15B

64

Promoted filial piety education in 64 educational institutions





Volunteers from Fab 15B read books about filial piety to teach children to express their gratitude and love to their parents

Environmental Protection

What We Want to Solve

Climate change has brought on environmental issues and food inequality. Enterprises should take action and help reduce the negative impacts of climate change.

How We Respond

The TSMC Charity Foundation works with local governments to help institutions aiding the disadvantaged install solar panels and energy-efficient light bulbs. Through volunteer programs of energy savings and ecological, the Foundation hopes to promote the education of ecological restoration and carbon reduction in schools, so as to conduct green sustainability, enhance environmental awareness, and work with food companies to reduce waste.

Our Actions

- Green Charity & Cherish Food Programs - Save/Create Energy
- Environmental Education Deepens Sustainability

Green Charity & Cherish Food Programs - Save/Create Energy

The TSMC Charity Foundation supports green energy and works with local governments to prioritize social welfare institutions requiring assistance. The Foundation provides construction funds to build solar panels on the roofs of those institutions. In 2021, a total of two solar power plants were built in Tainan City, Yunlin County, and Pingtung County, which reduced the monthly electrical expenditure of social welfare institutions. Also, the aforementioned welfare institutions could exchange solar power for annual operating budgets by NT$2.5 million.

> I would like to thank TSMC for equipping new LED lights for us. Compared to last year, the new lights saved us 400 kWh of electricity. TSMC also helped us build solar panels. Now, everyone is excited about sunny days — As the sun comes out, help is coming.
>
> **Hsueh-Ying Li**
> Director of St.Raphael Opportunity Cente

TSMC Participating Units

TSMC Charity Foundation

Institutional Beneficiaries

St. Raphael Opportunity Center, Taiwan Chutien Church, 13 schools in Yunlin County, 30 schools in Tainan City, 18 schools in Hsinchu City and Si Wei Elementary School in Taichung City.

Cooperating Units

CHI MEI Frozen Food Limited Company, Laurel Corporation, HSIN TUNG YANG Limited Company, Hunya Foods Limited Company, Lian Hwa Foods Corporation, Dachan Great Wall Group and LAO XIE ZHEN Limited Company

2
Built two solar power plants for disadvantaged institutions

62
Equipped 62 schools with LED energy-saving light tubes

122
122 centers that care for the disadvantaged regularly benefit from the Cherish Food Program

Green Energy for Social Welfare Institutes

Solar Power Rebates as Stable Financial Support Model

台積電慈善基金會 TSMC Charity Foundation

Assess Availability of Installing Solar Panel

Social Welfare Institutes

Sell Green Energy

Taipower Company

Green Energy Purchase

Green Energy Rebates

Rebates

Financial Support

Small Institute that Produce 20kWh of electricity

With NT$1.2 Million Construction Cost

Benefit

Social Welfare Institutes Gained

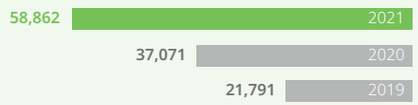
Monthly Rebates of NT$10,000

In addition, in order to provide students with better lighting at schools, the TSMC Charity Foundation disadvantaged hired disadvantaged students from Kun Shan University to install LED energy saving light tubes at a total of 62 schools in Hsinchu City, Taichung City, Yunlin County and Tainan City. The annual energy saving is NT$1.6 million, which can provide about 40,000 additional lunches.

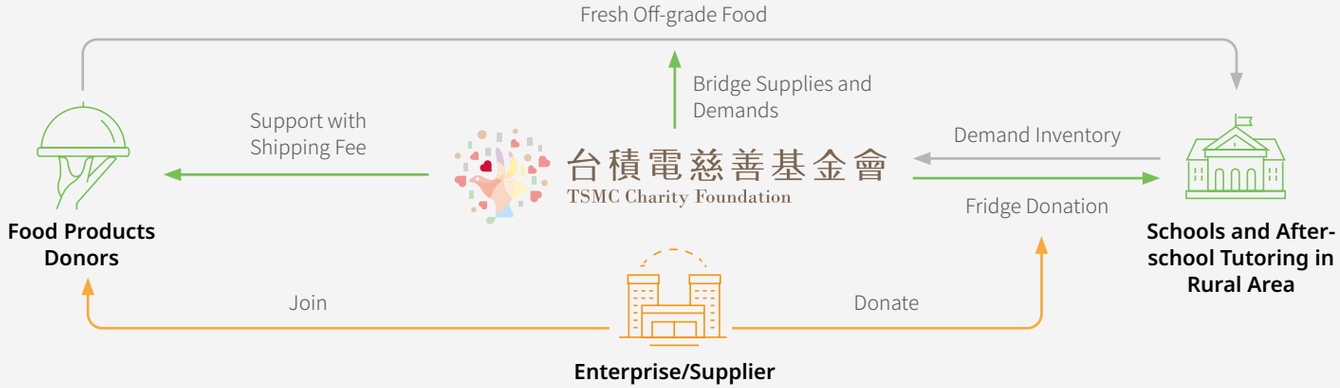
In 2021, LAO XIE ZHEN CO., LTD. became the seventh company of the TSMC Cherish Food Program, joining the existing six food companies of the TSMC Cherish Food Program to send goodwill foods to 122 agencies that serve the disadvantaged in 13 cities and counties in Taiwan, benefitting 58,862 people. During the pandemic, the Cherish Food Program expanded its services to partner with 1919 Food Banks to distribute 1,500 boxes of food to 160 after-school programs.

58,862

Cherish Food Program helped 58,862 people in 2021



Cherish Food Program





TSMC Charity Foundation Provides food and daily supplies to institution and families in need during the pandemic



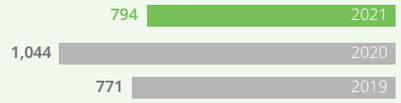
Ms. Sophie Chang, the chairperson of the TSMC Charity Foundation, installs LED energy-saving light tubes with students from Kun Shan University

Environmental Education Deepens Sustainability

In 2021, through ecological tours and DIY activities, TSMC ecological volunteers introduced students and tourists to biodiversity and raised awareness for ecological areas near TSMC fabs and the Tainan Jacana Ecological Education Park. In addition, TSMC volunteers used their expertise in energy saving and safety to help rural schools improve energy use efficiency on campus. The volunteers also designed games for students to learn the concepts of energy and water savings.

The TSMC Charity Foundation works with TSMC volunteers to develop diverse guided tours and environmental courses. In addition to providing semiconductor science tours, TSMC promoted eco-friendly plays for rural primary schools. During the pandemic, TSMC has developed online environmental education activities and has been committed to deepening the spirit of sustainability.

794
Environment protection volunteers served 794 times



TSMC Participating Units

TSMC Charity Foundation, Fab-12A, Fab-12B, Fab-15A, Fab-14, Ecological Preservation Volunteers, Fab Projects Volunteers, Giving Guided Tours Volunteers and Storytelling Volunteers

Institutional Beneficiaries

Jilai Elementary School in Tainan City, Baoshan Elementary School in Hsinchu County, Si Wei Elementary School in Taichung City and Jaudung Elementary School in Hsinchu County

Cooperating Units

Jacana Ecological Education Park, National Museum of Nature Science, TSMC Museum of Innovation, WALK in TAIWAN and Old Tree Yard Environmental Protection Foundation

689
Eco-volunteers served times

>2,756 hours
Ecological touring service

105
Volunteers served times in energy saving

1,050 hours
Energy saving teaching and service

682
Volunteers served times in touring

2,728 hours
Touring service

> Through thematic learning, the TSMC Charity Foundation enables environmental education to take root and expand.

Chu-Feng Liu
Headmaster of Jaudung Elementary School in Hsinchu County

> Through themed environmental education, learning becomes a part of life, helping children to grow and thrive.

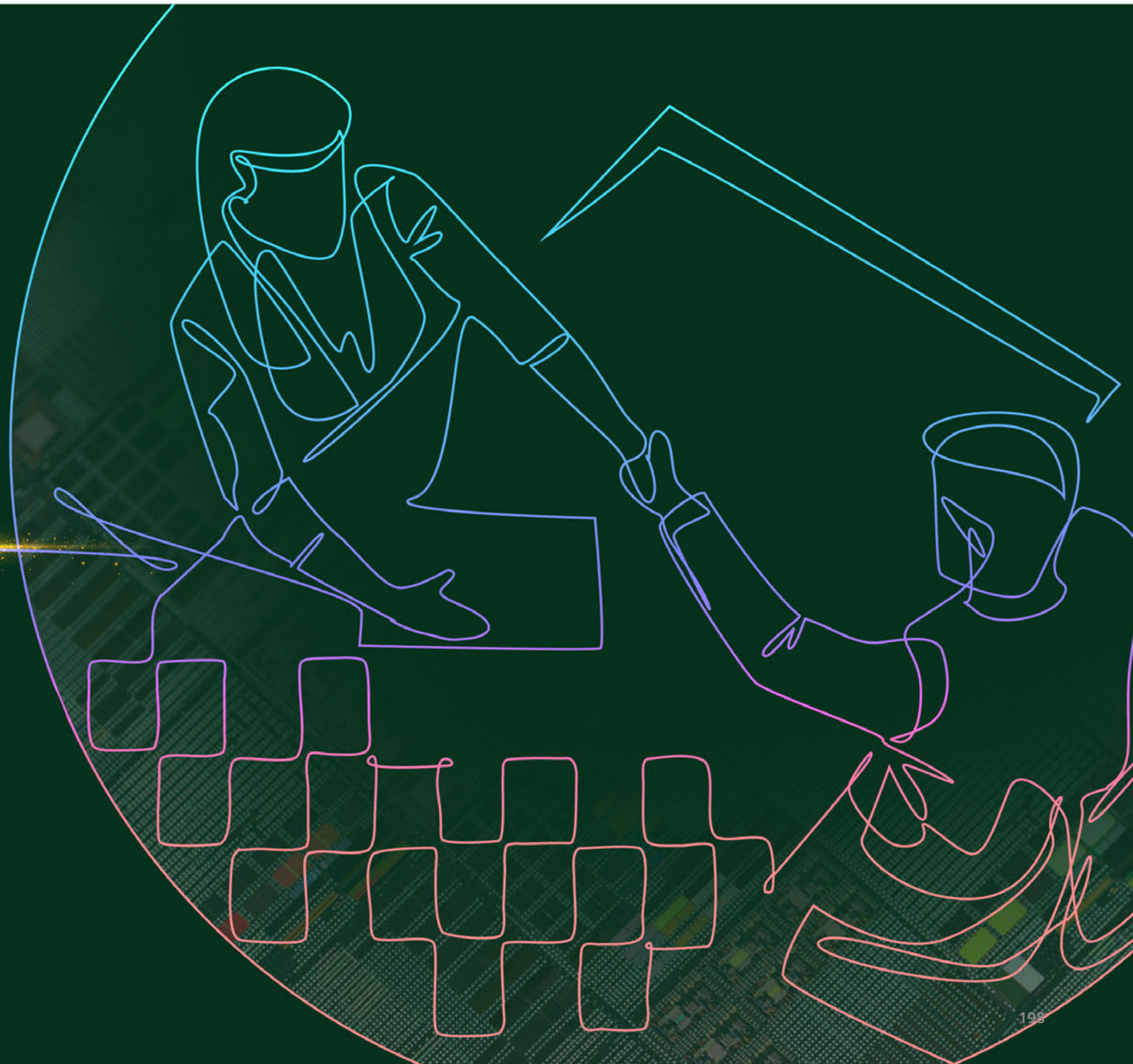
Mh Hsu
TSMC Storytelling Volunteer



Volunteers from Fab 6 conduct a safe energy inspection on campus and prepare materials to teach children about energy-efficient light bulbs

