



Central Taiwan Science Park Bureau,
Ministry of Science and Technology

Corporate Sustainability Report



2019

Corporate Sustainability Report

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To implement the development of sustainable social responsibility, Central Taiwan Science Park Bureau (the Bureau) regards taking care of the economic development of the park, promoting social harmony and environmental protection as its responsibilities and actively fulfills four goals of coexistence and co-prosperity, namely "the Unity of Production, Living, Ecology, and Life" for sustainable management. To cope with the global trends and keep up with the times, the Bureau actively echoes to the "17 Sustainable Development Goals (SDGs)" and 15 goals out of "18 Taiwan Sustainable Development Goals" with its core capabilities, disclosing our achievement in both English and Chinese versions of the 2019 Corporate Sustainable Report of Central Taiwan Science Park Bureau, Ministry of Science and technology. In addition, related policies, objectives and concrete results of the Bureau's management effectiveness in terms of the issues that concern all shareholders are also disclosed with open and transparent data in an objective manner.

• Epidemic Prevention to Jointly Safeguard CTSP

The global pandemic of COVID-19 occurred at the end of 2019, and the Bureau established an emergency response team to implement a series of epidemic prevention and control measures. In addition, the Bureau also assisted the park manufacturers in the preparation of epidemic prevention and continuous operation planning. We also strengthened the advocacy of epidemic prevention and set up an "Epidemic Prevention Section" on the internet, aiming at surviving the epidemic together.

• Creating Diverse Interactions to Reinforce Organizational Management

Diverse communication channels with the stakeholders are established through the CTSP official website, CSR website, Facebook fan page, Annual Report, and text messages. In addition, relevant responses to and explanations of topics the stakeholders concern about obtained from the interactions with them will be made in this CSR Report. An English version of this CSR Report will be issued for the first time in 2020, and the English version of the website will also be established to enable more diverse stakeholders to understand CTSP Bureau's current status and sustainable behavior.

• Integrity Governance of CTSP and Implementation of Integrity and Ethics

Directions As a public agency, CTSP Bureau abides by the "Freedom of Government Information Law" to protect people's right to know. When our staff perform duties, Integrity and Ethics Directions for Civil Servants is complied with to stay in line with integrity, self-discipline, fairness and law-based administration to eliminate all corruption cases and implement internal control system to create a friendly and clean image of CTSP Bureau with integrity and law-abiding as well as enthusiastic service spirit.

• Innovation-driven Industries and Upgrading of Smart Clusters

To drive the high-tech industry development in central Taiwan to facilitate the innovation and transformation of the science park, the Bureau provides resources for cultivation and innovation to prepare for the next dynamics for industrial upgrading. The establishment of the "Ai robotics Hub" is to reach the operational goals of talent cultivation and innovative practices to form a strong smart machinery industry chain and to apply AI to industries to enhance the economic development and industrial competitiveness of the country.



• Cradle of Talent Cultivation and Maintenance of Labor Rights and Interests in the Park

In order to assist the business units in the park to recruit talents and to promote local employment and foster excellent R&D personnel required in the industry, we provide complete and customized employment matching services. Advocacy and guidance of occupational safety and health, implementation of industrial safety related inspections, project inspection plans of labor conditions and labor grievance matters in the park are conducted to continue strengthening inspections of labor conditions to ensure the protection of labor rights.

• Advanced Deployment for a Sustainable, Disaster-free, and Safe Park

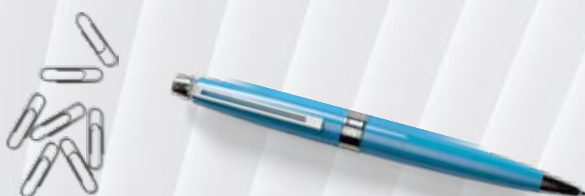
In the face of the increasingly severe climate change risks, the Bureau adopts rolling reviews of risks in all aspects and establishes the smart disaster prevention water information system and earthquake early warning system to cope with the operational challenges and opportunities brought by climate change. We counsel manufacturers on water and electricity saving measures to increase the overall energy use efficiency and also encourage them to make use of the emerging solar and renewable water resources to reduce the risk of disruption of energy resource supply, working on the reduction of GHG emissions for the implementation of the sustainable development of social responsibility.

• Practices of Environmental Management for the Implementation of a Green Park

The Bureau has never stopped the efforts in environmental protection. While working on the park operations, we also strengthen guidance and inspection of air pollution, water pollution and waste to ensure the environmental compliance. In addition, all parks have to comply with the contents of the environmental impact assessment documents and review conclusions, striving to reduce the environmental impact to the minimum and regularly implement environmental monitoring. To maintain the ecology of the park, more environment suitable for animal and plant growth as their habitats will be retained. The ultimate goal is not to affect the ecology, environment and people's lives.

• Realization of a Bright Future and Construction of a Friendly Park

To maintain the ecology of the park and create a friendly park with co-prosperity and harmony with the ecology, CTSP Bureau continues to strengthen environmental protection and promote life functions and actively participates in community activities, conducts health risk assessment and guided environmental education tours, and invites the public to appreciate public art. Looking into the future, the Bureau will continue to step toward the goals of Industrial Artificial Intelligence and innovation transformation, acceleration of park development and investment recruitment, and the digital transformation of park services to create a sustainable eco-park.





▶ About This Report

Dear readers, welcome to this edition of “2019 Corporate Sustainability Report of Central Taiwan Science Park Bureau, Ministry of Science and Technology” (hereinafter referred to as this Report). This is our fourth publication of the Non-Financial Reporting (Sustainability Reporting) issued by Central Taiwan Science Park Bureau, Ministry of Science and Technology (hereinafter referred to as Central Taiwan Science Park Bureau, CTSP Bureau or the Bureau). This Report was compiled by referring to GRI (Global Reporting Initiative) Standards for the disclosure of relevant performance and contents. In addition to continuously strengthening technology foresight and economic development needs, we also set the highest goals to strive for, namely “To be innovation-orientated, to work on environmental protection, to be locally friendly, and to have global visions”, aiming at creating sustainable benefits.



Our “2018 Corporate Sustainability Report” was highly recognized in external examination and was honored with the Taiwan Corporate Sustainability Awards- Gold Award in 2019. CTSP Bureau expects to publicly present transparent information of its practices and achievements in economic, environmental and social aspects through the preparation and compilation of the CSR Report to enable all social groups to understand our endeavor and commitment to sustainable management.

· Reporting Scope and Statistics Basis

The reporting scope covers CTSP Bureau and the land under its jurisdiction (Taichung Science Park, Huwei Science Park, Houli Science Park, Erlin Science Park and Chung Hsing Park). The reporting period was between January 1 and December 31 in 2019. There was no major change in the organization or supply chain in terms of the reporting scope compared with the previous version. All test data required by law was tested or verified by a third impartial party, and all numbers were presented in the most common way of description. Exact figures were given in this Report.

All the statistical data disclosed in this Report came from the internal statistics and investigation results of all departments in the Bureau’s “Working Group on Editing Corporate Sustainability Report”. The Environment and Labor Affair Division summarized data concerning the overall operation and performance in environmental management and social and economic aspects, the finalized Report was approved by the Director-General before publication. Compared with the 2018 CSR Report, the re-editing of some data will be noted in the text of this 2019 Report.

· Reporting Principles and Guidelines

The content framework of this Report was based on the core option criteria for the GRI (Global Reporting Initiative) Standards and the AA1000 AccountAbility Principles (AA1000AP). The priorities of the sustainability considerations of the stakeholders’ concern were identified through the substantive analysis model for the aspects to be disclosed, including environmental protection issues, related strategies, goals and measures, labor behavior, social aspects, human rights and local community impact, and the guidelines listed served as the compilation basis while relevant guidelines and initiatives referred to are listed as follows.

- GRI (Global Reporting Initiative) Standards (GRI Sustainability Reporting Standards)
- Sustainable Development Goals (SDGs)
- Taiwan Sustainable Development Goals
- AA1000 AccountAbility Principles
- ISO 26000 Guidance on Social Responsibility
- The UN Global Compact (UNGC)
- Task Force on Climate-Related Financial Disclosures (TCFD)

· Report Issuance

CTSP Bureau schedules the issuance of its “Corporate Sustainability Report” every year, and the content of the Report is simultaneously disclosed on its official website. If the CSR Report of the current year is not released for any reason, relevant contents will be disclosed in other publications.

Previous edition: Issued in July, 2019

Current edition: Issued in July, 2020

· Verification of this Report

To increase the impartiality of this Report, the Bureau entrusted British Standards Institution (BSI) to verify this Report in accordance with the GRI Standards (Sustainability Reporting Standards) and AA1000 AS (Assurance Standard) Type 1 (Moderate Level Assurance). It was verified by BSI that this Report was complied with the aforementioned framework and assurance standard level. To enhance the transparency and reliability of the organization report, the verification statement is attached in Appendix I and the GRI Content Index in Appendix II for the readers to refer to.

· Contact Information

It is hoped that the endeavor and achievement of CTSP Bureau in the promotion of sustainable management can be better understood by the general public and our stakeholders through this Report. Feedback from all walks of life serve as the basis for our continuous improvement. Please contact us for any questions or suggestions about this CTSP “2019 CSR Report”.

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▶ Message from the Director-General

CTSP showed no fear in the face of the keen industrial competition and challenges brought by the US-China trade war in 2019. Our strength was shown in the 9.98% annual revenue growth rate, reaching the figure of NTD 797.232 billion in total and the number of employees at CTSP increased by 6.07%, exceeding 50,000 people, with both figures hitting a historical high. The rapid growth of CTSP successfully attracted outstanding talents to station here, making it the technological life center in central Taiwan.

The development of the overall park depends on not only economic growth but also the simultaneous development of a humanistic community and environmental sustainability. While creating an economic miracle, CTSP also sets an example in the implementation of its social responsibility. Through the continuous issuance of the "Corporate Sustainability Report (CSR)", our stakeholders are informed of the efforts we make in strategic planning in terms of economic, environmental and social aspects as well as in sustainability.

Last year, our 2018 Corporate Sustainability Report was honored with the Taiwan Corporate Sustainability Awards- Gold Award. With the spirit of being better and better, in addition to presenting to the public our endeavor in industrial development and economic growth, our intention to take into account both humanities and sustainable development of the environment is also demonstrated in this year's Report. In terms of industrial development, CTSP actively introduces low-pollution and low energy-consuming industries and at the same time works with the businesses in the Park to promote various sustainable behavior, such as promoting green roofs, recycling and reuse of waste, and renewable water resources. In addition to the complete hardware facilities, art and humanities activities are also combined, and CTSP public art, "Art Tour in CTSP"- 3D surrounding guide to digital archives, as well as "Discovering the Beauty of CTSP" photography competition all combine technology and humanities to enable the public to experience the beauty of CTSP in diversity.

Looking into the future, the model of global industrial development is changing rapidly. At the time when the world is impacted by the global pandemic of COVID-19, only when we have a layout with forward-looking thinking can we obtain the opportunities for changes. In addition to the continuous promotion of various industry-Academic research subsidy programs, we also assist manufacturers with the breakthrough of technological innovation, the increase of added value of products, and acceleration of the construction and promotion of the 5G infrastructure. Furthermore, we also strengthen the technology R&D and application in the industrial chain, introduce new start-up teams into the park, connect the new start-up teams with the international incubation system to link to international resources. Besides, through the creation of a good environment for investment and living, high-tech manufacturers and talents at home and abroad are attracted to station in the park, forming a model park that combines park development and industrial innovation and transformation.



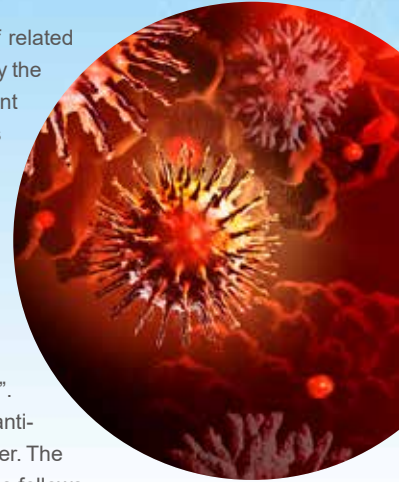
Director-General
Dr. Maw-Shin Hsu

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Special Column- COVID-19 Prevention Measures

Since the outbreak of the COVID-19 coronavirus pandemic, CTSP Bureau has launched a series of related prevention measures. The usual Lunar New Year gathering on the first day of the spring festival was replaced by the first emergency response meeting for epidemic prevention. The Director-General instructed the establishment of an epidemic prevention counter in the industrial and commercial as well as the administration buildings and the preparation of various epidemic prevention materials to avoid any gaps for epidemic prevention. In addition, an emergency response team was established, and various epidemic prevention meetings were convened to carry out the epidemic prevention work.

To reduce the impact of the new coronavirus on the manufactures in the park and for the smooth operation of the manufacturers, the trade union in the park and Bureaus in Three Science Parks jointly held a video conference on Feb. 17th, 2020 to discuss possible impacts of the “new coronavirus pandemic on the industries in the science parks and the coping measures and assistance needed from the government”. We invited the manufactures in the parks to participate in the video conference to understand the relevant anti-epidemic measures, the measures taken in the parks and the contingency plans to survive the epidemic together. The comprehensive epidemic prevention and continuous operation measures of CTSP Bureau are summarized as follows.



Internal anti-epidemic control measures at CTSP Bureau

- Established an emergency response team.
- Established a communication channel with the Taiwan Centers for Disease Control and the Health Bureau in the jurisdiction to pass on epidemic related information and provide related consultations.
- Strengthen cleaning and disinfection of the environment, post epidemic prevention announcements, and control access of non-essential visitors for official purposes.
- Prepare anti-epidemic materials, including infrared thermal imagers, forehead thermometer guns, goggles, masks, 75% alcohol, alcohol-based hand sanitizer and so on.
- Strengthen the employees' self-health management and the reporting and tracking system of those having traveled overseas.
- Implement measures of split operation and divert the management of different units.



Assist the manufactures in the park with epidemic prevention preparation and continuous operation planning

- Ask the manufactures to establish relevant anti-epidemic management mechanisms and assist them with the establishment of plans for continuous operation.
- Ask the manufactures to strengthen their personnel's health education for epidemic prevention and the implementation of frequent hand washing as well as the monitoring of body temperature.
- Established a single contact and service window, and the Deputy Director is assigned as the convener while all business units assist with the contacts and notification operations.
- Assist with the deployment of the production line of industrial masks needed in the park.
- Implement the propaganda and counseling of anti-epidemic measures in the workplace within the park and strengthen the inspection of the life management of foreign laborers and related anti-epidemic propaganda as well as control measures.

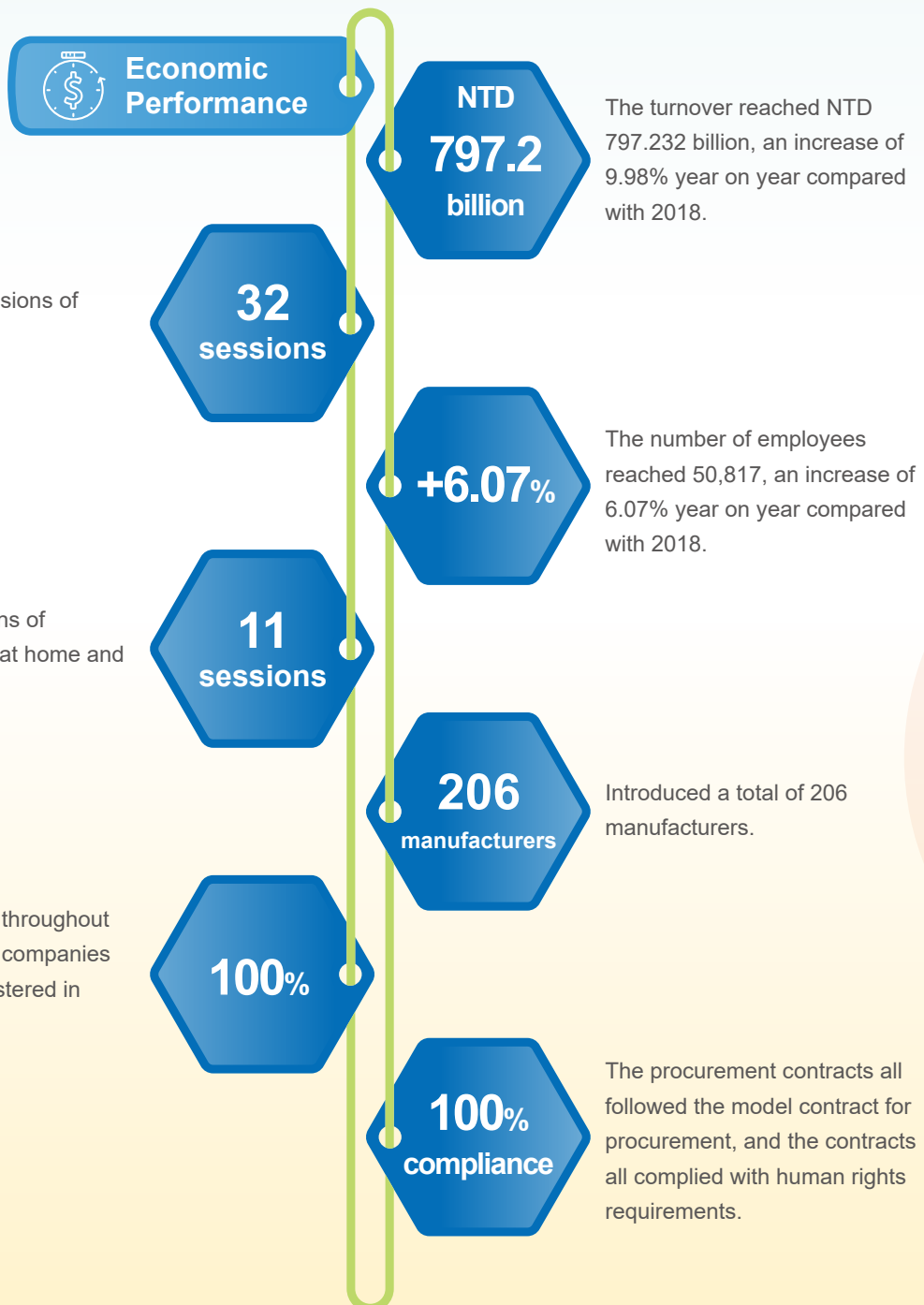


Strengthen epidemic prevention measures and pandemic propaganda

- Establish an “epidemic prevention section” online to strengthen the promotion of related anti-epidemic guidelines and guidelines for the plans for continuous operation of enterprises.
- Announce the medical consultation hotline in the park and formulate the SOPs for rescue operations.
- Provide park manufacturers with epidemic related and anti-epidemic information through Line Groups and emails.



2019 Performance of Sustainability Management





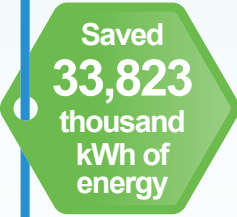
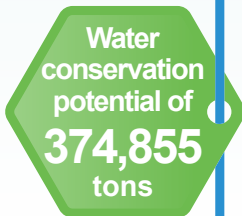
Environmental Performance

Provided 972 cases of consulting services concerning environmental protection



The environmental protection work complied with the total amount control and stricter standards of environmental impact assessment (EIA) commitment.

Provided guidance to 3 manufacturers, and the total water conservation potential amounted to 374,855 tons/year, reducing 59.98 tons of CO₂e / annual emission potential.



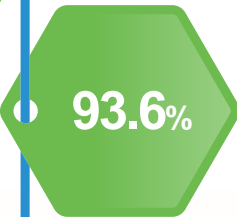
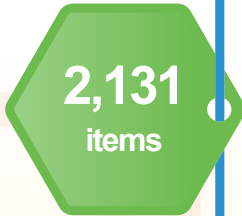
Provided guidance to 5 manufacturers, and the energy efficiency potential amounted to 33,823 thousand kWh of electricity every year, reducing approximately 18,028 tons of CO₂e emission.

The wastewater treatment plants in the parks all operate in accordance with regulations, and 100% of the discharged water was in line with the effluent standards and EIA commitments.



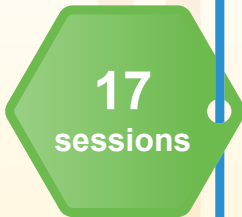
By providing guidance to the manufacturers in the park for water and electricity conservation, 18,087 tons of CO₂e emission could be saved.

Carried out 2,131 items of environmental monitoring projects.



The average reuse rate of waste in the parks has reached 93.6%, the highest among the three Science Parks.

Conducted a total of 17 sessions of environmental protection tracking, supervision meetings and on-site inspections.



A total of 15 species of protected birds were found in the ecological survey.

Organized 33 sessions of environmental education courses in Taichung, Huwei and Houli Parks; 17 sessions of environmental education related visits; 38 sessions of visits to the science park, with a total of 2,765 participants.



A total of 137,864 people took the free shuttle bus, reducing approximately 137 tons of CO₂e emission.



For the labor supervision and inspection program, 15 project inspection programs and 650 sessions of labor supervision and inspection were implemented.

Conducted epidemiology tracking (once every 5 years), and the cumulative number of people receiving questionnaire survey and blood biochemical tests reached 1,453 people.

In 2019, we provided counseling to 60 teams selected in the "From IP to IPO program (FITI)" and fruitful results were reached. Among them, 1 team was awarded the Entrepreneurship Excellent Award, 6 were awarded the Potential Award, and 23 set up new start-ups.

The overall satisfaction score in 2019 was 88.97 points, the highest score among the three Science Parks and also the highest in the same aspects compared with previous surveys in CTSP. The scores in six major aspects increased significantly compared with those in 2018.

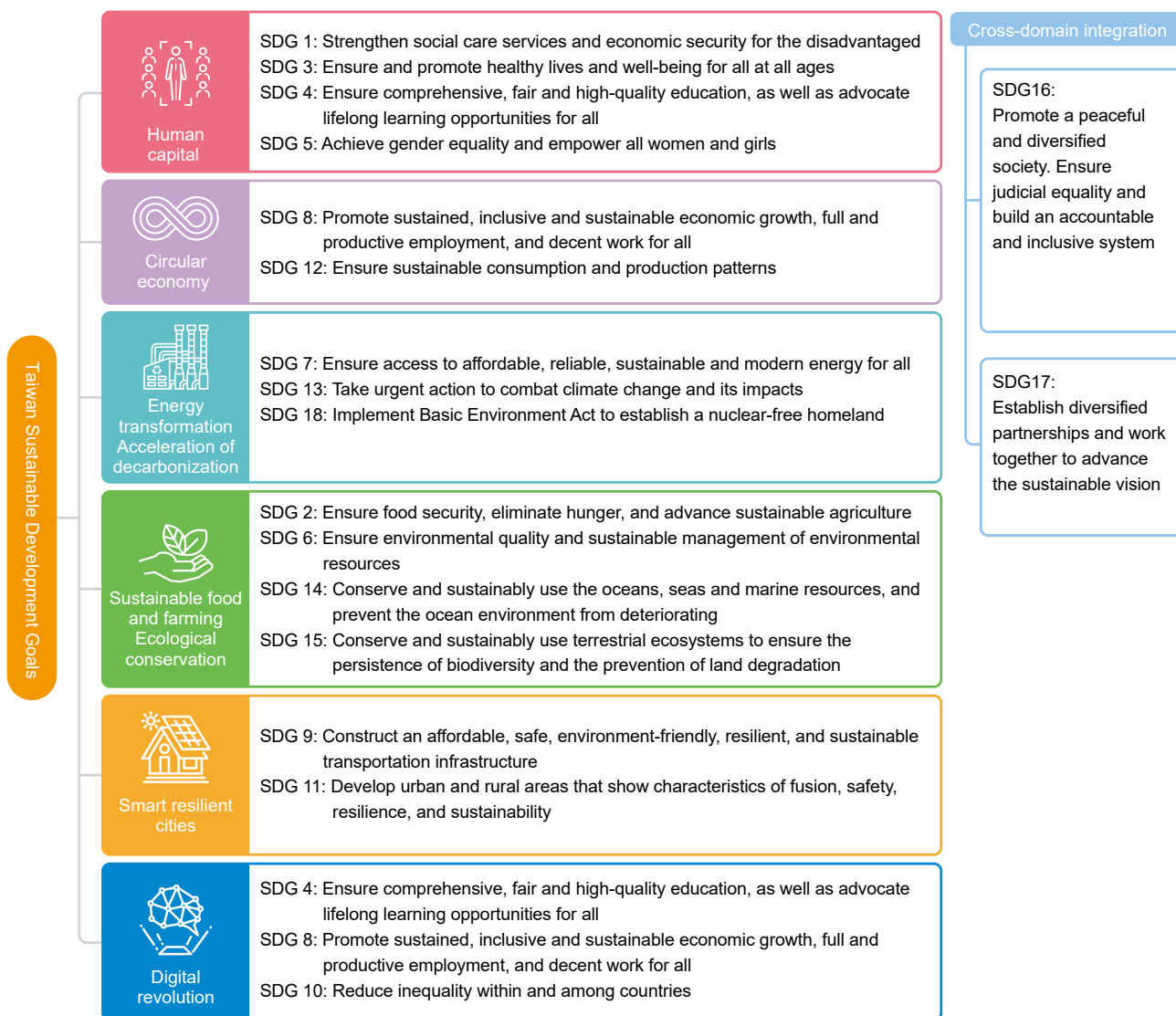
Organized a neighborly health care plan in Houli Park to provide health check-ups for residents meeting health check conditions. As of 2019, a total of 232 sessions of propaganda were held, 4,917 people received telephone interviews and 3,406 people received the health examination.

Conducted various industry-academia collaboration projects, talent cultivation, and the AI Robotics Hub and training programs, and a total of 7,427 talents with master's or doctoral degrees needed in the industries received the cultivation program.

Since the "FRC(FIRST Robotics Competition) Observation and Training" was held in 2017 and the FRC Taiwan Practice Tournament and FRC Off-Season were held in 2018 and 2019 respectively, the number of domestic high school FRC competition teams has rapidly increased from 3 teams in 2017 to 20 teams in 2019. The initiative was successfully obtained to organize the "2020 FIRST Robotics Competition Science Park Taichung Regional" in Taiwan, successfully promoting the robotics activity and cultivating STEM (Science, Technology, Engineering, and Mathematics) talents.

Active Implementation of Sustainable Development Goals (SDGs)

In the face of the huge changes and challenges brought by the emerging risks in the world, the United Nations passed the 17 Sustainable Development Goals (SDGs) and 169 targets in 2015 as the reference guidelines for policy transformation in various countries. Taiwan has taken inventory of the national systematic risks and the “Sustainable Development Goals of Taiwan” has been established based on the SDGs, which were passed and approved by National Council for Sustainable Development, Executive Yuan in July, 2019.



CTSP Bureau follows the global trend, connects with the global community and stays in dialogue with the world, and has been devoted to the implementation of the UN SDGs. Since 2016, the Bureau has disclosed its corresponding behavior in its CSR Report. To comply with national policies and to enable the stakeholders to understand the Bureau’s achievement in sustainable management, this CSR Report will further focus on “Taiwan Sustainable Development Goals”, and the specific corresponding actions taken with our core capabilities are also disclosed.

Taiwan Sustainable Development Goals integrated the core goals of the UN 17 SDGs and the systematic risk Taiwanese people are concerned about as well as the recommendations for transformation actions of the flagship projects of internationally important sustainable development research, and six major transformation fields are proposed, including “Strengthen the capacities of human resources”, “Circular economy”, “Energy transformation and acceleration of decarbonization”, “Sustainable food and farming system and ecological conservation”, “Smart cities” and “Sustainability-oriented digital revolution”. In addition, an item of “Cross-domain integration” was established for Goal 16 and Goal 17 that cross the six major fields. Specific practices of the Bureau in response to Taiwan Sustainable Development Goals within the scope of the park management business are described as follows.




Human capital


Core Goal 01: Strengthen social care services and economic security for the disadvantaged

Corresponding SDGs goals	Corresponding index	Practice behavior
	1.4.1: Organize entrepreneurship training sessions 1.4.2: Number of people receiving consultation and counseling services	Between 2013 and 2019, we provided counseling to 157 teams selected in the "From IP to IPO program (FITI)". Among them, 9 teams were awarded the Entrepreneurship Excellent Award and granted venture fund of NTD 2 million, 6 were awarded the Potential Award, and 74 set up start-ups.
	1.5.1: Number of deaths, missing persons and directly affected persons 1.5.2: Annual loss of public property attributed to disasters	The health and safety status of the labors in CTSP in 2019 was as follows: Disabling injuries: 98; Disabling injury frequency rate: 1.04; Disabling injury severity rate: 28; Work-related death: 2.


Core Goal 03: Ensure and promote healthy lives and well-being for all at all ages

Corresponding SDGs goals	Corresponding index	Practice behavior
	3.9.1: Improvement of air quality to maintain the health of the public	<ul style="list-style-type: none"> We organized a neighborly health care plan in Houli Park to provide health check-ups for residents meeting health check conditions. As of 2019, a total of 232 sessions of propaganda were held, 4,917 people received telephone interviews and 3,406 people received the health examination. We conducted epidemiology tracking (once every 5 years), and the cumulative number of people receiving questionnaire survey and blood biochemical tests reached 1,453 people.

Core Goal 04: Ensure comprehensive, fair and high-quality education, as well as advocate lifelong learning opportunities for all

Corresponding SDGs goals	Corresponding index	Practice behavior
	4.2.2: Supply of publicization and quasi-public pre-school education services	To enable the children of people working in the park to receive equal and high-quality education, we provide a diverse and international learning environment for the children of employees in the park. <ul style="list-style-type: none"> Started National Experimental High School at Central Taiwan Science Park in 2010. Established Junior High Department in Aug. 2016, formally becoming a complete secondary school. Assisted TSMC to establish a kindergarten in Fab 15A in 2018 to improve labor welfare and create a friendly workplace. International Bilingual School at Central Taiwan Science Park was established in Aug. 2019, and the first stage of enrollment targeted at 7th to 12th graders.
	4.3.1: Participation rate of youth and adults in higher education in the previous 12 months	<ul style="list-style-type: none"> We organized the 2019 CTSP Professional and Technical Talent Training Program and provided 21 training courses in 5 major categories, with a total of 664 trainees. For the 2019 Science Park Talent Cultivation Subsidy Program, a total of 14 module courses in 9 schools were subsidized, with a total of 1,041 trainees.
	4.7.4: Certified environmental education facilities	Taichung Wastewater Treatment Plant, Houli Wastewater Treatment Plant, Huwei Wastewater Treatment Plant under the jurisdiction of CTSP have obtained the environmental education facility certification. In addition, TSMC and AU Optronics in CTSP also obtained the environmental education facility certification respectively.

Core Goal 05: Achieve gender equality and empower all women and girls


Corresponding SDGs goals	Corresponding index	Practice behavior
	5.2.2: Proportion of females subjected to sexual violence by persons other than an intimate partner in the previous 12 months	To ensure the gender equality in employment within the jurisdiction of CTSP, eliminate gender discrimination in the workplace, and promote substantive equality of gender status, the Bureau has established a Commission on Employment Discrimination and Gender Employment Equality in accordance with Paragraph 1, Article 5 of the Act of Gender Equality in Employment.
	5.4.1: The time gap between unpaid housework and family care between a female and her spouse (including cohabitation)	The Bureau is devoted to building a friendly park. Three sessions of decree advocacy of Labor Standards Act, Act of Gender Equality in Employment, and regulations related to workers' retirement reserve funds were held in 2019.

 Circular economy

Core Goal 08: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

Corresponding SDGs goals	Corresponding index	Practice behavior
	8.1.1: Economic growth rate	Manufacturers in the park continue to make investment and the results have gradually shown. In 2019, the turnover amounted to NTD 797.232 billion, an increase of 9.98% year on year compared with 2018.
	8.6.1: Number of youth in vocational training and the employment rate after the training	<ul style="list-style-type: none"> To assist the public business institutions in the park to recruit high-quality talents and promote local employment where the park is located, the Bureau, the central and local governments work together to provide complete and customized employment matchmaking service. A total of 32 talent recruitment events were held in 2019, and the number of employees reached 50,817 people in December, an increase of 47,907 (6.07%) compared with the same period in 2018.
	8.6.2: Public employment service agencies help recommend and introduce the youth for employment	


Core Goal 12: Ensure sustainable consumption and production patterns

Corresponding SDGs goals	Corresponding index	Practice behavior
	12.1.1: Number of factories passing the compliance of cleaner production of the green factory	So far, there have been 11 buildings in CTSP obtaining Diamond Grade green building labels from EEWB, 5 Bronze Grade green building labels, 11 Qualified Level green building labels, 6 exempt from evaluation, 1 Diamond Grade intelligent green building, 1 Diamond Grade eco-community and 4 green factory label issued by MOEA.
	12.4.3: Industrial waste reuse rate in the science park	In the past 7 years, the reuse rate of industrial waste in the park under the jurisdiction of CTSP (including recycled) has increased from 71.26% to 93.6%.
	12.6.3: No. of Exchange-listed (and OTC-listed) companies compulsorily compile CSR Reports	As of the end of 2019, 45 companies in CTSP have issued CSR Reports.
	12.7.1: Green procurement ratio of the government agencies	In 2019, the procurement amount of environmentally friendly products totaled NTD 2,243,576, accounting for 100% of the total procurement amount.




Energy transformation and acceleration of decarbonization

Core Goal 07: Ensure access to affordable, reliable, sustainable and modern energy for all

Corresponding SDGs goals	Corresponding index	Practice behavior
	7.2.1: Cumulative capacity of renewable energy devices	In response to the central government's energy policy of "Green Roof Project", CTSP and the park manufacturers commonly promote solar power generation. In 2019, the capacity of solar power generation devices in CTSP has exceeded 40.67MW.
	7.3.1: Mandatory energy conservation requiring energy consumption coverage 7.3.2: Energy intensity	The energy intensity of CTSP in 2019 was 0.19 GJ/m ² , the same as 2018. To reduce electricity consumption, the "Air Conditioning Renewal and Improvement Project" was conducted in 2019, and is scheduled to be completed in May, 2020. It is expected to reduce the electricity consumption.


Core Goal 13: Take urgent action to combat climate change and its impacts


Corresponding SDGs goals	Corresponding index	Practice behavior
	13.1.1: Take inventory of climate risks and establish the adaptation priority action plan for implementation	<ul style="list-style-type: none"> Since 2014, we have guided and counseled the manufacturers on water and electricity conservation measures to improve the overall efficiency of energy resources use. In recent years, we have also encouraged companies to make use of the emerging solar energy and renewable water resources to reduce the risk of disruption of energy resource supply. To work in line with the Ministry of Science and Technology's (MOST) "Smart and Sustainable Development Plan for the Science Park" in 2016, the Bureau has introduced Technology Foresight into the intelligent management of the park and continually established the smart water disaster prevention information system, earthquake early warning system and updated the pipeline mapping system into the GIS database, hoping to reduce the losses to the minimum when disasters occur.
	13.3.2: Promote the changes in behavior of all and implement low-carbon local action 13.3.3: Adaptation of scientific capabilities and services in response to climate change	<ul style="list-style-type: none"> In 2018, the shuttle electric vehicles started operation in Huwei Park in CTSP, and as of the end of 2019, it has served 10,210 passengers and traveled 20,422 kilometers. During 2018 and 2019, the carbon-saving effects of the smart street lamps reduced carbon emissions by approximately 675 tons of CO₂e.




Sustainable food and farming system and ecological conservation

Core Goal 06: Ensure environmental quality and sustainable management of environmental resources

Corresponding SDGs goals	Corresponding index	Practice behavior
	6.3.1: Number of households connected to public sanitary sewer and penetration rate 6.3.2: Overall sewage treatment rate 6.3.3: Reclaim of effluents receiving secondary treatment for reuse in the industrial areas and the science park and the daily reclaimed volume of water 6.3.4: Passing rate of industrial wastewater inspection	<ul style="list-style-type: none"> The parks within CTSP are all equipped with complete sewerage system, with 100% of sewage pipeline connection, and regular water quality sampling and testing is conducted. According to statistics, in 2019, there were 147 companies equipped with industrial wastewater connection pipes in Taichung Park, 16 in Houli Park-Houli Site, 1 in Houli Park-Chising Site, and 8 in Huwei Park. The wastewater treatment plants in all park areas are all equipped with the three-stage treatment system, the highest level of wastewater treatment. In 2019, the quality of discharged water in all park areas was all in line with the effluent standards and tightened EIA standards.

Corresponding SDGs goals	Corresponding index	Practice behavior
	6.4.3: Recovery rate of process water in manufacturers in the science park 6.4.5: water pressure ratio	<ul style="list-style-type: none"> In 2019, the park areas within CTSP jurisdiction had more than 75% of water recovery rate. To mitigate the potential impact of water resources on the production in the park, the Bureau will continue the counseling and guidance on water conservation and water recovery.
	6.5.1: Set a national water resource management plan to maintain stable supply of water	<ul style="list-style-type: none"> Since 2004, CTSP has coordinated with the guilds in the park and formed a Water, Power and Gas Supply Committee with the trade associations. The Committee actively participates in the communication, coordination, suggestion and tracking among the power, water and gas supply companies and park manufacturers. When a drought occurs, the Bureau also actively works on the countermeasures with the trade associations and the Water Resources Agency, MOEA to increase the existing water storage capacity in the distribution tanks in the park and coordinates the adding of water intake points. Meanwhile, the park manufacturers can obtain the real-time water information through the real-time water level information disclosed on our website.

Core Goal 15: Conserve and sustainably use terrestrial ecosystems to ensure the persistence of biodiversity and the prevention of land degradation

Corresponding SDGs goals	Corresponding index	Practice behavior
	15.1.2: Proportion of land conservation areas included in the protected area system established by referring to the Land Planning Act	To maintain the ecology of the park and build an eco-friendly park, the Bureau conducts an ecological survey in each park annually, and we are also in harmony with the detention pond in the ecological park within CTSP to reserve a habitat more suitable for the growth of the animals and plants.
	15.5.1: Redbook index of terrestrial vertebrates	In 2019, an ecological survey was conducted in each park, and 8 rare and valuable species, 15 protected species of birds, 6 Taiwan endemic species of birds and 3 species of reptiles as well as 13 species of Taiwan endemic subspecies of birds were found.

 Smart cities

Core Goal 09: Construct an affordable, safe, environment-friendly, resilient, and sustainable transportation infrastructure

Corresponding SDGs goals	Corresponding index	Practice behavior
	9.1.1: Proportion of growth in highway public transport volume	The free shuttle bus in CTSP provides seamless connection between the park transfer station and the important transfer points of buses, long-distance buses, high speed rail, and Taiwan Railway in the life cycle. In 2019, a total of 137,864 people took the free shuttle bus in CTSP.


Core Goal 11: Develop urban and rural areas that show characteristics of fusion, safety, resilience, and sustainability

Corresponding SDGs goals	Corresponding index	Practice behavior
	11.11.1: Increase Gbps level household coverage rate to 90%	We worked in line with the "Project of Using ICT Technology for the Development of a Smart Park" of MOST, and cumulative 179 hotspots for Wi-Fi were completed, with an achieving rate of 293%; the cumulative number of people making use of this project reached 1,055,759 (from Dec. 2016 to the end of Dec. 2019).

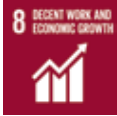


Sustainability-oriented digital revolution


Core Goal 04: Ensure comprehensive, fair and high-quality education, as well as advocate lifelong learning opportunities for all

Corresponding SDGs goals	Corresponding index	Practice behavior
	4.4.2: Proportion of schools providing IT related courses in senior high schools to enable teenagers to acquire ICT skills	Since the “FRC Observation and Training” was held in 2017 and the FRC Taiwan Practice Tournament and FRC Off-Season were held in 2018 and 2019 respectively, the number of domestic high school FRC competition teams has rapidly increased from 3 teams in 2017 to 20 teams in 2019, driving the domestic teams to participate in FIRST Robotics Competition in Australia, the U.S., and other regions.

Core Goal 08: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all


Corresponding SDGs goals	Corresponding index	Practice behavior
	8.1.1: Economic growth rate	Manufacturers in the park continue to make investment and the results have gradually shown. In 2019, the turnover amounted to NTD 797.232 billion, an increase of 9.98% year on year compared with 2018.
	8.6.1: Number of youth in vocational training and the employment rate after the training 8.6.2: Public employment service agencies help recommend and introduce the youth for employment	<ul style="list-style-type: none"> To assist the public business institutions in the park to recruit high-quality talents and promote local employment where the park is located, the Bureau and the central as well as local governments work together to provide complete and customized employment matchmaking service. A total of 32 talent recruitment events were held in 2019, and the number of employees reached 50,817 people in December, an increase of 2,910(6.07%) compared with the same period in 2018.

