

2019 CSR REPORT

ECO-FRIENDLY
DRAM PROVIDER

NANYA



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President's Message

04

Embracing the New Age of Innovative R&D and Technological Independence as We Celebrate Our 25th Birthday

The year 2019 was tumultuous for global politics and economics. In the face of this turbulent environment, Nanya Technology Corporation(NTC) has achieved its 7th consecutive year of profit with the company's sound finance and good competitiveness from the efforts of our colleagues. We would like to thank our customers, suppliers, shareholders, and the community for their support and affirmation over the years.

NTC will be celebrating its 25th anniversary in 2020. Throughout this time, we have focused on the DRAM industry and upheld our core value of innovation to constantly adapt to the rapidly changing semiconductor industry. The resources we have invested have helped us accumulate extensive research and development experience and cultivate an excellent technical team. We were able to transform our company and independently establish next-gen research and development capabilities. We are invested in innovative, next-gen technologies and will enter a new age of R&D and technological independence.

DRAM has become a critical component for a smart world. We have developed advanced and highly efficient, environmentally friendly products to fulfill the needs of the market and our customers. Our low energy consumption DRAM products helped our consumers save approximately 409.52 million kWh of electricity in 2019, which is equivalent to a 218,274-ton reduction in carbon dioxide emissions. We are dedicated to using innovative technologies to create positive impacts on the environment.

NTC aims to increase the operating efficiency of our production lines through process innovations. We are actively introducing AI technologies and have completed the development of 35 smart applications. The applications cover the following five major aspects of production: machine pre-diagnostics, productions control, productivity increase, quality inspection, and yield analysis. The annual benefit of these applications has reached

NT\$240 million. At the same time, we have cultivated 300 senior engineering employees who, through professional training courses, have been taught basic AI theories and practical technical abilities. We estimate that the senior engineering staff will be able to create over twenty new applications each year. Our goals are to gradually implement AI technologies in every work environment of every department, establish AI assisted, high-performance production lines, and completely elevate our production performance and capabilities.

Since climate change continues to be a challenge faced by the global community, we are strengthening our adaptability and protection against the extreme climate abnormalities. NTC will lower the possible operational impacts due to climate disasters and proactively decrease our greenhouse gas emissions. We will integrate green management into our corporate management structure and our various energy-saving solutions. The Process Waste Water Recovery Ratio has reached 96.95% by utilizing our comprehensive waste water recycling system and effectively using every last drop of water.

Employees are the key to our innovation, operation, and sustainable development goals. By strengthening our core values and management ideals of integrity and accountability, efficiency and innovation, and sustainable management, we hope to unite our employees and build a business that is a source of pride. In 2019, our outstanding employee retention rate was 98.48% and the average approval rate from our employee engagement survey reached 72% (with a 91% response rate). NTC will continue to implement rigorous talent training programs in the future to encourage self-improvement among employees. We will also provide clear advancement paths to assist employee career development and establish an objective, multi-aspect performance review mechanism to cultivate potential management talent. Lastly, we will devise various incentives to attract and retain excellent employees. The research and development, production, and service capabilities of our employees are continuously improving our competitive advantage in the face of international competition and global challenges.



The critical factor for successful corporate sustainability is the integration of all our available resources. The company will not devote only itself to sustainable management, it will partner with organizations throughout our supply chain to improve every aspect of our businesses, from technology, quality, and environmental protection to human rights, safety, and hygiene. We will encourage our suppliers to sign the "Letter of Compliance with Corporate Social Responsibility" and promote ideals of sustainability. The company has selected four primary aspects for promotion of social participation; talent cultivation, environmental protection and conservation, care for humanity and culture, and neighborly actions. Among these aspects, talent cultivation is the most closely tied with the core capabilities of our company. Therefore, we have developed many projects to train our semiconductor staff through industry-academia cooperation, high-tech talent cultivation, seminars and lectures, internships, and other long-term plans. We will play our part in the cultivation of Taiwan's semiconductor professionals.

We have developed a deep understanding of the responsibilities of a corporate citizen and have proactively responded to the United Nations Sustainable Development Goals (SDGs) in order to solve problems with global sustainable development. Starting with our own operations, we have reviewed every SDG related to our industry and corporate operations. We will transform these SDGs into real actions and bring about positive changes to society by reaching our short term (2020) and medium to long term (2025) sustainability goals.

The achievements of our sustainable development and the recognition we have received in recent years have driven our continuous advancements. NTC has been included in the Dow Jones Sustainability Emerging Market Index (DJSI) for two consecutive years (2018-2019) and was awarded the Leadership evaluation by the CDP (formerly the Carbon Disclosure Project) for two consecutive years (2018-2019). Our company continues to be selected as one of the FTSE4Good TIP Taiwan ESG Index constituent stocks. We won the "Outstanding Enterprise Innovation Award" in the 2019 National Industrial Innovation Award held by the Ministry of Economic Affairs of Taiwan, the "National Talent Development Award" by the Ministry of Labor, and the "New Star Award" in Corporate Social Responsibility by Common Wealth Magazine. We were awarded "TOP 50 Corporate Sustainability Awards", "Top 50 Corporate Sustainability Report Award", "Growth through Innovative Award", "People Development Award" and "Climate Leadership Award".

NTC will continue to strengthen our advantages for the future as a member of the global semiconductor industry. We will work together with our business partners and stakeholders to strive towards sustainable management. NTC is fully committed to achieving the six major goals to be **a trustworthy company, the best memory partner for our customers, a promoter of shared value, a producer of green technology, an attractive employer for professional talent, and an active participant in community and social welfare**.

President Pei-Ing Lee





PERFORMANCE HIGHLIGHTS

A Trustworthy Company

NT\$ 256.32 billion

Record-Breaking Market Capitalization

NT\$ 3.23 EPS

Profits for Seven Consecutive Years

0 cases Material Violations



The Best Memory Partner for Our Customers

91.7 points

Average Customer Satisfaction Score

1,432 patents

Awarded in the Past Three Years

19.3% Proportion of R&D Employees to all
Employees Hits New Record High



A Promoter of Shared Value

NT\$126.2 billion

Value Created with Industrial Chain Procurement

100% Key Suppliers' Completion Ratio of the Self-Assessment Questionnaire

100% High-risk Supplier Sustainability Audit Ratio in the Past Three Years



A Producer of Green Technology

27% Reduction in Greenhouse Gas Emissions per Unit Production (Base year: 2017)

100% Completion Rate of Life-Cycle Assessment(LCA) for Products

96.95% Process Water Recovery Ratio



An Attractive Employer for Professional Talents

98.48% Outstanding Employee Retention Rate

91% Employee Engagement Survey Participation

67.4% Internal Employee Substitution Rate for Job Openings



An Active Participant in Community and Social Welfare

20 times

Growth of Social Participation Input in 2019 (Base year: 2016)

NT\$7.35 million

Investment in Industry-academia Collaboration

6,045 person-time

Beneficiaries of Charity Events





AWARDS AND RECOGNITION



MEMBER OF

**Dow Jones
Sustainability Indices**

In collaboration with



Named to the Dow Jones Sustainability Emerging Markets Index for two consecutive years

FTSE4Good
TIP Taiwan ESG IndexFTSE4Good Emerging Index
FTSE4Good TIP Taiwan ESG Index**Sustainability Award
Silver Class 2020**RobecoSAM Sustainability
Award - Silver Class

DISCLOSURE INSIGHT ACTION

CDP's Climate Change Scoring:
Leadership Level for two consecutive
years



MSCI All Country World Index (ACWI)

Asia300

Ranked 2 in Asia300 Power Performers
by Nikkei Asia Review



- Top 50 Corporate Sustainability Awards- IT & IC Manufacturing Industry
- Top 50 Corporate Sustainability Report Award
- Climate Leadership Awards
- Growth through Innovation Awards
- People Development Awards



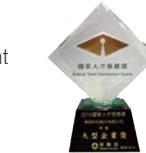
臺灣證券交易所

- Top 5% in 6th Corporate Governance Evaluation
- Taiwan High Compensation 100 Index
- Taiwan Employment Creation 99 Index



國家人才發展獎
National Talent Development Awards

National Talent Development Award



勞動部勞動力發展署
WORKFORCE DEVELOPMENT AGENCY, MINISTRY OF LABOR

Golden Certificate of
Talent
Quality-management
System (TTQS)



衛生福利部國民健康署
Health Promotion Administration, Ministry of Health and Welfare

Badge of Accredited Healthy Workplace by Ministry of Health and Welfare



Outstanding Enterprise Innovation Award by the Ministry of Economic Affairs



New Taipei City Smart Energy-Saving Outstanding Enterprise Award



New Taipei City Labour Safety and Health Award



1111 Job Bank - Happy Enterprise Award



Taiwan iSports certification from the Sports Administration of the Ministry of Education



Awards and Recognition



01

Operation and Governance

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13 / Major Products and Operation Performance



Company Overview

Nanya Technology Corporation ("NTC") is dedicated to the research, development, design, manufacture, marketing and sales of Dynamic Random Access Memory (DRAM), while establishing intellectual property and cultivating a strong development team. DRAM plays a key role that enables many smart devices which can be applied in cities, homes, offices, cars, the internet of things, the cloud and artificial intelligence.

For the next generation process technology, NTC has successfully developed core cell technology for the 10nm class DRAM process, which will enable sustainability of its DRAM products for at least 3 generations. As a world class DRAM solution provider NTC is continuously optimizing its product portfolio to enhance product value and provide solutions to customers. The deployed DDR4 product line and provide leading edge solutions to the consumer and server market. Additionally, NTC introduced a series of low-power products such as LPDDR4X and other mainstream products focused on smart phones, wearable devices, smart speakers, low-power laptops, and high-speed SSD applications, and aim to be one of the Best DRAM Provider for Smart World. NTC's consolidated revenue was NT\$51.7 billion, net income was NT\$9.8 billion, and earnings per share was NT\$3.23 in 2019.

As a trustworthy company, NTC is committed to corporate responsibility; to enhance corporate governance; to comply with regulations; to create value for shareholders; to take care our employees; to actively participate in social welfare; to promote green technology and environmental sustainability; and to strives for sustainable development.

We were recognized with numerous awards for corporate sustainability in 2019. NTC once again being selected as a constituent stock of the DJSI Emerging Markets Index, while obtaining CDP's Climate Change Scoring: Leadership Level for two consecutive years. We were awarded Top 50 Corporate Sustainability Award, Top 50 Corporate Sustainability Report Award, and 3 Best Performance of Specific Category in Growth through Innovative Award, People Development Award, and Climate Leadership Award by the Taiwan Corporate Sustainability Awards (TCSA); New Star Award in Corporate Social Responsibility by Common Wealth Magazine, which demonstrate our investments in sustainable development in recent years. In terms of talent cultivation, Golden Certificate of Talent Quality-management System (TTQS) Enterprise Version and the Ministry of Labor National Talent Development Award shows our supports in talent development.

NTC will continue to enhance innovation, fulfill corporate social responsibility, give back to society, cultivate talents, implement green technology, and work towards corporate sustainability.

◆ Company locations (including overseas branch offices)



Nanya Technology Corporation Global Sales Regions: US, Europe, Japan, China, Taiwan, and Asia-Pacific Region

● 12-inch Wafer Fabrication Plant

● Sales Office & FAE

● Design Center



Participation in Associations and Non-Profit Organizations

As a member of the global semiconductor industry, NTC not only pursues the greatest achievement on its core business, but also actively participates in external exchange activities related to its core business and sustainable development. Through participation in the activities, the Company cooperates with other enterprises in the industry in moving towards common good to respond to changes in the international situation and in the industry. We have formulated the [NTC Public Affairs Participation Guidelines](#). Policy formulation of all participation in related industries and participation in industrial labor unions or chambers of commerce are executed in accordance with the Guidelines. Moreover, the Public Affairs Participation Group has been set up under the Sustainable Development Committee to assess and review the decisions on participation in public affairs to ensure the Company's rights and obligations.

◆ Participation in associations and non-profit organizations

Associations	2017 membership fees (NT\$)	2018 membership fees (NT\$)	2019 membership fees (NT\$)	Our role
Taiwan Semiconductor Industry Association	NT\$320,000	NT\$320,000	NT\$320,000	Director
Taiwan IC Industry & Academia Research Alliance	NT\$100,000	NT\$100,000	NT\$100,000	Director
Center for Corporate Sustainability (joined in 2018)	-	NT\$280,000	NT\$280,000	Director

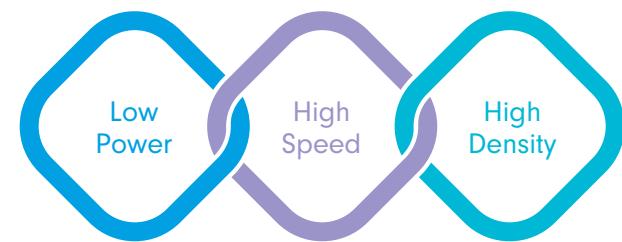
Major Products and Operation Performance

Product Introduction

Nanya Technology Corporation (NTC) is one of the key suppliers in DRAM industry, carrying products from standard DRAM, consumer DRAM, mobile DRAM, automotive / industrial-grade DRAM, and customized DRAM. With the seamless efforts from the R&D team, NTC is able to bring along new generation of DRAM devices in responding to the market demand. Moreover, NTC also announced its success in 10 nm-class DRAM cell technology to sustain DRAM cell size continuously scale-down for at least 3 generations. With that, NTC turns to the other page of beginning the development of the first generation of 10nm-class DRAM on the ground of its independent process and product technology. Looking ahead, the leading products – DDR4 and DDR5 are expected to be put into pilot run in the second half of 2020 and into mass production in 2021. In parallel, the second generation of 10nm-class process technology also entered the research and development stage in the expectation to start pilot run by 2022.

In 2020, NTC will still focus on the enhancement of competitiveness by optimizing the product portfolio of 20nm process. In order to increase sales volume, more products are getting qualified by Tier-1 cloud service providers. Also, NTC will accelerate the cycle in its 20nm product promotion, wider customer base and product approval from key accounts to address the goal of higher product value and flexibility in business management.

DRAM Market Mainstream





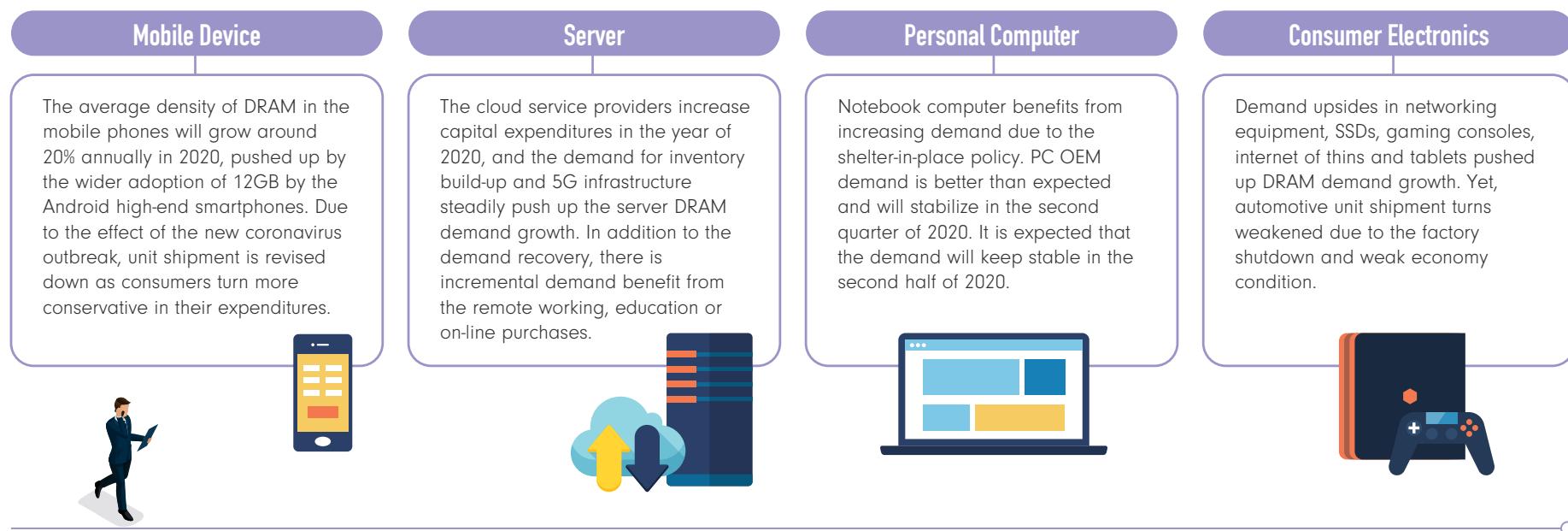
Market Overview

DRAM is one of the key components among electronic products and serving smartphones and server / data center demand, the most important market segments. As global operators begin to roll out 5G services, it renders the momentum to the unit shipment of mobile phones and DRAM density per set. For server demand, cloud servers and edge computing are the major drivers back up by the increasing reliance from mobile computing, artificial intelligence, internet of things, and the infrastructure construction of 5G base station. Base on the above, it is also expected that DRAM content per server will hike again from the new processor launch in the second half of 2020, and the continuous digitalization applied to more end devices. To sum up, DRAM demand is still in the trajectory to grow continuously.

Regarding DRAM supply side, top three DRAM suppliers expected supply bit growth will be much constrained in the year of 2020. As disclosed in the public statement to the investors, adding new wafer capacity in the year of 2020 is limited due to the capital expenditure reduction last year; therefore, the supply bit growth of the year is coming from the migration to more advanced process node as the major. Moreover, the status on China DRAM manufacturers is not clear, we will continue to observe and assess the impact to the industry.

Concerning DRAM demand impact from the COVID-19 pandemic, the demand increased from remote work, virtual learning or online shopping. Stronger demand from servers, notebooks, tablets, SSDs and networking devices, offsetting weaker demand from smartphones. Therefore, the overall DRAM bit demand is expected grow slightly in the first half of 2020, yet it remains in high uncertainties in the later part of the year. The strength of demand rebound will depend on when COVID-19 will end in Europe and the United States as well as the recovery of the global economy.

◆ DRAM Application Trend





◆ Business Development Plan

Short-term Plan

- Optimize the 20 nm product portfolio and expand the 8Gb DDR4 promotion
- Complete the validation at server manufacturers and first tier data center providers for bigger pie in server DRAM markets
- Enlarge customer base and shipment of 20nm-based products including 4Gb / 8Gb LPDDR3, 2Gb / 4Gb / 8Gb LPDDR4 / 4X. Intensify the promotion for better penetration into sub-segments like smartphones, wearables, smart speakers, portable devices and enterprise SSDs.

Long-term Plan

- Continue the migration to advanced process nodes, and provide more product mixes to meet customers' demands for different density budgets
- Prioritize consumer, mobile and server markets as the major market domain
- Extend services to versatile packages from DRAM discrete, KGD (known good die), and MCP (multi-chip packages). Additional, offer automotive / industrial grade products and customization to add NTC's product values and to strengthen competitiveness to its peers.

Operating Performance

NTC's consolidated revenue was NT\$51.73 billion, net income was NT\$9.82 billion, and earnings per share (EPS) was NT\$3.23 in 2019. Despite many challenges and uncertainties in the industrial environment in 2019, we still achieved good profits, generated free cash inflow, and further optimized our 20nm product portfolio. We independently developed 10nm class DRAM memory cell technology, which has enhanced our competitiveness.

The increase in tariffs, supply chain adjustments, and economic slowdown resulting from the US-China trade disputes in 2019, as well as Intel's CPU shortage, continued to affect the end application market and lowered the demand for DRAM. Average selling price for the year decreased by over 45% compared with that in the previous year. Bit shipment grew by over 10% compared with that in the previous year. The 2019 consolidated revenue of NT\$51.73 billion was down 39% compared with that in the previous year.

The 2019 gross profit was NT\$16.49 billion and gross margin was 32%. After deducting operating expenses, operating income was NT\$9.52 billion. Net cash inflows from operating activities reached NT\$17.41 billion, and was mainly due to net income and depreciation. After deducting capital expenditures of NT\$5.5 billion, free cash flow reached NT\$11.91 billion.

In addition to continuous optimization of our 20nm product portfolio, we decided to independently develop our process technology and product design as the main theme for future business development. Moreover, NTC will distribute a cash dividend per share of approximately NT\$1.50^{Note 1} in 2020 and this is the 6th year in a row to distribute cash dividends to reflect the Company's continuous growth. In the future, we will strive to maintain a stable dividend policy.

Note 1. If before the record date, the total outstanding shares increase because the Company's employees exercise their employee stock option rights, the final cash dividend per share will need to be adjusted accordingly.



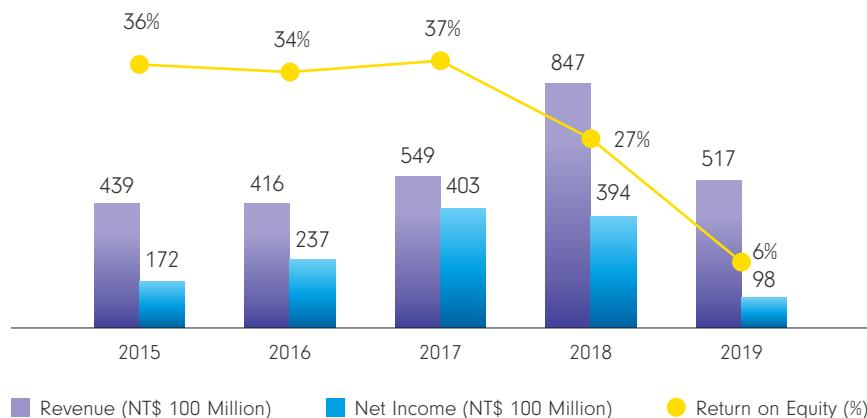


◆ Financial Performance During the Last Three Years

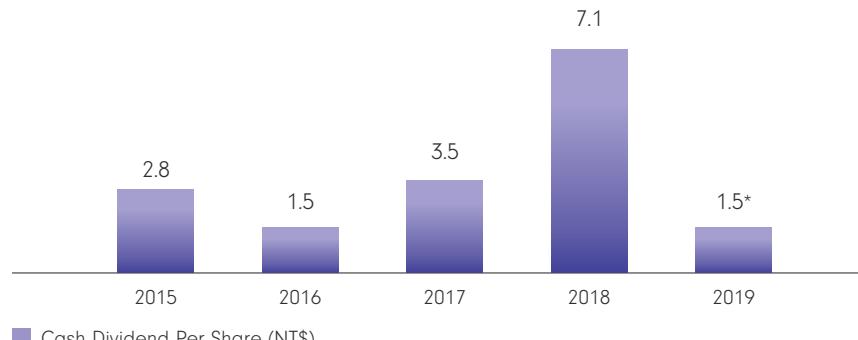
	2019	2018	2017	Unit	Note
Market Cap	2,563.2	1,706.8	2,258.5	NT\$ 100 Million	Calculate based on the stock price at the end of each year
Revenue	517.3	847.2	549.2	NT\$ 100 Million	
Operating Income	95.2	393.6	187.9	NT\$ 100 Million	
Return on Equity	6.2	26.5	37.0	%	
Cash Dividend	46.0	217.0	108.8	NT\$ 100 Million	Disclose according to the attribution year of dividends (dividends are to be distributed in the next year)
Cash Dividend Per Share	1.5*	7.1	3.5	NT\$	
Employee Welfare Expense	57.5	68.7	59.4	NT\$ 100 Million	

* If before the record date, the total outstanding shares increase because the Company's employees exercise their employee stock option rights, the final cash dividend per share will need to be adjusted accordingly.

◆ Financial Performance



◆ Cash Dividend



* If before the record date, the total outstanding shares increase because the Company's employees exercise their employee stock option rights, the final cash dividend per share will need to be adjusted accordingly.



◆ Shareholding Structure

Shareholding	Shareholder Structure	Government Agencies	Financial Institutions	Other Legal Persons	Individuals	Foreign Institutions and Foreigners	Total
Number of Shares Held (Share)	39,104,278	142,627,020	2,005,511,192	239,067,081	648,351,323		3,074,660,894
Shareholding Ratio (%)	1.27	4.64	65.22	7.78	21.09		100

As of March 30, 2020

Tax Policy and Information

NTC particularly formulated the Tax Policy to efficiently control tax risks, create the Company's long-term value, pursue sustainable development, and implement corporate social responsibility to completely ensure the rights of the Company and its investors.

NTC Tax Policy

- Full compliance with all applicable tax laws and regulations
- Disclosures in financial reports are made in accordance with applicable regulations and reporting requirements.
- Forbid transactions solely conducted for tax avoidance.
- Forbid the transferring value to low tax jurisdictions through transfer pricing.
- Forbid the use of secrecy jurisdictions.
- Develop relationships of mutual trust and respect with tax authorities through sufficient communication and good faith.



◆ Tax information of the past three years

	2019	2018	2017
Net profit before tax	11,225	41,584	41,831
Consolidated income tax expense	1,401	2,223	1,536
Consolidated income tax rate	12.48%	5.35%	3.67%

Unit: NT\$ million

Note: Quantities audited and verified by certified public accountants

◆ 2019 income tax expense by country

Country	Income tax expense (NT\$ million)	%
Taiwan	1,384	98.8
USA	14	1.0
Europe	2	0.1
Japan	1	0.1
Total	1,401	100.0



02

Corporate Sustainability

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22 / Materiality Analysis

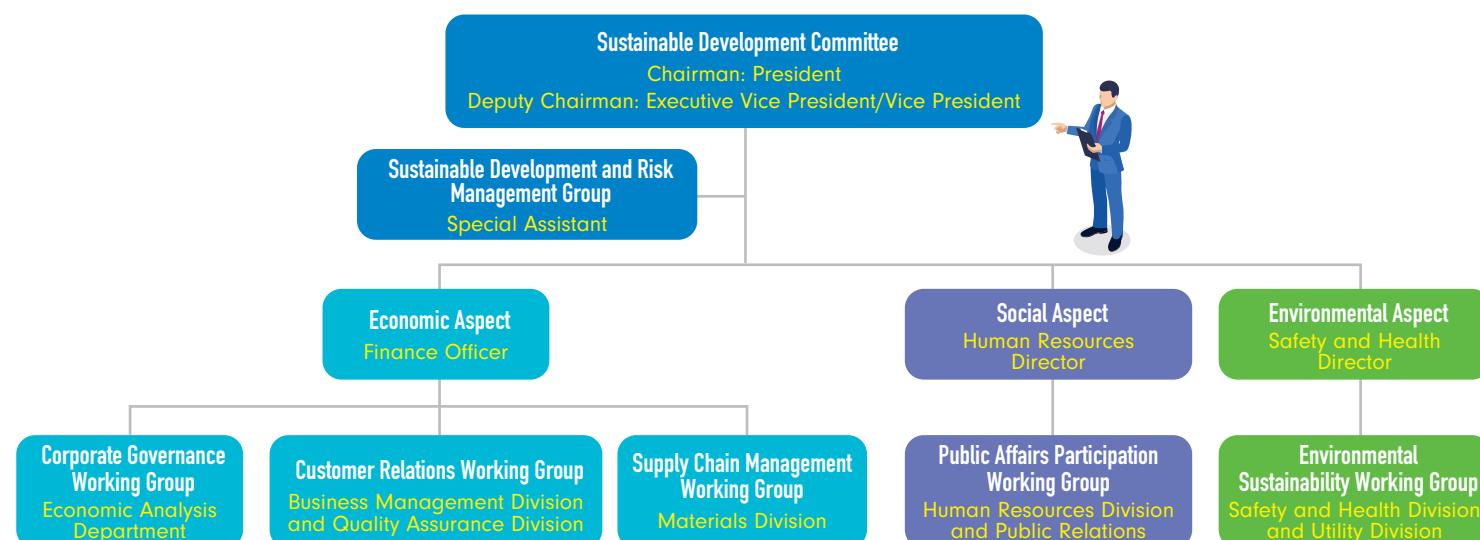
30 / Responding to UN Sustainable Development Goals

31 / Impact Valuation



Governance and Organization

Since Nanya Technology Corporation(NTC) established its Sustainable Development Committee in 2018, we have been pushing forward activities related to sustainable development step by step, becoming a solid partner in improving the challenges faced by the world. The Committee, chaired by the President, and with senior management ranked Assistant Vice President and higher as committee members, reports to the Board of Directors annually on the Company's sustainable development strategies, vision, goals, implementation policies, and results, linking up each functional organization to promote corporate sustainability. In the meantime, a dedicated organization, the Sustainable Development and Risk Management Group, was established under the President's Office to serve as the Secretariat. The organization is responsible to convene the Sustainable Development Committee meetings quarterly, plan and control various action plans, and integrate and supervise the execution progress and results on the aspects of economics, society, and environmental sustainability, ensuring the effectiveness of horizontal and vertical communication to specifically implement sustainable development.



Three aspects

The economic, social, and environmental aspects are led by finance, human resources, and safety and health supervisors respectively.

Four meetings

The Committee reports to the President quarterly on the implementation and results of sustainable development affairs, establishing key projects and performance indicators.

Five working groups

Five working groups are set up, including corporate governance, customer relations, supply chain management, public affairs participation, and environmental sustainability.



In 2019, NTC Sustainable Development Committee mainly conducted project reports and discussions relating to CSR work plans, risk management assessment, and legal and regulatory response, continuing to promote corporate sustainability, strengthen internal awareness and reforms, and move towards the vision of sustainable development.

Main points of the CSR reported to the Board of Directors

Corporate social responsibility achievements in 2018

- Constituent of the DJSI Emerging Markets Index
- A 5.5% rise in process water recovery rate compared with 2017
- Zero industrial safety incident for three years in a row
- Award for A- Leadership in the CDP's Climate Change Evaluation
- A 22.3% decrease in greenhouse gas emission intensity compared with 2017

Sustainable development organization and sustainability strategies

An overview of sustainable performance in 2018

Recognition and Awards received in 2018

Results of 2018 and goals for 2019

◆ Items promoted by the Sustainable Development Committee in 2019

CSR work plans

- Review improvements in waste water recycling rate, and create a video of water resources to promote environmental protection
- Install renewable energy equipment or evaluate the feasibility of purchasing green power (bundled) and review the results
- Deepen ISO 50001 energy management system and improve energy use
- Continue to participate in the CDP's evaluation
- Continue to promote the LCA inventory mechanism and hotspot improvement programs following the inventory
- Truly execute the supplier sustainable risk assessment and guidance
- Truly execute customer satisfaction evaluation through a third party
- Optimize corporate governance
- Participate in the DJSI evaluation, the Taiwan Corporate Sustainability Awards, and the Excellence in Corporate Social Responsibility Awards

Risk management assessment

- Sales and marketing risks
- Risks of wafer manufacturing and back-end packaging and testing
- Operation supporting risks
- Human resources risks
- Quality risks
- Environmental safety risks
- Corporate strategy and finance risks
- Emerging Risks

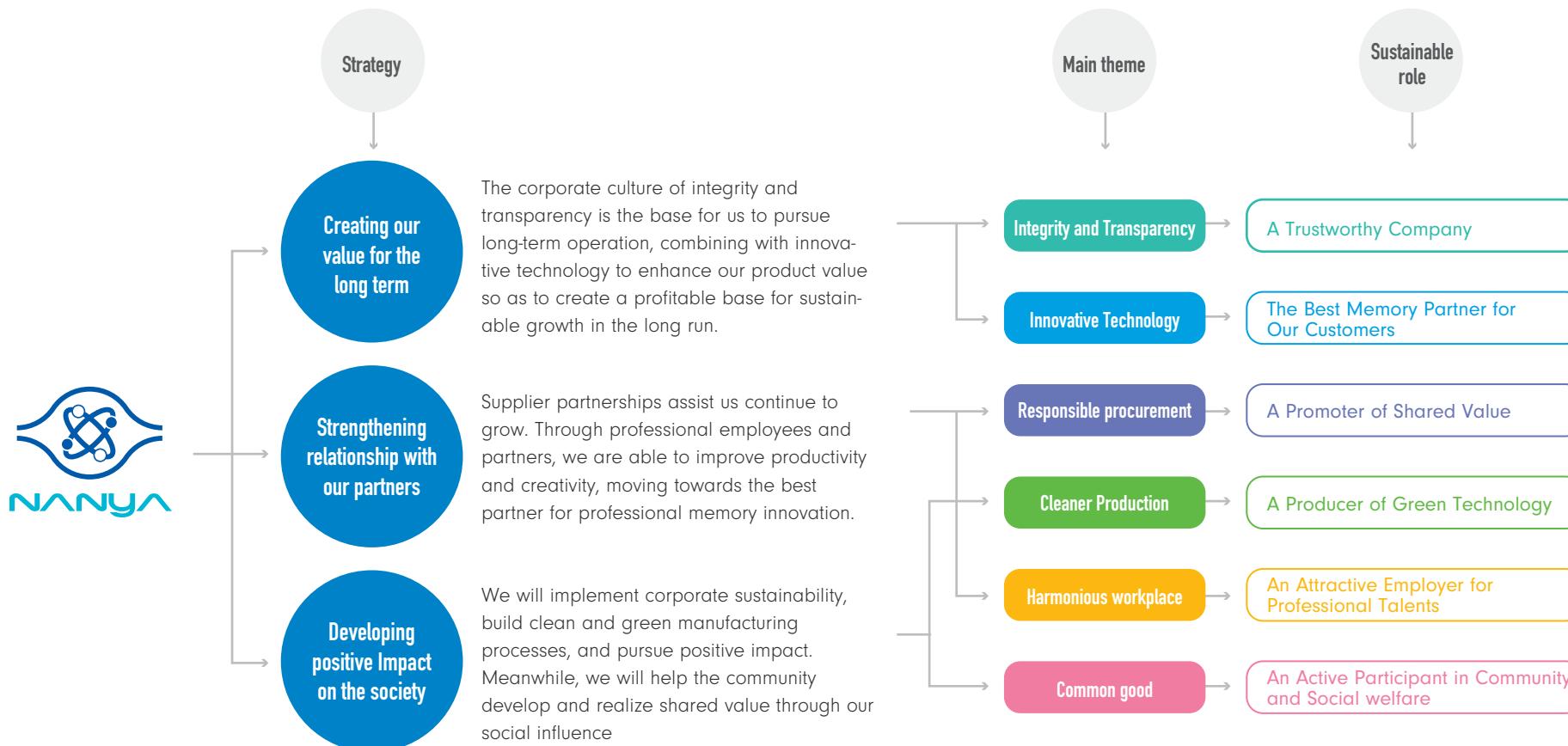
Review and response of legal and regulatory compliance

- Review known legal and regulatory compliance
- Response measures to new regulations



Sustainability Strategies

NTC has formulated three major strategies, which are creating our value for the long term, strengthening relationship with our partners, and developing positive impact on the society.





Materiality Analysis

NTC conducts materiality analysis annually, and the results of the analysis allow us to understand the sustainability issues concerning our stakeholders. Moreover, the results serve as the basis for the compilation of our corporate social responsibility report and corporate sustainability governance, so the stakeholders are able to understand the performance of NTC's practice regarding corporate sustainability. We also hope that during the process of promoting corporate sustainability, we could adjust our methods whenever necessary, and move towards a sustainable enterprise.

Materiality Analysis Process

We follow the GRI Standards to establish a systematic materiality analysis method. Through a three-stage process of identification and selection, deciding priority, and confirmation and review, we identify our own material sustainability topics, and set long-term sustainability goals in response to these topics.

1. Identification and selection

This stage includes identification of major stakeholders and selection of sustainability topics. With regard to identification of major stakeholders, we followed the GRI Standards and the AA 1000 Stakeholder Engagement Standard (SES), and identified seven major categories of stakeholders, including: employees, shareholders, customers, suppliers, the government, communities, and the media. With respect to selection of sustainability topics, we consider internal and external factors that might impact our corporate sustainability. Therefore, based on the international sustainability regulations and standards, industry-specific topics, sustainable evaluations, communication with stakeholders, and internal operational goals, a total of 19 issues were selected as NTC's sustainability topics, and were also served as the analysis basis for the second stage of deciding priority. Compared with the 17 sustainability topics in the previous year, new topics of information security and economic performance were added to the economic aspect, while no change was made to the environmental and social aspects.

2. Deciding priority

Based on two major principles: the stakeholders' level of concern, and the degree of impact on operations, NTC prioritized these 19 sustainability topics in this stage. In terms of a survey of the stakeholders' level of concern, in order to gather representative samples, we conducted a survey among the seven categories of stakeholders online or through paper questionnaires on their level of concern. In regard to the degree of impact on operations, we assessed the degree of impact of each topic on aspects related to operations, such as revenue, customer satisfaction, cohesion of employees, brand image, and cost.

3. Confirmation and review

Based on the analysis results of the stage 2, we drew a materiality matrix, and decided material topics. Our senior executives discussed and confirmed these material topics before deciding that 15 were our material topics, and the other 4 were potential sustainability issues, which would be disclosed optionally in the report. Compared the analysis results with those in the previous year, the new topic of information security in the economic aspect was regarded as a potential sustainability issue. On the other hand, the topic of human rights in the social aspect was regarded as a material topic. In relation to disclosure standards, we adopted the GRI's value chain presentation to make the stakeholders understand the positive and negative impact on the value chain resulting from different topics, while serving as the basis for the Company to strengthen its corporate sustainability management.





01

STEP

Identification and selection

Identification of
of stakeholders **7 major categories**

We adopted the AA 1000 Stakeholder Engagement Standard (SES), and held the CSR consultation meetings to identify seven major categories of stakeholders, including: employees, shareholders, customers, suppliers, the government, communities, and the media. In addition, we gathered and analyzed the concerned issues and identified the communication channels to include the stakeholders' concerns into the daily work and annual plans of our corporate social responsibility.

Selection of **19 sustainability topics**

To display the complete sustainability context, we gathered 19 sustainability topics through various channels, including: communication processes of stakeholders, international guidelines/regulations/trends (GRI Standards, SBSC, SDGs), industry-specific topics (RBA, SASB), sustainable investment evaluations (DJSI, CDP, MSCI Sustainability Indexes, FTSE4GOOD Emerging Index), and internal goals of organizations.

02

STEP

Deciding priority

Distribution of **528 questionnaires**
to investigate level of concern

In addition to the interactions with stakeholders through daily operation, before publishing the report, we conducted questionnaires among the identified seven major categories of stakeholders. At last, we collected a total of 528 valid questionnaires, analyzing the topics concerning each category of stakeholders.

Collection of **40 questionnaires**
to weigh impact on operations

While information was being disclosed, the impact on the organizational operation should be considered. We incorporated five major factors, including revenue, customer satisfaction, cohesion of employees, brand image, and cost, into our consideration, and asked our management team and employees to help evaluate the impact that each topic might have on the operation. At last, we collected a total of 40 questionnaires for analysis, understanding the key topics under different operational factors.

03

STEP

Confirmation and review

Confirmation of **15 material Issues**

Based on the analysis results in the Stage 2, we understood the distribution of sustainability topics in the materiality matrix. Our management team discussed these topics and finally decided 15 material topics, completing the NTC's CSR materiality matrix of 2019. The following procedure was to further decide the boundary of information disclosure and the planning of management policies.

Confirmation of **20 material topics**

According to the 15 material topics, our employees internally decided the stages that each topic might have significant impact on within the NTC's value chain. These 15 material topics corresponded to the 18 topics in the GRI Standards and two specific topics belonging to NTC, making a total of 20 main themes to be the basis for report compilation.





Stakeholders	Significance to NTC	Communication method	Communication frequency	Topic of concern	2019 outcome of communication	Reference section
Employees	Employees are considered as the most important asset of NTC. We regard our employees' happiness as our responsibility, so we collaborate with our employees to implement the vision of healthy and happy workplace through comprehensive salaries and benefits, training and education, and a two-way communication system.	1. Internal announcements 2. Meetings: Convene regular meetings, such as all-hands meetings (every half year)/executive meetings (quarterly)/production line operator meetings (quarterly)/various training and education courses 3. Two-way communication platforms: Living garden, NTC newsletter, and feedback 4. Electronic questionnaires: Course satisfaction, activity satisfaction, and Employee Engagement Survey	• All-hands meetings are held twice a year. • Executive meetings and production line operator meetings are held quarterly. • Other meetings are held whenever necessary. • Two-way communication platforms: Electronic newsletters are sent every two months, and feedback is replied within five days.	• Occupational Safety and Health • Employee development • Talent Retention and Employee Care	1. Two all-hands meetings were held. 2. Four executive meetings were held. 3. Four production line operator meetings were held. 4. A total of three NTC newsletters were sent.	• Harmonious workplace
Shareholders	Capital investment is a form of trust and support projected from the shareholders of NTC. The Company has set up a dedicated unit for investor relations. Through providing transparent information on corporate operation and management strategies and financial policies to our investors, we achieve the goal of increasing the value of our shareholders' investment.	1. Regular shareholders • A shareholders' meeting is held annually. • An annual financial report is published pursuant to regulations, and is distributed at the shareholders' meeting. • Shareholders are able to inquire via phone or e-mail. 2. Institutional shareholders • Institutional investor conferences and global conference calls are held quarterly. • Participation in domestic and overseas seminars held by investment institutions • Participation in investor forums held by brokers irregularly • Institutional investor visits on site or via phone	• Market Observation Post System (MOPS) - information updated in 2019: over 400 items • Shareholders' meeting - at least once a year • Institutional investor conferences - held once every quarter • Participation in forums or seminars twice every quarter • Irregular institutional investor visits via phone or on site	• Business Integrity	1. Institutional investor conference - held quarterly, totaling 4 sessions 2. Participation in forums or seminars twice every quarter, totaling 21 sessions 3. Irregular institutional investor visits on site or via phone ~ 80 sessions	• Integrity and Transparency
Customers	Customers are the best operational strategic partners of NTC. Through joint efforts to create new thinking and technologies, we are able to grasp application trends of the industry and enhance the value of our products.	1. technical support services 2. Customer meetings and distributor meetings 3. Regular technical support 4. Annual customer satisfaction survey 5. Customer training and education	• As per customers' request • Once in one or two months per customer • Once in one or three months per customer • Once a year • As per customers' request	• R&D and Innovation • Business Integrity • Customer Service	1. Completed 994 cases of customer platform parameter measurement service 2. Completed 95 sessions of customer technical exchanges and courses 3. Completed customer satisfaction survey with 100% coverage of customers, and the score of satisfaction reached 91.7 points	• Integrity and Transparency • Innovative Technology

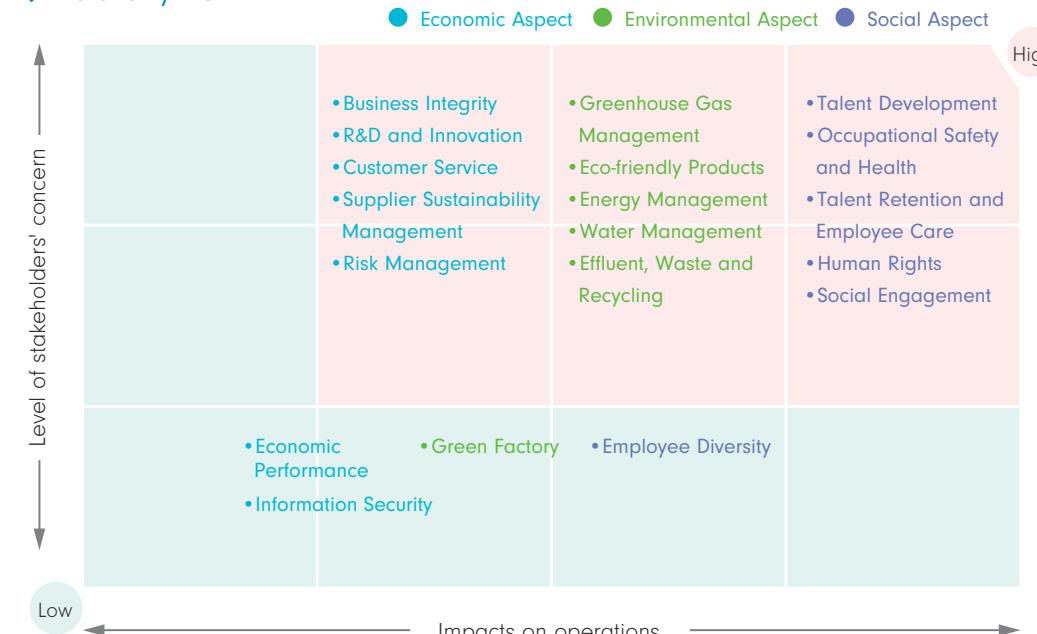


Stakeholders	Significance to NTC	Communication method	Communication frequency	Topic of concern	2019 outcome of communication	Reference section
Suppliers	Suppliers form a significant link in the product production of NTC. Through mutual trust partnership and a supplier management system, NTC works with suppliers to build a sustainable value chain.	1. Real-time supplier information platform 2. Regular face-to-face review reports or meetings 3. Supplier surveys, audits, and consultation are held in January, April, July, and October each year. 4. Annual evaluation of suppliers' stability of delivery and product quality	In addition to the regular audits in January, April, July, and October each year, irregular communication is conducted when necessary.	•Supplier Sustainability Management	1. In regards to delivery and stock management, regular and irregular review meetings were held every month - 82 key material suppliers. 248 non-critical material suppliers 2. Collected 330 SAQ questionnaires with 100% response rate 3. Audited 17 suppliers with high risk, and the improvement rate reached 100%	•Responsible procurement
Government	NTC continuously pays close attention to the up-to-date regulations of the government. In the face of the government's legal and regulatory requirements, we expect ourselves to exceed the statutory standards and actively respond to the policies proposed by the government.	1. Documents 2. Legal and regulatory briefings 3. Financial reports 4. Submit related reports or responses as required by the competent authorities and regulations 5. Communicate with the competent authorities through the industrial park, computer associations, etc.	Submit reports to the competent authorities as required, basically around once per month	•Business Integrity •Greenhouse Gas Management	1. Periodically submitted related reports or responses in accordance with regulations of the government. 2. Actively responded to the policies proposed by the government and made recommendations through associations.	•Integrity and Transparency •Cleaner production
Society	A happy society is the most important cornerstone of corporate sustainable development. Local prosperity and local value preservation should not be contradictory but complement each other. NTC expects itself to gain a firm foothold in business operation while it also actively engages in cultivating local connections, which will be integrated into local community reconstruction. This is an important subject when NTC is considering its social responsibility.	1. Announce relevant messages through the corporate website to inform the communities 2. A charity club is set up in the Company to participate in community volunteering activities. 3. Organize charity drive activities and participate in the relief missions for critical natural disasters domestically 4. An email box (audit@ntc.com.tw) is provided to the community residents for communication. 5. A management office has been set up at the plant area to handle communication with the communities.	•Assist with environmental cleaning activities once per month •Communicate and assist when necessary	•Greenhouse Gas Management •Eco-friendly products •Social engagement	1. Donated to 5 welfare food banks 2. Participated in environmental cleaning activities of the communities 3. Cooperated with non-profit organizations to promote and support Earth Hour	•Cleaner production •Common good
Media	The media is an important channel for the NTC's external communication, so we have a spokesperson and an agent system. Moreover, we have set up a dedicated unit for public relations. Multiple communication channels and consistency in conveying the corporate messages to the media allow the media professionals who care about the Company to understand the latest information.	1. Press releases 2. Quarterly press conferences 3. NTC's official website 4. Interviews with the spokesperson	About once per month	•Business Integrity •Social engagement	1. 24 press releases 2. Held seven press conferences 3. 2 exclusive interviews	•Integrity and Transparency •Common good





◆ Materiality Matrix



Note: Information Security in the sustainability management aspect, and result-oriented Economic Performance are potential sustainability topics, but their information and performance are still disclosed in the report.





◆ Material issues, GRI topics, and impact boundaries

	Material issues	GRI topics	Value chain					Corresponding Section
			Products design	Procure-ment	Manufac-turing	Test-ing	Cus-tomers	
Economic Aspect	Business Integrity	Anti-corruption (205) and Anti-competitive Behavior (206)		V	●	●		Integrity and Transparency
	R&D and Innovation	R&D and Innovation*	●					Innovative Technology
	Customer Service	Customer Privacy (418)					V	Innovative Technology
	Supplier Sustainability Management	Procurement Practices (204), Supplier Environmental Assessment (308), and Supplier Social Assessment (414)		V				Responsible Procurement
	Risk Management	Risk Management*			●	●		Integrity and Transparency
Environmental Aspect	Greenhouse Gas Management	Emissions (305)			●	●		Cleaner Production
	Eco-friendly products	Energy (302) and Emissions (305)	●	V	●	●	V	Cleaner Production
	Energy Management	Energy (302)			●	●		Cleaner Production
	Water Management	Water (303) and Effluents and Waste (306)			●	●		Cleaner Production
	Effluent, Waste and Recycling	Effluents and Waste (306)			●	●		Cleaner Production
Social Aspect	Talent development	Training and Education (404)			●	●		Harmonious Workplace
	Occupational Safety and Health	Occupational Health and Safety (403)			●	●		Harmonious Workplace
	Talent Retention and Employee Care	Market Presence (202) and Employment (401)			●	●		Harmonious Workplace
	Social Engagement	Local Communities (413)			○	○		Common Good
	Human Rights	Non-discrimination (406), Forced or Compulsory Labor (409), and Human Rights Assessment (412)		V	●	●		Harmonious Workplace

* Specific topics of NTC

** Degree of involvement: Direct relation (●), indirect relation (○), and commercial relation (V)





◆ NTC sustainability goals

Topic	Significance to operation	Long-term goals (2025)
Business Integrity	We will build a sound corporate governance system and implement various business ethics policies and risk management mechanisms between suppliers, customers, and stakeholders to maintain the important cornerstone of corporate sustainable operation and value creation.	KPI 1: Material violations of regulations: 0 cases KPI 2: Corruption cases: 0 cases KPI 3: Workplace violence: 0 cases KPI 4: Antitrust cases: 0 cases
R&D and Innovation	In order to maintain competitive advantages, we will research and develop advanced process technologies, and design new products of the next generation. Moreover, we will make forward-looking market plans, provide customers high value-added solutions, and establish high intelligent product lines to enhance efficiency.	KPI 1: Introduce 10nm technology into mass production KPI 2: Finish establishing high-efficiency production lines with AI-assistance
Customer Service	We aim to provide comprehensive customer service. Through regular communication and visits, we are able to understand customers' opinions about our products and services, which help us grasp customers' needs. Thus, we will make improvements to enhance customer satisfaction as well as market image.	KPI 1: Customer satisfaction score reaches at least 90 points. KPI 2: Customer platform parameters measurement services: 950 cases KPI 3: Customer technical exchange and courses: 84 sessions
Supplier Sustainability Management	We will promote sustainable performance of suppliers, improve resilience of supply chains, manage and control supply chain risks, and cooperate with suppliers to become the best partners in order to jointly move towards a sustainable future.	KPI 1: Use of conflict-free minerals for wafer product lines: 100% KPI 2: Key suppliers' completion rate of the RBA self-assessment questionnaire: 100% KPI 3: Completion rate of deficiency improvements by suppliers with high risk in audits: 100% KPI 4: Percentage of suppliers signing Supplier Code of Conduct: 100%
Risk Management	We will establish and maintain effective risk management mechanisms and constantly improve them, lower operation cost to ensure corporate sustainable profits, and create a quality working environment to achieve the goals of corporate sustainable operation.	KPI 1: Regular quarterly meetings and annual reports to the Board of Directors KPI 2: Annual risk assessment items: 200 items KPI 3: Stress test: 7 aspects each year KPI 4: Employees' training completion rate: 100%
Greenhouse Gas Management	We will include climate change risks into overall considerations of operations, and predict the probability of risk occurrence and levels of influence. We will also formulate risk response and mitigation plans, and crisis handling mechanisms in order to issue warnings as early as possible to mitigate the impact of climate risks on our operations.	KPI 1: Reduction of greenhouse gas emissions per unit of die by 25 % (base year of 2017) KPI 2: Reduction rate of PFCs emissions reaches 90 %
Eco-friendly products	We use complete advanced processes to provide competitive advantages of optimized energy consumption, efficacy, and chip sizes. In addition, we manufacture more advanced, more energy-saving, more eco-friendly, and hazardous substance free products for our customers, while lowering the environmental impact of the products.	KPI 1: Energy-saving products, such as 20nm and low-carbon products, reach 80% and above. KPI 2: 100 % products are to complete product life cycle assessment
Energy Management	We will improve the efficiency of energy use, promote energy saving measures, reduce greenhouse gas emissions, as well as lower environmental pollution to improve our image in society, and lower manufacturing cost while meeting the requirements of customers or government policies.	KPI 1: Energy conservation through energy-saving measures totals at least 80,000 MWh or higher from 2017 to 2025 KPI 2: Production disruption caused by climate change disasters 0 days KPI 3: Annual renewable energy use reaches 22,000MWh or higher.