Ecological volunteers design classes to teach students about green architecture, water recycling, and circular economy

Operations and Governance



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Corporate Governance

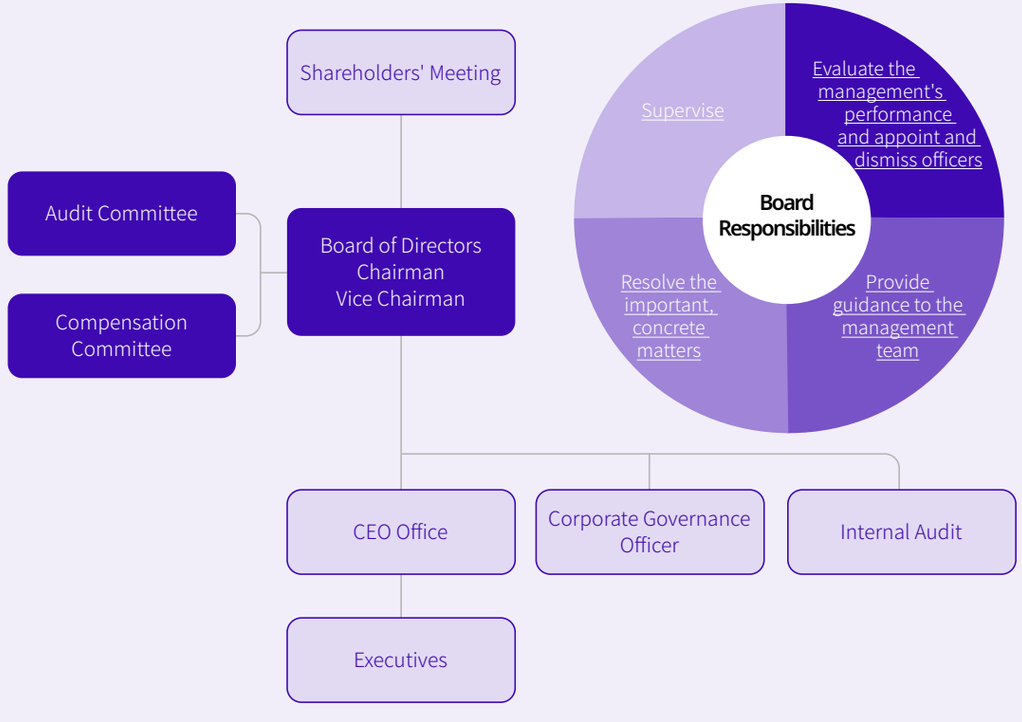
TSMC advocates and acts upon the principles of operational transparency and respect for shareholder rights. We believe that the basis for successful corporate governance is a sound and effective Board of Directors. In line with this principle, the TSMC Board delegates various responsibilities and authority to two Board Committees, the Audit Committee and the Compensation Committee. Each Committee's chairperson regularly reports to the Board on the activities and actions of the relevant committee. The Board of Directors plays the role of overseeing and providing guidance to the Company's comprehensive sustainable management strategies. TSMC's Chairman chairs the ESG Steering Committee, and the Chairperson of the ESG Committee serves as its Executive Secretary and reports quarterly to the Board of Directors on the implementation results and the future work plan.

Title/Name	Board of Directors	Audit Committee 100% Independent Directors	Compensation Committee 100% Independent Directors
Chairman Mark Liu	✓		
Vice Chairman C.C. Wei	✓		
Director F.C. Tseng	✓		
Director Ming-Hsin Kung (Representative of National Development Fund, Executive Yuan)	✓		
Independent Director Sir Peter L. Bonfield	✓	✓ Chair	✓
Independent Director Kok-Choo Chen	✓	✓	✓
Independent Director Michael R. Splinter	✓	✓	✓ Chair
Independent Director Moshe N. Gavrielov	✓	✓	✓
Independent Director Yancey Hai	✓	✓	✓
Independent Director L. Rafael Reif	✓	✓	✓
Jan C. Lobbezoo		Financial Expert Consultant	

Board of Directors and Committees

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.

Governance Structure



Nomination and Election of Directors

TSMC establishes the Guidelines for Nomination of Directors that set out the procedures and criteria for the nomination, qualification and evaluation of candidates for Directors. The members of TSMC Board of Directors are nominated via rigorous selection processes. It not only considers background diversity, professional competence and experience, but also attaches great importance to his/her personal reputation on ethics and leadership. Directors shall be elected pursuant to the candidate nomination system specified in Article 192-1 of the R.O.C. Company Law. The tenure of office for Directors shall be three years. The average tenure of current TSMC Board of Directors is 8.1 years. The Company aims to have at least 50% independent directors and as least one female director to serve on the Board.

Board Diversity and Independence

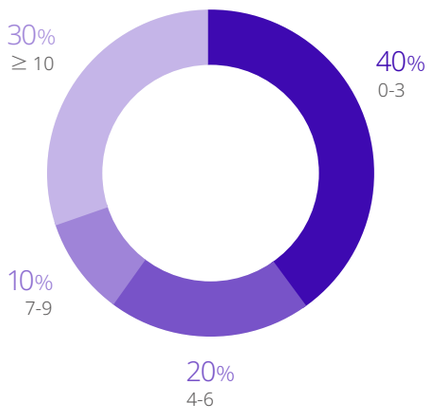
TSMC's Board is comprised of a diverse group of professionals from different background in industry, academia, law, etc. These professionals include citizens from Taiwan, Europe, and the U.S. with world-class business operating experience, one of whom is female. The six Independent Directors constitute 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.

Board and Audit Committee Performance Evaluations

TSMC implemented Board performance evaluations in 2021. Through self-assessment surveys via questionnaire, performance evaluations are completed annually by the Board as a whole, by individual directors and by the Audit Committee. For the results of the 2021 performance evaluations, please refer to the 2021 Annual Report.

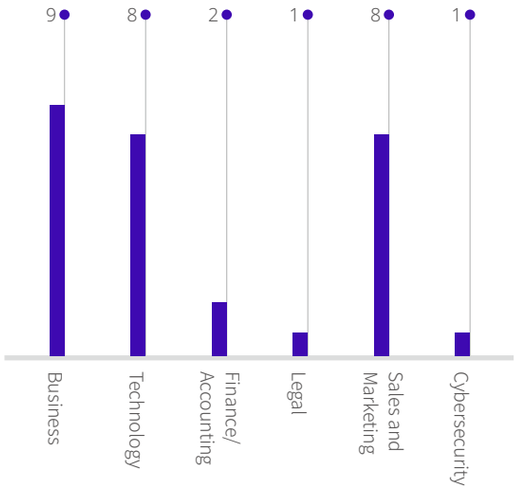
Board Tenure

Unit: Year



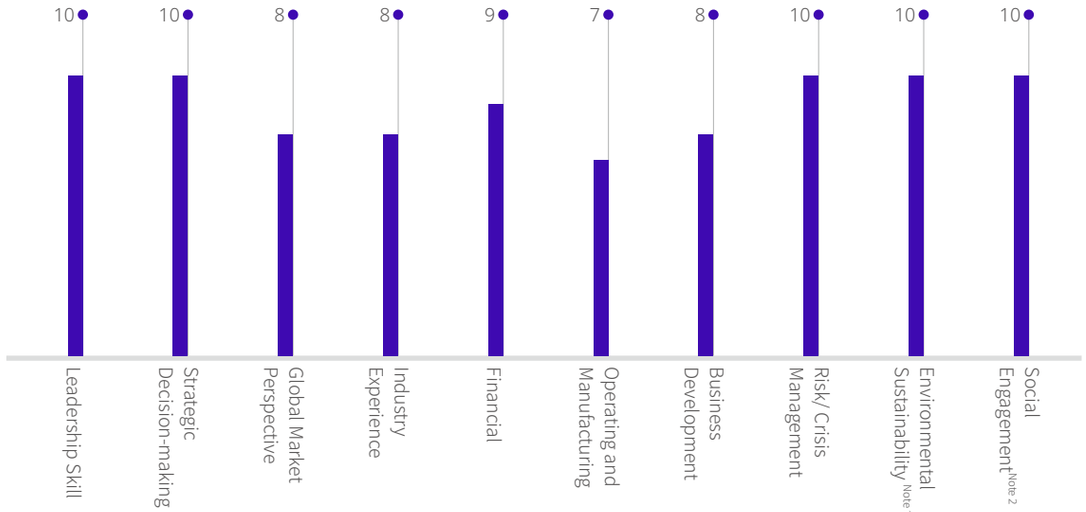
Directors' Professional Knowledge and Expertise

Unit: Person



Directors' Skills and Experience

Unit: Person



Note 1: Experience in understanding or addressing strategic environmental sustainability issues, including but not limited to strategic issues such as energy management, climate change, air pollution control, waste management, and water stewardship.

Note 2: Experience in understanding or addressing strategic social engagement issues, including but not limited to strategic issues such as participation in associations, human right, and human capital.