Core Goal 10: Reduce inequality within and among countries


Corresponding SDGs goals	Corresponding index	Practice behavior
	10.3.1: Public awareness of gender equality and laws and regulations related to elimination of employment discrimination	<ul style="list-style-type: none"> The “Commission on Employment Discrimination and Gender Employment Equality” was established, and the regular meeting is convened every six months to ensure equal employment opportunities and gender employment equality. In addition, the annual recognition ceremony of excellent business units “promoting gender equality in employment in the workplace” is organized to encourage companies in the park to actively implement labor laws and regulations to create a harmonious working environment. In 2019, the Commission on Employment Discrimination and Gender Employment Equality convened two meetings and organized 3 sessions of decree advocacy.
	10.6.1: Promote local practice, connect with school resources and help promote characteristic industries locally 10.6.2: Amount of serial resources invested in social innovation	<ul style="list-style-type: none"> We promoted R&D results of the Ministry of Science and Technology’s Project of Integrated Cross-campus Accelerator Network (iCAN Project) and established a platform of iCAN start-up incubator. We invited 11 new accelerators and top start-up & incubation centers to form the “Central Taiwan Accelerator Alliance” to support the start-ups and cultivate industrial talents in Central Taiwan.

Cross-domain integration

Core Goal 16: Promote a peaceful and diversified society. Ensure judicial equality and build an accountable and inclusive system

Corresponding SDGs goals	Corresponding index	Practice behavior
	16.4.1: Corruption conviction rate	<ul style="list-style-type: none"> As a public agency, CTSP Bureau should set an example and abide by various laws and regulations, disclose transparent information and prevent corruption. Internal control system should be implemented to create a friendly, honest and upright image with integrity and enthusiastic services. There was no occurrence of any corruption case in 2019.
	16.5.1: Download of open data of the government	To work in line with the information disclosure policy of the government, various data and information can be downloaded from our official website. In addition, the publication of the annual reports and the monthly Central Taiwan Science Park Newsletter provide the updates of the development of CTSP to the external world.

Core Goal 17: Establish diversified partnerships and work together to advance the sustainable vision

Corresponding SDGs goals	Corresponding index	Practice behavior
	17.9.2: The total number of participating countries in the planned activities	We signed a Memorandum of Understanding (MOU) with 16 science parks in the UK, Spain, Russia, Japan, South Korea, Vietnam, China, India, Thailand and Germany as well as the Asian Science Park Association (ASP). In addition, we also joined three international science park associations, namely ASPA, IASP and AURF and the Federation International Robot-sports Association (FIRA) to explore potential opportunities for cooperation.



SUSTAINABLE
DEVELOPMENT
GOALS



1

Listening- Creating Multiple Interactions

1.1 Introduction of Central Taiwan Science Park

1.2 Interaction with Stakeholders

1.3 Management of Material Topics





▶▶ 1.1 Introduction of Central Taiwan Science Park

The establishment of Central Taiwan Science Park (CTSP) was approved by the Executive Yuan in Sep. 2002, and 16 years have passed since its groundbreaking on July 28, 2003. Due to its superior location and the abundant resources in the natural and humanistic environment, high-tech manufacturers at home and abroad have actively entered and been stationed in CTSP. There are five parks within the jurisdiction, including Taichung Park, Houli Park (including the Houli Site and Chising Site), Huwei Park, Erlin Park and Chung Hsing Park, with a total development area of 1,485 hectares, making it an important hub of the western high-tech corridor in Taiwan.

The development of CTSP is to promote the industrial upgrading and transformation in the central region. Central Taiwan has the largest and densest precision machinery industry in Taiwan. With this advantage, CTSP drives the development of precision machinery to smart machinery and actively introduces forward-looking industries such as Smart Robotics, Smart Machinery and medical devices to strengthen the competitive advantages of industrial innovation and build a complete industrial cluster.

According to the "Blueprint Planning for Science Parks in the Next 10 Years" approved by MOST on July 11, 2018, CTSP will continue to improve its existing strengths and advantages of semiconductor, optoelectronics, precision machinery, and biotechnology industrial clusters and develop integration services of smart automation systems, introduce smart medical auxiliary technology and low-carbon, light-weight and energy-saving industries in the future. In addition, the planning for the five science parks within its jurisdiction is divided into the followings. Taichung Science Park and Houli Science Park are planned to be built into a key R&D base for AI, software and system integration, Huwei Science Park for biotechnology and pharmaceutical industries, Chung Hsing Science Park for R&D of agricultural biotechnology while Erlin Science Park for AI Smart Machinery development.

Taichung Science Park- Leading the Global Development of Industries

Taichung Science Park is located on the border between Daya District and Situn District of Taichung City, with an area of 466 hectares. It is home to Taiwan Semiconductor Manufacturing Company's (TSMC) advanced 7 nm manufacturing process, safeguarding Taiwan's leading position in the semiconductor industry. Giant Manufacturing Co., Ltd. (Giant Bicycles) also established its global headquarters here. With Taichung Metropolitan Park, Taichung International Airport and the High Speed Rail (HSR) Taichung Station nearby, Taichung Science Park is situated in an important transportation hub and has brought about ecological symbiosis and prosperity to the region.



Houli Science Park- A Model of Balancing Environmental Protection and Economic Growth

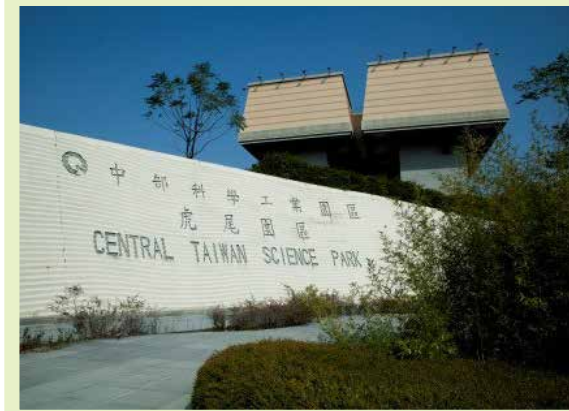
Located in Houli District in Taichung covering 255 hectares, Houli Science Park includes the Houli and Chising Sites and is predominantly occupied by optoelectronics, semiconductor and precision machine manufactures, with an aim of boosting economic prosperity through the integration of industrial resources in Houli. A Phase II EIA for the Chising Site was passed in 2018. The park hopes to exist in harmony and co-prosperity with the local region as a model for achieving a balance between environmental protection and economic development.





Huwei Science Park- A Town of Strategic Importance for Biotechnology

Covering an area of 97 hectares, Huwei Science Park borders the HSR Yunlin Station designated area to the east. Most tenants here are in the biotechnology industry, with a few in optoelectronics and communications. This science park, together with the surrounding HSR- designated area and National Taiwan University (NTU) Yulin Campus, form a technology area that drives overall development in Yunlin County. Its Wastewater Treatment Plant is the county's first facility to provide environmental education of wastewater treatment.



Erlin Science Park- A Strategic Town of Precision Machinery

Erlin Science Park encompasses 631 hectares. Due to a low water consumption requirement at Erlin Science Park and the characteristics of central Taiwan industries, this park's tenant recruitment is targeted at the precision machinery industry, which consumes less water and emits less carbon dioxide. A Phase II EIA and changes to the development project were passed in 2018. Currently, a number of companies are planning to build plants here and upon completion of land lease procedures, construction and operations will begin.



Chung Hsing Science Park- The Core of Technological Research and Development

Chung Hsing Science Park is located in the South Core Area of Chung Hsing New Village, with an area of 37 hectares. In 2012, 90% of the park area (except for the South Core Area) was designated a cultural landscape by Nantou County Government via a cultural heritage review announcement. After consultations and reviews, the preparation plan was ratified by the Executive Yuan on Jan. 5, 2018, with the name changed to "Preparation Plan for Chung Hsing Science Park (Second Amendment)". The park area was reduced to the South Core Area (exclusive of other administrative agencies.) Chung Hsing Science Park focuses on research and development without mass production (with the exception of the cultural and creative industry). Many research institutes and high-tech companies, such as the Institute of Industrial Technology Research Institute (ITRI) and Institute for the Information Industry (III), have already moved in and started operations in the park.

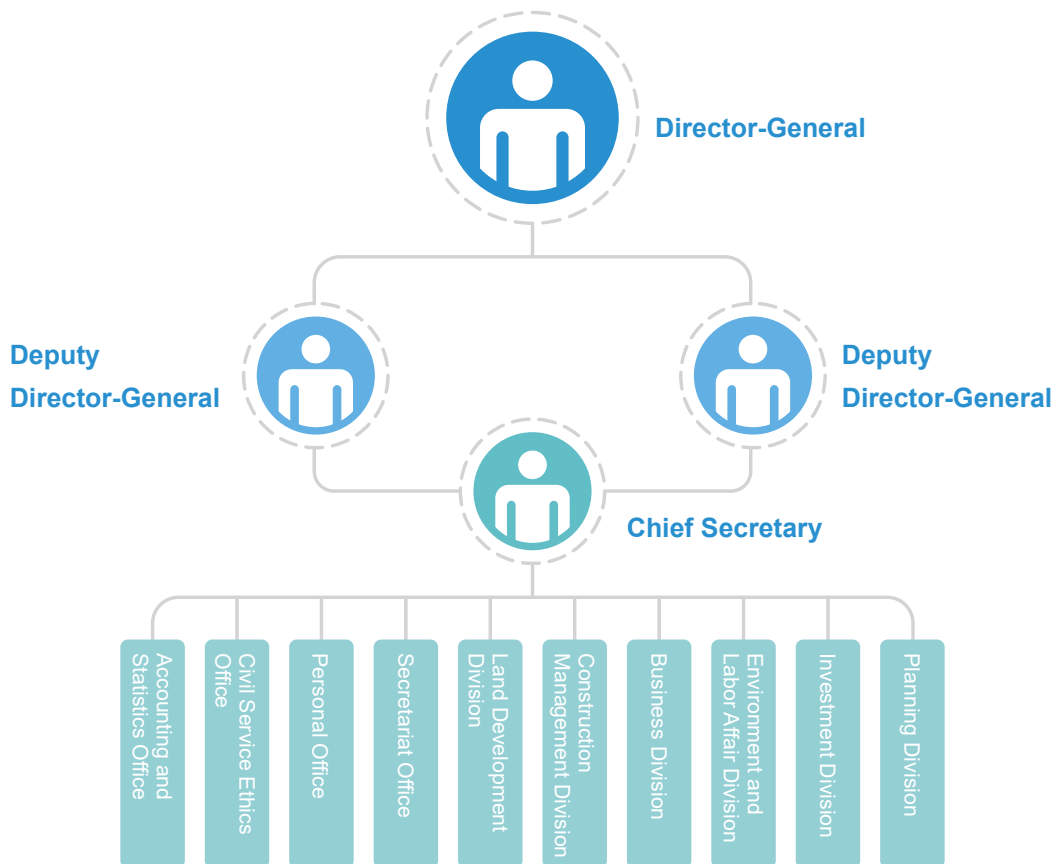




Organizational Structure

The Bureau is a public agency. To operate in coordination with the amendment of Act for Establishment and Administration of Science Parks announced on June 6, 2018, the word “industrial” was taken away from the original “Science Industrial Park”. On Dec. 11, 2019, the amendment of the Organization Act of the Central Taiwan Science Park Bureau, Ministry of Science and Technology was announced.

In accordance with the “Organization Act of the Central Taiwan Science Park Bureau” and business needs, six divisions and four offices were set up, including the Planning Division, Investment Division, Environment and Labor Affair Division, Business Division, Construction Management Division, Land Development Division, Secretariat Office, Personnel Office, Accounting and Statistics Office and Civil Service Ethics Office to effectively improve service quality and park manufacturers’ satisfaction, creating a good R&D environment to foster outstanding talents, striving to create a new niche in the technology sector.



The purpose for the government to establish science parks is to provide an excellent environment for industrial development with the introduction of high-tech industries for venture capital and recruitment and cultivation of excellent technological talents to facilitate the rapid transformation and upgrading of domestic industrial structure. However, in the process of expansion of the park development, negotiations and coordination for land acquisition were needed with local communities to reach a consensus on the balance between industrial development and sustainable development of local life. Under the premise of making good planning in a rational and prudent manner, higher-level plans were divided into detailed ones to be executed by various ministries and departments, aiming at integrating the synergy of plan implementation and the professional functions and energy of various ministries and departments.

To meet the requirements and expectations of the park manufacturers and the surrounding communities, CTSP Bureau has set up and announced the services items in accordance with the Executive Yuan's "Government Service Innovative Refinement Initiatives". In addition, with the spirit of being positive, responsible and courageous, the overall service efficiency is improved to further maintain the excellent investment environment and quality of life in the park to facilitate the development of high-tech industries.



White Paper of Citizen Services

Planning research and evaluation (Planning Division)



- Planning research and evaluation
- Arrange manufacturer visits
- Coordination with National Experimental High School at Central Taiwan Science Park (NEHS)
- Coordinate with trade associations for the organization of decree propaganda and assist them with related matters

Promotion of investment (Investment Division)



- Construct high-quality investment environment and actively introduce high-tech industries into the science park
- Increase the science park's international visibility through reception of visitors and media to stimulate willingness of investment
- Training of personnel
- R&D of advanced academia-industry collaboration projects
- Incentive programs for start-ups
- Strengthen regional collaboration to promote the smart machinery and aerospace industry upgrade project in Central and Southern Taiwan
- Accelerate the startup project of the biomedical industry in central Taiwan

Environmental protection administration (Environment and Labor Affair Division)



- Deal with labor complaints and mediate labor disputes in accordance with health and related regulations
- Organize labor inspections and publicize safety
- Handle affairs concerning environmental protection permits of the park manufacturers and the sewerage system
- Establish channels for medical services
- In charge of the disaster prevention and protection and police coordination

Business administration (Business Division)



- Business registration
- Establishment of the website of the Bureau
- Foreign trade and management of bonded goods
- Collection of park management fee
- In charge of Industrial and Commercial Service Building affairs and contact window

Construction in park areas (Construction Management Division)



- Design, construction and maintenance of public facilities
- Coordination of water, electricity, and gas supply control and related registration affairs
- Construct park greenspace landscape and conduct public art installation in the science park

Park facilities management and land administration (Land Development Division)



- In charge of park development planning related affairs
- Building management
- Traffic management in the science park
- Acquire land for park manufacturers to build plants
- Lease and management of land, plants and dormitories

Other Affairs



- Personnel Office: In charge of personnel administration related affairs
- Civil Service Ethics Offices: In charge of civil service ethics affairs
- Secretariat Office: In charge of sending and receiving official documents, application of archives and purchasing affairs and services
- Accounting and Statistics Office: In charge of budget, accounting and preparation of statistics



Budge Scale

As a public agency, the financial sources of CTSP Bureau are from the Treasury Fund and self-financing. The budgets include the official budget for maintaining official business for CTSP Bureau and the operations in the science park as operation funds. In 2019, the final accounting of the revenue was NTD 20 million and that of the expenditure on official business was NTD 536 million (personnel costs accounted for NTD 188 million). The final accounting of the income of operation funds in 2019 (excluding NEHS CTSP) amounted to NTD 3.708 billion, with the costs and expenses accounting for NTD 3.602 billion (personnel costs accounted for NTD 83 million). The final accounting of the construction improvement and expansion plan for fixed assets was NTD 864 million, and the business tax paid totaled NTD 41 million. All budgets and final reports are disclosed on the official website of CTSP Bureau in an open and transparent manner, available to all online.

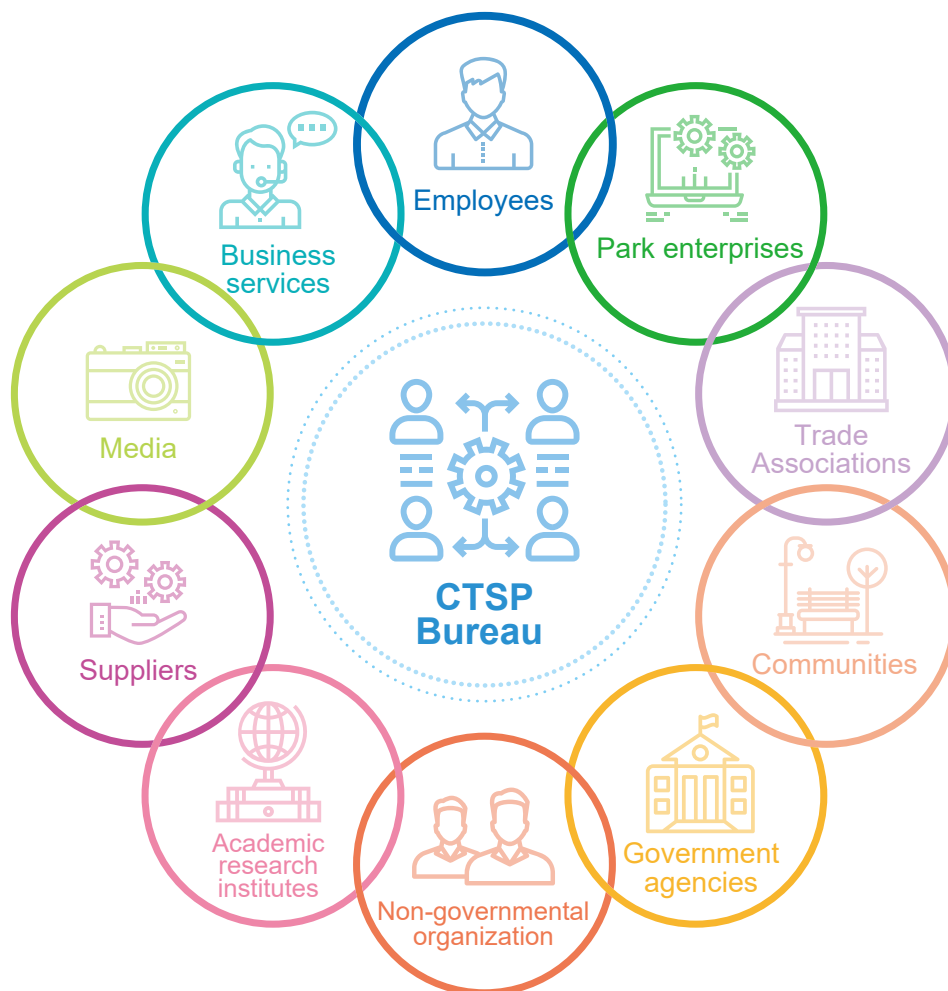
The budget, monthly final and accounting reports of CTSP Bureau



▶ 1.2 Interaction with Stakeholders

Identification of Stakeholders and Communication Channels

Through internal discussions with the heads of all units and by referring to the stakeholder groups identified in the same industry, CTSP Bureau further identified 10 groups of stakeholders based on the 5 major principles of the AA1000 Stakeholder Engagement Standards (SES) for the scoring and prioritization.





CTSP Bureau makes use of CTSP official website, CTSP’s CSR website, CTSP Facebook fan page, CTSP News Facebook Group, CTSP Annual Report, Central Taiwan Science Park Newsletter, and CTSP CSR Report to have communication and exchanges with the outside world on a regular or occasional basis. Other channels are also utilized to understand the stakeholders’ issues of concern and provide relevant responses and explanations. An English version of the CSR Report is to be issued in 2020, and the English version of the website will also be established to enable more diverse stakeholders to understand CTSP Bureau’s current status and sustainable behavior.



CTSP official website



CTSP’s CSR website



CTSP Facebook fan page



CTSP News Facebook Group






CTSP Annual Report



Central Taiwan Science Park Newsletter

In addition to the communication with various stakeholders through daily business, the Bureau has also set up the Director-General’s mailbox, Whistleblowing hotline and email (Tel: 04-25658588, ext. 6801; email: discipline@ctsp.gov.tw) to facilitate the public to make contact with us. In 2019, we accepted 155 petition cases, and among them, 2 were administrative reform proposals, 0 enquiry on administrative degrees, 19 cases of administrative violations, 114 cases of administrative rights protection and 20 public nuisance petitions concerning environmental protection.

Stakeholder	Significance of stakeholders	Issues of concern	Communication channels	Communication effectiveness in 2019
 Employees	The service capacity provided comes from our excellent employees. Therefore, we attach great importance to the employees’ opinions and maintain smooth interactive channels to ensure their maximum efficiency.	Anti-Corruption Environmental Compliance Training and Education	Staff symposium, education and training, sexual harassment complaint hotline, General-Director’s mailbox, intra-bureau e-bulletin, official notification system	<ul style="list-style-type: none"> The average number of education and training hours of the employees was about 62 hours/person.
 Park enterprises	The core goal of the Bureau is to expand the output value of CTSP. Therefore, smooth communication with the park manufacturers is maintained at all times to facilitate the promotion of the economic development in the central region.	Stable Energy Supply Anti-Corruption Effluents and Waste	Publicity/ symposium/ briefing, phone contact, manufacturer visits, official website announcement, official documents, satisfaction survey	<ul style="list-style-type: none"> A total of 7 sessions of park business seminars and 5 sessions of environmental protection regulations briefings. The score of the “overall satisfaction survey” of manufacturers was 88.97 points. A total of 8 manufacturers received water conservation and energy conservation counseling.
 Trade associations	Through exchanges with the trade associations, the Bureau can grasp the overall opinions of the park enterprises for proper and detailed planning of the park.	Safe Workplace Promotion Stable Energy Supply Circular Economy	Trade association symposium, meeting of the directors and supervisors of the trade associations	<ul style="list-style-type: none"> Co-organized one session of seminar on “Corresponding Strategies for Fake News for Enterprises” with the Allied Association for Science Park Industries.



Stakeholder	Significance of stakeholders	Issues of concern	Communication channels	Communication effectiveness in 2019
 Communities (Organizations and the public)	We adhere to the goal of coexistence and co-prosperity with the communities, and also pay much attention to the public opinions.	Emissions (the overall emissions of the park) Effluents and Waste Customer Health and Safety	Symposium of neighborhood chiefs, CTSP Newsletters, publicity/ symposium/ briefing, visit, public petition hotline	<ul style="list-style-type: none"> A total of 39 sessions of propaganda of the "Neighborly Health Care Plan" were held, and 626 people received telephone interviews while 546 people received the health examination.
 Government agencies	As a public agency, the Bureau shoulders the responsibility of propagation of decrees of superior agencies or business-related authorities.	Effluents and Waste Emissions (the overall emissions of the park) Environmental Compliance	Phone contact, official documents, Email, publicity/ symposium/ briefing,	<ul style="list-style-type: none"> In 2019, 5 sessions of environmental protection regulations briefings were held.
 Non-governmental organization	To dispel external doubts of the environmental impacts of the production activities in the park, the Bureau actively cooperates with non-governmental organizations for substantive review meetings and visits to ensure normal operation status.	Anti-Corruption Stable Energy Supply Effluents and Waste	EIA briefing, environmental supervision meeting, park visit, review meeting, visits	<ul style="list-style-type: none"> A total of 17 meetings for EIA review, tracking and supervision of various development projects were held.
 Academic research institute	Through links with academic research institutes, academic research is introduced into industrial entities for application, which can help upgrade park businesses. The Bureau actively plays an intermediary role for communication.	Start-ups Economic Performance (industrial upgrading) Environmental Compliance	Official documents, telephone, project briefing	<ul style="list-style-type: none"> Organized 4 sessions of forum. Held 2 sessions of technical matchmaking exchanges.
 Suppliers	The Bureau has to communicate with suppliers to ensure all services meet the needs to maintain the stability of the park's daily operations.	Effluents and Waste Circular Economy Environmental Compliance	Telephone, on-site inspection, meeting on an occasional basis	<ul style="list-style-type: none"> Carried out more than 600 on-site inspections for engineering projects
 Media	We maintain interactive and smooth communication channels with the media. The Bureau can issue and respond to issues and public opinions immediately to avoid the spread of error messages.	Effluents and Waste AI for Industries Climate Change	Press release, press conference	<ul style="list-style-type: none"> Issued 32 press releases



Business services

The completeness of the living functions can affect the willingness of the workers to work in the science park, so the Bureau maintains close communication with the business services industry.

Effluents and Waste Water and Effluents (water conservation in the park) Emissions (the overall emissions of the park)

Temporary meeting, business services industry amity conference

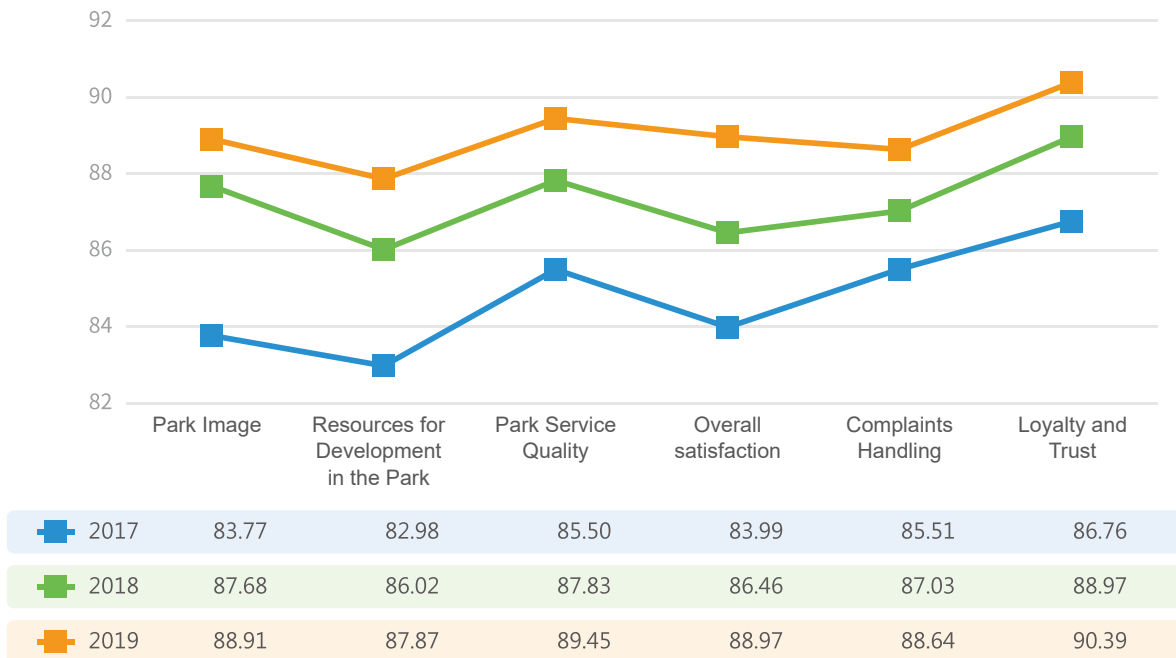
- Built a website as the business services platform and phone App

Manufacturers' Satisfaction Survey

The feedback from the manufactures has always been the most important thing for CTSP Bureau. For the suggestions gathered from the satisfaction survey and feedback from the manufacturers, we track and instruct the industry management team for speedy improvement, and in order to enhance various services in the park, CTSP Bureau forms a team in charge of manufacturer visits plans. In 2019, CTSP Bureau organized 7 seminars in Taichung, Chung Hsing, Huwei, and Houli Science Parks, targeting at listening to the manufacturers' opinions, helping them solve problems and at the same time promoting various policies and plans to strengthen the service quality and administrative efficiency of the Bureau, striving to win recognition and affirmation of the service quality of CTSP.

For the Bureau to have fair, objective and consistent evaluation indicators of the service quality and for the Bureau to pay attention to the satisfaction of the service targets to reach the goal of improving service quality, MOST entrusts a professional survey company for the satisfaction survey every year. In 2019, the score of the "overall satisfaction" among the manufacturers was 88.97 points, the highest score among the three Science Parks and also the highest in the same aspects compared with previous surveys in CTSP. Among the six major aspects, "Loyalty and Trust" scored highest while the scores of the others, namely "Park Image", "Resources for Development in the Park", "Park Service Quality", and "Complaints Handling" all increased compared with the previous year, showing that the quality of services the Bureau provided won the recognition and support from the manufacturers. In the future, we will continue to pay attention to the needs of manufacturers and assist them with the solutions to obtain more positive recognition and comments from the manufacturers.

Satisfaction survey of the science park



Moreover, to understand the surrounding residents' evaluation of the science park, the satisfaction survey has been conducted among surrounding residents since 2014. Among them, "Improving the safety of the living environment" (namely the satisfaction with proper public facilities, public security and fire protection) has scored the highest over the past three years.



▶ 1.3 Management of Material Topics

1.3.1 Identification of Material Topics

Substantive analysis was introduced in the preparation of our CSR Report to identify the sustainability topics the stakeholders concerned about through a systemic analysis model as the basis of the information disclosure of this Report to facilitate effective communication with the stakeholders. The analysis of the material topics of this Report was divided into the following five steps.

Identification of stakeholders

Step

1

Through internal discussions with the heads of all units and by referring to the stakeholder groups identified in the same industry, CTSP Bureau further identified **10 categories** of stakeholders.

Collection and summary of sustainability topics

Step

2

The sources for data collection include GRI Standards and the topics, indicators, regulations, agreements and declarations proposed by SDGs. The 33 topics in the GRI Standards served as the basis, and after internal discussions and based on the relevance and characteristics of CTSP, **37 topics** were summarized as the guidelines for questionnaire design.

Issues of concern and survey on level of impact

Step

3

Through the questionnaire survey of the stakeholders' issues of concern distributed to the stakeholders and the Bureau's executives, and based on the analysis results, the weighing of the evaluation criteria was then determined. A total of **192 copies** of CSR questionnaire were returned, and among them, 177 copies were questionnaires on issues of concern while 15 copies retrieved were questionnaires on level of impact (filled in by executives of CTSP Bureau).

Analysis and identification of materiality

Step

4

After analysis, the Bureau identified **14 material topics** in 2019. Considering the scoring and weighing of these topics under different evaluation criteria and the level of impact to sustainable management to executives, the risk priority number of each topic was calculated. Discussions were made with high-level executives for the adjustment and determination of the disclosure priority.

Review and discussion

Step

5

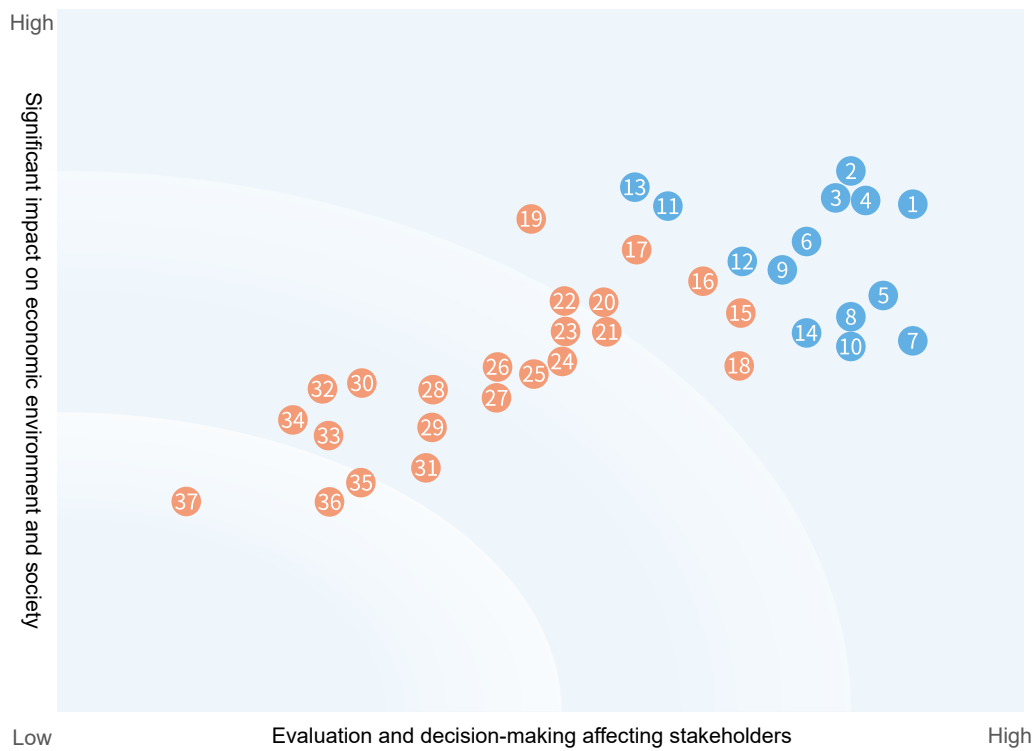
After analysis of the material topics, the value chain is used as the element for boundary analysis, serving as the reference basis of the material topics of CTSP Bureau. Effective management approaches were then established for the material topics, and relevant information was disclosed in the CSR Report.



Results of the Material Topics Identification

After the analysis of the questionnaire distributed to stakeholders and internal identification and discussion, a total of 14 material topics were identified this year. Compared with the Report in the previous year, Customer Privacy and Biodiversity are modified to secondary topics, with the addition of Labor Management Relations in the Park as the new material topic, and relevant descriptions are detailed and disclosed in the text of this Report.

Matrix of Materiality



Prioritization of material topics

1 Water and Effluents (Water conservation in the park)	6 Anti-corruption	11 Local Communities
2 Effluents and Waste	7 Economic Performance (Industrial upgrading)	12 Indirect Economic Impact (Infrastructure in the park)
3 Emissions (the overall emissions of the park)	8 Energy	13 Socioeconomic Compliance
4 Stable Energy Supply	9 Environmental Compliance	14 Labor Management Relations in the Park
5 Start-ups	10 Promotion of Safe Workplace	
15 Occupational Safety and Health	23 Training and Education	31 Human Rights Assessment
16 Investment Promotion	24 Supplier Social Assessment	32 Anti-competitive Behavior
17 AI for Industries	25 Non-discrimination	33 Security Practices
18 Circular Economy	26 Biodiversity	34 Gender Equality
19 Climate Change	27 Forced and Compulsory Labor	35 Procurement Practices
20 Supplier Environmental Assessment	28 Marketing and Labeling	36 Freedom of Association and Collective Bargaining
21 Customer Privacy	29 Raw Materials	37 Indigenous Rights
22 Customer Health and Safety	30 Child Labor	



1.3.2 Value Chain and Goals of Material Topics

In 2019, the major topics were summarized as “Integrity and Transparent Governance of CTSP”, “Intelligent Development and Upgrade of CTSP”, “Friendly Workplace and Employment in CTSP”, “Innovation and Entrepreneurship Incubator- CTSP”, “Disaster Reduction and Drought Relief Operations at CTSP”, “Sustainable Environment and Circular CTSP” and “Co-existence and Co-prosperity to Safeguard CTSP”, with the value chain serving as the element for boundary analysis. In the future, CTSP will continue to strengthen management and disclose relevant information in the CSR Report.

Aspect in sustainability	Corresponding GRI Standards/Custom topics	CTSP Bureau Value Chain Impact Boundary	Corresponding sections and chapters	Page
 Integrity and Transparent Governance of CTSP	Socioeconomic Compliance (419), Environmental Compliance (307), Anti-corruption (205)	CTSP Bureau, CTSP manufacturers, Suppliers/contractors, Government agencies	2. Integrity and Transparent Governance of CTSP	34
 Intelligent Development and Upgrade of CTSP	Economic Performance (Industrial upgrading) (201)	CTSP Bureau, CTSP manufacturers, Academic research institutes, Government agencies	3. Promotion of Innovation-driven Industries	56
 Friendly Workplace and Employment in CTSP	Promotion of Safe Workplace, Labor Management Relations in the Park	CTSP Bureau, CTSP manufacturers, Academic research institutes, Government agencies, Community residents, Employees	4. A Cradle for Excellent Talent Cultivation	78
 Innovation and Entrepreneurship Incubator- CTSP	Start-ups	CTSP Bureau, CTSP manufacturers, Academic research institutes	4. A Cradle for Excellent Talent Cultivation	78
 Disaster Reduction and Drought Relief Operations at CTSP	Stable Energy Supply, Water and Effluents (Water conservation in the park)(303), Energy (302)	CTSP Bureau, CTSP manufacturers, Suppliers/contractors, Government agencies, Community residents	5. Sustainability- Actions of Advanced Deployment	92
 Sustainable Environment and Circular CTSP	Effluents and Waste (306), Emissions (the overall emissions of the park) (305)	CTSP Bureau, CTSP manufacturers, Suppliers/contractors, Government agencies, Media, Community residents	6. Accountability- Environmental Management Behavior	110
 Co-existence and Co-prosperity to Safeguard CTSP	Indirect Economic Impact (Infrastructure in the park) (413), Local Communities (203)	CTSP Bureau, CTSP manufacturers, Suppliers/contractors, Employees, Community residents	7. Safeguarding for the Realization of a Better Future	128

Note:

The Impact Category of the value chain is explained as follows: CTSP Bureau, Employees, CTSP manufacturers, and Government agencies belong to “Direct Impact”; Suppliers/contractors belong to “Impact on Business Behavior”; Academic research institutes, Media and Community residents are “Contribution Impact”.



Management of Material Topic Goals



Aspect in sustainability Integrity and Transparent Governance of CTSP

Material Topics Socioeconomic Compliance, Environmental Compliance, Anti-corruption

Short-term Goals

- Continue regulatory compliance and hold 5 session of environmental regulation briefing in 2020 to provide park manufacturers with relevant education and training.
- Strengthen ethical corporate management to avoid conflicts of interest and implement risk control.

Medium- and long-term goals (3 years and more)

- Continue the implementation of environmental and socioeconomic regulatory publicity and education and training, aiming at zero major violations of regulations in CTSP.
- To build a clean government and create an honest society in accordance with the "National Integrity Building Action Plan".



Aspect in sustainability Intelligent Development and Upgrade of CTSP

Material Topics Economic Performance (Industrial upgrading)

Short-term Goals

- Set the investment target of introducing 18 manufacturers for investment every year.
- To consolidate and integrate the resource capacity of CTSP manufacturers and the government-industry-university-institute alliance, we will promote industry-university training collaboration, and strengthen the industry-university linkage and talent exchanges, at least 6 sessions of "Innovation and Start-up Forum and industry-academia matchmaking meeting", and at least 1 session of the "government-industry-university-institute exchange meeting" are scheduled to be organized to continue the promotion of industrial development and participate in the industry-academia innovation activities in the central region.
- Promote "Consolidating Regional Cooperation - the Advancement Project for Smart Machinery and Aerospace Industries in Central and Southern Taiwan (2017~2020). It is expected to introduce more than 1 manufacturer into the science park, with the investment amount of NTD 50 -100 million and facilitate the R&D of more than 5 cases of core technologies independently or jointly developed by the industry, academia and research institute.

Medium- and long-term goals (3 years and more)

- Gradually complete the industrial chain of semiconductor, optoelectronics, precision machinery, and biotechnology in CTSP to construct a sustainable industrial ecosystem.
- To promote the "Acceleration of Bio-medical Industry Innovation Program in the Central Region" (2019-2022) that will contribute to more than 8 industry-university-institute-medical collaboration cases, and the expected cumulative value of the derivative output will reach NTD 150 million and more.
- To promote "Industrial Artificial Intelligence at CTSP-Application Scheme of Intelligent Manufacturing Technology ", common demand solutions are summarized. The AI-based international software service platform is introduced, and 6 model case of smart manufacturing technology application solutions are built.



Aspect in sustainability **Friendly Workplace and Employment in CTSP**

Material Topics **Promotion of Safe Workplace, Labor Management Relations in the Park**

Short-term Goals

- In 2020, we continue to conduct at least 3 sessions of labor regulation related publicity briefing, and organize a total of 60 labor condition inspections (including gender work equality inspections) and labor regulation compliance visits and counseling to promote the implementation of various labor regulations among park manufacturers for the protection of the labor rights in the park.

Medium- and long-term goals (3 years and more)

- Actively promote harmonious labor-management relations in the park, promote equalization in the workplace, creating a friendly workplace in CTSP.
- To create a healthy workplace environment free of disasters, creating zero work-related injury and zero occupational disasters at CTSP.



Aspect in sustainability **Innovation and Entrepreneurship Incubator- CTSP**

Material Topics **Start-ups**

Short-term Goals

- Actively create high-quality of entrepreneurial environment and provide professional consultants and resources and introduce accelerator-linked industries. We continue to provide counseling to entrepreneurial teams, and more than 18 start-ups are expected to be set up.

Medium- and long-term goals (3 years and more)

- To assist start-ups to grow fast and increase the added value, it is expected to introduce more than 2 start-ups to CTSP for investment applications.



Aspect in sustainability **Disaster Reduction and Drought Relief Operations at CTSP**

Material Topics **Stable Energy Supply, Water and Effluents (Water conservation in the park), Energy**

Short-term Goals

- Add solar power generation equipment. As of 2020, the cumulative installation capacity of solar PV devices reached 45.72 MW.
- Continue to provide park manufacturers with guidance and counseling of water and electricity conservation to reach the goals of water reclamation for processes in different industries in the park (such as the 85% set for semiconductor and optoelectronics industries).
- In response to the initial operation of Erlin Park, a set of daily 200-ton reclaimed water treatment system will be installed first. The binary water supply is used for non-human contact purposes, including cooling water in the factory area and flushing water for toilets as well as water for road cleaning, cooling, landscape water replenishment and green land irrigation.