Topic	Significance to operation	Long-term goals (2025)
Water Management	Through daily management, reductions and water recovery, we maximize the use of water resources and lower environmental pollution and production cost, while setting up response mechanisms for water shortage to mitigate the production impact risks resulting from water shortage.	<p>KPI 1: Compared with the figure in 2017, a 35% decrease in the average unit water consumption (ton/k-pcs) by dividing total water consumption from 2018 to 2025 with the total production capacity of the year.</p> <p>KPI 2: Annual average process water recovery rate: More than 97%</p> <p>KPI 3: Production loss due to restricted water supply: 0 wafer</p>
Effluent, Waste and Recycling	We will recycle waste to improve the effective use of resources and reduce other problems deriving from pollution. Moreover, we will provide waste to other industries for reuse, achieving the advantages of environmental impact reductions and circular economy development.	<p>KPI 1: Waste disposal companies on-site audits and consultation rate > 80%</p> <p>KPI 2: Number of cases in violation of environmental regulations: 0 cases</p> <p>KPI 3: Reduction of VOC emissions per unit of die by 20 %(base year of 2017)</p>
Talent development	As a human-oriented company, we establish an advantageous training and development system, reinforcing our employees' core technological capabilities to achieve the Company's annual strategic goals, and cultivate outstanding high-tech semiconductor talent.	<p>KPI 1: Retention rate of key talent \geq 96%</p> <p>KPI 2: Annual planned course completion rate \geq 100%</p> <p>KPI 3: Percentage of open positions filled by internal candidates \geq 65%</p>
Occupational Safety and Health	Employees are our important assets. Through continuous improvements in providing employees with a safe and healthy working environment, we aim to enhance the awareness of safety culture, strengthen self-inspection, and reduce employee occupational accidents.	<p>KPI 1: Disabling injury frequency rate $<$ 0.17</p> <p>KPI 2: Disabling injury severity rate $<$ 5.9</p> <p>KPI 3: Self-inspection rate $>$ 94%</p> <p>KPI 4: Number of proposals engaging all employees for safety and health $>$ 1800 proposals</p>
Talent Retention and Employee Care	Employees are our important assets. We will continue to recruit high potential talent, and provide a friendly workplace, so our employees may continue to contribute to the Company while growing within the organization. Thus, we will maintain our competitive advantages.	<p>KPI 1: Retention rate of outstanding employees \geq 99%</p> <p>KPI 2: Voluntary turnover rate $<$ 5%</p> <p>KPI 3: Average approval rate of Employee Engagement Survey \geq 80%</p>
Human Rights	Value basic human rights, implement a human rights culture and training, establish principles of risk mitigation and compensation, and create a working environment that protects human rights.	<p>KPI 1: Implement human rights policies, and 100% employees complete training and education regarding the policies</p> <p>KPI 2: No major deficiencies are found in external audits or labor inspections</p>
Social Engagement	Based on our core competencies and values, we gather internal resources, invest in diverse aspects, and cooperate with upstream and downstream partners to convey the power of beauty and benevolence, and help create a better society.	<p>KPI 1: Memory talent cultivation:1000 person-time</p> <p>KPI 2: Number of volunteers account for 5% of total employees</p> <p>KPI 3: Connect with stakeholders via social engagement once a year</p>





Responding to UN Sustainable Development Goals

Reviewing our core competencies is the first step in response to the United Nations' Sustainable Development Goals (SDGs). Based on our 15 material topics, NTC identified methods that might solve the problems faced by humans around the globe. We found that our practice in 12 sustainability topics might link to 10 of the SDGs, especially the SDG 8 Decent Work and Economic Growth, and the SDG 12 Responsible Consumption and Production. NTC contributed the most to these two goals, because the two goals were in line with the key roles the Company played in innovation, green, and talent. Therefore, NTC could use its core competencies and operations to make the most contribution to the SDGs.

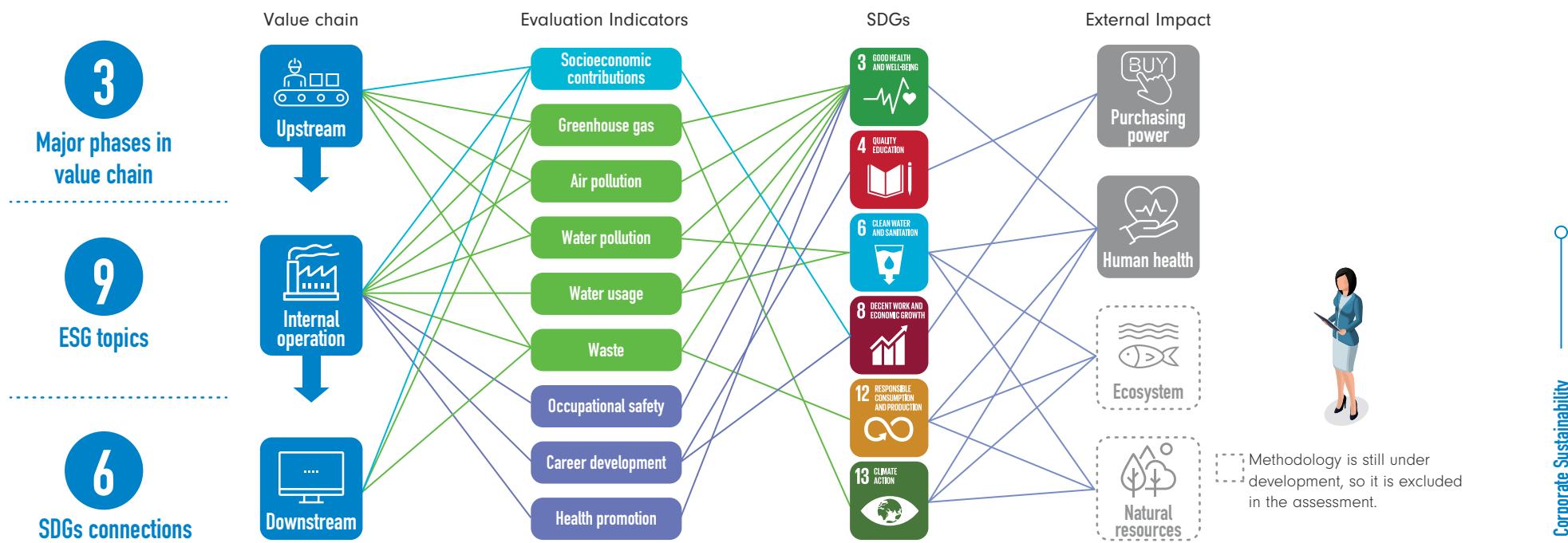
Sustainable role	NTC's material issues	4 QUALITY EDUCATION	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
A Trustworthy Company	Business Integrity									16.5	
The Best Memory Partner for Our Customers	R&D and Innovation				8.2	9.5					
A Promoter of Shared Value	Supplier Sustainability Management			7.3				12.4		16.5	
	Eco-friendly Products							12.4			
	Greenhouse Gas Management								13.3		
A Producer of Green Technology	Energy Management			7.3		9.4					
	Water Management		6.4								
	Effluent, Waste and Recycling		6.3					12.5			
	Talent Development	4.4									
An Attractive Employer for Professional Talents	Occupational Safety and Health				8.8						
	Human Rights				8.7		10.2				
An Active Participant in Community and Social Welfare	Social Engagement				8.5				13.3		17.7



Impact Valuation

"Influence" is NTC's original motivation of pursuing corporate sustainability, as only using the management thinking of the Triple Bottom Line (TBL), i.e., the economic, environmental, and social bottom line, could we show the substantive value created by corporate operations for stakeholders. We have cooperated with academic units to jointly develop management tools for sustainability impact valuation since 2017. Through the Impact pathway approach, we map out the externalities of the environment and society deriving from value chain activities, and monetize the impact to measure its potential effect on human well-being and socioeconomics. With the approach, we may provide decision-makers information for their consideration and comparison during the process of promoting corporate sustainability, and connect with the international sustainability management standards. In 2019, we continued to improve and deepen the application of impact valuation tools by including more diverse impact factors, selecting more appropriate calculation parameters, and optimizing existing calculation methods. Meanwhile, we traced and updated our previous calculation results. NTC will continue to pay attention to and participate in the development of methodology, hoping that we could continuously expand the aspects of assessment, and connect them to our material topics. Our aims are to improve the quality, reliability, consistency, and comparability of the valuation results.

◆ NTC's Impact Valuation Framework



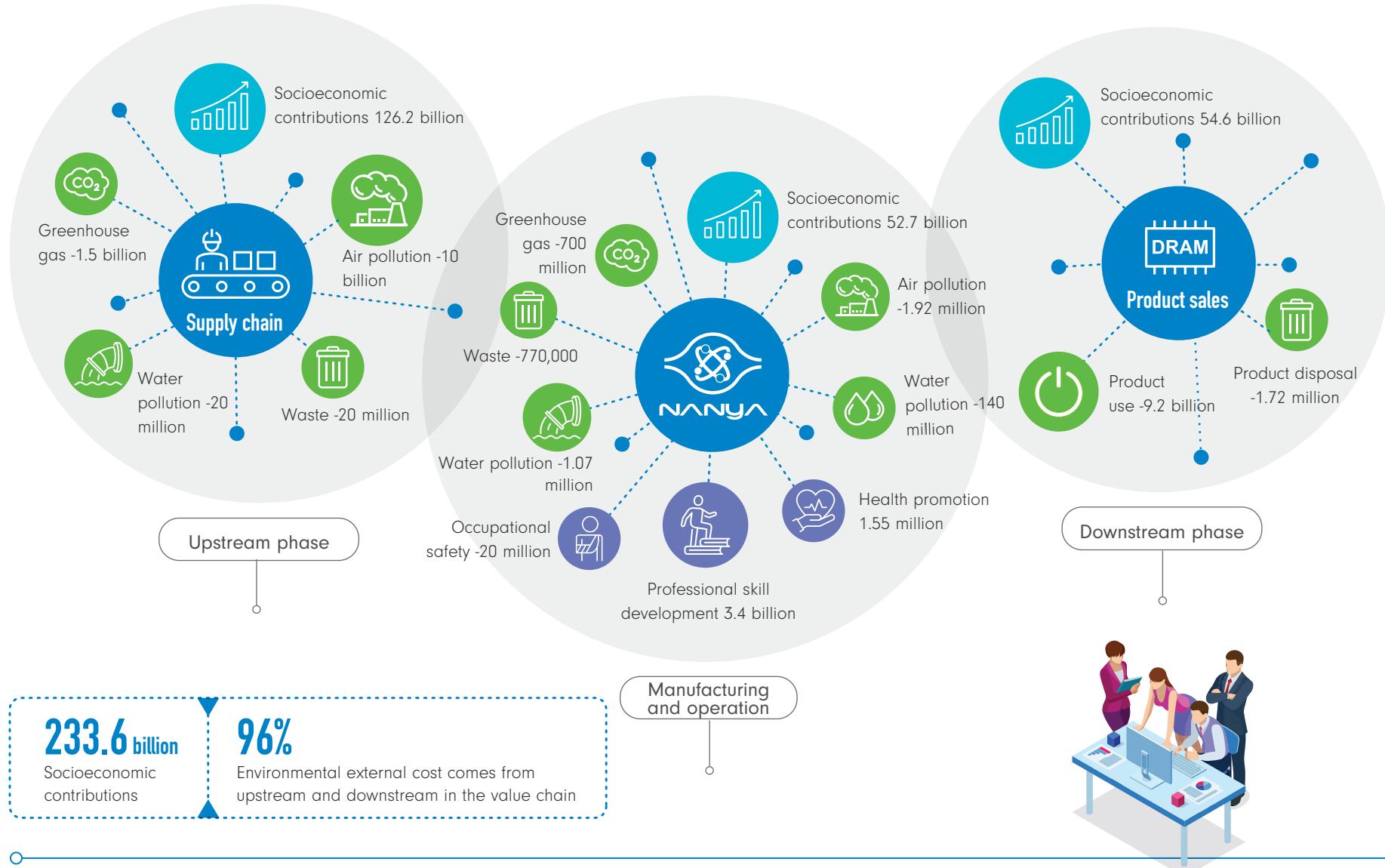


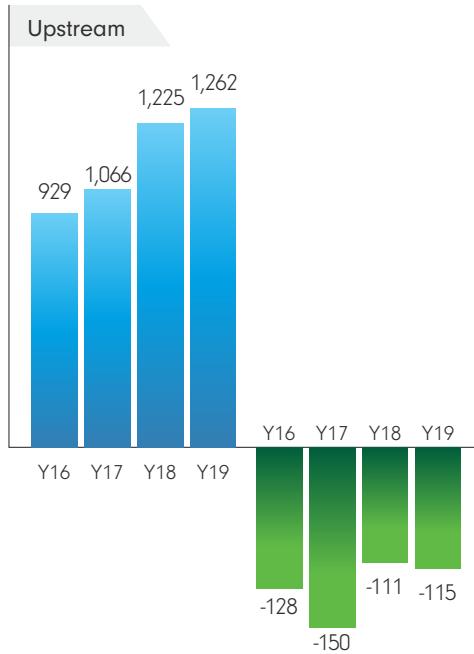
Boundary	Scope	Operating activities	Externality impact	Methodological description	Reference
Upstream	Economic aspect	Supplier procurement	• Socioeconomic contributions	We adopt the Input-Output Analysis to evaluate the indirect economic value generated by interdependent relations between industries due to purchasing activities, and use the externality cost of our own operational pollutants per unit to evaluate environmental impact of greenhouse gas emissions, water pollution (COD), waste (incineration), and air pollution (PM2.5, NOx, SOx, NMHC, and Pb) in supply chains.	Directorate-General of Budget, Accounting and Statistics (2015), Directorate-General of Budget, Accounting and Statistics (2019), Bureau of Energy (2019), US EPA (2016), UNEP/SETAC (2017), PWC UK (2015)
	Environmental aspect	Supplier procurement	• Social cost of carbon • Human health damage		
Internal operation	Economic aspect	Financial income and expenses	• Socioeconomic contribution	To evaluate the socioeconomic benefits created by operating activities for stakeholders, in addition to revenue, we also regard the expenses, such as salaries (employees), dividends (shareholders/investors), tax payment (the government), and depreciation (suppliers) as positive economic value.	The Company's Annual Report
	Environmental aspect	• Greenhouse gas emissions • Water consumption • Discharges of air pollutants • Waste water discharges • Waste output	• Social cost of carbon • Human health damage	We evaluate the human health damage and potential social cost resulting from water consumption, greenhouse gases, air pollutants, waste water discharges, and waste, but exclude the ecosystem quality degradation and resource depletion.	US EPA (2016), ReCiPe (2016), UNEP/SETAC (2017), PWC UK (2015), Environmental Protection Administration (2017), USEtox (2017)
	Social aspect	• Employee career development • Occupational incidents • Health promotion	• Socioeconomic contributions • Social cost of work hours lost • Medical cost of disease avoidance	As the social aspect involves extensive facets, and methodologies of most topics are still in their infant stage, we merely consider the issues, such as the social cost resulting from occupational incidents, the economic contributions of employee career development, and the promotion of health improvement activities to lower the risks of employees' health abnormalities.	Ho Jiune-jye (2005) Lee Chieh-hsien (2009) WHO (2008)
Downstream	Economic aspect	• Product sales	• Socioeconomic contributions	We focus on the first five major end-product applications of DRAM products, and in terms of supply and demand between sales amount and customers' industry production value, evaluate the indirect economic value created by product sales and the environmental impact resulting from the stages of product use and disposal. Moreover, considering the difficulty in acquiring data, social externalities in the downstream are excluded from the assessment for now.	Directorate-General of Budget, Accounting and Statistics (2015)
	Environmental aspect	• Product use • Waste disposal	• Social cost of carbon • Human health damage		Directorate-General of Budget, Accounting and Statistics (2019) Bureau of Energy (2019) US EPA (2016) UNEP/SETAC (2017) PWC UK (2015)

Note*1: Methodologies mainly refer to ISO 14008:2019 and the White Paper: Operationalizing Impact Valuation (2017) for evaluation frameworks

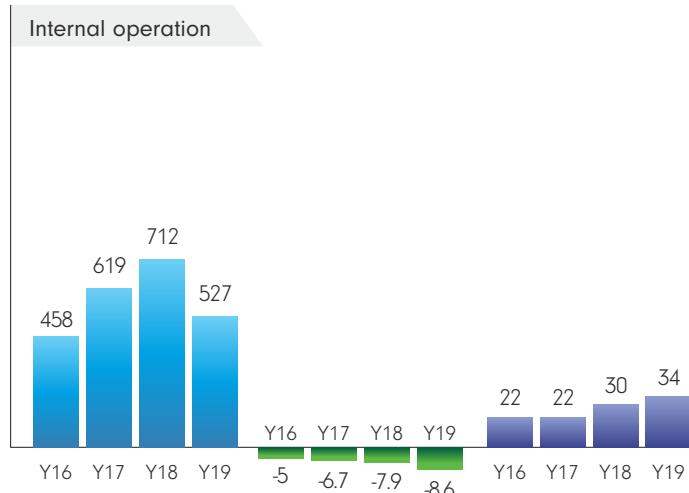
Note*2: Currency value conversion all considers the inflation coefficients of 2017, and the exchange rates of New Taiwan Dollar against foreign currencies.

◆ 2019 NTC sustainable impact valuation results





■ Economics: Economic value created by procurement for the industrial chain
■ Environment: Greenhouse gases, air pollution, waste water, and waste



■ Economics: Revenue, employee salaries, dividends, tax payment, depreciation, etc.
■ Environment: Water consumption, greenhouse gases, air pollution, waste water, and waste
■ Society: Occupational incidents, professional skill development, and health improvement



■ Economics: Economic value created by sales for the industrial chain
■ Environment: Environmental impact of end-product use and disposal

Note: Owing to updates on domestic GDP statistics by the Directorate-General of Budget, Accounting and Statistics in 2019, historical evaluation results of upstream and downstream were adjusted accordingly.

4 times

Socioeconomic contributions

Our supplier procurement drove the supply and demand of the industrial chain, creating nearly 130 billion economic benefits. Impacted by the market demand of the global DRAM market in 2019, the socioeconomic contributions of the entire value chain declined compared with the previous year.

+16%

Environmental external cost increased compared with 2018

The main reasons were increases in purchasing demand and the amount of product delivery. Among the reasons, air pollution of the supply chain impacted human health the most, followed by the social cost of carbon and impact on human health resulting from the electricity consumption of end-products.

+11%

Social external benefits increased compared with 2018

Social externalities mainly occurred in employment opportunities and economic benefits created by employees when they developed their professional skills. Employees' average salary increased in 2019, creating a social external benefit of nearly 3.4 billion.





03

Integrity and Transparency



“ A Trustworthy Company ”

Nanya Technology Corporation (NTC) adheres to regulations and abides by moral standards. We continue to strengthen corporate governance and risk management mechanisms and use comprehensive education and training programs to improve the professional ethics of all employees and build common prosperity in the industry to become the most trustworthy company.

Constituent
of FTSE4Good
TIP Taiwan
ESG Index

100%

TOP 5%

Continuous Inclusion as a Constituent of
"FTSE4Good TIP Taiwan ESG Index"
and a Role Model for Corporate
Sustainability in Taiwan

Employees' Labor and Ethical
Code of Conduct Training
Completion Rate and Antitrust
Education Completion Rate

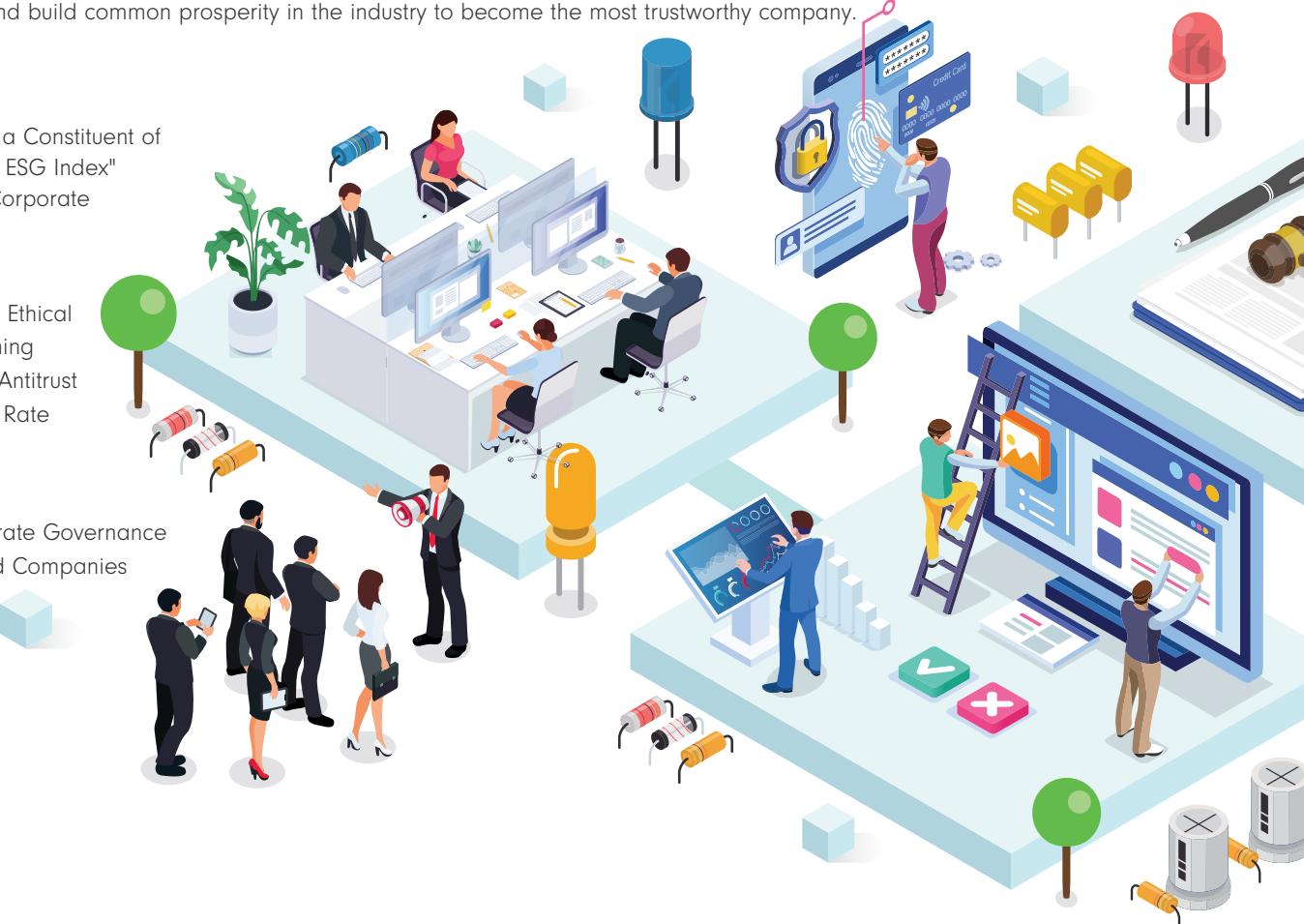
Top 5% in the 6th Corporate Governance
Evaluation of TWSE listed Companies

37 / Corporate Governance

40 / Risk Management

48 / Information Security

52 / Business Integrity



Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed

Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
Risk Management	<ul style="list-style-type: none"> Risk management: Establish effective risk improvement mechanisms and procedures. Loss management: Operating stress test and lowering operating costs. Effectiveness: Mobilize all employees for risk management training and regular drills for operating risks. 	<ul style="list-style-type: none"> Regular quarterly meetings and annual reports to the Board of Directors Annual risk assessment items: 200 items Stress test: 7 aspects each year Education and training: 100% of all employees 	Regular quarterly meetings and annual reports to the Board of Directors	✓ 4 times
	<ul style="list-style-type: none"> Focus on both internal and external operations: Implement regular internal education and training sessions and expand them to include external entities. Provide sufficient reporting channels and protection to cultivate professional ethics and legal compliance culture. 	<ul style="list-style-type: none"> Material violations of regulations: 0 cases Corruption cases: 0 cases Employees' labor ethical training completion rate: 100% Employees' antitrust training completion rate: 100% Illegal infringement in the workplace: 0 cases 	<ul style="list-style-type: none"> 0 cases of material regulatory violation 0 cases of corruption Employees' labor ethical training completion rate: 100% Employees' antitrust training completion rate: 100% 	✓ 234 items ✓ 7 aspects ✓ 100% ✓ 0 ✓ 0 ✓ 100% ✓ 100%

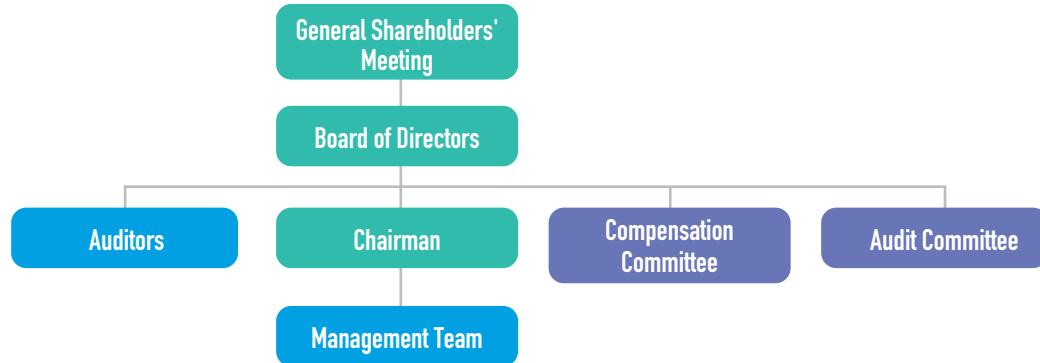
Corporate Governance

Nanya Technology Corporation (NTC) firmly believes that a rigorous and effective corporate governance system can enhance the Company's operations and protect its shareholders' interests. We shall strive to accomplish our missions for "continuous profits, sustainable operations, risk forecast, and precautionary measures" and ensure that the Company abides by relevant regulations, improves financial transparency, and increases operating performance. In 2019, NTC was again selected as a constituent of the "Dow Jones Sustainability Indices, DJSI Emerging Markets" and continued to be a constituent of "FTSE4Good TIP Taiwan ESG Index" and "TWSE Corporate Governance 100 Index". The Company was also ranked among the top 5% of TWSE listed companies in the 6th Corporate Governance Evaluation and it is evident that NTC has won recognition for its continuous hard work in corporate governance.



Board of Directors and Diversity

NTC's Board of Directors complies with relevant laws and resolutions of the shareholders' meeting in its operations. The Directors possess professional knowledge, skills, and qualifications required for the performance of their duties as well as the capabilities of business risk management. They shall maximize the interests of the shareholders based on principles of the Company's sustainable operations. The main duties of the Board of Directors are to ensure information transparency and legal compliance, appoint senior managements, formulate earnings distribution proposals, and supervise and provide guidance for the Company's operations. NTC also established the "[Codes of Ethics of Directors and Managers](#)" to require related personnel to uphold moral principles in the performance of their duties and prevent acts that damage the Company and its shareholders' interests.



NTC's "[Corporate Governance Principles](#)" stipulate that the composition of the Board members shall be determined by taking diversity into consideration without being limited to their gender, race, and nationality. The Board of Directors consists of 12 members with different professional backgrounds for a period of three years. Board members include 3 independent Directors, 2 female Directors (independent Directors and female Directors account for 25% and 17%, respectively), and 8 Directors who do not serve as managerial officers of the Company (they account for 67%). The Chairman also does not concurrently hold any position as a senior managerial officer of NTC, which promotes sustainable governance by a clear division of duties. As of the end of 2019, 4 of the Directors were aged 50-59 and the others were over 60 years old. The average tenure of Directors is 8 years. A total of 7 meetings of the Board of Directors were held in 2019 and the average attendance rate of Directors was 98% including attendance in person (90%) and attendance by proxy.

To strengthen the structure of the Board of Directors and corporate governance, not only female Directors but independent Directors were appointed to participate in the Board's operations. NTC's "[Rules for Election of Directors](#)" stipulate that at least one independent Director shall have accounting or financial expertise. The Company also enacted the "[Regulations on the Scope of Duties of Independent Directors](#)" to establish a good corporate governance and independent director system for the independent Directors to fulfill their functions in the Board and the Company's operations.

Professional Training of Board Members

To improve the Directors' professional skills and legal expertise, the President Office organizes training courses for the Directors each year to strengthen their professional competence and capability of operational management in order to monitor and guide the Company's operations more effectively. All Directors completed a total of 94 hours of training courses in 2019, with an average of 7.8 hours of those per Director. (the Directors' training status is disclosed on page 46 of [2019 annual report](#)). NTC plans to organize training courses on sustainable operations management and risk management for its Directors in the future.

◆ Functional Committees and Main Duties

Audit Committee

- The Audit Committee consists of 3 independent Directors and Mr. Ching-Chyi Lai serves as the convener
- A total of 6 Audit Committee meetings were held in 2019 and the attendance rate of 3 Committee members was 100%
- Authority and responsibility: The Committee supervises the Company's business execution and finances and reviews the Company's financial books. It assists the Board of Directors in its supervisory duties and it is responsible for tasks specified in the Company Act, Securities and Exchange Act, and other relevant laws and regulations.

Compensation Committee

- The Compensation Committee consists of 3 independent Directors and Mr. Shu-Po Hsu serves as the convener
- A total of 2 Compensation Committee meetings were held in 2019 and the attendance rate of 3 Committee members was 100%
- Authority and responsibility: The Committee prescribes and periodically reviews the performance evaluation for the Directors and managerial officers and the policies, systems, standards, and structures of their compensation

Compensation of Senior Executives

The compensation of managerial officers of the Company includes monthly salaries and various bonus systems, pension systems, and evaluation systems approved by the Compensation Committee. They are reported to the Board of Directors for approval before implementation.

The salary adjustment, bonuses, and other compensation of senior executives are determined in accordance with the Company's operations and personal performance and contributions. The Company included their economic, environmental, and social contributions and other corporate governance indicators for sustainable development. The Company also references salary standards in the industry and assigns the Human Resources Department to draft recommendations and report them to the Compensation Committee. The Committee Member shall review the recommendations and submit them to the Board of Directors for approval and execution.

◆ Management Shareholding

Title	Name	Ownership (shares)
President	Pei-Ing Lee	1,043,098
Executive Vice President	Lin-Chin Su	145,601
Vice President	Joseph Wu	120,000
Vice President	Rex Chuang	112,000
Vice President	Yau-Ming Chen	0
Assistant Vice President	Wesley Chang	21,042

March 30, 2020		
Title	Name	Ownership (shares)
Assistant Vice President	Chi-Meng Su	0
Assistant Vice President	Mark Mao	0
Assistant Vice President	Jeff J.P. Lin	150,027
Assistant Vice President	Rex Chen	21,000
Assistant Vice President	Chuan-Jen Chang	53,048





Risk Management

NTC established a comprehensive risk management policy and procedures in accordance with the management mechanisms and values of the Enterprise Risk Management (ERM) and ISO 31000 guidelines. We seek to enhance risk management of the organization, system, execution, and audit to mitigate the impact of risks on operations while enhancing the risk awareness and culture of all employees to continue to reduce the risks of the Company.

Organization and Operations

The Company's Risk Management Steering Committee is the highest decision-making unit for risk management. The Steering Committee is chaired by the President and is responsible for the management and control of risks in the Company's overall operations. The Company also established five major functional committees including the Operational Risk Management Committee, Information Security Risk Management Committee, Environmental Health and Safety Risk Management Committee, Finance Risk Management Committee, and Legal Risk Management Committee based on the Company's main operations. The Steering Committee meets quarterly to review the performance of risk management operations and operational continuity plans of each functional committee. The Risk Management Steering Committee reports to the Board of Directors each year and Corp. Audit conducts at least one audit each year. In addition, the Company also established a dedicated organization for sustainable development and risk management under the jurisdiction of the President Office. It also serves as the executive secretary of committees to ensure the effectiveness of horizontal and vertical communication in the organization and manage the implementation status of various projects.



Risk Management System

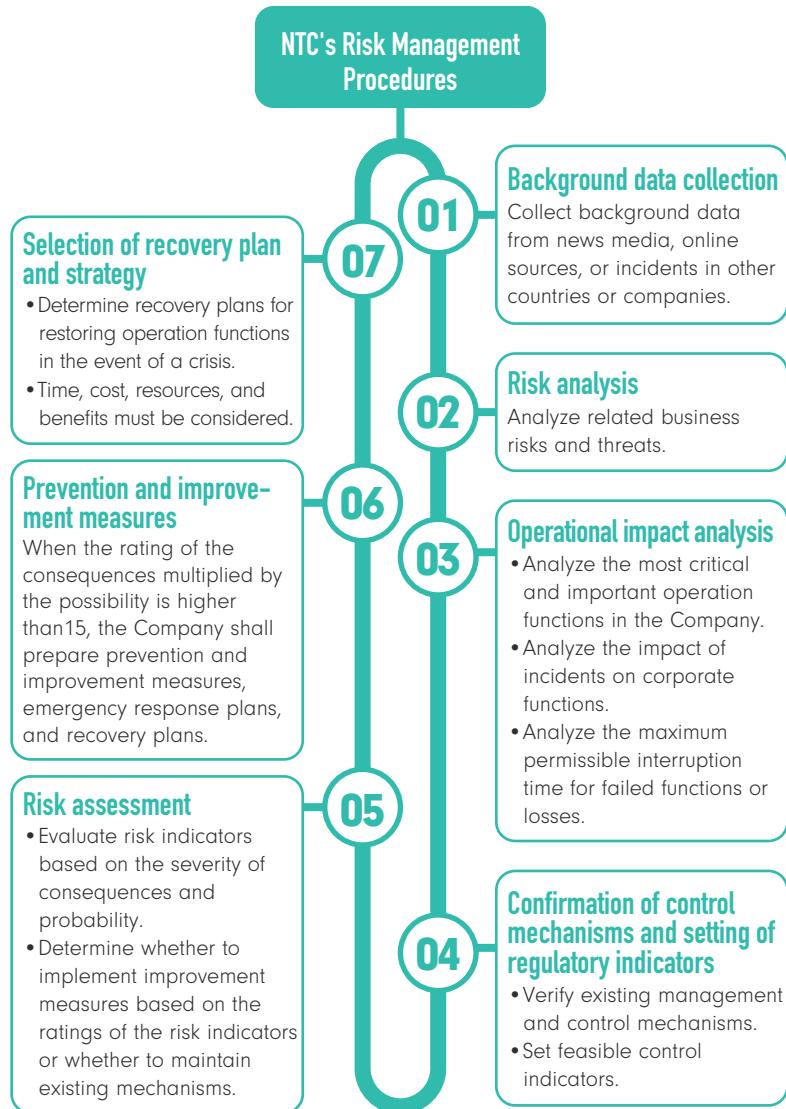
The Company has adopted the management mechanisms and values of the Enterprise Risk Management (ERM) for the establishment of risk management policies and commitments and established seven procedures for risk management based on the P-D-C-A cycle. We adopted comprehensive risk management systems and uncovered the Company's potential risks and opportunities to effectively execute risk management and ensure the normal operations of the Company. We seek to create value for shareholders, employees, customers, and society to achieve sustainable development of the Company.

Risk Management Policy

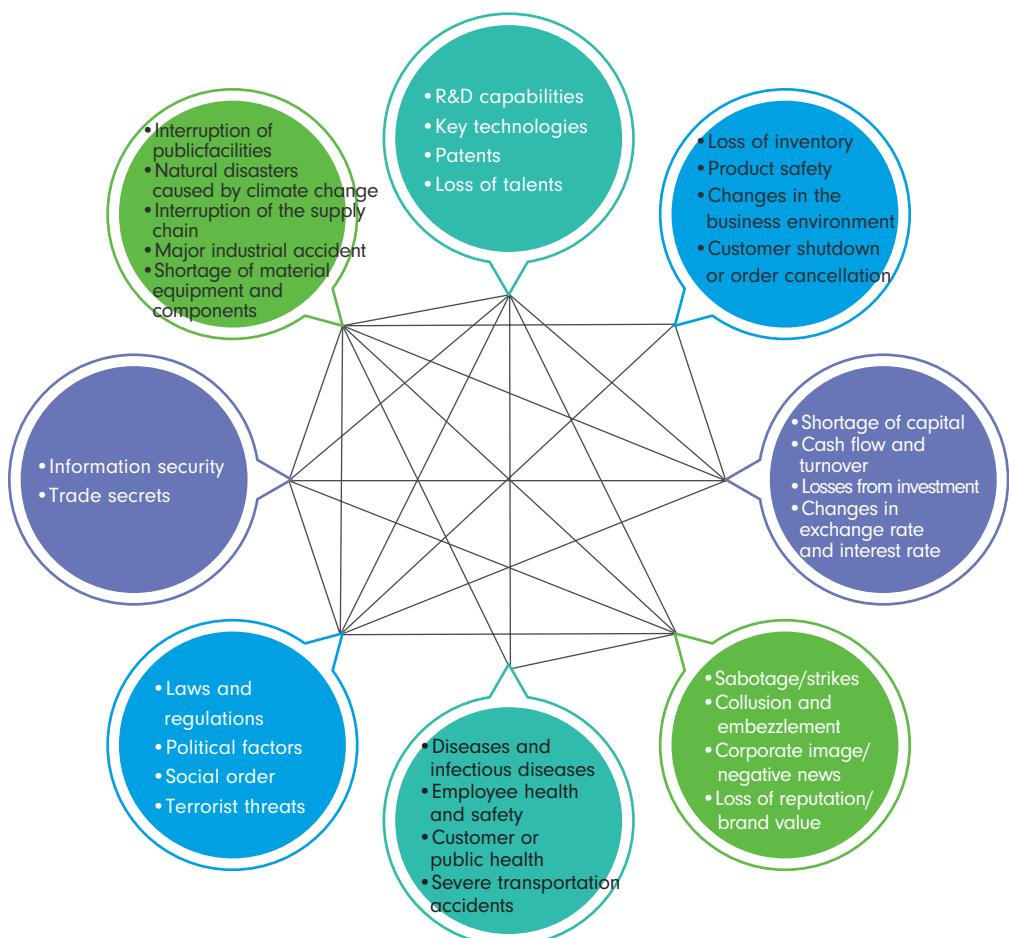
We will establish and maintain effective risk management systems and constantly improve them, lower operation cost to ensure corporate sustainable profits, and create a quality working environment to achieve the goals of corporate sustainable operation.

Risk Management Commitments

- All employees shall adhere to their commitments and managers in particular should lead by example and fulfill their supervisory responsibilities.
- We shall ensure that employees of all levels receive adequate training and have the skills for performing various risk management tasks to ensure the normal operations of the Company.
- The Company shall provide necessary resources to maintain the effective operations of risk management mechanisms and continue to implement improvements to reduce risks.
- We shall strengthen communication with stakeholders, increase the risk management awareness of all employees, and fulfill our risk management policy.



By analyzing potential risks in the internal and external environment, we confirm various risk factors and analyze the relationship between the risk factors to produce a risk map. The risk map helps us learn more about the relationship between each risk factor and their impact and allows us to control and monitor changes in risks.





Business Continuity and Emergency Response

The Company abides by the principles set forth in ISO 22301 for implementation in emergency response mechanism and measures in ISO 9001, ISO 14001, ISO 50001, ISO 27001, and ISO 45001 and obtained certification. To reduce risks and damage of emergency incidents, NTC has a complete set of operational norms and methods for handling emergency anomalies. We can immediately take response measures in the event of an emergency, mitigate the impact of the incident and quickly recover, and ensure normal operations to meet client needs. For example, we have specific treatment steps and improvement measures for raw material shortages and incidents that affect 10% of output (such as earthquakes, typhoons, toxic gases, fire alarms, labor shortages, etc.).

In addition, the emergency response to personnel safety, such as fire alarm, gas leakage, leakage, odor, earthquake and radiation leakage, emergency response measures, notification procedures and command systems are all in accordance with relevant environmental health and safety regulations. The Company organizes at least one emergency evacuation drill and two fire safety drills each year to ensure the effectiveness of emergency response measures. We use quarterly meetings to discuss related prevention and improvement measures on a regular basis to enhance our standard operating procedures. We also conduct regular drills for emergency response measures to effectively minimize risks.

Response Measures for the COVID-19 Pandemic

As a multinational company, NTC immediately began to restrict business travel of related employees (including the Company's subsidiary in Shenzhen) to Wuhan on January 3, 2020 after the outbreak of pneumonia of unknown sources in Mainland China at the end of 2019. The epidemic later intensified in Mainland China and the Central Epidemic Command Center was established in Taiwan. The Company established the "Nanya Technology Corporation Pandemic Prevention Task Force" (hereinafter referred to as the Pandemic Prevention Task Force) at the end of January 2020.

The special assistant of the President Office serves as the commander of the Pandemic Response Task Force and reports directly to the President. The Task Force oversees the Safety and Health Division, Human Resources Division, Production Division, Plant Manager Office, and Operation Management Division and senior executives serve as leaders of each task force to establish and implement various pandemic prevention measures. They also closely monitor the health status of employees and various stakeholders such as customers and employees of suppliers. They track the operations of the supply chain, market, and overseas subsidiaries to ensure the health of personnel and the normal operations of the Company.

◆ Main pandemic prevention measures

Hardware facilities

- Set up alcohol sterilizers and mask sterilizers across the plants
- Distribute medical masks to employees on the front line.
- The Company provides boxed lunch for all meals provided (exposure of food in open spaces is prohibited)
- Set up transparent acrylic partitions in the employee cafeteria
- Allocate resources to provide overseas employees in epidemic-struck areas with personal health protection equipment

System management

- Establish an agent system
- Adjust and enlarge office area cubicles
- Adopt flexible shifts and rotations for work based on the nature of business operations
- Completed backup plans for onsite work, separate work groups, or working from home

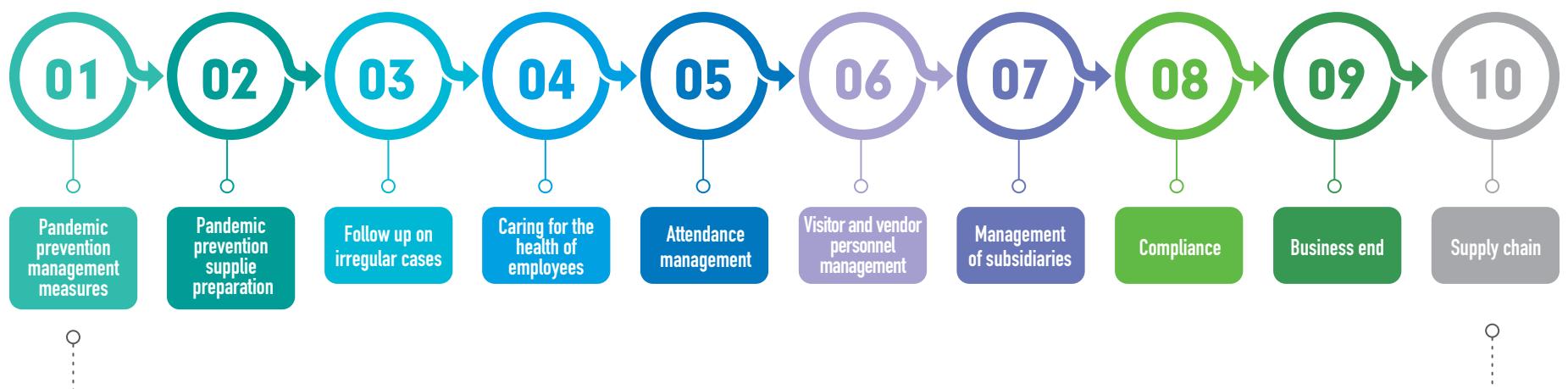
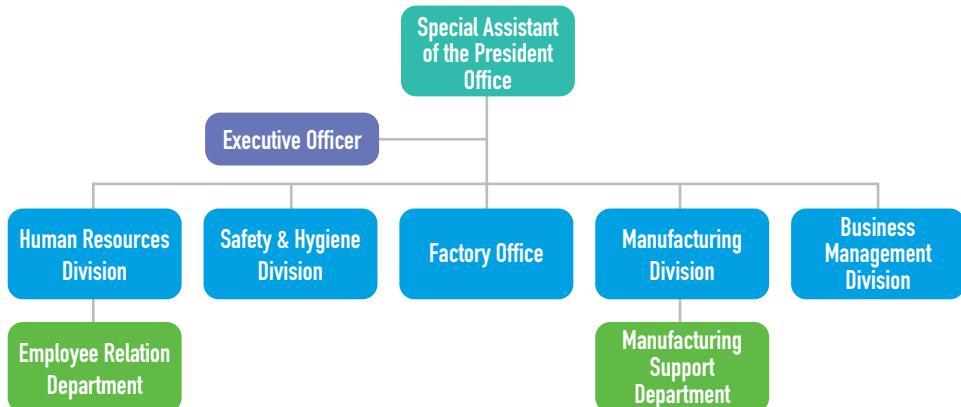




Due to the uncertainties of the pandemic, the Company has gained full control over the supply status of the supply chain and increased related inventories with the aim of helping customers stabilize production lines and ensuring the resilience of the supply chain. The Company's subsidiary in Shenzhen, Mainland China restored normal operations on March 2, 2020 and other subsidiaries also followed the requirements of local governments to implement flexible attendance schemes or work from home. As of the end of April 2020, all employees of the Company and subsidiaries and their cohabiting relatives have maintained good health and there has been no confirmed cases of COVID-19 in the Company.

※Established the Pandemic Response Task Force on January 30, 2020

◆ COVID-19 Pandemic Response Task Force





Risk Identification and Stress Test

Risk Identification Results

NTC continues to conduct risk identification in accordance with the risk items proposed by the Risk Management Steering Committee. The Company identified 234 risk items in 2019 and classified them under four risk ratings. After the classification, the Company did not discover any items with the highest risk rating which requires "immediate improvement". There were 7 items with the second highest risk rating of "improvement based on conditions", 65 items with the third highest risk rating of "acceptable risks", and 162 items that "do not require further actions".

The items that require "improvement based on conditions" mainly included three major aspects including operations (5 items; shortage of helium, TPC power supply irregularity, earthquakes, fire, and resignation of employees), information security and protection (1 item; ineffectiveness of terminal protection), and finance (1 item; exchange rate changes). We have already implemented response measures and our current risk level is significantly lower. We have also established a long-term management plan and crisis management mechanisms to continue to mitigate risks. The management measures are as follows:

Operations - Helium supply chain management	Operations - Utilities and safety, health and environmental management	Operations - Human resources management	Information security and protection	Finance - Exchange rate risks
<p>The Company shall execute cost-down improvements and verification plans for alternative products. We shall also work with existing suppliers to obtain quotas, establish long-term agreements, and develop new helium suppliers.</p>	<ul style="list-style-type: none"> The Company has obtained ISO 14001 and ISO 45001 update certification and implemented the management systems. The Company has reassessed emergency response operation procedures and regulations for irregular power supply from TPC and natural disasters such as earthquakes and fires. We have established the 2020 drill plan for implementation. 	<ul style="list-style-type: none"> The Company shall provide key R&D employees with more benefits and incentives. We shall provide a more diverse range of employee benefits and a desirable work environment. The Company shall refurbish the attendance inspection system for launch in 2020. The Company shall convene labor dispute education and prevention courses for entry-level managers. As of the end of 2019, the Company has completed five sessions of courses and shall continue to organize courses in 2020. 	<ul style="list-style-type: none"> The Company passed ISO 27001 certification and obtained the certificate in 2019. We shall continue to strengthen management measures for computer software and hardware, confidential documents, Internet access, physical access, and mobile phones to effectively reduce the possibility of losing terminal device protection. 	<ul style="list-style-type: none"> The sales of DRAM products are mainly conducted in USD. The Company has established an offshore subsidiary to reduce the impact of USD positions held by the parent company. As of the end of 2019, the amount affected by the exchange rate amounted to approximately NTD 200 million. The Company shall continue to monitor changes in exchange rates in 2020 and adjust its USD positions when appropriate.

Stress Test

NTC has conducted sensitivity analyses and stress tests on main risks in different aspects including financial, climate change, water resources, operations, market, business, legal compliance, and information security risks.

Finance

The sales of DRAM products are mainly conducted in USD. To reduce the impact of exchange rate fluctuations on profit and loss, the Company has established an offshore subsidiary at the end of 2018 and increased capital in separate phases to a total of USD 1.2 billion. As of the end of 2019, the parent company holds approximately USD 200 million which effectively reduces the impact of exchange rate fluctuations on the USD positions held by the parent company. If the NTD to USD exchange in 2020 rises from 30.1 to 29.2, the maximum foreign exchange losses are expected to reach NTD 250 million.