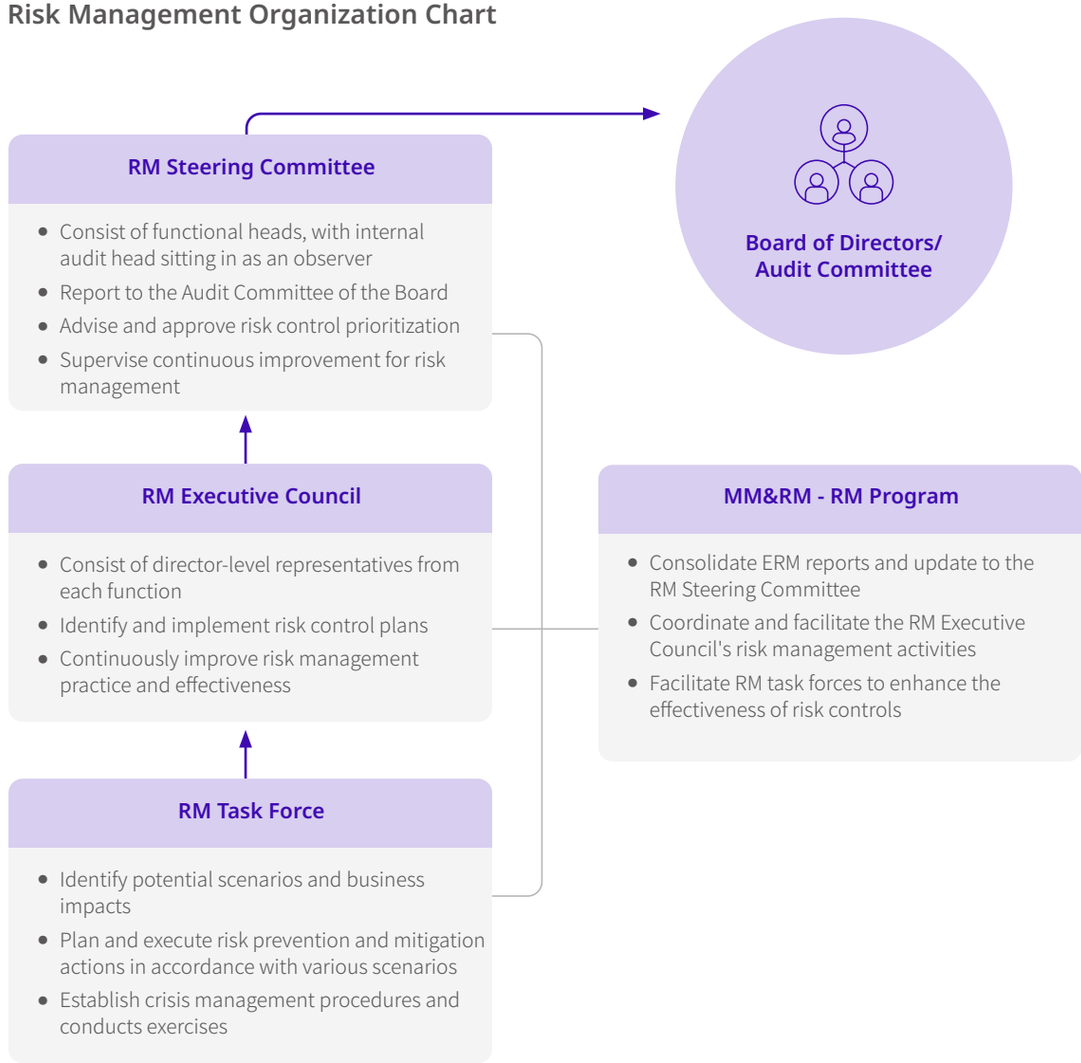
Risk Management

Based on corporate vision and long-term sustainable responsibility, TSMC's risk management organization is composed of the RM Steering Committee, RM Executive Council, RM Program and RM Task Force. Through cross-functional collaborations, TSMC established a comprehensive enterprise risk management (ERM) program, as well as applying ERM framework and risk map to integrate and manage potential sustainability risks including strategic, operational, financial and hazardous risks (climate change, utility supply, earthquake, fire, chemical spill, etc.) and assessing the risk levels by defining likelihood and impact severity of events on TSMC's operations, and to prioritize controls and implement corresponding mitigation measures. The risk management organization briefs the audit committee each year on the ever-changing risk environment facing TSMC, the focus of TSMC's ERM, and risk assessment and mitigation efforts. The Audit Committee's Chairperson also reports to the Board of Directors on the risk environment and risk mitigation measures to be taken. For more details of Risk Management, please refer to TSMC's 2021 Annual Report 6.3 Risk Management.

Enterprise Risk Management Framework

Risk Identification and Assessment	Risk Control and Mitigation	Risk Response	Risk Monitoring and Reporting
• RM Steering Committee and Audit Committee of the Board of Directors review and approve implementation of risk management strategy and prioritization of risk controls • RM Executive Council adopts risk map which assesses likelihood and impact of risk events on operations	• RM Program conducts cross-functional risk communication to facilitates each function for enhancing risk prevention and mitigation controls • RM Executive Council implements risk control and improves continuously • Each department includes the effectiveness of risk controls into annual self-assessment	• RM task forces establish crisis management and business continuity plan • RM Program plans and implements the response and exercise for material crisis events • Each department implements the planning and execution of business continuity plan	• Risk management organization reports to RM Steering Committee and Audit Committee on the focus of enterprise risk management, risk assessment, and mitigation efforts

Risk Management Organization Chart



Ethics and Regulatory Compliance

Ethics

"Integrity" is the cornerstone of TSMC's business philosophy. TSMC established the TSMC Ethics and Business Conduct Policy(Ethics Code) to be the guide for operating TSMC's business with integrity, and for forming a robust culture of integrity within TSMC. TSMC realizes that suppliers are key partners in the regulatory compliance and implementation of the Ethics Code, leading to TSMC establishing the Supplier Code of Conduct and Supplier Sustainability Standards to extend TSMC's core values 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 values of integrity.

TSMC established and published the Complaint Policy and Procedure for Certain Accounting & Legal Matters, making multiple reporting channels available for internal and external voices, and accepting anonymous reports, to protect the rights and interests of the company and its constituencies. 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 retaliation on any individual who in good faith reports a suspected violation or participates in an investigation. Furthermore, TSMC has an Ethics Committee that oversees the implementation of the Ethics Code and investigations and disciplinary actions for reported incidents. The Ethics Committee meets quarterly or whenever necessary. In 2021, the Ethics Committee met seven times to examine major reported incidents under investigation.

Regulatory Compliance

TSMC operates in many countries. To ensure that every business activity in compliance with applicable governing legislation, laws, regulations and regulatory expectations, TSMC has established a complete regulatory compliance system, including a sequence of regulatory identification, compliance policy and procedure formulation, implementation and execution, compliance training program, to closely monitor domestic and foreign government policies and regulatory developments that could materially impact TSMC's business and financial operations.

Ethics Compliance Activities



Regulatory Compliance and Policy Formulation

- Regulatory inventory check
- Regulatory monitor and update
- Regulatory identification
- Regulatory compliance review
- Policy formulation and update
- Training and promotion

2021 Achievements

Regulatory Compliance

- Regulatory Compliance: In 2021, TSMC did not receive any reports related to finance, accounting or antitrust matters, nor did we receive any complaints concerning breach of customer privacy and loss of customer data, or any material regulatory violations (where a fine exceeds NT$one million).
- More information related to TSMC ethics and regulatory compliance, please refer to 3.5 Ethics and 3.6 Regulatory Compliance of TSMC's 2021 Annual Report.

Training

Ethics Training Course for Newcomers Online program

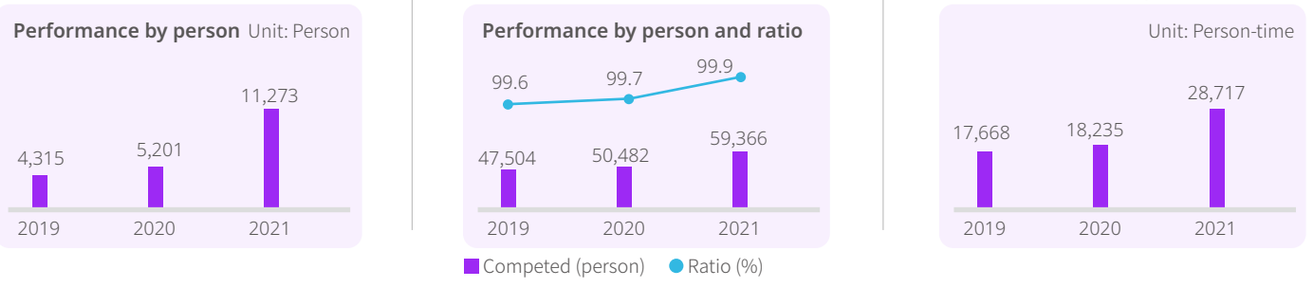
New employees in Taiwan sites (including contractors)

Annual Ethics and Compliance Training Course Online program

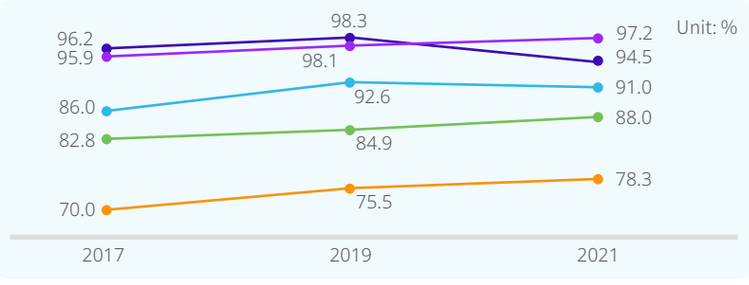
All employees

Conflict of interest declaration/ Declaration of Compliance with the Ethics Code

New employees, the designated managers or employees according to the Ethics Code



Suppliers' Feedback on TSMC's Ethics Related Activities



- Suppliers gave positive evaluation on TSMC staff's ethical conduct
- Suppliers subsequently conducted internal promotion activities in accordance with TSMC Ethics and Business Conduct Policy
- Supplier's willing to use the ombudsman system when applicable
- Supplier's awareness level of the TSMC ombudsman system
- Reply Ratio

- Source: 2021 Supplier Survey Questionnaire
- Supplier coverage (The transaction amount with TSMC reached NT$1,000,000 or above within 18 months since 2020) : 1,942 suppliers, including tier 1 suppliers and critical suppliers

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, which allows the company to give back to all its stakeholders, including shareholders/investors, employees, customers, suppliers, government, society, and others. Therefore, good financial performance is the key to corporate sustainability.

In the aspect of communicating financial performance with investors, TSMC strives to ensure information transparency. Not only does the company regularly disclose historical financial information, it also sets clear strategic financial objectives that enhance investors' confidence in TSMC's long-term investment value so that they are willing to grow with the company. As the multi-year megatrends of 5G and HPC-related applications are expected to fuel the demand for more computation power, TSMC sees strong growth potential in its advanced and specialty technologies in the next several years. Thus, the Company expects from 2021 to 2026 (1) its long-term revenue growth, in US dollar terms, to be 15% to 20% CAGR, with (2) long-term gross margin to be 53% and higher, and (3) ROE to be 25% and higher across the cycle.

Given the funding requirement of the growth opportunities and the need to maintain a solid financial foundation, TSMC issued a total of NT$234.6 billion in NT dollar denominated and US$13 billion in US dollar denominated corporate bonds with favorable pricing terms. After the bond issuances, TSMC continues to maintain the semiconductor industry's highest credit ratings.

