



TSMC 2020
Corporate Social
Responsibility Report



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Building a Mountain of Common Good

An infinite planet where all beings thrive.

TSMC is committed to responsible management.
Innovation and sustainability are our guiding principles
as we strive to build a world of inclusion and common good
from our sphere of IC chips and wafers.

In our pursuit for common good, we have made
solid strides with employees, customers, suppliers, investors,
and society to scale insurmountable peaks and to strive for better.

We galvanize all positive energy
for sustainable management and shared prosperity.
Join us. Let us create common good
and ascend towards a sustainable future of
infinite possibilities.



Letter from the ESG Steering Committee Chairperson

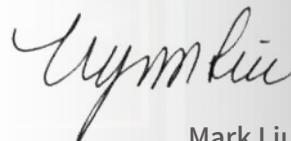
2020 was an extremely challenging year as the world experienced social and economic upheaval brought by the COVID-19 pandemic, and natural disasters occurring under extreme climate conditions left us with a deep impression of the threat and impact of climate change on humanity. The importance of ESG (Environmental, Social, and Governance) is gradually becoming a global consensus. As a responsible corporate citizen, TSMC endeavors to respond to climate change and mitigate climate impact to protect our shared global environment. In addition to signing the world's largest renewable energy purchase agreement in 2020, we further committed to using 100% renewable energy for global operations before 2050, becoming the world's first semiconductor company to join the RE100 initiative.

Over the years, TSMC has held its vision of uplifting society. We not only focus on our core business to unleash innovation with groundbreaking thinkers around the world, but also have systematically charted a long-term strategic direction for our ESG. The ESG Steering Committee serves as the center for the highest level of ESG decision-making. With myself serving as Chairperson, the ESG Steering Committee works with senior TSMC executives in a variety of fields to link the United Nations' Sustainable Development Goals (SDGs) with the Company's core competitive advantages. Our five focal points are Green Manufacturing, Responsible Supply Chain, Diverse & Inclusive Workplace, Talent Development, and Caring for the Disadvantaged. In 2020, the ESG Steering Committee pursued its goal of sustainable development and explored international ESG trends, evaluation standards, and corporate best practices. At the same time, it set TSMC's long-term ESG goals, strategies, and public declarations and took a fresh look at how we execute them. We also launched TSMC's first internal [CSR Award](#) to

encourage our colleagues to think creatively and participate actively to bring many innovative projects to life.

In addition, under the approval and supervision of the ESG Steering Committee, in 2020 TSMC brought its unique set of professional know-how and resources to support the global fight against the COVID-19 pandemic. In addition to keeping our colleagues healthy and safe and maintaining normal operations, we also provided needed support to society. We budgeted US\$20 million to provide for the communities where we operate, including Taiwan, China, Japan, Europe, the United States, and other areas in urgent need of resources, playing our role as a corporate citizen through tangible action.

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. Starting from our core business, we set goals for execution, evaluate action plans, and maintain positive interactions with our stakeholders to continue creating value. In addition, I would like to extend my thanks to everyone in the Company. It is only because of everyone's enthusiastic cooperation and persistence that we can continue to improve, grow stronger, and further meet our commitments to society and the environment to drive beautiful changes in society.



Mark Liu

Chairman and ESG Steering Committee Chairperson





Letter from the ESG Committee Chairperson

In 2020, the world was ravaged by the COVID -19 pandemic. TSMC took comprehensive disease prevention measures to ensure that operations could continue at wafer fabs around the world and went on to realize 11,617 product innovations for our customers. With innovative technologies, people are able to work and learn remotely. To reduce contact and gatherings, people can use AR/MR technologies to replace business trips, and smart robots to replace manual labor for delivering resources. TSMC stands in solidarity with everyone enduring this challenging time, and we strive to contribute to the health and welfare of the world.

During this time, we also worked with stakeholders to continue realizing our Five Major ESG directions as we resolutely progressed towards the UN's Sustainable Development Goals. In terms of Green Manufacturing, TSMC is actively using renewable energies, implementing 460 energy-saving measures, and introducing new generations of energy-efficient equipment. External research results have shown that we save 4GWh of energy for every 1 GWh of energy used by TSMC for the production of end products for customers. By increasing our energy efficiency, we are able to mitigate the impact of climate change.

In regards to Building a Responsible Supply Chain, TSMC was able to drive NT\$1.7 trillion in output value among related industries in 2020. Each TSMC employee creates, on average, 6.4 job opportunities in Taiwan. We shoulder the responsibility that comes with being an industry leader and have established Supply Online 360, a management platform for a sustainable supply chain, as well as the TSMC Supplier Sustainability Academy. To extend the high standards applied to TSMC Operations and Green Manufacturing, we have also asked suppliers to conduct EP&L assessment and carbon footprint verification, as well as set and strive for energy and water conservation goals.

In order to Create a Diverse & Inclusive Workplace, TSMC expanded our Human Rights Policy's scope of management to support employee and company growth on the basis of a healthy work-life balance. Investments into Talent Development include the expanded Semiconductor Program and IC Design Program. We are also providing resources through university research centers and industry-academia programs to foster generations of semiconductor professionals. Lastly, when it comes to Caring for the Disadvantaged, TSMC continues to support global prevention and treatment efforts against COVID -19 through the TSMC Education and Culture Foundation and the TSMC Charity Foundation; we have also galvanized efforts from subsidiaries around the world to contribute to the common good.

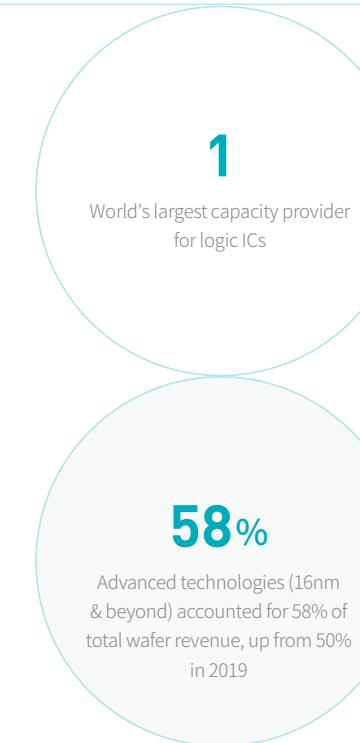
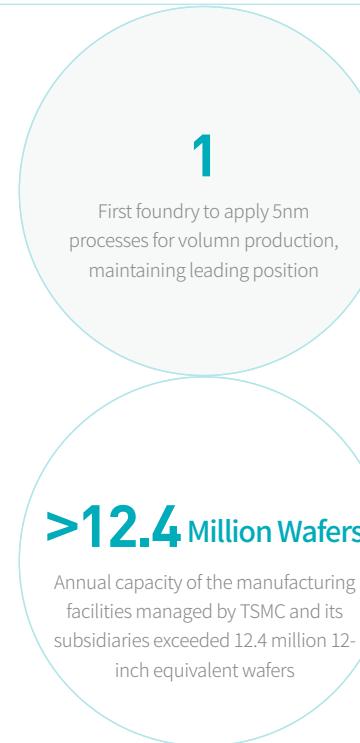
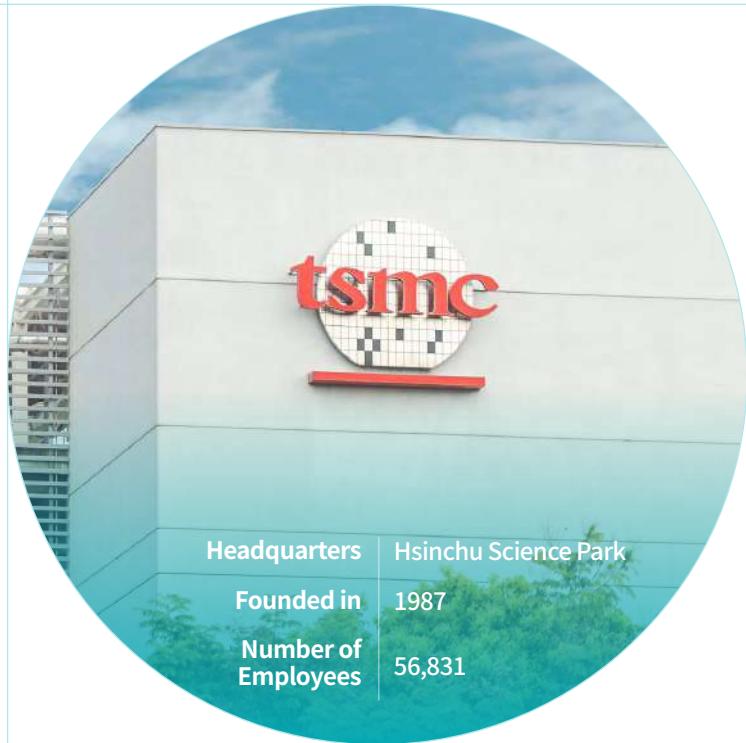
TSMC has taken tangible action to support the global sustainability movement, and we are the only semiconductor company in the world to be selected into the Dow Jones Sustainability Index (DJSI) for 20 consecutive years. As we look to our future, we will stay true to our unwavering commitment to responsible operations. We hope that every TSMC colleague stands firm at their post and continues to bring positive changes to our world.

Lora Ho

Senior Vice President and ESG Committee Chairperson

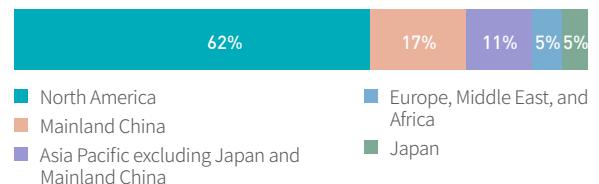


About TSMC

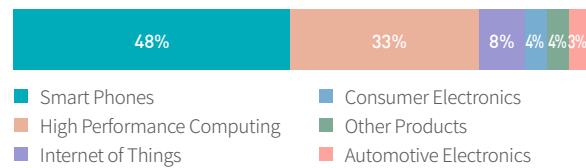


As COVID-19 ravages nations and introduces instability and tense geopolitical situations, TSMC is more committed than ever to using innovation for greater social welfare. Based on our trinity of strengths that includes technology leadership, manufacturing excellence, and customer trust, our mission is to be the trusted technology and capacity provider of the global logic IC industry for years to come. In 2020, TSMC's consolidated revenue reached NT\$1,339.3 billion, setting a new record for 11 consecutive years. While we continue to strive for greater business milestones, we also aim to develop strong relationships with stakeholders such as employees, shareholders, customers, and suppliers in order to fulfill our responsibilities as a corporate citizen. We will continue dedicating ourselves to environmental protection, society, and corporate governance to create common value for a sustainable future.

Revenue Percentage by Customer HQ Location



Revenue Percentage by Product Platform



TSMC Value



Customer Products/ Applications

Make Communication More Efficient and Work, Play, and Learn Anytime and Anywhere

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

Enable 5G, AI, Cloud, and Data Center Applications to Process Vast Amounts of Data and Information Anywhere and Anytime

- Central Processing Units (CPUs)
 - Graphics Processing Units (GPUs)
 - Field Programmable Gate Arrays (FPGAs)
 - AI Machine Learning Processors
 - High-speed Networking Chips, etc.

Empower Wearables, Smart Homes, Smart Cities, and Industry 4.0 Applications

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

Make Vehicles, Including Hybrid and Electrical Cars, Safer, Smarter and Greener

- Supercomputer Capabilities for Every Car
 - Microcontroller Unit (MCU)
 - Baseband
 - RF Transceivers
 - Wireless Local Area Networks (WLAN)
 - CMOS Image Sensors (CIS)
 - Near Field Communication (NFC)
 - Bluetooth
 - Embedded Flash Memory
 - Power Management ICs, etc.

Empower AI-enabled Smart Devices

- Microcontroller Unit (MCU)
 - Baseband
 - RF Transceivers
 - Wireless Local Area Networks (WLAN)
 - CMOS Image Sensors (CIS)
 - Near Field Communication (NFC)
 - Bluetooth
 - Embedded Flash Memory
 - Power Management ICs
 - Timing Controller (T-CON)
 - Other Applications for Smart 8K/4K Digital TV (DTV)
 - 4K Streaming Set-top Box (STB)
 - AI-embedded Smart Camera, etc.

Technology Platforms



 High Performance Computing



Internet of Things (IoT)



Automotive



Digital Consumer Electronics



Sustainability at TSMC

26%
Unleashing innovation by investing US\$ 3.72 billion, a 26% increase from 2020, into R&D

99%
Patent approval rate in the U.S., better than any other top 10 patent holder

27%
Increase in volunteers

>1 Million Participants

Over one million participants received employee training and total expense exceeded NT\$95 million

100 %
100% renewable energy consumption in TSMC offices in Taiwan and overseas locations; achieved net zero emissions for global offices through carbon credits

46%
Reduced air pollutant emissions per unit product by 46% since 2015, reaching the 2030 SDG ahead of schedule

1
Leading the world in volume production of 5nm process technology

64.7%
Total shareholder return

1.32 Billion
Invested into social engagement (NT\$)

1.8 Million
In 2020, the average overall salary of a TSMC new engineer with a master's degree is more than NT\$1.8 million. The average overall salary of direct employees is higher than NT\$1 million, which is 4 times of the minimum wage in Taiwan

1
First semiconductor company in the world to join RE100

95%
Reached 95% waste recycling rate for six consecutive years and only <1% of waste has been sent to landfills for 11 consecutive years

14.2 Trillion
Market capitalization (NT\$)

73,786
Beneficiaries of social engagement

1
Built the world's first water reclamation plant for industrial effluents

Economy

Society

Environment

Awards, Recognitions and Ratings

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



Dow Jones Sustainability World Index for the 20th Consecutive Year
Dow Jones Sustainability Emerging Markets Index

The Sustainability Yearbook 2020 Rankings – S&P Global Gold Class

2020 Climate Change A List – A-
2020 Water Security A List – A

RE100 Leadership Awards 2020 – Most Impactful Pioneer

"Prime" Rated by ISS ESG Corporate Rating

MSCI ACWI ESG Leaders Index Component
MSCI ESG Research – AAA Ratings
MSCI ACWI SRI Index Component
MSCI Emerging Markets ESG Leaders Index

FTSE4Good Emerging Index Component
FTSE4Good All-world Index Component
FTSE4Good TIP Taiwan ESG Index Component

SDG 2000 – The 2,000 Most Influential Companies

Sustainalytics

Corporate Knights

Corporate Knights & As You Sow

Alliance for Water Stewardship (AWS)

Institute of Electrical and Electronics Engineers (IEEE)

Wall Street Journal

FORTUNE

Forbes

Institutional Investor Magazine

Taiwan Stock Exchange

Taiwan Institute of Sustainable Energy

CommonWealth Magazine

Cheers Magazine

"Top-Rated" ESG Company within the Semiconductor Industry

2020 Global 100 Most Sustainable Corporations

2020 Carbon Clean 200TM List – 1st Place

"Platinum" Class Certification – Fab 15A, Fab 15B

2021 IEEE Corporate Innovation Award

The 100 Most Sustainably Managed Companies in the World

2020 World's Most Admired Companies

The World's Best Employers 2020

Most Honored Company (Technology/Semiconductors) – All-Asia
Best ESG (Technology/Semiconductors) – 1st Place (Buy-side and Sell-side) – All-Asia

Top 5% in Corporate Governance Evaluation of Listed Companies for the 6th Consecutive Year

The Most Prestigious Sustainability Awards – Top Ten Domestic Corporates for the 5th Consecutive Year

Taiwan Top 50 Corporate Responsibility Report Awards – Electronic Information Manufacturing – Platinum Award

English Report – Platinum Award
Sustainable Water Management Award
Climate Leadership Award
Supply Chain Management Award

Corporate Social Responsibility Award – Large Cap – 1st Place

Ranked No.1 in Top 10 Most Admired Companies to Young Generations

ESG Feature Stories

Sustainable Products by TSMC Facilitates Global Energy Conservation

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TSMC Supplier Sustainability Academy Shares Free Learning Resources

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First Automated Handling System for Wafer Warehouses in the World

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TSMC Semiconductor Programs Cultivate Next-generation Talent

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Aiding Global Prevention & Treatment Efforts against COVID-19

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Sustainable Products by TSMC Facilitates Global Energy Conservation

TSMC believes in thorough green innovation. Internally, we are striving for clean production in all fabs, implementing 460 energy-saving measures and conserving 500 GWh in 2020. Externally, we are leading the world in high-performance, energy-saving semiconductor technologies that enable customers to deliver energy-efficient products. Calculations using the Industry, Science, and Technology International Strategy Center's [model](#) reveal that, in 2020, TSMC helped the world conserve 4 kWh of energy for each 1 kWh spent in production - a testimony to TSMC's commitment to green manufacturing both internally and externally.

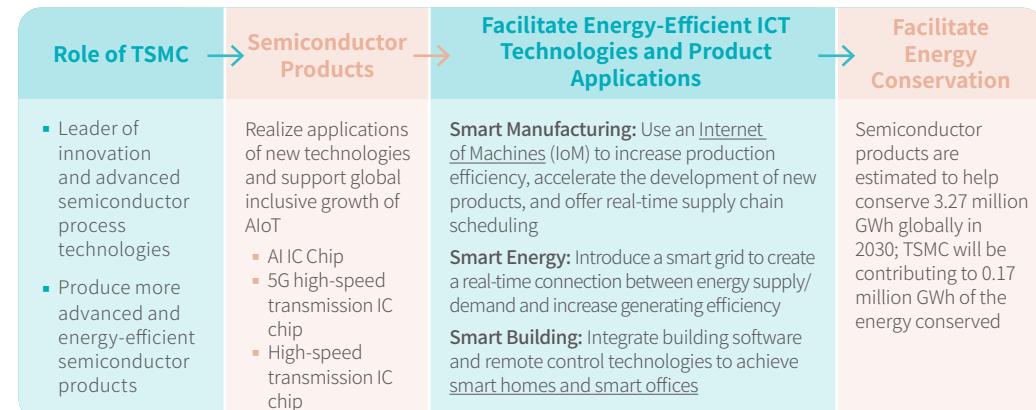
Referring to research results from the American Council for an Energy-Efficient Economy (ACEEE), the ISTI discovered that the link between economic growth and increasing energy consumption can be decoupled with the introduction of electronic products and smart product applications. The adoption of Information and Communication Technology (ICT) can also add value to industry productivity, increasing output for the same amount of resource input (energy, etc.). Upon further analysis, it was discovered that [electronic products](#) using semiconductors at its core can help conserve 10.7% of global energy (equivalent to 3.27 million GWh) in 2030. Considering the semiconductor/

electronic product ratio and TSMC market share, TSMC products produced for customers will conserve 0.17 million GWh in 2030, which is four times the energy consumed during production. With the help of research development that has introduced ways to make products and processes more energy efficient, TSMC continues to realize increasingly energy-efficient ICT applications and thereby assists other industries and communities with energy conservation.

Each 1 kWh devoted to production conserves 4 kWh for the world



TSMC Contributions to Global Energy Conservation



TSMC is dedicated to maintaining its technology leadership and strives to reduce energy consumption during the production process for the advancement of semiconductor innovation, various smart applications of electronic products, and energy conservation on a global scale.

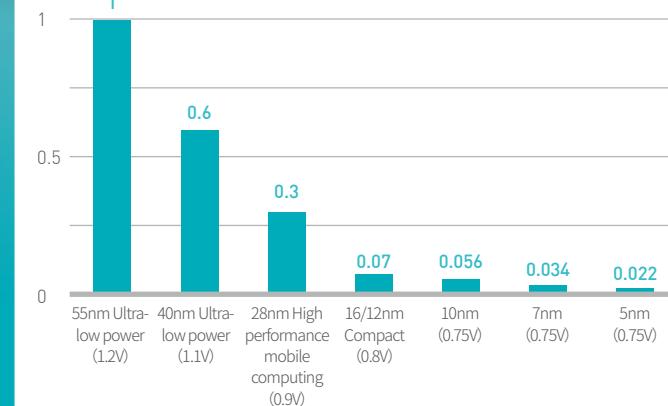
Stephen Su

Vice President and General Director at ITRI Industry, Science and Technology International Strategy Center (ISTI), and Director of AI Applications Strategy Office

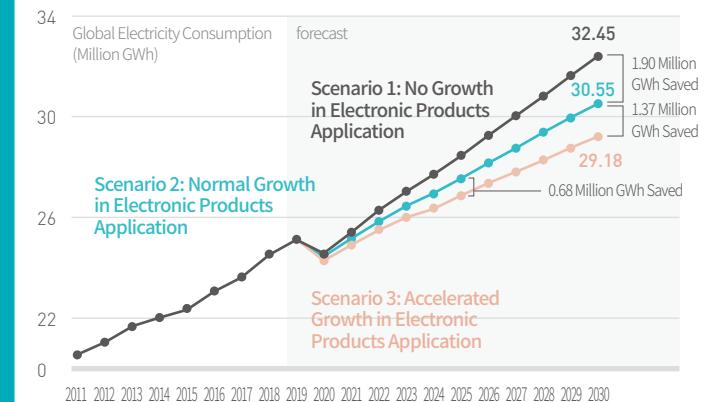


TSMC continues to lead the world in high-performance energy-saving semiconductor technologies, helping customers produce energy-efficient end products.

Energy Consumption per Unit Product by TSMC Process Technology Note



Global Energy Consumption Simulation



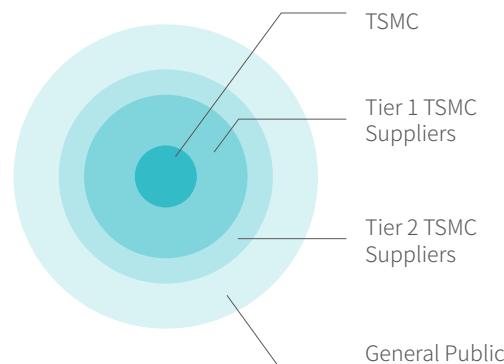


TSMC Supplier Sustainability Academy Shares Free Learning Resources

TSMC has a massive supply chain that spans across the world and the Company is always thinking of management directives to strengthen the capability and resilience of its supply chain and extend its influence to upstream suppliers of its own suppliers. In 2020, the Company founded the [TSMC Supplier Sustainability Academy](#) and started creating and sharing online courses and management tools for free. By designating compulsory courses and tracking training status, the Company was able to

ensure that tier 1 suppliers continued to improve their sustainability management capabilities and help supplier employees understand their labor rights. TSMC hopes that this can effectively raise labor rights awareness across the supply chain and help supplier employees protect themselves. Meanwhile, the Company has made the TSMC Supplier Sustainability Academy available to tier 2 suppliers (suppliers of TSMC's suppliers) and the general public upon registration.

Scope of Influence of TSMC Supplier Sustainability Academy



As a supplier, we felt that the establishment of the TSMC Supplier Sustainability Academy not only encourages us to make progress but also provides corresponding resources to help the supply chain work together for common good.

Andrew Chang

General Manager of Taiwan Speciality Chemicals Corporation

100%
of tier 1 suppliers have
completed trainings



TSMC Supplier Sustainability Academy Steering Committee Chairperson and Curriculum Blueprint

The first courses launched for the TSMC Supplier Sustainability Academy revolved around the [TSMC Supplier Code of Conduct](#). There were [five interactive, compulsory courses](#) on labor, safety and health, environmental protection, and ethics. Each course was designed to contain an exam upon completion to ensure the quality of learning. All tier 1 suppliers are asked to complete 100% of the training in 2021. As the curriculum required integration of internal resources, the Material Supply Chain Management Section convened a TSMC Supplier Sustainability Academy Steering Committee, organizing 7 major courses across the organization. With the online learning platform, the Company will continue to advance supplier capabilities in operations and quality management to further deepen its sustainability impact.



TSMC Supplier Sustainability Academy Management Platform

- Convene working meetings every two quarters to: (1) formulate the curriculum program, (2) integrate inter-organizational resources, and (3) continue perfecting the program
- Report annual progress and work plans to the Dean and Steering Committee Chairperson every year

Dean of the TSMC Supplier Sustainability Academy
Head of supply chain management

TSMC Supplier Sustainability Academy Steering Committee Chairperson
Appointed by head of supply chain management

Supply Chain Management Curriculum Committee

Appointed by department heads of Materials Management & Risk Management, Corporate Environmental Protection, Safety, and Health, Quality and Reliability, Intelligent Engineering Center, Corporate Information Security, Legal & Regulatory Compliance, and ESG

Environmental Protection Curriculum Committee

Occupational Safety and Health Curriculum Committee

Regulatory Compliance Curriculum Committee

Quality Control Curriculum Committee

Information Security Curriculum Committee

ESG Curriculum Committee



First Automated Handling System for Wafer Warehouses in the World



TSMC is always looking to implement applicable international standards. Since implementing the Electronic Human Factors System, the Company has continued to identify workplace hazards and conduct risk assessment and control for the uncovering, analysis, and elimination of occupational hazards. TSMC strives to create a healthy and safe workplace for our employees. In 2020, to effectively reduce ergonomic hazards from long-term, repetitive operations that warehouse employees must endure, TSMC has developed the world's first Automated Handling System for Wafer Warehouses. The system has been officially launched at Fab 18A and is being introduced to Fab 14A. It can effectively reduce 95% of the load for warehouse employees per person/per

day. By the end of 2022, the system will be gradually introduced into all of the 12-inch GIGAFAB® Facilities in Taiwan.

TSMC Grows With Employees: Transforming Power to Brainpower with On-the-job Training

Wafers, a raw material that is required for TSMC production, is delivered to our loading docks every day by suppliers. TSMC warehouse employees will then take out the packaged wafers, place them on a conveyor belt, and transport it to the clean room for production. To build a safer workplace and optimize efficiency of daily operational processes, TSMC has launched a Human Factor Engineering-Wafer Warehouse

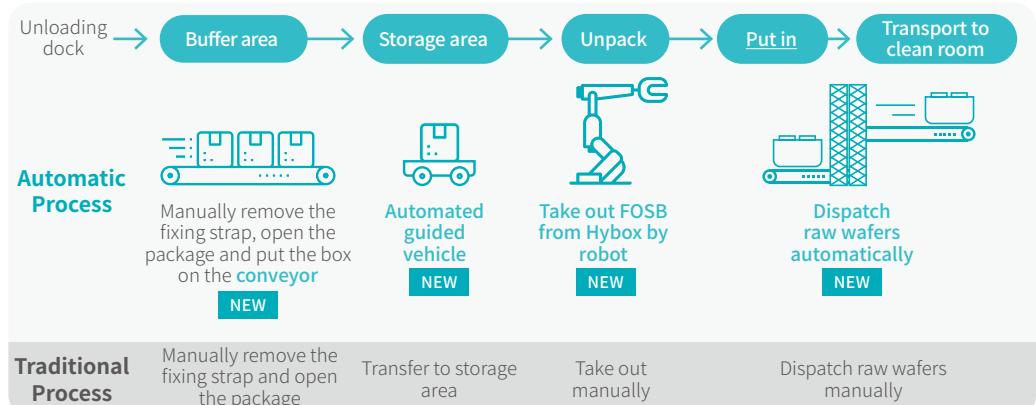
Automation project where we install an Automated Handling Systems for Wafer Warehouses and reduced the handling load for each warehouse employee by 1.8 metric tons per day. With the introduction of the automated system, the Material Supply Chain Management Section will be adjusting job duties and offering on-the-job trainings to warehouse employees. Employees originally working in loading will now be channeled into supply chain management, process integration, and other more technical duties to help the employee grow with the Company.

Reduced 95%
manual handling
load for employees

95%



TSMC Automated Handling System for Wafer Warehouses



Robotic arm places wafer cassettes onto conveyor belt and into the warehouse.

Roll-out Schedule for the TSMC Automated Handling System for Wafer Warehouses

2018

- Q1: Feasibility study for the Automated Handling System for Wafer Warehouses
- Q2: System design
Space planning for system implementation in new facilities
- Q3: Standardized design for packaging specs (NEW)

2019

- Q1: System prototype testing
- Q4: Fab 18A implementation completed

2020

- Q1: Fab 18A System launch
- Q3: Fab 14A System implementation

2021

- Q1: Fab 15A System implementation
- Q3: Fab 18B System implementation
Fab 14B System implementation
- Q4: Fab 12B System implementation

2022

- Q1: Fab 15A System implementation
- Q2: Fab 15B System implementation



ESG Directions

Talent Development

TSMC Semiconductor Programs Cultivate Next-generation Talent



TSMC launched a series of semiconductor programs in partnership with six universities in Taiwan to raise the competencies of semiconductor talents in Taiwan. The programs bridge students to industry trends and development so that they can effectively apply their academic knowledge to the development of advanced semiconductor process technologies that are increasingly complex. Jointly developed by TSMC experts in various fields and partnering university professors, the courses focus on three aspects, [Device/Integration](#), [Process/Module](#), and [Equipment Engineering](#). Each program covers 20

to 40 courses on specific subjects planned by a curriculum development committee consisting of TSMC executives who also teach classes to bridge the gap between academia and industry and to equip students with core knowledge and competencies required for semiconductor talents in advance. As of 2020, a total of 650 students have enrolled in TSMC's semiconductor programs as elective courses.

Partnership with **6**
universities



The semiconductor programs also provide students with internship opportunities and job interviews. Differentiated compensation packages are offered to proactive and outstanding students as an incentive to join the semiconductor industry. The program is expected to include 10 universities by 2024, which will bring up the number of student beneficiaries to 1,800. The three primary course themes will also extend to five areas of expertise to cover IC design and intelligent manufacturing. Amid global competition and challenges, the program will be a consistent effort to enhance industry competitiveness in Taiwan in the long run.

TSMC Semiconductor Programs at Taiwan Local Universities

Schools\ Track	Device/ Integration	Process/ Module	Equipment Engineering
National Tsing Hua University	✓	✓	
National Taiwan University NEW	✓	✓	
National Yang Ming Chiao Tung University NEW	✓	✓	✓
National Cheng Kung University NEW	✓	✓	✓
National Taiwan University of Science and Technology NEW			✓
National Taipei University of Technology NEW			✓

Most of the students are not quite clear about which courses will be helpful for their future career. TSMC's semiconductor programs provide a comprehensive framework to help students better understand the connection between courses and the practices. The programs also provide students with necessary knowledge and competitiveness in the semiconductor field to accelerate the learning curve after joining the workforce.

Chih Chen

Department Chair of Material Science and Engineering, National Yang Ming Chiao Tung University

Semiconductor programs are like a precious book. It helps me to start studying related courses as well as to prepare myself with the necessary knowledge and ability earlier, so that I can get ready for either doing research or joining the industry.

Shi-Chih Yang

Student at Department of Material Science and Engineering, National Yang Ming Chiao Tung University



TSMC launched a series of semiconductor programs in partnership with six universities in Taiwan.



ESG Directions

Caring for the Disadvantaged

Aiding Global Prevention & Treatment Efforts against COVID-19

In 2020, TSMC budgeted US\$20 million to join global efforts against COVID-19 and also brought its unique set of professional know-how and resources in global procurement and supply chain management to provide support for in-need medical or educational institutes in locations where the Company operates.

US\$20 Million

Allocated to support
COVID-19 relief efforts



Equipment Donations to Sustain the Health System

In Taiwan, the TSMC Charity Foundation supplied powered air-purifying respirators (PAPR) to medical centers to reduce risk of infection among frontline medical workers; the TSMC Education and Culture Foundation donated infrared cameras to the Ministry of Education which would be used in national entrance exams, etc. to protect the safety of our students.

Globally, TSMC North America donated sufficient supplies of critical personal protective equipment

and ventilators to local public health agencies, and its donation efforts also assisted in supporting the County's Field Respite Center established for quarantined COVID-19 patients. It also provided relief to vulnerable communities with immediate food, shelter and medical aid. TSMC Europe donated personal protective equipment, respirators, and other ICU equipment to medical centers across Europe; and also took advantage of its supply chain and logistics management resources to accelerate the delivery of medical supplies and equipment. In Asia, TSMC (Nanjing) donated protective clothing, goggles, gloves, and other necessities to community health centers; and computers to local schools and after-school care centers to ensure that students will be able to have unlimited access to online learning resources despite the pandemic. TSMC Japan collaborated with local governments to donate supplies to support COVID-19 prevention and treatment efforts.

Support for Research on Vaccines and Medical Equipment to Protect Developing Nations

Throughout the pandemic, TSMC also supported

medical research on COVID-19 diagnosis, vaccine, and treatment by the Foundation for the National Institutes of Health (FNIH) and funded UC Berkeley's successful research in converting low-cost positive-pressure ventilators into expensive ventilators needed to treat critically ill COVID-19 patients. The research was able to cushion the impact of the global medical equipment shortage.

We appreciate TSMC's generosity. Its efforts allowed the PreVENT team to design, manufacture, and deliver around 1,000 ventilators to developing nations. This helped physicians save lives during the COVID-19 peak last summer. I believe this is an outstanding example of industry-academia collaboration.

Tsu-Jae King Liu

Dean and Roy W. Carlson Professor of Engineering at the UC Berkeley College of Engineering



Top: The Hospital Quirónsalud Toledo in Spain receiving ventilators donated by TSMC.
Middle: Sophie Chang, TSMC Charity Foundation Chairperson, helping medical workers with PAPRs.
Bottom: TSMC employees around the world working together to support COVID-19 relief efforts.

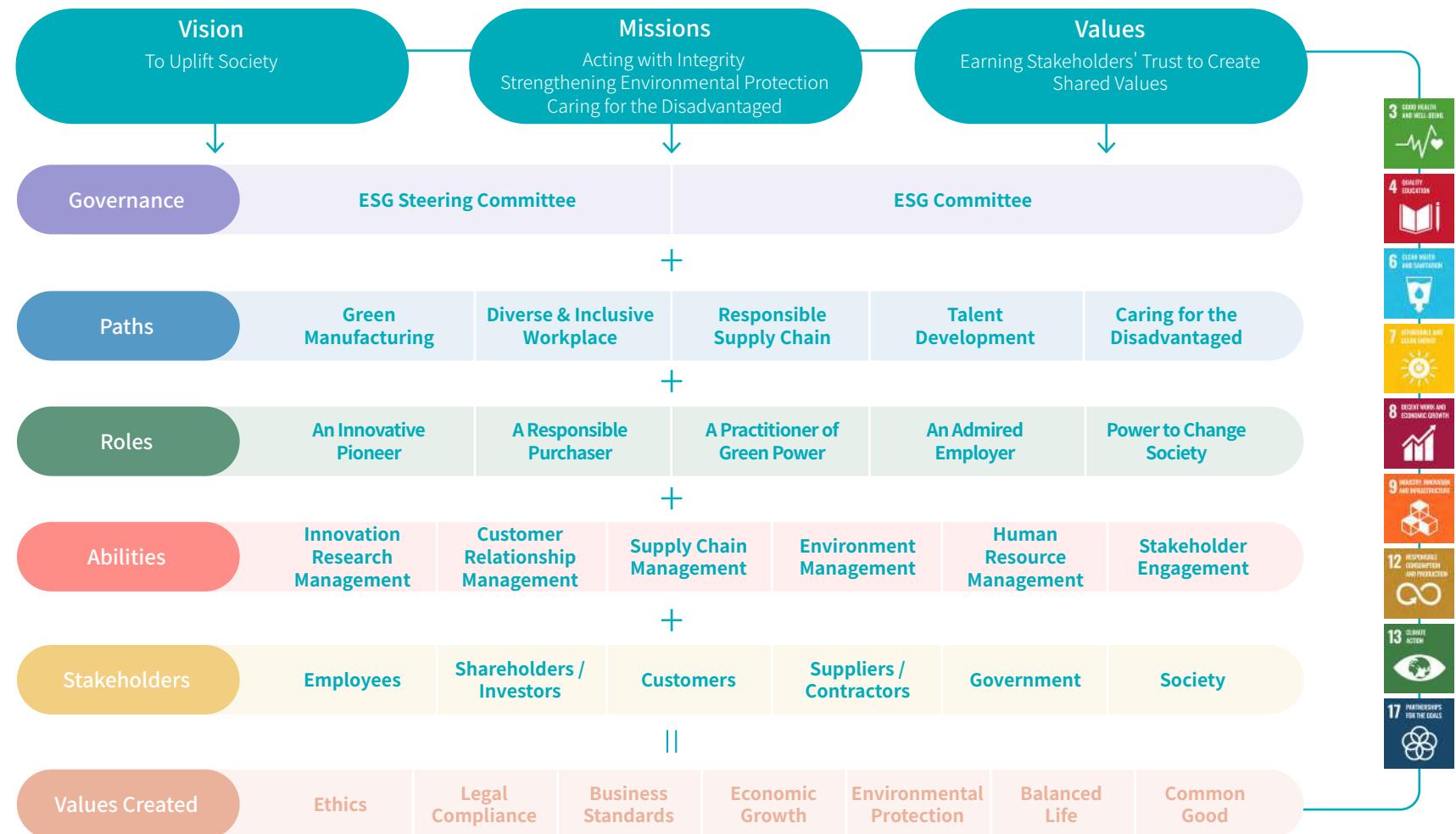
The background image is a scenic photograph of a waterfall, likely Skogafoss in Iceland, set against a backdrop of lush green hills and a bright, partially obscured sun.

Sustainable Business Practices

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ESG Implementation Framework

TSMC's [ESG Policy](#) is the top guiding principle for our sustainable development. The TSMC ESG Matrix set by TSMC's Founder, Dr. Morris Chang, clearly defines TSMC's ESG scope. In response to the vision of "Uplifting Society", TSMC implements sustainability governance effectively in its core business of dedicated IC foundry services through the ESG Implementation Framework. TSMC actively develops positive relationships with all stakeholders, including employees, shareholders/ investors, customers, suppliers/ contractors, and society to create shared value and pursue a sustainable future.





ESG Management Platform

In compliance with the vision and mission of the [TSMC ESG Policy](#), TSMC is fulfilling its responsibility as a corporate citizen and has established the ESG Steering Committee^{Note}, the highest level ESG decision-making center. TSMC's Chairman chairs the ESG Steering Committee and the ESG Committee chair acts as the executive secretary. Senior executives from various functions work alongside the two committee chairs to evaluate the Company's core operational capacity, establish mid-to-long term ESG goals, and align UN SDGs with the Company's core advantages for a development blueprint.



Note: The CSR Executive Committee was renamed as the ESG Executive Committee in March 2021; the CSR Committee was renamed as the ESG Committee at the same time.



Dr. Y.J. Mii
Senior Vice President,
Research &
Development



Dr. Kevin Zhang
Senior Vice President,
Business
Development



Dr. Jun He
Vice President,
Quality and
Reliability



Lora Ho
Senior Vice
President,
Europe & Asia
Sales



J.K. Lin
Senior Vice President,
Information Technology
and Materials
Management & Risk
Management

“ 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.

“ TSMC cultivates semiconductor talent and create an innovative workplace. We encourage colleagues to tackle the challenges before them and develop world-leading semiconductor technologies to help customers enable their innovation and usher the world into a better future.

“ TSMC strives for sustainable management and, in the spirit of shared prosperity, we strike close partnerships with customers and suppliers to pursue excellence, while maintaining the quality of our responsible supply chain through high levels of innovation.

“ Suppliers are important partners to TSMC on the road to sustainable management. We hope to build a responsible supply chain through raising ESG standards across the supply chain and drive positive change through the Supply Online 360, an online management platform for a global sustainable supply chain, as well as the TSMC Supplier Sustainability Academy.



2020 ESG Reporting to the Board of Directors

Achievements

- In response to climate change, TSMC has increased renewable energy use, raised the recycling rate of Company resources, commenced construction for a zero-waste manufacturing center, implemented circular economy, and launched the "Plant a Tree" Program
- For sustainable supply chain management, TSMC asked suppliers to sign a Supplier Code of Conduct and is now building a global supply chain management platform, "[Supply Online 360](#)"
- Launched Emotional Security Program for employees to create a diverse, inclusive workplace
- Supported semiconductor talent development and [STEM](#) education
- The TSMC Education and Culture Foundation and the TSMC Charity Foundation continued to support our youth, promote fine arts education, assist in remote education, and support the disadvantaged to bring positive change to society

2021 Work Plans

- Continue developing renewable energy sources and waste recycling technologies to expand the scope of circular economy and realize green manufacturing
- Build a high-quality and eco-friendly supply chain
- Continue investing in the semiconductor and STEM talents

2020 ESG Steering Committee

Achievements

- Explored global ESG trends, evaluation standards, and corporate best practices for the Company's own sustainability efforts
- Formulated long-term ESG strategies and objectives for the Company; regularly updated human rights policies and reevaluated how it is carried out
- Ensured TSMC has a strong culture of ESG, launched the Company's first [CSR Award](#), and received 785 sustainability proposals from employees and organizations
- Approved and supervised Donation Programs against COVID-19, taking advantage of the Company's expertise in technology, procurement, and supply chain management to support disease prevention efforts across the world
- The CSR Executive Committee was renamed as the ESG Steering Committee in March 2021; the CSR Committee was renamed as the ESG Committee at the same time

2020 ESG Committee

Achievements

- Complied with the [9 UN SDGs](#) selected by Chairman Liu and ESG Steering Committee Members; tracked and managed progress and efforts towards 2030 goals
- Further expanded green manufacturing scope, joined RE100, received additional AWS certifications, built the EP&L module for the Comprehensive Digital ESH Management System, advocated for EP&L among suppliers, built water reclamation facilities, and initiated plans for a zero-waste manufacturing center
- Launched Supply Online 360, launched supplier sustainability academy and on-site contractor care programs, issued [Supplier Sustainability Standards](#), formulated the supplier risk management matrix, required suppliers to propose and implement green manufacturing goals, and continued to push the Company's supply chain towards sustainability
- Issued [Information Security Declaration](#) to ensure better information security and protection of proprietary information in order to maintain the Company's competitive edge and protect partner interests
- The TSMC Charity Foundation formulated a blueprint to support remote education, assisted seniors living alone, advocated for filial piety, and increased volunteer services from TSMC employees; the TSMC Education and Culture Foundation advocated for fine arts, collaborated with external organizations to support education equality in remote areas, and gave our youth a stage for diverse development

Materiality Analysis and Stakeholder Communication

As we progress towards corporate sustainability, TSMC places great importance on the expectations and demands of internal and external stakeholders. As such, TSMC has established a framework for ESG disclosure in compliance with the latest AA 1000 Accountability Principle issued in 2018. The framework is established on the four major principles of Inclusivity, Materiality, Responsiveness, and Impact. Each year, TSMC regularly evaluates stakeholder feedback and ESG trends through diverse communication channels. We also continue to conduct materiality analysis to identify material ESG topics and establish long-term ESG targets, adopt action plans, and track ESG progress and efficacy accordingly. GRI Standards are also adopted by TSMC as the enduring standard for identifying material issues within TSMC. We have integrated ERM (enterprise risk management) to assess the trends and impact of risks posed by material ESG issues, explain to the public how TSMC is mitigating risks, and build a resilient organization capable of thriving under changing global landscapes.



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Phase III: Responsiveness

The ESG Committee was able to identify 14 ESG issues as material based on materiality analysis in 2020. TSMC assessed each issues' impact on the boundaries of TSMC's value chain from supply chain and company operations to customers. Pursuant to GRI Standards, we have also identified 23 material topics specific to TSMC in alignment with the ESG issues and collected internal information, data, and management approaches for disclosure in compliance with reporting regulations. Corporate governance, risk management, ethics, regulatory compliance, economic performance, tax policies, and information security are seven issues classified under General Disclosures by the GRI Standards. While they will not be mapped in the materiality matrix, relevant information will be disclosed annually.

Step



4 Stages

Procurement, wafer fabrication, packaging/testing, and customer use are the four major stages of TSMC's value chain which determine sustainability disclosure boundaries to help identify the impact of such issues on our upstream and downstream stages.

23 Topics

We have aligned the 14 material issues with the 23 specific topics in the GRI Standards to collect and disclose relevant information based on the reporting requirements and management approach dictated by GRI.

Phase IV: Impact

TSMC has established 2030 targets for each material ESG issue. The ESG Committee will regularly review progress towards annual targets and formulate changes to the following year accordingly. Plans, progress, and changes will be disclosed in the annual CSR Report for external parties.



74 Long-term Goals

Internal organizations formulated 74 long-term goals for material ESG issues to be achieved in 2030.

4 Meetings

ESG Committee meetings are held every quarter where internal organizations will report on their progress, tracking, and management.

TSMC Materiality Matrix



- An Innovation Pioneer
- A Responsible Purchaser
- A Practitioner of Green Power
- An Admired Employer
- Power to Change Society

Note: Corporate governance, risk management, ethics, regulatory compliance, financial performance, tax policy, and information security topics 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, CSR Report, ESG website and ESG Newsletter



Material Issues and Value Chain

Roles	Material Issues	GRI Standards Specific Topics	Upstream ^{Note 1}	TSMC Operations ^{Note 2}		Downstream ^{Note 3}	Operational Impact			
			Procurement Stage	Wafer Fabrication	Packaging/Testing	Customer Use	Profitability	Revenue	Customer Satisfaction	Employee Cohesion
An Innovation Pioneer	Innovation Management	Energy		✓	✓	✓	✓	✓	✓	
	Product Quality	Customer Safety and Health	✓	✓	✓	✓	✓	✓	✓	
	Customer Service	Customer Privacy				✓		✓	✓	
A Responsible Purchaser	Supplier Sustainability Management	Procurement Practices, Supplier Environmental Assessment, Supplier Social Assessment	✓				✓	✓		✓
A Practitioner of Green Power	Energy Management	Energy	✓	✓	✓	✓	✓			✓
	Climate Change	Emissions, Economic Performance	✓	✓	✓	✓				✓
	Water Management	Water, Effluents and Waste	✓	✓	✓					✓
	Air Pollution Control	Emissions		✓	✓					✓
	Waste Management	Effluents and Waste	✓	✓	✓					✓
An Admired Employer	Talent Attraction and Retention	Economic Performance, Labor/Management Relations, Diversity and Equal Opportunity, Market Presence		✓	✓		✓		✓	
	Talent Development	Training and Education		✓	✓		✓		✓	
	Human Rights	Labor/Management Relations, Non-discrimination, Freedom of Association and Collective Bargaining, Forced or Compulsory Labor, Human Rights Assessment	✓	✓	✓			✓	✓	✓
	Occupational Safety and Health	Occupational Safety and Health	✓	✓	✓			✓	✓	✓
Power to Change Society	Social Participation	Economic Performance, Indirect Economic Impacts, 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

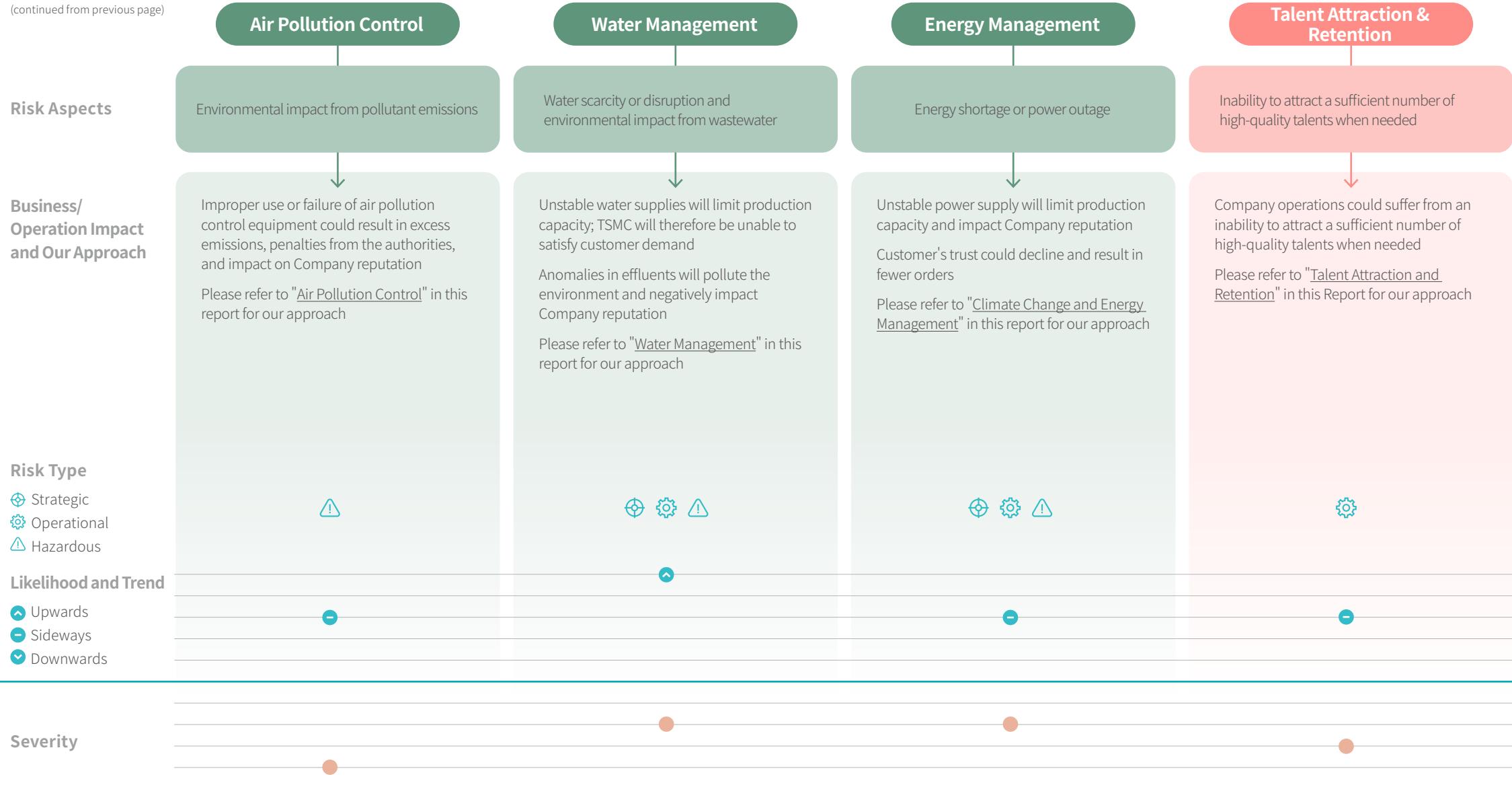
Note 3: "Customer Use" boundaries are customer products manufactured by TSMC



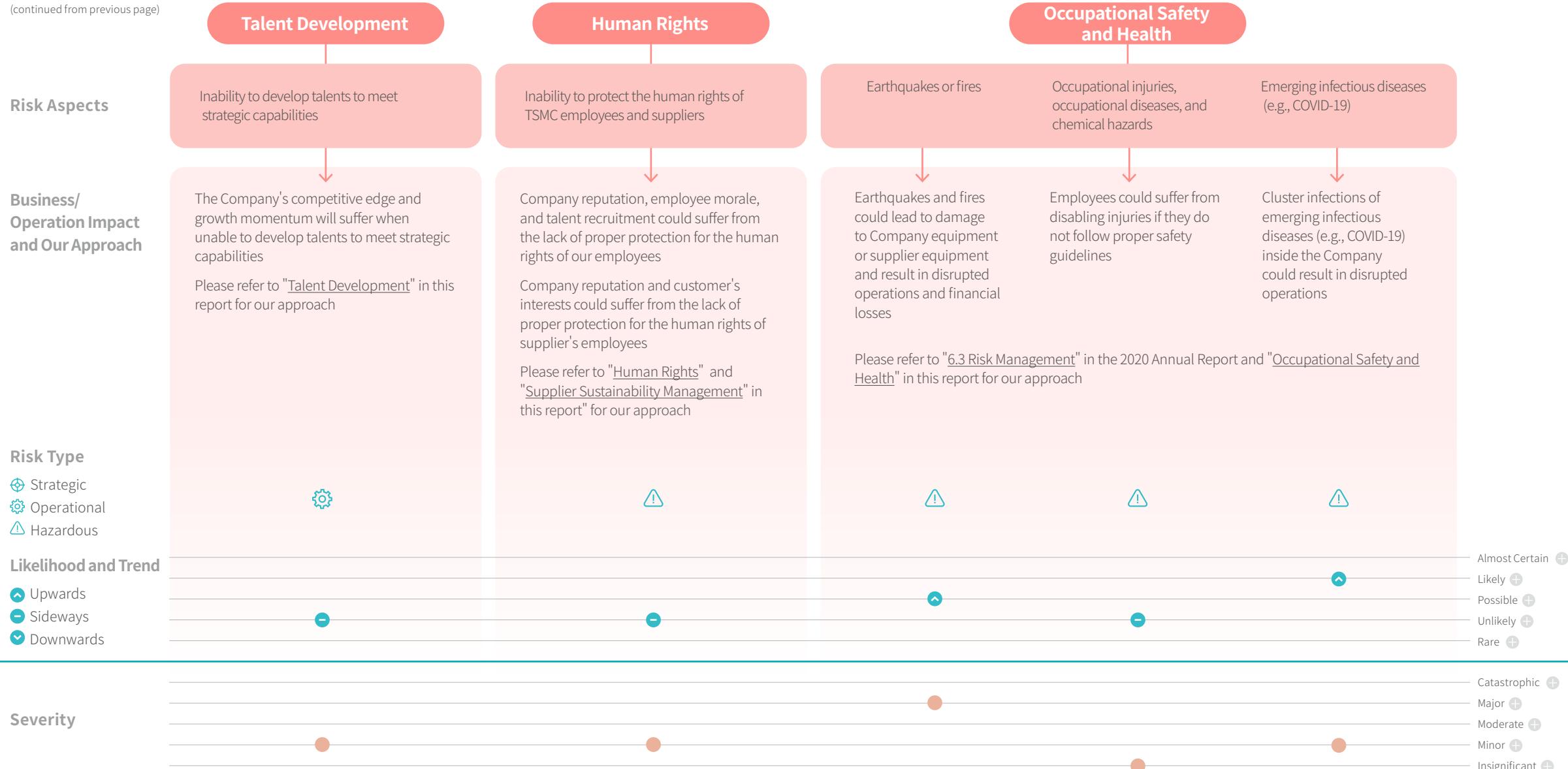
Material Issues & Risk Management



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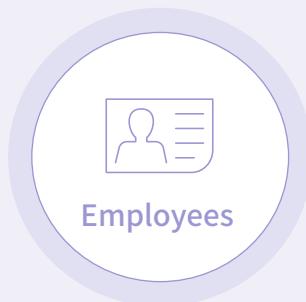


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Stakeholder Communication



62

Labor-management meetings

4,343

Cases handled through internal communication channels

Concerned with job duties and purpose, healthy and safe workplace, competitive compensation and welfare, opportunities for learning and growth, and work-life balance

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
- Employee survey/annually
- Ethics training/annually
- Employee core values survey/biannually

Issues

- Talent Attraction and Retention
- Talent Development
- Company's Long-term Development in Current Geopolitical Situation
- Ethics and Regulatory Compliance
- Social Participation

Focus Areas

- Company's long-term development under tense geopolitical situations and the global pandemic
- Strengthen industry-academia collaborations around the world to discover and cultivate more young talent
- Expand interaction and cooperation across organizations to broaden employee vision and foster well-rounded talents
- Host a variety of activities for employees to help achieve a better work-life balance
- Leverage big data or AI tools to upgrade office automation to improve productivity and reduce work hours
- Provide the latest regulations for related employees
- Offer more opportunities for employees to engage with society and help the disadvantaged

Responses from TSMC

- Helped employees understand how TSMC can grow given the current global landscape and competitive market through internal channels
- Continued to improve the quality and quantity of semiconductor courses and expand industry-academia collaboration to information engineering fields
- Strengthened dual career ladder system for both management and technical expertise to allow employees to develop to their full potential in the right places according to their personal characteristics and skills
- Strengthened employee training and offered more opportunities for internal transfers so that our employees can grow with the Company
- Continued to host various art, family, and sports events as well as clubs to facilitate a better work-life balance among employees
- Introduced the latest Industry 4.0 and Industrial AI technology to build a knowledge base for engineering analysis and make knowledge smarter
- Updated ethics and regulatory compliance training materials. Employee training completion rate was 99.72% with 50,482 employees having received training; management training completion rate was 100% with 5,425 managers having received trainings.
- Continued to invest in society through the TSMC Education and Culture Foundation and the TSMC Charity Foundation; continued to encourage employees to volunteer



TSMC CSR AWARD Primary Screening Poster Carnival

66

It's been years since I worked at TSMC, and I'm very happy that I was dispatched by my school to TSMC for the industry-academia partnership. I am working with TSMC and outstanding professors to advance exploratory research, narrow the gap between the industry and schools, and cultivate outstanding semiconductor professionals through the semiconductor courses.

Marvin M.F. Chang
Director of Corporate Research, TSMC



302

Institutional investors

262

Conferences and meetings

Concerned with sustainable value creation, and focused on business development strategies, stable profitability, good shareholder returns, and ESG performance

Engagement

- General shareholders' meeting/annually
- Investor conferences/quarterly
- Domestic and overseas broker conferences/as needed
- Face-to-face meetings, video conference calls and telephone conference calls/as needed
- Annual report, CSR report, and annual report on Form 20-F with the US Securities and Exchange Commission/annually

Issues

- Financial Performance
- Innovation Management
- Risk Management
- Climate Change

Focus Areas

- Impact from global politics and economy on the Company's operations and TSMC's response
- Changes in the nature of competition
- Future growth potential and profitability
- Dividend policy
- Measures in response to climate change and energy policy

Responses from TSMC

- In 2020, through quarterly investor conferences and 262 investor meetings, TSMC communicated with its investors about market trends, growth strategies, and profitability, and expressed its opinions on changes in the business environment
- With the support of strong operating performance and future growth potential, TSMC has been providing positive return to investors for 12 consecutive years
- TSMC distributed cash dividends on a quarterly basis. Shareholders of TSMC common shares received a total of NT\$10 cash dividend per share in 2020
- Disclosed ESG information and data according to semiconductor industry indicators issued by SASB (Sustainability Accounting Standards Board). Held Climate Risk & Opportunities Workshops to identify climate risks and opportunities according to the TCFD framework (Task Force on Climate-related Financial Disclosures); total of 5 climate risks (inc. zero emission trends) and 1 opportunity (improve company reputation) were added in 2020



TSMC 2020 general shareholders' meeting

66

TSMC's unrelenting pursuit of technology leadership, commitment to long-term shareholder returns and professional investor communication reflect its impressive values, business philosophy and culture. We look forward to seeing the Company's unique business model empower many wonderful technological innovations in the decades ahead, while creating win-win partnerships with its stakeholders.

Stefan Magnusson & Stanley Lu
Orbis Investments



115

Quarterly assessment meetings

1,205

Customer meetings

Concerned with TSMC's technology development and production planning, including product quality that fulfills customer demands, careful protection of customer information, supporting customers in successful production application, and gaining time-to-market advantage

Engagement

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

Issues

- Innovation Management
- Product Quality
- Customer Service
- Information Security

Focus Areas

- Technology development schedules and plans
- Capacity planning and production information
- Product quality
- Information protection

Responses from TSMC

- TSMC was able to offer 833 process technologies and 77 packaging technologies in line with its technological roadmap
- New TSMC-Online™ technical file navigation system assisted customer to access up-to-date information easily
- In response to the COVID-19 pandemic, TSMC offered remote auditing services to support customer's product launching on schedule and win customer trust
- By using a dynamic hotspot failure identification approach at the system level, we were able to increase the success rate of failure analysis, accelerate the development of new processes, and speed up the trouble-shooting stage during customer designs. This helped to reduce process flaws and make products more reliable
- TSMC created information protection protocols, built automated information security management system, and obtained ISO 27001 certification to be compliant with international security standards. Fab 12B/14A/15B have received ISO 15408 certifications, guaranteeing the highest level of safe production and information protection for our customers. All fabs with ISO 15408 certifications are ready to receive high security level orders and ensure optimal safety management in the production process and along the supply chain



Customers appreciate TSMC's support, which enables new products to be quickly completed from design to mass production.

66

With TSMC's expertise in advanced wafer fabrication technology and support in quality and reliability assurance, MediaTek is able to offer leading innovative designs that fulfill the strict requirements for high-end chipset solutions, recognized by tier-one clients around the world.

HW Kao

Corporate Vice President, MediaTek

66

TSMC's customer service teams have a clear understanding of our manufacturing needs and fights hard to support our interests. They always provide prompt responses and are very professional in handling issues. It is a pleasure to work with them. We hold them as the benchmark for service excellence. Please keep up good work and momentum on the support.

Dilip Vijay

VP and GM of APD/CSG/DCSG, Broadcom



395

Suppliers participated in the Responsible Supply Chain Forum

72

Supplier audit & communication meetings

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

Engagement

- Supplier Management Forum, Responsible Supply Chain Forum & 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 Management
- Ethics and Regulatory Compliance
- Product Quality
- Workplace Safety and Health
- Information Security

Focus Areas

- Carry out sustainable actions and continue to improve
- TSMC's ethics and regulatory compliance and supplier code of conduct
- Raw material quality
- Establish effective ESH management mechanisms
- Information security compliance, assessment results, and sharing experiences

Responses from TSMC

- Built Supply Online 360, a global supply chain management platform; established online TSMC Supplier Sustainability Academy with five lessons on Supplier Code of Conduct now available online
- All tier 1 suppliers signed the Supplier Code of Conduct and complied with business ethics (completion rate: 100%).
- 24 critical suppliers completed third-party supplier audits on sustainability risk by RBA-certified institutions; 12 suppliers received consultation on process advancement and quality improvement.
- Hosted Responsible Supply Chain Forum and related training courses for suppliers to share experience; required suppliers to apply learnings to factory operations
- Held nine Supplier Information Security Association meetings, completed supplier information security assessments for nine suppliers, and carried out five supplier information security programs to raise awareness for information security across the supply chain



President Chen Chou-Sin accepting a TSMC Outstanding Supplier Award on behalf of Chang Chun Petrochemical Co., Ltd. from J.K. Lin, Senior Vice President of Information Technology and Materials Management & Risk Management of TSMC.

66

We should shoulder the responsibility for environmental protection and strive to develop innovative green technologies by advancing processes, reducing industrial waste, and preventing pollution. We look forward to working with TSMC in the future and fulfilling our social responsibilities.

Alvin Hsieh

Sr. Regional Director of Entegris Asia LLC, Taiwan Branch

66

Sustainability should be the cornerstone of corporate growth. We are happy to be partnering with TSMC towards sustainable operations and a positive cycle.

Chou-Sin Chen

President of Chang Chun Petrochemical Co., Ltd., a Subsidiary Company of Chang Chun Group



50

Government meetings attended

48

Industry association conferences and meetings

Engagement

- Official correspondences and visits/as needed
- Interviews to provide industry experience and advice/as needed
- Conferences (e.g., briefings, public hearings, symposia, seminars, meetups)/as needed
- Communication platforms of the industry associations/monthly

Issues

- GHG Reduction/ Energy Management
- Water Management
- Environmental Regulations
- Occupational Safety and Health
- Innovation Management

Focus Areas

- Build factories that use diverse energy sources and increase use of renewable energies
- Build factories that use diverse water sources and increase use of reclaimed water
- Comply with environmental regulations
- Improve ESH management across the supply chain
- Application for U.S. investments
- Development trends in advanced semiconductor process technologies

Responses from TSMC

- Established 100% renewable energy target for TSMC by 2050 and joined the RE100
- 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 2021
- Represented the Taiwan Semiconductor Industry Association in discussions with the EPA on reasonable and viable air pollutant emission standards for the semiconductor industry
- Held seven ESH Experience-sharing Workshops and asked suppliers to set long-term sustainability goals for energy conservation, carbon reduction, fire prevention, occupational safety and health, and emergency response
- In December 2020, TSMC incorporated the TSMC Arizona Corporation and has made plans to build a 12-inch wafer fab in Phoenix, Arizona; the fab will employ 5nm processes and is slated to be in commission in 2024 to fulfill strong North American market demands for advanced technology
- Visited the U.S. Patent and Trademark Office, upon invitation, to share development trends in semiconductor technologies and TSMC's technologies

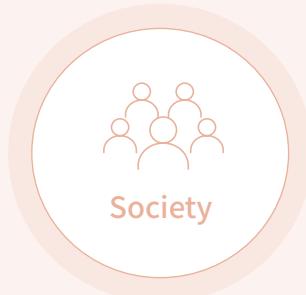


A fire equipment training course at TSMC's own fire training grounds. The grounds are equipped with a variety of equipment to ensure suppliers can learn how to operate them.

66

TSMC is the first semiconductor company in the world to join RE100, showing exemplary foresight, pioneering 100% renewable energy practices, and spearheading change among other corporations.

Helen Clarkson
CEO of The Climate Group



225

Cooperating charity groups

646,975

Cumulative number of beneficiaries

Concerned with the resources for education and arts offered by the TSMC Education and Culture Foundation to cultivate well-rounded talents in the new era; concerned with the emergency relief aid, volunteer service, and various charity programs provided by the TSMC Charity Foundation

Engagement

- Volunteer services/at least once per week
- [TSMC LinkedIn](#)/as needed
- Foundation websites/as needed
- "Sending Love" charity platform/as needed
- Project cooperation and visits/as needed
- [TSMC ESG Newsletter](#)/monthly

Issues

- Social Participation

Focus Areas

- Seeking additional partners for educating the disadvantaged and offering diverse education to young students
- Continue to support the arts and expand sponsorships for outstanding local art troupes
- Measures taken in response to social issues and major events, and impact of those measures
- Progress in environmental protection projects

Responses from TSMC

- In 2020, the TSMC Education and Culture Foundation invested NT\$ 99.85 million to support diverse education programs with our three cornerstones: Cultivate Young Generation, Educational Collaboration, Promote Arts and Culture. To strengthen ESG and the influence of women, the Foundation hosted the TSMC Youth Dream Building Project to give young Taiwanese people the opportunity to realize a sustainable future through creativity, and also organized five "TSMC Journeys of Female Scientist Lectures" to cultivate outstanding talents for Taiwan.
- In 2020, the TSMC Charity Foundation devoted funds, material resources, and volunteers to target four charity projects: Caring for Elders Living Alone, Promoting Filial Piety, Taking Care of the Disadvantaged, and Environmental Protection. The Foundation focused on putting resources into Education in Remote Areas and Aid for the Disadvantaged, with 10,451 volunteers serving nearly 64,000 hours. Donations exceeded NT\$160 million.



The Intelligent Engineering Center conducting experimental science education with students in Meihua Elementary School in Hsinchu County.

66

I would like to thank the TSMC Education and Culture Foundation for showing young students what it takes to realize your dream through the TSMC Youth Dream Building Project. It's challenging, but it gave us a better idea of where we stand.

Yu Chun Lin

Student of Dept. of Industrial Design,
National United University, Wining
teams member from the 3rd & the 4th
TSMC Youth Dream Building Project
competition

66

During this pandemic, TSMC has been incredibly supportive. I'd like to thank the TSMC Charity Foundation for offering personal protective gear and health supplements but also for appreciating the efforts of medical laboratory scientists.

Te-Lung Tsai

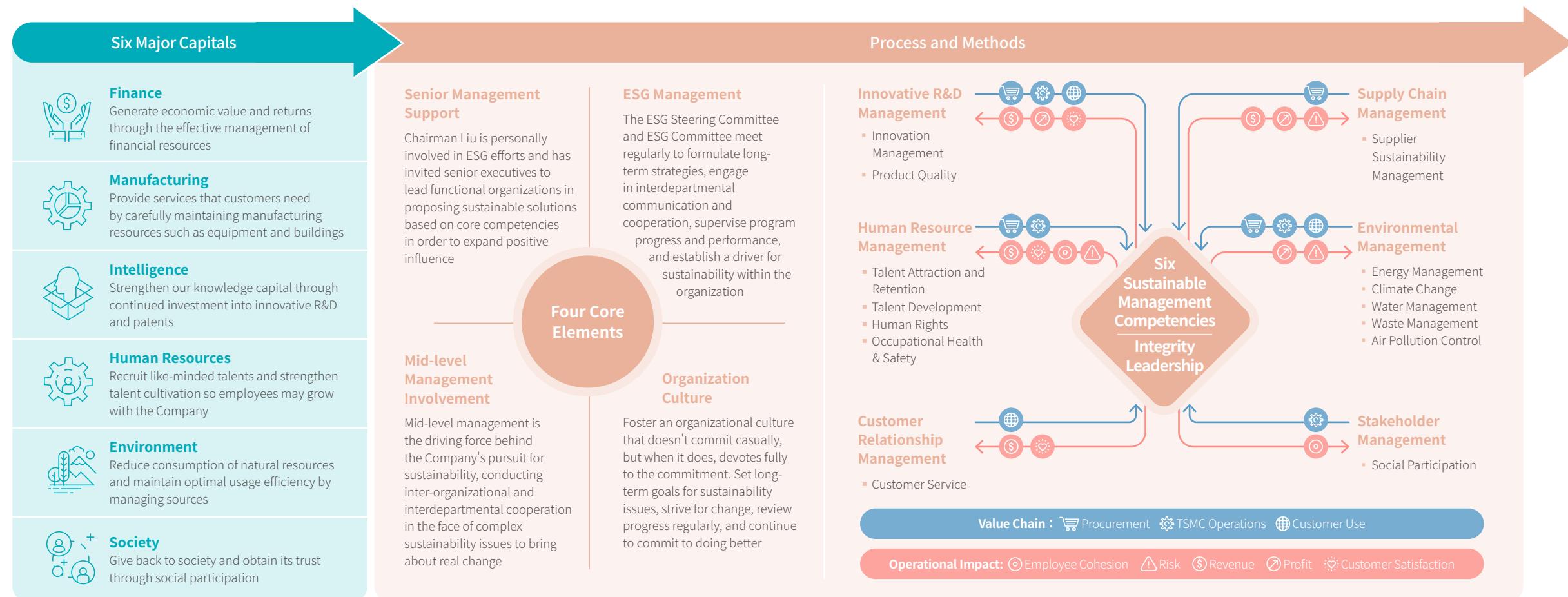
President of the Taiwan Association of Medical Technologists



Sustainability Impact

TSMC provides advanced processes and technology platforms to help customers realize innovations, drive the success and application of their products, and create value for society and stakeholders. This is a manifestation of the "Better, Together" spirit and a critical reason why TSMC can continue to grow and exert influence. TSMC believes in integrity leadership and has

created a sustainability impact management framework based on the Company's strong governance foundation, six major capitals, four core elements, six sustainable management competencies, and Environmental Profit and Loss (EP&L) valuation model to evaluate and manage the entire value chain's contribution to society.



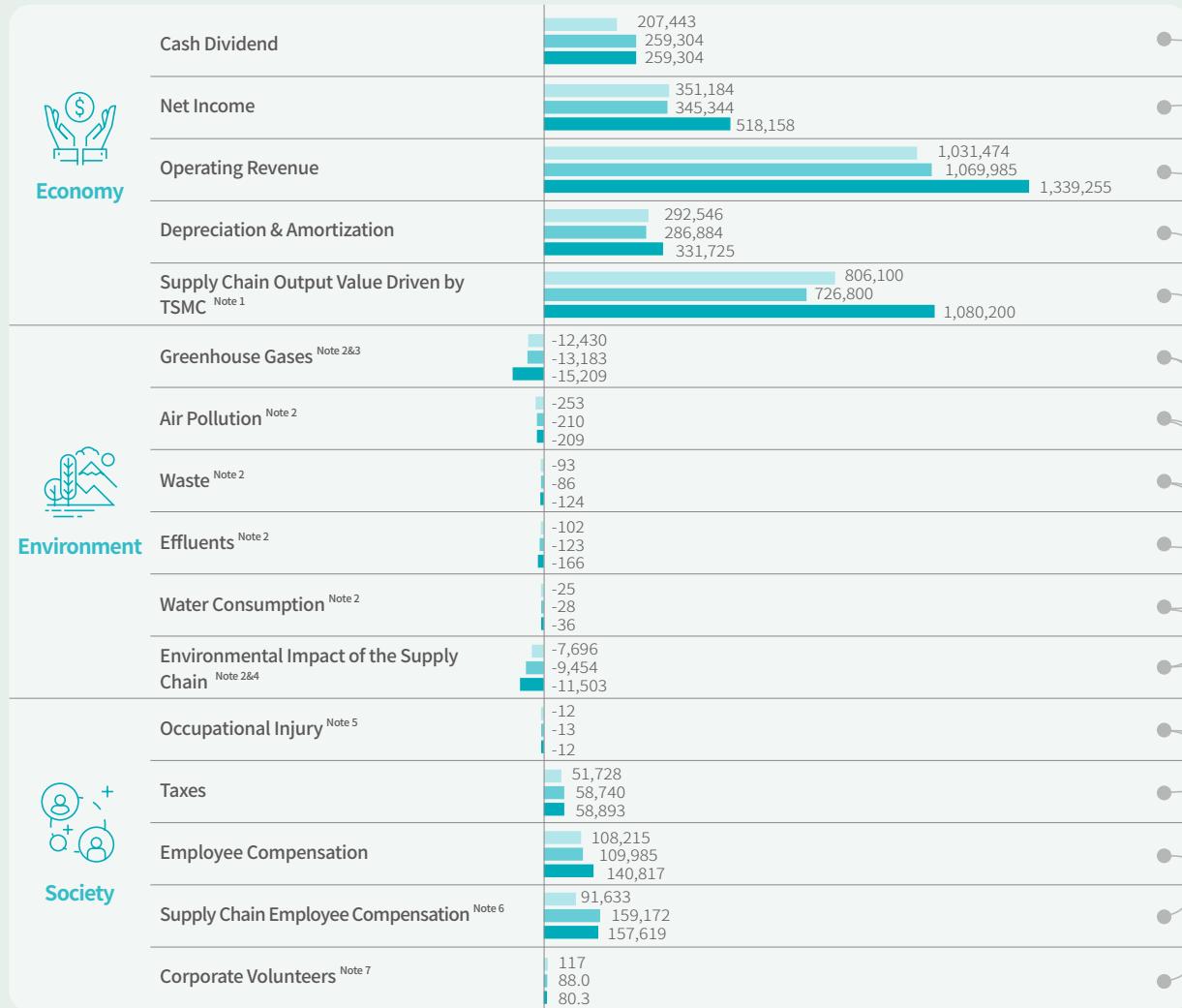
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Sustainable Value

Unit: Million (NT\$)



Impact



Investor



Customers



Suppliers



Communities



Government



Employees

- Stable returns & dividend for investors
- Assist customers with product application & success
- 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

In 2020, TSMC completed an economic, environmental, and social impact evaluation and introduced results for Supply Chain Employee Compensation and Corporate Volunteers. We also completed the sustainability impact valuations based on a triple bottom line (TBL). For more information, please refer to [sustainability impact valuations](#) in this report.

Note 1: "Supply Chain Output Value Driven by TSMC" in 2020 was calculated with assistance from the Industrial Economics & Knowledge Center using the Input-Output Table in 2016 issued by the Directorate General of Budget, Accounting and Statistics (DGBAS) with corrections using the RAS method. Data from 2018-2019 has also been adjusted.

Note 2: Environmental Profit and Loss (EP&L) presented in this section is the monetary assessment of possible external impacts from TSMC's purchase and production. For the costs and economic benefits arising from the implementation of environmental protection projects, please refer to "Environmental Cost" in TSMC's 2020 annual report. For the EP&L methodology, please refer to the TSMC 2020 Environmental Profit and Loss (EP&L) Report.

Note 3: GHG emissions data and subsequent EP&L from 2018-2019 are updated here.

Note 4: Environmental Impact of the Supply Chain includes only suppliers who had more than 3 transactions with TSMC in 2020 and with amounts exceeding NT\$10 million. A total of 1,041 suppliers meet the criteria. Their environmental impact is then calculated through the Environmentally Extended Input-Output (EExIO) analysis. The selection criteria for suppliers was amended in 2020 to include factory and equipment suppliers. Data from 2018-2019 are also adjusted.

Note 5: Value of Occupational Injury = Cost of Occupational Injury + Medical Expenses + Amount Individuals is Willing to Pay to Avoid Occupational Disasters

Note 6: 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 7: Corporate Volunteer Value = Volunteer Service Hours * Average TSMC Employee Income



Sustainability Impact Valuation

TSMC has constructed a Sustainability Impact Strategy Map derived from causal relationships. The map is constructed through the integration of P&L and sustainable management and it evaluates the TSMC value chain's social impact from an outside-in perspective. Since 2018, TSMC has been collaborating with the Corporate Sustainability Impact Center of Tunghai University to introduce an EP&L valuation model that is capable of converting all environmental footprints produced throughout production & operations into monetary social costs into our Total ESH Management system (TSM).

In 2020, in terms of TSMC operations, TSMC generated NT\$ 1.339 trillion in operating revenue, made a provision of NT\$331.7 billion for depreciation and amortization, and issued NT\$259.3 billion in cash dividend. TSMC not only helped customers succeed and suppliers become more sustainable, but also offered good returns to its investors. In terms of social value, we paid NT\$199.7 billion in taxes and payroll, supporting our government to expand infrastructure and social welfare, and to create more job opportunities; volunteer services from TSMC created NT\$80.32 million in social benefit while occupational injuries resulted in NT\$12.9 million in social costs. Environmental footprints and resource consumption from the production process resulted in an environmental cost of NT\$15.7 billion. In terms of the upstream supply chain, TSMC generated NT\$ 1.802 trillion output value in the supply chain, created 190 thousand job opportunities and NT\$157.6 billion in payroll, and resulted in NT\$11.5 billion in environmental costs.

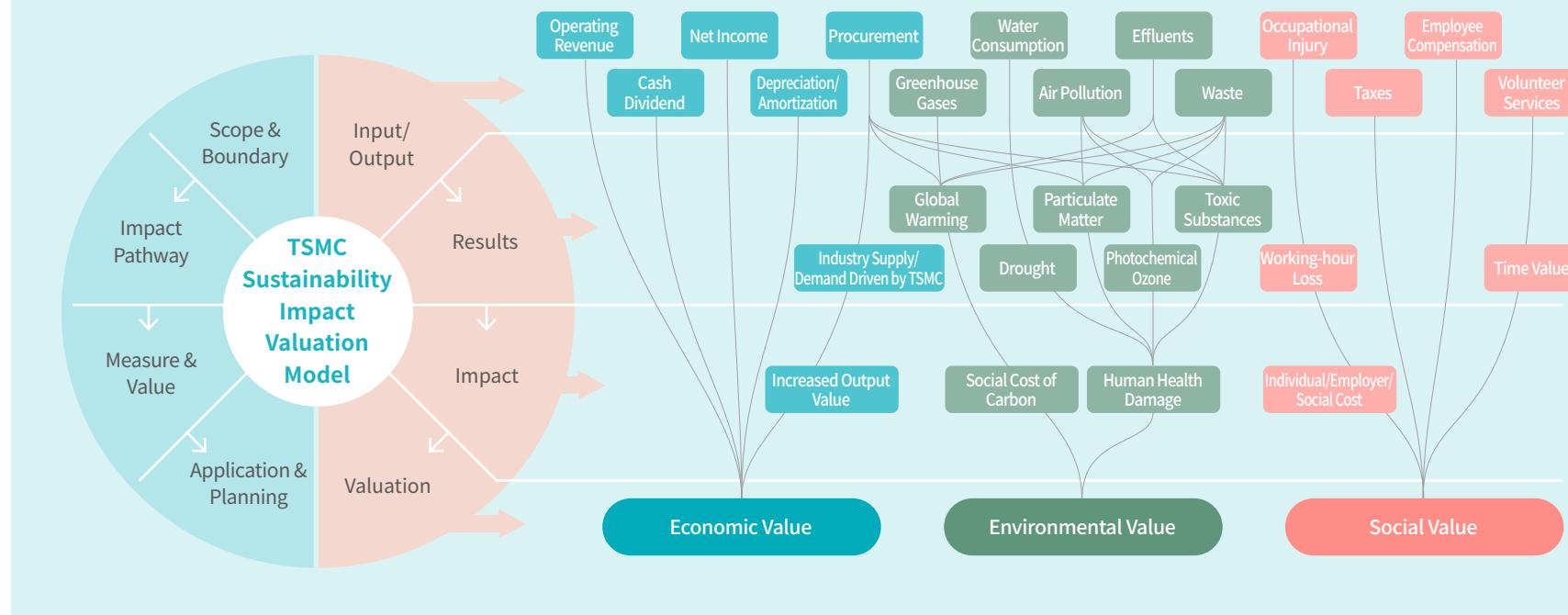
Case Study

Operations Management with EP&L at TSMC

TSMC introduced EP&L into production & operations management in 2018 and further applied EP&L analysis to the upstream supply chain in 2019. We conducted hot spot analysis through Environmentally Extended Input Output (EEIO) and started surveying each key supplier using a life cycle approach. As of 2020, we have surveyed and analyzed over 40 suppliers.

In 2020, our investigation showed that TSMC had experienced minor increases in environmental externalities from production and operations over the past three years. The main cause for the rise is an increasing demand for energy, water, and raw materials due to new factories and evolving advanced processes. To reduce social costs from energy consumption, TSMC achieved decreases in externalities from air

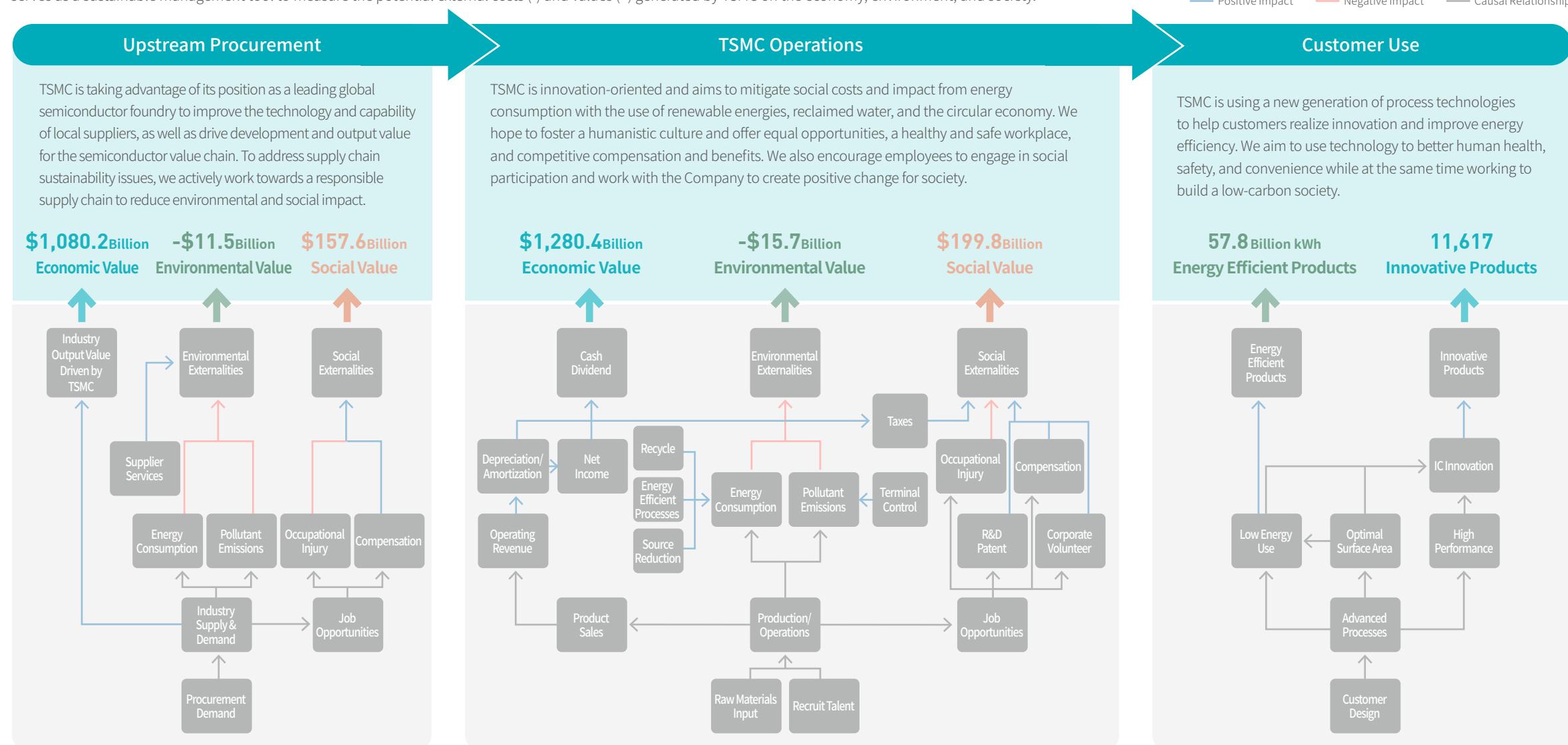
pollution and waste through low carbon manufacturing, improving energy efficiency, and increasing use of renewable energies; in 2020, the environmental externalities per unit product had reduced by 7% from the previous year. In terms of the supply chain, environmental externalities derived from TSMC procurement are largely concentrated in PM2.5 and GHG emissions from the production of chemical materials and chemical products. TSMC will continue to strive towards a responsible supply chain and ask that our suppliers commit to pollution control and reduced energy resource consumption. We intend to conduct an environmental survey on suppliers in 2021, to further uncover ways to reduce our environmental footprint, increase social welfare, make our supply chain more sustainable, and create more synergy for the value chain. For more details, please refer to the [TSMC 2020 Environmental Profit and Loss \(EP&L\) Report](#).





Sustainability Impact Strategy Map

From purchasing and TSMC operations to customer use, TSMC has outlined a strategy map for the value chain derived from the causal relationship between these interconnected lines to comprehensively evaluate our actions. Monetary value serves as a sustainable management tool to measure the potential external costs (-) and values (+) generated by TSMC on the economy, environment, and society.



Note 1: 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

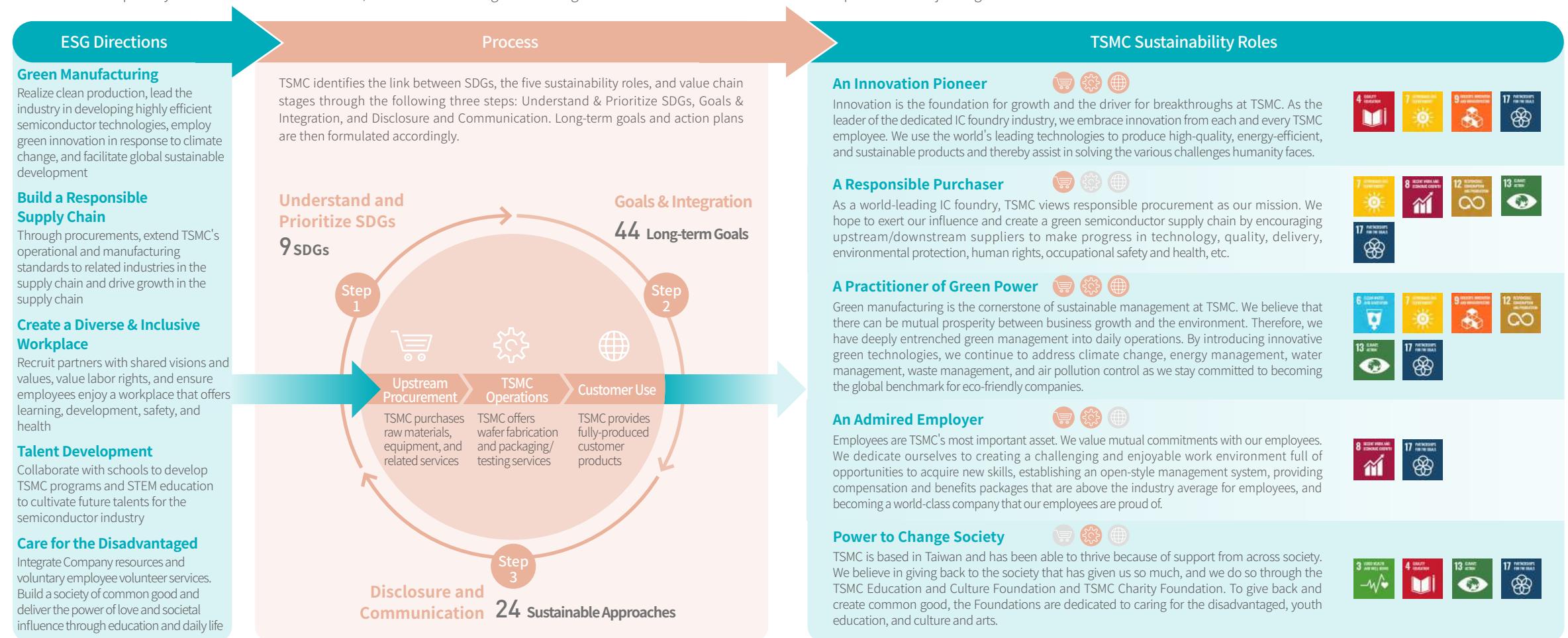
Note 2: The "TSMC Sustainability Impact Strategy Map" employs concepts of performance management to connect predicted results in value chain activities with causality among driving factors. We then apply the concept of P&L to identify positive or negative impacts on the economy, environment, and society. Such positive or negative impacts include direct or indirect economic value as well as the external costs or benefits brought onto the natural environment or society.



Carrying Out the UN Sustainable Development Goals

Humanity now faces grave challenges. In the face of such challenges, TSMC is focusing on improving core business competencies through our ten business philosophies and four core values. We are striving to fulfill our five sustainability roles and drive SDGs throughout the semiconductor industry by influencing the three major stages of upstream procurement, TSMC operations, and customer use. With guidance from the ESG Steering Committee, TSMC has set five ESG goals and selected nine primary SDGs. With the ESG Committee, we were able to integrate inter-organizational resources and

capabilities to formulate 44 timely and quantifiable long-term goals and implement 24 corresponding actions toward sustainability. We are integrating SDGs into our organizational culture and daily operations, and with Goal 17 of the SDGs – global partnerships – at the core, we are collaborating with internal/external stakeholders through participation, cooperation, and engagement to uncover opportunities for growth in the governance/economic, environmental, and social dimensions. We hope that we can join together in a sustainable future with shared values.





Linking SDGs and TSMC's Sustainable Development Goals for 2030

↑ Trending towards positive impact over past three years
↓ Trending towards negative impact over past three years
— Shown signs of instability over the past three years or new/adjusted targets without previous data



Good Health and Well-being

Offer Better Medical Care to Seniors Living Alone

- ↑ Provide 12,000 service visits to seniors living alone through Network of Love



Quality Education

Promote Filial Piety Among Our Youth

- ↑ Promote filial piety education in 120 educational institutions

Care for the Educationally Disadvantaged

- ↑ Continuous collaboration with public and private educational organizations and provide no less than NT\$15 million in resources annually

Volunteer Readers for Children in Remote Areas

- Provide more than 10,000 hours of reading services each year



Clean Water and Sanitation

Reduce Water Risks

- ↓ Reduce unit water consumption (liter/12-inch equivalent wafer mask layers) by 30% (Base year: 2010)
- Help suppliers implement water conservation measures and reach 3.5 million metric tons in cumulative amount of water conserved (Base year: 2020) **NEW**

Raise Effluent Standards

- Water pollution composite indicator 50% above effluent standards

Increase Usage of Reclaimed Water

- Increase the replacement rate of reclaimed water by more than 30%



Affordable and Clean Energy

Produce with Greater Energy Efficiency

- ↑ Double energy efficiency after five years of mass production for each process technology
- ↑ Save 5,000 GWh cumulatively between 2016 and 2030 through new energy-saving measures

Work with Suppliers Toward Energy Conservation

- ↑ Help suppliers implement energy conservation measures and reduce energy consumption by a cumulative total of 1,500 GWh (Base year: 2018)

Use Renewable Energy

- ↑ Renewable energy to account for 20% of energy consumption in new fabs after adopting 3nm processes. Continue increasing renewable energy purchases annually until 25% of fabs' power consumption is supplied from renewable energy and non-fab power consumption is 100% from renewable energy



TSMC Supports Local Baseball Teams

Since TSMC's 2020 Sports Day was canceled due to the pandemic, TSMC decided to allocate NT\$20 million from the Sports Day budget to kick off the "TSMC Little Baseball Hero Support Program," which is TSMC's first crossover collaboration with the Taiwan Aboriginal Baseball Development Association (TABDA) and the Taiwan Basegarden Baseball Development Association (TBBDA). The program aims to support young baseball players establish an education foundation, build up self-confidence, and unleash their potential.

The TSMC Little Baseball Hero Support Program supports TABDA to offer training to baseball coaches on sports nutrition, injury prevention, sports science, and applications. Through the development of players' second skills, the program provides junior high school baseball team members in Hualien and Taitung with career planning and vocational training. At the same time, the program supports TBBDA in expanding its current service area by establishing "Baseball Reading Classrooms" for baseball teams in junior high schools and elementary schools in areas where the TSMC fabs are located. In addition, a "Baseball Scholarship" will be presented by CPBL stars to encourage young baseball players to read and establish an educational foundation, paving the way for their career development.

TSMC Vice President T.S. Chang, a baseball enthusiast, leads members of TSMC's Fab 12B Softball Team and TSMC's Softball Club to visit schools in Hsinchu. They share their knowledge of baseball and the professional league with kids and help them with schoolwork and life coaching in the pursuit of their dreams.