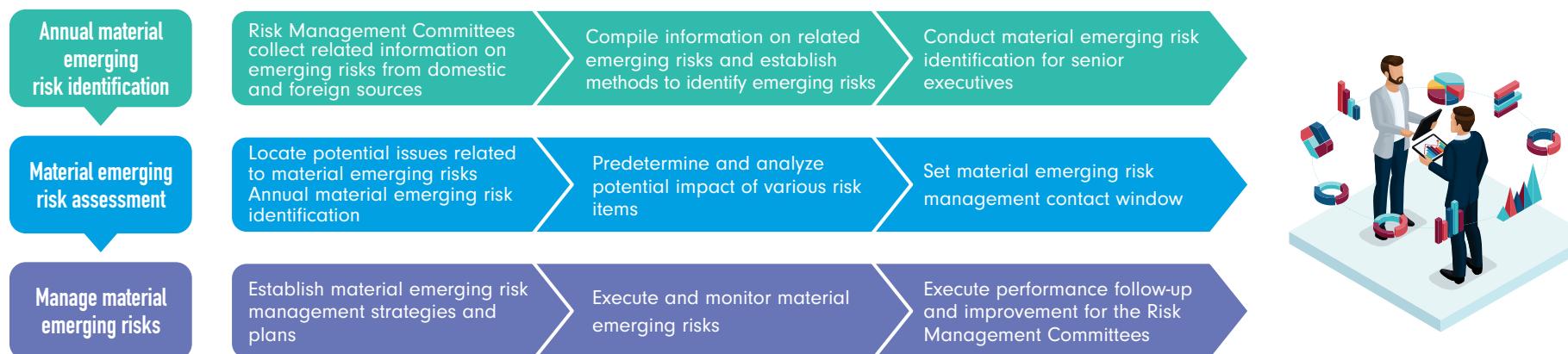
Climate change	<ul style="list-style-type: none"> We analyzed 18 risk factors on transitional risks (including legal/technology/market/reputation) and physical risks (including immediate/long-term) in accordance with the Task Force on Climate-Related Financial Disclosures (TCFD). Three items were classified as medium-high risk based on evaluation results. They are described below: <ol style="list-style-type: none"> Increase in the unit price of externally purchased electrical power: Taiwan's response to the intended nationally determined contributions (INDC) involves raising the price of electricity from NTD 2.5/kWh in 2019 to NTD 3.39/kWh by 2025. The potential financial impact is NTD 631 million/year and the Company shall respond with energy management solution. The coal consumption of an important supplier (over 50%) has caused a high carbon footprint for materials. The potential financial impact is NTD 820 million/year and we shall introduce an energy management system. Customers' strong demand for low-carbon products: The potential financial impact is NTD 4.3 billion/year and the Company shall continue to research and develop processes for low-carbon products and meet customer demands.
Water resources	<p>We inspected the Company's internal and external water sources and simulated water restrictions under different scenarios. We have water supply from the backup wells (400m deep), water tanks, and the two additional wells we completed in August 2019 which will supply 2,700 CMD of water. With 2,000 CMD of well water from Chang Gung Golf Club, we can maintain 143 days of normal production at the plants</p>
Operations	<p>Power interruptions severely affect the Company's production. We reviewed the Company's internal and external power supply system and conducted simulations for conditions where Taiwan Power Company reduces the contract capacity by 5%, 10%, 15%, or 20%. With emergency generators and DUPS support in our plants, we can maintain normal operations of the plants. If the external power supply is cut completely, it would cause losses from suspension of production. Based on actual revenue in 2019, the impact would be approximately NTD 4.2 billion/month.</p>
Market	<p>DRAM sales volume and prices fluctuate constantly in the market and NTC conducts two-factor sensitivity analysis at regular intervals to confirm the feasibility of management objectives and establish response strategies and plans. We observed the following based on the analyses in 2019: 1. Changes to the EPS under scenarios where prices are expected to drop by 30% but drop by 25% or 35%; 2. Changes to the EPS under scenarios where 100% of the target sales volume is expected to be attained but the sales volume only reached 90% or 80% of the target. Through the aforementioned changes, we discover that market volatility would result in positive impact on the EPS.</p>
Business strategy	<p>The Company conducts sensitivity analyses for the establishment of sales and production strategies. The analyses were implemented with sales price variations of 90%, 110%, and 120% of target sales prices under respective sales and production product portfolios and they showed the impact on the profit and loss of all product portfolios. We use the results of the analyses to select favorable sales and production strategies.</p>
Legal and regulatory compliance	<ul style="list-style-type: none"> The Company's legal compliance: Corp. Audit executes internal audits of the Company and implements corporate governance and ethical corporate management principles. We amended the internal management system in accordance with regulations. In 2018, a few employees who had left the Company violated the Trade Secrets Act and were reported by the Company. They are now under investigations by prosecutorial agencies and the incident currently does not affect the interests of the Company. We have strengthened information security management and adopted rigorous audits and protection measures for confidential information. EHS regulatory compliance: We have not been penalized by the government for EHS affairs or environmental protection issues in 2019. The Company obtained ISO 14001/ISO 45001 Environmental Health and Safety Management System certification and continued to implement the system effectively. We expect to complete the certification for ISO 45001:2018 Occupational Health and Safety Management System before 2021. The risks of suspension of work or international trade sanctions are extremely low. Labor law compliance: The Company abides by the regulations in the Labor Standards Act of the Republic of China. We actively protect labor interest and labor relations. We allow employees to report overtime work due to business requirements based on the Company's regulations. By adopting self-inspection and risk prevention ideals, we have protected the rights of laborers and improved the quality of the work environment. Intellectual property rights and patents: The Company has always valued the protection of intellectual property rights and patents and we have established a comprehensive management system for trade secret protection and trademark development. We have accumulated 4,000 patents mainly for DRAM production, mutual licensing between companies, and defense of patent rights.
Information security	<ul style="list-style-type: none"> NTC's long-term competitiveness derives from our continuous innovation and development of advanced process and product technologies and our protection of the Company's valuable assets. We are thus able to build a foundation of sustainability for NTC and provide high-quality and secure DRAM products and professional services to customers across the world. The ISO 27001 Information Security Management System certification demonstrate NTC's commitment and dedication to protecting intellectual property rights and we have internalized these values into our corporate culture. We regularly organize information training, security drills, simulations, and experiments as well as social engineering attack drills. In addition to enhancing users' awareness of the necessity of information security, we also use actual operations increase the risk awareness of all employees to achieve preventive effects. We shall integrate artificial intelligence into information security protection and we shall use AI to analyze information security incidents to expedite our response to information security incidents and lower risks.



Emerging Risks

NTC pays close attention to changes in the economic environment. We identify long-term risks and opportunities and adapt our business strategies to ensure sustainability and long-term operating performance. We assess emerging risks for the next 3-5 years at least once every year and the Risk Management Committees collect related domestic and international information to evaluate potential risks in the Company's long-term operations. They used questionnaires or evaluations in meetings of senior executives to identify three issues with the highest level of potential impact in the future and review mitigation and response strategies. The issues and strategies are reported to the Risk Management Steering Committee for resolution and used as important references for formulating future business strategies.

The Risk Management Committee collected and compiled 16 emerging risks in 2019. Members discussed and established five-point evaluation tables and questionnaires as investigation tools for identifying material emerging risks for senior executives (Assistant Vice President and above including the President) and it has identified three emerging risks. NTC has formulated response strategies and continues to implement improvements with the aim of mitigating related impact.





Material emerging risks	NTC is located in Taiwan which is geographically near China and we share the same language. Our R&D team of key processes are more susceptible to poaching than our competitors.	The DRAM industry in China has achieved breakthroughs in the processes under 20nm and their product portfolios overlap that of NTC and may affect our existing market in Mainland China.	A major power blackout in our main base of operations located in Taishan District that persists for more than 24 hours without restoration of power supply may severely affect production at the factory.
Possible impact	<ul style="list-style-type: none"> The loss of talents in key process development interrupts business operations or cause technology gaps. A high turnover rate increases the workload of employees or affects morale. The loss of technical talents causes leaks of trade secrets. 	<ul style="list-style-type: none"> Imbalance in supply and demand on the DRAM market and intense price competition lower profits and affect business performance. Loss of customers in China and decrease in market share affect business performance. 	<ul style="list-style-type: none"> The production of factories in the DRAM industry requires power supply at a stable voltage to ensure production precision and quality. When the source of power is not sufficiently stable, it may cause severe interruption and production loss in the wafer foundry of NTC. As the proportion of non-baseload power supply increases each year, impact on the stability of power supply will continue.
Response measures	<ul style="list-style-type: none"> We will strengthen our information security to protect trade secrets. We monitor China's memory industry and poaching, propose different response measures, and increase employees' awareness. We continue to plan and implement talent development and retention plans (elite talent training, promotion, bonuses and raises, employee bonuses, stock warrants, and treasury shares). We aim to create a happy workplace, and provide excellent benefits to increase our retention rate (Employee Assistance Program (EAP), counseling, guidance personnel, exercise in the workplace, and health promotion). 	<ul style="list-style-type: none"> Continue the research and development of new technologies and development of new products. Actively expand the automotive, industrial, Internet communication, and other high value-added markets. Actively expand the DRAM markets in the United States, Europe, and Japan. 	<ul style="list-style-type: none"> Establish comprehensive plant power backup systems to mitigate the impact of a sudden drop in voltage or power blackout. Implement systematic energy management based on ISO 50001 and formulate real-time energy monitoring and control and implement energy conservation plans. Formulate voltage stabilization measures and focus on whether to add voltage regulators for key equipment to mitigate the negative impact of non-baseload power supply. Enhance backup power switching drills for scenarios under which the power supply is lost and cannot be readily restored.

Promote Risk Awareness Culture

The Company has internalized risk awareness to the management level and we shall also include the results of risk management into annual performance evaluation items for the management (President and supervisors ranked Assistant Vice President and above). They shall execute operations based on the approval of the Board of Directors and use target management for supervisors to expand risk management measures and fully enhance the Company's risk awareness. In terms of the reporting mechanisms for potential risks, we have established the 24-hour instant case report system, the information security line, employee feedback mechanisms, etc. to provide employees with channels for immediate response. We also use TV walls, posters, and computer wallpapers to enhance the risk management awareness of all employees. We have established a variety of incentives to increase the risk awareness of all employees. We encourage employee proposals and innovation to uncover and improve potential risks. We conduct reviews and provide cash incentives based on the expected benefits, creativity, application scope, integrity, and quality contributions.





◆ Employee Proposals

	2017	2018	2019
Number of proposals	47	51	225
Proposal bonus(NTD thousands)	62	128	583
Expected annual proposal benefits (NTD thousands)	345,504	347,952	2,298,804

◆ Risk Type and Number of Cases

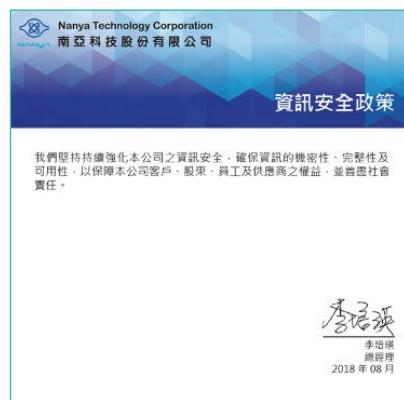
	2017	2018	2019
Process and equipment risks	28	19	105
Productivity and quality risks	12	23	91
Environmental health and safety risks	6	4	13
Other risks	1	5	16
Total	47	51	225

Risk Management Training

To increase risk awareness, our board members attend corporate governance and risk management courses each year. The Company also established risk management education materials for employees to read on the computer system to improve risk awareness of all employees. Total training hours in 2019 amounted to 1,576 hours and both the coverage rate and completion rate were 100%. The Company organized "risk management and crisis management" training courses for employees in the five major sectors including operations, safety, health, and environmental protection, finance, information security, and legal affairs to help main risk management personnel conceptualize and establish an effective crisis management system. The total training hours amounted to 237 man-hours which were used to increase the risk management personnel's awareness of the importance of risk management and improve operating procedures.

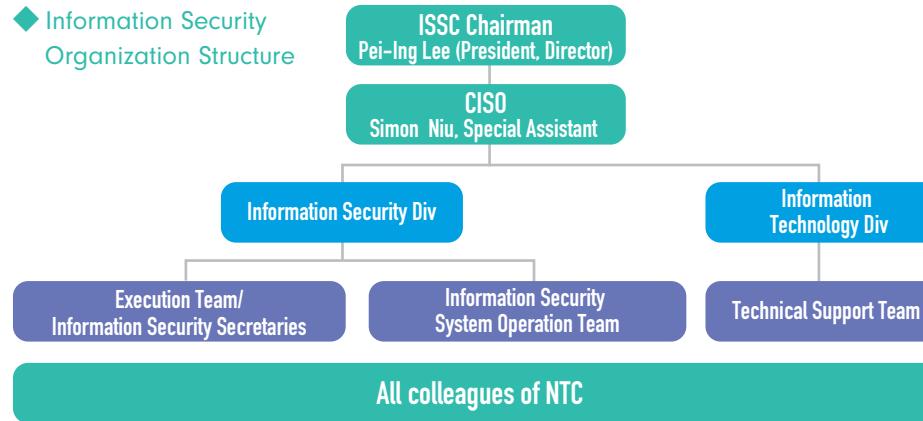
Information Security

NTC has actively promoted related information security systems to ensure the security of the information of the Company and customers. We have obtained the ISO 27001:2013 Information Security Management System certification in 2019 and strengthened information security restriction measures to ensure the smooth operations of the Company and gain the trust of suppliers and customers. NTC established an inter-departmental Information Security Committee to advance information security management. The President serves as the convener and five level 1 supervisors were appointed as Committee Members. They include the Information Security Officer and heads of the Quality Assurance Division, Legal & IP Division, Human Resources Division, and Automated Information Division. Meetings of the Information Security Committee are convened every week and they mainly focus on the formulation, approval, and supervision of the Information Security Policy, targets, and related regulations. The Committee also reports the results of the operations of the Information Security Management System to the Board of Directors every quarter. In addition, our Executive Directors also participate in the Company's quarterly information security meetings and annual information security management review meetings to ensure the effectiveness and results of the management.





◆ Information Security Organization Structure



◆ NTC confidential information management procedures

The Company has obtained ISO 27001 information security certification that can satisfy customer demands and attain international information security management standards.

01

The employment statement signed by the Company's employees upon hiring include the confidentiality obligations for during and after employment.

02

The Company has established the employee service guidelines and confidentiality requirements in the "Employee Handbook" to provide employees with guidance for their conduct.

03

In response to risks of poaching by competitors which may cause risks of inappropriate acquisition of the Company's confidential and sensitive business information, the Company has established the Information Security Section to take charge of planning, executing, auditing, and improving information security management.

04

Where the Company discovers a violation of laws by current or resigned employees, such violation shall be prosecuted to the fullest extent of the law.

05

◆ NTC's main measures for information security management

We adopted the defense-in-depth architecture with sensitive data encryption, endpoint protection, and network gateway protection, which are supported by network access control, document output management, and e-mail protection mechanisms. We also installed metal detectors for controlled information security products, so as to prevent external cyberattacks and internal leaks.

01

Access control, system login identity authentication, password control, access right control, and periodic vulnerability scanning. We also installed anti-virus software, updated security patches, controlled USB access, and established a backup mechanism to strengthen endpoint protection.

02

We installed an information security system to prevent computer viruses or malware from affecting information system services or accessing confidential data, and also prevent the theft of confidential data through social engineering.

03

We provide employees with annual information security education, training, and testing to raise their awareness of information security risks.



04

Each year, we examine our information security measures and regulations, follow information security issues, and formulate response plans to ensure their appropriateness and effectiveness.



05

In addition to the Company, we have expanded our information security to the entire supply chain. Equipment must pass a security inspection when entering our factories before they may be used. We also signed an information security clause with vendors and their employees to prevent attacks through our supply chain.

06



Information Security Risk Assessment and Drills

As different departments have different information system structures, the assessment must be conducted based on the severity of the impact of each system on key operation procedures. Each system must be divided and the degree of severity must be defined as the basis for determining the frequency of post-disaster recovery exercises. We have evaluated and identified all systems and classified them based on the level of severity from important to minor (Degree 1 to 3). The levels are explained below:

- A.Degree 1: The suspension of operations of the system will suspend services provided with the primary functions.
- B.Degree 2: The suspension of operations of the system will suspend services provided with the secondary functions.
- C.Degree 3: The suspension of operations of the system will not affect the services provided or the system can continue operations with other remedial measures to provide services.

The recovery drill cycle is also divided based on the period (annual, every two years, no drills required). Each department shall register the rating of the systems they are responsible for operations and maintenance in the list in the "information system severity level classification" document. All Degree 1 systems are provided with multiple backup mechanisms placed in different server rooms in different buildings. All production information is provided with remote backup through encryption and the Company conducts recovery exercises each year to ensure the regular operations of the system. The Company has a total of 17 systems that required drills in 2019. We completed drills for 17 systems and the completion rate was 100%. Each information system management unit notifies the response units in the execution of response measures in accordance with the response procedures in the "Information System Response Plan" in the event of major anomalies.

◆ Degree of severity and recovery cycle table

Severity level classification	Recovery drill cycle
1	One year
2	Two years
3	No drills required

Information Security Education and Objectives

In terms of information security training, NTC has invested many resources in hopes of improving information security protection awareness. It also organizes information security month activities each year to consolidate consensus for information security protection. Social engineering exercises are also implemented each quarter. The Company organizes training sessions for information security officers in routine information security meetings and monthly information security meetings. The Company compares the performance of reports from supervisors ranked level 1 or above in quarterly information security meetings. To develop a culture for the management of confidential information, all employees of the head office must complete the reading courses of the "Company Confidential Information Management Regulations" each year. The completion rate in 2019 was 100%.

2019 Information Security Training	Audience (Department and Title)	Head Count	Number of Courses /Hours	Coverage Rate
Social engineering exercises	All employees (excluding TA)	2648	8 times	100%
Social engineering training	Employees who clicked on the link	142	25 hours	100%
Monthly information security activities Information Security Month event - online questionnaire with gifts	All employees	1805	902.5 hours	80%
Information security seminars 2018 online threat analysis report	Mandatory for information security officers	33	49.5 hours	100%
Information security seminars Trends in information security attacks and social engineering case studies in 2019	Mandatory for information security officers	35	52.5 hours	100%
Information security seminars Information security of trade secrets and integrity in management course	Business units and supervisors	146	219 hours	90%
ISO 27001 Information Management System Preliminary training courses	ISO 27001 contact window	39	546 hours	100%
ISO 27001 Information Management System Risk assessment course	ISO 27001 contact window	39	546 hours	100%
ISO 27001 Information Management System Internal audit course	ISO 27001 contact window	36	504 hours	100%
ISO 27001 lead auditor training	Automated Information Division Information Security Section	2	80 hours	100%



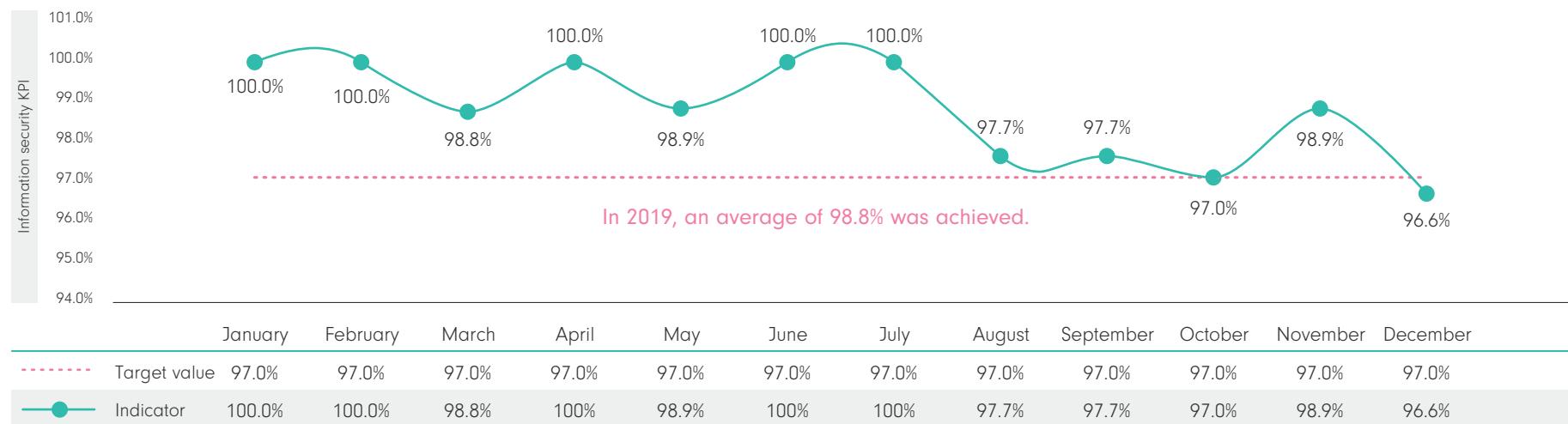


Information Security Goals

We have established quantitative management objectives to implement information security management and rigorously monitor the implementation status. In 2019, we have established 7 information security objectives for confidentiality, integrity, and availability and attained targets for 6 objectives. The office automation (OA) system failure blocked access to public disks (department folders) due to irregularities in the Namespace service of the File Server. The calculated downtime was approximately 1.52 minutes. We have added new Namespace rendering settings to prevent the recurrence of similar issues.

Item	Information security indicators	2019 Goals	2019 Achievements
		≥ 97%	99.7%
Confidentiality	(New) number of unauthorized access or use of technology transfer documents	0 times each year	0
	Click rate and attachment opening rate in social engineering exercises (%)	< 5%	0.8%
Integrity	OA Client Hot-Fix deployment completion rate (%)	≥ 99%	99.5%
	OA System Down Time (Year)	< 1 min	1.52 min
Availability	(New) R&D Database Down Time (Year)	≤ 1 time, < 24 hours	0/0

◆ 2019 Information security incidents



Information security indicator*

*The information security indicator is the monthly statistical indicator for information security violations. It is calculated based on the weight of the risks and threats of violations. A higher value indicates a lower number of information security violations or a lower level of information security threats.





Information Security Risk Protection

We understand that we face information security risks at all times. Therefore, the Automated Information Division has adopted the Nessus Vulnerability Assessment and Symantec Endpoint Protection (SEP) anti-virus mechanisms, and established MAC control over computers in clean rooms to detect system loopholes and vulnerabilities of online servers and protect process computers from virus infections. The Company shall identify potential major loopholes and risks in online systems, applications, or server computers and provide the system administrator with the results of scans and anti-virus report as references for necessary repairs and updates of the system. The Company shall conduct repairs and improvements for items rated as high-risk and above to increase system security and stability.

◆ Results of information security management

Number of violations of information security regulations and fines	2017	2018	2019
Number of violations of information security regulations	0	0	0
Number of violations of the information security of customers' personal data	0	0	0
Total number of customers affected by information leaks	0	0	0
Fine	0	0	0

Business Integrity

NTC upholds the corporate culture and spirit for "diligence". We use ethical, honest, fair, transparent, and responsible business philosophies to strengthen legal compliance. We established the "Codes of Ethics of Directors and Managers" for senior executives and the "[Ethical Corporate Management Principles](#)", and "Antitrust and Competition Legal Compliance Principles" for employees. We established the digital transaction platform for suppliers and a comprehensive auditing system to implement ethical governance and prevent violations of laws. NTC maintains neutrality in politics and encourages employees to perform their civic duties.

Antitrust Ethical Corporate Management Principles

To ensure employees understand and abide by the Antitrust Law and reduce the risks of violations, NTC established the "[Antitrust Policy](#)", "Antitrust and Competition Legal Compliance Principles" and the "Antitrust and Competition Legal Compliance Operating Procedures" to strictly require employees and managers to abide by laws and regulations and report the compliance status to the Board of Directors. We also organize regular training courses for related employees and require them to sign the compliance handbook. As of the end of 2019, the Company had one antitrust litigation in process. Please refer to page 139-140 of the Company's [2019 Annual Report https://www.nanya.com/tw/IR/42/](https://www.nanya.com/tw/IR/42/)

Anti-Corruption

All employees must abide by Nanya Technology Corporation's "Human Resources Management Regulations". Any abuse of powers, embezzlement, bribery, acceptance of commissions, once verified, shall result in termination of employment without exception. The direct supervisors shall also be punished accordingly based on the circumstances. To prevent violations, employees in operations, procurement, finished product warehouses, construction supervision, and budgeting roles shall be rotated periodically and they shall abide by principles for preventing conflicts of interests. We shall also formulate anti-corruption education materials to educate all employees in hopes that all employees can abide by ethical principles in both work and life and fulfill the corporate culture of "diligence". No cases of material corruption had occurred from 2016 to 2019.



Ethical Code of Conduct

NTC referenced the Code of Conduct of the Responsible Business Alliance and established the Labor Ethical Management Policy and Business and Ethical Code of Conduct as the basis for compliance by all employees (including managerial officers), employees of subsidiaries, customers, and suppliers in the business operations. The "Labor and Ethics Policy" and "Business and Ethical Code of Conduct" have been published on the internal and external websites and made available to all employees and external personnel at all times. To strengthen employees' integrity and ethical awareness, the Company continued to organize the "RBA Labor and Ethical Code of Conduct Course" and "Business and Ethical Code of Conduct Course" in 2019. The "RBA Labor and Ethical Code of Conduct Course" is an online course for all employees and the completion rate was 100%. The Company provides the physical "RBA Labor and Ethical Code of Conduct Course" for all new recruits.

Employees may not provide (or accept) bribes or participate in insider trading or other actions that violate moral standards and damage the Company's reputation. In the event of a material or corruption violation (e.g. employees abuse their powers and accept bribery), they shall be immediately terminated once such violations are verified. Where such violations damage the interest of the Company or lead to severe violations, the Company shall pursue their legal liabilities.

To continue to optimize the workplace environment, NTC implements related training by setting labor moral goals each year. We organized five courses including "Labor and Ethical Code of Conduct Course" and "Anti-corruption Course" with "Anti-corruption Course", "Business and Ethical Code of Conduct Course", "Senior Executive Ethical Corporate Management Course", and "Occupational Hazards and Preventive Training" based on the management objectives of "zero corruption", "zero sexual harassment", and "zero illegal infringement in the workplace". The training completion rate was 100% for all courses.

Ethical corporate management and labor ethical education results	2017	2018	2019	2020 Goals
"RBA Labor and Ethical Code of Conduct Course" completion rate	100%	100%	100%	100%
"Business and Ethical Code of Conduct Course" completion rate	100%	100%	100%	100%
"Anti-corruption Course" completion rate	99%	100%	100%	100%
"Senior Executive Ethical Corporate Management Course" completion rate	-	-	100%	100%
"Occupational Hazards and Preventive Training" completion rate	-	-	100%	100%



Note:

- The "Senior Executive Ethical Corporate Management Course" was incorporated into the "Business and Ethical Code of Conduct Course" and a total of 11 individuals completed the training.
- A total of 3,225 individuals completed the "RBA Labor and Ethical Code of Conduct Course" in 2019. (organized in November 2019)
- A total of 3,214 individuals (excluding senior executives) completed the "Business and Ethical Code of Conduct Course" in 2019. (organized in November 2019)
- A total of 3,135 individuals completed the "Anti-corruption Course" in 2019. (organized in March 2019)
- The "Occupational Hazards and Preventive Training" course opened in 2019 and it includes both physical and digital courses. The attendees of physical courses consisted of executives and project managers (466 individuals received training) and the digital courses were provided to all employees (3217 individuals received training).



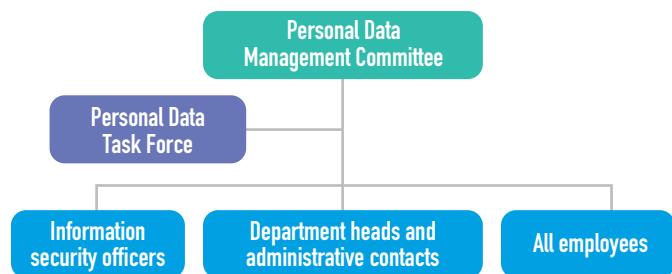


Protection of Personal Data

NTC established the "Privacy Policy" and "Personal Data Management Procedures" to provide guidance for the Company's employees and suppliers in personal data management. The regulations specify the organization and duties for personal data protection and provide regulations on the collection/processing/use of personal data to meet related regulations for the protection of personal data.

NTC established the Personal Data Management Committee to oversee related affairs for personal data protection. The Committee consists of the Director of the Human Resources Division who serves as the Data Protection Officer and 32 level 1 supervisors of departments serve as Committee Members. The Company also established a Personal Data Task Force to help the Committee implement personal data affairs

◆ Structure of the Personal Data Management Committee



○ Duties of the Personal Data Management Committee ○

Conduct regular tests to evaluate and assess the effectiveness of technologies and organizational functions used for processing personal data

Provide resources necessary for the establishment of personal data management mechanisms

Evaluate and review the compliance and appropriateness of mechanisms for protecting personal data

We set controlled access for personal information of employees or customers and apply strict restrictions on the use of such information. To implement personal data risk management, the Company conducts a personal data risk inventory and assessment each year. We also formulate and execute improvement measures for items with high risk ratings. In 2019, the personal data officers of each department (the information security officers or contacts responsible for personal data) conducted personal data inventory and risk assessment operations with 100% coverage. The evaluation results showed that most departments have implemented control and management mechanisms in accordance with personal data protection regulations. The risk ratings were between low and medium risks and there were no items with high risks. As NTC has established a subsidiary in Europe, we have adopted response measures based on the requirements in the EU's "General Data Protection Regulation" (GDPR) including the establishment of related SOPs, establishment of management organizations and personnel, and organization of educational seminars. We implemented related systems in subsidiaries to increase employees' awareness for personal information protection and reduce the risks of violations.



We organized two personal data protection courses in 2019 including the "Personal Data Protection and Updated Regulations Training" which lasted approximately 1 hour. The attendees included 29 information security officers assigned by the division heads of each plant. After the training, the personal data officers returned to their units as seed instructors to communicate the contents of the course to employees of their department. The other session was the "GDPR training" organized by the subsidiary in Europe which included physical training courses on GDPR regulations given by German lawyers. The course was 2 hours long and attendees included all 9 employees of our subsidiary in Europe. The completion rate was 100%. The Company executes internal persona data audits for the head office and subsidiaries each year to verify the implementation of personal data management. As the Company's personal information protection has been rigorously and effectively executed, there were no violations in 2019.

Number of violations of personal data regulations and fines	2017	2018	2019
Number of violations of personal data regulations	0	0	0
Fine	0	0	0
Number of reports by external entities	0	0	0
Number of reports by the competent authority	0	0	0

Internal Control

Internal Control System

NTC established an effective internal control system based on the Company and its subsidiaries' overall operation activities and its industry in accordance with the "Regulations Governing Establishment of Internal Control Systems by Public Companies". The Company conducts reviews at any time to respond to changes in the Company's internal and external environment as well as to ensure that the system design and implementation remain effective.

The implementation of the internal control system is a continuous operation. We continue to inspect various business and management operations and detect deviations from company policies, operating procedures, existing goals, or standards. We use a feedback system to respond to the appropriate management level and take necessary corrective actions for the issues to ensure the Company's operations are implemented in accordance with the original plans. We use the internal control system to complete audits and prevent abuse in operations.

Internal Audit

NTC established Corp. Audit under the Board of Directors and appoints dedicated auditors who participate in related auditing courses organized by professional training institutions each year to improve their professional skills. We also use the professional and independent internal audit operations framework to implement internal control in all levels of the Company.

Scope of Internal Audit



In addition to the audit report on the status of correction of defects and irregularities of internal control systems, the internal auditors shall follow up and provide reminders to ensure that relevant units take appropriate improvement measures in a timely manner. They shall submit the measures to the Independent Directors for review before the end of the following month after the completion of the audit report. Internal audit is not merely the responsibility of the independent audit department. The Company's units must complete independent business inspections within the specified cycles for specific audit items. Independent audit units shall review the results of the self-inspections and implement review inspections regularly or from time to time to ensure the execution of the internal control systems of each unit.

◆ Internal audit items

2020/3/30

	2017	2018	2019
Number of audit items	42	44	45
Number of anomalies discovered	9	7	4*
Anomaly improvement rate	100%	100%	100%

*The four anomalies included 2 for production, 1 for business, and 1 for finance. Improvements have been completed for all four anomalies.





Grievance and Complaint Channels

NTC has established the "Employee Complaint Guidelines" and "Reporting Regulations" to provide employees with channels for reporting any unlawful or unethical conduct. When employees discover a breach of laws or inappropriate conduct that affects the interests of individuals or the Company or other related material issues or where an individual attempts to gain unlawful interest by abusing the power of their office, they may file reports at any time for responsible dedicated units to take charge of processing. In addition, we also established a report hotline (02-29061001) on the Company's official website and a dedicated email (audit@ntc.com.tw) to provide complaint channels for stakeholders for infringements of their rights. We also assign dedicated personnel to take charge of processing the complaints. To protect the whistleblower, personnel responsible for processing cases shall conduct investigations based on the confidentiality principles and they shall be prohibited from disclosing cases to unrelated personnel. When investigating related individuals, the processing personnel shall only discuss parts that are relevant to the individuals to protect the identity of the whistleblower.

◆ Grievance and complaint cases

Grievance and complaint methods	2017	2018	2019
File written complaints (including anonymous reports)	4	1	0
Employee grievance report table	0	2	2
Complaint hotlines and mailboxes	0	1	0
Total	4	4	2
Confirmed cases following investigation	1	1	1
Processing and case closed	1	1	1
Case closure rate	100%	100%	100%

Note:

There were 2 cases in 2019 including one sexual harassment case and one workplace bullying case. Only 1 sexual harassment case was established based on the results of investigations. We have increased the awareness of all employees regarding sexual harassment prevention and required employees to pay attention to their conduct and treat each other with respect and politeness to prevent sexual harassments.

Information Disclosure

NTC uses diverse, updated, and transparent channels to disclose related information to external stakeholders comprehensively. NTC participated in 21 external investor conferences in 2019 and we also uploaded financial data and various information and video files to the company website and Market Observation Post System in accordance with requirements of the competent authority to provide investors with updated, correct, and transparent operation conditions and financial statistics.





Balanced Reporting

Regarding August 2019 media reports on the prosecutor's investigation of trade secret violations by a former employee, NTC immediately issued a press release stating that the case was reported to Taoyuan Division of Investigation Bureau, Minister of Justice ("MJIB") by NTC when discovery. According to MJIB's investigation, the former employee was prosecuted by Taoyuan District Prosecutors Office ("Prosecutors") and sentenced to one-year-and-eight-months by TYDC. NTC reiterates its determination on protecting its trade secret and IPs. NTC will continue investigating any illegal activities in order to protect NTC and its partners' R&D achievements, shareholders' interest and the fair market order.

According to the announcement of Securities and Futures Investors Protection Center on May 2nd regarding the insider trading of shares of Iotera Memories, Inc. and NTC. Two employees of NTC have been sentenced guilty and the improper benefits, NT\$213 and NT\$53,808, have been returned. The company respects the results of the judicial judgement. The case involves personal negligence, but no significant impact was brought to the company's operation and shareholders' interest. In addition to proper punishments to the employees, the company will also strengthened its internal legal compliance program and internal training to prevent similar case from happening.





Innovative technology



“The Best Partner for Our Customers”

“Innovation” is one of the driving forces for Nanya Technology Corporation's growth and competitiveness and one of our four core values. We shall strengthen product research, development, and manufacturing to satisfy the market's and customers' diverse demands and become the best memory partner for the smart generation.

9.5%
R&D expenses accounted for 9.5%
of revenue and R&D personnel
accounted for 19.3% of employees.
These demonstrate NTC's focus on
technological development.

1,432 cases
Number of Patents Awarded
in the Past Three Years

225 cases
Rewards for improvement proposals
reached 225 cases, a record high in
recent years



59 / R&D and Innovation

63 / Customer Service



Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed

Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
R&D and Innovation	<ul style="list-style-type: none"> Technological leader: Continue to invest in the R&D of advanced manufacturing processes to become a technological leader in the industry. Intellectual property rights protection: Create patents and secure patent rights; continue to protect trade secrets and trademarks to ensure that the Company's R&D resources and results are completely protected 	<ul style="list-style-type: none"> Complete the design of DDR5 products Start trial runs of 10nm DRAM pilot products Establish high-efficiency production lines with AI-assistance and reach a project completion rate of 70% 	Complete critical design review of DDR5 products	✓ Completed critical design review of DDR 5 products in September 2019
			Complete the verification of 10nm technology for product specifications and yield rate	✓ Completed the preliminary verification of 10nm DRAM new memory cell for product specifications
Customer Service	<ul style="list-style-type: none"> Design and testing: Use global engineering support services to resolve issues with customer design and testing. Production and sales: Implement rigorous control of quality and improve delivery efficiency. After-sales services: Use the customer complaint management system to follow up customers' issues 	<ul style="list-style-type: none"> Customer satisfaction score: Over 90 points Customer participation in platform parameters measurement services: 920 cases Customer technical exchange and courses: 80 sessions 	Establish high-performance production lines with AI-assistance: Reach a project completion rate: 40%	✓ 40%
			Complete verification of main servers for 4 customers	★ 8 customers
			Customer satisfaction score: Over 88 points	★ 91.7 points
			Customer participation in platform parameters measurement services: 920 cases	★ 994 cases
			Customer technical exchange and courses: 80 sessions	★ 95 sessions

R&D and Innovation

Smart products have been completely improving the quality of life for human beings and helping energy conservation and carbon reduction. Therefore, every year, NTC invests large amounts of resources in technological development of new types of DRAM products, next generation processes, and advanced 3D stacked packaging. The developments provide customers with value-added services, and reinforces protection for intellectual property and trade secrets, accelerating the move towards product diversification and smart factories. Moreover, we have set a vision for innovative development to introduce the second generation 10nm DRAM process into mass production in 2025, develop next-generation DDR5 products, enter fast-growing markets (artificial intelligence (AI), data centers, automotive and the Internet of Things), and set up high-efficient production lines with an AI-aided system.

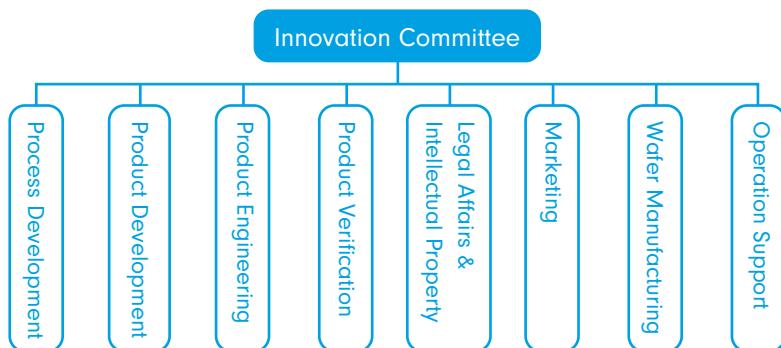


Innovative technology



Innovation Committee

In order to implement innovation management, create a culture of innovation, and enhance the company's innovative energy and value, NTC has specifically set up the Innovation Committee, a cross-departmental unit, formed by the senior management and chaired by the Executive Vice President (EVP). The Innovation Committee is positioned to coordinate and plan the overall innovation strategy and setting short-, medium- and long-term goals. The Innovation Committee regularly convenes meetings to review the progress of major projects.



R&D of Low Energy Consumption Products

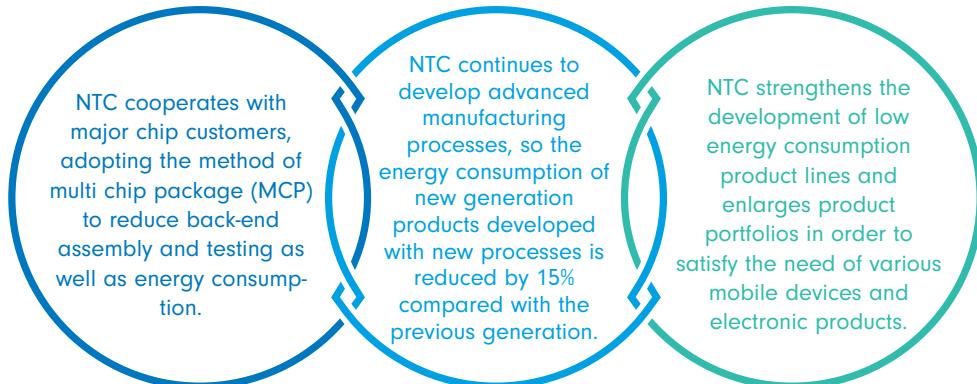
During the new product development stage, NTC already begins to consider the impacts on the environment caused by the product's life cycle. We actively research and develop new-generation low energy consumption DRAM products, as to reduce energy consumption of final electronic products and lower greenhouse gas emissions. The low power DRAM and 20nm consumer DRAM products sold in 2019 had lower working voltages and electric currents than those of the previous generation, so the energy consumption was less than that of the previous generation. Based on the quantity of products sold in one year, when comparing the energy consumption of the aforementioned DRAM products with that of the previous generation, approximately 409.52 million kWh of electricity consumption was saved and annual CO₂ emissions was reduced by 218,274 tons. Thus, we made real contributions to a greener earth.



◆ Investment and Output of Innovative R&D

Item	2016	2017	2018	Unit: NT\$100 million
				2019
Investments in Innovative R&D	Revenue (A)	416	549	847
	Budget for Innovative R&D (B)	24.8	36.7	48.9
	Percentage of revenue for allocated to innovative R&D (B/A)	6.0%	6.7%	5.7%
	Total number of employees (C)	2,679	2,984	3,219
Output of Innovative R&D	Total number of innovative R&D personnel (D)	312	430	501
	Percentage of innovative R&D personnel among all employees (D/C)	11.6%	14.4%	15.5%
	Number of patents awarded	478	471	502

R&D Policy for Low Energy Consumption Products



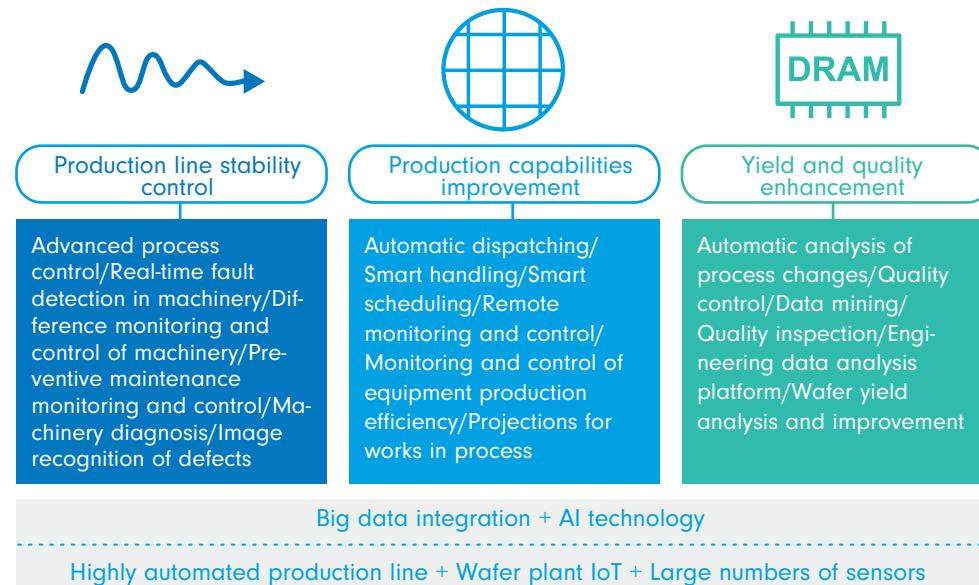


NTC Smart Factory

NTC's 12-inch wafer fabrication plant has all the necessary infrastructure that a smart factory requires, including highly automated production lines, Fab IoT, large numbers of sensors, big data integration, and AI technology. Currently, NTC has developed a number of innovative production line applications, including the machinery diagnosis, advanced process control, optimization of production schedules, projections of work in process, smart handling, wafer probe testing, defect image recognition, and pattern recognition of wafer yield. These applications can effectively enhance the entire operational efficiency of production lines. Because of these developments, three important aspects of production, i.e., yield, quality, and output, are benefited.

With increased difficulties in new-generation advanced processes, higher process precision is required. Moreover, diverse product portfolios have increased the complexity of line control. In 2019, NTC set a three-year blueprint for AI development, planning long-term goals for five main aspects: prognosis of machinery, process control, optimization of production schedules, quality inspection, and yield analysis. With the gradual implementation of AI technology in various major operational settings in the plants, high-performance production lines with AI-assistance are going to be established, so the overall efficiency and capacity of processes will be enhanced.

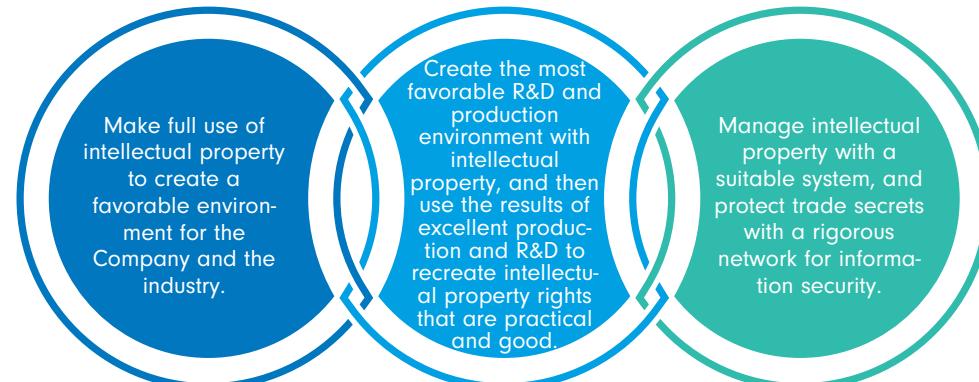
◆ NTC smart factory - three major applications



Status and Strategy of Intellectual Property

NTC has created many patents through the cooperation with world-class entities, technology transfer, and joint execution of R&D plans, and has acquired these patents. As of 2019, NTC has obtained as many as over 4,000 patents, which is hugely beneficial to R&D and production. Meanwhile, in relation to the protection of our trade secrets and trademarks, we have also established a complete protection system in order to maintain profitability and prevent risks. Therefore, we are able to continue protecting our intellectual property and R&D momentum.

NTC intellectual property strategy





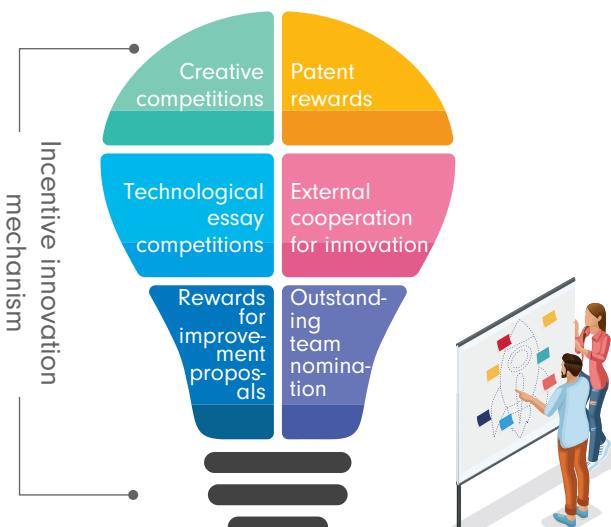
In addition, in the face of increasingly intense business competition and challenges of globalization, the protection of trade secrets has become an increasingly important subject for an enterprise to maintain its core competitiveness. Trade secrets include technology, methods, processes, recipes, programs, and design or other information that can be used in production, sales or operation, complying with the requirements for secrecy, economic value, and confidentiality measures that have been taken. In recent years, NTC has actively introduced advanced process technology, new product development, and innovative sales models, so the number of trade secrets generated in the past four years total 4,123 cases a year on average, which fully shows the Company's core business competitiveness. In order to ensure NTC's long-term competitive advantages, NTC introduced ISO 27001 Information Security Management system and obtained external certification in 2019, so the confidentiality and completeness of information can be ensured.

◆ Number of NTC trade secrets

Item	2016	2017	2018	2019
Number of trade secrets	3,274	4,172	5,056	3,989

Incentives for Innovation

"Innovation" is one of the driving forces behind NTC's technological growth and competitiveness enhancement and one of our core values. To encourage employees to innovate, the Company holds annual innovation competitions, offers patent rewards and rewards for improvement proposals, and organizes essay competitions and the best team competitions. We recognize and reward innovative ideas proposed by each employee, hoping that all employees will internalize the spirit of innovation.

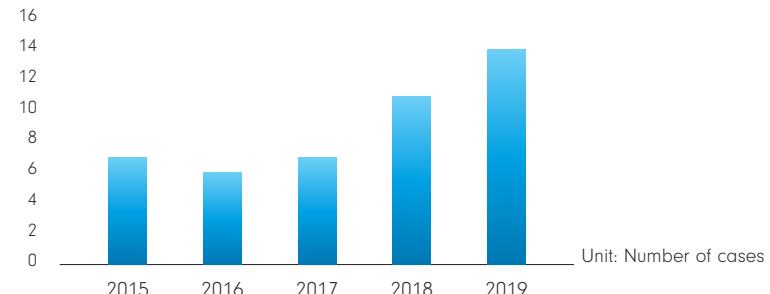


◆ Results of innovative activities

	2016	2017	2018	2019	Description
Patent rewards	Number of patents granted	478	471	502	459
	Rewards given	23,900,000	23,550,000	25,100,000	22,950,000 NT\$50,000 for each granted patent
Rewards for improvement proposals	Number of proposals	44	47	51	225 After being reviewed by the jury for its expected benefits, creativity, application range, level of completion, and quality contribution, rewards of NT\$300~30,000 are issued depending on the score the proposal is given.
	Rewards given	64,300	62,400	128,350	582,900
Technological essay competitions	Number of entries	47	46	58	65 • The competition is held once a year, and a reward of NT\$1,000 is issued for each entry. • The competition is divided into two groups: technological essay group and practical creation group, and the top three entries and two honorable mentions are selected from each group. The rewards for the top three are NT\$30,000, NT\$20,000, and NT\$10,000 respectively, while the reward for the honorable mentions is NT\$5,000.
	Rewards given	180,000	177,000	196,000	195,000
Best team competitions	Number of entries	6	7	15	15 The competition is held once a year, and the top three teams and two honorable mentions are selected. The rewards for the top three are NT\$90,000, NT\$50,000, and NT\$20,000 respectively, while the reward for the honorable mentions is NT\$5,000.
	Rewards given	170,000	170,000	170,000	170,000

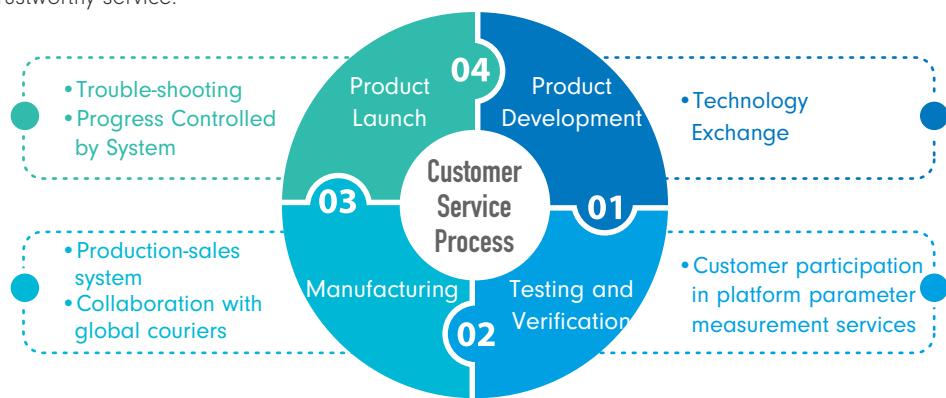
In addition, we have attached great importance to technological R&D. We incorporate external innovation into our R&D in open and innovative ways, so the Company can maintain sustainable development. We have worked on the design and basic research of next generation memory with professors from National Taiwan University, National Central University, and Chang Gung University, and the Electronic and Optoelectronic System Research Laboratories under the Industrial Technology Research Institute. We have also partnered with manufacturers of masks and machinery in joint development of next generation DRAM process and materials. Through customized Wafer Level Packaging and multiple application products developed rapidly with downstream system developers, the Company has launched several open innovation programs every year in the past five years in order to conform with the Company's short, medium, and long-term R&D plans. Please refer to the following graph for details.