AA-	Aa3	twAAA
Standard & Poor's (S&P) Ratings	Moody's Ratings	Taiwan Ratings

Four Strategies to Increase Long-term Investment Value

Continue to invest in technology leadership

14.5%
R&D investment increased at 14.5% CAGR Note

10.2%
R&D team grew at 10.2% CAGR Note

Provide excellent manufacturing services and capacity support

1,300 million
Total capacity exceeded 13 million 12"-equivalent wafers in 2021

15.2%
Capital expenditures increased at 15.2% CAGR Note

Pursue revenue and market share growth

14.6%
Net revenue increased at 14.6% CAGR Note

26%
TSMC produced 26% of the world semiconductor value (excluding memory output) in 2021

Maintain or improve profitability and investment returns

16.7%
Net income increased at 16.7% CAGR Note

25.5%
Average ROE Note

2.2 Trillion
Cumulative cash dividends from 2004 to 2021 (NT$)

Note: From 2012 to 2021

Supported by the Company's strengthening industry position, growth potential and solid operating performance, TSMC's share price, adjusted for cash dividends, increased 18.1% in 2021, marking 13 consecutive years of annual growth. 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, 2021, TSMC's market capitalization reached NT$16.2 trillion, or US$584.9 billion.

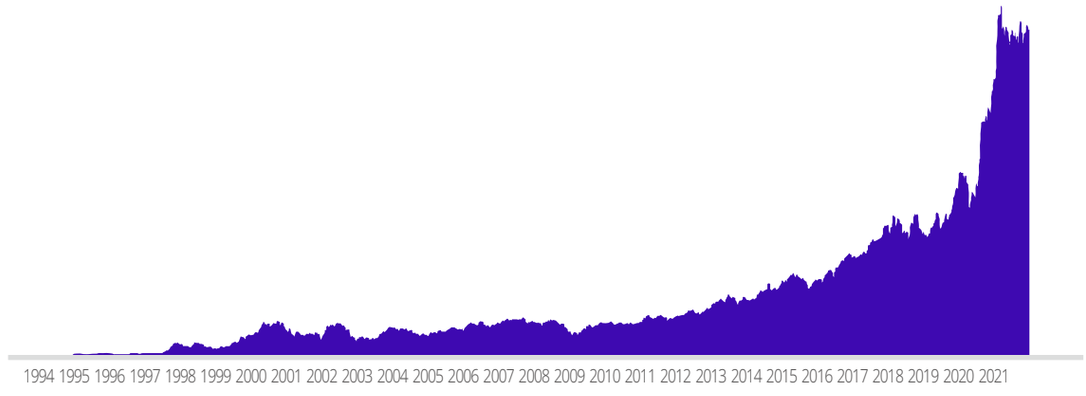
TSMC's solid financial performance enables the Company to distribute profits to shareholders in the form of cash dividends.

In June 2021, TSMC's Board of Directors approved quarterly cash dividend of NT$2.75 per share per quarter to be paid in the fourth quarter of 2021, an increase from NT$2.5 per share for the previous three quarters. TSMC's shareholders received a total of NT$10.25 per share in cash dividends in 2021. From 2004 to 2021, TSMC has paid out a total of NT$2.2 trillion, or US$71.8 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.

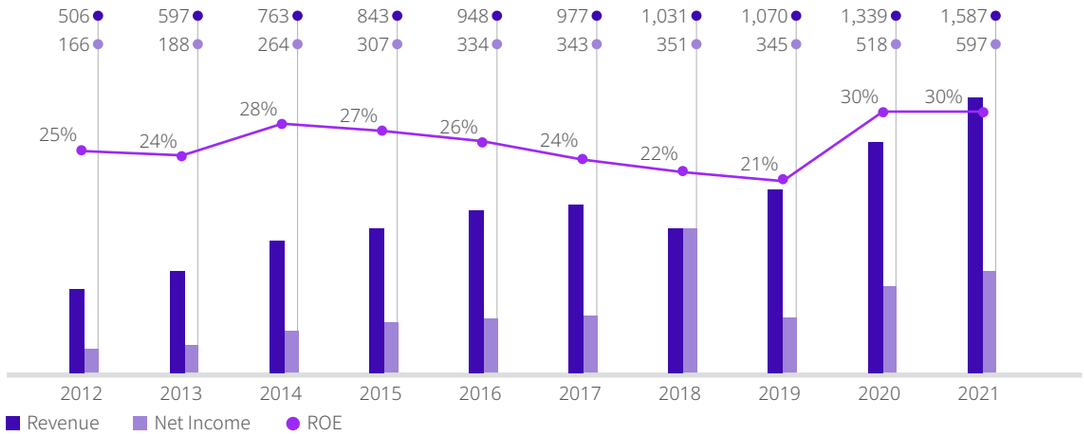
Market Capitalization

Unit: NT$ trillion

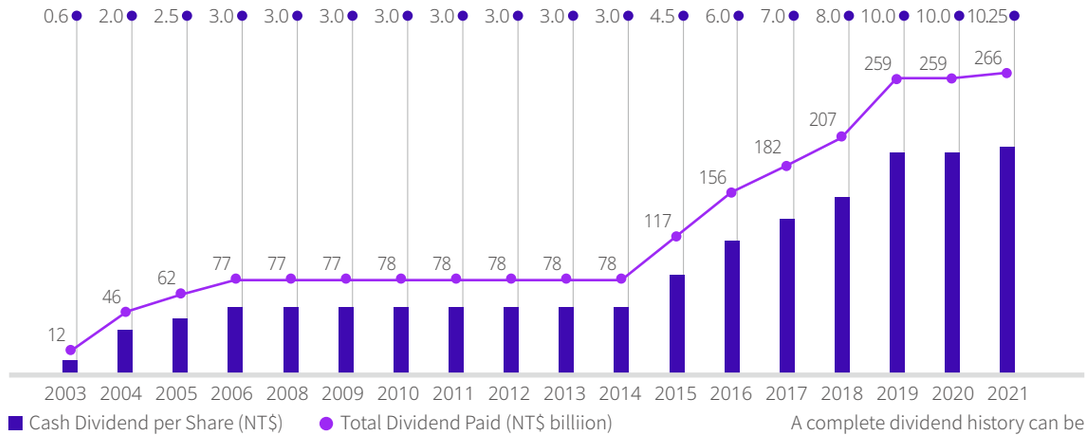


Financial Performance

Unit: NT$ Billion



Cash Dividend



A complete dividend history can be found on TSMC's website

Tax

TSMC supports tax policies and incentives that encourage enterprise innovation and foster economic growth. The Company aims for its tax approach and disclosure to be transparent and sustainable in the long term.

Tax Policy

1. 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.
2. Inter-company transactions are based on the arm's length principle, in compliance with internationally accepted transfer pricing guidance published by the OECD.
3. Be transparent in financial reporting. Disclosures are made in accordance with applicable regulations and reporting requirements.
4. Do not use tax havens or tax structures whose sole purpose is for tax avoidance.
5. Do not transfer value created to low-tax jurisdictions.
6. Develop strong, mutually respectful relationships with tax authorities based on transparency and trust.
7. Always consider tax as part of major business decisions.
8. 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 regularly briefs TSMC's Audit Committee on the ever-changing risk environment facing TSMC, the focus of the Company's enterprise risk management, and risk assessment and mitigation efforts. For more details on risk management, please refer to the Risk Management section in TSMC's 2021 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 responsibilities to the Controller. A team of qualified and experienced tax professionals support the Controller to meet TSMC's tax obligations. In addition, TSMC also leverages external tax service providers for complementary expertise.

TSMC's Audit 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.

Effective Tax Rate

TSMC's effective tax rate and cash tax rate in 2021 were 10.0% and 12.6%, respectively, both of which were lower than the industry average effective tax rate of 15.26% and the industry average cash tax rate of 14.12% based on SAM CSA Companion in 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 credit for research and development expenditures according to regulations under the R.O.C. Statute for Upgrading Industries and the Statute for Industrial Innovation.

$93.6 billion

In 2021, TSMC's total tax payments on a cash basis worldwide were NT$93.6 billion.

>90%

In 2021, over 90% of TSMC's revenue and profit before tax were generated from its business operations in Taiwan. Meanwhile, over 90% of its tax payments were also made to the Taiwan R.O.C. government.

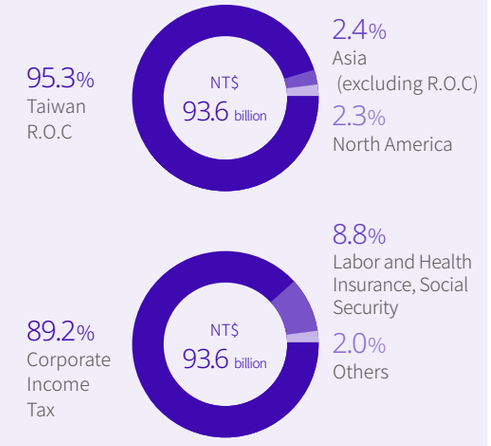
1st

Based on data provided by "Bloomberg Professional", TSMC was the largest corporate income tax payer among all public listed companies in Taiwan in 2021.

11.6%

TSMC's 2021 income tax payment in Taiwan represented 11.6% of total corporate income taxes collected by the R.O.C. government. Note 2

2021 Tax Breakdown Note 1



Income Tax Paid — 83.5 Billion (NT$)



Taiwan R.O.C 98.2% Asia (excluding R.O.C)1.1% North America 0.7%

Profit Before Tax — 663.1 Billion (NT$)



Taiwan R.O.C 96.8% Asia (excluding R.O.C)3.3% North America -0.3% Others 0.2%

Income Tax Accrued — 88.8 Billion (NT$)



Taiwan R.O.C 98.2% Asia (excluding R.O.C)1.3% North America 0.5%

Note 1: TSMC categorizes its profit before tax, income tax accrued, and taxes paid geographically based on the country in which TSMC and subsidiaries are located

Note 2: Source: National Statistics, R.O.C. (Taiwan)

Information Security

As the world's leading IC foundry, TSMC is actively strengthening the information security and proprietary information protection mechanisms, as stated in the TSMC Information Security Declaration. TSMC has successfully passed information security requirements of customers and third-party audits over the years. In 2021, TSMC furthered the promotion of information security management to the semiconductor supply chain. TSMC initiated and assisted SEMI(Semiconductor Equipment and Materials International Organization) to establish a Cybersecurity Committee and Specification for Cybersecurity of Fab Equipment. TSMC strives to further enhance supply chain information security.

Information Security Management Strategy

TSMC leverages four management mechanisms to enforce information security: dedicated information security organization, board of directors' supervision, executive level participation and employee level participation. TSMC standardizes information security management and imposes policies and guidelines to maintain competitiveness and protect the interests of customers and partners.