For more details, please refer to TSMC's ESG website: [TSMC Sports Day Funds Allocated to First Crossover Program to Support Local Baseball Teams](#)





Decent Work and Economic Growth

Offer Competitive Compensation

- ↑ Maintain position above 75th percentile among industry peers in total compensation

Facilitate Sustainability Across the Supply Chain

- ↑ Tier 1 suppliers required to complete Sustainability Management Self-assessment Questionnaire; completion rate 100%
- ↑ Tier 1 suppliers required to sign TSMC Supplier Code of Conduct every three years; completion rate: 100%
- Suppliers required to receive third-party (RBA-certified agencies) audits every three years: completion rate 100%
- Conduct due diligence for responsible mineral supply chains on three suppliers each year; 30 cumulative suppliers surveyed NEW

Promote Workplace Safety

- Disabling Injuries Frequency Rate (FR) < 0.3
- Disabling Severity Rate (SR) < 3
- ↑ Incident Rate per 1,000 Employees < 0.20
- ↑ All waste treatment vendors to acquire ISO14001 or other international EHS Management certifications
- ↑ Supporting high-risk operation suppliers with health and safety; completion rate: 100%
- ↑ Assist high-risk operation contractors with ISO 45001 certification for occupational safety and health management system; completion rate: 100%
- ↑ Ensure a cumulative total of 1,500 local suppliers participate in the ESH training program (Base year: 2016)

Support Local Suppliers

- ↑ Ensure a cumulative total of 145 local raw materials suppliers receive support on process enhancement and quality improvement (Base year: 2016)
- Encourage all major local raw materials suppliers and 75% of back-end packaging materials suppliers to participate in the Taiwan Continuous Improvement Competition with 60% of them advancing to the finals



Industry, Innovation and Infrastructure

Encourage Innovation

- ↑ Maintain TSMC's technology leadership and invest 8.5% of revenue R&D expenses annually
- ↑ Over 50,000 global patents granted
- ↑ Offer 1,200 process technologies and 170 packaging technologies in line with TSMC technology roadmap

Green Product Innovation

- Decrease the Product Environmental Footprint by 30% for each unit product (Base year: 2010)



Climate Action

Implement Mitigation Strategies to Climate Risks

- ↑ Reduce GHG emissions per unit product (MTCO2e/12-inch equivalent wafer mask layers) by 40%
- Ensure all high-energy-consumption suppliers receives ISO 14064-1 certification for GHG emissions; completion rate: 100% NEW
- ↑ 0 days of production interruption due to climate disasters

Strengthen Supply Chain Climate Resilience

- ↑ Invite suppliers to observe our annual emergency response drill; cumulative total of 300 suppliers have observed the drill (Base year: 2016)

Environmental/Energy-saving Volunteers

- Ensure 1,200 volunteer services annually for environmental causes



Responsible Consumption and Production

Reduce Industrial Waste Output

- ↓ Outsource ≤ 0.5 of unit waste disposal per wafer (kg/12-inch equivalent wafer mask layers)

Promote a Circular Economy

- ↓ Develop multiple types of electronics-grade chemicals for recycling within TSMC
- ↑ Reduce waste production among major local suppliers by 35% (Base year: 2014)

Chemicals Management

- ↑ Develop analytical abilities for carcinogenic, mutagenic, and reprotoxic substances for all materials and assist major suppliers in developing such abilities
- Replace NMP 100% (Base year: 2016)
- Ensure that all processes are free from PFASs with more than 4 carbon atoms

Better Recycling

- ↑ Reduce air pollutant emissions per unit product by 50% (Base year: 2015)
- ↑ >98% reduction rate of volatile organic gases

Facilitate Health Management

- ↑ Ensure zero cases of occupational hazard caused by exposure to chemicals



TSMC Launched Its First ESG AWARD to Enhance Corporate Sustainability Performance and Foster Good ESG Ideas from Employees

To fulfill its commitment to ESG and sustainable social development, TSMC continues to drive positive changes in the world through tangible actions. In 2020, TSMC launched its first CSR AWARD to acknowledge the fruitful ESG results attained within the Company. This award also encourages all TSMC employees to propose brilliant ideas pertinent to the Company's five ESG strategic directions, further inspiring employees to proactively explore opportunities for improvement within their respective duties. In addition, by sharing these ideas, the influence of the common good can be extended outside of TSMC. Within half a month since the award began accepting entries, we received 785 proposals with 25,883 employees contributing to the growing momentum of TSMC's culture of sustainability.

In a survey, **100%** of TSMC employees who participated in the event stated that through the TSMC CSR AWARD, they realized that fulfilling CSR is not just a charity cause. More significantly, it enables them to exert influence through their expertise and contribute to society and the environment. In addition, **98%** of the employees who participated in the event shared that through the TSMC CSR AWARD, they found the sustainable value of their jobs and are more inclined to proactively propose sustainable plans in their daily work and put the plans into action.

Check out [2020 TSMC CSR AWARD Highlight Video](#)





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An Innovation Pioneer

Innovation is the foundation of growth and driver for breakthroughs at TSMC. As the leader in the dedicated IC foundry industry, TSMC embraces innovation from every employee. We insist on producing sustainable products with high quality and low energy consumption through leading technologies to help resolve the many challenges humanity faces.

6,900
>12,000

Protected intellectual property rights, with 6,900 patent applications globally and over 12,000 trade secrets register

100

%

CMR substance assessment capability for 100% of materials

92.8

%

Customer satisfaction has exceeded 90% for seven consecutive years





Innovation Management

Strategies



Technology Leadership

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



Intellectual Property Protection

Patent protection

Continue to strengthen patent portfolio by keeping patent applications in sync with the Company's R&D resources to make sure that 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

2030 Goals

- Maintain TSMC's technology leadership and invest **8.5%** of revenue R&D expenses annually

2021 Targets

- 3nm process technology in risk production

2020 Achievements

- 5nm process technology in volume production
Target: 5nm process technology in volume production

- Over **50,000** global patent granted

- Exceed **5,500** global patent applications

- 6,900** global patent applications submitted Note
Target: Over 5,300 global patent applications

- Over **150,000** trade secret registrations

- Exceed **20,000** trade secret registrations

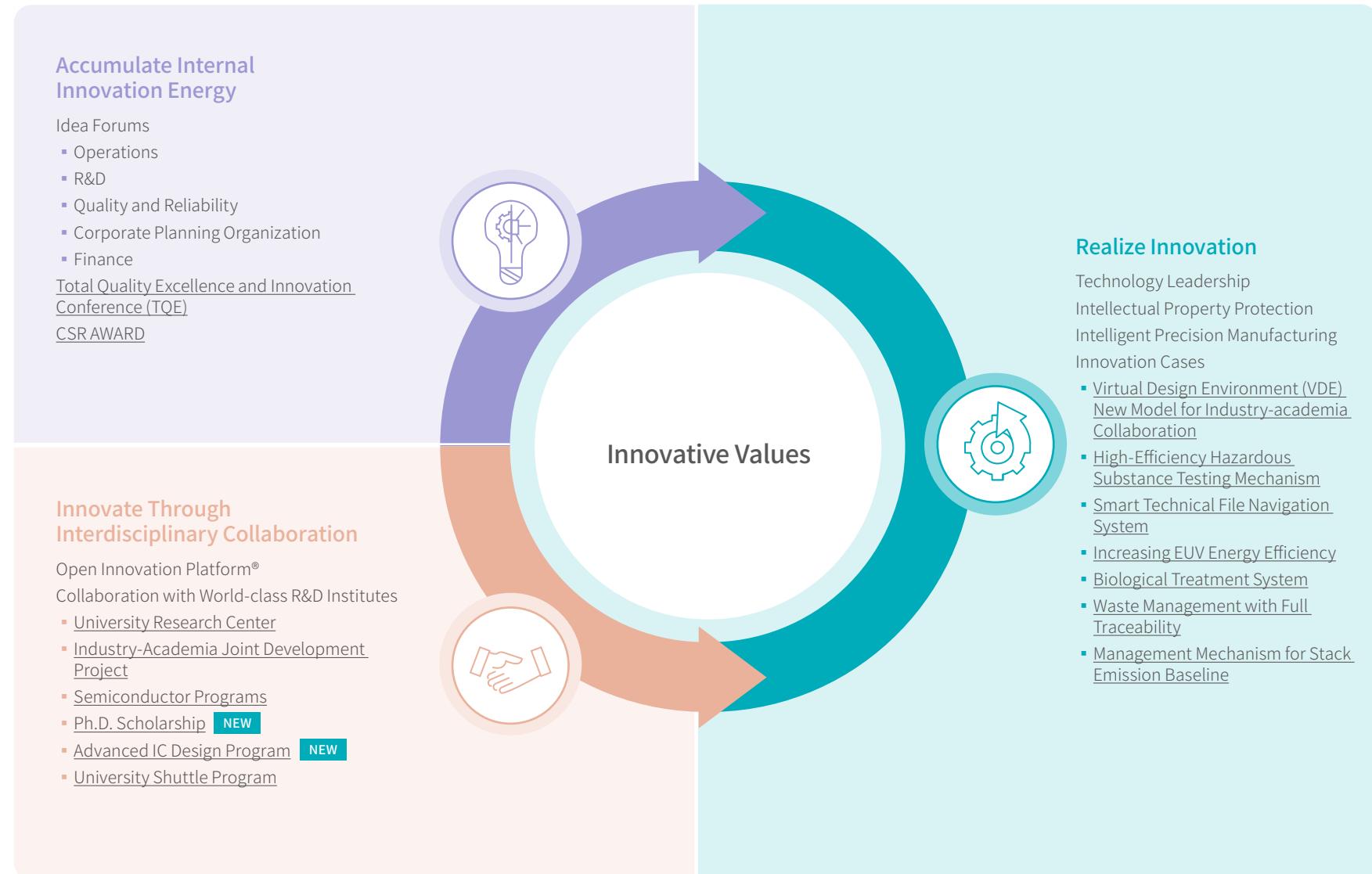
- Over **12,000** trade secret registrations
Target: Over 12,000 trade secret registrations

Note : In the wake of adjustments made to the patent portfolio plan for leading technologies, the annual target for 2020 in global patent applications was exceeded, and the long-term goal for 2030 remains unchanged.

V Achieved ↑ Exceeded — Missed Target

Innovation Management Framework

In response to the rapidly evolving semiconductor industry, TSMC has been striving to build an innovative workplace that highly encourages innovation since its establishment. In the face of challenges imposed by competitors and advanced process technology in 2020, TSMC continued to enhance the Company's leading technological competitive advantages through an internal incentive scheme for innovation. Employees are encouraged to bring forth a variety of innovations to enhance organizational innovation vitality. Meanwhile, we also dedicate resources to helping our customers, the industry and academia drive interdisciplinary innovation collaborations, including product innovation with our customers, technical talent innovation with research institutions, and green innovation with our suppliers.





Technology Leadership

In 2020, TSMC continued to expand its scale of research and development. The total R&D expenditure for the year was US\$ 3.72 billion, a 26% increase from the previous year and 8.2% of the Company's total revenue^{Note1}. The R&D team has grown to a team of 7,404 people, a 13% increase from the previous year. The scale of R&D investments is on par with top tech companies worldwide and even surpasses the scale of some companies.

Faced with the increasingly difficult challenge to continue extending Moore's Law, which calls for the doubling of semiconductor computing power every two years, TSMC has focused its R&D efforts on offering customers first-to-market, leading-edge technologies and design solutions

that contribute to their product success. In 2020, following the application of 5nm technology to mass production, the Company's R&D organization continued to fuel the pipeline of technological innovation needed to maintain industry leadership. For TSMC's 3nm technology, the sixth generation platform to make use of 3D transistors, TSMC continues full development with major customers and has completed IP design and started silicon validation, the Company's research and pathfinding pushed forward with exploratory studies for nodes beyond 2nm, which is the leading-edge technology in the semiconductor industry today.

In addition to complementary-metal-oxide-semiconductor (CMOS) logic, TSMC conducts R&D on a

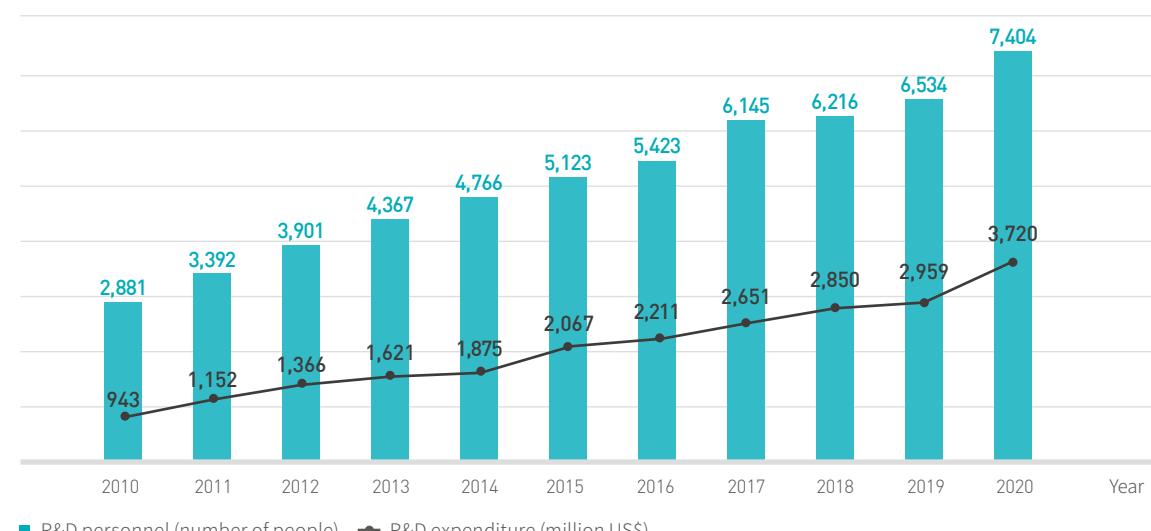
wide range of other semiconductor technologies that provide the functionalities required by customers for mobile System-on-Chip (SoC) and other applications, such as smartphones, high-performance computing, IoT, and automotive electronics, etc.

In 2020, TSMC maintained its strong partnership with the world's top research institutions, including the Semiconductor Research Corporation (SRC) in the United States and the Interuniversity Microelectronics Centre (IMEC) in Belgium. The Company also continues research collaboration with world-class universities, driving advancement in semiconductor technology and nurturing future talents.



TSMC focuses on offering customers first-to-market, leading-edge technologies and design solutions.

Continuous Investment in R&D



Note 1: As reflected upon the revenue growth in 2020, R&D expenditure is slightly under 8.5% of total revenue.

Specialty Technologies/Interconnect & Packaging Technologies

- 3D IC** 3D IC and System-on-Integrated Chips (TSMC-SoIC®) Technology
- InFO** Advanced Fan-Out and Integrated Fan-Out (InFO) Technology
- BCD** Power IC/Bipolar CMOS-DMOS (BCD) Technology
- MCU** Embedded Flash Memory/ Emerging Memory Technology
- CIS** CMOS Image Sensor Technology



Technology Leadership and Innovation

2018	2019	2020
CMOS Logic Technologies <ul style="list-style-type: none">N7+ technology entered risk production, the industry's first commercially available EUV (extreme ultraviolet) process technology	<ul style="list-style-type: none">5nm FinFET technology led the foundry to successfully entered risk production7nm FinFET plus technology entered volume production and led the world to deliver customer products to market in high volume	<ul style="list-style-type: none">Volume production of industry-leading 5nm process technology
Specialty Technologies/Interconnect & Packaging Technologies <ul style="list-style-type: none">Foundry's first underpanel optical fingerprint sensor technology in productionDeveloped an industry's unique 90nm BCD technology offering leading-edge 5-16V power devices and dense logic integration with competitive cost, as the next generation mobile Power Management IC (PMIC) solutionVolume production launch of new generation CMOS image sensors of sub-micron pixel for mobile applications and development of Ge-on-Si sensor for three dimensional range sensing applications with superior performanceHigh-volume production of InFO-PoP Gen-3 for mobile application processor packaging	<ul style="list-style-type: none">The world's first 7nm automotive platformCompleted process validation for System on Integrated Chips (SoIC®), an innovative wafer-level package technologyAchieved High-volume production of Gen-4 Integrated Fan-Out Package on Package (InFO-PoP) for mobile processor packagingSuccessful qualification of Gen-5 InFO-PoP advanced packaging technology for mobile applications and Gen-2 Integrated Fan-Out on Substrate (InFO-oS) for HPC applicationsDeveloped 40nm BCD (Bipolar-CMOS-DMOS) technology—unique in the industry—offering leading-edge 20-24V HV devices with full compatibility to 40nm ultra-low-power platform and integration of RRAM, in turn, enabling low power, high integration and small footprint for high-speed communication interface in mobile applicationsDeveloped 28nm 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 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	<ul style="list-style-type: none">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 resultsEntered 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 performanceDeveloped InFO-oS Gen-3, which provides more chip partition integration with larger package size and higher bandwidthExpanded 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 integrationAchieved technical qualification of 28nm eFlash to support automobile electronics and microcontroller units (MCU) applicationsBegan production of 28nm RRAM technology as a low-cost solution to support the price-sensitive IoT marketAchieved technical qualification of 22nm MRAM technology to successfully volume-produce MRAM and received the Flash Memory Summit 2020's Best of Show award for the most innovative AI applicationEntered volume production of CMOS image sensors technology, with shrunk sub-micron pixel size and sensors meeting automotive grade reliability compliance



Applications

5nm Fin Field-Effect Transistor (FinFET) (N5) technology

5G mobile communications High-performance computing

TSMC's most advanced technology that leads in both technology and production capacity, enabling revolutionary products in 2020.

Lead the industry to deliver most advanced products

7nm FinFET (N7) family technologies

5G mobile communications High-performance computing

Artificial intelligence Automotive electronics

N7 technology began volume production in April of 2018. By the end of 2020, TSMC has used N7 family technologies to produce more than one billion fully functional and defect-free chips for products to over 100 customers.

Introduce products with industry-leading performances and energy efficiency

N12e™ technology

AI-enabled Internet of Things (IoT) edge computing products with high performance and high energy efficiency

Based on 12FFC+ technology and its IP ecosystem, TSMC introduced N12e™ technology in 2020, bringing TSMC's world-class FinFET transistor technology to AI-enabled Internet of Things (IoT) and other high-efficiency, high-performance edge devices. This technology offers industry-leading low operating power (Vdd), and excellent low leakage performance of ultra-low-leakage (ULL) SRAM (static random access memory), and new ultra-low leakage devices.

Introduce edge AI-products with industry-leading power saving to prolong battery life of such products

22nm Ultra-low Leakage (ULL) (22ULL) analog technology

Smartphones AI-enabled IoT applications

22ULL analog technology platform, which is fully compatible with logical process, was established in 2020. This platform offers low-noise 2.5-volt input/output (IO) transistors and low temperature-coefficient-of-resistance (TCR) TaN (Tantalum nitride) thin film resistors to support customers' differentiated analog designs.

Introduce products with differentiated analog designs

22ULL Radio Frequency (RF) (22ULL RF) technology

4G RF Wireless connectivity to IoT

22ULL RF technology received product tape-outs from over 20 customers in 2020.

Introduce products with industry-leading RF performances and cost-effectiveness

22ULL Embedded Magnetic Random Access Memory (MRAM) technology

Wearable devices IoT microcontroller unit (IoT MCU)

22ULL Embedded MRAM technology IPs completed reliability qualifications in 2020, with >100K cycle endurance and reflow capability. This technology demonstrated automotive Grade-1 capability and was applied to volume production for customer wearable products in 2020.

Introduce leading energy-efficient MCU to extend battery life for wearables

CMOS Image Sensor (CIS) technology

Smartphones

In 2020, TSMC helped customers lead the market in rolling out 0.8µm pixel products. Pixel size was further reduced to 0.7µm within nine months with timely volume production. The smaller pixel size enables 30% higher resolution for CIS with the same chip size.

Lead the industry to deliver most advanced products

CMOS MEMS (micro electro-mechanical systems) technology

Medical devices

TSMC successfully helped customers bring monolithic ultrasonic scanners into volume production.

Lead the industry to produce innovative, high-performance and portable ultrasonic scanners at affordable low prices to better human health and living

3DFabric™ technologies

5G mobile devices High-performance computing applications

In 2020, TSMC introduced 3DFabric™, a comprehensive family of 3D silicon stacking and advanced packaging technologies, which are comprised of frontend TSMC-SoIC™ 3D silicon stacking and backend 3D interconnect technologies which include CoWoS® (chip on wafer on substrate) and InFO (integrated fan-out), providing customers flexible solutions for integration of chiplets.

Introduce products with industry-leading performances and energy efficiency

InFO-PoP (Integrated Fan-Out Package-on-Package) technology

Advanced mobile device applications

Successfully developed InFO-PoP technology, which integrates 5nm SoC (System-on-Chip) and DRAM (dynamic random access memory) for advanced mobile device applications. This technology helped deliver several customer products to market in high volume in 2020.

Introduce products with industry-leading performances and battery life



TSMC Continues to Advance Technologies to Unleash Customer Innovation

Semiconductors are transforming many key industries, including information and communication, transportation, education, health care, entertainment, agriculture, etc. because of their greater capabilities and better energy efficiency through innovations and breakthroughs. These advancements are critical to the future of electronics that will bring more positive impacts on our lives. As the most trusted dedicated foundry service provider in the world, TSMC continues to deliver industry-leading, next-generation, leading-edge semiconductor technologies, as well as offer comprehensive specialty technologies and leading 3D chip stacking and packaging services to help customers unleash their innovations and deliver more advanced, more capable, more energy-efficient, and more affordable products, including smartphones, high performance computing (HPC), Internet of Things (IoT), automotive, digital consumer electronics, health care devices, etc.

Collaborate with Customer to Deliver World's First Handheld, Single-probe, Whole-body Ultrasound System that Helps Improve Overall Healthcare System Efficiency

One remarkable example was our collaboration with Butterfly Network, which delivered its next-generation Butterfly iQ+, the world's only handheld, single-probe, whole-body ultrasound system in 2020, following the debut of its initial model, Butterfly iQ in 2018. By delivering groundbreaking performance and unparalleled efficiency with faster, sharper, and more

detailed imaging, the Butterfly iQ+ helps healthcare providers around the world save time during diagnosis and treatment of patients to improve overall patient outcomes. Leveraging Butterfly Network's most advanced Ultrasound-on-Chip™ technology and TSMC's world-leading CMOS MEMS manufacturing technology, the ultrasound transducers can be seamlessly integrated on a single chip. The Butterfly iQ+ features 15% faster frame rates and 60% faster pulse repetition frequency, to give healthcare practitioners the clarity they need to help get important insights quickly.

In addition, the Butterfly iQ+ extends battery life by 20% and scanning time by 100% to enhance operation efficiency. The high-performance imaging capabilities and excellent operation efficiency make this innovative product a powerful tool to help healthcare providers around the world to make timely diagnosis and decisions for treatment, even if they are in underserved communities or in remote areas. Additionally, the innovative Butterfly iQ+ has been shown to be a particularly useful tool during the global COVID-19 pandemic due to its lung imaging capabilities, portability and ease of cleaning, as infection control has become increasingly important. The Butterfly iQ+ marks a big step forward for point-of-care ultrasound with its innovations and breakthroughs, and will continue to bring significant clinical, economic and societal impact going forward.

In total, TSMC deployed 281 distinct process technologies, and manufactured 11,617 products for 510 customers in 2020 to continue to bring significant contribution to the advancement of modern society.

Butterfly Network Collaborates with TSMC to Unleash Innovation to Help Improve Patient Outcomes and Efficiency across Global Healthcare Systems



Butterfly iQ+

IC Product

- Butterfly Network delivers new-generation Butterfly iQ+, an innovative handheld, single-probe, whole-body ultrasound system

Product Innovation & Breakthrough

- Butterfly Network puts ultrasound on a single chip with its most advanced Ultrasound-on-Chip™ technology
- The Butterfly iQ+ features 15% faster frame rates and 60% faster pulse repetition frequency to deliver sharp imaging
- The Butterfly iQ+ extends battery life by 20% and scanning time by 100% to enhance operation efficiency



TSMC's Role

- Provide world-leading CMOS MEMS manufacturing technology to enable integration of the ultrasound transducers on a single chip
- Dedicate a professional engineering team to help Butterfly Network unleash this product innovation

Impact on Society

- By delivering groundbreaking performance with fast, sharp imaging and unparalleled efficiency, the Butterfly iQ+ can help healthcare providers around the globe save time in their diagnosis and treatment of patients, improving overall patient outcomes



Butterfly Network collaborates with TSMC to deliver its new-generation Butterfly iQ+, the world's first handheld, single-probe, whole-body ultrasound system that helps improve patient outcomes and efficiency across global healthcare systems

Photo: Courtesy of Butterfly Network



Intellectual Property Protection

TSMC constructs a global strategic patent portfolio to secure freedom in business operations, strengthen leadership in the industry, and protect R&D results in leading-edge technologies. Based on the Company's technology leadership in professional semiconductor manufacturing, the global intellectual property portfolio strategies combined with innovative analysis methods of patent map navigation, the battle-tested patents created through invention mining from R&D technology blueprints to seize the commanding heights in key technologies, TSMC generates more patents with higher R&D investment output rate in the industry. Meanwhile, under an innovative patent management mechanism, patent prosecution processes are closely monitored to ensure quality and efficiency. The Company reviews patent portfolio regularly, as well as acquiring patents strategically and/or collaborating with patent alliance(s), to build a comprehensive patent protection network.

Global Patent Portfolio Strategies



Ensure freedom in global operations



Protect leadership in innovative technologies



Strengthen overall market competitiveness



Establish exceptional IP reputation in the industry

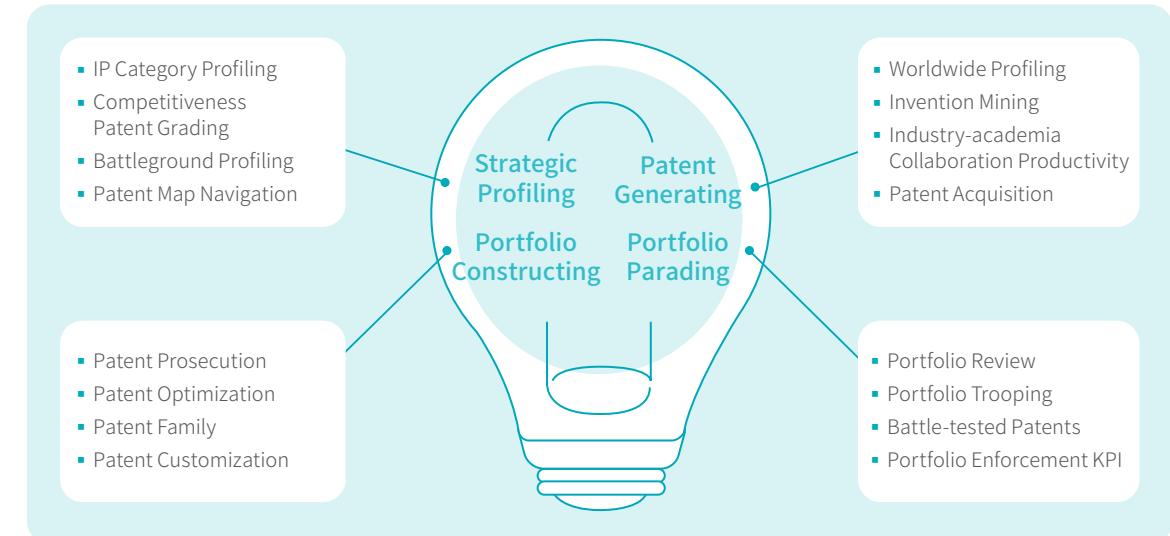
Build Global Strategic Patent Portfolio

TSMC's number of patent published applications in the U.S. ranked third in 2020, setting a new record in history. The number of patents issued in the U.S. ranked sixth on the list, same as the ranking of patent grants in 2018, the historical record. TSMC also ranks first among the top ten patent holders in the U.S. in terms of patent approval rate. The number of global patent grants accumulated has reached 45,000, and 27,000 of which were the contributions of 73 recognized [TSMC Prolific Inventors](#). Meanwhile, TSMC encourages employees to file their inventions for patent applications. In 2020, 459 employees contributed for the first time to a total of 387 U.S. patents.

Four Initiatives of Patent Management Mechanism

TSMC implements four IP management initiatives under an all-around patent management mechanism to protect the Company's R&D results and technology leadership. The initiatives include strategic patent profiling, competitive mining and generating, portfolio construction, and portfolio parading.

TSMC's all-around patent management mechanism involves a review mechanism, reward system, promotion education, and talent training programs. The Company has established a grading mechanism for patent prosecutions that reviews invention disclosures, manages entire patent application process, and expands patent families. It maximizes existing resources to generate a highly strategic patent portfolio that has significant global influence. Meanwhile, TSMC employees are encouraged to continuously file their inventions through diversifying innovation-driven mechanisms.



Patent Achievements with Quality and Quantity in 2020



Patent Applications

- **6,900** global patent applications, including over **3,500** U.S. patent applications
- Ranked **3rd** in most U.S. patent published applications, setting a new record
- Ranked **1st** in patent published applications in Taiwan for five consecutive years



Patents Granted

- Nearly **4,600** global patent grants, including over **2,800** U.S. patents
- Ranked **6th** in patent grants in the U.S. at a record-high, same as the ranking in 2018
- Ranked **1st** in patent grants in Taiwan



Patent Quality

- Highest patent approval rate at **99%** among the **Top 10** U.S. patent holders



In 2020, the annual TSMC Patent Campaign successfully attracted nearly 1,400 entries of inventions, and about 3,000 employees joined the Online Quiz on patent knowledge. Meanwhile, the cross-function Leading Technology Invention Forum held eight forums to discuss six emerging technologies and received more than 700 inventions.

TSMC also proactively maintains close ties with both domestic and international patent offices through technical exchanges, assisting patent examiners in better understanding the technical content of TSMC, and consequently accelerating the patent examination process in order to obtain high-quality patent protection. In 2020, TSMC was invited to share the Company's experiences in IP management in four industry-government-academia IP seminars, contributing to the widespread of IP education and talent cultivation, and facilitating an upgrade in IP protection. Meanwhile, TSMC also shares practical experiences and insightful advice on patent mechanisms and reviews efficiency to help build a comprehensive IP protection mechanism.

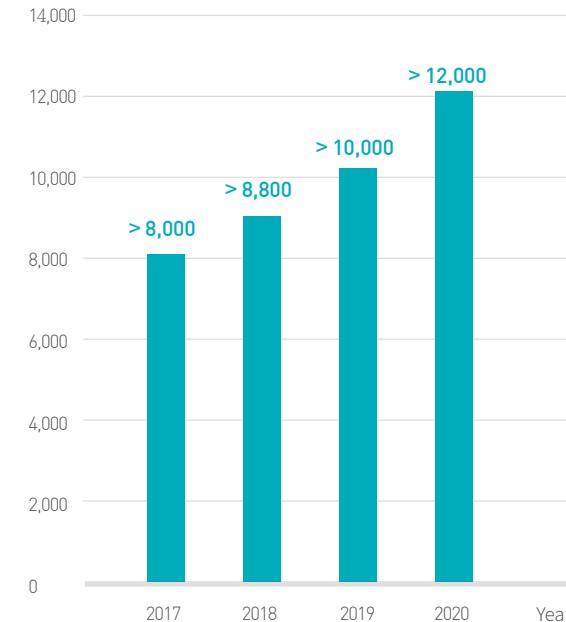
Trade Secret Protection

TSMC's stable core business is the foundation in fulfilling its corporate social responsibility. As TSMC's most important intellectual property, trade secrets are not only vital to TSMC's competitiveness, but also the driving force behind its sustainable innovation. Therefore, TSMC built up the Trade Secret Registration and Management System to record and track trade secrets that contribute

to the Company's technology leadership, manufacturing excellence, and customer trust. As of December 2020, over 100,000 trade secrets have been registered and recorded by more than 30,000 employees in the system.

TSMC proactively and systematically manages its key trade secrets as formatted records. Adhering to its culture of innovation and attitude of pursuing excellence, TSMC constantly improves its Trade Secret Registration and Management System by actively applying artificial

Number of Trade Secrets Registered Each Year

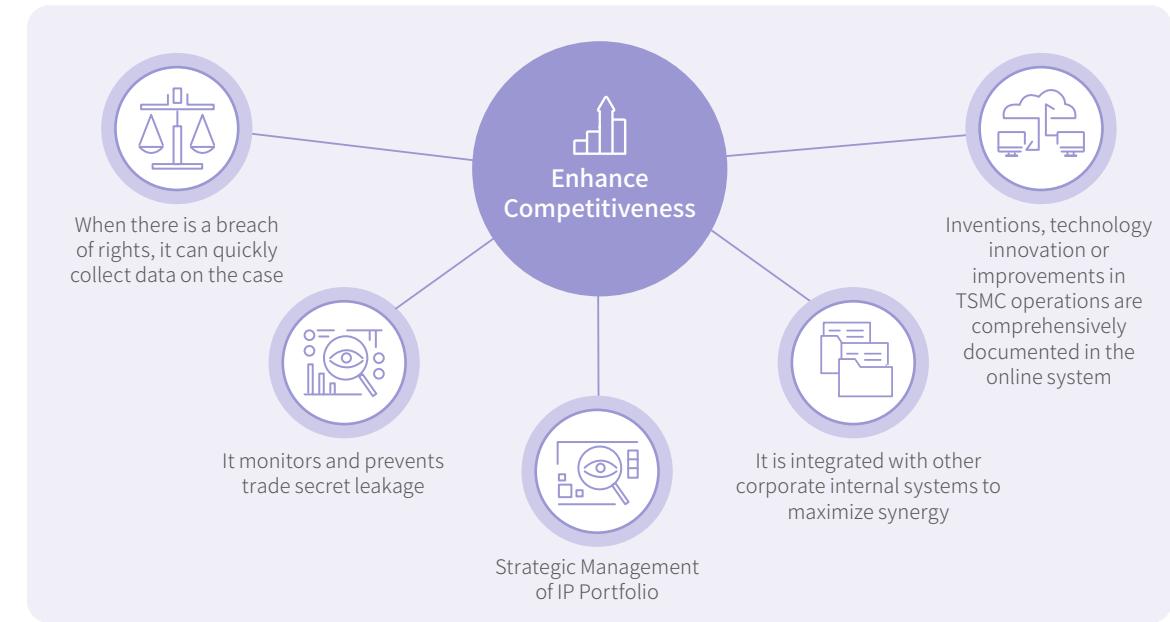


intelligence technology to keep up with the updates in technology trends and clusters. The Company also established a talent pool to maximize the operational efficiency and benefits of this Trade Secret Registration and Management System for sustainable technology innovation and strengthened overall competitiveness.

TSMC is fully committed to continuously enhance trade secret management to maintain an innovative culture. To recognize employees for their outstanding contributions

to the Company, TSMC presents the "Golden Trade Secret Award" every year to registered trade secrets that have the most significant impact on company competitiveness. As of 2020, TSMC has presented 1,616 Golden Trade Secret Awards to more than 4,000 inventors. In 2020, TSMC Chairman Dr. Mark Liu conferred special awards in appreciation of the talented inventors who have earned numerous awards and honors throughout the past six years.

Benefits of the Trade Secret Registration and Management System





Intelligent Trade Secret Management System Powered by Intelligent Automation and AI

Integrated with Human Resources System Integration

TSMC's trade secret registration system integrates with the human resources system and automatically updates employees' registration information in its human resources file. This serves to highlight employees' contributions to TSMC's technological innovations and serve as an important indicator for supervisors to consider for performance evaluation and promotion

Intelligent Reminder Function

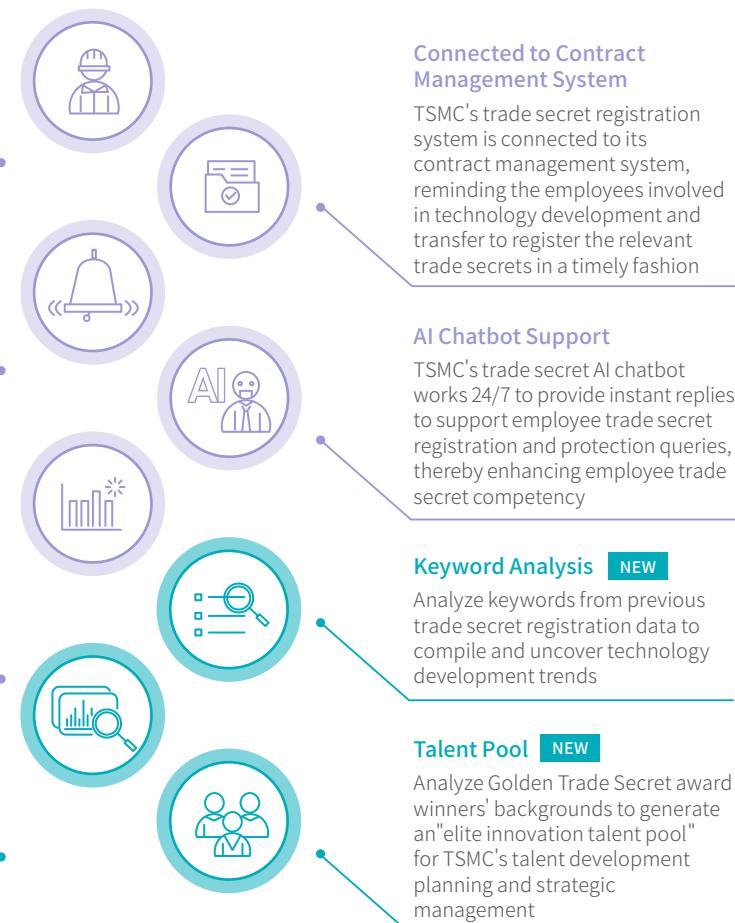
The trade secret system automatically compares employees' trade secret registration records, and reminds them to complete the registration process in a timely manner

Real-time Data Visualization Analysis

TSMC systems uses advanced information analysis software to visualize trade secret registration data and provide employees with real-time updates and precise data on the quantity of registrations, allowing them to more effectively understand their registration status and adjust their registration strategies more efficiently

Technology Cluster NEW

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



Intelligent Precision Manufacturing

As the world's leading semiconductor foundry service provider, TSMC is the first to realize automated manufacturing. The Company has applied AI to the big data and machine learning platform for wafer fabrication to create an intelligent manufacturing environment featuring self-diagnosis and self-feedback capabilities. In response to the increasingly diversified and growing need for high-quality chips, TSMC initiated a comprehensive digital transformation. Digitized fabs are launched to transform the manufacturing process. With automated data collection, system assistance and AI judgment, process efficiency per batch is increased by 30% to 40%. In accelerating intelligent manufacturing, TSMC has also built an AI quality control system for wafer fabs to ensure production quality, facilitate benchmarking among different fabs, and strengthen technology transfer capacity.

In intelligent manufacturing, TSMC introduced augmented reality (AR) and mixed reality (MR) technologies to enable cross-fab collaboration remotely. In 2020, iWorker, a remote work system was further adopted to enhance remote access management and internet traffic control. The system allows for over 2,000 employees to work from home simultaneously during peak hours in one day, which is a timely solution to limited access to regular workplaces as a result of the COVID-19 pandemic.

Since TSMC first introduced automated transport and overhead hoist transfer (OHT) systems to 8-inch fabs in 2019 along with the demand forecasting and dispatch

system, automated transport per day has exceeded 150,000 times as of December 2020. By providing a safe and friendly work environment, the systems help more than 3,000 employees increase work efficiency by 10 to 15%. The adoption effectively increases productivity and reduces risks of ergonomic injuries resulting from the handling of heavy objects.

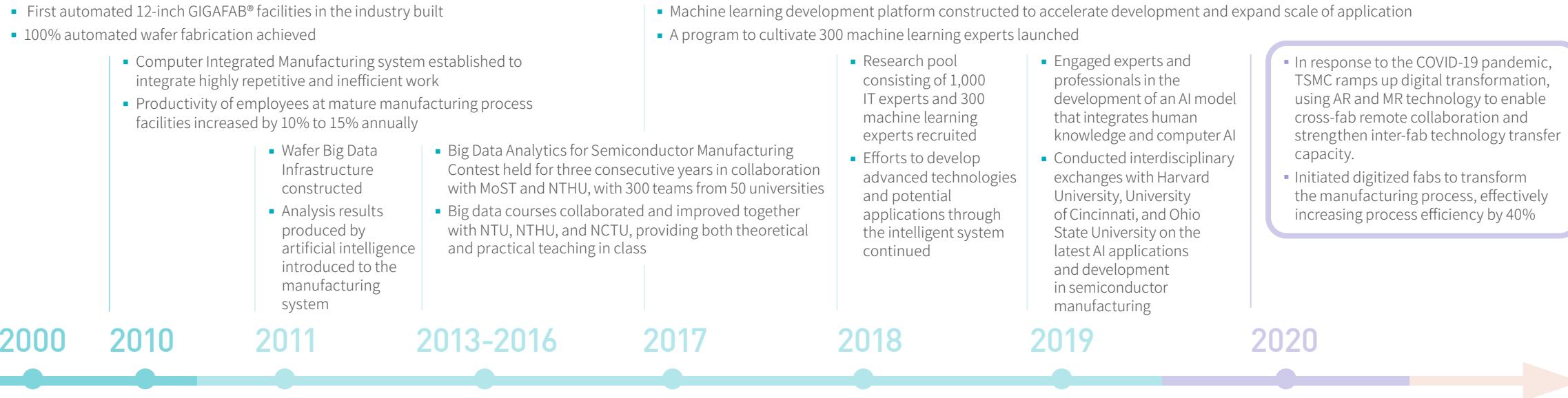
Armed with intelligent precision manufacturing technology, TSMC is expected to move towards intelligent assistive manufacturing and switch to fully automated intelligent manufacturing. TSMC will continue to inject innovation vitality into the global IC industry and be a trusted, long-term partner with our customers.



TSMC led the semiconductor industry by realizing automated manufacturing.



Timeline of Intelligent Precision Manufacturing



Automation Launched
Enhanced Automation

Intelligent Manufacturing Launched

Cross-field Talent Cultivation

Enhanced Intelligent System

Enhanced Intelligent Pool

AI and Knowledge Integration

Digital Transformation

Automated Manufacturing

Equipment Automation
Material Transfer Automation
Wafer Dispatching Automation

Wafer Big Data Infrastructure

Integrated Data Platform
High-performance Computing

Machine Learning Platform

Intelligent Manufacturing

Experts Take Part in Intelligent Model Development
Expert Knowledge Base
Target Analysis
Manufacturing Process Characteristics
Process Interdependence
Data Preprocessing

Intelligent Scheduling and Precise Dispatching
Ergonomic Productivity Enhancement
Equipment Productivity Optimization
Manufacturing Process and Equipment Control
Quality Monitoring and Control

Augmented/Mixed Reality
AI Quality Control
Digital Fab
Remote Work System

Cross-fab Remote Collaboration
Intelligent Precision Manufacturing
Inter-fab Technology Transfer



Open Innovation Platform®

TSMC's Open Innovation Platform® is a comprehensive design technology infrastructure that continuously drives innovation. It encompasses all critical IC implementation areas to effectively reduce design barriers and improve customers' first-time silicon success. Throughout the collaboration with OIP partners, spanning among five alliances of Electronic Design Automation (EDA), Intellectual Property (IP), Cloud, Design Center Alliance (DCA) and Value Chain Aggregator (VCA), TSMC actively

synergizes and realizes innovative thinking, under the common goal of shortening design cycle time, time-to-volume, time-to-market, and ultimately time-to-revenue.

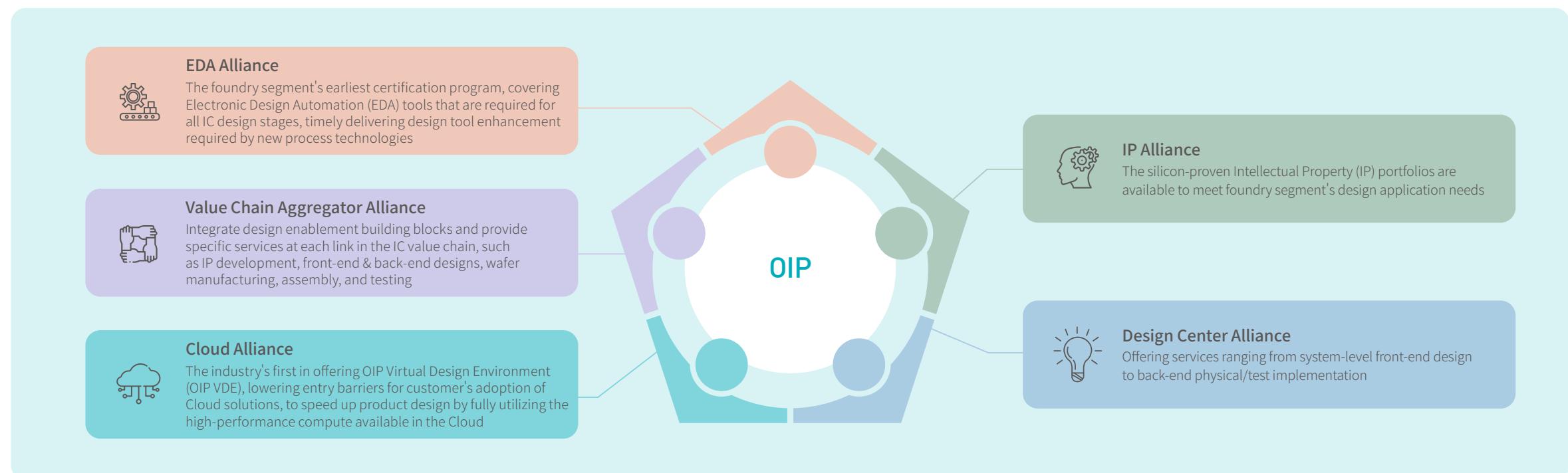
As OIP moves into its 13th anniversary, TSMC has been facilitating the collaboration & communication annually with OIP alliance partners on the latest process requirements, to infuse the most advanced semiconductor technology know-hows into their EDA, IP, Cloud products, and design services. Thus, TSMC

continues to expand its ecosystem solutions to be timely available to customers so they can enhance Power, Performance and Area (PPA) in their products. This helps achieve co-optimization among TSMC process technologies, OIP enablement solutions, and customer product designs. By 2020, TSMC had provided customers with more than 12,000 different technology files and 450 Process Design Kits (PDKs) via TSMC-Online™ from 0.5um to 3nm, as well as a portfolio of more than 35,000 IP titles from 0.35um to 3nm. Those deliverables support

customers for quick & reliable design and delivery of innovative products to fuel the incessant growth of global technology development.

In August 2020, TSMC held its online Technology Symposium and OIP Ecosystem Forum for the first time to maintain an important and close connection with worldwide customers and ecosystem partners during the COVID-19 pandemic.

TSMC's Five OIP Alliances





During the annual events, a complete set of design solutions were unveiled jointly with OIP alliance partners, as a result of tight partnership, to address the market demands for application-specific platforms of Mobile, High Performance Computing (HPC), Automotive, and IoT in the aspects as shown in the graph on the right.

TSMC was recognized by IEEE, the world's largest professional association dedicated to advancing technology, with the 2021 Corporate Innovation Award in December 2020 to highlight its leadership in foundry technologies along with its Open Innovation Platform®, which have enabled many revolutionary products in 5G mobile and energy-efficient, high-performance computing that have brought fundamental changes to the way we live and work.

"The IEEE extends its congratulations to TSMC for receiving the 2021 Corporate Innovation Award. TSMC's achievements in both developing 7nm technology, and enabling the innovations of IC designers everywhere, have placed it among a select group of organizations that have made lasting contributions to the field of engineering, and to the world."

—Dr. Toshio Fukuda, IEEE President and CEO

For the recognition of the contributions & outcomes that were delivered by OIP alliance partners from the collaborative activities, TSMC announced the 2020 OIP Partner of the Year Awards for Excellence in Accelerating Silicon Innovation.

Comprehensive Solutions in Advanced, Specialty and Wafer Level System Integration Technologies



Advanced Technology

3nm
(N3)

- Design solutions are ready for Power Performance Area (PPA) exploration for smartphone and HPC applications

5nm
(N5)

- Design solutions and ecosystem are ready and have been applied to real customer production chips
- Comprehensive automotive design solutions & ecosystem are under development

6nm
(N6)

- Design solutions and ecosystem are ready and have been applied to real customer production chips

7nm
(N7)

- Design solutions and ecosystem are ready and have been applied to real customer production chips
- Comprehensive automotive design solutions & ecosystem developed

N12e™

- Supports AI-enabled IoT products
- Contains design solutions for further speed/power enhancements

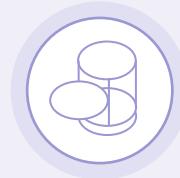
16nm

- Design solutions and ecosystem are ready and have been applied to real customer production chips
- Comprehensive automotive design solutions & ecosystem developed



Specialty Technology

- Integrated Specialty Technology Platform is established to provide optimal system-level solutions.
- The Platform covers NVM (Non-Volatile Memory), HV (High Voltage), Sensor, Bipolar-CMOS-DMOS (BCD), Ultra-Low Power/Ultra-Low Leakage (ULP/ULL), Analog, Radio Frequency (RF), and Logic technologies



Wafer Level System Integration Technology

- TSMC's 3DFabric™ is available to provide a family of advanced packaging solutions for Mobile and HPC design applications
- TSMC's 3DFabric™ provides solutions that comprise Front-End (FE) 3D technology for chip stacking using SoIC™ (System on Integrated Chips), and Back-End (BE) technology for advanced packaging using InFO (Integrated FanOut) and CoWoS® (Chip on Wafer on Substrate)
- Design reference flows are available to support customer's 3DIC designs in chip, packaging, and system integration implementation & verification to enable better system performance



University Programs

Talent cultivation is among the five primary sustainable development goals of TSMC. Through collaboration with universities, TSMC is dedicated to enhancing domestic talent quality and industry competitiveness through STEM education. In addition to offering consistent resources, TSMC initiates university programs under three main themes: research collaboration, talent cultivation, and career exploration for students. In 2020, TSMC founded the TSMC Scholarship for Ph.D. Students and expanded the scope of semiconductor and IC layout design courses in the curriculum. The Company also hosted events like the TSMC X Microsoft Careerhack to continuously invigorate the innovative momentum in the industry.

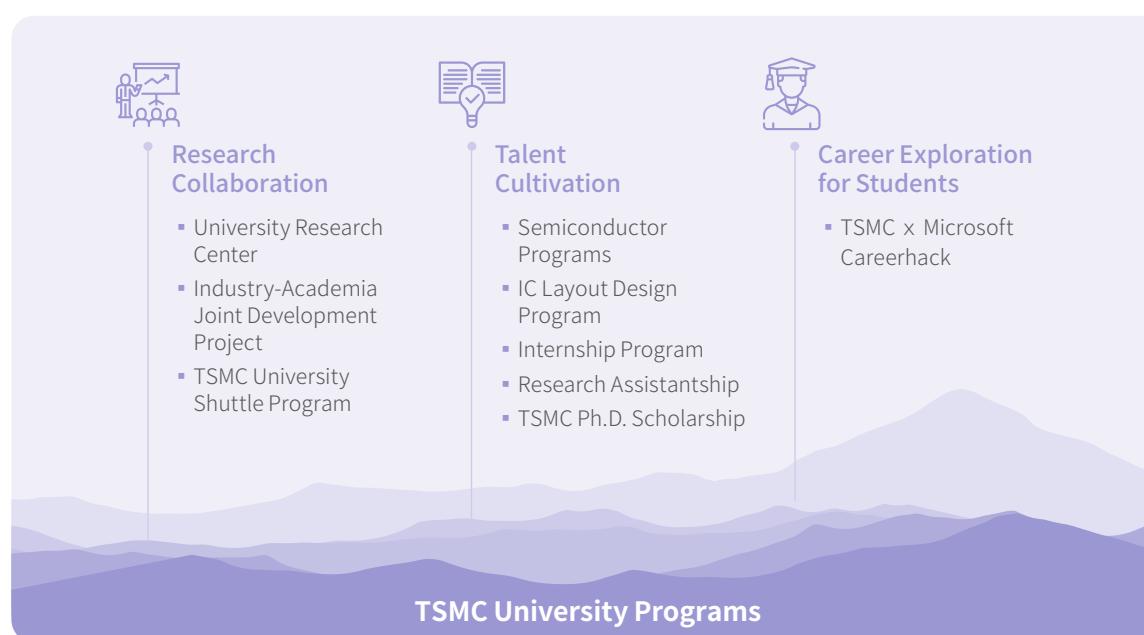
University Research Center

TSMC has established research centers in collaboration with top-ranked universities in Taiwan and dedicated research funds to encourage university professors to conduct groundbreaking semiconductor research projects. As the research centers strive to develop leading-edge technologies in semiconductor devices, material science, manufacturing process, and IC design, they are also training talents in semiconductor research. In 2020, more than 215 professors and 2,800 outstanding students in electronic engineering, physics, material science, chemistry, chemical engineering, and mechanical engineering joined TSMC's university research centers.

Industry-Academia Joint Development Project

TSMC works with universities in Taiwan and overseas to promote joint development projects. A variety of innovative research topics cover technologies in transistors, conductors, materials, simulation, and design technology. In 2020, TSMC collaborated with 89 professors in 25 universities on 86 industry-academia joint development projects. The annual research funds exceed NT\$338 million, and over 157 U.S. patent applications were filed.

86 Number of Industry-Academia Joint Development Projects in 2020



Note: Learn more about the Internship Program in Talent Attraction and Retention- Talent Recruitment in this report.

University Research Center & Industry-Academia Joint Development Project

Collaboration Project	University	Beneficiary/Collaboration Details	Dedicated Resources
University Research Center	<ul style="list-style-type: none"> ▪ National Yang Ming Chiao Tung University ▪ National Taiwan University ▪ National Cheng Kung University ▪ National Tsing Hua University 	Beneficiary/Students and professors Offer research assistantship to encourage outstanding students to focus on the study of semiconductor devices, materials, manufacturing processes, and IC design without financial burdens	NT\$17.88 million Nearly NT\$17.88 million awarded in 2020 to 186 students ^{Note}
Industry-Academia Joint Development Project	<ul style="list-style-type: none"> ▪ <u>10 universities in Taiwan and 15 universities overseas</u> 	Beneficiary/Professors Offer research funds to encourage university professors to propose new semiconductor research programs and cultivate semiconductor talents	NT\$388 million A total of NT\$338 million in research funds dedicated to 86 joint development projects in 2020

Note: The maximum grant amount given to an undergraduate department is 100 thousand, 120 thousand to a graduate program, and 360 thousand to a Ph.D. program. Grants were given to 86 undergraduate students, 55 graduate students, and 45 Ph.D. students in 2020.



TSMC Ph.D. Scholarship NEW

To facilitate the quality and R&D capabilities of key talents in Taiwan's semiconductor industry, TSMC launched a new Ph.D. scholarship in 2020, offering Ph.D. students NT\$500,000 in grants per year to a maximum of five years, NT\$2.5 million in total. The scholarship program also invites senior TSMC managers to be mentors in collaboration with university professors. By offering industry-academia research resources, outstanding students are encouraged to pursue Ph.D. degrees in studies pertinent to the semiconductor industry. A total of 22 students received the scholarship in 2020.

"I am honored to have received the recognition of TSMC's Ph.D. Scholarship and benefited from meeting the experienced mentors. Every lesson learned from the mentor gives me an in-depth understanding of the industry. I really appreciate TSMC for the resources and opportunity."

—Sheng-Tsung Lai, Ph.D. Student,
Department of Electrical Engineering,
Yuan Ze University

"Receiving TSMC's Ph.D. Scholarship is a huge encouragement for me. It's more than just a financial relief to me. The mentoring program enables me to more vividly envision my future research direction and life goals."

—Han-Fang Hsueh, Ph.D. Student,
Division of Electronic Materials,
Department of Materials Science and Engineering,
National Taiwan University

Advanced IC Design Program

The complexity of IC design rises with the rapid advancement of design applications in 5G, AI, and high-performance computing. In keeping up with Moore's Law that drives the development of 5nm and more advanced technologies, it is becoming increasingly challenging for wafer manufacturing technologies to seamlessly cater to customer's IC designs. To ensure the competitiveness in power, performance, and area (PPA) of end products, TSMC is leading the industry in the cultivation of top IC design and layout talents well-versed in design & technology co-optimization (DTCO).

"TSMC's Advanced IC Design Program is very helpful in eliminating the industry-academia gap. Especially with TSMC instructors offering first-hand industrial knowledge, students get a more concrete sense of the industry's demand and the most up-to-date advanced process technologies. The program also helps students better identify their future goals and career plans."

—David Hung-I Su, Adjunct Professor
at the Department of Engineering and System Science,
National Tsing Hua University



TSMC's Involvement	Course Detail	Frequency/Beneficiaries	Partnering University
<p>TSMC Advanced IC Design Program (Pre-courses) NEW</p> <p>University instructors</p> <ul style="list-style-type: none">Theories and teachings <p>TSMC instructors</p> <ul style="list-style-type: none">Conduct circuit design case studiesDemonstrate IC design flow in advanced technologies NEWIntroduce key IC manufacturing process, layout techniques and IP resourcesOffer onsite tutorials and Q&AOffer summer internship opportunities	<p>Introduction to IC design and 3D IC in advanced technologies NEW</p> <p>Standard cell design in advanced technologies NEW</p> <p>IC layout</p> <p>IC layout in advanced nodes and apply AI in assisting IC layout NEW</p>	<p>6 hours Six hours per school</p> <p>800 students The complete program is to be launched in 2021. An estimate of 800 students will join the program.</p> <p>150 students A total of 150 students in 2020</p>	<ul style="list-style-type: none">National Tsing Hua University NEWNational Yang Ming Chiao Tung University NEWNational Taiwan University of Science and Technology NEW <p>More universities are next in line to join the program.</p>
<p>TSMC-NTUT IC Layout and Design Courses</p> <p>University instructors</p> <ul style="list-style-type: none">Theories and teachings <p>TSMC instructors</p> <ul style="list-style-type: none">Conduct circuit design case studiesDemonstrate IC design flow in advanced technologies NEWIntroduce key IC manufacturing process, layout techniques and IP resourcesOffer onsite tutorials and Q&AOffer summer internship opportunities	<p>Introduction to IC design and 3D IC in advanced technologies NEW</p> <p>Standard cell design in advanced technologies NEW</p> <p>IC layout</p> <p>IC layout in advanced nodes and apply AI in assisting IC layout NEW</p>	<p>18 lessons 18 lessons/semester</p> <p>150 students A total of 150 students since 2016</p>	<ul style="list-style-type: none">National Taipei University of Technology



In 2020, the pre-courses of TSMC Advanced IC Design Program was first launched in National Tsing Hua University as an extended program based on the TSMC-NTUT IC Layout and Design Course that has been running for six years. A team of TSMC professionals carefully design course materials with a goal to expand the original IC layout courses into a comprehensive IC design program. In the courses, students learn about how TSMC maintains its technology leadership while shorting customers' time-to-market with DTCO design solutions, including electronic design automation (EDA) tool certification and design flow enablement for each new process technology. In December 2020, the pre-courses was launched at National Tsing Hua University, National Yang Ming Chiao Tung University, and National Taiwan University of Science of Technology.

The official launch of the TSMC Advanced IC Design Program will take place in the first semester of 2021. TSMC has also planned differentiated compensation packages as an incentive for students who finish the program to join the industry upon graduation. TSMC endeavors to continuously incubate semiconductor

"The six-hour pre-course of TSMC's Advanced IC Design Program is invigorating. It not only deepens my understanding of TSMC but also gives me a clear view of practical IC design flow in advanced technologies. It has intrigued me to further join the semiconductor industry and thrive."

—Hung-Teng Wu, participant of the pre-course of TSMC Advanced IC Design Program and student of the Department of Power Mechanical Engineering, National Tsing Hua University

talents on campus and contribute to the growth of a domestic talent pool for semiconductor and IC design.

University Shuttle Program

Committed to the cultivation of semiconductor talents, TSMC helped professors and students of 16 universities around the world in turning IC design into actual chips and verifying their designs in application through the TSMC University Shuttle Program in 2020. The free-of-charge support also gives students a chance to access TSMC's industry-leading manufacturing process.

While over 70% of the schools involved in TSMC University Shuttle Program switched to teaching remotely in the wake of the COVID-19 pandemic in 2020, the program has not been jeopardized by the pandemic and distance. The number of publications made through the TSMC Shuttle Program of the year reached 93 in the year. In addition, the program has proven that student research is more than just innovative ideas but highly feasible designs that can become high-yield chips with the help of TSMC. Moreover, ten papers of the total publications were elected into the International Solid-State Circuits Conference (ISSCC), a prestigious conference known as the "Olympics of IC design."

In addition to 5G, wireless communications, memory application, Artificial Intelligence, wearable devices, security applications, and biotechnology, the research fields for the program in 2020 also covered global sustainability trends like low-energy-consumption technologies. Researches on energy efficiency, including UCLA's radio frequency research, Stanford

University's biomedical research, UC Berkeley's wireless communications research, University of Michigan's pulse-injection crystal oscillator design, National Tsing Hua University's research on memory, and many applied research of National University of Singapore, are a strong indication that contemporary research is no longer focused on technological feasibility only. Power-saving features and durability which are the key factors in sustainable commercialization were also covered by the research.

"We have been working with the TSMC University Shuttle Program for the past years in the rapidly changing, wide range of memory applications. In addition to having cultivated numerous students of excellence dedicated to memory research, we regularly share our research findings at globally renowned conferences and journals which are met with acclamation across the industry, academia, and research institutions."

—Dr. Marvin M.F. Chang, Distinguished Professor at the Department of Electrical Engineering, National Tsing Hua University

"Thanks to the TSMC University Shuttle Program, the innovations we've worked tirelessly on were finally realized. Also, the early exposure to TSMC's industry-leading technologies gave me a competitive edge over my peers during job hunting."

—Dr. Win-San Khwa, Department of Electrical Engineering, National Tsing Hua University, a former participant of the TSMC University Shuttle Program
(Now a Corporate Research engineer at TSMC)

2020 University Program Manufacturing Technology and Field of Research

Manufacturing Technologies Provided to Students



- Non-volatile memory (NVM)
- Mixed signal circuits
- Analog signal circuits
- RF circuit design
- Digital signal circuits
- Ultra-low power (ULP)

Research Applications in Recent Years



- 5G and wireless communications
- Memory applications
- Artificial Intelligence
- Wearable devices
- Security applications
- Biotechnology
- Automotive and drone related radar applications
- Data center internet backbone



Key Academic Collaborators and Research Direction in 2020

University	Professor	Research Project Title	Innovative Results	Application
National Taiwan University	▪ Shen-luan Liu	▪ Phase-locked Loop Based on Oscillator and Filter Integration	▪ Improve the sensitivity of voltage and temperature; fast phase lock with different input signal	●
National Taiwan University	▪ Tai-Cheng Lee	▪ Phase-locked Loop Based on Voltage Controlled Oscillator Using Sub-sampling Technique	▪ Sub-sampling techniques applied to a voltage-controlled oscillator to effectively reduce noise under 5G high-frequency environment	●
National Tsing Hua University	▪ Chrong-Jung Lin ▪ Ya-Chin King	▪ Stackable 3D Resistive Random Access Memory (RRAM)	▪ Identical chip size to allow for more usable memories under three-dimensional structures	● ●
National Tsing Hua University	▪ Meng-Fan Chang	▪ Color image recognition and high energy-efficient computation using Resistive Random-Access Memory (RRAM) and Static Random Access Memory (SRAM)	▪ High-speed parallel computational memory featuring both storage and computation functionalities to drastically reduce the latency and space overheads of data movement in traditional edge processors, thereby speed up computation and reduce energy consumption	● ● ●
National University of Singapore	▪ Massimo Alioto	▪ Error-correcting and Physically Unclonable Function (PUF) Based Key Generation Architecture	▪ Equipped with error correcting function integrated with machine learning to significantly reduce voltage and temperature sweeps compared with traditional unclonable key generation structure	●
National Yang Ming Chiao Tung University	▪ Shyh-Jye Jou	▪ A Communication Millimeter-wave Baseband System with Self-healing and Testing functions	▪ Using Smart Sensing Technique and calibration method to reduce the complexity of analog circuit design and increase communication throughput	● ●
National Yang Ming Chiao Tung University	▪ Wei-Zen Chen	▪ 112-Gb/s PAM4 Cable Transmitter and Receiver	▪ A novel optimized algorithm for data/clock recovery on circuit, integrated with ultra-low-noise frequency synthesis technique to enhance modulation capacity	● ●
National Yang Ming Chiao Tung University	▪ Yen-Cheng Kuan	▪ W-band Multi-user Interference-tolerant Radar System	▪ High-precision frequency hopping radar system supporting simultaneous operations of multiple users without interfering with one another	● ●
University College Dublin	▪ Robert Bogdan	▪ Low-power Phase-locked loop Based on Charge-Sharing Locking Quadrature	▪ Suppress oscillator phase noise and achieve ultra-low jitter through enhancing phase noise endurance and injecting energy into oscillator	●
University of Michigan	▪ David Blaauw ▪ Dennis Sylvester	▪ Ultra-low-power Crystal Oscillator with High-energy Pulse Injection	▪ Injected with frequency-divided, high-energy, low-frequency pulse to significantly reduce power consumption and disturbing of the crystal oscillator	●



Case Study

Virtual Design Environment (VDE) in the Cloud Created a New Model for Industry-academia Collaboration, Contributing to the Tape-out Success of TSMC's First Academia-Developed 16nm FinFET Chip through University Shuttle Program

TSMC continues to expand R&D activities to secure its leadership in semiconductor technologies. As the development of TSMC's advanced manufacturing technology is moving forward at full speed while also maintaining the protection of TSMC proprietary information, TSMC launches the University Shuttle Program to share its process technologies with university professors and students for research. The program actively bridges the gap between academia and the industry.

"Through VDE, the first N16 FinFET University Shuttle Program chip tapeout was achieved. Stanford University and TSMC have created an innovative model for industry-academia collaboration that amplifies top research results by integrating advanced industrial process technology. It inspires more innovation to become a reality in the semiconductor industry."

—Dr. Philip Wong, Chief Scientist at TSMC

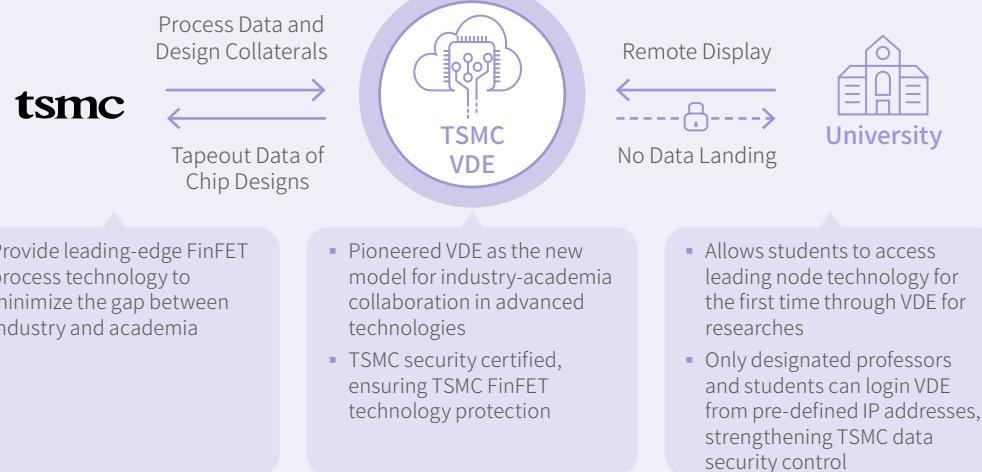
"TSMC University Shuttle Program in conjunction with the Virtual Design Environment in the cloud is simply an unprecedented combination. Students get to realize their innovative ideas using industry-leading advanced process technology. It is an incentive to attract more talents to join the semiconductor industry."

—Dr. Mau-Chung Frank Chang,
Distinguished Professor at UCLA

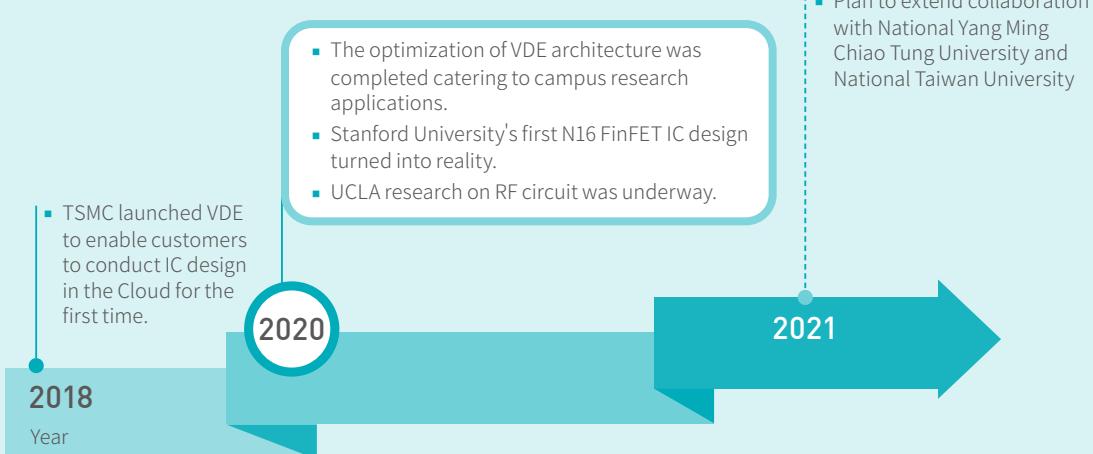
In 2020, TSMC expanded the architecture of Virtual Design Environment (VDE) in the cloud that was originally intended only for customers. After eliminating the concerns in information security, universities now can access TSMC advanced technology process database via VDE remotely to support research and teaching on IC design. This innovative cloud-based solution has greatly helped universities to take a stride directly into N16 FinFET technology for the first time, by two to three generations ahead of previously applicable process technologies in 40nm and 28nm.

To amplify the impact of TSMC's University Shuttle Program, TSMC offered N16 FinFET technology to universities in 2020, starting from the long-term industry-academia collaboration with Stanford University in the United States. A research team led by Dr. Mark Horowitz of Stanford's Electrical Engineering Department was the first to adopt the Virtual Design Environment (VDE) for the research on AI accelerator chips for deep neural network (DNN) in N16 FinFET technology. In December of the same year, the research team transmitted the IC layout design through VDE to TSMC and completed tapeout. Through TSMC's University Shuttle Program, the IC design was realized in actual silicon. This is the first N16 FinFET chip created by academia through TSMC University Shuttle Program and it advanced AI research in a big way.

Meanwhile, another long-time partner, the UCLA research team has also started research on RF circuits based on N16 FinFET process technology via TSMC VDE that will be under the guidance of distinguished professor Dr. Mau-Chung Frank Chang.



TSMC University Shuttle Program Facilitates Foresight IC Design



Product Quality

Strategies



Enhance Quality Culture

- Promote continuous improvement programs to enhance the internal quality culture
- Encourage local suppliers to participate in the Taiwan Continuous Improvement Award to strengthen a culture of quality and competitiveness within TSMC's local supply chain



Improve Quality Capability

- Leverage machine learning to construct a visual defect inspection and classification system for outgoing 12-inch wafers to increase employee productivity

2030 Goals

- Generate up to **NT\$ 20 billion** in value from improvement projects and involve outstanding projects in the Taiwan Continuous Improvement Award
- Encourage **100%** of major local raw materials suppliers and **75%** of back-end packaging materials suppliers to participate in the Taiwan Continuous Improvement Award; **60%** to advance to the finals^{Note1}

2021 Targets

- Generate **NT\$ 12 billion** in value from improvement projects and involve at least five outstanding projects in the Taiwan Continuous Improvement Award
- 100%** of major local raw materials suppliers and **50%** of back-end packaging materials suppliers to participate in the Taiwan Continuous Improvement Award; **20%** to advance to the finals **NEW**

2020 Achievements

- Generated more than **NT\$ 15 billion** in value from improvement projects and involve **6** outstanding projects in the Taiwan Continuous Improvement Award
Target: NT\$11 billion; 5 projects
- 79%** of major local raw materials suppliers to participate in the Taiwan Continuous Improvement Award
Target: 100%
- 46%** of back-end packaging materials suppliers to participate in the Taiwan Continuous Improvement Award
Target: 30%

V Achieved ↑ Exceeded — Missed Target



Note2



Note 1: Major 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 COVID-19 pandemic, fewer suppliers were involved with the award. The suppliers not engaged with the award shared experiences remotely.



(Continued from previous page)

V Achieved ↑ Exceeded — Missed Target

Strategies



Improve Quality Capability

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

- Strengthen management for hazardous substances to improve green manufacturing



Realize Quality Application

- Complete reliability qualification 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

2030 Goals

- Develop the ability to analyze **100%** of CMR (Carcinogenic, Mutagenic, and Reprotoxic) substances and help major suppliers develop the same capabilities

- N-methylpyrrolidone (NMP) **100%** replacement (Base year: 2016)

- No process involves Perfluoroalkyl Substances (PFASs) that have more than four carbons

- Complete reliability qualification 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.

2021 Targets

- Develop the ability to analyze **100%** of CMR substances and help **20%** of the major suppliers to develop the same capabilities **NEW**

- Reduce the use of NMP by **95%**

- VisEra requires photoresist suppliers to complete the assessment and selection of substitutes for Perfluorohexanoic acid (PFHxA) related substances and launch production line testing

- Complete reliability qualification for advanced process technologies, specialty process technologies, and wafer-level package process per the R&D targets

2020 Achievements

- Developed the ability to analyze **100%** of CMR substances
Target: 100% **V**

- Reduced the use of NMP by **59%**
Target: 95% **— Note3**

- Did not use PFASs with more than four carbons for the development of advanced processes of 3nm and below
Target: 100% **V**

- Completed reliability qualification for 5nm process technology volume production, 22nm Ultra-Low Leakage embedded MRAM IP, and the fifth-generation integrated Fan-Out packaging (InFO) **V**

Note 3: Reduction of NMP usage is limited to sites in Taiwan. Since the substitute chemicals affect the product yield in several sites, formula testing and adjustments were necessary. TSMC subsidiaries will proceed with chemical substitution in 2021.



TSMC strives to provide global customers with outstanding semiconductor foundry services. To continuously reduce product defect, while improving process control and the timely detection of abnormalities to avoid quality incidents that may affect our clients, the Quality and Reliability Organization works alongside other divisions to refine the quality management system. In 2020, TSMC precisely defined each process's identification for various packaging technologies to ensure quality control is implemented correctly at each stage. TSMC also synchronized the technology identification system with the customer-facing business units to enhance the coherence and accuracy of the flow from ordering to the production lines. In terms of system management, TSMC set up quality control procedures with clients (system providers) to ensure product quality.

Besides expanding its quality improvement efforts to VisEra, TSMC established Quality and Reliability laboratories across the globe to cultivate more advanced, efficient quality

analysis capabilities, which are the basis for continuously optimizing processes. Quality is the sound support for TSMC's technological advancement. In 2020, TSMC set up the highly automated Advanced Materials Analytic Center (AMAC), which adopts machine learning in analyzing the relevance between raw materials and process parameters to strengthen quality control of incoming materials.

Devoted to cultivating the next generation of quality management talents, TSMC continues to invest in the [Industry-Academia Joint Development Project](#). As of 2020, the Quality and Reliability Organization has completed 16 research projects with five universities, covering subjects of materials, process, and chip designs. A portion of research results has been introduced to the development of TSMC advanced processes. Meanwhile, TSMC has also [donated premium analytics and measurement equipment to universities](#) to elevate the quality analysis capabilities of academic institutions and strengthen the synergy of industry-academia collaborations.

TSMC Quality Management System



Design Service

- IP/Library Development
- Quality Assurance
- Design Kits Deliverables Management



Tech Development

- SPICE Model Management
- Process Technology Development Management
- Built-in Reliability Test
- Process Release Standard



Mask Making

- Remote Mask DB Check
- iTapeOut
- eJobView
- Mask Defect Inspection



Wafer Manufacturing

- Incoming Quality Control Note 1 NEW
- Advanced Process Control
- EQ Real Time Monitor
- Process Reliability Monitor
- Wafer Acceptance Test
- Outgoing Quality Gating



Backend Service

- Process Quality Control Note 2 NEW
- Package Reliability Monitor
- Outgoing Quality Gating
- System Quality Procedure Note 3 NEW



Customer Satisfaction

- Customer Claim Management
- Annual Customer Satisfaction Survey

Quality Tools Application

Potential Failure Mode & Effect Analysis

Control Plan

Statistical Process Control

Measurement System Analysis

Continuous Improvement-8Ds

Change Control Platform

Failure Analysis

Supplier/Subcontractor Quality Management

Note 1: Leverage machine learning to analyze the correlation between raw materials and TSMC process control parameters; build the highly automated Advanced Materials Analytic Center (AMAC) to enhance the raw material detectability.

Note 2: Optimize the naming rules for different packaging technologies to enhance the raw material detectability.

Note 3: Build related quality control procedures to have better cooperation with the system-level customers to ensure product quality.

Enhance Quality Culture

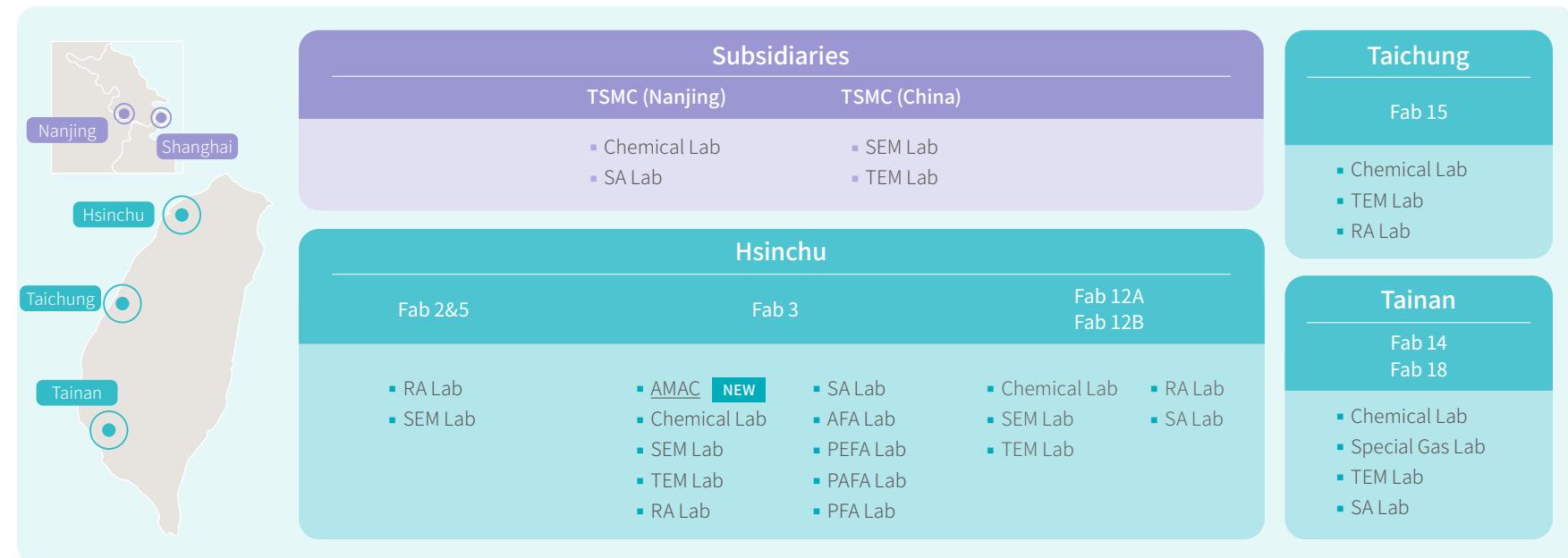
Quality is the cornerstone of sustainable development for TSMC. To ensure product quality and customer satisfaction, TSMC strives to improve the quality system and methodology. In 2020, the Quality and Reliability Organization held company-wide conferences such as the Total Quality Excellence and Innovation Conference (TQE), training programs, and quality improvement projects on experiment design, statistical process control, measurement technologies, machine learning, and quality auditing. These programs aim to deepen TSMC employees' problem-solving capabilities.

TSMC has held TQE for 28 years, which is a rewarding mechanism of public recognition. In 2020, a knowledge sharing platform for outstanding projects had been created as a new approach of TQE. Organizations and divisions were encouraged to learn from one another, sparking innovation in quality improvement. In 2020, TSMC employees submitted more than 10,000 improvement projects, generating more than NT\$15 billion in value. Notably, more than 240 projects recognized by the TQE are now published on the platform. As of December 2020, the posts have earned more than 300,000 clicks.

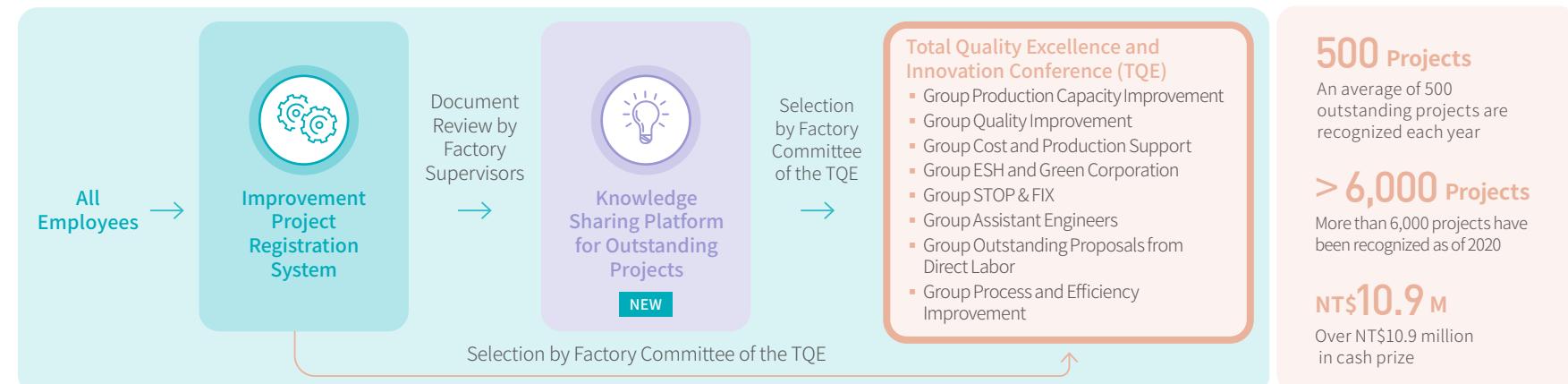
Moreover, TSMC puts up posters to promote quality in all sites, strengthening the commitment to quality among TSMC employees. In 2020, more than 99% of our employees stated that the posters and sharing of the outstanding projects are beneficial to raising awareness towards quality.

TSMC established a new theme - STOP & FIX - in 2019 to encourage our employees to take the initiative to prevent potential quality abnormality or outdated operation standards. In 2019, the category received 5,500 cases. By 2020, a total of over 6,500 cases were submitted, generating more than NT\$4.4 billion in value due to the improvement projects.

TSMC Quality and Reliability Laboratory Network



TSMC Company-wide Quality Culture



Timeline of Total Quality Excellence and Innovation Conference (TQE)

Progress	Key Tasks
2001-2008 Preparation stage	<ul style="list-style-type: none"> Digitize the project submission system (including project registration, review, and calculation of benefit value)
2009-2014 Expand the recognition of outstanding projects	<ul style="list-style-type: none"> Set outstanding project standard
2015-2019 Optimize application process and recognition themes	<ul style="list-style-type: none"> Optimize the inquiry function of the submission system Add report analytics to the submission system
2020 and beyond Strengthen organizational learning	<ul style="list-style-type: none"> Build the knowledge-sharing platform for outstanding projects

█ Accumulated Proposals (Unit: 10,000)
— Accumulated Effectiveness (Unit: NT\$ 100 million)
— Accumulated Bonus (Unit: NT\$ 10 thousand)

2020 TQE-Winning Cases

Group	Improvement Strategy	Improvement Benefit		
Production Capacity Improvement Improve production capacity of photomask tools	<ul style="list-style-type: none"> Established the three major automated systems <ul style="list-style-type: none"> Optimized scheduler system for photomask robotic arms Inspection system for photomask control wafers Integrated platform for photomask pattern inspection 	 Daily output increased	 Operation time reduced	140 million per year (NT\$)
Quality Improvement Improve the quality of photo-sensing products	<ul style="list-style-type: none"> Increased the concentration of ion implantation to increase color saturation Introduced 3D gates to reduce the after-image effect 	 Yield increased	 Increased rate of color saturation	After-image effect reduced by five times; such improvement allows photosensors to maintain ultra-high resolution as the size continues to become smaller
Cost and Production Support Breakthrough in the monitoring structure	<ul style="list-style-type: none"> A first-ever automated monitoring processing structure that calculates the optimized process and automatically selects programs and tools Increased monitoring flexibility, reduce the preparation time for monitoring and reduce the waste of production capacity 	 Increased rate of productivity of the monitoring staff	 Reduced rate of monitoring loss	120 million per year (NT\$)
ESH and Green Corporation Clean air free of ammonia safeguards our health	<ul style="list-style-type: none"> Vent renovation for tools that produce high concentrations of ammonia Increased the efficiency of ammonia removal by washing towers 	 Ammonia emission reduced by 28 tons/year, at a reduction rate of > 60%	 Reduced rate of Ammonia emission per product unit	45 million per year (NT\$)
STOP & FIX The exclusive technology of AI photomask image generation and matching	<ul style="list-style-type: none"> Designed innovative AI models that allow the computer to generate standardized photomask images 	 Intercepted photomasks that have quality concerns	 Reduced inspection time for photomask tools	
Assistant Engineers Tool maintenance and jig improvement	<ul style="list-style-type: none"> Optimized equipment maintenance Modularized jigs to reduce the hours required for tool maintenance 			38.4 million per year (NT\$)
Outstanding Proposals from Direct Labor Establish the first maintenance and repair center for automated wafer transportation	<ul style="list-style-type: none"> Developed recycling and reuse technologies for the motors Established a standardized calibration procedure for humidity sensor drift 	 Reduced alarm frequency	 Reduced motor scraps and calibration of humidity sensors, and reduced maintenance costs	30 million per year (NT\$)
Process and Efficiency Improvement NEW Strengthen IT security capabilities	<ul style="list-style-type: none"> Introduced IT vulnerability scanning tools Established a review mechanism for new systems; all new systems must pass the IT security review before going online Replaced 100% of software with no security updates 	 Reduced information security vulnerabilities significantly	 99 points scored for Corporate IT security, higher than the average score for semiconductor companies (90 points)	



TSMC is entirely devoted to improving quality. By participating in the Taiwan Continuous Improvement Award Competition, TSMC exchanges practical knowledge on quality improvement with peers from other industries and facilitates the advancement of all local industries. TSMC also encourages employees to observe and learn from the experiences of other sectors, which sparks innovation and problem-solving among the employees. In 2020, TSMC received five Golden Awards, one Silver Award, and one Best Innovation Award in the Taiwan Continuous Improvement Award Competition.

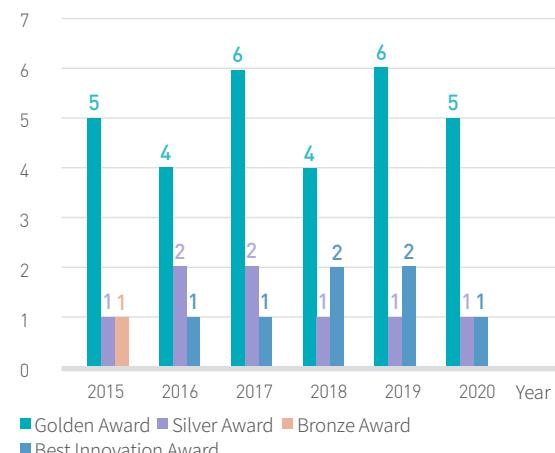
To facilitate the supply chain's sustainability, TSMC also encourages suppliers to participate in the Taiwan Continuous Improvement Award Competition. In 2019, 100% of the local major raw materials suppliers participated; in 2020, TSMC first expanded the scope to back-end packaging materials suppliers, 46% of whom participated. In 2021, TSMC will continue to improve participation and quality, aiming to achieve 50% of participation and 20% of advancement to the finals. In 2020, TSMC suppliers received four Golden Awards, five Silver Awards, and five Bronze Awards. To highlight such achievements in quality improvement, TSMC published the supplier award list on the [official website](#).

In 2020, while complying with COVID-19 regulations, TSMC's Quality and Reliability Organization promptly adjusted strategies and invited suppliers that did not participate in the competition to observe as a form of benchmark learning. TSMC's quality experts also offered consultation remotely, helping the suppliers pinpoint where to improve and selected appropriate improvement measures for their companies.

TSMC Track Record of Participating in the Taiwan Continuous Improvement Award Competition

Award	Improvement Benefit			
Golden Award & Best Innovation Award Establish new repair techniques for probe needles, increasing the productivity of package testing	18%	Increased probe needle efficiency	65%	Reduced maintenance time
Golden Award Revolutionize ion implantation for higher production capacity	18%	Increased production capacity	31%	Increased total production capacity of testing
Golden Award Improve defect inspection of automotive electronics products	89%	Improved large-scale wafer defect	15.7%	Increased production capacity
Golden Award Intelligent management of tool software that safeguards quality	100%	Software version control reached	97.9%	Reduced scraps
Golden Award Establish an intelligent online inspection system that increases efficiency	58%	Increased defect inspection efficiency	60%	Increased the percentage of intelligent automation

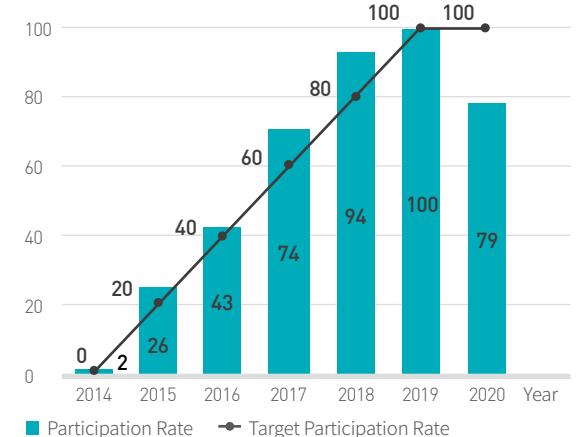
TSMC Track Record of Participating in the Taiwan Continuous Improvement Award Competition



TSMC Supplier Track Record of Participating in the Taiwan Continuous Improvement Award Competition



Percentage of Raw Material Suppliers Participating in the Taiwan Continuous Improvement Award Competition





Improve Quality Capability

In order to improve quality and efficiency, TSMC started to utilize machine learning technology and method in 2014, and successfully applied advanced spectrum analysis to automated classification of wafer defects so that differences among processes and equipment were detected, immediately triggering improvements. TSMC established a defect inspection and classification Outgoing Visual Inspector Productivity for the system for 12-inch wafers to refine the consistency of outgoing inspection and strengthen TSMC's overall competitive advantage. In 2020, the productivity of each 12-inch wafer outgoing visual inspector increased to 5,423 pieces per month. Furthermore, machine learning automation was expanded to back-end packaging visual inspectors, whose productivity was increased by 5.5%.

To fulfill the goals of raw materials and supplier management, the Quality and Reliability Organization first applied machine learning to the raw materials

Productivity of Each 12-inch Wafer Outgoing Visual Inspector



characteristics monitoring system in 2020, fortifying the inspection capability of the quality of incoming materials. Meanwhile, to deepen supplier management, the Quality and Reliability Organization worked with the Materials Management Organization to recruit the material quality improvement project team and increase key checkpoints on production lines for raw materials quality check. The project team also asked the suppliers to adopt Statistical Process Control (SPC) to enhance upstream raw materials analysis and monitor the consistency of processes and the quality of upstream raw materials. TSMC requires suppliers' factories to receive ISO 9001 certification and ensure that process change management, assessment, and quality auditing comply with international standards.

To implement hazardous substance management on raw materials, especially carcinogenic, mutagenic, and reprotoxic (CMR) substances, in 2020, TSMC achieved 100% of inspection capabilities and incorporated hazardous substance management regulations in Supplier Sustainability Standard, training, auditing, and consultation. TSMC asks major materials suppliers to secure qualifications in hazardous substance management, complete testing and analysis on certain carcinogenic substances, and include such findings as mandatory items in the Certificate of Analysis, voluntarily disclosing the quality check results of incoming materials. Meanwhile, TSMC asks all materials suppliers to inform TSMC of any supplies and materials containing any CMR substances and disclose such information on the Safety Data Sheet following Regulation of Labelling and Hazard Communication of Hazardous Chemicals. TSMC categorizes all materials with potential risks and conducts random sampling tests. By sharing CMR inspection technology, TSMC can elevate the monitoring and control capabilities of hazardous substances across the entire supply chain. In 2020, according to the audit

results of the Risk Management and Materials Management Organization, failures regarding hazardous substance management included insufficient labeling and categorized storage, insufficient personal protective gear, and failure to conduct regular product testing for hazardous substances. Relevant suppliers implemented corrective measures according to TSMC's recommendations by December 2020. Meanwhile, in terms of recycling and reusing acidic solutions, the Quality and Reliability Organization offers a reliable quality verification and control method that aids the Operations Organization to keep reducing the percentage of impurities in acidic solutions. In 2021, TSMC

plans to share the recycling and reuse technologies with the chemicals suppliers, expanding the effort to achieve its sustainable goals of balancing between product quality and environmental protection.

In 2020, TSMC once again worked with the SEMI to hold the second SEMICON in Taiwan to facilitate technological exchanges and deepen the local supply chain's sustainability and competitiveness.



In 2020, Chairperson of the TCIA Northern Taiwan Steering Committee and Vice President of TSMC, Dr. Jun He (Fourth from the right), served as the award presenter and encouraged the establishment of a responsible supply chain and inter-industry exchange.

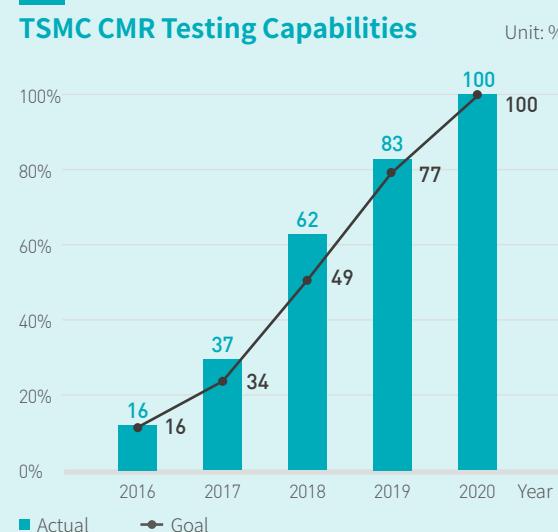
Case Study

TSMC Develops the High-Efficiency Hazardous Substance Testing Mechanism of 100% Detection

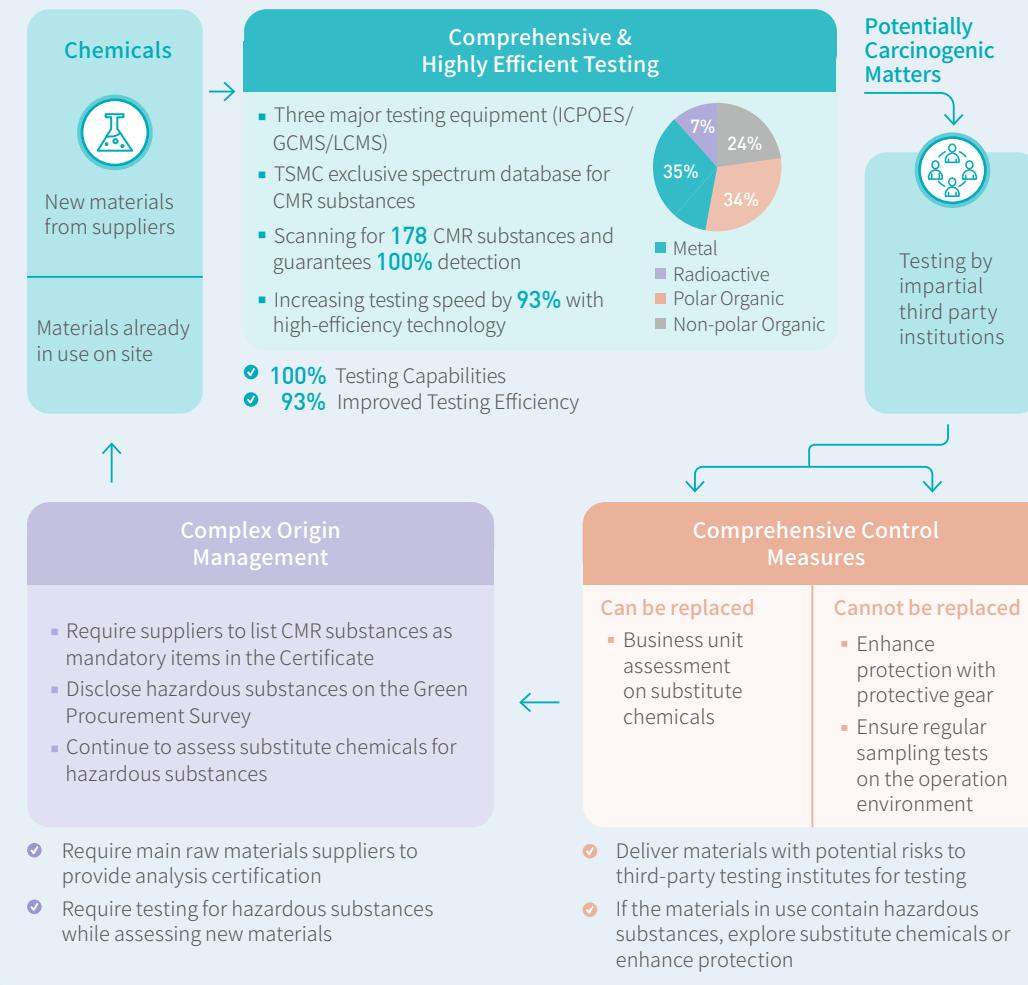
To fully track materials with potential risks, TSMC built the highly automated Advanced Materials Analytic Center (AMAC), creating an exclusive database for Carcinogenic, Mutagenic, and Reprotoxic (CMR) substances. Using three major spectrometry technologies - inductively coupled plasma optical emission spectrometry (GC-MS), chromatography/time-of-flight/mass- TSMC scans for carcinogenic substances listed in Group 1 (carcinogenic to humans) by International Agency for Research on Cancer. In 2020, TSMC completed the assessment and selection of technologies and materials for 3nm process, conducted analysis on 100% of the materials with potential risks, and identified 178 CMR substances in the semiconductor materials. TSMC significantly streamlined the analytic process and reduced the time required from seven days to twelve hours, elevating testing efficiency by 93%.