◆ Open innovation program



Customer Service

NTC is committed to providing the best customer service and is convinced that quality and timely customer service is crucial to the maintenance of customer relationships. Good customer relationships will help us build customer loyalty, and consolidate the good and trusted partnerships with customers. Our vision is to become the best memory partner in the smart era as well as a service-oriented enterprise. Through close cooperation with MCU makers and customers, we will strengthen product R&D and manufacturing in order to satisfy diverse requirements, provide customers with comprehensive products and system solutions, and offer better and more trustworthy service.



Product Design and Testing Verification Stage

In order to improve the efficiency and frequency of customer service and effectively build close relationships with customers, the Field Application Engineering Division provides technical supports to customers in Taiwan, China, Southeast Asia, Europe, the United States, Japan and South Korea, organizing irregular technology exchange sessions to meet the technical needs of customers. In 2019, the Division held a total of 95 sessions, providing technical supports and assisting customers' engineering personnel to solve problems in design and testing.

In addition, through the highly efficient, intensive, and high-quality customer platform parameter measurement service, of which 994 cases were completed in 2019, NTC assisted customers in understanding the characteristics of their product platforms so that the new product development progress and verification cycles of customers were significantly accelerated, reducing investment risks and helping final products to be launched in a timely manner in the demand market.



Production and Sales Stage

NTC has been certified for ISO 9001:2015 and IATF 16949:2016 quality system. The Quality Assurance Division monitors and controls product quality as well as implements improvements in order to make sure that all production processes are fully optimized. Moreover, the Division includes each stage of the production process into a well maintained and tightly controlled system, manufacturing the products that meet the customers' requirements. The sales staff continuously communicates with the customer and sends the weekly projections of the customer's future demand forecast back to the Company. The Company's production and sales system converts the information into a production plan after the head office aggregates the needs of global business feedback and the plan is adjusted according to the weekly feedback from sales staff, thereby adapting production to meet customer needs.

After-sales Service Stage

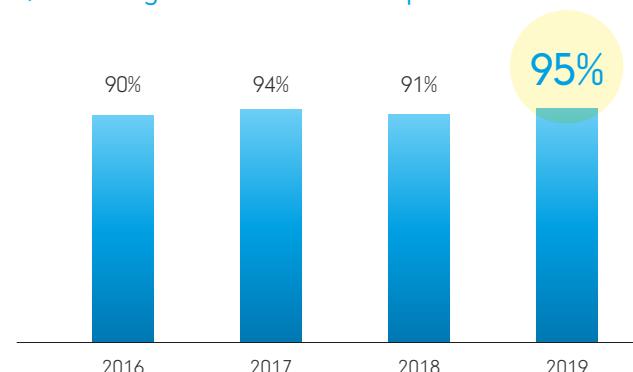
NTC is committed to enhancing product quality and rapidly responding to customers' quality issues to meet their expectations. In order to accelerate the efficiency of problem analysis, the NTC's service team will fully understand the problems reported by customers first, update analysis progress to customers based on analysis plans, and send customers the corrective measures and handling methods once analysis is completed. Through the cooperation among the divisions of Field Application Engineering, Quality Assurance, Product Engineering, and Manufacturing Process along with the process management conducted with a customer complaint handling system, over the years, NTC has been able to reply to over 90% of customers' complaints within target deadlines.



Achieving rate of customer complaint cases

In 2019, NTC completed 95% of customer complaint cases within target deadlines. The Company will continue to maintain frequent communication with customers and understand how customers use our products and failure conditions in the shortest time possible to accelerate problem analysis and solve problems.

◆ Achieving rate of customer complaint cases



Customer Privacy Protection

Customers are extremely important partners for NTC. Therefore, we are obligated to rigorously safeguard their privacy and confidential information as if it is our own. To ensure confidential information is well protected, NTC has formulated the Confidential Information Management Procedure. Regarding the documents provided by customers, after internal filing procedure and the confidentiality classification, these documents are archived in the document control center. In the future, if employees require access to these documents, they have to go through the document application procedure. Based on the level of document confidentiality and the purpose of use, corresponding supervisors give their approval and then the document control center will authorize the access and distribute the documents to the applicants. In 2019, no case involving violation of customer privacy occurred. If a customer suspects or discovers evidence indicating an information leak, a complaint can be lodged through the NTC Complaint Mailbox and Complaint Hotline.

Customer Satisfaction

Upholding the spirit of consistent pursuit of truth, NTC has been improving all the time in order to satisfy customers' requirements for product quality, delivery, and service. In relation to customer satisfaction, NTC employs an external third-party institution to conduct direct trade and a survey on the satisfaction of end-customers through the internet or interviews, hoping that NTC can understand customers' needs from a fair and objective perspective. The content of the survey includes the dimensions of product, delivery, quality, technical service, communication, commercial , and comparison with competitors. With regard to items with low-satisfaction, relevant departments are responsible for the review and proposing corrective measures. In addition, the results of customer satisfaction surveys are reported during top management meeting. Then the sales staff will provide customers with improvement results or the direction of continuous improvements, as to continue enhancing customer satisfaction. In order to enhance customer satisfaction, NTC has specifically established a review platform. The priority of the platform is to handle customers' requirements and make improvements accordingly.

In addition to the customer satisfaction survey, the NTC's service team periodically holds business and technological review meetings with customers to help NTC keep close relationships with customers and provide better service. We will commit ourselves to strengthening the collaborative cooperation among internal relevant divisions in response to urgent or sudden demands from customers. Moreover, we will continuously strive to improve product quality and the timeliness and efficiency of communication on quality issues with customers. Meanwhile, we will be maintaining smooth communication with customers and making every effort to satisfy the customers' requirements.



Customer Satisfaction Survey Procedure

The average overall satisfaction score of 2019 was 91.7 points, exceeding the target of 88 points. In the last three years, our customer satisfaction has gradually increased and the target score for 2020 is 90 points or above. Based on the industrial characteristics, business fluctuations, annual performance review, and benchmarking learning, the target of customer satisfaction survey is set at a reasonable figure and is submitted for approval by the President of the Quality Assurance Division.

According to the NTC's scores and the results of comparison with competitors, customers still approve of NTC's performance on delivery, technical support, and communication, mainly because at the product design, testing and verification stage, NTC helped customers to accelerate new product verification and technological exchanges. In addition, there was still room for improvement in the performance of product technology capabilities and quality. Based on the supply and demand of the market and product applications, we will accelerate new product development, strengthen exchanges with customers, and face various improvement issues with a proactive attitude. Moreover, we will insist on controlling product quality and making improvements according to customers' feedback. Thus, in 2019, there were no product recalls.

◆ Results of Customer Satisfaction Survey





05 Responsible Procurement



“ A Promoter of Shared Value

Suppliers have always been Nanya Technology Corporation's most important business partners. We aim to enhance cooperation to create greater value and share the value and benefits of cooperation and create a sustainable future.

100%

100% of key suppliers completed the self-assessment questionnaire.

8 outstanding suppliers

NTC evaluated suppliers of raw materials, components, and equipment, and hold annual supplier award ceremony.

100%

Suppliers meet the requirements for conflict-free minerals..



Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed

Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
Supplier Sustainability Management	<ul style="list-style-type: none"> Management of conflict minerals: No conflict minerals have been used in any of NTC's products Supply chain risk management: Implement regular "quality, delivery, service, cost, technology, and sustainable management" evaluations for suppliers 	<ul style="list-style-type: none"> Use of conflict-free minerals for wafer product lines: 100% Key suppliers' completion rate of the self-assessment questionnaire: 100% 	<p>Use of conflict-free minerals for wafer product lines: 100%</p>	✓ 100%

Supplier Sustainability Management

NTC Industrial Chain

The IC industry (including DRAM) is categorized into upstream IC design, mask making/wafer materials, midstream IC production, and downstream IC packaging and testing. NTC is committed to the research and development, design, production, and sales of IC products and we are primarily responsible for upstream IC design and midstream IC production in the industrial supply chain.

To improve the efficiency of customer service and effectively build closer relationships with customers in the upstream product design and testing and verification stages, the head office provides customers' technical solutions in various regions, including Taiwan, mainland China, Southeast Asia, Europe, America, Japan, and South Korea. In response to customer's requests, we irregularly exchange technologies with customers, provide technical support, and assist in solving the problems faced by the customer's engineering staff in design and testing.



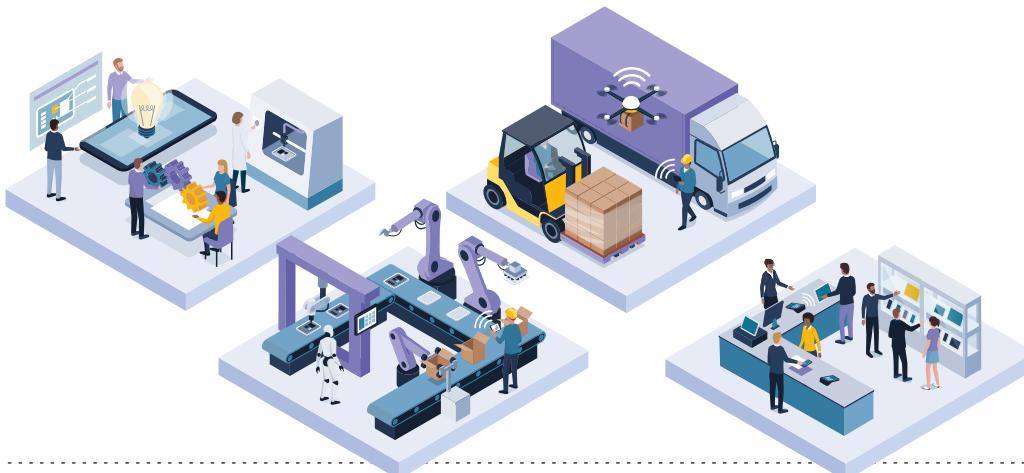
Responsible Procurement



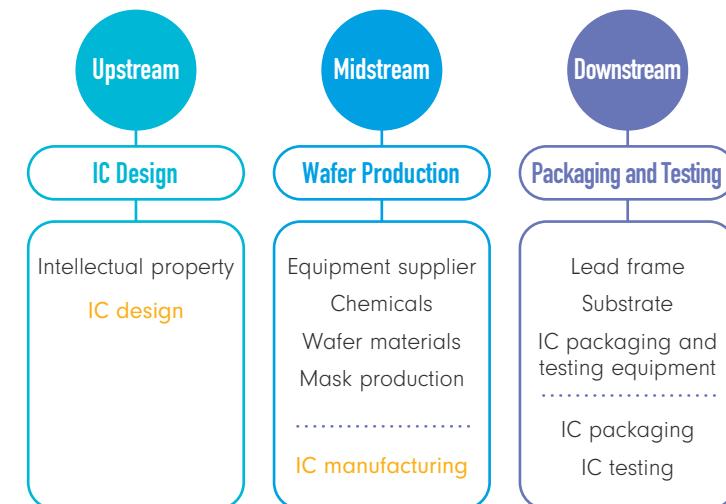
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The Company continuously communicates with customers in the midstream production and sales stages and report weekly to the head office on the feedback of customers' future demand forecasts. The head office aggregates the demand forecasts around the globe and converts them into production plans, which are adjusting weekly to meet customers' needs and maximize the benefits. In the meantime, we cooperate with downstream contractors to form a complete industrial value chain.



◆ NTC Industrial Chain



Supply Chain Overview

NTC's major suppliers include "suppliers" and "contractors". Major supplies are divided into two main categories, production materials and non-production materials. Production material suppliers are the Company's major suppliers and the number of them totaled 330 in 2019. Among the 330 major suppliers, 82 are regarded as key suppliers^{Note 1}. We are not only committed to implementing sustainable operations internally, but also working with suppliers jointly on constructing a resilient and sustainable supply chain to implement corporate sustainability.

Note 1 Please refer to appendix for the list of the 82 key suppliers in 2019.

◆ Number of suppliers and ratio of procurement amount

	2017	2018	2019
Number of major suppliers (Tier 1)	350	270	330
Number of key suppliers	89	80	82
Percentage of key suppliers (%)	25.4%	29.6%	24.9%
Percentage of procurement amount from key suppliers (%)	79%	77%	68%*

* The adjustment of procurement item classification in 2019 resulted in the decrease in the percentage of procurement amount from key suppliers.



Sustainable Supply Chain Management

NTC established a supply chain management framework. We use sustainability regulations, sustainability risk surveys, on-site sustainability audits/improvement measures, and supplier capability development to manage and control supply chain risks and enhance suppliers' sustainability performance. We hope that our suppliers would grow along with NTC and create more shared value.



Signature of "the Letter of Compliance with Corporate Social Responsibility"

To implement corporate sustainability step by step, we formulated the "[Formosa Plastics Group Supplier/Contractor Corporate Social Responsibilities Letter of Compliance](#)". (hereinafter referred to as the Letter of Compliance), which includes the Supplier Code of Conduct stipulated by Formosa Plastics Group, the RBA Code of Conduct, and regulations and requirements related to conflict-free minerals. Suppliers have to undertake to abide by the corporate social responsibility regulations in the Letter of Compliance before signing contracts with the Company. All major suppliers signed the Letter of Compliance in 2019 and our target is that all major suppliers have to sign the Letter of Compliance in 2020 too.

* Major suppliers included new suppliers and key suppliers.

		2017	2018	2019	2020 Goals
Major suppliers *	Number of major suppliers	350	270	330	
	Number of suppliers signing the Letter of Compliance	211	219	330	
	Percentage of suppliers signing the Letter of Compliance (%) (2018 Goals)	60.29%	81.11% (65%)	100%	100%
New suppliers	Number of new suppliers	76	18	87	
	Number of suppliers signing the Letter of Compliance	18	18	87	
	Percentage of suppliers signing the Letter of Compliance (%) (2018 Goals)	23.68%	100% (100%)	100%	100%
Key suppliers	Number of key suppliers	89	80	82	
	Number of suppliers signing the Letter of Compliance	72	63	82	
	Percentage of suppliers signing the Letter of Compliance (%)	80.89%	78.75%	100%	100%
Existing suppliers	Percentage of suppliers signing the Letter of Compliance	70%	80%	100%	100%

Responsible Procurement



Supplier Sustainability Assessment

In terms of supplier selection, when suppliers that directly produce materials are introduced into NTC's supply chain, they have to receive rigorous evaluations and reviews in addition to related third-party verification of ISO 9001 and ISO 14001. We use digital supplier assessment and management system to conduct reviews on six major indicators, including "quality, delivery, services, costs, technology, and sustainable operations". The score for sustainable operation indicators accounts for 10% to ensure compliance with the Company's supply chain requirements. With the ideals of sustainable operations in mind, we hope that we would jointly construct a sustainable supply chain with upstream and downstream suppliers.

◆ Supplier sustainability assessment indicators



*Sustainability contents

- Green environment evaluation items include the ISO 14001 certification, energy and resource conservation, reduction in greenhouse gas emissions, and waste recycling rate.
- Corporate social responsibility evaluation items include compliance with local labor laws and regulations.

Sustainability Risk Surveys and Assessment

NTC evaluates suppliers regularly each year for "quality, delivery, services, costs, technology, and sustainable operations". We seek to discover potential discrepancies on the supplier's end and immediately implement improvements. The assessment results are provided to the purchasing department as reference for procurement selection the next time. We use quarterly reports and various ad hoc meetings to review annual assessment scores with suppliers and share various information to construct good and smooth communication channels. The Company also establishes online support and management systems as a platform for exchanging information with suppliers.

To ensure the supply chain's implementation of sustainability, NTC distributes the NTC Supply Chain Code of Conduct Questionnaire to major suppliers each year. All major suppliers have to conduct self-assessment, fill in the questionnaire, and hand it back. Suppliers are required to reply the implementation status of various sustainability issues on the questionnaire and provide certification documents issued by related management systems. The results of the suppliers' self-assessment questionnaires shall be adopted as the basis of sustainability risk management and as reference for NTC's assistance to achieve supply chain sustainability. We screen 5% of high-risk suppliers for onsite audits based on the results of the assessments and provide assistance for improvements¹

¹ The purpose of on-site audit is to develop the supplier's sustainability capabilities. Therefore, if the high-risk object is an agent, a judgment will be made on whether to conduct on-site audit.

In 2019, all major suppliers (including key suppliers) completed sustainability risk assessment. The Company distributed the self-assessment questionnaire to 330 major suppliers and all of them handed the questionnaire back. After analysis of the questionnaires, a total of 17 high-risk suppliers were identified in 2019. In regard to the economic aspect, high-risk suppliers did not advise whether they formulated policies and procedures for sustainability and anti-corruption, and whether their companies use raw materials containing 3T1G, i.e., gold, tin, tantalum (TB), and tungsten (W). With respect to the social aspect, a lack of verification from related social responsibility management systems was found, such as SA 8000. In addition, there were no risk assessment procedures for identifying impacts or risks in terms of labor, and no related health and safety management system. In regard to the environmental aspect, these suppliers did not advise whether they formulated identification procedures for environmental protection laws and regulations, whether they obtained permits to discharge pollutants related to their operational activities, and whether they established procedures for identifying impacts/risks caused by climate change. Thus, regarding high-risk suppliers, the Company performed document reviews and on-site audits.

◆ Supplier sustainability risk assessment

	2017	2018	2019	2020 Goals
Major suppliers	Number of suppliers surveyed	350	270	330
	Response rate	63%	100%	100% 100%
	Number of high-risk suppliers	5	14	17
	Percentage of high-risk suppliers (%)	1%	5%	5%
Key suppliers	Number of suppliers surveyed	89	80	82
	Response rate	64%	100%	100% 100%
	Number of high-risk suppliers	4	1	5
	Percentage of high-risk suppliers (%)	4.5%	1.25%	6.1%
Tier 2 key suppliers	Number of suppliers surveyed	43	32	40 80
	Response rate	100%	100%	100% 100%
	Number of high-risk suppliers	1	3	2
	Percentage of high-risk suppliers (%)	2.3%	9.4%	5.0%

Note: Major suppliers included key suppliers.





Supplier Sustainability Audit

We audited 17 suppliers on their sustainability performance in 2019. The audit results showed 112 non-compliance items and the Company issued Corrective Action Request (CAR) for follow-up and improvement.

◆ Sustainability audit table

	2016	2017	2018	2019	2020 Goals
Numbers of audited suppliers	12	8	25	17	20
Average audit score	-	89.37	90.4	81.77	
Number of non-compliance audit items	3	20	39	112	
Category and number of violations	Labor ethics	<ul style="list-style-type: none"> • 1 instance of forced labor • 4 penalty records • 4 items involving work hours and wages • 3 items involving training and education • 1 item involving personal information protection • 2 items involving discrimination • 1 item involving the management system 	<ul style="list-style-type: none"> • 1 instance of forced labor • 2 penalty records • 7 items involving work hours and wages • 1 item involving training and education • 3 items involving discrimination • 3 items involving child labor/youth labor • 2 items involving information security • 1 item involving female night shift • 1 violation of labor regulations 	<ul style="list-style-type: none"> • 22 items involving human rights or employment discrimination • 4 items involving not having work rules formulated or approved • 14 items involving work hours and wages • 3 items involving grievance mechanisms • 3 items involving reward and punishment procedures • 8 item involving training, education, and communication <p>A total of 54 items</p>	
	EHS	3 violations of environmental regulations	<ul style="list-style-type: none"> • 2 violations of environmental safety regulations • 2 irregularities in operation management 	<ul style="list-style-type: none"> • 4 items involving fire safety • 8 items involving labor safety operation management • 6 items involving environmental information updates on public websites 	<ul style="list-style-type: none"> • environmental safety regulations • 39 defects in labor safety operation • 4 defects in environmental safety operation • 6 defects in fire safety operation <p>A total of 58 items</p>
Improvement completion rate	100%	100%	100%	100%*	

* 100% of the suppliers proposed improvement plans; 99% of them completed the plans.

Supplier Capability Development

In order to implement sustainability in daily management of the supply chain, we established the Material Review Board (MRB), make evaluations, conduct audits, and hold annual award ceremony.

NTC will conduct annual assessment and hold meetings to deliver the requirements to suppliers. Moreover, we also advocate the related issues on sustainability. In addition, we organize award ceremonies for outstanding suppliers based on the results of the annual assessment. During the ceremonies, senior executives directly communicate to suppliers regarding goals and requirements of the supply chain for quality, delivery, services, costs, technology and sustainability. In 2019 we made supplier assessment for suppliers of raw materials, components, and equipment and presented awards to 8 outstanding suppliers.

◆ 2019 Supplier Award Ceremony



The Company participated in the " 2019 Coastal Cleanup! Volunteer day" event with the supplier Air Liquide Far Eastern (ALFE), to have a friendly environment and harmonious community.



[Click here to watch "Coastal Cleanup Volunteer Day" video](#)



Sustainable Supply Chain Development Strategies and Projects

Sustainable Supply Chain Development Strategies

NTC firmly believes that the sustainable growth of supply chains has certain impacts on corporate sustainable development. Therefore, we are committed to developing sustainable supply chains. We actively invest in related resources and cooperate with suppliers to drive sustainable supply chains and achieve shared value.

NTCs commitments

- No conflict minerals have been used in any of our products and we have conducted procurement based on the green product regulations.
- We adhere to the principle of fair trade and conform with related laws and regulations to protect human rights, pay attention to labor's physical and mental health and safety, protect environment, and fulfill corporate social responsibility.
- In adherence with the principle of integrity, we are dedicated to implementing corporate social responsibility in our purchasing activities so as to pursue sustainable operations.



Sustainable Supply Chain Development Projects

Human rights risks of contractors' migrant workers

To protect labor rights and raise human rights awareness, we started to assess human rights risks of contractors' migrant workers in 2019. The assessment was based on the provisions of Freely Chosen Employment in the RBA Code of Conduct, including, voluntary work and redundancy, zero fees for workers and not holding their identity cards and personal certificates under any circumstances, and no unreasonable restrictions on workers' freedom of movement and their primary movement areas. We investigated and assessed four contractors and identified two without compliance with the standards. They mainly violated the provision of zero fees for workers.

In 2019, NTC assisted two contractors to propose and complete improvement programs. A total of NTD 31,614,000 were repaid to 550 workers. We plan to expand the scope of human rights assessment for migrant workers in 2020 and continue to promote the assessment to key suppliers. In addition to the promotion in supplier meetings or on-site audits, we will ask key suppliers which hire migrant workers to abide by related human rights provisions.

Contractor and supplier product and environmental footprint inventory

NTC has advanced product environmental footprint inventory since 2018. We selected one contractor and one supplier to conduct product environmental footprint inventories to complete the life cycle inventory of our memory products, gain more understanding of key points in products' environmental impact, and satisfy requirements of related stakeholders.

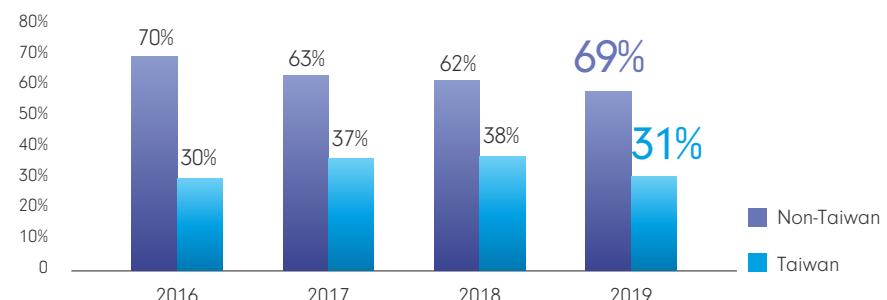
- Contractors (packaging and testing): The results of the 2019 product environmental footprint inventory indicated that the majority of the product environmental impact was caused by the use of electricity in the manufacturing stage, followed by gold bonding wires and solder balls during the procurement of raw materials, liquid nitrogen, and tap water. We expect energy-conserving mechanisms to mitigate environmental impacts. If the chance of mitigation is slim, we strive to avoid the deterioration in energy consumption. In 2020, we plan to roll out improvement activities for major items in the inventory results.

- Suppliers (wafer): In 2019, wafer suppliers cooperated in conducting product environmental footprint inventory. The product environmental impact was mainly caused by the use of electricity and the large electricity consumption of crystal pulling at the factory. In regard to the former, we plan to install a 356KW photovoltaic system on the factory's RC rooftop. With respect to the latter, we completed 14 energy conservation plans in 2019 and saved 2,390kWh. In 2020, we will continue to ask wafer suppliers to roll out improvement activities for the sources of environmental impacts revealed in the environmental footprint inventory results.

Local Procurement

NTC prioritizes local procurement to facilitate stable development and cooperation with suppliers, provide faster service time, shorten delivery time, reduce unnecessary costs, and reduce the impact on the environment. However, as semiconductor equipment and technologies mostly involve foreign production or international collaboration, most of the materials used in the semiconductor industry are still produced in foreign countries. This has led to larger foreign procurement compared to domestic procurement. NTC shall continue to cooperate with local suppliers to expand procurement and employment opportunities in Taiwan and create greater value in partnerships with suppliers.

◆ Percentage of local materials procurement amount in 2016-2019



Management of Conflict Minerals

NTC is committed to a responsible procurement management strategy for the ban on conflict minerals to satisfy current and future market, legal, and regulatory expectations. We aim to meet requirements for the ban on conflict minerals and bear responsibilities specified by the Responsible Business Alliance (RBA) and satisfy the Responsible Minerals Assurance Process (RMAP). NTC's six contractors and seven materials suppliers have completed investigations on conflict minerals in their supply chains and confirmed that 100% of the 40 minerals suppliers in the supply chain meet requirements for the ban on conflict minerals and made substantive contributions to the environment and the supply chain.



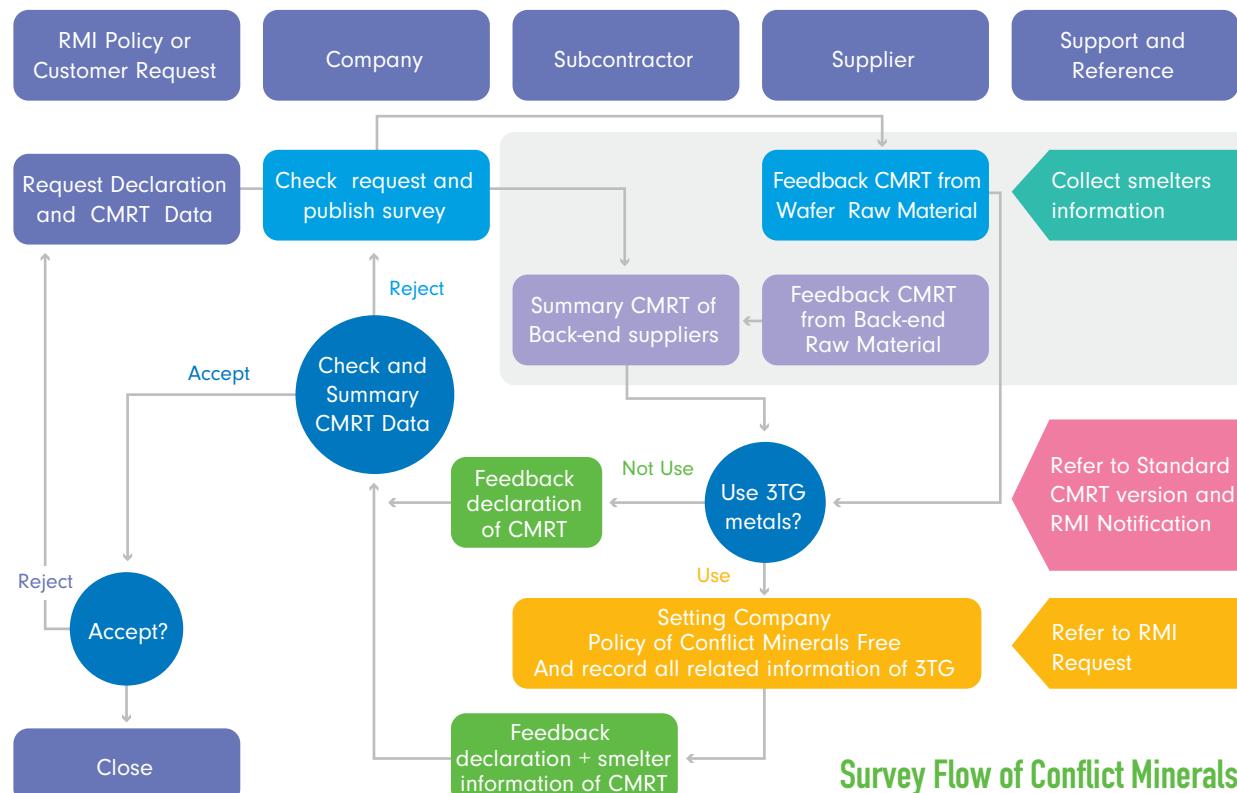
Suppliers that used raw materials containing 3TG shall comply with the Company's policies and use the Conflict Minerals Reporting Template (CMRT) as an investigation tool for 3TG investigation results to ensure that the supply chain does not participate in illegal financing of warlords or armed militants or violate basic human rights. Among the minerals used in our products, approximately 10% of the gold, tantalum, tin, and tungsten (referred to as 3TG) come from the Democratic Republic of the Congo (DRC) or adjoining countries. They are also sourced from recycled or scrapped metals.

We have not directly purchased raw ores or unrefined 3TG. We have also refrained from purchasing illegal minerals from the Democratic Republic of the Congo and its adjoining countries, or armed militants in other conflict areas. We shall ensure that the supply chain does not directly or indirectly support illegal organizations. All of NTC products have been verified and we have upheld responsible mineral procurement principles in the procurement process. No conflict minerals have been used.

◆ The Company's current 3TG applications are as follows:

Metal name	Applicable product	Application category
Gold	IC	Gold bonding wire
Tantalum	wafer	Wafer manufacturing target
Tin	IC	Solder paste, solder ball, tin wire
Tungsten	wafer	Wafer manufacturing target

◆ Procedures for the Management of Conflict Minerals



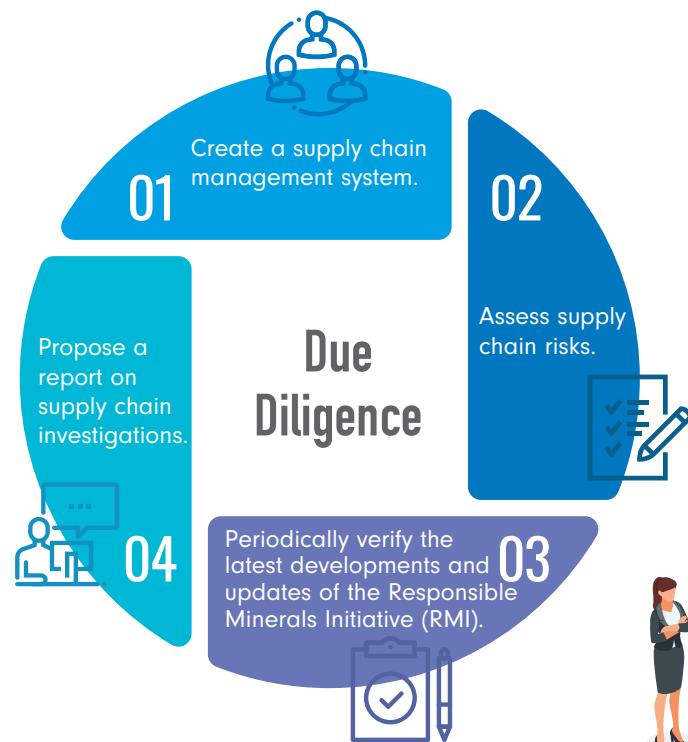
Survey Flow of Conflict Minerals



○ Responsible Procurement

Investigation Preparation

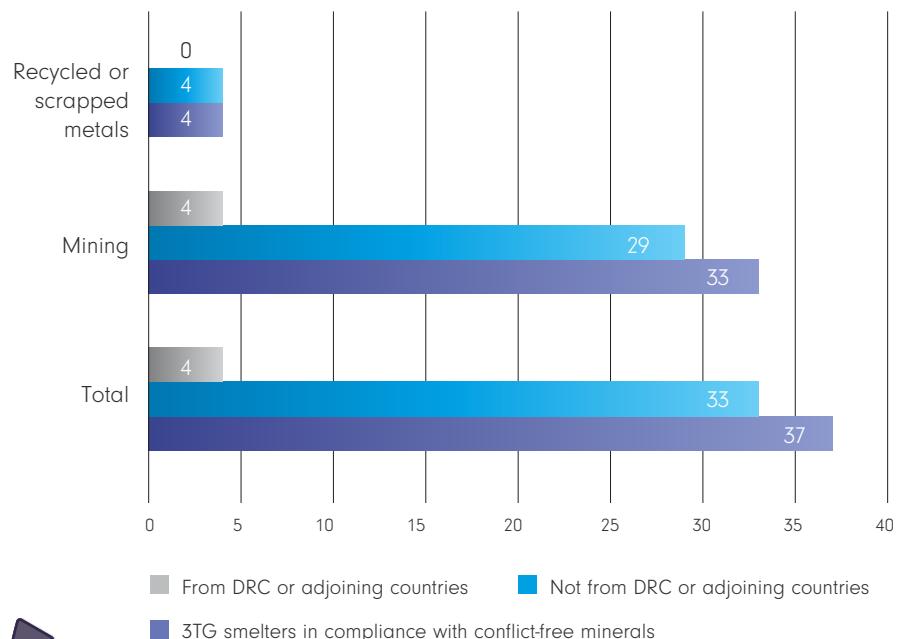
NTC's supply chain maintains multi-level supply chain relations with the raw ores. Before investigations, we shall inspect the supply chain materials and define the applicable categories of 3TG in the Company's products. We shall screen and select suppliers for the conflict minerals investigations and implement a series of top-down investigations on the suppliers. We shall use the standard investigation tools defined in the Responsible Minerals Initiative (RMI) and obtain the latest lists.



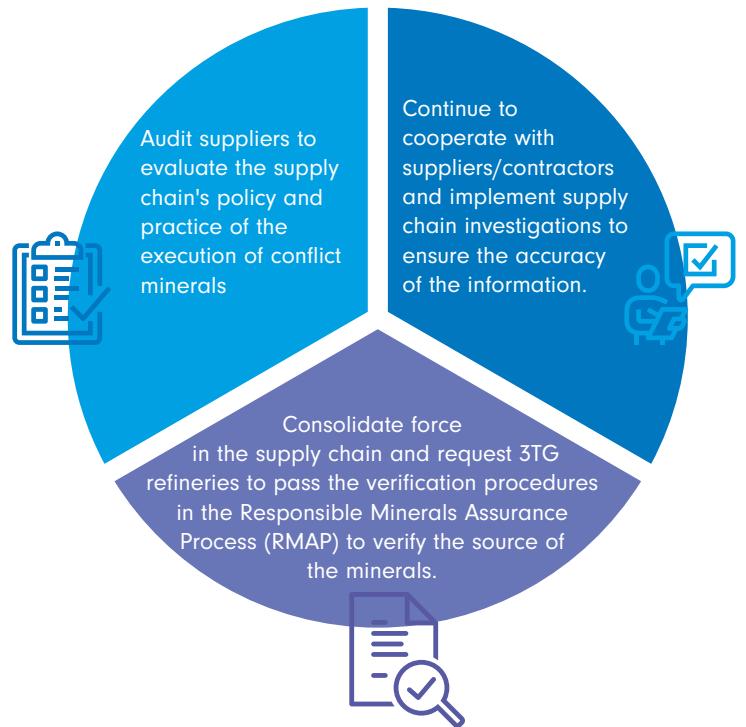
Corresponding Product Categories for 3TG Minerals and Investigation Data

NTC provides memory products. According to due diligence in the supply chain and comparison with the list of qualified refineries of the Responsible Minerals Initiative (RMI), a total of 40 minerals suppliers have provided information on the source of 3TG minerals and we identified information for 37 smelters in the supply chain investigation.

◆ Source of 3TG minerals procurement



NTC shall continue to implement due diligence based on the Responsible Minerals Assurance Process (RMAP) and lower risks in the supply chain.





06

Cleaner Production



“ A Producer of Green Technology”

With the green ideal that we only have one Earth, Nanya Technology Corporation insists that we help leave the best living environment for generations to come. We actively manage all impacts on the environment during operations. We adopt higher standards than regulations in terms of energy, resources, emissions, and waste to avoid or reduce impact risks. We also set goals to review the progress and results of sustainability performance to fulfill our responsibilities for green production and safeguard the natural environment.

100%

Greenhouse gas verification and climate change risk identification coverage

96.95%

Annual average process water recovery ratio

16%

Reduction of VOCs emissions per unit capacity compared with 2018

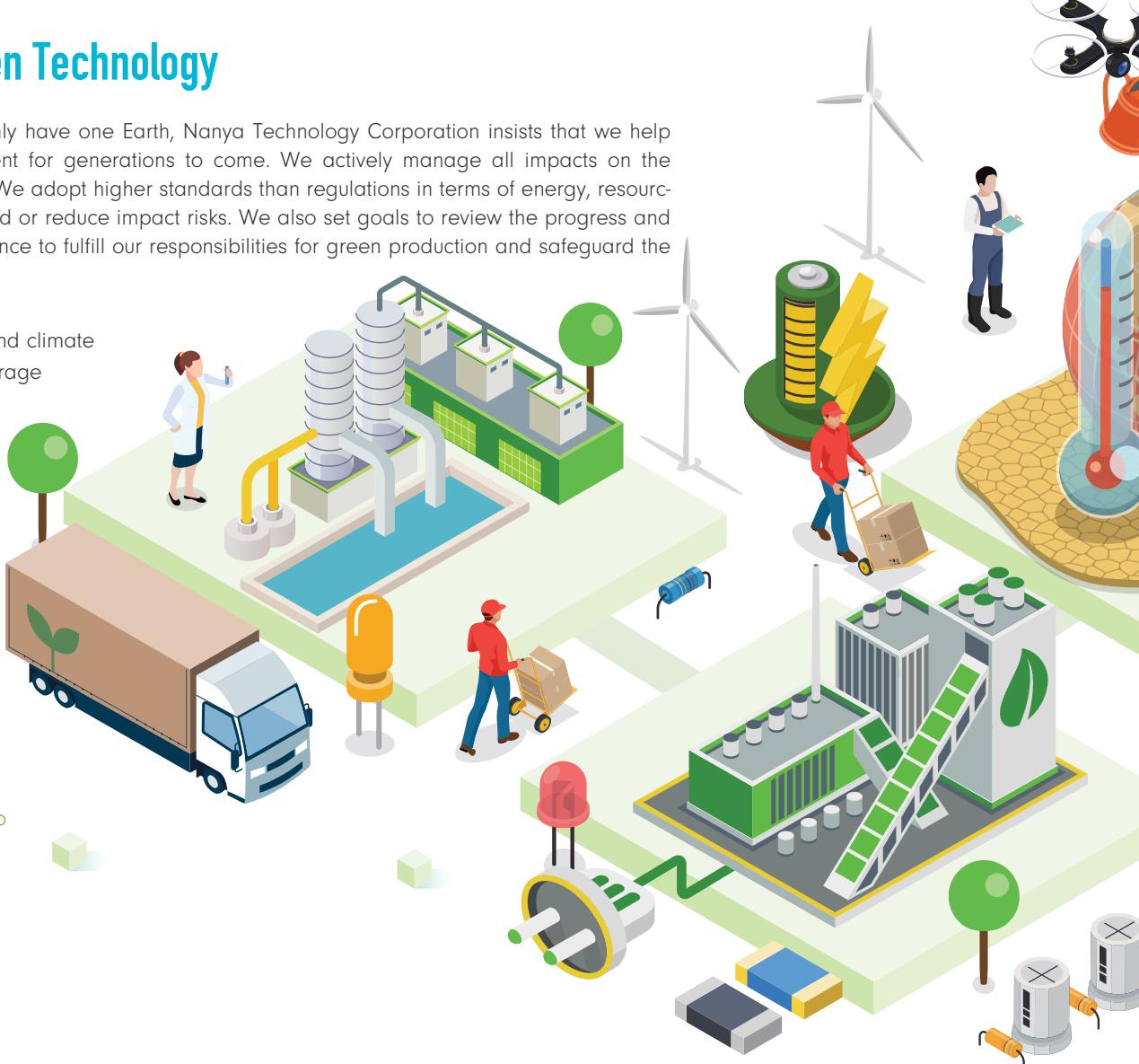
80 / Eco-friendly Products

88 / Greenhouse Gas Management

95 / Energy Management

98 / Water Management

100 / Effluent, Waste and Recycling





Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed



Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
Eco-friendly products	<ul style="list-style-type: none"> Technology improvements: Research and develop advanced and highly efficient products to help consumers reduce the energy consumption and carbon emissions when using the products Consider product life cycle: Consider the friendliness of products on the environment Hazardous substance management: Continue to promote replacement plans for hazardous substances in the production process 	<ul style="list-style-type: none"> Energy-saving products, such as 20nm and low carbon products account for 75% and above of our products 100% products are to complete product life cycle assessment 100% products are to conform with relevant regulations and customers' hazardous substance free (HSF) specifications 	Ratio of 20nm and other advanced process > 70% 100% products completed product life cycle assessment 100% products met the requirements of hazardous substance free standards 100% materials contained zero perfluorooctanoic acid (PFOA) or related substances	✓ 75% (4Gb eq) ✓ 100% ✓ 100% ✓ 100%
Green-house Gas Management	<ul style="list-style-type: none"> Energy conservation and carbon emissions reduction: Set short, medium, and long-term goals and actively implement related management measures. Low-carbon manufacturing: Commit to improvement in production technologies and reduce greenhouse gas emissions in the production process. 	<ul style="list-style-type: none"> Reduction of greenhouse gas emissions per unit of die by 15 % (base year of 2017) Reduction of perfluorocarbons (PFCs) emission in manufacturing process reaches 90% Reduction of perfluorocarbons emissions by 20% per unit of die (base year of 2015) 	Reduction of greenhouse gas emissions per unit of die by 5 % (base year of 2017) Reduction of perfluorocarbons (PFCs) emission in manufacturing process reaches 90% Reduction of perfluorocarbons emissions by 30% per unit of die (base year of 2015)	✓ 27% ✓ 90 % ○ R&D used part of production capacity, so unit chip output failed to reach the target with a 29% reduction
Energy Management	<ul style="list-style-type: none"> Implementation of energy conservation measures: Implement ISO 50001 Energy Management System for systematic management and improve the efficiency of energy usage Innovative applications: Use external exchanges or training to obtain the latest energy conservation technology or energy-saving methodology 	<ul style="list-style-type: none"> Cumulative annual energy-saving benefit with new energy-saving solutions from 2017 to 2020 reaches at least 50,000MWh. Annual renewable energy use reaches 1,200MWh 	Cumulative annual energy-saving benefit with new energy-saving solutions from 2017 to 2019 reached at least 21,000MWh/year Power consumption per unit production capacity < 0.66 MWh/kpcs	★ 27,148MWh ✓ 0.65 MWh / kpcs
Water Management	<ul style="list-style-type: none"> Response to risks: Establish backup water sources and water storage tanks and use emergency response organization between company plants to coordinate water usage. Wastewater recycling and reuse: Establish wastewater collection processing and adopt different multiple recovery and reuse to improve the water recovery rate Water usage reduction: Conserve water through daily management 	<ul style="list-style-type: none"> Annual average process water recovery ratio: 97% Production loss due to restricted water supply: 0 wafer 	Annual average process water recovery ratio: 94% Production loss due to restricted water supply: 0 wafer Water consumption per unit production capacity is at 3 tons/kpcs	★ 96.95% ✓ 0 ✓ 3 ton/kpcs
Effluent, Waste and Recycling	<ul style="list-style-type: none"> Circular economy: Increase waste recycling and reuse rate to use resources effectively. Source reduction: Continue to promote waste reduction and increase waste recycling rate. 	<ul style="list-style-type: none"> Violation of environmental laws and regulations: 0 cases On-site audit and assistance rate of waste disposal suppliers >60% Reduction of VOC emissions by 15% (base year of 2017) 	Propose plan to reuse "waste organic solvents (IPA)" and increased the recycling volume by 85% compared with 2017 Maintain waste recycling rate above 97%	✓ 89.59% ✓ 98.14%

○

Cleaner Production

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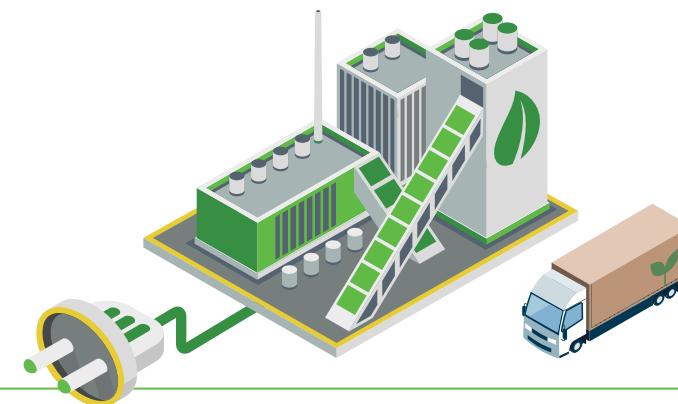


Eco-friendly Products

Nanya Technology Corporation(NTC) and our customers jointly protect the Earth. We implemented the Life Cycle Thinking (LCT) and the Design for Environment. We have been striving to develop advanced, highly efficient, and eco-friendly products. We not only continue to assist customers in developing products of low-energy consumption design, but also exert our influence on the supply chain for hazardous management and conflict minerals management. The Company has formulated environmental and safety performance indicators, promoted various waste reduction and resource reuse, greenhouse gas reduction and other projects, in order to consider the environmental friendliness of products on the environment. We implement green product management in coordination with the Green Product Promotion Committee (GPPC). We consider 7 major environmental impacts during the stages of procurement, manufacturing, transportation, product use, and disposal and recycling, right from the beginning of product development, so as to identify improvement opportunities to increase environmental benefits.

◆ NTC green design matrix

	Purchasing	Manufacturing	Transportation	Product use	Disposal and recycling
Energy efficiency	●	●	●	●	
Greenhouse gas	●	●	●	●	
Material reduction	●	●	●		
Conflict minerals	●				
Hazardous substances	●	●		●	
Waste reduction		●		●	
Water resources reduction	●				



Environmental external benefits

We consider the environmental impact of entire product life cycle when developing new products. In terms of electronic products, the energy consumption in the usage stage is one of the most significant indicators of the environmental impact. NTC actively researches and develops low power consumption products, and assist customers to lower demand for energy when they use electronic products so that greenhouse gas emissions can be reduced.

409.52 million kWh Electricity Savings

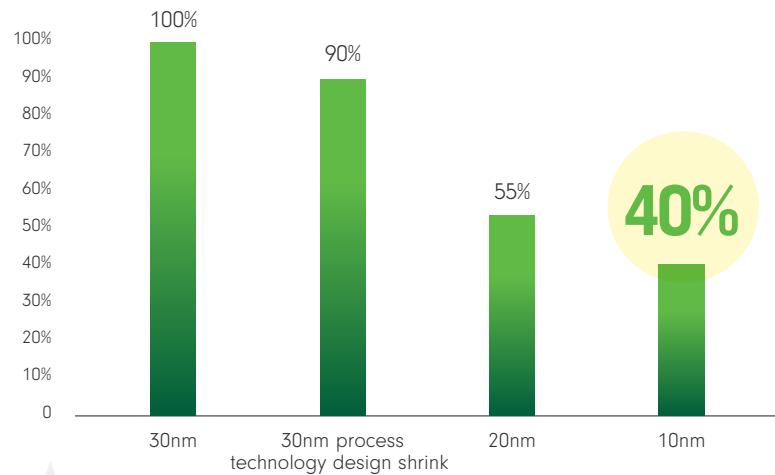
- Product: low-power DRAM and 20nm consumer DRAM products
- Scope: total sales volume of 2019
- Calculation: Number of products sold in one year and compared the power consumption with the previous generation products
- Benefits: electricity conservation and carbon reduction

Energy Conservation Product Design

NTC officially put its low-power DRAM and 20nm consumer DRAM products on the market in 2019. With the energy-saving design of reduction in operating voltage and current, the power consumption in the usage stage is lower than the previous generation and effectively reduce carbon emissions for customers. Comparing the power consumption of the number of products sold in one year with that of the previous generation products, electricity savings totaled approximately 409.52 million kWh (1.47×10^9 Megajoules (MJ)) or reduced CO₂ emissions by 218,274 tons. Calculating using the CO₂ absorption of the Daan Forest Park at 389 tons per year (according to the Bureau of Energy, MOEA), the electricity savings were equal to the CO₂ absorption of about 561 Daan Forest Parks.

The demand for smartphone upgrades is expected to drive the global memory market, so the LPDDR4 (low power double data rate memory) may become the main supply for mobile memory in recent years. Thus, in 2016, NTC started the plan of research and development as well as efficacy of LPDDR4, reinforcing product features, and developing high density products to meet specification requirements and product features of PC and consumer markets. In 2018, NTC successfully developed the only domestic DRAM plant with 20nm process technology, and designed the first product of 4Gb LPDDR4 Mobile DRAM with 20nm process technology domestically. In the same year, in regard to memory capacity and application on global mobile devices, the usage rate of the LPDDR4 series reached at least 50%. Moreover, in 2019, we successfully designed the first product of 8Gb LPDDR3 Mobil DRAM and 4Gb LPDDR4X Mobile products with 20nm process technology domestically. Each new generation of LPDDR products has better energy efficiency than the previous generation. Currently, the energy savings of the latest generation LPDDR4X reach 69% compared with that of the LPDDR1 in the early period. This largely helps the actual usage time of mobile devices. NTC has been committed to advanced manufacturing process and green product R&D. The Company has independently developed advanced 10nm process technology since 2018, and the trial run is expected to be carried out in 2020. The 10nm process technology will significantly shrink the size of chips and allow the production capacity of a piece of wafer to increase by 25%. This will help the Company achieve the goal of energy conservation and carbon reduction while keeping the same production capacity.