Dedicated information security organization	TSMC established the Corporate Information Security (CIS) organization to coordinate policy formulation, implementation, risk management and compliance audits with its Proprietary Information Protection Division and Information Technology Security Division.
Board of Director's supervision	The TSMC Audit Committee is responsible for supervising and managing enterprise information security. The head of the Corporate Information Security organization reports information security management performance to the Board Audit Committee every six months. Sir Peter L. Bonfield, the Chairman of the Audit Committee oversees and evaluates TSMC's information security management.
Executive level participation	TSMC set up the TSMC Proprietary Information Protection Committee organized by the senior executives of each function. Quarterly meetings are held to review and decide on information security and information protection guidelines and implemented measures.
Full employee level participation	TSMC established a self-healing information security management culture with full employee participation to jointly improve the overall information security of the company.

Build up information security culture and implement management mechanism

To enhance the resilience of corporate information security, TSMC actively implements information security measures through professional talent cultivation and certification, information security education/training and social engineering drills as well as diversified communication channels. The company adopts international information security standards to improve defense and adaptability to build an information security culture.

Diversified information security communication channels

- Produce creative and diversified awareness posters, host lectures, and periodically hold communication meetings.
- Collect employees' opinions through information security suggestion boxes and regular questionnaires and propose improvement plans.
- Employee punishment will be imposed based on non-compliance with information security and the degree of impact on the company.
- Hold an internal review meeting and award ceremony every year as well as conduct a comprehensive review and discussion on the policy implementation results of the year in order to formulate annual implementation goals.

Professional training and certification for information security employees

- TSMC cultivates a professional information security team and continues to encourage personnel to obtain international information security certifications.
- Corporate Information Security planned 6 courses by experts from other organizations/fields at TSMC to understand the characteristics of different organizations and determine the information security operation and management. The most appropriate control mechanisms were set according to each organization's requirements and goals.

Information security training and social engineering walkthrough

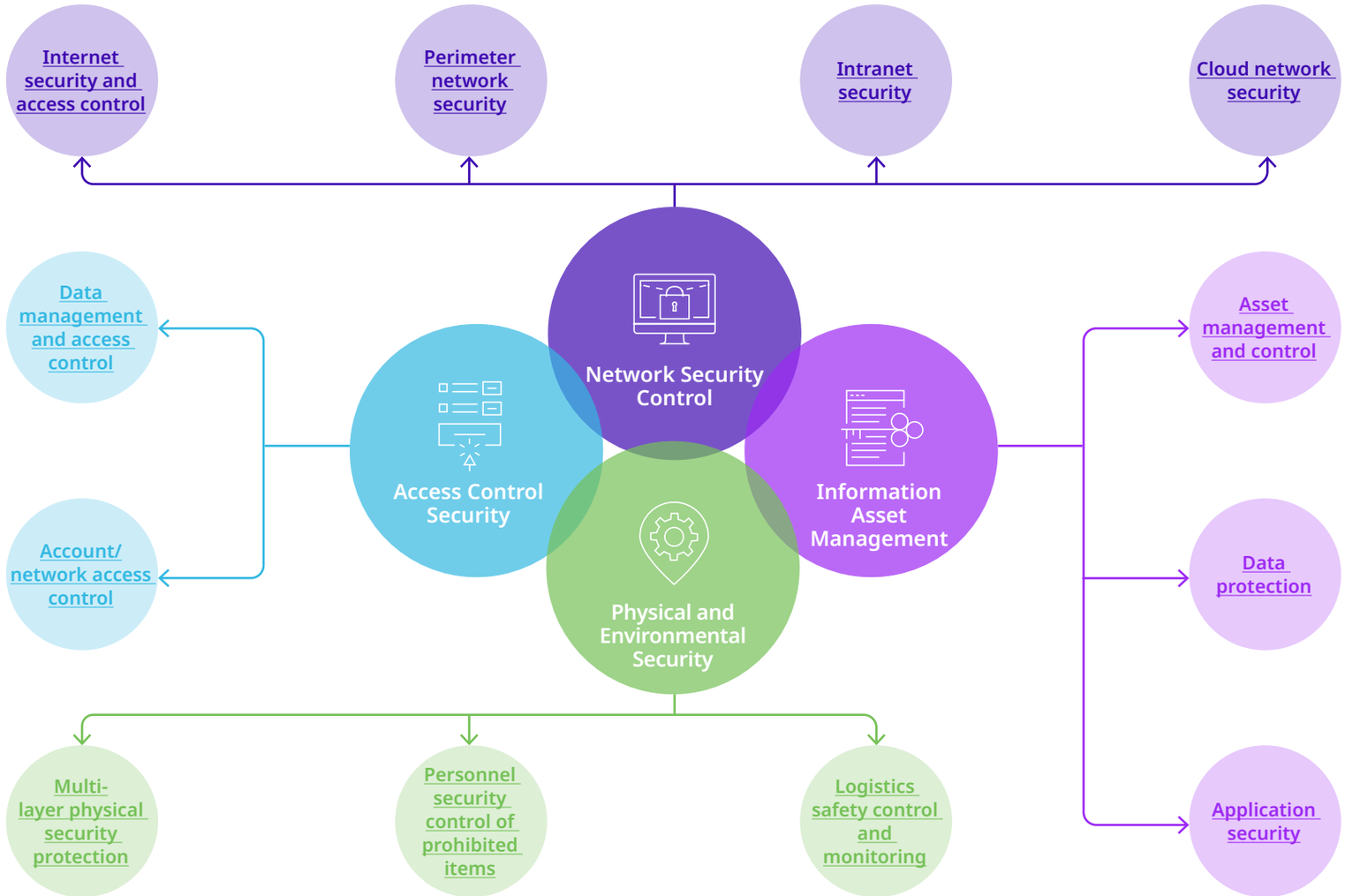
- All new employees and suppliers must attend training courses containing the latest information security policy.
- TSMC imports the most well-known test tools and question banks in the world, and randomly selects employees for different phishing email simulations on threat identification



Deploy the latest international information security standards

- Establish automated information security management system and obtain the ISO/IEC 27001 information security certification.
- Continuously achieve ISO/IEC 15408 security certification
- TSMC continues to adopt new information security international standards, such as NIST CSF, SANS CSC, information security maturity standards and risk assessment mechanisms to ensure effective physical security, information security, system operation and product protection and controls.

Information Security Technical Measures in 2021



Construct comprehensive information security operation management

TSMC implemented the Business Continuity Management Policy to support the company's continuous operation management. In addition to daily information security management, it holds an information security accident emergency response and recovery exercise every year, to ensure continuous operation. According to the script, when an information security incident occurs in the simulation plant, the 24-hour Cyber Incident Response Center (CIRC) directs and coordinates the response. In order to ensure the disaster response capability at critical moments and the continuous operation of information systems without interruption, TSMC established an internal information security evaluation team. This team conducts continuous security risk assessments to confirm that the internal security operation control points are effective. An automated evaluation mechanism was also established so that if a loophole is found in the inspection result, the repair will be completed within the specified time limit. Every year, TSMC continues to conduct Red Team Assessments with external professional teams simulating intrusion attacks without affecting operations. Through the drill process, the detection and response capability of TSMC's information security defense are verified, and potential risks discovered.

Strengthen Supplier Information Security Management and Performance

TSMC is not only deepening the connotation of its own information security management but also striving to promote information security measures and standards to supply chain-related industries. TSMC drives the overall supply chain to improve and establish information security standards using the information security risk assessment platform as an indicator of effectiveness.

Initiate and Lead the Information Security of the Semiconductor Industry Supply Chain

TSMC continues to provide excellent semiconductor manufacturing services to global customers, meeting all information security requirements and international standards. TSMC initiated cooperation with SEMI (Semiconductor Equipment and Materials International Organization) to formulate a global Specification for Cybersecurity of Fab Equipment, which defines general specifications in four areas: computer operating system, network security, endpoint device protection and security monitoring, as well as information security auditing. To provide consistent guidelines for semiconductor equipment suppliers, Specification for Cybersecurity of Fab Equipment was officially announced at the International Semiconductor Exhibition (SEMICON TAIWAN) in December 2021. TSMC initiated the process to assist SEMI to establish the SEMI Cybersecurity Committee. The director of TSMC Corporate Information Security, Tu Zhen, served as the inaugural chairman of the SEMI Cybersecurity Committee, working together with industry players to solve the semiconductor industry's information security protection problems and improve the overall information security level.

Achievements of Supplier Information Security Management in 2021

Established TSMC's supply chain information security requirements standards

- Established and integrated the management and announcement mechanism of TSMC Supplier Proprietary Information Protection and Information Security (PIP & IT Security) Specifications
- Developed Supplier information security management requirements which has 12 categories covering 135 items according to TSMC's needs and international standards
- Established an online work permit application reservation and authority management mechanism to strengthen the management of suppliers entering the factory

Established automated supply chain information security questionnaire and third-party information security evaluation mechanism

- TSMC conducted an information security assessment by surveying more than 1,200 suppliers and contracting a third-party information security assessment.
  - Of the 417 TSMC assessed suppliers with scores lower than 80, 198 improved their scores to above 80. TSMC will continue to monitor the improvement plans of the other 219 suppliers.
  - Of the 179 third party assessed suppliers with scores lower than 80, 155 improved their scores to above 80, a total of more than 3,000 key security weaknesses have been improved
  - Cooperated with 1 key supplier in improving information security through the TSMC Supplier Information Security Alliance channel

Established diversified information security promotion and training mechanism

- Published 4 issues of Supply Chain Security Newsletter, with over 200,000 recipients.
- Developed supplier-friendly information security training courses and developed 2 online information security courses in the TSMC Supplier Sustainability Academy

Established TSMC and supplier information security incident risk management

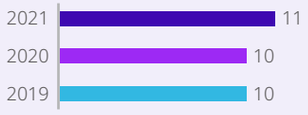
- Established TSMC Supply Chain Information Security Incident Management and Reporting Mechanism
- Established Real-time Notification Risk Handling Procedure to share industry experiences raise information security alerts

2021 Information Security Measures Enforcement Result

Policies

11 Regulations

Newly created or revised 11 information security regulations



Violations

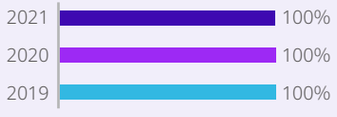
0.04%

- 0.04% of employees were found violating information security protection and PIP procedures and penalized consistent to the severity of damage caused by their violations.
- Corrective measures:
  - Strengthened employee training programs and promotion campaigns
  - Set improvement measures and implemented monitoring on employees

Training/Promotion programs

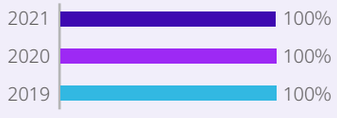
100%

All new employees, a total of over 5,000 individuals, completed information security and protection training courses



100%

All new vendors, a total of over 51,000 individuals, completed PIP training courses

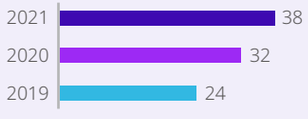


12 Email Phishing and Social Engineering Drills

Conducted 12 email phishing and social engineering drills with more than 60,000 employees including general employees and supervisors at all levels

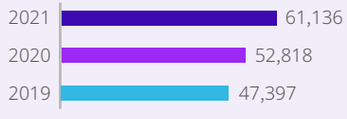
38 Posters

A total of 38 posters were created to promote important regulations and announcements regarding information protection and information security



61,136 Employees

- 61,136 employees completed the annual information security online refresher e-learning course



- Course content
  - Major events and new regulations in 2021
  - Case studies on information security regulatory violations
  - Ways to check information security or escalate issues concerning security regulations and seeking consultancy if needed

Information Security Certification

1 Giga Fabs and **1** Backend Fab Obtained ISO/IEC 15408 Certification

Fabs 14B and Advanced Backend Fab 2 were successfully certified by the German Federal Office for Information Security (BSI) for ISO/IEC 15408- EAL6 under Common Criteria (Site Certification)

300 mm Fab Obtained ISO/IEC 27001:2013 Information Security Certification

Areas include: Client Silicon IP merge, mask manufacturing and production, inventory management and related IT management applied to support 12-inch wafer manufacturing (Tainan)

4 Customer Security Audits

Cooperated with four customers in obtaining ISO/IEC 15408 certification for their products, and ensured their product information protection during manufacturing

Information Security Team Professional Certificate

51

In 2021, TSMC information security team has obtained 51 international top-level information security certifications (including CISSP, CISA, EH, CHFI, ISO 27001 Lead Auditor, etc.).