TSMC adheres to its commitment to hazardous substance management. Following its chemicals management procedure, TSMC actively sets up a defense against CMR and hazardous substances. Regarding the materials currently in use, once the chemical laboratory finds CMR substances in testing, the materials must be tested by an impartial third party institution and adopt comprehensive control measures. TSMC would require the business units that use such materials to assess alternative chemicals, aiming to substitute the material completely. If 100% substitute is not immediately

possible, TSMC will continue to invest in developing alternatives while providing adequate protective gear for employees on-site and conducts regular sampling tests on the operation environment complying with Regulations of Monitoring Labor Operational Environment to prevent risks of exposure for the workers. Regarding new materials, the control and monitoring are conducted through the TSMC Green Procurement Survey. TSMC requires that suppliers provide a certificate of analysis to prove that the materials comply with regulations to safeguard TSMC employees and the industry supply chain.



TSMC Hazardous Substance Testing Mechanism





Management of Hazardous Substances from Fabrication

TSMC's hazardous substance management is based on the QC 080000 Hazardous Substance Management System Requirement, aiming to avoid entirely or minimize the use of hazardous substances that may affect human health or pollute the environment. TSMC is committed to fully comply with international standards and the customers' requirements on hazardous substances for all customer products.

Hazardous Substance Management Throughout the Product Life Cycle

	Key Tasks	2020 Achievements
Process Design and Development Stage	Comply with Green Procurement Procedure, avoiding raw materials containing hazardous substances for new processes	In 2020, added PFASs with one to four carbons are substances that require disclosure
Production Stage	Require suppliers to provide documentation proving that the raw materials comply with hazardous substance regulations. TSMC conducts random sampling tests to ensure compliance with such raw materials	171 In 2020, TSMC completed testings for 171 raw materials, whose results all complied with TSMC regulations
Product Stage	Sampling every primary product to third party impartial institutions for hazardous substance testing every year	2020 test results all complied with regulations and TSMC requirements
Disposal Stage	Scrapped products are categorized and stored according to Waste Disposal Act and commission legitimate contractors for proper disposal	In 2020, to minimize hazard, TSMC stipulated the individual storage management procedure for scrapped products containing a low amount of lead solder bump

In 2020, TSMC continued substituting all PFOA-related (Perfluoroctanoic acid, PFOA) substances and succeeded after multiple improvements and tests. In recent years, the international community have noticed concerns for Perfluoroalkyl substances, PFASs, including the 6-carbon Perfluorohexanoic acid, PFHxA. The European Union is planning to regulate the substance in the future. Within TSMC, only a part of the photoresists used by VisEra contains such substance. Anticipating the regulatory tightening worldwide, TSMC has taken

the initiative to assess substitute chemicals with suppliers in 2020.

Furthermore, TSMC uses N-Methyl-2-Pyrrolidone (NMP) in several photoresist wet-stripping processes. To reduce risks of exposure and pollution, TSMC started the replacement project in 2016, avoided using 100% of the NMP in 7nm and more advanced processes in introducing and designing stage of photoresist wet stripping process, and existing fabs continued to conduct replacement. Since replacement requires changing equipment hardware and process parameters, partial sites' product yield was affected and had to undergo multiple formula adjustments and testings. In 2020, TSMC continued to work closely with several customers, assessing substitute materials for more than 50 processes. Although TSMC missed the target to replace 100% of NMP compared to the base year of 2016, the Company is still working towards goals of company-wide 95% reduction of NMP in 2021 and 100% NMP replacement and avoid using PFASs of more than four carbons in all processes by 2030.

For the advanced logic process, the Quality and Reliability Organization completed product quality and reliability qualifications of EUV lithography 5nm Fin Field Effect Transistor (FinFET), helping the world's first 5nm product into mass production in 2020. For the specialty process, TSMC completed reliability qualification for 22nm Ultra-low Leakage (ULL) embedded MRAM IP. Furthermore, for high-performance mobile computing and high-performance ULL process platforms, TSMC successfully passed the consumer-grade qualification and automotive grade-1 qualification for 28nm Embedded Flash. For advanced packaging, TSMC integrated the front-end wafer process and back-end chip packaging to provide advanced packaging solutions. This is the system integration for wafer-grade processes. Also, TSMC completed qualifications for the fifth-generation integrated Fan-Out packaging (InFO), whose linewidth is more sophisticated, and heterogeneously integrated larger-size CoWoS® packaging technology and went into mass production to meet the demands for mobile devices and high-performance computing products.

Realize Quality Application

The Quality and Reliability Organization helps customers introduce product reliability needs to product design during the stage of technological development. In 2020, TSMC's Quality and Reliability Organization collaborated with its R&D team to focus on the advanced logic manufacturing process, specialty process, advanced packing technologies development, and quality qualification to ensure that component features, product yield, and reliability meet the requirements.

Thanks to the qualification of technologies, the real-time defense system of semiconductor manufacturing services, the application of innovative approaches, and the establishment of quality culture among the suppliers, TSMC did not encounter any significant re-calls in 2020. The Company also continued to pass third-party certifications, meeting requirements of IATF 16949: 2016 of the automotive industry and IECQ QC 080000: 2017 by the International Electro-Technical Commission (IEC).

Customer Service

Strategies



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



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

2030 Goals

- Maintain customer satisfaction rating of over **90%**
- Reduce cases of problematic engineering quality or poor reliability to **60%** of the level in 2019 for every million 12-inch wafers shipped

2021 Targets

- Maintain customer satisfaction rating of over **90%**
- Reduce cases of problematic engineering quality or poor reliability to **70%** of the level in 2019 for every million 12-inch wafers shipped

2020 Achievements

- Customer satisfaction rating of **92.8%**; seven consecutive years with > **90%** satisfaction
Target: > 90%
- Reduce cases of problematic engineering quality or poor reliability to **70%** of the level in 2019 for every million 12-inch wafers shipped
Target: 95% of the level in 2019

- In line with TSMC's technology roadmap, TSMC provides customers with over **1,200** types of available wafer manufacturing and process technology, and over **170** types of advanced packaging technology

- In line with TSMC's technology roadmap, TSMC provides customers with over **860** types of available wafer manufacturing and process technology, and over **85** types of advanced packaging technology

- Pass customer product information audit with no major flaws

- Pass customer product information audit with no major flaws

- In line with TSMC's technology roadmap, TSMC provides customers with over **833** types of available wafer manufacturing and process technology, and over **77** types of advanced packaging technology
Target: 800 types of technology and 60 types of advanced packaging technology

- Pass customer product information audit with no major flaws
Target: No major flaws

V Achieved ↑ Exceeded — Missed Target



Customer trust is TSMC's core value. We believe that TSMC's competitiveness hinges on how competitive our customers are and that our customers' success is also our success. In order to provide customers with the highest level of service, TSMC has established a devoted customer service team, which is a dedicated coordination window to provide timely assistance and creates the best customer experience, from design support, mask making, and wafer manufacturing to backend services. TSMC also commits to protecting proprietary customer information to the highest standard to develop a long-term partnership and become a long-term and trusted partner that is critical to their success.

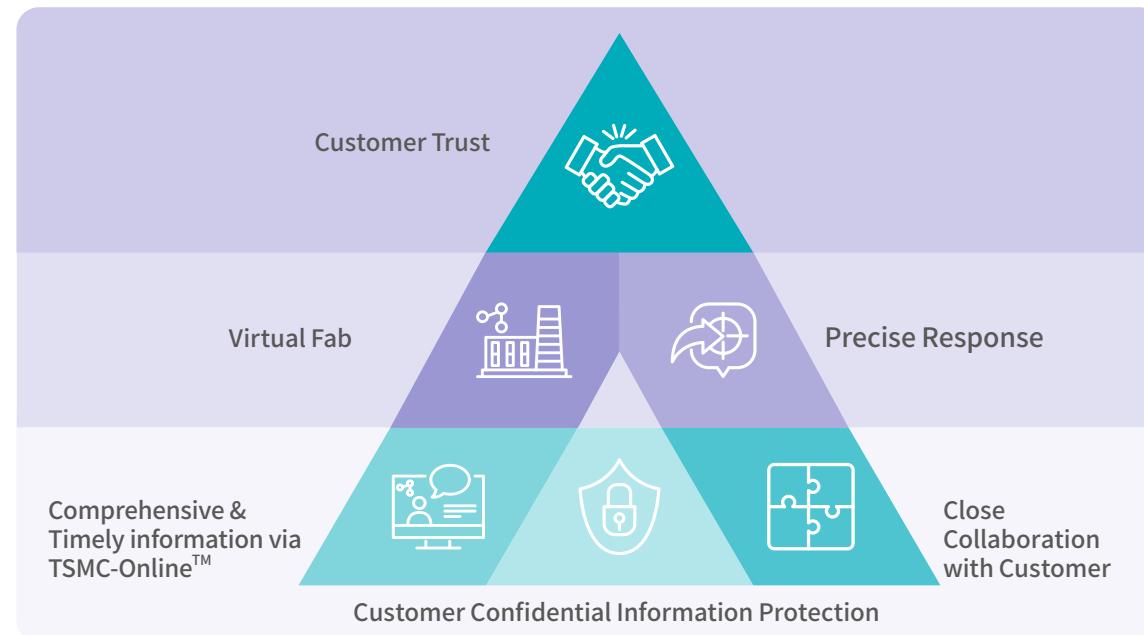
Precise Response

Customer feedback and opinions are important foundations for advancing customer relationships. TSMC learns about customer needs through irregular meetings, quarterly reviews, and annual satisfaction surveys. The channels are a way for customers to provide feedback on the performance of business behavior, relationship, technology, quality, yield, design support, manufacturing, customer service, and further expectations for the future. TSMC regularly reviews and analyzes customer feedback to propose optimal solutions. By having a comprehensive response process to customer needs, TSMC continues to

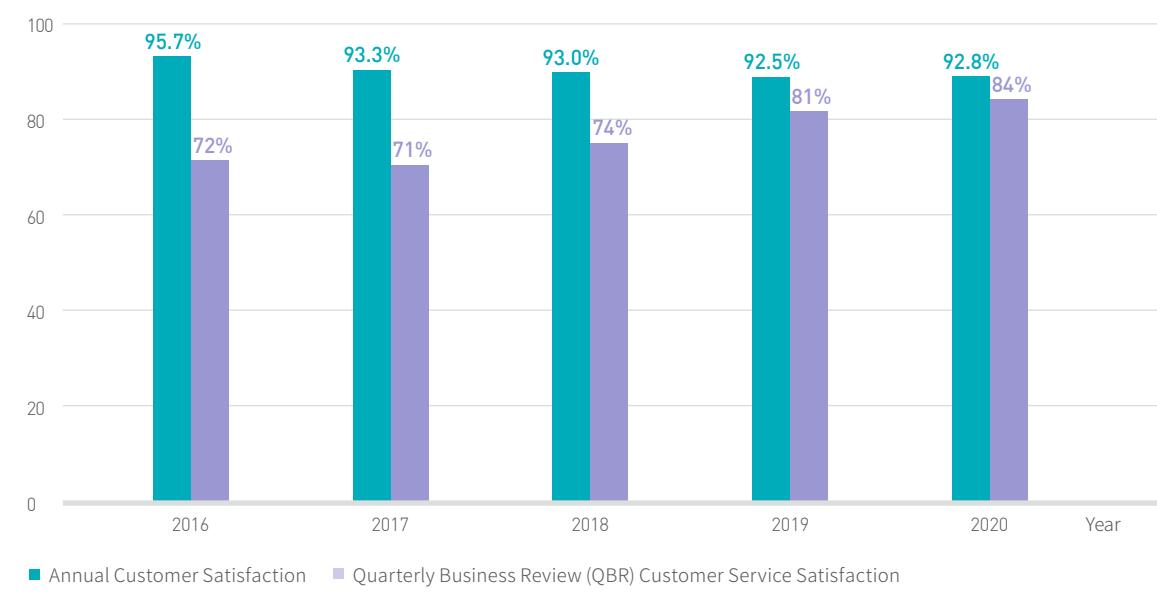
advance customer relations. In 2020, under the COVID-19 pandemic, TSMC held a total of 1,205 online meetings with 163 customers, 115 quarterly reviews with 31 customers, and annual satisfaction surveys with nearly 200 customers. Responding to customer expectations for convenient access to technical files and higher response efficiency to business needs, TSMC established a smart technical file navigation system and further reviewed and simplified project review, quotation, and contract signing processes to increase response speed to customer's business needs. The annual customer satisfaction rating in 2020 was

92.8%; maintaining high ratings of above 90% for seven consecutive years. Customers responded positively to the new, streamlined business process in the customer satisfaction survey. Satisfaction ratings from customer service items evaluated quarterly also reached over 80%. In response to a rapidly changing market, TSMC is working closely with customers to continuously satisfy their needs with advanced technology, manufacturing excellence, and high-quality services.

Customer Service Strategy Pyramid

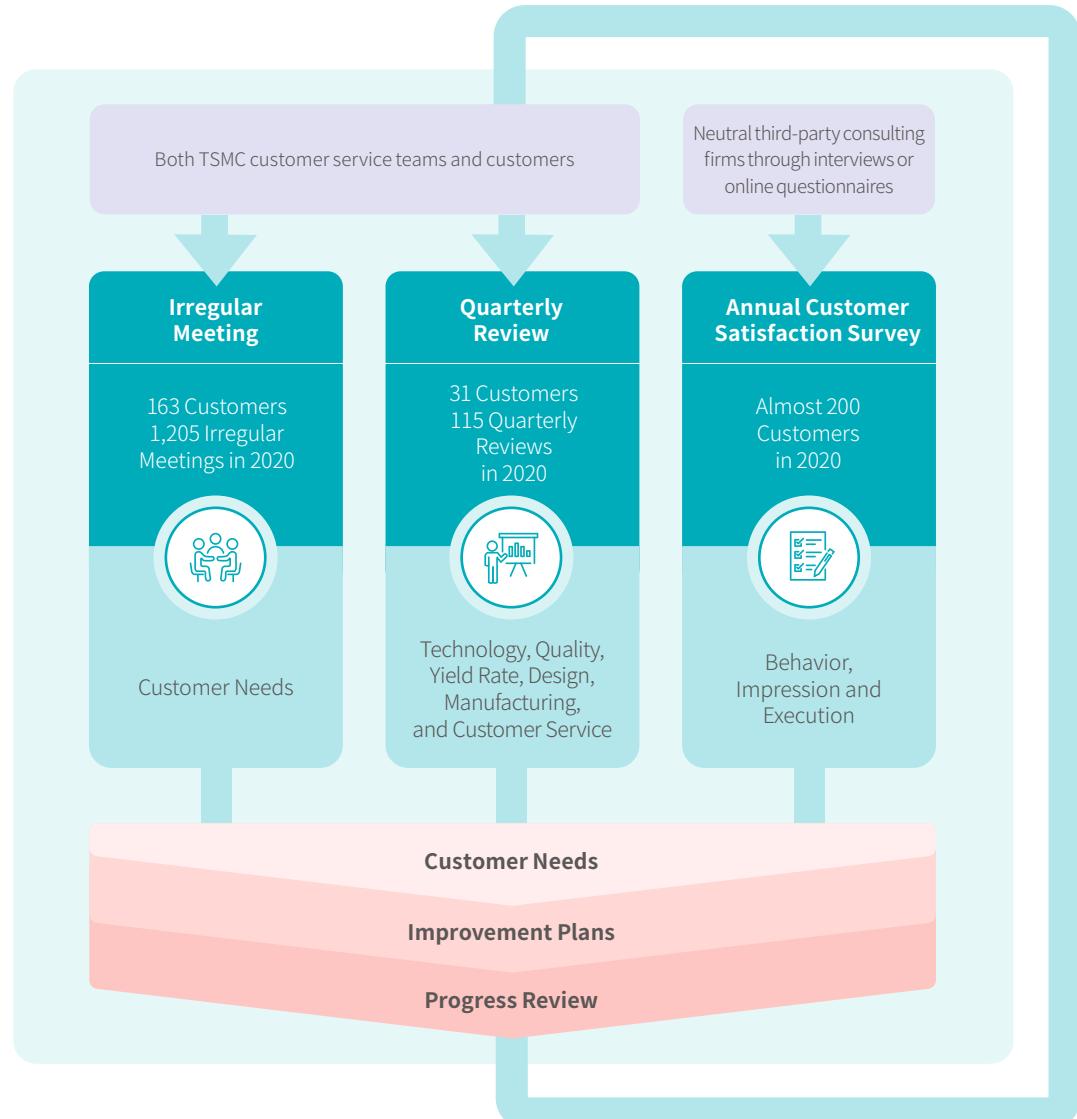


Annual Customer Satisfaction





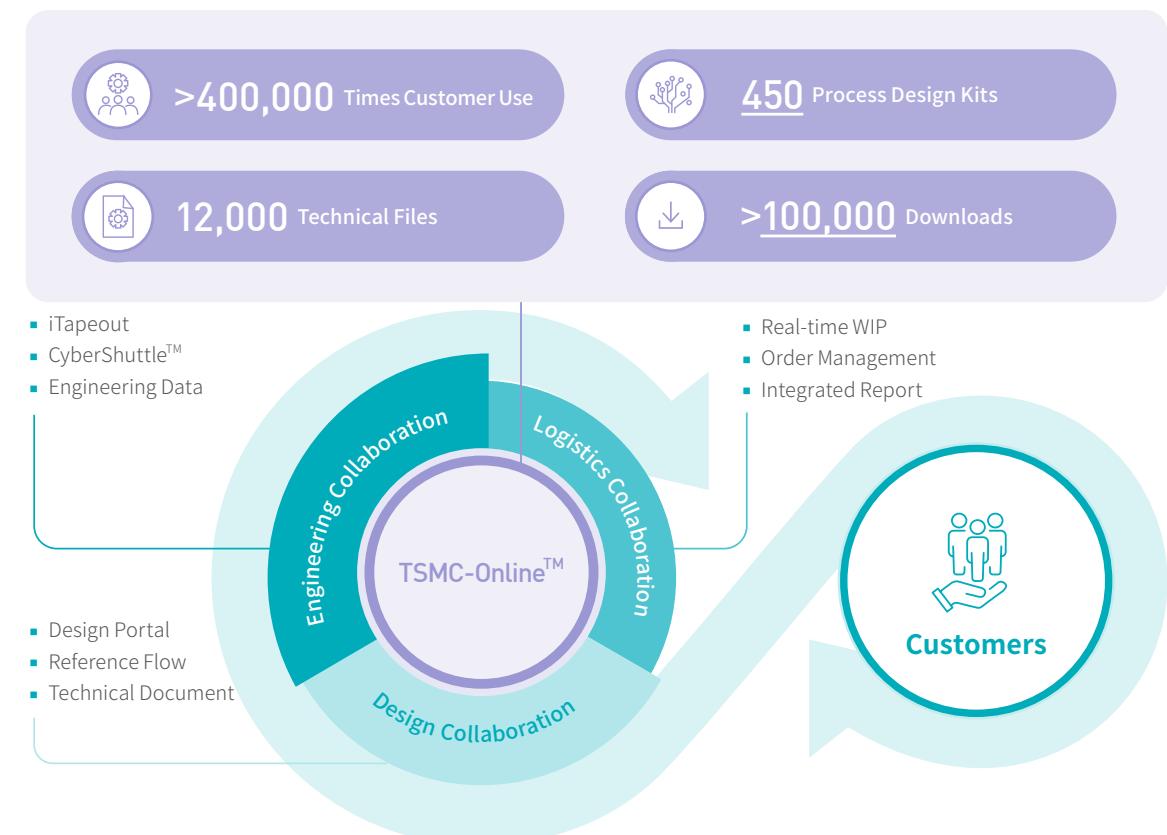
Various Communication Channels for Customers



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 a 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.

For design integration, TSMC-Online™ offers customers with comprehensive, accurate, and up-to-date information during the design stage to help customers quickly complete their product design; 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 can have real-time





knowledge of order status. To serve as a customer's "virtual fab", through TSMC-Online™, customers can manage comprehensive product manufacturing information on a real-time basis. TSMC offers transparent and comprehensive services for wafer fabrication to ensure that our customers achieve product success.

With the continuous increase in the types of advanced technologies, the design complexity is also constantly increasing. In 2020, TSMC collaborated with [OIP alliance partners](#) and cloud service providers to offer unlimited and comprehensive information security protection to customers. We also used cloud services to create a highly accessible design environment to help customers accelerate design to market and win business opportunities.

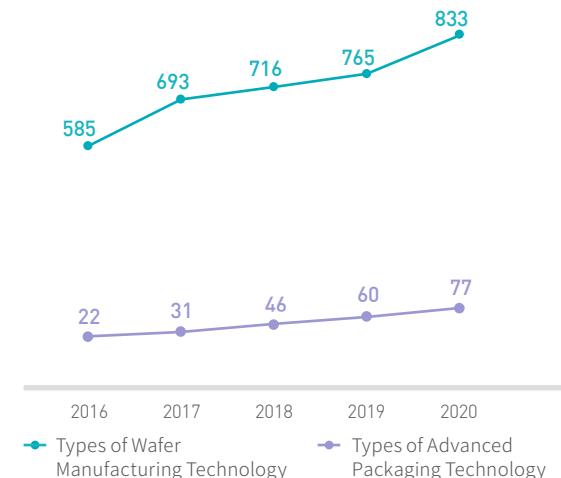
In 2020, in line with the technology roadmap, we provided customers with more than 830 types of wafer technologies and more than 70 types of advanced packaging technologies. For protecting proprietary customer information, TSMC commits to ensuring the interest of all customers and to designing protection mechanisms that can satisfy customer needs. To help customers accelerate product certification, TSMC obtained ISO 15408 IT security certification for Fab 12B, Fab 15B, and Fab 14A in 2020, 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.

Under the pandemic, customers are not able to take international business trips. As a result, TSMC

is complying with security standards for proprietary information to build remote sharing platforms for different information security levels. TSMC has successfully completed 15 remote audits to support customer's product launching on schedule and win customer trust.

TSMC strongly believes that continuous innovation, highest-quality products and services are the key factors to maintain 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 we become a long-term important partner that customers can trust and rely on for success.

Technology Types for Customers



Note: 2020 index includes Taiwan Facilities and Subsidiaries.

Case Study

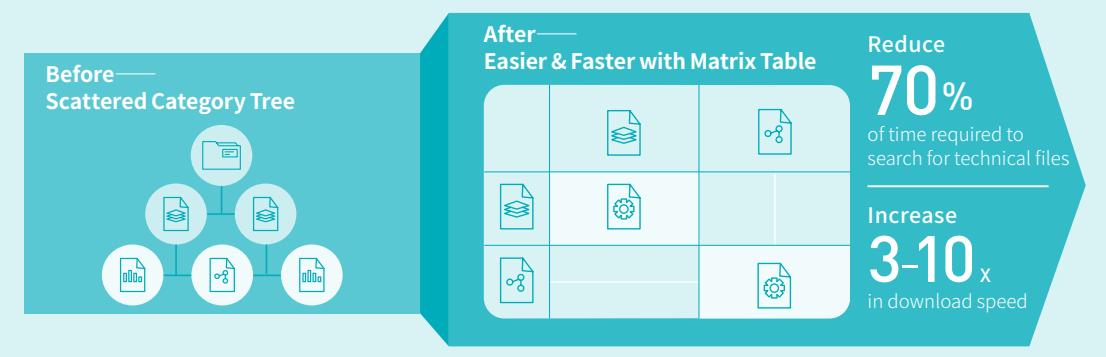
Smart Technical File Navigation System

With an increasing number of technology types, TSMC-Online™ offers more than 12,000 technical files as of 2020. In the existing complex binary indexed tree, customers often get lost or make mistakes along the pathway. As the technology grows more complex and file sizes increase, it takes a longer time to download documents.

In 2020, TSMC's Customer Service Organization, Business Development Organization, and Corporate IT Organization worked together to revamp TSMC-Online™ data structure and launch a smart file navigation system to help customers access required technical files for new product designs faster. To ensure the system is robust at the time of launching, the Customer Service Organization and Business Development Organization have referred to user feedbacks and access how technical files

are used and categorized from the customer's perspective. We use a 2D matrix table to replace the existing binary indexed tree and strengthen filter and search functions. With support from the Corporate IT Organization, TSMC-Online™ is also open for cloud download services under the premise of information security.

With the new TSMC-Online™ data structure and smart file navigation system, customers will be shown a file map that helps them find any files easily; at the same time, cloud services will also significantly increase technical files download speed. The smart file navigation system is launched in stages beginning in March 2021. We predict that the system will effectively reduce the time that customers search for technical files by 70% and increase the download speed by three to ten times.



TSMC Delivers Unrivalled Manufacturing Flexibility

>12.4M 2020 total managed capacity reached over 12.4M 12-inch wafer equivalents



2020
2019
2018

281
272
261



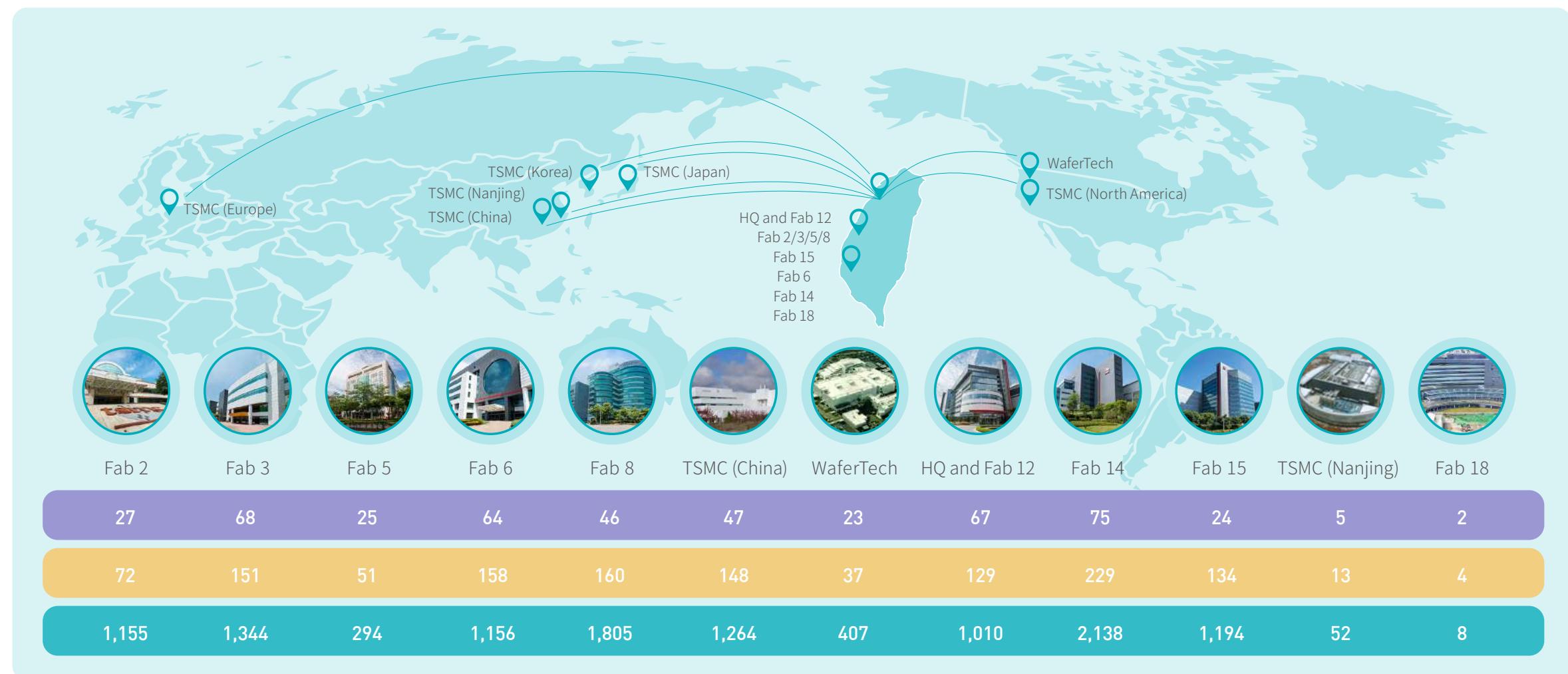
2020
2019
2018

510
499
481



2020
2019
2018

11,617
10,761
10,436





2

A Responsible Purchaser

As the world's largest dedicated IC foundry, we have made it our mission to purchase responsibly. We have the power to make a difference and we are doing so by asking our suppliers to make advancements in the following aspects: technology, quality, delivery, environmental protection, human rights, safety, and health. Our goal is to build a green and sustainable semiconductor supply chain.

100

%

All tier 1 suppliers have signed
the TSMC Supplier Code of
Conduct

100

%

All minerals are conflict-free

210

Million GWh

Cumulative energy
conserved by suppliers
through TSMC support



Supplier Sustainability Management

Strategies

2030 Goals

2021 Targets

2020 Achievements

V Achieved ↑ Exceeded — Missed Target

Safeguard Labor Rights

- Tier 1 suppliers' completion rate for signing the TSMC Supplier Code of Conduct every three years: **100%**^{Note1}
- Tier 1 suppliers' completion rate of the Sustainability Management Self-Assessment Questionnaire: **100%**
- Critical suppliers' completion rate for receiving third-party audits (by RBA-certified auditing institutions) every three years: **100%**^{Note2}
- TSMC continues to monitor supplier employees working at TSMC factory sites
- Supplier due diligence on sourcing conflict-free minerals: **100%** of the minerals used are sourced responsibly
- TSMC audits a cumulative total over **30** suppliers (at least three suppliers per year) for due diligence on sourcing conflict-free minerals NEW

- Tier 1 suppliers completed the Sustainability Management Self-Assessment Questionnaire at a completion rate of **100%**
- Continue to require critical suppliers to receive third-party audits by RBA-certified auditing institutions. The target is for **60** critical suppliers to complete third-party audits
- TSMC continues to monitor supplier employees working at TSMC factory sites
- Supplier due diligence on sourcing conflict-free minerals: **100%** of minerals used are conflict free
- Complete audits on at least three suppliers for due diligence on sourcing conflict-free minerals NEW

- All Tier 1 suppliers signed the TSMC Supplier Code of Conduct for a completion rate of **100%**
Target: 100% V
- All Tier 1 suppliers completed the Sustainability Management Self-Assessment Questionnaire for a completion rate of **100%**
Target: 100% V
- A total of **24** critical suppliers completed third-party supplier audits by RBA-certified institutions
Target: **60** critical suppliers Note3
V
- Monthly alert automatically generated on the attendance of supplier employees working at TSMC factory sites V
- 100%** sourcing conflict-free minerals
Target: 100% V



Manage Sustainability Risk

All suppliers are required 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 their management systems, and reduce disruption risk for business operations

Note 1: Tier 1 suppliers: Suppliers trading directly with TSMC with more than three orders per year, with order amount exceeding NT\$5 million. In 2020, 1,144 suppliers met the criteria. Since the suppliers signing every year were relatively consistent, the frequency was adjusted from every year to every three years.

Note 2: Critical suppliers: Suppliers accounting for the top 85% of purchasing expenses or of a single-source purchase, with indicators such as procurement amount, product supply criticality, and business relation with TSMC.

Note 3: Due to the COVID-19 pandemic, TSMC lowered the target number of suppliers for on-site audits in 2020 to minimize contagion risk.



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Strategies



Manage Sustainability Risk

All suppliers are required 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 their management systems, and reduce disruption risk for business operations

2030 Goals

2021 Targets

2020 Achievements

V Achieved ↑ Exceeded — Missed Target

Strengthen Supply Chain Resilience

- Continue to diversify facilities and assess new suppliers; develop **145** multi-source supply solutions (Base year: 2018)^{Note4}
- A cumulative total of **300** local raw materials suppliers participate in the observation of TSMC annual emergency response drill (Base year: 2016)

- Develop **105** multi-source supply solutions for raw materials
- A cumulative total of **130** suppliers participate in the observation of TSMC annual emergency response drill

- Developed **70** multi-source supply solutions
Target: 64
- 21** local raw materials suppliers participated in the observation of TSMC annual emergency response drill, with a cumulative total of **111** suppliers
Target: 20 suppliers this year, 110 in total



Improve the Sustainability of the Supply Chain

- A cumulative total of **1,500** local suppliers participate in the Environment, Safety, and Health (ESH) training program (Base year: 2016)
- A cumulative total of **145** local raw materials suppliers receive consultation on process advancement and quality improvement (Base year: 2016)
- Completion rate of Safety and Health consultation for critical high-risk suppliers: **100%**^{Note5}

- A cumulative total of **680** suppliers participated in the ESH training program
- Hold the annual Responsible Supply Chain Forum
- Ten local raw materials suppliers receive consultation on process advancement and quality improvement, with a cumulative total of **55** suppliers
- Critical high-risk suppliers complete Safety and Health consultation at a rate of **100%**

- A cumulative total of **558** suppliers participated in the ESH training program
Target: 500 in total
- Integrated TSMC's annual Supply Chain Management Forum into Responsible Supply Chain Forum
- 12** suppliers received consultation on process advancement and quality improvement, with a cumulative total of **45** suppliers
Target: 12 suppliers this year, 45 in total
- Critical high-risk suppliers completed Safety and Health consultation at a rate of **100%**



Optimize Local Procurement

To continuously increase local sourcing, TSMC actively provides consultation on improving core capabilities, and sets reduction targets for energy consumption, water consumption, waste, and carbon emissions to support the sustainable development of the local supply chain

Note 4: TSMC raised the 2020 target from 125 to 145 as the multiple-source supply solution program achieved the 2030 Goal of 125 ahead of schedule.

Note 5: A total of 32 critical high-risk suppliers (formerly known as vendors with high-risk operations) were audited in 2019, of which 3 suppliers with safety and health audit scores below 70 received consultation in 2020 and passed improvement requirements after evaluation.



(Continued from last page)

Strategies

2030 Goals

2021 Targets

2020 Achievements

V Achieved ↑ Exceeded — Missed Target

Reduce Environmental Impact

<p>▪ Increase Local Sourcing^{Note 6}</p> <ul style="list-style-type: none">- 64% local sourcing for indirect raw materials- 60% local sourcing for spare parts	<p>- 60.5% local sourcing for indirect raw materials</p> <ul style="list-style-type: none">- 50% local sourcing for spare parts	<p>▪ 60% local sourcing for indirect raw materials</p> <p>Target: 60%</p> <p>▪ 44.8% local sourcing for spare parts</p> <p>Target: 50%</p> <p>▪ 31% local sourcing for backend equipment</p> <p>Target: 36%</p>
<p>▪ Provide consultation on power reduction for suppliers and reduce electricity consumption by a cumulative total of 1.5 billion kWh (Base year: 2018)</p> <p>▪ Reduce waste production among major local suppliers by 35% (Base year: 2014)^{Note 8}</p>	<p>▪ Reduce supplier electricity consumption by a cumulative total of 320 million kWh</p> <p>▪ Reduce waste production among major local suppliers by 30.4%</p>	<p>▪ Reduce supplier electricity consumption by a cumulative total of 210 million kWh</p> <p>Target: 200 million kWh</p> <p>▪ Waste production among major local suppliers reduced by 29.4%</p> <p>Target: 29.1%</p>
<p>▪ High electricity consumption suppliers receive ISO 14064-1 Greenhouse Gas Emission verification at a completion rate of 100%^{Note 7} NEW</p> <p>▪ Provide consultation on water reduction for suppliers and reduce water consumption by a cumulative total of 35 million tons (Base year: 2020) NEW</p>	<p>▪ High energy consumption suppliers receive ISO 14064-1 Greenhouse Gas Emission verification at a completion rate of 50%</p> <p>▪ Reduce supplier water consumption by a cumulative total of 4.5 million tons</p>	<p>Note 9: For spare parts, the annual local sourcing target was missed because the proportion of advanced packaging increased and quality requirements have become stricter, and because TSMC had to increase inventory levels due to COVID-19.</p> <p>Note 10: For backend equipment, since the proportion of advanced packaging has increased and both quality requirements and technical specifications have become stricter, TSMC has also increased the procurement volume of domestic and foreign suppliers, and the demand for foreign suppliers is still strong; requirements; therefore, TSMC removed the target beginning in 2021.</p>

Note 6: Referring to TSMC's main operation region of Taiwan.

Note 7: Definition for high electricity consumption suppliers: Energy consumption at a single site exceeding 5 million kWh per year.

Note 8: Referring to raw materials suppliers in the top 80% of local waste production. Calculation formula: A/(A+B)(%); A: waste reduced by the factory in the underlying month (tons); B: total waste produced by the factory in the underlying month (tons).

As a global semiconductor industry leader, TSMC aims to lead the improvement of the supply chain and is committed to an environmentally and socially responsible business model. TSMC focuses on two policies, Sustainability Risk Management and Local Procurement Optimization, as the core of our sustainable supply chain development, driving the supply chain towards a safe work environment, dignity of labor, ethical business conduct, and environmental protection. In 2020, TSMC worked closely with supplier partners through four guiding principles: Code Compliance, Risk Assessment, Audit Participation, and Continuous Improvement, TSMC encourages supplier partners to continue improving, commit to essential values, and take the initiative to promote sustainable practices to their upstream suppliers.

Implementing the Four Guiding Principles of Responsible Supply Chain Management

To foster growth for supplier partners worldwide, TSMC continues to expand the scope of our supply chain management. TSMC upgraded the supply chain business portal, Supply Online, to a global responsible supply chain management platform, Supply Online 360, which integrates supplier communication and increases information accuracy and immediacy. The platform went online on December 22, 2020. On the practical level, the platform is built upon the structure of the four

guiding principles and based on the TSMC Supplier Code of Conduct. Through its new feature, the Sustainability Management Module, the Supply Online 360 platform enables digital follow-up for signature compliance with the Code of Conduct, completion of the Sustainability

Management Self-Assessment Questionnaire, and progress in audit improvement. Using online data, these new features can improve the efficiency of efforts in the physical world. At the same time, TSMC established the TSMC Supplier Sustainability Academy

and the Supply Chain Worker Grievance Channel on the Supply Online 360 platform, taking tangible actions to build a responsible supply chain and working closely with suppliers to ensure the sustainability of the semiconductor supply chain.

Rules of Implementation	Code Compliance	Risk Assessment	Audit Participation	Continuous Improvement
Management Measures	<p>Suppliers comply with the TSMC Supplier Code of Conduct and extend the scope of management to their upstream suppliers.</p> <ul style="list-style-type: none"> Tier 1 suppliers are required to sign the Supplier Code of Conduct. Critical Suppliers are required to ask their upstream suppliers, contractors, and service providers to commit and adhere to the TSMC Supplier Code of Conduct. Added Supplier Sustainability Standards. NEW 	<p>Suppliers evaluate their compliance via Sustainability Self-Assessment Questionnaire (SAQ) or are evaluated by the TSMC Team.</p> <ul style="list-style-type: none"> Determining the level of Code compliance of Tier 1 suppliers via Sustainability Self-Assessment Questionnaire to assess risks. The TSMC Supplier Healthiness Assessment Rectification Program (S.H.A.R.P.) team identifies risks with indicators such as procurement amount, product supply criticality, and business relation with TSMC. NEW Monitor suppliers with serious violations, tracking their continuous improvement to reduce risks. Suppliers are required to assess and mitigate climate change risks. 	<p>Critical suppliers receive third-party audits by RBA-certified institutions or on-site audits by the TSMC S.H.A.R.P. Team.</p> <ul style="list-style-type: none"> Critical suppliers are required to receive third-party audits; TSMC monitors audit results and requires improvement. Establish Supply Chain Sustainability Program, which conducts on-site audits with the S.H.A.R.P. methodology. 	<ul style="list-style-type: none"> TSMC provides consultation or assistance and arranges for follow-up inspections for improvement. TSMC may reduce the trade volume or terminate trade with suppliers that fail to meet the requirements. Provide business operations and sustainability training programs free of charge, and require suppliers to complete the programs. NEW
Supply Online 360	<p>Integrate TSMC supplier standards and requirements, and publish them on the online platform NEW</p>	<p>Establish a digital management tool for supplier sustainability indicators, the Sustainability Management Module included Self-Assessment Questionnaire function NEW</p>	<p>Set up an auditing function for the Sustainability Management Module NEW</p>	<ul style="list-style-type: none"> Establish TSMC Supplier Sustainability Academy NEW Establish Supply Chain Worker Grievance Channel NEW

Code Compliance

As a member of the Responsible Business Alliance, RBA, TSMC sets its Supplier Code of Conduct according to RBA's Code of Conduct. It requires suppliers to comply with the Code of Conduct while encouraging them to ask their upstream suppliers, contractors, and service providers to approve and adopt the same code in practices and management. New suppliers must sign the TSMC Supplier Code of Conduct to be eligible for partnership. The new suppliers must undergo regular risk assessments and audits in future partnerships and continue to improve according to audit results.

In 2020, TSMC further established the TSMC Supplier Sustainability Standard, which specifies five major categories for implementation, focuses on sustainable conduct, and helps suppliers to take tangible actions for sustainability.

Risk Assessment and Audit Participation

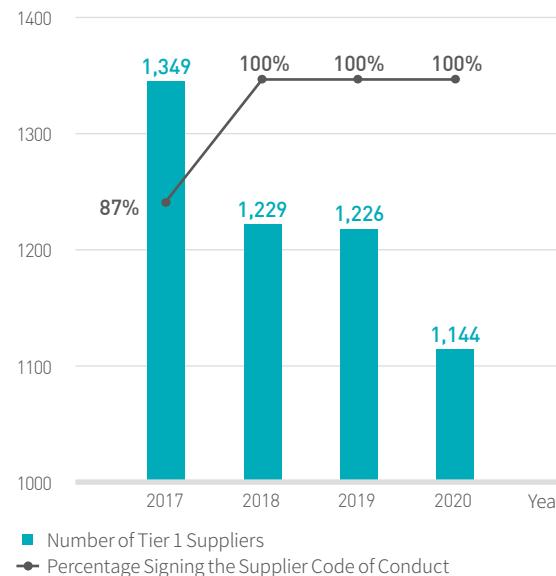
To deepen its understanding of the supply chain's development and identify potential risks, TSMC adopted a three-phase risk assessment process in 2020. By classifying, categorizing, and identifying areas for

improvement for suppliers, TSMC provides training resources on the Supply Online 360 platform and conducts on-site audits and consultations for critical high-risk suppliers, ensuring effective risk control.

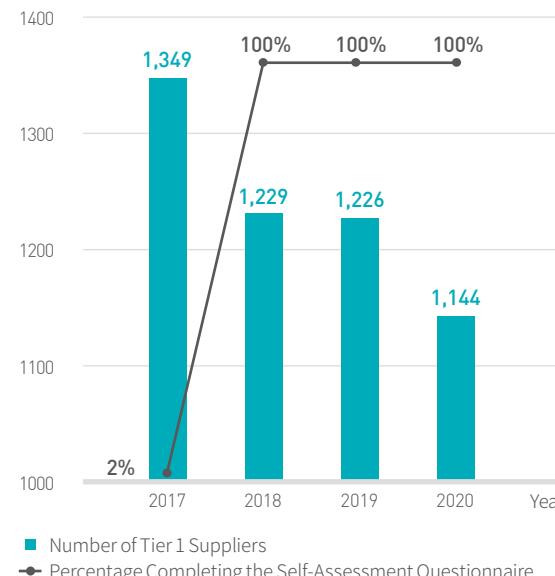
After the preliminary assessment for all suppliers, TSMC requires Tier 1 Suppliers to conduct the SAQ to identify sustainability risks. In 2020, Tier 1 Suppliers in Taiwan, where TSMC is headquartered, completed 1,144 SAQs, in which the five major categories of the TSMC Supplier Code of Conduct were covered. The assessment results show that, for the Labor category, suppliers often have

no specified protocols to monitor the work environment of their supply chain. For Safety and Health, suppliers lack identification and risk planning for environmental protection laws, operations in confined space, and operations involving hazardous materials. For the Code of Business Ethics, SAQ results show that 21% of the suppliers do not have a business ethics management system. In addition, TSMC requires critical suppliers to follow up the sustainability management of their upstream supply chains. Through Supply Online 360, it's expected to conduct integrated management from Tier 1 suppliers in 2021.

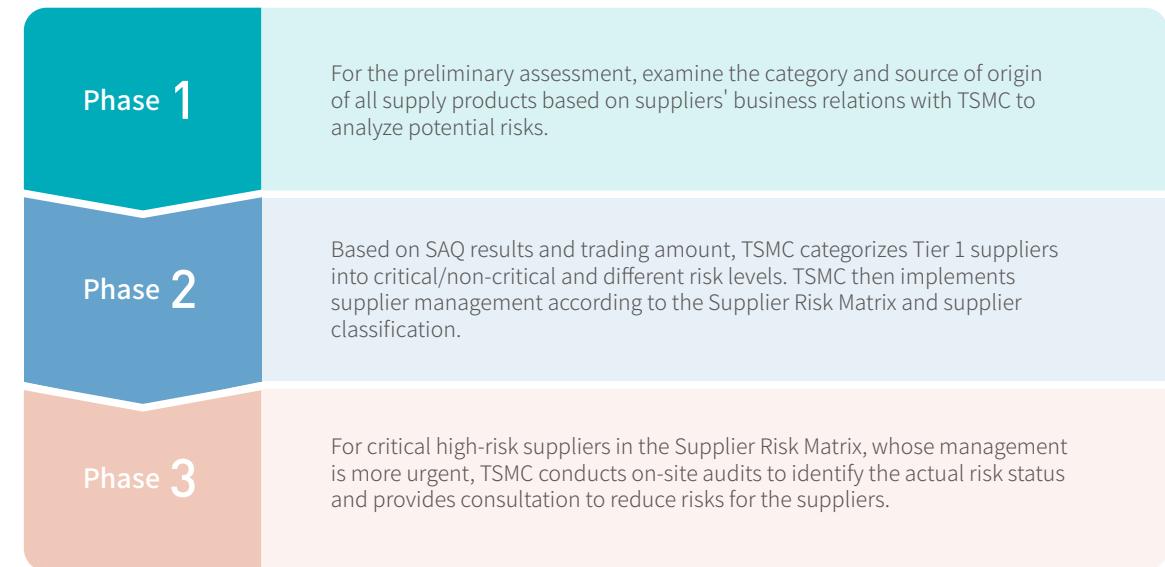
Signing of the Supplier Code of Conduct



Self-Assessment Questionnaire Results



Three-phase Risk Assessment



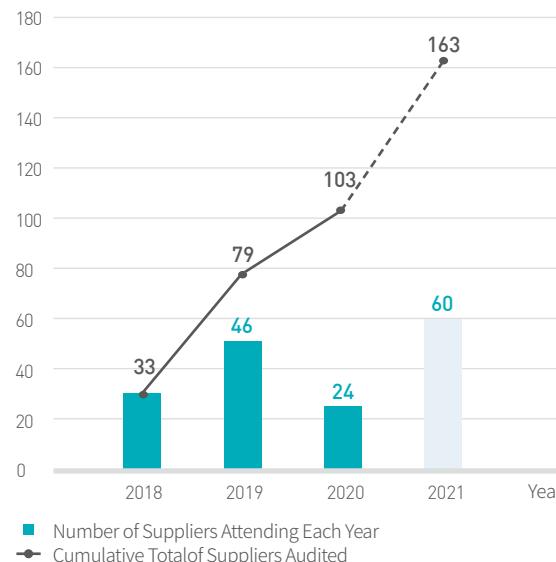
At the same time, TSMC categorizes critical suppliers according to indicators such as procurement amount, supplier product criticality, and business relation with TSMC and determines risk levels referring to SAQ results and priority violation records. Using the two dimensions of criticality and risk levels, TSMC establishes a Supplier Risk Matrix that classifies suppliers annually. This classification is then used in determining specific sustainability management actions to continuously enhance supplier understanding of the five major categories defined by the RBA. TSMC aims to improve supplier capabilities and effectively track sustainability risks in the supply chain.

After identifying risks using the Supplier Risk Matrix, TSMC implements management measures according to

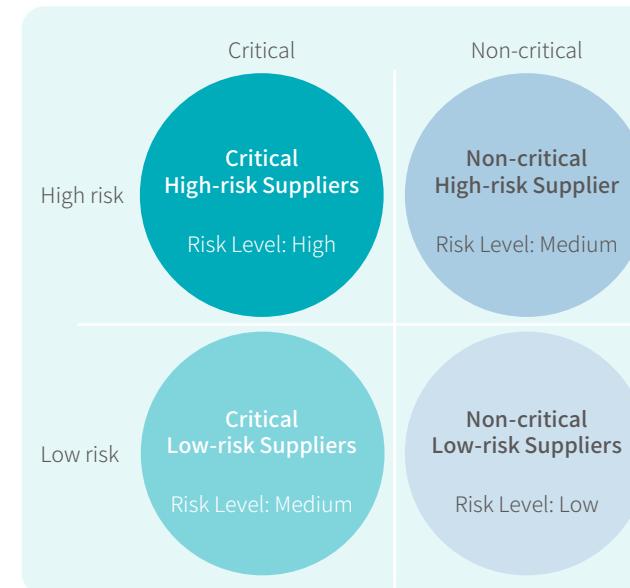
supplier classifications. In 2020, the TSMC S.H.A.R.P. Team collaborated with third-party institutions certified by the RBA and completed 24 on-site audits for critical high-risk suppliers, assessed actual risks, and improve supplier performance on sustainability.

TSMC aims to work closely with suppliers in maintaining consistent material supply and services, and ensure mutual benefit by guiding suppliers to establish a safe work environment that safeguards workers' health and limits environmental impact. TSMC launched the TSMC Supplier Sustainability Academy education platform on Supply Online 360, and by compiling training courses from TSMC operational and manufacturing practices, TSMC provides

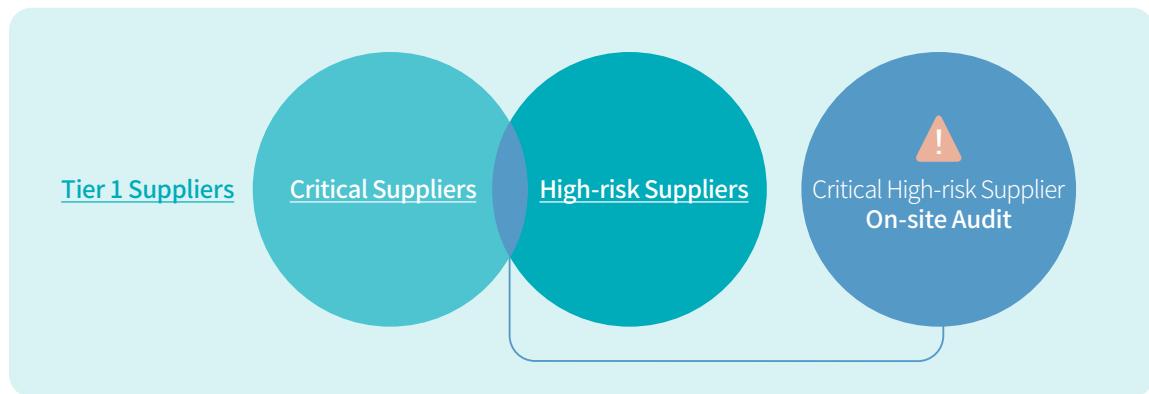
Number of Suppliers Completing Third-party Audits



Supplier Risk Matrix, Classification and Management Measures



Critical High-risk Suppliers Assessment Process



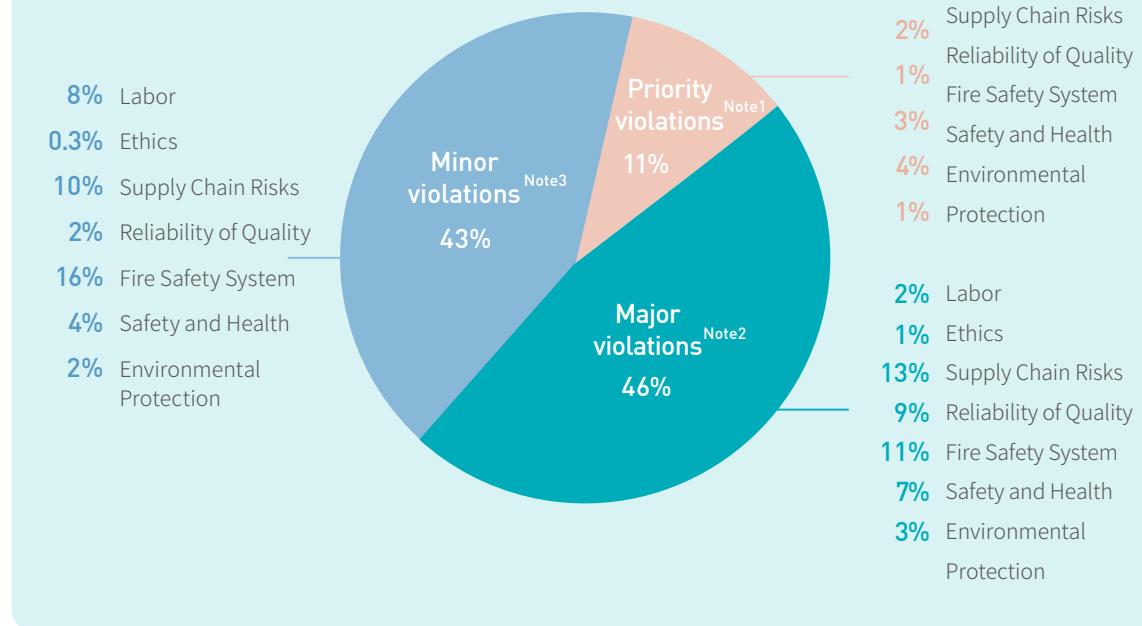
- Signing the TSMC Supplier Code of Conduct
- Risk Assessment via SAQ
- Completion of the TSMC Supplier Code of Conduct Program of the Supplier Sustainability Academy
- On-site Audit

Critical High-risk Suppliers	✓	✓	✓	✓
Critical Low-risk Suppliers	✓	✓	✓	✓
Non-critical High-risk Supplier	✓	✓	✓	✓
Non-critical Low-risk Suppliers	✓	✓	✓	✓

2020 Critical High-risk Suppliers Audits

Auditor	TSMC S.H.A.R.P. Team and RBA-certified Third Party Institutions
Suppliers Audited	Factories of 24 Critical High-risk Suppliers
Audit Methods	24 On-site Audits

Distribution of Audit Violations



Categories	Major Violations Audited	Key Achievements
Labor	<ul style="list-style-type: none"> Not fully adhering to work hour regulations 	<ul style="list-style-type: none"> Require suppliers to comply with labor work hour regulations fully
Ethics	<ul style="list-style-type: none"> Lacking policy or procedures for gifts, such as the amount/frequency limit between supplier and clients, or employee education on reporting conflict of interests 	<ul style="list-style-type: none"> Require suppliers to establish business ethics rules; expected to complete in 2021
Supply Chain Risks	<ol style="list-style-type: none"> Not establishing multiple sources or safety stock for raw materials or finished goods Lacking comprehensive water and electricity backup plans in response to climate change Lacking comprehensive human resources plans in response to unexpected developments (e.g., COVID-19) 	<ol style="list-style-type: none"> Establish and verify multiple sources for raw materials and finished goods, and have safety stock in place Establish water and electricity backup plans and compile the plans in advance when building new production lines Establish comprehensive business continuity plans in response to COVID-19
Reliability of Quality	<ol style="list-style-type: none"> Lacking control over the quality of raw materials Not implementing upstream supply chain risk assessment or business continuity plan; not conducting regular on-site and document audits for upstream suppliers Not planning or notifying TSMC in time when making changes to the production process 	<ol style="list-style-type: none"> Control and manage the quality of raw materials to ensure that materials comply with specifications and quality is consistent Assess risks of the upstream supply chain, conduct on-site audits, and encourage compliance with TSMC standards Enhance internal training on protocols relevant to production process changes
Fire Safety System	<ol style="list-style-type: none"> Not establishing an effective fire safety management system Fire safety equipment not compliant with relevant regulations Fire safety equipment lacking maintenance 	<ol style="list-style-type: none"> Required suppliers to assign personnel specifically for fire safety management Required suppliers to fully implement management of hot work, flammable chemicals, and fire safety equipment, and provide TSMC's relevant procedures for suppliers' reference Required suppliers to improve fire safety equipment, comply with regulations and provide relevant consultation Shared checklist of fire equipment maintenance to suppliers and held fire protection operation training
Safety and Health	<ul style="list-style-type: none"> Lacking comprehensive personal protective equipment and emergency response management 	<ul style="list-style-type: none"> Require suppliers to establish a comprehensive management procedure, share TSMC practices and procedures
Environmental Protection	<ul style="list-style-type: none"> Not establishing an effective rainwater management system 	<ul style="list-style-type: none"> Establish management measures for separating rainwater and wastewater

Note1: Priority violations may present risks of production halt, loss of life, legal violations, or systematic failure. For example: lacking response mechanism for unexpected disruptions in production lines, environmental pollution, hiring child labor, or forced labor.

Note2: Major violations refer to significant differences between implementation and proper ESH procedures, such as daily operations not adhering to ESH procedures.

Note3: Minor violations refer to risks other than priority or major violations, such as incomplete training records or incomplete ESH procedures.

Continue to Advance Supply Chain Sustainability

learning resources on labor rights, environmental protection, workplace safety and health free of charge. Such knowledge on corporate management improves supplier capabilities and even extends to upstream suppliers, enhancing the sustainability of the overall supply chain.

TSMC values people above all else, and has further established a public reporting channel for supplier employees on Supply Online 360. This offers protection for supplier employees, extends and deepens TSMC's management, and builds a more inclusive workplace for the supply chain.

Reporting Procedure



As the global semiconductor industry continues to grow, TSMC considers effective supply chain management to be an important mission. TSMC cares about the sustainability of the environment, society, and the economy, aspiring to improve supply chain management, and effect behavioral change. TSMC makes use of two policies to do so: 1: "Sustainability Risk Management", which requires all suppliers to adhere to the [TSMC Supplier Code of Conduct](#), take actions to improve labor rights, safety and health, environmental protection, business ethics, and the efficiency of

their management systems, and reduce disruption risk for business operations. 2: "Local Procurement Optimization" to continuously increase local sourcing, actively provide consultation on improving core capabilities, and set reduction targets for energy consumption, water consumption, waste, and carbon emissions to support the sustainable development of the local supply chain. As a leading semiconductor company, TSMC aims to use its influence in the industry with these two policies as well as the four Action Plans to promote progress towards sustainability.

"Thanks to the auditing and coaching from TSMC's team of experts, TPPC's concept of disaster prevention has been extended to risk management, system maintenance, and loss prevention designs that enabled our disaster prevention standards to reach the international level for semiconductor fabs in a short period of time and strengthened the company's overall disaster prevention capability and the safety awareness of employees."

— Chih Hung Feng, Assistant Vice President of Xinying Plant,
TAIWAN PULP & PAPER CORPORATION

Four Action Plans





Sustainability Risk Management

TSMC implements two of the action plans, Safeguard Labor Rights and Strengthen Supply Chain Resilience, through audits and consultations that urge suppliers to continuously improve, building a work environment that ensures the dignity of workers and business ethics. In 2020, TSMC initiated the S.H.A.R.P. program, in which TSMC and suppliers work closely and effectively. Such comprehensive, collaborative efforts continue to reduce supply chain risks.

Action Plans	Supplier Problems and Challenges	TSMC Consultation Measures	Number of Suppliers	2020 Performance
	Insufficient transparency of supplier compliance with the TSMC Supplier Code of Conduct	<ul style="list-style-type: none"> Require Tier 1 suppliers to sign the TSMC Supplier Code of Conduct Require suppliers to complete third-party audits by RBA-certified auditing institutions Set up Supply Chain Worker Grievance Channel on Supply Online 360 	1,144	<ul style="list-style-type: none"> ✓ Tier 1 suppliers signed the statement at the completion rate of 100%. ✓ 24 Critical high-risk suppliers completed audits by third-party RBA-certified institutions. ✓ No complaints reported during the underlying year.
	Records of supplier employees working at TSMC sites for seven consecutive days ^{Note1}	<ul style="list-style-type: none"> Quarterly review on whether supplier employees work at TSMC sites for seven consecutive days 	36	<ul style="list-style-type: none"> ✓ Upgrade management tools, enabling automatic monthly reports that alert changes in supply and ask suppliers to improve.
	Whether suppliers comply with regulations on sourcing responsible minerals and raw materials	<ul style="list-style-type: none"> Continue due diligence to ensure sourcing of 100% conflict-free minerals 	1	<ul style="list-style-type: none"> ✓ Completed 100% of due diligence on conflict-free minerals sourcing for the supply chain.
	Insufficient workplace safety rules for contractors and subcontractors at TSMC factory sites	<ul style="list-style-type: none"> Strengthen workplace safety management for contractors, especially on-site operational subcontractors and downstream subcontractors, and specify penalties and fines for workplace safety violations Strengthen workplace safety management for contractors, including workplace safety management in the comprehensive supplier evaluation 	2	<ul style="list-style-type: none"> ✓ Include violation penalty terms in orders. Suppliers taking the orders implicitly agree to violation penalties. In 2020, 1 supplier received a penalty for violations.^{Note2} ✓ United Integrated Services and Taiwan Puritic Corp received TSMC Outstanding Supplier Awards.
	The current supply chain lacks emergency response capabilities, which may lead to disruption risk in supply	<ul style="list-style-type: none"> Continue to develop multi-source supply solutions Invite suppliers to observe TSMC annual emergency response drills Initiate the S.H.A.R.P. program 	21	<ul style="list-style-type: none"> ✓ Develop 70 multi-source supply solutions. ✓ 21 suppliers participated this year, with a cumulative total of 111 suppliers. ✓ Completed 24 S.H.A.R.P. audits.
			24	

Note 1: In 2020, supplier employees at TSMC factory sites occasionally still worked for seven consecutive days. TSMC has emphasized the importance of work hour management to suppliers.

Note 2: Added violation penalties to the order form in 2018, and the practice continued in 2020.



Sourcing Responsible Minerals

TSMC supports sourcing conflict-free raw materials as a practice of humanitarianism and compliance with social ethics. Therefore, TSMC has adopted a series of compliance measures based on industry best practices, including the due diligence framework by the Organization for Economic Cooperation and Development (OECD), the Model Supply Chain Policy for a Responsible Global Supply Chain of Minerals from Conflict-affected and High-risk Areas. TSMC is also a firm supporter of the Responsible Business Alliance

(RBA) and Global e-Sustainability Initiative (GeSI), requiring suppliers to source conflict-free raw materials according to the Responsible Minerals Assurance Process (RMAP). TSMC requires suppliers to comply with our responsible minerals sourcing policy and sign a statement of conflict-free minerals for products containing tantalum, tin, gold, and tungsten. Since 2018, TSMC has also disclosed to customers the source smelters for cobalt used in TSMC products. By 2021, TSMC plans to audit at least three suppliers that use tantalum, tin, gold, and tungsten to strengthen disclosure from suppliers.

For the latest TSMC disclosure documents, please visit the [TSMC website](#) or the website of the [US Securities and Exchange Commission](#).

Supplier Healthiness Assessment Rectification Program (S.H.A.R.P.)

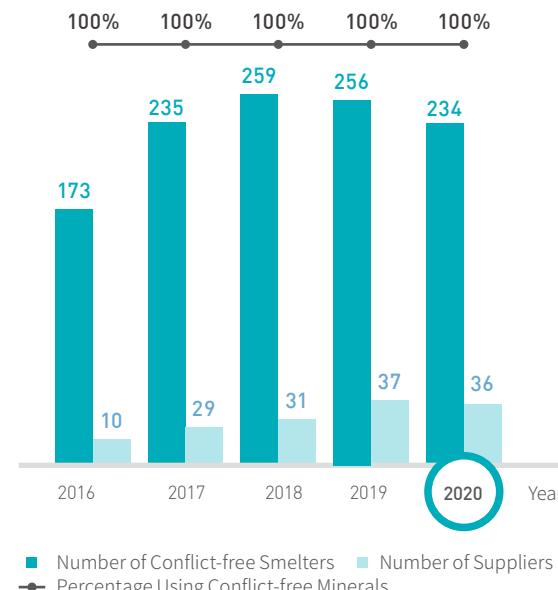
To enhance supply chain resilience and ensure business continuity, TSMC started the Supply Chain Sustainability Program in 2020, assembling an auditing team with in-house experts and third-party RBA-

certified institutions, named the Supplier Healthiness Assessment Rectification Program (S.H.A.R.P.). The program audits five major categories, including Supply Chain Risk, Quality and Reliability, Environmental Protection, Safety and Health, Fire Safety System, and Labor Ethics. Through on-site audits, face-to-face communication, and other methods, TSMC continues to develop benchmark behaviors in the five major categories and improve the supply chain.

Conflict-free Minerals Management Process



Conflict-free Minerals Due Diligence



Note: Data stated herein include Tier 1 Suppliers of TSMC facilities in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing), and VisEra.

S.H.A.R.P.





Optimize Local Procurement

Two of the action plans, "Improve the Sustainability of the Supply Chain" and "Continue to Reduce Environmental Impact", are tangible actions TSMC has taken to optimize local procurement. TSMC offers consultation for suppliers to expand production capacity, advance production processes, and improve quality. At the same time, TSMC requires suppliers to guarantee environmental safety and health in the workplace, reduce environmental impact and its external cost, and mitigate the effects of climate change and resource depletion. TSMC conducts Supplier Environmental Profit and Loss (EP&L) assessments to quantify environmental impact, guiding suppliers to set up targets of environmental protection to improve the local supply chain.

Action Plans	Supplier Problems and Challenges	TSMC Consultation Measures	Number of Suppliers	2020 Performance
 Improve the Sustainability of the Supply Chain 	Production capacity, production process, and quality management require improvement	<ul style="list-style-type: none">Provide consultation for suppliers to expand production capacity, improve advanced measurement technology, and enhance manufacturing quality	32	<ul style="list-style-type: none">Completed 89 items of quality improvement in materials for advanced processes; 32 suppliers completed capacity expansion according to the mass production needs for 5 nm and 3 nm processes
	Insufficient implementation of Environmental Protection, Safety and Health	<ul style="list-style-type: none">Hold the annual Responsible Supply Chain Forum	101	<ul style="list-style-type: none">TSMC ESG Committee Chairperson and Senior Vice President, Lora Ho, shared TSMC's commitment to sustainability, while 92% of the suppliers attended expressed interest in sustainable development strategies and 89% expressed interest in risk control
		<ul style="list-style-type: none">Hold forums to share experiences of real practices on Environment, Safety and Health	147	<ul style="list-style-type: none">Explain TSMC Supplier Sustainability Standard, require suppliers to establish management systems for Environment, Safety and Health and fire protection, and urge senior management of the suppliers to enhance supervision.
 Continue to Reduce Environmental Impact 	Address environmental impact and resource depletion caused by localized manufacturing	<ul style="list-style-type: none">Fortify management of supplier Environmental Safety and Health, and include the performance as one of the indicators in the comprehensive supplier evaluation	1	<ul style="list-style-type: none">Present Excellent Supplier Award to Chang Chun Petrochemical Company, setting an example for other suppliers
		<ul style="list-style-type: none">Promote local sourcing to reduce transportation cost, set sourcing targets for indirect raw materials, spare parts, and backend equipmentRequire local suppliers with high power consumption to reduce electricity usageRequire top ten waste-producing suppliers to reduce waste and report on the progress made each yearConduct annual Supplier Environmental Profit and Loss (EP&L) assessment	17	<ul style="list-style-type: none">60% for indirect raw materials, 44.8% for spare parts, 31% for backend equipment
			10	<ul style="list-style-type: none">Provide consultation on power reduction for suppliers and reduce energy consumption by a total of 210 million kWhReduce waste production of supplier business units by 29.4%
			30	<ul style="list-style-type: none">Encourage raw materials suppliers to participate in the assessment; expected to complete in 2021



Enhance Supply Chain Environment, Safety and Health and Loss Prevention Capabilities

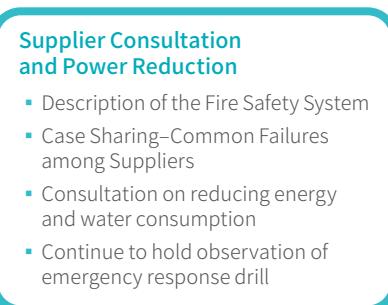
To enhance environment, safety and health and loss prevention capabilities, TSMC divides its supply chain environment, safety and health training into two aspects: experience-sharing and on-site audits. In 2020, for experience sharing, TSMC illustrated the content and implementation guidelines for the Supplier Sustainability Standard and shared case studies on common violations in sustainability audits, such as failure to wear personal protective equipment properly, deficiency of the management procedures of fire protection system impairment/ hot work operation, and failure to turn on the valves of fire protection systems. TSMC recommended measures for improvement and shared tangible, actionable solutions to reduce energy

and water consumption in the experience sharing forum. The forum elevated the soft power of suppliers, and a total of 347 people from 147 suppliers attended. For on-site audits and consultation, in 2020 the TSMC S.H.A.R.P. team visited supplier companies to examine production lines, evaluate supplier fire protection software and hardware, and offered suggestions for improvement.

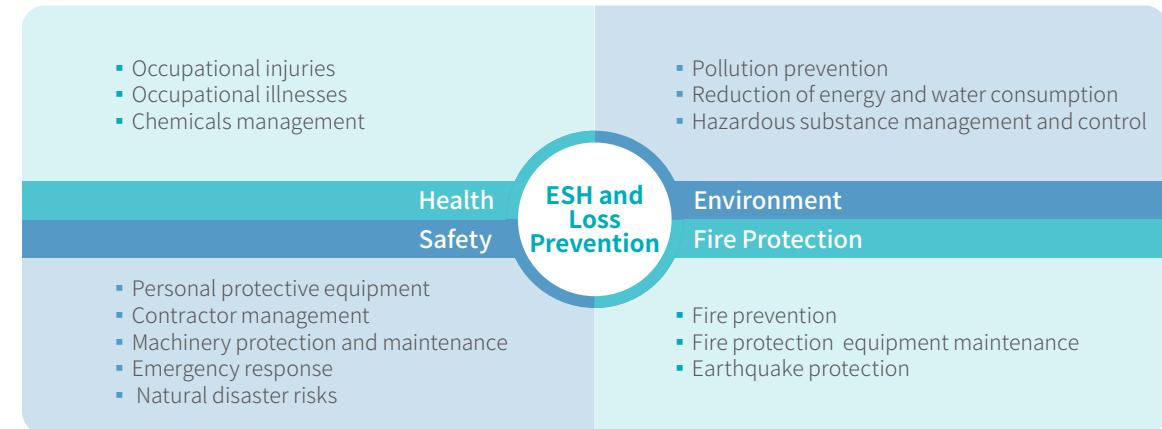
In 2020, TSMC continued to strengthen experience sharing by inviting suppliers to the Facility services Academy at Fab 15, offering effective training by detailing the operation, maintenance, and testing procedures of fire protection equipment on-site. In 2020, TSMC held observations of emergency response drills in factories for local raw materials suppliers for the fifth consecutive year. A total of 21 suppliers observed the drills on-site, with a cumulative total of 111 people attending.

Key Points in Promoting Supply Chain ESH and Loss Prevention

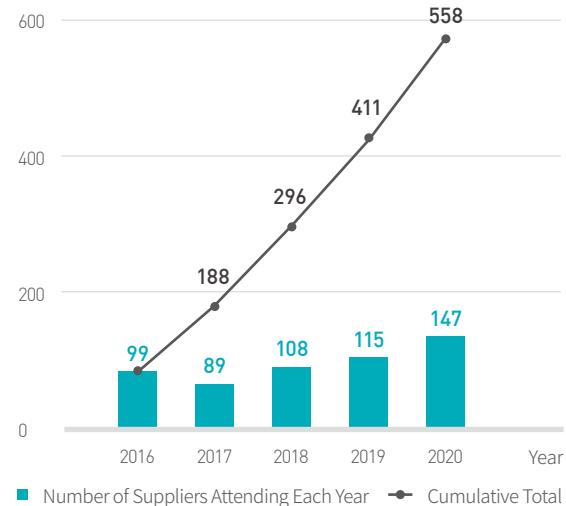
- Supplier Consultation (ESH training/Observation of emergency response drills)
- Supplier Consultation
- Supplier On-site Audit



Key Points in Supply Chain ESH and Loss Prevention



ESH Experience-Sharing Training Program-Number of Suppliers Attended

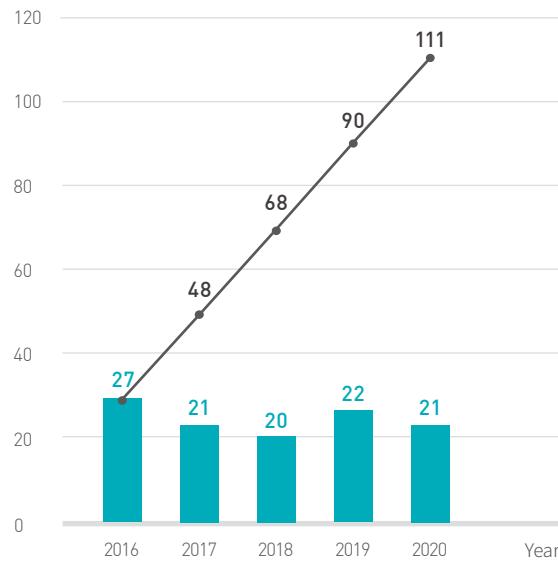


Improve the Local Supply Chain

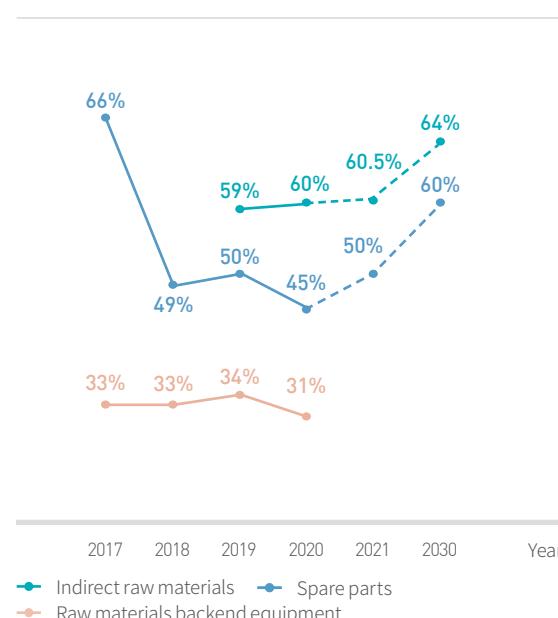
TSMC's production is primarily located in Taiwan. Our procurement can be divided into six categories: equipment, spare parts, raw materials, facility services, IT, and goods. To build a more effective and competitive supply chain, TSMC actively seeks to elevate local suppliers' advanced manufacturing process capabilities and establish a comprehensive local semiconductor supply chain.

Besides promoting local sourcing in Taiwan, TSMC has also set up independent procurement organizations for TSMC subsidiaries, including TSMC (China), TSMC (Nanjing), and WaferTech. Such organizations are the extension of the TSMC global supply chain, which helps local suppliers to improve technological levels, quality consistency, and reduce costs as well as carbon emissions.

Number of Suppliers Attending Observation of Emergency Response Drills



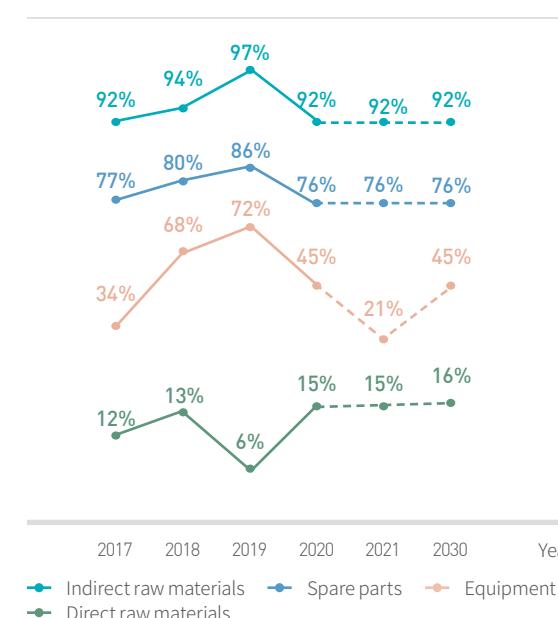
Percentage of Local Sourcing in Taiwan



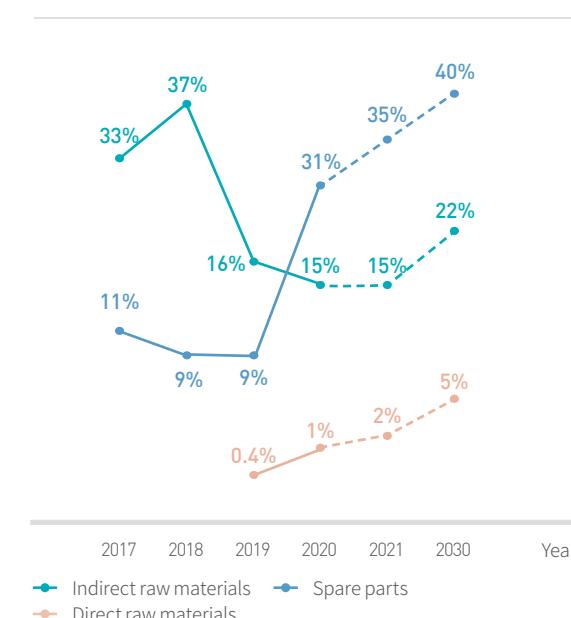
2020 Supply Chain Management Activities for Taiwan Facilities



Percentage of Local Sourcing in the US



Percentage of Local Sourcing in China



Consultation Achievements for Enhancing Advanced Process Capabilities of Local Suppliers

Consultation Targets	Supplier Problems and Challenges	TSMC Consultation Measures	2020 Achievements
 <p>Development of Spare Parts for Advanced Processes</p>	<p>2 Spare parts maintenance</p> <p>2 Spare parts coating</p> <p>4 Spare parts machining</p> <ul style="list-style-type: none"> The percentage of imported high-level spare parts for several advanced processes is still too high, as local suppliers lack critical process technology Some advanced tools must be sent overseas for repair and maintenance, which is time-consuming and affects production schedules 	<ul style="list-style-type: none"> Assemble a team of experts to provide consultation for local suppliers, offer technological training, and assist in certification Regular exchange with suppliers on industry developments and cutting-edge technologies to ensure supplier R&D directions are consistent with industry demands 	<p>✓ Provide consultation to develop 110 spare parts for advanced processes</p>
 <p>Build Capacity</p>	<p>4 Chemicals</p> <p>1 Abrasives</p> <p>2 Photoresists</p> <p>2 Gases</p> <ul style="list-style-type: none"> Capacity insufficient to meet advanced process requirements 	<ul style="list-style-type: none"> Production line expansion 	<p>✓ Capacity increase</p> <p>✓ Establish the Best-Known Method (BKM) for improving deficient quality</p>
 <p>Improve Advanced Measurement Technology</p>	<p>5 Chemicals</p> <p>1 Abrasives</p> <p>1 Photoresists</p> <p>4 Gases</p> <ul style="list-style-type: none"> Measurement technology insufficient to meet advanced process requirements 	<ul style="list-style-type: none"> Add analytical instruments Introduce advanced instruments 	<p>✓ Zero rejects</p> <p>✓ Increase detection threshold</p> <p>✓ Capability for IC material analysis</p>



Continue to Reduce Environmental Impact

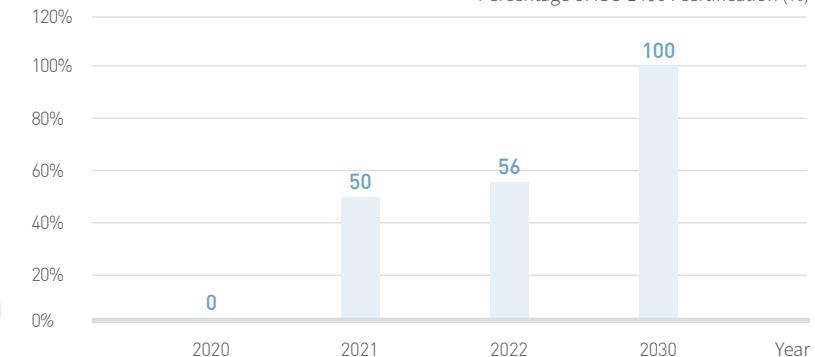
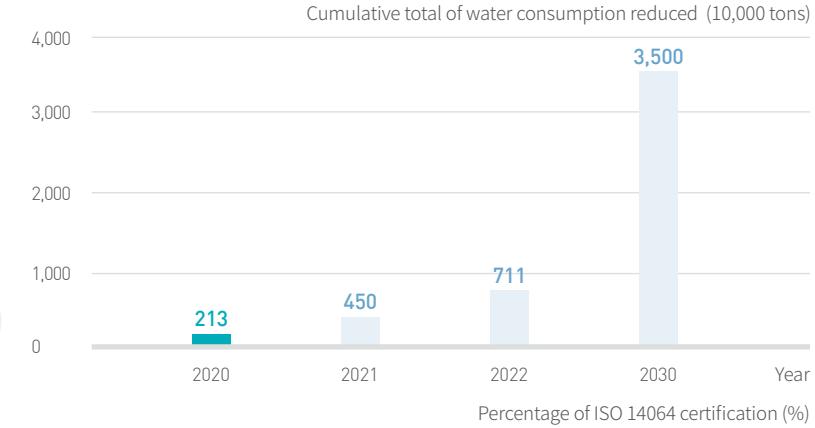
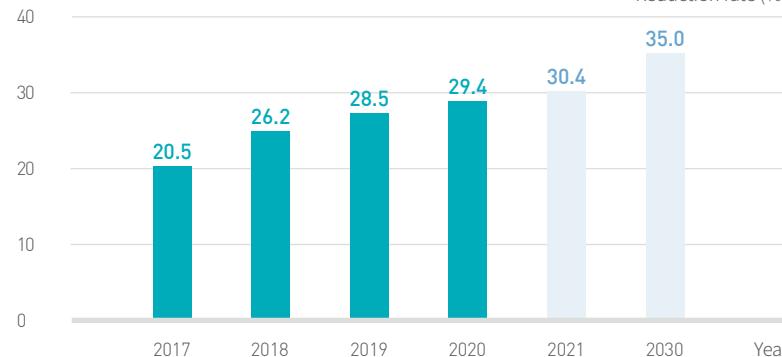
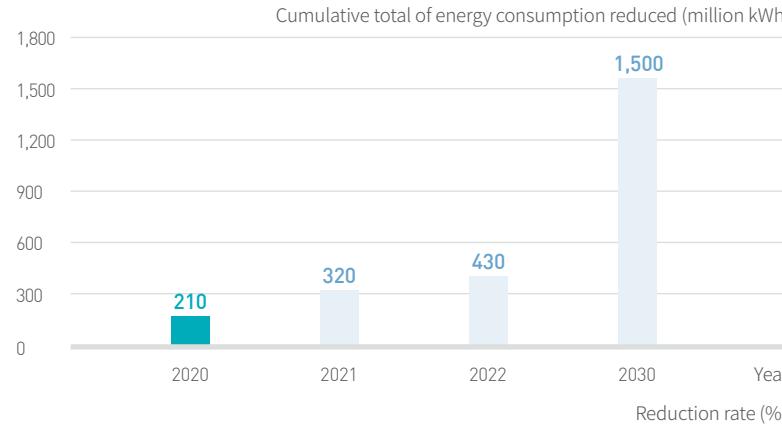
Drawing on experience, TSMC requires and assists suppliers to continuously improve performance on sustainability. In 2020, suppliers reduced energy consumption by 210 million kWh. In 2021, TSMC will increase its efforts, requiring suppliers to set power reduction targets in each factory's annual

environmental protection targets to push towards the sustainability goal of reducing a cumulative total of 320 million kWh. For local suppliers that produce the most waste, in 2020, waste production per unit decreased by 29.4%, surpassing the annual target of 29.1%.

In addition to energy consumption and waste reduction, TSMC will expand its management scope to water and carbon emission reduction in 2021, requiring suppliers to implement measures to reduce water consumption, set specific reduction targets, and regularly follow up on the results. TSMC aims to reduce water consumption by a cumulative total of 35 million tons by 2030. At the

same time, TSMC also requires [High Energy Consumption Suppliers](#) to undergo greenhouse gas emission certification and receive ISO 14064 -1 Organization Quantification and Reporting of Green House Gases certification. The goal is to achieve a 100% completion rate by 2030. By working closely with suppliers, TSMC aims to mitigate climate change risks.

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



3

A Practitioner of Green Power

Green manufacturing is the cornerstone of sustainable management at TSMC. We believe that corporate growth and environment protection should not be mutually exclusive; our goal is to become the global standard of eco-friendly corporations. To such ends, we integrate green management into daily operations and strive to carry out climate change and energy management, water management, waste management, and air pollution control through introducing innovative green technologies.

2

Received AWS Platinum certifications with the highest score in semiconductor industry for 2 consecutive years

1

To realize a circular economy, TSMC built its first Zero-Waste Manufacturing Center

1

TSMC leads the global semiconductor industry with the largest LEED-certified building area

Climate Change and Energy Management P.89

Water Management P.103

Waste Management P.112

Air Pollution Control P.122





Climate Change and Energy Management

Strategies



Strengthen Climate Resilience

Establish climate change countermeasures and preemptive precautions to lower risk of climate disasters



Drive Low-carbon Manufacturing

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



Use Renewable Energy^{Note4}

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



Increase Energy Efficiency

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

2030 Goals

- 0 day of production interruption due to climate disasters

- Reduce GHG emissions per unit product (metric ton of carbon dioxide equivalent (MTCO2e)/12-inch equivalent wafer mask layer) by **40%** (Base year: 2010)
- Reduce unit product environmental externalities ^{Note3} by **30%** (Base year: 2010)

- 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 **25%** renewable energy for fabs and **100%** renewable energy for non-fab facilities

- Save **5,000** GWh cumulatively between 2016 and 2030 through new energy-saving measures
- Double energy efficiency after five years of mass production for each process technology^{Note5}

2021 Targets

- 0 day of production interruption due to climate disasters

- Reduce GHG per unit of production (metric ton of carbon dioxide equivalent (MTCO2e)/12-inch equivalent wafer mask layer) by **20%**
- Reduce unit product environmental externalities by **8%** (NT\$12-inch equivalent wafer mask layer)

- Continue to purchase renewable energy and achieve **9%** of renewable energy in TSMC and overseas sites use **100%** renewable energy

- Save **500** GWh and **2,200** GWh cumulatively
- Increase 5nm process technology energy efficiency by **0.2** times in the second year of mass production

V Achieved ↑ Exceeded — Missed Target

2020 Achievements

- 0 day of production interruption due to climate disasters

Target: 0 days

- Reduced GHG emissions per unit product (metric ton of carbon dioxide equivalent (MTCO2e)/12-inch equivalent wafer mask layer) by **23%**

Target: 18%

- Reduced unit product environmental externalities by **7.5%** (NT\$12-inch equivalent wafer mask layer)

Target: 5%

- Purchased **1,230** GWh of renewable energy, Renewable Energy Certificates (REC), and carbon credits, achieving **7.6%** of TSMC's power consumption; TSMC overseas sites used **100%** renewable energy

Target: 7% of TSMC power consumption and 100% of power consumption in overseas sites

- **500** GWh energy saved, and cumulatively saved **1,700** GWh

Target: 400 GWh; 1,600 GWh

- Energy efficiency of 10nm and 7nm process technologies increased by **1.4** times in the fourth year of mass production^{Note6}

Target: 10nm process technology energy efficiency increase by 0.8 times in fourth year of mass production

Note 1: As of 2020, GHG emissions include fluorinated GHG emissions; the indicator will be used to evaluate various practices in the future.
Note 2: As of 2020, the unit for unit product indicators will be in "12-inch equivalent wafer".

Note 3: Environmental externality refers to the potential impact of the environmental footprint derived from business activities on human well-being, and takes the environmental profit and loss as a comprehensive index. The internal EP&L module was completed for the Total ESH Management digital system in 2020 and 19 key suppliers were included into EP&L evaluations to continue identifying ways to improve. Overseas fabs were unable to complete product life cycle assessment because of the COVID-19 pandemic and the assessment will be completed in 2021.

Note 4: Definition of Renewable Energy Use: Purchase renewable energy, Renewable Energy Certificates, and carbon credits produced by renewable energy

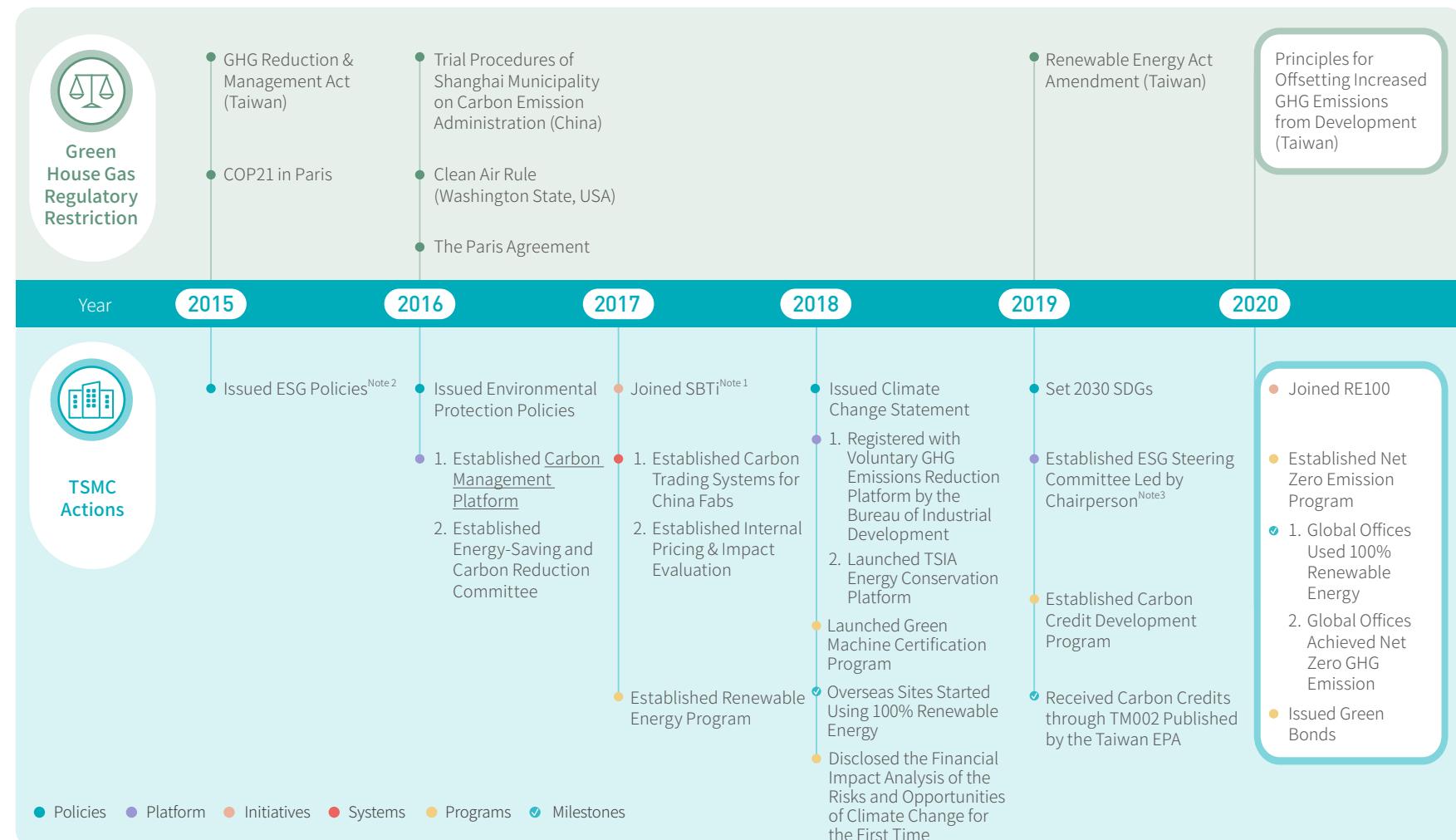
Note 5: Energy efficiency is the product equivalent per kWh of power (12-inch equivalent wafer mask layer/kWh)

Note 6: Some 10nm production lines have been converted to 7nm production lines

The year 2020 was an important milestone in TSMC's fight against climate change. TSMC closely follows and carries out a variety of climate action goals following the Paris Agreement. The ESG Steering Committee, led by Chairperson Dr. Mark Liu, evaluates TSMC climate change guiding principles twice a year and ESG Committee Chairperson Senior Vice President Lora Ho annually reports to the Board of Directors on climate actions and results of the year. In May 2020, TSMC signed the world's largest corporate renewable power purchase agreement (PPA); in July 2020, TSMC was officially approved by RE100 as the first semiconductor company to be a member of this global initiative for renewable energy, and TSMC declared a sustainability goal of using 100% renewable energy by 2050, driving the development of green energy industry, and realizing a future for sustainable environments.