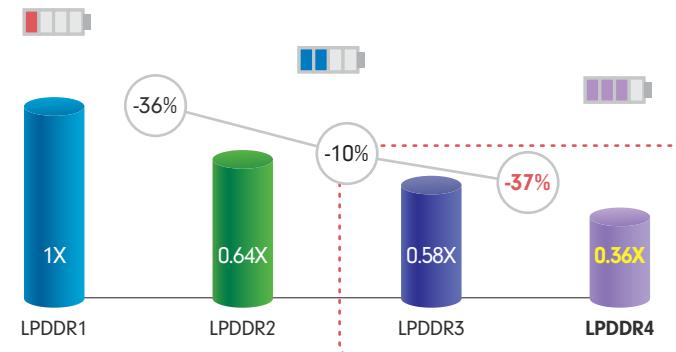
◆ Use advanced process technology to optimize chip sizes



Left figure: Using the size of product chips in 30nm process as the comparison base, the more the advanced process is the smaller the chip sizes are; Right figure: Source from the electronic technology magazine

◆ LPDDR4 Energy Efficiency

(mW / GBps)



Energy efficiency is measures in power consumption per bandwidth

*Source : SEC



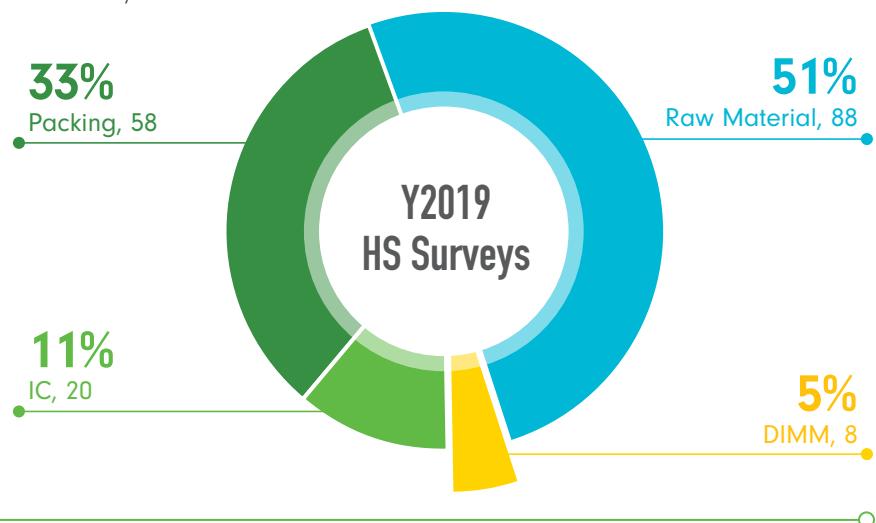
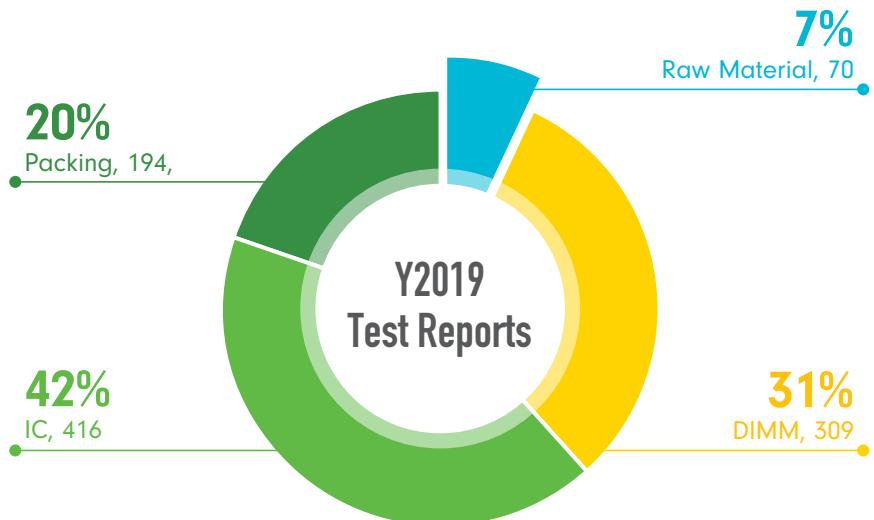
Hazardous Substance Free Product

The GPPC was established in 2005 to promote hazardous substance free (HSF) management. This has helped NTC to continue to achieve its objectives during the product manufacturing process, including pollution prevention, energy conservation, waste reduction, and avoidance of hazardous substances. The Company vertically connects suppliers of raw materials and process materials with rear-section packaging contractors and packaging material suppliers. Thus, NTC forms an effective green product supply chain with upstream and downstream suppliers in the supply chain. Through the GPPC, we referred to laws and regulations of the EU and countries in other regions and the hazardous substance management specifications of major international customers to stipulate the General Rules of Environmental Management Substances for Components and Materials. We continue to effectively control and manage the sources of raw materials and related materials in order to achieve the standards of green products and mitigate impacts on natural environment during manufacturing process of products. Under the instruction of the General Rules of Environmental Management Substances for Components and Materials, all of our products need to conform to international regulations and customer's requirements, such as RoHS, REACH, packaging instructions, and WEEE. Moreover, through the establishment of HSF management system of materials, we ensure that the wafers we manufacture and rear-end IC packaging products conform to the international regulations and related specifications of customers towards HSF management.



RoHS report items of 5 contractors and 42 raw material suppliers were reviewed while 989 RoHS reports were reviewed. The completion rate: 100%.

- Two versions of REACH SVHC item survey (REACH SVHC V.20 & V.21) were completed while 148 HS Survey reports were reviewed. The completion rate: 100%.
- A total of 26 HS Surveys in three versions (HS Survey V32 & HS Survey V34&V34.1) requested by customers were completed. The completion rate was 99% with a total of 173 surveys.





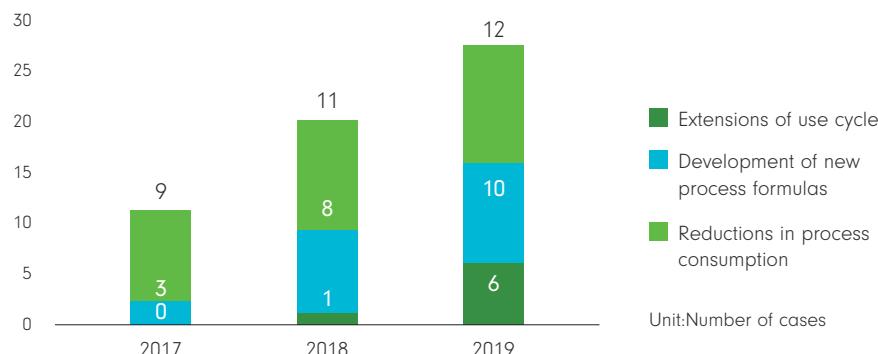


Use of Raw Materials

NTC makes good use of the limited sources of the Earth in three ways. We recycle raw materials, assess the reasonable and appropriate use of raw materials, and streamline manufacturing process. Thus, a dedicated organization was established to set annual implementation goals for raw material reduction and periodically review the performance of raw material reduction. Accumulative 28 entries in improvement proposals regarding the consumption of raw materials were completed in 2019, including the development of new process formulas, reductions in process time, extensions of use cycle, and reductions in process consumption. Among the improvement proposals in 2019, the one yielded the most benefits was reducing the consumption of sulfuric acid and hydrogen peroxide by 25% for single wafer cleaning equipment through process condition optimization.

Control wafers are used to monitor process conditions during the production process. Used control wafers can be reused through re-fabrication. Each control wafer is expected to be reused around 7.5-11 times in NTC. Therefore, the cost of purchasing brand-new control wafers is saved while plenty of waste is reduced. We recycle product packaging materials as many as possible. Wafer cassettes of raw silicon wafers are also recycled and reused in product shipments, and the reuse rate of these cassettes is nearly 100%. This approach can reduce the consumption of approximate 24,000 pieces of brand-new 12-inch wafer cassettes each year, equal to a reduction of 108 tons in the use of plastics. Reusable packaging materials used in supplementing finished products are recycled to be used in product exchanges for customer complaints, product storage, and outsourcing to reduce the times of application and purchases, further achieving the performance of recycling and packaging material reduction. In addition, the use cost of packaging materials can be reduced.

◆ Improvement projects for raw material consumption



◆ Use and output of raw materials

Input			
Produce raw materials	Consumption	Renewable	Non-renewable
Raw silicon wafer (1,000pcs-12-inch)	854	●	
Process chemicals (ton)	53,840	●	
Process gas (million M ³)	6065	●	
Electricity (million kWh)	709	●	
Clean water (cubic meter)	3,235	●	●
Wafer packaging materials (ton)	184.5	27%	73%



Output	
Product	Output volume
Raw silicon wafer (1,000pcs-12-inch)	854
Waste gas	Emissions
Greenhouse gas (ton-CO ₂ e)	478,722
Volatile organic compounds (ton)	18.9
Sulfide (ton)	2
Nitrogen oxide (ton)	10.4
Waste water	Discharge volume
Waste water volume (cubic meter)	2,634
Waste	Waste production
General business waste (ton)	5,904
Hazardous business waste (ton)	16,222



Life Cycle Assessment (LCA)

We assess product environmental impacts, identify and mitigate hotspots via the Simapro, a life cycle assessment tool. In the meantime, the Company also uses the product environmental data and coefficients accumulated through analysis processes to build a decision support system for NTC's green product development. In the future, the system will expand to all of the new product development. In response to the EU's requirements of environmental protection topics, we gave multiple considerations on the requirements and conducted quantitative LCA assessments on 100% of our products manufactured in 2019 in each life cycle stage. Pursuant to the ISO 14040s Life Cycle Assessment, which requires the product environmental footprint to be quantified and communicated and the content of the guidelines, the company performed the product environmental footprint declaration. We also referred to the regulations of ISO 14064-1 Greenhouse Gas Inventory and ISO 14067:2018 Carbon Footprint standards to implement the declaration. The analysis products were Dynamic Random Access Memories (DRAMs), and the LCA system boundaries included raw material manufacturing, transportation, wafer manufacturing, packet packaging, module packaging, product use, and recycling/disuse. The Company mainly engaged in memory wafer manufacturing and outsourced other production activities. Therefore, the main system boundary was wafer manufacturing. Among the 14 sources of the environmental footprint, the improvement results of three emission hotspots related to greenhouse gases (GHG) are as follows:

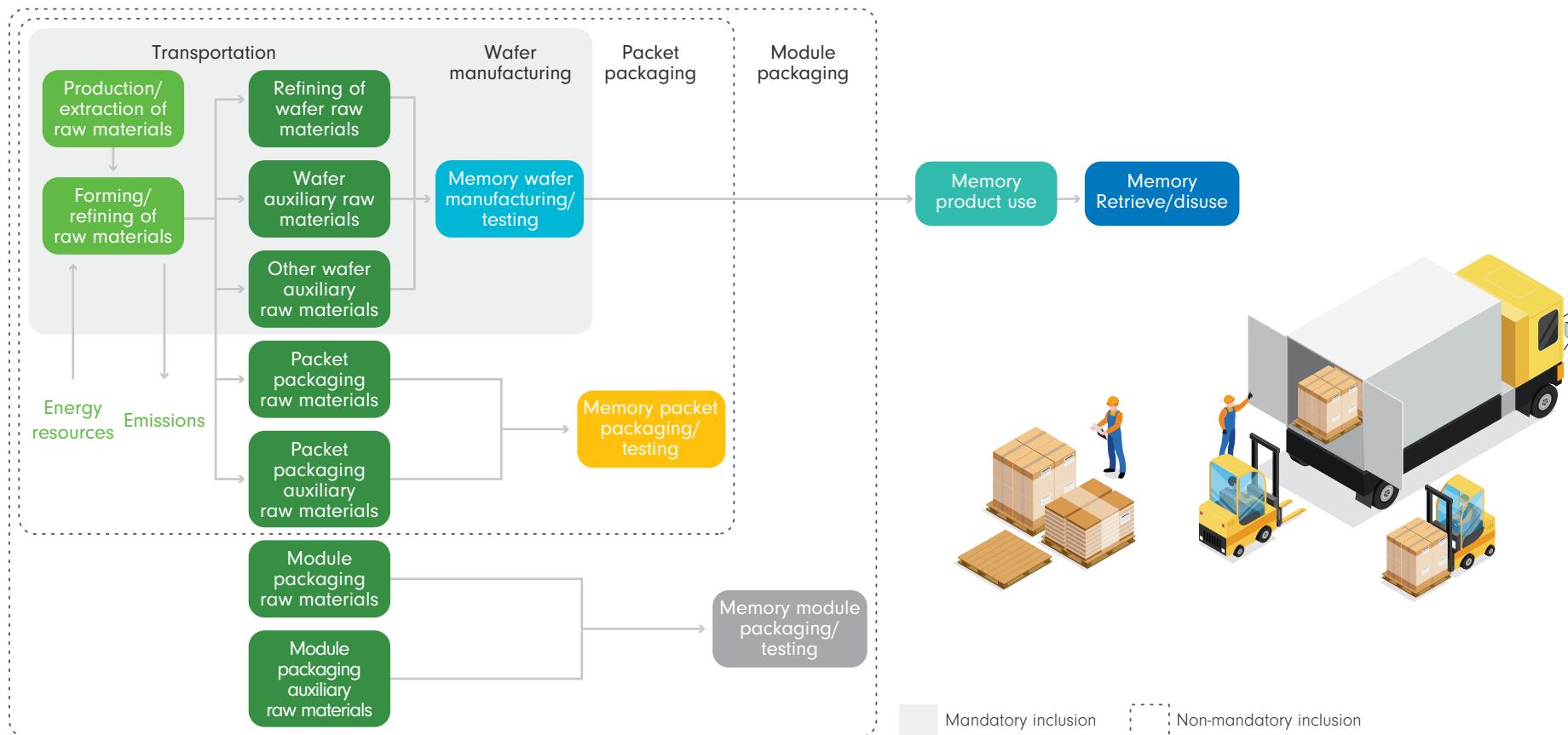
Three hotspots related to greenhouse effect in the 2018 product LCA inventory results	Percentage of product carbon footprint	Response	Progress and results	Subsequent improvement
① Electricity use	82.27%	Promoted ISO 50001 Energy management systems	Electricity savings of 28,232MWh in 2019, and reduction of 2,985 tons in CO ₂ emissions	<ul style="list-style-type: none"> Continue to drive energy management plans Plan and use renewable energy
② 12-inch prime wafer	3.62%	Key suppliers cooperated in conducting wafer LCA inventory.	Inventory results of key suppliers: GHG emissions accounted for 40.8% of electricity, which was coal-fired. Emission factor registered 0.845, which was 50% higher than 0.554 released by the Taiwan Power Company.	We communicated with key suppliers and found that they implemented many energy conservation programs in production each year. We also set the goal of replacing coal-fired source electricity with natural gas. Moreover, we assessed the possible benefits of carbon footprint reduction in products on both sides if we implemented an green energy program by using solar panels to reduce GHG emissions.
③ Calcium chloride used in wastewater treatment	1.92%	Capital expenditure totaled NTD 5.13 million, which was used to increase the acid wastewater collecting system with resin column regeneration.	Calcium chloride consumption was reduced by 200 tons/per month on average. (Consumption was reduced from 1,150 tons/per month to 950 tons/per month, a 17.4% decline.) The product carbon footprint was reduced by 0.34 %.	The acid wastewater collecting system was formally implemented in December 2019.



Cleaner Production

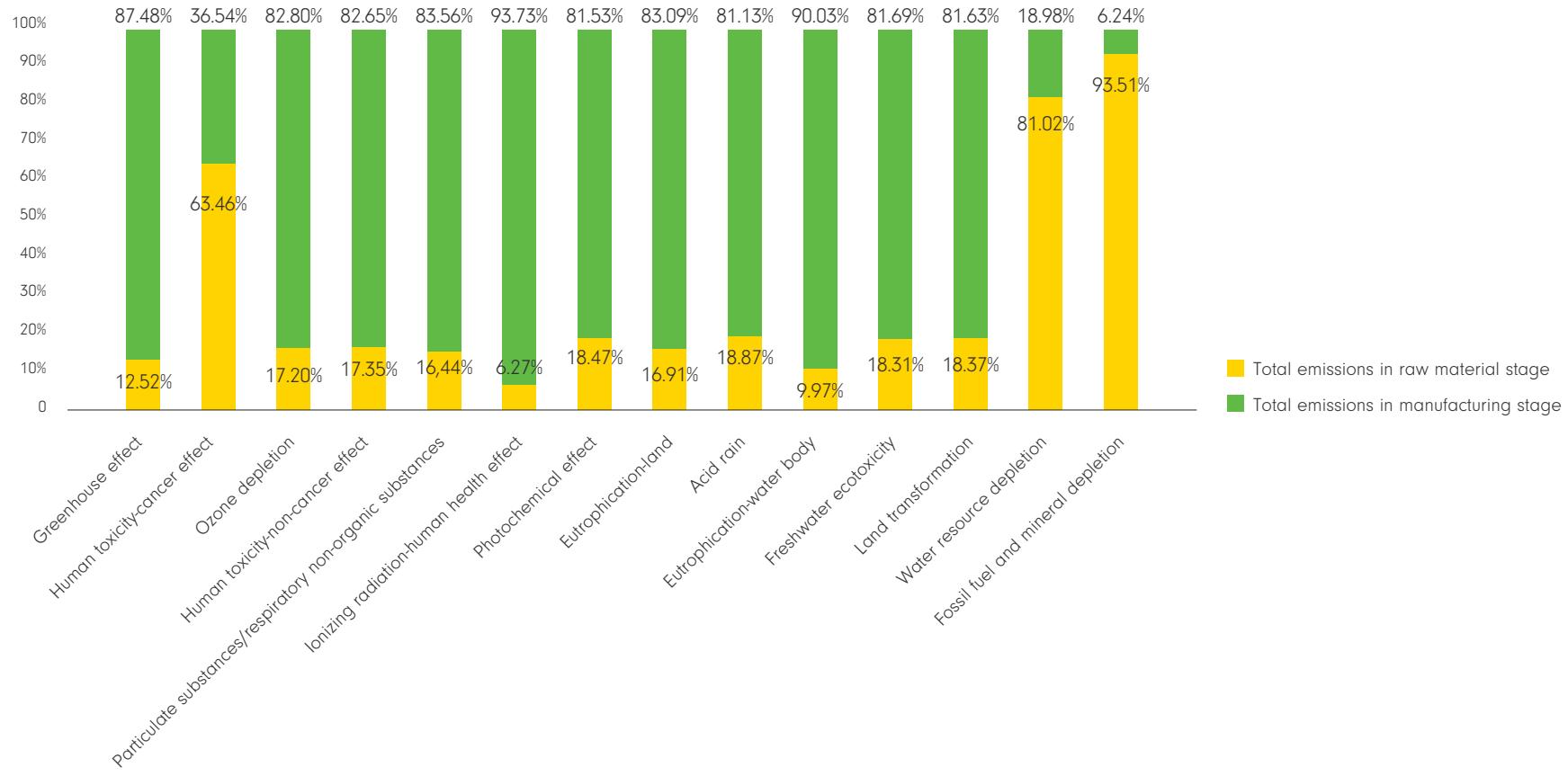
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◆ System boundaries for major product environmental footprint





◆ Ratio in raw material and manufacturing stages





Greenhouse Gas Management

Management Organization and Strategy

The Climate Change Management Working Group is overseen by the President's Office. The working group sets reduction goals based on the ideal of sustainable environment to implement energy conservation and carbon reduction measures. In 2018, the Company introduced the Task Force on Climate-related Financial Disclosures Recommendation (TCFD) formulated by the Financial Stability Board (FSB), and disclosed the Company's measures in relation to governance, strategy, risk management, and indicators and goals. Our Business Risk Management Working Group meets each quarter to consider the potential impact of climate change to our overall operations, estimating the probability of risks and their impact, and establishing risk response and mitigation plans, as well as crisis management mechanisms. Major climate risks that have been identified include natural disasters, laws of different countries on the energy efficiency of products, and consumers' preference for environment and climate friendly products. This will have a more significant effect compared with the past. We analyze risks based on their probability and impact, and formulate relevant measures in hopes of reducing the impact of climate risks.

◆ Based on the TCFD framework, the Company's management organization and strategy are explained as follows:



- The Corporate Sustainable Management Committee supervised by the board of directors is the main competent authority.
- Corporate social responsibility meetings are held quarterly, and are presided over by the President. The climate change is listed as one of the discussion topics.



- Short, medium, and long-term climate-related risks and opportunities are periodically identified, and so are impacts of climate-related risks and opportunities on organizational operation, strategy, and financial plans.
- The resilience of organizational strategy is considered under different climate scenarios.



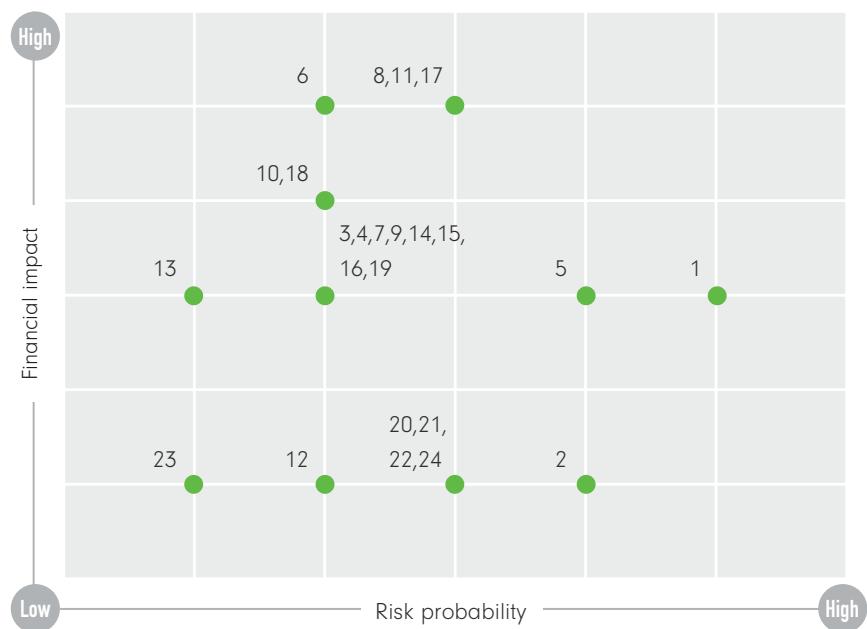
- Impact levels and probability are used to assess the significance of related risks and opportunities brought by climate change.
- Identify climate risks and opportunities with the TCFD framework and organize workshops to forge a consensus for the confirmation of executive-level positions



- Set goals for greenhouse gas management and resource recycling and resource.
- Promote ISO 50001 energy conservation programs.
- Conduct the scope 1/2/3 of greenhouse gas inventory and certification each year, and confirm the sources of greenhouse gas and manage key sources.
- Conduct product environmental footprints inventory, and promote carbon reductions throughout the entire supply chain.
- Participated in the Climate Change Program initiated by the CDP, disclosing information on carbon emissions, and communicating with stakeholders.

Considering the impact and countermeasures of climate change, the Company asks internal related departments to meet every two years to discuss and identify topics highly related to climate change risks and opportunities. Based on the TCFD guidelines, topics include policy and regulatory risks, technological risks, market risks, and physical risks. In 2019, we collected 24 items of climate-related risks. We used financial impact and risk probability to analyze these 24 items and zoomed in on 6 items of material risks. In addition, we collected 18 items of climate-related opportunities, and zoomed in on 6 items of opportunities based on correlation.

◆ Risk probability vs Financial Impact in terms of climate change topics



◆ Other risks topics

2. Implementation, inventory and, registration of management regulations concerning greenhouse gas reduction
3. Costs increase in suppliers' raw materials owing to energy regulations or requirements
4. Major suppliers' response to the Renewable Energy Development Act
7. Investees' costs transfer in response to increase in unit electricity price in 2025
9. Government's policies on a nuclear-free homeland, reduction in coal-fired power generation, and increase in natural gas power generation
10. Power outage risks caused by government's policies on a nuclear-free homeland and reduction in coal-fired power generation
12. Increase in fuel (petrol and diesel) costs owing to climate change
13. The Equator Principles (EPs) adopted by lending banks when issuing loans
14. Unable to provide customers with sufficient information on carbon emissions
15. Customers reduce orders placed to our company owing to poor performance of our CDP carbon management
16. Fuel costs increase (in coal and lightly cracked fuel) owing to climate change or related regulations
18. Unstable electricity supply owing to climate change
19. Increase in customers' negative attention owing to climate change topics
20. Increase in government's negative attention owing to climate change topics
21. Increase in the public's negative attention owing to climate change topics
22. Carbon reduction goals and plans or energy transition expected by institutional shareholders/lending banks
23. Sea level rise
24. Rise in average temperatures



◆ Climate change material risks

No.	Material risks	Financial impact	Management measures
6	Increase in unit electricity price in 2025	30% increase in costs of purchased electricity impacts profitability	Drive internal energy management plans for energy conservation
8	Replace current products with low carbon emission products	Low carbon emission technology fails to meet consumers' requirements, so the quantity of orders declines, leading to a decrease in revenue.	Strengthen low carbon emission product R&D, and enhance product competitiveness
17	High proportion (over 50%) of coal-fired energy consumed by major suppliers results in a rise in product carbon footprints.	The quantity of orders is impacted by higher carbon emissions of the Company's products	<ul style="list-style-type: none"> Require major suppliers to conduct LCA inventory Understand the annual GHG inventory reports of major suppliers and the execution of their energy conservation and carbon reduction plans Urge major suppliers to replace coal-fired fuel with natural gas fuel
1	The Renewable Energy Development Act is formulated.	Various investments required to comply with the laws and regulations	<ul style="list-style-type: none"> Establish and install renewable energy equipment Or schedule the purchase of green energy certificates
5	Major investees' response to the Renewable Energy Development Act	Wafer packaging and testing is our major investees and their electricity comes from the Taiwan Power Company. In the future, we have to set up certificates or arrange payments. Therefore, production costs will increase and reflect on the costs of packaging and testing.	<ul style="list-style-type: none"> Require major investees to conduct product LCA inventory Understand the annual GHG inventory reports of major investees and the execution of their energy conservation and carbon reduction plans
11	Customers demand low carbon products	Low carbon products fail to meet consumers' requirements, so the revenue declines, impacting profitability.	Invest in R&D resources to develop low carbon products

◆ Climate change material opportunities

Material opportunities	Financial opportunities	Management measures
AI plans at factories	Save on electricity costs	The chilled water system is the main source of electricity consumption at factories, so we use artificial intelligence (AI) to optimize the improvements in energy conservation.
Promote ISO 50001 Energy management systems	Save on electricity costs	36 energy conservation projects were implemented in 2019
Conduct LCA and scope 3 inventory	<ul style="list-style-type: none"> Confirm green product value Provide inventory data to customers Enhance the product awareness and purchase willingness of consumers to increase consumption 	Review raw material suppliers' carbon emissions, filter the top 20 resources, and negotiate reduction in product carbon emissions with suppliers.
Negotiate carbon inventory and energy conservation and carbon reduction topics with suppliers	<ul style="list-style-type: none"> Enhance green product value Enhance the purchase willingness of consumers to increase consumption Enhance the product awareness and purchase willingness of consumers to increase consumption 	Negotiate carbon projects with suppliers each year and cooperate with the top 20 suppliers
Develop and expand low carbon products and services	<ul style="list-style-type: none"> Enhance product competitiveness and meet market demands Increase revenue 	Invest in R&D resources to develop low-power products
Energy regulations stipulate stricter requirements for energy-saving products	Low carbon products meet consumers' requirements, so sales increase.	Invest in R&D resources to develop energy-saving products



Greenhouse Gas Inventory and Reduction

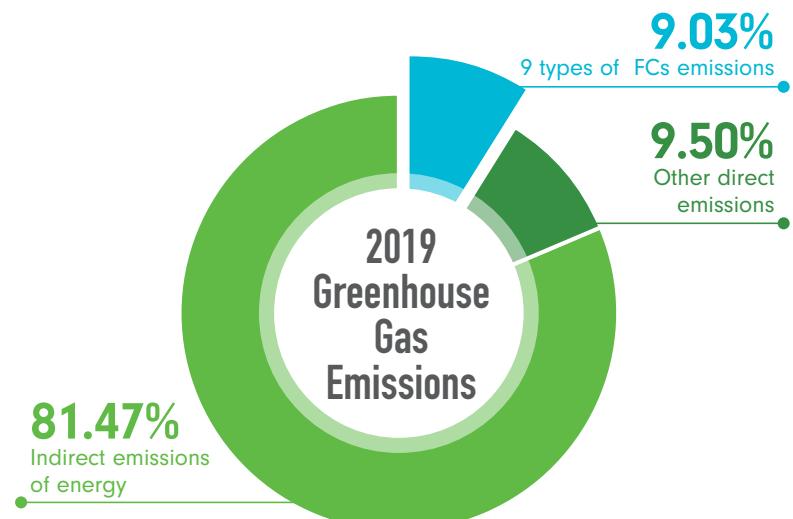
The main sources of greenhouse gas emissions at semiconductor fabrication plants are electricity and perfluorocarbons (PFCs). Electricity is necessary for operations and production, as it sustains the normal function of all machinery and equipment at plants. PFCs are perfluorocarbons and compounds of the same kind used during manufacturing process. They are categorized as greenhouse gases of Global Warming Potential (GWP).

Greenhouse Gas Inventory

Based on ISO 14064-1, the Greenhouse Gas Reduction and Management Act of the Environmental Protection Administration under the Executive Yuan, the Regulations on Greenhouse Gas Inventory and Registration, the Guidelines on Greenhouse Gas Inspection, the Guidelines on Greenhouse Gas Registration, and the WBCSD/WRI Greenhouse Gas Protocol, we use the 100% operational control approach to define our organizational boundary and calculate scope 1 and scope 2 emissions. Since 2018, scope 3 emissions have been added in order to strengthen the integrity of the greenhouse gas in the value chain.

NTC's all operating locations in Taiwan are included in inventory scopes. The main sources of greenhouse gas (GHG) emissions are purchased electricity (accounting for about 81%) and perfluorocarbons (PFCs) used in manufacturing process (accounting for about 9%). GHG emissions in 2019 was 478,721.881 tons CO₂e. Our scope 1 emissions was 88,700.641 tons CO₂e, and we did not have any CO₂ emissions from biomass fuel. Our scope 2 emissions was 390,021.240 tons CO₂e.

The GHG emission factor was based on the GHG Emission Factor Management Table announced on the registration platform of the Environmental Protection Administration under the Executive Yuan, IPCC 2006, and the emission factor announced by the Bureau of Energy under the Ministry of Economic Affairs, and the self-factory steam factor of the Nan Ya Plastics Corporation's utility plant. The GWP values were cited from the IPCC Fourth Assessment Report.



◆ Greenhouse gas emissions from 2016 to 2019

	Scope 1 (ton CO ₂ e)	Scope 2 (ton CO ₂ e)	Total (ton CO ₂ e)
2016	51,584.827	238,436.600	290,021.428
2017	59,751.301	316,442.280	376,193.581
2018	78,311.545	369,904.142	448,215.687
2019	88,700.641	390,021.240	478,721.881

Note:

1. 9 types of PFCs emissions included CF₄, C₃F₈, C₄F₆, C₄F₈, CHF₃, CH₂F₂, CH₃F, SF₆, and NF₃, which were used during manufacturing process.
2. Other direct emissions included process gases of CO₂, CH₄, and N₂O, HFCs, and non-process gas of SF₆, such as fire extinguishing equipment, high-voltage power panels, refrigerators and freezers.
3. Indirect emissions of energy included the use of electricity and steam.



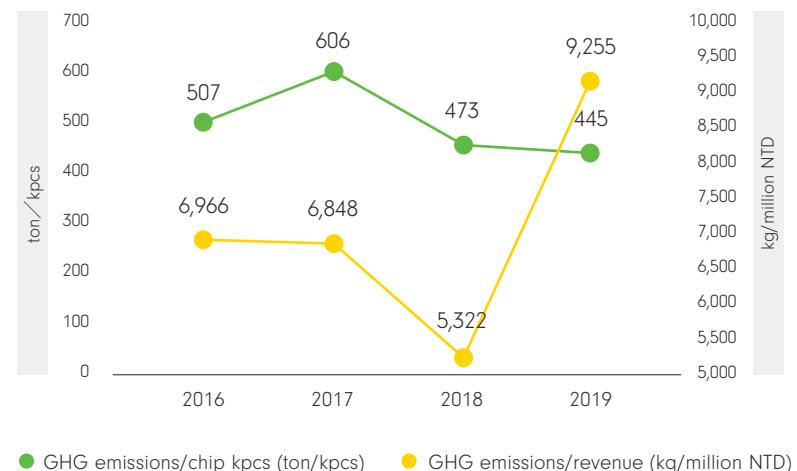
Compared with the base year of 2017, the greenhouse gas emissions in 2019 increased by approximately 27.2%, and the number of wafer produced increased by approximately 23.8%. In terms of unit wafer emissions, the emission intensity in 2019 was 0.77kg CO₂e/wafer area cm², same as the figure in 2018. With respect to the emission intensity of unit chip output, the GHG emissions/total chips in 2019 decreased by 22.4% compared to 2018. Along with the enlargement of process machinery and auxiliary equipment in 2019, the energy consumption increased dramatically. In addition, with the increase in product output, the consumption of raw materials also increased, leading the greenhouse gas emissions in 2019 increased by 6.8% compared to 2018.

Note1 Emission intensity: Greenhouse gas emissions of unit wafer area output

◆ GHG emissions



◆ Run chart of Y2016-Y2019 GHG emissions



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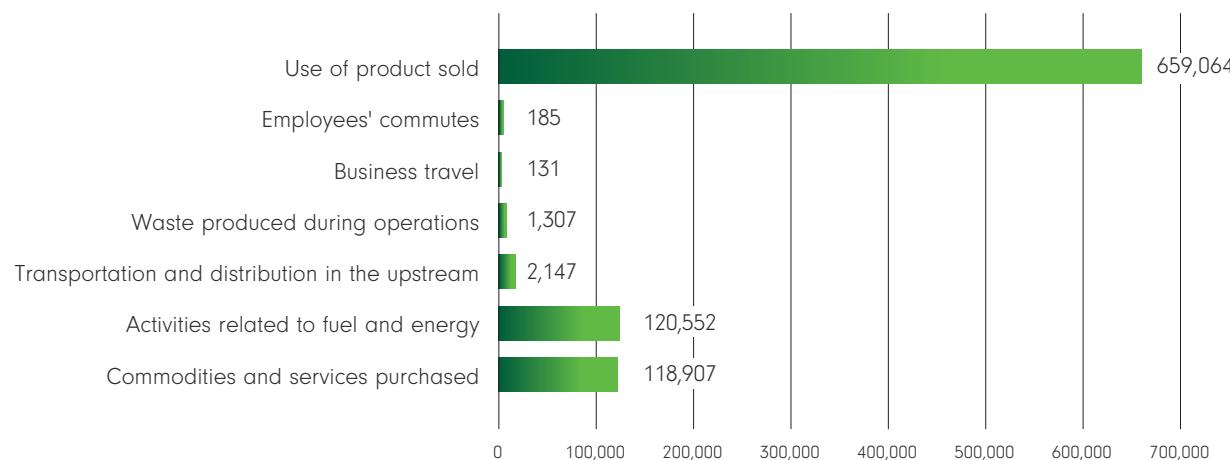


Scope 3 Greenhouse Gas Inventory

To improve the completeness of our GHG inventory in the value chain, we began conducting scope 3 inventory in 2017 in accordance with the Greenhouse Gas Protocol, and received ISO 14064-1 verification by a third party. Among the 15 items of scope 3, a total of 7 items of scope 3 GHG emissions were verified. The highest GHG emissions came from the use of products sold, followed by the commodities and services purchased in the upstream, and activities related to fuel and energy that were not included in scope 1 or scope 2.

Category	Description
(1) Commodities and services purchased	Carbon emissions of the procurement of raw materials for memory manufacturing and auxiliary raw materials in the process, excluding outsourcing services.
(3) Activities related to fuel and energy that were not included in scope 1 or scope 2	Carbon emissions of the life cycle assessment in the upstream for the fuel and energy used when making purchase.
(4) Transportation and distribution in the upstream	Carbon emissions of transportation from upstream suppliers' material deliveries to our factories, including air, land, and sea transportation.
(5) Waste produced during operations	Carbon emissions of waste produced during manufacturing process, including waste transport and disposal.
(6) Business travel	Carbon emissions of flights taken by employees when going on foreign business trips.
(7) Employees' commutes	Carbon emissions of the Company's all shuttle bus routes.
(11) Use of product sold	Carbon emissions of electricity consumed by all products sold in 2019 when they were used by customers. The inventory commodities included televisions, network devices, mobile devices and computers use.

◆ 2019 Scope 3 emissions of GHG (MtCO₂e)





Greenhouse Gas Reduction

NTC actively promotes voluntary reductions and participates in the annual voluntary reduction promotion plan of industrial greenhouse gases promoted by the Industrial Development Bureau under the Ministry of Economic Affairs. Since PFCs have the properties of high Global Warming Potential, the Company has gradually implemented greenhouse gas reduction since 2006. When planning to build fabrication plants, we purchase high reduction rate Local Scrubber; Currently, the PFC Local Scrubber used in the thin film and etching processes is Burn Type, destroying PFCs through the high temperature generated by combustion. In order to reduce the emissions of PFCs into the air, the Company formulated the acceptance criteria of PFC reduction rate processed by Local Scrubber. The gas treatment efficiency of CF₄ emission should reach above 90%, and the reduction rate of processing C₃F₈, C₄F₆, C₄F₈, CHF₃, CH₂F₂, and SF₆ should reach more than 95% while the reduction rate of NF₃ should be over 99%. After the installation of Local Scrubber is completed, the FTIR will be used to detect the reduction rates of various PFC gases to meet the reduction trend in the future.

Note2 Global Warming Potential (GWP) is the warming intensity of the gases relative to carbon dioxide (set the CO₂'s GWP = 1); The Global Warming Potential referred in this article are the gases with a GWP value higher than 675 (based on the GWP values of the IPCC Fourth Assessment Report (FAR)).

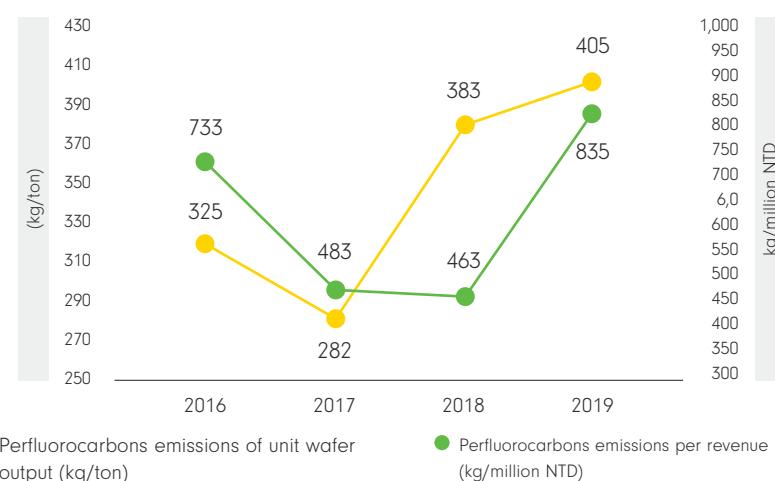
Note3 Local Scrubber: Local waste gas treatment equipment.

Note4 FTIR: Fourier-Transform Infrared Spectrometer

◆ PFC reduction performance



◆ Run chart of Y2016~Y2019 perfluorocarbons emissions



Carbon Disclosure Project(CDP)

In adherence with the principle of transparent disclosure, we have participated in ratings of the Carbon Disclosure Project (CDP) since 2009, disclosing related information about GHG emissions and reductions each year. Achieved CDP Investor and Supply Chain Programs Leadership Level (A) in 2018 and 2019. In addition to the CDP and public disclosure of related information about carbon emissions in this report, NTC also actively discloses its greenhouse gas emissions and reductions in the greenhouse gas report system of the Responsible Business Alliance (RBA), or provides related information with regard to carbon emissions so as to help customers establish a calculation base for their product carbon footprints.



Energy Management

Limited service life of fossil energy and environmental impact have become the most important topics, so efficient management is urgent. The energy that NTC uses mainly comes from purchased electricity and natural gas; Externally, other indirect energy consumption that generates greenhouse gas emissions includes raw materials transportation, production of raw materials suppliers, waste transportation/disposal, employee travel, and employee commutes. In order to mitigate the environmental impact of greenhouse effect, when building fabrication plants, energy conservation is the base for the plans, such as adopting a dual-temperature chilled water system and waste heat recovery and utilization in freezers. Over the past years, we have constantly introduced various energy saving technologies. We have improved our facilities through multiple ways, such as automatic control equipment, equipment efficiency enhancement, energy recovery and reuse, and the improvement of production management to reduce energy consumption. In the meantime, we prioritize energy saving equipment in the stages of equipment installation design and procurement. Moreover, the Company promotes energy management plans in offices and public areas to reinforce the concept of energy conservation to our employees. The Company also continues to reduce the consumption of raw materials and increases the recycling amount of waste to mitigate the global impact of greenhouse gases.

The increase in production capacity has driven the increase in energy consumption. The production capacity of NTC in 2019 increased by 12.9% compared to 2018. The annual electricity consumption increased 63,505 MWh (2.3×10^8 Million joules or increased by 9.8%, which was equivalent to an increase of 33,848 tons CO₂e. The annual natural gas consumption increased 326,380 M³ (1.22×10^7 Million joules) or increased by 7.7%, which was equivalent to an increase of 614 tons CO₂e. The annual energy consumption costs totaled NTD 1,649,170,000, increasing NTD 158,070,000 or increasing by 10.6% compared with the costs of 2018. Total per unit energy consumption of 2019 (electricity + natural gas) decreased 0.02 MWh/k-pcs (72 Million joules/k-pcs) compared with the consumption of 2018, reducing by 2.8%. The production capacity in 2019 increased by 12.9% compared to 2018, but the revenue decreased by 38.9% compared to 2018. Energy Consumption per revenue increased 6.5 MWh/million NTD (2.3×10^4 Million joules/million NTD), increasing by 79.7%. The unit energy cost decreased NTD 30,000/k-pcs compared with the cost of 2018, reducing by 1.9%. The energy cost per revenue decreased NTD 1,430,000/million NTD, increasing by 81.3%.

◆ 2016 to 2019 electricity consumption

	2016	2017	2018	2019
Electricity consumption (MWh)	429,719	575,893	645,387	708,892
Electricity consumption (Megajoules, MJ)	1.547×10^9	2.073×10^9	2.323×10^9	2.552×10^9

◆ Run chart of Y2016~Y2019 electricity consumption





◆ 2016 to 2019 natural gas consumption

	2016	2017	2018	2019
Natural gas consumption (M ³)	2,290,230	3,662,649	4,245,273	4,571,653
Natural gas consumption (MWh)	23,818	38,092	44,151	47,545
Natural gas consumption (megajoules, MJ)	8.575x10 ⁷	1.371x10 ⁸	1.589x10 ⁸	1.712x10⁸

Note:

1. Calculating based on 1 cubit meter of natural gas = 10.4 kWh of electricity.
2. Calculating based on 1,000 kWh = 3.6 MJ

◆ Run chart of Y2016~Y2019 natural gas consumption



Unit natural gas consumption (M³/k-pcs)

Natural gas consumption per revenue (M³/million NTD)

The calculation of production capacity was the output of Good Electronic Chip (GEC), and the output of various products was converted into around 4Gb product particle numbers, using per thousand pieces (k-pcs) as the calculating unit.

◆ 2016 to 2019 diesel consumption

	2016	2017	2018	2019
Diesel consumption (liter)	20,000	70,000	14,400	20,000
Diesel consumption (megajoules, MJ)	7.034x10 ⁵	2.462x10 ⁶	5.064 x10 ⁵	7.034 x10⁵

Note:

- According to the "Energy Product Unit Calorific Value Table" published by the Bureau of Energy, Ministry of Economic Affairs in 2019, 1 liter of diesel fuel = 8,400 thousand calories, 1 thousand calories = 4,186.8 joules to calculate the calorific value of diesel.

The Diesel Rotary Uninterruptible Power Supply (DUPS, emergency energy generators) is used for unexpected situations, and its energy consumption accounts for very few of the energy consumption of the entire company. The energy consumption of the DUPS from 2016 to 2019 accounted for less than 0.05% of the total energy consumption, so the data was not listed in the statistical analysis of each figure.



◆ 2016 to 2019 energy costs

	2016	2017	2018	2019
Energy costs (10,000 NTD)	98,726	129,510	149,110	164,917

◆ Run chart of Y2016~Y2019 energy costs



The Company introduced ISO 50001 Energy management systems and completed the verification in 2018, hoping to constantly improve energy use and management. Pursuant to the standards, we established, supervised, measured, documented, improved energy intensity, and promoted the best practices methods of energy management as well as strengthened favorable management behaviors. In 2019, a total of 36 energy management measures were completed, and the total annual energy savings was 12,470 MWh (4.49×10^7 Million joules). We plan to complete a total of 38 energy management measures in 2020, and the estimated annual energy savings is 31,961 MWh (1.15×10^8 Million joules). As we have continued to focus on and put effort into energy conservation and carbon reduction topics, we made a declaration of intent to actively save energy and reduce carbon emissions at the High-tech Energy Saving and Carbon Reduction Forum held by the Taiwan Semiconductor Industry Association in 2019. We also received [the excellent award in the New Taipei City Smart Energy-saving Competition in 2019](#). We started to build a platform for energy management systems to allow automatic energy management. A real-time monitoring platform was built in the energy management system with hierarchical management of a tree structure for statistics of various systems and equipment. The investment amount totaled NTD 21.8 million, and the platform was completed at the end of 2019. The platform have been beneficial to energy consumption management and improvement of various organizations and machine groups.



Note 1: The CO₂e emissions of electricity was based on the latest statistics announced by the Bureau of Energy under the Ministry of Economic Affairs. The electricity emission factor of 2018 = 0.533 kg CO₂e/kWh.

Note 2: The CO₂e emissions of natural gas was based on the GHG Emission Factor Management Table v6.0.4 announced by the Environmental Protection Administration under the Executive Yuan.

At the same time, We are planning to use more than 1,200MWH of renewable energy in 2020 and 22,000MWH in 2025



Water Management

Water Use and Recycling

Our main water source comes from the Shihmen Reservoir. We divert water from the Taoyuan Canal and process it before supplying it to production. The gravity flow is used to independently divert water without affecting the ecology of water resources and any other purposes of usage. In addition, rainwater recycling can supply water to production while tap water is supplied for household. In 2019, the water consumption was 3,258,386 tons, of which diverted from the Taoyuan Canal was 3,200,748 tons, accounting for 98.2% of the total water consumption. The total amount of rainwater recycling was 31,072 tons, accounting for 1% of the total water consumption. Tap water consumption was 23,775 tons, accounting for 0.8% of the total water consumption. The production capacity in 2019 increased by 12.9% compared to 2018, leading to an increase of 236,024 tons, or 7.8%, in annual water consumption. The annual intensity of per unit water consumption reduced by 0.14 tons/k-pcs or 4.4%; The intensity of water consumption per revenue increased by 27.3 tons/million NTD or 76.5%. The annual consumption of ultra-pure water increased by 349,570 tons or 11.6%. The annual intensity of per unit ultra-pure water consumption reduced by 0.04 tons/k-pcs or 1.3%; The intensity of ultra-pure water consumption per revenue increased by 29.5 tons/million NTD or 82.6%.

◆ 2016 to 2019 total water consumption

	2016	2017	2018	2019
Water consumption (ton)	2,244,759	3,092,814	3,022,362	3,258,386

◆ Run chart of Y2016~Y2019 water consumption



- Per unit water consumption (ton/k-pcs)
- Water consumption per revenue (ton/million NTD)

The calculation of production capacity was the output of Good Electronic Chip (GEC), and the output of various products was converted into around 4Gb product particle numbers, using per thousand pieces (k-pcs) as the calculating unit.

◆ 2016 to 2019 ultra-pure water consumption

	2016	2017	2018	2019
Ultra-pure water consumption (ton)	2,287,149	2,630,671	3,022,306	3,371,876

◆ Run chart of Y2016~Y2019 ultra-pure water consumption



- Per unit ultra-pure water consumption (ton/k-pcs)
- Ultra-pure water consumption per revenue (ton/million NTD)

The calculation of production capacity was the output of Good Electronic Chip (GEC), and the output of various products was converted into around 4Gb product particle numbers, using per thousand pieces (k-pcs) as the calculating unit.



NTC's operating locations are all located in Taiwan, where rainfall is unevenly distributed between regions and seasons, easily leading to regional and seasonal droughts. Thus, NTC continues to promote water saving measures, commits itself to water recycling, and strengthens its adaptability to protect itself against water risks caused by natural geographic conditions. The production requires a large amount of water, so water shortage will cause production interruption and affect the output and delivery. To mitigate the immediate impact of water shortage, a cistern with the capacity of 43,000 tons and two detention basins with the capacity of 4,060 tons each were installed in the plant. Therefore, the rainwater can be effectively recycled during the rainy season in preparation for short-term water shortage. In regard to countermeasures against severe or long-term water shortage, NTC and the adjacent factories of the Formosa Plastics Group will jointly set up an emergency response organization for water shortage. Through the emergency response organization, water resources can be promptly deployed among factories to support each other. In addition to designing water saving processes, the NTC's water management chiefly emphasizes water reduction and recycling. Currently, the main directions for implementation are as follows:

- Implement water saving results through work guidelines.
- Achieve the reduction effects through conservation methods, such as reduction and recycling.
- Promote water saving through daily management practices.



Click here to watch "Environmental Sustainability - A Producer of Green Technology" video

- Build waste water classification treatment and adopt multiple recycling to maximize the use of water resources.
- Currently, with the installed acid-alkaline wastewater, hydrofluoric wastewater, and organic wastewater recycling systems along with various promotions of water saving measures, the recycling rate has reached 96.95% (the recycling rate of process water is calculated with the formula approved by the environmental quality supervision and management committee of the Nanlin Technology Park, which meets the committed value of environmental impact assessment that the recycling rate of process water is 81.1%). In 2019, the amount of recycled water processed through wastewater recycling systems, process recycling systems, and rainwater recycling totaled 3,511,758 tons, accounting for 107.8% of the total water consumption. In the future, to conform with the next phase of the production capacity expansion plan, the Company has planned to expand the hydrofluoric wastewater recycling system again. The estimated investment amount is NTD 25 million and another 500 tons hydrofluoric wastewater will be recycled per day. In the future, to conform with the expansion plan of plant area, a total of NTD 455 million is expected to be invested in building new hydrofluoric wastewater COD and total nitrogen treatment systems, which not only will solve the problem of excessively high hydrofluoric wastewater COD and total nitrogen, but also recycle the hydrofluoric wastewater at the same time. Additional 500 tons hydrofluoric wastewater is expected to be recycled per day. The systems are expected to be completed in 2021.