Information Security Assessment

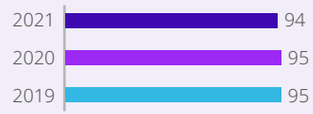
99 Points

The third-party evaluation on TSMC's information security resulted in a score of 99 in 2021

Surveys

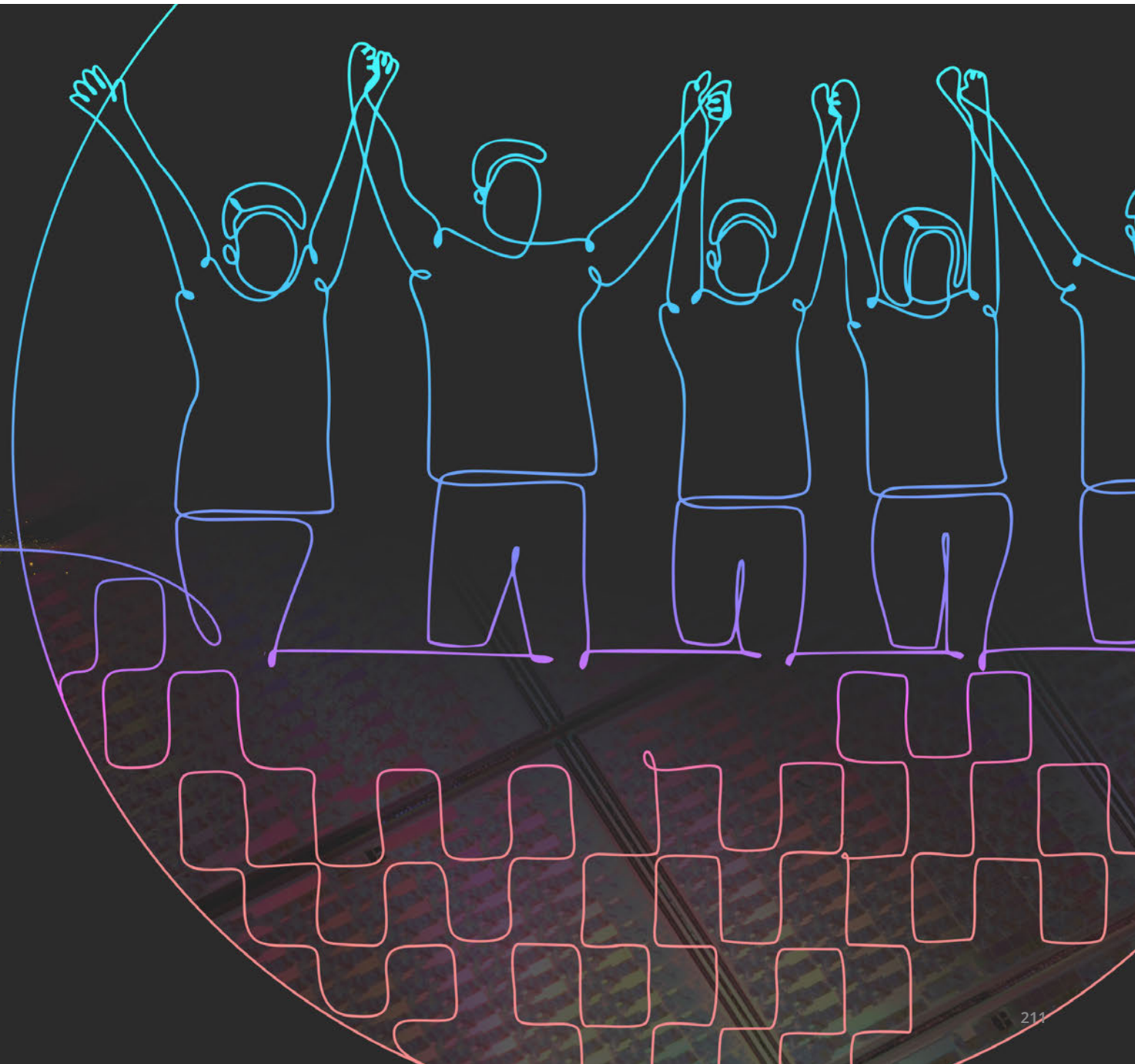
94 Points

- Average a score of 94 for employee approval of information protection-related policies
- Conducted an information protection engagement survey in 2021, collected over 55,000 surveys with over 89% response rate



In 2021, TSMC's external audits concluded that no major information security flaws, major violations, incidents of customer data breach and regulatory fines occurred. Moreover, there has been zero complaint concerning breach of customer privacy and loss of customer data from either third parties or regulatory bodies resulting in judicial action.

Note: 2021 indicators cover TSMC's Taiwan fabs and overseas subsidiaries



Appendix

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About this Report

To drive positive change towards a better society, TSMC has been issuing non-financial reports for 23 consecutive years. In addition to complying with Sustainability Information Disclosure Framework, the report also heeds expectations and suggestions from various stakeholders regarding the Company's daily operations and uses materiality analysis to adjust sustainable management practices and align with international sustainability standards. We hope that the annual Sustainability Report can become an important tool for managing ESG practices internally and a way to disclose mid- and long-term strategies, practices, and progress. We collaborate with employees, shareholders/investors, customers, vendors/contractors, the government and public associations, and society to strive for a sustainable future.

Reporting Period

The reporting period is between January 1, 2021 and December 31, 2021. The report is published in June 2022 in both English and Chinese and is available on TSMC's ESG website. The report covers major topics of interest to stakeholders as well as TSMC practices in the economic, environmental, social, and governance dimensions. Visit the following links for more historical data and information:

ESG Performance Summary/ Video	**ESG Website**	**ESG Newsletter**
TSMC LinkedIn	**TSMC TCFD Report**	**TSMC UN SDGs Actions Report**

Reporting Scope

The reporting scope includes all TSMC fabs in Taiwan (HQ and all wafer fabs and backend fabs in Taiwan), TSMC (China), TSMC (Nanjing), WaferTech, VisEra, and other subsidiaries. Changes from last year include an expansion to Fab 18 Phase 4 in Taiwan which has begun volume production. If the scope of reporting is different from the above statement, a note will be added to explain any differences in this paragraph.

Primary Changes in the 2021 ESG Disclosures

Name of Report

In compliance with the Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Sustainability Reports by TWSE Listed Companies, the name of the report has been officially changed to Sustainability Report

Materiality Analysis

Materiality analysis will be conducted once every three years and we have issued our first TSMC Materiality Analysis Report

Disclosure Boundaries

Disclosure boundaries for sustainability topics have now been expanded to include new fabs

Updates

Publish a new case study on corporate sustainability to provide real-time updates on the Company's progress toward sustainability; added a new section on ESG FAQs

Theme Reports

TSMC introduces its first UN SDGs Actions Report and updates the TCFD Report and the EP&L Report

Data Collection Boundaries for Sustainable Development Issues

● Collect complete data ◐ Collect partial data — The issue lacks materiality to the institution and is not included in the boundary of data collection

Issue \ Boundaries	Taiwan Facilities[Note 1]	WaferTech	TSMC (China)	TSMC (Nanjing)	VisEra	Other Subsidiaries[Note 2]
Innovation Management	●	—	●	●	—	◐
Product Quality and Safety	●	●	●	●	◐	—
Customer Relations	●	●	●	●	◐	●
Sustainable Supply Chain	●	◐	◐	◐	◐	—
Climate and Energy	●	●	●	●	●	●
Water Stewardship	●	●	●	●	●	—
Circular Resources	●	●	●	●	●	—
Air Pollution Control	●	●	●	●	●	—
Diversity and Inclusion	●	●	●	●	●	●
Talent Attraction and Retention	●	●	●	●	●	●
Talent Development	●	●	●	●	●	●
Human Rights	●	●	●	●	●	●
Occupational Safety and Health	●	●	●	●	●	—
Social Impact	●	—	—	—	—	—

Note 1: TSMC's fabs in Taiwan include corporate headquarters, wafer fabs, testing and assembly facilities.
Note 2: TSMC subsidiaries or offices in North America, Europe, Japan, South Korea, and other countries.