As advanced processes continue to evolve, IC processes have become increasingly complex and now require higher electricity consumption. In 2020, TSMC purchased renewable energy, invested in the development of green tools, and worked diligently to carry out all 460 energy-saving measures and introduce new energy-saving tool models to strive towards better energy efficiency in all technology nodes of processes. Facing the potential risks brought by extreme climates and global warming, TSMC focuses on regulatory compliance, energy and carbon emissions reduction, and carbon asset management. TSMC is also using the Task Force on Climate-related Financial Disclosures (TCFD) framework proposed by the Financial Stability Board (FSB) to identify climate risks and opportunities. Based on the results, measures and goal management were established to effectively track response progress and outcomes, thereby lowering the financial impact of climate risks on business operations.

Milestone of Responses to Climate Change

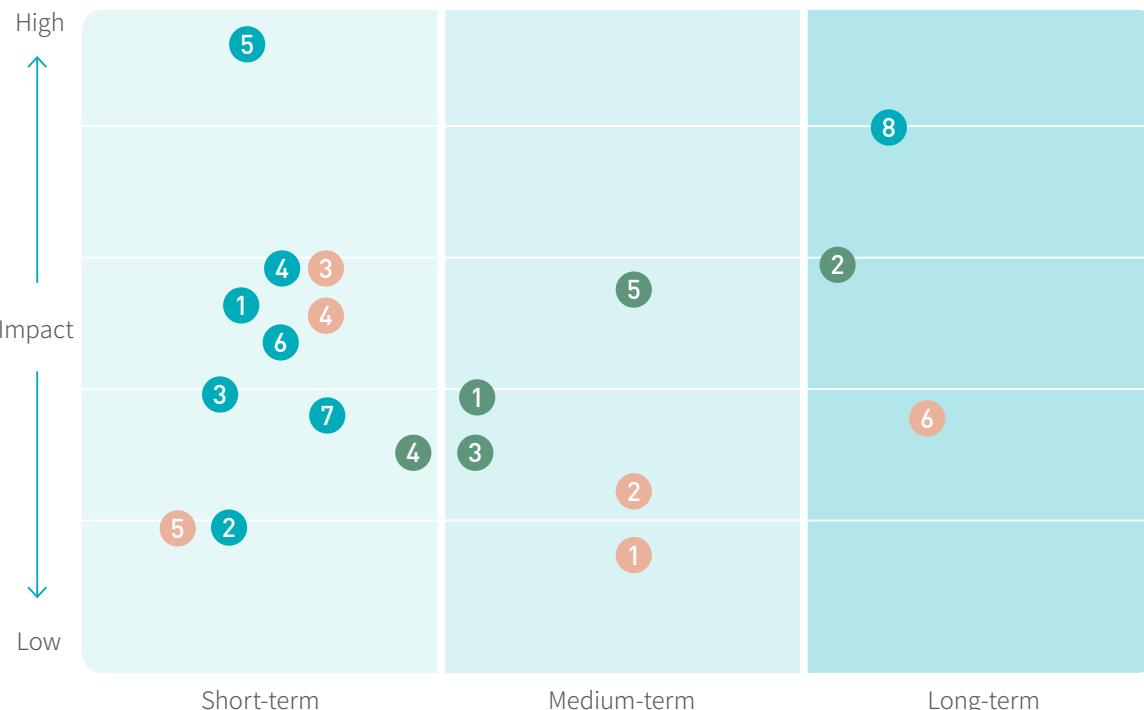




Strengthen Climate Resilience

Resilience to climate disasters is an integral part of corporate operations in an environment with increasingly volatile climates. TSMC uses the RCP8.5 global warming scenario issued by the UN to identify disaster factors introduced by extreme climates and established Climate Risk Adaptive Standards. In 2020, TSMC was able to successfully defend against potential impact from disasters and potential operating losses from climate change to achieve the target of zero production interruption.

Climate Change Risk and Opportunity Matrix

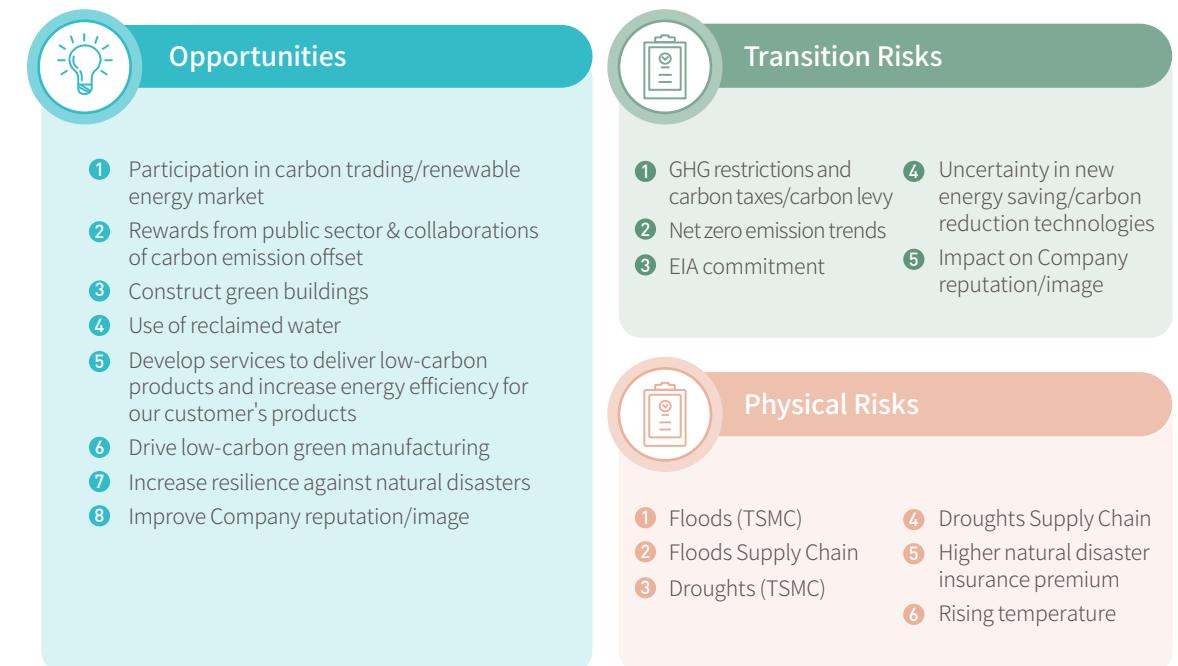


Identify Climate Risk

To uncover potential risks and opportunities, TSMC follows the TCFD framework to evaluate climate change risks and opportunities cross-functionally. In 2020, TSMC hosted a Climate Change Risk and Opportunity Workshop and invited related internal organizations to engage in group discussions on "policies and regulations", "market, technologies, and reputation", and "physical risks". Net zero emissions trend, EIA

requirements, uncertainty in new energy saving/carbon emission reduction technologies, flood and drought impact to supply chain, and insurance premium increasing for natural disaster, and other risk factors were new introduced into the financial impact analysis of climate change in 2020 as climate risks to account for internal and external environmental changes; enhancing corporate reputation was introduced as a new climate opportunity. In 2020, to cope with climate change,

TSMC also carried out actions such as purchasing local renewable energy, building the TSMC Water Reclamation Plant in Tainan Science Industrial Park, planning and building green buildings, implementing programs for energy saving and carbon emissions reduction, and water conservation, investing into energy-efficient products, elevating building foundation, and more. For more details, please see "Financial Impact Analysis of Climate Change".





Financial Impact Analysis of Climate Change

Climate Risk	Potential Financial Impact	Climate Opportunities	Potential Financial Impact	2020 Actions
GHG Emissions Restriction and Carbon Taxes/Carbon Fee	<ul style="list-style-type: none"> ▪ Restriction on manufacturing capacity expansion; increase in operation costs 	Participation in Renewable Energy Plans Participation in Carbon Trading Market	<ul style="list-style-type: none"> ▪ Early purchases of renewable energy, successfully increasing manufacturing capacity 	<ul style="list-style-type: none"> ▪ Signed renewable energy contracts of up to 1.3 GW in Taiwan ▪ Purchased 1,230 GWh of renewable energy to offset 100% of carbon emissions of <u>global offices</u> and all overseas operation sites
Net Zero Emission Trends	<ul style="list-style-type: none"> ▪ Increased cost of installation and operation for carbon reduction facilities ▪ Increased cost for purchasing carbon offset products ^{Note1} 	Obtain Rewards from Public Sectors and Collaborations of Carbon Emission Offset Develop Services to Deliver Low-carbon Product and Increase Energy Efficiency for Customers' Products	<ul style="list-style-type: none"> ▪ Stock up on required carbon credit for future emissions ▪ Satisfy customer demands for energy-efficient products and increase revenue 	<ul style="list-style-type: none"> ▪ Received rewards from public sector for offsetting F-GHGs and nitrous oxide ▪ Used carbon credit to offset carbon emissions and achieve net zero for <u>global offices</u> ▪ Invested in the development of 5-nm energy-efficient products
EIA Commitment	<ul style="list-style-type: none"> ▪ Unsuccessful attempts at obtaining renewable energy and reclaimed water have become obstacles to fabrication using advanced technologies 	Use of Reclaimed Water	<ul style="list-style-type: none"> ▪ Successfully build advanced production line 	<ul style="list-style-type: none"> ▪ Started construction for the TSMC Water Reclamation Plant in Southern Taiwan Science Park
Uncertainties in the Development of New Energy Saving/Carbon Reduction Technologies	<ul style="list-style-type: none"> ▪ Increase energy consumption in production lines using new process technologies result in higher operating costs 	Construct Green Buildings	<ul style="list-style-type: none"> ▪ Reduce utilities costs 	<ul style="list-style-type: none"> ▪ Acquired 2 green building certificates
Impact on Company reputation	<ul style="list-style-type: none"> ▪ Damage to company image when unable to meet stakeholder expectations 	Enhance Corporate Reputation	<ul style="list-style-type: none"> ▪ Upgrade sustainability ratings by TSMC stakeholders 	<ul style="list-style-type: none"> ▪ Only semiconductor company to have been in the Dow Jones Sustainability Index (DJSI) for 20 consecutive years; Listed in Leadership of CDP climate change and water security
Flood/Drought	<ul style="list-style-type: none"> ▪ Production affected, resulting in financial losses and a decrease in revenue 	Increase Resilience against Natural Disasters	<ul style="list-style-type: none"> ▪ Strengthen climate resilience and lower the risk of operation interruption and potential losses 	<ul style="list-style-type: none"> ▪ Elevated building foundation of Fab 18 Phase 3 by 2 meters ▪ Fab 18 Phase 3 committed to using and developing reclaimed water ▪ Established a comprehensive water monitoring system
Higher Natural Disaster Insurance Premium	<ul style="list-style-type: none"> ▪ Increase in operating costs 	Drive Low-carbon Green Manufacturing	<ul style="list-style-type: none"> ▪ Save energy and reduce costs 	<ul style="list-style-type: none"> ▪ Conserved 500 GWh of electricity through energy conservation programs
Rising Temperature	<ul style="list-style-type: none"> ▪ Increase in energy consumption, costs, and carbon emissions 			

Note 1: Carbon offset products are renewable energy certificates, carbon credits or other carbon neutral products.



Drive Low-carbon Manufacturing

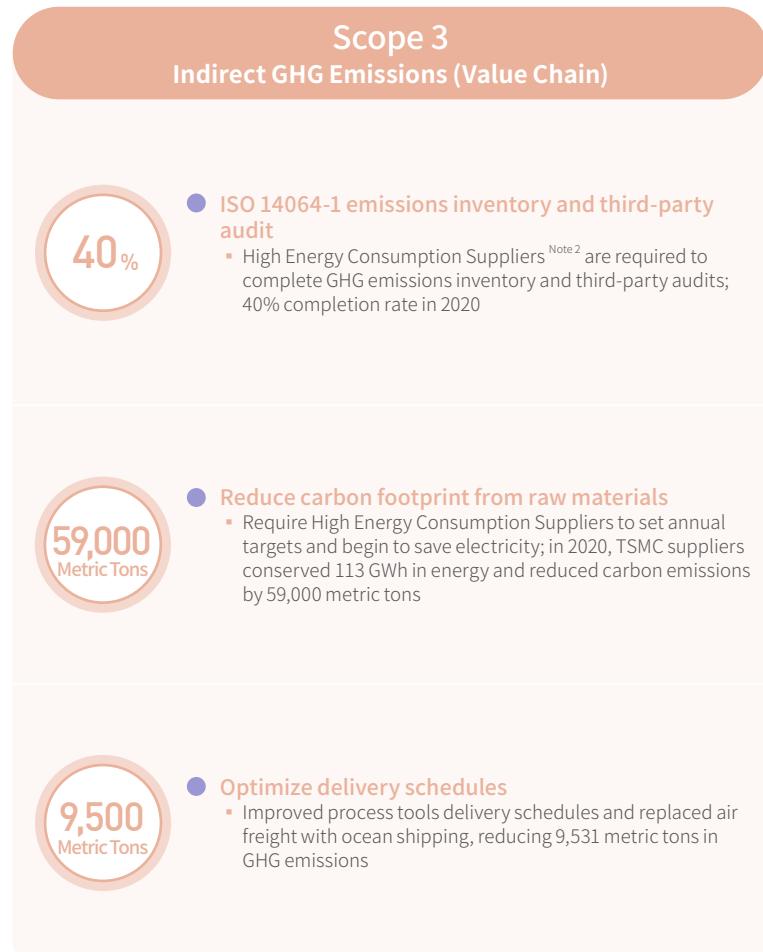
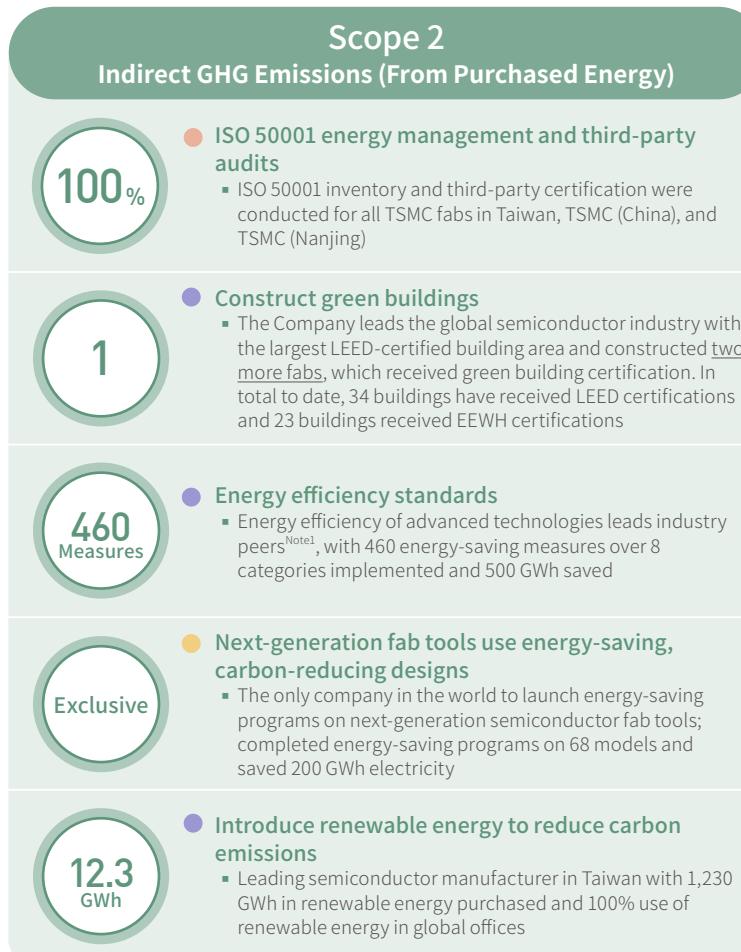
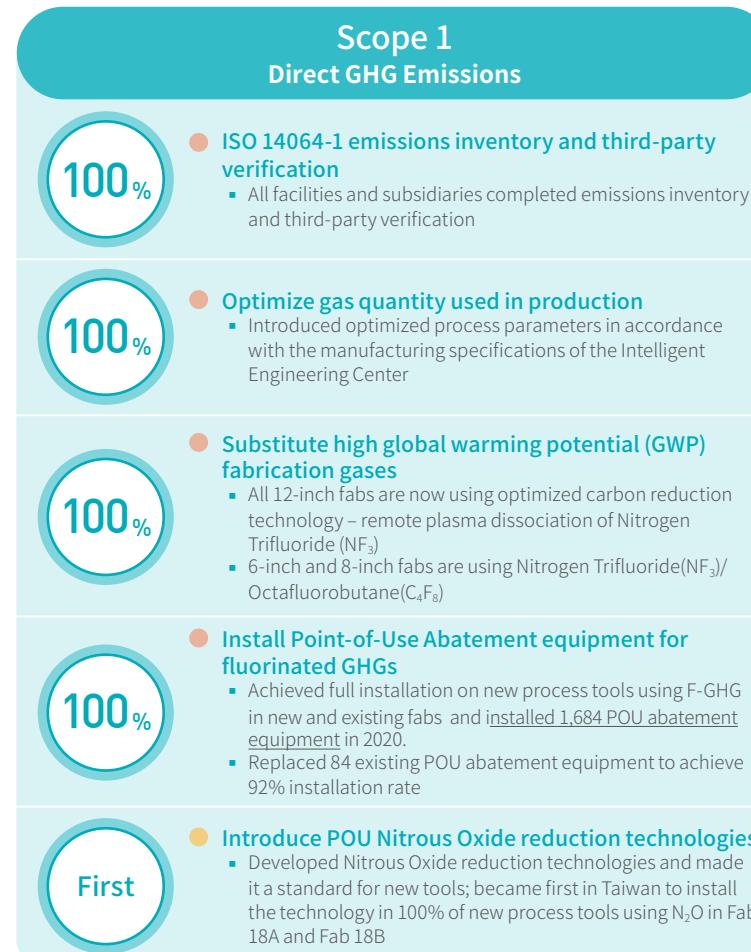
TSMC has long been committed to green manufacturing and aspires to be a world leader in low-carbon manufacturing. The Company performs yearly reviews of the overall effectiveness of carbon reduction based

on third-party-verified GHG inventory results. Because F-GHG emissions and the indirect emission of GHGs due to power consumption are the two main sources of GHG emissions, TSMC has for many years, continued to

establish industry best practices for GHG reduction. In 2020, TSMC replaced and installed roughly 1,684 local abatement facilities for fluorinated GHGs and nitrous oxide; acquired two new green building certificates; and

implemented [energy-saving projects](#) for process tools machines while taking progressive steps to increase [the use of renewable energy](#) to reduce the GHG emissions per unit product.

GHG Reduction Best Practices



Note 1: Figures from Joint Steering Committee (JSTC) report of the World Semiconductor Council.

Note 2: High Energy Consumption Suppliers are the suppliers that use >50 million kWh/year in a single facility.

● Market Leader: Leads global industry peers

● All TSMC: Introduced in all TSMC facilities

● Significant: First and only in the semiconductor industry



GHG Emissions Inventory

In 2020, TSMC continued to implement the benchmark practices of optimizing the use of process greenhouse gases, minimizing global warming potential (GWP), maximizing the removal rate in exhaust, and comprehensively adopted the best available technology. By taking tangible actions, the Company has effectively reduced 4.2 million metric tons of direct CO₂e emissions (Scope 1), of which fluorinated GHG emissions per

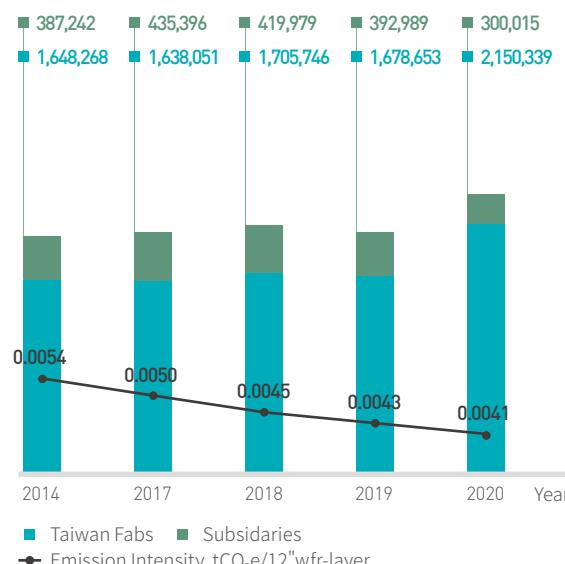
unit product were reduced considerably by 68% in 2020, more than two times the target set by the World Semiconductor Council. Indirect emissions (Scope 2), caused by energy consumption, were also curbed as a result of increased use of renewable energy; indirect emissions (Scope 3) of upstream and downstream value chains mainly involve raw material production and energy-related activities. As such, TSMC has set energy conservation and carbon reduction goals with its

suppliers to work together toward creating a sustainable supply chain.

As the world's largest provider of semiconductor technologies and capacity, TSMC is deeply aware of our responsibilities towards local and global environments. We pay close attention to Science Based Targets (SBTs) in line with the 2° C scenario and various climate actions such as the RE100 initiative. Using renewable energy is the primary

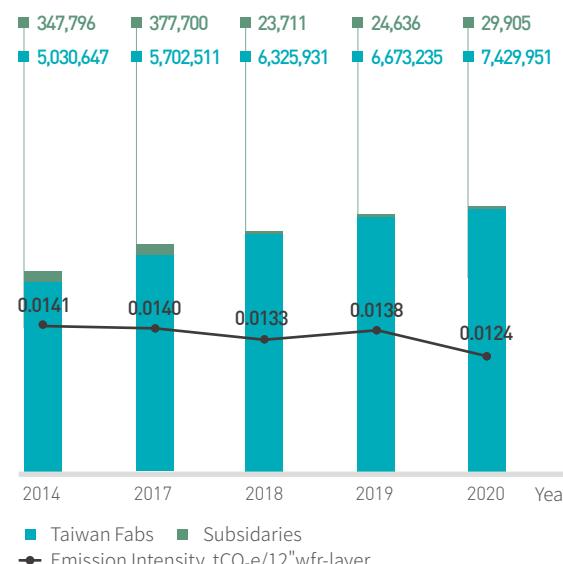
way that companies are able to reduce carbon emissions, so TSMC has to collaborate with external partners to develop carbon reduction/carbon negative technologies and obtain carbon credits for carbon offset to ensure TSMC is moving towards the SBT targets and net zero emissions. In 2020, TSMC was able to achieve 100% use of renewable energy in global offices and also used carbon credits to offset carbon emissions from natural gas used in the kitchen to achieve net zero emissions, setting a milestone for TSMC.

Scope 1 GHG Emissions



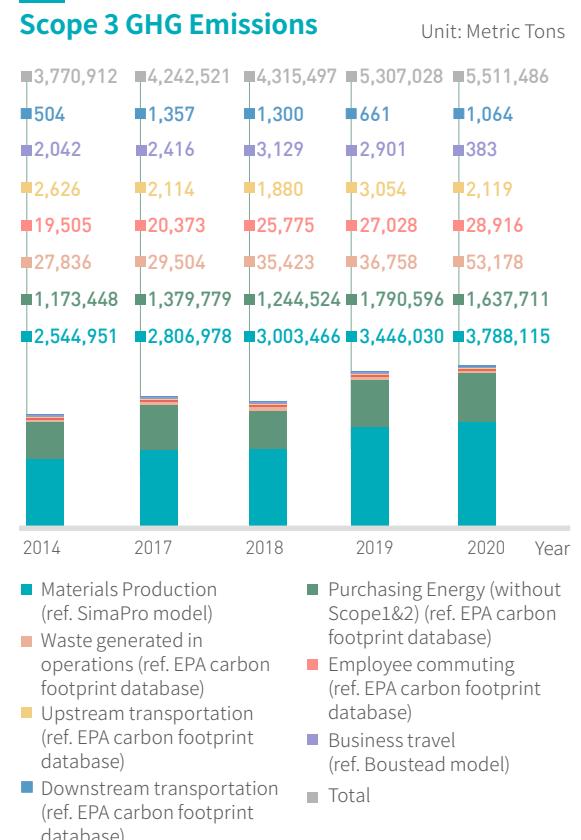
Note 1: GHG emissions data for Scope 1 and Scope 2 from TSMC facilities in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra
Note 2: GHG emissions data for Scope 3 from TSMC facilities in Taiwan

Scope 2 GHG Emissions

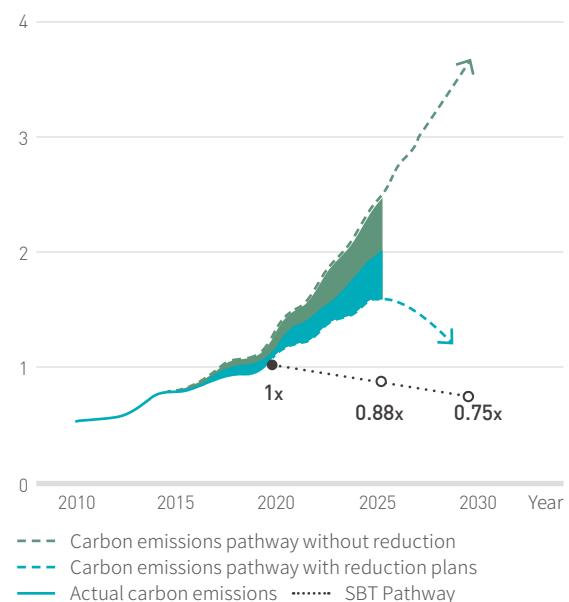


Note 3: Emission factor based on data released in 2020 by the Bureau of Energy stating that 0.509 kg of CO₂e / kWh, where 1 kg of CO₂e equals 6,805 kJ
Note 4: As of 2020, the unit for unit product indicators will be in "12-inch equivalent wafer"

Scope 3 GHG Emissions



GHG Emissions and Reduction Trends



Note 1: GHG emissions include Scope 1 & 2; standardized baseline is the values in 2020.
Note 2: TSMC revised the base year for Science Based Targets from 2017 to 2020.



TSMC's manufacturing is primarily based in Taiwan. In 2020, TSMC achieved major progress in the renewable energy market: the Company became part of the first group to engage in renewable energy wheeling transactions. Unfortunately, our efforts have yet to guarantee sufficient supply in European and U.S. facilities. With our growing capacity, TSMC is unable to suppress the growth of overall carbon emissions despite implementing industry-leading standards for energy conservation/carbon reduction and achieving targets for unit product carbon reduction. TSMC will continue striving towards SBTs and net zero emissions by strengthening green innovation, purchasing renewable energy, driving the development of regional green energy industries, using carbon neutral raw materials, and expanding external collaborations to develop carbon credit projects.

Value EP&L and Strive to Reduce Carbon Externalities

Every three years, TSMC updates or establishes product life cycle assessments, water footprint assessments, and carbon footprint assessments in Taiwan fabs and obtains ISO 14040, ISO 14066, and ISO 14047 certifications. Product life cycle assessment for overseas fabs was expected to be completed in 2020 but third-party certification organizations were unable to conduct site audits due to COVID-19; product life cycle assessment for overseas fabs will be delayed to 2021.

In terms of reducing unit product environmental footprint, TSMC uses an Environmental Profit and Loss (EP&L) tool to convert environmental impact from TSMC operations into external costs (also known as environmental externalities). In 2020, TSMC completed the EP&L module for the Total ESH Management digital system, allowing us to systematically compile operation data from various facilities in a timely manner as a continuous improvement management tool. Analysis in 2020 revealed that Scope 1 and Scope 2 GHG emissions are the primary source of TSMC's environmental externalities, accounting for 96.6%. To mitigate external costs brought on by TSMC operations, TSMC continues to drive low-carbon manufacturing, improve energy efficiency, increase the use of renewable energy, and more. In 2020, unit product environmental externalities was reduced by 7.5% from the previous year. TSMC also applied EP&L to upstream raw material suppliers, and we discovered that chemical raw materials manufacturing suppliers accounted for 51% of the supply chain's environmental externalities, which was primarily particulate matters and GHG emissions. EP&L is now the cornerstone for TSMC when formulating carbon reduction strategies. In 2021, TSMC will be expanding partnerships with suppliers to work together and reduce external costs on society from GHG emissions and reach the 2030 goal of reducing unit product environmental externalities by 30%.

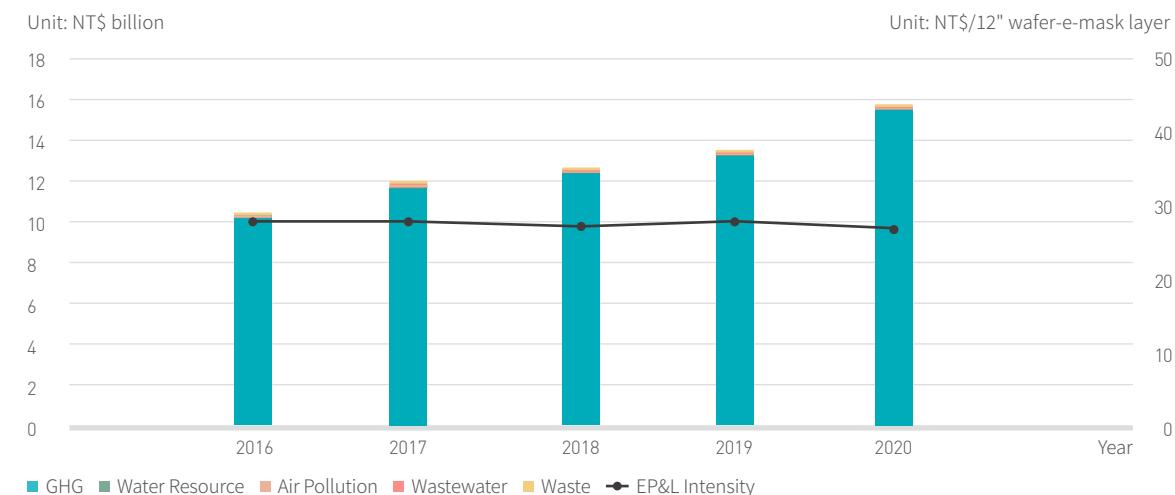
Use Renewable Energy

In 2020, with full support from the Board and management team, TSMC was able to purchase more renewable energy and move towards carbon neutrality. In July 2020, TSMC officially joined the RE100, becoming the first semiconductor company in the world to do so. We committed to 100% renewable energy in global operations and zero direct CO₂ emissions from electricity consumption by 2050. TSMC hopes to drive the trend of renewable energy use in the global semiconductor industry through its own



Renewable energy from solar plants in the salt flats of Chiayi County was officially provided to TSMC in early May 2020, making TSMC one of the first companies in Taiwan to purchase retransmitted renewable energy (Photo credit: Vena Energy Taiwan)

EP&L Trend Chart





sustainable actions. In 2020, TSMC received the first RE100 Leadership Awards - Most Impactful Pioneer from The Climate Group.

Purchasing Renewable Energy

TSMC vision is for corporate growth and the environment to prosper together. Our sustainability goals for 2030 are 25% renewable energy consumption for all fabs and 100% renewable energy consumption for non-fab facilities. After all overseas sites transition to using

100% renewable energy, we will also expand the ratio of renewable energy consumption in local sites.

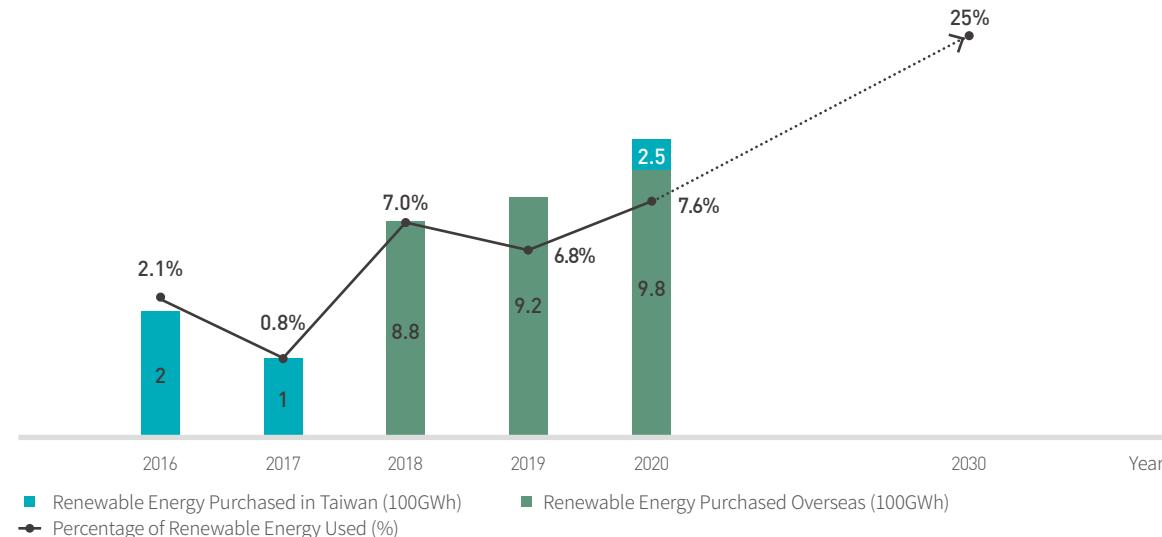
The renewable energy development in Taiwan is in the early stage and TSMC is working with the MOEA, Bureau of Energy, Bureau of Standards, Metrology, and Inspection, Taipower, and the Allied Association for Science Park Industries to discuss and eliminate the gap between regulation and real practice as well as scheme out details for future wheeling transaction. By communicating closely with the government and with

support from renewable energy businesses, Taiwan was able to reach its first renewable energy wheeling milestone in May 2020. The Solar Plant in Chiayi County generated and transmitted renewable energy to TSMC, and a number of onshore wind farms transmitted to TSMC fabs in Taiwan in the fourth quarter of 2020, a sign that Taiwan's renewable energy sector is growing stronger. As of the end of 2020, TSMC has signed power purchase agreements to purchase 1.3 GW of renewable energy, which will reduce 2.2 million metric tons of carbon emissions each year, helping achieve 100%

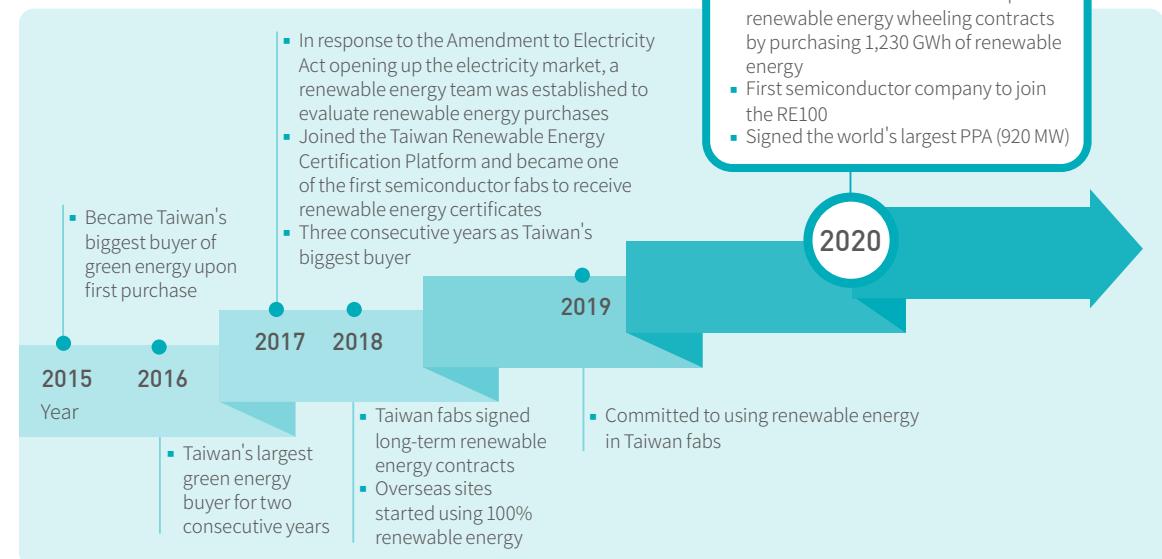
renewable energy used in global offices, and making contribution to climate change mitigation.

TSMC hopes to drive the renewable energy sector and related industries by purchasing renewable energy and supporting related government policies. Starting in 2018, TSMC began to purchase renewable energy, RECs, and carbon credits in 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,

Use of Renewable Energy and Ratio



Renewable Energy Development Timeline





Canada, Europe, China, and Japan; 2020 marks the third consecutive year that TSMC has achieved zero carbon emission from power consumption in overseas sites.

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 2020, 416 kWp of solar panel capacity was installed, and has already provided 4.63 GWh, reducing carbon emissions by 2,356

metric tons (the equivalent of annual carbon absorbed by 200,000 trees); in 2021, an additional 227 kWp in capacity of solar panels will be added, and this is expected to generate up to 5.76 GWh of electricity.

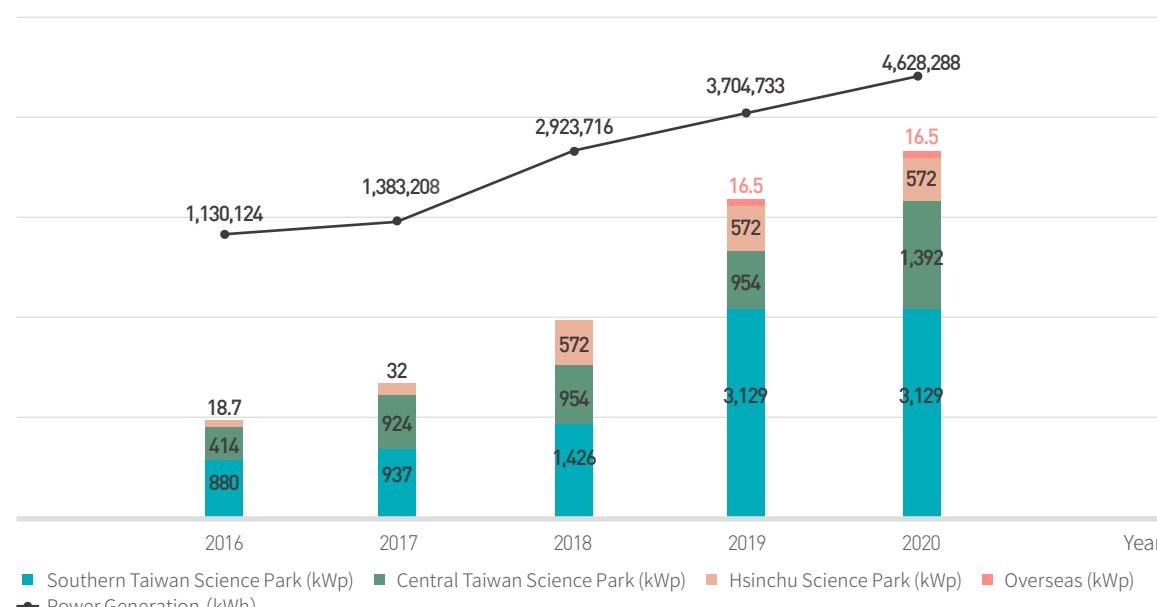
Increase Energy Efficiency

In 2020, TSMC continued to implement energy efficiency programs for manufacturing processes and with the goal of increasing energy efficiency by 100% after a process technology has entered mass production for

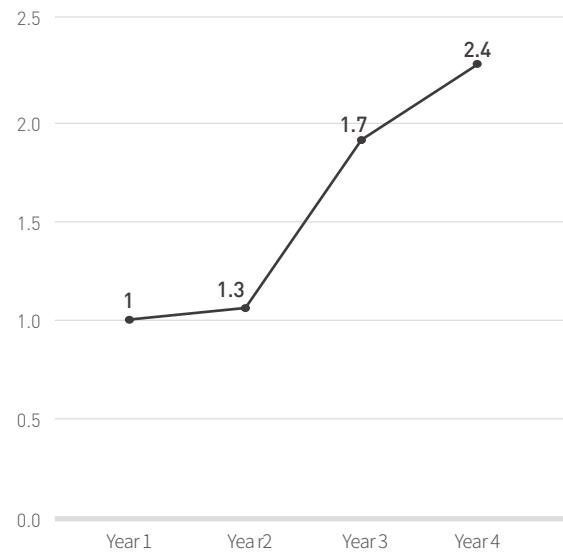
five years. By expanding innovative energy-saving measures, installing smart energy-saving equipment, and adding components for energy conservation, TSMC was able to increase energy efficiency of 10nm and 7nm process technologies in the fourth year of mass production by 1.4 times, reaching our long-term 2030 goal ahead of schedule; energy efficiency for the 16nm and above process technologies has also improved by 1.8 times. TSMC has an unwavering commitment to continue improving energy efficiency in the face of more complex, advanced process technologies in the future.

In 2020, TSMC consumed a total of 16,900 GWh in energy; with electricity making up 95%, natural gas coming second at 5%, and diesel with less than 0.1%. Electricity is the main energy used to power TSMC's manufacturing equipment and fab systems. Natural gas is used in exhaust treatment facilities to reduce the direct emission of fluorinated greenhouse gases 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.

TSMC Renewable Energy Capacity & Generated

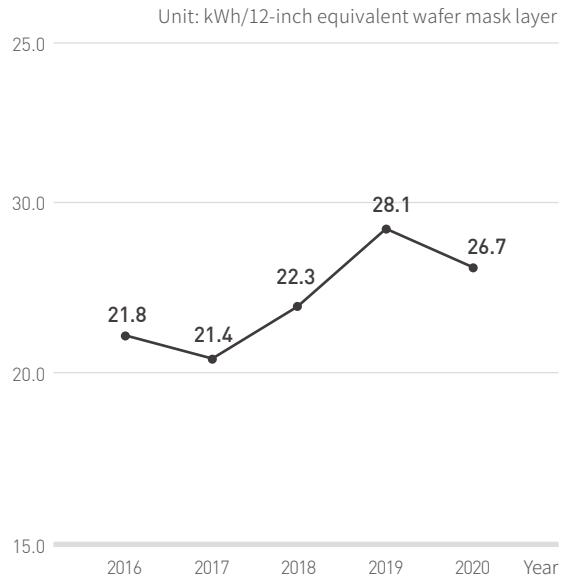


Energy Efficiency of 10nm & 7nm Process Technologies



Note 1: Standardized baseline for energy efficiency is the values taken from the first year of mass production of 10nm and 7nm process technologies.
Note 2: The data covers TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra.

Unit Product Energy Consumption



Note 1: The data covers Taiwan Facilities, TSMC (China), WaferTech, and TSMC (Nanjing)
Note 2: Diesel and natural gases are not used in manufacturing and is therefore not counted in unit product energy consumption.
Note 3: The unit product indicator is calculated based on 12-inch wafer equivalent starting from 2020.

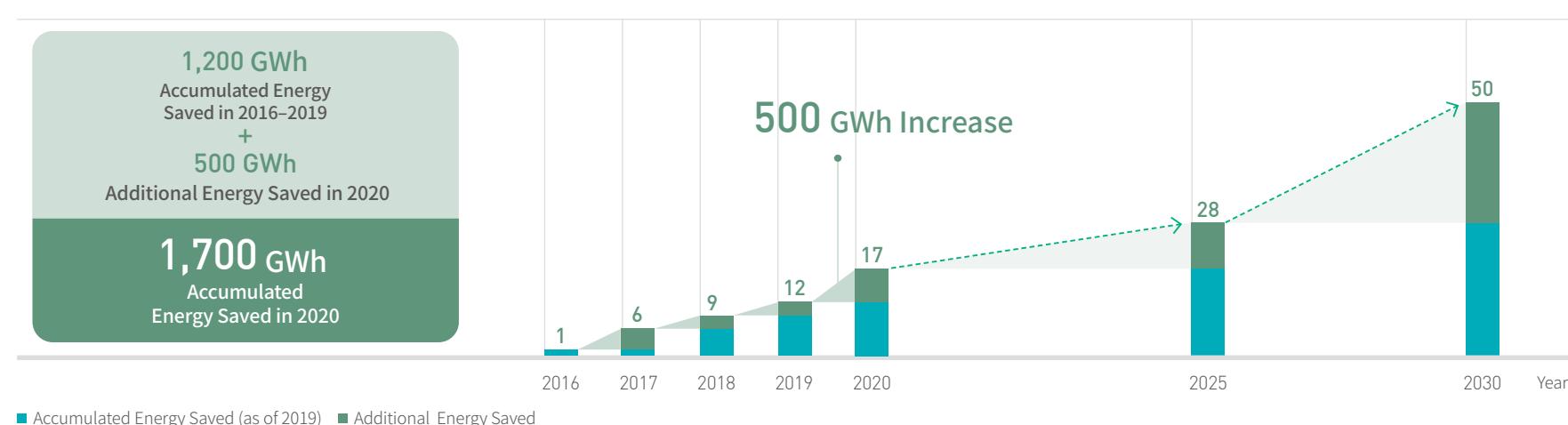
Expand Energy-saving Measures

In 2020, TSMC's Energy-saving and Carbon Reduction Committee worked to conserve more energy through company-wide roll-outs of energy-saving measures. The committee defined five major energy conservation teams for different process technologies as part of their efforts to conserve more 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.

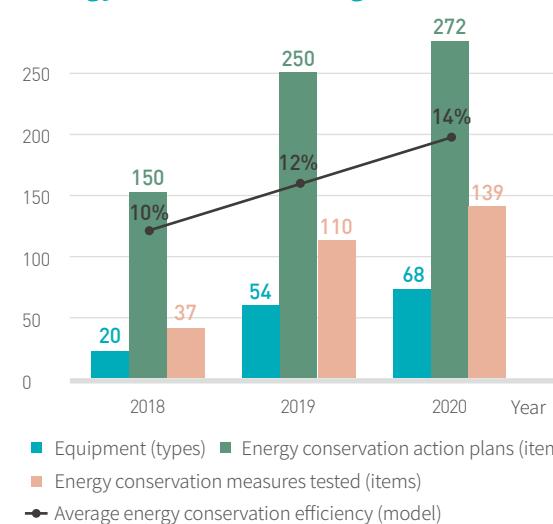
In response to the growing number of tools used at TSMC, the Intelligent Engineering Center launched the Green Manufacturing Engineering Program in 2020 to reduce equipment repair risks and increase energy efficiency. With the program, the Intelligent Engineering Center integrates energy conservation planning and operations for all fabrication equipment across all fabs. Each month, the five energy conservation teams meet and discuss new innovative measures for rapid roll-out into other fabs and set standards for new fabs as soon as possible. [The New Generation Equipment Energy Conservation Program](#), launched in 2018, reached new heights in 2020 with 139 energy-saving measures tested and applied to 68 different types of 5 nm and 3nm manufacturing tools, helping TSMC save 200 GWh in energy consumption.

In 2020, TSMC carried out 460 energy-saving measures across 8 different categories and was able to conserve 500 GWh in energy consumption, the equivalent of 250,000 metric tons of carbon emissions. The energy savings translated into NT\$1.25 billion of actual financial savings and external carbon costs reduced from lower carbon emissions were around NT\$380 million.

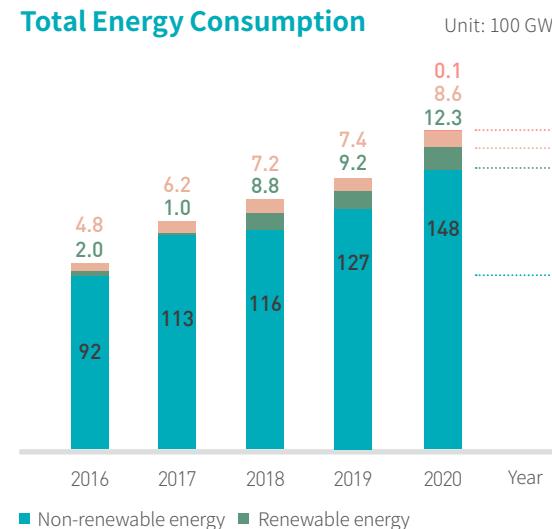
15-year Energy-saving Targets



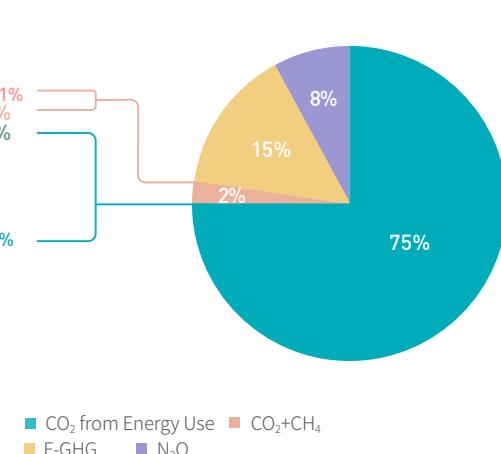
Results of the New Generation Equipment Energy Conservation Programs



Total Energy Consumption



GHG Emissions



Note1: 1 cubic meter of natural gas=10.5 kWh of electricity; 1 kWh=3,600 kilojoules.
Note 2: Data included Taiwan Facilities, WaferTech, TSMC (China), TSMC (Nanjing), and VisEra.



Energy Conservation Teams for Green Innovation

Categories/ Competent authority	Five Energy Conservation Teams	Machines	Energy Conservation Goals	2020 Achievements
Manufacturing Equipment Intelligent Engineering Center	Advanced processes R&D team	New generation 3nm/5nm machines	<ul style="list-style-type: none"> Develop and test energy-saving components Find optimal tool settings for energy conservation Determine specifications for new tools 	<p>Fab 12B reduced 25 GWh by introducing green components, green pumps, and optimal exhaust settings</p>
	12-inch wafer fab team	Existing 12-inch wafer machines	<ul style="list-style-type: none"> Optimize recipe settings for existing tools Seek new ways to conserve energy Determine best known method for energy conservation 	<p>Fab 15A and 15B reduced 25% in energy consumption by introducing low-energy consumption system for pipeline heating that effectively reduced pipeline surface temperature</p>
	Advanced backend and 8-inch wafer fab team	Existing backend & 8-inch fab machines	<ul style="list-style-type: none"> Replace low energy efficiency auxiliary equipment Determine specifications for new packaging and testing equipment 	<p>All 8-inch wafer fabs began using green pumps and green chillers, saving 12 GWh each year</p>
	EUV team	EUV machines	<ul style="list-style-type: none"> Increase energy efficiency Determine specification for new tools 	<p>Fab 12B, Fab 15B, and Fab 18A increased energy efficiency by 5% with big data analysis</p>
	Facility team	General facilities not for manufacturing	<ul style="list-style-type: none"> Replace low energy efficiency equipment Install smart energy conservation system for facility equipment Determine specifications for new equipment 	<p>Fab 12A/B, Fab 14B, Fab 15A, Fab 15B, and Fab 18A saves 17.1 GWh each year by using lithium-ion batteries for the uninterrupted power supply system</p>



The Energy Saving and Carbon Reduction Committee awarded Energy Conservation Model Awards and Energy Conservation Innovation Awards according to employees' success with energy conservation targets and innovative ideas.



Trophies were made from recycled TSMC copper to add a special eco-friendly touch while encouraging energy innovation.

Energy Conservation Measures



Lighting Energy Savings

- Smart lighting in non-cleanroom areas
 - Replace bulbs with LED lighting
- Fabs: All fabs

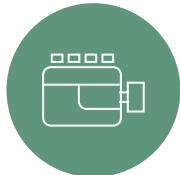
10 Measures; **16** GWh Energy Saved; **8,100** Metric Tons CO₂ Reduced



Energy Usage Management

- Reduced cooling water for manufacturing processes
 - Reduced exhaust emissions from equipment
- Fabs: All fabs

92 Measures; **42** GWh Energy Saved; **21,400** Metric Tons CO₂ Reduced



Unit Replacement

- Replace with new high-efficiency, energy-saving pumps
- Fabs: Fab 3, Fab 2/5, Fab 6, and Fab 8

25 Measures; **10** GWh Energy Saved; **5,100** Metric Tons CO₂ Reduced



A.C. Energy Savings

- Smart, energy-saving cooling unit
 - A.C. adjustments for energy conservation
- Fabs: All fabs

10 Measures; **94** GWh Energy Saved; **47,800** Metric Tons CO₂ Reduced



Standby Energy Savings

- Energy-saving mode for uninterrupted power supply system
 - Cooling fan for battery cabinet to conserve energy
- Fabs: All fabs

9 Measures; **98** GWh Energy Saved; **49,900** Metric Tons CO₂ Reduced



New Unit Specs

- New equipment uses high efficiency, energy-saving auxiliary equipment
- Fabs: 12-inch fabs/Advanced backend

125 Measures; **96** GWh Energy Saved; **48,900** Metric Tons CO₂ Reduced



Increased Performance

- Modified wet film for A.C. humidifier
- Fabs: 12-inch fabs

7 Measures; **32** GWh Energy Saved; **16,300** Metric Tons CO₂ Reduced



Equipment Adjustments

- Optimized power consumption
- Fabs: All fabs



182 Measures; **112** GWh Energy Saved; **57,000** Metric Tons CO₂ Reduced

Note: Carbon dioxide emission is 0.509 kg CO₂e/kWh; 1 kWh=3,600 kilojoules.



In addition to expanding energy-saving facilities and equipment, TSMC is also reducing material consumption, increasing climate resiliency, and including eco-friendly designs by building certified green buildings. As of 2020, 34 fabs have received LEED gold international certifications and 23 fabs received EEWH certifications. TSMC also leads the global semiconductor industry with the largest LEED-certified architectural area, and is number one in Taiwan for the largest green building-certified areas and certified green fabs. In addition, TSMC launched the "Plant a Tree Program" in 2020, collaborating with government agencies to obtain land for creating forests and offering the public a healthier, better urban environment.



TSMC built certified green buildings.

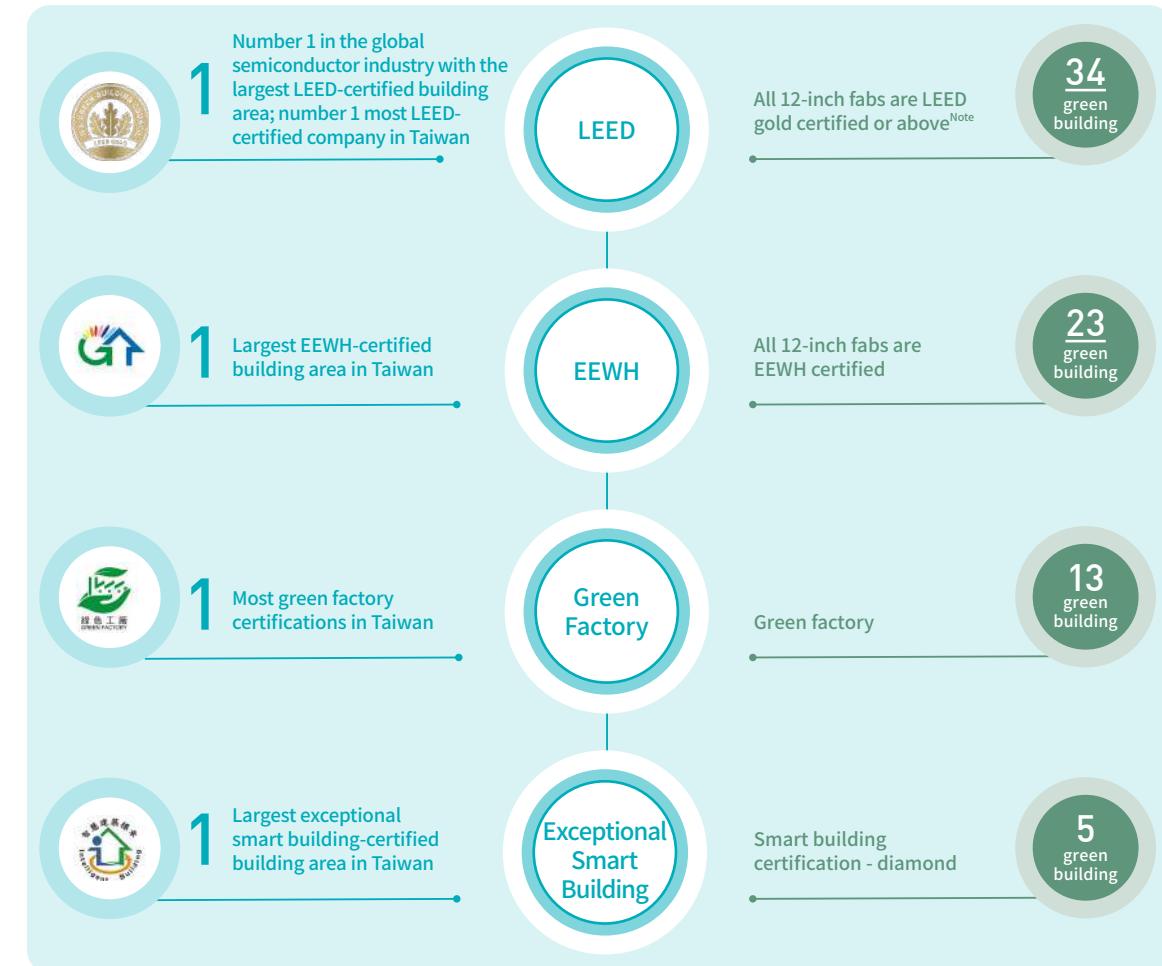
Leading the Industry by Example

In 2020, although COVID-19 caused production and business activities around the world to decelerate, TSMC continued to actively save energy and reduce carbon emissions, hoping to serve as a benchmark for the industry. In 2020, TSMC was once again recognized as an Outstanding Manufacturer for Voluntary Greenhouse Gases Emissions Reduction by the Bureau of Industrial Development, and was rated as a leading enterprise by the Carbon Disclosure Project (CDP) for carrying out green manufacturing commitments.

TSMC has long worked to develop climate mitigation and adaption measures, and we are happy to share our insight and experiences with outside parties. The TSMC-led Taiwan Semiconductor Industry Association (TSIA) Energy Committee regularly engages with 13 association members to share energy-saving experiences and management practices. In 2020, TSMC conserved 500 GWh in energy and helped association members save a total of 300 GWh in energy as well. TSMC also helped members obtain ISO 50001 certifications and was successful with a 71% completion rate. GHG reductions reached 82% in 2020, exceeding the association's goal.^{Note}

Note: Declared commitment to energy conservation and carbon reduction at the High-Tech Energy Saving and Carbon Emission Reduction Symposium ; 50% ISO 50001 completion rate and 80% GHG reduction rate in 2020; target for 2025 is 80% ISO 50001 completion rate and 85% GHG reduction rate .

TSMC Built Certified Green Buildings





Case Study

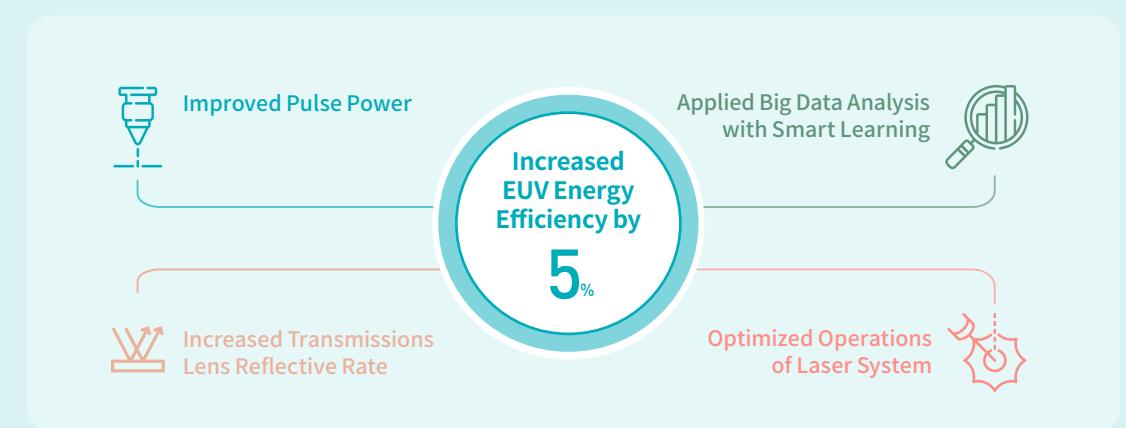
TSMC Leads Industry by Applying Big Data Analysis on EUV Machines to Increase Energy Efficiency by 5%

Semiconductor technologies are constantly evolving and Extreme Ultraviolet (EUV) technology is key to the successful evolution to process technologies below 5nm. Unfortunately, energy consumption from EUV machines is more than ten times that of deep ultraviolet (DUV) machines. In order to ensure both process technology advancement and environmental sustainability, TSMC is searching for ways to conserve EUV power consumption and was able to successfully increase energy efficiency by 5% in 2020 through big data analysis and improving mechanisms.

EUV machines are the most advanced machines in semiconductor lithography processes, and there is incredibly high risk associated with product quality when changing any processes. However, TSMC decided to collaborate with suppliers for the New Generation Equipment Energy Conservation Program. Research into EUV machines gave us further insight into the mechanism: EUV is reflected, on average, more than 10 times through a special transmission lens within the EUV machine. Each reflection results in 30% energy loss and so the machine preserves less than 2% of the light source power. In order to increase energy

efficiency of EUV machines, TSMC turned to big data to learn about how EUV light is produced, how energy is consumed, and how it operates. We discovered that the pulse created from EUV light and transmissions lens is the main factor in energy consumption, and immediately worked to develop mitigation measures.

In 2020, TSMC first amended equipment programming to achieve optimal EUV light pulse power and redesigned the structure of the transmission lens to increase reflective rate by 3%. TSMC also analyzed data from our carbon dioxide laser system magnifier and realized that by replacing holding frequency with fluctuation frequency, we would be able to increase the magnifier's energy efficiency by 10%. Our three-pronged approach successfully increased the energy efficiency of EUV machines by 5% and the innovative approach has now been applied to new 3nm EUV machines so that we may do our part in conserving energy and reducing carbon emissions.



TSMC successfully increased energy efficiency by 5% in 2020 through big data analysis and improving mechanisms.

Water Management

Strategies



Manage Water Resource Risk

Enforce climate change mitigation policies, implement water conservation and water shortage adaptation measures



Develop Diverse Water Sources

Develop water reclamation technologies; continue to practice water conservation and use reclaimed water during fabrication



Develop Preventive Measures

Improve the efficiency of water pollution prevention and removal of water pollutants^{Note2}

2030 Goals

- Reduce unit water consumption (liter/12-inch equivalent wafer mask layer) by **30%**
(Base year: 2010)

2021 Targets

- Reduce unit water consumption (liter/12-inch equivalent wafer mask layer) by **9%**
(Base year: 2010)

2020 Achievements

- Reduced unit water consumption by **8.9%**
(Base year: 2010)^{Note4}

Target: 10%



- Increase the replacement rate of reclaimed water by more than **30%**^{Note1}

- Complete the TSMC Tainan Science Park Reclaimed Water Plant and begin water supply

- TSMC Tainan Science Park Reclaimed Water Plant tender project completed and construction commenced



Target: Commence the TSMC Tainan Science Park Reclaimed Water Plant tender project and start supplying water in 2021

- Water pollution composite indicator **50%** above effluent standards^{Note3}

- Water pollution composite indicator reduction rate of **44%**

- Discharged less than **6.3 ppm** of tetramethylammonium hydroxide(TMAH)^{Note5}

Target: Less than 6 ppm



Note 1: Replace city water with reclaimed domestic or industrial wastewater.

Note 2: The scope of water pollution projects and figures include Taiwan facilities and VisEra.

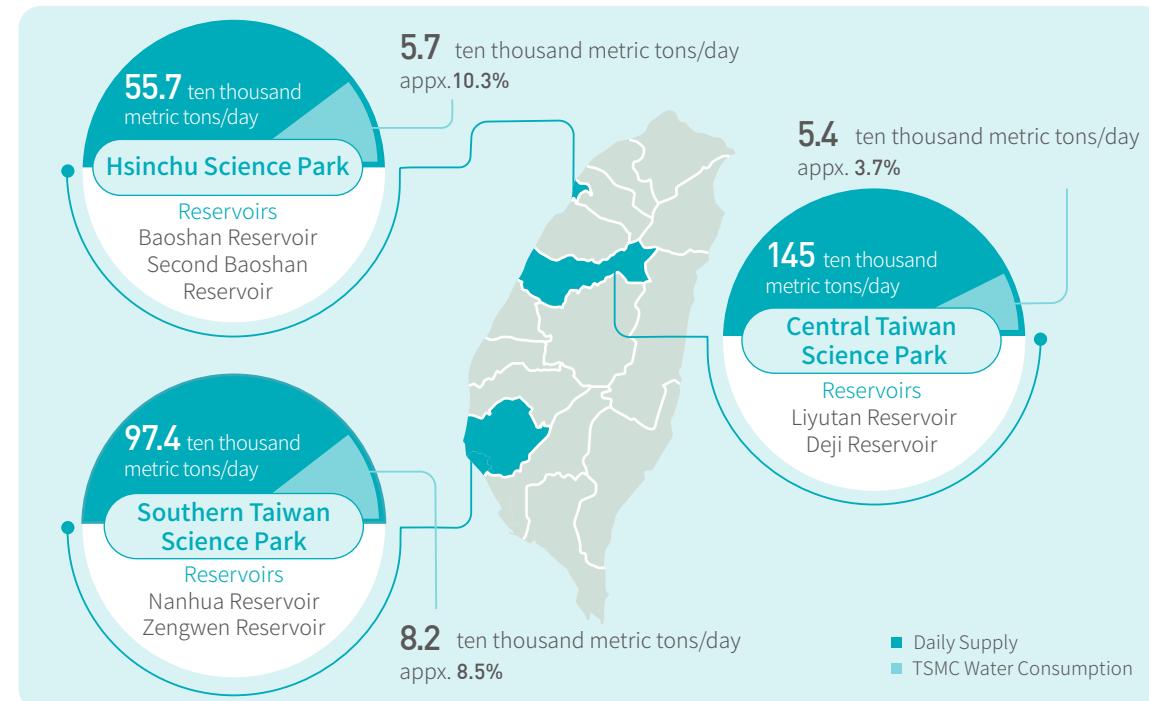
Note 3: 2030 Goals raised from 30% to 50%.

Note 4: Due to test production in new fabs, unit water consumption did not meet our target. TSMC continues to commit to the development of water reclamation technologies. The TSMC Tainan Science Park Reclaimed Water Plant is expected to be operational by 2021.

Note 5: Due to increased fab production, TMAH concentration levels in discharge failed to meet the target. TSMC is evaluating expansion of the treatment system.

In 2020, TSMC became the first to bring 5 nanometer (5nm) process technologies to mass production. TSMC increased clean water consumption as 5nm process technology includes advanced wafer stacking and reduced wire width, meaning that the smallest dust particle could have an impact on yield. This further demonstrates the importance of effectively using water resources and flexibility in water resource management. TSMC strives for comprehensive water cycle management through the following three major strategies: managing water resource risk, developing diverse water sources, and developing preventive measures.

TSMC Water Consumption Rate at Three Science Parks

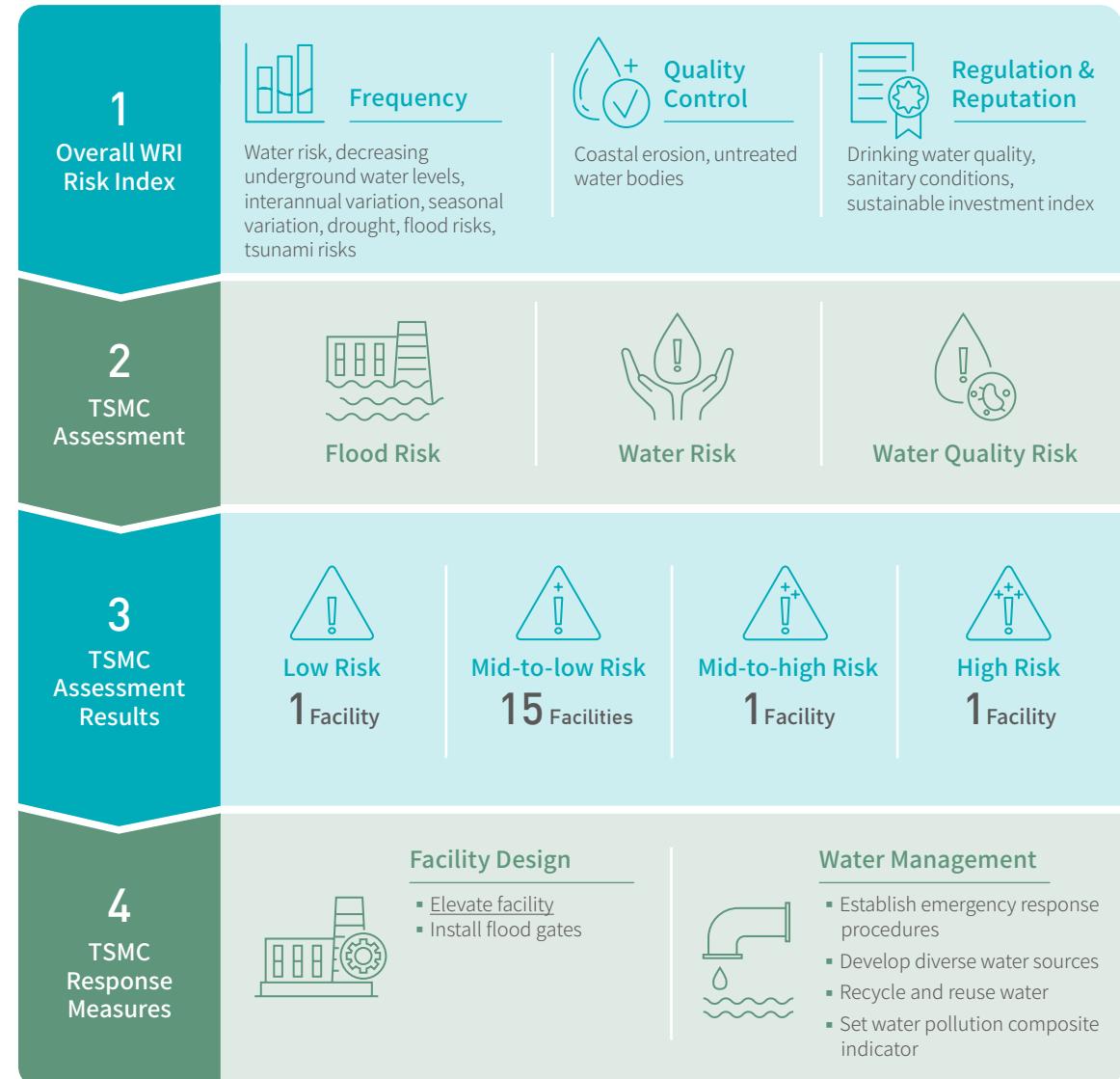


Manage Water Resource Risk

Assess Water Risks & Establish Water Risk Indicators

In 2020, TSMC adopted the Water Risk Atlas from the World Resources Institute (WRI) to evaluate water risk levels in areas with TSMC facilities by using key indicators of water supply, effluent water quality, and regulatory/reputation risks. TSMC facilities in Taiwan and our affiliate 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 they face differences in water quality in their regions and require refined water, thereby increasing wafer unit water consumption.

TSMC WRI Risk Identification



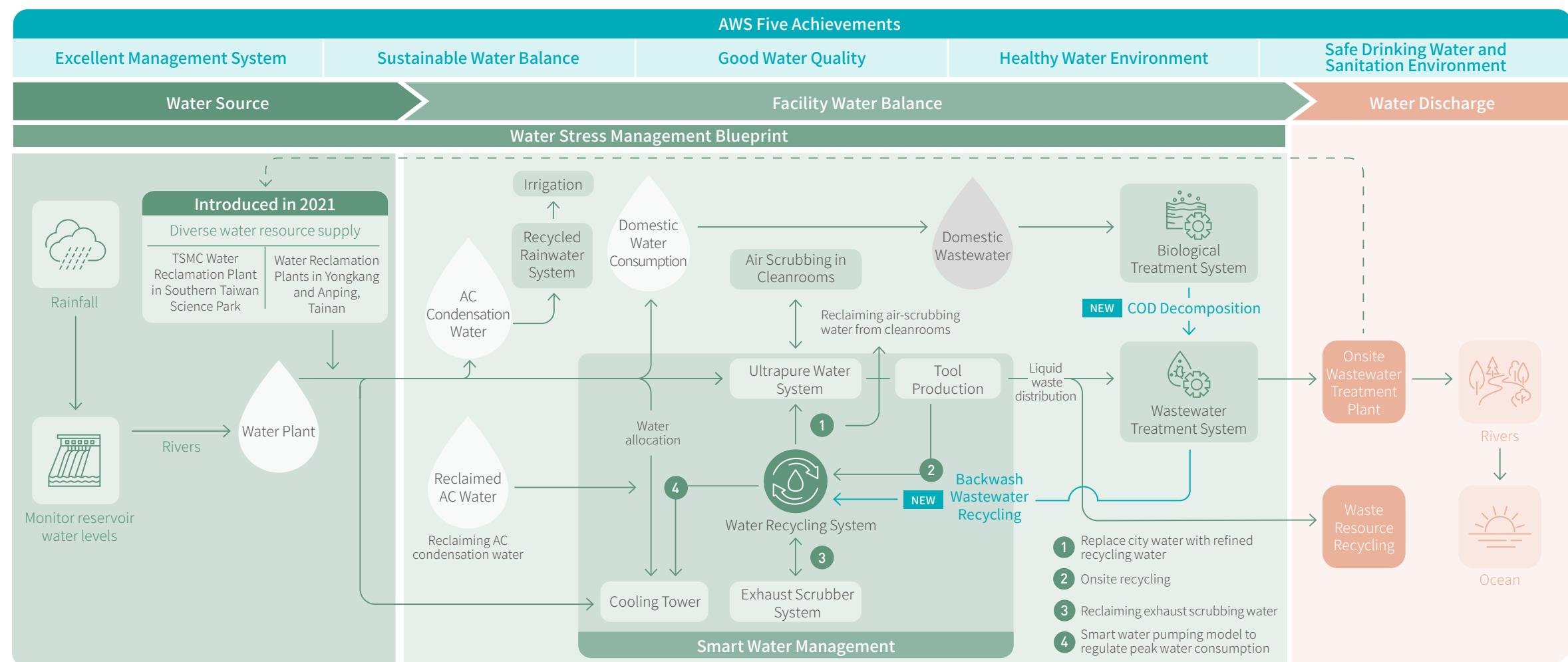


Effective Water Management with AWS

The Alliance for Water Stewardship (AWS) sets the global standard for sustainable water management. TSMC became the first semiconductor company in the world to receive Platinum Certification when Fab 6 and Fab 14B were certified. Other TSMC fabs are using the "smart copy" technique to earn AWS certifications as well. In 2020, Fab 15A and Fab 15B

broke records again by obtaining Platinum Certifications from AWS. In 2021, TSMC will be focusing on certifications for Hsinchu facilities including Fab 12A, Fab 12B, Fab 5, and Advanced Backend Fab 3.

Water Balance and Supply Chain Environmental Relationship Chart





As a result of climate change, 2020 was the first year without typhoons since 1964. Without typhoons, the reservoir watershed experienced a sharp decline in rainfall collection. TSMC deployed a blueprint for water stress management to monitor water levels in various reservoirs and adopted a water balance chart to take stock of water conservation measures. In May 2020, when the drought monitoring signal changed from blue to green (indicating fairly severe drought conditions),

Drought Contingency Measures

Government		TSMC
Drought Monitoring Signal from the Water Resources Agency	Government Response Measures	Response Measures
Blue	Normal water levels	Stabilize supply and demand
Green	Fairly severe	Encourage farmers to suspend farming
Yellow	First stage	Suspend water supply for irrigation in certain areas for specific times
Orange	Second stage	Reduce water supply to industrial users by 5-20%
Red	Third stage	Ration water by district

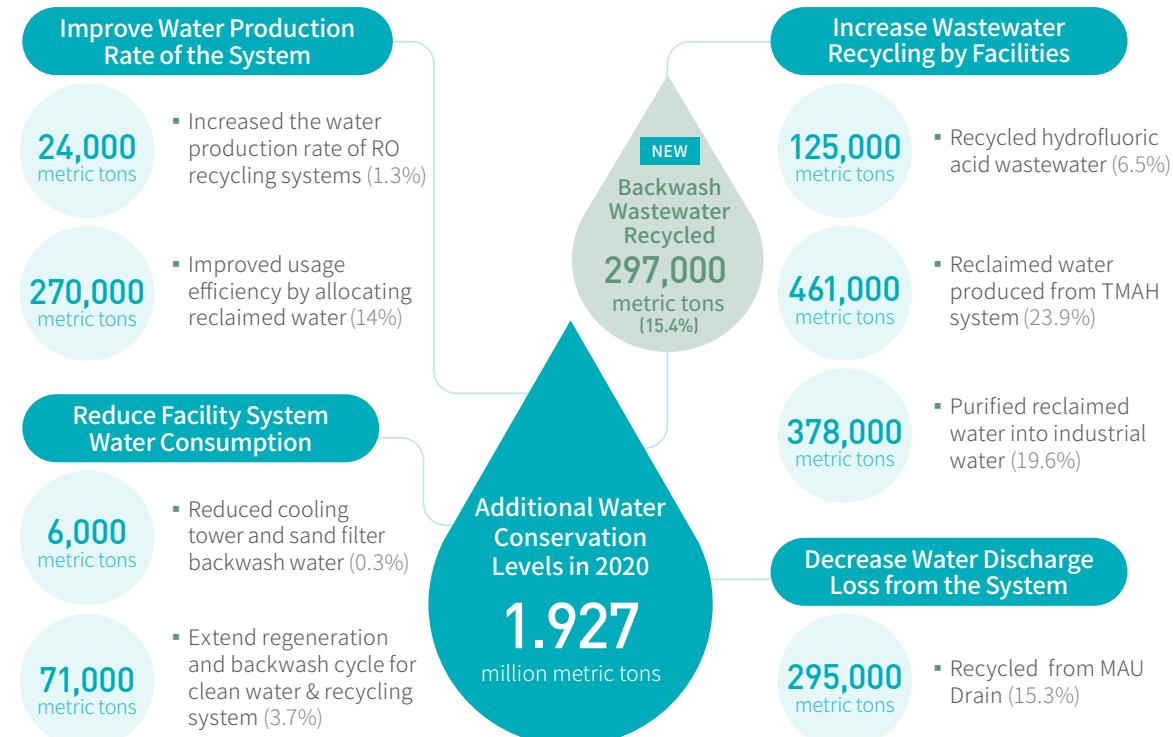
TSMC immediately established a Drought Emergency Response Team to monitor water sources and water truck capacities and reduce water consumption by 5%. Water levels remained low until November 2020, during which TSMC decided to further reduce water consumption by 7%. Smart water recycling management mechanisms were activated to allocate reclaimed water to TSMC facilities and increase water efficiency.

Strengthen Water Management & Increase Water Recycling

The four major water conservation measures at TSMC are to "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 ". These four measures are integrated with the three water management processes of "Water Supply Diversity, Water Efficiency Management, and Wastewater Resource Recycling". TSMC strives to uncover more opportunities to conserve water

and has developed 38 distribution systems based on the composition and concentration of wastewater from fabrication for wastewater classification and resource management. Equipment is then used to decompose pollutants and increase water recycling. With 9 recycling systems and 13 wastewater facilities, TSMC has been able to develop 10 renewable materials as of 2020.

Water Conservation Measures & Achievements in 2020





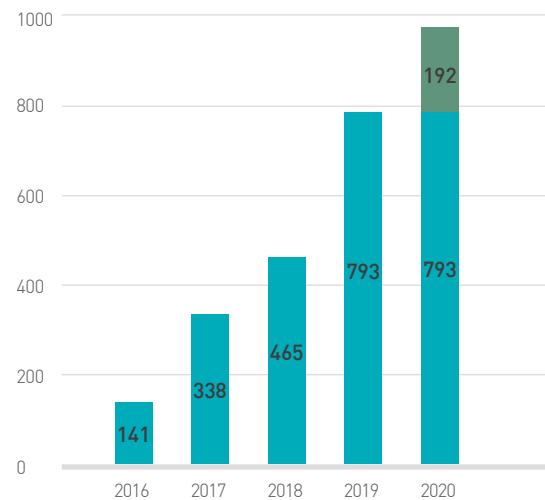
Wafer unit water consumption continues to increase due to stricter requirements for clean water from advanced processes and optimized operations. TSMC is implementing our four water conservation measures to increase water sources and reduce water consumption, but we continue to seek other opportunities to conserve

water. In 2020, TSMC launched a backwash wastewater recycling system and was able to conserve 297,000 metric tons of water, further increasing water conservation levels in 2020 to 1.927 million metric tons, and reducing wafer unit water consumption to 128.4 (L/12-inch equivalent wafer mask layer). TSMC was able to achieve

an 8.9% reduction from the base year but was unable to meet our annual target. In 2021, the TSMC Tainan Science Park Reclaimed Water Plant will become operational and it is expected to reduce TSMC's demand for city water. In 2020, the wafer unit wastewater discharge was 86.0 (L/12-inch equivalent wafers mask layer), which was a

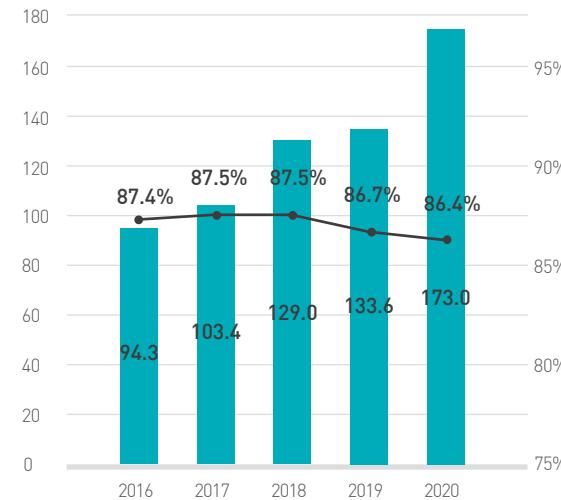
3.9% reduction from last year. This indicates that our four water conservation measures are effective in reducing pollutant concentration and increasing water recycling.

Annual Water Conservation



- Annual Cumulative Water Conserved (ten thousand metric tons)
- Annual Additional Water Conserved (ten thousand metric tons)

Water Recycling and Usage Efficiency



- Average process water recycling rate (%)
- Total amount of water recycling (million metric tons)

Note 1: Total amount of water recycled includes numbers from manufacturing process water treatment and recycling as well as manufacturing process water recycling in scrubber towers

Note 2: Total volume of water recycled and average recycling rate of water for manufacturing processes are calculated with data from TSMC facilities in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing) and VisEra

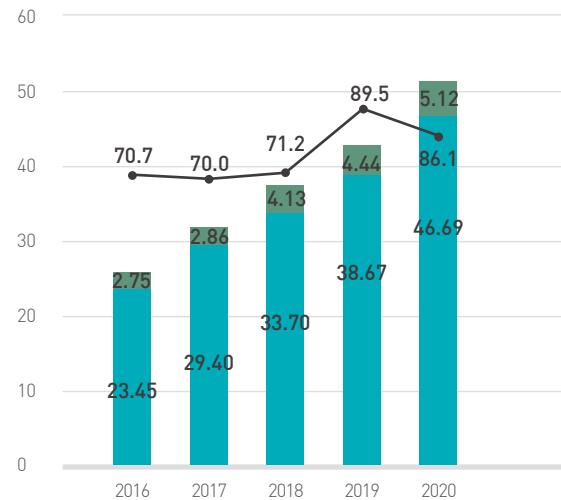
City Water Consumption and Water Consumption per Wafer-Layer



- Water consumption per wafer-layer (Liter/12-inch equivalent wafer mask layer)
- Total city water consumption of Taiwan facilities (million metric tons)
- Total city water consumption of subsidiaries (million metric tons)

Note: City water consumption and unit water consumption intensity index are calculated with data from TSMC facilities in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing) and VisEra

Wastewater Discharge per Unit Product



- Wafer mask unit wastewater (Liter/12-inch equivalent wafer mask layer)
- TSMC Wastewater (million metric tons)
- Subsidiary Wastewater (million metric tons)

Note: Wastewater discharge and unit wastewater intensity index are calculated with data from TSMC facilities in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing) and VisEra

Develop Diverse Water Sources

Cyclical Water Resources & Developing Reclaimed water

As a leading global semiconductor company, TSMC began investing in water reclamation technologies in 2015 by coordinating with government agencies to develop domestic wastewater recycling processes that meet water quality standards and establish industrial wastewater recycling facilities. In 2019, bidding for TSMC Tainan Science Park Reclaimed Water Plant opened successfully and in 2020, construction commenced and wastewater supply network designs within the park began. In 2021, we expect the water plant to supply ten thousand metric tons of reclaimed water per day. The water plant will help reduce city water consumption, make strides toward water recirculation, and develop diverse water sources.



Fab 18A biological treatment system.

Milestones in Water Reuse

Procurement, 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

2019

2020

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

TSMC Water Reclamation Plant Progress

Jun



Water Reclamation Plan Groundbreaking Ceremony

Sep



Concrete Pouring for Ground-Level Walls

Dec



Rebar Works

Construct Water Reclamation Plant and Supply Water

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

2021

2022

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

- Increase water supply from the TSMC Tainan Science Park Reclaimed Water Plant to 10,000 tons/day
- Supply TSMC with 5,000 tons/day of water from the water reclamation plant in Yongkang, Tainan
- Supply TSMC with 10,000 tons/day of water from the water reclamation plant in Anping, Tainan

- Increase water supply from the TSMC Tainan Science Park Reclaimed Water Plant to 20,000 tons/day
- Increase water supply for TSMC from the water reclamation plant in Yongkang, Tainan to 9,500 tons/day
- Supply TSMC with 10,000 tons/day of water from the water reclamation plant in Anping, Tainan to 37,500 tons/day
- Supply TSMC with 9,500 tons/day of water from the water reclamation plant in Yongkang, Tainan
- Increase water supply for TSMC from the water reclamation plant in Anping, Tainan to 37,500 tons/day

Total Water Supply from the Tainan Science Park Reclaimed Water Plant
67,000
(metric tons/day)

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



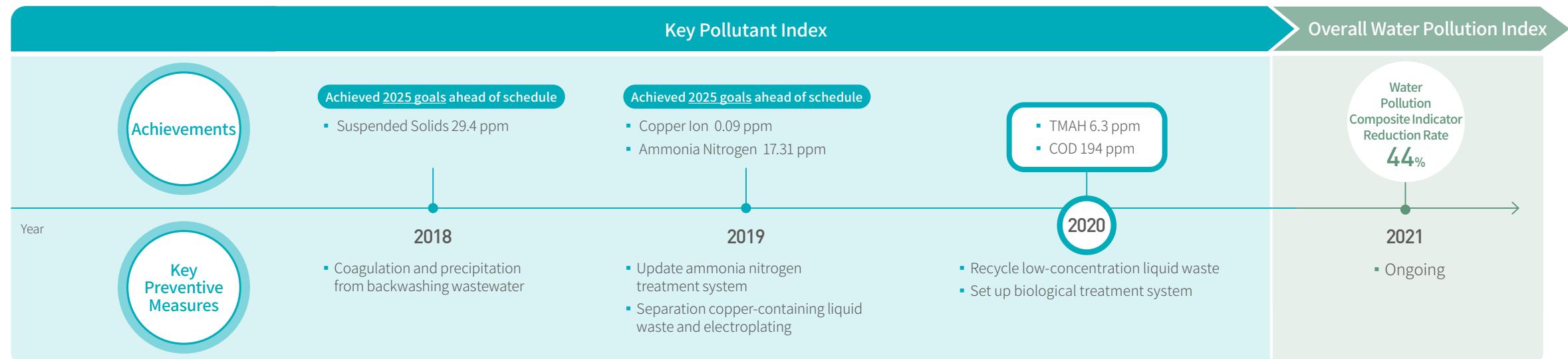
Develop Preventive Measures

Reduce Pollutant Concentration in Effluents

As a leader in the global semiconductor industry, TSMC is working on developing a variety of measures for water pollution prevention to mitigate impact on the environment caused by TSMC operations. Suspended solids, ammonia nitrogen, and copper ion are key pollutants that were reduced to legally required effluent standards ahead of schedule in 2018 and 2019. In 2020, Tetramethylammonium hydroxide (TMAH) concentration was reduced to 6.3ppm but failed to achieve the 2020

target despite a 20% reduction from the previous year. TSMC is working to reduce TMAH concentration by developing low-concentration TMAH recycling and anion adsorption technologies. COD reduction is more difficult to achieve because evolving fabrication processes have increased demand for organic compounds. TSMC hopes to develop biological treatment systems that can help achieve 100ppm by 2025.

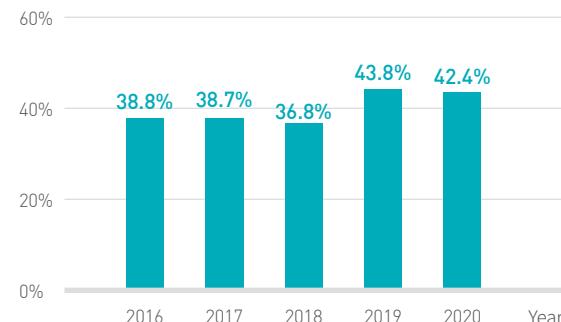
Preventive Techniques on Key Pollutants of Wastewater Quality



Water Pollution Composite Indicator

For a comprehensive insight into the environmental impact of effluent pollutants, TSMC has developed a water pollution composite indicator based on eight major pollutants. The indicator is capped by legal effluent standards and serves as a key indicator in reducing and preventing pollutant concentration in effluents. In response to evolving fabrication processes and increased demand for chemicals, TSMC will continue to develop its own membrane bioreactor system and has increased reduction goals in 2030 from 30% to 50%. In 2020, the Water Pollution Composite Indicator was reduced by 42.4%, exceeding the 20% target of the year.

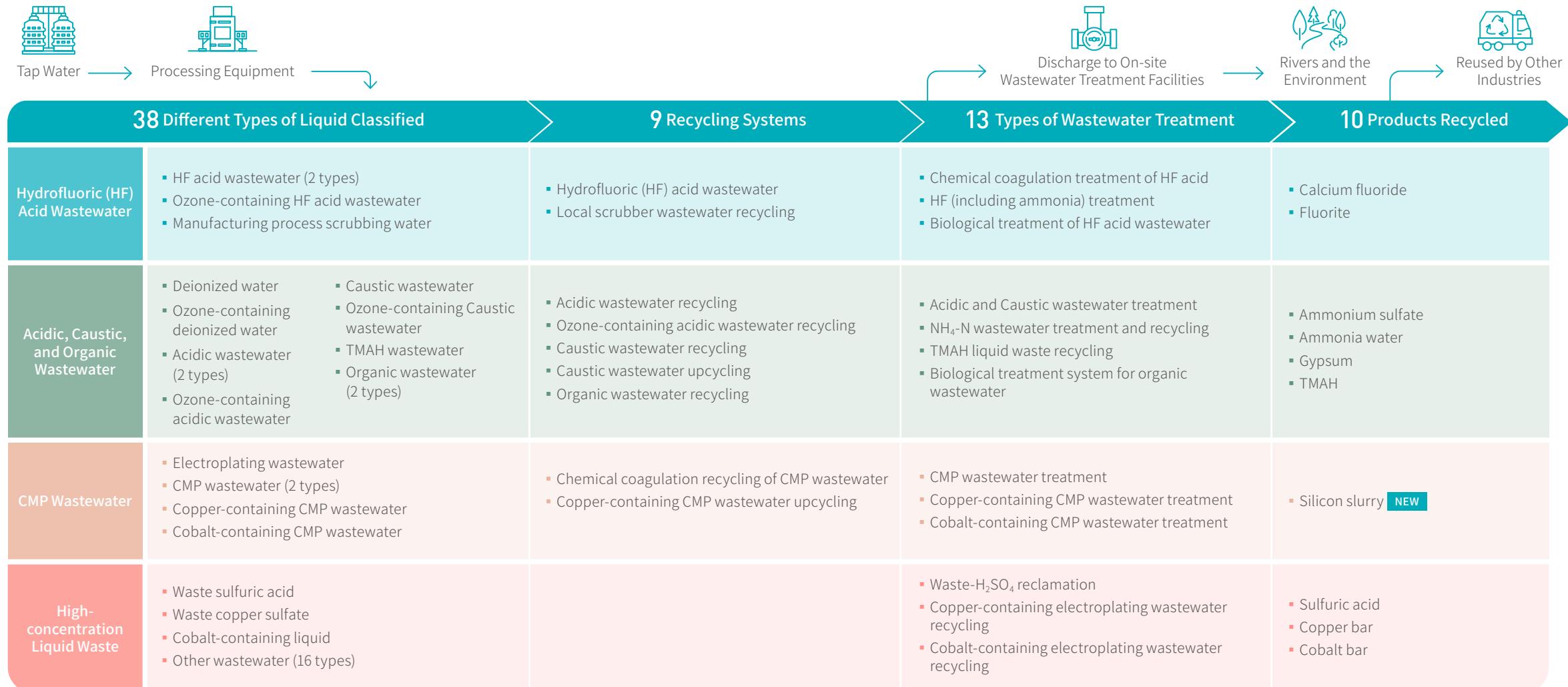
Water Pollution Composite Indicator Reduction



Note: Data includes Taiwan Facilities.



Wastewater Classification and Resource System



Note 1: TMAH stands for Tetramethylammonium hydroxide

Note 2: Among these recycled products, sulfuric acid and electronic grade coating copper are reused on TSMC sites, while the rest are reused externally by other industries

Note 3: Introduced silicon slurry recycling in 2020

Case Study

Track Distribution in High-concentration Organic Matter Processes to Reduce COD Emissions > 90%

Semiconductor manufacturing technology continues to advance, increasing the demand for organic compounds as well as increasing COD levels in effluents. To improve water quality, TSMC has designed a distribution system to collect advanced organic wastewater (AOR) and monitor equipment that emit high-concentration organic compounds. TSMC has been able to reduce COD concentration by more than 90% through adjusting organic compound emission parameters on equipment. Organic wastewater from semiconductors requires a more complex biological treatment than regular organic wastewater. TSMC invested labor and resources to sustain our environment, successfully developing a membrane bioreactor system applicable to semiconductor manufacturing to further reduce COD levels.