Medium- and long-term goals (3 years and more)

- Add the installation of solar power generation equipment. As of 2030, the cumulative installation capacity of solar PV devices will reach 61.82 MW.
- Promote experience exchange and technical improvement and pursue the optimization of water and electricity conservation among park manufacturers. Under the principle of rationalization of energy use efficiency, the water reclamation rate in the processes of industries in the park will be promoted.
- To work in line with the operation of Erlin Park, water resources regeneration center and binary water supply pipeline are established in phases (the final phase is 20,000 tons per day). Reclaimed water is used for cooling water in the factory area and flushing water for toilets as well as water for road cleaning, cooling, landscape water replenishment and green land irrigation. In addition, rolling review is made to examine the supply and demand of reclaimed water, and dedicated pipeline providing water to demanding manufacturers or reclaimed water business in the surrounding area will be installed when needed to increase the efficiency.
- The other sites of CTSP (Taichung, Houli) will cooperate with the schedules of regional development plans for reclaimed water (such as Suinan and Fengyuan) to jointly promote the use of water resources.



Aspect in sustainability Sustainable Environment and Circular CTSP

Material Topics Effluents and Waste, Emissions (the overall emissions of the park)

Short-term Goals

Medium- and long-term goals (3 years and more)

- The overall sewage treatment rate in the park is 100%.
- Erlin Park promotes the optimization of water reclamation and reuses all the reclaimed water.
- The proper disposal rate of waste reaches 100%.

- We continue to provide guidance and counseling and verify the environmental compliance of the permit documents as well as the discharge water quality standards of the park manufacturers.



Aspect in sustainability Co-existence and Co-prosperity to Safeguard CTSP

Material Topics Indirect Economic Impact (Infrastructure in the park), Local Communities

Short-term Goals

Medium- and long-term goals (3 years and more)

- Interact and communicate with community residents on a regular basis and continue to build the park.
- Taichung Park has obtained the Green Building Label of EEWH-EC (Eco-community).
- The Phase I standard factory building of Huwei Park is scheduled to be completed in Nov. 2021.

- Continue to organize environmental education work of the sewage plant and all movement for neighborhood cleaning in the neighboring communities.
- Continue to implement ecological communities to maintain sustainable development and an eco-friendly environment.





2

Integrity and Transparent Governance of CTSP

2.1 Human Resources

2.2 Knowing and Obeying the Law

Special Column- Supplier Management of Erlin Public Works

2.3 Four Savings Project

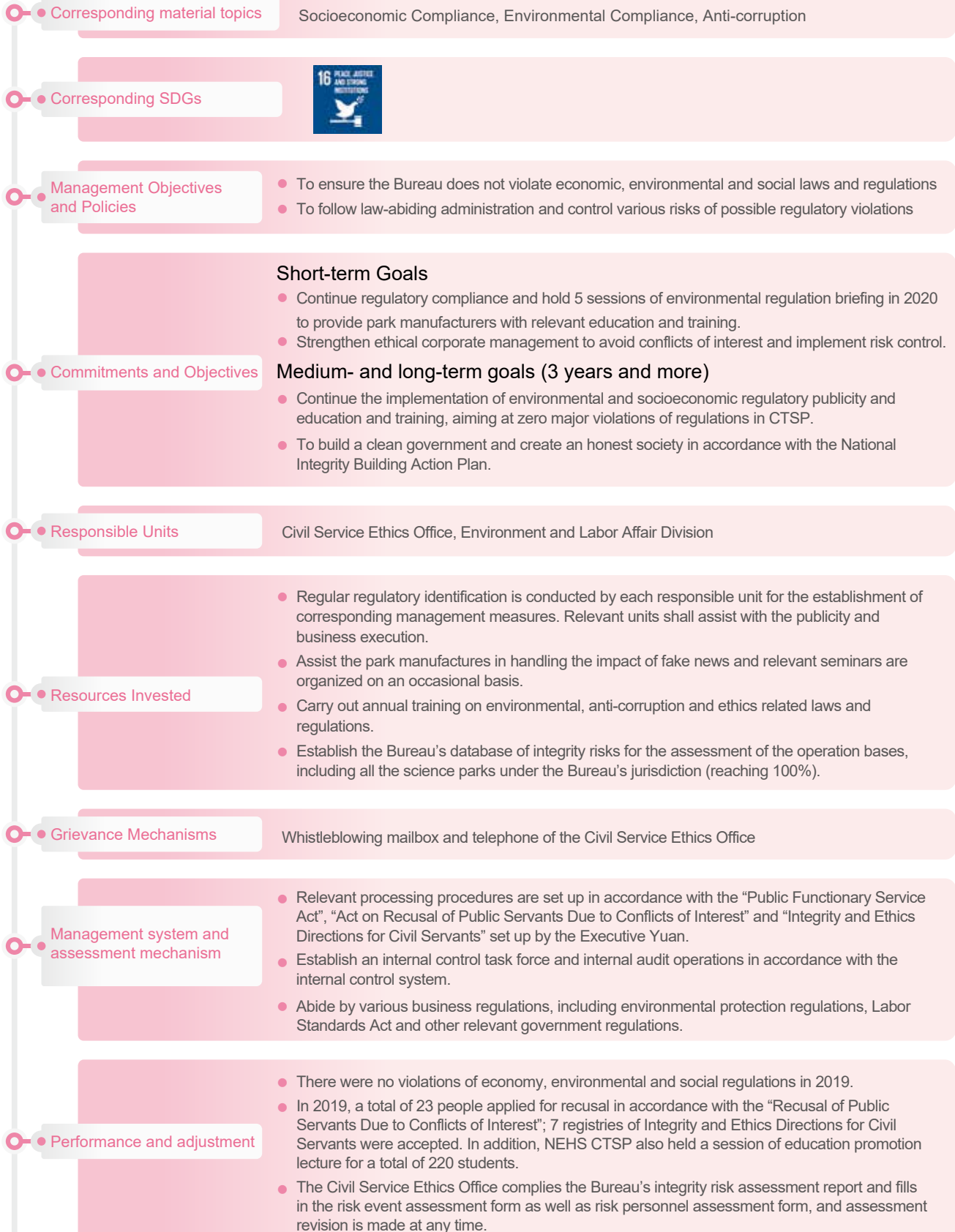


As a public agency, CTSP Bureau shall comply with all laws and regulations and protect the people's right to know by disclosing various information in accordance with the "Freedom of Government Information Law". In addition, the Bureau follows the "Integrity and Ethics Direction for Civil Servants" set up by the Executive Yuan to enable the civil servants to perform their duties in an honest, fair and impartial manner for law-based administration so as to eliminate all corruption cases and implement internal control system, creating a friendly and clean image of CTSP Bureau with integrity and law-abiding and enthusiastic service spirit.





Integrity and Transparent Governance of CTSP



▶ 2.1 Human Resources

2.1.1 Composition of Employees

CTSP Bureau is a government agency, and all the employees are full-time civil servant and are also residents in Taiwan. There are no part-time or temporary employees. The total number of employees over the past three years is shown in the table below. As of the end of Dec. 2019, the total number of employees of the Bureau was 137, including 117 appointees through national examination, 5 janitors, 3 maintenance workers, 1 driver and 11 contract clerks. The Bureau encourages the recruitment of employees with disabilities to promote a friendly and barrier-free workplace. Currently, there are 4 employees with disabilities, working as the staff, contract clerk and maintenance workers, accounting for 2.92% of the total employees, surpassing what is stipulated in employment related laws and regulations.

In 2019, the number of employees decreased by 22.6% compared with 2018. This was because that the Bureau cooperated with the revitalization plan for Chung Hsing New Village as well as the cultural assets preservation policy of the Executive Yuan, and after receiving the verification and response letter from the Executive Yuan, a total of 35 people of our budgeted staff, including 4 staffs, 2 janitors, 17 maintenance workers, 7 drivers and 5 contract clerks were transferred to the National Development Committee of Executive Yuan in response to the adjustment of business related to Chung Hsing New Village.

Staff composition in the past 3 years							
Year		2017		2018		2019	
Category	Age/ gender	Male	Female	Male	Female	Male	Female
Staff	Below 29	4	7	4	5	3	3
	30-49	41	35	39	34	38	36
	50 and more	19	13	23	16	21	16
	Subtotal	64	55	66	55	62	55
Contract clerk	Below 29	0	0	0	1	0	0
	30-49	3	5	3	5	2	2
	50 and more	1	7	1	7	1	6
	Subtotal	4	12	4	13	3	8
Maintenance worker	Below 29	0	0	0	0	0	0
	30-49	6	7	2	5	2	3
	50 and more	27	6	26	6	2	2
	Subtotal	33	13	28	11	4	5
Total		181		177		137	

Note:

- Maintenance workers include janitors, mechanics and drivers.
- In 2019, male employees accounted for 50.36% while female employees accounted for 49.64%. Employees under 29 years of age accounted for 4.38%, those between 30-49 years accounted for 60.58%, and those aged 50 and above accounted for 35.04%.



Employee distribution in the past three years				
Year		2017 (Number of people)	2018 (Number of people)	2019 (Number of people)
Item/ Gender	Age			
Chief level supervisors or higher	Male	Below 29	0	0
		30-49	0	0
		50 and more	6	6
	Female	Below 29	0	0
		30-49	1	0
		50 and more	2	4
Non-chief level supervisors and higher	Male	Below 29	4	4
		30-49	44	42
		50 and more	14	18
	Female	Below 29	7	6
		30-49	39	38
		50 and more	18	20
Maintenance worker	Male	Below 29	0	0
		30-49	6	2
		50 and more	27	26
	Female	Below 29	0	0
		30-49	7	5
		50 and more	6	6
Total		181	177	137

New Employees and Retention of Staff

CTSP Bureau complies with relevant regulations concerning the appointment of civil servants and Labor Standards Act for the hire (recruitment) of staff and does not employ child labor (above 15 and less than 16 years old). No child labor is used for the dispatched workers providing labor services. In 2019, there was no case of child labor at CTSP Bureau. All the staff at the Bureau are civil servants. In the event of leave, personal shift, retirement or resignation, the business shall be handled in accordance with the regulations stipulated in the "Matters to be Noticed for Agency in Duty".

Number of new staff in the past three years								
Year	2017				2018			
Item/ Gender	Number of new male staff	Employment rate for males (%)	Number of new female staff	Employment rate for females (%)	Number of new male staff	Employment rate for males (%)	Number of new female staff	Employment rate for females (%)
Below 29	0	0.00%	2	28.57%	1	25.00%	0	0.00%
30-49	3	6.00%	2	4.26%	5	11.36%	5	11.36%
50 and more	0	0.00%	0	0.00%	1	4.17%	0	0.00%
Total number of new staff	7				12			
Total number of staff	181				177			
Total employment rate (%)	3.87%				6.78%			

Number of new staff in the past three years				
Year	2019			
Item/ Gender	Number of new male staff	Employment rate for males (%)	Number of new female staff	Employment rate for females (%)
Below 29	0	0.00%	0	0.00%
30-49	3	7.14%	2	4.88%
50 and more	0	0.00%	1	4.17%
Total number of new staff	6			
Total number of staff	137			
Total employment rate (%)	4.37%			

Note:

1. The number of new staff also included those who left midway.
2. Employment rate (%)= Number of newly hired in the category in the current year/Total number of staff in the category at the end of the current year.



Turnover Number in the past three years								
Year	2017				2018			
Item/ Gender	Number of male turnovers	Male turnover rate (%)	Number of female turnovers	Female turnover rate (%)	Number of male turnovers	Male turnover rate (%)	Number of female turnovers	Female turnover rate (%)
Below 29	1	25.00%	2	28.57%	0	0.00%	1	16.67%
30-49	3	6.00%	0	0.00%	3	6.82%	3	6.82%
50 and more	10	21.28%	1	3.85%	2	8.33%	0	0.00%
Total turnover number	17				9			
Total number of staff	181				177			
Total turnover rate (%)	9.39%				5.08%			

Turnover Number in the past three years				
Year	2019			
Item/ Gender	Number of male turnovers	Male turnover rate (%)	Number of female turnovers	Female turnover rate (%)
Below 29	0	0.00%	1	33.33%
30-49	5	11.90%	4	7.84%
50 and more	22	91.66%	9	37.50%
Total turnover number	41			
Total number of staff	137			
Total turnover rate (%)	29.93%			

Note:

1. Turnover number included those who were retired, promoted, transferred to other agencies and left the Bureau.
2. Turnover rate (%)= Turnover number in the category in the current year/Total number of staff in the category at the end of the current year.
3. The reason for the increased turnover rate in 2019 compared with 2018 was because that the Bureau cooperated with the revitalization plan for Chung Hsing New Village as well as the cultural assets preservation policy of the Executive Yuan, and after receiving the verification and response letter from the Executive Yuan, a total of 35 people of our budgeted staff were transferred to the National Development Committee of Executive Yuan in response to the adjustment of business related to Chung Hsing New Village.

Staff Promotion and Position Vacancies

CTSP Bureau's internal promotion for position vacancies is conducted in accordance with "Civil Service Employment Act", "Enforcement Rules of Civil Service Employment Act", and "Regulations for Staff Promotion and Transfer at CTSP Bureau, MOST". The qualifications are calculated based on the promotion scoring table, and the hire is conducted in a supplementary method, "Civil Service Employment Act" and other laws shall be applied and there will be no different treatment due to gender, sexual orientation, age, appearance or physical or mental disabilities.

Parental Leave without Pay

In accordance with the "Civil Servant and Teacher Insurance Act", in the event of disability, old-age care, death, family funeral, childbirth and parental leave without pay, insurance benefits shall be applied in accordance with regulations. In terms of the attendance system, it will be handled in accordance with "Civil Service Leave Regulations". When the staff have the needs for leave without pay, such as for military service, childcare, parent care and further studies, applications can be made in accordance with "Regulations for Retaining Civil Service Position without Pay" and other related welfare regulations. The statistics of parental leave without pay at CTSP Bureau in the past three years are shown in the table below.

Year	2017			2018			2019		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Number of staff who actually applied for maternity leave of the year (A)	0	3	3	0	2	2	0	0	0
Number of employees who should be reinstated after the maternity leave of the year (B)	0	1	1	0	0	0	0	0	0
Number of employees who were actually reinstated after the maternity leave of the year (C)	0	1	1	0	0	0	0	0	0
Number of employees who were actually reinstated after the maternity leave in the previous year(s) (D)	0	1	1	0	3	3	0	1	1
Number of employees who were reinstated for one year after the maternity leave in the previous year(s) (E)	0	1	1	0	3	3	0	1	1
Reinstatement rate of the year % (C/B)	--	100%	100%	--	--	--	--	--	--
Retention rate (E/D)	--	100%	100%	--	100%	100%	--	100%	100%

Note:

Cross-year cases meant that the leave without pay was not applied in the current year, and the application could be made in the previous year or 2 years ago.



2.1.2 Employee Compensation and Benefits

Employee Compensation and Evaluation Subsidies

CTSP Bureau is a public agency and does not apply to the management mechanism of the board of directors. However, the management of compensation is handled in accordance with the regulations of the Public Functionaries Remuneration Act and Regulations for Civil Service Additional Pay. The standard salary of grassroot personnel, calculated based on that of the new staff through Elementary Civil Service Exam is 1.31 times that of the local minimum salary while that of the maintenance worker is 1.1 times that of the local minimum salary. Therefore, the salary is 100% higher than the minimum wage prescribed by the "Labor Standards Act", and the salary of the male and female civil servants in the Bureau does not have any difference due to gender difference.

The regular performance evaluation of the civil servants and the contract personnel of the Bureau is regularly conducted based on the "Civil Service Performance Evaluation Act" and CTSP Bureau Guidance for the "Performance Review for Hired and Contracted Personnel" respectively. In 2019, 100% of the staff participated in the performance appraisal (Note: In accordance with the Civil Service Performance Evaluation Act, the performance of those working for less than 6 months is not evaluated). In addition, a total of 11 hired and contracted clerks participated in the appraisal, and the appraisal rate reached 100%.

Living Allowance Subsidies of Staff

Staff benefits include bonuses and subsidies for wedding, funeral, child education and others. In addition to the fixed salary, staff within the organization also have bonuses and subsidies, where bonuses include performance and year-end bonuses and condolences, and the distribution is based on regulations of "Civil Service Performance Evaluation Act" and "Notes for 2019 Year-end Bonus for the Military, Public, and Teaching personnel". In addition, civil servants may apply for the wedding, funeral and child education subsidies. The pension after retirement is paid and allocated in accordance with "Regulations Governing the Pension and Severance Payment of Civil Service" and its implementation rules.

Employee Health

CTSP Bureau is not regulated by the Labor Union Act and the Occupational Safety and Health regulations. No organization or groups have been set up, nor are there any groups similar to the nature of a trade union. What is more, there are no employees at high risk of occupational disease. The employee's health and safety statistics between 2017 and 2019 are as follows: zero incident of work-related injuries, zero occurrence of occupational disease and zero incident of work-related deaths.

The employees of the Bureau receive health checkups in accordance with the Key Points for the Implementation of Health Examinations for Civil Servants. Those aged over 40 years and above can apply for health check-ups on official leave in accordance with the regulations; the Director-General and Deputy Director-General may apply for the subsidies of the health checkups every year and civil servants aged 40 and more can apply for the subsidies every two years. A total of 18 employees applied for and received the subsidies in 2019.

2.1.3 Staff Training

CTSP Bureau sets up annual training plans to continuously strengthen the capabilities of the public servants and assist them in managing their retirement life, such as functional management and lifelong learning plans. The Lifelong e-learning platform does not provide statistics on the average training hour by gender, so the following table shows the annual average training hours by staff category.

Year		2017			2018			2019		
Item/ Gender		Total number	Total training hours	Average training hours	Total number	Total training hours	Average training hours	Total number	Total training hours	Average training hours
Management positions	Male	27	929	34	24	950	40	23	1,269	55
	Female	10	634	63	12	482	40	13	687	53
Full-time	Male	43	1,968	46	42	2,392	57	38	2,479	65
	Female	46	3,186	69	41	2,406	59	40	2,912	73
Contracted	Male	5	131	26	3	85	28	3	94	31
	Female	22	229	10	8	172	22	8	308	39

Note:

1. The statistics of actual training hours for maintenance workers were not gathered, so the information concerning that part is not included in the table.
2. Management positions refer to full-time staff holding the position of section chief or higher.
3. The total number of trainees did not include staff on leave without pay of the current year.

Every year, civil servants at CTSP Bureau receive 20 hours of business-related training as instructed in the letter from the Executive Yuan. Besides, those meeting certain qualifications can also participate in 4-week promotion training or be selected to attend advanced training or seminars lasting for several days. Take 2019 as an example, the main reason for the higher average training hours among male managers than female ones was because two of them participated in the 4-week promotion training. Full-time female employees had higher average training hours than male ones mainly because 1 of them received the basic training for the Elementary Civil Service Examinations for more than 4 weeks, 1 participated in the 4-week promotion training and 2 participated the 70-hour basic training for professional procurement personnel.

The employment period of contracted personnel is on a yearly basis. Although there are no limits on the learning hours, trainees can take the training courses organized by CTSP Bureau or online e-learning courses, and the business units can also assign personnel to participate in relevant training based on the individual situations and business needs. The number of learning hours of male contracted staff was more than 30 hours, with a total of 2 trainees while those of female ones was also more than 30 hours, with a total of 6 trainees. In summary, every staff at CTSP Bureau has opportunities for training regardless of the difference in gender and type of employment.

Training for New Employees

In 2019, there were 2 trainees in the basic training for new civil servants, generally organized by National Academy of Civil Service of the Civil Service Protection & Training Commission (CSPTC) or entrusted to training institutions, focusing on the basic concepts, ethics, service attitude, administrative procedures and techniques new civil servants should be equipped with. For the practice training, the employing agencies (institutions) are entrusted by CSPTC to organize the training for the improvement of knowledge and skills required for the work, and assessment of ethics and service attitude are the focus in the training. Moreover, to improve knowledge and skills required for the job, new employees are recommended to participate in civil service-related training or seminars based on the nature of business and training when necessary.



Training for Medium and Senior Managers

Section chiefs were the trainees recommended to participate in the physical courses of management competence application and advanced courses in 2019, with a total of 10 trainees. High-level personnel were recommended to participate in the physical seminars for leadership development (with management training), including Senior Managers Seminar, Innovative Service Seminar, Vision Modeling Seminar, Information Management Seminar, Environmental Insight Seminar, and Practices for Central Agency to Face Media, with a total of 7 trainees.

Policy and Competency Training

Training and courses organized in 2019 included Environmental Education, Two Human Rights Conventions, Convention on the Rights of the Child and Domestic Regulatory Review, Conversations of Foreign Guest Reception, English Correspondence, Legislation and Practice in Civil Service Administration, Convention on the Elimination of All Forms of Discrimination Against Women and the Implementation and Utilization of Gender Mainstreaming in Law- Take Gender Quality Measures and Jinxin Award for Example, the Pleasure of Reading- Meeting the Writers, Public Safety and Inspection and Changes to Use of Buildings and Advocacy Workshop of Interior Decoration of Buildings, Public Art Business Observations and Visits, Basic and Advanced Courses of Documents and File Management and so on. A total of 52 sessions were registered in the Civil Service Lifelong e-learning in 2019.

In 2019, the employees participated in a total of 7,850 hours of training courses (including digital ones). The employees received a total of 321 hours of training for human right policy in 2019. All the employees (100%) at CTSP Bureau received human rights training (including official document advocacy, posting documents and regulation compilation).

Training of Information Safety

A total of 16 sessions of information safety-related courses were organized in 2019, including supervisory information security education training (information safety awareness training), personal information inventory and risk identification, advocacy of information security awareness and common threat prevention, publicity of information security and personal information, assets inventory and risk assessment methods, with a total of 39 training hours and 473 trainees.

2.1.4 Employee Rights and Care

Respect for Human Rights

In addition to the due rights provided to the employees in accordance with relevant regulations, CTSP Bureau also respects internationally recognized regulations of human rights, providing fair and equal treatment to all employees regardless of gender, race, religion or political affiliation. In addition, the Bureau has also set up the “CTSP Bureau Rules for Prevention, Complaint, and Discipline of Sexual Harassment” and regularly holds publicity meetings for sexual harassment prevention and control, and grievance channels are also provided. There was no human right grievance case at CTSP Bureau in 2019.

The Shortest Notice Period

The employees in the Bureau are all civil servants while contract-based staff are hired on a yearly basis, and the contract employees are the personnel hired by contract within the budgeted posts in accordance with “Contract-based Worker Employment Act” and “Executive Yuan and Subordinate Agencies Contracted-Employment”, and the contractual relationship with the employing agency under public laws is determined since the date of employment. Based on the Lao Dong Yi Zi No. 0960130914 Announcement on November 30, 2007 by the former Labor Committee of Executive Yuan, these employees are excluded from the application of



Labor Standards Act. Therefore, the minimum notice period prescribed in the Labor Standards Act does not apply.

Freedom of Association

We respect the rights of employees granted by law, and the freedom of assembly and association are governed by the “Civil Servant Association Act”. The Bureau has never hindered or stopped the employees from the freedom of association. So far, two clubs have been established, including the Red Feet Club and Badminton Club.

Employee Care

To maintain good communication with our colleagues, the employee grievance channel is provided through the Director-General's mailbox. Various measures and activities are also provided to listen to the voices of our employees in a considerate, warm and respectful manner to understand their needs and solve problems.

- Communication with supervisors and managers are strengthened through business meeting and related occasions.
- We actively provide related information about employees' rights on occasions such as wedding, funerals and celebrations.





▶ 2.2 Knowing and Obeying the Law

2.2.1 Legal Compliance

The Bureau is a public agency, not a profit-making institution, and does not apply to anti-competitive behavior or Anti-trust and Anti-Monopoly Laws. We comply with the “Freedom of Government Information Law” to protect people’s right to know and all affairs are announced and explained in the announcement. All the business is handled in accordance with the “Civil Service Administrative Neutrality Act”, in a politically neutral manner and there were no cases of political contributions. Nor were there incidents of major leaks in the outsourced sewage treatment plants or violations of environmental regulations.

Anti-competitive conduct and antitrust regulations	Not applicable	Product and service safety regulations	Not applicable
Product labeling regulations	Not applicable	Marketing Communication Regulations	Not applicable
The Freedom of Government Information Law	No violation ✓	Government Procurement Act	No violation ✓
Civil Service Administrative Neutrality Act	No violation ✓	Political contributions	No violation ✓
Corruption incident	No violation ✓	Customer privacy	No violation ✓
Risk of child labor	No violation ✓	Forced labor	No violation ✓
Discrimination incident	No violation ✓	Violation of indigenous rights	No violation ✓
Environmental regulations	No violation ✓	Serious leakage	No violation ✓
Various social and economic laws and regulations	No violation ✓		

Strengthening and Advocacy of Management Procedures for Avoidance of Conflict of Interest

There has not been any relevant judgment or prosecution concerning the Bureau’s procurement procedure incident in 2019. To strengthen the employees’ professional knowledge of procurement and regulations concerning avoidance of conflict of interest for compliance when handling procurement operations to ensure the fairness of procurement operations and improve the quality and efficiency of procurement operations for procurement transparency, the following measures were taken in 2019.

- We held 5 management meetings to strengthen advocacy of recusal due to conflicts of interest and provisions in the Government Procurement Act and Act on Recusal of Public Servants Due to Conflicts of Interest. Moreover, based on the relevant regulations of the Act on Recusal of Public Servants Due to Conflicts of Interest, a total of 13 times of recusal, including “voluntary recusal”, “application for recusal”, and “recusal ordered ex officio” were announced in the Bureau’s e-bulletin to inform our employees and also to strengthen their knowledge.
- The Bureau organized the “advocacy briefing of Government Procurement Act” and Workshop and “Seminar of Government Procurement Act- Deficiency of Procurement Audits” to improve knowledge related to subsequent procurement operations and strengthen key points of various operations to improve the procurement procedures and maintain the fairness and openness of government procurement operations.
- The content concerning avoidance of conflict of interest- “Disclose beforehand and make public announcement afterward” was published in the “No. 178 Issue of Central Taiwan Science Park Newsletter” to remind the bidder or subsidy applicants to pay attention to relevant regulations.
- To improve the Bureau’s evaluation procedures for the most advantageous tender, the work schedule is planned appropriately in accordance with the nature of the case, and preliminary review is made in advance to perfectly prepare the selection work. In addition, before the selection meeting, the committee members would be asked whether evading applies, and committee members are also asked to sign and submit the Letter of “Guarantee of Procurement Selection Committee” to pay more attention to whether there exist any stakes between the committee member and the bidder. Meanwhile, the selection committee members are also timely reminded of their duties to avoid any situation that can affect the fairness of procurement from happening.

2.2.2 Anti-corruption

In accordance with the prescriptions of “Public Functionary Service Act” and “Integrity and Ethics Directions for Civil Servants” set up by the Executive Yuan, civil servants of the Bureau should comply with the law-based administration to avoid the conflict of interest, and the conducts of accepting donated property, banquets and entertainments and illicit lobbying are forbidden. It is clearly stipulated in the relevant handling procedures for incidents of donated property, banquets and entertainments and illicit lobbying for the civil servants to abide by to ensure their honesty, integrity, impartiality and fairness when performing their duties and that the public interest is always the priority.

To implement the early warning mechanism and anti-corruption risk management, the Civil Service Ethics Office has established the database of integrity risks for the assessment of the operation bases, including all the science parks under the Bureau's jurisdiction (reaching 100%) based on the principle of “preventing corruption, stamping out corruption, and then preventing corruption”. Assessment data of the previous year serve as the basis for the reviewing of reasons and suitability of risk data (personnel and events) case by case and response behavior is proposed as the focus of the integrity work of the year and also for the compilation of the integrity assessment report, listing the evaluation forms of risk events and risk personnel for review and revision at any time. The Bureau has conducted a risk assessment on the organization and business characteristics in 2019, and the risk events listed all belonged to low-risk events. In addition, in terms of the coordination of appropriate term and rotation method of personnel susceptible to risk, the Bureau implements the job rotation system and business handover audit and inspection, aiming at discovering the crucial reason of the problem to effectively prevent illegalities.

Anti-corruption issues have drawn a lot of attention internationally in recent years, and as a government department, the Bureau follows government decrees and implements the principle of administrative neutrality both politically and legally. Our employees should also have the concept of knowing and obeying the law. All the anti-corruption business is planned and implemented by the Civil Service Ethics Office. In 2019, the anti-corruption related issues were implemented in accordance with the annual policy goals of the Agency Against Corruption, Ministry of Justice to construct a clean and preventive anti-corruption government with zero tolerance for corruption. To implement the prevention, discovery and handling, business reform, agency safety and official business maintenance, we have carried out the followings in 2019.

1. We have made use of the Civil Service Ethics Office mailbox to publicize important anti-corruption policies and messages to all employees (reaching 100%). Before specific festivals (spring festival, Dragon Boat Festival and Mid-autumn Festival), we strengthened the advocacy of compliance with the regulations prescribed in the “Integrity and Ethics Directions for Civil Servants” to reinforce the awareness of the integrity concept.
2. Handling business audits: We conducted project audits for businesses vulnerable to malpractice. The purpose of audits was not limited to the traditional prevention of malpractice, more focus was drawn to promoting benefits. Through the implementation of audits, potential internal and external risks could be identified at early stage for prevention and possible crises that may generate could also be reduced, and the system can be more complete.
3. Warning for events or personnel with potential risks: To implement the early warning functions for anti-corruption, we effectively tracked and managed early warning as cases. When an event or the personnel with potential risks occurs, the ratification should be immediately be done by the senior officer to take precautions and relevant early warning is used as the operating procedures and will be controlled by the internal control system of the Bureau.
4. Organization of corporate anti-corruption advocacy: We cooperated with the Taichung Investigation Branch of Investigation Bureau, Ministry of Justice and organized “Business secret protection and crime investigation seminar for advocacy of corporate integrity” on January 22, 2019, to encourage enterprises to integrate into the law-abiding philosophy fundamentally and improve the protection of their own business secrets so as to commonly maintain industrial ethics and competitive order to reconcile the social public benefits.
5. Strengthen supervision and audit mechanism of procurement cases: Relevant regulations concerning avoidance of conflict of interest and anti-corruption have been formulated for all the bidding documents of the procurement cases. For the procurement cases of the Bureau, they will be summarized for cross-comparison analysis case by case every 6 months, and procurement analysis reports are made to discover abnormal cases. In addition, the aforementioned procurement cases are also listed in the “Consolidated misconduct of procurement cases” to be reported to the Civil Service Ethics Office of MOST for follow-up tracking and to prevent abuse from happening.
6. Handle the reports and petition cases from the public (manufacturer), actively play the function of investigating and preventing malpractice, carefully investigate and handle these cases, and the investigation results are submitted to the Director-General and replied to the whistleblower (petitioner) to maintain the clean image of the Bureau. In addition, we can also understand the areas to be improved for our services and improvement plans can be set up as a reference for relevant offices and divisions.



Advocacy briefing of integrity education and discipline promotion in NEHS CTSP



Minister of Justice Tsai Ching-hsiang attended the Seminar on Business Secret Protection and Crime Investigation in person



Whistleblowing channel: Civil Service Ethics Office
Tel: 04-25658588, ext. 6801, 6811 or 6813
Email: discipline@ctsp.gov.tw
Fax: 04-25658822

2.2.3 Internal Control

Since 2011, CTSP Bureau has worked in line with the internal control related regulations proclaimed by the Executive Yuan and actively promoted internal control work. In addition, the internal control task force was established, and the Deputy Director-General served as the convener, the chief secretary as the deputy convener and the first-level supervisors of different units as the committee members. The planning and implementation of various internal control operations are implemented by each office and division according to the nature of the business while the staff work is in the charge of the Planning Division.

The meeting of the internal control task force is convened every three months to review and deliberate the opinions of the internal control system from the Control Yuan, the National Audit Office and the Ministry of Science and Technology and to conduct self-assessment and internal audit.

Division of labor of CTSP Bureau's Internal Control Task Force

Planning Division

- Compilation of budget estimates (public construction plans, technological development plans and social development plans)
- Control and management of operation fund and risks
- Administrative performance evaluation (administration performance evaluation, annual administration plan management, risk management and so on)

Investment Division

- Review of the establishment of park businesses and operations management
- Innovation and development of technology research, technical talent training and acquiring and adjustment of human resources in the park
- Business promotion work (international cooperation, media relations, marketing, congressional liaison and visitor reception)



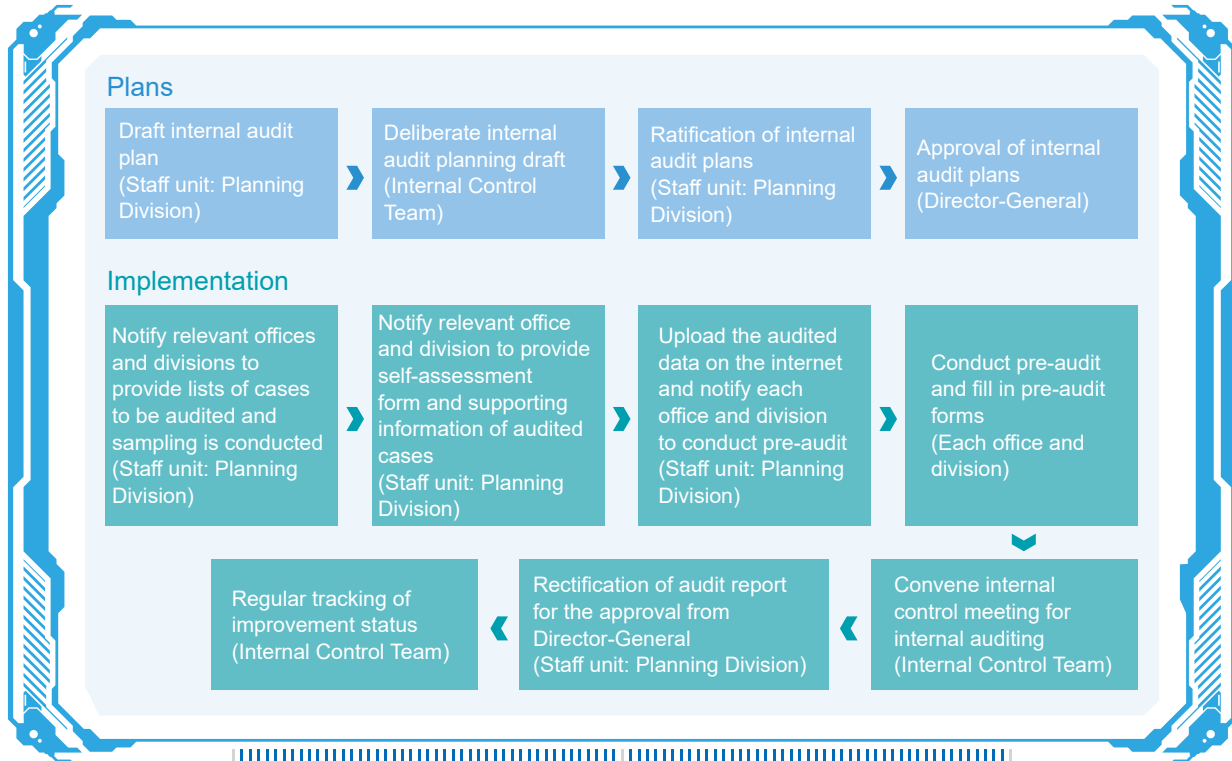
Environmental and Labor Affair Division	<ul style="list-style-type: none"> • Planning and management of environmental protection in the park • Business concerning labor inspection • Business concerning labor administrative • Management of safety protection, disaster prevention and emergency response affairs in the park
Business Division	<ul style="list-style-type: none"> • Industrial and commercial registration management in the park • Management of trade and bonded operation • Planning and management of system outsourcing operations
Construction Management Division	<ul style="list-style-type: none"> • Quality control of public works in the park
Land Development Division	<ul style="list-style-type: none"> • Formulation and review of establishment planning, physical planning and related plans in the park • Management of park land, plants and dormitories • Park traffic management
Secretariat Office	<ul style="list-style-type: none"> • Cashier and property management business • Procurement business (government procurement and management operations)
Personnel Office	<ul style="list-style-type: none"> • Personnel business (personnel hiring, salary, benefits, retirement, etc.)
Accounting and Statistics Office	<ul style="list-style-type: none"> • Accounting business
Civil Service Ethics Office	<ul style="list-style-type: none"> • Ethics business (advocacy of ethics laws and regulations and anti-abuse measures, investigation and handling of ethical issues)
According to the attribution of business of each office and division	<ul style="list-style-type: none"> • Others

The Bureau conducts the internal audit at least once a year to check the establishment and implementation of internal control. Timely suggestions for improvement are given, or advice or early warning opinions on the economy, efficiency and effectiveness of the resources use as well as major challenges concerning management and performance are provided so as to detect and prevent abnormal issues in a timely manner to reasonably ensure the normal operation of the business.

The audit report has to be completed within 2 months after the audit and be submitted to the Director-General for approval, followed by regular track of the deficiencies of the internal control and the implementation of suggested reforms. Among them, tracking of internal control deficiencies has to be done until completely improved while that of suggested reforms until the feasibility is evaluated by relevant unit to decide whether to accept the suggestion or adopt relevant corresponding measures.



Implementation process of annual internal audit operations of CTSP Bureau



2.2.4 Supplier Management

CTSP Bureau is a public agency, but it spares no efforts in the management of the value chain. Regarding the supplier management, in addition to the compliance with the "Government Procurement Act", relevant regulations concerning social and environmental aspects are also followed and on-site inspections conducted. There are also relevant ordinances and regulations for the management of park businesses. Labor inspections, factory visits, environmental supervision and advocacy briefing are conducted on regular or occasional basis.

Every year, we respond and manage the major topics our stakeholders concern about. This shows the significance and meaning of sustainable development to CTSP Bureau and its partners in the value chain. We hope that through relevant management, we can work with our partners in the value chain to create a brighter future for CTSP together.



Compliance with Government Procurement Act

The bidding of all the projects, labor services and property procurement projects are conducted in accordance with the "Government Procurement Act". A list of recommendations for selection committee members is generated on the Public Construction Commission website for all units with procurement needs, and the head of the business unit would select the committee to select suppliers in a transparent and fair manner and under the competition principle.

The procurement contracts of the Bureau follow the model contract for procurement which specifies relevant legal norms and ethical regulations, including insurance, employers' liability and People with Disabilities Rights Protection Act as well as the Indigenous Peoples' Basic Law to protect the right to work of specific groups, 100% in line with human rights conditions.

In 2019, the winning tenderers throughout the year were all the companies established and registered in Taiwan. The procurement category is divided into property, engineering and labor services. The number of procurement projects, amount and ratio in the annual amount are detailed in the table below.

Year	2017			2018			2019		
Item/Category	Number of procurement projects	Amount (NTD 1,000)	Ratio in the annual amount	Number of procurement projects	Amount (NTD 1,000)	Ratio in the annual amount	Number of procurement projects	Amount (NTD 1,000)	Ratio in the annual amount
Property	18	52,717	5.58%	58	251,083	9.68%	14	136,423	2.79%
Engineering	26	304,706	32.28%	29	1,753,168	67.57%	31	2,174,690	44.59%
Labor services	51	586,667	62.14%	74	590,198	22.75%	68	2,566,488	52.62%

Environmental Inspections of Contractors

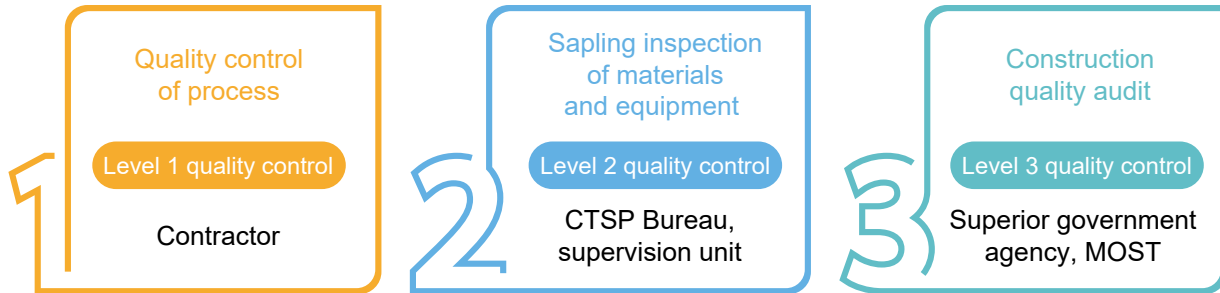
All public projects are open to tender and are handled by the contractors for the construction work. The contractor's construction plan and items to be handled shall be checked before the construction begins to avoid any regulatory violations. Contractual division of labor and responsibilities are as prescribed in the contract. To reduce the problems generated for responsibility clarification for the violation of regulations set by competent authority during construction period, reasonable expenses for environmental protection are listed in the contract.