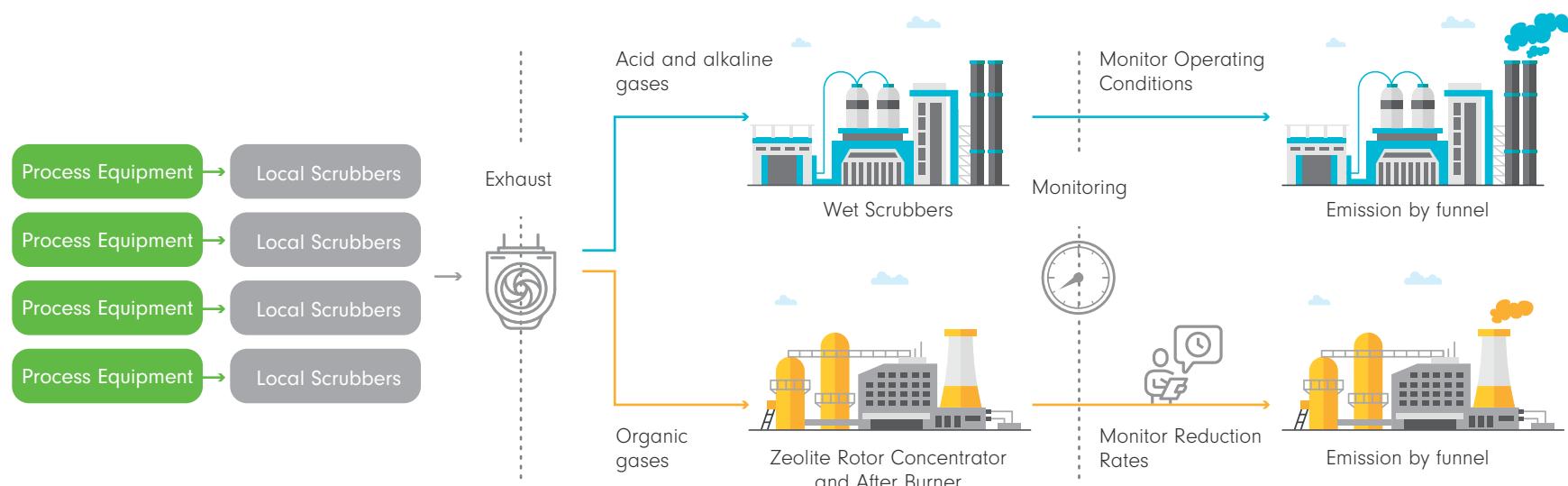


Effluent, Waste and Recycling

Based on the environmental protection and commitments of environmental impact assessment, we regularly monitor environmental impact factors, such as air quality, noise and vibration, the quality of surface water and groundwater, traffic flow, and the ecosystem within the scope of development to truly appreciate its impacts on the environment. NTC has not violated any environmental protection regulations since 2014. In addition, NTC has checked with the competent authorities that the NTC's developing areas are not at an environmentally sensitive location or a location with specific purposes. In accordance with our EHS policy, we have striven to promote various waste reduction and resource reuse to comply with the relevant requirements of regulations, and responded to the commitments to environmental protection-related requirements signed by the Company. We assess the amount that can be reduced, and the types and amount of waste and wastewater that can be recycled and reused, and then set annual project goals. The projects are then included in the annual budget and work plan.

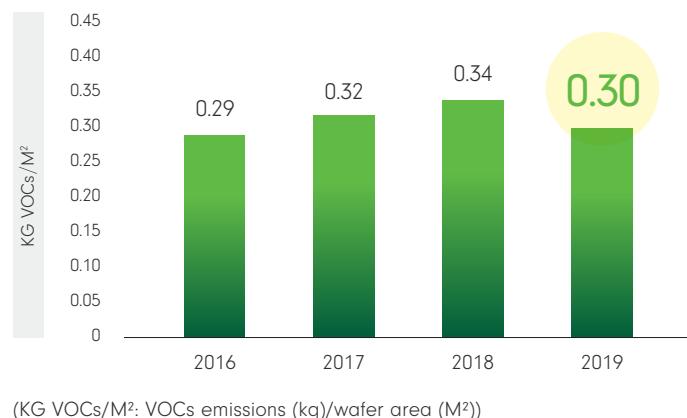
Air Pollution Prevention

NTC has always paid attention to pollution prevention since the establishment of 1st factory. With the planning of the environmental management programs, we effectively reduce the consumption of raw materials and lower the concentration of waste gas emissions. We use air pollution prevention equipment in compliance with the regulations, including Local Scrubber, acid/alkaline scrubbers, VOC zeolite rotor concentrators, and post-combustion devices. Detections over the years show that the Company has met (or outperformed) the pollutant emission standards stipulated in the government's environmental regulations. To continue to maintain the best performance of treatment equipment, each equipment is maintained and inspected periodically. The operators who have received complete training and education are to maintain the system in good operation and ensure that the waste gases emitted do not endanger the environment. (Remark: VOC stands for volatile organic compound; Local Scrubber is local waste gas treatment equipment.)

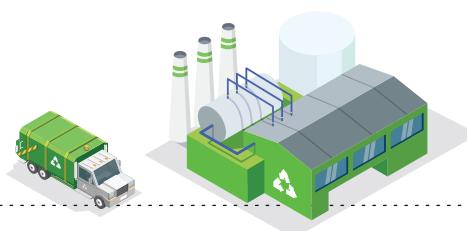


◆ 2016-2019 VOCs emission intensity

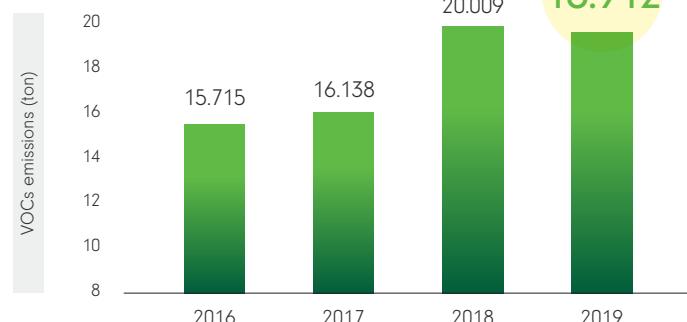
VOCs Emission Intensity



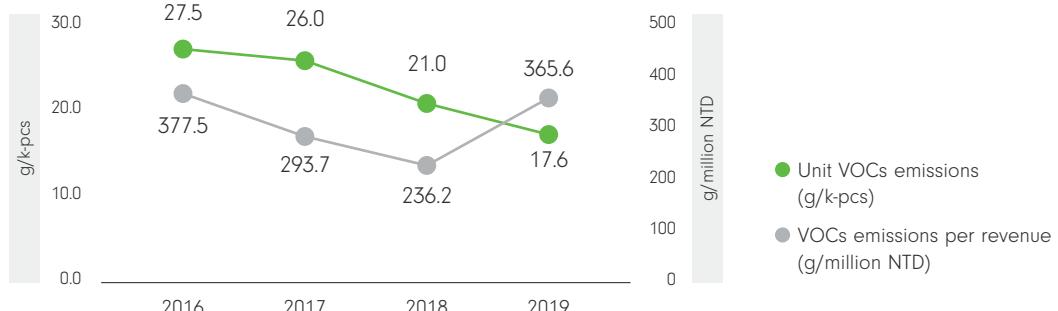
The main air pollutants produced by the manufacturing process are categorized into acidic, alkaline and organic waste gases. The waste gases are imported into appropriate treatment processes and equipment based on their properties. From the production line, the waste gases are imported into the local waste gas treatment system to have specific substances removed. Acidic or alkaline waste gases are then treated by the acid/alkaline scrubbers. After the treatment, the waste gases are neutralized and can be released into the atmosphere. Organic waste gas is absorbed and concentrated by the zeolite rotor, and then imported into the combustion equipment to be directly broken down. The combustion efficiency rate reaches 99%, which is much better than the regulated standards. The reduction rate of overall VOC emissions will be maintained at 90% and above, complying with regulatory requirements. Unit (using chips as the denominator) VOC emissions reduced by 16% compared to 2018. In 2019, unit organic air pollutant emissions (emission intensity) was .3 kg VOCs/m².



◆ Y2016~Y2019 VOCs emissions



◆ Run chart of Y2016~Y2019 VOCs emissions

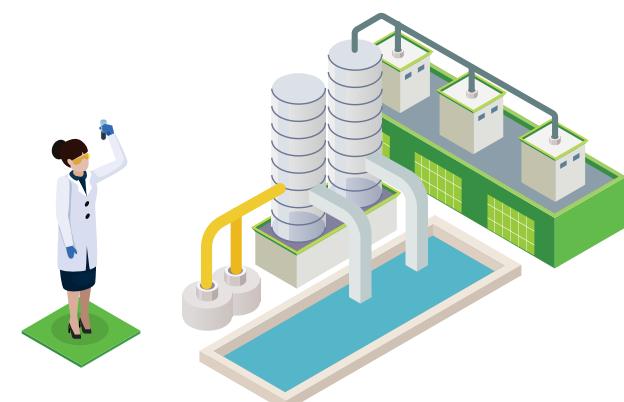
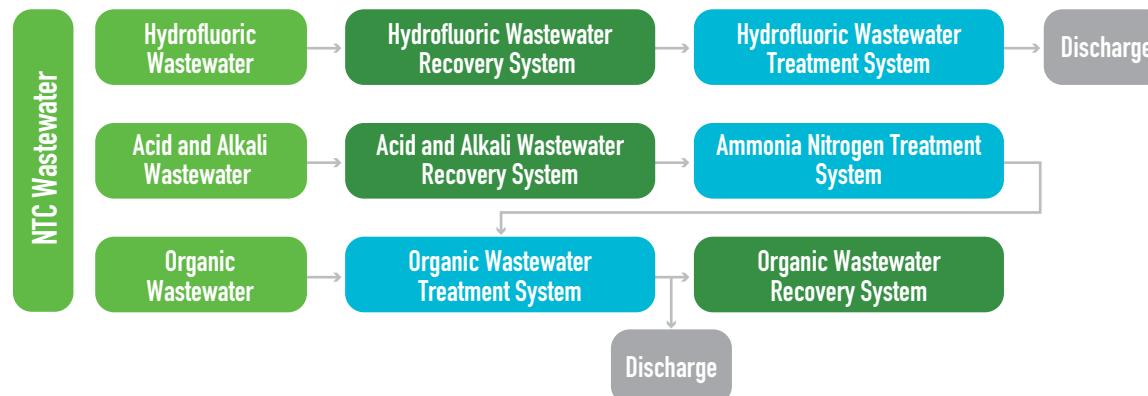




Wastewater

All wastewater is collected according to property classification and sent to appropriate waste water equipment for treatment. To ensure that the quality of discharged wastewater follows the environmental regulations, the quality of discharged wastewater is connected and monitored synchronously with the Environmental Protection Department. In addition, off-line sampling, analysis, and detection are outsourced every quarter to improve the wastewater quality management and control. When the wastewater quality meets the discharge standards, all treated effluents are discharged into the Dake River. To avoid environmental pollution and ecological impacts owing to abnormal quality of wastewater, we have spared no effort to prevent and control water pollution, gradually upgrading and investing in wastewater treatment facilities. The wastewater treatment is carried out in over 20 different pipelines at factories. The wastewater is mainly classified into organic wastewater, general acidic and alkaline wastewater, hydrofluoric wastewater, and outsourced high-concentration wastewater. In relation to wastewater treatment, we process wastewater according to the properties of wastewater. Other than following the legal standards, we also reuse recyclable wastewater that is treated by the recovery system to reduce the discharge amount of wastewater. The plant area was reconstructed on the existing plant space, so no massive excavation of the peripheral vegetation of the designated land was made. In addition, wastewater was properly treated before being discharged to the Dake River. Investigations showed that the discharging area had not affected the habitat of protected animals or damaged the habitat.

The gross volume of discharged wastewater totaled 2,633,701 tons, increasing 137,801 tons or by 5.5% compared to 2018. The annual unit wastewater discharge intensity decreased 0.17 tons/k-pcs or by 6.5% while the annual wastewater discharge intensity per revenue increased 21.4 tons/million NTD or by 75.5%. To conform with the expansion of the plant FAB-3A-N in 2016, additional wastewater systems and recycling systems were installed. These systems were classified into acidic and alkaline, organic, and hydrofluoric acid (HF) wastewater systems. The existing acidic and alkaline wastewater system already has a recycling system in place. In 2017, the expansion of reverse osmosis (RO) membranes on the system were completed, which could increase the recycling water of 288 tons per day. With the expansion of the new plant, the installation of additional organic wastewater recycling system was completed in 2017, which could increase the recycling water of 1,500 tons per day. In 2018, the installation of hydrofluoric wastewater recycling system was completed, which could increase the recycling hydrofluoric wastewater of 500 tons per day. Because of the increase in the recycling volume of wastewater, the annual average process water recycling rate enhanced to 96.95% in 2019. To conform with the next phase of the production capacity expansion plan, the Company has planned to expand the hydrofluoric wastewater recycling system again. The estimated investment amount is NTD 25 million and another 500 tons hydrofluoric wastewater will be recycled per day. In the future, to conform with the expansion plan of plant area, an estimate of NTD 455 million will be invested in building new hydrofluoric wastewater COD and total nitrogen treatment systems. This not only will solve the problem of excessively high amount of hydrofluoric wastewater COD and total nitrogen, but also recycle the hydrofluoric wastewater at the same time. It is estimated that additional 500 tons hydrofluoric wastewater will be recycled per day. The systems are expected to be completed in 2021. In response to the decrease in sludge treatment plants and the ever stricter acceptable criteria, an additional isopropanol-concentration system have been built to reduce the load of wastewater COD since 2017. Moreover, additional organic sludge dewatering equipment was installed. As of 2018, the water content rate of sludge had reduced from 84% to 60% and below. In 2019, the water content rate of treated sludge remained at 60% and below.





◆ 2019 testing results of discharged wastewater quality

Testing items	Unit	Regulated standards	Testing results			Complying with the standards or not
			Minimum value	Average value	Maximum value	
pH	-	6 - 9	7.0	7.1	7.3	●
Chemical oxygen demand (COD)	mg/L	<100	36.4	44.8	52.6	●
Suspended solids (SS)	mg/L	<30	4.0	5.9	10.2	●
Fluoride	mg/L	<15	2.6	6.5	8.2	●
Ammonia nitrogen	mg/L	<30	5.4	9.2	13.1	●



◆ 2016 to 2019 wastewater discharge volume

	2016	2017	2018	2019
Wastewater discharge volume (tons)	1,866,364	2,574,479	2,495,900	2,633,701

◆ Run chart of Y2016~Y2019 wastewater discharge volume



- Per unit wastewater discharge volume (ton/k-pcs)
- Wastewater discharge volume per revenue (ton/million NTD)

The calculation of production capacity was the output of Good Electronic Chip (GEC), and the output of various products was converted into around 4Gb product particle numbers, using per thousand pieces (k-pcs) as the calculating unit.

Waste Management

The general business wastes and the hazardous business wastes are all managed by the output department in terms of storage, clearance, detections, and reduction promotions. In addition, the Company periodically audits the waste contractors to check whether the contractors follow the regulations of waste disposal to dispose of the wastes, in order to confirm the legality and ensure that all wastes are well disposed of or recycled. Therefore, we can prevent the environment from being impacted again by our wastes. NTC had not shipped any hazardous wastes to other countries from 2014 to 2019.

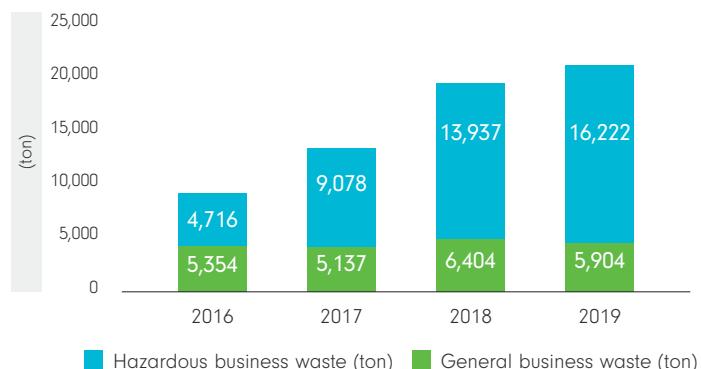




Recycling

The total business waste of 2019 was approximately 22,126 tons, including 5,904 tons of general business waste (including 157 tons of announced recycling projects), 16,222 tons of hazardous business waste, and 0.355 tons/per wafer area (m^2) of unit waste generation. Compared with 2018, the total waste generation increased by around 8.1%, and unit waste generation slightly increased by 3.4%; mainly due to the continuous increase in production capacity of new manufacturing process, which resulted in an increase in waste generation alongside. Although hazardous business waste largely increased 2,285 tons or by 16.4% owing to new manufacturing process, more than 85% of the waste was treated and recycled in cooperation with recycling vendors and then served as industrial raw materials. In the future, we will continue to reduce waste and increase the recycling amount in order to achieve our sustainable development goals of effectively recycling and reusing waste.

◆ 2016 to 2019 total waste generation



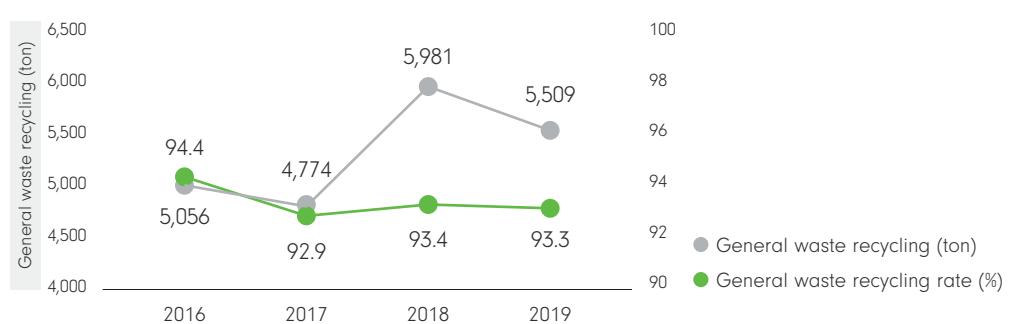
◆ Run chart of Y2016~Y2019 hazardous waste generation



◆ Business waste disposal methods in 2019

	Recycling	Incineration	Buried	Total
Hazardous (ton)	16,212	10	0	16,222
General (ton)	5,509	395	0	5,904
Total	21,721	405	0	22,126

◆ Run chart of Y2016~Y2019 general waste recycling





Expenses and Benefits of Environmental Safety

NTC implemented the environmental accounting system and the environmental benefits accounting system in 2008 and 2009 respectively. The environmental accounting system allows us to monitor environmental expenditure information, evaluate the benefits from environmental expenditures, and concretely and correctly disclose our environmental protection measures to stakeholders. Statistics are compiled for each category of environmental protection expenditures according to the rules established by the Environmental Protection Administration, and are used for internal management, so that the public will understand the environmental protection efforts of enterprises. According to the consolidated statistics, the environment capital expenditure of 2019 was NTD 350,447,000, and the environmental expenditure was approximately NTD 675,846,000, totaling NTD 1,026,293,000. Environmental expenditures accounted for 1.98% of our 2019 total revenue of NTD 51.727 billion.

◆ 2016 to 2019 amount of environmental accounting expenses

	2016	2017	2018	2019
Capital expenditures	1,100	861,328	475,265	350,447
Environmental expenditures	435,000	512,505	644,055	675,846
Total	436,100	1,373,833	1,119,320	1,026,293

NTD: Thousand

◆ 2019 amount of environmental accounting expenses in detail

NTD: Thousand

Categories of costs	Description	Recurrent expenditures	Capital expenditures	
Operating costs	Air pollution prevention costs: Costs of air pollution prevention, water pollution prevention, and other types of pollution prevention	507,619	350,447	
	Global environmental protection expenses: (1) expenses of climate change prevention (2) other expenses related to global environmental protection	23,275	0	
	Resource and energy reduction and recycling expenses: (1) enhance the efficiency of resource utilization (2) costs of waste reduction, recycling, and reprocessing (3) energy conservation expenses	125,197	0	
Related costs from upstream and downstream of suppliers and customers	(1) green procurement (2) expenses incurred in providing products for the sake of environmental protection	156	0	
Management costs	(1) costs of personnel environmental training and education (2) expenses incurred in acquiring external verification	(3) expenses incurred in measuring environmental impacts (4) other	19,247	0
R&D costs	Expenses incurred in researching and developing products because of environmental protection	0	0	
Social activity costs	Expenses incurred in improving the environment, such as nature protection, afforestation, and landscaping the environment	255	0	
Environmental taxation and fees	(1) expenses incurred by air pollution (2) examination and certificate expenses for pollution prevention and control	97	0	
Sub-total		675,846	350,447	
Total		1,026,293		





◆ Promotion results of ISO 14001 Energy management systems

	2016	2017	2018	2019
Energy (electricity) conservation program	4,427	16,677	8,744	64,934*
Waste reduction program	720	778	0	3,360
Program of reducing consumption of process raw materials	8,168	14,960	12,179	5,221**
Actual benefits of business waste recycling	14,021	778	11,502	10,386
Electricity fees saved through low power consumption and advanced process***	-	305,111	736,071	697,553
Total benefits***	27,336	338,304	768,496	781,454
Records of violating environmental protection regulations	0	0	0	0

* The Company completed the energy management system certification in 2018, and implemented 36 energy management plans in 2019.

** Some programs of reducing consumption of process raw materials are long-term plans, and are expected to yield results in 2020 and 2021

*** The unit in the 2018 report was NTD, which was a typographical error. The unit has been corrected to NTD: Thousand.

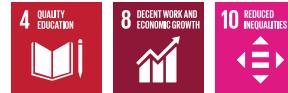


◆ Benefits of auditing internal management systems

	ISO 14001		ISO 45001	
	2018	2019	2018	2019
Number of deficiencies	17	9	10	13
Type of deficiencies	Mainly violating 4.4.6 Operational Control and 8.1 Operational Planning and Control.	Mainly failing to update forms related to environmental aspects and legal inspections, without compliance with 7.5.2 Creating and Updating.	Job safety analysis (JSA) had not been conducted according to the SOP; contractors' safety notices were not complete; tracking abnormal checkpoints was not thorough; emergency preparation for clean room environment and emergency assessment for finding abnormalities in hazard identification were not complete.	Failing to completely fill in forms related to hazard identification (§6.1.2) totaled 7 cases, the most among the total deficiencies, followed by not designating personnel to attend employee consultation meetings (§5.4), totaling 3 cases. Improvements in all the deficiencies were completed.
Closure rate	100%	100%	100%	100%



07 Harmonious Workplace



“ An Attractive Employer for Professional Talents

Employees are the key to innovation, operation, and sustainable development goals. By strengthening our core values and management ideals of integrity and accountability, efficiency and innovation, and sustainable management, we hope to unite our employees and build a business that is a source of pride.

67.4%

Internal employee substitution rate for job openings reached 67.4%

72%

Employee Engagement Survey average approval rate increased by 4% compared with the previous year

0%

Disabling injuries frequency rate and disabling injuries severity rate

110 / Employee Diversity

114 / Talent Retention and Employee Care

122 / Human Rights

126 / Talent Development

136 / Occupational Safety and Health





Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed

Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
Talent development	<ul style="list-style-type: none"> Improvement of professional skills: Establish annual training development plans based on the Company's strategy Key talent: Strengthen key talent development and enhance the retention rate of key talent Individual development: Pay attention to employees' individual development and enhance internal employee substitution rate for job openings 	<ul style="list-style-type: none"> Annual planned course completion rate $\geq 100\%$ Retention rate of key talent $\geq 90\%$ Internal employee substitution rate for Job openings $\geq 60\%$ Gold Medal Certification in the Talent Quality-management System (TTQS) 	<ul style="list-style-type: none"> Annual planned course completion rate $\geq 96\%$ Internal employee substitution rate for job openings $\geq 50\%$ Employees' average annual participation: 12 times Return on human resource investments* $\geq 15\%$ 	★ 110.2% ★ 67.4% ★ 31.7 times ○ 11.9
Talent retention and employee care	<ul style="list-style-type: none"> Manpower stabilization: Implement talent retention plans to stabilize outstanding talent Excellent compensation: Provide competitive compensation Enterprise approval rate: Reinforce core values and galvanize solidarity 	<ul style="list-style-type: none"> Retention rate of outstanding employees $\geq 97\%$ Voluntary turnover rate $< 6\%$ Employee Engagement Survey average approval rate $\geq 72\%^{**}$ 	<ul style="list-style-type: none"> Retention rate of outstanding employees $\geq 95\%$ or higher Voluntary turnover rate $< 8.4\%$ Employee Engagement Survey average approval rate $\geq 70\%$ 	★ 98.48% ★ 5.92% ★ 72%
Human rights	<ul style="list-style-type: none"> Compliance with laws and regulations: Comply with international human rights guidelines and implement related policies and standards Protection for equal rights: Establish risk management and preventive measures, design diverse communication channels, and create an equal workplace 	<ul style="list-style-type: none"> Completion rate of training on prevention of hazardous behaviors in the workplace: 100% Completion rate of training on labor and code of ethics: 100% No major deficiencies found in external audits or labor inspections 	New goals set for 2020	
Occupational Safety and Health	<ul style="list-style-type: none"> Early diagnosis and early improvement: Continuous PDCA improvements for the occupational health and safety system Safety culture: Build employees' safety awareness and establish a high-quality safety culture Cross-inspection: Cross-inspection by internal and external institutions to strengthen independent inspections 	<ul style="list-style-type: none"> Disabling injuries frequency rate $< 0.23^{***}$ Disabling injuries severity rate $< 7.6^{****}$ Independent inspection rate $> 93\%^{*****}$ Number of safety and health proposals > 1800 proposals 	<ul style="list-style-type: none"> Disabling frequency rate < 0.25 Disabling severity rate < 8 Independent inspection rate $> 92\%$ 	★ 0 ★ 0 ★ 99.3%

*Owing to the industry's characteristics, the margin of market variation is large and difficult to control. Thus, this was not included in the annual goals, but would be tracked continuously.

**The survey is based on a ten-point system, and approval rate refers scores of higher than 7

***Disabling injuries frequency rate (FR) = (total employees with disabling injuries $\times 106$)/total work hours

****Disabling injuries severity rate (SR) = (total days lost to disabling injuries $\times 106$)/total work hours

*****Independent inspection rate = (Number of cases reported by departments/number of discrepancies reported by safety and health units) *100%



Employee Diversity

Employees are the most important asset to NTC, as they are the key to supporting sustainable operations and innovative R&D within the Company. We strive to create a humane and comfortable working environment where new employees are subjected to systematic training courses and have access to diverse learning resources to help them quickly accumulate professional knowledge and skills regarding the semiconductor industry, and receive reasonable compensations in return. The Company also has an Employee Welfare Committee that organizes exciting and interesting recreation activities on a yearly basis to improve employees' work-life balance on both the physical and mental level, creating a LOHAS-style (Lifestyles of Health and Sustainability) workplace. We believe a competitive and stable workforce to be essential for improving the Company's productivity and competitive advantage. We strive to become the best employer by designing and providing an environment where talent may thrive to cultivate talent.

Stable Workforce

NTC's workforce structure is quite stable. In 2019, the Company hired a total of 3,307 permanent employees in Taiwan and in overseas subsidiaries (3,204 in Taiwan and 103 in overseas subsidiaries), and 42 non-permanent employees^{Note 1}. Male employees totaled 2,377 whereas female employees totaled 930, representing a gender ratio of 2.55 (male):1 (female). Average age of the Company's employees was calculated at 36.6. The 30-49 age group was the most dominant of all, representing 69.13% of the total employees. 100% of permanent and non-permanent employees are hired directly by the Company. The Company hired no part-time staff in 2019 and 100% of its employees worked on a full-time basis.

In 2019, NTC had 111 female junior-level managers, which accounted for 43.36% of total junior-level managers; there were also 3 female mid-level managers, which accounted for 6.82% of total mid-level managers; the Company currently has no female in the executive-level positions. Due to the special characteristics of the semiconductor industry and realities concerning talent supply, males still dominated the management roles. As for production line management roles such as team leader and shift leader, females accounted for as high as 93.62% and had significant influence on the productivity of NTC. There were a total of 17 female managers of section chief-grade and above in revenue-generating departments, which accounted for 14.17% of total managers.

Note 1: Non-permanent employees include contracted consultants, fixed-term contract staff and part-time employees.

◆ Number and percentage of female managers in the last 3 years

Count/Percentage	2017		2018		2019	
	Number of females	Percentage of females	Number of females	Percentage of females	Number of females	Percentage of females
Total employees	879	29.46%	925	28.74%	930	28.12%
Management levels (junior + middle + senior management)	111	37.76%	115	36.74%	114	36.31%
Junior management *	108	46.35%	112	43.92%	111	43.36%
Middle management (plant/division head)	3	6.00%	3	6.82%	3	6.82%
Senior management (Assistant Vice President and above)	0	0.00%	0	0	0	0.00%
Head of production line operations	87	94.57%	89	93.68%	88	93.62%
Head of revenue-generating department (section head and above)**	17	11.33%	18	15.00%	17	14.17%

* Junior management positions include section and department head and head of production line operations

**Revenue-generating department refers to any department other than planning, administration, operational support, quality assurance, legal affairs and safety & health.





The semiconductor industry is both capital and technology intensive. In addition to the multi-billion dollar plants and manufacturing equipment, NTC requires a substantial amount of outstanding talent from an engineering background to join its production team. As of December 31, 2019, the Company had 3,307 permanent employees on its payroll, and 81.91% of whom were professionals^{Note 2}. Overall, the Company has a competitive, healthy and growing talent base to support development of innovative manufacturing process technologies and new products. With respect to age distribution, the 30-49 age group accounted for the most of our employees, and regarding the education background, the majority of our employees held a bachelor's or master's degrees.

Note 2: "Professional" refers to offline production personnel

◆ Age group of permanent employees

Division	Classification	Taiwan				Overseas subsidiaries				Total			
			Percentage of total females in Taiwan operations		Percentage of total males in Taiwan operations		Percentage of total females in overseas operations		Percentage of total males in overseas operations		Percentage of total female employees		Percentage of total male employees
Age group	Age 29 and under	122	13.36%	633	27.63%	2	11.76%	19	22.10%	124	13.33%	652	27.43%
	Age 30-39	375	41.07%	897	39.15%	8	47.06%	16	18.60%	383	41.18%	913	38.41%
	Age 40-49	374	40.97%	599	26.15%	1	5.88%	16	18.60%	375	40.32%	615	25.87%
	Age 50-59	40	4.38%	152	6.63%	6	35.30%	27	31.40%	46	4.95%	179	7.53%
	Age 60 and above	2	0.22%	10	0.44%	0	0.00%	8	9.30%	2	0.22%	18	0.76%





Top Talents Attraction

The Company complies with Taiwan's labor regulations and its own ethical employment principles when recruiting and hiring staff. The Company strives to provide equal employment opportunities and environment, and recruit talent solely based on individual professional capabilities and experiences without discrimination owing to age, ethnicity, gender, sexual preference, religion, political association, place of birth, marital status, appearance or disability. Employees' promotion, performance evaluation, training, reward and discipline after hiring have been explicitly formulated, so everyone has an equal opportunity for employment and training.

In 2019, a total of 182 engineers were hired to support organizational transformation and transition into advanced manufacturing process. The Company recruits entry-level engineering talent through factory sites and campus recruitment programs. The Company approaches renowned local colleges each year to recruit engineering graduates at all professional levels and matches them to open positions on-site. In 2019, the Company held 18 campus recruitment events at renowned colleges nationwide, and engaged young students in a series of interaction, communication and discussion based on the theme - "Infinite Future." It is our hope to encourage all willing students to pursue a dream career in the high-tech industry and contribute to semiconductor development in Taiwan. Recruitment of entry-level production line operators is carried out with the help of local employment service stations near the Company's plants. On-site interviews are held from time to time, and local residents are hired as a priority to promote local employment. Management positions of Taiwan operations consist entirely of Taiwanese nationals for 100% localized hiring.

◆ Campus recruitment



Click here to watch campus recruitment video





To promote the semiconductor development and the Company's operations, NTC actively recruits new members to join in its team and work collaboratively down the road. New recruits accounted for approximately 7.2% of the Company's total employees in 2019. Gender distribution of new recruits was approximately 4.95 (male):1 (female).

* Percentage of total new female recruits

** Percentage of total new male recruits

*** Percentage of total new recruits

**** New recruits refer to: Personnel hired and remained employed in 2019 (excluding those who resigned during the year)

◆ New recruits of Taiwan and overseas operations, by age

Division	▲		▼		Total		
	Number of people	Percentage*	Number of people	Percentage**	Number of people	Percentage***	
New recruits ****	Age 29 and under	26	65.00%	169	85.35%	195	81.93%
	Age 30-39	11	27.50%	22	11.11%	33	13.87%
	Age 40-49	3	7.50%	7	3.54%	10	4.20%
	Age 50-59	0	0.00%	0	0.00%	0	0.00%
	Age 60 and above	0	0.00%	0	0.00%	0	0.00%
Total new recruits		40		198		238	
Percentage of total employees		1.21%		5.99%		7.20%	

Diversified Recruitment Policy

NTC have domestic and overseas operating locations. Therefore, in addition to Taiwanese, we have hired employees of diverse nationalities including Chinese, French, German, Italian, Japanese, Korean, British, American, Turkish and Singaporean (total 10 nationalities) within the last 3 years. Non-Taiwan national employees totals 98, accounting for 2.96% of total employees, forming an international and diverse workplace.

NTC also supports the government's policies of hiring people with disability as part of its workplace diversity initiative. As of December 2019, Taiwan operations hired a total of 26 employees with disability, which represented 0.81% of total employees. Due to the work nature involved and inconvenient traffic access, hiring people with disability has been rather difficult. The Company will continue to hire the required number of people with disability and provide suitable job openings for them so as to increase employment opportunities for those with disability and create a friendly workplace.

	2017	2018	2019
Number of nationalities	9	10	11
Nationality category	Taiwanese, Chinese, German, Italian, Japanese, Korean, British, USA, French	Taiwanese, Chinese, German, Italian, Japanese, Korean, British, USA, French, Turkish	Taiwanese, Chinese, German, Italian, Japanese, Korean, British, USA, French, Turkish, Singaporean
Number of employees with disability	25 people	27 people	26 people





Talent Retention and Employee Care

NTC not only offers salary packages that are competitive for the semiconductor industry, but also introduces a full range of welfare measures and training systems that address employees' needs on all aspects from work, life to health. It is the goal of the Company to create a work environment where employees may realize their full potentials with a peace of mind, and for which we have implemented an employee assistance program as part of our corporate social responsibilities.

Job Security

The Company continues to promote fair and reasonable operations and prioritizes the protection of employees' rights. Under the human resources integration system of the Formosa Plastics Group, employees are transferred first before they are made redundant. Transfer and redundancy of employees are announced and notified in advance in accordance with the Labor Standards Act and relevant regulations, whereas department managers would also communicate fully with the employees in question and execute decisions in accordance with the regulations. The Company uses quarterly bonus as a retention incentive, a profit-sharing measure, to encourage employees to actively accomplish operational goals.

NTC wins the trust and recognition of its employees by offering a favorable work environment and livelihood security. These are the reasons why the Company has relatively stable employee turnover rate compared to peers. The voluntary turnover rate lowered from 8.53% in 2018 to 5.92% in 2019. (Gender distribution of employee turnover was approximately 2.8 (male): 1 (female)). We implemented various talent retention plans and incentive measures in 2019, including the issuance of "employee stock option certificates" and implementation of "adjustable salary package for new recruits."

The Company uses remuneration and incentive bonuses to control employee turnover risks and retain talent.

◆ Turnover rate analysis for the last 3 years - Taiwan & Overseas



2,559 people

- Total employees receiving employee stock option certificates
- First wave of eligible employees went on board before 2016/3/31 + number of people issued: 2394 people
- Second wave of eligible employees went on board before 2016/7/31 + number of people issued: 165 people

187 people

New recruits
subject to salary
adjustment



Note:

1. Turnover rate = (employee turnover number in January/total number of people employed at the end of January) x 100% + (employee turnover number in February/total number of people employed at the end of February) x 100% + ... +(employee turnover number in December/total number of people employed at the end of December) x 100%
2. Voluntary turnover refers to resignation initiated by the employee. The Company calculates turnover rate mainly based on voluntary turnover. Total turnover rate includes voluntary (including retirement) and involuntary turnover (including dismissal, redundancy, death, etc.)
3. Until 2018, the data had only showed the turnover rate in Taiwan. Starting 2019, overseas data was also included in the calculation of turnover rate.
4. Starting 2019, turnover rate calculation excluded the number of direct interns.



◆ Employee turnover and retirement by age - Taiwan

Employee turnover and retirement	Division		↑		↓	Total	
		Number of people	Percentage of entire division	Number of people	Percentage of entire division	Number of people	Percentage of entire division
Age group	Age 29 and under	16	30.77%	74	51.75%	90	46.15%
	Age 30-39	26	50.00%	49	34.27%	75	38.46%
	Age 40-49	9	17.31%	16	11.19%	25	12.82%
	Age 50-59	1	1.92%	3	2.10%	4	2.05%
	Age 60 and above	0	0.00%	1	0.70%	1	0.51%
Total number of employee turnover and retirement		52		143		195	
Percentage of total employees*		1.62%		4.46%		6.09%	



*Percentage of total employees: Refers to the number of resigned/retired females, males and employees as a percentage of total employees in Taiwan as of December 2019.

Employee Engagement Survey

In 2019, the Company conducted an organization-wide Employee Engagement Survey to evaluate employees' approval rate of the Company. This survey used 28 questions to collect employees' opinions on six aspects, and achieved a response rate of 91%. The results showed an average approval rate of 72%, which was slightly higher than the rate of 68% last year. This meant that the Company's efforts to strengthen employees' esprit de corps through employee activity promotion, compensation, and bonuses had achieved results. The Company started to conduct the Employee Engagement Survey in 2017. We reviewed the results each year and made adjustments to various measures step by step. We hope that the survey would have more beneficial effects on our development of a happiness enterprise.

Aspects	2017		2018		2019	
	↑	↓	↑	↓	↑	↓
Individual work performance	65%	69%	60%	66%	60%	71%
Engagement with line manager	68%	73%	66%	73%	60%	73%
Understanding of corporate vision/culture	66%	70%	64%	72%	65%	75%
Performance of the managed team	67%	70%	63%	74%	63%	75%
Relationship with peers	77%	79%	75%	81%	71%	81%
Satisfaction with promotion/compensation	64%	65%	58%	65%	56%	65%
Average approval rate	70%		68%		72%	
Response rate	44%		85%		91%	

2019 improvement plans

- **Introduction of professional psychological counseling services:** Combine psychological counseling services with the existing new recruits counseling mechanism to help new employees get acquainted with their work environment faster
- **Mid-level management communication training camp:** Plan mid-level management communication camps to help mid-level managers to strengthen their leadership and communication skills
- **Plan a Women Empowerment Plan:** In view of female employees' low approval rate on satisfaction with promotion/compensation, we have considered planning a Women Empowerment Plan, hoping that the opportunities for females in terms of work and life would be enhanced so as to increase diversity at workplace.

Note: 1. This survey is based on a ten-point system.

2. The above approval rate refers scores of higher than 7



A union was established by NTC's employees in April 2012. Although the Company has not signed a collective bargaining agreement with the union, it still actively maintains communication channels and harmonies with the union. The Company holds a standing meeting each month with the union, so the frequency of meetings is higher than that required by the regulations. This allows the union to fully function and express opinions, which enhances labor-management harmonious relations and welfare.

◆ Union members in the last 3 years - Taiwan

	2017	2018	2019
Number of union members	64 people	71 people	81 people
Percentage of employees with union membership	2.22%	2.27%	2.53%

Competitive Compensation Program

NTC's salary packages for new recruits are determined based on individual education and experiences, peer level, local economics, and supply/demand of the local labor market, and outlined in employment contracts. Employees of similar job content, education, and experiences are remunerated with equivalent salaries and benefits without gender difference of any kind. Adjustments to employees' salaries and benefits are evaluated primarily based on work performance.

The Company's compensation and welfare systems have been developed through local salary surveys and discussions with regional salary associations, after taking into account factors, such as industry competitiveness, macroeconomics, corporate culture, and business sustainability. This process ensures the competitiveness of our overall salary package. Monthly salary includes base salary, meal/travel/location allowance and operational allowance, as well as efficiency bonus. We also offer additional bonuses and variable compensations based on employees' individual performance and accomplishment of organizational goals (or profitability), and in doing so, we reward employees for their excellent performance and share with them the profits we make as a group, regardless of their gender. After taking into account quarterly incentive bonuses and year-end remuneration, employees received more than 4 months' worth of salary in bonus on average in 2019. In addition, the average annual compensation of full-time employees in non-executive positions in 2019 totaled NTD 1,400,000, reducing by 21.9%^{Note 1} compared with 2018, while the median annual compensation of such employees totaled NTD 1,163,000.

NOTE1 Compared with 2018, a decline in average compensation in 2019 mainly resulted from an increase in the number of people hired in 2019, a decline in profit before tax, and the competent authority's adjustments to the calculation base.

◆ Full-time employees in non-executive positions

	2018	2019	Difference to the previous year
Number of people	2,769	3,133	Increased by 13.1%
Average compensation (thousand NTD)	1,793	1,400	Reduced by 21.9%*
Median compensation (thousand NTD)	-	1,163	-

* Compared with 2018, a decline in average compensation in 2019 mainly resulted from an increase in the number of people hired in 2019, a decline in profit before tax, and the competent authority's adjustments to the calculation base.





Characteristics of NTC's compensation:

- NTC is included in the Taiwan High Compensation 100 Index, showing that the Company's compensation is very competitive
- Year-end bonus, festive bonus, Dragon Boat Festival/Mid-Autumn Festival diligence bonus, and grade bonus
- Long-term incentives: Include employee remuneration, employee stock option certificates, incentive bonus, and annual salary adjustments

Item	Details	Target
Remuneration for employees	Amount allocated to employees from previous year's earnings, subject to resolution of the board of directors and shareholders	All permanent employees
Employee stock option certificates	Employees' rights to subscribe a certain quantity of the Company's shares at the specified price within the effective duration in the future	Employees granted with warrants
Incentive bonus	Bonus is allocated based on quarterly target accomplishment, individual performance, and percentage of days on the job	All permanent employees
Annual salary adjustment	Salary is adjusted in line with increased price level, peer standards, and competitive margin over peers	All permanent employees

Male and female employees in Taiwan have the same starting salary and terms of compensation. Female managers received slightly lower compensation on average than males in 2019. In terms of total salary package, females received 92.35% that of males on average; in terms of remuneration, females received 93.24% that of males on average. This difference was mainly attributed to the higher average years of service among males, which entitled them higher compensation and remuneration compared to females. In 2019, female employees of non-managerial role received total salary package at 109.02% that of male counterparts on average, and remuneration at 113.15% that of male counterparts on average. Females received higher compensation and remuneration than males in this respect mainly because of their higher average years of service. Overall, the Company offers competitive compensation along with full benefits and facilities that enable employees to enjoy job security and quality of life.

1.81%

Increment of starting salary for entry-level production line operators over the minimum wage

NT\$23,520 UP

Starting salary for entry-level production line operators

65.02%

Increment of starting salary for employees with bachelor's degree in engineering over the minimum wage

NT\$38,120 UP

Starting salary for employees with bachelor's degree in engineering

◆ Comparison Ratio of Male and Female Employees - Taiwan

Average compensation ratio	2017	2018	2019
Female-to-male salary ratio - executive level	-	-	-
Female-to-male salary ratio - management level	86.77%	88.64%	92.35%
Female-to-male remuneration ratio - management level	89.43%	92.07%	93.24%
Female-to-male salary ratio - non-management level	110.35%	109.11%	109.02%
Female-to-male remuneration ratio - non-management level	116.37%	115.31%	113.15%

Note:

1."Salary" refers to the annual average of regular earnings (including take-home base salary, efficiency bonus, meal/location/travel allowance, operational/professional bonus and other payable items) + grade bonus.

2."Remuneration" refers to the annual average of regular earnings + grade bonus + incentive bonus + employee remuneration + festive bonus + Mid-Autumn Festival and Dragon Boat Festival diligence bonus + year-end bonus.

3."Executive level" refers to assistant vice president grade and above, and the Company had 0 female senior manager in the last 3 years.

4."Management level" refers to section chief + department head + division head.



The Company offers employees in Taiwan unpaid parental leaves. Employees are free to apply for the unpaid parental leave to balance their lives between work and family. Thus, employees are able to take care of children at ease, which helps with the stability of family and the society. In 2019, a total of 356 employees (112 females and 244 males) were entitled to take unpaid parental leave, and a total of 23 people (19 females and 4 males) had actually applied.

◆ Application of unpaid parental leave and reinstatement rate - Taiwan

Item	2017			2018			2019		
	♂	♀	Total	♂	♀	Total	♂	♀	Total
Number of employees eligible for unpaid parental leave	103	176	279	86	219	305	112	244	356
Number of employees applying for unpaid parental leave	37	2	39	24	3	27	19	4	23
Number of employees due for reinstatement in the current year (A)	19	1	20	15	1	16	10	2	12
Number of employees applying for reinstatement in the current year (B)	12	1	13	10	1	11	5	1	6
Number of employees still on the job 12 months after reinstatement	10	-	10	9	1	10	9	1	10
Reinstatement rate % (B/A)	63.16%	-	65.00%	66.67%	100.00%	68.75%	50.00%	50.00%	50.00%
Retention rate %	90.91%	-	90.91%	75.00%	100.00%	76.92%	90.00%	100.00%	90.91%

Note:1. "Number of employees due for reinstatement in the current year": does not include employees who applied to extend their unpaid leave during the year.

2. "Number of employees applying for reinstatement in the current year": includes employees who applied for reinstatement in the current year before the end of their leave.

3. "Retention rate" refers to the percentage of employees reinstated from unpaid parental leave who continued to work for one year and above.

4. Owing to statistical errors, the values of 2017 and 2018 were adjusted.

- **Leave:** We offer employees different types of leave in accordance with laws and regulations. In addition, payment of salary in the event of employees' absence during sick leave and typhoon days is more favorable than what the labor regulations require.
- **Insurance:** In addition to the Labor Insurance and the National Health Insurance, the Company's Employee Welfare Committee also purchases group insurance for employees.
- **Wedding/funeral/child care:** The Company offers congratulatory or condolence money for occasions such as wedding or funeral involving the employee or employee's spouse, parents or child, and subsidizes line managers for giving congratulatory/condolence money in their personal capacity. The Company also offers child care leave that eligible employees may take and adjust work hours accordingly for child care.
- **Retirement benefits:** For those choosing the pension fund system based on the Labor Standards Act, the Company has deposit 2% monthly salary to a special retirement account of Bank of Taiwan. The size of pension fund under the system accumulated to NTD 516,000,694 in 2019, and had been fully contributed. For those choosing the pension fund system based on the Labor Pension Act, the Company contributes 6% monthly salary to employee's individual retirement account. Employees are eligible to contribute more amounts voluntarily, and the amount will also be deposited into his retirement account.
- **Healthcare services:** As a member of Formosa Plastics Group, the Company has the support of Chang Gung Memorial Hospitals as well as access to medical center-grade treatment and healthcare services. Employees of NTC and their dependents are subsidized when seeking treatment at Chang Gung Memorial Hospitals, and are entitled to discounts on health checkups and various deductibles not covered by the National Health Insurance Scheme.





Friendly Environment Benefits

The Company offers a wide range of benefits from dining, accommodation, shuttle bus to parking to improve the friendliness and convenience of the work environment for employees. The Employee Welfare Committee also arranges diverse benefits and activities for employees. The Employee Welfare Committee comprises 9 members, 1 of whom is appointed by the Company whereas the other 8 are elected by employees from different departments. The Employee Welfare Committee received approximately NTD 37 million in funding in 2019; the majority of which was spent on incentive trips, festive gifts, birthday vouchers, children's scholarship, group insurance, entertainment, and childbirth and hospitalization subsidies.

Main welfare measures

Employees are entitled to apply for single dormitory at discount rates.

Canteens have been established at all plant sites to serve healthy and hygienic meals to employees, whereas convenience stores, coffee/fruit shops etc are also available to satisfy employees' needs for diversity. Special meals are prepared during festive occasions and Chinese New Year periods as recognition for the sacrifice of those on shift.

Car/motorcycle parking lots and shuttle bus services have been made available as more convenient commuting options for employees.



2019 year-end party



2019 film carnival



2019 baseball day



2019 family day - advance to the happiness and play the world



Coffee/fruit shops



Convenience store



Clean single dormitory

Harmonious Workplace



Sports-friendly Workplace

The Company organizes sports and entertainment activities from time to time to advocate work-life balance. By encouraging the creation of sports clubs and exercise space, we aim to promote sports habits and employees' physical as well as mental health. Some of the actions taken are as follows:

● Full-fledged sports/fitness center

The Company has a multi-purpose sports and recreation center with facilities including air track, basketball court, badminton court, KTV, pool table, aerobics room, massage chair and fitness equipment that employees may use to maintain health amidst their busy schedules.

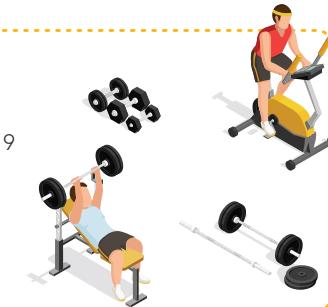


12,077 people

Number of people using the sports and recreation centers in 2019

46,429 visits

Number of visits to the sports and recreation centers in 2019



● Promotion of sports habits

The Company promotes sports habits through activities, encouraging employees to exercise amidst their busy schedules to achieve work-life balance. As the Company has a five-star sports center and a recreation center, and sports clubs of diverse themes, including jogging, basketball, table tennis, badminton, and slow pitch softball, we organized a Sports Festival activity in 2019 to promote these clubs and strengthen relationships within departments. The Sports Festival activity encouraged departments or clubs to propose creative sports plans regarding the use of facilities in the recreation center, hoping to stimulate the sports atmosphere in the Company and encourage employees to make good use of sports facilities in the recreation center amidst their busy schedules so as to promote sports habits and strengthen interactions and understanding among employees. The number of people using the sports center had increased and the Company was awarded the 2019 Taiwan iSports Certification, which showed that the Company's sports habits were enhanced and received external recognition.



NTC received the 2019 Taiwan iSports Certification



A total of 20 departments and over 1,500 employees participated in the 2019 Sports Festival activity



Newly opened recreation center was the best place for employees who love exercise after work





● Diverse club activities

The Company has 24 clubs of diverse themes, including parenting, jogging, basketball, table tennis, badminton, slow pitch softball, hiking, and camping. More than 1,145 employees had participated in the above club activities in 2019. Clubs are encouraged to recruit participants on a yearly basis to enhance exposure.



Volleyball club



Basketball club wins awards in the corporate sports meet each year



Employee trip



Basketball club - 3 on 3 tournament

Healthy and Caring Environment

For the convenience of female employees, the Company offers priority parking lots for pregnant employees and has nursery rooms in place to support gender equality. The health center also conducts maternal hazard assessments for women who are pregnant and breastfeeding. The Company complies with We the Occupational Safety and Health Act, and as an employer, it undertakes hazard evaluation, control and classification measures for work activities that are hazardous to maternal health. For female workers who are pregnant or have given birth less than a year ago, the Company adopts health protection measures and adjusts work details as recommended by physicians, and keeps relevant details on record. The Company disseminates health-related information and organizes women's health seminars on a regular basis. There are professional nurses stationed at plant sites to offer counsel on infant care for pregnant women. Nursery rooms fully equipped with lockers, refrigerators and water heaters have been deployed at all plant sites for the peace and comfort of all breastfeeding employees.