Report Writing and Quality Management Process

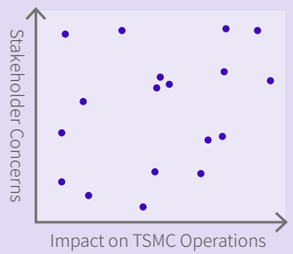
Engagement

Inclusivity

Communicate with stakeholders to identify reasonable expectations

Materiality

Analyze and identify issues that concern and significantly impact TSMC and stakeholders



Comprehensiveness

Define the boundaries of material issues and data collection

Planning

Launch Kick-off Meeting

- Deliver a comprehensive plan proposal
- Define the main theme and content of the report
- Establish Editing and revision guidelines
- Verify matters requiring collaboration

ESG Department

Employee Engagement Ideas

Inter-departmental Meetings

- Share new trends and approaches
- Share the annual plan for improvements
- Report case studies
- Plan the ESG Newsletter

ESG Committee Assigned Writer

Editing

Compile, edit, and revise in compliance with the SMART principle and six quality indicators set forth by the GRI

Long-term Sustainability Goals

Review the 2030 Sustainability Goals in accordance with the SMART principles

- Specific
- Measurable
- Achievable
- Realistic
- Time-bound

Develop the six major quality checklists

Ensure compliance with 21 quality indicators

- Accuracy
- Balance
- Clarity
- Comparability
- Reliability
- Timeliness

Review

- Confirm sustainable activities and performances by the organization
- Audit information accuracy

Division-level Managers

- Verify information and data

VPs and Above Executives of TSMC

- Preliminary and on-site paperwork review by third parties
- Raise matters requiring attention revealed from the reviews

Independent Verification Agency

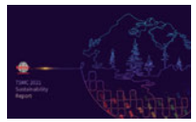
- Review and finalize report

ESG Committee Chairperson

Communication

Communication channels to external parties

- TSMC Website and ESG Website
- TSMC ESG Newsletter
- Reach out to stakeholders through newsletters
- TSMC ESG Facebook page
- TSMC LinkedIn
- Supply Online 360
- Customer newsletter
- Reporting on government platforms



Sustainability Report

Internal communication channels

- Hand out EDM to all employees
- myTSMC internal Website
- ESG AWARD Website
- ESG Steering Committee
- ESG Committee
- Inter-departmental ESG communication meetings

Report Writing Guidelines and Principles

ESG

Standards

- GRI Standards: Comprehensive Option
- AA1000 AccountAbility Principles Standard
- The International Integrated Reporting Framework
- SASB Index for the Semiconductor Industry
- TCFD 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

Certification Organization

- DNV GL Business Assurance Co. Ltd. certified this Report in compliance with the DNV VeriSustain™ Protocol, GRI Standards, SASB Index, and the TCFD Framework

Financial

Standards

- IFRSs approved and issued by the Financial Supervisory Commission (FSC)
- Regulations Governing the Preparation of Financial Reports by Securities Issuers

Certification Organization

- 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

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Phone: +886-3-5636688

Address: 8, Li-Hsin Rd. 6, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C

Sustainability Information Disclosure Framework

E Environmental S Social G Governance
Sustainability Disclosure Standards Sustainability Disclosure Indicators

The TSMC Sustainability Report follows the editorial standards of the Global Reporting Initiative (GRI), AccountAbility (AA), United Nations (UN), Carbon Disclosure Project (CDP), International Integrated Reporting Council (IIRC), Sustainability Accounting Standards Board (SASB), Financial Stability Board (FSB), World Economic Forum International Business Council (WEF IBC) and refers to their principles of reporting disclosure (to establish a systematic management process for reports) and indicators (environmental, social and governance indicators) to report TSMC's sustainability information and data. In addition, TSMC utilizes sustainability information disclosure as a proactive management tool to serve as a guide for organizations to improve.

GRI
GRI Sustainability Reporting Standards
E S G

AA
AA1000 AccountAbility Principles Standard
E S G

UN
Global Compact
E S G

CDP
Climate Change and Water Security
E S G

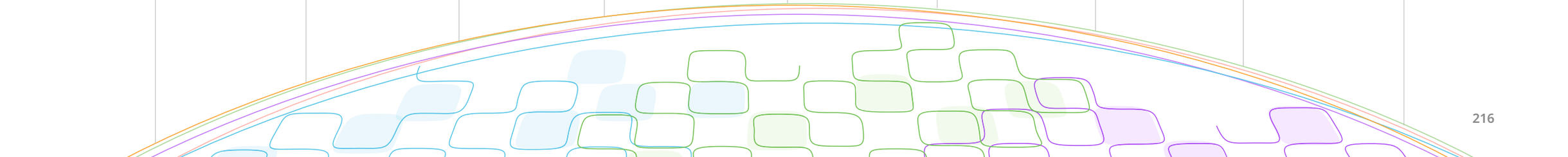
IIRC
International Integrated Reporting Framework
E S G

SASB
Semiconductor Industry Indicators
E S G

UN
Sustainable Development Goals
E S G

FSB
TCFD Recommendations
E S G

WEF IBC
Stakeholder Capitalism Metrics
E S G



Participation in Industry Associations and Non-Profit Organizations[Note 1]

Based on a foundation of healthy corporate governance, TSMC actively carries out its three missions of Acting with Integrity, Strengthening Environmental Protection, and Caring for the Disadvantaged, meeting our commitments to society and the environment to drive more beautiful changes in the world. TSMC participates in a variety of industry associations and public policy related non-profit 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]. With the impact brought by climate change and extreme weather, TSMC is not only committed to reaching net zero emissions by 2050 but also actively participates in international and domestic organizations for climate actions. Together with our supply chain partners, TSMC is committed to environmental sustainability. In 2021, TSMC participated in more than 80 industry associations and non-profit organizations at home and abroad, with expenditures of over NT$44.37 million[Note 3]. Total expenditures in the past five years (2017~2021) were about NT$147.82 million[Note 4].

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 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)
- Semiconductor Equipment and Materials International (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)
- Information Technology Industry Council (ITI)
- National Committee on United States-China Relations
- Greater Phoenix Chamber of Commerce

TSMC Chairman Dr. Mark Liu has served as Chairman of TSIA since 2019, and in 2021 chairs the World Semiconductor Council. 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, Senior Director Hsiao-Chin Tuan currently 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, and Director Dr. James Tu currently serves as chairperson of SEMI Taiwan's Cyber Security 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 Vice President Connie Ma currently serves as executive controller of The Allied Association for Science Park Industries. Chairman Dr. Mark Liu currently serves as director of CNAIC. Senior Vice President J.K. Lin currently serves as director of TEEMA. 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 171 to 197 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 encourages employees to fulfill their civic duty.

Note 3: The five largest membership fees paid or donations made by TSMC in 2021, in descending order, are:

1) Information Technology Industry Council (ITIC)/NT$11,174,800
   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$5,501,533
   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$4,472,800
   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) Taiwan Association for Net Zero Emissions/NT$2,400,000
   Responding to global climate change, TSMC and corporate partners who also cares about environmental sustainability jointly founded Taiwan Alliance for Net Zero Emission and Taiwan Association for Net Zero Emission to accelerate energy saving and carbon reduction in the enterprise sector and strive to achieve net zero greenhouse gas emissions.
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 non-profit organizations between 2017 and 2021 were NT$21,176,571, NT$21,735,668, NT$20,338,992, NT$40,197,059, and NT$44,367,769, respectively.

Note 5: In addition to the expenditures disclosed in Note 4, TSMC's government relations expenses in 2021 amounted to NT$39,191,979, with the primary expense being employee payroll. TSMC did not make any political donations in the reporting period. In the past five years (from 2017 to 2021), TSMC did not make any political donations or other spendings related to ballot measures or referendums.v



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, the Company 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
- 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 Taiwan Association for Trade Secrets Protection (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



Environmental Sustainability

Responding to climate change and mitigating climate impact to protect our shared global environment, TSMC 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. To achieve the commitment of Net Zero Emissions by 2050, TSMC mobilizes supply chain partners to reduce carbon footprint, creating a green supply chain for the semiconductor industry. TSMC participates in industry associations and non-profit organizations in the area of environmental sustainability including:

- Taiwan Alliance for Net Zero Emissions/Taiwan Association for Net Zero Emissions
- Taiwan Climate Partnership
- Taiwan Institute for Sustainable Energy/Taiwan Center for Corporate Sustainability
- Science and Technology in Society Forum
- RE100
- Business Council for Sustainable Development of Taiwan
- CommonWealth Sustainability Council

TSMC is among the first members of Taiwan Alliance for Net Zero Emissions, Taiwan Climate Partnership, and CommonWealth Sustainability Council. Senior Vice President J.K. Lin currently serves as vice chairman of Taiwan Association for Net Zero Emissions. Senior Vice President Lora Ho currently serves as director at the Taiwan Center for Corporate Sustainability.



Human Rights and Supply Chain Management

Respecting human rights and creating a respectful workplace are critical to TSMC and our suppliers. TSMC is a full member of the Responsible Business Alliance, and in addition to meeting the alliance's requirements in auditing suppliers, we have also asked our suppliers to strictly comply with local regulations to safeguard human rights. TSMC requires all suppliers to commit to the Assurance to Comply with TSMC's Code of Ethics and Business Conduct and in July 2021, TSMC issued a statement titled Supply Chain Partners Should Ensure Protection of Human Rights During the COVID-19 Pandemic 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

ESG Performance Summary

	Key Indicators	2019	2020	2021
Operational & Economics	Revenue (NT$ billion)	1,070	1,339	1,587
	Net income attributable to shareholders of the parent company (NT$ billion)	345	518	597
	Income tax expense (NT$ billion)	45	67	66
	Cash dividend (NT$ billion)	259	259	266
	R&D expenditures (NT$ billion)	91	109	125
	Capital expenditures (NT$ billion)	460	507	839
An Innovation Pioneer	R&D expenses to revenue (%)	8.5	8.2	7.9
	Global patents granted	39,118	45,162	50,506
	Registered trade secrets	88,000	100,000	120,000
	Value generated from improvement projects (NT$/ billion)	15	15	12
	Encourage all major local raw materials suppliers to participate in the Taiwan Continuous Improvement Competition (%)	100	79	64
	Encourage back-end packaging materials suppliers to participate in the Taiwan Continuous Improvement Competition (%)	-	46	67
	Local and back-end packaging materials suppliers that advanced to the finals of the Taiwan Continuous Improvement Award (%)	-	-	16
	New innovative testing methods for product quality and reliability	-	-	254
	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
	Develop analytical abilities for carcinogenic, mutagenic, and reprotoxic substances and assist the suppliers that supply materials with potential risks in developing such abilities (%)	83	100	100
	NMP replacement rate (%) (Base year: 2016)	38	59	75
	Ensure that manufacturing processes are free from PFASs with more than 4 carbon atoms	Replaced 86% of PFOA-related matters	Ensured that all 3nm process and beyond are free from PFASs with more than 4 carbon atoms	Selected PFHxA substitutes and launched production line testing
	Diversify facilities and assess new suppliers in compliance with the multi-source program (Base year: 2018)	56	70	109

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	Key Indicators	2019	2020	2021
A Responsible Purchaser	Tier 1 suppliers' completion rate of the Sustainability Management Self-Assessment Questionnaire (%)	100	100	100
	Critical suppliers' completion rate for receiving third-party audits (by RBA-certified auditing institutions) every three years (%)	102	40	60
	Total number of critical high-risk suppliers that have received audits for the S.H.A.R.P. Program	-	-	86
	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
	Total number of suppliers audited for due diligence in responsible mining	-	-	3
	Raw materials suppliers invited to observe the annual emergency response drill (Base year: 2016)	90	111	132
	Total number of suppliers that participated in the ESH training program (Base year: 2016)	411	558	759
	Critical high-risk suppliers that received safety and health support (%)	100	100	100
	Increase local sourcing of indirect raw materials (%)	59	60	60.4
	Increase local sourcing of parts and components (%)	50	45	46.4
	Total energy conserved by helping suppliers (GWh) (Base year: 2018)	0.97	2.1	3.4
	Total water conserved by helping suppliers (metric tons) (Base year: 2020)	-	2,130,000	19,710,000
	High-energy-consumption suppliers that have received ISO14064 certification for GHG emissions (%)	-	-	51
	Waste reduction in major waste-generating suppliers (%) (Base year: 2014)	28.5	29.4	31