During the construction period, the contractors shall handle all kinds of environmental protection and water and soil conservation work in accordance with environmental regulations and water and soil conservation laws and provisions in the contract. In addition to the contract terms, illustration and specifications prescribing matters needed to be handled, contractors shall also regularly conduct construction reviews, safety health and environmental protection meetings and coordination organization meeting in accordance with the construction drawing and schedule diagram to control the progress and quality, safety and health, environmental protection, disaster prevention during flood season, emergency response, ecological conservation, maintenance of traffic, cultural heritage protection and other relevant issues on a monthly basis.

The quality management system of public works is a 3-level system. The contractors are in charge of Level 1 quality control, and CTSP Bureau and the supervision unit are responsible for the Level 2 quality assurance. Finally, the superior government agency or MOST conduct the Level 3 quality control for the inspection of project quality and schedules.



Quality management system of public works



The project organizer will dispatch personnel to supervise the construction of the project from time to time and issue the "Project Supervision and Quality Verification Form". When there is any defect in the supervision, the responsible manufacturer will reply to improvement suggestions and the supervision unit will be responsible for the inspection. The improvement situation will be recorded for future reference once determined acceptable after assessment. If the competent authority conducts supervision and assessment or other inspection operations, when fines are imposed or when the project is suspended in accordance with the Environmental Impact Assessment Act or environmental protection or water conservation related laws and regulations, the contractor shall be responsible for the payment of the fines and improvement until the improvement is confirmed acceptable by the competent authority.

Moreover, no matter it is the construction of plant for new manufactures or the expansion project for the existing manufacturer, both will involve construction site management operations. Therefore, to effectively control construction projects, it is required to properly install pollution prevention and control facilities to ensure that various control prescriptions of the Water Pollution Control Act and Air Pollution Control Act are followed, reducing the impacts of the construction on the residents in the neighborhood. Every year, the Bureau conducts inspections of the construction sites of the public works and the self-built plants in the park from time to time. According to statistics, there were a total of 178 inspections in 2019.

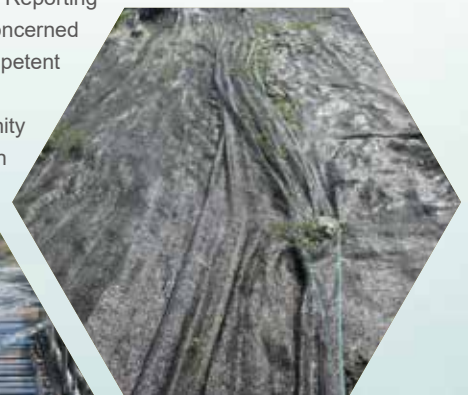


Special Column - Supplier Management of Erlin Public Works

With the continuous development of Central Taiwan Science Park as a whole, the project of Erlin Park site has commenced continually. Therefore, how to effectively control the construction projects and require the installation of appropriate pollution protection facilities on construction sites to reduce dust and other air pollution behavior and how to reduce the inconvenience the construction projects bring to the public have become the focus of the Bureau. To this end, the Bureau conducts on-site inspections of the construction operations of the development projects in the science park on an occasional basis. Relevant key points of management are detailed as follows.

When conducting construction site inspections, the key points focus on the followings.

- (1). Notice board: The notice board is set outside the perimeter and there must be a control number (based on which to manage the air pollution fee), the person in charge, contact number, and the reporting phone number on the board.
- (2). Construction Site Perimeter: The full-height sight-blocking barrier fences are mainly the fences for Type 1 construction projects that are 2.4 meters high, and the overflow protection base is installed around the perimeter of the construction site.
- (3). Piles of construction materials: when using construction materials, sand, soils or waste generating fugitive dust emissions that are piled at the construction site, they shall be covered with dust-control fabric or mesh, or chemical stabilizers shall be sprayed regularly.
- (4). Vehicle routes: The vehicle routes within the construction site shall be paved with steel plates, concrete, asphalt concrete, coarse grade mixture or other granular materials with equivalent functions; the control facilities must cover 80% or more of the vehicle route surface area.
- (5). Exposed areas: Control facilities used to effectively suppress dust on exposed areas within the construction site include covering with dust-control fabric or a dust-control mesh; paving with steel plates, concrete, asphalt concrete, coarse grade mixture or other granular materials with equivalent functions; planting of vegetation; surface compaction in combination with water spraying measures; carrying out regular spraying with chemical stabilizers.
- (6). Entrances and exits of the construction site: On all four sides of the carwash platforms, overflow protection bases or other control facilities shall be installed to prevent carwash wastewater from spilling from the construction site; installing grit chambers for effective grit removal.
- (7). Construction structure: On the outer side of scaffolding at the construction site dust-control mesh or fabric shall be used to effectively suppress dust.
- (8). Moving materials from higher floors: Elevator shaft, conveyor lines inside the building, concealed line transportation, concealed line transportation, and manual conveyance shall be used to suppress fugitive escape of dust when construction materials, sand, soils or waste that generate fugitive dust emissions are moved from higher floors to the ground floor or underground floor at the construction site.
- (9). Transport vehicles and machinery transporting construction materials: Transport vehicles and machinery that transport construction materials, sand, soils or waste that generate fugitive dust emissions to enter or exit the construction site should employ closed box transport machinery, use control facilities that tightly cover the transported materials with dust proof fabric or other non-breathable covers that prevent them from falling to the ground. The edges of the dustproof fabric or other non-breathable covers shall extend at least 15 centimeters beyond the upper edges of the truck bed.
- (10). In accordance with the prescriptions of the "Water Pollution Control Measures and Test Reporting Management Regulations", before proceeding to work at construction sites, the parties concerned shall present a "plan for the reduction of pollutants from runoff wastewater" to the competent authority for approved.
- (11). Construction control is cooperated during the construction period in the Siangshihliao community and Wanhe farm community to prevent the impact of long-term operation of machinery with high noise.
- (12). The "autonomous management plan" for mobile pollution sources is planned in the park area to improve the control of exhaust emissions from diesel transport vehicles used in the transport activities in the park area as a measure for environmentally friendliness. The Bureau requires the self-owned or related business units in the park to provide diesel transport vehicles meeting Stage 4 (inclusive) diesel cars or Stage 3 diesel cars with smoke filters for transport activities.



▲ The bare surface in the work area is covered with dust-proof nets to prevent dust from raising.

◀ A platform for carwash is set up at the entrance and exit of the construction site.



▶ 2.3 Four Savings Project

■ The Use of Resources at CTSP Bureau

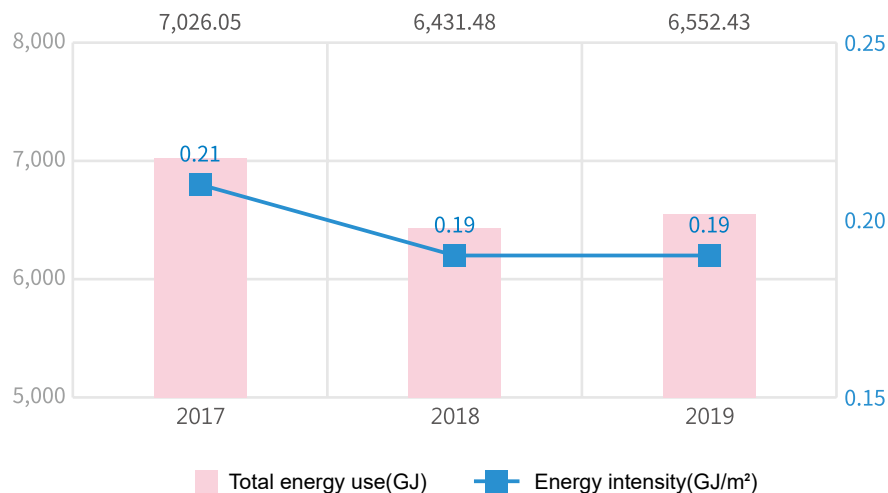
The Bureau works in line with the government's Four Savings Project on the use of electricity, water, oil and paper and implements concrete goals prescribed by Executive Yuan. The energy intensity in 2019 was the same as that in 2018, and the energy consumption increased slightly. To reduce energy consumption, the Bureau conducted the "Air Conditioning Renewal and Improvement Project" in 2019, which is expected to be completed in May, 2020. It is expected to reduce electricity consumption.

Year/ Item	2017	2018	2019
Electricity (kWh)	1,865,263	1,689,751	1,753,106
Gasoline (liter)	6,483	8,143	4,617
Diesel (liter)	2,832	2,351	2,577
Total energy consumption (GJ)	7,026.05	6,431.48	6,552.43
Energy intensity (GJ/m ²)	0.21	0.19	0.19
Water consumption (million liter)	4.15	4.11	4.20
Water intensity (million liter/m ²)	0.00012	0.00012	0.00012
Online approval ratio	51.80%	54.00%	55.56%

Note:

1. The organization unit of measurement is the floor area of the administrative building of Bureau (33,724.91 m²).
2. The energy conversion coefficient referred to the calorific value coefficient of different energy sources from EPA's Greenhouse Gas Emission Coefficient Management Table 6.0.4 version.

Energy consumption in the past three years





Energy and Water Conservation Measures at CTSP Bureau

To meet the requirements of the goals of Executive Yuan's energy and water conservation projects, the Bureau has implemented the following energy-saving measures: replacing lamps with power-saving ones, controlling the number of light sources in the parking lot based on the time of use and lights were replaced with LED lamps and automatic sensors were installed, the temperature of the air-conditioners are set at 26-28 degrees, the melting temperature is set higher and the time using air-conditioners is shortened. The annual electricity consumption has gradually decreased from the 2.02 million kWh in 2009 to 1.75 million kWh in 2019 because of the policy of opening all windows in the building to increase ventilation and reduce heat radiation effect, a 13.37% decrease compared with 2009.

In terms of the water-saving measures, the Bureau adopts the methods of reducing the pressure of supply, reverse osmosis drinking water, water resources recycling and reuse to save water resources. Furthermore, the electronic bulletin is also used to urge our employees from time to time to implement water conservation measures. In 2019, the annual water consumption was 4,200 m³, an 18.60% decrease compared with the 5,160 m³ in 2009.



3

Promotion of Innovation-driven Industries

- 3.1 Driving the Development of High-tech Industry in Central Taiwan
Special Column - External Marketing and Active Attraction of Investment
- 3.2 Smart Clusters Upgrade
Special Column - Industrial Artificial Intelligence at CTSP-
Application Scheme of Intelligent Manufacturing Technology
- 3.3 Establishment of the Foundation of AI Resources



In the face of industrial innovation and changes in the market brought by AI, CTSP Bureau works with the central and local governments, providing complete and customized employment matching services and building the “AI Robotics Hub” to promote local employment and to foster high-quality R&D manpower required in the industry in accordance with the project of MOST. The operational goals are to cultivate talents and implement innovative practices to create a strong industrial chain of intelligent machinery industry and establish an ecosystem of AI industry so as to enhance the national economic development and industrial competitiveness.





Intelligence Development and Upgrade of CTSP

Corresponding material topics

Economic Performance (Industrial upgrading)

Corresponding SDGs



Management Objectives and Policies

- Drive the high-tech industry development in central Taiwan.
- Connect with the government-industry-university-institute resources to support the continuous development of industrial clusters.

Commitments and Objectives

Short-term Goals

- Set the investment target of introducing 18 manufacturers for investment every year.
- To consolidate and integrate the resource capacity of CTSP manufacturers and the government-industry-university-institute alliance, we will promote industry-university training collaboration, and strengthen the industry-university linkage and talent exchanges, at least 6 sessions of "Innovation and Start-up Forum" and "industry-academia matchmaking meeting", and at least 1 session of the "government-industry-university-research institute exchange meeting" are scheduled to be organized to continue the promotion of industrial development and participation in the industry-academia innovation activities in the central region.
- Promote "Consolidating Regional Cooperation - the Advancement Project for Intelligence Machinery and Aerospace Industries in Central and Southern Taiwan" (2017~2020). It is expected to introduce more than 1 manufacturer into the science park, with the investment amount of NTD 50 -100 million and to facilitate the R&D of more than 5 cases of core technologies independently or jointly developed by the industry, academia and research institute.

Medium- and long-term goals (3 years and more)

- Gradually complete the industrial chain of semiconductor, optoelectronics, precision machinery, and biotechnology in CTSP to construct a sustainable industrial ecosystem.
- To promote the "Acceleration of Bio-medical Industry Innovation Program in the Central Region" (2019-2022) that will contribute to more than 8 industry-university-research institute-medical collaboration cases, and the expected cumulative value of the derivative output will reach NTD 150 million and more.
- To promote "Industrial Artificial Intelligence at CTSP- Application Scheme of Intelligent Manufacturing Technology", common demand solutions are summarized. The AI-based international software service platform is introduced, and 6 model cases of intelligent manufacturing technology application solutions are built.

Responsible Units

Investment Division, Planning Division

Resources Invested

The Investment Division is in charge of promoting the park and attracting investment.

Grievance Mechanisms

Director-General's mailbox

Management system and assessment mechanism

The Planning Division gathers the statistics of investment, industrial turnover, the number of employees and so on every month.

Performance and adjustment

- The turnover in CTSP in 2019 amounted to NTD 797.232, a 9.98% increase compared with 2018.
- It is expected to introduce 18 new manufacturers in 2019, with a total investment of NTD 5.812 billion. In addition, capital increase cases of 14 manufacturers were also completed, with an increase of NTD 30.325 billion in capital.
- In 2019, we "strengthened regional collaboration to promote the Smart Machinery and Aerospace Industry Upgrade Project in Central and Southern Taiwan", and the subsidy approved to manufacturers was NTD 40,029 thousand for technology research and development, which drove the manufacturers to invest approximately NTD 71,771 thousand in R&D.
- The Planning Division forms a team in charge of plans of visiting manufacturers. Through visiting manufacturers or holding seminars, the policy and projects promoted by the Bureau can be publicized. At the same time, we can also have an in-depth understanding of the problems faced by the manufacturers and care about their needs to propose solutions.



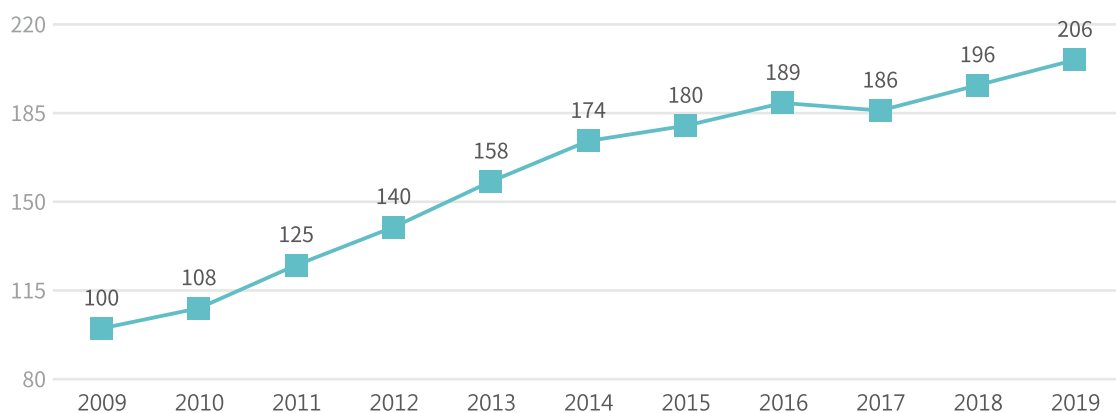
▶ 3.1 Driving the Development of High-tech Industry in Central Taiwan

3.1.1 Overview of Park Development

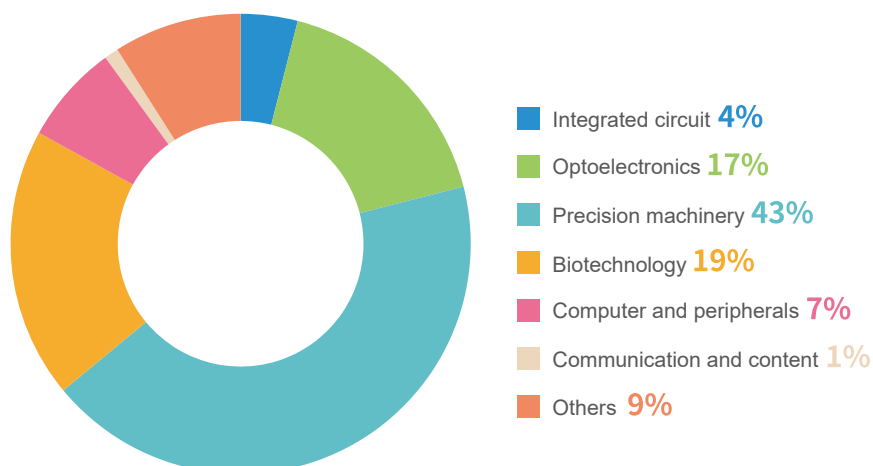
Continuous Growth of the Number of Manufacturers

CTSP has introduced high-tech industries at home and abroad to station in the park. As of the end of 2019, with the positive efforts made to attract investment, the number of validly approved manufacturers reached 206, and 14 research institutions and incubation centers have been introduced into CTSP. In addition, to encourage entrepreneurship (innovation) & incubation centers or research institutions with incubation services to cultivate excellent technology of manufacturers and invest in the science park, the Bureau holds an annual event to select excellent entrepreneurship (innovation) & incubation centers for cultivation of excellent manufacturers, and in 2019, Chaoyang University of Technology, National Chung Hsing University and National Chi Nan University won the award.

Number of validly approved manufacturers



Ratio of companies in each industry





Successful integration of industrial clusters



Integrated circuit

- Currently, there are 9 companies, including TSMC, Winbond, Micron, SPIL, Applied Materials, Hermes Epitek, MIC and others.
 - The investment amount of the projects reaches NTD 1136.9 billion.
- Among them, a total of 8 12-inch fabs from three companies, including TSMC, Winbond and Micron have started mass production. In addition, in 2019, TSMC's 10nm and 7 nm process plants both have started mass production, which completes the mid- and downstream industrial chain, creating employment opportunities while driving the industrial transformation in central Taiwan.



Optoelectronic

- There are a total of 34 companies, including the benchmarking corporations such as AU Optronics, Corning, Nitto Denko, JSR Micro, EPSTAR, GSEO, H.P.B. Optoelectronics, Taiwan Ohara Optical, Taiwan Color Optics, Raystar Optronics, and Glory Science.
 - The investment amount of the projects reaches NTD 889.2 billion.
- As these leading optoelectronic manufacturers and upstream material manufacturers at home and abroad entered CTSP, a complete upstream, midstream and downstream optoelectronic industry chain has been thus formed.



Precision machinery

- Currently, there are a total of 88 manufacturers, making it the industry with the largest number of manufacturers in CTSP.
 - The investment amount of the projects reaches NTD 66.1 billion.
- Precision machinery has always been the key industry in CTSP, and the types of manufacturers cover large manufacturers producing equipment, machinery, parts and machine tools for optoelectronics and integrated circuit industries in the park, reducing the production costs to greatly enhance industrial competitiveness and the world's leading cluster of precision machinery is further formed here. In 2019, the world's third largest (largest in Taiwan) machine tool group, Fair Friend Group, the large Swiss machine tool manufacturer, Tornos, and the 180-year-old professional fasteners manufacturer, Bossard, entered CTSP, adding new force to the development of intelligence precision machinery industry.



Biotechnology

- A total of 40 manufacturers entered CTSP, including Orient Pharma, Everest Biotechnology, Adimmune, Yushenbio, GeneReach Biotechnology, Singen, Microwave Precision, Isred Biotech Clinical, Minima, and CH Biotech.
 - The investment amount of the projects reaches NTD13.3 billion.
- The products include vaccines, medical equipment and testing reagents, which effectively gather the biotechnology manufacturers in the central region, driving the development of industrial cluster of the biotech industry.



Computer and peripherals/ Communication and digital content

Currently, there are 15 manufacturers, including Bomex Technology, Fulltech Fiber Glass Group, Bolymin, WFE Technology, GKB Global, Orange Electronic, Bigbest and so on; Inpaq Technology in the communication and digital content industry also stations here.



Others (provide scientific industrial operation, management, technical services and so on)

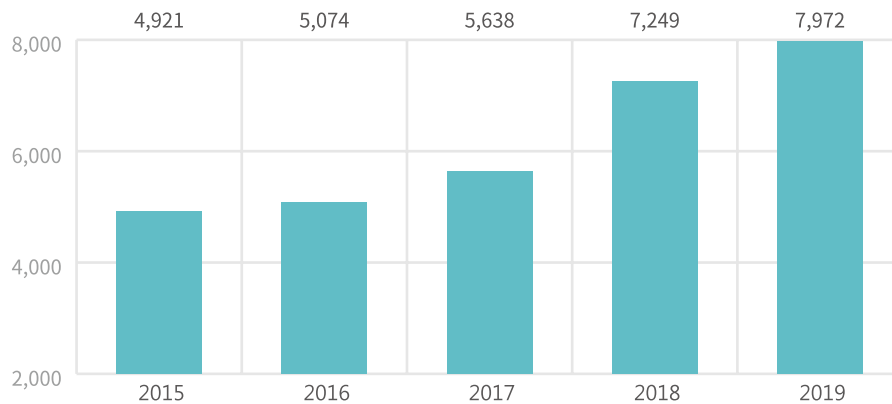
- Currently, there are RATC, Balazs Asia, gas plants and other companies in other industries in CTSP, with a total of 19 corporations.
- Gas supply industry: There are 5 companies, including Air Liquide Far Eastern, United Industrial Gases, Air Products, Lien Hwa Commonwealth Corporation, and BOC Lien Hwa Industrial.
 - Warehousing logistics: Central Science Park Logistics Co. Ltd.
 - Technical and maintenance services for manufacturing equipment of integrated circuit and flat panel display companies: Canon Semiconductor Equipment Taiwan
 - Solar power generation: Sungen Power Corp., TronGen Power Corporation, and Xu Xiao Electric Power.
 - Precision analysis services for special materials: Balazs Asia provides services to semiconductor and optoelectronics industries.

Turnover Hitting Record High Once Again

Benefiting from 5G, there are increasing demands for AI, high-performance computing, IoT, automotive electronics, mobile devices, and servers, leading to brisk orders for the high-end process in major semiconductor manufacturers, the revenues of the semiconductor industry supply chain, such as the foundry, memory and packaging and testing continued to grow. The turnover of CTSP in 2019 amounted to NTD 797.232 billion, a 9.98% increase compared with 2018, hitting a record high once again. Among them, the turnover of the integrated circuit industry was the highest, reaching approximately NTD 605.260 billion, accounting for the highest 75.92% of the total, followed by the optoelectronic industry (NTD 154.146 billion, accounting for 19.34%), precision machinery industry (NTD 25.718 billion, accounting for 3.22%) and others (NTD 12.108 billion).

Turnover of CTSP in recent years

Unit: NTD 100 million



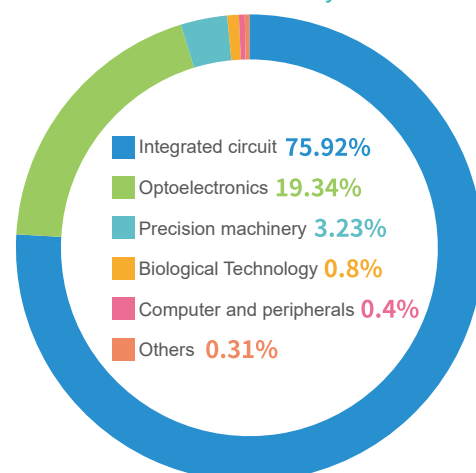
The turnovers of the major industries in CTSP all performed well. The turnover of the integrated circuit industry increased by 17.59% due to the improvement of performance of mobile devices, IoT, AI industry, Internet communication, servers, and automotive electronics, leading to increasing demands and the continuous increase of high-end process orders. The turnover of the optoelectronics industry declined by 9.85% due to the continuous expansion of panel production capacity in China, leading to more supply than demands in the overall panel industry. However, the manufacturers maintain their industrial competitiveness by continuous R&D and manufacturing of high-end and niche products. The turnover of precision machinery industry decreased by 11.98% due to the slowdown in demands for equipment, affecting the status of orders for manufacturers. The turnover of the biotechnology industry grew by 36.75% because manufacturers continued to invest in the industry and new products were gradually launched, showing great results gradually.

2019 Turnovers of each industry

Unit: NTD 100 million

Industry	Turnover	Percentage (%)
Integrated circuit	6,052.60	75.92
Optoelectronics	1,541.46	19.34
Precision machinery	257.18	3.23
Biological Technology	63.70	0.80
Computer and peripherals	32.21	0.40
Others	25.17	0.31
Total	7,972.32	100.00

Ratio of Turnovers in each industry





The total import and export volume of Central Taiwan Science Park in 2019 amounted to NTD 595.109 billion, of which the export value was approximately NTD 446.994 billion, a 28.49% increase compared with last year while imports amounted to NTD 148.115 billion, a 21.92% decline compared with last year. The export value was greater than the import value, with a trade surplus of NTD 298.879 billion in 2019.

Integrated circuit industry had remarkably great performance among the export industries in CTSP, and the export value reached NTD 313.460 billion while the growth rate was as high as 59.29%. This was mainly because of the increasing demands for smart phones and hand-held devices as well as the 5G emerging industries such as AI, IoT, automotive electronics, biometrics and so on, resulting in brisk demands for high-end process.

Comparative analysis of 2019 import and export values of each industry in CTSP						
Unit: NTD 100 million						
Industry	Exports value		Growth rate %	Imports value		Growth rate %
	2018	2019		2018	2019	
Integrated circuit	1,967.91	3,134.60	59.29	1,541.17	1,346.77	-12.61
Optoelectronics	1,288.62	1,116.22	-13.38	311.65	98.24	-68.48
Precision machinery	174.63	163.02	-6.65	32.16	25.40	-21.01
Computer and peripherals	24.52	27.47	12.06	5.67	5.32	-6.13
Biological Technology	23.23	28.63	23.21	3.40	2.84	-16.24
Others	0	0	0	2.81	2.58	-8.27
Total	3,478.91	4,469.94	28.49	1,896.86	1,481.15	-21.92

3.1.2 Enhancing International Links and Exchanges

Technology Exchanges and Visits

To step toward international development and enhance international influence, CTSP Bureau is committed to the promotion of domestic and foreign manufacturers matching, visits and exchanges, international investment attraction and participation in activities of global science park associations, aiming at establishing a platform for international collaboration so as to accelerate the upgrade momentum in the industries in the science park. As of the end of 2019, MOU had been signed between the Bureau and 16 foreign science parks, including those in the United Kingdom, Spain, Russia, Japan, South Korea, Vietnam, China, India, Thailand, and Germany, as well as the Asian Science Park Association (ASPA). CTSP has joined three international science park associations—ASPA, IASP, and AURP, and the Federation International Robot-sports Association (FIRA). Technology exchanges with foreign science parks are carried out continuously to explore potential cooperation opportunities.

In addition, delegations from all over the world also visited the Bureau to gain international perspectives through multi-party exchanges, bringing in new thinking into the park. In 2019, we received a total of 788 foreign distinguished guests from 5 continents.



January

The Bureau signed the Soft-Landing MOU with the CEO of the Kyoto Research Park (KRP), Mr. Nobuya OGAWA. In the future, manufacturers and start-ups from both science parks can make use of the space facilities and services in the mobile office in the mutually beneficial field provided by each other.

April

The Bureau signed the MOU with FIRST in the U.S., contributing to holding FIRST Robotics Competition (FRC) in Taichung in 2020.

June

Went to Bhutan to participate in the ASPA 2019 Leadership Meeting and Council Meeting.

September

Participated in the 2019 Taiwan Image Exhibition held in Surabaya, Indonesia, by TAITRA, publicizing information of CTSP and AI Robotics Hub. Visit to the local science park was also arranged to understand the current situation of the industries in Indonesia.

November

Participated in the 2019 Annual Conference of ASPA in Hsinchu, discussing and reviewing with the representatives the challenges and prospects of science parks in the digital era. Science and technology tour was also co-organized and distinguished guests from various countries were invited to visit CTSP to enhance the international influence and visibility of CTSP.

Participation in International Science Park Associations

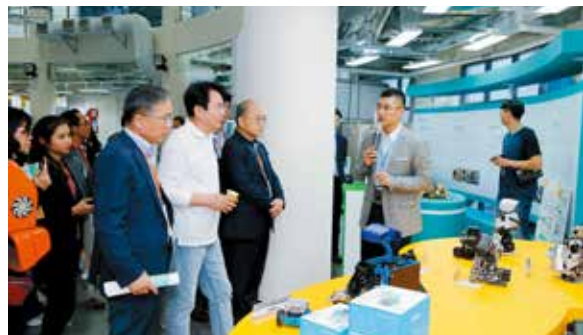
CTSP Bureau actively participates in international science park associations and related technology conferences. In June, 2019, the Bureau participated in the ASPA 2019 Leadership Meeting and Council Meeting in Bhutan; in mid-November, we participated in the 2019 Annual Conference of ASPA in Hsinchu, and there were 290 participants in total, and among them, 105 came from 14 countries, including 6 southbound countries, namely Bhutan, Indonesia, India, Malaysia, Thailand and Vietnam.

The theme of 2019 Annual Conference of ASPA was “Prospects and Challenges of Science Parks in Digital Era”, and speakers from home and abroad were invited to share diverse and international perspective and visions of how to respond to the trends of AI and big data for science parks. On this annual conference dated on November 12, Mr. Tsun-Hua Yang, the Assistant Professor from National Chiao Tung University and Professor Yung-Chien Luo from Tunghai University were invited to share the effectiveness of CTSP’s smart water disaster prevention information system and the achievement of the reuse of water.

The delegation of the distinguished guests from more than 10 countries, including Japan, South Korea, Russia, Turkey, Iran, Indonesia, Thailand and so on, including the Secretary-General of ASPA, Dr. Sunkook Kwon, the former president, Dr. Horihsa Uchida, and representatives of sister parks participated in the science and technology tour after the annual conference. As one of the co-organizers, Director-General, Mr. Maw-Shin Hsu attached great importance to the arrival of these international friends, and he personally expressed his warm welcome to the Secretary-General and all the distinguished guests. In addition, representatives from the trade union were also invited to have exchanges with these guests. ASPA members visited CTSP again after their last visit when CTSP Bureau organized the ASPA Leadership Meeting in 2011. They were stunned and impressed by the development of CTSP when they visited our AI Robotics Hub.



ASPA Secretary-General, Dr. Sunkook Kwon (fourth from right), former president, Dr. Horihsa Uchida (third from left), the Director-General of the Bureau, Mr. Maw-Shin Hsu (third from right, Chief Supervisor of the Allied Association for Science Park Industries, Mr. Chi-Chia Hsieh (fifth from right) and other distinguished guests.



Distinguished guests from ASPA visited CTSP’s AI Robotics Hub.



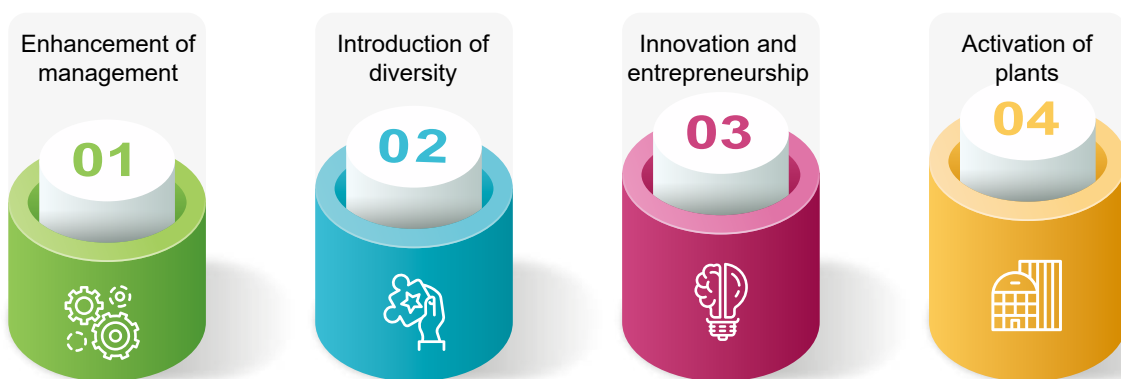
To facilitate good sustainable development, CTSP Bureau has participated in industrial and business organizations at home and abroad in an attempt to enhance exchanges with various enterprises and obtain the latest business information.

Domestic and foreign organizations CTSP Bureau participated in		
	Name of organization	Serving as
Domestic	Chinese National Association of Industry and Commerce, Taiwan (CNAIC)	Member
	Taiwan Industrial Technology Association (TITA)	Member
	Association of the Industry, Academician, Training of Central Taiwan Science Park	Member
Foreign	Asian Science Park Association (ASPA)	Director
	International Association of Science Parks (IASP)	Member
	Association of University and Research. Parks (AURP)	Member

3.1.3 Innovation and Transformation of Science Park

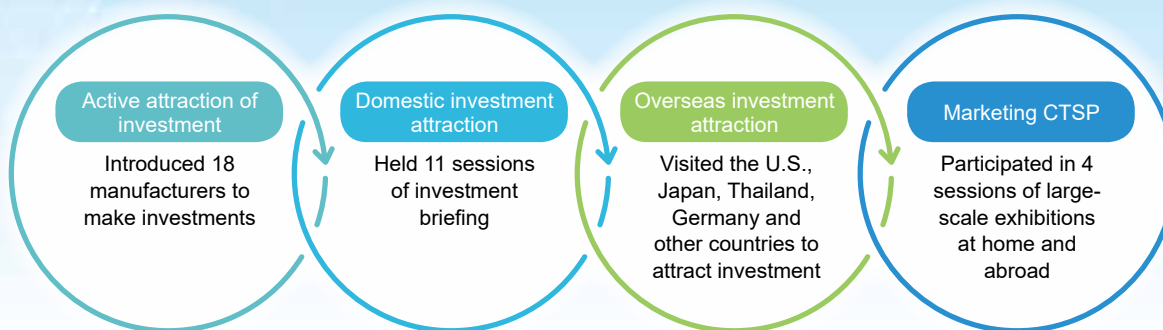
To cooperate with the innovation and transformation of the science park, diverse start-ups have been introduced, the park area has been revitalized for utilization, and the maximum efficiency of resources are reached to meet the needs of practical operation so as to facilitate the promotion of the business of the science park. Ministry of Science and Technology (MOST) actively carried out the revision of the Act for Establishment and Administration of Central Taiwan Science Industrial Park. The Legislative Yuan approved the third reading on May 15, 2018 to remove the word “Industrial”, and the President announced the implementation on June 6 in the same year. To work in line with the revision of the “Act for Establishment and Administration of Central Taiwan Science Park”, the Bureau also revised the name from “Central Taiwan Science Industrial Park Bureau” into “Central Taiwan Science Park Bureau”, and its implementation was announced by the President on December 11, 2019. The official removal of the word “Industrial” symbolizes a new milestone for the science park, relaxing the restrictions on the types of organizations in the park and facilitating the introduction of diversified innovation and R&D businesses into the park. In addition to continuous assistance in the development of the high-tech industries in Taiwan, it also follows the trend of the times and strengthens the competitiveness of the park for CTSP to step toward a science park with the turnover reaching trillion as soon as possible.

Future development direction of the science park after the revision of the Act for Establishment and Administration



Special Column- External Marketing and Active Attraction of Investment

To continue to promote the development of high-tech industries in Taiwan, CTSP Bureau is dedicated to the attraction of investment and marketing of CTSP to actively seek potential high-tech manufacturers and assist them in understanding the overall investment environment of CTSP. In 2019, a total of 18 manufacturers have been introduced into CTSP, with the estimated investment amount of NTD 5.812 billion.



In terms of domestic investment attraction, 11 sessions of investment briefing were held in CTSP Chung Hsing Park, Neihsu Science Park in Taipei, Hsinchu Biomedical Science Park, Taiwan Tech Arena(TTA), Da-Yeh University, CTSP Administrative Building, National Central University, National Formosa University, Forte Hotel Changhua, Chungkang Export Processing Zone (CEPZ), Nan Kai University of Technology, and Providence University.

In addition, to market CTSP, attract investment and promote industries, the Bureau actively participated in large-scale exhibitions at home and abroad, including Photonics Festival in Taiwan, 2019 BIO Asia-Taiwan, 2019 Bio Annual International Convention and Taiwan Expo 2019 in Indonesia to present the performance of management at CTSP, establishing and enhancing the image of a high-quality science park.

Furthermore, to attract overseas high-tech manufacturers to make investment in CTSP, the Bureau participated in the CES Exhibition in the United States to attract investment from January 7th to 15th in 2019. We visited the headquarters of Illinois Tool Works Inc.(ITW), the major high-tech equipment manufacture in Chicago, the headquarters of Schweizerische Industrie Gesellschaft(SIG), and the equipment manufacturer, Label-Aire, in Los Angeles. The three science parks in Taiwan cooperated with MOST and visited Japan to attract investment from January 21 to 26 in 2019 and visited well-known Japanese enterprises including JSR Corp., Asahi Kasei Corporation, Mitsubishi Chemical, Nagase Corp., Sumitomo Bakelite Corp., Nitto Denko Corp. and Sysmex Corporation. Among them, Nitto Denko Corp. and JSR Corp. have invested and established Taiwan Nitto Optical Co., Ltd. and JSR Micro in Central Taiwan Science Park since October 2003 and March 2005. The Ministry of Science and Technology and the 3 science parks held a investment briefing in Tokyo and Osaka on 23rd and 25th, attracting more than 100 enterprises to the briefing. From April 22 to 29, the Bureau went to the United States for the matching of start-up investment, signed an MOU with the headquarters of FIRST and visited the accelerator in the San Francisco Bay Area to observe its business model, and we also invited these enterprises to visit CTSP and establish cooperative relations to strengthen international cooperation. From September 8 to 12, we participated the Medical Fair Thailand to market Taiwanese manufacturers and attract investment. From November 16th to 24th, we participated in the MEDICA Trade Fair in Germany and held the joint investment promotion for the three science parks in Taiwan, publicizing the excellent investment environment in Taiwan and exploring business opportunities for smart medical in Taiwan.



From Nov. 16 to 24th, the Bureau participated in the MEDICA Trade Fair in Germany for investment attraction (Chief Secretary Li-Chun Peng, third from left)



CTSP Bureau held the "CTSP Erlin Park Investment Briefing on August 29th"



▶ 3.2 Smart Clusters Upgrade

3.2.1 Smart Machinery and Aerospace Industry Upgrade Project in Central and Southern Taiwan

The Bureau organized the “Consolidating Regional Cooperation - the Advancement Project for Smart Machinery and Aerospace Industries in Central and Southern Taiwan” from 2017 to 2020, providing the R&D subsidies to manufacturers in the park and those in the supply chain to encourage the equipment manufacturers in different industries to invest in the R&D of smart machinery and aerospace industry. In addition, the vertical and horizontal technologies needed in the high-intelligence process are integrated to encourage the precision machinery industry to move toward the development of smart equipment technology and enhance the levels of key technologies and equipment module technology.