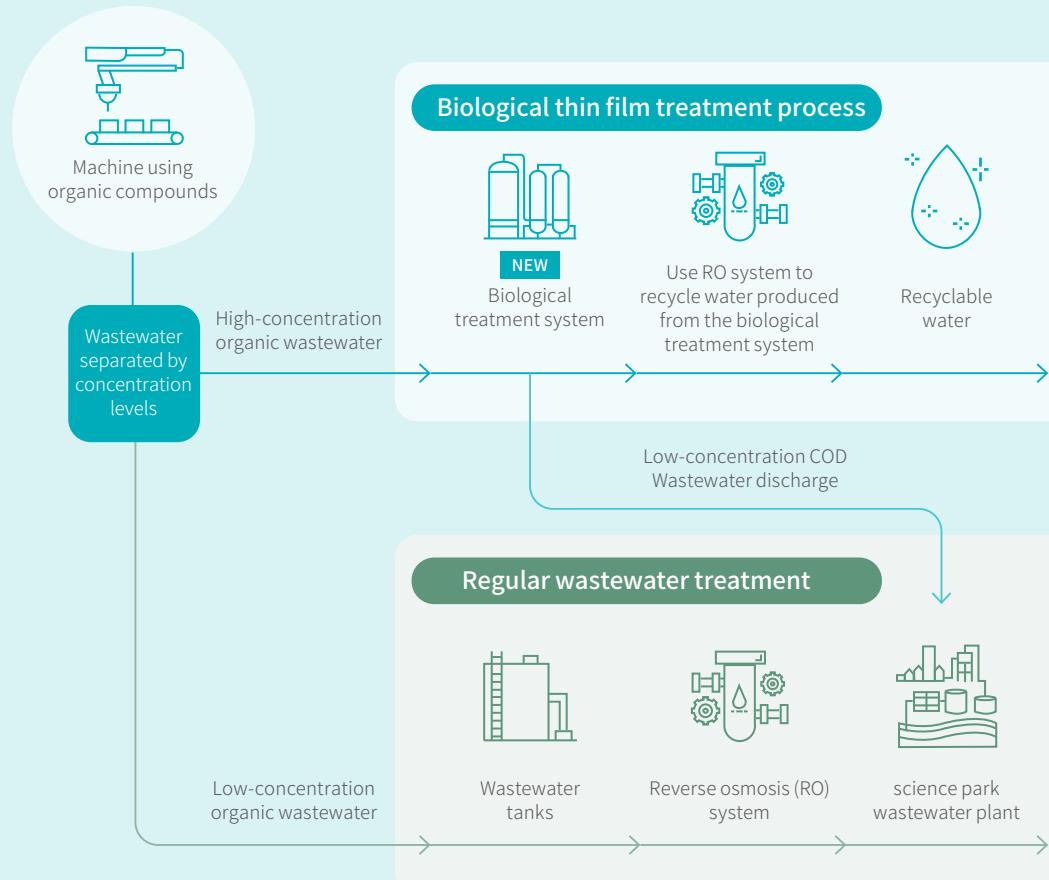
Developing Hydrofluoric Acid Wastewater Membrane Bioreactor System to Reduce COD

The membrane bioreactor system is a key technology that resolves previous problems with organic wastewater. However, the system requires a large area and the process faces problems

with clogging from biological thin films as the organic wastewater from semiconductor fabrication contains hydrofluoric acid. As such, TSMC is working to develop a membrane bioreactor system applicable to semiconductor manufacturing. High-concentration organic wastewater sources are first identified and channeled into the membrane bioreactor system to reduce the size of the system and ensure the system can be placed within fabs. Organic wastewater containing hydrofluoric acid will undergo reverse osmosis to increase fluoride ion levels, increase efficiency gain with calcium fluoride, and contain calcium carbonate levels (water hardness) below 300 ppm. An automatic thin film pickling device is also designed so that bacteria can adhere to the permeable membrane for better performance, reduced clogging, and water recycling.

In 2020, Fab 18A successfully used a distribution tracking to improve machinery emission parameters and reduce COD emission concentration to 150 ppm with the help of TSMC's unique membrane bioreactor system. Fab 18A accomplished a major milestone for new fabs and its processes will become the design standard for future fabs. We are also advancing our biological treatment of organic wastewater to drive green manufacturing, and expect to achieve <100 ppm in COD emissions by 2025.

COD Treatment Process





Waste Management

Strategies



Source Reduction

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



Circular Economy

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



Audit and Guidance

Conduct audit, joint evaluation and guidance based on regulations governing waste treatment vendors in high-tech industry

2030 Goals

- Outsourced unit waste disposal per wafer ≤ 0.50 ^{Note1}
(kg/12-inch equivalent wafer mask layer)

2021 Targets

- Outsourced unit waste disposal per wafer ≤ 1.15 ^{Note2}
(kg/12-inch equivalent wafer mask layer)

2020 Achievements

- Outsourced unit waste disposal per wafer 1.01 ^{Note3}
(kg/12-inch equivalent wafer mask layer)
Target: ≤ 0.88

- Develop multiple types of electronic-grade chemicals for TSMC resource circulation

- In-house resource recycling rate $\geq 22\%$

- In-house resource recycling rate 22% ^{Note3}
Target: $\geq 23\%$

- All waste treatment vendors shall acquire ISO 14001 or other international EHS Management certifications^{Note4}

- 82% of waste treatment vendors shall acquire ISO 14001 or other international EHS Management certifications

- 80% of waste treatment vendors have acquired ISO 14001 or other international EHS Management certifications
Target: 75%

Note1: The unit product indicator for outsourced unit waste treatment per wafer is calculated based on 12-inch wafer equivalent starting in 2020. Accordingly, the goal was adjusted from 0.22 (kg/8-inch equivalent wafer mask layer) to 0.50 (kg/12-inch equivalent wafer mask layer).

Note2: See section on "Source Reduction" for reasons why targets were not achieved.

Note3: TSMC will be building advanced manufacturing facilities in 2021. Considering the initial demand for equipment cleaning and wafer testing in new facilities, the target set for outsourced unit waste

treatment per wafer in 2021 is higher than that of 2020. To achieve the ≤ 0.50 target for 2030, TSMC will launch programs including raw material reduction, expanding in-house resources recycling equipment, building a zero waste manufacturing center and electronic-grade material recycling trials.

Note4: 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. Vendors exempted from online reporting, government-owned enterprises, or public-to-private enterprises, are excluded from the aforementioned vendors.



As a practitioner of green manufacturing, TSMC's waste management strategies abide by the principle of waste minimization, resource recycling, and reuse maximization. In 2020, the waste recycling rate reached 95% for the sixth consecutive year. TSMC achieves source optimization and minimization by adjusting raw materials usage parameters at the source and technical solutions for process technology. After raw materials are used in manufacturing processes, onsite recycling is prioritized so that resources are sufficiently reused instead of being disposed of as waste right away. TSMC also promotes source reduction throughout the supply chain to facilitate

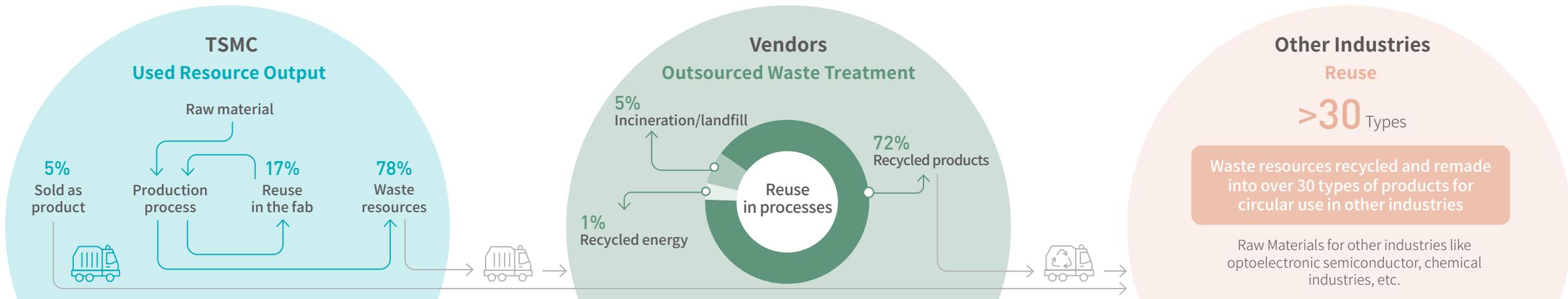
waste reduction upstream, and the reuse of wafer cassettes at downstream packaging and testing facilities.

TSMC's waste resource management makes use of in-house resource recycling equipment and turns waste into products. Furthermore, TSMC approved construction plans for our first Zero-Waste Manufacturing Center in 2020. When waste treatment needs to be outsourced, recycling and recovery are prioritized over incineration and landfill to ensure optimal resource utilization. The percentage of waste sent to landfills has been less than 1% for the past 11 years as of 2020.

In addition to implementing a circular economy, TSMC also takes full responsibility for the management of waste clean-up, treatment, and recycled product flow. Under the Waste Treatment Vendor Sustainability Enhancement Project, 80% of waste treatment vendors have acquired ISO14001 certification. At the same time, the existing waste life cycle management procedure is continuously being upgraded towards the more systematic, automated, and smart Intelligent Waste Management Procedure with Full Traceability. In 2020, TSMC collaborated with the Environmental Protection Administration (EPA) to establish the first

[Automated Waste Disposal Declaration Platform](#) in the industry. It provides a mechanism for real-time waste declaration and clean-up monitoring launched along with TSMC's GPS Satellite Fleet System. In addition, the Intelligent Management Plan for Proper Waste Treatment was started to launch to fully replace manual inspection. Systematic cloud-based tracking is used to trace recycled product transport and flow to prevent illegal waste disposal. Waste treatment vendors are encouraged to keep pace with TSMC in achieving environmental sustainability.

Intelligent Waste Management Procedure with Full Traceability

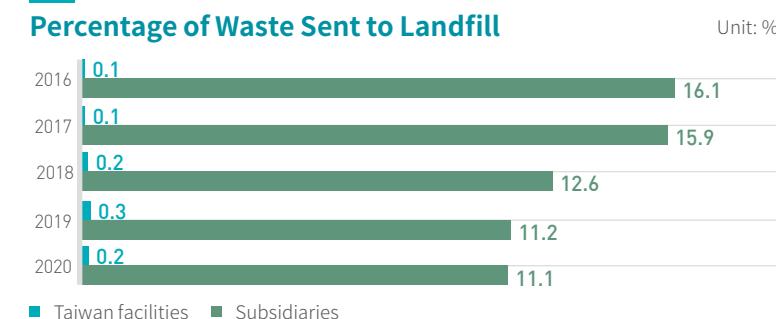
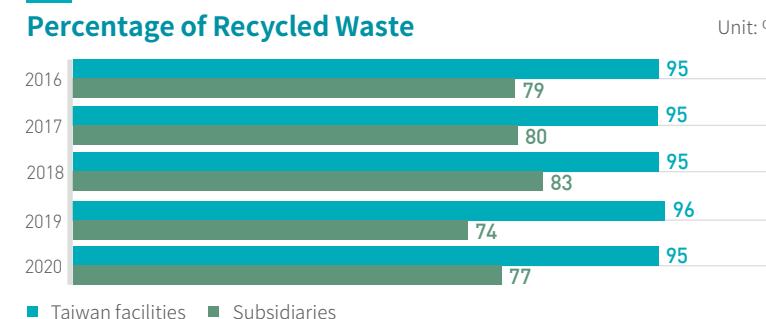
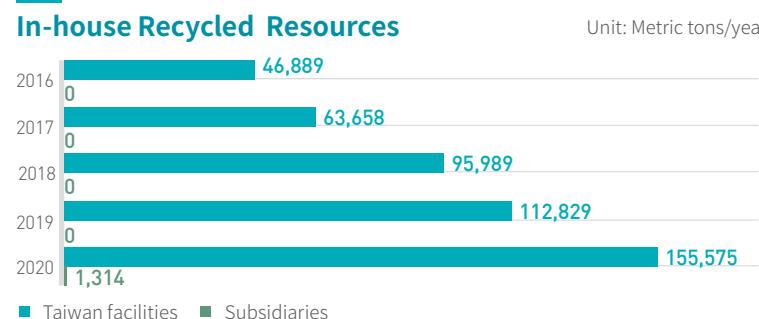
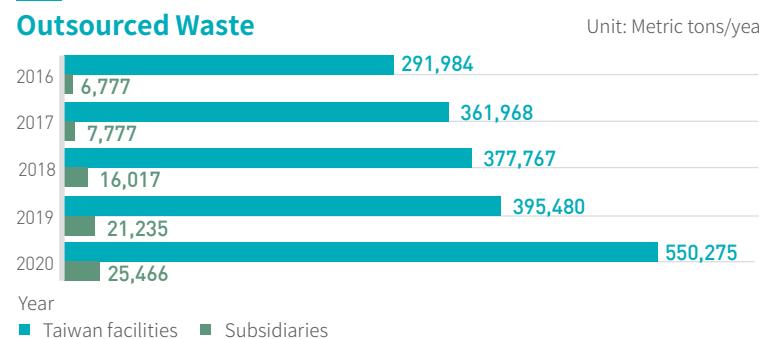


In-house Waste Management	Waste Clean-up	Treatment and Reuse Operation	Recycled Product Transport	Recycled Product Flow
<ul style="list-style-type: none"> Source separation and collection procedure Waste output tracking and in-house reduction project Resource recycling equipment Zero-Waste Manufacturing Center NEW 	<ul style="list-style-type: none"> New vendor selection procedure Annual evaluation standards Waste Management Practice Forum NEW 	<ul style="list-style-type: none"> TSMC GPS satellite fleet system Automated Waste Disposal Declaration Platform NEW 	<ul style="list-style-type: none"> Annual audit plan Quarterly audit plan ISO 14001 certification plan Intelligent management plan for proper treatment NEW 	<ul style="list-style-type: none"> Cloud reporting platform NEW

● Waste treatment vendor management project



	Outsourced General Waste	Outsourced Hazardous Waste
72% Recycled Materials	513,643 metric tons	240,728
17% Reused in Fabs	120,188 metric tons	0
5% Converted to Products and Sold	35,387 metric tons	14,575
1% Recycled Energy (Auxiliary Fuel)	3,971 metric tons	2,711
Incineration	31,252 metric tons	24,792
Landfill	1,409 metric tons	6,460
		1,409
		0



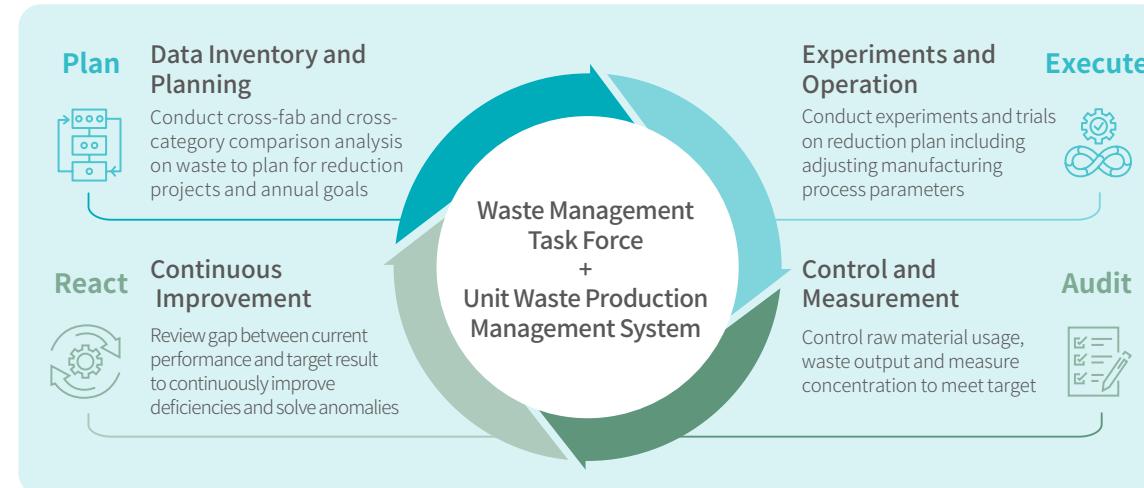


Source Reduction

As complexity and production capacity increase in advanced processes, TSMC's raw material consumption increases along with waste generation. To reduce environmental impact, TSMC established a Waste Management Task Force and the Unit Waste Production Management System in a cross-organizational effort. The self-imposed management mechanism is enhanced with the Plan-Do-Check-Act (PDCA) management cycle to commit to source reduction. In 2020, TSMC implemented 226 waste management improvement measures, including process simplification, extending the life cycle of chemicals and maintenance schedule, exploring new chemical alternatives, and introducing high-temperature manufacturing processes. A total of 37,858 metric tons of waste were reduced as TSMC strives to lower material

use and waste production from all dimensions. New TSMC facilities began operations in 2020. Due to the complexity of new process development, higher demand for wafer cleanliness, and the need to continue adjusting and optimizing operations system, the outsourced unit waste treatment per wafer was 1.01 (kg 12-inch equivalent wafer mask layer). The in-house resource recycling rate was 22%, which also missed the original goal for the year. In the future, TSMC will continue to implement measures such as reducing chemicals at the source, expanding in-house resource recycling facilities, building and launching the Zero-Waste Manufacturing Centers, and reusing electronic-grade materials to meet the 2030 goal of achieving 0.5 kg outsourced waste treatment per wafer.

Waste Reduction Management Mechanism



Waste Reduction Measures and Results in 2020

105 Cases	Chemical use time/flow reduction
43 Cases	Process simplification solution
34 Cases	Chemical alternatives
28 Cases	Life cycle extension of chemicals
9 Cases	Maintenance schedule extension
7 Cases	Introduction of high-temperature process
2 Cases	Copper-containing/cobalt-containing liquid waste electrolysis
1 Cases	Ammonium sulfate waste crystallization
1 Cases	Silicon-containing liquid waste filter press dehydration
1 Cases	Sulfuric acid liquid waste reclamation



Circular Economy

Dedicated to the implementation of a circular economy, TSMC is no longer just a waste resources producer. To strengthen control over product flow and reduce risks derived from mishandling by outsourced vendors, TSMC continues to implement the "Action Plan to Turn Waste into High-Value Products", which includes the development and introduction of resource recycling technologies and equipment. Waste resources produced in manufacturing processes are revitalized and remade into products to be used within TSMC facilities or sold to other industries.

Since 2015, TSMC has been actively implementing on-site reuse of waste sulfuric acid, and has set up equipment to recycle cobalt-containing and copper-containing liquid wastes to reduce sulfuric acid consumption and outsourced treatment of cobalt-containing and copper-containing liquid wastes. To increase the value of materials recycled from copper-containing liquid waste, TSMC worked with raw material suppliers on developing purification procedures that remake pure recycled copper tubes into electronic-grade copper anodes. A cumulative total of over 10 metric tons of electronic-grade copper

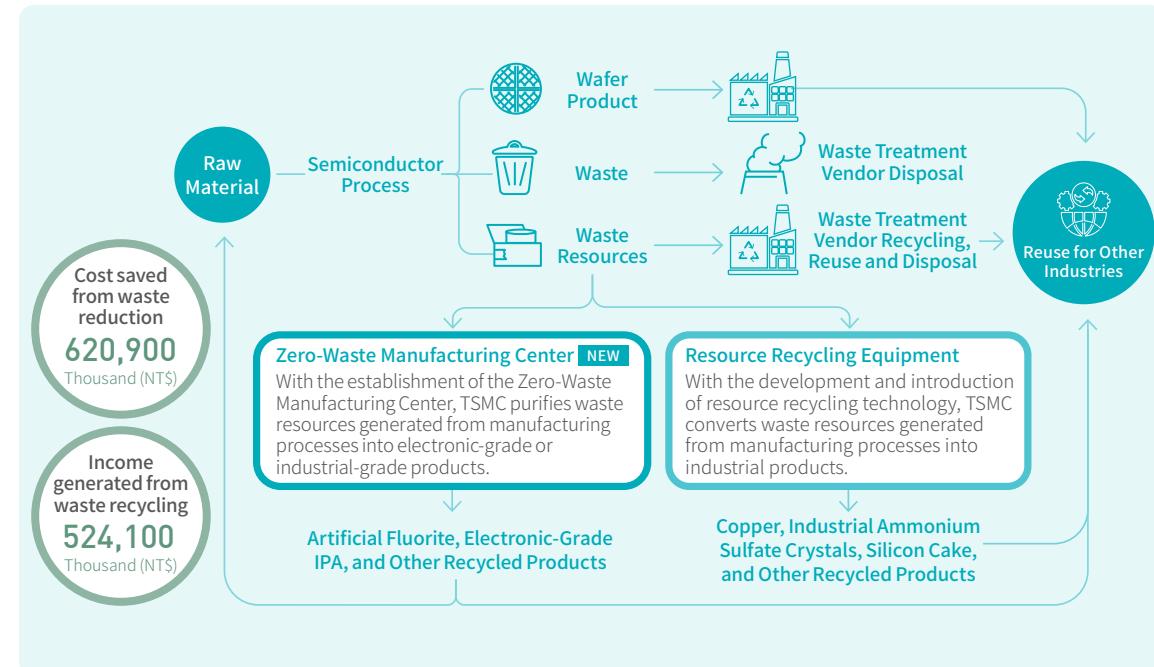
anodes have been reused in TSMC manufacturing processes as of 2020. In addition, TSMC has built the Ammonium Sulfate Waste Crystallization System to optimize operational procedures and efficiency. In expanding in-house resource recycling equipment, TSMC introduced the ["Physical Regeneration Technique for Backgrinding Wastewater"](#) that turns silicon-containing liquid waste into industrial silicon cake, TSMC's [fifth recycled product](#). In 2020, TSMC recycled over 150,000 metric tons of waste and produced 120,000 metric tons of products, creating more than NT\$500 million of value in resources circulation.

In 2020, TSMC approved construction plans for the Zero-Waste Manufacturing Center in the Central Taiwan Science Park. Construction is scheduled to complete in 2023. At the same time, TSMC participated in technology development and launched the electronic-grade chemicals recycling pilot line including IPA and cyclopentanone and ammonia. The goal is to purify IPA, cyclopentanone and ammonium sulfate waste into reusable materials for TSMC processes and subsequently reduce environmental impact through material reclamation.

Timeline for the Waste-to-Value Action Plan



TSMC Aspires to be a Practitioner of Circular Economy



Case Study

Ammonium Sulfate Waste Crystallization System 2.0 Significantly Increases Treatment Capacity by 400%

In response to the advancement of manufacturing processes and capacity, TSMC continues to strengthen efforts towards achieving a circular economy and effectively reducing the environmental impact of increased waste. TSMC collaborated with vendors throughout the supply chain to assess and improve the [Ammonium Sulfate Waste Crystallization System](#). In 2020, TSMC completed the development of Ammonium

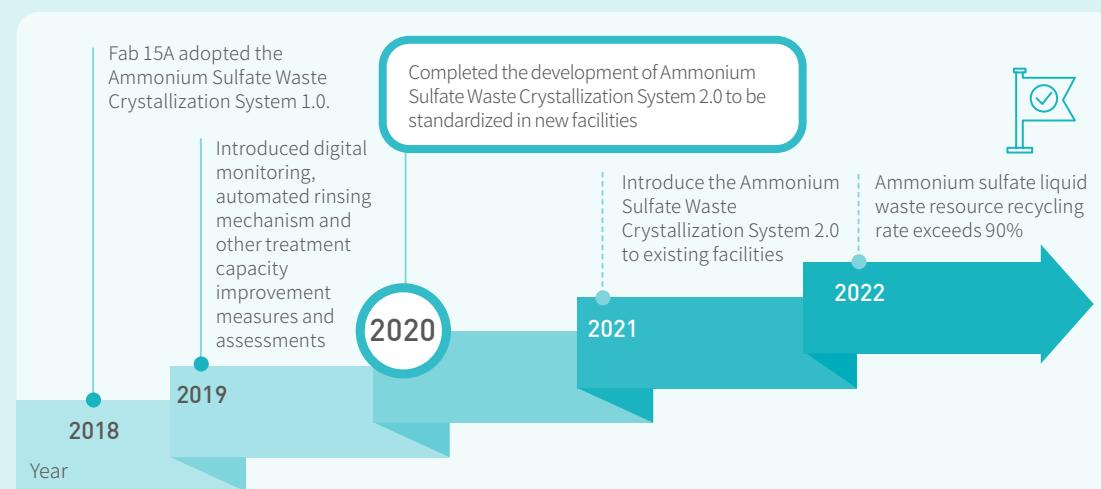
Sulfate Waste Crystallization System 2.0. Heating equipment is introduced to accelerate the heating cycle and reduce production loss after regular maintenance. Digital dashboards monitor ionic concentration of the system to stabilize evaporation capacity. Also, the automated rinsing mechanism prevents blockage of process route to maintain solid-liquid separation performance. The upgraded system can increase treatment capacity by 400% from 400 metric tons to

2,000 metric tons a month. Accordingly, the system will become standardized in new facilities built in the future.

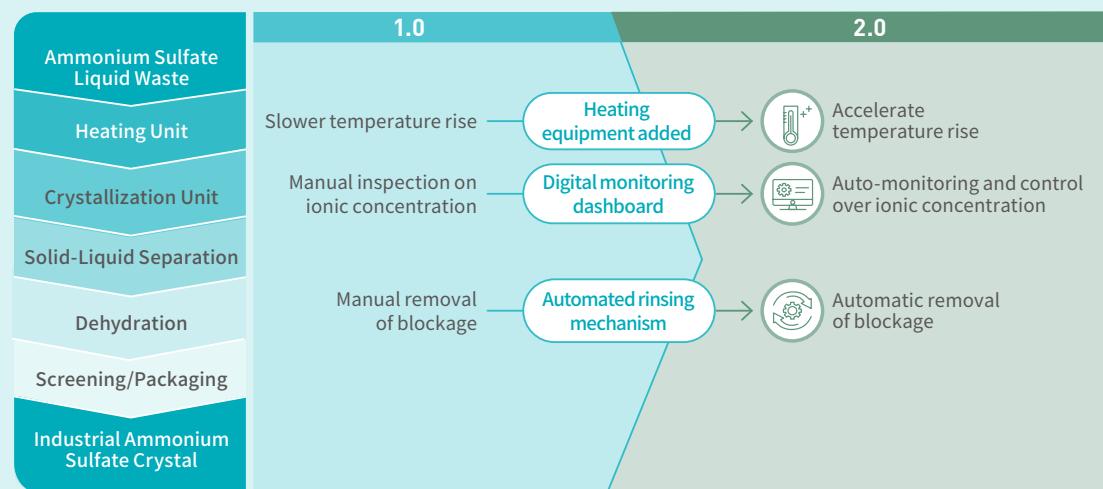
Since 2018, TSMC has reduced over 15,800 metric tons of ammonium sulfate liquid waste outsourced for treatment and produced 4,200 metric tons of industrial ammonium sulfate crystals. The value created from waste recycling and reduction has exceeded NT\$35 million. TSMC will adopt the "smart copy" technique

to introduce the Ammonium Sulfate Waste Crystallization System to existing facilities. In 2022, the system can reduce ammonium sulfate outsourced for treatment by an estimated 60,000 metric tons per year and yield more than 15,000 metric tons of industrial ammonium sulfate crystals, which will create NT\$130 million in value.

TSMC In-House Ammonium Sulfate Waste Recycling Timeline



Ammonium Sulfate Waste Crystallization System





Case Study

Zero-waste Manufacturing Center Facilitates Circular Economy

In addition to proactively developing waste recycling technologies to recycle and reuse waste materials, TSMC initiated a project to build our first Zero-waste Manufacturing Center. Proposing a novel circular economy model, the project aims to purify waste resources into semiconductor-grade chemicals that will return to TSMC manufacturing processes. The recycled material will substitute for at least 30% of raw material demand. The project also plans to

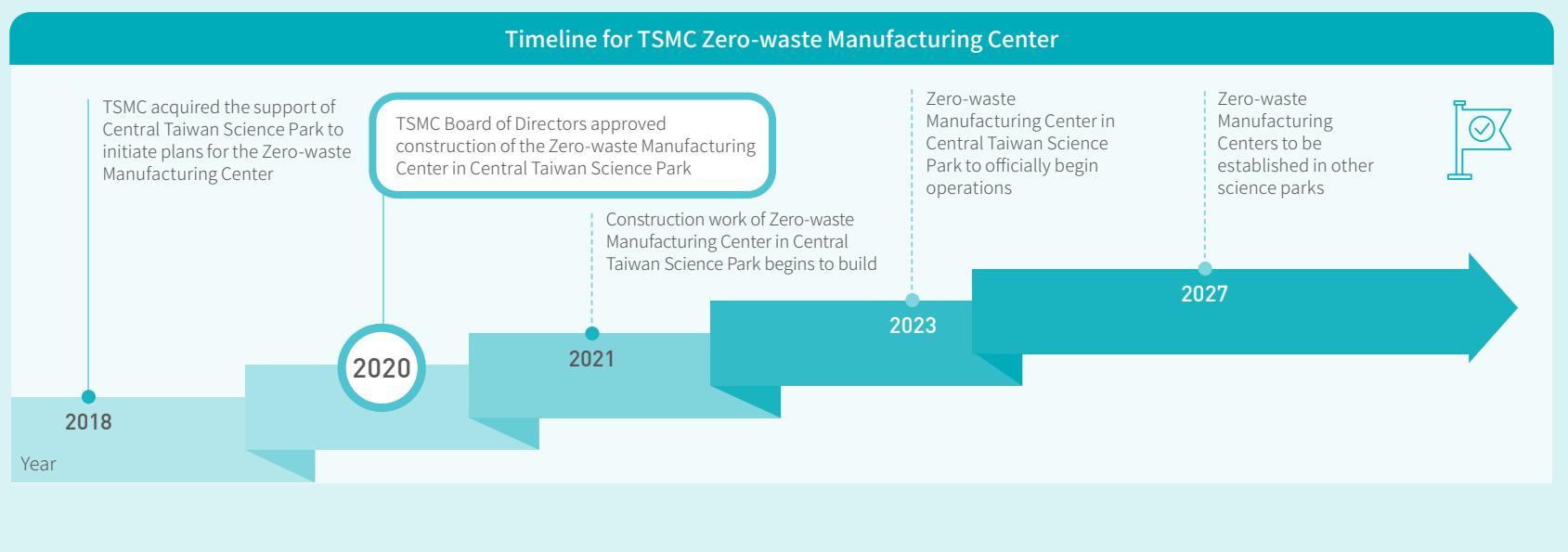
recover residual heat from waste resources as assisting energy, which will reduce energy demand in recycling processes, enabling TSMC to truly meet its sustainability goal of developing green manufacturing using green technologies.

TSMC's first Zero-waste Manufacturing Center, which will be located in Central Taiwan Science Park, was approved by the Board of Directors in 2020. The construction work begins in 2021. Guided by the three principles of

maximum waste reduction, optimal environmental benefits, and minimized management risk, the center is expected to reduce outsourced waste treatment by 140,000 metric tons each year and create NT\$1.2 billion of value in waste recycling and reduction. It will be our first facility based on circular economy model. The Zero-waste centers will gradually expand to be built in Hsinchu and Tainan as TSMC continues to pursue its sustainability goals.

Audit and Guidance

Committed to source reduction and achieving a circular economy, TSMC also takes full responsibility for the management of outsourced waste treatment through the Waste Treatment Vendor Sustainability Enhancement Project. For new vendor selection, TSMC has a cross-division team of experts and a comprehensive selection procedure to carefully choose outstanding vendors to work with. A document review and onsite operational inspection will be conducted in six dimensions. Qualified vendors are subjected to weekly and monthly document reviews and quarterly and annual onsite inspections. Eight dimensions covering 166 inspection items are listed in accordance with the Waste Treatment Vendor Annual Audit Plan. Lastly, vendor replacement is carried out based on the three dimensions stipulated in the Annual Evaluation for Waste Treatment Vendors.

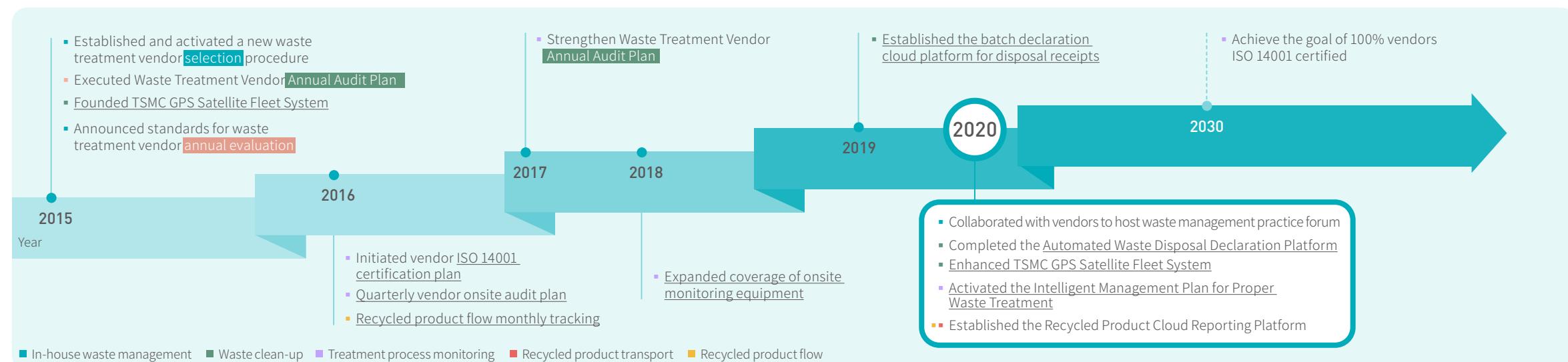


In 2020, TSMC audited over 55 waste treatment vendors on site, reaching a 100% inspection rate, and 79 deficiencies were improved. The percentage of vendors evaluated as "excellent" and "good" has improved from 36% in 2015 to 75%. The number of vendors certified for ISO14001 increased to 44, accounting for 80% of all vendors. In striving for excellence, TSMC initiated the Intelligent Waste Management Procedure with Full Traceability. Through the introduction of smart automation, manual inspections can be replaced with systematic management of suspicious activities through auto-detection and reporting. The procedure will enhance vendor sustainability as TSMC is committed to achieving green manufacturing.

Waste Cleanup and Disposal Vendor Management Process

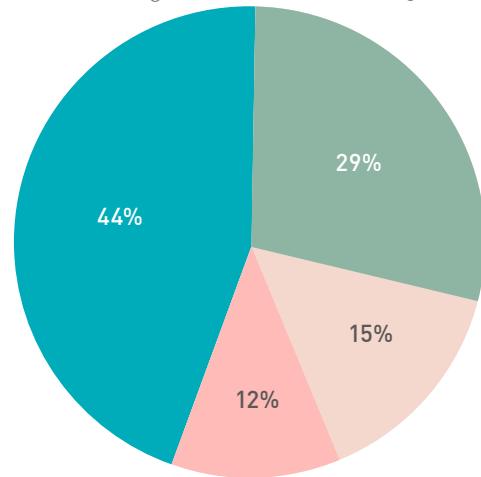


Timeline for Waste Treatment Vendor Management



Waste Treatment Vendor Audit and Guidance Results in 2020

■ Waste Management ■ Safety and Health Management
 ■ Wastewater Management ■ Air Pollution Management



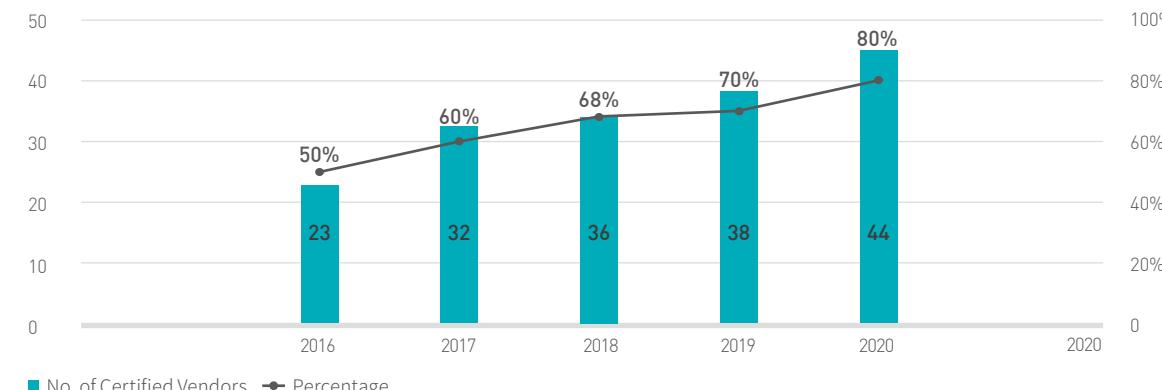
Deficiency Type	Number of Deficiencies	Legal Compliance Correction	Onsite Environment/Operational Improvement	Setting regulations and procedures
Waste Management	35	<ul style="list-style-type: none"> Amend waste disposal contracts to comply with laws and regulations Correct waste storage area labelling to comply with laws and regulations 	<ul style="list-style-type: none"> Improve waste storage environment 	<ul style="list-style-type: none"> Set regulations for waste treatment vendor audits
Safety and Health Management	23	<ul style="list-style-type: none"> Designate supervisors to specific chemical operations 	<ul style="list-style-type: none"> Improve Globally Harmonized System of Classification and Labelling of Chemicals and safety data sheet (SDS) conformity onsite 	<ul style="list-style-type: none"> Set regulations to ensure correct use of safety harness, helmet, and other protective gear when operating at height or exposed to noise
Wastewater Management	12	<ul style="list-style-type: none"> Amend onsite operational records and comply with the water pollution prevention measures plan and permit 	<ul style="list-style-type: none"> Improve onsite effluent discharge labelling and wastewater pipe labelling 	
Air Pollution Management	9	<ul style="list-style-type: none"> Improve onsite operational records and comply with the stationary pollution source installation, operating and fuel use permit 	<ul style="list-style-type: none"> Increase inspection frequency at sampling checkpoints onsite 	

Evaluation Results^{Note}



Note: Total score 100: ≥ 90 Excellent; < 90 Good ≥ 80; < 80 Average ≥ 70; < 70 Passed ≥ 60; < 60 Disqualified vendor

ISO-certified Waste Treatment Vendors





Case Study

TSMC Leads the Industry to Embrace an Era of Intelligent Waste Management with Full Traceability

In 2020, TSMC built an industry-leading intelligent waste management procedure with full traceability. Through multiple automated and intelligent projects, TSMC strengthens management of three outsourced areas of waste clean-up, treatment, and recycled product transport and flow to continue improving waste product life cycle management.

Waste Clean-up: Enhanced Traceability with Automated Declaration Platform

In 2020, TSMC collaborated with the Environmental Protection Administration (EPA) to establish the [Automated Waste Disposal Declaration Platform](#). Along with TSMC's enhanced GPS Satellite Fleet System, the real-time, comprehensive, automated,

and highly efficient waste clean-up monitoring procedure, it will save 16,000 hours of labor and 240,000 papers used for receipts in 2021 at most. It increases accuracy and efficiency for the industry in waste declaration. TSMC was invited by EPA to share its experiences developing the platform and shared a video on the Industrial Waste Report and Management System website to encourage others in the industry to follow suit.

Waste Treatment: Replace Manual Inspection with Advanced Technology & Smart Management

Once waste enters a treatment facility, proper handling is of utmost importance. TSMC started to upgrade the onsite remote monitoring system at 6 key waste treatment vendors to replace

conventional manual inspections. First, TSMC worked with waste treatment vendors on stipulating checkpoints in treatment processes and set up onsite equipment. The system automatically tracks and integrates data, images, and declaration information. In addition, it supervises treatment processes and sends out anomaly alerts through license plate and image recognition technology. After that, TSMC carries out onsite anomaly investigations and manages suspicious activities in treatment processes based on the auto-detection and report system mode.

Recycled Product Transport and Flow Tracking: Build Systematic Cloud Platform and Convert from Monthly Declaration to Itemized Reporting

After waste is properly treated into products, transport and flow are vital to the results of TSMC's model of

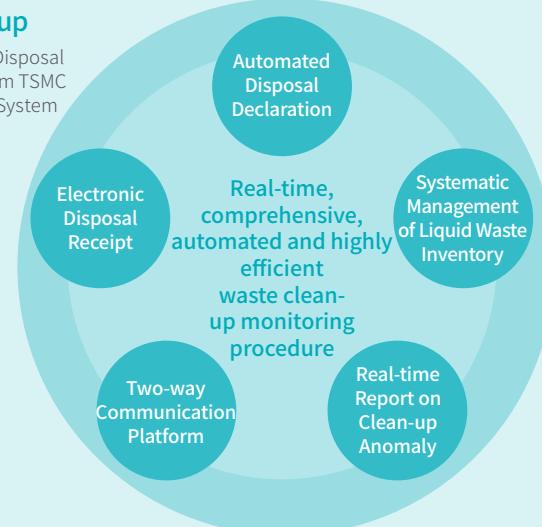
a circular economy. TSMC launched a Recycled Product Flow Cloud Reporting Platform in 2020 and will require vendors to report on recycling product transport and flow item by item instead of declaring on a monthly basis in 2021. As the transport footprint is more real-time and transparent, the life cycle of waste is more comprehensively managed based on full traceability.

In 2020, TSMC hosted the first Waste Management Practice Forum, providing a summary of regulatory changes to serve as a basis for legal compliance. TSMC also shared its management tips and experiences with common deficiencies and deficiencies subjected to penalties. Through face-to-face communication with vendors on enhancing the management procedure, vendors are also encouraged to advocate it to their clients as a joint effort to achieve environmental sustainability.

Improvement Actions for the Intelligent Waste Management Procedure with Full Traceability in 2020

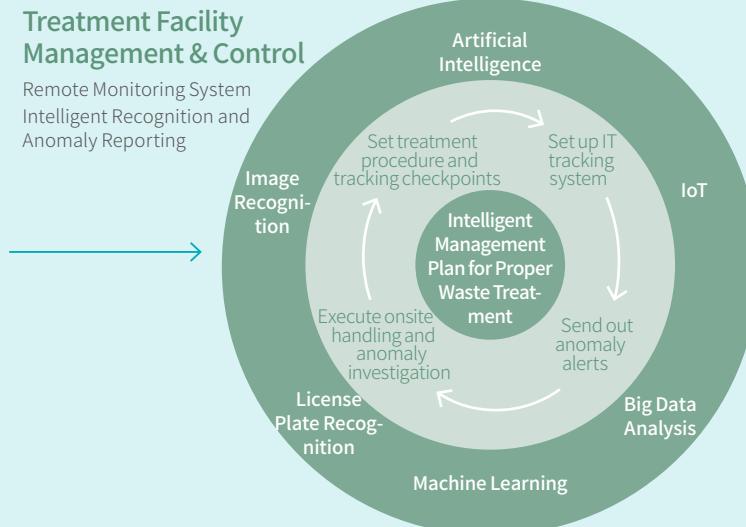
Waste Clean-up

Automated Waste Disposal Declaration Platform TSMC GPS Satellite Fleet System



Treatment Facility Management & Control

Remote Monitoring System
Intelligent Recognition and Anomaly Reporting



Recycled Product Flow Management & Control

Itemized Cloud Reporting
Real-time and transparent transport tracing



Air Pollution Control

Strategies



Best Available Technology

Adopt Best Available Technology to control pollutants emitted through operations and lower impact on the environment



Strengthen Monitoring of Air Pollution Prevention Equipment

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

2030 Goals

- Reduce unit air pollutant emissions by **50%**
(Base year: 2015)^{Note1 & Note2}

- Reduction rate of volatile organic gases > **98%**

2021 Targets

- Reduce unit air pollutant emissions by **45%**

- Reduction rate of volatile organic gases > **96%**

2020 Achievements

- Reduced unit air pollutant emissions by **46%**
(Base year: 2015)

Target: 32%

- Reduction rate of volatile organic gases > **98.3%**

Target: > 95%



- Report < **1** case of abnormal occurrences to supervising authorities^{Note3}

- Report < **1** case of abnormal occurrences to supervising authorities^{Note3}

- Reported **0** cases of abnormal occurrences to supervising authorities

Target: < 1

Note 1: As of 2020, the unit for unit air pollutant emissions is changed from 'L/ 8-inch equivalent wafer mask layer' to 'L/12-inch equivalent wafer mask layer'.

Note 2: Increased the 2030 Sustainable Development Goal from 45% to a 50% reduction from the base year.

Note 3: Abnormal occurrences are defined as equipment failure that cannot be repaired within 24 hours or abnormal emissions due to suspended use.



TSMC is committed to air pollution control. In 2020, we were able to enhance volatile organic gases reduction rate to 98.3% and achieve our 2030 Goals ahead of schedule because of the Low-efficiency Single Zeolite Rotor Concentrators Upgrade Initiative and the introduction of dual zeolite rotor concentrators to new facilities. This 98.3% significantly exceeds legal requirements of 90% from the Air Pollution Control and Emissions Standards for the Semiconductor Industry and the suggested reduction rate of 92% from the Environmental Protection Administration (EPA) in the

BACT for Volatile Organic Gases. Through effective separation of emissions from sources and highly effective local scrubbers, TSMC is now managing air pollutants through multi-phase BAT to reduce unit air pollutant emission and build a sustainable future.

Best Available Technology

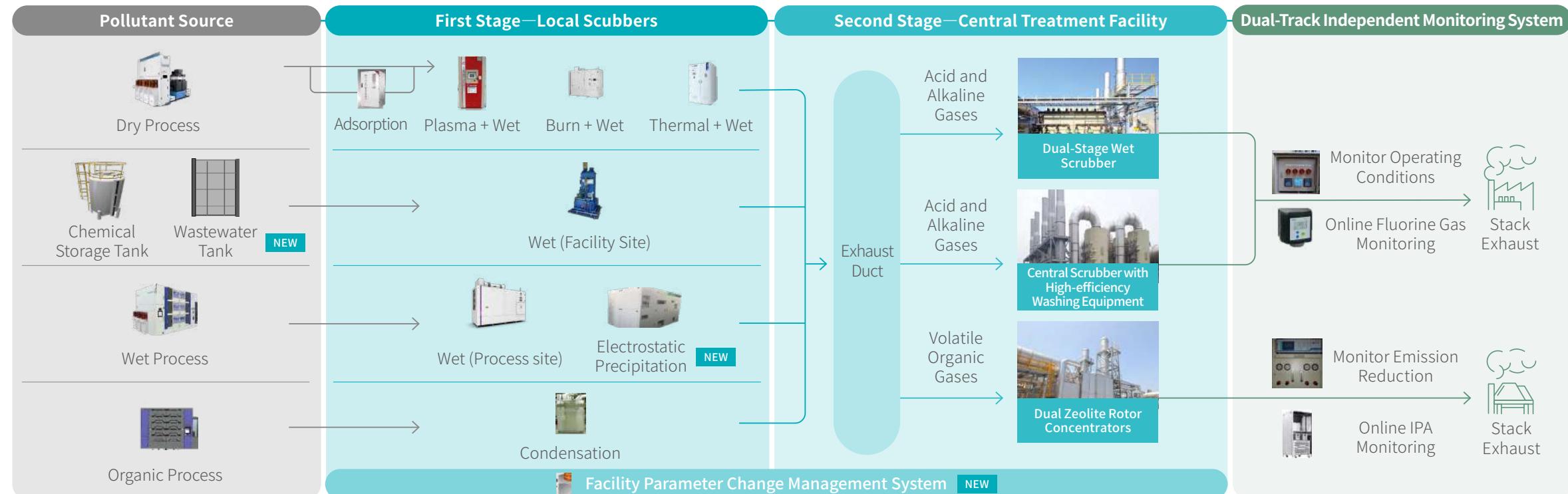
Air pollutant emissions from the semiconductor industry are primarily comprised of acid/alkaline gases and volatile organic gases. TSMC has adopted Separation

Emission from Sources and Multi-Phase BAT for pollution prevention. We continue to work with experts in the industry to advance prevention systems by introducing additional local scrubbers and improving terminal prevention facilities to ensure that air pollutant emissions meet or exceed government standards.

In the first phase of source separation, newly-installed high-efficiency local scrubbers will be treating specific toxic gases, corrosive gases, flammable gases, perfluorocarbon greenhouse gases, and other acid/

alkaline gases. In the second phase, waste gases containing low concentrations of inorganic acid/alkaline gases will be sent to the central scrubber, which is the terminal prevention facility, for second-phase water rinsing and neutralization treatment. For volatile organic gases, facilities determine whether condensing local treatment facilities are required based on boiling points. The exhaust will then be channeled into zeolite rotor concentrators. By classifying and separating exhaust gases from the source and utilizing second-phase treatment, we can effectively increase air emission treatment efficiency.

Air Pollution Prevention Treatment Procedures



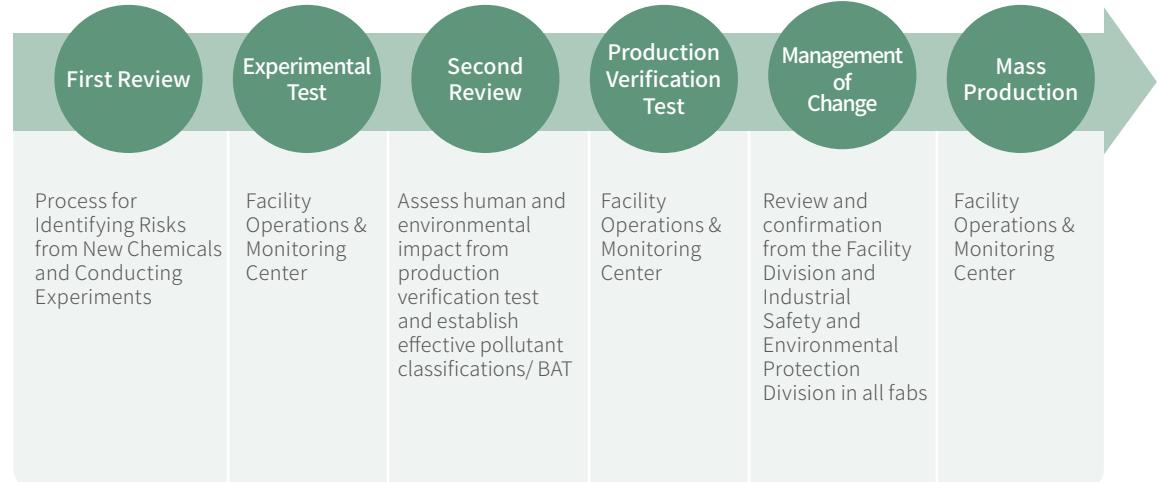


Effective Source Separation-Local Scrubbers

TSMC continues to expand on existing production capacity and accelerate R&D progress. To prevent further air pollution from new processes and chemicals, TSMC established the New Tool and New Chemical Review Committee, comprised of personnel from the Corporate Environment Safety and Health Division, Industrial Safety and Environmental Protection Division, and Facility Division. The committee is responsible for reviewing the safety and environmental impact of new tools and chemicals. New chemicals must go through two stages of review. The first review verifies risks related to the new chemicals and establishes control measures, and determines the environmental impact of the new process or chemical based on its properties. During this stage, the review committee also assesses how to classify exhaust gases and which local treatment facilities to use. The second review is to assess environmental impact from production verification tests and establish the exhaust gas classification to serve as the standard when using the new chemical.

Fabs must apply for a Management of Change before they become eligible for new chemicals that have already passed the second review. The Industrial Safety and Environmental Protection Division and Facility Division must first confirm the effectiveness of air pollution prevention equipment towards the new chemical before its deployment into mass production. In 2020, TSMC remained proactive in air pollution prevention and conducted 422 reviews for 239 new chemicals and 183 new tools. In 2020, TSMC collaborated with suppliers to test new local treatment facilities with different mechanisms such as adsorption, burning, and wet electrostatic precipitation (Wet-EP). Local treatment equipment were evaluated for safety and performance by TSMC and for efficiency by a third-party. Intensive testing was conducted to ensure that local treatment equipment are able to deliver on-target pollutant reduction before they are introduced into pollutant treatment for specific semiconductor process.

Review Process for New Chemicals



Local Scrubbers Categories

Process	Semiconductor Fabrication	Target Pollutant	Control Technologies	Equipment	Reduction Rate	Real-time Parameter Monitoring
Dry Process	Epitaxial Dry Etching	Corrosive Gases Perfluorocarbons	Burn + Wet		> 99%	Natural gas flow Oxygen flow Circulating waterflow Inlet pressure
	Dry Etching	Corrosive Gases Perfluorocarbons Flammable Gases	Plasma + Wet		> 95%	Current amperage Circulating waterflow Inlet pressure
	Thin Film Diffusion Sputtering	Corrosive Gases Perfluorocarbons Flammable Gases	Thermal + Wet + Chemical Dosage		> 95%	Reactor temperature pH value Circulation water flow Inlet pressure
	Ion Implantation Sputtering Epitaxy	Toxic Gases	Adsorption		> 95%	Pressure difference of local scrubber Inlet pressure
	Thin Film	Nitrous Oxide (N ₂ O)	High-Temperature Thermal+Wet		> 90%	Reactor temperature Circulating waterflow Inlet pressure
	Wet Etching	Corrosive Gases Organic Gases	Wet + Chemical Dosage (Process Site)		> 95%	Pressure difference of local scrubber pH value Circulation water flow Inlet pressure
Organic Process		Sulfuric Acid (H ₂ SO ₄)	Electrostatic Precipitation		> 95% NEW	Corona voltage Corona current Inlet pressure
	PR Stripping	High Boiling Point Organics	Condensation		Specific High Boiling Point Organics > 95%	Pressure difference of local scrubber Condensation temperature
Storage Tanks	Chemical Storage Tank	Corrosive Gases	Wet + Chemical Dosage (Facility Site)		> 95% NEW	Pressure difference of local scrubber pH value Circulating waterflow Inlet pressure
	Wastewater Tanks	Acid and Alkaline Gases				



Enhance Local Scrubber Performance

TSMC adopts eight different types of local scrubbers to pre-treat high-concentration exhaust based on pollutant properties. The eight different local scrubbers include thermal-wet, burn-wet, plasma-wet, wet type in facility, wet type in process, adsorption, condensation, and high-temperature thermal scrubber. As TSMC continues to develop its manufacturing, the company also continues to collaborate with suppliers for new local scrubbers. In 2020, TSMC started using Wet-EP local treatment for wet etching. Wet-EP local scrubbers use a corona technology that is highly effective against acid/alkaline gases and can deliver >95% sulfuric acid (H_2SO_4) reduction. In 2020, our 12-inch wafer fab became the first to extend the use of local treatment facilities from chemical storage tanks to wastewater tanks. By installing a highly efficient wet local scrubber with dosing system for acid alkaline gases from

high concentrations of wastewater tanks, the reduction rate was able to achieve a 95%, thereby relieving the load from central terminal treatment facilities. By upgrading local treatment facilities and separating emissions from the source, TSMC was able to achieve a 27% reduction in ammonia (NH_3) emissions from 2019 to 2020.

Evolving Terminal Prevention Facilities

As air pollutant emissions evolve and increase with process technology, TSMC has been working to improve the performance of terminal prevention facility. In 2019, volatile organic gases accounted for 34% of TSMC air pollutant emissions, and we consider volatile organic gas reduction to be a top priority. In 2020, TSMC collaborated with prevention equipment suppliers to raise the reduction standard for single zeolite rotor concentrators from 95% to 97%. To further improve adsorption, the concentrators will

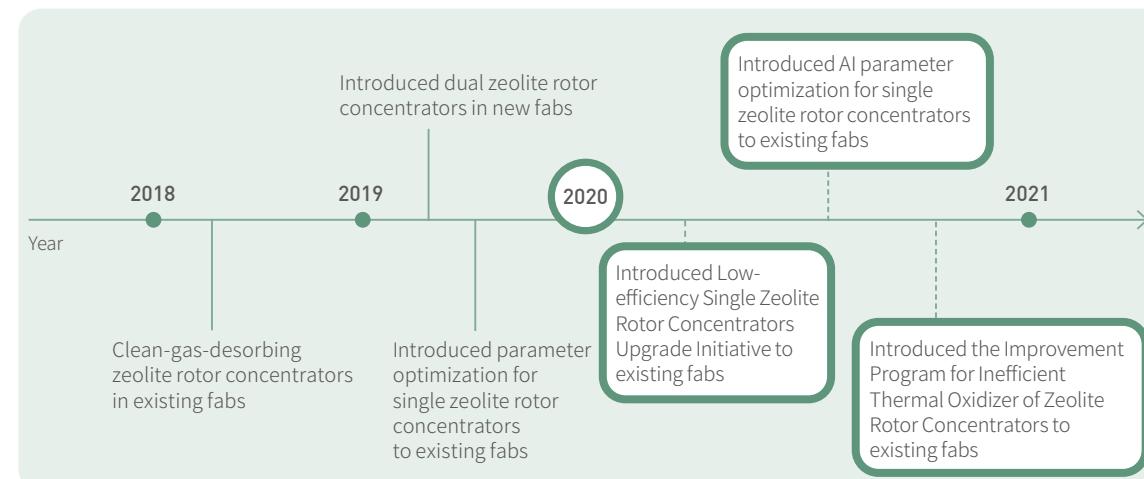
also adopt a new and highly effective fiberglass substrate. Between 2019 to 2020, a total of eight single zeolite rotor concentrators were replaced as part of the Low-efficiency Single Zeolite Rotor Concentrators Upgrade Initiative. We intend to replace eight more low-efficiency single zeolite rotor concentrators in 2021 to ensure the reduction rate of volatile organic gases can exceed 97% steadily. In 2020, a full roll-out was achieved for the clean-gas-desorbing zeolite rotor concentrators developed in 2017 in all 12-inch wafer fabs before 7nm process. All 12-inch wafer fabs are now equipped with optimized parameters for single zeolite rotor concentrators to ensure the average reduction rate for volatile organic gases in all 12-inch wafer fabs exceeds 98%.

The Facility Division collaborated with prevention equipment suppliers and adopted dual zeolite rotor concentrators, which is an upgraded technology that

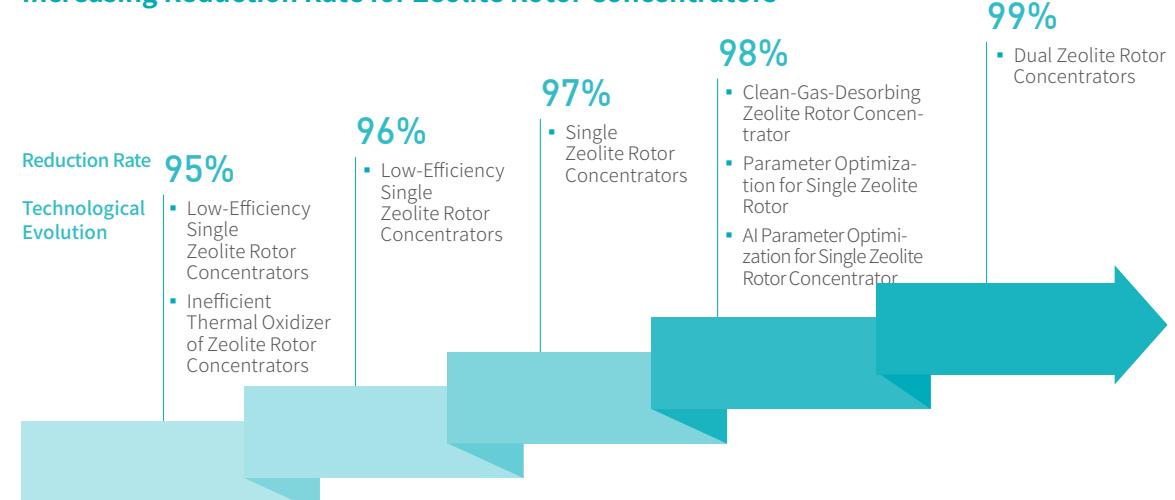
adds a new rotor concentration process after the exhaust is adsorbed and burned by the first rotor concentrator. After the second rotor concentration process, exhaust will be channeled back into the first rotor concentrator for processing. The repeated process achieves a 99.5% reduction rate. As of 2020, Fab 15B and Fab 18A have adopted dual zeolite rotor concentrators. In 2021, dual zeolite rotor concentrators are expected to roll out to Fab 18B, Fab 12 P8, Advanced Backend Fab 6, and other fabs.

In 2020, the average reduction rate of volatile organic gases in TSMC reached 98.3%, enabling us to meet our 2030 Sustainable Development Goals ahead of schedule. The reduction is a testimony to our commitment to air pollution reduction.

Zeolite Rotor Concentrators Milestones

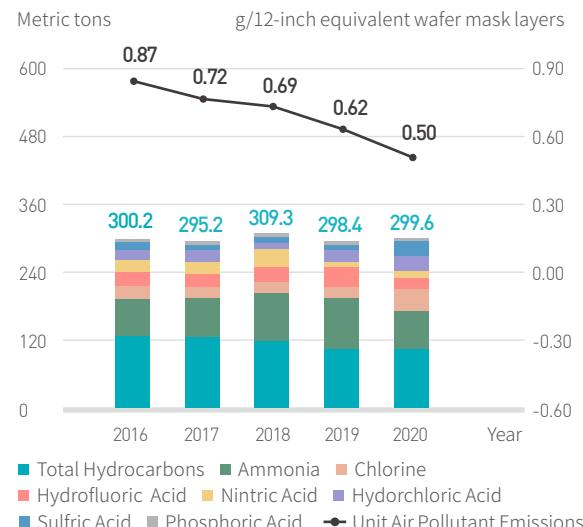


Increasing Reduction Rate for Zeolite Rotor Concentrators



TSMC uses scrubbing towers and regular demister layer treatment approaches against acid/ alkaline gases. To improve the overall efficiency of terminal prevention facilities, in 2020, the Facility Division and the Industrial Technology Research Institute collaborated to design a High-efficiency Acid and Alkaline Scrubber. This new scrubber is equipped with a high-efficiency demister, airflow distributor, and filter. Regulations for packed layers, sprinklers, and Raschig rings were also updated. Fab 18B is set to be the first to acquire the new scrubber in 2021.

Total Emission and Air Pollutants Emissions per Unit of Production

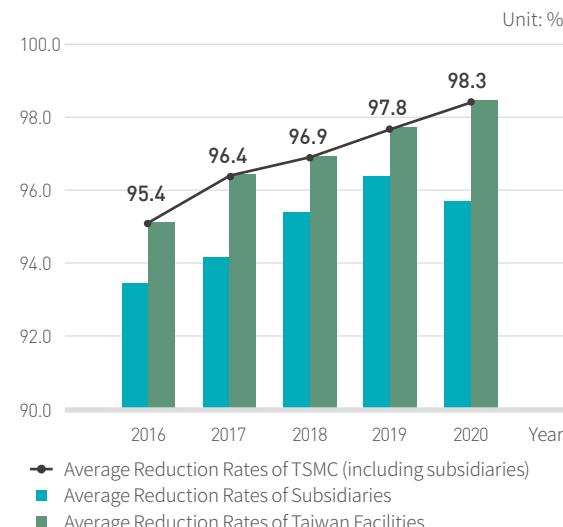


Note 1: TSMC air pollutant emissions were reported in accordance with local laws and regulations.

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

In 2020, the Facility Division also collaborated with the Corporate Environment Safety and Health Division to establish a Stack Emission Baseline. TSMC implemented mitigation measures for stack emissions and monitor results regularly. As a result of the aforementioned reduction efforts, unit air pollutant emission (L/12-inch equivalent wafer mask layer) in 2020 was reduced by 46% against the base year of 2015, meaning that we achieved the 2030 Goal of 45% reduction ahead of schedule, and have therefore increased the 2030 Sustainable Development Goals to a 50% reduction from the base year.

Annual Reduction Rate of Volatile Organic Gases



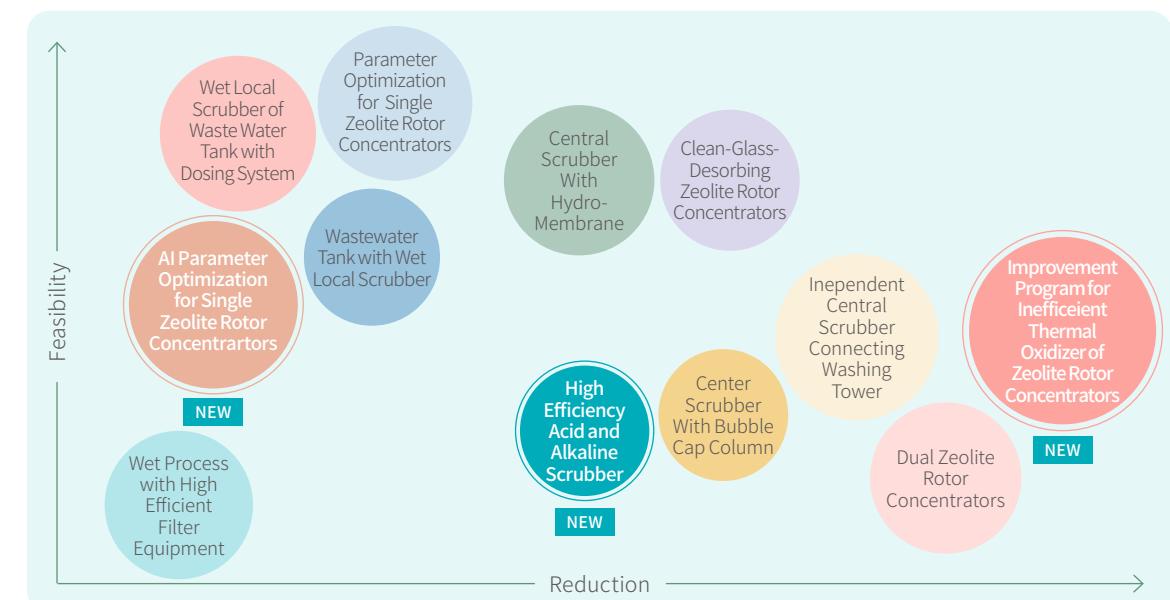
Note: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra. Data excludes WaferTech as there is no total hydrocarbon monitor to provide any record of reduction rates.

Improve Air Pollution Prevention Technologies

TSMC continues to explore ways to achieve air pollution reduction and improve the performance of air pollution prevention equipment. Before introducing new prevention technologies, we assess viability in terms of space, safety, and economics. In 2020, TSMC introduced three new technologies: High-efficiency Acid and Alkaline Scrubber, Improvement Program for Inefficient Thermal Oxidizer of Zeolite Rotor Concentrators, and AI Parameter Optimization for Single Zeolite Rotor Concentrators. To achieve our goal of smart manufacturing, we began applying smart

parameter tuning to air pollution prevention facilities for single zeolite rotor concentrators. Concentration level at entry, temperature, air flow, and other external parameters are imported into the tool so that it can automatically set the optimal burning temperature, desorption temperature, rotor revolution, and other operating parameters. By stimulating functions and the artificial neural network, we can enable equipment to recommend optimal settings for maximum reduction of volatile organic gases. TSMC completed preliminary testing and found that optimal desorption flow and rotor revolution will be able to increase the reduction rate of volatile organic gases of single zeolite rotor concentrators to 98% or more.

Prevention Technology Feasibility & Reduction Effectiveness Evaluation





Strengthen Monitoring of Air Pollution Prevention Equipment

TSMC works to actively improve equipment efficiency, and is strengthening stability and monitoring of air pollution control equipment to ensure compliance with local rules and regulations. All air pollution prevention equipment are equipped with "N+1" (at least one) backup system(s) and an uninterruptable power supply system to guarantee continuous operation. In order to maintain continuous emissions monitoring, prevention equipment is also equipped with comprehensive alert systems, including a dual-track independent monitoring system that is immediately activated upon system failure. The system will alert the Facility Monitoring and Control Center and Industrial Safety Emergency Response Center to repair equipment or switch backup systems.

Due to rapid advances in process technology, 12-inch wafer fabs use different fabrication processes, emit

different pollutants, and require different local scrubbers. To ensure effective management over the parameters on local scrubbers, TSMC debuted the Facility Parameter Change Management System in 12-inch wafer fabs in 2020. The system can effectively manage operating parameters on local scrubbers and terminal prevention facility. The parameters will then automatically be compared to standard parameters at a fixed time every day to ensure prevention equipment are operating on optimal parameters. Inconsistent parameters will be automatically reported to the person in charge for system confirmation and to confirm stack emission in normal condition. With the addition of an early warning system, the Air Pollution Prevention Equipment Operation Status Platform, TSMC reported 0 abnormal occurrences in air pollution prevention equipment to supervising authorities in 2020.

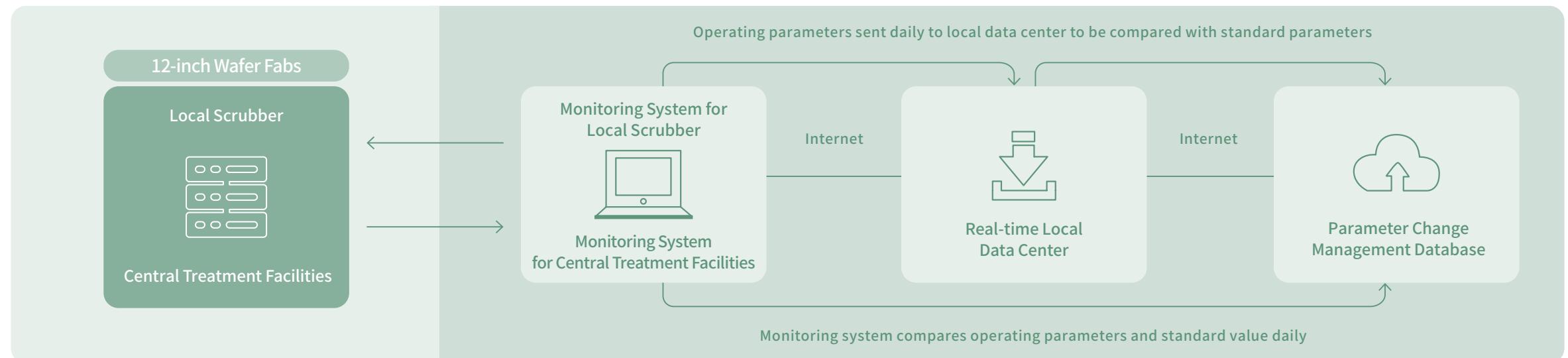


Industrial Safety Emergency Response Center.



Facility Monitoring & Control Center.

Facility Parameter Change Management System





Case Study

Achieving 45% Reduction Goal for Unit Air Pollutant Emissions Ahead of Schedule by Introducing a Management Mechanism for Stack Emission Baseline

TSMC believes in "Zero Emissions" and is committed to reducing air pollutant emissions. In order to maintain high efficiency in air pollution prevention equipment, TSMC introduced the Facility Parameter Change Management System to monitor optimal operating parameters and also consistently monitor and control concentration levels at the stack emissions. We are deploying a two-method approach – emissions separation at the source and improving performance of terminal prevention facilities – to reduce concentration levels in our emissions.

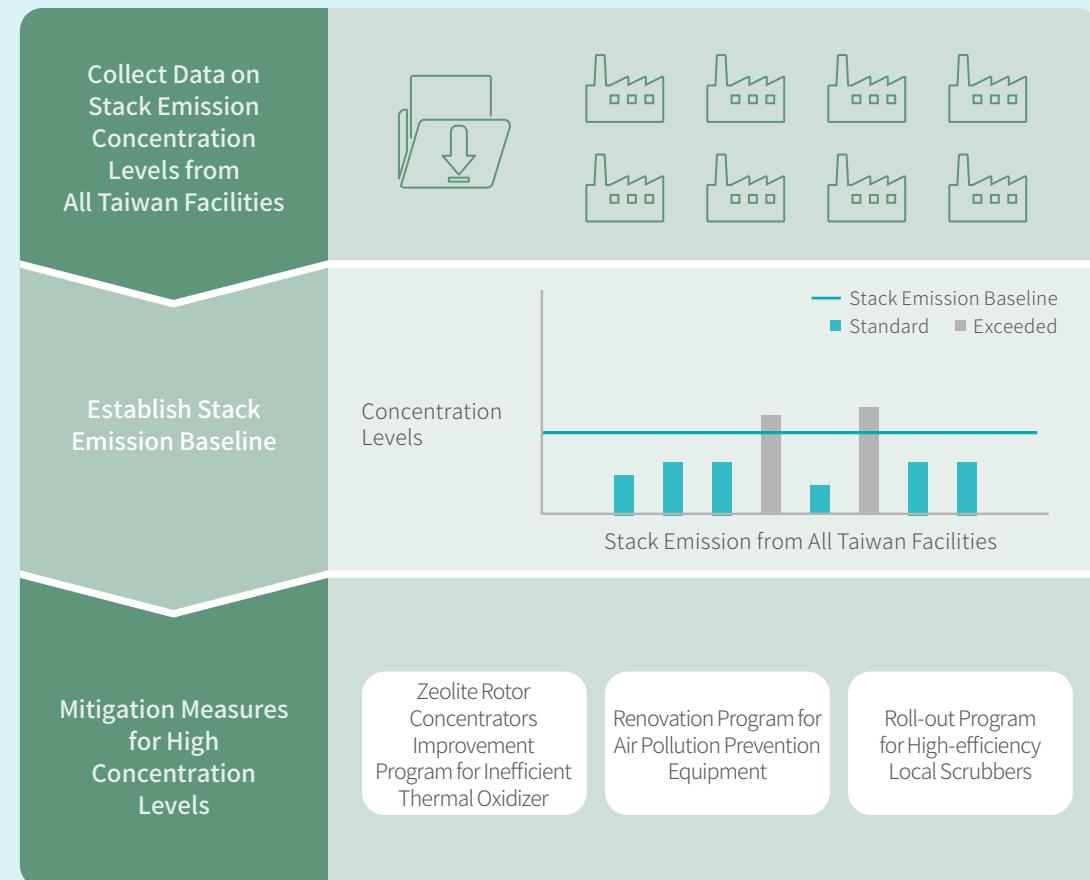
In 2020, the Facility Division and Corporate Environment Safety and Health Division collaborated to introduce the Management Mechanism for Stack Emission Baseline. The air pollutant baseline was developed by gathering data on emission concentration levels at stack emissions in TSMC fabs in Taiwan. We discovered that the concentration level of volatile organic gases exceeded regulatory standards from cross-contamination in exhaust duct. Stacks generally employ a regenerative thermal oxidizer that uses shared exhaust duct, which can result in cross-contamination. As such, we were only able to achieve a 95% reduction in volatile organic gases for regenerative thermal oxidizers, which still has room for improvement when compared to the 98% for direct-fired thermal oxidizers.

In order to target exhaust ducts with high concentration levels, TSMC launched the Improvement Program for Inefficient Thermal Oxidizer of Zeolite Rotor Concentrators in 2020 to replace regenerative thermal oxidizers with direct-fired thermal oxidizers, a single pathway oxidizer. Condensation type scrubbers were also installed at the pollution source to capture organic matter with high boiling points and drastically reduce concentration levels in stack emission from terminal prevention facilities. In 2020, upgraded regenerative thermal oxidizers achieved an average of over 98% reduction in volatile organic gases. In addition to deploying the Renovation Program for Air Pollution Prevention Equipment to replace expired terminal prevention facility for stacks with exceeding acid/alkaline gases emission baseline, TSMC is also investigating pollutants from the source, implementing the Roll-out Program for High-Efficiency Local Scrubbers, and regularly monitoring progress.

In 2020, TSMC carried out three programs to target 79 stacks that exceeded concentration baselines. A total of 36 exhaust ducts were renovated and inspected. A budget will be allocated to continue renovating the remaining stacks.

By implementing the Management Mechanism for Stack Emission Baseline and renovating stacks that exceed the concentration baseline, TSMC achieved 46% (L/12-inch equivalent wafer mask layer) reduction in unit air pollutant emission from the base year of 2015 and was able to achieve our 2030 Sustainable Development Goals ahead of schedule.

Management Mechanism for Stack Emission Baseline





4

An Admired Employer

Employees are TSMC's most important asset. We value mutual commitments with our employees. We dedicate ourselves to creating a challenging and enjoyable work environment full of opportunities to acquire new skills, establishing an open-style management system, providing compensation and benefits packages that are above the industry average for employees, and becoming a world-class company that our employees are proud of.

8,193

New Employees

140.8

Billion(NT\$)

0

Recruited 8,193 new employees around the world with competitive job opportunities

In payroll and employee benefits globally

Reinforced occupational safety and health to ensure zero cases of occupational hazards from chemical exposure





Talent Attraction and Retention

Strategies



Bolster Employee Commitment

- Fulfill core values and business philosophy

- Provide competitive compensation packages



Fulfill Internal Transfer Policy^{Note4}

- Underscore on-the-job training with systematic job rotations



Maintain Healthy Turnover Rate



Strengthen Industry-Academia Cooperation with Semiconductor Program

2030 Goals

Conduct Employee Opinion Survey on Core Values every two years and 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 to work for TSMC in the next five years

- Maintain position above **75th** percentile among industry peers in total compensation

- Fill over **50%** of vacancies through internal transfers

- Fill over **75%** of manager positions through internal promotions

- Maintain total turnover rate between **5%-10%**
- Less than **10%** new hire (< 1 year) turnover rate

- Promote diverse industry-academia cooperation with internships, competitions, and the comprehensive Semiconductor Program on device/integration, process/module, and equipment engineering. Welcome **5,000** students from global universities and graduate programs to enroll in aforementioned events

2021 Targets

Reinforce core values based on the 2020 Employee Opinion Survey on Core Values results, conduct the 2021 Employee Engagement Survey to increase employee engagement, and strive towards our commitment to sustainability

- Continue to maintain a position in the **75th** percentile among industry peers in total compensation

- Fill over **50%** of vacancies through internal transfers

- Fill over **75%** of manager positions through internal promotions **NEW**

- Maintain total turnover rate between **5%-10%**
- Strengthen onboarding training and culture integration to ensure **≤ 15%** new hire (< 1 year) turnover rate

- Promote diverse industry-academia cooperation with internships, competitions, and the comprehensive Semiconductor Program on device/integration, process/module, and equipment engineering. Welcome **3,500** students from global universities and graduate programs to enroll in aforementioned events

▼ Achieved ▲ Exceeded — Missed Target

2020 Achievements

2020 Employee Opinion Survey on Core Values^{Note1} revealed

- **96%** of employees were fully committed to their work
Target: 95%
- Over **95%** of employees were willing to continue to work for TSMC in the next five years
Target: 95%

- According to the Labor Market Research Report, the total compensation of employees in TSMC is above the **75th** percentile
Target: Above the 75th percentile

- **45.2%** of job vacancies were filled through internal transfers^{Note2}
Target: > 50%

- **79.3%** of manager positions were filled through internal promotions **NEW**

- Total turnover rate: **5.3%**
Target: 5% to 10%
- New hire (< 1 year) turnover rate: **15.7%**^{Note3}
Target: < 13.5%

- Promoted diverse industry-academia cooperation with internships, competitions, and the comprehensive Semiconductor Program on device/integration, process/module, and equipment engineering. Welcomed **2,000** students from global universities and graduate programs to enroll in aforementioned events
Target: 2,000 students

Note 1: For more details, please refer to 4. Employee Commitment.

Note 2: In 2020, TSMC expanded external recruitment due to growing labor demands and therefore only 45.2% of vacancies were filled through internal transfers, missing the 2020 target of 50%. TSMC will continue to facilitate internal transfers and strive towards the goal of "Over 75% of manager positions shall be filled through internal promotions".

Note 3: For more details, please refer to 2.1 Employee Turnover.

Note 4: Related explanation on Fulfill Internal Transfer Policy has been moved from Talent Attraction and Retention to Talent Development in consideration of the scope and definition of the subject.



In TSMC's strategy of talent attraction and retention, industry-academia cooperation is mainly structured through the Semiconductor Program on device/integration, process/module, and equipment engineering. Beginning in 2021, the Semiconductor Program will be expanded to include information engineering so that students from different departments may also enroll and potentially become semiconductor professionals for the local semiconductor industry. TSMC also intends to attract and retain talents, bolster employee commitment, and support long-term company growth by maintaining our status as a leading employer.

Shared Visions and Values

Recruitment Criteria

"Putting the right people with shared visions and values in the right positions" has always been TSMC's guideline for recruiting talents, designing compensation packages, managing employee performance, and developing training programs. We are committed to our declaration of Diversity and Inclusion at TSMC and all employees at TSMC are treated equally regardless of gender, religion, race, nationality or political affiliation. With shared vision, we work toward a common goal under a common commitment. With shared values, we abide by a common set of values and a unified code of conduct. By putting the right person into the right position, TSMC enables its employees to contribute to the Company where they are most needed and allows employees to develop with the company, thereby generating success for both employees and the Company.

To hire people with shared visions and values, TSMC prioritizes character and capability over professional

skills when assessing candidates. Due to the Company's expansion and business needs in recent years, mobility has become an important criterion as well. To this end, TSMC has developed a number of selection criteria on integrity, resilience, initiative, innovation, decision-making, and other qualities. Candidates shall be evaluated by selection criteria assessment and interviews.

Responding to technological changes and the rise of a new generation of talent, TSMC recognizes that only through proactive measures in talent incubation, recruitment, and retention, can the Company tap into employees' capabilities in R&D, manufacturing, and service to thereby sustain TSMC's long-term competitive advantages in the face of global competition and challenges. Furthermore, considering that TSMC operations are largely based in Taiwan, TSMC is aiming to develop high-quality talents for Taiwan's semiconductor industry. To such ends, TSMC has cooperated with prestigious universities in Taiwan to design the comprehensive Semiconductor Program that will contain theoretical and practical courses. The Program was first launched in National Tsing Hua University and has since spread to National Taiwan University, National Cheng Kung University, National Yang Ming Chiao Tung University, National Taipei University of Technology, and National Taiwan University of Science and Technology in 2020. In 2021, TSMC will be collaborating with world-leading IT companies to expand the Program to include credited information engineering courses that integrate theory and practicum. The goal for 2030 is to have 5,000 students around the world participate in our industry-academia programs.

Note: For more details on TSMC's partnership with universities, please refer to the Innovation Management section of this report.

Workforce Structure

As of the end of 2020, TSMC has 56,831 employees globally. Among them, 38,456 employees are managers, professionals, and assistants while the remaining 18,375 are technicians. As the semiconductor industry is both knowledge and technology-intensive, over 80% of our managers and professionals hold a Master's degree or higher. Around 90% of TSMC's employees are based in the principal place of business, Taiwan, with the remaining 10% in subsidiaries in Asia (including China, Japan, South Korea, etc.), North America, Europe, etc.

Female Workers

Due to the nature of the semiconductor industry and local social/cultural background, male employees account for more than 60% of employees and 80% of managers, professionals, and assistants at TSMC. Female workers are the pillars of production line technicians, with around 80% of the technicians being women. As TSMC's fabs become increasingly automated, there is a declining need for production line technicians, a group consisting mainly of female employees, which is leading to a gradual drop in the total percentage of female employees at TSMC.

Despite the decline in the percentage of female employees in recent years, under fair selection mechanism, TSMC's female employees enjoyed a similar promotion ratio in 2020 with their male counterparts, at 0.90:1, female section managers or above are generally promoted more than their male counterparts at a ratio of 1.11:1.

TSMC cares about diversity and inclusion. We are striving towards gender equality and we continue to spotlight issues relating to female workers. Every employee's desire for personal pursuits is respected and we also seek for different solutions. We welcome women to join the TSMC family and we will ensure that female workers are retained for the long-term so they can live up to their full potential and make valuable contributions to TSMC and society.

Female Workers



Note: Junior management positions include first-line managers; top management positions include Vice Presidents and higher, excluding Chairman, board directors, and CEO.



Workforce Structure

Category	Group	Male		Female		Subtotal and Percentage by Group	
		Employees	Group Percentage (%)	Employees	Group Percentage (%)	Employees	Percentage of Total Employees (%)
Position	Managers	5,123	87.5	734	12.5	5,857	10.3
	Professionals	22,449	80.8	5,318	19.2	27,767	48.9
	Assistants	3,870	80.1	962	19.9	4,832	8.5
	Technicians	4,294	23.4	14,081	76.6	18,375	32.3
Location	Taiwan	32,269	63.0	18,950	37.0	51,219	90.1
	Asia	2,308	58.6	1,632	41.4	3,940	6.9
	North America	1,127	69.6	493	30.4	1,620	2.9
	Europe	32	61.5	20	38.5	52	0.1
Age	18~20	24	57.1	18	42.9	42	0.1
	21~30	10,096	67.1	4,960	32.9	15,056	26.5
	31~40	16,315	64.1	9,138	35.9	25,453	44.8
	41~50	7,276	55.3	5,876	44.7	13,152	23.1
	51~60	1,854	64.0	1,043	36.0	2,897	5.1
	60+	171	74.0	60	26.0	231	0.4
	Ph.D.	2,257	90.1	247	9.9	2,504	4.4
Education	Master's	21,368	80.4	5,195	19.6	26,563	46.7
	Bachelor's	8,904	60.9	5,718	39.1	14,622	25.7
	Other Higher Education	1,685	30.2	3,901	69.8	5,586	9.8
	High School	1,522	20.1	6,034	79.9	7,556	13.3
Employment Status	Regular	35,733	62.9	21,092	37.1	56,825	100.0
	Contractor	3	50.0	3	50.0	6	0.0
Total						56,831	

Note: The total of 56,831 employees only includes regular employees and contractors expected to become regular employees. In addition to the two groups mentioned, TSMC employs 284 contractors, who are not included in the figures listed in the Global Workforce Structure. Contractors include employees with disabilities (269 individuals) and employees for special projects or short term support (15 individuals).

Compensation Ratio by Gender

Region/Subsidiary	Position	Male	Female
Taiwan	Managers	1	0.97
	Professionals	1	0.93
	Assistants	1	0.97
	Technicians	1	1.13
China	Managers	1	0.96
	Professionals	1	0.88
	Assistants	1	0.91
	Technicians	1	1.11
North America, Europe, Japan, and South Korea	Managers	1	0.94
	Professionals	1	0.78
	Managers	1	0.71
	Professionals	1	0.86
VisEra	Assistants	1	1.06
	Technicians	1	1.03
	Managers	1	0.75
	Professionals	1	0.83
WaferTech	Assistants	1	0.91
	Technicians	1	1.00



Talent Recruitment

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, we target recent graduates and overseas professionals for more professional positions. This contributes to a diverse and inclusive talent pool and also fulfills the Company's long-term development needs.

Campus Recruitment

TSMC's core values, corporate culture, and world-leading business performance has again warranted our placement on top of the 2021 Top 10 Most Admired Companies to Young Generations list by the Cheers magazine. In 2020, to align with the Company's growth, TSMC expanded recruitment and introduced 7,322 new hires in Taiwan and 8,193 new hires around the world. Among them, 79.5% of all new hires are below the age of 30.

Recruitment in Taiwan was through official website, campus recruitment, intern programs, JDP (Joint Development Program), RDSS (Research Development Substitute Services), social media, and more. Our Internship Program is a major annual program in Taiwan which, in recent years, has been expanded to TSMC North America, TSMC (China), and TSMC (Nanjing). In addition to recruiting intern candidates through referrals by professors, campus department offices, and employees, we reach out to potential candidates through social media and face-to-face job fairs on campus.

In 2020, TSMC launched the DNA Program which revolves around the following three targets: Develop, Navigate,

and Advance Offer. The Program offers diverse learning activities and actual project engagement to give interns the opportunity to explore themselves and learn about the semiconductor industry and related technologies as well. TSMC held 18 lectures, course programs, and workshops in 2020, offering interns with a wealth of diverse learning experiences. Outstanding interns were awarded an advance offer to TSMC upon graduation, contributing to success for both students and the Company.

In 2020, the world was largely impacted by the COVID-19 pandemic. Taiwan remained relatively unaffected and so, with disease prevention measures on hand, TSMC continued to host the Summer Internship Program for Taiwan fabs and recruited 347 interns, of which 30% (105 interns) were female students. After the internship, 114 interns received advance offers after evaluation, accounting for 33% of total participants. Among them, 25% were female. The percentage of female students participating in the internship program, receiving advance offers, or joining TSMC are higher than the current percentage of female professionals at TSMC (19.2%). This shows that TSMC continues to strive towards gender equality in the workplace. Unfortunately, due to the pandemic, Intern Programs at TSMC North America, TSMC (China), and TSMC (Nanjing) had to be scaled back. A total of 42 interns were recruited, of which 14.2% (6 interns) were female students.

TSMC's internship program allows students to familiarize themselves with the industry and identify a domain of interest for further progression. Students can then register for semiconductor-related courses when they

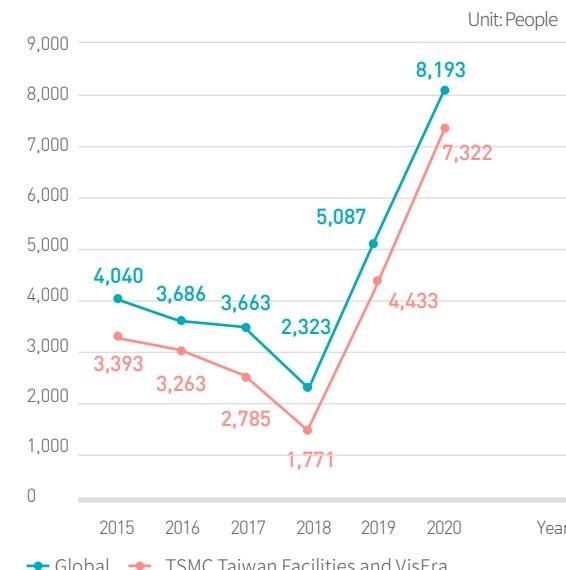
return to school, better adapt to the industry in the future, and reduce the transitional phase required for adapting to the workplace. As of 2020, an average of 40% of the interns from 2018 to 2019 have joined TSMC either through advance offers or regular recruitment, indicating that internship recruitment program is effective in attracting talent for TSMC at an early stage.

Overseas Recruitment

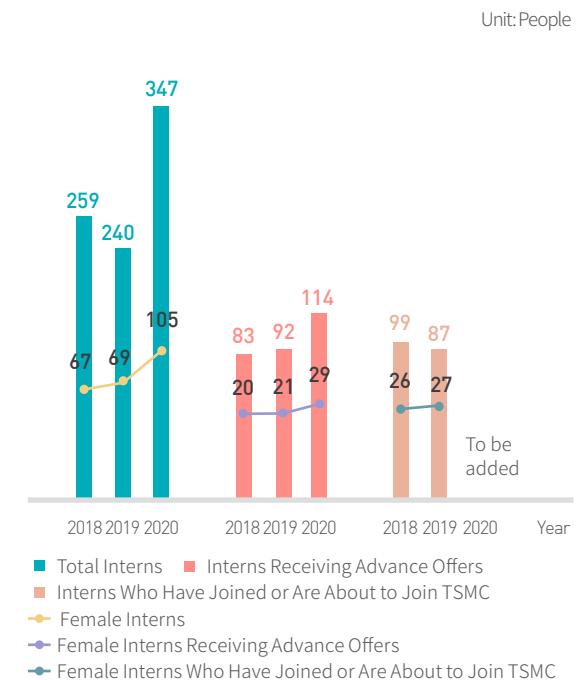
To sustain the Company's diversified talent pool and recruit talent in special fields, TSMC has continued

with the Overseas Talent Recruitment Program in regions with a high density of semiconductor talents. In terms of industry-academia cooperation, TSMC has maintained close contact with MIT, Stanford University, UC Berkeley, 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. TSMC is also consistently recruiting experienced semiconductor professionals in key technological hubs in the U.S., India, Canada, Japan, and other European nations.

New Employees



Interns Receiving Advance Offers or Hired



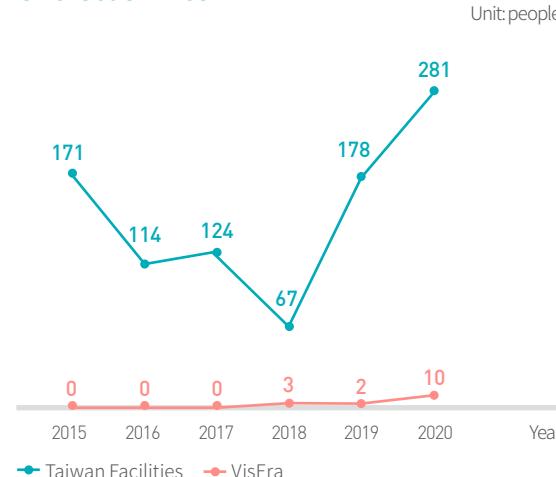


Hire Disabled Workers in Taiwan

According to Article 38 of the People with Disabilities Rights Protection Act in Taiwan, the number of disabled people with the capability to work shall be no less than 1% of a company's total employees, and when a company employs a person with severe disabilities, that person shall be calculated as two. In addition, companies that do not employ a sufficient amount of people with disabilities shall periodically pay subsidies to the Disabled Employment Funds held by competent authorities for labor affairs at local municipalities and counties (cities) based on the deficient amount. The amount of the subsidies is based on the deficient amount of employed disabled workers multiplied by monthly basic wage.

In line with the government's policies and regulations,

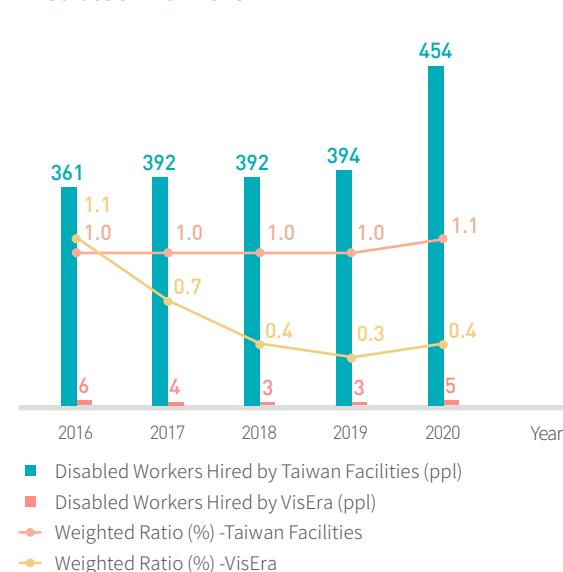
Overseas Hires



TSMC endeavored to provide job opportunities to those with disabilities. In 2020, we also maintained partnership programs with various universities in Taiwan to provide high-quality positions, such as Campus Recruitment Representatives, for disabled university students or graduates.

In 2020 TSMC's fabs in Taiwan complied with regulations and employed a total of 367 new employees with mild or moderate disabilities, and 87 with severe disabilities, with the weighted ratio reaching 1% of total employees. In 2020, VisEra also provided vacancies for disabled candidates. However, due to the nature of available 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.

Disabled Workers



Case Study

TSMC Continues to Expand & Offer High-quality Jobs With Comprehensive Disease Prevention Measures

In 2020, COVID-19 impacted global industries. In response to the demand for increased output capacity and technological development, TSMC continued to recruit more employees for our fabs, especially in Taiwan. TSMC started adopting online recruitment and remote interviews beginning in March to offer a more flexible interview approach for candidates. This ensures that we can fulfill the rising demand for talents while also guaranteeing the safety and health of all those involved. TSMC held 4 campus recruitment webinars for senior students in college preparing to graduate in 2020. With the pandemic contained during the second half of 2020, TSMC relaunched some of the campus recruitment events, holding 18 interview sessions at 6 universities throughout September and October. We also introduced a mobile recruitment bus for the



TSMC introduces mobile recruitment bus for the first time to offer students with diverse interview experiences.

first time to offer students with diverse interview experiences. In 2020, we hired 7,322 new employees at our fabs in Taiwan, which was 1.65 times the number of new hires in 2019.