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	Key Indicators	2019	2020	2021
A Practitioner of Green Power	Greenhouse gas emission (metric ton-CO_2 equivalent) (Scope 1 and Scope 2 market-based)	8,769,614	9,464,696	10,304,344
	Scope 1 (metric ton-CO_2 equivalent)[Note 1]	2,071,743	2,004,841	2,151,937
	Taiwan sites	1,678,754	1,710,677	1,808,427
	Subsidiaries[Note 2]	392,989	294,164	343,510
	Scope 2 (metric ton-CO_2 equivalent) (market-based)	6,697,872	7,459,856	8,152,497
	Taiwan sites	6,673,235	7,429,951	8,116,440
	Subsidiaries[Note 2]	24,637	29,905	36,057
	Scope 2 (metric ton-CO_2 equivalent) (location-based)	7,350,195	8,282,509	9,196,964
	Scope 3 (metric ton - CO_2 equivalent)[Note 3]	5,307,028	5,511,486	6,049,256
	Carbon offset (metric ton - CO_2 equivalent)	15,376	4,125	241,577
	Fluorinated greenhouse gas emission (metric ton - CO_2 equivalent)	1,081,212	1,311,530	1,369,478
	Reduction rate of GHG emissions per unit product compared to the base year (metric ton - CO_2 equivalent - 12-inch equivalent wafer mask layer) (%)	17	23	27
	Energy consumption (GWh) (including electricity, natural gas and diesel)	14,323	16,919	19,192
	Direct energy consumption (GWh) (including natural gas and diesel)	747	861	1,112
	Indirect energy consumption (GWh) (non-renewable energy)	12,658	14,828	16,409
	Indirect energy consumption (GWh) (renewable energy)	918	1,230	1,671
	Renewable energy used at all TSMC fab operation sites (%)	6.7	7.6	9.2
	Renewable energy used at overseas subsidiaries (%)	100	100	100

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	Key Indicators	2019	2020	2021
A Practitioner of Green Power	Total energy conserved from new energy saving measures since 2016 (GWh/y)	12	17	24
	Energy efficiency after volume production - 16nm technology	1.4 (5th year)	-	-
	Energy efficiency after volume production - 10nm & 7nm technology	0.7 (3rd year)	1.4 (4th year)	1.5 (5th year)
	Energy efficiency after volume production - 5nm technology	-	-	0.2 (2nd year)
	Days of production interrupted due to climate disasters	0	0	0
	NO_x emissions (metric tons)	116.67	170.36	205.57
	SO_x emissions (metric tons)	32.18	38.13	39.48
	VOC emissions (metric tons)	102.1	106.8	107.7
	Reduction in air pollutant emissions per unit of production (%)	30	45	54
	Reduction rate of volatile organic gases (%)	97.8	98.3	98.4
	Number of unusual events reported in air pollution prevention equipment	0	0	0
	ISO 14001 certified sites number	22	23	24
	ISO 14001 certified sites percentage (%)	100	100	100
	Water consumption (million metric tons)	64.3	77.3	82.8
	Taiwan sites	58	70.6	76.1
	Subsidiaries Note 2	6.3	6.7	6.7
	Process water recycling rate (%) Note 3	86.7	86.4	85.4
	Total water saving (million metric tons) Note 3	133.6	173	186.3

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	Key Indicators	2019	2020	2021
A Practitioner of Green Power	Ultra-pure water usage (million metric Tons)	90.1	102.4	109.5
	Tetramethylammonium hydroxide (TMAH)	7.9	6.3	5.5
	Copper ion (Cu^{2+})	0.09	0.07	0.07
	Reduction % in unit water consumption (liter/12-inch equivalent wafer mask layer) (Base year: 2010)	5.2	8.9	14.9
	% of water pollution composite indicator above effluent standards	43.8	42.4	42.5
	Waste generated (metric tons)	416,715	575,740	674,703
	General waste generated (metric tons)	219,584	277,340	335,080
	Taiwan sites	212,465	269,640	326,069
	Subsidiaries Note 2	7,119	7,700	9,011
	Hazardous waste generated	197,131	298,400	339,623
	Taiwan sites	183,015	280,635	319,763
	Subsidiaries Note 2	14,116	17,765	19,860
	Waste recycling rate (%)	96	95	95
	Taiwan sites	96	95	95
	Subsidiaries Note 2	74	77	85
	Outsourced unit waste disposal per wafer (kg/12-inch equivalent wafer mask layer)	0.89	1.01	0.99
	Develop multiple types of electronic-grade chemicals for resource recycling within TSMC - % of resource recycling within facilities	22	22	22
	Waste treatment vendors that have obtained ISO14001 or other international EHS Management certifications (%)	70	80	82

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	Key Indicators	2019	2020	2021
An Admired Employer	Numbers of employee	51,297	56,831	65,152
	Employee training hours	74,178	926,379	3,185,784
	Females in all employees (%)	37.8	37.1	35.4
	Females in management (%)	12.7	12.5	13
	Females in junior management (%)	13.6	13	13.4
	Females in top management (%)	11.1	10	8.3
	Females in newly hired technicial professionals (%)	-	-	21.3
	Turnover rate (%)	4.9	5.3	6.8
	New hire (< 1 year) turnover rate (%)	13.4	15.7	17.6
	Voluntary turnover rate (%)	4.8	5.1	6.7
	Total compensation amongst industry peers	Top 25%	Top 25%	Top 25%
	Management positions filled through internal promotions (%)	-	79.3	82.5
	Positions are filled through internal transfers (%)	50.8	45.2	57.6
	Employees are fully committed to their work (%)	-	96	-
	Employees are willing to continue working for TSMC in the next five years (%)	-	95	-
	Goals for the issue of sustainably engaged from the Engagement Survey in comparison to the WTW Global High Performance Norm	-	-	Top 25%
	Injury frequency rate [Note 4]	0.52	0.42	0.38
	Injury severity rate [Note 5]	9	4	7
	Occupational fatalities - employees	0	0	0

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	Key Indicators	2019	2020	2021
An Admired Employer	Occupational fatalities - contractors	0	0	0
	Incident rate per 1,000 employees	0.425	0.311	0.252
	Cases of occupational disorders caused by exposure to chemicals	0	0	0
	Contractors that have obtained ISO 45001 certification for occupational safety and health management system with help from TSMC (%)	50	60	65
Power to Change Society	Total participants in youth competitions	-	1,551	1,614
	Promotional events on semiconductor sciences	-	5	6
	Sponsor outstanding local artists or groups	7	Suspended due to COVID-19	12
	Hours in reading services	8,400	5,060	4,910
	Annual cash donations to the disadvantaged (NT$ million)	13.21	12.1	22.63
	Children in remote areas that have benefited from TSMC programs	1,400	3,279	5,287
	Service visits to seniors living alone by Network of Compassion	9,527	10,855	15,719
	Meals delivered by Network of Compassion	-	-	304,477
	Promote filial piety education	37	57	64
	Annual beneficiaries of the Cherish Food Program	21,791	37,071	58,862
	Volunteer service from environmental protection volunteers	770	1,044	794

Note: Figures from all Taiwan fabs and subsidiaries of TSMC

Note 1: To ensure consistent data in GHG inventory and reduction goals after 2020, inventory data for Scope 1 will comply with the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gases Inventories starting from 2020 and the base year also change from 2010 to 2020

Note 2: The scope of subsidiaries in Environmental parts includes WaferTech, TSMC China Company Limited, TSMC Nanjing Company Limited and VisEra

Note 3: Figures from all Taiwan fabs of TSMC

Note 4: 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 (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 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 5: 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 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

Independent Third Party Assurance Statement

DNV

Independent assurance statement

Scope and approach

Taiwan Semiconductor Manufacturing Company Ltd. ('TSMC' or 'the Company') commissioned DNV Business Assurance Co. Ltd. ("DNV") to undertake independent assurance of the 2021 Sustainability Report (the "Report") for the year ended 31 December 2021.

We performed our work using DNV's assurance methodology VeriSustain™[1], 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 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 performance data using the reliability principle together with TSMC data protocols for how the data are measured, recorded and reported. The performance 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.

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.

Responsibilities of the Directors of TSMC and of the assurance providers

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, 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.

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 sustainabiilty issues that could affect TSMC and are of interest to stakeholders;
- Review of TSMC approach to stakeholder engagement and recent outputs;

[1] The VeriSustain protocol is available on dnv.com

DNV

- 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 energy, air emission, water resource, chemical and waste management), human resource, safety, purchasement, wellness, human resource, product development, information security, intellectual property, business secret and TSMC cultural and educational foundation were chosen to interview;
- Site visits to HQ in Taiwan, remoting meeting with other production sites, one of them is in China, to review process and systems for preparing site level sustainability data and implementation of sustainability strategy. Sites chosen were 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;
- Review of the processes for gathering and consolidating the specified performance data and, for a sample, checking the data consolidation. Where financial data had been checked by another third party, and, where data of scope 1, 2 and 3 of Green House Gases Emission has been verified by DNV, we tested transposition from these sources to the report; Where relevant data and information has been generated from a certified management system note which data and management system certification and that this was considered;
- An independent assessment of TSMC's reporting against the Global Reporting Initiative (GRI) Standards (Comprehensive Option).
- There was a confidential issue that we cannot assess the salary data. The verification was conducted based only on the Chinese version Report.

Opinion

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.

TSMC has developed its own data management system for capturing and reporting its ESG performances. In accordance with DNV VeriSustain Protocol requirements for a moderate / limited level assurance engagement, we conclude that no systematic errors were detected which causes us to believe that the specified sustainability data and information presented in the Report is not reliable.

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.

- To publish theme report on special ESG field can be considered for enhancing the efficiency and result of communication with stakeholders widely.
- To enhance the performances disclosure of human right policy implementation and demonstrate the Due Diligence on human right topic.
- It is suggestion to improve the process of supply chain data verification to increase the accuracy of information that suppliers provided.

Sustainability Context
Sustainability 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.

DNV

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 "Comprehensive option". 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.

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 significant ESG issues identified through this process are reflected in the Report.

Responsiveness:

TSMC 2021 Sustainability Report meets the content requirements of the GRI Standards. 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.

Neutrality

The disclosures related to sustainability issues and performances are reported in a neutral tone, in terms of content and presentation, however Report could further bring out responses related to the challenges faced during the reporting period at various geographical locations of operations in terms of disclosure of all identified material aspects, sustainability goals and targets etc.

For and on behalf of DNV Taiwan
28 Apr, 2022

Wu, Johnny
Lead Verifier
Business Assurance
DNV Taiwan

David Hsieh
District Manager,
Business Assurance
DNV Taiwan

Statement Number: C522939-2921-DNV-TWN

Contact Information

Taiwan Facilities

Wafer Fabs

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