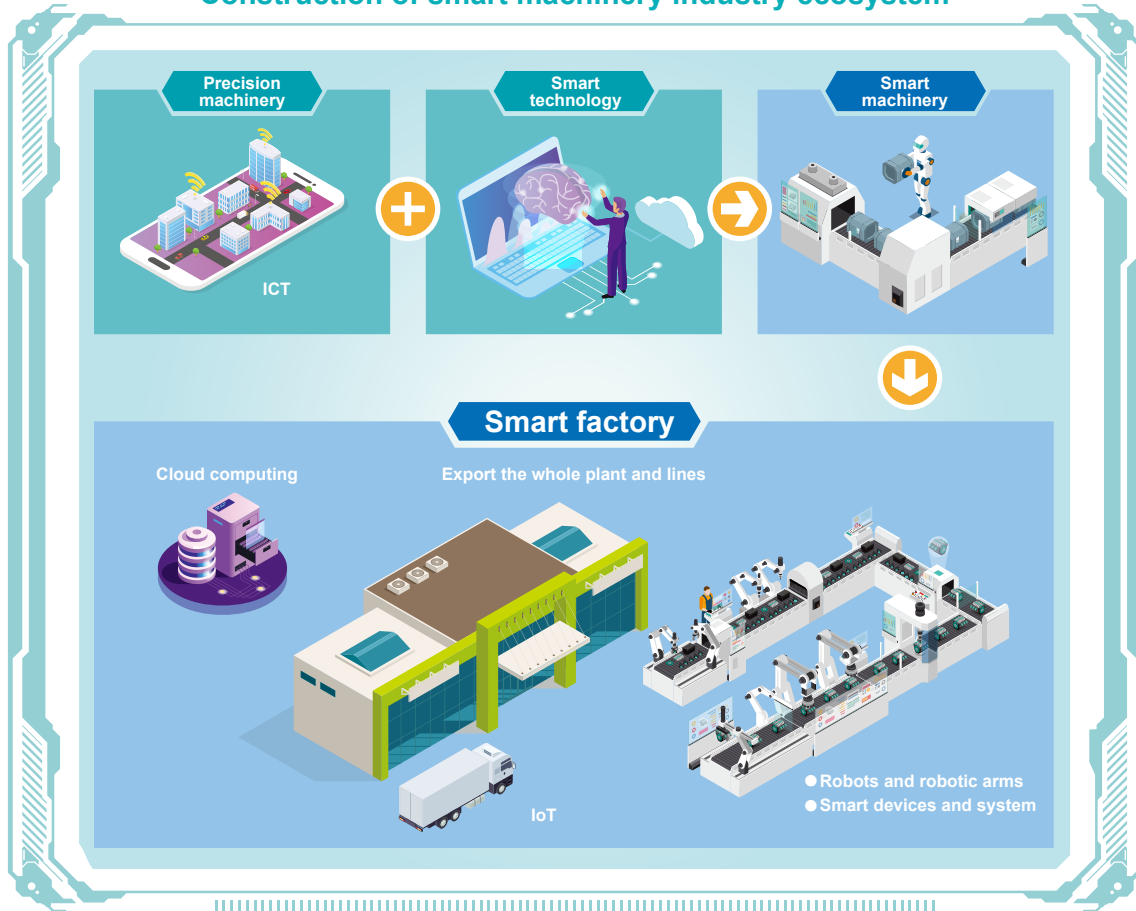
The scope of project subsidy includes smart machinery and the R&D project of key components in optoelectronics, semiconductor, energy and biomedical industries. It is hoped that with the combination of the R&D capacity in academia, the industry value can be increased. Manufacturers as well as academic research institutes that are interested can prepare the project proposal and apply for the subsidy. To promote the industrial application of smart machinery technology, 4 demonstration production lines have been set up in National Chung Hsing University, Goodway Machine Corp., and National Formosa University, creating a demonstration field for smart machinery and smart sensing technology, providing technical solutions to various commercialized and modularized systems to assist manufacturers in creating highly intelligent factories. Currently a total of 227 companies and groups have visited these demonstration field.

In 2019, 63 companies in total visited the production lines built for the project. 2 sessions of seminars on innovation and entrepreneurship were organized, with a total of 216 participants, and 9 corporations signed the Cooperation Intention with research institute. Counseling was provided to 14 manufacturers and industrial talent training courses were also held, with a total of 1,090 participants. Furthermore, 6 subsidy projects (including 4 R&D projects, 1 innovation project and 1 local linkage project) were verified, with the approved subsidy amount reaching NTD 53,029 thousand, driving the manufacturers to invest approximately 71,771 thousand in R&D. In addition, it was approved to grant the subsidy of NTD 13,000 thousand to Taichung City Government to assist the local government in the development of smart machinery and aerospace industry. A total of 19 domestic patents and 12 foreign patents are expected to be applied for while 23 domestic and foreign papers, 25 domestic and foreign research reports to be published, creating direct employment for 167 people and cultivating 113 professional R&D technical talents and 44 professionals with masters' and doctor's degrees.

To accelerate the development of smart machinery and artificial intelligence in the industries domestically, the Bureau also promotes the project of “AI Robotics Hub” to link with the cluster advantages of the precision machinery industry and on the other hand to foster cross-field innovative talents. Industries and academia in need of the resources in the park are welcome to make use of these resources to facilitate industrial innovation and transformation together.



Construction of smart machinery industry ecosystem



3.2.2 Bio-medical Industry Innovation Program in the Central Region

Since 2019, the Bureau has been promoting the “Project of Acceleration of Medical Device Industry Innovation and International Leap Promotion- Acceleration of Bio-medical Industry Innovation Program in the Central Region”. With the advantages of the existing industries of precision processing and optical industry, along with the resources of minimally invasive medical materials, manufacturers of medical devices and the hospital resources, assistance is provided to manufacturers in the development of high-value minimally invasive surgical instruments and smart assistive devices to enable CTSP to gradually develop into a new cluster of biomedical industry.

The period of this project is from 2019 to 2022, and a project office (PIDC) is entrusted to be established, providing subsidy resources to biomedical manufacturers for the proposal of projects. The project is divided into integrated and expansion types. Integrated type of project links the biomedical manufacturers, academia, research institutes and hospitals for the development of modularization and systematic biomedical products to accelerate the speed of product commercialization, promoting the innovative research development in the biomedical industry. Expansion type of project is to encourage innovative technology and products, or biomedical products being approved for marketing to develop industrial marketing models, guiding domestic biomedical products to enter the international market to increase the reach of the manufacturers and the market, enhancing the exposure of domestic products and enabling the momentum of industrial operation to continue to grow.

It is expected that through the biomedical industry- university collaboration subsidy project, the integration of the clinical platform of the large medical system in central Taiwan can be effectively integrated, creating the multilateral benefits of cross-field cooperation among industry, university, research institutes and hospitals, bringing investment and development of different types of biomedical products, integrating resources and strengthening the innovation capability, connecting a corridor for the biomedical industry – from north to south.



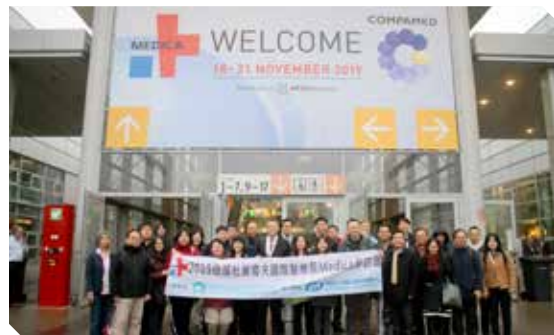
Characteristic medical and medical materials industries in central Taiwan



In 2019, a total of 13 R&D projects for subsidies were approved, with the total subsidy amount of NTD 42,727 thousand. The manufacturers are estimated to invest NTD 64,106 thousand in R&D, produce 9 prototypes, apply for 19 domestic and foreign patents, publish 9 domestic and foreign papers and cultivate 112 masters and doctors, contributing to future derivative output value of NTD 575 million. Assistance is also provided to manufacturers to enhance technology capacity and integrate key resources to accelerate commercialization of medical products through the cross-field industry-academia-research institute-hospital collaboration. This project also assists innovative products to expand its domestic and international markets rapidly through marketing promotion activities at home and abroad to increase the output value of the domestic biomedical industry.



Matching and exchange meeting for the expansion of medical material markets in Southeast Asia



MEDICA in Dusseldorf, Germany



Medical Fair Thailand



Taiwan Healthcare + Expo

3.2.3 Industry, Government, Academia, and Research Institution Collaboration

Association of the Industry, Academician, Training of Central Taiwan Science Park

“CTSP Industry, Academia, and Training Association” was jointly established by CTSP and Chung Hsing University (hereinafter referred to as the Association). Full support from the Central Vocational Training Center, manufacturers in the science park and various colleges and universities was received during the preparation stage, aiming at promoting the integration of resources in the industry, government, academia and research institution, promoting industrial technology, training and fostering talent, employment matching and establishing industry, academia and training database. By making use of the existing equipment, technical human resources to promote the goal of regional integration of industry-academia collaboration for the establishment of a cooperation network between the manufacturers and the academic research circles, enhancing the competitiveness of the high-tech industry in central Taiwan. Meanwhile, the results and momentum of R&D can be used to boost the upgrade of CTSP and the industries in central Taiwan.



ICTSP Academia- University-Research-Training Exchange Meeting, convened on Sep. 20, 2019.



ICTSP Academia- University-Research-Training Exchange Seminar, held on Dec. 16, 2019.

The Industry, Academia, and Training Association is one of the most important platforms to promote Industry, Academia, and Training cooperation in central Taiwan. Since its establishment in September, 2008, it has organized forums, academic lectures, and large-scale industry-university job fairs to continue the promotion of industrial development in central Taiwan and participation in innovation activities in industry and academia, which can indirectly facilitate collaboration between the academia and the industry. In 2019, the Association assisted in the organization of 4 forums in Erling, Huwei, Chung Hsin and Houli Science Parks and 2 sessions of “International Industry-University Alliance School Pledge Conference and Technical Matchmaking Exchange Meeting”, making use of these to establish an cooperation platform for industry-academia- research collaboration to strengthen the industry-university linkages.



International Industry-University Alliance School Pledge Conference



CTSP Industry-Academia Matchmaking Exchange Meeting



CTSP Huwei Science Park Innovation and Start-up Forum and Investment briefing



CTSP Houli Science Park Innovation and Start-up Forum and Investment briefing

Central Taiwan Accelerators Alliance

The AI Robotics Hub is a complete and sound ecosystem of innovation and start-ups. Through gathering the accelerated incubation momentum in central Taiwan, the development of smart machinery, smart medical and other AI fields can be promoted. On October 22, 2019, a total of 11 Industry-University-Research-Innovation Accelerators and Entrepreneurship Incubation Centers, including Formosa Incubator and Accelerator of Tunghai University were invited to jointly established the “Central Taiwan Accelerators Alliance” to foster talents in start-up industries. In addition, the “Central Taiwan Accelerator, Innovation and Entrepreneurship Forum” and the results presentation was held on December 24, 2019, demonstrating the strength of the start-up team.

Moreover, in 2019, through the combination of the local industry-academia-research resources for the promotion of cultivation of a startup team, the Bureau continued to promote the “Satellite Subsidy Scheme of AI Robotics Hub at CTSP”, which can be divided into “Oriented Cultivation Group” and “Industrial Collaboration Group” based on the nature of the scheme. On December 20, 2019, the “Smart Acceleration x Agricultural Innovation – CTSP Smart Agriculture Forum and Exchange Meeting” was held to present the staged results of the counseling startups. For example, National Kaohsiung University of Science and Technology and Council of Agriculture would discuss a cooperation project of a smart farm shed, the Emerald Garden and the National Formosa University would discuss the rental of Chumpo unmanned vehicles combined with the image operation services and so on.



Smart Acceleration x Agricultural Innovation – CTSP Smart Agriculture Forum and Exchange Meeting



Central Taiwan Accelerators Alliance



Central Taiwan Accelerator, Innovation and Entrepreneurship Forum



Global Research & Industry Alliance

In 2019, CTSP Bureau and four universities in central Taiwan organized the “International Industry-University Alliance School Pledge Conference”. The Pledge Conference focused on Central Taiwan Science Park, and an industry- university alliance was formed together with four universities in central Taiwan, including National Chung Hsing University, National Formosa University, Feng Chia University and China Medical University to generate greater momentum by utilizing different R&D resources in different universities.

After the Bureau and the four universities formed an alliance, the momentum of the industry in the central Taiwan and the legal person-university-research institutions are linked to set up a platform for industry-university- research institutions to connect with the international market and to provide talents for the industries and scientific research services, playing the accelerator for the development of international manufacturers. Through the integration of the momentum in the industry, the technology, capability and products can be exported to the world. Furthermore, the schools can make use of the existing space for innovation and startups in CTSP as well as the AI Robotics Hub and the resources in the industry, providing more favorable conditions for the development of the innovation team.



Deputy Director-General, Mr. Wen-Fang Shih (central), president of Feng Chia University (second from left), president of National Chung Hsing University (second from right), Mr. Fuh-Sheng Shieu, vice president of National Formosa University (right), and vice president of China Medical University (left) jointly started the alliance.

Science Park R&D Piloting Cooperation Projects between Industries and Academia and Innovative Product Award

To inspire and assist park manufacturers in innovative technology and encourage manufacturers to combine the development momentum of academic and research institutions to jointly conduct heterogeneous integration and cooperative research on key technologies, stimulation of industrial differentiation and high added value are utilized to cultivate high-quality R&D manpower needed in the industry and enhance the economic development and industrial competitiveness of the country. In 2019, subsidies for 8 R&D projects were approved, and the approved amount was NTD 19,540 thousand while the investment from the manufacturers reached NTD 40,263 thousand. There were 12 domestic and foreign patents applied, 38 domestic and foreign papers published, creating direct employment for 27 people and cultivating 31 masters and doctors while turning the energy in academic and research institutions into commercialized results.

Moreover, to encourage park manufacturers to actively research and develop innovative products, we set up the Innovative Product Awards. In 2019, the winning manufacturers were AUO with its “32-Inch 4Kp144 Mini Led Monitor”, Raystar Optronics with its “0.96 OLED Display”, GEOSAT Aerospace& Technology with its “Ptersaur”, GoldMed BioTechnology with its “HAVITAL® HA+Collagen Drink”, CH Biotech with its “WeatherKing”, AUO Crystal with its “Silicon Origin”, Taiwan Main Orthopaedics Biotechnology with its “Smart Surgical Glasses”, and PharmaEssentia with its “Ropeginterferon alfa-2b (P1101)”. The award giving ceremony was held on the Bureau’s anniversary, July 26 in 2019.



2019 Innovative Product Award Winners



AUO Taichung Plant: "32-Inch 4Kp144 Mini Led Monitor"



Raystar Optronics: "0.96 OLED Display"



GEOSAT Aerospace & Technology Taichung Plant: "Ptersaur"



GoldMed BioTEchnology Taichung Branch: "HAVITAL® HA+Collagen Drink"



CH Biotech : "WeatherKing"



AUO Crystal: "Silicon Origin"



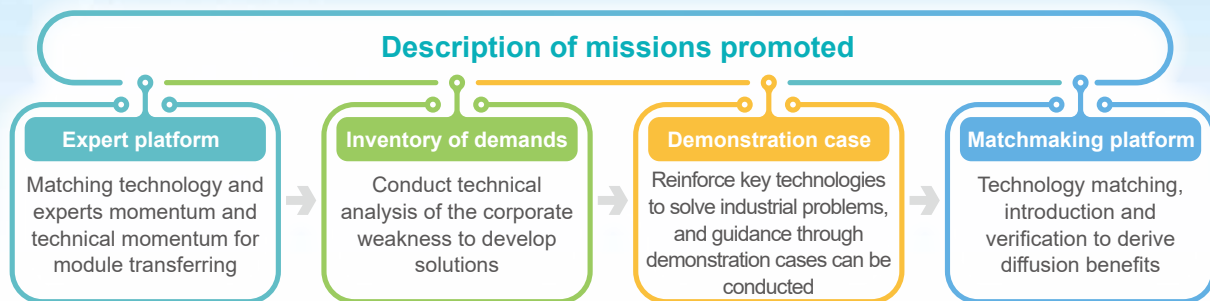
Taiwan Main Orthopaedics Biotechnology : "Smart Surgical Glasses"



PharmaEssentia Taichung Branch: "Ropeginterferon alfa-2b (P1101)"

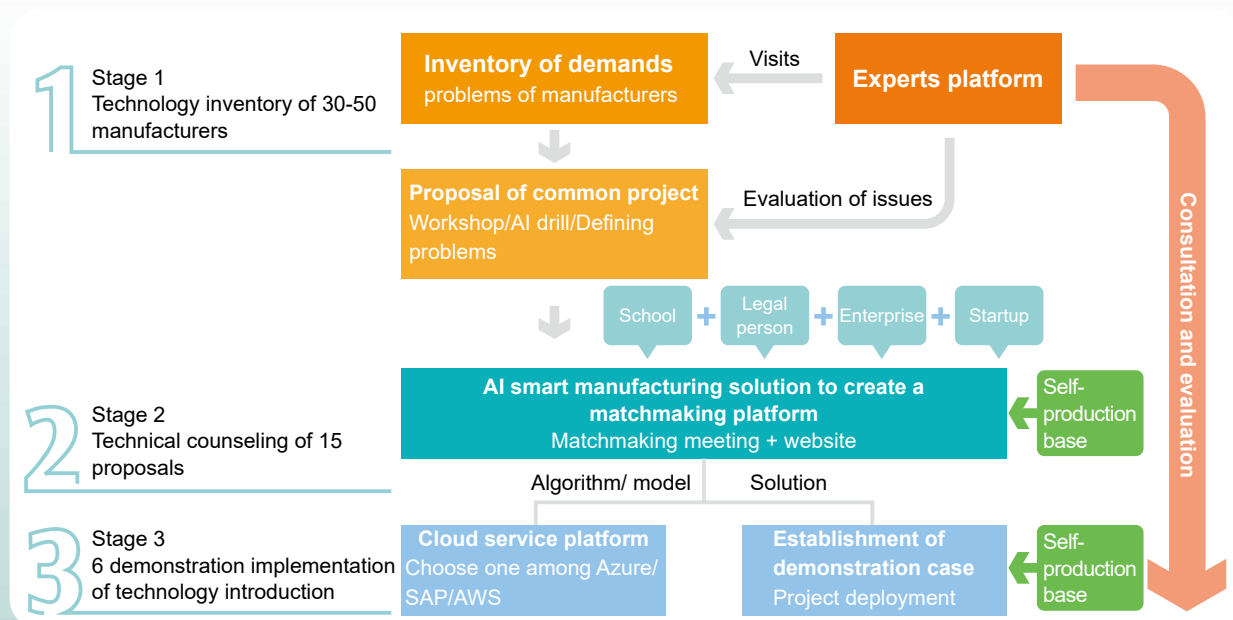
Special Column - Industrial Artificial Intelligence at CTSP- Application Scheme of Intelligent Manufacturing Technology

We cooperate with the MOST's "Artificial Intelligence Research" and Development Strategic Plan to step toward the goal of a smart and innovative country. In view of the fact that central Taiwan serves as the important region for the development of smart machinery industry, there is indeed necessity and urgency to develop artificial intelligence. The Bureau entrusted Industrial Technology Research Institute (ITRI) to promote the "Industrial Artificial Intelligence at CTSP- Application Scheme of Intelligent Manufacturing Technology" and provide technical counseling for park manufacturers for free diagnosis of the "AI application in smart factories", creating customized solutions for manufactures. Through enhancing the technological energy in the park, the smart upgrade and high added value of the industry can be achieved.



The scheme focuses on the inventory of technical needs and assistance in the solutions in the main industries in the park, including integrated circuit, optoelectronics, precision machinery, biotechnology, computer and peripherals and other industries, and experts in relevant fields from academic or research institutions are invited to set up an "expert platform" together. Through the on-site visits and discussions with the experts, the inventory of the pain points of technology and needs of the manufactures is conducted. In the early stage, 15 proposals for the Application Scheme of Intelligent Manufacturing Technology would be completed, and solutions to technical problems are provided to manufacturers by using the AI technology matchmaking platform and software (such as ITRI Aidea, SAP and AWS). Furthermore, exclusive workshops are created based on the needs of these enterprises and more comprehensive solutions are formulated through speeches and interaction.

Based on the common problems and technical requirements proposed by the manufacturers, solutions to intelligent manufacturing technology were proposed, and collection of data concerning technical schemes was conducted, along with the verification of the feasibility, rationality, results and benefits as well as the analysis of difference after introduction were also conducted. Finally, 6 application schemes of intelligent manufacturing technology were proposed as demonstration. The methods used in these demonstration schemes are then utilized to guide park manufacturers to facilitate the diffusion of technology, which will simultaneously enhance the competitiveness of the park as well as the manufacturers and support the upgrade of AI and smart manufacturing technology of park manufacturers.

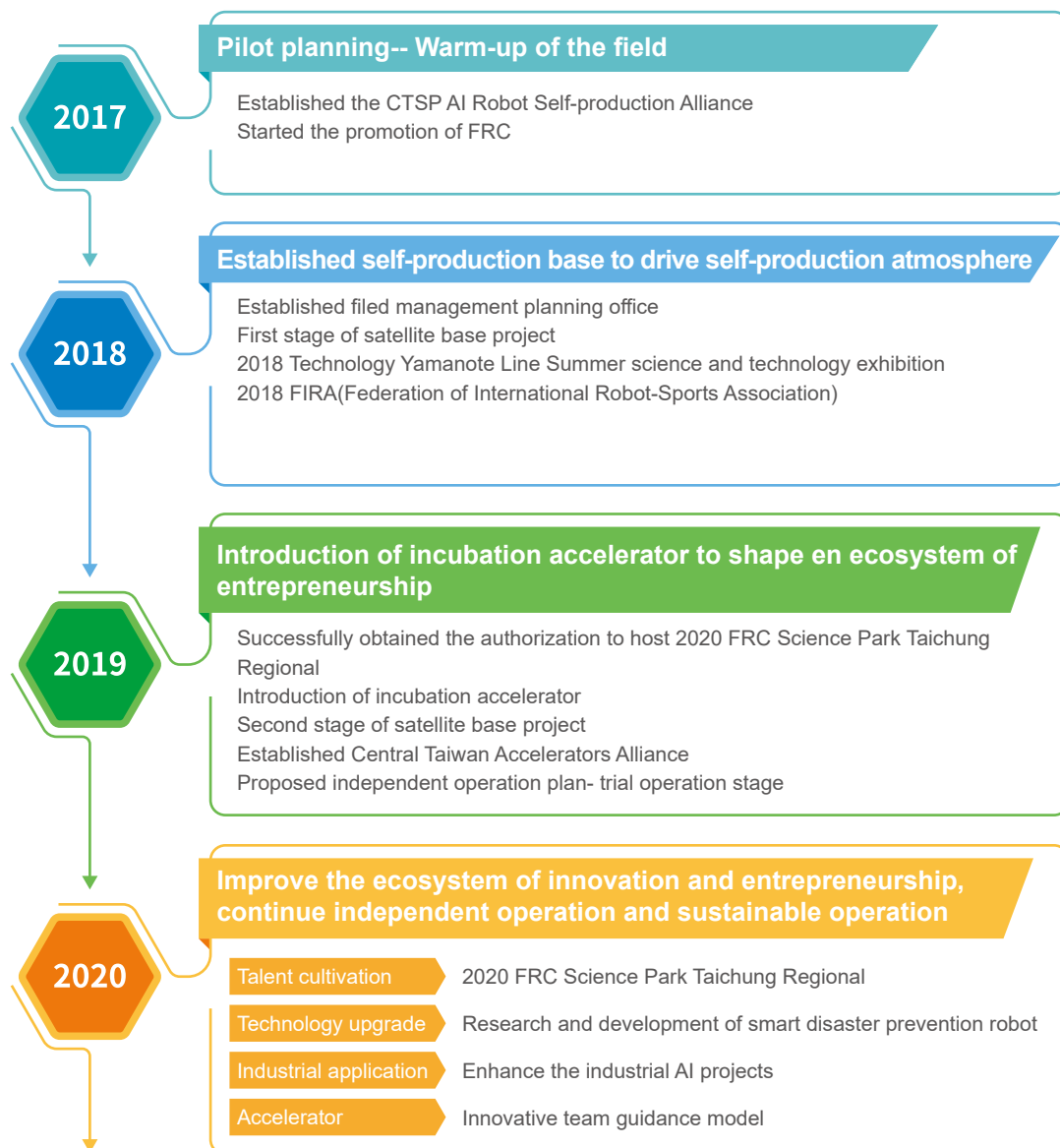




▶ 3.3 Establishment of the Foundation of AI Resources

3.3.1 AI Robotics Hub at CTSP

With the development of artificial intelligence, AI resources in the industries changed faster than before. To cope with the possible talent gap in the future, the Bureau has promoted the “Project of AI Robotics Hub at CTSP” since September, 2017 under the special budget for the massive infrastructure project, and related facilities of basic and advanced AI robot was completed in 2018 for the purpose of establishing a human-oriented innovative self-production base to provide a AI robot control experience environment, including drones and AI-related robot assembly training with the introduction of the tool box concept, emphasizing on hands-on work and verification to foster cross-field self-production talents. The AI Robotics Hub provides services of international self-production space operations, self-production community operations, development of low-volume prototype products, counseling of startup acceleration incubation, management of intellectual property of patent and finance, technical research and development counseling services and so on to create a one-stop innovative ecological service system.





The target group of AI Robotics Hub at CTSP focuses on makers, startup teams and enterprises, which integrates the advantages of academic research and industrial clusters and links 14 satellite bases to jointly promote the four major areas of AI application, including smart machinery, smart medical care, smart education and smart agriculture. It not only facilitates the maturation of new innovative technology and products and cross-field collaboration and alliance but also combines the energy of the center and the satellite base to promote the results of artificial intelligence. Through the provision of professional modules and the demonstration cases of the intelligence manufacturing technology application derived from counseling, the innovation and development of the industrial ecosystem in central Taiwan is further driven. As of the end of 2019, the AI Robotics Hub has attracted more than 50,000 visitors.

To consolidate the atmosphere of startups and increase the communication channels of startup teams in central Taiwan, the Bureau held the "Startups' Experience Sharing Forum" in CTSP AI Robotics Hub on April 18, 2019, and approximately 50 startup companies with 70 people participated. The participants shared their entrepreneurial experience and mental journey, and they were well informed of the abundant entrepreneurial resources CTSP can provide. To provide these startup companies practical assistance and combine the tutoring resources, the Bureau introduced the accelerator to link the resources in the industries and professional teachers and promote resource sharing with the incubation centers in universities, supplemented by the provision of various self-production equipment and guidance from professional teachers, aiming at fully supporting new startup teams and strengthening innovation energy to establish the foundation of the entrepreneurial ecology in central Taiwan at CTSP.



CTSP's former Director-General, Dr. Ming-Jung Chen (sixth from right in the front) and the CTSP Startup Alliance

3.3.2 Cultivation of Taiwanese Robot Team- Linking with the International Trend

Gradual Growth of FRC Team in Taiwan

AI Robotics Hub at CTSP provides various robot experiential courses, competitions, forums and activities to promote the development of AI Robots to cultivate more talents and teams to participate in international competitions. Since the FRC Observation and Training was held in 2017 and the FRC Taiwan Practice Tournament and FRC Off-Season were held in 2018 and 2019 respectively, the number of domestic high school FRC competition teams has rapidly increased from 3 teams in 2017 to 20 teams in 2019, driving the domestic teams to participate in FIRST Robotics Competition in Australia, the U.S., and other regions.

Under the efforts of the Bureau, we obtained the initiative of organizing the 2020 FIRST Robotics Competition Science Park Taichung Regional in Taiwan, and it is hoped that the seeds of the self-production of robots can sprout and take root in high school and vocational schools in Taiwan. AI Robotics Hub at CTSP has complete FRC machine and equipment that can be provided to the participating teams for testing and exercise, and there are also professional teachers to provide consultation and technical guidance so as to encourage more school teams to participate in FRC robot education and international competition.



To enable the participating teams to have more opportunities to practice before going abroad for the competition to achieve good results, AI Robotics Hub at CTSP built a 1:1 simulation competition venue in accordance with the latest specifications announced by the headquarters of Federation International Robot-sports Association (FIRST) and held the “2019 FRC Taiwan Practice Tournament” on January 30 and 31 in the gymnasium of National Experimental High School at CTSP. Through the experience of simulation competition, the potentials of the team players and the problem-solving abilities were stimulated, and the team tacit and cohesion were strengthened. More than 400 teachers and students participated in the practice tournament, and after two days of keen competition, National Experimental High School at CTSP won the Chairman’s Award, and Taipei Municipal LiShan High School, Kaohsiung Municipal Chung-Cheng Industrial High School and Heng Yee Catholic High School won the 1st place.



Group photo of more than 400 participants of all participating teams

“2019 Taiwan FRC Off-Season and Forum” in CTSP was held on August 17~18 in the gymnasium of National Experimental High School at CTSP, with the participation of 400 teachers and students. 7 new cross-school teams were added in this event. Through the process, these students’ potential and problem-solving abilities were stimulated. The teams also learned from each other through the competitions. In addition to experiencing the exciting competition, the participants also learned the importance of teamwork and cooperation.

The “FRC International Forum” was held in the morning on the first day of the off-season competition, and three international distinguished guests, Luan Heimlich, the FRC Australia Director, Lael Grant and Glenn Lee, the senior coaches from Hawaii, were invited to share with the teams in Taiwan their abundant and practical experience in FRC competition. Distinguished guests from abroad were also invited to serve as the jury, giving these participating teams different levels of ideas and diverse international perspectives.



Dr. Maw-Shin Hsu, the Director-General of CTSP Bureau and the winning teams in FRC Off-Season

To prepare for the 2020 “FIRST Robotics Competition Science Park Taichung Regional” in Taiwan in March, the Bureau invited the experts from the FRC guidance team of the Carnegie Mellon University to visit AI Robotics Hub at CTSP on December 19, 2019 to share relevant research on FRC robots with the students in central Taiwan. One of the speakers, Dacid Lobashhan, has more than 15-year experience in the development of robots. He shared the research on the application of robots in fields like manufacturing, agriculture, space, autonomous driving, rescue search and so on. Thomas Pope and Joseph Lawrence Jackson Jr. shared their experience leading the senior FRC teams and how to further come up with the best robot, providing reference for the participating teams in Taiwan.

2020 FIRST Robotics Competition Science Park Taichung Regional in Taiwan will be held in Feng Chia University. Currently, there are 30 teams signing up in the competition, including 25 domestic teams and 5 foreign teams from the USA, Australia and Singapore. The participants are expected to exceed 600.



Great Results Achieved by FCU-CTSP

The AI Robotics Hub at CTSP and Feng Chia University formed the CTSP Representative Team, FCU-CTSP, and participated in the “2019 Humanoid Taiwan” on May 18-19 as the warm-up competition for the 2019 FIRA RoboCup held in South Korea in August. The items of the competition included simulation competitions of the two major international competitions, FIRA and RoboONE, the items included humanoid robot playing football, decathlon, boxing, video control, Spartan race and so on. A total of 150 teams are expected to participate with 500 people. Prof. Jacky Baltes, President of FIRA, Prof. Kuo-Yang Tu, Chair, Prof. Tzoo-Hseng S. Li from NCKU and other experts reminded the participating teams the competition rules, skills and precautions.

One team of FCU-CTSP, “Smile”, won the 1st place in two items, Challenge 1 and Challenge 2 in the AndroSot humanoid robot football match on the first day. Another team, “Disappearing Nano” also won the 3rd place on the first day and also won the 1st place in AndroSot.

The 2019 FIRA was held in Daejeon in South Korea. Since the Bureau’s participation in FIRA as the first industry member and holding of the largest-scale 23rd Competition in history in the same year, we have selected team members in 2019 in order to continue the enthusiasm for international competitions among college students in Taiwan and to achieve the goal of cultivation of AI talent in the local teams. Prof. Chih-En Kuo from Dept. of Automatic Control Engineering of Feng Chia University and Prof. Chung-Hsien Chang in Center for General Education instructed robot-related knowledge and made use of the software and hardware equipment at AI Robotics Hub at CTSP while combining series of courses for professional knowledge and other resources to jointly train the CTSP representative team- “FCU-CTSP”.



One of CTSP’s representative teams, the “Smile” Team, won the 1st place in AndroSot

“FCU-CTSP” achieved great results as expected. In the future, the Bureau will continue to participate in global robot competitions to cultivate AI talents to catch up with the international trend and facilitate exchanges among international teams so as to gain the development trends and opportunities of AI robots in hope to facilitate the development of industries in central Taiwan.



Group photo of CTSP’s representative team in FIRA- “FCU-CTSP”



FCU-CTSP concentrated on the challenges in AndroSot humanoid robot football match

4

A Cradle for Excellent Talent Cultivation

- 4.1 Creation of Employment Opportunities
- 4.2 Talent Cultivation
- 4.3 A Workplace at Ease
- 4.4 Innovation and Entrepreneurial Resources





CTSP Bureau is dedicated to constructing a friendly park and a healthy workplace. Every year, we conduct business promotions through various activities, promoting propaganda of occupational safety and health, guidance and implementation of industrial safety related inspections. In addition, we also cooperate with the Ministry of Labor to carry out inspection plans of various labor conditions, handle labor complaints in the park and continue to strengthen labor condition inspection to ensure labor rights protection. In terms of labor disputes in the park, the Bureau handles the disputes in a positive manner, guiding the labor and management to solve the labor disputes from the legal perspectives for a legal and reasonable solution and thus to facilitate a safe, healthy and humanized labor environment for the labors.






Friendly Workplace and Employment in CTSP



In addition, to attract more excellent talents and encourage manufacturers and practitioners in innovation and entrepreneurship, the Bureau provides incubation and innovative resources to prepare for the next momentum for industrial upgrading.



Innovation and Entrepreneurship Incubator- CTSP

- Corresponding material topics** Innovation and Entrepreneurship
- Corresponding SDGs**

- Management Objectives and Policies**

 - Encourage innovative R&D and development of start-up businesses to prepare for the next momentum for industrial upgrading.
 - Implement cultivation subsidy plans and provide resources for start-up incubation.
- Commitments and Objectives**

Short-term Goals

 - Actively create high-quality entrepreneurial environment, provide professional consultants and resources and introduce accelerators to link industries to continue to provide counseling to entrepreneurial teams. More than 18 start-ups are expected to be established.

Medium- and long-term goals (3 years and more)

 - To assist start-ups to grow fast and increase the added value. It is expected to introduce more than 2 start-ups to CTSP for investment applications.
- Responsible Units** Investment Division
- Resources Invested**

 - Organize talent cultivation subsidy plans and cultivation plans for professionals as well as technical talents in the science park.
 - The Investment Division carries out the resource planning for innovation and incubation.
 - In cooperation with MOST's "Forward-looking Infrastructure Development Program": Digital infrastructure in four years (2017~2020) and invested NTD 1 billion in the construction of the "AI Robotics Hub Project".
- Grievance Mechanisms** Director General's mailbox
- Management system and assessment mechanism**

 - Satisfaction survey of the courses
 - The FITI CAMP under the "From IP to IPO Program (FITI)" allows the start-up teams to confirm their business model. Two sessions of competition are held every year, and entrepreneurial funds are granted based on the ranking.
- Performance and adjustment**

 - The overall satisfaction among the trainees in the professional talent training courses was over 89%.
 - Talent cultivation plans encouraged the students to participate in the college special project competition and won a total of 7 awards; the students obtained 23 relevant certificates; a total of 5 industry-university collaboration projects in central Taiwan as well as 1 Utility Model Patent were facilitated.
 - In 2019, we provided counseling to 60 teams selected in the From IP to IPO program (FITI) and among them, 1 team was awarded the Entrepreneurship Excellent Award, 6 were awarded the Potential Award, and 23 new start-ups were set up.
 - In 2019, we assisted in the establishment of 48 robot-related start-ups, incubation centers and accelerators, creating employment opportunities for 238 people.

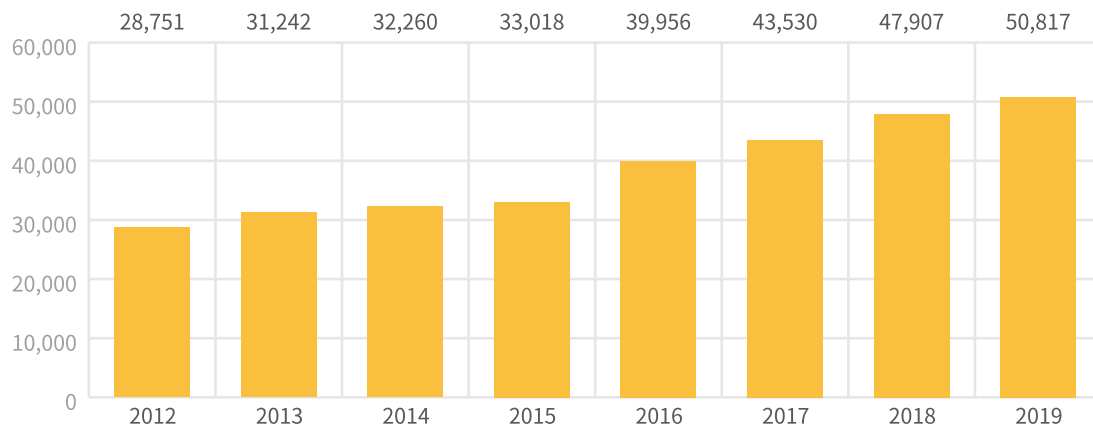


▶▶ 4.1 Creation of Employment Opportunities

As the number of manufacturers in CTSP increases year by year, the number of employees in the park also continue to go up. The number of employees reached 50,817 by December in 2019, an increase of 2,910 (6.07%) compared with the same period in 2018. In terms of the number of employees in the industries, the industry with the largest number of employees is the semiconductor industry, accounting for 38.72%, followed by the 38.41% in the optoelectronics industry. In terms of the distribution of educational levels, employees with college degree or above account for as high as 75.88%; in terms of the ratio of gender, the ratio of male employees and employees accounts for 65.33% and 34.67% respectively.

In the Erlin Park, 25 manufacturers will station here in the first phase, and the construction of plants has started in 2019, expecting to create 6,000 job opportunities. As the number of manufacturers in Erlin Park continue to increase, the number of employees will also go up, promoting the prosperity of the local place.

Statistics of employees in CTSP



To assist park businesses with the recruitment of high-quality talents and promote local employment, CTSP Bureau and the central as well as local governments work together to provide complete and customized job matching services.

Joint recruitment event

2

sessions

The Bureau organized the Joint Recruitment Event on April 20 and November 2 in 2019 with the Taichung City Employment Service Office, and the cumulative number of participating manufacturers was 52, providing more than 2,461 job opportunities, with the matching rate of 49%.

Single manufacturer recruitment event

30

sessions

We organized single manufacturer recruitment events with Yunlin-Chiayi-Tainan Regional Branch of Workforce Development Agency, Ministry of Labor and Taichung City Employment Service Office to meet the individual recruitment needs of the manufacturers.



Recruitment event- applicants are filling in their basic information in the e-resume area.



There were many job applicants on-site

Leaders in Future Trends (LIFT 2.0)

One of the reasons for the science parks in Taiwan to play a crucial role in the development of high-tech industry in the world is that in the initial stage of the establishment of science parks, many overseas talents returned to Taiwan from the Silicon Valley to contribute what they had learned to Taiwan. The continuous high-tech industry talent inflow enhanced the industrial development and competitiveness of Taiwan.

To attract overseas talents to come (return) to Taiwan for employment, Ministry of Science and Technology organized the “2019 Leaders in Future Trends (LIFT 2.0) project” to actively promote the supply-demand matching mechanism between overseas scholars and domestic industries, academia, and research institutions, arrange these overseas talents to come (return) to Taiwan to participate in overseas talent exchange activities in which they would meet with domestic industries and research institutions and have exchanges in symposiums for face-to-face matching opportunities between the industry-academia-research institutions and the high-level talents to facilitate the employment development for overseas scholars coming (returning) to Taiwan.

MOST held 2 sessions of “Domestic Exchange Meeting for Overseas Talent” in 2019, and a total of 10 manufacturers and academic institutions (30 overseas scholars) and 12 manufacturers (with over 50 overseas scholars) participated in the meetings respectively. The participants all showed their recognition and support for the events. It is hoped to introduce international talents to achieve the effectiveness of encouraging industrial innovation and stimulating technological leap.

▶▶ 4.2 Talent Cultivation

Professional and Technical Talent Training Plans at CTSP

To meet the park manufacturers' needs for recruitment and training of technical talents and to improve the professional knowledge and skills of employees in CTSP, the Bureau continues to organize the “Professional and Technical Talent Training Plans” at CTSP every year. Courses in five categories are offered, including optoelectronics and solar energy, technology management, semiconductor technology, biomedicine and precision machinery, which not only provides diverse learning channels for the employees in the park but also assists manufacturers in the park in enhancing manpower quality and cultivation of excellent technical talents that can further create the development of core and key capabilities of the employees in the park. In 2019, the Bureau continued the original physical courses, with a total of 21 training courses in 5 major categories and a total of 664 trainees. Furthermore, we also began to promote digital learning courses focusing on “management of technology industry”, providing a convenient way of learning for employees in the park, effectively saving their time and space while the aim of high-efficiency learning can be reached. The results of overall satisfaction survey after class showed over 89% satisfaction, and the average satisfaction of course content and practicability to work as well as facilitation to future development reached more than 87%, showing that the quality of the course content and implementation of courses met the needs of the trainees and manufacturers overall.

Talent Cultivation Subsidy Plans in the Science Park

To encourage colleges and universities near the science parks and the industries to co-organize module courses and corporate internship courses, we provide cultivation and training courses in the form of industry-university collaboration to grasp the practical needs for technical manpower in the technology industry. Trainees can accumulate practical experience through internship opportunities to enhance their employment capabilities as graduates-to-be, which shortens the gap between the theoretical knowledge and practical experience of talents in technology industry, effectively making up for the manpower gap required in the industry as the implementation of high-quality talent rooting project. In 2019, subsidies were approved to a total of 14 module courses in 9 schools, with the total amount of NTD 10.11 million, cultivating 1,041 talents in total.