During the recruitment, TSMC continues to follow principles of "putting right people with shared visions and values in the right positions". We continued to adhere to internal interview standard scales and evaluations to ensure that all new hires maintain a shared vision. At the same time, TSMC provides orientation, training programs, buddy program and more to help newcomers to adapt to work environment and role faster. These practices encourage employees to stay with TSMC to push the envelope of technology together.

"When we saw TSMC's recruitment bus on campus, I thought it was pretty cool. I had to take this opportunity and see if I could become a part of TSMC."

—Jia-Pu Li, Graduate Student at the Department of Engineering Science, National Cheng Kung University



Fulfill Internal Transfer Policy

To help employees plan their career paths, TSMC is dedicated to enhancing the transparency of internal job opportunities, thereby encouraging internal transfers, allowing the right people to gravitate toward the right positions, and reducing turnover rates. In 2020, TSMC achieved 100% internal transfer completion rate. However, TSMC expanded external recruitment due to growing labor demands and therefore only 45.2% of vacancies were filled through internal transfers, missing the 50% target for 2020. TSMC does remain committed

to talent development and will promote employees with potential when necessary for organizational growth. 79.3% of manager positions were filled through internal promotions, reaching the annual target. TSMC will continue to strive to fulfill internal transfers and promotions to meet rising demands from organizational growth but also a need for personal career development.

Employee Turnover Rate

To ensure talent mobility and long-term growth, TSMC firmly believes that a healthy employee turnover rate

should be between 5% and 10%, which has thus become the Company's long-term goal. In 2020, TSMC's employee turnover rate was 5.3%, which is in line with what we believe to be a healthy turnover rate.

Compensation and Benefits

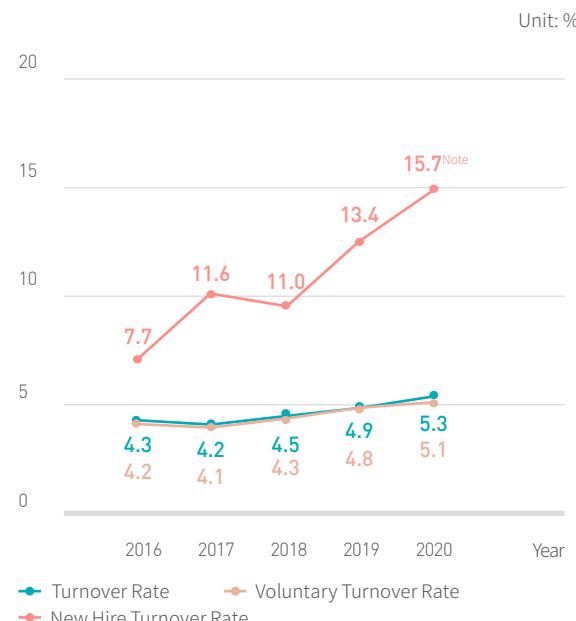
Competitive Compensation Package

TSMC provides competitive compensation packages to attract and retain the best talents, and to 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.

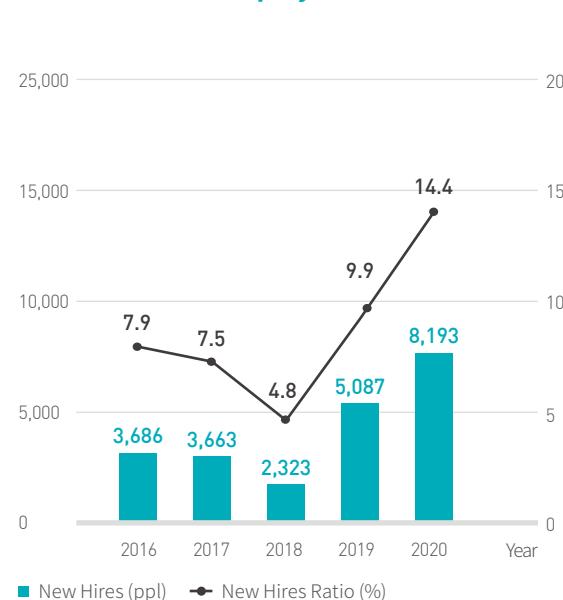
As TSMC continues to grow in revenue and profit, we have increased total compensation and benefits for employees from around NT\$99.7 billion to NT\$140.8 billion between 2016 and 2020, and average compensation and benefits for employees from around NT\$2.12 million to NT\$ 2.48 million during the same period.

Historical Turnover Rates

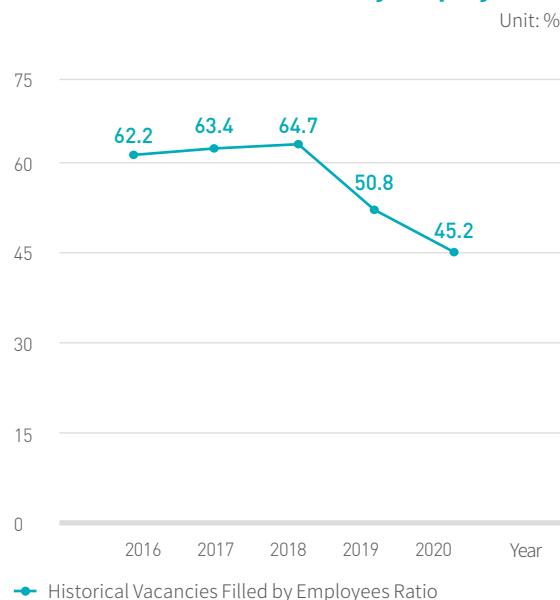


Note: In 2020, TSMC witnessed a large increase in new hires and therefore the new hire turnover rate exceeded the originally anticipated 13.5%.

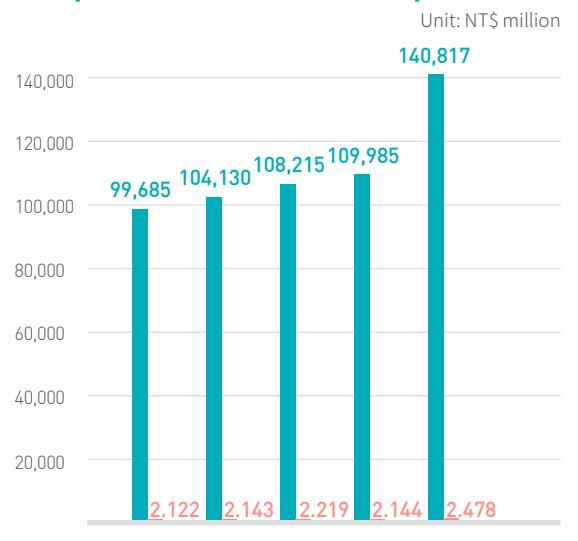
Historical New Employee Ratio



Historical Vacancies Filled by Employees



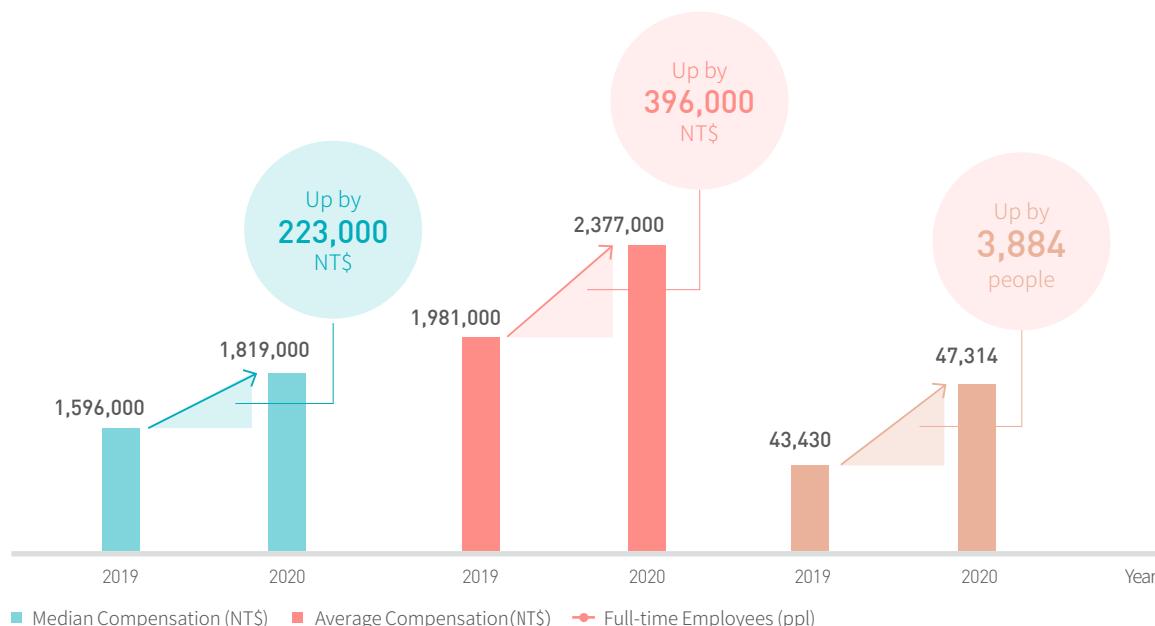
Compensation and Benefits Expenses



■ Compensation and Benefits of Total Global Employees
■ Average Compensation and Benefits per Person of Total Global Employees

In 2020, TSMC's revenue and profits reached new record highs. The cash bonus and profit-sharing scheme allocated for Taiwan facilities was valued at NT\$69.5 billion. In 2020, the average total compensation for a new TSMC engineer with a master's degree was higher than NT\$1.8 million including 12 months in base salary, 2 months in year-end bonus, cash bonuses and profit-sharing scheme. The average total compensation for direct labor was higher than NT\$1.0 million, meaning the average monthly income is four times the minimum wage in Taiwan.

Average and Median Compensation



In addition, the Taiwan Stock Exchange requires all listed companies in Taiwan to disclose the number, the average and median compensation of full-time employees in non-executive positions and their respective differences against the previous year (as shown in the table below). 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 at profit-year basis therefore part of the compensation data is projected.

We hope the Company can continue to grow in the future and so TSMC adjusted the salary structure for all formal employees in Taiwan facilities in January of 2021. Some variable pay items were recategorized into the base salary and each employee experienced a 20% increase in base salary, increasing monthly disposable income for entry-level employees. In addition to the salary structure changes, the annual salary adjustment for 2021 commence as planned. TSMC believes that a competitive compensation can help the Company generate operational success and maintain a leadership position above industry peers in TSMC profits and overall compensation packages.

Corporate Officer Shareholding Guidelines

TSMC believes that long-term shareholding by corporate officers can strengthen the link between corporate officers and shareholders. In 2020, TSMC established the Corporate Officer Shareholding Guidelines, requesting the Chairman, CEO, and other corporate officers to hold shares valued at a certain percentage of their annual base salary. Throughout their time at TSMC, corporate officers must maintain a certain value of shares as required by the Company.



- In order to maintain the competitiveness of our compensation, TSMC appropriately adjusts employees' salaries annually, taking into consideration of the results of global salary surveys, market salary scales, and economic indices in Taiwan and other overseas locations.
- In April 2020, TSMC gave salary raises to all TSMC employees in Taiwan and abroad. The salary increase rate was 3%-5% for employees in Taiwan, 7% - 8% for employees in China, and 3% - 5% for employees in other regions.



- The employee incentive programs take into consideration TSMC's financial and operational performance, future development, and the operational performance of each subsidiaries, with linkage to employee's job responsibilities and performance. The programs are implemented with short-term and long-term incentive schemes according to local industry practices.
- The incentive program of TSMC fabs in Taiwan is implemented over a period of two years. Cash bonuses are paid quarterly to provide timely incentive 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 either by annual cash bonus or by 1 to 3 years of long-term scheme.
- In 2020, for TSMC employees, total compensation and benefits which includes salary, allowances, cash bonus, profit sharing, pensions, and other benefits, totaled NT\$ 140.8 billion.
- In 2020, the median of global employees' annual compensation (excluding pensions and benefits) was about NT\$1.81 million, and the ratio between the total annual compensation of the CEO and the median employee compensation was about 233:1. Considering the differences in compensation structure across countries, the data of median annual compensation is based on the actual amount paid to fulltime employees with full-year seniority.

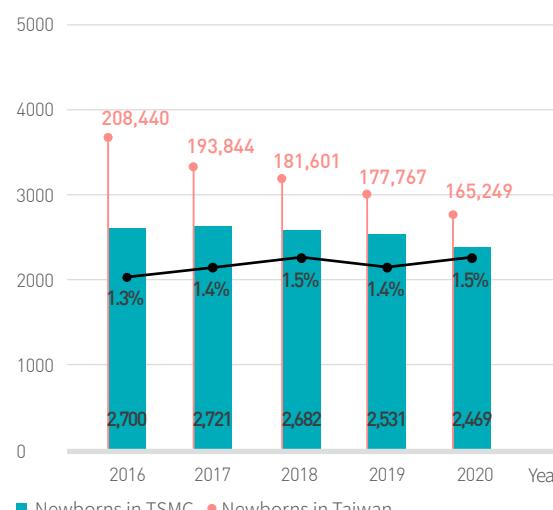


Parental Benefits

To provide sufficient support in their personal and work lives, TSMC offers employees parental leaves in accordance with local laws and regulations, sets up four kindergartens for fabs in Taiwan, and provides a comprehensive leave management system. Employees have flexibility in making use of their vacation days to take care of their children. Employees who need to take long leaves of absence for military service or severe injuries can also apply for unpaid leaves, and then apply for reinstatement after the expiration of the period, to fulfil both personal and family needs.

In 2020, a total of 557 employees in TSMC's Taiwan facilities and VisEra applied for unpaid parental leaves,

Newborns in TSMC



Note: Data includes Taiwan Facilities and VisEra

and a total of 497 employees were scheduled to return from unpaid parental leaves, of which 392 employees returned either as scheduled or ahead of schedule, leading to a return rate of 78.9%. The retention rate, on the other hand, was 77.7%, since 306 out of 394 employees who resumed duty in 2019 were still in service by the end of 2020.

In addition, in 2020, the number of TSMC employees aged between 20 and 64 in Taiwan accounted for 0.33% of Taiwan's population of the same age group. Meanwhile, the number of employees' newborns was 2,469, which was 1.5% of the total number of newborns in Taiwan, an example of our outstanding benefits having positive contributions to society.

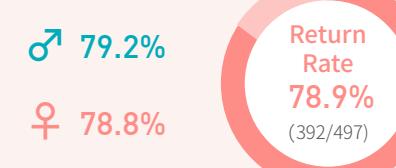


To provide sufficient support in their life and work, TSMC sets up four kindergartens for Taiwan facilities.

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

♂ 79.2%

♀ 78.8%



Employees expected to return to work after parental leave in 2020
♂ 101 People
♀ 396 People

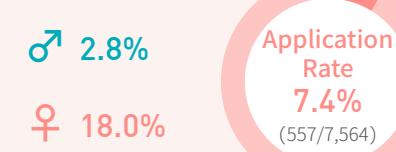
Employees expected to return to work in 2020 after parental leave and returned as scheduled or in advance
♂ 80 People
♀ 312 People

Employees returned to work from unpaid parental leave in 2019
♂ 83 People
♀ 311 People

Employees returned to work from unpaid parental leave in 2019 and are still in service at the end of 2020
♂ 64 People
♀ 242 People

♂ 2.8%

♀ 18.0%



Employees meet unpaid parental leave criteria in 2020
♂ 5,295 People
♀ 2,269 People

Employees applied for unpaid parental leave in 2020
♂ 148 People
♀ 409 People

♂ 77.1%
♀ 77.8%

♂ 80 People
♀ 312 People

♂ 77.1%

♀ 77.8%

♂ 5,295 People
♀ 2,269 People

♂ 148 People
♀ 409 People



Benefits Better Than Statutory Regulations

To encourage employees to strive towards long-term Company development, TSMC offers employees benefits that are better than the statutory requirements and regulations for benefits such as holidays, insurance, pensions, financial assistance for emergencies, subsidies for marriage/ childbirth/ funerals, and discounts in designated shops. Furthermore, all TSMC facilities are equipped with 24-hour health centers, where healthcare management professionals and appointed on-site physicians provide quality services beyond those required by legal statutes. The health centers work with hospitals and Employee Assistance Program services providers to offer comprehensive support for the emotional and physical well-being of our employees ^{Note1}.

TSMC values the well-being of its employees. The company encourages employees to exercise regularly by subsidizing 63 sports clubs, improving exercise facilities, and holding regular sports events to help employees find peers with similar sports interests for balance between work and life. In 2020, TSMC was granted the Exercise Enterprise Certification Award by Sports Administration of the Ministry of Education.

TSMC clubs are highly active ^{Note2}. The clubs not only participate in games hosted by Hsinchu Science Park, Central Taiwan Science Park, and Southern Taiwan Science Park Note 3 but also engage with other clubs in the community. For example, the Ballroom Dancing Club of Hsinchu Science Park was invited to participate in the end-of-year dance

Note 1: For more details, please refer to the Occupational Safety and Health section of this report.

Note 2: WaferTech is based in the state of Washington in the U.S. To comply with local Covid-19 regulations, WaferTech did not convene any sport-related club activities in 2020.

Note 3: Including the Hsinchu Science Park Competition, Central Taiwan Science Park Games, and Southern Taiwan Science Park Friendlies.

performance by Industrial Technology Research Institute while the Softball Club at Southern Taiwan Science Park hosts tee ball games during the weekends to teach local children about softball and fulfill their social responsibility.

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, so as to assure sufficient funding for employee pension payments in the future.

Pension Allocation and Preparation



TSMC Practices
<ul style="list-style-type: none">TSMC provides a defined benefits plan based on an employee's length of service and average monthly salary for the six-month period prior to retirement under the Labor Standards ActThe money was administered by the Labor Pension Fund Supervisory Committee and deposited in the Committee's name into a designated account with the Bank of Taiwan
<ul style="list-style-type: none">In accordance with employee retirement guidelines set forth in the Labor Pension Act in Taiwan, TSMC contributes to employees' personal accounts in Bureau of Labor InsuranceTSMC's overseas subsidiaries also make monthly contributions to the pension management department at a certain percentage of the employee's base salary

Pension Status in 2020
<ul style="list-style-type: none">TSMC and VisEra contributed an amount equal to 2% of salaries paid each monthThe fair value of TSMC's planned assets in Taiwan was NT\$5,066,203,000 at the end of 2020. In accordance with the above provisions, the amount of recognized expenses of TSMC in 2020 was NT\$ 204,915,000. The amount of accrued pension liabilities to be contributed in accordance with the law was NT\$ 11,914,074,000 at the end of 2020VisEra's pension reserve amount, at the end of 2020, was NT\$2,160,799
<ul style="list-style-type: none">TSMC in Taiwan made monthly contributions equal to 6% of each employee's monthly salary to employees' pension accounts. The total amount of pension in 2020, including contributions from overseas subsidiaries, was NT\$2,809,484,000



Case Study

Excellent Instructor Award

Talent is a critical component to TSMC's success and internal instructors are important drivers for fostering talents within the Company. The Excellent Instructor Award has been awarded to internal instructors for teaching excellence for 15 years now. We also hope that the award can encourage other outstanding colleagues to join the ranks of our instructors and share their experiences for more efficient teachings. A total of 63 instructors received awards from Dr. C.C. Wei, CEO of TSMC, at the 2020 awards ceremony. We also invited external presentation coaches to share some tips on teaching and the key to becoming a better instructor.



2020 TSMC Excellent Instructor Award

Employee Commitment

TSMC's four core values of integrity, commitment, innovation, and customer trust were defined since Founder Dr. Morris Chang established the company. Today, incumbent chairman Mark Liu and chief executive officer C.C. Wei carry on the legacy by requiring all employees to serve with the four core values of TSMC in mind. Through interactive websites, microfilms, employee-made films, conferences, lectures, and internal journalism, TSMC's leadership continuously engages with managers and employees to communicate the Company's vision, core values, and business philosophy as part of efforts to consolidate corporate culture, and deepen mutual commitment between the Company and its employees.

To monitor employees' commitment to TSMC's core values and to the Company, TSMC conducts biennial surveys on how employees perceive the company's core values. The survey scope in 2020 included TSMC's Taiwan facilities, TSMC (China), TSMC (Nanjing), WaferTech^{Note}, TSMC North America, TSMC Canada, TSMC Europe B.V., TSMC Japan, and TSMC Korea. The survey covered 97.9% of employees from TSMC & subsidiaries. For the 2020 survey, the valid response rate was 86% with a total of 52,464 surveys issued and 44,904 valid responses.

The 2020 [Employee Opinion Survey on Company Core Values](#) contained the same four sections on integrity, commitment, innovation, and customer trust as the 2018

survey did. Each section contained five questions. In 2020, the Employee Opinion Survey on Company Core Values scores were tallied through positive responses in which the total ratio of "strongly agrees" and "agrees" from a five-point scale will be tallied and presented as survey results.

In two of the questions in the "Commitment" section, the 2020 survey results showed that 96% of employees were fully committed to their work and making the Company better while 95% of employees were willing to continue

to work for TSMC and grow with the Company in the next five years. The aforementioned questions are "8. I am willing to commit fully in my work to make TSMC an even more successful company." and "10. For the next 5 years, I am willing to contribute my talents to TSMC and grow together with the Company." [Survey results for the "Commitment" section](#) reached the 95% target previously set.

Note: In 2020, WaferTech was included in the survey scope for the first time. VisEra was not included in the survey due to its different industrial background



Talent Development

Strategies

2030 Goals

2021 Targets

2020 Achievements

▼ Achieved ▲ Exceeded — Missed Target

- Non-required courses on the e-Learning Platform offered by the Self-Directed Learning Program shall register a usage rate of at least **60%**

- Self-learning shall account for no less than **50%** of learning programs designed for the specific needs of organizations

- Self-learning accounted for **64.4%** of learning programs designed for the specific needs of organizations

▼

Target: 50%

- The number of usage for self-learning resources is no less than **50,000**

- The number of usage for self-learning resources over **50,000**

NEW

- Continued to support new fab personnel in achieving a **100%** completion rate for courses such as "Advanced Training on Wafer Processes", "Physics of Semiconductor Devices", "Professional Development for Process Engineers", and "Four Lessons on Quality"

Target: 100%

▼



Facilitate Self-learning

Provide diverse learning resources and channels to encourage self-learning among employees. This will enhance individual performance and potential



The 2030 sustainable development goal of Talent Development at TSMC is aimed at ensuring that employee skillsets remain relevant, supporting long-term TSMC growth, and promoting lifelong learning among employees. In the next decade, TSMC will enhance on-the-job training, offer diversified learning resources, and build comprehensive self-learning programs to promote self-learning among employees, enhance the learning agility of organizations, and help employees grow. To these ends, TSMC has formulated the strategy to promote self-learning. Furthermore, since self-learning has accounted for more than 64.4% of learning programs, the Company is setting new goals aimed at encouraging employees to take advantage of online elective courses. In addition, TSMC has also established a talent development framework and encourages employees to rotate within the organization to develop comprehensive capabilities.

Fulfill Talent Development

Promoting self-directed learning is the important strategy for talent development at TSMC. To facilitate self-learning, TSMC is dedicated to raising employee awareness on self-learning and encouraging them to use diverse learning resources and tools. Employees are encouraged to engage in learning activities that align with the Company's growth, organizational needs, and personal performance at any time or place and of any form. Employees should continue to progress their self-efficacy at work and galvanize energy for Company growth and social progress. In addition, TSMC has proactively implemented on-the-job training and certification systems, allowing employees to learn and improve their work performance in the workplace. The Company not only systematically designs job rotation

programs to cultivate future talent, but also encourages its employees to complement their career plans with the Company's organization development, so as to allow them to utilize their talents and grow.

Transparent System for Employee Development and Job Rotation

TSMC offers a comprehensive framework for employee development, whereby a dual career ladder system covering both management and technical positions allows employees to explore their full potential in either of the two types of positions according to personal characteristics and skills. For example, the selection process for TSMC Academy Fellows and Academicians identifies employees dedicated to scientific research and ensure that they are unencumbered by managerial tasks so that they can devote more time to breakthrough research and their fortés.

Furthermore, the promotion system in the employee development framework is based on two major principles: transparency on internal vacancies and respect for employees' transfer decisions. It considers development potential as an important indicator for evaluating candidates for promotion. A handbook on promotion procedures and numerous relevant tools are offered to managers to help them assess candidate potential.

In 2020, 34.3% of managers and 26.9% of professionals were transferred or rotated for individual development or due to organizational development. The Company's expansion led to an increasing number of new recruits in 2020 and a reduced percentage of only 45.2% vacancies filled through internal transfers than the previous year.

Human Resource Development Strategies

Dual Career Ladder System

Develop a comprehensive employee development framework, strengthen HR-related systems and supplementary measures, and build an environment where each employee is put in the position that best suits their abilities

Talent Mobility

Facilitate talent mobility by ensuring transparency on internal vacancies, respecting employees' transfer decisions, and allowing employees to plan for their own careers

Promotion Indicators

Potential has been listed as one of the indicators as the reference for evaluating candidates for promotion

Employee Development

Uncover employees' potential and create an environment that encourages employees to pursue personal growth

Learning Development

Help organizations and employees grow rapidly to adapt to changing environments and fulfill the needs of growing organizations

Develop Capabilities

Provide R&D support and train personnel for new fabs, offering training courses on topics such as process and physics. Help employees advance their English skills for the global market and strengthen employee training and development to ensure strong employee capabilities

Enhance Management Literacy

Enhance management literacy among management of all levels, thereby strengthening employee commitment

Corporate Culture Legacy

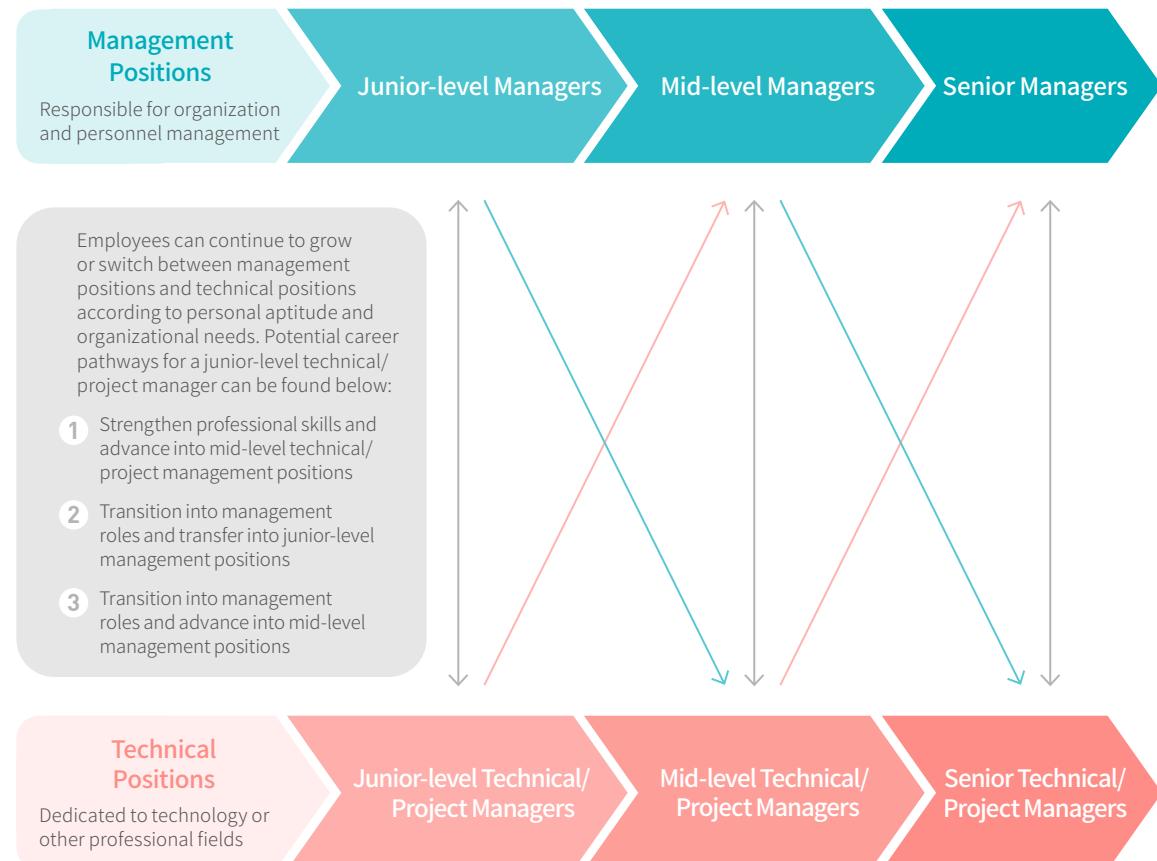
Strengthen employees' commitment to TSMC's core values and bolster TSMC's core values as the company expands



While there is a decrease, TSMC remains dedicated to internal talent mobility and developing well-rounded leaders. Therefore, we will continue reinforcing the dual career ladder system, uncovering employee potential based on competencies and personal preference, and

ensure internal job rotations by maintaining that 50% of vacancies shall be filled through internal transfers. Our commitment to internal job rotations is driven by our hope to meet rising demands from organizational growth but also a need for personal career development.

Employee Development Framework-Dual Career Ladder System





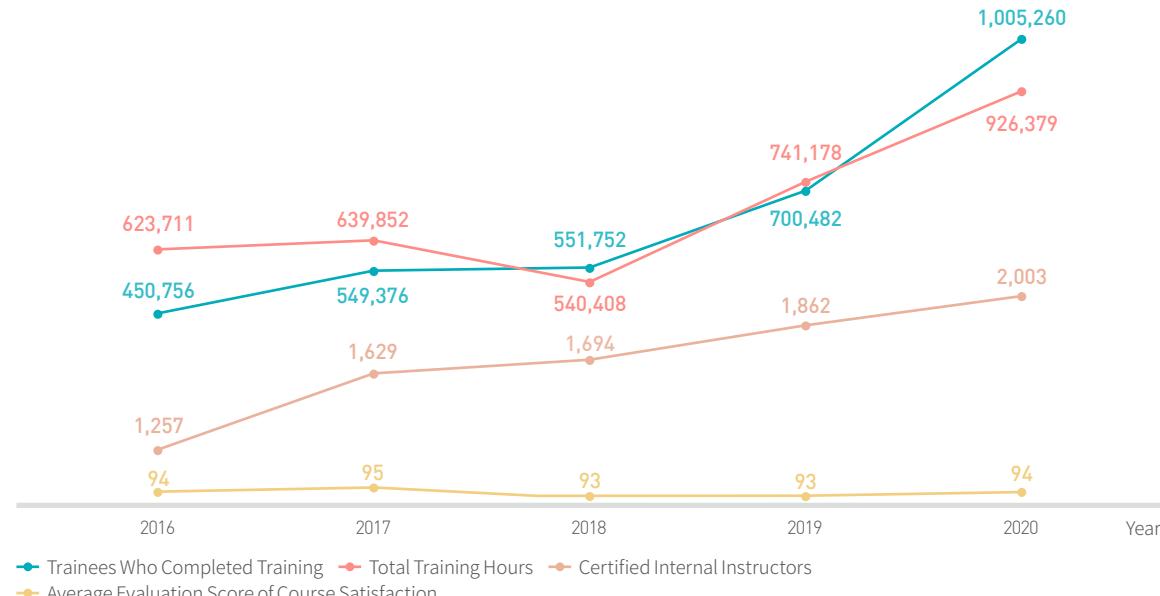
Diverse and Equal Opportunities for Learning and Development

The Company's growth is inextricably connected to our employees' personal growth. Self-learning can not only enhance work performance but also give employees the opportunity to contribute to social progress in daily life. TSMC designs employee learning and development programs based on three key elements: goal, plan, and discipline. The Company is committed to building a diverse and equal learning environment that encourages

continuous learning and offers rich content. It has also formulated the TSMC Employee Training and Education Procedures to integrate internal and external resources, enhance employee capabilities, and help employees and Company grow with society.

TSMC's employees set individual development plans according to personal requirements, mid-year and year-end performance review, and career development goals. The individual development plans form one of the bases on which the Company's annual training program is designed.

Historical Training Index



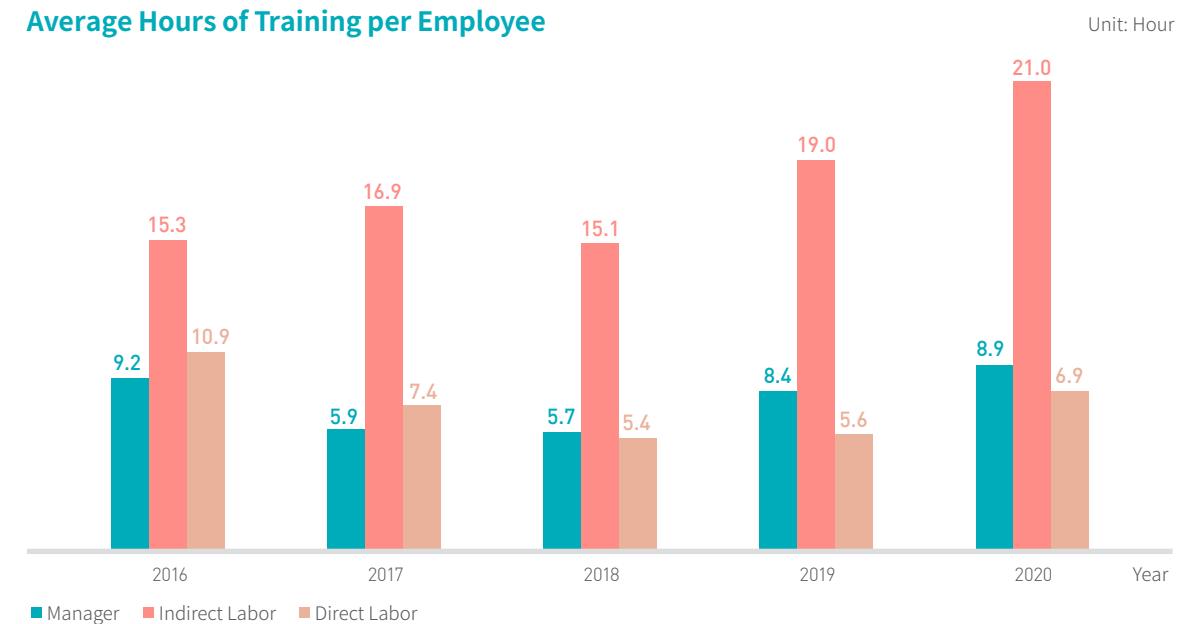
Note: Due to the design differences between training systems, the average evaluation score excluded data from TSMC North America.

In 2020, employee performance assessment registered a completion rate of 100%. In the same year, TSMC provided over 920,000 hours of training programs and activities for learning and development to over 1 million participants. Each employee received, on average, over 16 hours of training and training expenses exceeded NT\$95 million.

To ensure the effectiveness of training programs, TSMC measures the outcome with four levels of evaluation-reaction, learning, behavior, and results-based on the theory proposed by American scholar Donald L. Kirkpatrick.

In 2020, all open courses were evaluated on the reaction level, including contents, instructor, administration, and satisfaction scores. The courses received an overall satisfaction score of 94 (the total score is 100). A total of 850,000 participants completed 3,500 online courses and learning evaluations. 8% of the training courses were further evaluated on the behavioral level. Most on-the-job training offered by internal organizations were further evaluated at the learning and behavioral level, and evaluations at the results level have been built into the employee performance management and development system.

Average Hours of Training per Employee





2020 Key Objectives for Learning and Development Programs

To continue targeting the strategy of promoting self-learning, TSMC is assisting employees in advancing their studies in their professional domain while extending their reach to other domains. To reach to this goal, TSMC is offering self-learning resources for employees to learn at any time and place.

Professional Training for Engineers/ Junior-level Managers

Deepen engineers'/junior-level managers' domain knowledge in front-end/back-end processes and instill quality awareness through actual classes, self-learning, co-learning, and hand-on operations



Progress

Advanced technical courses executed by fab-level managers

- Advanced Training on Wafer Processes
- Professional Development for Process Engineers
- Four Lessons on Quality
- Physics of Semiconductor Devices

2020 Enforcement Report

100% ✓ Advanced Training on Wafer Processes

100% ✓ Professional Development for Process Engineers

100% ✓ Four Lessons on Quality

100% ✓ Physics of Semiconductor Devices

Self-learning

Develop mobile learning applications and e-Learning systems that enable employees to learn at any time and place



Progress

- Launched mobile learning applications so that employees can use mobile phones to engage Self-learning at all times
- Strengthen functions on e-Learning platform to allow employees to share and recommend courses among each other and foster a culture of Self-learning
- Launch a Self-learning Bar that offers specific subjects and themed online learning resources

2020 Enforcement Report

Launched

6,500 Visits

✓ Mobile Learning Application

✓ E-Learning 2.0

✓ 6,500 Visits to Self-learning Bar

English Skills

Strengthen TSMC employees' English skills to support our goals of a globalized operation model and talent development



Progress

English program includes

- Online English Webinar
- English Workshops
- One-on-one English Consultation
- English Learning Website
- English Book Fair

2020 Enforcement Report

> 14,000 ✓ Sign-ins to Online English Webinar

> 400 ✓ Participants at English Workshops

> 80% ✓ Usage Rate of One-on-one English Consultation

300–500 ✓ Average Visit/Day to the English Learning Website

76% ✓ Increase in Language Books Sold

Human Rights



Enforce TSMC Human Rights Policy, Responsible Business Alliance Code of Conduct, and United Nations Guiding Principles on Business and Human Rights

Strategies

2030 Goals

2021 Targets

2020 Achievements

▼ Achieved ▲ Exceeded — Missed Target

- Establish communication and reporting channels for all employees globally and establish a comprehensive system for management and analysis

- Maintain **100%** e-voting at labor-management meetings in all Taiwan facilities

- All of TSMC's Taiwan facilities adopted an e-voting system for the election of new labor representatives and list e-voting systems as the only voting method for all future elections of the same kind

▼

Target: All of TSMC's Taiwan facilities shall adopt an e-voting system for the election of new labor representatives and list e-voting systems as the only voting method for all future elections of the same kind

- No material regulatory violations (penalty: **> NT\$1 million**)

- No material regulatory violations (penalty: **> NT\$1 million**)

- No material regulatory violations (penalty: **> NT\$1 million**)

▼

Target: No material regulatory violations

- Strengthen employee understanding of TSMC Human Rights Policies and ensure it is applied into the workplace through full employee engagement in online courses **NEW**

- > 95%** employees complete trainings
- 100%** passing rate in post-class

Human Rights Policy

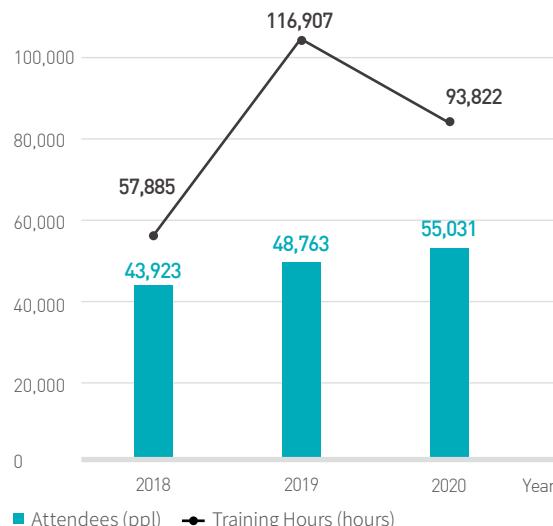
TSMC believes that respecting human rights and creating a respectful workplace is critical to TSMC and our suppliers. To ensure comprehensive human rights actions, TSMC formulated the [Human Rights Policy](#) in 2020.

Human Rights Governance

Human Rights Policy is the highest guiding principle for planning, execution, review, and action for all human rights governance in TSMC. Across all global sites and facilities, operational supervisors shall work with senior executives in HR, Information Technology and Materials Management & Risk Management, and Legal organization and take charge of human rights topics.

- The highest HR executive will be responsible for managing/ coordinating and reporting

Human Rights Protection Training



major human rights topics in TSMC to management.

- The Human Rights Operation Center of HR organizations will be responsible for human rights topics that have daily relevance to employees. Regulations should be formulated and implemented in accordance with Measures for Human Resources Management System and the Internal Control Procedures for Human Resource Management System to ensure that the Company meets Responsible Business Alliance (RBA) or higher standards.
- The IT Supply Chain Management Section of the Information Technology and Materials Management & Risk Management organization will be responsible for all human rights topics related to suppliers. All regulations shall be formulated and implemented

in compliance with the TSMC's [Supplier Code of Conduct](#) to ensure proper supplier management.

Human Rights Protection Training

In 2020, TSMC provided employees with a total of 93,822 hours of human rights protection training. In total, 55,031 employees (107,057 training attendances) completed the training program, accounting for 96.8% of TSMC's total employees. Going forward, TSMC will continue to focus on human rights protection and offer training programs to raise human rights awareness among employees to minimize risks.

Human Rights Risk 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. Using RBA's self-assessment questionnaire (SAQ), TSMC conducts annual assessments to identify internal operations bearing the highest social, environmental, and moral hazards.

Between 2016 and 2018, TSMC commissioned a third-party institute trained in social and environmental audit to conduct RBA's Validated Assessment Program (VAP) on all fabs in addition to TSMC's annual SAQ assessment. Of the 16 fabs assessed, 14 fabs received full marks ^{Note}. Responding to customer demand, TSMC conducted VAP audits on Fab 12b in 2020. The complete audit report will be made available to customers on RBA-Online in 2021.

Risk Management

Taiwan Facilities													Subsidiaries						
Corporate Headquarters	Fab2	Fab3	Fab5	Fab6	Fab8	Fab12A	Fab12B	Fab14A	Fab14B	Fab15A	Fab15B	Advanced Backend Fab1	Advanced Backend Fab2	Advanced Backend Fab3	Advanced Backend Fab5	VisEra	TSMC (China)	TSMC (Nanjing)	Wafer-Tech
SAQ	95.6	92.2	92.2	92.2	92.2	91.8	92.6	92.6	91.9	92.6	93.5	92.9	93.9	93.2	95.2	90.3	93.2	91.3	89.3
VAP	-	-	-	-	-	-	-	200	-	-	-	-	-	-	-	-	-	-	-
VAP	-	-	(200)	(200)	(200)	-	(200)	-	-	(200)	(200)	-	-	-	-	-	-	196.5	-
VAP	-	(200)	(200)	(200)	(200)	(200)	193.3	(200)	182.4	(200)	(200)	(200)	(200)	(200)	(200)	-	(200)	-	(200)
VAP	-	-	-	✓	✓	-	✓	-	✓	✓	✓	✓	-	-	✓	-	-	-	-

SAQ Assessment Scores(2020) ● Low risk (≥ 85) ● Medium risk ($\geq 65 \& < 85$) ● High risk (< 65)

VAP Assessment Scores (2020) ■ VAP Assessment Scores (2019) □ VAP Assessment Scores (2016-2018) ▨ VAP Assessment Scores (2021)

Note : Full marks = 200



Human Rights Policy Concerns and Practices in 2020

	Safe, Healthy, and Harassment-free Workplace	Non-discrimination & Equal Employment Opportunity	Prohibit Forced Labor and Child Labor	Working Time	Responsible Mineral Sourcing	Assist Employees with Maintaining Work Life Balance and Physical/Mental Health
Targets and Actions	<ul style="list-style-type: none"> Formulate OSH Management Procedures and establish Employee Health Management Program Meeting and Occupational Disease Investigation Committee Formulate Sexual Harassment Prevention Policies and establish the Sexual Harassment Investigation Committee 	<ul style="list-style-type: none"> Establish TSMC Recruitment Interview Internal Control Procedures and declare principles of non-discrimination and offer the Recruitment & Selection training courses and suggestions/reminders to the hiring supervisors 	<ul style="list-style-type: none"> Comply with the 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 employment relations 	<ul style="list-style-type: none"> Formulate Management Measures for Working Hours Procedure and build an Attendance Record System and Overtime System 	<ul style="list-style-type: none"> TSMC requires suppliers to comply with its conflict-free minerals sourcing policy and sign a statement on conflict-free minerals for products containing tantalum, tin, gold, and tungsten 	<ul style="list-style-type: none"> Provide a variety of activities and clubs to enrich the concept of work-life balance Provide child care facilities and education counseling/services to assist employees
Risk Assessment	<ul style="list-style-type: none"> Investigate whether there are any occupational diseases from chemical exposure Increase voluntary participation rate for non-statutory employee health plans Case inquiry by the Sexual Harassment Investigation Committee and Ombudsman 	<ul style="list-style-type: none"> Eliminate discrimination in the workplace in compliance with Internal Control Procedures starting from recruitment 	<ul style="list-style-type: none"> Inquire candidate regarding willingness-to-work during interviews Candidates must provide proof of identification for review 	<ul style="list-style-type: none"> Understand employee work hours through reporting channels, facility-level communication meetings, and management systems Employees must agree to overtime requests and TSMC shall provide overtime pay or compensatory leave 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Examine participation rates Increase the quota on Company-owned childcare facilities
Target Group	<ul style="list-style-type: none"> All employees 	<ul style="list-style-type: none"> New hires Indigenous peoples, women, migrant workers, contract employees, disabled workers, etc. 	<ul style="list-style-type: none"> New hires 	<ul style="list-style-type: none"> All employees 	<ul style="list-style-type: none"> All suppliers 	<ul style="list-style-type: none"> All employees Employees in need
High-risk Employees	<ul style="list-style-type: none"> 1,739 employees under special health management (For more details, please refer to the Occupational Safety and Health section of this report) 2 incidents verified by the Sexual Harassment Investigation Committee 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 2,738 employees received cerebrovascular and cardiovascular diseases prevention management (for more details, please refer to the Occupational Safety and Health section of this report) 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 0
Mitigation Measures	<ul style="list-style-type: none"> Quarterly meetings on occupational health management held by senior executives to manage and control the five major safety hazards of occupational diseases across departments Launched Psychological Safety Program Offered classes on anti-harassment and anti-bullying 	<ul style="list-style-type: none"> A total of 730 managers completed the Recruitment & Selection training course in 2020 	<ul style="list-style-type: none"> Complied with legal regulations for recruitment and hiring; prohibited child labor and forced labor 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Suppliers of products containing tantalum, tin, gold, and tungsten must collaborate with more than one compliant smelter 	<ul style="list-style-type: none"> Collaborated with members of the TSMC Employee Welfare Committee and activity organizers to promote activities and encourage participation Optimized pay structure and offer an additional 7 days of paid leave to attract and retain outstanding kindergarten teachers Strengthened STEAM education at the TSMC kindergarten
Remedies	<ul style="list-style-type: none"> Immediate transfer from original post Provide ample medical support Provide compensatory leave and subsidies according to laws and regulations 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Risk prevention through regular VAP and SAQ mechanisms 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 	<ul style="list-style-type: none"> If there is any evidence of overtime work, supervisors will be required to make the necessary improvements and restitute the rights to which employees are entitled 	<ul style="list-style-type: none"> Suppliers will be asked to terminate sourcing if there is evidence of sourcing from non-compliant mines 	<ul style="list-style-type: none"> Conduct questionnaires to make improvements in the future 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 child care facilities Offer competitive compensation and benefits to kindergarten teachers
Reporting Channels	<ul style="list-style-type: none"> Occupational Disease Investigation Committee & Employee Voice Channels 	<ul style="list-style-type: none"> <u>Irregular Business Conduct Reporting</u> 	<ul style="list-style-type: none"> <u>Irregular Business Conduct Reporting</u> 	<ul style="list-style-type: none"> <u>Employee Voice Channels</u> 	<ul style="list-style-type: none"> <u>Reporting Channels for Supply Chain Employees</u> 	<ul style="list-style-type: none"> <u>Employee Voice Channels</u>



Employee Engagement

TSMC values employee opinions/interests and therefore offers several communication channels. The highest-level executives of the HR organization are responsible for many of the channels, ensuring that matters are handled in an efficient and confidential manner as we continue to strive towards an open and transparent environment for employees/managers and colleagues to communicate. Furthermore, TSMC respects employees' right to take part in collective bargaining and peaceful rallies. In accordance with legal requirements in Taiwan, the Company regularly holds labor-management meetings to brief employees on Company operations and invite employees to engage in discussions on labor conditions and benefits. To facilitate labor-management communication, after the labor representative's four-year term was up in 2018, fabs in the Central Taiwan Science Park adopted an e-voting system for the election of new labor representatives. The e-voting system was expanded in 2019 to Longtan facilities and in 2020 to Hsinchu and Tainan facilities to encourage more employee voting. As of December 31st, 2020, all labor representative elections in Taiwan facilities have been conducted through e-voting.

In 2020, TSMC's internal communication channels handled a total of 4,343 cases of employee opinions and complaints, including 4 through the Sexual Harassment Investigation Committee, 171 through the Ombudsman System, 906 through the Employee Opinion Box, 3,192 through the Fab Caring Circle, and 70 cases through the Irregular Business Conduct Reporting System. All reported cases have been processed and addressed by competent organizations.

Cases reported through the Sexual Harassment Investigation Committee, the Ombudsman System

and Irregular Business Conduct Reporting System were investigated and reviewed by designated committee members. Cases reported through the Employee Opinion Box were handled by responsible persons, who would then communicate with employees about the solutions and outcome. Employees can access all internal communication channels via the internal employee portal.

In 2020, there were 2 verified cases of sexual harassment as confirmed by the Sexual Harassment Investigation Committee. The perpetrating employees received severe

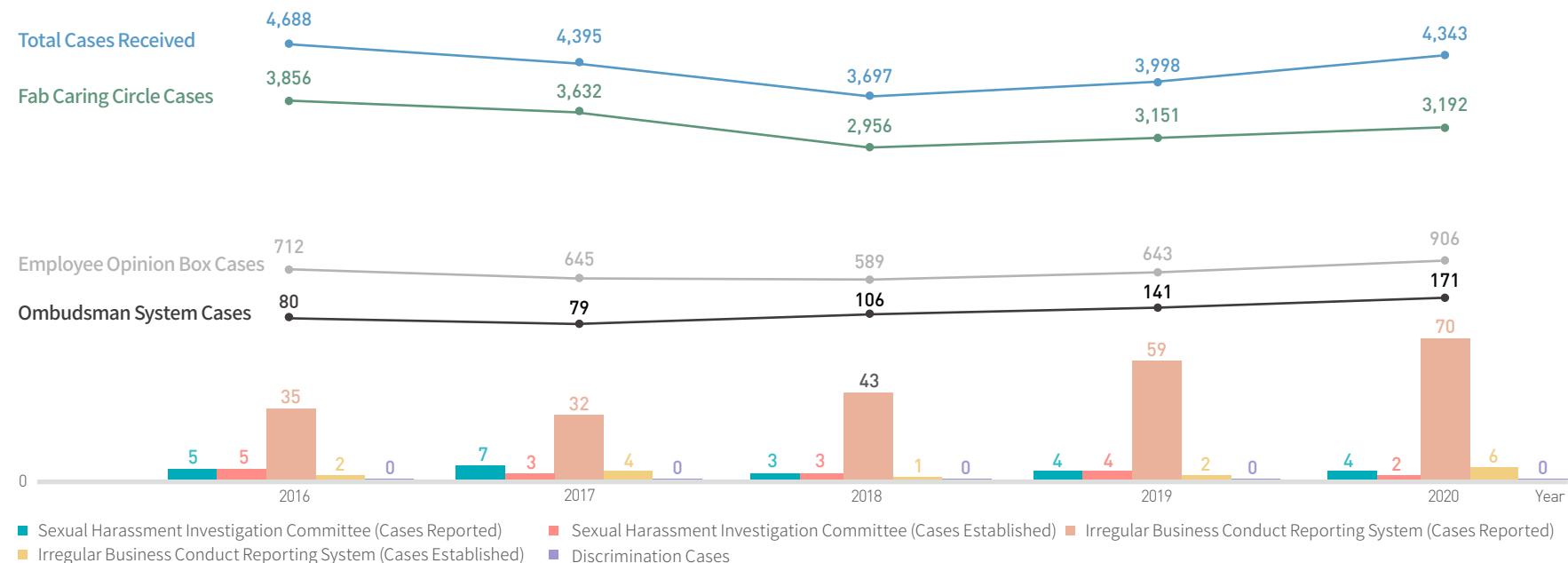
punishments and one was dismissed from the Company. As both cases involved social software abuse, TSMC has reinforced the social software section in the 2020 sexual harassment prevention courses to raise awareness among employees.

There were 6 violations to business ethics and all involved employees have been punished in compliance with Company regulations. The importance of business ethics continues to be advocated in related courses. In 2020, the annual business ethics and regulatory compliance training

completion rate was 99.72%, with 50,482 employees having received trainings. Management training completion rate was 100%, with 5,425 managers having received trainings.

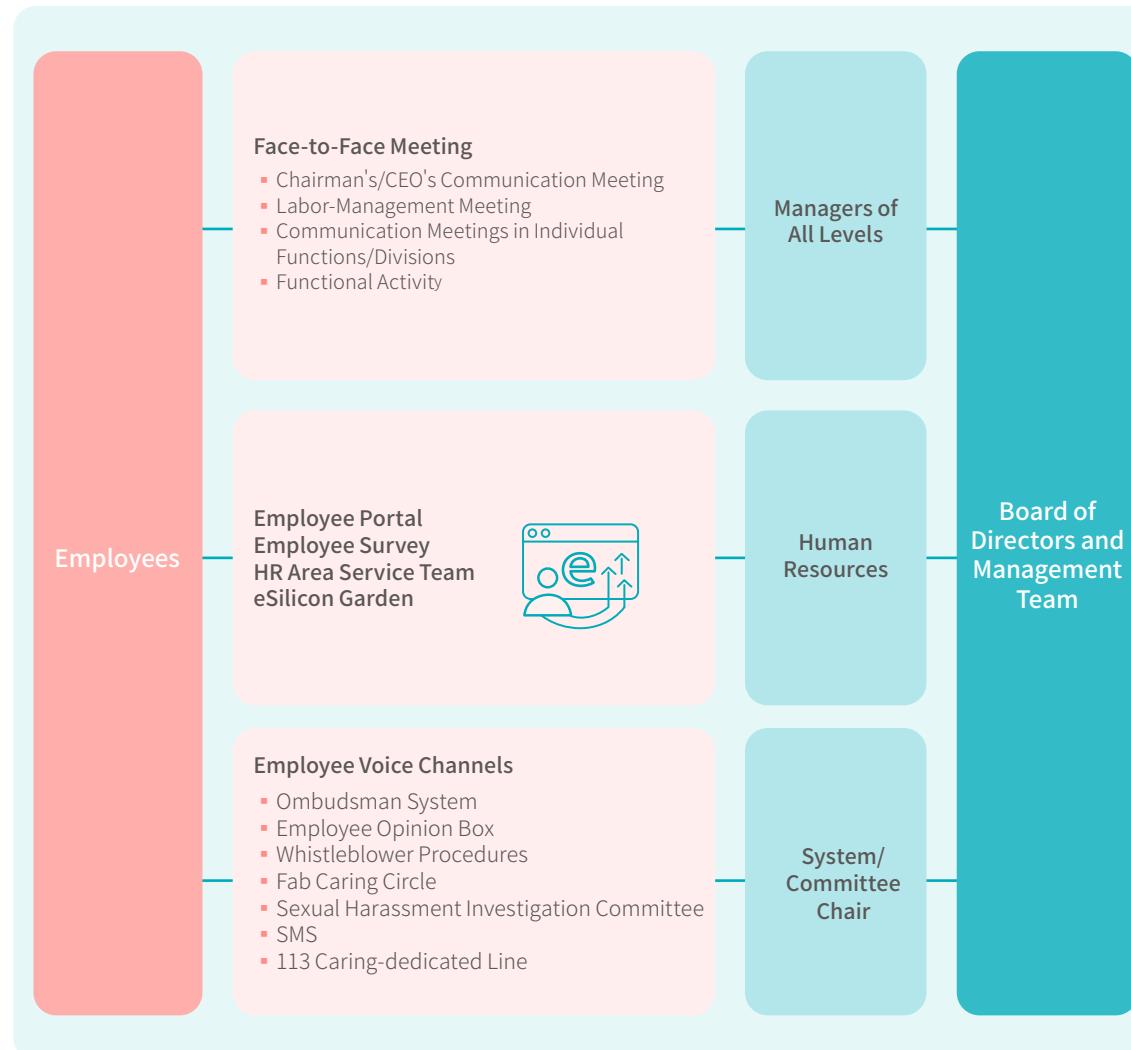
With these effective internal communication channels, the relationship between the management level and employees has been harmonious over the years. TSMC has always respected employee rights to form a labor union, but so far none have been formed.

Cases Reported Through Internal Communication Channels



Note: 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.

Internal Communications Structure



Employee Voice Channels



Occupational Safety and Health

Strategies



Promote Safety Culture

Advocate for a humanistic safety culture, manage safety risks and establish an intrinsically safe working environment



Comprehensive Health Management

Prevent occupational diseases and promote a comprehensive health management



Internal-External Alliance

Collaborate with external parties to establish a safer working environment across the supply chain

2030 Goals

- Incident Rate per 1,000 Employees < 0.20
- Disabling Injury Frequency Rate (FR) < 0.3^{Note1}
- Disabling Severity Rate (SR) < 3^{Note1}

2021 Targets

- Incident Rate per 1,000 Employees < 0.20
- Disabling Injury Frequency Rate (FR) < 0.4
- Disabling Severity Rate (SR) < 4

2020 Achievements

- Incident Rate per 1,000 Employees: 0.311
Target: < 0.20
- Disabling Injury Frequency Rate (FR): 0.42
Target: < 0.45
- Disabling Severity Rate (SR): 4
Target: < 6

^{Note3}

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- 0 Cases of Occupational Disorders Caused by Exposure to Chemicals
- Health Program Participation Rate: 55%

- 0 Cases of Occupational Disorders Caused by Exposure to Chemicals
- Health Promotion Program Participation Rate: ≥ 53%

- 0 Cases of Occupational Disorders Caused by Exposure to Chemicals
Target: 0 cases
- Health Promotion Program Participation Rate: 53.5%
Target: ≥ 53%

- Assist all contractors with high risk operations^{Note2} in obtaining ISO 45001 certification for occupational safety and health management system

- Assist 65% of our contractors engaged in high risk operations obtain ISO 45001 certification for occupational safety and health management system

- Assisted 60% of our contractors engaged in high risk operations obtain ISO 45001 certification for occupational safety and health management system
Target: 60%

▼

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, 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 2: 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. For mitigation measures, please see [Safety Performance Index](#).



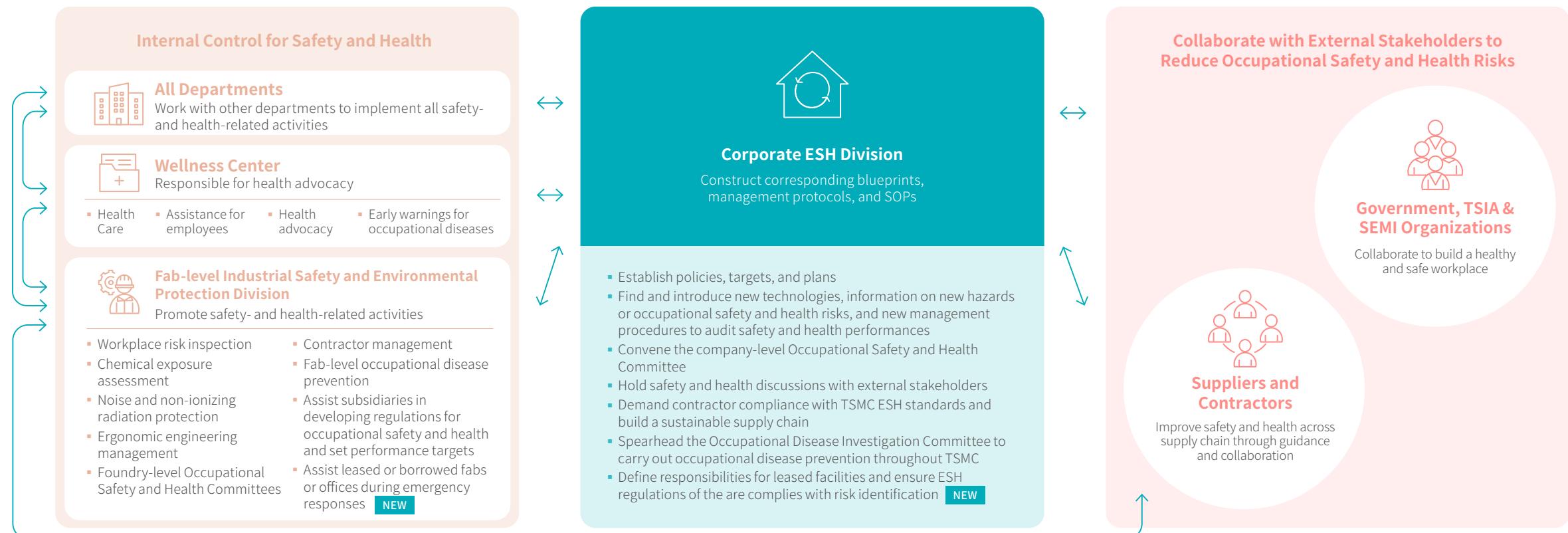
In 2020, all TSMC's fabs in Taiwan received ISO 45001 certifications and, in response to [ISO 45001 system](#) updates, TSMC assisted TSMC (China), TSMC (Nanjing), WaferTech, and VisEra obtain ISO 45001 certifications to comply with the latest international standards on occupational safety and health, and to ensure the safety and health of all TSMC employees. TSMC also established a Disease Control Committee in response to the COVID-19 pandemic. The committee's purpose is to design prevention measures based on changing situations,

designate isolated working groups of employees and vendors, and maintain day-to-day operations.

With higher production capacity, the number of contractors visiting TSMC subsequently set a new record in 2020, climbing from 32,168 people/day in 2019 to [39,470 people/day](#). TSMC is now the most visited semiconductor company in Taiwan. TSMC is committed to providing a safe workplace for contractors and hopes that contractors can participate in creating a friendly

and healthy workplace. To such ends, TSMC founded the Editorial Committee comprised of 108 engineers from the Industrial Safety and Environmental Protection Division. The Committee categorized and restructured complicated regulations on environment protection, safety, and health. The regulations were compiled and classified based on the fabrication stage it would impact and the Contractor ESH Bluebook was issued in March 2020. The bluebook is an intuitive [illustrated reference guide](#) that can help contractors and inspire our peers to create a safe and

healthy workplace across the supply chain. The Contractor ESH Bluebook has also been updated to comply with new regulations. TSMC immediately established Thermal Hazard Prevention Procedures to comply with the latest Thermal Hazard Prevention Guide for Outdoor Labor in High Temperatures. The Procedures are intended to warn and provide measures to contractors about potential heat strokes, heat exhaustion, or seizures induced by heat.





Promote Safety Culture

TSMC believes that people comes first and we strive to build a humanistic workplace. Each management level has the responsibility to build a safe and healthy workplace and we ask employees to comply through various management systems and regulations. We continue to improve by observing people, the environment, and behaviors. Educational training is also provided to ensure that employees works toward this goal and thereby propel TSMC into sustainable development.

Safety and Health Measures

Following the [TSMC Safety and Health Policy](#), TSMC implemented the following measures and used the Safety Performance Index (SPI) to track performances for safety and health measures. The Occupational Safety and Health Committee 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.

Safety and Health Measures



Measures	Safety and Health Efforts in 2020			
	SPI	Taiwan Fabs	Overseas Fabs	VisEra
Regulatory Updates	✓	✓	△ ¹	✓
Standardized Management Procedures	✓	✓	✓	✓
Safety and Health Education ^{Note 2}	✓	✓	✓	✓
Hazard Identification and Assessment ^{Note 4}	✓	✓	✓	✓
Management of Change	✓	✓	✓	✓
Chemical Management ^{Note 5}	✓	✓	✓	✓
Tool Management	✓	✓	✓	✓
Contractor Management	✓	✓	✓	✓
Compliance Audit	✓	✓	✓	✓
Emergency Response	✓	✓	✓	✓
Occupational Injury Prevention	△	✓	✓	✓

Note 1: A regulation update platform poised to launch at TSMC (China) and TSMC (Nanjing) to address regulatory discrepancies will be postponed to 2021 due to problems in the setup of domain firewalls.

Note 2: 2020 Training Statistics.

Note 3: Launched interactive online training course on safety and health for new employees. The interactive video is more fun and effective; over 95% of employees were satisfied with the new training.

Note 4: TSMC is committed to building a safety culture that protects employees and the company. We encourage employees to suggest ways to improve workplace safety. Their suggestions will then be classified and tracked to control, prevent or reduce hazard and risks.

Note 5: [Chemical Management Procedures](#).

Note 6: For more details, please refer to [TSMC First to Introduce All-Hazard Management Program](#).

✓ Completed △ Ongoing



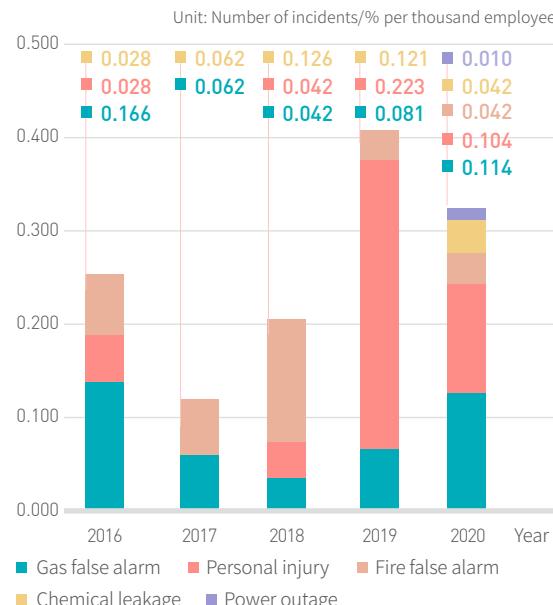
Safety Performance Index

The TSMC Safety Performance Index (SPI) was 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 and false alarms. In 2020, blue-light indicators were reduced

to 70.4% from 88.8% in the previous year while red-light indicators rose by 1% as the number of incidents grew from 21 in 2019 to 30 in 2020. Upon investigation with the 3L5W (Three-legged Five Whys) [⊕] tool, we discovered that the incidents included 11 gas false alarm, 10 personnel injuries, four early warnings for fire false alarm incidents, four chemical leakages, and one power outage. The SPI has been declining each year since 2019.

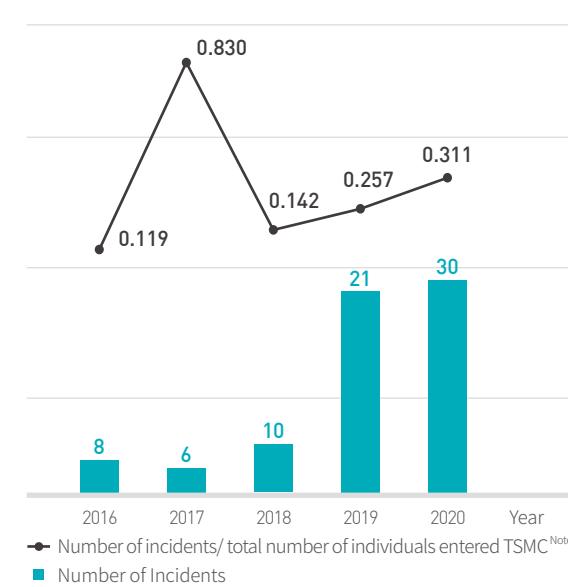
As such, TSMC will issue safety culture questionnaires to a number of fabs in 2021 to identify matters that can be improved. The questionnaire results are expected to be analyzed in 2022 and we will be able to gain insight into the efficacy of previous mitigation measures.

Historical Incidents by Type



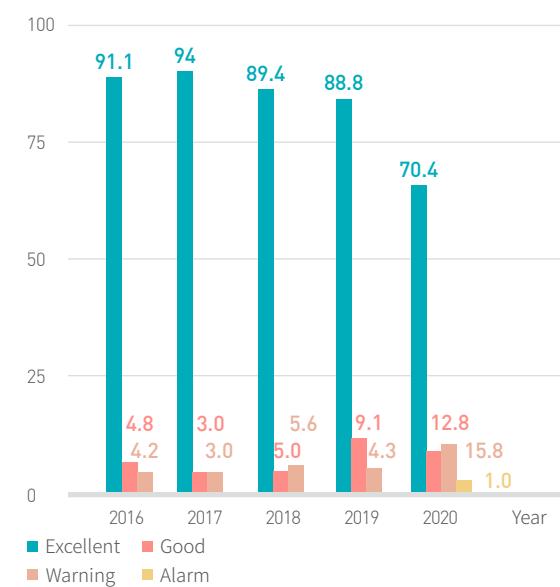
Note: In 2020, the incident by type per thousands of individuals entered TSMC included employees from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra; and contractors to TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra.

Historical Incidents



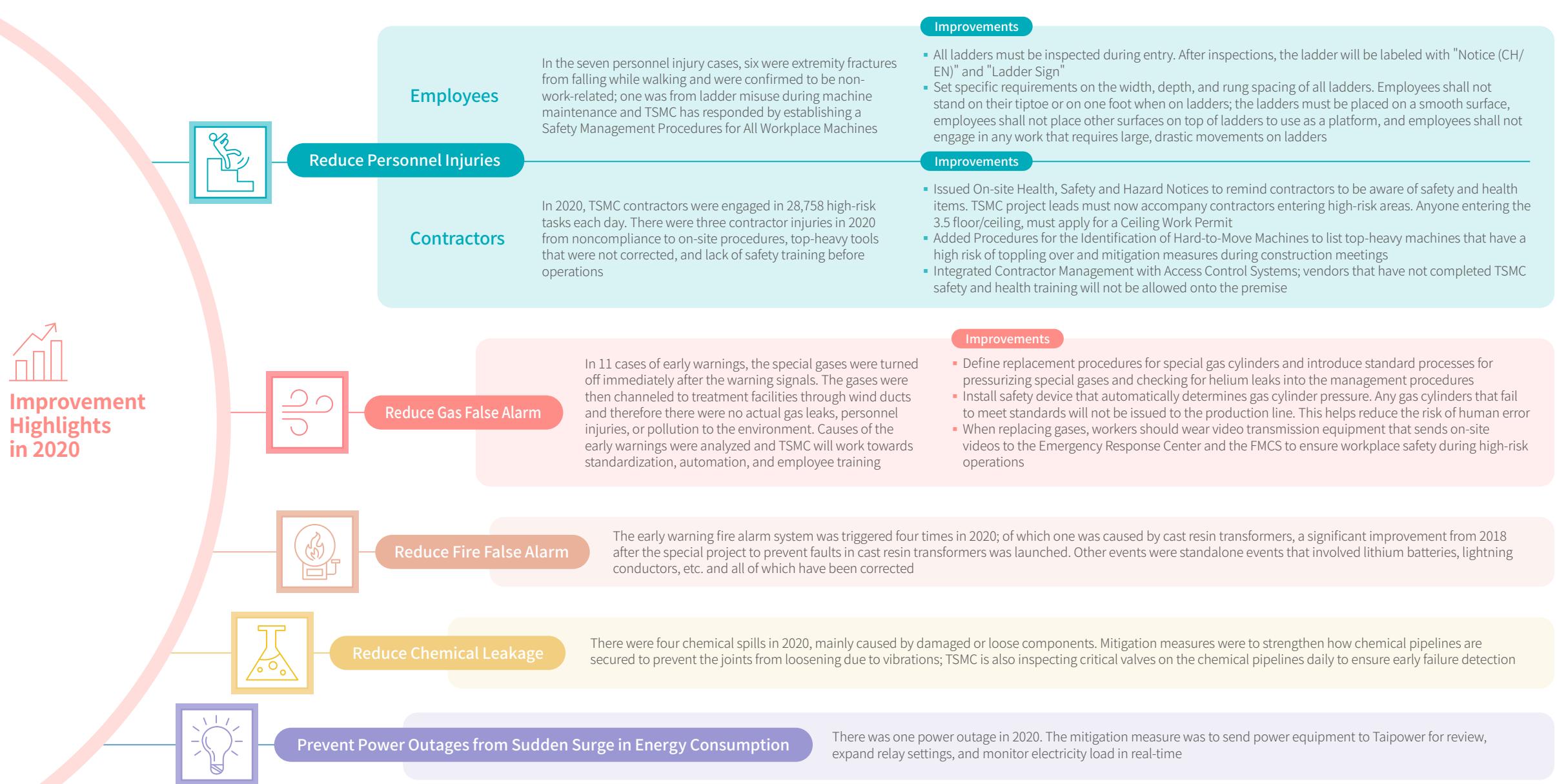
Note: In 2020, the incidence rate per thousands of individuals entered TSMC included employees from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), WaferTech, and VisEra; and contractors to TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra.

Safety Performance Index Chart



Note 2: Figures from TSMC fabs in Taiwan, WaferTech, TSMC (China), TSMC (Nanjing), and VisEra.







Statistics on Disabling Injuries

The definition for 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 2020, TSMC reviewed the Occupational Safety and Health Act stipulating that only work-related injuries shall be counted towards SR/ FR. Other non-work injuries such as falling in the cafeteria or parking lot due to other reasons shall not be counted towards occupational injuries but should be investigated and resolved.

Employee vacation, medical insurance, and insurance shall remain the same.

Disabling Injuries

In 2020, there were 43 disabling injuries among employees with 422 working days lost. Of the 43 disabling injuries, 29 were from men with 308 working days lost and 14 were from women with 114 working days lost. Men suffered from a higher number of work-related disabling injuries and working days lost than women did. Aside from falling^{Note}, the main causes were crushing injuries, cuts, scrapes, and punctures during maintenance.

Female Injuries

In 2020, the majority of female injuries were from falling or collisions that mainly occurred while transporting cleanroom trolleys at 6-inch and 8-inch fabs.

Improvements

1

Implemented LOTO (Lock out Tag out) measures that require employees to lock out and tag out all moving parts during maintenance. In 2020, 2,577 operations were completed and added to the Maintenance Procedures

2

Used preventative equipment while using or turning off valves on gas-powered devices and fool-proofing equipment to prevent injuries during operations. The Industrial Safety and Environmental Protection Department will also conduct sporadic inspections daily to increase alertness

3

Established certifications for operators and supervisors. Uncertified employees will not be allowed to operate on the equipment. Training records and operation application records will be linked; to protect employees, untrained employees will not be allowed to apply to operate

4

Safety and health training materials now contain chapters on when and how to use protective gear for cuts/scrapes/punctures

Improvements

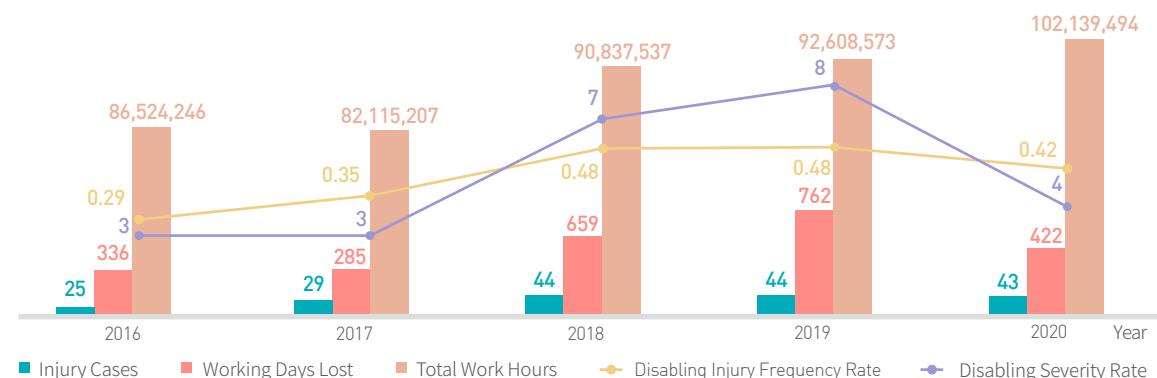
Redesigned trolley route and storage location after on-site observation and operator feedback

Added bumper strips to all sides of the trolley to prevent serious injuries from accidental collisions

Installed mirrors at collision-prone areas to increase alertness while transporting trolleys

Note: Please refer to "Improvement Highlights in 2020" for details of falling.

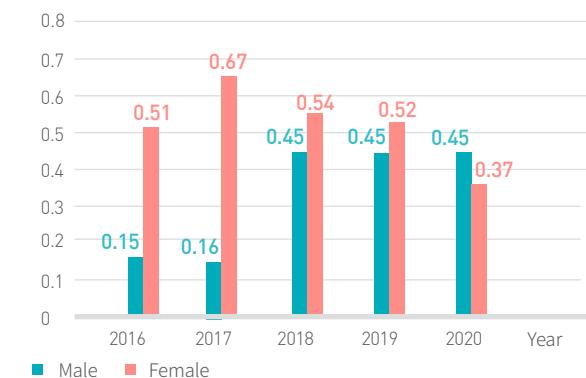
Total Working Hours, Injuries, and Working Days Lost^{Note 1}



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. The table above details data from the past 5 years based on the new definition.

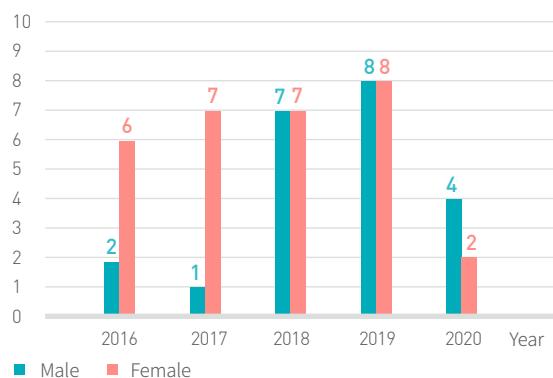
Note 2: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra.

Disabling Injuries Frequency Rate by Gender



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

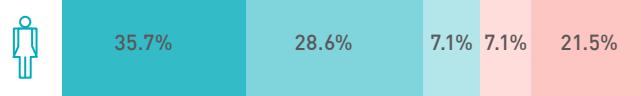
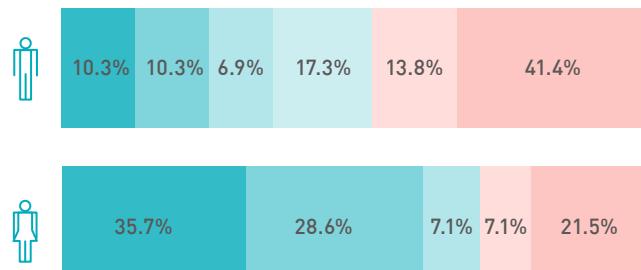
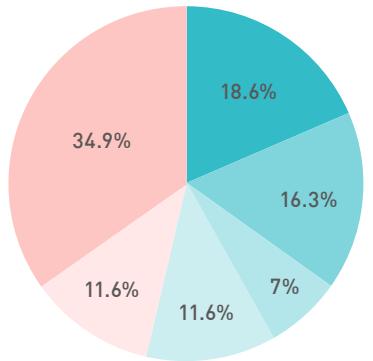
Disabling Severity Rate by Gender



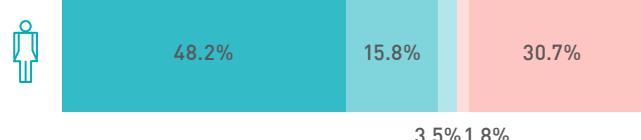
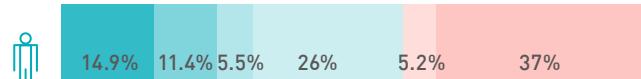
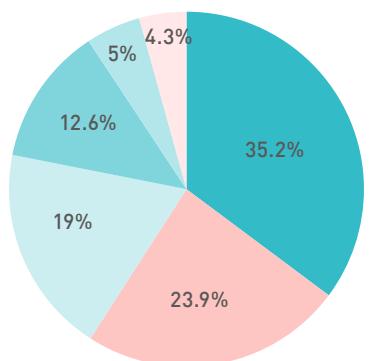
Note: Figures from TSMC fabs in Taiwan, TSMC (China), TSMC (Nanjing), and VisEra..

In 2020, TSMC experienced 37 non-work-related injuries. Falling accounted for the highest percentage with 24 cases, resulting in a loss of 485 working days.

Disabling Injury Frequency Rate by Injury



Disabling Severity Rate by Injury



■ Fall ■ Crush, collision ■ Ergonomic injuries ■ Crush ■ Cut, scrape,puncture ■ Others

Cause Analysis and Prevention for Falls



Personal

22 Falls from Other Reasons: Not paying attention when walking, losing balance while turning, tripping on shoelaces, misstep in the stairways, tripping when getting out of car, slipping on rainy days, or fainting from discomfort

Improvements

Continue to optimize fall-prone areas, place posters to raise awareness, and remind employees to pay attention to personal safety

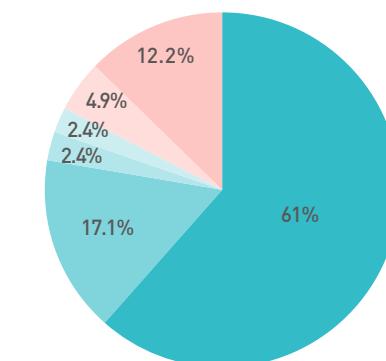
Office

2 Falls from Failing to Follow Through with Cleaning Procedures

Improvements

- Review cleaning and waxing processes, establish measures to put up construction fences for safe operations, prohibit other employees from entering the premises while cleaning
- Use chemical sorbent pads to clean oil stains on the floor to prevent falls
- Add cleaning and waxing processes into monthly training courses for cleaning staff

Non-work-related Injuries Rate



TSMC's ESH Center of Facility Academy.



Comprehensive Health Management

Work-related diseases and personal health issues undermine productivity and may significantly impact the Company's operation. A comprehensive health management plan identifies health risks in the workplace, takes responsive measures, prevents occupational diseases, and promotes physical and mental health among employees.

Prevent Occupational Diseases

Moving beyond traditional approaches to occupational health, TSMC has been committed to building a safe and healthy workplace where each work item is assessed with risk identification to uncover five major potential risks, including chemical, physical, ergonomic, biological, and social/psychological, and to design preventive measures accordingly. In 2020, TSMC continued to work with Professor Peng-Chi Tsai from National Cheng Kung University to monitor chemical workstations and analyze results.

In January 2020, in response to the global COVID-19 pandemic, TSMC established the Disease Control Committee and set up a real-time disease control section on the Company's internal website so employees have immediate access to the latest updates and measures.

Prevention Measures & Achievements against Occupational Diseases

Ergonomic

On-site Inspections with Occupational Physicians

Sustainable Measures

- Arranged occupational physicians to visit loading sites at TSMC fabs in Taiwan and request feedback
- The ergonomic risk assessment form was streamlined to ensure instant risk level assessment
- Computerized ergonomic risk assessment systems used to identify operations with high-ergonomic risks
- Health centers conducted questionnaire surveys, tracked employees who apply for pain relief patches, and arranged meetings with occupational physicians

Achievements

- 6 on-site visits from occupational physicians with 2 feedbacks, including annual employee training, and redesign of poorly designed handles, etc. All necessary changes were made with a 100% completion rate
- Computerized assessments were conducted on 10 employees with above-average height. Office chairs were raised and foot mats were provided to maximize comfort levels. Target employee satisfaction rate stood at 100%
- 185 employees were impacted by soreness and participated in the ergonomic risk exposure survey. Upon assessment from occupational physicians, 7 of these 185 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 2020

- Conducted lead exposure risk assessment on all fabrications using lead mixtures or compounds in advanced backend fabs

Sustainable Measures

- Chemicals Management: For more details, please refer to the [Chemical Management Process](#)
- First Taiwan semiconductor company to introduce the [EU EN 14175-3](#) standards for fume hoods and establish laboratory fume hood exhaust standards

Achievements

- Strengthened protection in workplaces that use lead mixtures or compounds
- All chemicals were assessed as low risk and the safety information for all chemicals used at TSMC is 100% accurate
- All chemical-related tasks inside laboratories shall be conducted inside fume hoods to reduce health risks to operators



(Continued from previous page)

Social/Psychological

Carry out Cerebrovascular and Cardiovascular Disease Prevention and Management Program

New Measures in 2020

- Used IT system to integrate data from employee health check-ups (including historical data) to ensure the screening of more employees into the program for continuous management, and combine with a reminder mechanism to daily monitor working hours of high-risk operators

Sustainable Measures

- Conduct employee health risk assessment and divide into different levels for management after annual checkups. Health information and medical support are also provided
- Physicians will recommend adjustment to employee work hours and job contents

Achievements

- The number of employees under current management has grown to **2,738**. TSMC has taken advice from the occupational physician to inform the employees, employee's supervisor, and HR representatives to adjust the employees' workload to reduce risks of cerebrovascular and cardiovascular diseases
- Integration with In-Out system to remind employees, supervisors, and HR representatives for long working hours, or rearrange an assessment with occupational physician

Biological

Track CDC Updates to Provide Employees with the Latest Health Information

New Measures in 2020

- Continued to track communicable epidemics domestically and abroad and establish preventive/response measures for notifiable epidemics
- Established Epidemics Control Committee to develop COVID-19 countermeasures and reporting mechanisms for non-notifiable epidemics

Sustainable Measures

- Employees on business trips to areas with disease outbreaks will be briefed and provided with disease prevention toolkits
- Provide up-to-date information on seasonal flu and Dengue Fever

Physical

Better Identification of Physical Hazards

New Measures in 2020

- Compiled the Laser Source Calibration Guidelines and added special eye test

Sustainable Measures

- Develop 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 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

Epidemics Prevention – Shutting Out COVID-19

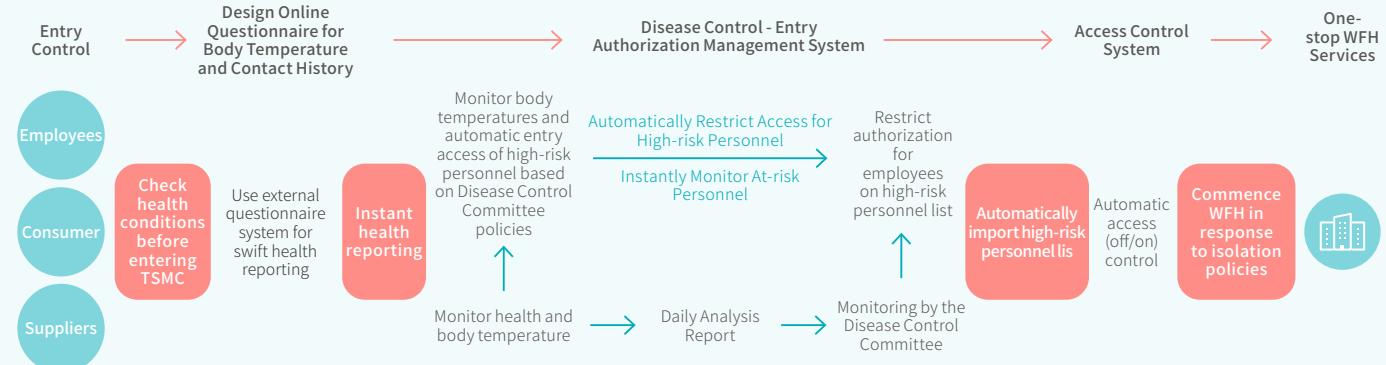
In 2020, in response to the global COVID-19 pandemic, TSMC established the TSMC Disease Control Committee with members from the Corporate Environment Safety Health Division, HR, Operations, Materials Management, Customer Service, Public Relations, and offshore subsidiaries. The Senior Vice President of Information Technology and Materials Management & Risk Management is the commander for disease prevention and is responsible for disease prevention/control measures and emergency response; taking stock of required labor and resources and allocating accordingly; and making necessary announcements on disease prevention/control measures in TSMC. The Corporate Environment Safety Health Division Director is the executive secretary of the committee, responsible for gathering and compiling local disease prevention policies from regions where TSMC has fabs or subsidiaries; follow up on domestic and overseas situations and suggest disease prevention measures to the commander; work with the Wellness Center for the high-risk employee list; and establish the Disease Prevention Guidelines for TSMC. All TSMC fabs in Taiwan, domestic subsidiaries, and offshore subsidiaries were required to adhere to relevant disease prevention/control measures to ensure effective control over the pandemic, guarantee employee safety, and maintain day-to-day operations.

Epidemic Risk Management to Protect Employees and Contractors

1 Cloud Controller

Through cloud services, TSMC has developed a body temperature feedback system with smartphone IM functions for all personnel entering the Company. The system is connected to the ACS and can effectively manage entry authorizations for high-risk personnel. Every day, the cloud controller reports suspicious temperatures to prevent high-risk personnel from entering TSMC.

Epidemic Risk Management Process



2 Self-management in Employees and Contractors

People are required to wash hands, check body temperatures, and confirm identity when entering TSMC. Everyone must report body temperatures, complete the Health Declaration Form, wear masks in public spaces, maintain a safe social distance, and comply with strict dining rules.



3 Investigation and Emergency Response to Confirmed Cases

TSMC has established a comprehensive investigation process and emergency response structure with defined roles according to the company's Disease Prevention Guidelines. In 2020, TSMC had one confirmed COVID-19 case and immediately organized an emergency response team within an hour to investigate the confirmed case. In addition to guidelines from the National Health Command Center (NHCC), TSMC has initiated additional quarantine measures for an expanded list of contacts and disinfected workstations. TSMC also offered support to the employee confirmed to have Covid-19 and his/her contacts for medical follow-ups, COVID-19 related health measures, and assistance in daily life.

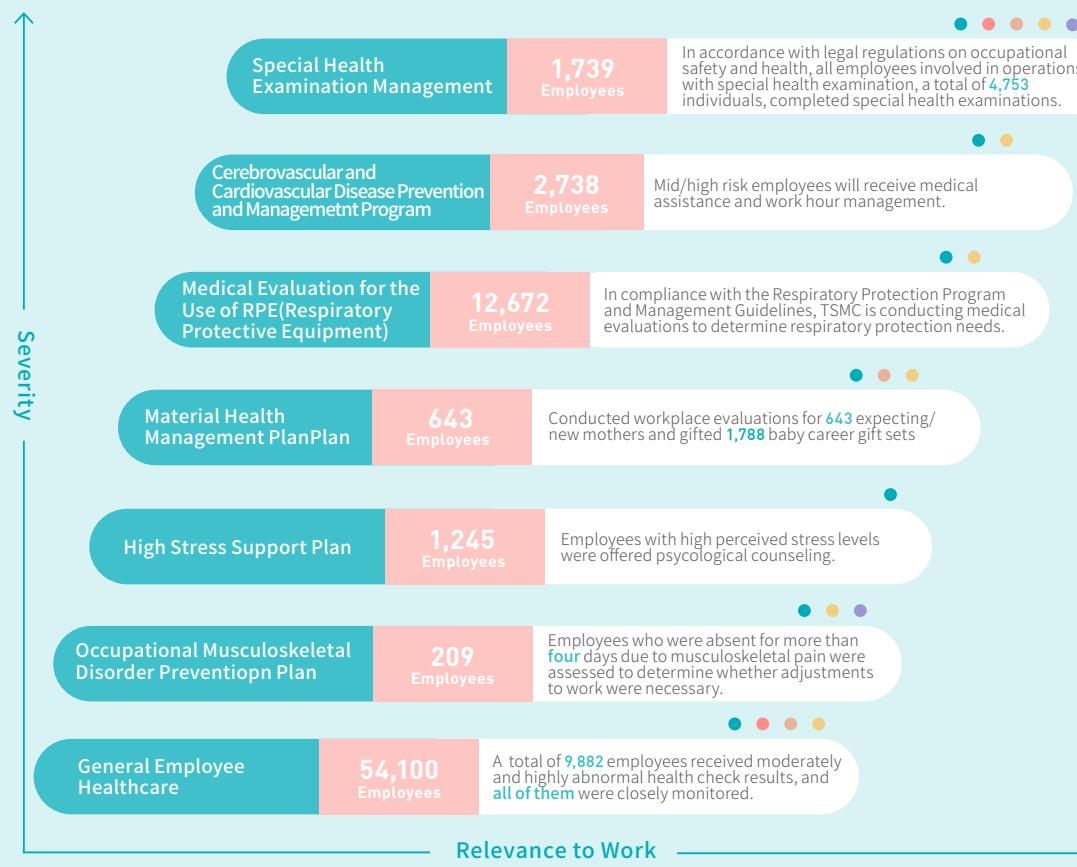


Assist Employees in Health Management, Including Health Risk Management & Health Care

Occupational Health Risk

Health Risk Management

TSMC's occupational health risk management plan covers both occupational hazards and personal health, which need to be improved to protect employees' health.

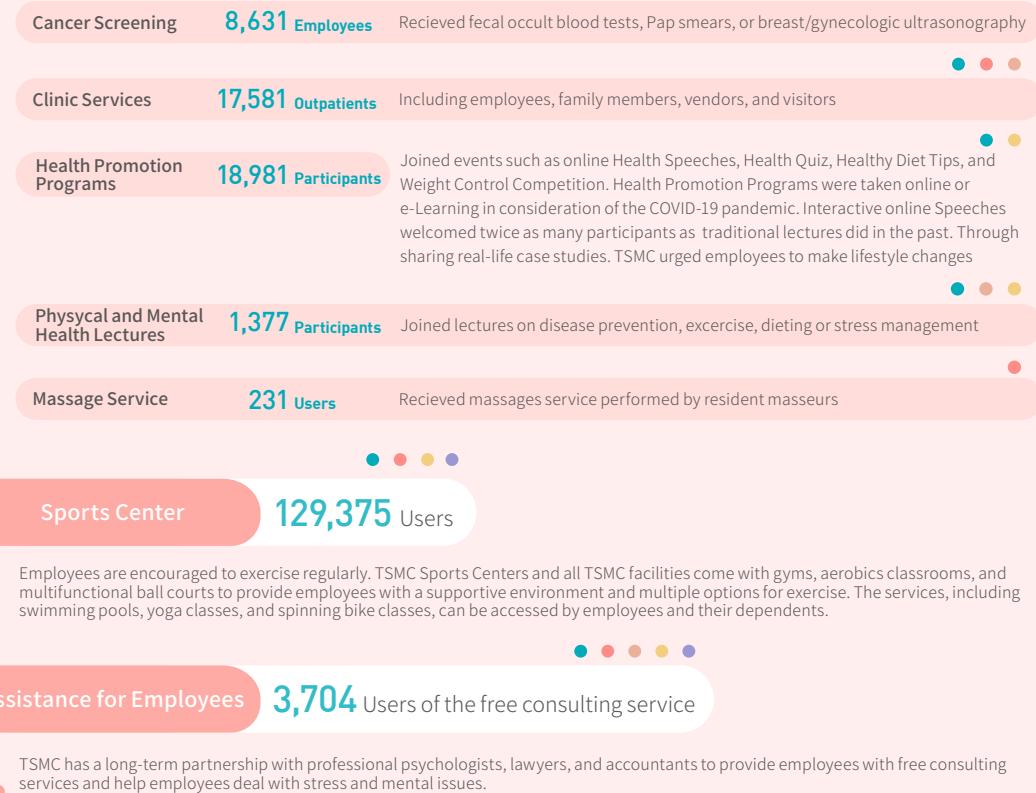


Health Care

Offer employees a supportive environment and a variety of health care programs to maintain employee health.