Priority parking lots for pregnant employees



Lactation room





Human Rights

Human Rights Policy

NTC places great emphasis on employees' rights. The Company has labor and ethics policies Labor and ethics policies, and complies with related international human rights regulations, including behavioral guidelines of Responsible Business Alliance (RBA), SA8000 Social Accountability Standard, International Labour Organization (ILO), The Universal Declaration of Human Rights, The UN Guiding Principles on Business and Human Rights, General Data Protection Regulation (GDPR) and local government's regulations. By implementing human rights risk assessment and management, the Company hopes to create an inclusive and friendly workplace.

All the hiring in 2019 did not violate the principle of non-discrimination. The Company pledges not to hire child labor under the age of 16 and has never employed child labor. For the protection of employer's and employees' rights, all employees are given an employment notice prior to the work commencement date. The Company signs employment commitment in writing with all new recruits on the work commencement date, and 100% of employees have signed the commitment, meaning that all employees of the Company are fully protected by the terms of the employment contract. All employees have been hired with employment terms established under the free will, consent and consensus of both parties; no employee was forced or coerced to perform work activities unwillingly. In 2019, the Company organized training courses in human rights policies or procedures, including occupational safety and health, labor laws and regulations, labor and ethics, personal data protection, and occupational health protection. The training courses had 12,087 participants and accumulated 13,242 hours in total training participation.

◆ 2019 training hours and percentage of courses in human rights policies or procedures

Category	Human rights issues	Number of participants	Percentage of employees attending training (number of participants/number of employees)	Hours in total training participation
Occupational safety and health	Occupational injury and illness	4,637	140.2%	10,265
Labor laws and regulations	Excessive overtime work hours and employment disputes	138	4.2%	276
Labor and ethics	Excessive overtime work hours, sexual harassment, child labor, and forced labor	6,832	206.6%	2,015
Personal information protection	Personal information protection	38	1.1%	47
Occupational health protection	Maternity protection, occupational health protection, and abnormal workload	442	13.4%	639
Total		12,087	-	13,242



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Human Rights Risk Assessment

NTC assesses human rights risks using RBA and workplace health principles. The Company has an internal audit system in place to regularly assess employees' risk exposure and devise mitigation measures accordingly. We constantly identify human rights issues, susceptible parties and departments, and perform human rights risk assessments on a regular basis. Risk values are calculated to reflect the percentage of people at risk relative to total employees; based on the assessment results, the Company is able to devise annual improvements and set mitigation targets for human rights risks in the future.

NTC has incorporated the four main tasks of the Occupational Safety and Health Act and GDPR into our human rights risk assessment framework, defined the high-risk group in the scope of human rights issues, and calculated risk values based on the percentage of people at high risk. The 2019 risk value was 10.4%, reducing by 2.9% compared with 2018. Excessive overtime work hours, employment disputes, sexual harassment, and occupational health protection were human rights issues identified as medium risk, which were subject to exposure risks. Thus, we implemented mitigation measures and provided compensations for these risk factors.

◆ Human rights risks of NTC

Human rights issues	Parties susceptible to influence	Assessment tools	2018 risk	2018 risk value	2019 risk	2019 risk value
Excessive overtime work hours	Production engineer/technician/R&D personnel	Attendance system	Medium		Medium	
Occupational injury	Production/new recruit	Occupational injury report	Low		Low	
Employment dispute	All employees	Government correspondence on employment disputes	Medium		Medium	
Occupational illness	All employees	Special health checkup	Low		Low	
Sexual harassment	Female	Grievance investigation	Medium		Medium	
Child labor	Employees aged 18 and below	Identity proof	Low		Low	
Forced labor	All employees	RBA internal audit	Low		Low	
Personal information protection	All employees (European employees)	In violation of GDPR	Medium	13.3%	Low	10.4%
Maternity protection	Females in pregnancy or within 1 year of labor	Females in pregnancy or within 1 year of labor are subjected to regular tracking	Low		Low	
Occupational health protection	People with blood pressure > 140/90mmHg or metabolic syndrome	People with blood pressure >140/90mmHg or metabolic syndrome are subjected to regular tracking	Medium		Medium	
Abnormal workload	Overtime working exceeding 37 hours a month for 6 consecutive months	People who work overtime more than 37 hours a month for 6 consecutive months are subjected to regular tracking	Low		Low	
Ergonomic engineering	People with ergonomic engineering risk grade>2	People with ergonomic engineering risk grade >2 are subjected to regular tracking	Low		Low	



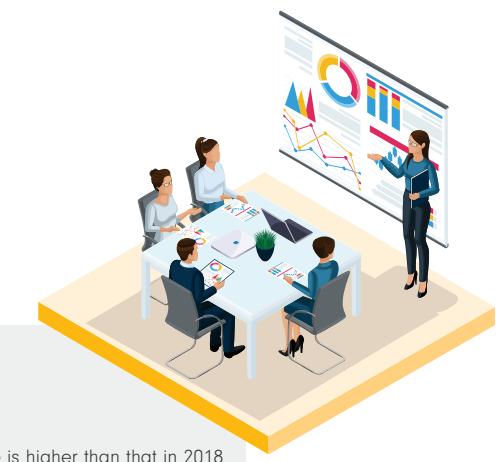
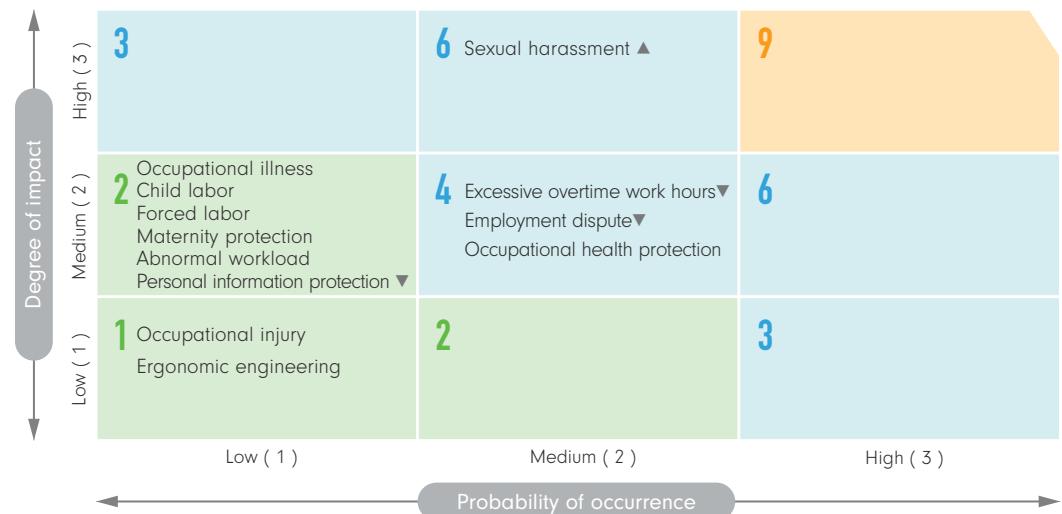
Harmonious Workplace

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◆ Human rights risk matrix



Description:
 High risk (score: 9),
 Medium risk (score: 3~6)
 Low risk (score: 1~2)
 ▲ indicates the risk score is higher than that in 2018
 ▼ indicates the risk score is lower than that in 2018

◆ Mitigation measures and compensations proposed for issues identified as medium risk in 2019

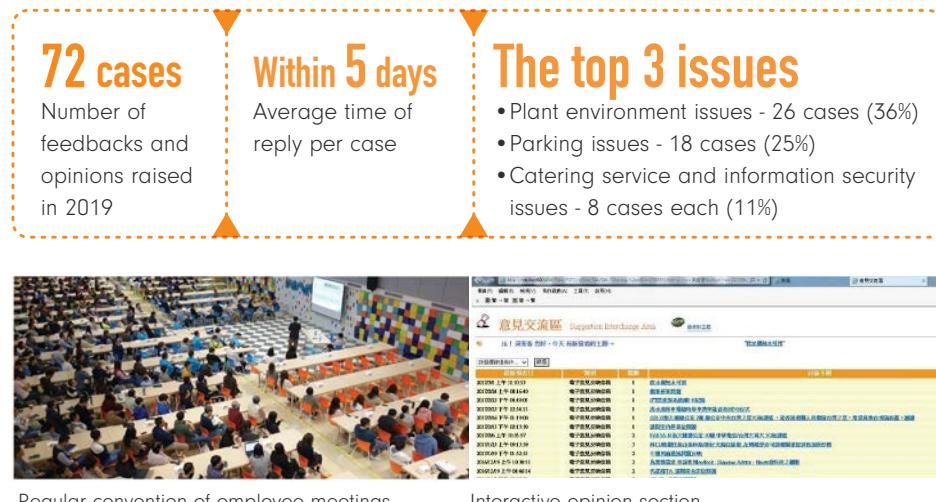
Human rights issues	2019 risk	Mitigation measures	Compensations
Sexual harassment	Medium	Enhancing training and communication. Physical training for managerial personnel (9 sessions; 466 participants). Online training courses for all employees (3217 people completed the training).	<ul style="list-style-type: none"> Completing investigations and penalties; announcing the disciplinary results on the plant sites Segregating victim from the accused, and arranging other appropriate work positions.
Excessive overtime work hours	Medium	<ul style="list-style-type: none"> Units that exhibit excessive overtime work hours were instructed to analyze the underlying cause and propose improvements Employees' overtime working was monitored on a monthly basis, and line managers were notified to make improvements 	Internal policies have been adjusted to prohibit employees from working overtime in excess of statutory limits. Company dealt with such matters in accordance with regulations and reached an agreement with employees.
Employment dispute	Medium	<ul style="list-style-type: none"> The Company has always responded to employment disputes through open and rational communication, as we strive to resolve difference in opinions and develop consensus among the workforce. Actively collecting information on labor laws and regulations, planning corresponding strategies in advance, and making timely adjustments to related management systems to reduce the possibility of employment dispute. 	<ul style="list-style-type: none"> The union raised objections to information security policies and performance evaluation system. The Company and the union communicated very hard to resolve their disagreements and reached a consensus in the end. Some employees violated the Work Rules and employment contract. The Company dealt with such matters in accordance with regulations and reached an agreement with employees.
Occupational health protection	Medium	<ul style="list-style-type: none"> The Company conducted investigations on areas including maternal health, health checkup of high risk groups, ergonomic engineering, and abnormal workload. Employees who had been subjected to regular tracking were offered health-related counsel and recommendation 	<ul style="list-style-type: none"> Providing health-related counsel and recommendation Employees might discuss with line managers to have overtime reduced if they were physically or mentally unable to cope. Regular follow-up diagnosis and treatment.



Preventive Measures against Workplace Violence

NTC formulated the Ban on Workplace Violence Written Statement, which was signed and announced by the supreme leader, showing our resolve regarding zero-tolerance towards workplace violence. Before the release of the Guidelines for Workplace Violence, the Company had established the Workplace Sexual Harassment Prevention, Grievance and Disciplinary Policy and the NTC Guidelines for Handling Employee Complaints. Thus, we have planned related prevention and subsequent investigation measures for employees who experience improper treatment. In 2019, we combined the aforementioned two regulations into the NTC Employee Protection and Grievance Regulations for further complete management.

Starting 2020, the Company plans to conduct employee protection and prevention hazard identification and risk assessment in each department, and manage potential risk groups to prevent and mitigate risks in advance. In addition, we plan to educate division, department, and section heads about the regulations, ask them to make commitments, and use management self-review checklist to ensure that workplace violence is precluded. The Company has psychological counseling rooms. In cooperation with the Teacher Chang Foundation, counseling psychologists provide counseling services twice each month in the workplace, so employees have access to unload and counsel their worries. In addition, we regularly organize seminars on workplace mental health promotion to allow employees to relieve pressure.

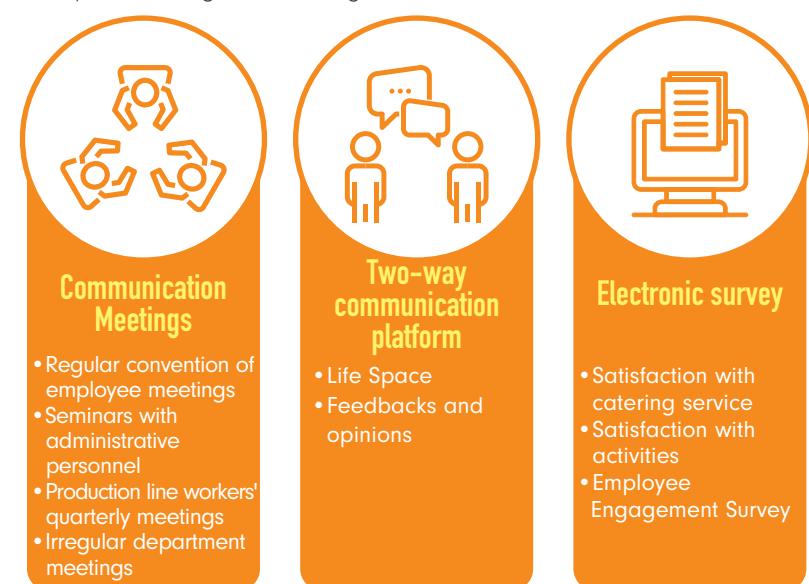


Grievance Channels

The following grievance channels have been implemented according to the NTC Employee Protection and Grievance Guidelines, the Workplace Sexual Harassment Prevention, Grievance and Disciplinary Policy, and NTC Whistle-blower Policy: The Human Resource Department is responsible for handling improper or unfair work requests, workplace harassment and other work-related issues. Illegal, non-compliant and improper conducts involving the Company can be reported to the President's Office through mail or phone.

Labor-Management Relations and Communication

The Company has diverse, open and transparent communication channels in place to maintain harmonious employment relation, facilitate labor-management collaboration and improve workers' benefits. These communication channels allow the Company to take initiative in learning employees' thoughts and address problems in a timely manner, so the Company has positive labor-management communication. The Company also has complaint mailbox, whistle-blower hotline and sexual harassment prevention hotline available for reporting unlawful matters, and any opinions concerning corporate policies may be raised using the Management System Improvement Opinion Form. Employees are entitled to communicate openly and thoroughly with the management about work-related or personal affairs, terms of employment, salary, benefits and personal opinions through the following channels:





Talent Development

Talent Development System

◆ Talent development guidelines

Ideology

NTC is people-oriented and sustainability, and advocates lifelong learning while assisting employees with their career development. It is the Company's goal to create a competitive training system that is suitable for the semiconductor industry.

Policy

To improve talent quality and support employees' ongoing education and career development. To optimize the training system and offer diverse, systematic training solutions needed for employees to develop proper skills, knowledge and attitude, and thereby accomplish the Company's annual strategic objectives.

Objective

- **2020 Goals:** Encourage employees in individual development and on-the-job training, and internal employee substitution rate for job openings reaches 60% or above.
- **2025 Goals:** Encourage employees in individual development and on-the-job training, and internal employee substitution rate for job openings reaches 65% or above.

System

Training procedures, education/training implementation rules, structured on-the-job training policy, on-job training management policy, internal instructors training rules, middle management and executive cultivation rules, and training materials management policy.

Implemen- tation

Annual employee training plans are devised and executed according to corporate strategies. The Company monitors training and development indicators on a monthly basis, whereas the Employees Training & Development Committee members and senior executives conducts quarterly reviews on execution of the plans and training and development results.

Talent Development System and Management

NTC's talent development system is composed of four major frames, i.e., core competencies, professional training, organization management, and individual development. The Company constantly improves its entire talent development system to offer employees better and efficient talent development system. With the aim of strengthening individual development, in 2019, we planned key talent (elite development program), employee self-learning program (linking up individual development plan, on-the-job training, and internal employee substitution rate for job openings), middle management and executive cultivation program to encourage employees to take on-the-job training courses, rotate different positions, and receive project assignment as well as expand learning tools and methods of employees' areas of expertise.



Talent review

- Department division review
- Talent distribution review



Competency analysis

- Overall competency analysis
- Division gap analysis



Talent development

- Tasks of relevant units
- Talent cultivation development planning



Individual development

- Improving self-abilities
- Achieving work targets

Innovative models and self-learning: (2020 self-learning development program coverage $\geq 50\%$)

Entice employees' self-aware, initiate, and active learning attitudes, and enthusiasm for continuous and active learning; offer diverse learning resources and methods, including internal training sharing, customized professional courses, and learning through activities, such as competitions or workshops. Use education, sharing, customization, competition, and rewards to create a learning organization and transform "required to learn" into "want to learn." The training plans coverage of the 2019 self-learning development program reached 39.7%, driving the learning atmosphere of the entire organization.



The talent development management system executes classroom and e-learning courses of various themes including: orientation, general knowledge, specialist training, managerial skills, internal instructors, direct employees, and individual career development.

- **Orientation**

The orientation is intended to provide new employees with a quick understanding of the corporate environment and the semiconductor industry, and help them adapt to the Company's organization and culture in shorter time. The orientation offers a comprehensive range of basic training and on-the-job training courses to shorten employees' learning curve and help them develop skills in line with the Company's strategies. In 2019, a total of 326 new recruits completed their orientation during the year.

- **General knowledge training**

This training mainly comprises courses that have been structured in line with the government's legal Core requirements on labor safety and environmental competency health, or customers' product quality requirements, or the Company's business development strategies.



- **Function-based specialized training**

Specialized training is a systematic way for employees to develop professional knowledge and the required skills, and incorporates one-on-one mentorship, operations certification, and external training assignment. This year, we focused on professional engineering presentation training to help improve professional capabilities of individual employees.

- **Direct employee training**

Direct employees are offered pre-job training on the professional knowledge and machine operation skills to help them obtain the required certifications. By adopting the trainer system and offering rewards, direct employees are given the incentive to adapt quickly to the clean room environment and join the production line at an earlier time. A total of 86 direct employees had completed their training during the year.

- **Management training**

The middle management and executive cultivation program is linked to the succession planning, and the road map to management competency cultivation is formulated. Management competence training of different grades and advanced management workshops for specific professional positions are organized on a regular basis to reserve management talent. These training courses are intended to improve leadership, decision-making and adaptation of management philosophy among personnel in management positions. In addition, the annual Management Team Camp further unites consensus within the Company's management team, and contributes effectively to the accomplishment of corporate objectives.

- **Individual development**

Administrative resources and incentives are being offered in accordance with the Company's on-the-job training policy to encourage lifelong learning and support career development among employees. Internal employee substitution rate for job openings was calculated at 67.4% for 2019.

- **Individual development**

The Company has an internal training program in place to develop quality instructors for the purpose of transferring corporate knowledge. A total of 457 participated in the internal instructors training in 2019. As a show of gratitude and encouragement for instructors' contribution to the enhancement of internal training, the Company organizes commendation events every year during Teacher's Day in September with the support and participation of senior management. A total of 15 top-performing



Department heads in Management Team Building



Award ceremony for outstanding lecturers



Harmonious Workplace



Talent Development Results

The Company organized 1,873 training sessions and delivered 5,982 hours of training in 2019. These courses received 103,301 enrollments and accumulated 106,886 hours in total training participation. The average training hours per person were 32.3 hours and the total training expense reached NTD 8,405,894. The significant increase in training sessions and hours in training participation in 2019 was mainly attributed to the self-learning incentives offered to various departments and the course feedback system established during the year.

◆ Employee training and average training hours

Item	▲			▼			Total		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Total main-hours of training (hours)	14,870	21,128	30,251	41,446	51,946	76,635	56,316	73,074	106,886
Total number of employees (persons)	879	925	930	2,105	2,294	2,377	2,984	3,219	3,307
Average training hours per person (hours)	16.9	22.8	32.5	19.7	22.6	32.2	18.9	22.7	32.3

◆ Average training hours by category

Category	▲			▼			Total hours		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Managerial role	12.2	13.2	22.8	13.2	13.7	22.8	3,908	4,446	7,577
Professional technology	21.0	23.5	30.6	22.5	24.3	31.7	34,981	40,821	55,213
Administrative support	21.8	26.5	57.5	16.7	25.7	55.9	10,891	16,021	35,315
Direct employees	12.4	20.2	14.8	12.4	19.9	14.5	6,536	11,786	8,781

Note:

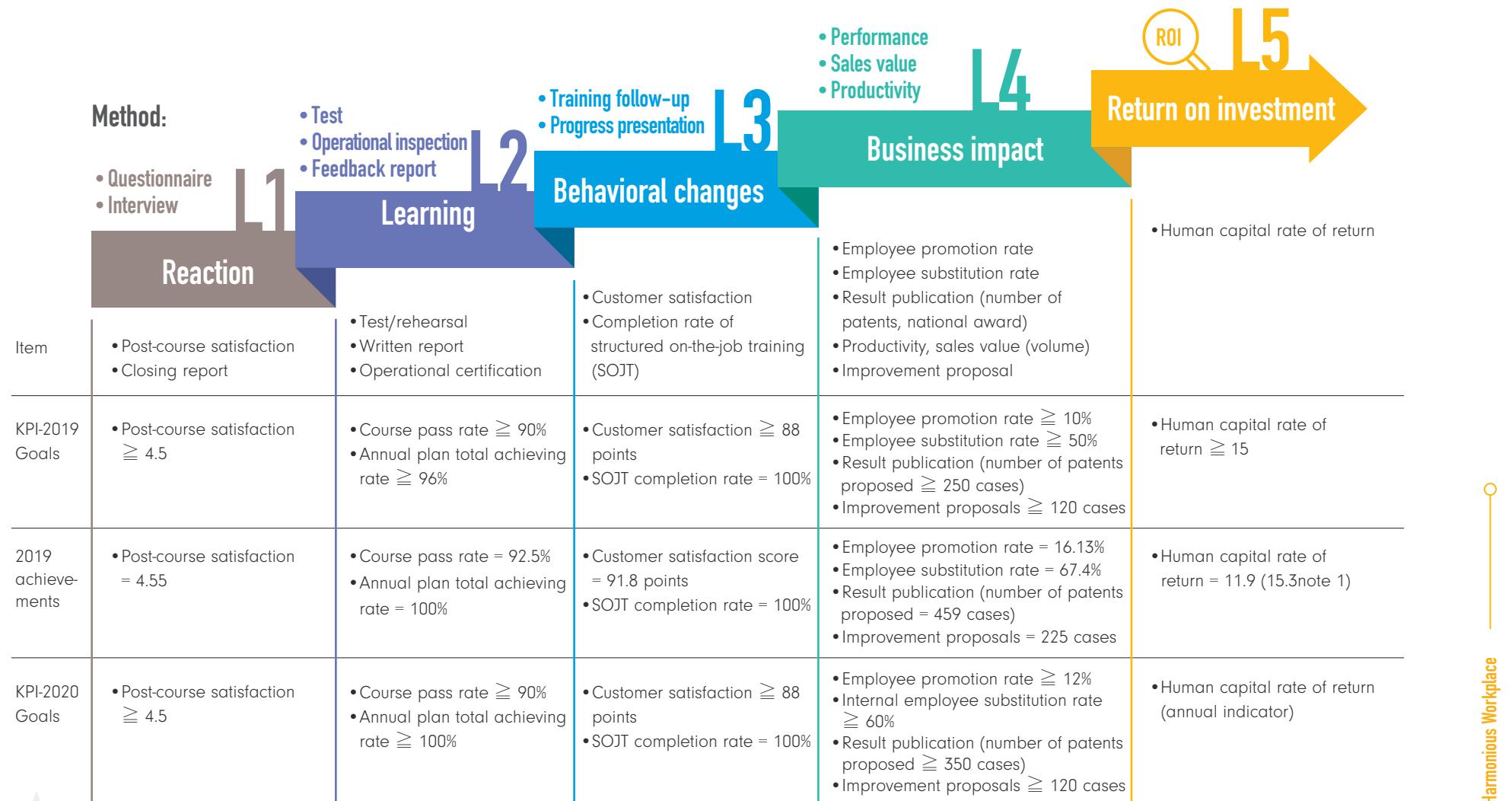
- 1.Employee training hours do not include training under mentorship
- 2.Managerial role refers to assistant vice president grade and above, plant/division head, department/section head, and production line chiefs



Training management indicator	2017	2018	2019
Total number of course sessions	981	1,786	1,873
Total number of training hours	2,524	5,689	5,982
Total enrollments for courses	22,018	38,218	103,301
Hours in total training participation	56,316	73,074	106,886
Average training hours per person	18.9	22.7	32.3
Training expense (NTD)	7,537,561	5,142,302	8,405,894
Average training expense per person (NTD)	2,526	1,597	2,542
Employee substitution rate (%)	43.0	47.4	67.4



To improve the effectiveness of implementation of training to meet the demand of the Company's strategic goals, we have adopted the Kirkpatrick model and evaluated the training courses on several levels (L1~L5). We set up KPIs for each level to evaluate the learning results after classes to ensure the diversity and completeness of the training results evaluation. Employee substitution rate (%) = number of internal opening substitution for the year/total number of internal job openings for the year*100%



Note 1: The normalization value calculated on the average market price for the human capital rate of return is 15.3



Grade	Item	2017	2018	2019	2019 Goals	Score (10 scales)
Level 5 Return on investment (ROI)	Human capital rate of return	15.3	20.8	11.9	15	8
	Productivity per employee (NT\$ K)	18,404	26,319	15,642	-	-
	Profit contribution rate of human cost (%)	201	263	171	-	-
	Return on personnel training investment (%)	485	799	313	-	-
Level 4 Result	Employee promotion rate (%)	16.08	16.12	16.13	16	10
	Promotion rate of employees with < 3 years service (%)	2.07	3.67	4.35	-	-
	Promotion rate of employees with ≥ 3 years service (%)	14.02	12.45	11.77	-	-
	Turnover rate of total employees (%)	11.68	9.04	5.92	8.4	10
	Turnover rate of outstanding employees (%)	4.46	1.41	1.52	5	10
	Employee substitution rate (%)	43.0	47.4	67.4	50	10
	Number of patents (cases)	471	502	459	250	10
Level 3 Behavior	Improvement proposals (cases)	47	51	225	120	10
	Customer satisfaction (score)	88.7	90.6	91.8	88	10
	Completion rate of structured on-the-job training (SOJT) (%)	100	100	100	100	10
Level 2 Learning	Course pass rate (%)	90.6	94.1	92.5	90	10
	Annual plan total achieving rate (%)	90.8	98	100	96	10
Level 1 Reaction	Satisfaction (5-point scale)	4.51	4.72	4.55	4.5	10

Note: The decrease in ROI at Level 5 in 2019 mainly resulted from the decline in revenue caused by poor market conditions. The normalization value calculated on the average market price for the human capital rate of return was 15.3.



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Experience sharing

NTC appreciates the organizer and review committee members for awarding us the 2019 NTDA for Large Enterprise. We will continue to improve our talent development system, focus on employee cultivation and development, and actively promote the ideals of talent development. A summary of key points for this award is as follows:

01 Problem analysis and key points

- Understanding the NTDA operation procedures (application information about evaluation, mechanism, timing, documents, etc.)
- Using the experience of implementing TTQS to improve evaluation items which are substandard
- Referencing and understanding the practices and experiences of award-winning enterprises
- Adopting and executing projects for the goal of winning the award

02 Issues, knowledge and tips

- Establishing control over the 11 review indicators in three aspects of the NTDA
- Preparing self-assessment sheet of the 11 review indicators in three aspects and presenting it to the review committee members
- Providing details on the Company's adoption of talent development, ongoing improvement items, and completion progress
- Preparing complete file on training programs, policies, documents and records for review
- Engaging the President to enhance senior managers' attention toward training
- Presenting professional teamwork; rehearsing at early, middle and late stages of the review process

03 Solutions and recommendations

- Acquiring first the TTQC qualifications and operating them under the NTDA framework
- Clearly displaying the requirements of the 11 review indicators in three aspects of the NTDA
- Providing talent development operation, performance, and innovative measures as well as the spread of benefits
- Showing the improvement measures and concrete performance of talent development towards target customers
- Talent development innovative action plans worth being learned by peers

04 Preparation for the review

- Establish control over the 11 review indicators in three aspects of the NTDA
Gather documents and proofs relating to the indicators; prepare self-assessment sheet of the review indicators and present to the review committee
- Prepare proof of Talent development completed in previous years
The review includes an authenticity check, and therefore requires preparation of training and development plan, policies, documents and records on file
- Professional involvement from the senior management
Engage the President to present professional teamwork

NTC participated in the Talent Quality-management System (TTQS) certification program promoted by the Ministry of Labor in 2018. The TTQS reviewed the training plan, design, do, review and outcome, and the Company won the TTQS Gold Medal in the Large Enterprise category. We also participated in the National Talent Development Awards (NTDA), a prestigious award in the national human resources field in 2019. The Company stood out among the many participants and received the 2019 NTDA for Large Enterprise, which again recognized our efforts to reinforce talent development.



National Talent Development Awards



Talent & Development Projects

NTC constantly improves its growth and competitiveness, and enhances its capabilities to independently research, develop, innovate the DRAM technology, the Company's core technology. We have implemented artificial intelligence to strengthen the manufacturing of our products to satisfy diverse demands of customers and markets. Based on the Company's operational strategy, we have planned technology projects and training and development programs. We would explain the main projects and training and development programs in the last 3 years and their results.

Year	Project	Training topic	Importance of the project to corporate operations	Assessment of training results and operational benefits (NT\$)	Kirkpatrick (L1~L5)	Employee participation rate (%; as a percentage of all employees)
2019	Artificial intelligence and smart manufacturing training program	<ul style="list-style-type: none"> • Work with specialist in the field, information experts, and statisticians to jointly develop AI applications • Form a technology research team, and establish basic/ advanced technology practices and research projects • Train and expand the applications and development of practical projects • Set up an AI community and file related knowledge and documents 	<p>Establish high- efficacy production lines with AI-assistance; improve the efficiency of wafer testing and yield analysis; enhance manufacturing process control, predictions about best conditions, and productivity; improve the efficiency of machinery and identify main application scenarios for machine prognostic and health management system; achieve a key milestone in smart manufacturing.</p>	<p>Employee response: Post-course satisfaction = 4.65</p> <p>Employee learning: Training Course pass rate = 99.25%</p> <p>Employee behavior: SOJT completion rate = 100%</p> <p>Employee performance: Technology project: Completion of basic theory learning, including 22 items in machine learning algorithm, and 11 items in deep learning algorithm; completion of 7 research projects.</p> <p>Efficiency improvement:</p> <ol style="list-style-type: none"> 1.Completion of 38 AI projects in smart manufacturing technology improvements: 21 items using deep learning models, 10 items using machine learning models, and 7 items using mathematical rules 2.Benefits: <ul style="list-style-type: none"> • Labor costs: 27.7 (person/day) (equivalent to NTD 14 million) • Revenue contribution: NTD 176 million (Including costs of maintenance and consumables, increases in production capacity, and benefits of yield improvement) • Potential benefits of productivity: NTD 50 million <p>Finance value: NT\$ 240,000,000 (ROI: 56%)</p>	<p>L1 Satisfaction</p> <p>L2 Course pass rate</p> <p>L3 Structured on- the-job training (SOJT)</p> <p>L4 Technology project</p> <p>L4 Productivity</p> <p>L5 Return on investment</p>	71%
2019	R&D in 10nm process and development and expansion in 20nm non-standard product	<ul style="list-style-type: none"> • Development of 10nm DRAM new type memory cell technology • Key memory technologies, such as memory array and core circuit • Standardization of mask manufacturing technology • Expansion of non-standard product servers and low-power and automobile/industrial products 	<p>Breakthroughs in key technologies and establishing a company with capabilities of independent R&D, innovation and technologies; breakthroughs in production capacity and technologies and increasing in sales profits and value of our products; laying the foundations for sustainable operations.</p>	<p>Employee response: Post-course satisfaction = 4.52</p> <p>Employee learning: Training Course pass rate = 92.20%</p> <p>Employee behavior: SOJT completion rate = 100%</p> <p>Efficiency improvement: Completion of 91 product R&D and validation tasks, 137 productivity proposals, and 225 improvement proposals</p> <p>Output volume: Sales of non-standard products > 44M (piece)</p> <p>Result publication: A total of 459 patents</p> <p>Finance value: NT\$ 2,401,854,240 (ROI: 573%)</p>	<p>L1 Post-course satisfaction</p> <p>L2 Course pass rate</p> <p>L3 Structured on- the-job training (SOJT)</p> <p>L4 Productivity</p> <p>L4 Result publication</p> <p>L5 Return on investment</p>	82%



Year	Project	Training topic	Importance of the project to corporate operations	Assessment of training results and operational benefits (NT\$)	Kirkpatrick (L1~L5)	Employee participation rate (%; as a percentage of all employees)
2018	Training program for advanced procedure/niche DRAM development	<ul style="list-style-type: none"> • Training on advanced procedures/new procedures/niche products • Conference skill training for project managers • Managerial skill training for managers • Training for the improvement of training program 	As the Company progresses into the next-generation production procedure (20nm), new marketing and product strategies are required to support development of this advanced procedure as well as demand for niche DRAM products. This training program has the potential to improve the Company's product competitiveness and stabilize product margins.	<p>Employee: SOJT completion rate = 100%</p> <p>Efficiency improvement: A total of 239 product R&D/validation enhancement/advanced procedure adoption/productivity improvement tasks were completed, and 51 improvement proposals were raised</p> <p>Output volume: > 950M</p> <p>Finance value: NT\$ 2,045,604,729 (ROI: 783%)</p>	L3 Structured on-the-job training (SOJT) L4 Productivity L4 Productivity L5 Return on investment	85%
2018	Talent development system enhancement program	<ul style="list-style-type: none"> • Market planning and sales competitiveness enhancement course • TTQS evaluation • Professional skill enhancement on all management levels 	Given the Company's talent and technology-intensive nature, it is important to implement an effective and technology-focused training program that not only aligns with the Company's strategic goals, but also improves employees' professional skills, know-how and increases sale of next-generation products.	<p>Result publication:</p> <ol style="list-style-type: none"> 1. A total of 502 patents 2. Won Ministry of Labor's TTQS evaluation - Gold <p>Finance value: NT\$ 649,451,446 (ROI: 855%)</p>	L4 Result publication L5 Return on investment	82%
2017	Advanced DRAM procedures and product development training program	<ul style="list-style-type: none"> • Training for new procedures and product conversion • Project management and execution training • Training for the improvement of training program 	This program has enabled the company to successfully adopt next-generation production procedures (20nm) and develop proprietary R&D capabilities for a number of benefits including reduced product cost, increased production capacity, enhanced product competitiveness, and sustainable operations.	<p>Employee: SOJT completion rate = 100%</p> <p>Efficiency improvement: Implementation of new procedures and products and productivity. A total of 717 production enhancement tasks were completed, and 47 improvement proposals were raised</p> <p>Result publication: A total of 471 patents</p> <p>Finance value: NT\$ 3,602,699,075 (ROI: 530%)</p>	L3 Structured on-the-job training (SOJT) L4 Productivity L4 Result publication L5 Return on investment	86%





Diverse Development and Learning Paths

NTC provides employees a variety of on-the-job training and learning methods to promote lifelong learning, and assist employees with career development. Thus, we have planned diverse learning channels so as to expand their scope of learning.

Online learning video center

To provide a more flexible method and environment for learning we established a video center to offer employees digital learning environment.



Language learning subsidies

- The Company's "language learning subsidy program" subsidizes employees for taking internal English courses. In addition, the Company collaborates with external language training institutions to offer training opportunities.
- A "TOEIC Exam Simulation System" was set up within the Company for employees to practice, and the Company also organizes simulation exams to prepare employees for the real event. In addition, the Company sets targets for TOEIC scores.

On-the-job diploma

Subsidies and incentives are being offered in accordance with the Company's on-the-job training policy to encourage employees to participate in on-the-job training courses outside work hours and help them in individual development and attaining new degrees.

Participation in external courses

We encourage employees to obtain certifications relevant to their works through participation in external training courses, as this is likely to enhance employees' capabilities in product development and innovation, which continues to increase product value.

	2017	2018	2019
Total online class hours (hours)	10,958	14,408	25,987
Language learning subsidies(NTD)	194,660	447,466	403,070
Accumulated number of employees taking on-the-job diploma courses (person)	696	699	708
Number of participants in external training courses (person)	113	171	279

In addition to the diverse learning platform and classroom courses, the Company regular holds interdepartmental knowledge sharing conferences each year, including: I share and share love, TED TALK, i-change, and i-future activities, so as to offer diverse learning paths and strengthen learning results.



i-future sharing activity

Diverse on-the-job training and learning channels

Digital platform
Online training
Streamed video

Outsourced training
Practical learning
External training assignment

Course Seminar
Workshop

Talent reserve
Employee development
Elite program

On-the-job training
Counseling for new recruits
Mentorship

Knowledge management
Online think tank
Social media sharing



Maximizing Employee Performance

The purpose of NTC's performance management system is to maximize employees' potentials. In addition to providing good learning environment and implementing sound performance management systems, the Company also emphasizes productive interaction between line managers and their subordinates. Apart from annual performance evaluation, line managers are also required to engage subordinates in quarterly performance reviews. Through interaction and communication, employees are given the care and assistance they need to improve and accomplish individual as well as organizational goals.

The review process begins with the line manager breaking down organizational goals and setting individual work objectives for subordinates face-to-face, and is followed by feedbacks on the execution of work objectives and performance review at the end of the period. Between 2015 and 2019, 100% of employees were subjected to objective management and performance ranking. Performance management tools used by the Company in 2019 included: annual performance evaluation for all employees, and 180- & 360-degree performance evaluation for managers. Using different talent development tools, the Company offers suitable work performance improvement opinions to employees of all grades.

180-degree performance evaluation is intended for section managers and above, and involves review from 4~6 colleagues or managers that the subject has business dealing with, as chosen by the line manager. 360-degree performance evaluation is intended for plant and division managers and above, and involves feedbacks from subordinates on the subject's managerial skills. Details of the 180-degree performance evaluation (involving colleagues) and the 360-degree performance evaluation (involving subordinates) are shown in the table below. In 2019, 10% of the Company's employees were subjected to multi-dimensional performance evaluation. Employees who exhibit good performance are rewarded; for those who exhibit poor performance, the system actively reminds their line managers to direct attention and provide assistance until there is significant improvement in performance. This treatment is not differentiated by gender in any way.

◆ Assessment criteria of the 180- and 360-degree performance evaluation

Category	180-degree performance evaluation by peers	360-degree feedback by subordinates
Assessment item	Work attitude	Excellence
	Teamwork	Decision-making skills
	Communication skills	Innovativeness
	Execution skills	Leadership
		Communication





Occupational Safety and Health

ISO 45001 Occupational Safety and Health Management System

With the joint efforts of senior executives and all employees, NTC passed the system conversion certification of ISO 45001:2018 in August 2019. The President also signed the occupational safety and health policy, promising that NTC would offer its employees a safe, healthy, and good working environment. Meanwhile, an occupational safety and health management manual was formulated to allow all employees to have abilities to prevent hazards when conducting business activities to prevent occupational accidents. The Company reviews updates on local laws and regulations and its compliance on a monthly basis, and conducts regulatory and hazard identification and risk assessment each year. If process change management process occurs, the identification and assessment will also be conducted. In addition, the Company conducts risk assessment on regular and irregular high risk operations to control, monitor, and minimize risks. The Company continues to arrange special health checkups for high-risk employees, including those exposed to noise, chemical substances (arsenic/mercury/indium) and ionizing radiation, and classifies employees based on check-up results for health management.

◆ 2019 execution of occupational safety and health management

Safety and health regulations

Regulatory identification

Hazard identification

Occupational accident prevention

Training and education on health and safety

Emergency response

Operating environment monitoring

Chemical classification and management

Change management

Contractor management

Job safety analysis

Observation and interviews for job safety

Health management and improvement

Audit plans

Ongoing improvement measures



◆ Items of Execution and Results

Item	Execution	2019 results
Safety and health regulations	Formulating safety and health regulations and executed accordingly	Completed updates on regulation documents in response to ISO 45001 system conversion
Regulatory identification	Reviewing updates on local laws and regulations and the Company's compliance on a monthly basis, and auditing each unit with a regulatory identification checklist each year	Completed modifications for 8 updates on regulations (guidelines) and audited each unit with a regulatory identification checklist of six major regulations
Hazard identification	Conducting regular and irregular hazard identification of operations and environment	Finished 7,034 items
Occupational accident prevention	Forming an occupational accident prevention investigation group to investigate causes when an accident occurs, and making ongoing improvements	No occupational accident occurred
Training and education on health and safety	In addition to arranging training courses for certifications required by regulations, special hazardous operations, and emergency response team (ERT) personnel for new employees, senior employees, and supervisors, the Company holds seminars on health and safety issues and professional defensive driving course, and places education posters regarding health and safety at workplace on a monthly basis.	A total of 270 training hours with 4,637 participants; A total of 60 participated in the defensive driving course at the plant taught by the Banqiao Motor Vehicles Office
Emergency response	Planning emergency response plans and conducting emergency response drills for moderate and high risk items specified in hazard identification	Completed 47 emergency response drills
Operating environment monitoring	Planning sampling strategy and conducting operating environment monitoring once every half-year, analyzing results and reporting	A total of 314 items were monitored and reported, and the testing values of chemicals were all below the allowable concentration.
Chemical management	Providing a chemical safety data sheet (SDS); classifying and managing chemicals	A SDS was placed on site and a checklist of chemical classification and management was completed.
Change management	Holding regular equipment safety meetings to review change management items	Finished improving the suggested items
Contractor management	Contractor review system, pre-work safety notice, contractor in-plant training, work permit application, daily toolbox meetings, high risk operations (such as confined space), and job safety analysis	A total of 2,662 people passed the contractor in-plant safety and health training. 100% of contractors had passed the training to date.
Job safety analysis	Holding regular and irregular job safety analysis meetings	Finished improving the suggested items
Observation and interviews for job safety	The Safety and Health Department arranges observation and interviews for job safety with on-site employees of each unit on a monthly basis, and arranges team leader and above of each unit to receive observation and interviews with their subordinates on site on a quarterly basis.	The Safety and Health Department arranged 36 topics and raised 28 improvement proposals.
Health management and improvement	Conforming with the Health Center under the Human Resources Division to plan and implement four major health management programs	Performance of the four major health management programs was reviewed monthly by the Occupational Safety and Health Committee
Audit plans	Planning internal audit plans and auditing the compliance of systems accordingly	100% improvement completion rate of audit defects
Ongoing improvement measures	Each unit makes safety and health improvements and raised proposals	A total of 29 ongoing improvement proposals were raised by all units.





◆ Safety and Health Improvement Proposals and Measures

	2017	2018	2019
Number of improvement proposals	25	27	29
	16	17	13
Improvement of moderate-high risk issues (number of cases/details)	Installation of ventilation equipment for laboratory, work isle improvement, emergency response drill, installation of forklift sensor, and installation of supply truck safety harness for reducing operational risks	Installation of water absorption device, ladders and maintenance platforms for elevated operations, and improved ventilation for reducing operational risks	Installation of oxygen concentration detector, area lighting improvement, improved the efficiency of local ventilation equipment in clean rooms and laboratories, and installation of anti-fall fences for reducing operational risks
Item	5	3	5
Corrective measures (number of cases/details)	Traffic safety improvement, valve fluid leakage prevention	Office air conditioning improvement, pipeline support enhancement and repiping	Installation of electrical copper bar insulation protection, valve fluid leakage prevention, and traffic safety of scooter-riding
Project improvements (number of cases/details)	4	7	11
	Job safety analysis (JSA) project	Traffic safety project	Earthquake hazard prevention project

Safety and Health Organizations and Performance Indicators

NTC attaches great importance on occupational safety and health, and convenes Occupational Safety and Health Committee meetings on a monthly basis, which is better than the regulated frequency. The meetings are presided over by the Executive Vice President, and attended by senior executives, department heads, and committee members, of which 34% are labor representatives. They jointly review the attainment of safety and health management goals, and the performance of safety and health projects. The Company's tireless efforts to improve safety and health was recognized by receiving [the 8th Industrial Safety and Health Award - Excellent Unit](#) - Outstanding Practice from the New Taipei City government for the first time in June 2019.



Industrial Safety and Health Award - New Taipei City Mayor Hou Yu-ih and the Executive Vice President of NTC



Disabling injuries frequency rate (No. of disabling injuries/million work hours) and disabling injuries severity rate (No. of work days lost/million work hours) were both 0 in 2019, meaning that the Company had achieved zero disabling injury. The Company will strive to maintain zero disabling injury in the future.

◆ Employee absence rate, occupational illness, and number of resigned employees owing to occupational accidents

	2017		2018		2019	
Disabling injuries frequency rate (FR)		0		0		0
↑ ↓	0	0	0	0	0	0
Disabling injuries severity rate (SR)		0		0		0
↑ ↓	0	0	0	0	0	0
Frequency-severity indicator		0		0		0
↑ ↓	0	0	0	0	0	0
Absentee rate (AR)		0.34%		0.45%		0.44%
↑ ↓	0.10%	0.24%	0.19%	0.26%	0.20%	0.24%
Number of occupational illnesses certified by physicians		0		0		0
↑ ↓	0	0	0	0	0	0

Note:

1. Disabling injuries frequency rate (FR) and disabling injuries severity rate (SR) are based on occupational hazard data reported by the Company, and do not include contractors, traffic accidents outside production facilities, or minor injuries (that can be treated via first-aid on site).

2. Absence rate (AR) = total hours absent (including inpatient leave + outpatient leave + occupational injury leave + menstrual leave)/total work hours*100%.

◆ Employee total work hours, number of injury cases, and number of work days lost

	2017	2018	2019
Total work hours (hours)	5,278,224	5,974,816	6,398,888
Number of injury cases	0	0	0
Work days lost	0	0	0

Contractor Management

NTC has formulated contractor safety management regulations, including contractor review system, pre-work safety notice, contractor in-plant training, pre-work job safety analysis, work permit application, high risk operation control (such as open fires, confined space, ladders, hoist, live electrical connection, chemicals, etc.), daily toolbox meetings, and contractor checklist of before/during/after work, to provide all workers a safe working environment and achieve the goal of contractor's zero occupational accident.





Selection of Quality Contractors

In order to strengthen and optimize safety measures, we have implemented a grading system for all contractors that undertake construction works outsourced from the Company. The system exists not only to control contractors' quality and safety standards, but also to protect their employees from occupational injury.

By investigating contractors' professional background, factory location, equipment, work site safety management capabilities and track records, the Company rates its contractors by competency and assigns one of three grades: A, B or C. Contractors that meet grade requirements are eligible to issue quotations for construction projects of appropriate specialization and size, whereas those that do not meet the grade requirements may apply for upgrade review. The Company convenes regular supplier conferences and assists suppliers with upgrades by reviewing improvements in areas such as specialization, work safety personnel, professional technicians, key technical personnel, business partners, work equipment, and track records.

Contractor Work Safety Review System

NTC values contractors' employees as our own, so contractors' safety has always been a key safety and health management concern for us. To facilitate construction projects, the Company devotes attention not only to work quality and progress, but to safety and environmental management as well. In addition to existing systems on outsourcing management, contractor work safety review and work safety training, the Company introduced pre-work health check and training courses this year to ensure workers' compliance with safety requirements and safety conducts. Through these measures, we hope to accomplish our goals toward zero hazard and zero accident.

NTC has formulated contractor management policies and systems, and imposes the same safety and health standards for contractors' employees as do its own. The Company ensures construction quality at the source, and uses computerized control from design, budgeting, outsourcing to the work stage. Only the top-performing contractors are selected for plant expansion or maintenance. A certification-based training system has been adopted as means to improve contractors' work skills and safety awareness, and reduce the probability of occupational hazard.





Daily Toolbox Meetings

To ensure that the contractors do take safety measures to prevent accidents and eliminate occupational hazards during work activities, the Company explicitly informs contractors of the work environment they are presented with as well as the safety and health measures they are expected to take during the tender stage. Once the work has been assigned, the winning contractor will be strictly required to follow applicable rules, including the convention of daily toolbox meetings to announce work site rules and confirmation of work site safety before commencing work each day. All uses of temporary facility, safety/health facility and pollution control measure and disposal of waste and soil by contractors during the work period are bound to comply with relevant laws and corporate policies. Any occurrence of work safety incident due to non-compliance will result in work suspension or termination of further business dealings.

Employee Healthcare

The Company collaborates with professional medical team from Chang Gung Hospital to provide annual health check service for employees. A total of 1420 employees had completed their health checks in 2019, for which the Company incurred total expenses of NTD 1,699,405. Employees who exhibit abnormal health check results are tracked on an ongoing basis and subjected to health management. All of our factories have a medical room with a physician stationed on site to provide employees with professional medical and consultation services. Seminars on spirituality and health and healthcare courses are arranged each quarter to meet employees' need for knowledge on physical and mental health.

Enforcement of Health Promotion

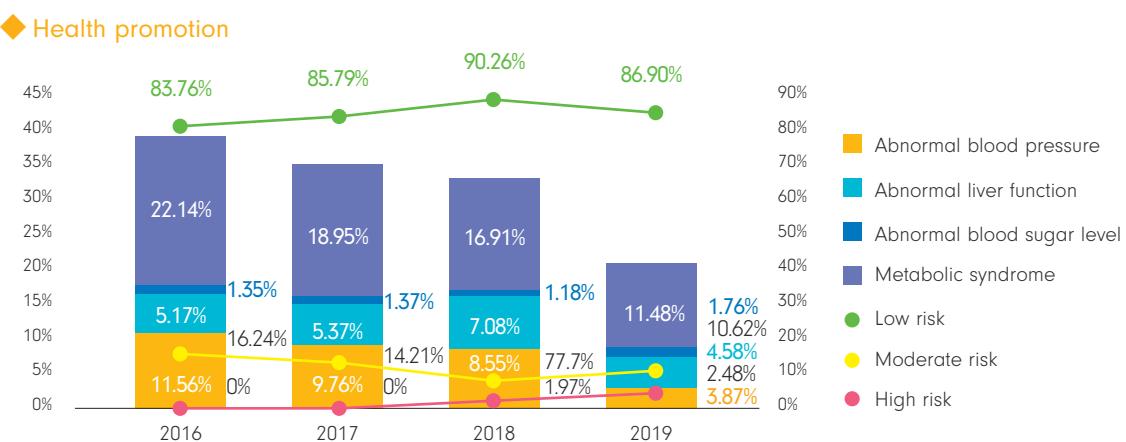
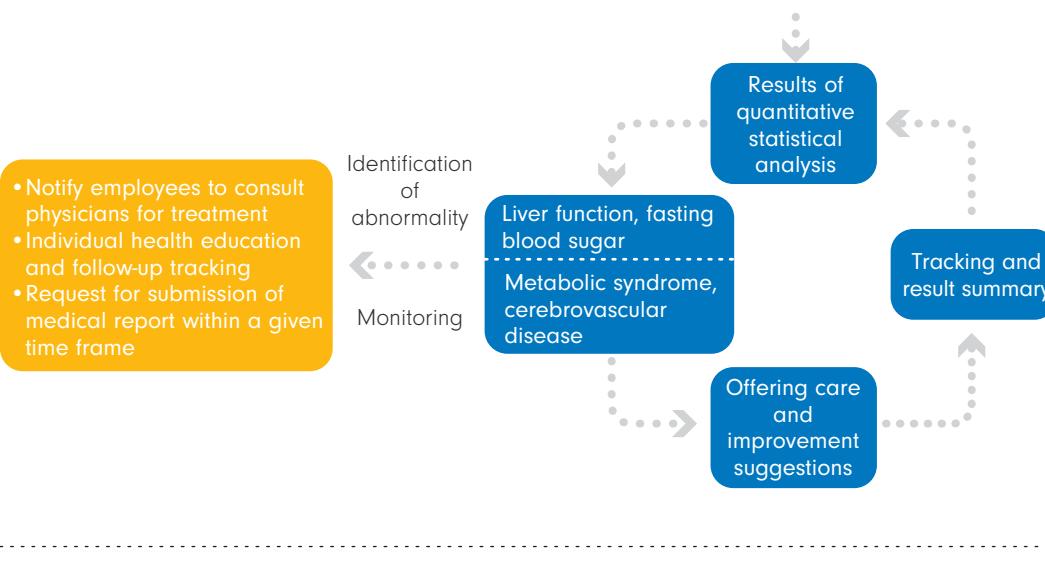
The Company offers regular employee health check services that are more favorable than what the laws require, and the health checkup also includes cancer screenings for α -Fetoprotein, carcinoembryonic antigen and oral cancer and waistline monitoring. Based on the health check results, the Company identifies employees who exhibit abnormal health conditions (such as liver function, blood sugar level, metabolic syndrome, cerebrovascular disease, etc.) and provides them with healthcare information, suggestions and follow-up tracking.