	Name of subsidized course	School
1	Module course for talent cultivation for diversified biotechnology industry and career integration	China Medical University
2	Module course for implemen Module course for talent cultivation for diversified biotechnology industry and career integration tation of special project of pharmaceutical plant cultivation, fermentation and component analysis of functional components	Hungkuang University
3	Practical module course for industrial water treatment technology and gas operation as well as safety management of chemicals in high-tech industry	Hungkuang University
4	Module course for integrated circuit (IC) testing talent cultivation	Chaoyang University of Technology
5	Implementation of smart IoT sensing system	National Formosa University
6	Module course for smart manufacturing in combination of machine vision and integration of electromechanics	National Formosa University
7	Module course for the cultivation of AI and Big Data application talent	National Taichung University of Science and Technology
8	Module course for Green Run talent cultivation plans	National Taichung University of Education
9	Module course for machine tool component designer cultivation	National Chin-Yi University of Technology
10	Module course for manufacturing management	National Chin-Yi University of Technology
11	Practical internship for the LEAN management of smart manufacturing	National Chin-Yi University of Technology
12	Corporate internship course for the cultivation of talent in mechanical design and development	National Chin-Yi University of Technology
13	Corporate internship course for biotechnology and cosmetic technology	Providence University
14	Filtration and micro-pollution control in the semiconductor industry	Tunghai University

▶▶ 4.3 A Workplace at Ease

4.3.1 Protection of Labor Rights in the Park

Handling various labor right promotion affairs

CTSP Bureau is committed to constructing a friendly park. In 2019, 3 sessions of advocacy briefing of Labor Standards Act, Act of Gender Equality in Employment, and Regulations for Workers' Retirement Reserve Funds were organized. In addition, regular meetings are convened by the Employment Discrimination Review and Gender Employment Equality Committee to gather suggestions from the committee members to construct a friendly workplace. On the other hand, we also cooperate with the Ministry of Labor to carry out inspection plans of various labor conditions, handle labor complaints in the park and continue to strengthen labor condition inspection to ensure labor rights protection. In terms of labor disputes in the park, the Bureau handles the disputes in a positive manner, guiding the labor and management to solve the labor disputes from legal perspectives for a legal and reasonable solution.



Model worker recognition ceremony

Moreover, to commend the employee's contribution to the industries in the park and to national economic development, the Bureau organizes the model worker selection event and grant the awards publicly to affirm the professionalism and excellent contribution of these model workers.

Promotion of Gender Equality

The Bureau continuously improves the hardware facilities in the park and actively guides park manufacturers to promote equal rights in the workplace and improve working conditions for the construction of a friendly workplace. The Bureau has conducted the selection of the excellent business units for the “promotion of equal rights in the workplace” in July and August since 2016 to encourage corporations to actively implement labor laws and regulations to construct a harmonious working environment.



Experience sharing and exchanges of the promotion of a friendly workplace was conducted between Yung Sheng Optical Co., Ltd. and CTSP manufacturers

In the selection of excellent business units for the “promotion of equal rights in the workplace” in 2019, Micron Technology and JSR MICRO TAIWAN won the Excellence Award while Taiwan Nitto Optical, Yung Sheng Optical and Raystar-Optronics won the Outstanding Award. In addition to what is stipulated in legal regulations, these companies also promote gender wage equality, female executive associations, flexible work arrangement, priority parking space for pregnant employees and exclusive dust-free clothes, showing their attention and efforts in the promotion of equality rights in the workplace.

In 2019, the Bureau organized a visit to a friendly workplace, Yung Sheng Optical Co., Ltd. and the content included the experience sharing of the promotion of equality rights in the workplace and the friendly facilities in the factory so as to facilitate a friendly workplace in the park, promotion of gender equality in the workplace and exchanges of practical experience.

Establishment of Employment Discrimination Review and Gender Employment Equality Committee

To ensure equal employment opportunities for employees of its jurisdiction to avoid any discrimination against job applicants or employees or unfair treatment of gender work right and to eliminate discrimination in the workplace, CTSP Bureau has established the CTSP Employment Discrimination Review and Gender Employment Equality Committee in accordance with Article 2 of Enforcement Rules of Employment Service Law and Article 5-1 of the Act of Gender Equality in Employment. The tasks of the Committee include the followings.

In terms of employment discrimination

1. Items to be identified in employment discrimination cases
2. Provide suggestions for eliminating employment discrimination
3. Consultation and assistance in investigation or employment discrimination complaints
4. Suggestions for fair employment policies and measures
5. Collection of information of employment discrimination

In terms of gender work equality

1. Consultation and discussion on the Act of Gender Equality in Employment and its subsidiary regulations
2. Investigation and review of gender equality complaints
3. Review of annual work plan
4. Survey on the current status of gender equality within the Bureau's jurisdiction
5. Deliberation of the identification of employment discrimination
6. Other matters to promote gender equality in the workplace

To strengthen and implement human rights related issues, we comply with “the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)” and organize seminars related to the promotion of equal rights in the workplace in which the CEDAW is incorporated appropriately, such as the issues of division of housework, equal caring responsibility and so on to make the content of the advocacy more diverse.

In 2019, 2 sessions of Employment Discrimination Review and Gender Employment Equality Committee meetings were held, in which the business of gender equality work in the park was detailed and the review of 2 complaints of gender equality were conducted (the review results showed that there was no violation of Act of Gender Equality in Employment).



Handling of Labor Complaints

Based on the labor complaints, special inspection plans of the Ministry of Labor and self-inspection plans, the Bureau continues to implement labor condition inspections of the park businesses. Inspection items include those stipulated in "Labor Standards Act", "Act of Gender Equality in Employment", "Labor Pension Act", "Labor Insurance Act", and "Employee Welfare Fund Act". If any illegal matters are found from the results, the business unit will be notified for immediate improvement and punished accordingly by law.

We sent staff to conduct labor condition inspections immediately to business units suspected of violating regulations. It was found that the overtime exceeded time limit in 7 cases, not paying for the overtime in 5 cases and another 5 cases violating the Labor Standards Act, Labor Pension Act and Employment Service Act, with a total of 17 cases being fined in accordance with regulations. In addition to informing the complainants of the inspection results and the punishments or sanctions, the business units were also informed for improvement. In another 39 cases, the complainants misunderstood the legal regulations and after inspection and the business units in these cases were found not violating the regulations. Therefore, detailed explanation of relevant regulations was responded to the complainants. In 2019, we conducted 66 labor conditions inspections (including inspection of gender equality in employment) and fines were imposed in 17 cases by law. No violations of Act of Gender Equality in Employment or employment discrimination were found in the inspections conducted in 2019.

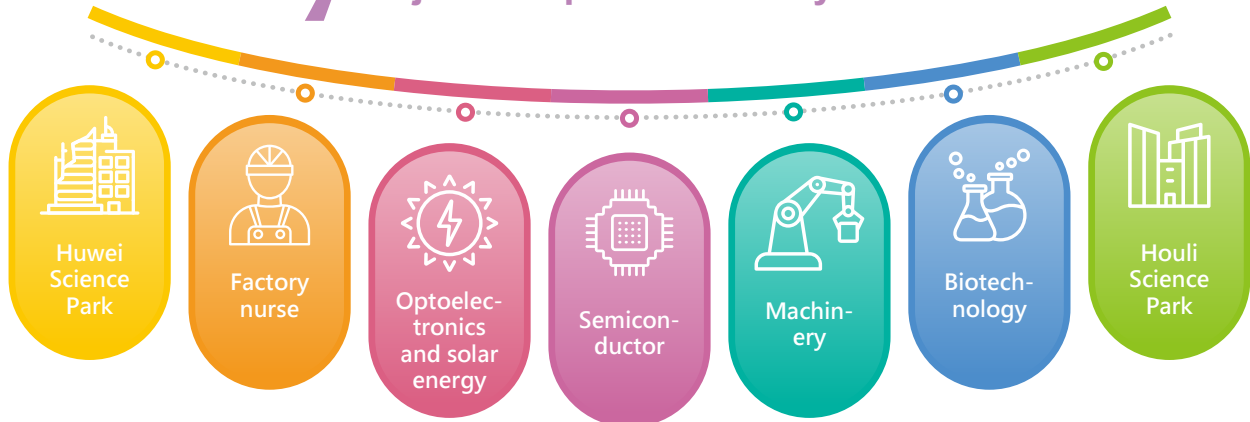
4.3.2 Workplace Safety and Health Promotion in the Park

Advocacy of Occupational Safety for the Construction of a Safe Workplace

When conducting the advocacy of occupational safety and health and providing counseling or implementing labor inspections, we adopt a single-window and advance safety assessment and guidance mechanism through IT technology to strengthen the business units' self-management and expansion of the whole staff participation mechanism. Besides, we also utilize diverse anti-disaster resources to effectively improve the overall safety and health level of the park and promote labor health and labor inspection efficiency to construct a safe, healthy and humanized labor environment. The labor health and safety status at CTSP in 2019 is as follows: There were 98 disability injuries, disabling injury frequency rate of 1.04, disabling severity rate of 28, 2 work-related deaths, 1 occupational disaster (fall occupational accident) and 1 other traffic accident. In addition to investigations of these occupational disasters in accordance with law and preparation and submission of the reports of these cases to Occupational Safety and Health Administration of the Ministry of Labor for review, counseling was also given to these business units for improvement. Among them, the employee who suffered from fall was an employee with disabilities. We have urged park manufacturers to strengthen the concept of occupational safety and health among employees with disabilities for them to establish awareness of industrial safety to reduce occupational disasters so as to fully protect the safety of employment among these employees. For the occupational traffic accident, we have asked the business units to implement the precautions for road safety, including looking out for the driving direction before starting the car in the plant, paying attention to the road conditions, giving priority to pedestrians, and using the turn signals when making a turn. Personnel and traffic control should be made at high-risk intersections, and additional command manpower should be added when necessary. Relevant occupational disaster cases are also publicized to all manufacturers in the park for them to examine similar risks in the plants and adopt countermeasures to prevent disasters from happening again.

To promote industrial safety culture in the park, CTSP Bureau actively counsels "CTSP Association for Occupational Safety and Health Promotion" and it is divided into 7 major occupational safety families, including "semiconductor", "optoelectronics and solar energy", "machinery", "biotechnology", "Houli Science Park", "Huwei Science Park" and "Factory Nurse" while TSMC, AUO, Kashiwama, PharmaEssentia, Micron, JSR Micro and Winbond as the convener of the 7 families respectively. These big corporations lead other small manufacturers and convene meetings to publicize safety and health regulations, exchange disaster prevention information, share safety and health management experience, discuss the management of chemicals and emergency response to accidents and support each other rescue facilities to serve the function of mutual support for emergency response in accidents.

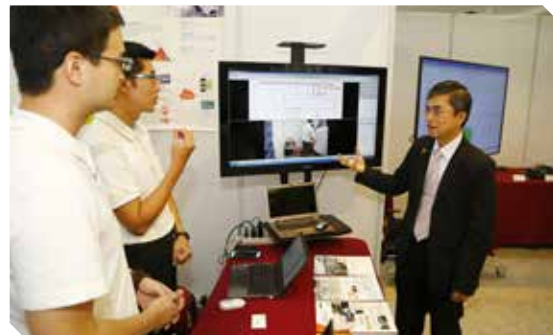
7 major occupational safety families



Moreover, a total of 2 project counseling plans related to occupational safety and health were implemented for the supervision and counseling of occupational safety and health in projects, and 15 sessions of training and briefings of occupational safety and health related laws and regulations were organized in 2019. Furthermore, 1 visit to excellent unit of industrial safety and health promotion as well as 1 occupational safety and health seminar were implemented. For the labor supervision and inspection plans in 2019, 15 special inspection projects were implemented and 650 sessions of labor supervision and inspection were carried out. The inspection results showed that a total of 31 cases were fined and 10 were suspended due to violations of Occupational Safety and Health Act. The Bureau actively provides counseling, advocacy and inspections to implement the requirements for business units in the park to ensure safety and health in the working environment to protect labor rights.



Occupational Safety and Health Seminar



Display of disaster prevention system and safety and health equipment



Training of professional emergency response technicians for toxic chemical disasters



Visits to excellent unit of industrial safety and health promotion



Set up CTSP Employee Clinic to Take Care of the Physical and Mental Health of Employees in the Park

The CTSP Employee Clinic managed by China Medical University Hospital is established on the 1st floor of the Bureau's Industrial and Commercial Service Building, and there are outpatient clinics for Occupational Medicine, Chinese and Western Medicine and Rehabilitation Departments. In 2019, the total outpatient visits reached 7,559. Besides the outpatient services, it also organizes first aid personnel education and training, breast ultrasound exam, breast cancer prevention, sports, Psychiatry and Psychosomatic Medicine, physical fitness, vaccination and other health promoting lectures and visits. Professional medical physicians are invited to the corporations in the park for special consultations, with 4,025 participants in total, to take care of the employees' physical and mental health and improve the occupational health promotion of the park manufacturers.

Joint Emergency Response

The Bureau actively integrates the capacity of emergency response of disasters among the manufactures in the park and established the CTSP "Emergency Response for Joint Defense to Major Disasters", integrating the capacities of the official, military and park manufactures for a joint defense mechanism for disaster prevention, aiming at making CTSP a standard model area of joint defense.

In 2019, the Bureau cooperated with the Houli Plant of AUO Optronics and held a disaster prevention and response drill at CTSP. The Fire Bureau and the Environment Protection Bureau of Taichung City Government, the Environmental Incidents Specialist Team in Central Taiwan, Science Park Police Unit, Employee Clinic and park manufactures for joint defense were all invited to participate in the drill. The scenarios were set at integrating the park safety protection and disaster response for joint defense, including disaster response and joint defense of earthquake and evacuation, fire and toxic disaster.

The highlight of the drill was the demonstration of the use of technological disaster relief tools. The "crawler-type remote control turret tank" can put off fire by remote control; the unmanned helicopter dropped fire extinguishing bombs to extinguish fire to improve the efficiency of disaster relief and avoid disaster relief personnel from getting deep into the fire scene and toxic gas area. More than 100 participants joined the drill, and the process of the drill was lifelike and the response actions were accurate. CTSP continues to make efforts in the construction of an innovation-oriented and high-quality investment environment. In addition to actively integrating the IT technology equipment to strengthen disaster preparedness, joint defense agreements were also signed with Central Weather Bureau, 36th Chemical Troops and the Professional Technical Team of Environment Accidents in central Taiwan. Counseling is actively provided to manufacturers for process safety assessment, industrial safety and joint defense as disaster prevention. In addition, by holding disaster relief training and drills, the overall safety protection and response efficiency in the park can be improved. In the future, we hope to further promote more technological disaster relief so that when a disaster occurs, it can be eliminated in the first place to reduce possible losses.



2019 joint defense drill of emergency response



Crawler-type remote control turret tank

▶ 4.4 Innovation and Entrepreneurial Resources

4.4.1 From IP to IPO Program (FITI)

The industries in Taiwan have an urgent need to strengthen their competitiveness through transformation to remain invincible in the international competition. Taiwan has had abundant entrepreneurial momentum, but many entrepreneurial teams often encounter many difficulties in the process of starting a business, especially because they fail to produce products the market demands, leading to failure eventually. According to statistics, only about 15% of the entrepreneurial teams can persist until they succeed. It is obvious that it is a long way to go from patent transfer to commercialization of the company. At a moment like this, the support from the government becomes extremely important.

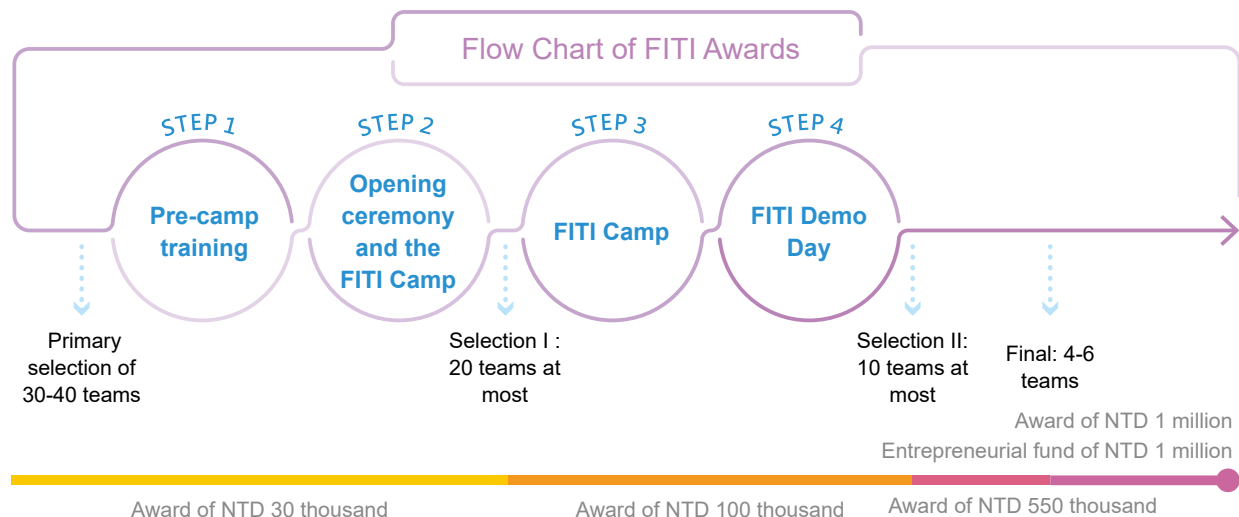
Therefore, MOST launched the From IP to IPO Program (FITI) to assist the entrepreneurial teams to realize their dreams. To integrate resources inside and outside the science park, the Bureau provides services such as entrepreneurial office, broker with nanny-style service and professional consulting, actively promoting the innovation and development of start-up business in the park.

To implement the innovation economy and promote transformation of the science parks, MOST (formerly the National Science Council of the Executive Yuan) has promoted the “From IP to IPO Program (FITI)” since 2013 to bridge the gap between “innovation” and “entrepreneurship”. This project is organized by the National Research Institute, and the bureaus of all science parks cooperate with the plan by providing resources inside and outside the science parks, preparing for various entrepreneurial fields, counseling and training and other services, including providing entrepreneurial offices, dormitories for singles, inviting successful business operators in the park to serve as professional consultants and academic research institutions to provide devices and equipment and services related to testing and verification, and providing broker with nanny-style service and so on.

FITI CAMP

The FITI CAMP under the “From IP to IPO Program (FITI)” allows the start-up teams to confirm their business model and to ensure the products can be mass produced. Through consultations, lectures, forums and team workshops on different topics, practical guidance is provided to enable in-depth conversations between the teams and the domestic and foreign professionals to obtain the most practical guidance and suggestions, strengthen the business modeling approach of the teams so that the start-up teams can take steadier steps toward the path to realize their dreams.

Every year there are two sessions of competition in the project, and 40 teams are selected in each session to enter the science parks. After 3 stages of screening, 4-6 teams are selected from the 40 and are granted the “Excellent Entrepreneur Award” and the entrepreneurial fund of NTD 2 million. From 2013 to 2019, we provided counseling to 157 teams selected in the “From IP to IPO program (FITI)” and fruitful results were obtained. Among them, 9 teams were awarded the Entrepreneurship Excellent Award, 6 were awarded the Potential Award, and 74 new start-ups were set up.





CTSP coached 14 teams in the first session and 22 teams in the second for FITI. Among them, 1 team was awarded the Entrepreneurship Excellent Award, 6 were awarded the Potential Award, and 60 new start-ups were set up in 2019. In addition, 12 start-up companies were introduced to CTSP, and 9 matchmaking meetings were conducted, with approximately 600 participants

MOST Deputy Minister, Dr. Yu-Chin Hsu granted the Entrepreneurship Excellent Award- Real-time Weather Forecast



4.4.2 Self-production Base for Incubation of Innovation

The Bureau created an innovative and entrepreneurial field, AI Robotics Hub, focusing on smart machinery, smart medical and other AI fields, and start-up accelerators functions has also been introduced to link local industrial clusters. Investment is also made in the emerging technologies of artificial intelligence, big data, cloud computing and other fields and outstanding talents in these industries are also cultivated.

To improve the innovation and entrepreneurial capacity of the AI Robotics Hub, in 2019, the start-up accelerators-linked industries and professionals resources were introduced, and the entrepreneurial space, self-production equipment and other resources were open to the innovation and entrepreneurial teams of AI and smart machinery to use. We actively create the AI Robotics Hub as an innovation platform and construct an AI innovation ecosystem. In 2019, it is planned to assist with the establishment of 48 robot-related start-ups or incubation centers and accelerators, creating 238 job opportunities.



The 2nd floor of the CTSP AI Robotics Hub is the office for start-up teams



The Bureau co-organized the "2019 Smart Factory Forum with DigiTime"

By linking with the specialists stationed in the Hub and coaching matchmaking and by using the equipment invested in the Hub, we assist enterprises and teams to conduct the development of innovative and high-value products. In 2019, it attracted robot development teams to develop a total of 19 related application projects. Among them, William Tools, Isoul AI Robot and China Medical University further developed the projects into development projects, such as "the Hand Tool Smart Robotic Grinding Development Project", "Intelligent Technology Development Project for the Mushroom Industry" and "AI Image Delineation System Development Project". In addition, the key technology and 20 products were produced, such as "the Smart Robotic Grinding Module" and so on.

iCAN Plan for the Rooting of Innovation

To activate the R&D results in colleges and universities, MOST has established a cross-school accelerating campus entrepreneurship cultivation platform. On January 8 in 2019, the first touring briefing of the "Integrated Cross-campus Accelerator Network (iCAN)" was held in CTSP AI Robotics Hub. Through the inventory of the national innovation research and development results and the introduction of domestic and foreign accelerators for innovation and cultivation, the R&D results of colleges and universities, start-up teams having received subsidies from MOST (such as FITI, Germination Program, the Industrial Value Creation Program for Academia and Global Research & Industry Alliance) are solicited to accelerate the promotion of start-up businesses from the scientific and technological R&D results in colleges and universities.



iCAN project moderator, Prof. Ching-Yao Huang (5th from right in the front row) and the participants

Vision Program

Guided by MOST and implemented by Science & Technology Policy Research and Information Center (STPI), a briefing on the selection of the Taiwan Innovation & Technology Arena (TITAN) was held in CTSP AI Robotics Hub on January 31, 2019, injecting international resources into CTSP and start-up teams in central Taiwan and providing relevant assistance to these start-up teams. Some new start-up teams would participate in this event.

The selected start-up teams would be video interviewed by accelerators in the U.S. and Singapore respectively. The start-up teams are required to present the training results on-site and conduct fundraising briefings to Angel Ventures and make exchanges with other foreign teams and corporations. Selected Taiwanese teams will receive practical guidance and training from international industry instructors and receive one-month accelerating training in Silicon Valley and Singapore on diverse themes, such as legal regulations in the U.S., financial planning and marketing strategies to learn international entrepreneurial experience.

Financial Planning Consulting for start-up Teams

Due to the fact that the financial, tax and equity planning of the start-up teams is closely related to the company's future operational development and capital needs, affecting investors to decide whether to invest funds or not, the Bureau has especially cooperated with Big Four accounting firms (Ernst& Young, KPMG, Deloitte, and PwC) to provide professional financial consulting services to the start-up teams receiving coaching, and on August 13, 2019, the cooperation agreement was signed at CTSP AI Robotics Hub. The Big Four accounting firms will provide free (weekly/monthly, hours limited) financial planning consultation and advice for the start-up teams at CTSP.

In the future, the Bureau will actively promote innovation and entrepreneurship and strengthen innovation momentum, create a matching platform for entrepreneurial resource sharing to introduce innovation and AI robot elements into local industries for the implementation and rooting of the entrepreneurial ecosystem in central Taiwan.



Director-General of CTSP Bureau, Mr. Maw-Shin Hsu (3rd from right), CPA Tony Huang from EY (2nd from left), CPA Peggy Wang from KPMG (1st from right), CPA Pei-hsuan Lee from PwC (1st from left), and CPA Din-jin Su from Deloitte (2nd from right) signed the cooperation agreement together.



5

Sustainability- Actions of Advanced Deployment

5.1 Risk Management

Special Column- Responding to Climate Change- A Sustainable, Disaster-free and Safe Science Park

5.2 Energy Resource Management at CTSP



Environmental protection and climate change are the common and important issues humans on earth have to cope with together. The domestic environmental laws and regulations are getting more and more stringent, coupled with the increasing costs of energy use and more restrictions, business impacts are thus generated. As a government agency, CTSP Bureau not only cooperates with the competent authorities to create green energy, guidance and assistance are also provided to educate manufacturers in the park for strengthening concepts of energy conservation, resource recovery, pollution prevention and ecological conservation to implement the concept of coexistence and co-prosperity between the development of the science park and environmental protection.





Disaster Reduction and Drought Relief Operations at CTSP

Corresponding material topics Stable Energy Supply, Water and Effluents (Water conservation in the park), Energy

Corresponding SDGs



Management Objectives and Policies

- Avoid impacts on the operating activities of the park manufacturers due to water resource or energy supply problems.
- Create a resilient park to improve the response capability when disasters occur so as to reduce potential losses.

Short-term Goals

- Install solar energy generation equipment. As of 2020, the cumulative capacity of solar PV devices installed will reach 45.72 MW.
- Continue to provide park manufacturers with guidance and counseling of water and electricity conservation to reach the goals of process water reclamation in different industries in the park (such as the 85% set for semiconductor and optoelectronics industries).
- In response to the initial operation of Erlin Park, a set of daily capacity of 200-ton reclaimed water treatment system will be installed first. The binary water supply is used for non-human contact purposes, including cooling water in the factory area and flushing water for toilets as well as water for road cleaning, cooling, landscape water replenishment and green land irrigation.

Medium- and long-term goals (3 years and more)

- Add the installation of solar power generation equipment. By 2030, the cumulative installation capacity of solar PV devices will reach 61.82 MW.
- Promote experience exchange and technical improvement and pursue the optimization of water and electricity conservation among park manufacturers. Under the principle of rationalization of energy use efficiency, the process water reclamation rate of industries in the park will be promoted.
- To work in line with the operation of Erlin Park, water resources regeneration center and binary water supply pipeline are established in phases (the final phase is 20,000 tons per day). Reclaimed water is used for cooling water in the factory area and flushing water for toilets as well as water for road cleaning, cooling, landscape water replenishment and green land irrigation. In addition, rolling review is made to examine the supply and demand of reclaimed water, and dedicated pipeline providing water to demanding manufacturers or reclaimed water business in the surrounding area will be installed when needed to increase the efficiency.
- The other sites of CTSP (Taichung, Houli) will cooperate with the schedules of regional development plans for reclaimed water (such as Suinan and Fengyuan) to jointly promote the use of water resources.

Commitments and Objectives

Responsible Units

Environment and Labor Affair Division, Construction Management Division, Land Development Division, Water, Power and Gas Supply Committee

Resources Invested

- The Construction Management Division provides guidance on water and electricity conservation for park manufacturers.
- The Construction Management Division Power and the trade associations formed the Water, Electricity and Gas Supply Committee.
- Participate in the meeting of the drought disaster emergency response team held by units at all levels.
- In response to the central government's energy policy of "Green Roof Project", CTSP and the park manufacturers jointly promote solar power generation.

Grievance Mechanisms

Director-General's mailbox



● Management system and assessment mechanism

- The Planning Division collects monthly data on water and electricity consumption of the park manufacturers.

● Performance and adjustment

- Provided guidance to 3 manufacturers, and the total water conservation potential amounted to 1,027 CMD (equivalent to 374,855 tons/year), reducing the annual emission by 59.98 tons of CO₂e in 2019.
- Provided guidance to 5 manufacturers in the park and the total electricity conservation potential amounted to 33,823 thousand kWh/year, reducing the annual emission by 18,028 tons of CO₂e in 2019.
- The water reclamation rates of all parks at CTSP in 2019 were 86.60% for Taichung Science Park, 81.00% for Houli Science Park, 91.30% for Chising Science Park, 89.30% for Huwei Science Park, 100% for Erlin Science Park and 26.30% for Chung Hsing Science Park.
- In 2019, the capacity of solar power generation devices in CTSP has exceeded 40.67MW.
- CTSP Bureau forms a team in charge of manufacturer visits plans. By visiting factories or holding seminars to convey the policies and plans promoted by the Bureau, we can have in-depth understanding of the problems faced by the manufacturers and care about their needs to come up with solutions.
- Water, Electricity and Gas Supply Committee participates in the communication, coordination, suggestion and tracking of various businesses between the electricity, water and gas supply companies and the park manufacturers.

▶▶ 5.1 Risk Management

5.1.1 Risk Management Policy

To work in line with the policy of the central government, the Bureau has made a resolution in the 2nd Risk Management and Crisis Management Promotion Group meeting to incorporate risk management into internal control operations. CTSP "Risk Management Policy and Operation Principles" ceased to apply since December 27, 2019, and risk management and crisis management operations has been conducted in accordance with CTSP's "Directions for the Internal Control Task Force", "Internal Control System", "Operation Directions for Disaster Prevention Notification" and "Description of Emergency Response Team Operation". In addition, the Bureau has also established an internal control task force chaired by the Deputy Director-General, with the Chief Secretary serving as the deputy chairperson and the head of each unit serving as the member, and the meetings are convened every three months. In terms of the rolling review of risk project operations, the Director-General will chair the meeting and the principle is to convene a meeting once a year.

The Bureau has designed and reviewed the worksheets of the control operation based on the risk assessment results, the audit opinions of the Final Reports from the National Audit Office in previous years, cases of (proposing) corrective measures by the Control Yuan and common business (including cross-functional) stipulated by the competent authorities. The 9th edition of internal control system was amended on February 23, 2020, and 13 individual businesses, 5 common businesses and 1 cross-functional business were formulated, and the control operation worksheets of a total of 19 businesses have been established. Each division office shall handle it accordingly, and the supervisors and section chief of each unit or department are responsible for the promotion and supervision of the implementation of related businesses.

Please refer to CTSP official website for relevant risk management policies and operation principles of CTSP Bureau.





2019 CTSP Bureau's Major Risk Identification Profile

Catastrophic (3)	<ul style="list-style-type: none"> • Earthquake disaster • Drought risk • Typhoon risk • Park flooding 		
Critical(2)	<ul style="list-style-type: none"> • The EIA commitments have not been implemented. • Corruption of employee(s) occurs, affecting the image of the agency. • Controversy over the construction and maintenance project. • Maintenance and management of public facilities. • The interest rate of financing of operation fund increased sharply. • Misconduct occurs when handling procurement procedures due to not being meticulous enough. • News media risk. 	<ul style="list-style-type: none"> • The case has passed the EIA, but appeal or litigation is still proposed by the environmental protection groups. • Major fires, chemical spills, environmental pollution or toxic disasters encountered by park manufacturers. • Mishandling of large-scale dismissal of labor that can damage labor rights and lead to labor disputes. • The sewage treatment facilities cease operation without warning or there is ruptures in sewage pipelines. • Poor water conditions or water outage without warning. • Abnormal power without warning. • The amount of soil generated by the construction of plant in the park exceeds the quantitative amount of the EIA, bring a large number of construction vehicles. • Fire occurs in a residence (dormitory) in the park. 	
Minor (1)	<ul style="list-style-type: none"> • The manufacturers fail to be devoted to R&D in accordance with the development trend of the global high-tech industries, and thus the competitiveness is reduced and thus fail to exert the industrial clustering effect. 	<ul style="list-style-type: none"> • The operating conditions of the park manufacturers are poor, affecting the investment benefits of the park development and labor employment. • Incidents of protest groups occur in the park. • Leakage of official secret(s) known or kept in the course of performing its functions. 	<ul style="list-style-type: none"> • Incident of information security anomaly
Level of Impact / Incidence Rate	Very unlikely (1) It only occurs under special circumstances.	Likely (2) It may occur in some circumstances.	Almost certain (3) It may occur in most cases

Distribution of risks:

1. Extreme risks that require immediate actions. →The probability and impact of risk distribution are of Level 3-3.
2. High risks, and the management need to supervise the plans drawn up and provide resources. →The risk distributed are of level 2-3, 1-3, 2-2, 3-2, and 3-1.
3. For moderate risks, the scope of responsibility of the management has to be clearly defined. →The probability and degree of impact of the risk distribution are of Level 1-2 and 2-1.
4. Low risks are handled in general procedures. →The probability and impact of the risk distribution are of Level 1-1.

5.1.2 Management of Information Security

Improved Information Security

Technology keeps changing as time passes. With the continuous advancement of Internet Technology and technology, CTSP Bureau, as a government agency, continues the upgrade of software and hardware every year to strengthen the protection of information security and implement relevant preventive measures. In addition, we also hold a seminar on corporate core know-how: Lectures of Business Secret Protection to comprehensively improve the prevention in advance and lessen post-incident damage from the aspects of legal norms, protective actions, illegal effects, relief procedures, practice sharing and education and training of investigators.

- The importance of computer equipment: With the information equipment and the convenience it brought about, what follows are issues concerning information security. Ensuring information security would be the right attitude in the face of the coming of the information century.
- Information security goals: To ensure the correct operation of the computer room and the internet that will not be unavailable due to the leakage or destruction of sensitive data or personal data due to information security incidents. There has been no leakage of important security information in the Bureau for the past three years.
- Principle of information security: To protect the confidentiality, integrity and availability of information assets, and further to provide a safe, stable and highly efficient information service overall.
- Information security measures: Through ISO 27001:2013 Information Security Certification, regular information security checks, mandatory regular password changes, vulnerability scanning, account checks and policy reviews of firewall and intrusion detection system, we organize internal education and training of internal information safety, social engineering education and training, and annual seminars on information security to ensure the confidentiality, integrity and availability of information assets, and further to provide a safe, stable and highly efficient overall information service.
- Corporate core know-how-- Business Secret Protection Measures: The identification and protection of business secret are highly professional. In addition, the protection of the outcome of wisdom can be evaluated as business secrets, patent application or timely disclosure of the technology.

Planning

- (1).In terms of policies, the Bureau and Ministry of Justice worked together to assist manufacturers to establish a protection mechanism to protect business secret, providing a seminar on "Business Secret Protection and Crime Investigation", assisting the enterprises to construct a comprehensive business secret protection network from the perspectives of defining legal requirements, breach of responsibilities and corporate remedies.
- (2).In terms of reconnaissance, to enhance the professional knowledge of internal investigators, the Bureau and the National Police Agency co-organize the training seminar on "Business Secret Protection and Crime Investigation" for precautionary measures to reduce damage afterwards.
- (3).In terms of resources, Ministry of Justice Investigation Bureau and private business secret experts work together to hold a keynote speech of "Corporate Operation Information Protection- Leakage Warning and Risk Identification" and practices sharing, hoping that the corporations can make early planning and make good use of resources in the public and private sectors.



Information Security Seminar




Seminar on Business Secret Protection and Crime Investigation



Corporate Operation Information Protection- Leakage Warning and Risk Identification



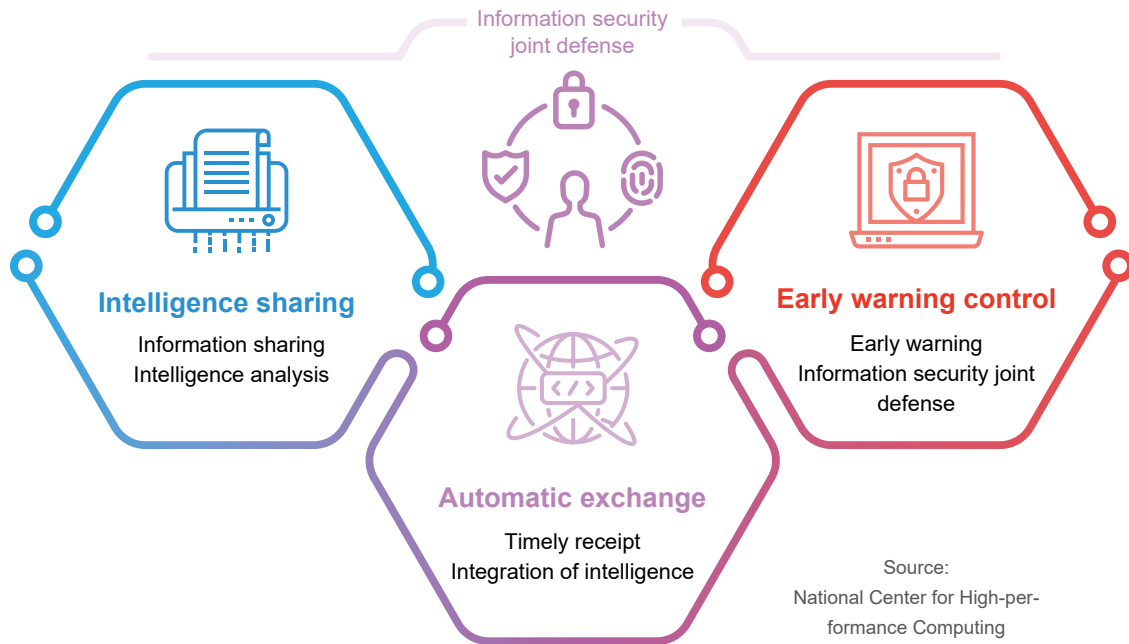
Please check CTSP official website for more information of our information security related policies.



Science Park Information Sharing and Analysis Center (SP-ISAC)

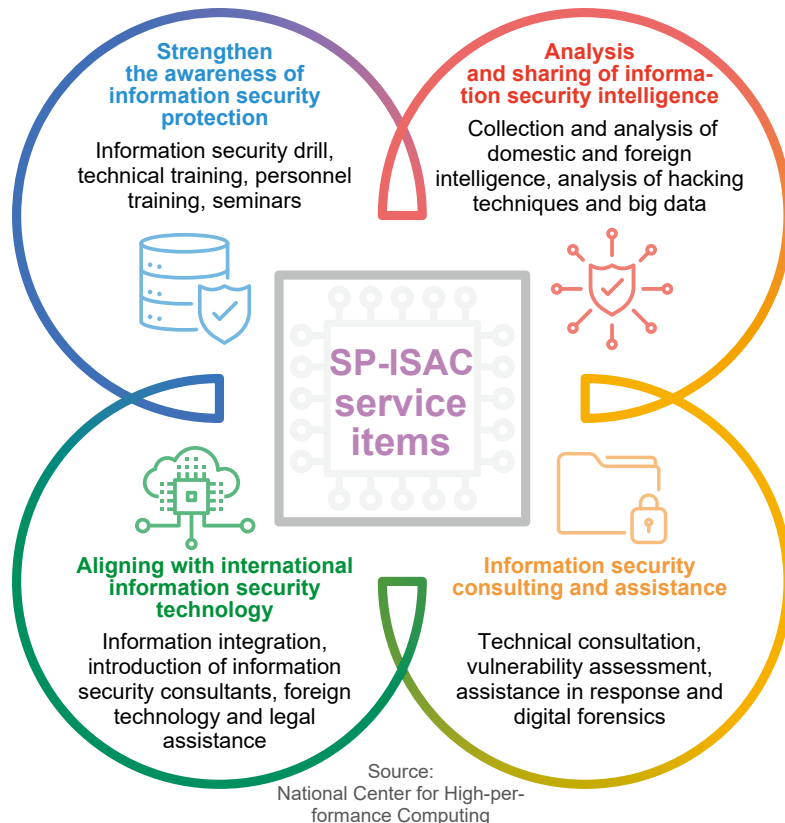
In order to strengthen the information security protection measures of the eight critical information infrastructure (including Energy, Water, Information and Telecommunication, Transportation, Banking and Finance, Public Healthcare, High-tech Industrial Parks and Government) to implement the national information security protection policy, the government plans for various competent authorities to establish the "Information Sharing and Analysis Center (ISAC)". By combining the forces in the public and private sectors, ISAC members from different fields gradually establish a multi-directional notification mechanism to promote the sharing of information security and analysis and other joint defense capabilities in Taiwan and fully cooperate with the promotion of national information security policies.

Improvement of the overall response and protection capabilities of information security



The “Science Park Information Sharing and Analysis Center (SP-ISAC)” is promoted in Hsinchu, Central Taiwan and Southern Taiwan Science Parks by MOST, aiming at analyzing and sharing intelligence of information security and aligning with international information security technology to enable information security management personnel of manufacturers in the park to grasp the latest attack methods to propose countermeasures to achieve the protection goals of early warning, assistance with improvement and emergency response, so as to strengthen the protection capabilities of internal information security management and protection in the science parks.