Health and Wellness Programs in 2020

46,801 Participants

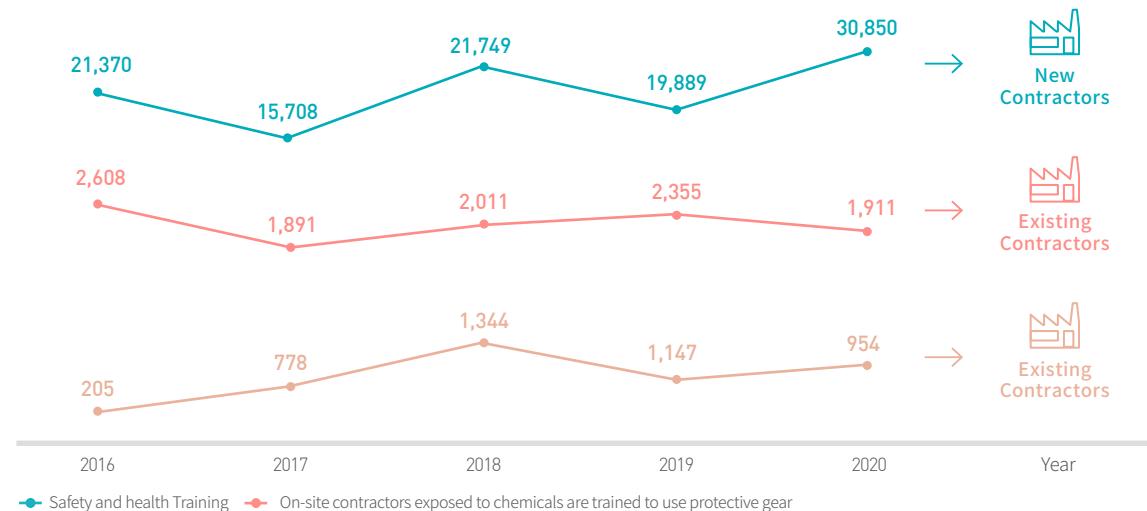




Internal-External Alliance

As a leader in the global semiconductor industry, TSMC exerts an ever-greater influence on societies and industries. Therefore, TSMC recognizes its obligations in creating a healthy workplace together with its vendors and contractors. In the first half of 2020, TSMC reduced and restricted face-to-face exchanges with outside parties to share our experience in safety and health. When the pandemic eased in the second half of the year, TSMC reinitiated training and consultations. We worked with our business partners, the industry, the government, academia, and all of society to reduce safety and health risks from vendors and contractors.

Training Programs for Contractors



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

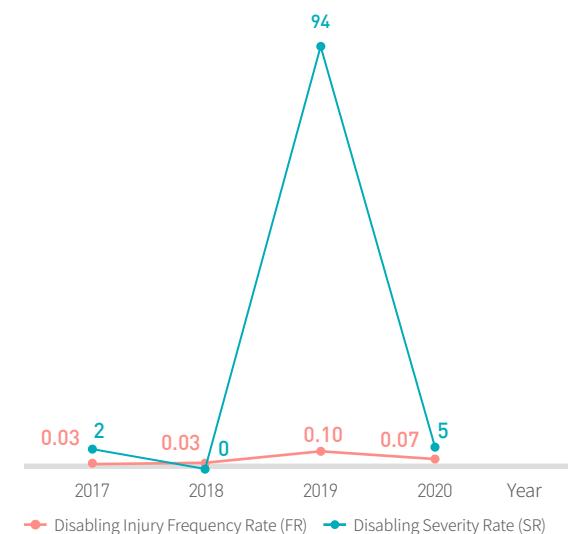
Work with External Parties to Optimize Work Environment

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. In 2020, the ESH Working Group was held online in response to the COVID-19 pandemic. The goal was to share experiences on managing a safe and healthy workplace while eliminating the risk that comes with public gatherings.

Raise Contractor Awareness on Health Risk through Better Hazard Notices

Contractors under high risk of chemical exposure were identified through analyses on risks of chemical exposures and the frequency and nature of their operations. 3% of contractors were identified as high risk bearers, and TSMC has been committed to reducing their risk of occupational diseases from chemical exposure. In 2020, contractors registered lower Disabling Injuries Frequency Rate (FR) and Disabling Severity Rate (SR) than those of the previous year, but there were still three vendors that suffered from occupational accidents on TSMC fabs. The accidents resulted in a loss of 262 working days. For mitigation measures, please see [Improvement Highlights](#).

Disabling Injuries in Contractors



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

Sustainable Measures in 2020

- TSMC dispatched its occupational physicians to inspect on-site contractor operations and analyze the risks of chemical exposure
- Asked contractors to report to TSMC any abnormal results from special health examinations
- Continued updating the Contractor ESH Bluebook with vendor feedback

Achievements

- On-site contractors were guaranteed zero risks of chemical exposure in TSMC
- 0 reported cases of abnormal health examination results
- The Contractor ESH Bluebook has been updated per vendor feedback and republished to ensure readers have the latest information



TSMC demonstrated the operation and maintenance of the fire extinguishing system.

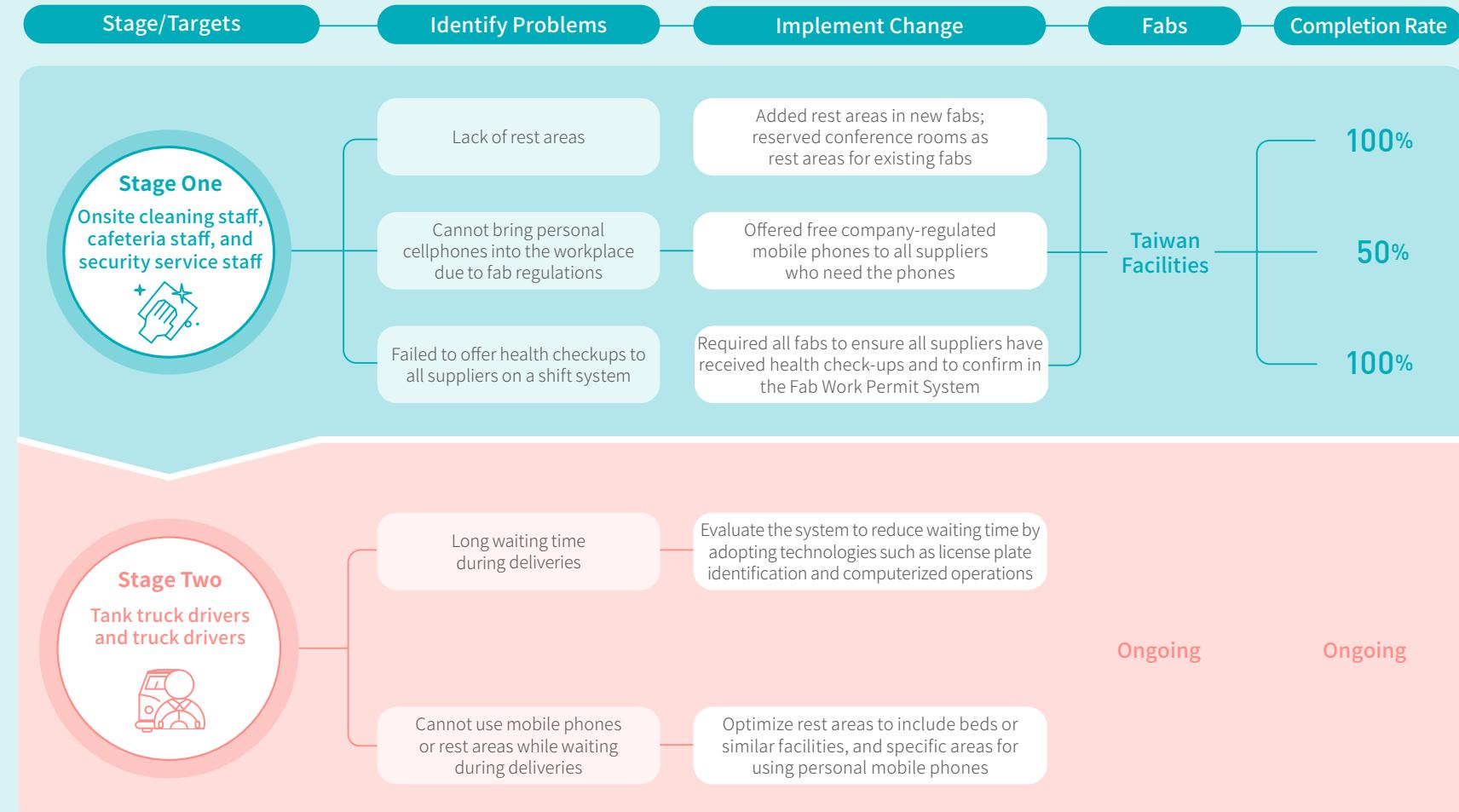


Case Study

On-site Supplier Support Program

TSMC is committed to creating a better workplace environment and therefore launched the On-Site Supplier Support Program in 2020 to support on-site supplier working at entry-level positions in Taiwan fabs. In addition to minimum wage and legal work hour guarantees, TSMC is planning a 2-stage workplace upgrade program that will benefit 7,000 people.

In 2020, TSMC interviewed cleaning staff, cafeteria staff, and security service staff to gain more insight into their daily work and subsequently outlined ways to improve their work situations as part of the Support Program. As of now, TSMC has added rest areas, made communication tools accessible, and ensured health check-ups in all employees. In 2021, TSMC will commence the second stage of the support program to target tank truck drivers and truck drivers. We are looking to create a friendly supplier workplace by improving their workflows and offering better workplaces/facilities.





Strengthen Safety Guidance at Construction Sites

To ensure construction workers' safety during fab construction, TSMC is working with contractors to build a safe construction site and strengthen safety management organizations of the construction sites. Contractors, construction site safety committee, and TSMC are working together in a three-level management system to guarantee safety on construction sites.

In 2020, TSMC invited senior executives from third-level contractor companies to participate in the TSMC Construction Contractor Worksite Safety Symposium in an

effort to strengthen their resolve in construction site safety management. During the meeting, all parties signed the Declaration of Construction Site Safety and invited a team of outside experts to improve safety awareness and knowledge in frontline safety supervisors. The experts offered insight into the three main stages of risk identification, safety oversight, and inspections. Based on [risk identifications](#), the experts then offered suggestions to each contractor to help build a more robust safety management system.

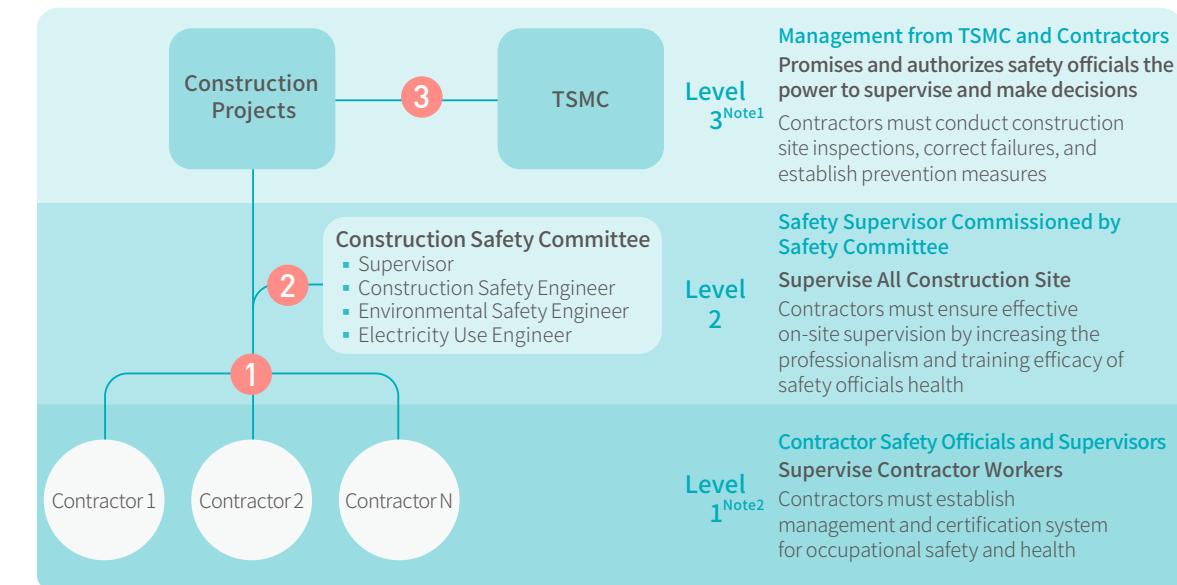
TSMC regularly works with 5 civil engineering contractors and 3 steel structure contractors that engage in a higher percentage of high-risk operations. To ensure safety of the construction sites, TSMC invited outside experts in 2020 to

conduct a 3-month, high-intensity on-site evaluation. The results and recommendations are provided to the responsible unit for future improvements. Construction site safety failures were compiled into training materials based on operations, techniques, and regulations. A three-hour training was then held at a Construction Office; 300 frontline safety personnel and supervisors attended.

Beginning in 2021, TSMC will [strengthen control measures](#) on openings to reduce risks of construction workers falling into floor holes. During the same time, TSMC will also launch the Contractor Self-Management Program for Construction Safety that requires the contractor's environmental protection and

safety unit to conduct monthly site inspections. Any issues and changes will be reported to senior executives in the contractor company but TSMC will also request reports from time to time to ensure compliance. Quarterly safety meetings are held for civil engineering contractors and steel structure contractors with high occupational accident rates. Senior executives from contractors are required to explain safety performances of the quarter, mitigation measures, and prevention measures. By engaging senior executives and getting them to pay attention to construction site safety, TSMC is introducing a top-down safety management system in construction sites. In the event of accidents, TSMC may suspend or terminate contracts depending on the severity of the situation.

Construction Site Safety Measures



Note 1: Senior executives from contractors were required to sign a Declaration of Construction Site Safety during the Construction Contractor Worksite Safety Symposium in 2020
Note 2: TSMC commissioned the Safety and Health Technology Center in 2020 to assist safety trainings and guide contractors to design and implement safety plans



Construction Site Safety Efforts and Achievements

New Measures in 2020

- Increased professionalism and trainings of construction safety officers. Construction workers were required to receive construction site safety trainings before getting work permits
- Invited outside experts to instruct contractors and increase safety awareness and knowledge in frontline site safety supervisors
- Required contractors to establish a certification system for health management systems and occupational safety and health

Subsustainable Measures

- Require all high-risk operation contractors to obtain occupational safety and health management system certifications
- Confirm that contractor owners are aware of his/her responsibilities detailed in the Occupational Safety and Health Act and has personally participated in the Occupational safety and health Committee to improve previous oversight
- Authorize on-site construction site safety officers to suspend construction work when necessary to prevent occupational accidents

Achievements

- All construction workers received construction site safety training; **10** trainings were held for construction site safety officers from contractors
- 1** new contractor received certification and all of the **34** high-risk operation contractors received ISO certification for occupational safety and health management; the target for all contractors to receive certification was met



TSMC Construction Contractor Worksite Safety Symposium –
TSMC Executives Reiterate the Importance of Site Safety Management



Construction Site Safety Guidance Program –
Training



Fall Prevention Training



TSMC Construction Contractor Worksite Safety Symposium –
Safety Declaration by Senior Executives from Contractor Companies



Construction Site Safety Guidance –
On-site Inspections by Experts



Double Hook Safety Harness Training

5

Power to Change Society

Based in Taiwan, TSMC has flourished with support from all sectors of society. TSMC believes that giving back to the community has been critical to our success. We've been caring for the disadvantaged, helping youth education, supporting arts and culture through the TSMC Education and Culture Foundation and TSMC Charity Foundation to give back and create common values.

80.55

Million(NT\$)

Invested into liberal arts and science education for youth and to strengthen the equality of educational right

10,855

Services

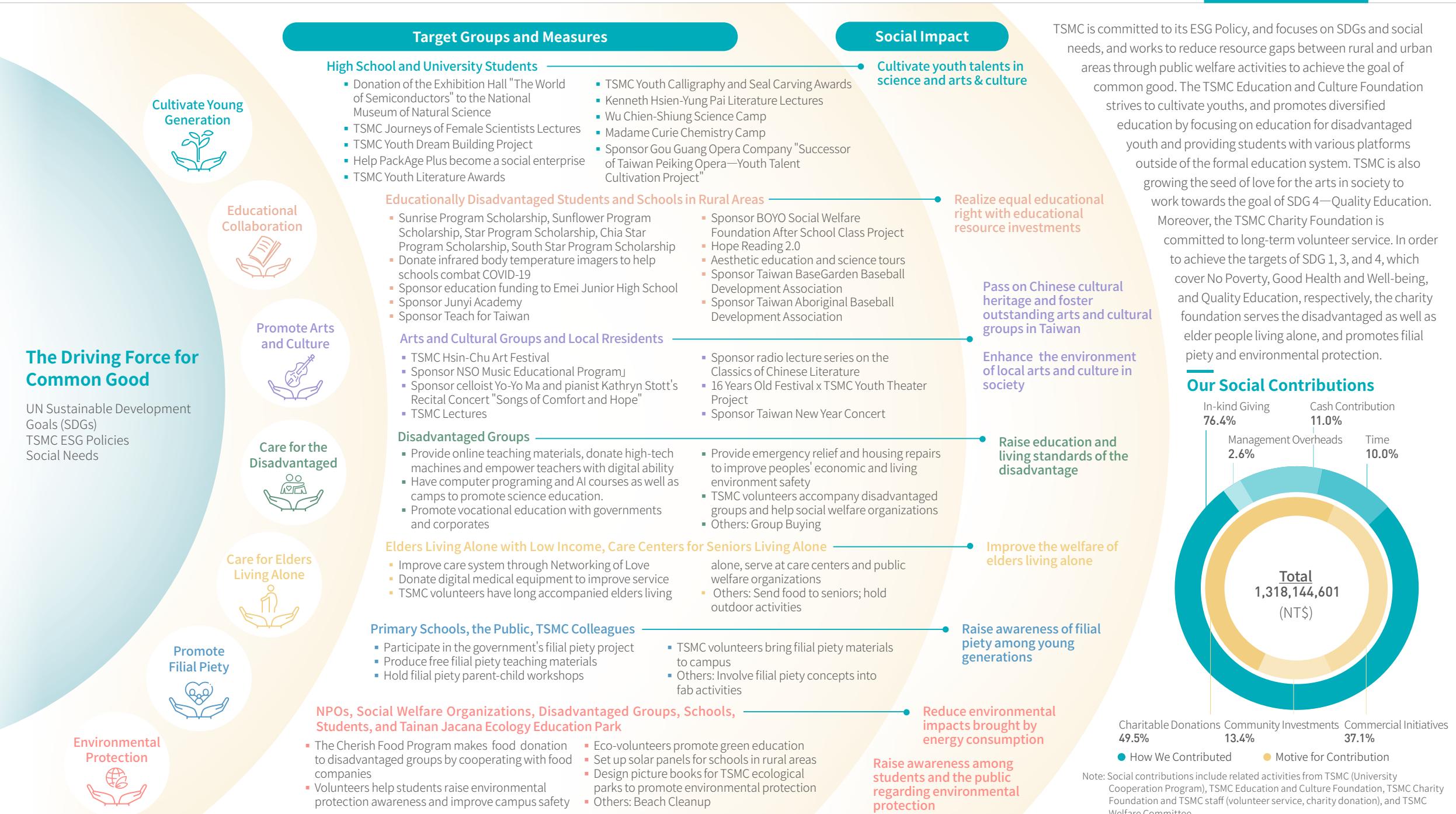
Collaborated with 15 medical and care centers, providing 10,855 services to seniors through the Network of Love

37,071

Beneficiaries

92 organizations supporting the disadvantaged regularly benefit from the Cherish Food Program, with a total of 37,071 beneficiaries





TSMC Education and Culture Foundation

Strategies



Cultivate Young Generation

Hold educational events; provide diversified educational platforms



Educational Collaboration

Cooperate with educational organizations to narrow the gap in educational resources



Promote Arts and Culture

Hold art festivals to foster local art groups

2030 Goals

- Ensure overall competition participation is higher than the previous year

- Hold at least ten popular semiconductor science activities

- Continue to cooperate with educational organizations, investing in resources of more than **NT\$15 million**

- Sponsor ten local talented artists or art groups

2021 Targets

- Ensure the participant number of youth competition events is higher than the previous year

- Hold at least six popular semiconductor science activities

- Offer scholarships for underprivileged students to five universities

- Continuously sponsor education funding to the Public & Private Experimental Emei Bilingual Junior High School

- Continuously organize the TSMC Hsin-Chu Art Festivals and sponsor at least five talented local artists or groups annually

- Organize at least **15** humanities lectures in college

- Continuously organize at least four TSMC Lectures

V Achieved ↑ Exceeded — Missed Target

2020 Achievements

- Youth Competition events attracted a total of **1,551** participants, an increase of **47** participants from 2019

Target: The number of youth event participants is higher than the previous year

- Donated exhibition hall "The World of Semiconductors" to the National Museum of Natural Science as to promote popular science education

- Held five TSMC Journeys of Female Scientist Lectures

Target: Hold at least 3 popular semiconductor science activities and semiconductor camps

- Provided a total of **NT\$7 million** in scholarship to **70** underprivileged students from five universities

Target: Offer scholarships for underprivileged students to 5 universities

- Sponsored education funding to the Public & Private Experimental Emei Bilingual Junior High School

- Donated **100** infrared body temperature imagers to the Ministry of Education during Covid-19

- TSMC Hsin-Chu Art Festivals cancelled due to Covid-19

Target: Continuously organize the TSMC Hsin-Chu Art Festivals and sponsor at least 5 talented local artists or groups annually

- Sponsored NSO Music Educational Program

- Sponsored recital concert "Songs of Comfort and Hope"

- TSMC Lectures held four humanities lectures

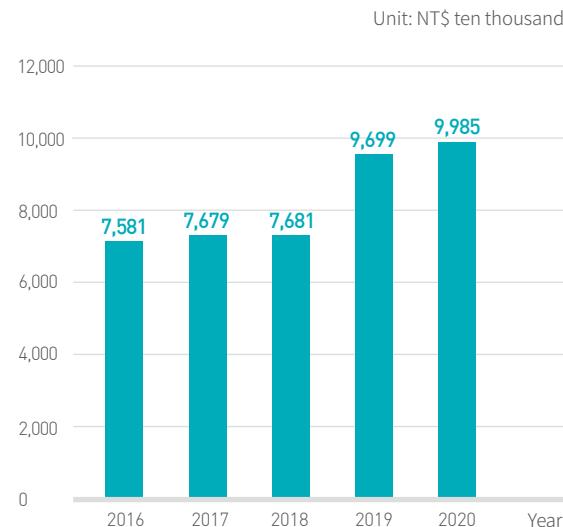
Target: Continuously organize at least 4 TSMC Lectures

- Organized **17** Kenneth Hsien-Yung Pai Literature Lectures

Target: Organize at least 15 humanities lectures in college

To fulfill TSMC Company's corporate social responsibility, TSMC Education and Culture Foundation, established in 1998, contributed NT\$99.85 million in 2020 into 3 engagements: "Cultivate Young Generation", "Educational Collaboration", and "Promote Arts and Culture". The Foundation worked hand-in-hand with educational organizations from both the public and private sectors to care for young generation and hope to cultivate well-rounded talents in this new era; through

Sponsorship from the TSMC Education and Culture Foundation between 2016-2020



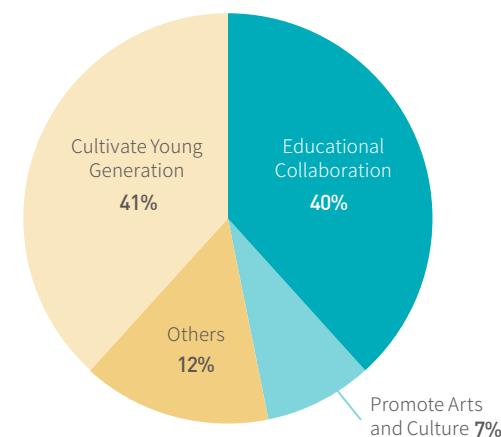
various competitions and popular science education programs, the Foundation endeavored to lead youths toward self-exploration and pursuit of their dreams. The Foundation also held cultural events and sponsored local art groups to contribute to the community as well as enrich the public's appreciation for the arts.

For further information about the events and the sponsorships, please refer to the official website of the [TSMC Education and Culture Foundation](#).

Sponsorship from the TSMC Education and Culture Foundation in 2020

Contributed Total Amount

NT\$ **99.85** million





Cultivate Young Generation

- Promote popular science to nurture science talents in the future
- Establish diversified platforms to encourage the youth to explore themselves and enrich their humanistic quality



Educational Collaboration

- Collaborate with public schools
- Collaborate with non-profit educational organizations



Promote Arts and Culture

- Promote online cultural activities in response to the impact of COVID-19
- Promote the Humanities and Chinese Classics

Core Engagement



Cultivate Young Generation

Our Actions

- [Promote Popular Science to Foster Science Talents in the Future](#)
- [Establish Diversified Platforms to lead the Youth toward Self-Exploration and the Humanities](#)

What We Want to Solve

Due to the absence of literary, aesthetics, science, and self-exploration curriculum in the current high school and higher education, young students lack the opportunities to dig out and embody their talents.

How We Respond

In 2020, the Foundation contributed a total of NT\$40.86 million to hold various competitions, camps, lectures to inspire students' interest in science and the humanities as well as to lead them toward self-exploration and pursuit of their dreams.

Promote Popular Science to Foster Future Science Talent Donate the Exhibition Hall *The World of Semiconductors* to the National Museum of Natural Science

To promote popular science education, lead the general public to learn about the IC industry, and to cultivate future semiconductor talents, the Foundation sponsored the exhibition hall *The World of Integrated Circuit* to the National Museum of Natural Science in 1997. In 2002 and 2011, TSMC Education and Culture Foundation again sponsored the renovation of the exhibition hall. The exhibition hall, renamed *The World of Semiconductors* in 2011, keeps providing knowledge on semiconductors to visitors since then. In order to update the contents of the exhibition to keep up with the rapid advancement of technology, the Foundation organized the third renovation, and The World of Semiconductors exhibition hall officially opened in August 2020.

> NT\$40.86 million
was contributed for popular science education

"I'm grateful for having the opportunity to give back to society after retirement. Volunteering at the National Museum of Natural Science has given profound meaning to my retirement."

—Ming-Chieh Guan, TSMC retiree & exhibition volunteer

The new exhibition hall features five major sections: Discovery, Application, Progress, Innovation, and Imagination. With the latest interactive display and AR technique the exhibits lead the general public to realize the science knowledge of semiconductors as well as the prospect and history of the industry. The tour services at the exhibition hall are provided by volunteers from the TSMC Charity Foundation, encouraging TSMC retirees to take part in the volunteer program. Along with the exhibitions, the TSMC volunteers continued to contribute to the society by sharing the knowledge in the semiconductors.

Organize the TSMC Journeys of Female Scientists Lectures

To inspire female students' interest in semiconductors, in 2020, the Foundation held five Female Scientists lectures for five girls' senior schools, 200 female students in total, at National Museum of Natural Science. Apart from having female employees from TSMC to provide tour services, acclaimed female scientists, such as Physics Professor Ming-Feng Tai from National Tsing Hua University etc. were invited to share their trajectories of study and careers. The Foundation hope that the tour could inspire female students to unlock their potential and then embark on the study of science. The Foundation will extensively invite 12 girls' senior schools to join in the tour in 2021.

"There is no gender difference when one shines in their professional field. Women can be equally accomplished as men."

—Participant from Stella Matutina Girls's High School



Atayal children at the *Exploration Theater* area.



Dr. Mark Liu, Chairman of TSMC, Dr. F.C. Tseng, Chairman of TSMC Education and Culture Foundation, and Sophie Chang, Chairperson of TSMC Charity Foundation, visit the exhibition hall along with children at the *Application of Semiconductors* section.



TSMC Female Scientist Lectures—Mi-Hua Lin, Deputy Manager of Research and Development, explains semiconductor processing to students.

Establish Diversified Platforms to Lead the Youth toward Self-Exploration and the Humanities

Organize the 5th TSMC Youth Dream Building Project to Encourage the Young Generation Care about Environmental Sustainability

Since 2016, the Foundation has been funding TSMC Youth Dream Building Project, providing an annual 3-million grant for dream building projects and encouraging college students to care about social issues, embark on a journey of self-discovery, and provide creative solutions. A total of NT\$3 million Award is granted to help students make their dreams come true.

The fifth Youth Dream Building Project was held in 2020. Apart from inviting students from Taoyuan, Hsinchu, Miaoli, and Tainan areas to submit their projects, the competition further invited students from Taichung area to participate. Under the theme of circular economy, the competition attracted 102 groups of students from 36 universities to submit their proposals. The proposals presented by the teams cover various areas in our society: from creating a popular science column on

Check out 4th TSMC Youth Dream Building Project Highlight Video

102 groups
of students participated TSMC Youth Dream Building Project



"Aesthetic Cycle" Glass Art Installations, designed by the design team led by professor Yi-Ying Chiang, Department of Arts and Design, NTHU.



Teams selected in the first round of the fifth Youth Dream Building Project visit TSMC Museum of Innovation.

"I want to express my gratitude to the TSMC Education and Culture Foundation for putting so much effort in organizing the activities. 'Care for the Earth through Small Acts' was a successful learning-through-play project. The activities catered to children's interest and level of literacy, and were able to help children form habits of recycling and waste reduction."

—Mei-Lan Tsai, Principal of TSMC Preschool

semiconductors, to a reclaim woods project, to an anti-drug campaign, and to making custom animal prosthetics for stray dogs. A total of NT\$3 million were granted to eight groups that were selected into the final round.

In order to resonate better with young people and the TSMC employees on the theme of "circular economy", the Foundation initiated a special pilot project of "Aesthetic Cycle." A special glass recycling machine was set up by the Foundation at the headquarters of TSMC to encourage employees to recycle glass waste created from their daily life. Over a thousand pieces of family glass waste were collected through the machine in two months. The project invited Spring Pool Glass and Design Lab led by Prof. Beatrice Chiang of National Tsing Hua University to recycle glass waste into recycled bottles and created an art installation of "Aesthetic Cycle." The installation

displays icons of Taiwanese landscape and signifies the core concept of "loving nature and respecting the humanity" and is displayed currently at the square of TSMC Museum of Innovation.

In addition, the Foundation invited the Daidai Rebag team, two times winning team from the Youth Dream Building Project competition, to run a series of environment protection activities at the TSMC Preschool, not only through illustrated books reading and game playing to promote the idea of environmental protection in 2020, but through repurposing the children's own old clothes into bags. Hence the children learn how to classify and recycle waste. The Foundation expects our next generation would grow to be environmentally friendly through small acts in everyday life and put the new generation concepts of environmental education into action.

"I'm very grateful that the TSMC Youth Dream Building Project provided us with the opportunity to pursue our dreams. The future is unforeseeable, but from this experience, I have gathered a little bit more of courage to believe in my dreams and in turn embark on this long, bumpy journey."

—Hsuan Chen, a team member from "The Bridge of Tails", one of the selected teams in the fourth Youth Dream Building Project



Children learned about recycling at TSMC Preschool.



Children at TSMC Preschool transformed used-clothes into recycle bags.

Fund PackAge Plus to Become a Social Enterprise

In 2019, the TSMC Education and Culture Foundation participated in the ATCC Case Competition. *PackAge Plus*, the TSMC representative team, won second place in the final round of the competition. Through providing reusable packaging service, *PackAge Plus* endeavors to establish a plastic-free online shopping reward mechanism and later set up a social enterprise after the competition. To assist the team in continue to their dreams and promoting the idea of circular economy, the Foundation sponsored *PackAge Plus* NT\$1 million startup funds. *PackAge Plus* changed the existing e-commerce packaging practices by successfully producing ten thousand pieces of reusable packaging in 2020 and it will continuously expand its influence on environmental sustainability.



Reusable package designed by PackAge Plus.

Calligraphy and Literature Contests

To enrich the youth's humanistic quality, the TSMC Foundation provides all kinds of educational platforms

for young students to shine, such as the 17th TSMC Youth Literature Award and the 13th TSMC Calligraphy and Seal-Carving Competition in 2020. Through these competitions, the Foundation hopes to encourage young students throw themselves into literature and calligraphy.

The 17th TSMC Youth Literature Award, with the theme *Before Becoming an Adult*, attracting a total of 831 submissions, up 12 percent from the previous year. The Foundation also organized 4 campus lectures, where Taiwan's renowned writers shared their abundant writing experiences and gave guidance to students on writing techniques and ways of perception. The Foundation also used social media to raise people's interest in literature. For instance, the TSMC Youth Literature Facebook Page gained nearly 14 thousand followers, and an individual work was shared by over 3 thousand times.

In 2020, the theme of 13th TSMC Calligraphy and Seal-Carving Competition was "Antidote", which incorporated Chinese herbal medicine into visual design and Chinese



Students from Chengyuan High School at Huang Yung-Sheng Chinese Herbal Medicine Pharmacy.



Students from Chengyuan High School at Chien-Yuan Chinese Herbal Medicine Pharmacy.

calligraphy. An walking tour event—"Medicine Cures the Body, Calligraphy Cures the Heart" was organized for the opening of the competition. The activity invited Chinese calligraphy artist Mr. Gu Yao-Hua to take students and teachers to Chinese herbal medicine pharmacies on Di-hua Street. In addition to learning about traditional Chinese herbal medicine and tools, the students also realized the history of these pharmacies as well as got a chance to appreciate the plaques collection, prescriptions and vintage accounting books, written by famous calligraphers. Those events attracted a total of 607 participants.

Exclusive Sponsorship—Kenneth Hsien-Yung Pai Literature Lectures: *Dream of the Red Chamber*

Dedicated to promoting Chinese Classics, in 2020 the Foundation initiated its exclusive sponsorship for the Hsien-yung Pai Literature Lecture Series on *Dream of the Red Chamber* at National Tsing Hua University and co-designed the course with Department of Chinese Literature. The



Writer Kenneth Hsien-Yung Pai in a lecture.

course aimed to deepen students' humanistic literacy, and to give NTNU, a top-notch university in science and engineering, a more humane touch. The 3-month course, comprising of 17 lectures, invited Hsien-Yung Pai, a literary master in Taiwanese Literature, writers, and scholars from Taiwan and abroad to talk about the classic novel from their area of research focus—literature, aesthetics, gender, drama, and modern technology and many more, and share their perspectives on *Dream of the Red Chamber*. Students were guided to appreciate the human nature and sensibility of *Dream of the Red Chamber* and to gain a better understanding of Chinese culture. The course attracted over 500 students to enroll, and a limited number of seats were reserved for students from National Hsin-Chu Senior High School and National Hsinchu Girls' Senior High School to audit the lectures. In compliance with the COVID-19 prevention measures, the first three classes lectures were physical lectures, and the rest 14 lectures were conducted online. The complete lectures course can be accessed via NTHU OpenCourseWare and the official website of TSMC Education and Culture Foundation at viewers' convenience.



Educational Collaboration

Our Actions

- [Collaboration with Public Schools](#)
- [Collaboration with Nonprofit Educational Organizations](#)

What We Want to Solve

An unequal right to education experienced by children from underprivileged 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 been caring for educational issues since its establishment. In 2020, the Foundation contributed NT\$39.69 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 resource, and to response to the New K-12 Compulsory Education Curriculum, the Foundation also assisted to develop online literacy courses and the teacher training program. Moreover, scholarships were provided to help lessen disadvantaged college students' financial burden when pursuing higher education.

Collaborate with Public Schools

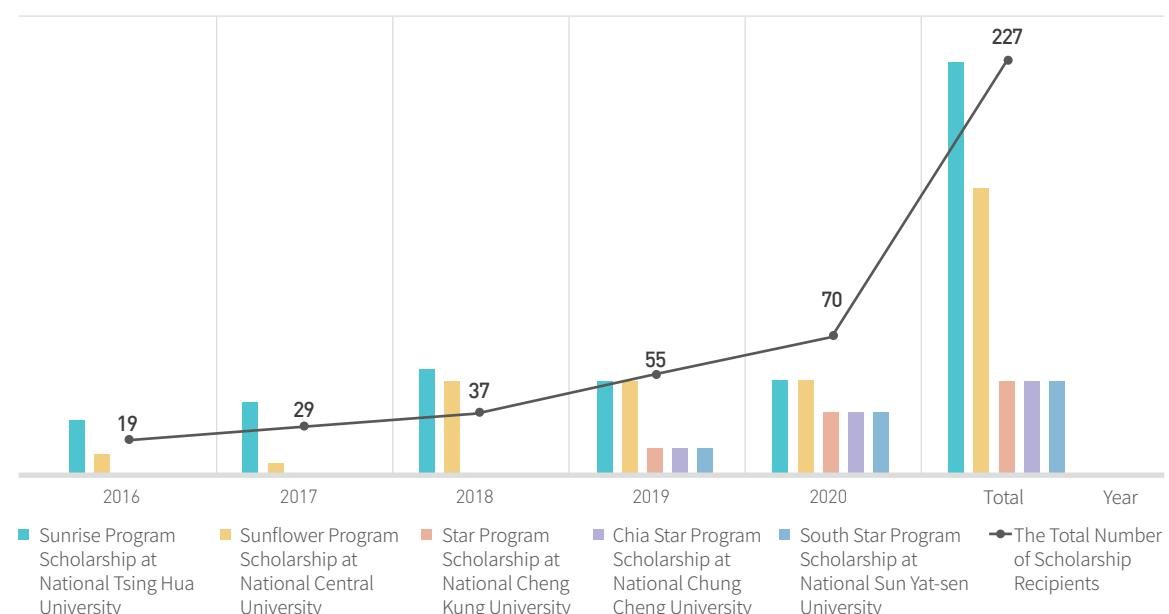
Continuously to Provide Scholarship and Digital Learning Equipment for Disadvantaged College Students

Dedicated to assisting outstanding yet economically disadvantaged students, the Foundation sponsored NT\$7 million to 70 disadvantaged students from 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). Chia Star Program Scholarship (National Chung Cheng University) in 2020. The scholarship programs ease students' financial burden,

> NT\$ 39.69 million
to strengthen the equality of educational right

NT\$ 7 million
Disadvantaged college students scholarship

Number of Students Sponsored by TSMC Education and Culture Foundation (2016-2020)



"It was heartwarming to have received a laptop computer. I never thought I could be using the kind of laptop computer my classmates are using. I would like to thank the TSMC Education and Culture Foundation for helping me."

—Ms. Chang, Recipient of Sunrise Program Scholarship

offer life and academic support, and help students focus in school. In 2020, for the first time, the Foundation provided 25 scholarship freshman recipients with a laptop computer each to assist them in educational needs.

Donate 100 Thermal Imagers to Schools to Confront COVID-19

As many schools around Taiwan couldn't get facilities that can take multiple body temperature simultaneously, and in turn worried that students would be affected by such pandemic prevention and control loophole, the Foundation contacted the Ministry of Education and donated 100 thermal imagers. The imagers were distributed to 25 universities, 45 high schools, and one junior school, and were prioritized for usage in 3 large-scale examinations—the Comprehensive Assessment Program for Junior High School Students, TVE (Technological & Vocational Education) Joint College Entrance Examinations, and College Advanced Subject Test, to increase efficiency in body temperature monitoring of test students.

330,000
test-takers benefited from thermal imagers

Collaborate with Nonprofit Educational Organizations

Funding to turn over the Experimental Education at Emei Junior High School, Hsinchu County

The Foundation has long been caring for rural education in Taiwan. In 2020, the Foundation joined hands with the Cheng Zhi Foundation to realize a shared vision of providing rural areas with equal access to education resource. A three-year education funding sponsorship was provided to Emei Junior High School, the first KIST (Knowledge-Is-Power-Program Inspired Schools in Taiwan, KIST) school to give students a more equal



An exchange on music and culture, titled "Music Teacher of the Day": Ray Chen was invited to be the Music Teacher of the Day at Emei Junior High School to share his love and appreciation for music to students and in return, culture exchanged by students.



Music appreciation session, "A Guide to Vivaldi's *The Four Seasons*", was arranged to introduce students to the world of classical music.



Students explained the art of making tea to Ray Chen.



Students and faculty were invited to "NSO Chamber Concerts—Ray & Friends" (jointly performed by the internationally acclaimed violinist Ray Chen and the National Symphony Orchestra at the National Concert Hall) to enhance student' music literacy.

right to education in Hsinchu area. The Foundation also organized music education courses to cultivate the students' art appreciation.

Junyi Digital Education Platform Program 2.0

As the New K-12 Compulsory Education Curriculum took effect in 2019, the Foundation launched a media survey with the United Daily News-Vision Project in the same year, targeting teachers and students from 1,500 junior and senior high schools to understand teacher's needs in three areas: teacher qualification, teaching materials, and classroom hardware and software facilities. Survey results were then used as the basis for "Critical Thinking Ability Training", the online literacy course jointly designed by the Foundation and the Junyi Academy Foundation. The online course has reached more than 120 thousand views with a video completion rate of 90 percent by December, 2020. In the meantime, to familiarize teachers with course content,

teaching material and teaching method, 26 workshops involving 518 teachers in total were held. In addition, the Foundation also collaborated with 3 after-school classes for the disadvantaged in holding 5 workshops titled "Critical Thinking Teaching Workshop", where students were taught to cultivate critical thinking.

>120,000 views
of Critical Thinking Ability Training Online Program

"Thanks to the TSMC Education and Culture Foundation's joint effort in driving Taiwan's education technology development, and children are able to grow and improve in their learning process."

—an excerpt from *Junyi Academy Foundation 2020 Winter Issue*

Promote Arts and Culture

Our Actions

- Promote Online Arts and Culture Events in Response to the Pandemic
 - Promote Humanities Classics

What We Want to Solve

How We Respond

In 2020, the Foundation planned to contribute NT\$37 million to organize high-quality arts and culture exhibitions and performances to support art groups. Due to the impact from COVID-19, however, many exhibitions and activities were canceled under such concerns. As the pandemic showed signs of slowing down in the second half of 2020, the Foundation contributed NT\$7.23 million to sponsorships of arts education programs and online streaming program. With the help of technology, the Foundation could be able to continue and to expand the promotion of arts.



Note: Data accumulated from 1998 to 2020

Promote Online Arts and Culture Events in Response to the Pandemic

The TSMC Foundation has been holding the Hsin-Chu Art Festival for 17 consecutive years since 2003, with a different theme for each year. Major art events are held regularly in Hsinchu, Taichung, and Tainan to lead the public experience the beauty of arts. In 2020, in response to the government's Covid-19 precaution regulations, the Foundation had to cancel the art festival. As the pandemic showed signs of slowing down in the second half of the year, two concerts were held and livestreamed, enabling art to reach wider corners during the pandemic.

**TSMC Education & Culture Foundation
Supports Local & International Art Groups**

NSO Music Educational Program

The TSMC Education and Culture Foundation initiated the NSO Music Educational Program together with National Symphony Orchestra (NSO) and Public Television Service (PTS). The program invited Ray Chen, a world-class Chinese violinist, to host a master class at the National Concert Hall, so that students in Taiwan had the opportunity to broaden their horizons in music. The master class was live-streamed globally with the help of technology, benefiting music students that couldn't attend classes in person. The online program has attracted 73,000 views.



Check out Ray Chen master class Highlight Video

73,000 participants
of Ray Chen's Master Class

"The world has changed because of the pandemic, and we wanted to do something a little different. We're really grateful for the sponsorship and support the TSMC Education and Culture has given to Ray Chen's Master Classes. Such support enabled us to present the strength and beauty of music through the high resolution technology, and deliver the performing arts to a wider audience."

—Wen-Chen Kuo, Executive Director of NSO



Recital Concert "Songs of Comfort and Hope"



Promote Humanities Classics

Sponsor Radio Lecture Series on the Classics of Chinese Literature, and Published Audio Books Professor Xin Explains Laozi

The Foundation has long been devoted to promotion and revitalization of the Chinese Classics Literature, and has sponsored Professor Yi-Yun Xin's production of radio program series "Chinese Classic" for 10 consecutive years. In 2020, Professor Xin recorded and aired the 52 episodes of "Professor Xin Explains the Book of Songs", reaching a total of 800 thousand audience. In the same year, *Professor Xin Explains Lao-Zhi* audio book series was published and donated to 130 high schools in Taiwan, hoping more students in Taiwan can be exposed to such content. Furthermore, an accumulated total of 3,000 sets of all published audio book series were donated to Chinese literature-related departments in 60 universities.



Professor Yi-Yun Xin at the Press conference of the Audio Books- Professor Xin Explains Laozi

3,000 sets
of audio book on the Classics of Chinese Literature was donated

TSMC Lectures

Since 2014, the Foundation has held the TSMC Lectures to promote humanities and philosophy from the East and the West. In 2020, due to COVID-19's enormous impact on our lives, the Foundation invited Dr. Ming-Ke Wang, an Academician of Academia Sinica, to speak on Virus, Anti-Virus, and Witch Hunt: Collective Fear and Violence within Human Communities from an anthropological perspective to plow through the origin and cause of fear in different regions of different periods throughout history. Four lectures were organized, with a total of 442 participants.



Lecturer Dr. Ming-Ke Wang, Academician of Academia Sinica

Sponsor 16 Years Old Festival x TSMC Youth Theater Project

The Foundation has sponsored "16 Years Old Festival", organized by the Cultural Affairs Bureau, Tainan City Government, for four consecutive years. The festival derives from the 16-year-old rite of passage, a traditional ceremony practiced in the Tainan City, and has been working to establish a platform for youths to participate in arts and culture events through three approaches: Plays watching, Plays production, and Plays acting. The festival is open to registration for

youth with an age from 16 to 18 , who are interested in art performance and hope to express themselves through performing.

Each year, the "16 Years Old Festival" selects 50 youths as participants, and as of 2020, over 30 participants have chosen drama and theater related majors in university. In 2020, the Festival was themed "Tshut Thuat" (to be a promising youth), and had attracted more than 1,000 participants to the performances, interactive lectures, workshops, Youths Act in Plays Project, and Assistant in black dress (volunteering work at the Festival).



Group photo taken at 2020 16 Years Old Festival press conference.



TSMC Charity Foundation

Strategies



Care for the Disadvantaged

We care about inequality of educational resources & emergency aid in Taiwan and offer support when necessary



Care for Elders Living Alone

We work with hospitals across Taiwan through the Networking of Love system and provide a variety of medical resources to support medical care for elderly citizens living alone



Promote Filial Piety

We collaborate with the Ministry of Education, schools, media, and other enterprises to promote filial piety education at schools



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

2030 Goals

- Provide more than **10,000** hours of reading services each year
- Donate more than **NT\$1,800 million** to the disadvantaged each year
- Help over **10,000** children in remote areas

2021 Targets

- Reading service exceed **9,000** hours
- Donate over **NT\$1,300 million** to the disadvantaged
- Help over **4,000** children with the remote education program

2020 Achievements

- Reading service exceeded **5,060** hours^{Note1}
Target: 8,500 hours
- Donated **NT\$12.1 million** to the disadvantaged^{Note2}
Target: NT\$11 million
- The remote education program helped **3,279** children
Target: 2,000 children

V Achieved

↑ Exceeded

— Missed Target

- Offer **12,000** services to elderly citizens living alone through Networking of Love

- Offer **11,000** services through the Networking of Love

- Offered **10,855** services to elderly citizens living alone
Target: 10,000 services

- Promote filial piety education in **120** educational institutions

- Promote filial piety education at **60** educational institutions

- Promoted filial piety education at **57** educational institutions
Target: 50

- Over **50,000** annual cumulative beneficiaries of the Cherish Food Program each year
- Environment protection volunteers provide services of over **1,200** times each year

- Over **40,000** cumulative beneficiaries of the Cherish Food Program
- Environment protection volunteers provide services of **1,000** times

- Over **37,071** cumulative beneficiaries of the Cherish Food Program
Target: 25,000
- Environment protection volunteers provided services of **1,044** times
Target: 1,000 times

Note1: In response to the COVID-19 pandemic, volunteer activities were suspended in accordance with related policies in the first half of 2020.

Note2: The amount includes donations from TSMC volunteers and the Sending Love Forward project. These are cash donations, excluding goods donation, repair services or other donations.

Since its founding in 2017, the TSMC Charity Foundation has dedicated itself to four major areas: Caring for the Disadvantaged, Taking Care of Elder People Living Alone, Promoting Filial Piety, and Environmental Protection. In 2020, with Caring for the Disadvantaged as the main direction, TSMC Foundation also made Education in Remote Areas and Disadvantaged Aid the primary target, aiming to create complete plans for remote areas and help children acquire needed skills in the workplace. It is hoped that rural flight and talent gap issues could thereby be addressed.

As the COVID-19 pandemic ravaged the world, the TSMC Charity Foundation called on TSMC's employees to donate money and industrial-grade protective equipment to support frontline health workers. The TSMC Charity Foundation also invited other charity partners to create a positive force within a society rocked by the pandemic.

**NT\$
3,825 million**
 Social Contribution^{Note}

12,177
 Volunteer Service
 Times

64,779
 Service Hours

10,451
 Volunteers

26,077
 Donations

73,786
 Beneficiaries

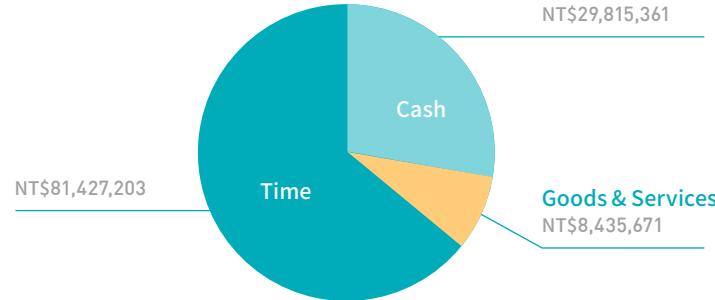
Note: Including cash donations, goods donation, repair services or other indirect donations.



Donations by the TSMC Charity Foundation

Total NT\$ 119,678,235

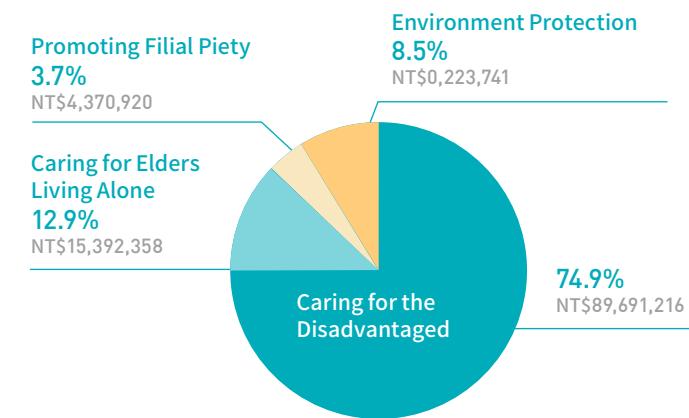
What We Donated^{Note1}



How We Donated^{Note2}



Projects We Supported



Accumulated Volunteer Headcount^{Note3}



Accumulated Service Times



Accumulated Volunteer Service Hours



Note 1: TSMC has categorized activities into cash, time, and goods & services 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 donated 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 donations into a monetary amount (NT\$) in order to calculate their percentage.

Note 3: Volunteers attending activities organized by the TSMC Charity Foundation include TSMC's current, former and retired employees, family members of TSMC employees, and volunteers from cooperative companies.

Care for the Disadvantaged

Our Actions

- [Close the Urban/Rural Divide with Empowerment Projects for Education in Remote Areas](#)
- [Offer Financial Support and Better Living Spaces for Higher Quality of Life](#)

What We Want to Solve

According to statistics from the Ministry of Education in 2019, a total of 1,177 schools are located in remote areas, accounting for nearly 30% of total schools in Taiwan. Those schools are facing instability from turnovers, population migration, and gaps in educational resources, therein affecting the children's right to quality education.

How We Respond

The TSMC Charity Foundation listed Character Education, Subject-based Education, and Vocational Education as the three primary focuses. We hope to uncover student potential by providing educational resources based on their needs. TSMC volunteers are also collaborating with local schools that implement University Social Responsibility (USR) to build confidence in students and empower them to give back to their hometowns in the future.

Close the Urban/Rural Divide for Education in Remote Areas through Empowerment Projects

Character Education—For Adaptive Development

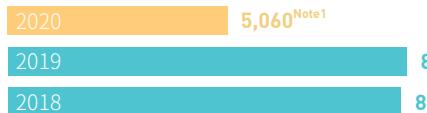
Reading Volunteers Regularly Visit and Serve Children in Remote Areas

Reading volunteers visit eight primary schools in remote areas of Hsinchu, Taichung, and Tainan every semester to read stories, teach English and math, and provide scholarships to motivate students to learn. In 2020, reading volunteers served a total of 1,012 times and provided over 5,060 hours of reading service.

TSMC supports the Junyi Academy through regular employee donations to strive towards education equality. Volunteers from the Advanced Packaging Technology and Service Organization, Product Development Organization, Quality and Reliability Organization, and Fab 3 utilize online education resources to help children from Anding Elementary School in Tainan, Ruei Yuan Elementary School in Taoyuan, and Meihua Elementary School, Hexing Elementary School and Taoshan Elementary School in Hsinchu. In addition, the Corporate & Compliance Division of the Legal Organization regularly travels to Yuandong Elementary School in Hsinchu and utilizes practical teaching materials and games to trigger children's interest in learning English. In 2020, reading volunteers totaled 689 times.

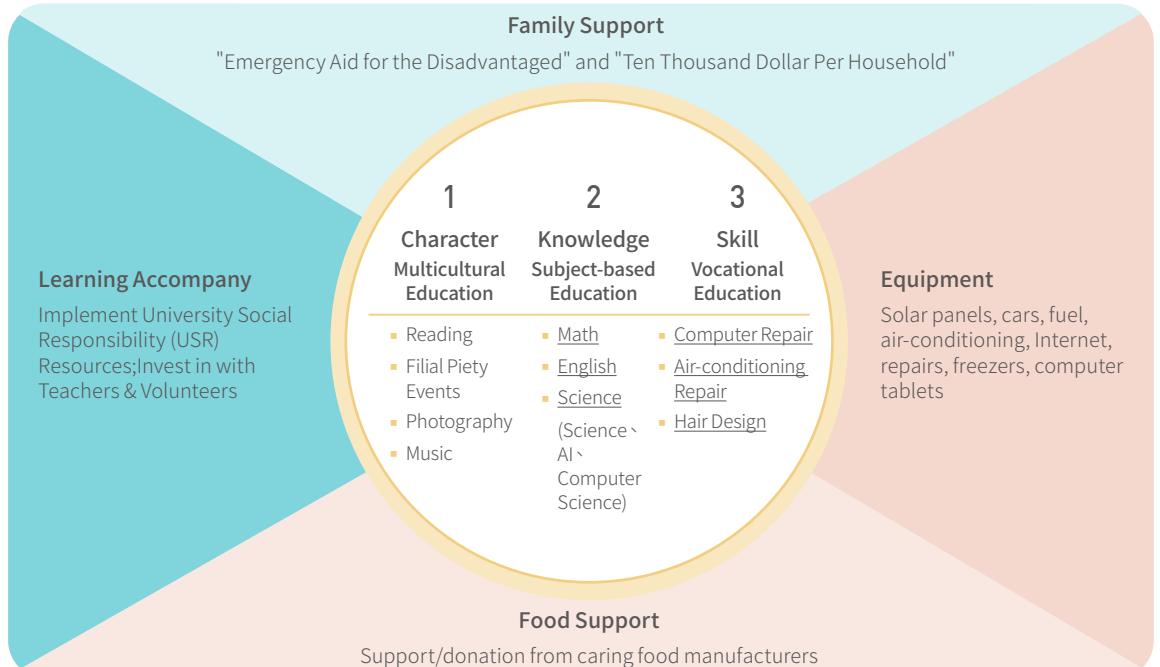
Note1: In response to the COVID-19 pandemic, volunteer activities were suspended in accordance with related policies in the first half of 2020.

2020
5,060 hours
of reading services



Legal Organization utilized practical teaching materials to trigger children's interest in learning English.

Three Strategies for Rural Education



Note 2: Refer to Promoting Filial Piety to learn more about filial piety event of Character multicultural education.



Eyes on Us

Volunteers with background in photography from [Fab 2](#) and [Fab 5](#) are long-term volunteers to Yufeng Elementary School and Shilei Elementary School in Hsinchu County, teaching photography, holding exhibitions, and encouraging students to participate in national photography competitions to boost their confidence. A total of 224 children have benefitted from this program. In 2020, volunteers started teaching children how to use drones to record their lives and beautiful surroundings.

Influence Society through Music

[Fab 14](#) cooperates with the Junyi Academy (which has continued to advocate for education in remote areas) and Teach for Taiwan to co-host charity concerts. The net profit of the 2 concerts held last year, which attracted 5,232 people, has been applied to foundation



Fab 14 cooperated with education organizations to co-host charity concerts.

operations. [Fab 2](#) and [Fab 5](#) supported Holy Family for Special Education by inviting their team to perform at TSMC year-end parties and offering them a platform to showcase their talents.

Subject-based Education—Paving the Way

Enrich Learning Materials with Software & Hardware Resources

The TSMC Charity Foundation collaborated with Junyi Academy and TutorABC to bring in software, hardware, and online courses to provide more diversified materials for rural students. In 2020, a total of 96 tablet PCs, 180 used computers, and 210 hours of online English tutoring classes were provided. After the death of Chen Junlang, the founder of Kid's Bookhouse, the TSMC Charity Foundation took the initiative and began assisting the bookhouse, matching local resources, and inviting teachers and students from Senior Health & Care Management Indigenous Department of the National Taitung University's. Every week, students of the department will visit Kid's Bookhouse to tutor, educate high-potential students, and close the education gap.

Enriched

62 educational institutions in remote areas with software & hardware resources

Work with Universities to Promote Smart IoT & Improve Information Education in Primary Schools

In response to the information education trend promoted by the Ministry of Education, the TSMC Charity Foundation joined hands with the Strategy Development Office of the National Yang Ming Chiao Tung University to develop the first smart IoT teaching materials for primary schools in Taiwan so as to enrich their current courses. In 2020, following TSMC's strategies, providing scholarships to students from National Yang Ming Chiao Tung University as teaching assistants to serve at five schools recommended by the Hsinchu City Government Education Department. At the end of the same year, 31 primary schools joined this program; teachers and students that participated gained further knowledge in utilizing information technology.

Promote Science Education with TSMC Teaching Videos

The [Intelligent Engineering Center](#) is a long-time partner to Meihua Elementary School in Hsinchu County and conducts experimental science education. In 2020, by incorporating learning tasks and group competitions in class, new scientific experiment programs were created, allowing volunteers with no science background to teach scientific experiments in a safe and fun way. We made six teaching videos to attract more volunteers from different backgrounds to participate in the service. The [Quality and Reliability Organization](#) and the [Facility Division](#) adopted teaching the videos at the Baoshan Elementary School in Hsinchu and the Hualien District Haili Holiday School to teach students and make sure that they enjoyed the learning process; a total of 250 volunteers were involved.

Organize AI Camps to Broaden Students' Horizons

Artificial Intelligence (AI) is one of the main axes that the TSMC Charity Foundation focuses on in developing science education. In addition to continuing the program in cooperation with Microsoft Taiwan Corporation, the Foundation further cooperated with AI4kids and Kneron to arrange AI training courses for TSMC volunteers. In the same year, the [Product Engineering department](#) also invested in volunteer services, organizing a two-day AI camp for a total of 16 hours at Hexing Elementary School in Hsinchu. At the camp, students learned how to code an automatic parking lot identification system and a voice assistant for mobile phones; the exercises helped students learn that AI could be used in daily life. The camp further guided students to design AI modules on their own and strengthened their ability for scientific applications.



The Intelligent Engineering Center conducted experimental Science education with students in Meihua Elementary School in Hsinchu County.



Vocational Education— Develop Children's Skills

Cross-field Cooperation: Enterprises Supporting Vocational Training

By cooperating with the Pingtung County Government and Daikin Industries, Ltd., the TSMC Charity Foundation promotes vocational education and provides a 30-hour air-conditioning cleaning and maintenance course for students aged over 16 in Pingtung County. After training, students can get certifications and start working. Graduates are also encouraged to provide services to charity organizations as a way to give back to society. The Foundation further invited companies to join the program by organizing 2 courses in 2020 to a total of 58 students. This year, Happy Hair is planning to provide training and opportunities to students interested in the hair salon industry. In addition, the Foundation called on TSMC's information system hardware contractors to jointly organize 3 vocational activities for students in the Changhua and Nantou rural areas, with a total of 60 students participating.

Educate Students on Diverse Career Paths & Help Find a Path for Them

In 2020, in order to unlock rural students' potential

"Getting admitted to appliance maintenance class allows me to receive good training and gain hands-on experience. During the Chinese New Year, I used what I learned to clean the air conditioning at home and the elders praised me. Thank you for giving me an useful skill."

—Sin-An Chen , Student of National ChiaTung Agricultural Vocational Senior High School

"Compared with children from areas with abundant resources, children in rural areas generally lack self-esteem. The TSMC Charity Foundation guides students to discover their own potentials, affirm their abilities, and see future possibilities so that students could pay more attention to fields they are interested in."

— Hongyuan Lin, Principal of National Chiayi Agricultural Vocational Senior High School

and let them know more about different careers, by cooperating with 104 Corporation, the TSMC Charity Foundation invited 100 craftsmen from different fields to film [videos](#) introducing their work and its required skills, encouraging young people to explore different careers. The [Intelligent Manufacturing Center, Fab 8](#), and the [Quality and Reliability Organization](#) provided support to the St. Francis' Maiden's House, Hsinchu City Renai Children's Home, and Miaoli St. Francis' Nursery. The goal was to "Explore Skills for New Career Possibilities", which hopes to inspire confidence and interest in career development among students through the TSMC career event day, practical agricultural career experience, and DIY activities; 116 students benefitted from the program.

Offer Financial Support and Better Living Spaces for Higher Quality of Life

Financial Support for the Disadvantaged

In 2020, the TSMC Charity Foundation continued its

efforts with the "Ten Thousand Dollar Per Household" and "Emergency Aid for the Disadvantaged" programs by providing financial support to disadvantaged families and families facing big challenges. By working with the different government social welfare departments, the Foundation visited disadvantaged families to understand their needs. The Foundation called people and companies to donate and worked with [Sending Love Forward](#) to find social resources for these households and to offer them basic necessities, benefitting 75 households.

old. Therefore, the Organization provided new tables and chairs and replaced old monitors to ensure a safe learning environment. InW 2020, the TSMC Charity Foundation assisted in the renovation of three classrooms to provide a comfortable environment for teachers and students.

**3,521 hours
of community volunteer services
for 503 beneficiaries**

Caring for the Community; Volunteers Help the Elderly and the Young

Hsinchu Veterans Home and St. Teresa Children Center are TSMC's long-term partners and TSMC volunteers visit the two organizations to bring warmth and joy through regular activities. In 2020, TSMC volunteers served the two organizations 503 times with 3,521 hours of service.

Upgrade Campus Environment and Equipment

The [Corporate Planning Organization](#) has long been volunteering in after school classes in Zhudong, Erchongpu, and Xinpu of Hsinchu County. They discovered that most of the after school classes were short of funds and much of the teaching equipment was

2020

Donated NT\$16.18 million
to the disadvantaged

2020	1,618
2019	1,321
2018	2,000

(Larger amounts of outside donations in 2018 for
disaster relief in Hualien)

Build a Safe Home to Give the Disadvantaged Security

In 2020, through the introduction and recommendation of the World Vision Taiwan, the [Advanced Packaging Technology and Service Organization](#) assisted in repairing 4 disadvantaged family houses in Yongkang District and Liuying District in Tainan, addressing the problems of water leakage and exposed pipelines.



Support Local Social Welfare Organizations to Overcome COVID-19 Challenges

Volunteers from the [Human Resource Organization](#), [Fab 6](#), [Fab 8](#), [Fab 12A](#), [Fab 12B](#), [Fab 14](#), the [Intelligent Manufacturing Center](#), and the [Product Development Organization](#) assisted Luway Opportunity Center, Sylin-Lu Social Welfare Foundation, Taiwan Fund for Children and Families, and Shandao Academy in raising funds for daily operations during the pandemic. The [Product Development Organization](#) helped St. Camillus Center for Intellectual Disability raise NT\$1 million for its equipment. Through TSMC i-Charity Platform, [Fab 6](#) invited TSMC employees to support the World Vision Taiwan, raising NT\$1.09 million. The [Quality and Reliability Organization](#) assisted a private child-care nursing home in Miaoli in raising NT\$180,000, which flattened the donation gap caused by the pandemic.



The Advanced Packaging Technology and Service Organization assisted in repairing disadvantaged family houses in Liuying District in Tainan.

Case Study

TSMC Charity Foundation's Education Demonstration Sites in Rural Areas

The TSMC Charity Foundation promotes rural education demonstration sites and, together with the Changhua County Government, introduced the three main strategies: Multicultural Education, Subject-based Education, and Vocational Education into 17 after-school classes, benefitting a total of 937 disadvantaged students.

In terms of Multicultural Education, volunteers from Fab 15A and Fab 15B visit BOYO Changhua Center, Dazhuang Community After School Care Class, and Maxing Community After-school Care Class every other week to help students with their studies. To ensure sustainability, the Junyi Academy provides online teacher training to let more volunteers participate. As for Subject-based Education, the TSMC Charity Foundation has worked with the BOYO Social Welfare Foundation, also avid education advocates, to establish a location for after-school classes in Changhua. We offered tablets/used computers and utilized online platforms such as TutorABC and the Junyi Academy to improve English and math abilities. Lastly, we worked with TSMC's computer equipment suppliers to organize computer maintenance courses for interested students.

"Aiming for the common good, TSMC contributes not only to Taiwan's economy but also to Taiwan's rural education."

—Lai Ching-te, Vice President of the Republic of China



Vice President Lai Ching-te went to the Changhua Center to learn more about TSMC's investment in rural education.



Care for Elders Living Alone

Our Actions

- [Networking of Love Partners Create Services to Better Serves](#)
- [Strengthen Medical Care and Repairs to Improve Convenience and Safety](#)
- [TSMC Volunteers Serve Elders to Enrich Their Lives](#)

What We Want to Solve

According to statistics from the Ministry of Interior, R.O.C., Taiwan, Taiwan's population showed negative growth in 2020. It is estimated that, by 2025, Taiwan will become a super-aged society with over 20% of our population aged over 65. The number and needs of disadvantaged elders and those living alone may continue to grow.

How We Respond

The TSMC Charity Foundation works with our medical and healthcare partners to share information through Networking of Love. We offer elders living alone with quality and comprehensive care in an attempt to meet their needs.

Networking of Love Partners Create Services to Better Serves Cross-industry Sharing to Expand the Supply of Elderly Care Services

In 2020, the Networking of Love organized a cross-industry sharing event for the first time, inviting public welfare partners from food, education, energy, and other industries to share their experiences and inspire each other. They cared for the elderly living alone through online platforms and improved resource efficiency. With 70 participants, the event opened up more opportunities for cooperation.



Strengthen Medical Care and Repairs to Improve Convenience and Safety

Provide Sarcopenia Meters and Shuttles to Improve the Quality of Medical Treatment

Inconvenient traffic and insufficient medical resources impact the quality of medical care in remote areas and

the elderly's willingness to seek medical attention. In 2020, the TSMC Charity Foundation received a request from the Zhudong Branch of the National Taiwan University Hospital, stating that the hospital needs portable Sarcopenia meters. The Foundation therefore invested NT\$550,000 to support the hospital's need so that the elderly can get proper care at home. In addition, the Foundation spent NT\$900,000 on purchasing shuttle buses for the Longchang Cultural and Health Station in Dulan Village, Taitung County, which will be used to pick up physically challenged elders, overcoming the long distance between hospitals and their homes.

Purchased equipment for 2 rural hospitals and small long-term care institutions

Repair Houses to Provide a Safe Living Environment for the Elderly

The TSMC Charity Foundation and the Hualien Mennonite Foundation, through rigorous assessments, utilized their engineering experience of post-disaster reconstruction to help 7 elders living alone repair their houses to offer a safe living environment.

7 houses of disadvantaged elders repaired

"As a member of the Networking of Love, we will narrow the social gap together with TSMC. With technology, we can show that we care and help them feel loved. OLD YES!"

—Ms. You Lili, Chief Director of the Old Five Old Foundation

"We appreciate the TSMC Charity Foundation for bringing and spreading love across Taiwan. Together we can create more good and make love infinite!"

—Lihua Yang, Associate Director of China Medical University



The Network of Love open house event in 2020 invited charity partners to brainstorm ideas for innovative projects implementation, creating more opportunities for collaboration.



TSMC Volunteers Serve Elders to Enrich Their Lives Celebrate the Chinese New Year with Joy

In 2020, volunteers from the [Quality and Reliability Organization](#), [Fab 3](#), [Fab 15B](#), [Fab 12A](#), and [Fab 12B](#) sent food and clothes to agencies that offer geriatric care such as the Stella Matutina Social Welfare Foundation, Huashan Foundation, Old Five Old Foundation, and Hsinchu Catholic Social Service Center. The foods were dishes that are commonly eaten during reunion dinners; through cooking activities, elders were able to get active, socialize, and stay young.

Accompany Elders on Dragon Boat Festival and Moon Festival

For the Dragon Boat Festival, volunteers from [Fab 12B](#) visited 78 elders, giving them Zongzi and nutritional



Fab 12A works with the Huashan Social Welfare Foundation to purchase household appliances and take care of the elders who live alone.

oats. Volunteers also prepared Wormwood soap, which symbolizes good luck and dispels evil, as gifts to celebrate the festival. Before the Moon Festival, [Fab 12A](#) and [Fab 15B](#) raised 197 gift boxes and 40 boxes of moon cake for the elderly living alone served by the Huashan Foundation and the Old Five Old Foundation to warm their hearts.

"Simply being there is the best support that we can provide. Through listening and caring, our society could achieve the common good."

—Frankie Tsai, Dep. Manager of [Fab 12A](#)

"I feel different all day when I could really help. I find myself capable and willing to give more!"

— TSMC Employees' Children Who Participated in Quality & Reliability Org Volunteering Activities



Quality and Reliability Organization celebrated Father's Day with the elders living alone.

Go Shopping and Create Good Memories Together

Together with the Mennonite Social Welfare Foundation, volunteers from the [Material Supply Chain Management Division](#) took the elderly in Hualien to visit the Taipei Zoo, embarking on an urban adventure through the Taipei MRT system. Volunteers from [Fab 15B](#) accompanied physically challenged elders to purchase daily necessities, helping them step out from their homes and connect with society again. Volunteers from [Fab 12A](#) made scallion pancakes



Volunteers from the Material Supply Chain Management accompanied elders living alone to Taipei Zoo.

with the elders of the Hsinchu Veterans Home. Through social events like DIY cooking, they hoped that elders can go out more and stay physically and emotionally young.

"It is wonderful to have the opportunity to serve the elders. During the process, we can learn to help others and further realize the beauty of sharing."

—Handy Ko, Director of
Material Supply Chain Management



Promote Filial Piety

Our Actions

- [Online Teaching Materials to Promote Filial Piety](#)
- [Promote Filial Piety & Strengthen Civic Morality](#)
- [Filial Piety Story-reading to Raise Awareness](#)
- [Let the Seeds of Filial Piety Sprout Awareness](#)
- [Supporting the MOE Warmth Project](#)

What We Want to Solve

According to statistics from the Ministry of Health and Welfare, Taiwan's society is now an aging society and the percentage of elders living alone continues to rise. Considering the limited social resources, the TSMC Charity Foundation is hoping to strengthen concepts of filial piety and family communications to tackle the challenge from the source.

How We Respond

The TSMC Charity Foundation believes that, by cooperating with governments, enterprises, and schools, we can cushion the impact from an aging society through diverse events raising awareness for filial piety, promoting a parent-children relationship filled with understanding and care, increasing awareness on filial piety among our youth, and ensuring that our seniors are cared for.

Online Teaching Materials to Promote Filial Piety

The TSMC Charity Foundation cooperated with the Filial Piety Resource Center under the K-12 Education Administration in 2020 to hold 4 filial piety parent-child workshops to around 123 participants. In order to promote filial piety, the Foundation, based on their past experience, created online teaching materials, including workshop introductions, operating manuals, and teaching demonstration videos. These are available for free download on the [Filial Piety Resource Center's website](#).

Actions to Promote Filial Piety



Note1: In response to the filial piety concept advocated by Chairperson Sophie Chang of the TSMC Charity Foundation, the Ministry of Education provided filial piety courses, encouraging students to practice filial piety in their daily lives. The project includes essay-writing events, micro-films, and flash mobs. The MOE also established the Filial Piety Resource Center to strengthen filial piety courses and teaching.

Note2: The "Warmth Project" is included in the series of MOE filial piety activities, encouraging students to express love to their families and pass on the taste of home through activities. Starting from the curriculum, the value of family can be deepened and let children give back to their families.

Filial Piety Story-reading to Raise Awareness

In 2020, TSMC's filial piety volunteers held story-readings on filial piety in school, organized activities revolving around filial piety, and prepared fun, interactive lessons to imbue teachings of filial piety into the curriculum so as to sow the seeds of filial piety. We are currently working with 15 schools through 122 filial piety volunteers.

Fab 15B has been teaching filial piety at Taichung Beishi Elementary School through sharing filial piety stories and worksheets, encouraging students to think about their interactions with their elders and impressing in them the concept of filial piety; a total of 510 students participated in filial piety education at Taichung Beishi Elementary School.

Let the Seeds of Filial Piety Sprout

Fab 12A invited colleagues to take photos of their family members and convey their love through post-it notes; **Fab 15A** visited BOYO Social Welfare Foundation in Changhua to help children make Mother's Day cakes and read related books to encourage children to express gratitude to their mothers.

"We appreciate the TSMC Charity Foundation for promoting and practicing filial piety to make our society better."

—Chongzhe Xu, Acting Principal of Wago International Senior High School

Supporting the MOE Warmth Project

In 2020, the K-12 Education Administration under the MOE promoted a series of teaching plans to increase parent-child interactions by getting students to knit, cook lunch boxes, and write autobiographies of their elders. The **Quality and Reliability Organization** showed support for the project by visiting Baoshan Elementary School-Lake Branch in Hsinchu County to teach students how to make nutritious and delicious meals so that they can understand the hard work their parents do. **Fab 14B** taught Tainan Municipal Jingliao Junior High School's students to assist their elders in completing their autobiography through interviews, so as to promote mutual understanding among family members.



The Quality and Reliability Organization showed support for the project of MOE by teaching students how to prepare meals, so that they can understand the hard work their parents do.

"The Warmth Project is doing great, thanks to the TSMC Charity Foundation's support. Thank you for your dedication and effort to create a good society."

—Li Jinyang, Principal of Filial Piety Resource Center of the K-12 Education Administration, Ministry of Education

"Long-term collaboration with the TSMC Charity Foundation gives me insight into their kind hearts. It seems that they will never get tired of learning and promoting filial piety."

—Yuyun Liao, Curriculum Supervisor, Filial Piety Resource Center of the K-12 Education Administration, MOE



The Quality and Reliability Organization showed support for the project of MOE by teaching students how to prepare meals, so that they can understand the hard work their parents do.

Environmental Protection

Our Actions

- [Cherish Food Program Continues to Grow](#)
- [Volunteers Help Improve Energy Efficiency](#)
- [Eco-volunteers Sending the Green Message](#)
- [Tour Volunteers are the Bridge Connecting the Public with Semiconductors](#)
- [Assist in Setting Up Solar Panels](#)
- [Promote Environmental Protection through Playlets](#)

What We Want to Solve

Climate change has brought on environmental issues and food inequality. Corporations should take action and help reduce the negative impacts of climate change.

How We Respond

The TSMC Charity Foundation is assisting TSMC fabs in recovering surrounding ecosystems and advocating for sustainable actions, environmental awareness, and renewable energies in schools and communities. The Foundation is also working with food companies to reduce food waste.

Cherish Food Program Continues to Grow

In 2020, the TSMC Charity Foundation worked with Chi Mei Food, Laurel Corporation, Hsin Tung Yang, Hunya Foods Co., Ltd., Lian Hwa Foods Corporation, and Shih Chen Foods Co., Ltd. to expand the scope of the Cherish Food Program by regularly sending goodwill foods to 92 agencies that serve the disadvantaged in 13 cities and counties in Taiwan, benefitting 37,071 people. In addition, 20 freezers were donated to charity agencies to ensure that foods remain fresh.

2020

37,071 people
benefitted from the Cherish Food Program

2020

37,071

2019

21,791



TSMC Charity Foundation collaborated with Hsin Tung Yang to organize a volunteer chef activity which supplied a delicious feast to residents of Shuangxi District in the New Taipei City.

Distributing Goodwill Food to Locations Across Taiwan

Six Companies Offer Fresh Goodwill Products

CHIMEI
奇美食品



Launch the Cherish Food Program

TSMC Offers Freezers and Subsidizes Shipping Costs



HUNYA FOODS
宏亞食品



HISIN TUNG YANG
新東陽



DaChon
大成

Has helped a total of

92 locations
37,071 people

Long-term Collaborations with TSMC Volunteers (18)
6,715 Beneficiaries

Education Institutions in Remote Areas (58)
21,577 Beneficiaries

Network of Love (13)
8,515 Beneficiaries

Ten Thousand Dollars Per Household Program and Emergency Aid for Disadvantaged Program (3)
264 Beneficiaries



Volunteers Help Improve Energy Efficiency

TSMC's energy conservation volunteers are committed to promoting water and energy conservation knowledge. [Fab 6](#) assisted two rural schools in Tainan to inspect the status of water and electricity use and conduct safety tests to ensure maximum energy efficiency. At the same time, they also use interactive teaching and self-made teaching aids to educate students on energy and water conservation. In 2020, energy conservation volunteers served a total of 52 times to provide over 520 hours in energy-saving services.



TSMC opened the green ecological parks at Fab 15 to student tours.

Eco-volunteers Sending the Green Message

TSMC is striving to recover ecosystems surrounding TSMC fabs and make sure that the ecosystem is conducive to biodiversity. It opened the green ecological parks at [Fab 12B](#), [Fab 15](#), and [Fab 14](#) to student tours. Students are able to experience cleanroom suits, engage in DIY activities, and conduct scientific experiments to strengthen their understanding and participation in environmental protection. In addition, eco-volunteers from TSMC serve regularly at the Shuihu

Ecological Education Park to share the environment and the beauty of nature with the public. In 2020, eco-volunteers served a total of 992 times in providing over 3,968 hours in tours.

Tour Volunteers are the Bridge Connecting the Public with Semiconductors

TSMC believes that sharing technological knowledge is one of the most important ways to give back to society. TSMC not only provides tour services to *The World of Semiconductors* at the National Museum of Natural Science and TSMC's Museum of Innovation for the general public to better understand the semiconductor industry and its applications. In 2020, *The World of Semiconductors* has been updated to make it comprehensive and up-to-date. There have been 2,565 volunteers that served over 10,260 hours in guiding participants to learn about the chip production process and semiconductor development through interactive games.

Assist in Setting Up Solar Panels

In 2020, the [Facility Division](#) donated over NT\$1.2 million to the Taichung St. Coletta Catholic Training Center for Special Needs and the Maria Wufeng Caring Home for solar panels. The donation was to support renewable

energy and helped the two organizations gain financial support by selling their green electricity.

Promote Environmental Protection through Playlets

Volunteers from [Fab 12A](#) have been accompanying students from the Baoshan Elementary School in Hsinchu. They arranged playlets to teach students how to cherish food and the environment. Environmental protection books were also donated to schools to raise environmental awareness among students.

"Life is like an integrated circuit with different paths and choices. We hope that children can learn in a fun way. Their laughs prove that they are having fun when learning and inspire us a lot."

—Wenquan Liang, TSMC Tour Volunteer

2020
1,044 services
from environment protection related volunteers

2020	1,044
2019	771
2018	653

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 semi-annually to the

Board of Directors on the implementation results and the future work plan. Starting from 2021, the reporting frequency to the Board of Directors has been increased to a quarterly basis.

Governance Structure



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.

Four Boards Responsibilities

- Supervise
- Evaluate the management's performance and appoint and dismiss officers
- Resolve the important, concrete matters
- Provide guidance to the management team



Diversity on Board

TSMC's Board is comprised of a diverse group of professionals from different backgrounds in industries, 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.

Nomination and Election of Directors

The Board of Directors established the "[Guidelines for Nomination of Directors](#)", which describes the procedures and criteria for the nomination, qualification and evaluation of candidates for Directors. In addition, TSMC envisions its Board to be composed of a majority of independent directors, with the independence of each independent director candidate considered and assessed under relevant laws.

Board and Audit Committee Performance Evaluations

TSMC implemented Board performance evaluations in 2020. 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 2020 performance evaluations, please refer to the [2020 Annual Report](#).



Risk Management

Based on both its corporate vision and its long-term, sustainable responsibility to both industry and society, TSMC operates an enterprise risk management (ERM) program to integrate and manage potential sustainability risks including strategic, operational, financial and hazardous risks (e.g. climate change, utility supply, earthquake, fire, chemical spill, etc.) that represent potential negative consequences to operations and financial results. The TSMC risk management organization is composed of the RM Steering Committee, RM Executive Council, RM Program and RM Task Force.

Risk Management Organization Chart



The risk management framework (including risk identification and assessment, risk control and mitigation, risk response, risk monitoring and reporting) is applied to identify and prioritize risk controls, and to implement various controls and risk treatment. The risk management organization 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. The audit committee's chairperson also reports on the risk environment and risk mitigation actions to be taken. For more details of Risk Management, please refer to TSMC's 2020 Annual Report "6.3 Risk Management".

Enterprise Risk Management Framework





Ethics and Regulatory Compliance

Integrity is TSMC's most important core value. Based on this value, TSMC has established its ethics and regulatory compliance system, including a sequence of regulatory identification, compliance policy and procedure formulation, implementation and execution, self-assessment and examination, as well as open reporting channels and whistleblower protection. The Company's management team acts in accordance with our Ethics Code and fosters a robust ethics and regulatory compliance through its tone from the top. The ethical culture of TSMC is continuously strengthened through comprehensive education, training and promotion provided to its employees. At the same time, TSMC works hand in hand with its customers and supply chain to serve the mutual benefit of the industry, and serves as a trustworthy partner to its stakeholders.

Zero tolerance for corruption

TSMC holds zero tolerance for corrupt practices and strictly prohibits any behavior of bribery, fraud, blackmail, misuse or misappropriation of the Company's assets, or impairment of the Company's interest for personal gain. [TSMC Ethics and Business Conduct Policy \(the Ethics Code\)](#) is the guideline for implementing the aforementioned core values. Every employee is required to exercise self-discipline by complying with the highest ethical standards and substantially implements integrity, equality, and transparency in daily operations. In view of

the importance of compliance with the Ethics Code, the Company's management team regularly reports to the Board and the Audit Committee on ethics and regulatory compliance. TSMC formed an Ethics Committee, which oversees implementation of the Ethics Code as well as investigation and disciplinary action for reported incidents. At the same time, suppliers are an important part of the implementation of the Ethics Code and regulatory compliance. TSMC established the "[Supplier Code of Conduct](#)" bringing the core value of integrity into our supply chains and demonstrating it in business behavior; and published [TSMC's Anti-Corruption Commitment](#) on TSMC's webpage, enabling stakeholders to recognize TSMC's core value of integrity.

Regulatory Identification and Policy Formulation

TSMC identifies potential risks and impacts arising from regulatory changes by regularly tracking such changes. According to the results of regulatory identification, TSMC assesses whether internal regulations align with the changes to ensure that relevant policies and regulations are applicable and appropriate. In 2020, TSMC updated its export control policy to be in line with the latest export control regulatory changes.

Implementation and Execution – Training and Promotion

TSMC requires all of its organizations, subsidiaries and employees to ensure their business operations are compliant with laws, Company policies, and regulations when doing business. Through an annual Control Self-Assessment (CSA), employees examine their own compliance performance and are open for audit by the Internal Audit organization. This is an important part of TSMC's effort to implement regulatory compliance.

To raise employee awareness of ethics and regulatory compliance, TSMC provides a variety of training courses for all employees based on relevant job responsibilities. The training courses include face-to-face courses and promotions as well as mandatory and elective online courses. Through posters around our facilities, guidelines and FAQs on regulatory compliance on the Company's intranet, internal email distributions, and promotional articles, TSMC ensures that all employees have timely access to new information on regulations and have a deeply-ingrained awareness of various issues.

In 2020, TSMC provided an "Annual Ethics and Compliance Training Course", a mandatory online training course including topics such as ethics and anticorruption, avoiding and reporting conflict of interest, export control, privacy and personal data protection, and antitrust laws, to a total of 50,482 employees, reaching 99.7% completion rate. TSMC additionally offered more than 20 face-to-face compliance training courses and online

courses on subjects regarding export control and anti-trust laws to employees in relevant functions - a total of 1,272 employees completed our online course on export control, and another 841 on anti-trust. In 2020, we held both a sustainable supply chain experience exchange and our annual Responsible Supply Chain Forum to share and exchange practical experience on topics such as the Ethics Code, labor rights, environmental protection, and occupational safety. In total, 518 attendees from 337 suppliers participated in these activities.





Assessment and Examination

To implement the Ethics Code and to avoid potential conflicts, TSMC requires every newly-hired employee to complete a conflict of interest declaration upon arrival. Employees with specific job grades or positions need to complete the declarations annually. In 2020, 18,235 TSMC employees completed the Annual Conflict of Interest Declaration to which all declarants agreed to comply with the Ethics Code. Internal Audit performs an audit according to the annual audit plan approved by the Board of Directors and reports the results and follow-up improvement plans to the Board and management. Internal Audit will also administer the CSA and assess its fulfillment by each fab/division to ensure effectiveness and for internal self-assessment.

In addition, every two years, TSMC performs anonymous surveys to suppliers and employees in turn to regularly evaluate the effectiveness of ethics and regulatory compliance promotion. To closely track employee feedback for ethics and regulatory compliance, in 2020, according to annual employee survey results, 88.7% of employees trust the confidentiality measures of the reporting channel, and 92.5% of employees are willing to use the reporting channel to report misconduct.

Reporting and Protection

TSMC has established and published its Complaint Policy and Procedure for Certain Accounting & Legal Matters

and pledges to comply with the relevant regulations in the policy. Open and multiple reporting channels are available for internal and external voices to protect the rights and interests of stakeholders and the company. All reported incidents collected from reporting channels inside or outside of TSMC are properly recorded and traced. TSMC also prohibits any form of retaliation by providing proper protection for any individual who in good faith reports a suspected violation or participates in an investigation. In 2020, the Ethics Committee held a total six meetings to examine major reported incidents under investigation.

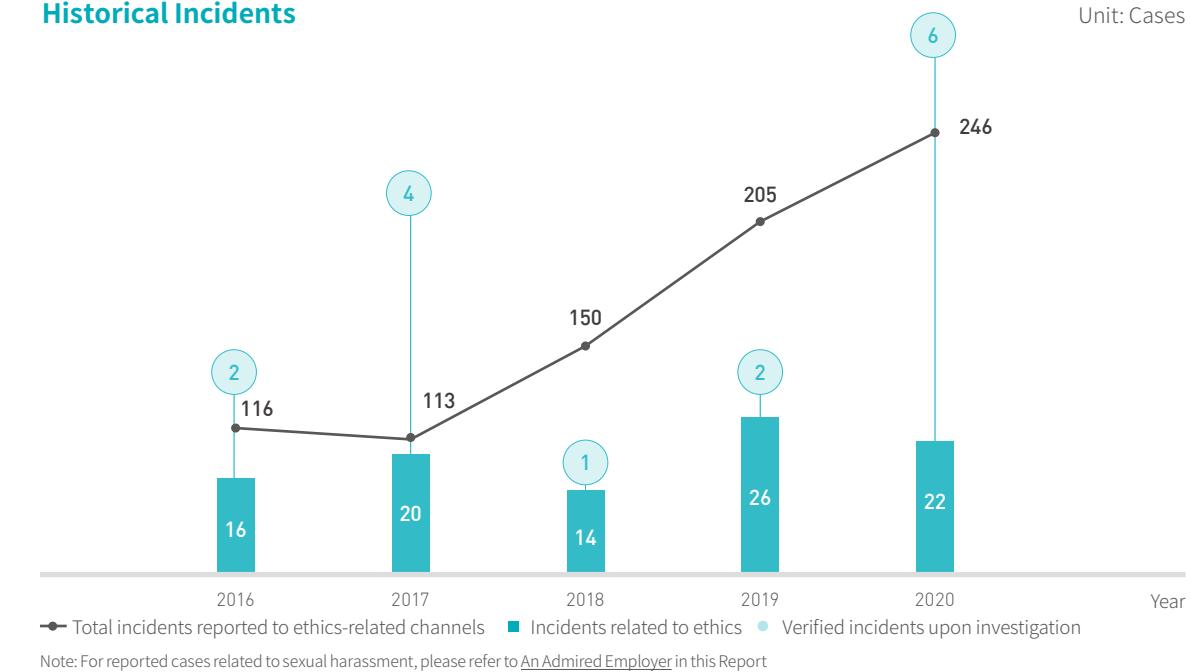
TSMC investigates each individual case according to its characteristics through specific divisions, and treats every received case seriously, carefully, and effectively to ensure the accuracy of the investigation. Each investigated case confirmed to be true will receive discipline, up to and including dismissal, termination of the business relationship, and legal prosecution as appropriate. The TSMC Ethics Committee will evaluate each case to determine whether it is an exceptional case or whether it results from systemic issues of insufficient awareness in ethics. This will allow TSMC to continue evaluating whether it is necessary to improve its management and internal control procedures. Activities such as emails to employees that disclose the violations and disciplinary actions in each quarter are conducted to promote employees' awareness and avoid recurrence of similar incidents.

In 2020, we 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\$1 million).

In 2020, the incidents reported through the Audit Committee Whistleblower System, Ombudsman System,

and Irregular Business Conduct Reporting System totaled 246. Among them, 155 cases were related to employee relations, 69 cases were categorized as others (e.g. asking personal questions or private matters), and 22 cases were related to ethics. Six incidents were verified upon investigation and determined for disciplinary action by the Ethics Committee. In 2020, TSMC leveraged the six violations to strengthen ethics promotion for all employees in supplier-related activities.

Historical Incidents





Financial Performance

A solid financial foundation is the key to corporate sustainability. With good financial performance, prudent business plans, and disciplined capital management, TSMC is able to maintain a solid financial foundation to weather industry cyclicalities. TSMC pursues good financial performance mainly through revenue growth and consistent improvement in profitability to create greater economic value for its stakeholders, including shareholders/investors, employees, customers, suppliers, government, society, and others.

To communicate TSMC's long-term investment value with investors, in 2015 TSMC set clear strategic financial objectives: (1) average return on equity (ROE) to be at least 20% across cycles; (2) compound annual growth rate (CAGR) of net income to be between 5% and 10% for the years 2015 through 2020. Concluding 2020, TSMC delivered (1) average ROE of 24.4% and (2) net income

CAGR of 11.1% for the years 2015 through 2020, both exceeding the prior targets.

As the multi-year megatrends of 5G and HPC-related applications are expected to fuel strong demand for TSMC's advanced technologies in the next several years, the Company is entering a period of higher growth from 2020. Therefore, TSMC further expects (1) its long-term revenue growth, in US dollar terms, to be 10% to 15% CAGR from 2020 to 2025, with (2) minimum ROE of 20% across cycles.

Given the funding requirement of the growth opportunities, macroeconomic uncertainties, the current low interest rate environment, and ability to diversify funding sources, TSMC issued a total of NT\$120 billion in NT dollar denominated and US\$4 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.

Four Strategies to Increase Long-term Investment Value



Continue to invest in process technologies and capacity



Maintain or improve profitability and investment returns



Maintain trusting relationships with customers



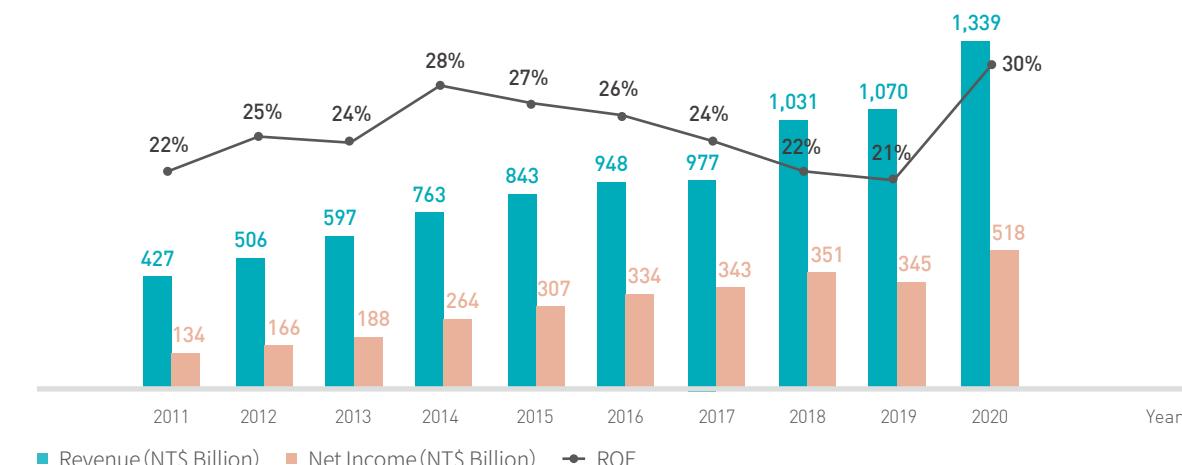
Pursue revenue and market share growth



Financial Performance

24.8% 10-Year Averaged ROE (2011-2020)

12.4% 10-Year Net Income CAGR (2011-2020)

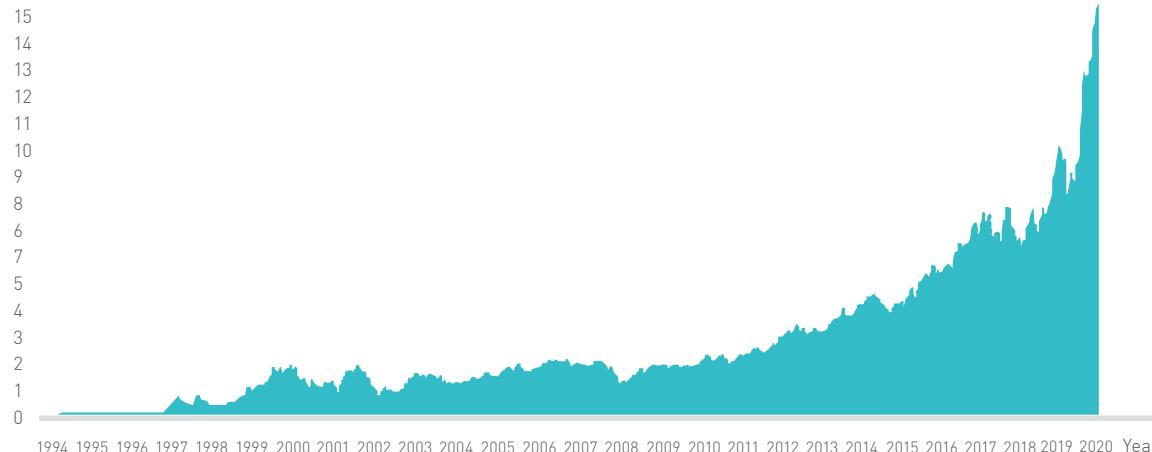




Supported by the Company's strengthening industry position, growth potential, and solid operating performance, TSMC's share price, adjusted for cash dividends, increased 64.7% in 2020, marking 12 consecutive years of annual growth. Since the Company went public in 1994, TSMC has been profitable every year and TSMC's market capitalization has been growing steadily. As of December 31, 2020, TSMC's market capitalization reached NT\$14.2 trillion, or US\$498.5 billion.