	Abnormal blood pressure	Abnormal liver function	Abnormal blood sugar level	Metabolic syndrome	Low risk	Moderate risk	High risk	Total employees completing health checks for the year
2016	11.56%	5.17%	1.35%	22.14%	83.76%	16.24%	0	813
2017	9.79%	5.37%	1.37%	18.95%	85.79%	14.21%	0	950
2018	8.55%	7.08%	1.18%	16.91%	90.26%	7.77%	1.97%	1,017
2019	3.87%	4.58%	1.76%	11.48%	86.90%	10.62%	2.48%	1,420
								4,200

◆ Number of contractor injury cases, and number of work days lost

Year	2017	2018	2019
Number of injury cases	0	0	0
Work days lost	0	0	0





In addition to arranging health check for employees, the Company also has a Health Center available to provide services such as preliminary treatment of injuries, preventive healthcare, weight management, and smoking cessation consultation. Furthermore, the Health Center organizes health seminars, blood donations, stress relief workshops and technology-based fitness programs to promote preventive healthcare and reduce risks of illness. These events receive at least 300 enrollments on a yearly basis.

Response to Epidemic Disease

The Company has assembled an Epidemic Response Team based on recommended practices for SARS and avian influenza to facilitate quick response in the outbreak of epidemic disease, such as influenza virus. Response measures are being devised and conveyed to employees on an ongoing basis. At the end of 2019, when few COVID-19 was confirmed, the Company immediately set up the Epidemic Response Team to prepare and drill for possible outbreak of the disease.

- Epidemic prevention promotion**
 - Influenza virus response measures are announced internally.
 - Large posters are placed throughout plant premise to convey the importance of epidemic prevention.
 - Distribution of self-health management notice
- Epidemic prevention measures**
 - Reporting, containment and epidemic prevention leave.
 - Epidemic prevention for contractors and visitors





Good Muscle Strength Enhances Workplace Vitality



AED+ CPR



Weight-loss activities



Blood donation activities



2019 health checkup



Pap test





Common Good



An Active Participant in Community and Social welfare

Nanya Technology Corporation is committed to social engagement and participates in public affairs and local care to become an active participant that gives back to the society. We promote social influence and community development to lead society to a better and sustainable future.

95.78%

Business initiative investments accounted for 95.78% of NTC's investments in social engagement

1,953
participants

A total of 38 seminars with industry experts were organized and NTC cooperated with 4 universities on 8 industry-academia research plans; a total of 1,953 people participated in the seminars and plans

14,045
participants

In 2019, a total of 14,045 people used fair-trade coffee and assisted community development and income increases in the Third World

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145 / Social Influence

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Strategy and Achievement

○ Unachieved ✓ Achieved ★ Surpassed

Material Issues	Strategies	2020 Goals	2019 Targets	2019 Achievements
Social engagement	<ul style="list-style-type: none"> Talent cultivation: Conform with the education system and cultivate outstanding semiconductor talent. Environmental protection: Connect different types of NPOs and promote environmental protection ideals. Humanistic care: Improve social welfare by working with local art and charity groups Good neighbor: Participate in public affairs in the neighborhood communities and build a harmonious and mutually beneficial living sphere. 	<ul style="list-style-type: none"> Increase the total investment amount by 15% Number of credit courses opened (unit: course) is doubled. Acquire the Work-Life Balance Award Acquire the Accredited Healthy Workplace certification 	Total investments increased by 15% from 2018 Business initiatives accounted for 85% of total investments in the year 130 interns Organized 15 sessions of campus seminars	★ 52.4% ★ 94.1% ★ 136 interns ★ 38 sessions
			Received Taiwan iSports certification from the Sports Administration of the Ministry of Education Awarded the Originality Prize of the Corporate Promotion of Family-friendly Program by the New Taipei City government, and acted as a demonstration workplace for sports promotion in New Taipei City	

Social Influence

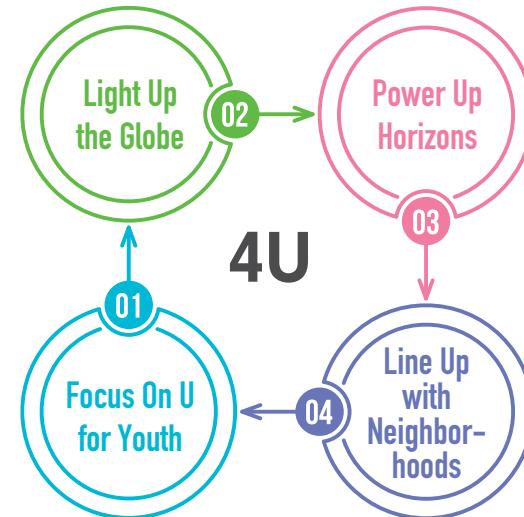
As an industry leader, Nanya Technology Corporation (NTC) earnestly commits itself to creating positive influences. The Company has responded to the challenges proposed by the United Nations in the Sustainable Development Goals (SDGs) by combining our core capabilities with SDGs. We have connected our core capabilities with three SDGs and developed four main developmental directions. We continue to promote these four directions to exert social influence. The three SDGs we have connected to are SDG 8, SDG 13, and SDG 17. SDG 8 (Decent Work and Economic Growth) is our driving force for talent cultivation and industry-academia collaboration to actively promote technology upgrades and enhance economic value through innovation so as to help young people and students develop professional skills. By connecting to SDG 8, we have set up a main public welfare theme of talent cultivation. SDG 13 (Climate Action) allows us to deeply experience the impacts that extreme climates have had on the community environment and the ecology. Therefore, we have set up a main direction of environmental conservation to safeguard environmental biodiversity and move toward a low carbon society. SDG 17 (Partnerships For the Goals) is the foundation for the Company's public welfare implementation, so we have built two main themes of humanistic care and community harmony so that we are able to make long-term contributions to the communities and neighborhoods in which we have been operating.



Common Good

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Talent cultivation, environmental protection, humanistic care, and community harmony became our main directions of social engagement. We have set short, medium and long-term goals for the four main directions and promoted these goals step by step. In 2019, we launched the 4U (For You) projects: Focus On U for Youth, Light Up the globe, Power Up horizons, and Line Up with neighborhoods. We gathered our internal and external funding, supplies, and manpower to carry out concrete actions for social engagement.



Main theme	4U projects	Purpose	Vision	Subjects	Social influence
 Talent cultivation	 Focus On U for Youth	By using the Company's core operational capabilities and conforming with the education system, we will jointly cultivate talent	• Cultivate and reserve outstanding technological talent	Students in colleges and universities	• Promote general science education • Implement industry-academia collaboration
 Environmental protection	 Light Up the Globe	Connect different types of NPOs and promote environmental protection	• Build a green and sustainable ecological environment	Community organizations and environmental protection groups	• Mitigate ecological impact • Popularize environmental protection knowledge
 Humanistic care	 Power Up Horizons	Combine local arts and culture with charity establishments and promote humanistic public welfare activities to enhance social well-being	• Create and convey the power of beauty and kindness	Local arts and culture organizations and charities	• Enhance social well-being • Promote arts and culture
 Community harmony	 Line Up with Neighborhoods	Participate in public affairs in the neighborhood communities and promote a harmonious and mutually beneficial living sphere	• Establish an inclusive and harmonious living sphere	Local township offices and community organizations	• Make contributions to the neighborhoods • Realize community inclusion



NTC has adopted the London Benchmarking Model (LBG) to evaluate the benefits and influence of each public welfare activity and adjust public welfare programs and invested resources step by step. Moreover, NTC reviews the effects and results to tightly link core operations with social issues. To deepen and expand corporate long-term influence on society, the Company focuses on connecting its core operational capabilities with social demands. We hope that through our professional innovative capabilities, which are our most competitive advantage, we are able to resolve social issues and create a mutually beneficial and beautiful home. Shared value is the core concept of NTC's participation in social public welfare. In the short run, we hope that our invested resources will deliver the maximum benefits. In the long run, we hope that the behaviors, awareness, and well-being of the entities we have helped would generate positive influence.

In recent years, cash and commodities have been the main resources NTC has invested in public welfare activities, accounting for 90% of all resources, while employee volunteering accounts for a part of NTC's participation. The main types of public welfare activities are commercial activities aimed at technological talent cultivation, followed by long-term investments in the communities. Only a small part of the activities are purely for charity. In the future, we will continue to review the effects of public welfare activities through the LBG, focus on the ratio of commercial activities to long-term investments in the communities, and consider the percentage of employee volunteers. Meanwhile, we have set medium and long-term goals for future promotions.

Main theme	Content	Commercial benefits	Social benefits
 Talent cultivation Focus On U for Youth	<ul style="list-style-type: none"> • Future Stars • Outstanding Projects • Cultivate Students • Understanding Projects • Speech Projects 	<ul style="list-style-type: none"> • Innovative technology R&D (8 industry-academia collaboration cases) • NTC's supervisors serving as industry experts (26 supervisors) • Enterprise exploration projects (1,942 visitors) • Satisfaction of interns (average satisfaction of 4.4 points on a 5-point scale) 	<ul style="list-style-type: none"> • Enhance technological capabilities (NTD 7.35 million in industry-academia collaboration projects) • Industry-academia technology connections (1,953 participants in seminars with industry experts) • Assisting employment opportunities (scholarships of NTD 569,500)
 Environmental protection Light Up the Globe	<ul style="list-style-type: none"> • Environmental topic initiatives • Safeguarding ecological environment • Community assistance 	<ul style="list-style-type: none"> • Cohesion of employees (161 employees participated) • Media favorability (1,440 hours of online media exposure) • Enhance corporate image (participated in 1 environmental protection initiative event) 	<ul style="list-style-type: none"> • Reduction of plastic, paper, and carbon usage (110,000 kWh saved in electricity consumption through turning off the lights for one hour in all of Taiwan/carbon reduction of 60,940kg in all of Taiwan)
 Humanistic care Power Up Horizons	<ul style="list-style-type: none"> • Cooperating with public welfare groups • Community care • Charity bazaars 	<ul style="list-style-type: none"> • Cohesion of employees (1,088 employees as participants) • Media favorability (720 hours of online media exposure) • Enhance corporate image (5 certificates of appreciation) 	<ul style="list-style-type: none"> • Prospering community environment (purchased 240kg of fairtrade coffee) • Reducing the wealth gap (provided financial aid to 5 entities)
 Community harmony Line Up with Neighborhoods	<ul style="list-style-type: none"> • Community assistance • Community care • Safeguarding ecological environment 	<ul style="list-style-type: none"> • Cohesion of employees (31 employees participated) • Media favorability • Enhance corporate image (1 certificate of appreciation) 	<ul style="list-style-type: none"> • Deepen community communication (interacted with 2,150 people in the neighborhoods) • Environmental biodiversity (cleaned 1 hiking trail)





NTC is committed to youth empowerment. Since 2016, we have actively deepened cooperation with industry associations, colleges, and research establishments. The resources we invested in cultivating technological talent increased from over NTD 2 million to over NTD 20 million in 2018. The amount reached over NTD 40 million in 2019. The investment amount increased substantially every year. The increased budget was mainly invested in talent cultivation under Focus On U for Campuses. The main form of invested resources is money which accounted for more than 90% of the resources.

The commercial innovative public welfare activities, which use our core capabilities to resolve social issues, have always been our priority in implementing our public welfare themes. NTC has actively promoted technological upgrades and innovations for economic value enhancement in order to cultivate professional skills of youngsters and students, allowing us to be in line with the ideas of Decent Work and Economic Growth of SDG 8 on the aspects of talent cultivation and industry-academia collaboration.

◆ Public welfare categories invested in by NTC

	Charities	Long-term community investment	Commercial initiatives
2016	10.18%	0.00%	89.82%
2017	3.02%	30.30%	66.68%
2018	7.15%	0.64%	92.21%
2019	2.11%	2.11%	95.78%

◆ Resources invested in social public welfare

Cash contributions		Commodity donation		Employee volunteers		Management costs		
Appropriation (NTD)	Percentage (%)							
2016	1,999,048	99.75	0	5,000	0.25	0	0.00	
2017	4,946,200	69.70	2,142,000	30.18	8,500	0.12	0	0.00
2018	19,732,840	97.54	43,000	0.21	30,400	0.15	424,270	2.10
2019	42,218,927	97.57	112,597	0.26	86,400	0.20	852,755	1.97

Social engagement

NTC hopes to make efforts to resolve social and environmental issue as well as promoting local community development in terms of public welfare implementation. When investing in each public welfare theme, we always consider the connection between social issues and the NTC's roles and methods, displaying annual effects through method promotion so as to convey the NTC's public welfare footprints to the public. Meanwhile, through the feedback for these issues, we also review the public welfare themes and promotion methods, pursuing a co-prosperity society.





Focus On U for Youth



Talent cultivation

Social issues we would like to resolve

With the power of academic research, we assist college students on campus to reduce the gap between the campus and workplace so that they may more quickly adapt to the workplace. At the same time, we integrate the resources of industry and academia to jointly enhance the capabilities of Taiwan's technology industry.

Our role and methods

- Future Stars:** We established several scholarships to encourage students to engage in academic research, make constant improvements, and put their education to use. We hope that outstanding students will continue to study in their field of interest.
- Outstanding Projects:** To promote exchanges between the industry and academia and make good use of academic resources, we cooperate with well-known colleges on industry-academia research plans and sponsor campus activities. We also help colleges to strengthen teacher-student interactions to enhance education quality and domestic industry competitiveness.
- Cultivate Students:** Through many campus projects and two-way cultivation, we provide college students internship platforms and encourage students to develop abilities in different areas so as to reserve specialized talent in advance.
- Understanding Projects:** We invite students to visit our company to help them better understand the industry's development. The alumni of the invited schools encourage the students on campus by sharing their work experience to strengthen the sense of belonging.
- Speech Seminars:** To help students strengthen the connections between what they learn at school with the realities of the workplace, our middle management and executives began interacting with students face-to-face on campus as industry experts in seminars or programs.

Major results in 2019

- Future Stars:** A total of 3 scholarships were provided and the total amount was around NTD 569,500
- Outstanding Projects:** We cooperated with 4 universities on 8 industry-academia research plans, and the invested amount totaled NTD 7,350,000. The Company sponsored 3 campus activities with a total of NTD 355,520.
- Cultivate Students:** We cooperated with 9 colleges on the internship programs. A total of 166 interns worked at the plant, including 60 indirect and 106 direct staff members.
- Understanding Projects:** A total of 38 corporate visits were held with about 1,942 teachers and students participants.
- Speech Projects:** As industry experts, they shared their experience with key schools in northern Taiwan during 38 seminars and with a total of 1,953 attendees in 2019.

Our footprints

Future Stars

- We set up Scholarship Regulations for interns and awarded outstanding students with scholarships after their internships. In 2019, we provided scholarships to 2 students.
- We will expand our scholarship programs in the second half of 2020 to encourage outstanding students to engage in related academic research and innovative technology.

Common Good

Focus On U for Youth



Talent cultivation

Our footprints

Cultivate Students

- We cooperated with 9 colleges on the internship programs, and established a complete internship system to effectively enhance the employability of students, cultivate their practical skills, and allow them to experience the workplace as early as possible.

Understanding Projects

- We organized an event where our employees who graduated from NTU returned to alma mater. During the event, these employees shared their work experience and provided information about the Company's generous salaries and benefits so as to create the image that the Company is an excellent employer.
- We invited teachers and students of the colleges in northern Taiwan to attend the Company's corporate visits, so students could understand the operations and characteristics of our company. A number of the visits were planned in line with the internship programs. Before the internship, students could understand more about the job through visits. Moreover, students could figure out if they were suitable for certain positions through interviews and communication with executives.
- We sponsored the Electronics Camp organized by the NTU System-on-Chip (SOC) Center and the College of Electrical Engineering and Computer Science (EECS). Through group activities and an on-site plant visit, exchanges between the industry and the academia could be improved and students were allowed to go into a semiconductor clean room to further understand the operation environment. We also recruited outstanding students with backgrounds in electrical engineering from around Taiwan.

Speech Seminars

- Seminars with industry experts were held in 11 colleges. The easy-to-understand lectures gave students new perspectives on technology, emerging processes, and IC design directions.
- Seminar on semiconductor industry practices participated by MCUT Department of Electronic Engineering (E.E. Dept.): In 2019, the Company cooperated with MCUT to organize a seminar on semiconductor industry practices in connection with the practice course of the E.E. Dept. to strengthen the employability of the students. The executives of our six main engineering departments and the divisions of marketing, process integration, and manufacturing served as industry experts. On-site visits were arranged after the end of the course to promote industry-academia exchanges.

Outstanding Projects

- In 2019, the Company, for the first time, jointly set up the intelligent electronics institute program with National Taiwan University of Science and Technology to cultivate industry-academia talent through the Layout program. The lecturers were from the industry and academia. The Company's experienced executives served as industry experts to tell students about industrial practices.
- In 2019, we cooperated with universities on 8 industry-academia research plans, which focused on semiconductor application technology, product design, and R&D. These universities included National Taiwan University, National Tsing Hua University, Chang Gung University, and National Chiao Tung University (NCTU).



Taiwan Tech Layout industry-academia program



Visit from the Department of Electrical Engineering, National Taipei University of Technology (MCUT)



Electronics Camp organized by NTU SOC Center and the EECS:



Seminar with industry experts participated by NTU ICS Group



Seminar with industry experts participated by NCTU Institute of Electronics



Seminar with industry experts participated by Ming Chi University of Technology



Light Up the Globe



Environmental protection

Social issues we would like to resolve

Our role and methods

Major results in 2019

Our footprints

The burdens on our earth resulting from climate change and environmental pollution are getting serious and gradually becoming a global focus. Thus, it is imperative to fulfill our responsibilities as citizens of the Earth through enhancing environmental conservation awareness.

NTC connects non-profit environmental protection organizations with different attributes with each other and actively participates in various activities to promote environmental protection concepts, for example:

- Support the Earth Hour activity and save electricity consumption starting with small steps to safeguard the energy of earth.
- Hold swallow watching and wetland talks; promote ecological conservation and reconstruction.

About 300 employees participated in the initiative activities, and the amount of nearly NTD 250,000 was invested.

Earth Hour Event

The global energy conservation event is held at 8:30-9:30 pm on the last Saturday of March every year. NTC has participated in the event for two years in a row. Executive Vice President, Lin-Chin Su, led NTC's employees to participate in the event in the Youth Park in Taipei City.



Summer swallow watching

The Wugu Wetland is designated as one of the national wetlands in Taiwan. The New Taipei City government and the Society of Wilderness have worked together to conserve and reconstruct the wetland as well as educate the public. Therefore, the wetland has become a popular place for swallow watching. In collaboration with the Society of Wilderness for the second year, NTC encouraged our employees to attend the swallow watching activities with their children and understand the importance of wetlands to the ecology. The event attracted 83 participants.

Taishan Ecological Tour activities-environmental education parent-child camp

NTC and the Society of Wilderness jointly organized an environmental education parent-child camp in the summer of 2019. A total of 65 employees and their children participated in the camp. Through the camp, they understood the rich and diverse ecology in the Taishan District where NTC planted the seeds of sustainability.



Power Up Horizons



Humanistic care

Social issues we would like to resolve

Enhance humanistic qualities of the public and broaden their horizons on the human-oriented base in order to build a loving and caring social atmosphere.

Our role and methods

Work with local academic establishments and public welfare groups to promote art and culture activities to sponsor local soft power of culture and creativity as well as assist vulnerable groups in need of help

Major results in 2019

Donated to 5 public welfare food banks
A total of 14,045 people consumed fair-trade coffee

Our footprints

Weight loss activity for public welfare

NTC held a 3-month weight loss activity and public welfare donations. During the 3-month period, the Company donated NTD 1,000 to food banks every time one of our employees lost 1 kilogram. The Company could only donate a maximum to 5 food banks, and the amount of donations to each food bank could not exceed NTD 100,000. A total of 461 employees participated in the activity, and they lost 1,500.7 kilograms in 3 months. The Company distributed the donations of NTD 500,000 to the Andrew Food Bank, the Youth Power Club, the Chinese Christian Relief Association, the Taiwan People's Food Bank Association, and the Mustard Seed Mission.



Fair-trade pantry

The Company's pantries have become places where public welfare ideals have been implemented since June 2018. NTC has joined the project of fair-trade pantries promoted by Okogreen Co. Ltd., (the first Taiwanese trading company to receive certification from the Fairtrade International (FLO)), installing fair-trade coffee machines in the pantries of the company. Our employees can drink a cup of fair-trade coffee for NTD 10 each. As of the end of 2019, a total of 14,045 people had used the fair-trade coffee machines. To implement public welfare ideals, NTC and its employees will continue to support fair-trade coffee so as to assist the community development in third world countries, and improve the lives of impoverished farmers.





Line Up with Neighborhoods



Community harmony

Social issues we would like to resolve

Local prosperity and local value preservation should not be contradictory but complement each other. How enterprises can incorporate themselves into community reconstruction is a crucial subject an enterprise's social responsibility in the process of cultivating local connections.

Our role and methods

Listen to local needs, and use concrete actions to display the enterprise's sincerity with respect to creating shared prosperity with local residents

Major results in 2019

A total of 31 participants joined the mountain cleanup event at our plant (the mountain area)

Our footprints

Mountain cleanup activity jointly attended by NTC, NPC, and residents in the community

NTC, Nanya Plastics Corp. (NPC), and residents of the Guei He Village in the Taishan District cleans the environment around our plant together (the mountain area) every year. In 2019, we invited small children of our employees to attend the mountain cleanup activity, so parents and children could work together to maintain the cleanliness of the mountains. NTC hopes that the Company would help the society more and even become an active participant in repaying society. Through regular mountain cleanup activities, our employees have the chance to repay the surrounding community and create a mutually beneficial environment.



Taishan Ecological Tour activities-Mingzhi Academy and Hakka Cultural Festival

The Company's location is close to some historical, cultural and ecological attractions, including the Taishan Up Temple, the Qitou hiking trails, the Qiongzai Lake, and the Mingzhi Academy. To promote the ideal of local LOHAS community and protect the Mingzhi Academy, a famous landmark in the Taishan District and the first school in northern Taiwan, NTC sponsored the Taishan District Office of the New Taipei City Government to organize the 2019 Mingzhi Academy and Hakka Cultural Festival and Gate Ready Graff Party on the Mingzhi street.



Common Good



09 Appendix

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About this Report

Report Overview

This report is the tenth Corporate Social Responsibility Report issued by Nanya Technology Corporation (NTC), and contains information regarding the Company's corporate governance, environmental sustainability development, employee care and social welfare practices from January 1, 2019 to December 31, 2019. The scope of this report mainly covers NTC and its subsidiaries. Inconsistencies, if any, are explained separately in notes. The statistics provided in this report have been obtained from NTC's audited financial statements.

Information disclosure timeframe

January 1, 2019 to December 31, 2019

Scope of data

Nanya Technology Corporation's operations system include Nanya Technology Corporation and its subsidiaries.

Data quality management

Financial data: KPMG Taiwan
 Quality management ISO9001, IATF16949: LRQA
 Environmental management ISO14001: LRQA, ISO14064: SGS
 Safety and health ISO45001/TOSHMS: LRQA
 Electronic Industry Citizenship Coalition Code of Conduct RBA VAP (V5.1): TUV
 Sustainability Information AA1000AS 2008 with 2018 Addendum: BSI

Guidelines and Standards for Drafting

GRI Standards Core option

Level of Guarantee

AA 1000 Type II High assurance level

Contact Window

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Date of Publication

Nanya Technology Corporation's CSR report is published annually.

- Current edition: June 2020
- Last edition: June 2019
- Next edition: June 2021

Report Management

- 1 Annual results review
- 2 Confirm drafting methods
- 3 Collect information
- 4 Report preparation
- 5 Third-party attestation
- 6 Sustainable Development Committee Confirmation
- 7 Reports to the Board of Directors
- 8 Publish the Report on the CSR page of the Company's website





Appendix-NTC CSR Performance

NTC's Sustainable Roles	Sustainability Indicators	Unit	2017	2018	2019
A Trustworthy Company	Revenue	NT\$ 100 Million	549.2	847.2	517.3
	Operating Expenses	NT\$ 100 Million	58.5	72.6	69.8
	EPS	NT\$	14.36	12.80	3.23
	Ratio of Outside Directors	%	25	25	25
	Board Members Participation Rate	%	96	92	98
	"RBA Labor and Ethical Code of Conduct Course" completion rate	%	100	100	100
	"Business and Ethical Code of Conduct Course" completion rate	%	100	100	100
	"Anti-corruption Course" completion rate	%	99	100	100
	Internal audit anomaly improvement rate	%	100	100	100
	Grievance and complaint case	-	4	4	2
The Best Memory Partner for Our Customers	Appropriation for Innovative R&D/ Revenue	%	6.7	5.7	9.5
	Number of innovative R&D personnel/ Total Number of employees	%	14.4	15.5	19.3
	Number of patents granted	-	471	502	459
	Number of NTC trade secrets	-	4,172	5,056	3,989
	TAT meet rate of RMA cases	%	94	91	95
	Score of satisfaction	-	88.7	90.5	91.7
	Coverage rate of satisfaction survey	%	100	100	100
	Number of major suppliers (Tier 1)	-	350	270	330
	Number of key suppliers	-	89	80	82
	Proportion of key suppliers	%	25.4	29.6	24.9
A Promoter of Shared Value	Proportion of procurement from key suppliers	%	79	77	68
	Major supplier (including key suppliers)	%	60.29	81.11	100
	new suppliers	%	23.68	100	100
	key suppliers	%	80.89	78.75	100





NTC's Sustainable Roles	Sustainability Indicators	Unit	2017	2018	2019
A Promoter of Shared Value	Percentage of high-risk suppliers by sustainability risk assessment	Major suppliers key suppliers Tier 2 key suppliers	%	1 4.5 2.3	5 1.25 9.4 5
	Sustainability audit	Numbers of audited suppliers	-	8	25 17
		Average audit score	-	89.37	90.4 81.77
		Non-compliant audit item	-	20	39 112
	Local procurement(Taiwan)	Improvement rate	%	100	100 100
			%	37	38 31
	Improved performance of raw material consumption	Extensions to use cycle Formula development of new processes Reductions of process consumption	-	0 3 9	1 8 11 12
	Greenhouse gas emissions (scope 1 + 2)	ton-CO ₂ e	376,428.143	448,215.687	478,721.881
	Emission intensity - GHG emissions per unit area of product	kg-CO ₂ e/cm ²	0.75	0.77	0.77
	GHG emissions/chip kpcs	ton/kpcs	606	473	445
A Producer of Green Technology	GHG emissions/revenue	kg/million NTD	6,848	5,322	9,255
	PFC Performance	ton-CO ₂ e	373,941	519,291	569,563
	Perfluorocarbons emissions per unit wafer output	kg/ton	282	383	405
	Perfluorocarbons emissions per unit revenue	kg/million NTD	483	463	835
	Electricity consumption	MWh/million NTD	10.5	7.6	13.7
	Electricity consumption per unit capacity	MWh/k-pcs	0.93	0.68	0.66
	Natural gas consumed per unit capacity	M ³ /k-pcs	5.9	4.5	4.2
	Natural gas consumed per unit revenue	M ³ /million NTD	66.7	50.1	88.4
	Energy costs per unit capacity	10 thousand NTD/k-pcs	0.209	0.156	0.153
	Energy costs per unit revenue	10 thousand NTD/million NTD	2.36	1.76	3.19



NTC's Sustainable Roles	Sustainability Indicators	Unit	2017	2018	2019
A Producer of Green Technology	Water consumption per unit capacity	ton/k-pcs	4.98	3.17	3.03
	Water consumption per unit revenue	ton/million NTD	56.3	35.7	63.0
	Ultra-pure water consumption per unit capacity	ton/k-pcs	4.24	3.17	3.13
	Ultra-pure water consumption per unit revenue	ton/million NTD	47.9	35.7	65.2
	VOCs emissions per unit capacity	g/k-pcs	26.0	21.0	17.6
	VOCs emissions per unit revenue	g/million NTD	293.7	236.2	365.6
	Waste water discharge volume per unit capacity	ton/k-pcs	4.15	2.62	2.45
	Waste water discharge volume per unit revenue	ton/million NTD	46.9	29.5	50.9
	Hazardous waste/chip kpcs	kg/k-pcs	14.6	14.6	15.1
	Hazardous waste/revenue	kg/million NTD	165.3	164.5	313.6
An Attractive Employer for Professional Talents	Recycling rate of General waste	%	92.9	93.4	93.3
	Amount of environmental accounting expenses	NTD thousand	1,373,833	1,119,320	1,026,293
	Total employees	%	29.46	28.74	28.12
	Junior management (section/department head)	%	46.35	43.92	43.36
	Percentage of female managers	%	6.00	6.82	6.82
	Middle management (plant/division head)	%	0	0	0
	Top management (Assistant Vice President and above)	%	11.33	15.00	14.17
	Head of revenue-generating department (section head and above)	%	94.57	93.68	93.62
	Head of production line operations	%	9	10	11
	Nationality count	-	25	27	26
A Safe and Healthy Workplace	Number of employees with disability	-	10.86	8.53	5.92
	Voluntary separation rate	%	11.68	9.04	6.27
	Total separation rate	%	64	71	81
	Number of union members	-	2.22	2.27	2.53
	Percentage of employees with union membership	%	86.77	88.64	92.35
A Responsible and Ethical Company	Female-to-male total salary ratio - management level	%	158	158	158
	Female-to-male total salary ratio - operational level	%	158	158	158



NTC's Sustainable Roles		Sustainability Indicators	Unit	2017	2018	2019
An Attractive Employer for Professional Talents		Female-to-male remuneration ratio - management level	%	89.43	92.07	93.24
		Female-to-male total salary ratio - non-management level	%	110.35	109.11	109.02
		Female-to-male remuneration ratio - non-management level	%	116.37	115.31	113.15
		Reinstatement rate of unpaid parental leave	%	65.00	68.75	50.00
		Retention rate of unpaid parental leave	%	90.91	76.92	90.91
		Average training hours per person	hours	18.9	22.7	32.3
		Substitution rate of employees	%	43.0	47.4	67.4
		Total employee-related expenses (salaries + benefits)	NTD thousand	3,419,910	3,902,719	4,089,890
		Human Capital Return on Investment	%	15.3	20.8	11.9
		Productivity per employee	NTD thousand	18,404	26,319	15,642
		Profit contribution rate of human cost	%	201	263	171
		Return on personnel training investments	%	485	799	313
An Active Participant in Community and Social welfare		Disabling injuries frequency rate	Number of Injuries / Million Man-hours	0	0	0
		Disabling injuries severe rate	Lost hours of Injuries / Million Man-hours	0	0	0
		Frequency-severity indicator	-	0	0	0
	Category	Ratio of Charities	%	3.02	7.15	2.11
		Ratio of Community Investment	%	30.30	0.64	2.11
	Type of Contribution	Ratio of Commercial initiatives	%	66.68	92.21	95.78
		Ratio of Cash Donation	%	69.70	97.54	97.57
		Ratio of Goods Donation	%	30.18	0.21	0.26
		Ratio of Volunteering	%	0.12	0.15	0.20
		Ratio of Management Cost	%	0	2.10	1.97





Key Supplier List

Supplier Name
ASAHI KASEI CORP.
KMG SINGAPORE PTE LTD
NORTHERNWEST CORPORATION
ROHM AND HAAS ELECTRONIC MATERIALS
ROHM AND HAAS ELECTRONIC MATERIALS A
SILTRONIC SINGAPORE PTE LTD
SK SILTRON CO., LTD.
TOKYO OHKA KOGYO CO., LTD.
ULVAC, INC.
Air Products San Fu Co., Ltd.
Praxair Chemax Semiconductor Materials Co.,LTD.
Toppan Chunghwa Electronics Co., LTD.
Taisil Electronic Materials
WORLDFULL INT'L CORP.
Formosa Biomedical Technology Corp
Formosa Sumco Technology Corporation
INNOS Taiwan International Trading Co. Ltd.
Taiyo Nippon Sanso Taiwan, Inc.
BASF Taiwan Ltd., EDM
HITACHI CHEMICAL INTERNATIONAL CO.,
NIKKO METALS TAIWAN CO., LTD.
Tosoh SMD Taiwan,Ltd.
TOK TAIWAN CO., LTD.
TAIWAN MAXWAVE CO., LTD.

Supplier Name
Shin-Etsu Handotai Taiwan Co., Ltd.
Photronics DNP Mask Corp.
SUMITRONICS TAIWAN CO., LTD.
Honeywell Electronic Materials Taiwan Co.,Ltd
FUJIFILM ELECTRONIC MATERIALS TAIWAN CO., LTD.
SAFC HITECH Taiwan Co.,LTD
ROHM AND HAAS ELECTRONIC MATERIALS TAIWAN LTD.
TAIWAN KANTO DENKA CO., LTD.
Taiwan Polygas Technology CO., LTD.
Kemitek Industrial Corp., Ltd
Marketech International Corp.
Air Liquide Far Eastern Ltd.
Air Liquide Far Eastern.,Ltd
Jing He Science Co.,LTD.
Nan Ya Plastics Corporation
Showa Specialty Gas (Taiwan) Co, Ltd.
Entegris Asia LLC, Taiwan Branch
Praxair Surface Technology Inc. Taiwan
Versum Materials Technology LLC Taiwan Branch
Rohm and Haas Electronic Materials CMP Asia Inc., Taiwan Branch
TES Solutions Co., Ltd.
Giga Gas & Electronic Materials Company
TOPCO SCIENTIFIC CO., LTD.

Supplier Name
Cabot Microelectronics B.V. Taiwan
Botai Advanced Materials Co., Ltd.
Wah Lee Industrial Corp.
Versum Materials Taiwan Co. Ltd.
Versum Materials Taiwan Co., Ltd. Taichung Branch
MERCK PERFORMANCE MATERIALS LTD.
GlobalWafers CO., Ltd.
Asia Union Electronic Chemical Corporation
Lienhwa Industrial Gases Co., Ltd. Chung Kang Branch
KANTO-PPC Inc.





GRI Standards Index

GRI Standards (Version 2016)	Disclosure indicator	Indicator description	Chapter	Page
	102-1	Name of the organization	Company Overview	11
	102-2	Activities, brands, products, and services	Company Overview Major Products and Operation Performance	11 13
	102-3	Location of headquarters		11
	102-4	Location of operations	Company Overview	11
	102-5	Ownership and legal form		11
	102-6	Markets served		11
	102-7	Scale of the organization	Company Overview Major Products and Operation Performance	11 13
	102-8	Information on employees and other workers	Employee Diversity	110
	102-9	Supply chain	Supplier Sustainability Management	67
GRI 102: General Disclosures 2016	102-10	Significant changes to the organization and its supply chain	No significant change had taken place in 2019	-
	102-11	Precautionary principle or approach	Risk Management	40
	102-12	External initiatives	The Company participates in CDP by responding to CDP questionnaires	-
	102-13	Membership of associations	Company Overview	13
	102-14	Statement from senior decision-maker	Message from the President	04
	102-16	Values, principles, standards, and norms of behavior	Business Integrity	52
	102-18	Governance structure	Governance and Organization Corporate Governance	19 37
	102-40	List of stakeholder groups	Materiality Analysis	22
	102-41	Collective bargaining agreements	Talent Retention and Employee Care	114
	102-42	Identifying and selecting stakeholders	Materiality Analysis	24
	102-43	Approach to stakeholder engagement		24





GRI Standards (Version 2016)	Disclosure indicator	Indicator description	Chapter	Page
GRI 102: General Disclosures 2016	102-44	Key topics and concerns raised	Materiality Analysis	24
	102-45	Entities included in the consolidated financial statements	Major Products and Operation Performance, Appendix - About the report	15 ~ 155
	102-46	Defining report content and topic Boundaries	Appendix - About the report	155
	102-47	List of material topics	Materiality Analysis	24
	102-48	Restatements of information	None had occurred in 2019	-
	102-49	Changes in reporting	Materiality Analysis	24
	102-50	Reporting period		155
	102-51	Date of most recent report		155
	102-52	Reporting cycle	Appendix - About the report	155
	102-53	Contact point for questions regarding the report		155
	102-54	Claims of reporting in accordance with the GRI Standards		155
	102-55	GRI content index	Appendix - GRI Standards Index	161
	102-56	External assurance	Appendix - Assurance Statements	166
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	Materiality Analysis	24
GRI 200: Economic Series				
Series	Indicator	Description	Corresponding chapter	Page
GRI 103: Management Approach 2016	103-2	The management approach and its components	Materiality Analysis	24 ~ 52 ~ 67 ~
	103-3	Evaluation of the management approach	Talent Retention and Employee Care; Employee Diversity; Supplier Sustainability Management; Business Integrity	110-121
GRI 201: Economic Performance 2016	201-1	Direct economic value generated and distributed	Major Product and operation Performance	16
	201-3	Defined benefit plan obligations and other retirement plans	Talent Retention and Employee Care	118
GRI 202: Market Presence 2016(Material issue)	202-1	Ratios of standard entry level wage by gender compared to local minimum wage	Talent Retention and Employee Care	116
	202-2	Proportion of senior management hired from the local community	Employee Diversity	112
GRI 203: Indirect Economic Impacts 2016	203-1	Infrastructure investments and services supported	Social influence	145
	203-2	Significant indirect economic impacts	Social engagement	148



GRI 200: Economic Series

Series	Indicator	Description	Corresponding chapter	Page
GRI 204: Procurement Practices 2016(Material issue)	204-1	Proportion of spending on local suppliers	Supplier Sustainability Management	74
	205-1	Operations assessed for risks related to corruption		52
GRI 205: Anti-corruption 2016 (Material issue)	205-2	Communication and training about anti-corruption policies and procedures	Business Integrity	53
	205-3	Confirmed incidents of corruption and actions taken		57
	206-1	Legal actions for anti-competitive behavior		No violation had occurred in 2019

GRI 300: Environmental Series

Series	Indicator	Description	Corresponding chapter	Page
GRI 103: Management Approach 2016	103-2	The management approach and its components	Materiality Analysis Supplier Sustainability Management; Energy Management; Water Management; Greenhouse Gas Management; Effluent, Waste and Recycling	24、67、88-107
	103-3	Evaluation of the management approach		24、67、88-107
GRI 301: Materials 2016	301-1	Materials used by weight or volume	Eco-friendly products	84
	301-2	Recycled input materials used		84
	301-3	Reclaimed products and their packaging materials		84
GRI 302: Energy 2016 (Material issue)	302-1	Energy consumption within the organization	Energy Management	95-97
	302-3	Energy intensity		95-97
	302-4	Reduction of energy consumption		95-97
	302-5	Reductions in energy requirements of products and services		95-97
GRI 303: Water 2016 (Material issue)	303-1	Interactions with water as a shared resource	Water Management	98-99
	303-2	Management of water discharge-related impacts		98-99
	303-3	Water withdrawal		98-99
GRI 305: emissions 2016 (Material issue)	305-1	Direct (Scope 1) GHG emissions	Greenhouse Gas Management	91
	305-2	Energy indirect (Scope 2) GHG emissions		91
	305-4	GHG emissions intensity		92



GRI 300: Environmental Series

Series	Indicator	Description	Corresponding chapter	Page
GRI 305: emissions 2016 (Material issue)	305-5	Reduction of GHG emissions	Greenhouse Gas Management	94
	305-6	Emissions of ozone-depleting substances (ODS)	The Company does not use ODS	-
	305-7	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	Effluent, Waste and Recycling	100-101
GRI 306: Effluents and Waste 2016 (Material issue)	306-1	Water discharge by quality and destination	Water Management	98
	306-2	Waste by type and disposal method	Effluent, Waste and Recycling	102-104
	306-3	Significant spills	No spillage of oil, fuel, waste or chemical had occurred in 2018	-
	306-4	Transport of hazardous waste	Effluent, Waste and Recycling	103-104
	306-5	Water bodies affected by water discharges and/or runoff	Water Management	98-99
GRI 307: Environmental Compliance 2016	307-1	Non-compliance with environmental laws and regulations	There had been no violation of environmental protection law in 2019.	-
GRI 308: Supplier Environmental Assessment 2016(Material issue)	308-1	New suppliers that were screened using environmental criteria	Supplier Sustainability Management	67
	308-2	Negative environmental impacts in the supply chain and actions taken		67

GRI 400: Social Series

Series	Indicator	Description	Corresponding chapter	Page
GRI 103: Management Approach 2016	103-2	The management approach and its components	Materiality Analysis Customer Service; Supplier Sustainability Management; Employee Diversity; Talent Retention and Employee Care; Occupational Safety and Health Talent Development; Social Engagement	24 \ 63 \ 67 \ 110-143 \ 148
	103-3	Evaluation of the management approach		24 \ 63 \ 67 \ 110-143 \ 148
GRI 401: Employment 2016 (Material issue)	401-1	New employee hires and employee turnover	Employee Diversity	110
	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	Talent Retention and Employee Care	118
	401-3	Parental leave		118
GRI 402: Labor/Management Relations 2016	402-1	Minimum notice periods regarding operational changes	Talent Retention and Employee Care	114
GRI 403: Occupational Health and Safety 2016 (Material issue)	403-1	Workers representation in formal joint management-worker health and safety committees	Occupational Safety and Health	136



GRI 400: Social Series

Series	Indicator	Description	Corresponding chapter	Page
GRI 403: Occupational Health and Safety 2016 (Material issue)	403-2	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	Occupational Safety and Health	136
	403-3	Workers with high incidence or high risk of diseases related to their occupation		137
GRI 404: Training and Education 2016 (Material issue)	404-1	Average hours of training per year per employee	Talent development	128
	404-2	Programs for upgrading employee skills and transition assistance programs		134
	404-3	Percentage of employees receiving regular performance and career development reviews		135
GRI 405: Diversity and Equal Opportunity 2016	405-1	Diversity of governance bodies and employees	Corporate Governance Employee Diversity	37
	405-2	Ratio of basic salary and remuneration of women to men		110
GRI 406: Non-discrimination 2016	406-1	Incidents of discrimination and corrective actions taken	Business Integrity Human Rights	52
				122
GRI 409: Forced or Compulsory Labor 2016 (Material issue)	409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	Supplier Sustainability Management Human Rights	67
				122
GRI 412: Human Rights Assessment 2016 (Material issue)	412-1	Operations that have been subject to human rights reviews or impact assessments	Human Rights	122
	412-2	Employee training on human rights policies or procedures		122
GRI 413: Local Communities 2016 (Material issue)	413-1	Operations with local community engagement, impact assessments, and development programs	Social engagement	148-153
GRI 414: Supplier Social Assessment 2016 (Material issue)	414-1	New suppliers that were screened using social criteria	Supplier Sustainability Management	67
GRI 417: Marketing and Labeling 2016	417-2	Incidents of non-compliance concerning product and service information and labeling	None had occurred in 2019	-
	417-3	Incidents of non-compliance concerning marketing communications		-
GRI 418: Customer Privacy 2016 (Material issue)	418-1	Substantiated complaints concerning breaches of customer privacy and losses of customer data	Customer Service	64
GRI 419: Socioeconomic Compliance	419-1	Non-compliance with laws and regulations in the social and economic area	None had occurred in 2019	-



Independent Assurance Opinion Statement



By Royal Charter

INDEPENDENT ASSURANCE OPINION STATEMENT

Nanya Technology 2019 Corporate Social Responsibility Report

The British Standards Institution is independent to Nanya Technology Corporation (hereafter referred to as Nanya Technology in this statement) and has no financial interest in the operation of Nanya Technology other than for the assessment and verification of the sustainability statements contained in this report.

This independent assurance opinion statement has been prepared for the stakeholders of Nanya Technology only for the purposes of assuring its statements relating to its corporate social responsibility (CSR), more particularly described in the Scope below. It was not prepared for any other purpose. The British Standards Institution will not, in providing this independent assurance opinion statement, accept or assume responsibility (legal or otherwise) or accept liability for or in connection with any other purpose for which it may be used, or to any person by whom the independent assurance opinion statement may be read. This independent assurance opinion statement is prepared on the basis of review by the British Standards Institution of information presented to it by Nanya Technology. The review does not extend beyond such information and is solely based on it. In performing such review, the British Standards Institution has assumed that all such information is complete and accurate. Any queries that may arise by virtue of this independent assurance opinion statement or matters relating to it should be addressed to Nanya Technology only.

Scope

The scope of engagement agreed upon with Nanya Technology includes the followings:

1. The assurance scope is consistent with the description of Nanya Technology 2019 Corporation Corporate Social Responsibility Report.
2. The evaluation of the nature and extent of the Nanya Technology's adherence to AA1000 AccountAbility Principles (2018) and the reliability of specified sustainability performance information in this report as conducted in accordance with type 2 of AA1000 Assurance Standard (2008) with 2018 Addendum sustainability assurance engagement.

This statement was prepared in English and translated into Chinese for reference only.

Opinion Statement

We conclude that the Nanya Technology 2019 Corporation Corporate Social Responsibility Report provides a fair view of the Nanya Technology CSR programmes and performances during 2019. The CSR report subject to assurance is materially correct without voluntary omissions, based upon testing within the limitations of the scope of the assurance, the information and data provided by the Nanya Technology and the sample taken. We believe that the 2019 economic, social and environmental performance information are correctly represented. The CSR performance information disclosed in the report demonstrate Nanya Technology's efforts recognized by its stakeholders.

Our work was carried out by a team of (CSR) report assurers in accordance with the AA1000AS (2008) with 2018 Addendum. We planned and performed this part of our work to obtain the necessary information and explanations we considered to provide sufficient evidence that Nanya Technology's description of their approach to AA1000AS (2008) with 2018 Addendum and their self-declaration in accordance with GRI Standards: Core option were fairly stated.

Methodology

Our work was designed to gather evidence on which to base our conclusion. We undertook the following activities:
 a top level review of issues raised by external parties that could be relevant to Nanya Technology's policies to provide a check on the appropriateness of statements made in the report
 discussion with managers on Nanya Technology's approach to stakeholder engagement. Moreover, we had sampled two external stakeholders to conduct interview
 interview with 24 staffs involved in sustainability management, report preparation and provision of report information were carried out
 review of key organizational developments
 review of the extent and maturity of the relevant accounting systems for financial and non-financial reports
 review of the findings of internal audits
 the verification of performance data and claims made in the report through meeting with managers responsible for gathering data
 review of the processes for gathering and ensuring the accuracy of data, followed data trails to initial aggregated source and checked sample data to greater depth during site visits
 the consolidated financial data are based on audited financial data, we checked that this data was consistently reproduced
 review of supporting evidence for claims made in the reports
 an assessment of the organization's reporting and management processes concerning this reporting against the principles of Inclusivity, Materiality, Responsiveness and Impact as described in the AA1000AP (2018)

Conclusions

A detailed review against the Inclusivity, Materiality, Responsiveness and Impact of AA1000AP (2018) and sustainability performance information as well as GRI Standards is set out below:

Inclusivity

In this report, it reflects that Nanya Technology has continually sought the engagement of its stakeholders and established material sustainability topics, as the participation of stakeholders has been conducted in developing and achieving an accountable and strategic response to sustainability. There are fair reporting and disclosures for economic, social and environmental information in this report, so that appropriate planning and target-setting can be supported. In our professional opinion the report covers the Nanya Technology's inclusivity issues and has demonstrated social responsible conduct supported by top management and implemented in all levels among organization.

Materiality

The Nanya Technology publishes material topics that will substantively influence and impact the assessments, decisions, actions and performance of Nanya Technology and its stakeholders. The sustainability information disclosed enables its stakeholders to make informed judgements about the Nanya Technology's management and performance. In our professional opinion the report covers the Nanya Technology's material issues.

Responsiveness

Nanya Technology has implemented the practice to respond to the expectations and perceptions of its stakeholders. An Ethical Policy for the Nanya Technology is developed and continually provides the opportunity to further enhance Nanya Technology's responsiveness to stakeholder concerns. Topics that stakeholder concern about have been responded timely. In our professional opinion the report covers the Nanya Technology's responsiveness issues.

Impact

Nanya Technology has Identified and fairly represented impacts that were measured and disclosed in probably balanced and effective way. Nanya Technology has established processes to monitor, measure, evaluate and manage impacts that lead to more effective decision-making and results-based management within an organization. In our professional opinion the report covers the Nanya Technology's impact issues.

Performance information

Based on our work described in this statement, specified sustainability performance information such as GRI Standards disclosures disclosed in this report, Nanya Technology and BSI have agreed upon to include in the scope. In our view, the data and information contained within Nanya Technology 2019 CSR Report are reliable based on procedures undertaken by means of vouching, re-tracking, re-computing and confirmation.

GRI Sustainability Reporting Standards (GRI Standards)

Nanya Technology provided us with their self-declaration of in accordance with GRI Standards: Core option (For each material topic covered by a topic-specific GRI Standard, comply with all reporting requirements for at least one topic-specific disclosure). Based on our review, we confirm that social responsibility and sustainable development disclosures with reference to GRI Standards' disclosures are reported, partially reported or omitted. In our professional opinion the self-declaration covers the Nanya Technology's social responsibility and sustainability topics.

Assurance level

The high level assurance provided is in accordance with AA1000AS (2008) with 2018 Addendum in our review, as defined by the scope and methodology described in this statement.

Responsibility

This CSR report is the responsibility of the Nanya Technology's chairman as declared in his responsibility letter. Our responsibility is to provide an independent assurance opinion statement to stakeholders giving our professional opinion based on the scope and methodology described.

Competency and Independence

The assurance team was composed of Lead auditors experienced in relevant sectors, and trained in a range of sustainability, environmental and social standards including AA1000AS, ISO 14001, ISO 45001, ISO 14064 and ISO 9001. BSI is a leading global standards and assessment body founded in 1901. The assurance is carried out in line with the BSI Fair Trading Code of Practice.

For and on behalf of BSI:



Peter Pu, Managing Director BSI Taiwan

...making excellence a habit.TM

Statement No: SRA-TW-2019028

2020-05-10

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