SP-ISAC center started its officially operation on February 1, 2018. It is operated by the National Center for High-performance Computing. In the initial planning, services including collection, analysis and sharing of domestic and foreign intelligence of information security and big data, information security technology consultation, vulnerability assessment, assistance in response and digital forensics, information security resources, introduction of foreign technology and related legal assistance and organization of technical training, personnel training, seminars and assistance in information security drills are all provided free of charge. We hope to construct a strong high-tech park information security joint defense system with the full participation of the manufacturers in the parks and the assistance of information security experts in various fields to maintain the information security in the science parks.



Special Column - Responding to Climate Change- A Sustainable, Disaster-free and Safe Science Park

In the face of the increasingly severe risks of climate change, production and operation of park businesses may be impacted. CTSP Bureau has taken corresponding management actions for energy resource supply risks and natural disaster risks. The Bureau has assessed the risks and opportunities brought about by the park's transformation into a low-carbon economy and other possible financial impacts in accordance with the framework of Task Force on Climate-Related Financial Disclosures (TCFD).

We continue to respond to the operational challenges and opportunities brought about by climate change through the implementation of various plans. At the same time, the relevant information concerning climate change would be introduced into the operational and investment decisions. Since 2014, we have been guiding manufacturers to implement water and electricity conservation measures to improve the overall utilization efficiency of energy resources. In recent years, we have also encouraged manufacturers to make use of emerging solar energy and reclaimed water resources to reduce the risk of interruption in the supply of energy resources. Furthermore, we also devote ourselves with our suppliers to green procurement to facilitate the realization of solutions to climate change, making every effort to reduce GHG emissions and implement the sustainable development of social responsibility.

CTSP Bureau's Correspondence to TCFD Framework



Governance

The "Planning Division" and "Environment and Labor Affair Division" of the Bureau serve as the management units for relevant financial impacts of climate change.



Strategy

After identifying climate-related risks and opportunities, discussions of coping strategies are discussed with relevant units, and financial impacts on CTSP are also evaluated (for example, the implementation of smart street lighting system can reduce energy costs, and the implementation of smart disaster prevention water information system can reduce disaster losses).



Risk Management

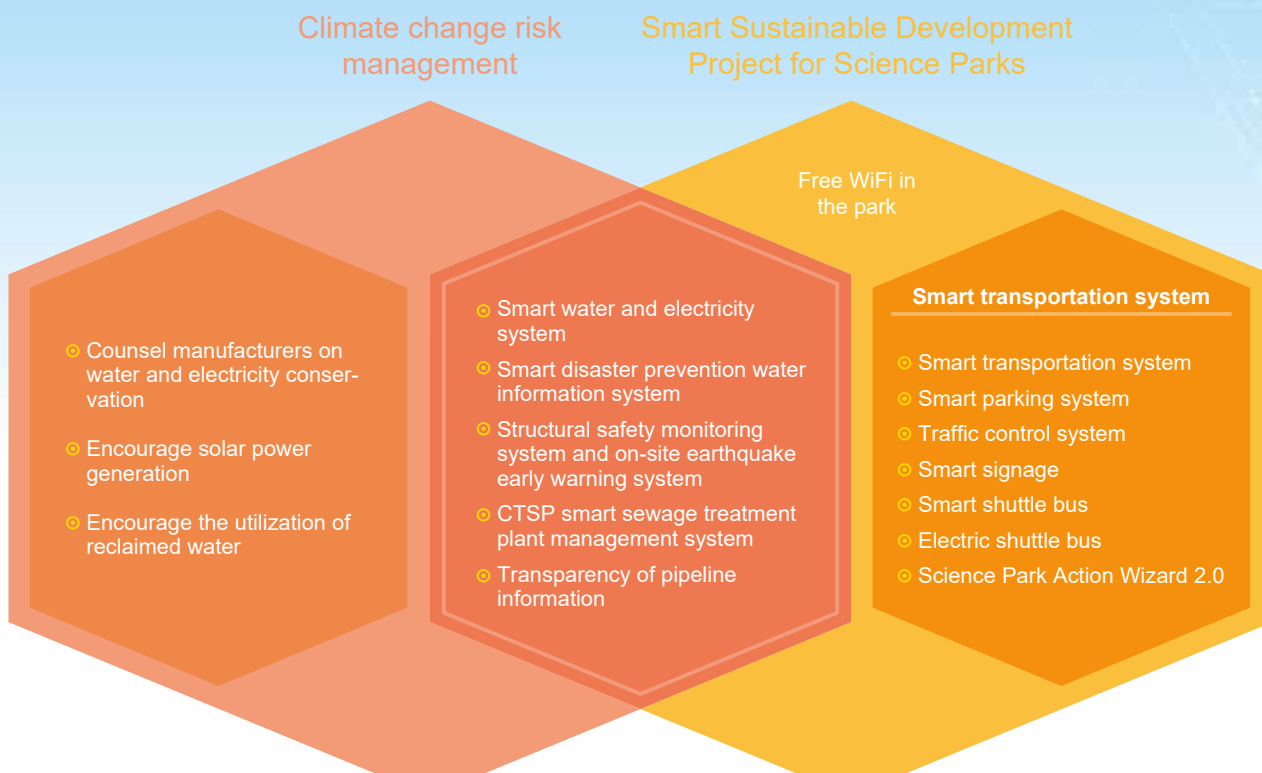
Based on the climate-related risks and opportunities provided by TCFD, the Bureau divides climate related risks into two categories: (1) Transition risks related to low-carbon economy, and (2) Physical risks related to climate change. Opportunities created from adaptation to climate change include improved resource utilization efficiency and cost reduction, adoption of low-carbon energy, development of new products and services, entering new markets and improved resilience of the supply chain. The "Planning Division" and "Environment and Labor Affair Division" of the Bureau make assessment of climate-related risks and opportunities based on the level of impact on the operation of the park and the probability of occurrence.



Indicators and targets

We encourage park businesses to introduce ISO 14064-1:2018 (GHG inventory management system) and participate in CDP Project (Carbon Disclosure Project) to establish the capability for annual GHG inventory and use carbon footprint as the basis for the management of environment of the park.

In addition, the Bureau has introduced the forward-looking technology into the smart management of the park. We have cooperated with the MOST's "Smart Sustainable Development Project for Science Parks" and established smart disaster prevention water information system and earthquake warning system, and updated the park pipeline maps to the database of the Geographic Information System (GIS) by making use of the Information and Communication Technology (ICT), aiming at reducing the losses to the minimum when disasters occur.

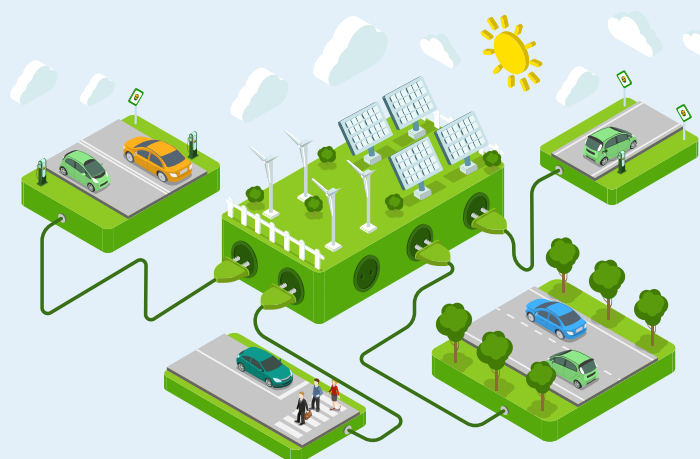


See Chapter 7.2 for other items in the Sustainable Development Project for Science Parks

The "Smart disaster prevention water information system" and "Smart sewage treatment plant management system" established by CTSP Bureau was nominated for the Sustainable Infrastructure Award in IDC Smart City 2019 SmartCity Asia Pacific Awards with the theme of "A Sustainable, Disaster-free and Safe Park".

Establishment Plans for Smart Water and Electricity System

Water, electricity and lighting are the most important infrastructure in a science park. To become the model of "green science park", CTSP built smart LED street lighting in Taichung Science Park in 2017, making use of smart technology and communication capability of the Internet to provide safe lighting and energy conservation. During 2018 and 2019, the effectiveness of carbon reduction of the smart street lighting was 675 tons of CO₂e emissions. The establishment project of the smart water system in Taichung Science Park is to be completed in February, 2020. With this system, we can monitor the water supply status in a real-time manner to avoid any incidents that can waste water resources, improving the water leakage rate while reaching the benefits of water and energy conservation and carbon reduction, and the the establishment of a smart water management display platform is also completed.



Smart Disaster Prevention Water Information System

In recent years, under the impact of the worldwide climate change risks, the short-duration heavy rainfall has been more frequent. With the goal of creating a smart park that provides “safe industrial investment environment”, the Bureau has entrusted the National Applied Research Laboratories (NARLabs) to implement the “CTSP Autonomous Smart Water Information System Establishment Project”. By using the cutting-edge monitoring and big data analysis technology of NARLabs, the disaster IoT network is established in Huwei Science Park, Chung Hsing Science Park and Erlin Science Park, integrating the environment sensors in the park (including rain gauges, water level gauges, image monitors and so on) for full-time management and control, collecting environmental monitoring data into the Cyber-Physical System (CPS).

The “Smart disaster-prevention water information system” makes use of machine learning techniques and AI technology. In addition to grasping the real-time condition of the science park, the results of water conditions within the following 6 to 72 hours and flood risk assessment can also be interpreted for the development of support script applicable to the decision making in the face of natural typhoon and flood disasters, and feasible disaster prevention and mitigation decisions can be automatically suggested to assist the parks under the jurisdiction of CTSP to take the correct disaster prevention measures and contingency strategies to reach the goal of reducing losses and resume normal operations as soon as possible.



CTSP smart disaster prevention water information system can make a fast overview of the weather and water conditions, and shows the disaster warning messages in the park



Director-General of CTSP Bureau, Mr. Maw-Shin Hsu (center) explained the application of the “Smart disaster prevention water information system” in the press conference

In 2019, the Line Bot of water information was completed and the drones were used for smart inspections. Line Bot of water information can make push notification of hydrological warning messages and active disaster prevention and mitigation suggestions for decision-making to park manufacturers and the response personnel of the Bureau when abnormal water conditions occur in the park or when the special weather warnings are issued to strengthen the efficiency of information transmission. When a typhoon or a flood occurs, drones that can be used immediately for smart inspection based on the pre-planned route and photos returned will go through the anomaly detection with the AI image recognition system to quickly grasp the disaster information to enable us to dispatch staff to conduct inspection and repair as soon as possible.

CTSP Smart Sewage Treatment Plant Management System

CTSP Smart Sewage Treatment Plant Management System bears the heavy responsibility of maintaining the normal operation of manufacturers to ensure that the quality of effluent discharged from the sewage treatment plant can meet the national effluent standards and stricter EIA standards at all times, creating a safe investment environment for manufacturers. The Bureau has established the “Smart Sewage Treatment Plant Management System” and installed automatic continuous monitoring of water quality (amount) and real-time camera for real-time control at important interception points in the sewerage, grasping the current status of water quality of more than 90% of connecting pipelines of the the manufacturers. Furthermore, the big data collected from monitoring are analyzed by technologies of expert system of AI, neural network, regression prediction and others, and the results are provided as reference for operation management response and decision making.

If water quality is found abnormal, the operator can handle the situation in advance with an early warning time of 15 minutes and more. In addition, important equipment with 50HP and above is equipped with 4 in 1 sensors for the voltage, current, vibration and temperature to establish predictive diagnosis that provides suggestions for repair or replacement to extend the service life of equipment, greatly improving the efficiency of management, strengthening effluent discharge control mechanism and risk control. The aforesaid monitoring data and analysis results are combined with multi-media, such as a web page, TV wall, text message, LINE and display robot for immediate provision of information for decision-making. In addition, a reclaimed water treatment pilot plant is also built with smart remote control to effectively solve the sewage treatment problem of NEHS CTSP.



Smart control of sewage

Sewage treatment from the **2** systems

System

1

The “smart sewage discharge emergency response management system” monitors the rainwater channels, flood detention ponds and drainage channels through the park; establishment of real-time warning and energy conservation system for important equipment

System

2

“Intelligent operation and management system of the sewerage system” monitors the sewerage, interception points, and connected discharge pipes of manufacturers with large-volume discharge; promote environmental education by combining reclaimed water pilot plant and remote control

Set up a smart remote platform to combine all monitoring data and the current control information of the sewage treatment plant

Source of photo: Achievements of intelligence promotion of the science park

Structural Safety Monitoring and On-site Earthquake Early Warning System

To enhance the earthquake disaster and emergency response capabilities of the park, the Bureau has cooperated with the National Center for Research on Earthquake Engineering of NARLabs for the establishment of the “On-site Earthquake Early Warning System” deployed in the five major science parks under the jurisdiction of the Bureau. By making use of the speed difference between seismic P wave and S wave, early detection of the first arrived P wave can be made and identified, and early warning message is sent out within a short period of time before the destructive S wave arrives, buying several to dozens of seconds for earthquake response.

The “Structural Safety Monitoring System” is established in the office building of the Bureau, with the deployment of the seismometer, accelerometers, thermometers, GPS signals and so on to record the dynamic response of the structures in a real time manner when an earthquake occurs. All signals of the sensors for the dynamic response of the structures will be synchronized and integrated in the data center for automated preliminary analysis, providing fast structural health diagnosis and safety assessment to help with the judgment of whether evacuation is needed or whether it is safe to continue to work in the building.



The Structural Safety Monitoring System can provide fast structural health diagnosis and safety assessment after an earthquake occurs

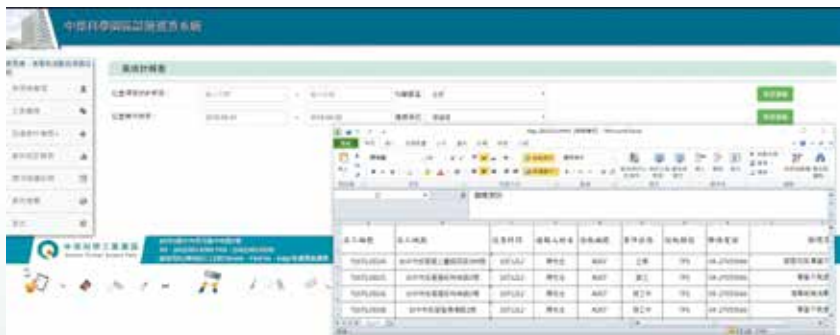


Director-General of CTSP Bureau, Mr. Maw-Shin Hsu (right) explained in the press conference how the Structural Safety Monitoring System can provide fast structural health diagnosis and safety assessment after an earthquake occurs

Transparency of Pipeline Information

Pipelines are the infrastructure for the basic needs for people's livelihood. In addition to the pipelines used for water, electricity, natural gas and broadband for the use in daily life, there are also pipelines for special industrial gases required in the process by the park manufacturers. After the occurrence of some major pipeline disasters at home and abroad in recent years, there has been increasing awareness of disaster prevention. A complete pipeline database and pipeline management are what it takes to reduce disasters. Therefore, the integrity and accuracy of pipeline database is indispensable.

In 2019, the Bureau improved and integrated the pipeline map data of the park and transferred it the newly-built geographic information system (GIS), providing the information to relevant personnel in the excavation and management agencies. To facilitate the management of park facilities, the Bureau has established a facility inspection notification system. When the inspectors discover damage to the roads and facilities of the park, immediate report can be made for repairs. The repair personnel can reply the latest status immediately after repairs so that relevant personnel can be kept posted of the latest on-site situation. In addition, the Bureau has built a new broadband pipeline maintenance system, providing applicants and management units with online application, notification and inquiries to improve the efficiency of administrative operations.



Schematic diagram of the facility inspection notification system in CTSP



Schematic diagram of the road excavation management system



The mobile smart road excavation engineering assistant helps manufacturers to grasp the pipeline information at any time to ensure safety



▶▶ 5.2 Energy Resource Management at CTSP

Central Taiwan Science Park is the latest science park to be established in Taiwan. As the number of manufacturers and industrial turnover still continue to go up, the demands and consumption of energy resources also increase. CTSP Bureau regularly gathers statistics of the energy use status to ensure compliance with the amount approved in the EIA while at the same time guide the park manufacturers to improve the efficiency of energy use.

The water used in CTSP comes from Taiwan Water Corporation (TWC). The water source of each park differs due to the deployment of the TWC. The water sources of the parks at CTSP are detailed as follows: Liyutan Reservoir for Taichung Science Park and Houli Science Park; the existing tap water system for Erlin Park; Chi-Chi Weir for Chung Hsing Science Park; Linnei Water Treatment Plant for Huwei Park. The "Aqueduct Water Risk Atlas" of the World Resources Institute showed that the whole Taiwan belong to Low - Medium (1-2), and the site of each park is not in any national or international protected area. The water intake is from legal water sources applied for the authorization from the government, which will not have significant impact on water sources. In 2019, due to the increase of the production capacities of the manufacturers, the energy use also increased.

Year/ Item	2017	2018	2019
Power consumption (kWh)	7,795,546,000	7,749,679,846	10,486,214,360
Power consumption (GJ)	28,063,966	27,898,847	37,750,371
Power use intensity (GJ/ NTD 100 million)	4,977	3,849	4,735
Intake water (IW) (million liters)	47,277	50,132	49,617
Water consumption (million liters)	7,539	9,305	11,697
Intensity of intake water (million liters/ NTD 100 million)	8.39	6.92	6.22

Note:

1. The denominator of power use intensity and intensity of intake water is CTSP's total annual turnover for the year (the turnover for 2019 reached NTD 797.2 billion).
2. Every kilowatt of electricity=1kWh=3,600 KJ
3. Water consumption=Water intake (used) - drainage
4. The operating manufacturers in Chung Hsin Science Park focus on research and experimental industries, and no process wastewater is generated. Therefore, the energy calculation does not include Chung Hsin Science Park.

5.2.1 Guidance of Water and Electricity Conservation

To effectively manage water and electricity consumption of the park, "Regulations for Science Park Water and Power Advisory Management" was proclaimed to be in effect on December 5, 2018, requiring park users to save water and electricity to make effective management, flexible scheduling and diversified development of the park, increasing water and electricity efficiency in the park. There are five major precautions, including water and electricity application mechanism, keeping water use record and relevant information, responding measures and cooperating items when there is water shortage, water and energy conservation measures as well as counseling and rewards, and control measures for breach of obligations.

Full text of "Regulations for Science Park Water and Power Advisory Management"



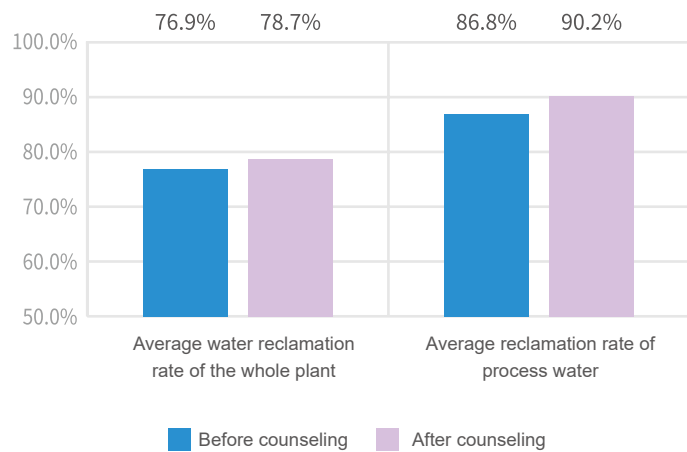


Counseling of Water Conservation in the Park

To alleviate the potential impact water resources cause on production in the park, the Bureau continues to conduct related counseling and advocacy of water conservation and reclamation. In 2019, counseling of water conservation was conducted to 3 manufacturers. Before the counseling, the total water consumption of the 3 manufacturers totaled 27,011CMD. After the counseling, the reasonable water consumption was 25,987CMD, and the total water conservation potential amounted to 1,027 CMD (equivalent to 374,855 tons/year). In addition, based on the CO₂e emission from every 1 m³ of water announced by TWC for the conversation of the benefits of the “energy conservation and carbon reduction” measures, about 0.16 kg of CO₂e can be reduced for every ton of water saved, reducing 59.98 tons of CO₂e/year.

2019 Water Conservation Counseling Performance

Item	Before Guidance	After Guidance
Average water reclamation rate of the whole plant	76.9%	78.7%
Average reclamation rate of process water	86.8%	90.2%

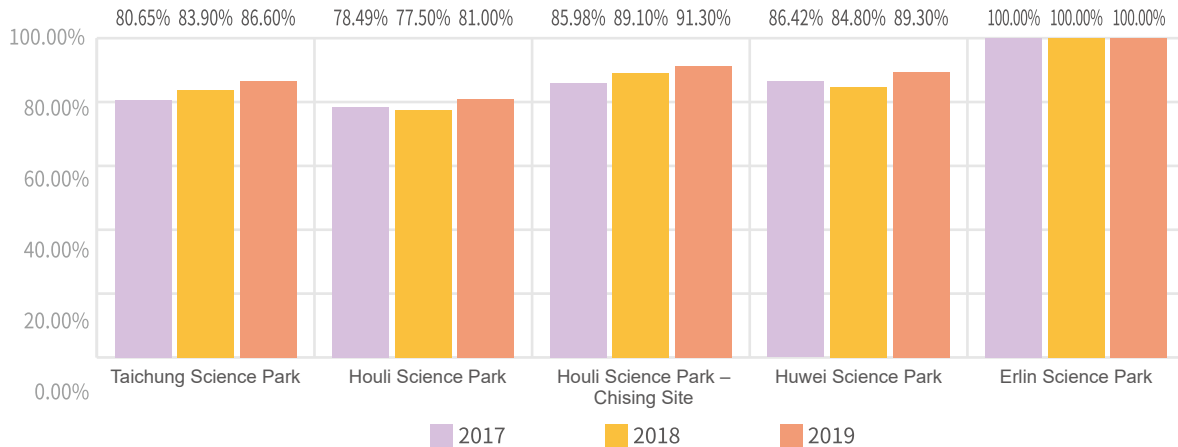


Water reclamation rate in each park			
Park /Year	2017	2018	2019
Taichung Park	80.65%	83.90%	86.60%
Houli Park	78.49%	77.50%	81.00%
Houli Park-Chising Site	85.98%	89.10%	91.30%
Huwei Park	86.42%	84.80%	89.30%
Erlin Park	100%	100%	100.00%

Note:

1. Reclamation rate (Reuse rate)= Amount of reclaimed water/(Original water withdrawal+Reclaimed water)*100
2. Chung Hsing Science Park is a new park established in 2019. It is positioned as a research and development park, and water is mostly used for people's livelihood.

Water reclamation rate in each park



Counseling of Energy Conservation in the Park

Since 2014, the Bureau has conducted field counseling on energy conservation. As of 2019, a total of 30 manufacturers have been counseled. The energy consumption of the manufacturers in the park is mainly electricity. The energy conservation potential of the counseling is 33,823 thousand kWh every year, reducing approximately 18,028 tons of CO₂e emission, with the total saving rate of 1.19%.

Encouragement of Green Buildings in the Park

Since the development of CTSP in 2004, efforts have been made in the promotion of a sustainable environment, aiming at co-existence and co-prosperity with the environment. Many achievements have been reached in the buildings within the jurisdiction of CTSP. As of 2019, 11 buildings have obtained Diamond Grade green building labels from EEWH, 5 Bronze Grade green building labels, 11 Qualified Level green building labels, 6 exempt from evaluation, 1 Diamond Grade intelligent green building, and 4 green factory labels issued by MOEA.

Among them, the planning of NEHS CTSP's school buildings stresses on the use of the existing environmental resources and creation of an ecological environment, making it the very first senior high school to obtain the Diamond Grade green building label from EEWH in central Taiwan. In addition, the building of Central Taiwan Innovation Research Park in Chung Hsing Science Park has also obtained the diamond grade intelligent green building candidate certificate, making it the first public construction building to obtain the dual diamond candidate certificate for green building and smart building at the same time.



Diamond grade intelligent green building candidate certificate for the Central Taiwan Innovation Research Park



Diamond Grade green building label for the new construction of the TSMC's FAB15 Phase 6 at CTSP



5.2.2 Stable Supply of Water and Electricity

CTSP Bureau has coordinated with the trade associations and formed the Water, Electricity and Gas Supply Committee to actively participate in the communication, coordination, suggestion and tracking of various businesses between the electricity, water and gas supply companies and the park manufacturers, aiming at providing stable energy resources for park manufacturers.

Drought Relief Measures in the Park

In recent years, Taiwan has suffered from droughts repeatedly, and water rationing has been implemented around Taiwan. To reduce the impact of water rationing on park manufacturers, we not only ask the manufacturers to cooperate with water conservation measures of collecting and storing rainwater for utilization and increase water reclamation rate during difficult times, the Bureau also actively discusses countermeasures with the trade associations in the park and Water Resources Agency of MOEA, increases the existing water storage capacity of the distribution reservoir, and coordinates the establishment of additional water intake points. At the same time, the real-time water level information is disclosed on the Bureau's official website, enabling the manufacturers in the park to get the water information in a real-time manner.

During the drought period, a drought emergency response team will be formulated and a platform for drought relief will be established, and the "CTSP drought relief and response area" will be set up to disclose real-time water information on the internet, providing water supply monitoring light signal, reservoir water storage and regular meeting minutes. Taichung Science Park and Houli Science Park have also prepared public water storage facilities (distribution reservoir and elevated water tower) and entrusted professionals for operation and management to make full use of the storage facilities and adequate water supply during drought period for manufacturers' production use. In terms of the maintenance of the water supply pipeline network in the park, we set up a catch basin flow meter for the water supply pipeline network in the park with the Fourth Branch of Taiwan Water Corporation to carry out leak detection and preventive measures to reduce losses due to water leakage.

CTSP drought relief and response area



During the drought relief period in 2019, the Bureau regularly participated in a total of 11 working conferences of the drought disaster emergency response team convened by Central Region Water Resources Office, Water Resources Agency and Ministry of Economic Affairs to fully grasp the dynamics of water conditions while cooperating with the policy to promote the advocacy of water conservation. In addition, water consumption inventory and water conservation control are also carried out for major water users in the park.



Working conference of drought relief

5.2.3 Development of Emerging Energy Resources

Green Energy Roofs Project

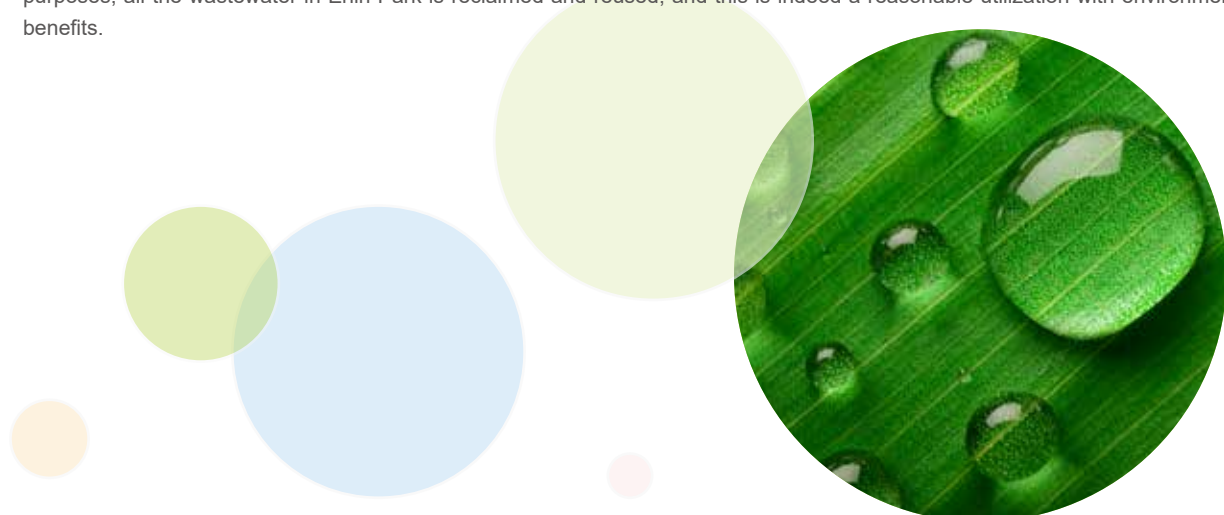
In response to the central government's "Green Energy Roofs Project", CTSP and park manufacturers jointly promote solar power generation, which not only makes good use of the existing building area of the plants in the park but also saves additional land use space, implementing the concept of co-existence and co-prosperity between the development of science park and environmental protection, jointly contributing to environmental protection on earth. In 2019, additional facilities were installed on the roofs of Mosa Industrial Corp., Chenfull International Co., Ltd., Winbond Electronics Corp., I-Chu Technology Co., Ltd., Micron Technology Taiwan and public facilities, installing solar power plants with a total of the capacity of 5.68 MW on the roofs, and as of the end of 2019, the cumulative solar power generation capacity in CTSP exceeded 40.67 MW.

Reclaimed Water Resources

In response to Taiwan's economic development, one of the 5 shortages is the shortage of water resources. It is obvious that water resources have become a key factor in Taiwan's industrial development. However, due to the limitation of geographic conditions, global climate change, socio-economic development and the rising environmental awareness, it is not easy to develop emerging water resources. The Executive Yuan has set up specific measures for "expanding resources", "conservation measures", "deployment" and "backup", and the Reclaimed Water Resources Development Act was also passed through legislation, aiming at a future with adequate water resources overall, and enabling reclaimed water a new option for industrial water use strategies.

In the initial stage of CTSP development, there were no reclaimed water resources to be utilized. In response to the development needs, it was planned to cooperate with the use of reclaimed water discharged from the Taichung City Shuinan Water Recycling Center after the quality of the effluent was improved from 2017. Although Taichung Science Park is not regulated by the EIA, and is not within the scope of mandatory use as stipulated in the Reclaimed Water Resources Development Act, for the sake of being environmentally friendly and to promote circular economy as well as to fulfill the social responsibility of sustainable development, after the active investigation and further matched potential manufacturers with water use in the park, Taichung Science Park has planned to use the reclaimed water in Shuinan Water Recycling Center. It is estimated to supply 10,000 tons of water per day from 2023.

To actively cooperate with the water resource reclamation policy, CTSP's Erlin Science Park will promote water recycling plans in accordance with "Reclaimed Water Resources Development Act" and related sub-laws. Erlin Science Park selects low-water use industries to enter the park, and plans to set up a water resource center. Wastewater from the manufacturers will be treated in the water resource center to meet the the stricter water quality standards and then be provided in the park for different purposes, including for cooling water supplementation, flushing water for toilets, road washing and cleaning, green land irrigation, secondary supplementary water, providing units with water demands to use and for other purposes (road sprinkler cooling, wastewater treatment water) that does not contact human bodies. In addition, the reclaimed water in Erlin Park can also be provided to meet the needs of relevant authorities to provide water sources for environmentally friendly purpose to suppress dust, optimizing water recycling and use, reaching the goal of promoting circular economy. With proper treatment of wastewater, proper use of non-human contact purposes, all the wastewater in Erlin Park is reclaimed and reused, and this is indeed a reasonable utilization with environmental benefits.



6

Accountability- Environmental Management Behavior

6.1 Cap Control

Special Column- Circular Economy

6.2 Environmental Monitoring



CTSP Bureau has always been untiring in environmental protection. When operating the park, guidance and inspections of air pollution, water pollution and waste are also strengthened for the compliance with relevant environmental regulations. Furthermore, each park has to comply with the EIA report and review conclusions to strive to reduce the environmental impact to the minimum and conduct regular environmental monitoring to reach the ultimate goal of not impacting on the ecology, environmental and people's lives.





Sustainable Environment and Circular CTSP

Corresponding material topics

Effluents and Waste,
Emissions (the overall emissions of the park)

Corresponding SDGs



Management Objectives and Policies

- To avoid the pollution from the operation activities of park manufacturers from exceeding the environmental load, we continue to construct the park in a spirit of “four goals of coexistence and co-prosperity” and implement relevant controls on the park manufacturers for the sake of creating a sustainable environment.
- Monitor the environmental impact in the park in accordance with the “cap control”.

Commitments and Objectives

Short-term Goals

- The overall sewage treatment rate in the park is 100%.
- Erlin Park promotes the optimization of water reclamation and reuses all the reclaimed water.
- The proper disposal rate of waste reaches 100%.

Medium- and long-term goals (3 years and more)

- We continue to provide guidance and counseling and verify the environmental compliance of the permit documents as well as the discharge water quality standards of the park manufacturers.

Responsible Units

Environment and Labor Affair Division

Resources Invested

- The Environment and Labor Affair Division is in charge of the review of different environmental protection permits, handling on-site inspection and tracking counseling, and implementing monitoring of the environmental quality.
- Establish sewage treatment plants in the parks and entrust professional organizations for the operation.

Grievance Mechanisms

Toll free line for environmental grievance: 0800-777795

Management system and assessment mechanism

- Counsel and check whether park manufacturers regularly declare air pollution fees and emissions, conduct regular inspections or implement industry-specific regulations.
- Review the park manufacturers' water pollution control measures (hereinafter referred to as water measures) plans in accordance with the prescriptions in the “Water Pollution Control Measures and Permit Application Review Management Regulations”.
- Conduct the inspections of the waste disposal plans in accordance with the “Waste Disposal Act” in an occasional manner.

Performance and adjustment

- Conducted a total of 17 sessions of EIA tracking and monitoring meetings in 2019.
- The average reuse rate of industrial waste in the science parks has reached 93.6% (recycling included) in 2019.
- There was no incident of major leakage or arbitrary dumping in 2019.
- The air pollution and sewage discharge in 2019 met the commitment value of the EIA.
- Continue to handle environmental protection petition cases in the park, and actions were taken upon receiving the petition.

▶▶ 6.1 Cap Control

CTSP Bureau has always been untiring in environmental protection. When operating the park, guidance and inspections of exhaust gas, wastewater discharge and waste disposal are also strengthened for the compliance with relevant environmental regulations. Furthermore, the development of each park has to comply with the contents of EIA report and review conclusions as well as commitments. We further require park manufacturers to make autonomous management of pollution prevention and control equipment, operation procedures and environmental protection management to become an example for other fields to follow, striving to reduce the environmental impact to the minimum and conduct regular environmental monitoring to reach the ultimate goal of not affecting the ecology, environmental and people's lives.

In addition, based on the conclusion of the review of the environmental impact report for the expansion of Taichung Science Park, the management system for the use of hazardous chemical substances confirmed by health risk assessment has been set up by referring to the spirit of the REACH (Registration, Evaluation and Authorisation of Chemicals), and key points of chemical substance control operations have been formulated. As of 2019, registration codes for a total of 111 chemicals have been issued. Furthermore, the Bureau has also established an independent chemical reporting platform online for business units to grasp the use of chemical materials of the manufacturers.

6.1.1 Environmental Management of Manufacturers

Environmental Permit Review

Central Taiwan Science Park is a park implementing the cap control. Businesses which want to enter CTSP have to submit an estimate of the total amount of pollution in the stage of investment application. After officially entering CTSP, re-application is needed if larger amount of allocation is required. The Bureau will determine whether to approve the application based on the overall amount of the park and report to the local competent authorities. According to statistics, a total of 55 applications for pollution amount allocation changes were made in 2019, and among them, 51 were approved (including those submitting the application in 2018 and being approved in 2019).

To facilitate the application for environmental protection permits of manufacturers in the park, a single-window mechanism is adopted. Since 2003, the Bureau has successively applied for the commissioning of the permit review affairs of each park to the Environmental Protection Administration to enable park manufacturers to obtain various environmental protection permits and documents required quickly.



Application to enter CTSP

Submission of total business pollution amount estimation sheet

- Stationary pollution source permit
- Proposal of measures for water pollution prevention and cure
- Proposal of industrial waste disposal
- Reuse of industrial waste
- The Bureau conducts the self-review and will review with the local competent authority (Environmental Protection Bureau) together
- The Bureau conducts the self-review and will invite experts or scholars to assist in the review when necessary
- The Bureau conducts the self-review
- The Bureau conducts the self-review and will invite experts or scholars to assist with the review



A total of 150 environmental protection application documents were received in 2019, and 138 of them were approved (including those submitting the application in 2018 and being approved in 2019)



On-site Inspection and Follow-up Counseling

After the issuance of permit, on-site inspection and follow-ups are the basic work to implement permit management and promotion of cap control. In addition to understanding whether the business units actually fulfill the contents of the permit, the blind spots of the system can be further discussed. By regulating the businesses to comply with the content of the permit with actual and feasible methods, the overall quality of the environment and the promotion of sustainability can also be facilitated.

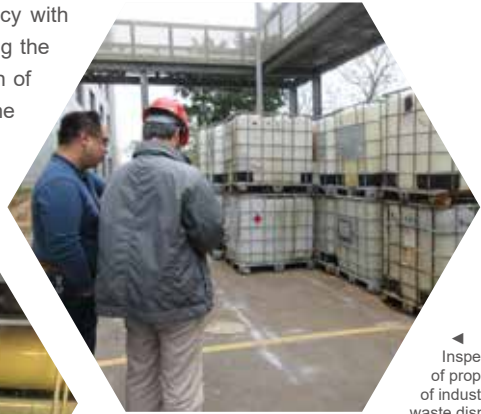
In 2019, the Bureau conducted 212 permit inspections. If any discrepancy with the permit is found after inspection, the Bureau will issue a document requesting the business to make improvement or submit relevant documents for the permission of changes. For the inspections of the waste reuse organizations, in addition to the staff of the Bureau, experts and scholars in relevant fields will also be invited to assist in the inspections to ensure the waste reuse organizations outside the park properly handle the waste generated by the park businesses to prevent any concerns of environmental pollution outside the park.



▲ Inspection of stationary pollution source permit



▲ Inspection of water pollution source permit



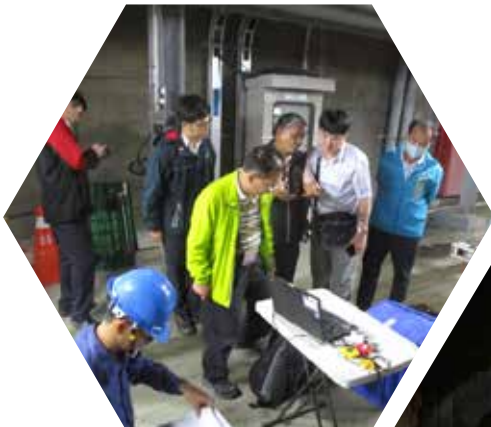
◀ Inspection of proposal of industrial waste disposal



▶ Inspection of industrial waste reuse organization by experts and scholars

On-site inspection and follow-up counseling

The Bureau conducts flue exhaust sampling test for park manufacturers at night or on holidays and monitors whether the exhaust gas emitted by park manufacturers is compliant with regulations by a qualified inspection company certified by the EPA. The test results for 2019 were all compliant with relevant regulations.



▲▶ Sampling operation for inspection of manufacturers at night.



◀▶ Sampling operation for inspection of manufacturers in the daytime.



Environmental Regulations Advocacy and Consulting Services

In response to the constant updates or amendments of various environmental related laws and regulations, the Bureau will conduct various legal promotion briefing every year from time to time to strengthen the attention of and compliance with environmental regulations. A total of 5 sessions of environmental protection regulations briefings, 1 environmental protection forum, 2 sessions of education and advocacy meeting of energy conservation and carbon reduction, 2 sessions of environmental protection related briefings and 4 sessions on-site counseling meetings for the park manufacturers were conducted in 2019.

In addition, the Bureau also provides park manufacturers with consulting services of environmental protection business. We can understand the difficulties the manufacturers face in the process operation or the preparation of environmental protection documents by having face-to-face communication or case counseling, and further assist them with solutions. A total of 972 consultation services were provided in 2019.



Briefing on key points of revision of the relevant sub-laws of Water Pollution Control Act



Environmental Protection Forum

6.1.2 Air Pollution and GHG Management

Stationary Pollution Source Control

To implement the cap control in the park, CTSP Bureau continues to implement counseling and inspection after issuing the stationary pollution source installation and operating permit. Businesses not complying with the content of the permit will be asked to improve immediately in written documents and follow-up inspection will also be carried out.

The Bureau provides counseling and inspection and at the same time assist in reviewing whether the park manufacturers declare the air pollution fee, emission declaration, regular inspection and declaration or industry-specific regulations in accordance with the prescribed schedule.

Approved emissions of the stationary pollution source operation permit					
Year	2015	2016	2017	2018	2019
Nitrogen oxides (NOx)	202.83	279.89	319.90	359.34	323.57
Sulfur dioxide (SOx)	99.61	97.66	93.85	89.02	96.11
Volatile Organic Compounds (VOCs)	334.90	377.09	362.17	389.47	383.34
Particulate matter	73.82	85.84	84.88	89.42	107.43

Note:

1. The above data of the approved air pollution emissions show the total value of each park, and the above values are lower than the values of emission commitment in the EIA documents.
2. If there are relevant control standards for the EIA, it will be handled in accordance with such commitment values in the EIA.