TSMC's solid financial performance enables the Company to distribute profits to shareholders in the form of cash dividends.

Market Capitalization



TSMC's Board of Directors approved quarterly cash dividends of NT\$2.5 per share per quarter in 2020. TSMC's shareholders received a total of NT\$10 per share in cash dividends in 2020. From 2004 to 2020, TSMC has paid out a total of NT\$1.9 trillion, or US\$62.4 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.

14.2 Trillion (NT\$)

Market Capitalization at the End of 2020

64.7%

Total Shareholder Return in 2020

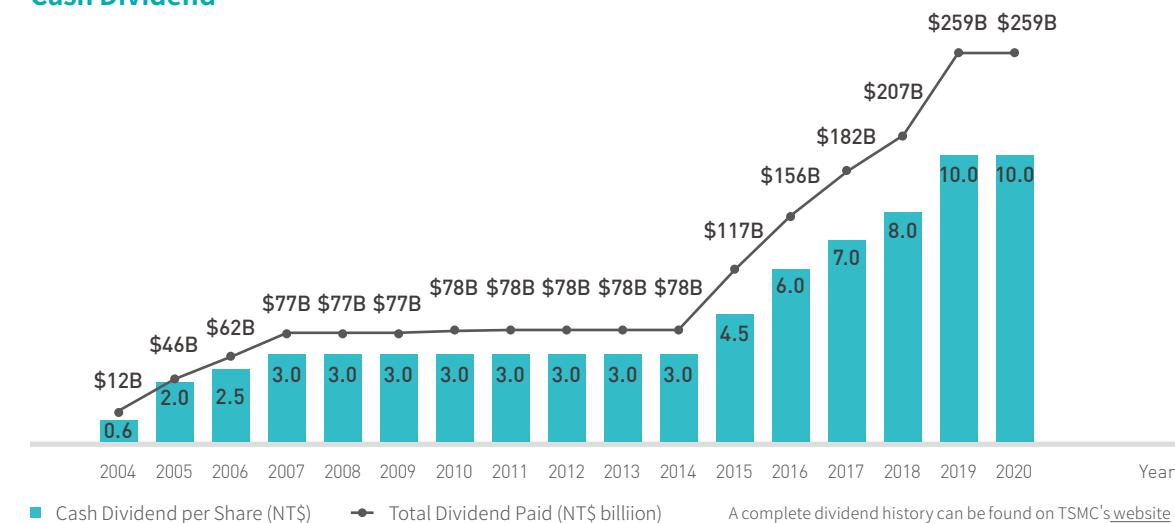
1.9 Trillion (NT\$)

Cumulative Cash Dividends from 2004 to 2020

10 Per Share (NT\$)

Total Cash Dividend Paid in 2020

Cash Dividend





Tax Policy

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.

Eight Commitments

- 01 Act at all times in compliance with all applicable laws and regulations
- 02 Inter-company transactions are based on the arm's length principle, in compliance with internationally accepted transfer pricing guidance published by the OECD
- 03 Be transparent in financial reporting. Disclosures are made in accordance with applicable regulations and reporting requirements
- 04 Do not use tax havens or tax structures whose sole purpose is for tax avoidance
- 05 Do not transfer value created to low-tax jurisdictions
- 06 Develop strong, mutually respectful relationships with tax authorities based on transparency and trust
- 07 Always consider tax as part of major business decisions
- 08 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 "Risk Management" section in TSMC's 2020 Annual Report.

Tax Governance

The ultimate responsibility for taxation management for TSMC and its subsidiaries rests with the Chief Financial

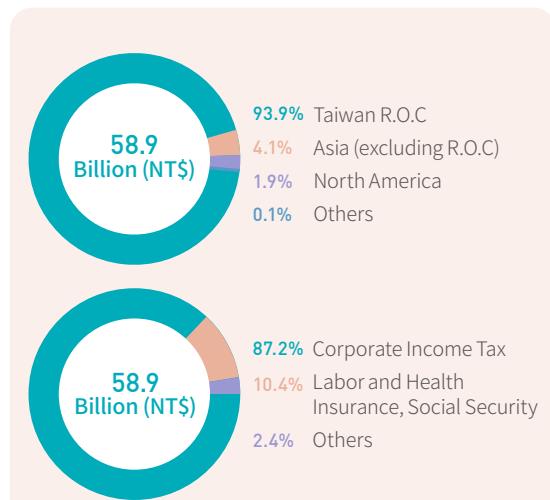
Officer, who delegates day-to-day responsibility to the Controller. A team of qualified and experienced tax professionals supports the Controller to meet TSMC's tax obligations. In addition, TSMC also leverages external tax service providers for complementary expertise.

TSMC's Audit 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 in 2020 was 11.5%, unchanged from 2019. The effective tax rate in 2020 was lower than the R.O.C. statutory corporate income tax rate of 20%, 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.

2020 Tax Breakdown



Income Tax Paid — 51.4 Billion (NT\$)

Taiwan R.O.C. 97.0% Asia (excluding R.O.C.) 1.8%
North America 1.2%

Profit Before Tax — 584.8 Billion (NT\$)

Taiwan R.O.C. 94.7% Asia (excluding R.O.C.) 3.4%
North America 0.5% Others 1.4%

Note: TSMC categorizes its profit before tax and taxes paid geographically based on the country in which TSMC and subsidiaries are located.

58.9
Billion(NT\$)

In 2020, TSMC's total tax payments on a cash basis worldwide were NT\$58.9 billion

> 90 %

In 2020, 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

1

Based on data provided by "Bloomberg Professional", TSMC was the largest corporate income tax payer among all public listed companies in Taiwan in 2020

10.1%

TSMC's 2020 income tax payment in Taiwan represented 10.1% of total corporate income taxes collected by the R.O.C. government



Corporate Information Security

Information security and Proprietary Information Protection are commitments from TSMC to customers, shareholders, and employees. We are proactive in carrying out our information security management system and in setting related policies, management procedures and regulations. In 2020, the [TSMC Information Security Declaration](#) was published to declare our resolution and objectives in information security protection—to maintain TSMC's competitive advantage and safeguard customers and business partners' interests.

Corporate Information Security

The Corporate Information Security (CIS) organization, established in 2019, is in charge of information security

policy formulation, implementation, risk management, and compliance audits, with the Proprietary Information Protection Division and the Information Technology Security Division under its supervision. Reports on information security management performance, related issues and directions are delivered every six months by CIS's highest-level supervisor to the Board of Directors and Audit Committee. As the Audit Committee is responsible for monitoring corporate information security, TSMC's information and cybersecurity management mechanisms are evaluated by [Sir Peter L. Bonfield](#), chairman of the Audit Committee, who possesses a strong information security background.

The Proprietary Information Protection Committee was established to implement information security strategies formulated by CIS and ensure related guidelines, procedures, and regulatory compliance are carried out internally. The Committee is chaired by the senior vice president of Information Technology and Materials Management and Risk Management, and vice presidents of Legal, Human Resources, Research and Development, and Operations serve as committee members. In addition, the highest-level supervisor from CIS acts as the executive secretary, and the highest-level supervisor from Internal Audit as an observer. The committee meets each quarter to review and resolve on guidelines and policies, and carry out formulated information security measures.

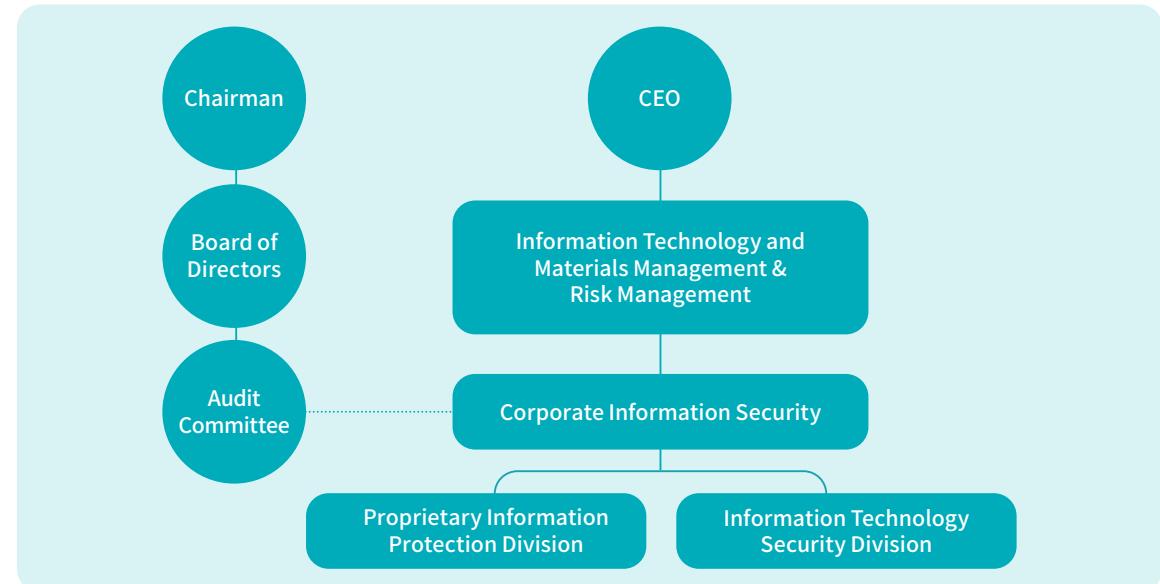
Strategies and Framework of Corporate Information Security

The Corporate Information Security let the concept of information security take root in the Company through TSMC Proprietary Information Protection (PIP) Working Committee. The PIP Working Committee, which covers all organizations by all functions, convenes monthly meetings to keep track of situations on the ground and discuss PIP measures such as information protection, compliance, and policy applicability utilizing the Plan-Do-Check-Act (PDCA) cycle to ensure thorough management of information security. Reports on implementation results are delivered to the Proprietary Information Protection Committee regularly.

TSMC Information Security Declaration



Structure of TSMC Corporate Information Security





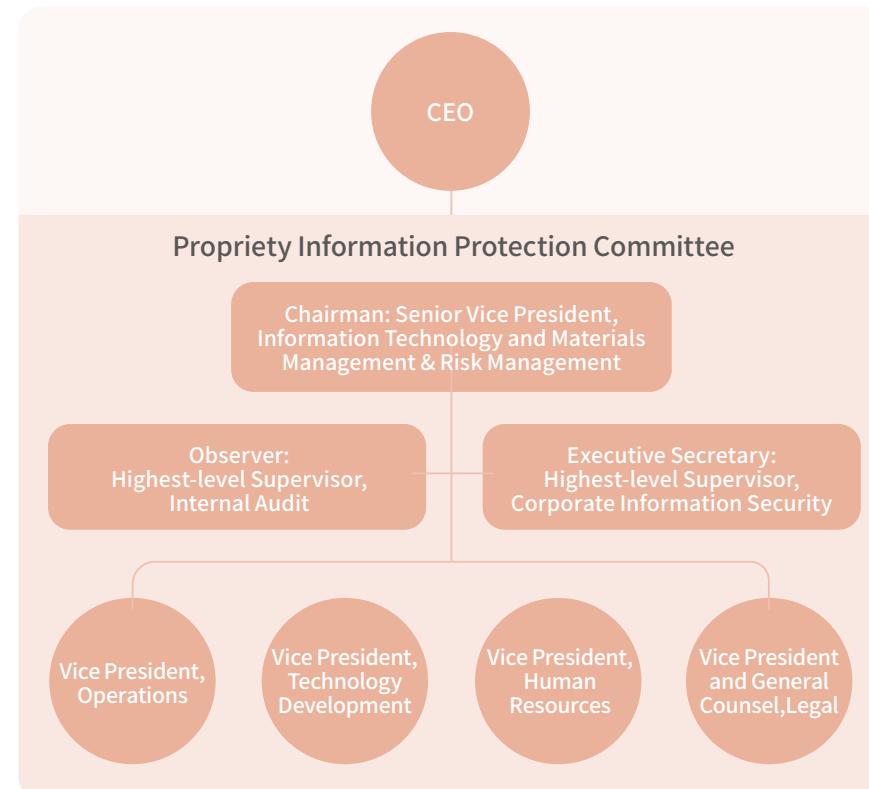
The "planning" stage of the PDCA cycle focuses on information security risk management to minimize systemic, technological, and procedural corporate information security threats by establishing a comprehensive Information Security Management System (ISMS), and ISO certification (ISO/IEC 27001 and ISO/IEC 15408) across fabs. Enable the best proprietary information protection to fulfill customers' needs. The doing stage focuses on implementation of multilayered

information security defense. TSMC continuously adopts innovative information protection technology and integrates the security control solution with daily operations including maintenance of software and hardware facilities, and supplier information security management. Systematically monitoring information security measures to protect the confidentiality, integrity, and availability of TSMC assets. Proactive monitoring on security management performance is carried out in the

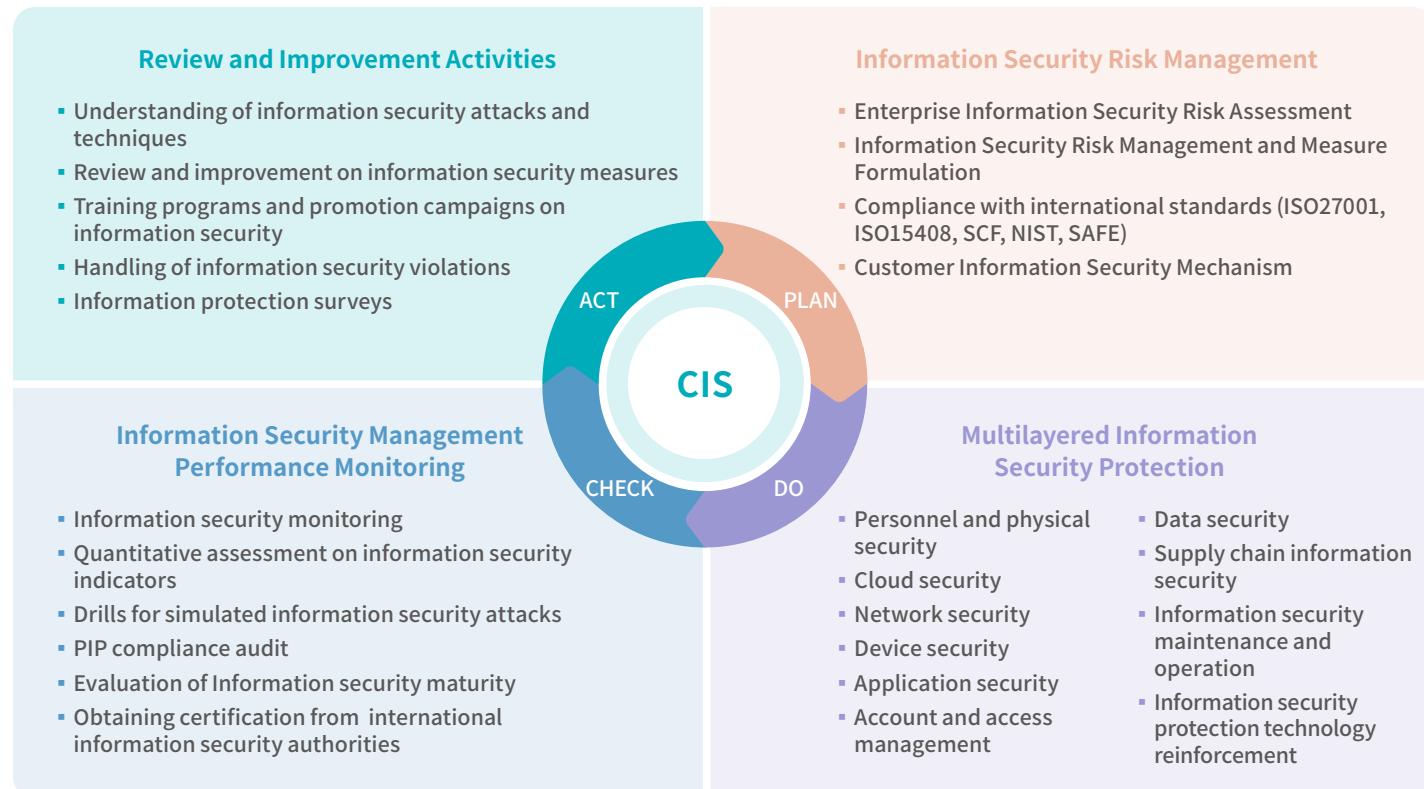
"checking" stage, where related indicators and quantitative analyses are used to evaluate effectiveness of security defense, and information security maturity is assessed through regular drills on information security attacks. In the "action stage", security measures are regularly reviewed and activities are planned for continuous improvement. Continue to monitor and audit to ensure security control effectiveness and sustainability. When employees are found violating information security protection and PIP

procedures, penalties consistent to the severity of damage caused by their violations are given (including annual employee assessment and legal actions when necessary). In addition, based on security KPI and maturity assessment report, improvement activities for training programs, promotion campaigns and security control mechanism are constantly reviewed and planned to prevent breaching of TSMC proprietary information.

Structure of TSMC Proprietary Information Protection Committee



Structure of Corporate Information Security Risk Management and Improvement





2020 Corporate Information Security New Measures

Multilayered Information Security Protection



- Adopted new technology for vulnerability scan and fulfill system and software continuously updates
- Strengthened firewall and network access control to prevent the spreading of computer viruses across devices and TSMC facilities



- Designed advanced virus scanning tools to prevent fabs from installing virus-infected tools
- Installation of anti-virus and advanced malware detection solutions across our computer devices



- Defined security self-check forms, assessment standards and improvement goals
- Enhanced application security controls and integrated the security controls in development process and platform



- Supplier security defense self-examination mechanism established
- Latest regulations and announcements on information security delivered regularly to TSMC suppliers



- Advanced information protection tools developed; document classification and information protection are strengthened through labeling
- Control and tracking of documents and encrypted data
- Control of out-going emails

Reviews and Improvement Activities



- Enhancement of employees' awareness of email phishing and social engineering, and drills on phishing emails carried out
- Regular drills on threat identification organized to raise employee' information security awareness

Information Security Performance Monitoring



- Regular network and information security assessments carried out by external experts (from information security audit organizations, and cybersecurity and information security risk assessment institutes)
- Third-party verified results and threat profiles integrated for risk analysis to strengthen information security management

Third-party Evaluation Results on TSMC's Information Security in 2020



In 2020, 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 complaints concerning breach of customer privacy and loss of customer data from either third parties or regulatory bodies resulting in judicial action.

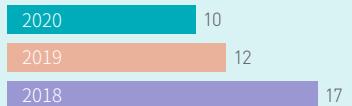


2020 Corporate Information Security Measures Enforcement Report

Policies

10 Regulations

Newly created or revised 10 information security regulations



Certifications

300 mm Fab

Achieved 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)

3 Fabs Achieved

ISO/IEC 15408 Certification

Fabs 14A, 15B, and 12B were successfully certified by the German Federal Office for Information Security (BSI) for ISO/IEC 15408-EAL6 under Common Criteria (Site Certification)

2

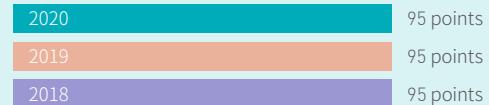
Customer Security Audits

Cooperated with 2 customers in obtaining ISO15408 certification for their products, and ensured their product information protection during manufacturing

Survey

95 Points

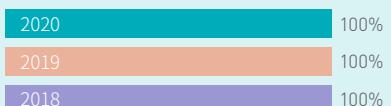
- Average score of 95 for employee approval of information protection-related policies
- Conducted an information protection engagement survey in 2020, collected over 43,000 surveys with over 82% response rate



Training programs/Promotion campaigns

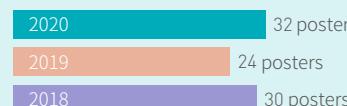
100%

All new employees, a total of over 5,000 individuals, completed information security and protection training courses



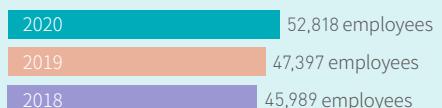
32 Posters

A total of 32 posters were created to promote important regulations and announcements regarding information protection and information security



52,818 Employees

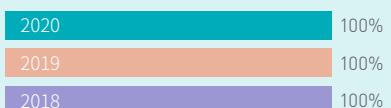
52,818 employees completed the annual information security online refresher e-learning course



- Major events and new regulations in 2020
- Case studies on information security regulatory violations
- Ways to check information security or escalate issues concerning security regulations and seeking consultancy if needed

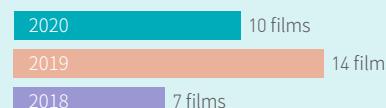
100%

All new vendors, a total of over 23,000 individuals, completed PIP training courses



10 Micro Movies

A total of 10 micro movies were created to promote important regulations and announcements regarding information protection and information security



3 Issues of Supplier Information Security Newsletter

Over 150,000 subscribers received Supplier Information Security Newsletter

NEW

6 Email Phishing and Social Engineering Drills

Conducted 6 email phishing and social engineering drills, involving more than 40,000 participants

NEW

Note: 2020 PIP performance indicators cover TSMC's Taiwan facilities and overseas subsidiaries.

Events/Violations

0.05 %

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

Appendix

About this Report	202
Participation in Industry Associations and Non-profit Organizations	205
ESG Performance Summary	206
GRI Standards Comparison Table	208
Climate Change Management Framework	225
Sustainability Accounting Standards Board	227
Independent Third Party Assurance Statement	229
Contact Information	230

About this Report

Working towards sustainability, TSMC strives for a better future along with its employees, shareholders and investors, customers, suppliers and contractors, the government, society, and all other stakeholders. TSMC has issued non-financial reports for 22 consecutive years. In accordance with the standards set by the Global Reporting Initiative (GRI), Task Force on Climate-related Financial Disclosures (TCFD), and Sustainability Accounting Standards Board (SASB), the reports present the expectations and feedback given by various stakeholders regarding the Company's daily operations. The reports have become an important tool for managing sustainability efforts, disclosing sustainability strategies and measures, and sharing achievements. TSMC is committed to making positive changes for a better future.



Reporting Period

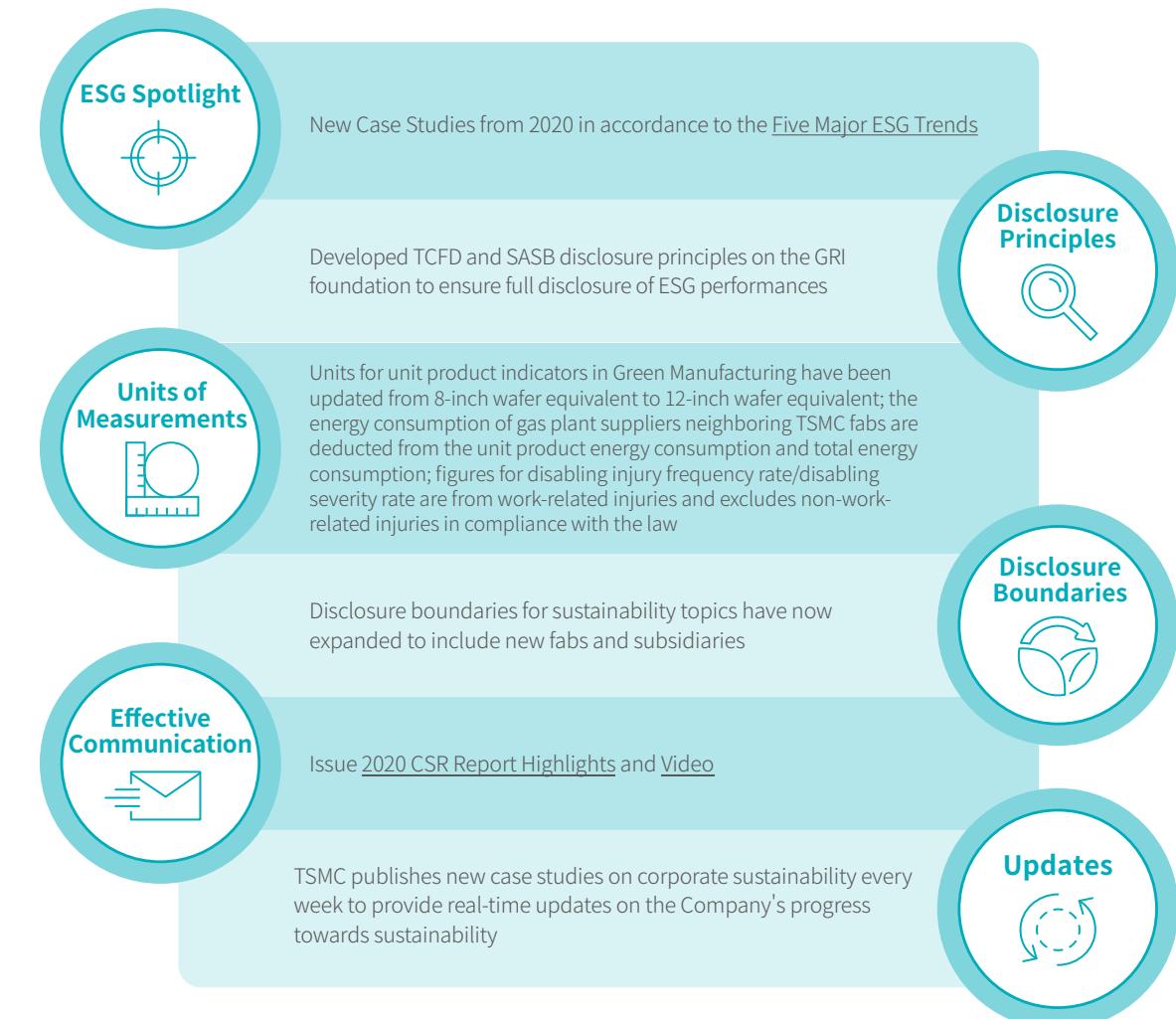
The reporting period is between January 1, 2020 and December 31, 2020. The report is published in June 2021 in both English and Chinese, and is available on [TSMC's ESG website](#). It mainly covers the major topics of interest to stakeholders as well as TSMC's practices in the economic, environmental, and social dimensions. Visit the following links for more data and information.



Reporting Scope

This report includes TSMC Taiwan Facilities (corporate headquarters, wafer fabs in Taiwan, advanced backend fabs) TSMC (China), TSMC (Nanjing), WaferTech, VisEra, and [other subsidiaries](#). Compared to 2019, Fab18 P3 expanded its facilities in Taiwan and started operation. If the scope of reporting is different from the above statements, a note will be added to explain any difference in that paragraph.

Primary Changes in the 2020 ESG Disclosures





Data Collection Boundaries for Sustainable Development Issues

● Collect complete data

● Collect partial data

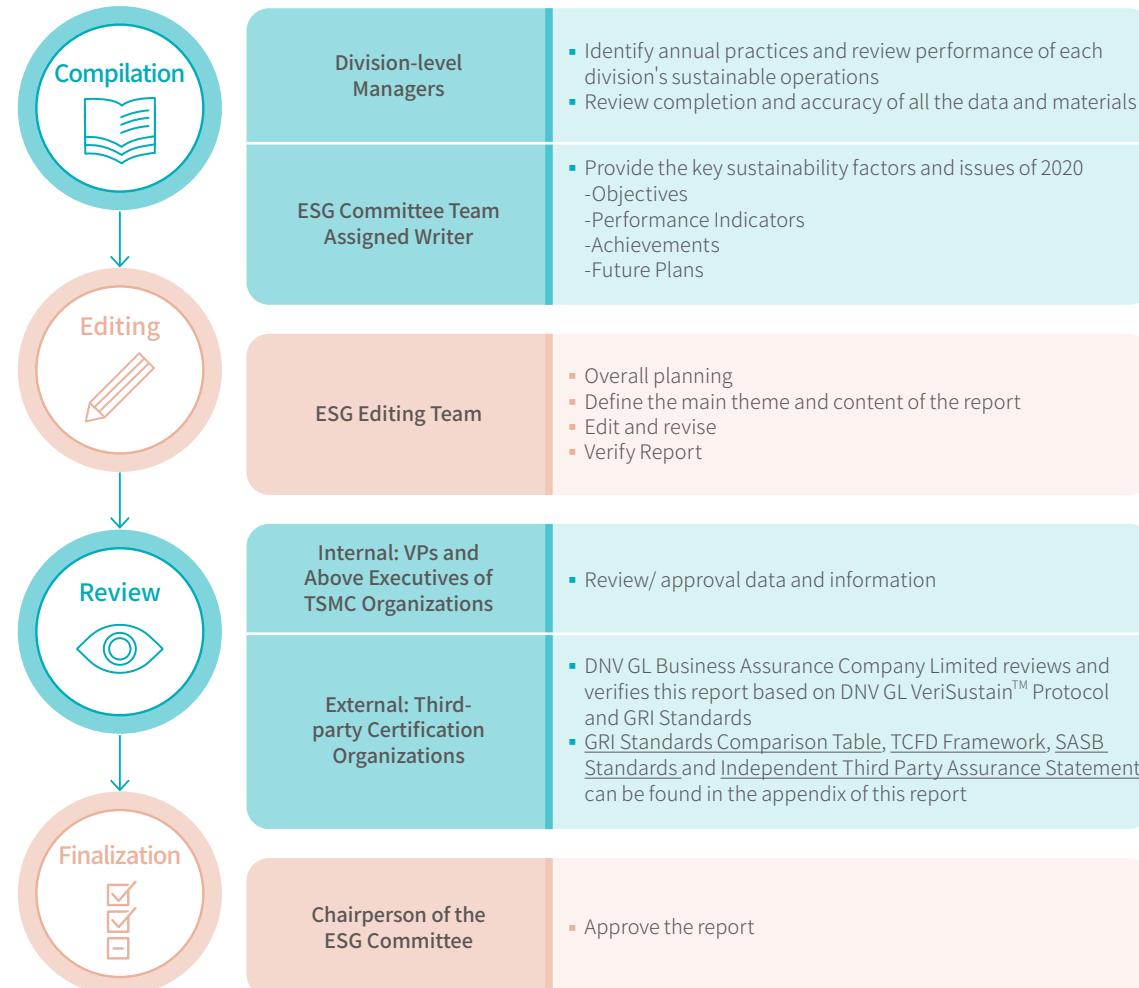
— The issue lacks materiality to the institution and is not included in the boundary of data collection

Issue	Taiwan Facilities ^{Note 1}	WaferTech	TSMC (China)	TSMC (Nanjing)	VisEra	Other Subsidiaries ^{Note 2}
Innovation Management	●	—	●	●	—	●
Product Quality	●	●	●	●	●	—
Customer Service	●	●	●	●	●	●
Supplier Sustainability Management	●	●	●	●	●	—
Climate Change and Energy Management	●	●	●	●	●	●
Water Management	●	●	●	●	●	—
Waste Management	●	●	●	●	●	—
Air Pollution Control	●	●	●	●	●	—
Talent Attraction and Retention	●	●	●	●	●	●
Talent Development	●	●	●	●	●	●
Human Rights	●	●	●	●	●	●
Occupational Safety and Health	●	●	●	●	●	—
Social Participation	●	—	—	—	—	—

Note 1: TSMC's facilities 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



Note 1: DNV GL VeriSustain™ Protocol is consistent with AA 1000 Accountability Principles (AA1000AP) and ISAE 3000.

Note 2: For the United Nations Global Compact (UNGC) Comparison Table and other related certification and verification documents, please visit [TSMC's ESG website](#).

Report Writing Guidelines and Principles



ESG

Standards

- GRI Standards: Comprehensive Option
- TCFD Framework
- SASB Standards
- AA 1000 Accountability Principle

Certification Organization

- DNV GL Business Assurance Co. Ltd.



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 TSMC's ESG Newsletter.

Responsible Unit: ESG Committee
 ESG Website: <http://www.tsmc.com.tw/csr/en/index.html>
 Email: CSRSURVEY@TSMC.COM
 Phone: +886-3-5636688
 Address: 8, Li-Hsin Rd. 6, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C



Participation in Industry Associations and Non-profit Organizations^{Note1}

TSMC's Corporate Social Responsibility vision is to uplift society, and our mission is integrity, strengthening environmental protection, and caring for the disadvantaged. Under this vision and mission, TSMC participates in a variety of industry associations and 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^{Note2}. With the threat and challenges brought by the COVID-19 pandemic around the world, TSMC applied our unique knowledge and resources to provide aid and relief. TSMC provided aid to areas most in need of resources, including Taiwan, Europe, the United States, and Mainland China to fight against pandemic and save lives. Following the announcement to build and operate

an advanced semiconductor fab in the United States, TSMC expanded participation in industry associations and chambers of commerce in the United States. In 2020, TSMC participated in more than 100 industry associations and non-profit organizations at home and abroad, with expenditures of over NT\$40.19 million^{Note3}. Total expenditures in the past five years (2016~2020) were about NT\$139.74 million^{Note4}.

As a leading semiconductor company, TSMC aims to use its influence in the industry to join hands with other enterprises to work for our mutual benefit in order to adapt to changes in the industry and the international environment, as well as improve the Company's quality and competitiveness. 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 global and domestic semiconductor industry. In addition to participating in the main industry associations in the field of semiconductors, the Company also 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 to steer industry development include:

- Taiwan Semiconductor Industry Association (TSIA)
- Semiconductor Industry Association (SIA)
- Semiconductor Equipment and Materials International (SEMI)
- Global Semiconductor Alliance (GSA)
- Taiwan IC Industry & Academia Research Alliance
- Information Technology Industry Council (ITIC)
- Information Technology and Innovation Foundation (ITIF)
- The Allied Association for Science Park Industries
- Chinese National Association of Industry and Commerce, Taiwan
- Taiwan Electrical and Electronics Manufacturers' Association
- Monte Jade Science & Technology Association of Taiwan

TSMC Chairman Mark Liu has served as Chairman of the TSIA since 2019, Senior Vice President Y.P. Chin currently serves as chairperson of TSIA's Energy Committee, and Director Fung Han-Wen currently serves as chairperson of TSIA's Environment, Safety and Health Committee. Senior Director Tuan Hsiao-Chin currently serves as chairperson of SEMI's MEMS & Sensors Committee, Senior Director Arthur Chuang currently serves as chairperson of SEMI's High-Tech Facility Committee, Director John Lin currently serves as chairperson of SEMI's IC Committee, and Director M.D. Chen currently serves as chairperson of SEMI's Materials Committee. Senior Vice President Rick Cassidy currently serves as a member of the Board of Directors at GSA. Senior Vice President Y.P. Chin currently serves as standing director of The Allied Association for Science Park Industries, and Vice President Connie Ma currently serves as a standing controller of The Allied Association for Science Park Industries.

Technology Innovation

Technology innovation is the key driving force moving the technology industry forward. TSMC not only cares for and invests in technology innovation and participates in the definition of technical standards, it 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
- Taiwan Association for Trade Secrets Protection (TTSP)
- Peripheral Component Interconnect Special Interest Group (PCI SIG)
- JEDEC

TSMC Vice President and General Counsel Sylvia Fang jointly founded the Taiwan Association for Trade Secrets Protection (TTSP) in 2015, and served as its Chairman for the first two terms to help promote legal reform of Taiwan's trade secret laws and regulations. Currently she is a standing executive director of the TTSP.

Corporate Governance

The robustness of a company's corporate governance not only affects that company's development, it can also affect the economic stability of a region. TSMC places great importance on corporate governance and has received invitations to speak on our principals and methods for corporate governance, as well as discuss the results of TSMC's 33 years of corporate governance. TSMC participates in industry associations in the area of corporate governance including:

- Asian Corporate Governance Association (ACGA)
- Asia Business Council
- Taiwan Corporate Governance Association (TSGA)

Environmental Sustainability

As TSMC's business continues to grow, its requirements for sustainable measures such as energy conservation, carbon reduction, water saving, and waste reduction all continue to increase as well, and the Company devotes much attention to its participation in the associations and organizations related to the issue of environmental sustainability. In addition to sharing our experiences with the organizations below, TSMC has appointed more than 10 internal experts to serve as committee members and committee chairpersons in the TSIA and the Allied Association for Science Park Industries to set standards in energy, water, environmental protection, and occupational health, and meet these standards together. TSMC participates in industry associations and non-profit organizations in the area of environmental sustainability including:

- Science and Technology in Society forum
- Taiwan Institute for Sustainable Energy/ Taiwan Center for Corporate Sustainability
- Business Council for Sustainable Development of Taiwan
- RE100

TSMC Senior Vice President Lora Ho currently serves as member of the Taiwan Center for Corporate Sustainability board of directors.

Human Rights and Supply Chain Management

TSMC is an official member of the Responsible Business Alliance, and in addition to meeting the alliance's requirements in auditing suppliers regarding labor, safety and health, environment, ethics, and management systems, we have also led our suppliers to join this alliance to expand its effectiveness. TSMC also requires all suppliers to commit to the "Assurance to Comply with TSMC's Code of Ethics and Business Conduct" ensuring that TSMC employees and suppliers follow high ethical standards. TSMC participates in industry associations in the area of human rights and supply chain management including:

- Responsible Business Alliance (RBA)
- Responsible Minerals Initiative

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 166 to 188 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 three largest membership fees paid or donations made by TSMC in 2020, in descending order, are:

1) Information Technology Industry Council (ITIC)/ NT\$11,772,400

The United States is one of TSMC's primary markets. TSMC participates in the ITIC in the United States 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 government on the importance of technology to global economy.

2) Taiwan Semiconductor Industry Association (TSIA)/NT\$5,010,984

TSMC participates in the TSIA to support Taiwan's semiconductor industry and 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\$4,797,440

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.

Note 4: TSMC's expenditures of membership and donation for industry associations and non-profit organizations between 2016 and 2020 were NT\$36,296,334, NT\$21,176,571, NT\$21,735,668, NT\$20,338,992, and NT\$40,197,059 respectively.

Note 5: In addition to the expenditures disclosed in Note 4 above, TSMC's government relations expenses in 2020 was NT\$40,857,291, with the primary expense being employee payroll. TSMC did not make any political donations in reporting period.



ESG Performance Summary^{Note1}

Key Indicators		2016	2017	2018	2019	2020
Economic	Revenue (NT\$ billion)	948	977	1,031	1,070	1,339
	Net Income (NT\$ billion)	334	343	351	345	518
	Income Tax Expense (NT\$ billion)	52	53	46	45	67
	R&D Expenditures (NT\$ billion)	71	81	86	91	109
	Capital Expenditures (NT\$ billion)	328	331	316	460	507
Environmental	Greenhouse Gas Emission (Metric Ton–CO ₂ equivalent) (Scope 1 and Scope 2 Market-based)	7,413,953	8,156,140	8,475,367	8,769,614	9,910,209
	Scope 1 (Metric Ton–CO ₂ equivalent)	2,035,510	2,075,928	2,125,725	2,071,743	2,450,354
	Taiwan Facilities	1,648,268	1,640,532	1,705,746	1,678,754	2,150,339
	Subsidiaries ^{Note2}	387,242	435,396	419,979	392,989	300,015
	Scope 2 (Metric Ton–CO ₂ equivalent) (Market-based)	5,378,443	6,080,212	6,349,642	6,697,872	7,459,856
	Taiwan Facilities	5,030,647	5,702,511	6,325,931	6,673,235	7,429,951
	Subsidiaries ^{Note2}	347,796	377,701	23,711	24,637	29,905
	Scope 2 (Metric Ton–CO ₂ equivalent) (Location-based)	347,796	377,701	7,001,654	7,350,195	8,282,509
	Scope 3 (Metric Ton–CO ₂ equivalent)	3,767,411	4,242,521	4,315,497	5,307,028	5,511,486
	Fluorinated Greenhouse Gas Emission (Metric Ton–CO ₂ equivalent)	1,259,527	1,194,136	1,185,433	1,081,212	1,311,530
	NO _x Emissions (Metric Tons)	60.54	82.5	118.92	116.67	170.36
	SO _x Emissions (Metric Tons)	33.08	43.87	39.71	32.18	38.13
	VOC Emissions (Metric Tons)	163.6	170.8	168.4	102.1	106.8
	Energy Consumption (GWh) (Including electricity, nature gas and diesel)	9,848	12,016	13,167	14,323	16,919
	Direct Energy Consumption (GWh) (Including nature gas and diesel)	489	628	726	747	861
	Indirect Energy Consumption (GWh) (Electricity)	9,358	11,388	12,441	13,576	16,058
	Water Consumption (Million Metric Tons)	42.0	48.9	56.8	64.3	77.3
	Taiwan Facilities	38.6	45.2	51.0	58.0	70.6
	Subsidiaries ^{Note2}	3.4	3.8	5.7	6.3	6.7
	Process Water Recycling Rate (%) ^{Note3}	87.4	87.5	87.5	86.7	86.4
	Total Water Saving (Million Metric Tons) ^{Note3}	94.3	103.4	129.0	133.6	173.0

(Continued on next page)



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	Key Indicators	2016	2017	2018	2019	2020
Environmental	Ultra-Pure Water Usage (Million Metric Tons)	68.8	79.7	85.1	90.1	102.4
	Tetramethylammonium hydroxide (TMAH)	16.3	12.9	13.1	7.9	6.3
	Copper ion (Cu^{2+})	0.19	0.22	0.18	0.09	0.07
	Waste Generated (Metric Tons)	298,761	369,745	393,784	416,715	575,740
	General Waste Generated (Metric Tons)	163,584	201,114	213,840	219,584	277,340
	Taiwan Facilities	158,899	196,077	208,340	212,465	269,640
	Subsidiaries ^{Note2}	4,685	5,037	5,501	7,119	7,700
	Hazardous Waste Generated	135,177	168,631	179,944	197,131	298,400
	Taiwan Facilities	133,085	165,891	169,427	183,015	280,635
	Subsidiaries ^{Note2}	2,092	2,740	10,516	14,116	17,765
Social	Waste Recycling Rate (%)	95	95	95	96	95
	Taiwan Facilities	95	95	95	96	95
	Subsidiaries ^{Note2}	79	80	83	74	77
	ISO 14001 Certified Facilities	18	20	22	22	23
	ISO 14001 Certified Facilities (%)	100	100	100	100	100
	Numbers of Employee	46,968	48,602	48,752	51,297	56,831
	Employee Training Hours	623,711	639,852	540,408	741,178	926,379
	Women in Workforce (%)	40.1	39.3	38.7	37.8	37.1
	Females in Management (%)	11.7	12.3	12.6	12.7	12.5
	Females in Junior Management (%)	12.8	13.6	13.7	13.6	13.0
	Females in Top Management (%)	20.0	20.0	18.5	11.1	10.0
	Turnover Rate (%)	4.3	4.2	4.5	4.9	5.3
	Voluntary Turnover Rate (%)	4.2	4.1	4.3	4.8	5.1
	Safety-Injury Frequency Rate ^{Note4}	0.29	0.35	0.47	0.52	0.42
	Safety-Injury Severity Rate ^{Note5}	3	3	7	9	4
	Fatalities-Employees	0	0	0	0	0
	Fatalities-Contractors	0	0	0	0	0
	Cash Donation (NT\$ million) ^{Note6}	89.1	301.2	199.0 ^{Note7}	163.5	144.4

Note 1: Figures from all Taiwan facilities and subsidiaries of TSMC.

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 facilities 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.

Note 6: Cash donation is the amount of cash donations by TSMC, TSMC Education and Culture Foundation, TSMC Charity Foundation, TSMC employees and TSMC Employee Welfare Committee.

Note 7: In response to the government's renewable energy policy, TSMC purchased 100 GWh green power in 2017, which was the main reason for the increase in annual cash donations. The government's green power purchase plan was terminated at the end of 2017. TSMC is proactively searching for renewable energy.



GRI Standards Comparison Table

Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
GRI 102 : General Disclosures			
102-1	Name of the organization	About TSMC	6
102-2	Activities, brands, products, and services	About TSMC	6
102-3	Location of headquarters	About TSMC	6
102-4	Location of operations	About TSMC	6
102-5	Ownership and legal form	About TSMC; Please refer to 2020 TSMC Annual Report (II) Financial Statements	6
102-6	Markets served	About TSMC	6
102-7	Scale of the organization	About TSMC; Please refer to 2020 TSMC Annual Report (II) Financial Statements	6
102-8	Information on employees and other workers	An Admired Employer: Talent Attraction and Retention - Shared Visions and Values- Workforce Structure All employee number has been disclosed in "Workforce Structure", the number of contractors has also disclosed in the note In 2020, there were 2,605 non-employee workers conducted preventive maintenance tasks for facility systems.	131
102-9	Supply chain	A Responsible Purchaser: Supplier Sustainability Management - Sustainability Risk Management/Local Procurement Optimization Details please refer to 2020 TSMC Annual Report 5.3.5	83
102-10	Significant changes to the organization and its supply chain	About TSMC; Please refer to 2020 TSMC Annual Report (II) Financial Statements A Responsible Purchaser: Supplier Sustainability Management	6 73
102-11	Precautionary Principle or approach	The risk management organization regularly briefs the 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. The audit committee's chairperson also reports on the risk environment and risk mitigation actions to be taken. TSMC and its subsidiaries are committed to proactively and cost effectively integrating and managing strategic, operational, financial and hazardous risks together with potential consequences to operations and financial results. TSMC operates an enterprise risk management (ERM) program and apply a risk map considering likelihood and impact severity to identify and prioritize corporate risks. Various risk treatment strategies are also adopted in response corporate risks as they are identified. Refer section 6.3 Risk Management of 2020 TSMC Annual Report for details of implementation of ERM (Enterprise Risk Management)	131
102-12	External initiatives	Responsible Business Alliance (RBA, the previous EICC) and Responsible Minerals Assurance Process (RMAP, the previous Conflict-free Smelter Program); Participated in RE100; TCFD (Task Force on Climate-related Financial Disclosures) Supporter, committed to evaluating and publicly disclosing climate change risks and opportunities	131
102-13	Membership of associations	Appendix: Participation in Industry Associations and Non-profit Organizations	205
102-14	Statement from senior decision-maker	Sustainable Business Practices: ESG Implementation Framework, ESG Management Platform Letter from the ESG Steering Committee Chairperson, Letter from the ESG Committee Chairperson	17 4
102-15	Key impacts, risks, and opportunities	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
102-16	Values, principles, standards, and norms of behavior	Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance Please refer to 2020 TSMC Annual Report : 3.5 Code of Ethics and Business Conduct 3.6 Regulatory Compliance	192
102-17	Mechanisms for advice and concerns about ethics	Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance Please refer to 2020 TSMC Annual Report : 3.5 Code of Ethics and Business Conduct 3.6 Regulatory Compliance 5.5.6 Employee Engagement/Employee Communication	192
102-18	Governance structure	Sustainable Business Practices: ESG Management Platform Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance Please refer to 2020 TSMC Annual Report : 2.3.1 Organization Chart 3 Corporate Governance	18
102-19	Delegating authority	Sustainable Business Practices: ESG Management Platform	18
102-20	Executive-level responsibility for economic, environmental, and social topics	Letter from the ESG Steering Committee Chairperson; Letter from the ESG Committee Chairperson Sustainable Business Practices: ESG Management Platform	4 18
102-21	Consulting stakeholders on economic, environmental, and social topics	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication Operations and Governance: Corporate Governance Please refer to 2020 TSMC Annual Report : 3.4 Taiwan Corporate Governance Implementation as Required by the Taiwan Financial Supervisory Commission/Assessment Item 5	21 190
102-22	Composition of the highest governance body and its committees	Operations and Governance: Corporate Governance <ul style="list-style-type: none">▪ TSMC's Board of Directors consists of distinguished members with a great breadth of experience as world-class business leaders or professionals. All of them have management experience and competency in economic, environmental and social topics.▪ TSMC established its Audit Committee and Compensation Committee in 2002 and 2003, respectively, both of which are now composed entirely of independent directors. Please refer to 2020 TSMC Annual Report : 2.4.1 Information Regarding Board Members 3 Corporate Governance	21
102-23	Chair of the highest governance body	The Chair of the highest governance body is not an executive officer	



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
102-24	Nominating and selecting the highest governance body	<p>In 2019, TSMC established “Guidelines for Nomination of Directors”, which describes the procedures and criteria for the nomination, qualification and evaluation of candidates for Directors. Please refer to our website.</p> <p>TSMC envisions the membership of its esteemed Board of Directors to be composed of highly ethical professionals with the necessary knowledge, experience and understanding from diverse backgrounds. TSMC envisions its Board to be composed of as many independent directors as possible, and the independence of each independent director candidate is also considered and assessed under relevant laws. Therefore, TSMC composes its Board with world-class candidates who are/were international or local business leaders in the high-tech industry, prestigious academics or other professionals excelling in their chosen field of expertise. All of them have management experience and competency in economic, environmental and social topics.</p> <p>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 independence of each independent director candidate is also considered and assessed under relevant law such as the Taiwan “Regulations Governing Appointment of Independent Directors and Compliance Matters for Public Companies”. Under R.O.C. law, in which TSMC was incorporated, any shareholders holding one percent or more of our total outstanding common shares may nominate their own candidate to stand for election as a Board member. This democratic mechanism allows our shareholders to become involved in the selection and nomination process of Board candidates. The final slate of candidates is put to the shareholders for voting at the relevant annual shareholders' meeting.</p> <p>There are no limits on the number of terms that a director may serve. We believe the Company benefits from the contributions of directors who have over their years of dedicated service acquired unique insights into the operations and financial developments of the Company. The Company reviews the appropriateness of each director's continued service to ensure there are new viewpoints available to the Board.</p>	
102-25	Conflicts of interest	<p>The avoidance of conflicts of interests is governed by several corporate processes. First, any director or executive officer who, for him/herself or on behalf of another, wishes to engage in any business activity that overlaps with TSMC's business must obtain the prior approval of our shareholders' meeting or Board of Directors respectively in accordance with relevant laws. Second, each board member and executive officer must complete an annual declaration on related party transactions which is reviewed by our Audit Committee. Third, we are subject to strenuous reporting requirements on reporting any related party transactions under both R.O.C. and U.S. security rules.</p> <p>Please refer to 2020 TSMC Annual Report:</p> <ul style="list-style-type: none">2.4.1 Information Regarding Board Members4.1.4 Major Shareholders4.1.8 Related Party Relationship among TSMC's 10 Largest Shareholders5.3.5 Raw Materials and Supply Chain Management-Suppliers Accounted for at Least 10% of Annual Consolidated Net Procurement5.4 Customer Trust-Customers Accounted for at Least 10% of Annual Consolidated Net Revenue8.1 Subsidiaries <p>Please refer to Consolidated Financial Statements for 2020:</p> <p>Note 38: Additional Disclosures</p> <p>Table 6 - Total Purchases from or Sales to Related Parties of at Least NT\$100 Million or 20% of the Paid-in Capital</p>	



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
102-26	Role of highest governance body in setting purpose, values, and strategy	<p>Sustainable Business Practices: ESG Implementation Framework, ESG Management Platform</p> <ul style="list-style-type: none">▪ TSMC's Chairperson chairs the ESG Steering Committee and the ESG Committee chair acts as the executive secretary. The Chairperson of the ESG Committee reports annually to the Board of Directors on implementation results of the prior year and the work planned for the upcoming year (the report includes economic, environmental and social topics). In addition, the Board of Directors also reviews the annual plan and the donations of the "TSMC Education and Culture Foundation" and "TSMC Charity Foundation".▪ TSMC's Board of Directors consists of distinguished members with a great breadth of experience as world-class business leaders or professionals. All of them have management experience and competency in economic, environmental and social topics.▪ TSMC has set an "ESG Policy" and an "ESG Matrix", and the "ESG Matrix" clearly defines the scope of the TSMC's responsibilities.	17
102-27	Collective knowledge of highest governance body	<p>Please refer to 2020 TSMC Annual Report:</p> <p>3. Corporate Governance "Continuing Education/Training of Directors" in 2020.</p> <p>Quarterly management reports and semi-annual CSR reports develop and enhance the Board of Directors' collective knowledge of economic, environmental and social topics.</p>	
102-28	Evaluating the highest governance body's performance	<p>Operations and Governance: Corporate Governance-Board of Directors and Committees-Board and Audit Committee Performance Evaluations</p> <p>Please refer to 2020 TSMC Annual Report:</p> <p>3.1 Corporate Governance/2020 Corporate Governance Awards and Ratings</p> <p>3.2 Board of Directors/Director's Compensation</p> <p>3.4 Taiwan Corporate Governance Implementation as Required by Taiwan Financial Supervisory Commission/Assessment Item 3 - (3)</p> <p>7 Corporate Social Responsibility/2020 ESG Awards and Ratings</p>	190
102-29	Identifying and managing economic, environmental, and social impacts	<p>Please refer to 2020 TSMC Annual Report:</p> <p>3.2 Board of Directors</p> <p>The Board of Directors considers economic, environmental and social topics and their impact, risks and opportunities, and stakeholder opinions, when resolving important company matters, for example, when approving capital appropriations. The Board will also review the corporate strategies proposed by TSMC management, evaluate the prospects of these strategies, review their progress, and provide guidance to TSMC management when needed.</p> <p>3.2.1 Audit Committee</p> <p>3.2.2 Compensation Committee</p> <p>3.4 Taiwan Corporate Governance Implementation as Required by Taiwan Financial Supervisory Commission/Assessment Item 5</p> <p>6.3 Risk Management</p> <p>7 Corporate Social Responsibility/ESG Management/Stakeholder Engagement</p>	



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
102-30	Effectiveness of risk management processes	Please refer to 2020 TSMC Annual Report : 6.3 Risk Management	
102-31	Review of economic, environmental, and social topics	Operations and Governance: Corporate Governance-Board of Directors and Committees Please refer to 2020 TSMC Annual Report : 3. Corporate Governance 6.3 Risk Management	190
102-32	Highest governance body's role in sustainability reporting	Please refer to 2020 TSMC Annual Report : 3 Corporate Governance (This report is reviewed and approved by the Company's functional heads and Chairperson of the ESG Committee)	
102-33	Communicating critical concerns	In addition to holding regular meetings, TSMC management will regularly provide to the Board of Directors material company reports and information: <ul style="list-style-type: none">▪ Accounting department: monthly financial information and quarterly financial statements▪ Internal Audit department: quarterly internal audit report▪ Public Relations department: press releases In addition, the Board maintains a regular line of communication with TSMC management, which will remain open if an event of critical concerns occurs. Please refer to 2020 TSMC Annual Report : 3.2.4 Director and Committees Members' Attendance/Audit Committee Meeting Status	
102-34	Nature and total number of critical concerns	Please refer to the material information the Company has disclosed on Market Observation Post System (MOPS), which indicates the total number and nature of critical concerns. Please refer to 2020 TSMC Annual Report : 6.3 Enterprise Risk Management Framework: TSMC and its subsidiaries adopt risk management strategies corresponding to risk level through implementing an Enterprise Risk Management (ERM) system that weighs strategic, operational, financial and hazardous risks that may disrupt the Company's operations or financial results. If any events of critical concerns occur, the Company can resolve the event by using existing risk management mechanisms.	
102-35	Remuneration policies	Please refer to 2020 TSMC Annual Report : The extent and value of the services provided for the management of the Corporation and operating performance includes objectives for economic, environmental, and social topics. 2.4.2 Remuneration Paid to Directors 2.5.2 Compensation Paid to CEO and Vice Presidents 2.5.3 Employees' Profit Sharing Bonus Paid to Management Team Pension funded according to applicable law and there is no difference with other employees. And also, 2020 CSR Report: An Admired Employer: Talent Attraction and Retention-Compensation and Benefits-Benefits Better Than Statutory Regulations, Solid Pension System. Our compensation is above the industry peers, and our benefit program also exceeds statutory requirements.	138



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
102-36	Process for determining remuneration	An Admired Employer: Talent Attraction and Retention-Competitive Compensation Package Please refer to 2020 TSMC Annual Report : 3.2.2 Compensation Committee 3.2.4 Director and Committees Members' Attendance/ Compensation Committee Meeting Status	135
102-37	Stakeholders' involvement in remuneration	Please refer to 2020 TSMC Annual Report : 4.1.12 Compensation to Directors and Profit Sharing to Employees ▪ Based on TSMC's Articles of Incorporation, before paying dividends or bonuses to shareholders, TSMC shall set aside not more than 0.3% of its annual profit to directors as compensation and not less than 1% to employees as a profit sharing. ▪ TSMC's Articles of Incorporation shall be approved by the shareholders and the annual employees' profit sharing and directors' compensation will be reported in the next AGM.	
102-38	Annual total compensation ratio	An Admired Employer: Talent Attraction and Retention-Competitive Compensation Package ▪ Median of global employees annual total compensation ▪ Annual total compensation ratio between CEO and median	135
102-39	Percentage increase in annual total compensation ratio	An Admired Employer: Talent Attraction and Retention-Competitive Compensation Package Headcount and average annual compensation of non-corporate executive full-time employees, and year-over-year difference.	135
102-40	List of stakeholder groups	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
102-41	Collective bargaining agreements	An Admired Employer: Human Rights-Employee Engagement TSMC values employee opinions/interests and therefore offers several communication channels. The highest-level executives of the HR organization are responsible for many of the channels, ensuring that matters are handled in an efficient and confidential manner as we continue to strive towards an open and transparent environment for employees/managers and colleagues to communicate. Furthermore, TSMC respects employees' right to take part in collective bargaining and peaceful rallies. In accordance with legal requirements in Taiwan, the Company regularly holds labor-management meetings to brief employees on Company operations and invite employees to engage in discussions on labor conditions and benefits.	148
102-42	Identifying and selecting stakeholders	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
102-43	Approach to stakeholder engagement	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
102-44	Key topics and concerns raised	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
102-45	Entities included in the consolidated financial statements	About TSMC; Please refer to 2020 TSMC Annual Report (II) Financial Statements	6
102-46	Defining report content and topic Boundaries	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication Appendix: About This Report	21 202
102-47	List of material topics	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
102-48	Restatements of information	▪ TSMC's production is primarily measured in 12-inch wafers. The unit product indicators mentioned in the "A Practitioner of Green Power" are calculated based on 12-inch equivalent wafers. ▪ Only work-related injuries shall be treated as SR/FR, unrelated injuries in the workplace are not considered.	
102-49	Changes in reporting	Appendix: About This Report	202
102-50	Reporting period	Appendix: About This Report	201



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102-51	Date of most recent report	June, 2020	
102-52	Reporting cycle	Appendix: About This Report	202
102-53	Contact point for questions regarding the report	Appendix: About This Report	202
102-54	Claims of reporting in accordance with the GRI Standards	Appendix: About This Report	202
102-55	GRI content index	Appendix: GRI Standards Comparison Table	208
102-56	External assurance	Appendix: Independent Third Party Assurance Statement	229
GRI 103 : Management Approach			
103-1	Explanation of the material topic and its Boundary	Sustainable Business Practices: Materiality Analysis and Stakeholder Communication	21
103-2	The management approach and its components	Please refer to the contents of related topics	
103-3	Evaluation of the management approach	Please refer to the contents of related topics	
GRI 201 : Economic Performance			
201-1	Direct economic value generated and distributed	Sustainable Business Practices: Sustainability Impact An Admired Employer: Talent Attraction and Retention - Compensation and Benefits Operations and Governance: Financial Performance/Tax Policy Appendix: ESG Performance Summary Please refer to 2020 TSMC Annual Report (II) Financial Statements for detailed information.	135 135 196 206
201-2	Financial implications and other risks and opportunities due to climate change	A Practitioner of Green Power: Climate Change and Energy Management-Climate Risks Identification, Climate Risks Matrix, Climate Financial Risk Analysis Appendix: Climate Change Management Framework	92 225
201-3	Defined benefit plan obligations and other retirement plans	An Admired Employer: Talent Attraction and Retention-Compensation and Benefits-Solid Pension System-Pension Allocation and Preparation TSMC's defined contribution plan recognized expenses of NT\$2,809,484 thousand for the years ended December 31, 2020. TSMC makes monthly contributions equal to 6% of each employee's monthly salary in Taiwan. TSMC's oversea subsidiaries also make monthly contributions at certain percentages of the basic salary of their employees in accordance with local practices.	138
201-4	Financial assistance received from government	Financial assistance received from the R.O.C. government: In 2020, TSMC enjoyed a tax benefit of NT\$47.1 billion from five-year tax exemption for capital investments made in previous years. (Our wafer fabs in China received subsidies from the local government, but according to the agreement, TSMC can not disclose the content and amount.)	



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GRI 202 : Market Presence			
202-1	Ratios of standard entry level wage by gender compared to local minimum wage	<p>An Admired Employer: Talent Attraction and Retention - Compensation and Benefits - Competitive Compensation Package</p> <p>In 2020, the average overall salary of a TSMC new engineer with a master's degree is more than NT\$1.8 million. The salary includes 12-month base salary, two-month year-end bonus, cash bonus and profit sharing. The average overall salary of direct employees is higher than NT\$1 million, which is 4 times of the minimum wage in Taiwan.</p> <p>For the non-TSMC employee workers, TSMC requests their companies that the compensation paid to their workers shall comply with all applicable wage laws, including those relating to minimum wages, overtime hours and legally mandated benefits.</p>	135
202-2	Proportion of senior management hired from the local community	<p>In the 2020 TSMC Annual Report, 2.5.1 Information Regarding Management Team, we disclosed that 19 out of 25 members of the management team are local, accounting for 76.0%.</p> <p>Definition:</p> <p>Senior management: management team is disclosed in 2020 TSMC Annual Report, 2.5.1 Information Regarding Management Team</p> <p>Local: defined by nationality</p> <p>Important base: defined as where the headquarter located and where the majority of employees work.</p>	
GRI 203 : Indirect Economic Impacts			
203-1	Infrastructure investments and services supported	Power to Change Society: TSMC Charity Foundation. Contents including donation, in-kind giving, construction services, repair services, volunteers services, etc.	176
203-2	Significant indirect economic impacts	<p>In total, TSMC deployed 281 distinct process technologies, and manufactured 11,617 products for 510 customers in 2020 to continue to bring significant contribution to the advancement of modern society.</p> <p>Sustainable Business Practices: Sustainability Impact</p>	
GRI 204 : Procurement Practices			
204-1	Proportion of spending on local suppliers	A Responsible Purchaser: Local Procurement Optimization	83
GRI 205 : Anti-corruption			
205-1	Operations assessed for risks related to corruption	<p>Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance</p> <p>TSMC assesses anti-corruption risk by function rather than by geographical region since more than 90% of TSMC employees work in Taiwan. Based on the TSMC core value of Integrity, our anti-corruption risk assessment incorporates applicable regulations, classifies corruption by type, accounts for our business operation procedures and specifications, requires full compliance and implementation by all employees, mandates annual self-assessments and examinations, and establishes open reporting channels (internal and external) and whistleblower protection. An objective of our anti-corruption risk assessment is to detect abnormal incidents early and effectively prevent the occurrence of corruption. Based on TSMC 2020's training regimes and awareness campaign, employee ethics survey, annual CSA (Control Self-Assessment) Reports received from each division, and a review of the reported anti-corruption incidents from our reporting channels and the results of subsequent investigations thereto, our corruption risk is appropriately controlled and no significant corruption risk was identified.</p> <p>Please refer to 2020 TSMC Annual Report:</p> <p>3.5 Code of Ethics and Business Conduct</p> <p>3.6 Regulatory Compliance</p>	192



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205-2	Communication and training about anti-corruption policies and procedures	<p>Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance</p> <p>Integrity is the most important value of TSMC's culture. TSMC publishes the "TSMC Anti-Corruption Commitment" to reiterate that TSMC take a zero-tolerance approach toward corruption, meanwhile elaborating the regulations regarding avoiding conflicts of interest, political and charitable contributions, and whistleblower channel. Please refer to our website.</p> <p>TSMC provides anti-corruption and ethics training when each new colleague. For the current colleagues, TSMC provides a variety of training courses in the form of face-to-face courses, communication meetings, online compulsory and elective courses, and provides regulatory compliance guidelines and FAQs through the factory posters, company's internal website, internal e-mails, and education propaganda articles, etc., to ensure colleagues access to new knowledge of regulations and deepen their knowledge of various issues.</p> <p>In 2020, TSMC provided current colleagues with "Annual Ethics and Compliance Training Course" (mandatory 0.5 hour online course). The completion rate of each operating base is as follows: 99.7% in Taiwan, and Asian regions outside Taiwan (Mainland, Japan, South Korea), North America (U.S., Canada), and Europe are all 100%.</p> <p>Please refer to 2020 TSMC Annual Report:</p> <p>3.2.1 Audit Committee 3.5 Code of Ethics and Business Conduct 3.6 Regulatory Compliance</p>	192
205-3	Confirmed incidents of corruption and actions taken	<p>Operations and Governance: Corporate Governance-Ethics and Regulatory Compliance</p> <p>Please refer to 2020 TSMC Annual Report:</p> <p>3.5 Code of Ethics and Business Conduct</p>	192
GRI 206 : Anti-competitive Behavior			
206-1	Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	<p>Please refer to 2020 TSMC Annual Report:</p> <p>6.3.3 Operational Risks/Risks Associated with Litigious and Non-litigious Matters</p>	
GRI 207 : Tax			
207-1	Approach to tax	Operations and Governance: Tax Policy	196
207-2	Tax governance, control, and risk management	Operations and Governance: Tax Policy	196
207-3	Stakeholder engagement and management of concerns related to tax	Operations and Governance: Tax Policy	196
207-4	Country-by-country reporting	<p>The Organization for Economic Cooperation and Development (OECD) developed a country-by-country reporting system in which the Taiwan R.O.C. government participates. This reporting process was developed in part to aid tax authorities in their audit selection processes. Under the OECD agreement, this reporting information is kept with tax authorities who have the tax expertise to understand and assess this business-sensitive tax information. TSMC supports the business information provided as part of the country-by-country reporting system remaining exclusively with government tax authorities.</p>	



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GRI 302 : Energy			
302-1	Energy consumption within the organization	Appendix: ESG Performance Summary (Environmental Dimension)	206
302-2	Energy consumption outside of the organization	A Practitioner of Green Power: Climate Change and Energy Management - GHG Emissions Inventory	94
302-3	Energy intensity	Appendix: ESG Performance Summary (Environmental Dimension)	206
302-4	Reduction of energy consumption	A Practitioner of Green Power: Climate Change and Energy Management-Increase Energy Efficiency	97
302-5	Reductions in energy requirements of products and services	A Practitioner of Green Power: Climate Change and Energy Management - Increase Energy Efficiency Please refer to 2020 TSMC Annual Report : 7.2.2 Sustainable Products	97
GRI 303 : Water			
303-1	Interactions with water as a shared resource	A Practitioner of Green Power: Water Management-Risk Management of Water Resources	104
303-2	Management of water discharge-related impacts	A Practitioner of Green Power: Water Management-Develop Preventive Measures	109
303-3	Water withdrawal	A Practitioner of Green Power: Water Management-Risk Management of Water Resources It is necessary to disclose the proportion of the water withdrawal to the total water withdrawal of the water area in the high or extremely high water stress risk area according to the World Resources Institute (WRI) water stress evaluation. TSMC (China) is a high-risk area of water stress. Its water withdrawal area is the Jinze Reservoir, which supplies 2.56 million tons per day. TSMC (China) uses 0.6 million tons of water per day, accounting for 0.2% of its water withdrawal area.	104
303-4	Water discharge	A Practitioner of Green Power: Water Management-Risk Management of Water Resources	104
303-5	Water consumption	A Practitioner of Green Power: Water Management-Risk Management of Water Resources	104



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GRI 305 : Emissions			
305-1	Direct (Scope 1) GHG emissions	Appendix: ESG Performance Summary (Environmental Dimension)	206
305-2	Energy indirect (Scope 2) GHG emissions	Appendix: ESG Performance Summary (Environmental Dimension)	206
305-3	Other indirect (Scope 3) GHG emissions	Appendix: ESG Performance Summary (Environmental Dimension)	206
305-4	GHG emissions intensity	Appendix: ESG Performance Summary (Environmental Dimension)	206
305-5	Reduction of GHG emissions	A Practitioner of Green Power: Climate Change and Energy Management-GHG Reduction Best Practices, GHG Emissions InventoryA Practitioner of Green Power: Climate Change and Energy Management-Expanding Usage of Renewable Energies	94 95
305-6	Emissions of ozone-depleting substances (ODS)	TSMC does not use Montreal Protocol restricted ODS.	
305-7	Nitrogen oxides (NO _x), sulfur oxides (SO _x), and other significant air emissions	A Practitioner of Green Power: Air Pollution Control Emissions in 2020: NO _x : 170.36 tons SO _x : 38.13 tons	122
GRI 306 : Effluents and Waste			
306-1	Waste generation and significant waste-related impacts	A Practitioner of Green Power: Waste Management	112
306-2	Management of significant waste-related impacts	A Practitioner of Green Power: Waste Management	112
306-3	Waste generated	A Practitioner of Green Power: Waste Management	112
306-4	Waste diverted from disposal	A Practitioner of Green Power: Waste Management	112
306-5	Disclosure 306-5 Waste directed to disposal	A Practitioner of Green Power: Waste Management	112
GRI 307 : Environmental Compliance			
307-1	Non-compliance with environmental laws and regulations	Company has no significant fines and non-monetary sanctions for non-compliance of environmental laws and regulations 2020.	
GRI 308 : Supplier Environmental Assessment			
308-1	New suppliers that were screened using environmental criteria	A Responsible Purchaser: Supplier Sustainability Management-2020 Goals and Achievements 100% new suppliers compliant and signed "TSMC ethics and supplier code of conduct"	73
308-2	Negative environmental impacts in the supply chain and actions taken	A Responsible Purchaser: Supplier Sustainability Management - Sustainability Risk Management TSMC requires suppliers to meet its sustainability standards through the "TSMC Supplier Code of Conduct", which includes environmental impact issues, and requires Tier 1 suppliers to complete a sustainability self-assessment questionnaire. In 2020, a total of 1,144 responses to the questionnaire (including operating units in Taiwan and China) were collected in the 2020. If the supplier has potential risks, they will be required to follow up with improvement.	81



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GRI 401 : Employment			
401-1	New employee hires and employee turnover	<p>An Admired Employer: Talent Attraction and Retention - Shared Visions and Values - Talent Recruitment - Campus Recruitment</p> <ul style="list-style-type: none">▪ Approximately 90% of TSMC employees are located in Taiwan. Overseas employees are mostly located in Asia, which is only 6.9% of all employees; the proportion of other regions is lower.▪ In 2020, to align with the Company's growth, TSMC expanded recruitment and introduced 7,322 new hires in Taiwan and 8,193 new hires around the world. Among them, 79.5% of all new hires are below the age of 30.	133
401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	<p>An Admired Employer: Talent Attraction and Retention-Compensation and Benefits-Benefits Better Than Statutory Regulations</p> <p>Note: TSMC provides localized leave and insurance programs to employees in overseas regions. We grant additional days of annual leave to employees in Taiwan, China, North America and Europe. As for insurance programs, the comprehensive life and medical insurance programs are also designed in consideration of local regulations, industry practices and local conditions for each overseas region.</p>	138
401-3	Parental leave	<p>An Admired Employer: Talent Attraction and Retention-Compensation and Benefits-Parental Benefits</p>	137
GRI 402 : Labor/Management Relations			
402-1	Minimum notice periods regarding operational changes	<p>An Admired Employer: Human Rights-Employee Engagement</p> <ul style="list-style-type: none">▪ Any significant issues and changes will be announced in quarterly meetings. Extraordinary meetings may be held when necessary.▪ If the employment relationship with some employees needs to be terminated due to major operational changes, the Company will notify employees in advance abide by the law.	148
GRI 403 : Occupational Safety and Health			
403-1	Occupational safety and health management system	<p>In order to implement occupational safety and health management and control, TSMC established an executive organization with the division of roles and responsibilities. In response to the requirements and expectations of TSMC from internal and external stakeholders, in 2020, in addition to continuing to improve the existing safety culture promotion and risk management measures and in response to expansion plans, the number of contractors entering TSMC has reached 39,470 people per day. TSMC has standardized contractor operational safety and health management procedures, established the "Contractor Environmental Safety and Health Blue Book", strengthened the safety management system, and cooperated with contractors to create a safe and friendly environment. The corporate-level Safety and Health Committee is hosted by the Corporate ESH Director, percentage of total workforce represented is 44%.</p>	
403-2	Hazard identification, risk assessment, and incident investigation	<p>An Admired Employer: Occupational Safety and Health - Promote Safety Culture - Statistics on Disabling Injuries</p> <p>The definition for 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 2020, TSMC reviewed the Occupational Safety and Health Act stipulating that only work-related injuries shall be counted towards SR/ FR. Other non-work injuries such as falling in the cafeteria or parking lot due to other reasons shall not be counted towards occupational injuries but should be investigated and resolved. Employee vacation, medical insurance, and insurance shall remain the same. In 2020, there were 43 disabling injuries among employees with 422 working days lost. Of the 43 disabling injuries, 29 were from men with 308 working days lost and 14 were from women with 114 working days lost. Men suffered from a higher number of work-related disabling injuries and working days lost than women did. Aside from falling, the main causes were crushing injuries, cuts, scrapes, and punctures during maintenance. Improvement measures include: Implemented LOTO (Lock out Tag out) measures that require employees to lock out and tag out all moving parts during maintenance. In 2020, 2,577 operations were completed and added to the Maintenance Procedures. Safety and health training materials now contain chapters on when and how to use protective gear for cuts/scrapes/punctures.</p>	155



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403-3	Occupational health services	TSMC's occupational health risk management plan covers both occupational hazards (Including the five major hazards: chemical, physical, ergonomic, social/ psychological, and biological) and personal health (including pregnancy, poor cerebrovascular/ cardiovascular functions, muscle and bones, stress management, etc.), which need to be improved to protect employees' health. In accordance with legal regulations on occupational safety and health, all employees involved in operations with special health examination, a total of 4,753 individuals, completed 100% special health examinations.	
403-4	Worker participation, consultation, and communication on occupational safety and health	An Admired Employer: Occupational Safety and Health-Promote Safety Culture-Safety and Health Measures	152
403-5	Worker training on occupational health and safety	An Admired Employer: Occupational Safety and Health-Promote Safety Culture-Safety and Health Measures	152
403-6	Promotion of worker health	An Admired Employer: Occupational Safety and Health-Comprehensive Health Management-Health Care	160
403-7	Prevention and mitigation of occupational safety and health impacts directly linked by business relationships	An Admired Employer: Occupational Safety and Health-Comprehensive Health Management-Occupational Disease Prevention	157
403-8	Workers covered by an occupational safety and health management system	Workers include the scope of employees and contractors	
403-9	Work-related injuries	An Admired Employer: Occupational Safety and Health-Promote Safety Culture-Statistics on Disabling Injuries	155
403-10	Work-related ill health	An Admired Employer: Occupational Safety and Health -Comprehensive Health Management-Prevention Measures & Achievements against Occupational Diseases	157
GRI 404 : Training and Education			
404-1	Average hours of training per year per employee	An Admired Employer: Talent Development-Fulfill Talent Development-Diverse and Equal Opportunities for Learning and Development <ul style="list-style-type: none">▪ The current design of the training system does not include the average hours of training per employee per year based on gender▪ Reveal the average hours of training per employee each year▪ Reveal the average hours of training by different categories of employees per year(manager, non-manager indirect employee, and direct employee)	143
404-2	Programs for upgrading employee skills and transition assistance programs	An Admired Employer: Talent Development-Fulfill Talent Development <ul style="list-style-type: none">▪ Although it does not provide transition assistance programs for "employees who have ended their careers due to retirement or termination of employment relationships", the company's "talent development" goals have always been focused on ensuring that employees can keep up with the times to support the company's long-term growth and meeting the needs of employees for lifelong learning. In other words, as long as employees continue to learn step by step under the company's talent development system, they will be well prepared for their career development after leaving the job.▪ If employees who are leaving the company have individual needs, they can also get professional counseling services in psychological, legal and financial aspects through "Consultation and Consultation"	141



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404-3	Percentage of employees receiving regular performance and career development reviews	An Admired Employer: Talent Development-Fulfill Talent Development-Diverse and Equal Opportunities for Learning and Development Based on individual job requirements, performance assessment results (The performance appraisal was conducted in the middle of the year and at the end of the year, and the assessment rate was 100% in 2019), and career development needs, the employees of TSMC set up their own individual development plans (IDP), which are part of the basis of the company's annual training plan.	141
GRI 405 : Diversity and Equal Opportunity			
405-1	Diversity of governance bodies and employees	Operations and Governance: Corporate Governance-Board of Directors and Committees Please refer to 2020 TSMC Annual Report : 2.4.1 Information Regarding Board Members TSMC's Board is comprised of a diverse group of professionals from different backgrounds in industries, 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 ratio is 10%). An Admired Employer: Talent Attraction and Retention-Shared Visions and Values-Talent Recruitment TSMC's Board is comprised of a diverse group of professionals from different backgrounds in industries, academia, law, etc. These professionals include citizens from Taiwan, Europe and the U.S. with world-class business operating experience. In 2020, a total of 8,193 employees were hired, including members of younger generations, overseas elites, and the physically and mentally handicapped.	190
405-2	Ratio of basic salary and remuneration of women to men	An Admired Employer: Talent Attraction and Retention - Workforce Structure - TSMC Compensation Ratio by Gender	133
GRI 406 : Non-discrimination			
406-1	Incidents of discrimination and corrective actions taken	An Admired Employer: Human Rights <ul style="list-style-type: none">▪ Act in accordance with the TSMC Human Rights Policy and the (RBA) Responsible Business Alliance Code of Conduct▪ Formulate implementation policies and management methods -Each operating base has a dedicated unit to form a "planning, execution, inspection, and action" cycle▪ Require employees to participate in human rights protection training	145



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
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GRI 407 : Freedom of Association and Collective Bargaining

407-1	Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	<p>An Admired Employer: Human Rights</p> <p>Act in accordance with the TSMC Human Rights Policy and the Responsible Business Alliance (RBA) Code of Conduct</p> <ul style="list-style-type: none">▪ Formulate implementation policies and management methods▪ Each site of operations has a dedicated unit to form a "planning, execution, inspection, and action" cycle▪ Require employees to participate in human rights protection training▪ Establish a number of channels for employees' feedback, many of which are checked by the top human resources organization and handled in a fast and confidential manner. We are committed to providing an open and transparent communication environment for supervisors, colleagues, and peers.▪ The company respects the rights of all employees to organize and participate in the trade union of their choice, collective bargaining, and participation in peaceful assemblies. It also respects the right of employees to avoid such activities. As of now (including 2020), no employees have come forward to organize trade unions. <p>A Responsible Purchaser: Supplier Sustainability Management-Sustainability Risk Management</p> <p>TSMC requires suppliers to meet its sustainability standards through the "TSMC Supplier Code of Conduct", which includes workers freedom of association or group consensus, and requires Tier 1 suppliers to complete a sustainability self-assessment questionnaire. In 2020, a total of 1,144 responses to the questionnaire (including operating units in Taiwan and China) were collected in the 2020. If the supplier has potential risks, they will be required to follow up with improvement.</p>	81
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GRI 408 : Child Labor

408-1	Operations and suppliers at significant risk for incidents of child labor	<p>TSMC abides by local laws and regulations, and take actions according to TSMC Human Rights Policy and Responsible Business Alliance Code of Conduct. We treat all workers, including regular, contract, and temporary employees, and interns, with dignity and respect, and reduce every kind of risk to protect our employees. More details on TSMC Human Rights Policy</p> <p>A Responsible Purchaser: Supplier Sustainability Management - Sustainability Risk Management</p> <p>TSMC requires suppliers to meet sustainability standards through the "TSMC Supplier Code of Conduct", which includes a no child labor policy, and requires Tier 1 suppliers to complete a sustainability self-assessment questionnaire. In 2020, a total of 1,144 responses to the questionnaire (including operating units in Taiwan and China) were collected in the 2020. If the supplier has potential risks, they will be required to follow up with improvement.</p>	81
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Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
GRI 409 : Forced or Compulsory Labor			
409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	<p>An Admired Employer: Human Rights TSMC abides by local laws and regulations, and take actions according to "TSMC Human Rights Policy" and "Responsible Business Alliance Code of Conduct".</p> <ul style="list-style-type: none">Formulate implementation policies and management methodsEach site of operations has a dedicated unit to form a "planning, execution, inspection, and action" cycleEach site of operations has a dedicated unit to form a "planning, execution, inspection, and action" cycleRequire employees to participate in human rights protection trainingFormulate "Working Hours Management Measures" that comply with laws and regulations. Except for the unanimous agreement of supervisors and colleagues, overtime pay or compensatory time off is required to extend working hours.In addition to setting up a reminder function for supervisors and employees in the "attendance system and overtime reporting system", and reviewing and controlling them month by month, they also carefully check their opinions and complaints <p>A Responsible Purchaser: Supplier Sustainability Management-Sustainability Risk Management TSMC requires suppliers to meet the sustainability standards through the "TSMC Supplier Code of Conduct", which includes a no bonded labor policy, and requires Tier 1 suppliers to complete a sustainability self-assessment questionnaire. In 2020, a total of 1,144 responses to the questionnaire (including operating units in Taiwan and China) were collected in the 2020. If the supplier has potential risks, they will be required to follow up with improvement.</p>	145
GRI 412 : Human Rights Assessment			
412-1	Operations that have been subject to human rights reviews or impact assessments	<p>An Admired Employer: Human Rights-Human Rights Governance-Human Rights Risk Management</p> <ul style="list-style-type: none">Use the standardized risk assessment template (SAQ) designed by the "Responsible Business Alliance" to identify the highest social, environmental and moral risks in the businessEntrust a third-party organization with special training in social and environmental audits to continuously implement the "Verification Audit Process" (VAP) of the Responsible Business Alliance for all fabsThe results of the evaluation in 2020 are the same as those in the past few years, and both are in a "low risk" state	146



Disclosure Number	Disclosure Title	Report Contents or Explanation	Page
412-2	Employee training on human rights policies or procedures	An Admired Employer: Human Rights-Human Rights Governance <ul style="list-style-type: none">▪ Disclose the total training hours, total number of employee and employee training percentages related to human rights policies▪ In 2020, TSMC provided employees with a total of 93,822 hours of human rights protection training. In total, 55,031 employees (107,057 person-time employees) completed the training program, accounting for 96.8% of TSMC's total employees	145
412-3	Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening	In 2020, TSMC continued to construct new facilities in Taiwan. Taiwan has a high evaluation of international human rights appraisal, and has no significant issues on this topic	
GRI 414 : Supplier Social Assessment			
414-1	New suppliers that were screened using social criteria	A Responsible Purchaser: Supplier Sustainability Management - 2020 Goals and Achievements New suppliers signed the TSMC Supplier Code of Conduct for a completion rate of 100% and conducted risk assessment	72
414-2	Negative social impacts in the supply chain and actions taken	A Responsible Purchaser: Supplier Sustainability Management - Sustainability Risk Management Please refer to the "Protection of Labor Rights" action plan in the "Responsible Supply Chain" chapter, TSMC manages supplier employees working in TSMC's factory sites in Taiwan through reminders, audits, contracts and penalties and related actions to address issues such as working hours/safety/labor	80
GRI 416 : Customer Safety and Health			
416-1	Assessment of the health and safety impacts of product and service categories	There is no significant safety and health impacts for the products and services that TSMC provided to customers.	
416-2	Incidents of non-compliance concerning the safety and health impacts of products and services	Not applicable	
GRI 418 : Customer Privacy			
418-1	Substantiated complaints concerning breaches of customer privacy and losses of customer data	An Innovation Pioneer: Customer Service-customer's Virtual Fab (no customer complaints regarding information leakage)	68
GRI 419 : Socioeconomic Compliance			
419-1	Non-compliance with laws and regulations in the social and economic area	Company has no significant fines and non-monetary sanctions for non-compliance in social and economic areas in 2020	



Climate Change Management Framework^{Note}

Category

Corporate Management Strategies & Actions

2020 Enforcement Report

The Board of Directors regularly reviews risks and opportunities related to climate change.

- **ESG Steering Committee:** The ESG Steering Committee is TSMC's top organization in climate change management. The ESG Steering Committee is chaired by the Chairman of TSMC, and the chair of the ESG Committee serves as the executive secretary. It reviews TSMC's climate change strategies and goals every six months and reports to the Board of Directors. (The CSR Executive Committee was renamed as the ESG Steering Committee in 2021 and the meeting frequency has increased from biannually to quarterly)
- **Energy Saving and Carbon Emission Reduction Committee:** The Energy Saving and Carbon Emission Reduction Committee is the Company's management organization for taking action on climate change risk and opportunity. It is chaired by the Senior Vice President of Fab Operations. Every quarter, this Committee formulates management plans, reviews implementation status, and discusses future plans.
- **RM Steering Committee:** The RM Steering Committee reports to the Audit Committee annually on the risk environment, primary risk management items, risk assessment, and response measures. The Audit Committee then reports and discusses major items with the Board of Directors.



Governance

- Interdepartmental discussions and identifying short-, mid-, and long-term climate risks and opportunities

- Assess the potential financial impact on TSMC from major climate risks and opportunities

- Conduct scenario analysis and assess Net Zero Emission targets & actions



Strategies

- 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 energies. For more details, please refer to the [ESG Management Platform](#) section of this report.
- The executive secretary of the ESG Steering Committee reported to the Board and received support on sustainable development strategies and progress for green manufacturing, joining the RE100, purchasing renewable energies, long-term goals, and other related projects. (The reporting frequency has been increased from biannually to quarterly since 2021.)
- The Energy Saving and Carbon Emission Reduction Committee defined [five major energy conservation teams](#) for different process technologies to conserve more energy from production equipment and fab facilities. As an incentive for the energy conservation teams, the Energy-Saving and Carbon Reduction Committee awarded Energy Conservation Model Awards and Energy Conservation Innovation Awards according to the teams' success with energy conservation targets and innovative ideas.
- The Chair of the RM Steering Committee gave an annual report to the Audit Committee/Board of Directors on water, energy risks, renewable energy demands, and other topics related to climate change.
- The Committee also carried out 460 energy-saving measures across [8 different categories](#) and was able to conserve an additional 500 GWh in energy consumption. For more details, please refer to the [Increase Energy Efficiency](#) section of this report.
- According to [interdepartmental discussions on climate risks and opportunities](#), the Committee identified 8 opportunities and 11 risks. For more details, please refer to the [Climate Change Risk and Opportunity Matrix](#) section of this report.
- Completed qualitative assessment on the financial impact of climate risk and opportunities and formulated risk mitigation measures accordingly (for more details, please refer to the [Financial Impact Analysis of Climate Change](#) section of this report); also implemented quantitative assessment of the financial impact from major climate risks.
- Based on the 2-degree scenario of global warming set forth by the Intergovernmental Panel on Climate Change (IPCC), the committee analyzed climate risks in production & operation processes and formulated mitigation measures in compliance with the [Climate Risk Adaptation Standards](#); also established TSMC's climate change strategy to strive towards Net Zero Emission.



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Category	Corporate Management Strategies & Actions	2020 Enforcement Report
 Risk Management	<ul style="list-style-type: none">▪ 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 risks identification and assessment in the Enterprise Risk Management (ERM) process▪ Set management metrics related to climate change	<ul style="list-style-type: none">▪ Held TCFD workshops and, through <u>interdepartmental</u> discussions, jointly identified, prioritized, and assessed the financial impact of climate risks/opportunities.▪ Reported the assessment results of the climate risk/opportunities and relevant action plans to the ESG Committee Chair.▪ For more details, please refer to the <u>6.3 Risk Management</u> section in the <u>2020 TSMC Annual Report</u>.▪ Established the following as climate change performance indicators: GHG emissions per unit product, environmental footprint per unit product, amount of renewable energy purchased, total amount of electricity saved, improved production efficiency, and days of production interruption due to climate disasters. For more details, please refer to the <u>Climate Change and Energy Management Strategies, Goals, and Outcomes</u> section of this report.
 Indicators and Targets	<ul style="list-style-type: none">▪ Review impact on TSMC operations based on carbon inventory, carbon footprint, and life cycle analysis; also evaluated Scope 1, 2 & 3 risks and corresponding mitigation strategies▪ Set climate change management targets and review progress & performance	<ul style="list-style-type: none">▪ In accordance with carbon inventory results, the risks of Scope 1 emissions were reduced effectively because of continuous implementation of carbon reduction actions; the risk of Scope 2 indirect GHG emissions due to electricity consumption and the risk of Scope 3 due to supplier indirect emissions continue to increase. For more details, please refer to the <u>Greenhouse Gases (GHG) Inventory</u> section of this report.▪ Set climate change and energy management goals for 2030 in accordance with climate change performance indicators; senior executives performed regular reviews on implementation performance. For more details, please refer to the section entitled <u>Climate Change and Energy Management Strategies, Goals, and Achievements</u> and <u>GHG Reduction Best Practices</u> sections of this report.



Sustainability Accounting Standards Board

Topic	Code	Accounting Metric	Category	Report Contents or Explanation
Greenhouse Gas Emissions	TC-SC-110a.1	<ul style="list-style-type: none">Gross global Scope 1 emissionsTotal emissions from perfluorinated compounds	Quantitative	<ul style="list-style-type: none">2,450,354 metric tons CO₂-e664,974 metric tons CO₂-e
	TC-SC-110a.2	<ul style="list-style-type: none">Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	<ul style="list-style-type: none">Please see Climate Change and Energy Management: Low-carbon Manufacturing
Energy Management in Manufacturing	TC-SC-130a.1	<ul style="list-style-type: none">Total energy consumedPercentage grid electricityPercentage renewable	Quantitative	<ul style="list-style-type: none">60,908,400 Gigajoules95% of energy consumed was supplied from grid electricity7.3% of energy consumed was renewable energy <p>Please see Climate Change and Energy Management</p>
Water Management	TC-SC-140a.1	<ul style="list-style-type: none">Total water withdrawnTotal water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	<ul style="list-style-type: none">77,257 thousand m³; from regions with High or Extremely High Baseline Water Stress: 4 %72,255 thousand m³; from regions with High or Extremely High Baseline Water Stress: 1 % <p>Please see Water Management: Water Resource Risk Management</p>
Waste Management	TC-SC-150a.1	<ul style="list-style-type: none">Amount of hazardous waste from manufacturing, percentage recycled	Quantitative	<ul style="list-style-type: none">440,714 metric tons; 98% recycledThe amount of hazardous waste includes 142,314 metric tons of in-house recycled hazardous waste <p>Please see Waste Management</p>
Employee Health & Safety	TC-SC-320a.1	<ul style="list-style-type: none">Description of efforts to assess, monitor, and reduce exposure of employees to human health hazards	Discussion and Analysis	<ul style="list-style-type: none">Please see Occupational Safety and Health
	TC-SC-320a.2	<ul style="list-style-type: none">Total amount of monetary losses as a result of legal proceedings associated with employee safety and health violations	Quantitative	<ul style="list-style-type: none">Company has no significant monetary losses as a result of legal proceedings associated with employee safety and health violations

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Topic	Code	Accounting Metric	Category	Report Contents or Explanation
Recruiting & Managing a Global & Skilled Workforce	TC-SC-330a.1	<ul style="list-style-type: none">Percentage of employees that are (1) foreign nationals and (2) located offshore	Quantitative	<ul style="list-style-type: none">Please see Talent Attraction and Retention
Product Lifecycle Management	TC-SC-410a.1	<ul style="list-style-type: none">Percentage of products by revenue that contain IEC 62474-declarable substances	Quantitative	<ul style="list-style-type: none">0.16 %
	TC-SC-410a.2	<ul style="list-style-type: none">Processor energy efficiency at a system-level for: (1) servers, (2) desktops, and (3) laptops	Quantitative	<ul style="list-style-type: none">TSMC is working with customers to innovate with new generations of chips and create more energy efficient electronic products. Please see Sustainable Products by TSMC Facilitates Global Energy Conservation
Materials Sourcing	TC-SC-440a.1	<ul style="list-style-type: none">Description of the management of risks associated with the use of critical materials	Discussion and Analysis	<ul style="list-style-type: none">Please see Supplier Sustainability Management: Sustainability Risk Management
Intellectual Property Protection & Competitive Behavior	TC-SC-520a.1	<ul style="list-style-type: none">Total monetary losses as a result of legal proceedings associated with anti-competitive behavior regulations	Quantitative	<ul style="list-style-type: none">Please see 2020 TSMC Annual Report: 6.3.3 Operational Risks/ Risks Associated with Litigious and Non-litigious Matters



Independent Third Party Assurance Statement



Independent assurance statement

Scope and approach

Taiwan Semiconductor Manufacturing Company Ltd. ('TSMC' or 'the Company') commissioned DNV GL Business Assurance Co. Ltd. ('DNV') to undertake independent assurance of the 2020 Corporate Social Responsibility Report (the "Report") for the year ended 31 December 2020.

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.

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 sustainability issues that could affect TSMC and are of interest to stakeholders;
- Review of TSMC approach to stakeholder engagement and recent outputs;
- Review of information provided to us by TSMC on its reporting and management processes relating to the Principles;
- Interviews 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

¹ The VeriSustain protocol is available on dnvgl.com



- management), human resource, safety, procurement, wellness, human resource, product development, and TSMC cultural and educational foundation were chosen to interview;
- Site visits to HQ in Taiwan, remote 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 demonstrate the Due Diligence on human right topic, through human right risk assessment identifying negative impact on value chain, then establish long terms and short terms objectives/ targets to enhance the implementation of human right policy.
- By reporting the actions taken instead the procedure described, to demonstrate the performance on human right topics control.

Sustainability Context

Corporate Social Responsibility 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.

Materiality

The materiality determination process was revaluated 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 time lines 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 2020 Corporate Social Responsibility 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
19 May, 2021

Wu, Johnny
Lead Verifier
Business Assurance
DNV Taiwan
Statement Number: 00001-2021-ACSR-TWN

David Hsieh
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