GHG Emission Inventory and Reduction

CTSP Bureau has gathered statistics of 2018 GHG emissions of the top 15 manufacturers in the revenue ranking list in the entire park, and the statistics are shown in the following table (statistics for 2019 had not been completed before the issuance of this Report). Among the 15 manufacturers, 5 manufacturers should be checked for their GHG emissions in the first batch (operational control rights; the base year is mainly based on the inventory of each manufacturer), and the GHG emission inventory registration operation of the entire factory for the previous year shall be completed by the end of every August as prescribed; the number of manufacturers not being the registry objects for regular inventory but entrusted a third-party to conduct the inventory was 3; the other 7 manufacturers conducted autonomous inventory.

2018 Emissions of top 15 manufacturers in the revenue ranking list in the entire park	
Number of manufacturers	15
Scope 1 (10,000 tons of CO ₂ e)	89.51
Scope 2 (10,000 tons of CO ₂ e)	479.34
Total emissions (10,000 tons of CO ₂ e)	568.85
Turnover (NTD 100 million)	6,868.34
Emission intensity (10,000 tons of CO ₂ e/ NTD 100 million)	0.083

Note:

A total of 8 companies have received external verification and 7 have not been verified. Those not being verified referred to the table of GHG emission coefficient management v. 6.0.4 released by Environmental Protection Administration for the conversion of CO₂e, and the GWP Value for Greenhouse Gas Inventory was referenced from IPCC (Intergovernmental Panel on Climate Change) 2007 AR4 Version as the calculation basis for the parameters used.

In addition, based on the EIA documents of Houli Park, the Bureau requires manufacturers stationed in Houli Park to conduct regular GHG inventory and reporting operation, and statistics of GHG inventory in Houli Park is conducted every September (statistics for 2019 had not been completed before the issuance of this Report). In Houli Park, there are only 2 manufacturers that should conduct the registry of GHG inventory in the first batch (operational control rights; the base year is mainly based on the inventory of each manufacturer), and the rest all conducted autonomous inventory.

The GHG inventory of the manufacturers in CTSP Houli Park was conducted in accordance with ISO 14064 and GHG inspection guidelines. The CO₂ emission coefficient was calculated in accordance with the IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) while the GWP value followed the regulation of the Environmental Protection Agency. The GWP (global warming potential) of IPCC 4th Assessment Report should be adopted from 2016.

CO ₂ e emission in Houli Park		
Year	2017	2018
Scope 1 (10,000 tons of CO ₂ e)	15.8	17.68
Scope 2 (10,000 tons of CO ₂ e)	73.4	89.08
Total emissions (10,000 tons of CO ₂ e)	89.2	106.76
Turnover in Houli Park (NTD 100 million)	865.07	1,332.17
Emission intensity (10,000 tons of CO ₂ e/ NTD 100 million)	0.10	0.08

The Bureau implements guidance on energy and water conservation techniques for park manufacturers to indirectly reduce the CO₂ emissions in the park every year. In 2019, we provided guidance to 3 manufacturers, and the total water conservation potential amounted to 374,855 tons/year, reducing 59.98 tons of CO₂e/annual emission potential. In addition, by providing guidance to 5 manufacturers in the park for energy conservation, the energy conservation potential totaled 33,823 thousand kWh annually, reducing approximately 18,028 tons of CO₂e emission.

2019 Carbon reduction measures in the park		
Item	Counseling of water conservation	Counseling of electricity conservation
Conservation potential	374,855 ton/year	33,823 thousand kWh/year
Carbon reduction	59.98 tons of CO ₂ e/year	18,028 tons of CO ₂ e/year
Total	18,087.98 tons of CO ₂ e/ year	

Notes:

1. According to the announcement of TWC, approximately 0.162 kg of CO₂e emission can be reduced for every ton of tap water saved.
2. Data for each plant were provided by the end of December, 2019. Calculation is made based on the electricity emission coefficient at 0.554kg CO₂e/kWh (The latest table of GHG emission coefficient management v. 6.0.4 released by Environmental Protection Administration was referenced).

6.1.3 Management of Wastewater

Management of Water Measures of the Manufacturers

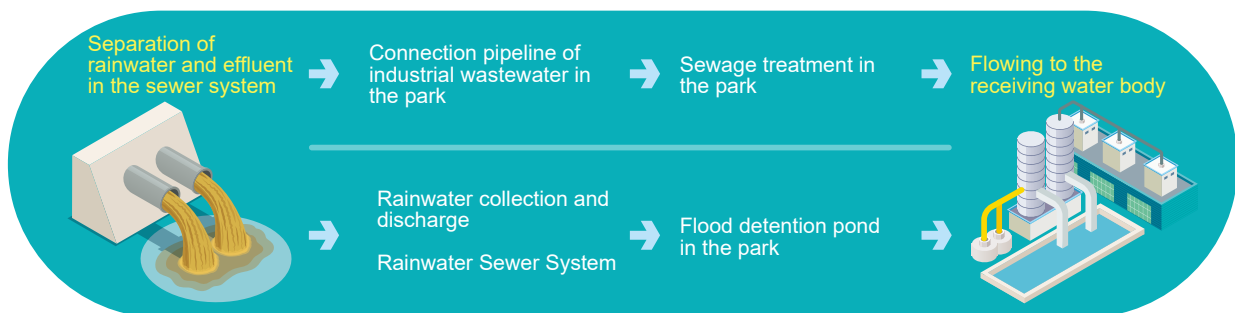
The management of water measures of manufacturers is in accordance with the “Regulation for the Use and Management of Wastewater Treatment and Sewerage System in the Science Park”. Wastewater and sewage of each manufacturer have to be pre-treated to meet the management standards before being discharged into the sewerage system in the park. In addition, for large-scale business entities in the park, CTSP Bureau would review the manufacturers’ water measures plans with the assistance of experts and scholars to ensure that the sewage pre-treatment facilities installed in the park can meet the expected benefits of water quality management standards, and guidance and inspection will be conducted on an occasional basis after the issuance of permit. According to statistics, in 2019, there were 147 companies equipped with connection pipes for wastewater treatment in Taichung Park, 16 in Houli Park-Houli Site, 1 in Houli Park-Chising Site, and 8 in Huwei Park.

2019 Allocation amount of wastewater discharge				
Unit: m ³ / day (CMD)				
Item\ Park	Taichung Science Park	Houli Park-Houli Site	Houli Park-Chising Site	Huwei Park
EIA approved cap	145,000	57,000	39,000	16,000
Approved allocation amount	141,824	23,898	20,058	4,964
Approved amount of connected pipelines	134,737	19,072	15,079	2,082



Sewerage System

The parks within the jurisdiction of the Bureau have set up a complete rainwater and sewerage system, and all wastewater of the business units entering CTSP, including domestic sewage and process wastewater, should be collected in the sewage treatment plant to be treated to meet the national effluent standards and stricter EIA standards before being discharged. The Rain Water Sewer System collects surface runoff rainwater in the park. In addition to rainwater collection in the public areas, the manufacturers have to design complete rainwater collection pipelines in the plant at the construction stage of the factory, and the rainwater inlet should be set up to be incorporated into the rainwater sewer system and then discharged to the flood detention ponds before entering the receiving water body. The Bureau also regularly arranges sampling and testing plans for the sewerage systems in the park. Through the regular test results, the operating conditions of the rainwater sewer system in the park can be understood to ensure the normal quality of water.



Sewage Treatment Process

The sewage treatment plants in the park are all of the tertiary treatment system, using the standard activated sludge biological treatment unit (for Taichung and Houli sewage treatment plants, the AO biological nitrogen removal system is used while Huwei sewage treatment plant adopts the contact aeration method). In addition, chemical coagulation and physical filtration treatment units are added to the subsequent units to improve the quality of the secondary treated water to reduce the impact on the receiving water body.

Sewage treatment process can be divided into sewage process unit and sludge process unit. Sewage from the manufacturers flows to the confluence well in the plant area and then enters the storage tank through the mechanical bar screen, after being pumped to the vortex grit chamber, it enters the adjustment tank and pH adjustment tank and finally to the aerobic or anoxic tank. Sewage flows through the aerobic tank or anoxic tank to the secondary sedimentation tank for solid-liquid separation. The upper effluent flows to the rapid mixing tank, flocculation basin, tertiary sedimentation tank and to the filter unit to further improve the quality of the discharge water, and pumps is used to get partial of the effluent for reclamation.

Except for that part of the sedimentation sludge in the secondary sedimentation tank is returned to the aerobic or anoxic tank, the remaining sludge and the tertiary sedimentation sludge are discharged to the sludge mixing tank according the set procedure, and then sludge concentration is increased by the sludge concentration unit, that is, the sludge pump is used to send the sludge to the dewatering unit. After dehydration, the sludge cake is transported outside the plant for final disposal in accordance with regulations.

100% Compliance with the Effluent Discharge Standards and EIA Commitment

The sewage treatment plants in the parks all operate in accordance with regulations and properly treat wastewater as well as control the amount and water quality of the discharged effluent. The effluent discharged from the sewage treatment plant in Taichung Science Park flows to Dadu River through a dedicated pipe, and the discharge site is located in the downstream of the tidal stream of Dadu River. The effluent from Huwei Park is discharged to Hsin Chuang Zi Main Drainage; sewage treatment plants of Houli Park- Houli site and Chising Site jointly discharge effluent to Daan River, and there is no livelihood and irrigation water intake in the downstream of the discharge site. The sewage from Erlin Park is reclaimed and reused by the manufacturer until the completion of the water resource center. Currently, there is a manufacturer stationed in Erlin Park, and sewage from that manufacturer is reclaimed and reused.

Manufacturers in Chung Hsin Park focus on the industries for research and experiment, and thus no process wastewater is produced here. Qualified treatment service providers are entrusted for the treatment and transport of wastewater from the laboratories of the manufacturers in the park, and domestic sewage is connected with the sewerage system in the park and is sent to the sewage treatment plant on Chong Cheng Road for proper treatment before being discharged. In 2019, the water quality of the discharged effluent in the parks was a lot better than the effluent standard and the stricter standards of EIA commitments. The total amount of pollution discharged is lower than the upper limit of the total amount of pollution, leaving no influential impacts on the water bodies and biodiversity.

2019 Discharge data of the sewage treatment plants in the parks				
Item/ Park	Taichung Science Park	Houli Park-Houli Site	Houli Park-Chising Site	Huwei Park
Annual effluent discharge (million liters)	30,571	4,172	2,823	354
Average daily effluent discharge (CMD)	83,757	11,429	7,734	970

2019 Discharge data of the sewage treatment plants in the parks					
Item/ Park	Taichung Science Park	Houli Park-Houli Site	Houli Park-Chising Site	Huwei Park	
BOD ₅ (mg/L)	Discharge standard	25	25	30	
	EIA commitment value	20	10 (7-day average)	20	
	Average monitoring value	3.6	2.0	2.0	2.1
COD (mg/L)	Discharge standard	80	80	100	
	EIA commitment value	80	80	60	80
	Average monitoring value	29.3	27.8	32.9	25.0
SS (mg/L)	Discharge standard	25	25	30	
	EIA commitment value	20	10 (7-day average)	10	20
	Average monitoring value	3.4	4.2	1.9	1.9



6.1.4 Waste Management and Recycling

Treatment of Industrial Waste in the Park

In terms of the treatment of industrial waste in the parks under the jurisdiction of the Bureau, the general industrial waste is mainly processed by public or private waste clearance and disposal organizations or recycled and reused in accordance with the "Waste Disposal Act"; hazardous industrial waste is transported to the industrial treatment center guided by the MOEA or a public or private Class A disposal organization to be treated or reused in accordance with relevant regulations.

After the waste clearance and disposal plan permit is obtained, the business has to report the information of output of waste and storage situation. The Bureau will also conduct inspections of waste clearance and disposal proposals from time to time to review whether the businesses have any omissions or inconsistencies in the declaration. Furthermore, inspections are also made to check whether waste cleared and transported at the business end has obtained the proper disposal documents certified by the disposal agency to ensure that there is no arbitrary dumping after the waste leaves the factories.

The waste disposal volume of the parks under the jurisdiction of CTSP over the past 3 years is shown in the table below. Waste generated is mainly general industrial waste. Hazardous industrial waste of the manufacturers handled abroad is in compliance with the Basel Convention. In 2019, the total volume of hazardous industrial waste treated abroad totaled 2.528 tons, accounting for 0.0019% of the treatment ratio. The cadmium-containing batteries are transported to South Korea and Japan for proper disposal.

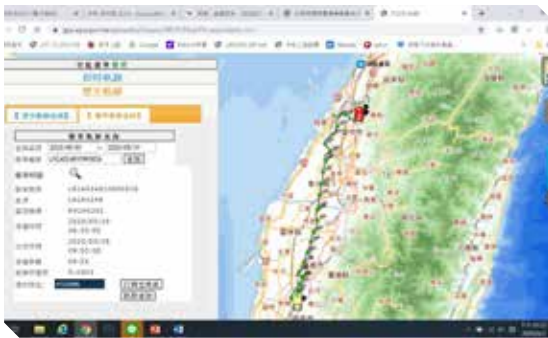
Waste disposal volume over the past 3 years							
							Unit: ton
Category	Method	2017		2018		2019	
		Quantity	Total	Quantity	Total	Quantity	Total
General industrial waste	Recycling and reuse	146,379.71		163,457.24		165,149.94	
	Incineration	10,170.80		8,722.55		10,050.86	
	Landfill	2,253.06	164,156.73	6,000.37	184,008.07	2,425.42	179,298.97
	Other processing methods (Biological, solidification, stabilization, etc.)	5,353.16		5,827.91		1,672.75	
Hazardous industrial waste	Recycling and reuse	114,875.27		123,481.53		125,971.06	
	Incineration	4,944.69		4,961.46		5,284.5	
	Other processing methods (Biological, solidification, stabilization, etc.)	152.90	119,976.28	291.37	128,734.36	481.21	131,739.30
	Processed abroad	3.42		0		2.528	

Note:

In 2019, the total volume of hazardous industrial waste treated abroad totaled 2.528 tons, and the treatment ratio was 0.0019%. Mercury lamps were transported (including mercury containing waste lighting sources, such as lamps and bulbs) to Japan for proper disposal while cadmium-containing batteries to South Korea and Japan for proper disposal, which is exactly compliant with the Basel Convention.

Sludge Recovery in the Sewage Treatment Plant

In addition to entrusting qualified agencies for clearance and disposal of sludge generated in the sewage treatment plants in the parks under the jurisdiction of the Bureau, the treatment plants also declared the sludge generated on the EPA website in accordance with the control regulations of EPA. The triplicate form for removal and disposal is issued when the sludge leaves the plant, and the transport vehicle is also equipped with a GPS tracking system to know where the sludge is transported to, and proper treatment certificate will be issued by qualified treatment agencies. In addition, the sewage treatment plant of the Bureau will also follow the transport vehicle from time to time to make sure and grasp the trajectory data to make sure that the sludge is indeed cleared and transported to the entrusted qualified treatment organization.



GPS vehicle trajectory record (Houli)



Follow the sludge removal vehicle of the sewage treatment plant (Houli)

The clearance and disposal of the sludge generated in the sewage treatment plants in the parks of CTSP are handled by qualified cleaning and disposal institutions in accordance with relevant regulations in the Waste Disposal Act. After being removed and transported to the disposal agency, the sludge cake is physically and thermally treated. Then it is made into admixture to be reused in the raw materials for red bricks, cement products, aggregates, non-structural concrete products, brick products and so on.



Special Column - Circular Economy

In recent years, the Bureau has actively assisted and guided park manufacturers to conduct waste reduction and reuse, and we also organize the selection and recognition of excellent units for waste reduction and resources recycling, aiming at substantially assisting park manufacturers to reduce the output of end-of-the-waste. We provide suggestions on source reduction and waste reuse technology to increase the waste recycling rate, gradually turning CTSP into an ecological park with “resource recycling”. In 2019, 3 excellent manufacturers with waste reduction and resources recycling and 3 excellent personnel were selected and commended, and the excellent manufacturers were also invited for experience sharing.

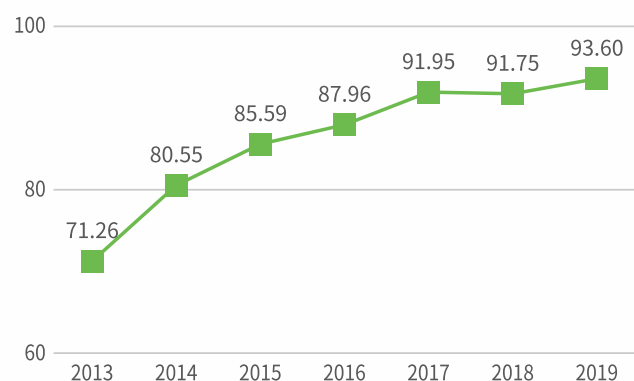
The results of the promotion can be divided into two major pillars, continuous promotion of waste recycling among manufacturers and tracking and counseling waste reuse organizations, and both are detailed as follows.

1. Continuous promotion of waste recycling among manufacturers

To reach the goal of “zero waste” of resource recycling, the Bureau continues to promote source reduction and encourages as well as counsels park manufacturers to apply for reuse. After receiving the application for reuse resources from manufacturers, the written review is conducted in accordance with the “Management Regulations for Reuse of Industrial Waste in Science Parks”, and experts and scholars are also invited to conduct an on-site review, and the reuse organization shall make revision based on the review opinions and the application can only be approved upon confirmation of the committee members. In 2019, a total of 5 reuse application were approved. In terms of the approved items, 2 applied for the reuse of waste isopropanol, 1 for waste sulfuric acid, 1 for hydrofluoric acid waste liquid, and 1 for ammonium sulphate waste liquid. In 2019, the total reuse amount declared by the reuse organizations amounted to approximately 20,578.48 tons. In recent years, the waste reuse rate (including recycling) within the Bureau’s jurisdiction has increased from 71.26% to 93.6% in 2019.

In terms of strengthening publicity, a total of 82 sessions of waste inspection and source reduction publicity were completed, and 1 session of reuse technology and regulation promotion advocacy was also conducted. Furthermore, to strengthen the resource recycling market mechanism, the total amount of environmental products of the Bureau purchased amounted to NTD 2,243,576 in total, accounting for 100% of the purchase amount.

Reuse rate of industrial waste (including recycling)



2. Tracking and counseling waste reuse organizations

After the Bureau approved the application for waste reuse, we will conduct regular review of the waste reuse organization, and experts as well as scholars are also invited to conduct the tracking and counseling work. We hope that the experts and scholars can provide advice on deficiencies or improvement of process based on their expertise in relevant fields and guide the waste reuse organizations to reduce violations of environmental protection laws or avoid from being reported so that the industrial waste reuse in the park is safe and secure. In 2019, a total of 15 counseling inspections for the waste reuse organizations were conducted to make sure that the approved cases for waste reuse indeed implement the waste reuse operations in accordance with relevant regulations.



Waste reuse technology advocacy briefing



On-site survey review of waste reuse application



Follow-up counseling provided by experts and scholars to waste reuse organizations

▶ 6.2 Environmental Monitoring

Environmental Monitoring and Tracking Committee

Pursuant to the Environmental Impact Assessment Act, the industry competent authority members shall track the implementation status of environmental impact documents. Therefore, the MOST established the Environmental Impact Assessment Tracking Team for the development behavior of the science parks (hereinafter referred to as the EIA Tracking Team), which is composed of experts, scholars and representatives of manufacturers and agencies. In 2019, 1 tracking meeting was implemented in the Bureau.

To strengthen the monitoring of the EIA review results of the development plan of Houli Park (Houli site), Environmental Protection Administration, Executive Yuan (hereinafter referred to as EPA) established the Supervision Team of the EIA Review results of the Houli Site Development Plan in 2006 (hereinafter referred to as the Supervision Team of EIA Review Results). The supervisory committee was composed of EPA's Bureau of Environmental Inspection, experts, scholars, non-governmental organizations and residents, and on-site inspections were conducted before the supervision meeting.

Before the development of CTSP, the environmental impact statements were all submitted for review, followed by the EIA briefing sessions in accordance with the law for active communication with all sectors. After the review was passed, EIA documents and commitments were followed. Houli and Erlin Parks established the Environmental Protection Supervision Group (hereinafter referred to as EPS Team) in accordance with the commitments. In 2011, Taichung Science Park organized the "Second Seminar on the environmental impacts of the 1st and 2nd stage of CTSP" development in the former Environmental Protection Bureau of Taichung County and promised to set up the EPS Team in the seminar. Taichung, Houli and Erlin Parks all invited experts and scholars, representatives of the company, representatives of the community and representatives of relevant groups to form the EPS Team in accordance with the Regulations for the Establishment of Environmental Environment Protection Supervision, with a total of 17 experts and scholars from environmental Engineering, water conservation and health risk and other fields, coupled with 13 NGO representatives, 24 local village chiefs, 4 representatives of local competent authorities, 4 manufacturer representatives, and 62 external committee members to improve the extensive participation in environmental supervision, hold supervision meetings regularly to continue the tracking of the park development status.

2019 EIA Inspections and tracking of CTSP development projects and supervision meetings

Organizer	Category	Name of Meeting	Times
Environmental Protection Administration	EIA Monitoring On-site inspection	EIA monitoring and on-site inspections of the environmental impact statements of the development projects in the parks	3
	EIA Monitoring	"Supervision Team meeting of the EIA Review results of the Houli Site Development Plan for the development plan of Houli Park (Houli site) at CTSP"	2
MOST	EIA tracking	Meeting of the "Environmental Impact Assessment Tracking Team for the development behavior of the science parks"	1
CTSP Bureau	EIA Monitoring	Meeting of the "Environmental Protection Supervision Group of Taichung Park at CTSP"	5
	EIA Monitoring	Meeting of "Environmental Protection Supervision Group of Houli Park (Houli site and Chising Site) at CTSP"	4
	EIA Monitoring	Meeting of "Environmental Protection Supervision Group of Erlin Park at CTSP"	2
Total			17



The 50th meeting of EPA's Bureau of "Environmental Inspection's Supervision Team of the EIA Review results of the Houli Site Development Plan in the Phase 3 Development Area (Houli site-Houli Farm) at CTSP"



MOST's Environmental Impact Assessment Tracking Team – On-site inspection at Chung Hsin Park

Handling Environmental Protection Petition Cases

CTSP Bureau has set up a toll-free petition hotline 0800-777795, providing dedicated staff to answer phone calls 24 hours a day and to go to the site for on-site inspections and processing operations. In 2019, we have received 20 petitions in total, including 9 petition cases on air pollution, 10 on noise and 1 on waste. These petitions were immediately handled when we received them. All the petition cases in 2019 have been closed.

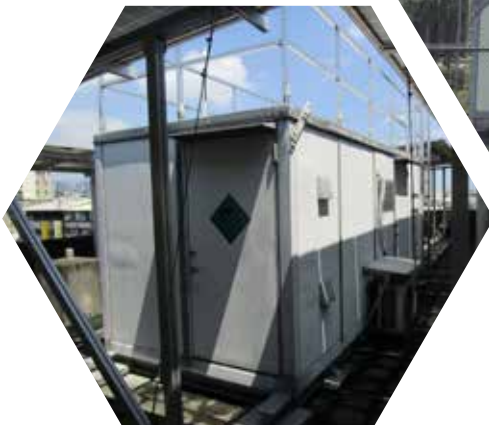
6.2.1 Monitoring of Environmental Quality

To effectively prevent pollution emissions to reduce the environmental impact of park operations to the minimum, CTSP Bureau conducts various environment monitoring based on the environmental monitoring plans in the EIA documents, including air quality, noise and vibration, quality of discharged effluent, surface water quality, groundwater quality, sediment, soil, ecology, traffic volume and cultural assets, and a total of 2,131 items of environmental monitoring projects were carried out in 2019. The environmental monitoring results of the Bureau are disclosed on the CTSP Environmental Protection Information Integration Network for the public to refer to in an open and transparent manner.

To understand the current status of various environmental factors other than those in EIA documents, the Bureau added some supplementary monitoring items in 2019, including air quality, noise and vibration, quality of discharged effluent, surface water quality and groundwater quality, and a total of 1,069 environmental monitoring items were carried out.

CTSP
Environmental
information
integration website

▼ Air quality monitoring-
Photochemical Assessment
Monitoring Stations in Taichung
Science Park



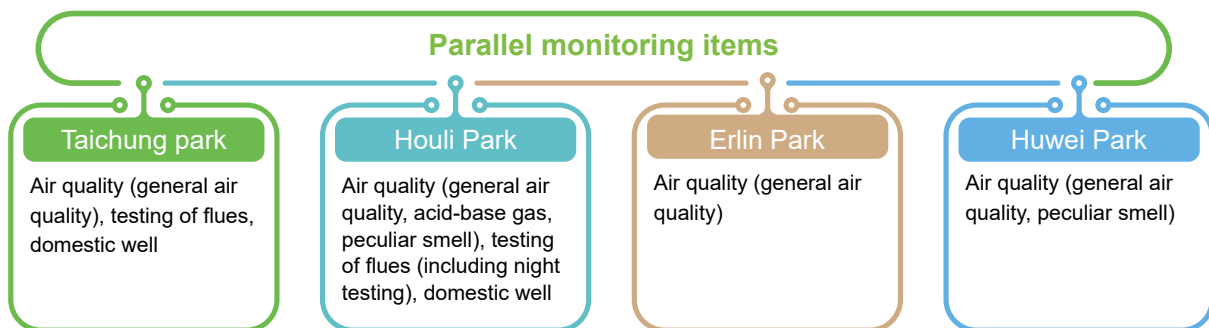
▲ Air quality monitoring-
Houli Park- Chising
Site-General air quality
monitoring station



▲ Noise and vibration



In addition, to improve the credibility of the data, the Bureau also planned parallel monitoring in 2019, including the items of general air quality, acid-base gas, peculiar smell, testing of flues (including night testing), domestic well and so on for synchronous inspection carried out from time to time to ensure the quality of the monitoring data. On May 16 and October 16, 2019, the Bureau arranged and worked with the Environmental Protection Supervision Group members (local village chiefs) to carry out the night-time testing of flues to understand the status of night-time emissions, and no abnormality was found from the test results. We hope to truly understand the impact of the park operations on the environment through inspections on an occasional basis.





6.2.2 Ecological Survey

Although the purpose of the development of the science park is for production, maintaining the ecology of the park is also one of the unswerving principles of the Bureau. The greening of each park is not only for aesthetics, biodiversity and species adaptability are also put into consideration. We retain more environment suitable for the growth and habitat of more animals and plants in the detention basin ecological park, constructing an eco-friendly science park.

In accordance with the EIA commitment, the Bureau regularly conducts ecological survey in the parks (Taichung, Houli, Erlin and Chung Hsin Parks).

Terrestrial ecology

Birds

Generally speaking, the number of species would be higher in autumn and winter and lower in spring and summer. This is because of Taiwan's proximity to the tropics, and it attracts migratory birds from northern countries to come to spend winter, and the number is larger than the summer migratory birds coming to breed here. In addition, some of the resident birds have the habit of altitudinal migration, therefore, the total number of birds in autumn and winter is mostly higher than in other seasons.

Protected Species

Found in	Name	
Taichung Park	Level 2 Protected species: <i>Acridotheres cristatellus</i> , <i>Elanus caeruleus</i> , <i>Accipiter virgatus</i> and <i>Otus bakkamoena</i> Level 3 Protected species: <i>Lanius cristatus</i>	
	Expansion land Level 2 Protected species: <i>Otus bakkamoena</i> and <i>Accipiter virgatus</i> Level 3 Protected species: <i>Lanius cristatus</i>	
Houli Park	Level 3 Protected species: <i>Lanius cristatus</i> is found in Houli and Chising Farms	The black-winged kite (<i>Elanus caeruleus</i>)
Erlin Park	Level 2 Protected species: <i>Elanus caeruleus</i> , <i>Pernis ptilorhynchus</i> , <i>Spilornis cheela</i> , <i>Accipiter trivirgatus</i> , <i>Buteo japonicus</i> , <i>Rostratula benghalensis</i> , <i>Falco tinnunculus</i> , <i>Falco peregrinus</i> Level 3 Protected species: <i>Glareola maldivarum</i> , <i>Lanius cristatus</i>	
Chung Hsin Park	Level 2 Protected species: <i>Accipiter trivirgatus</i> , <i>Accipiter virgatus</i> , <i>Spilornis cheela</i> , <i>Butastur indicus</i> , <i>Otus bakkamoena</i> , <i>Otus spilocephalus</i> Level 3 Protected species: Level 3 Protected species	The brown shrike (<i>Lanius cristatus</i>)

Amphibians and reptiles

The surrounding environment of the park is mostly grassland and agricultural land. Therefore, the species recorded are common species. According to the record of the number of species in the past, the largest number of species occurs in spring and summer. Amphibians and reptiles reproduce in spring and summer, and this is the normal seasonal changes.

Taiwan endemic species

Found in	Category	Name
Chung Hsin Park	Amphibians	<i>Bufo bankorensis</i> , <i>Kurixalus idiotocus</i> , <i>Zhangixalus moltrechti</i> , <i>Polypedates braueri</i>
1. Taichung Park	Reptiles	1. <i>Diploderma swinhonis</i>
2. Erlin Park		2. <i>Diploderma swinhonis</i> , <i>Takydromus stejnegeri</i>
3. Chung Hsin Park		3. <i>Japalura swinhonis</i> , <i>Takydromus stejnegeri</i>

Aquatic Ecology

The monitoring locations are the dedicated pipe outlet of Houli Park and the downstream of the sewage discharge outlet of Chung Hsin Park. The monitoring items include fish, benthic organisms, aquatic insects, and zooplankton and phytoplankton. According to the monitoring results in 2019, the most common fishes are *Barbonymus gonionotus*, *Chelon subviridis*, *Mugil cephalus*, hybrid of *Oreochromis niloticus*, hybrid of *Cromeria nilotica*, *Opsariichthys pachycephalus*, and *Acrossocheilus paradoxus*; shrimps, crabs and shellfish include *Pomacea canaliculata* and *Periophthalmini*; benthic organisms include *Varuna litterata*, *Chiromantes dehaani*, *Macrobrachium formosense*, *Nitzschia*, *Naviculaceae*, *Macrobrachium nipponense* and *Physa acuta*; the aquatic insects recorded are *Gerridae*, *Chironomidae* and *Corydalidae*.

Taiwan endemic species		
Found in	Category	Names
Houli Park	Fish	<i>Acrossocheilus paradoxus</i> , <i>Spinibarbus hollandi</i> , <i>Opsariichthys pachycephalus</i> , <i>Candidia barbata</i> and <i>Rhinogobius candidianus</i>
Chung Hsin Park	Fish	<i>Zacco barbata</i>

Eco-friendly countermeasure- Artificial Nest Boxes

In accordance with the EIA commitments, the Bureau has set up 10 nest boxes in total in Guang Fu Elementary School (Chung Hsing New Village), Guangrong Elementary School, Guanghua Elementary School, Education Center and Hushan Farm. In 2019, in addition to the records of the inhabiting of *Hemidactylus frenatus*, Formosan Giant Flying Squirrel was found in 2 locations, and the protected bird, *Otus bakkamoena*, was observed in the nest box, and the hatching was recorded. In addition, the Bureau also set up 13 nest boxes in Huwei Sewage Treatment Plant and Guangfu Elementary School (Huwei Township), mainly provided for bat breeding, winter sleep and general inhabitation. Furthermore, cases of use by creatures were also observed, including *Hemidactylus frenatus*, *Erthesina fullo*, *Heteropoda venatoria* and *Polypedates megacephalus*.



Otus bakkamoena and the egg in the nest box



Otus bakkamoena in the nest box



7

Safeguarding for the Realization of a Better Future

7.1 Park Construction

7.2 Local Life

7.3 Community Participation, Giving Back to the Local Place

7.4 Future Prospects

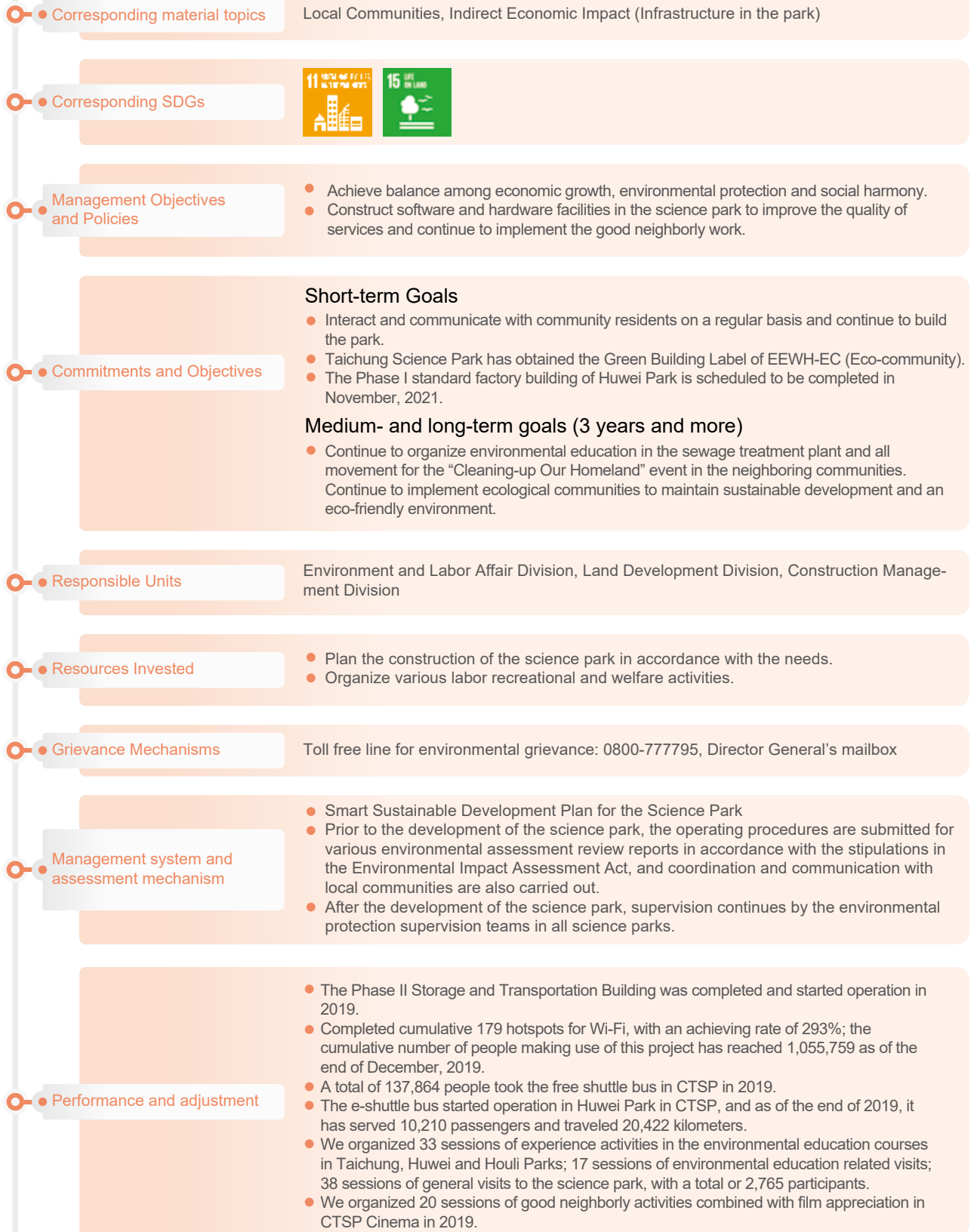


To maintain the ecology in the science park for the construction of an eco-friendly park with the concept of co-existence and co-prosperity, the Bureau regularly conducts ecological survey every year in the science parks within CTSP and cooperates with the ecological park of the flood detention pond, which not only preserves more animals and plants suitable to grow and stay in the environment locally, but also creates a leisure and recreational space for the community residents.





Co-existence and Co-prosperity to Safeguard CTSP





▶▶ 7.1 Park Construction

To facilitate the rational use of land, avoid disasters caused by the development of the land and implement the concept of conservation and sustainability of water and soil resources, Taichung science Park signed the MOU with the Soil and Water Conservation Bureau in 2017 for the first large-scale development of the soil and water conservation demonstration area. The safety of water and soil conservation on the hillside has been put into consideration in the development of the park, and the design and construction of ecological engineering methods are combined. Meanwhile, considering the leisure needs of the residents in the surrounding areas and the employees in the park, the flood detention ponds were designed as a recreational sports park with the landscape of ecological wetland. Currently, there are 10 large flood detention ponds in Taichung Science Park, with an area of 52 hectares. The flood detention capacity exceeds the required standard of the 50-year flood frequency design, which largely increases the protection standard to the 200-year flood frequency, providing strict protection of the park and downstream areas.

CTSP Bureau continues to carry out related construction of the park, and the construction projects in 2019 are as follows.

The commencement of the Phase II Storage and Transportation Building

The Phase II Storage and Transportation Building was completed and commenced in March, 2019. The area for storage and transportation increased by approximately 7,200 pings, and the total space for logistics storage and transportation amounted to approximately 16,000 pings, providing warehousing, import and export warehouses, customs declaration, transportation, logistics integration planning and other services, enabling the park manufacturers to handle these affairs nearby, which helps improve the operational efficiency.



Establishment of iBike stations in Taichung Science Park

After 4 years of striving, the 3 iBike stations in Taichung Science Park, located at the CTSP Bureau on Zhongke Rd. side, in front of the CTSP standard factory buildings, and in front of Giant Operation and R&D Headquarters were officially commenced in 2019. On April 2, we held the "LOHAS CTSP: Let's Join the Fun of iBike Riding" event and the founder of Giant Group, the key person behind the establishment of the iBike stations, Mr. KingLiu, was invited to participate in the commencement ceremony. Publicity was also implemented to invite the public to make more use of the iBike at CTSP and experience many beautiful scenic spots in the science park, and they can also get to know the science park full of joy and fun.





Huwei Standard Factory Building starts the era of energy saving green buildings

The groundbreaking ceremony for the first phase of Huwei Standard Factory Building was conducted on December 9, 2019, and it is scheduled to be divided into two phases. After it is opened to the manufacturers, the estimated output value can reach NTD 2.6 billion. The first phase of the standard factory building in Huwei Science Park is expected to be completed in November, 2021. The building adopts green building design that complies with the four indicators of ecology, energy, waste reduction and health.



CTSP Huwei Police Branch officially stations in the new office building

To meet the needs of the police services and science park development, we organized the contracted the construction of the "Huwei Police Branch Office Building Construction and Interior Renovation Project" and on July 29, 2019, the Huwei Police Branch officially entered the new office building to provide public security and transportation services to improve the quality of services in the science park.



▶▶ 7.2 Local Life

7.2.1 Digital Services

Free Wi-Fi in the Science Park

To work in line with the MOST's overall plan of "Using ICT Technology for the Development of Smart Park Project", the Bureau scheduled a work project for the deployment of WiFi hotspots in public space within CTSP (including Taichung, Houli, Chising, Chung Hsin, Erlin and Huwei Science Parks), providing convenient free Wi-Fi access to park manufacturers, visitors, and employees.

The project was originally planned to set up 60 hotspots in 2016, and the goal was to reach more than 200,000 users in 2017 (more than 600,000 users in 3 years). As of December, 2019, the number of the Wi-Fi hotspots completed reached 179, with the achievement rate of 293% since the implementation of this project. The cumulative number of users reached approximately 1.055759 million (calculated from December in 2016 to the end of December in 2019).

Business Service Platform Website

As of the end of December, 2019, a total of 32 manufacturers have stationed in the Bureau's Industrial and Commercial Service Building, with an occupancy rate of 100%. In addition to providing financial, medical, employment, postal, transportation, catering and other related services, law firms and accounting firms are also introduced into the science park to strengthen the operational efficiency of industrial and commercial services. Furthermore, in order to enhance the industrial and commercial service information in the science parks, the Bureau established a Business Service Platform Website on our webpage, and the platform is equipped with 3 major functions, including mobile APP download, industrial and commercial information and related links.

1. Mobile APP download: Linked with the Apps of the latest and most popular catering (including delivery), transportation services and online banking services to reach the goal of replacing physical channels with online services.
2. Industrial and commercial information: Searching and collecting the information of the major industrial and commercial service industries, including industrial and commercial administration, living and catering, education of middle and primary schools and popular stores in the surrounding areas. Considering the convenience of the users' mobility, responsive web design (RWD) is used so that users can directly operate on their mobile devices, including making phone calls, navigating, searching for business hours and online reviews.
3. Related links include links to the webpage of Labor Affairs Bureau of Taichung City Government, the Allied Association for Science Park Industries, Compass Magazine and so on.



Platform website designed for smartphones



QR Code for Business Service Platform



An Art Tour at CTSP- Surround View Digital Guide System

Every inch of land at CTSP is managed by our staff with the purpose of design and aesthetics to create diverse beauty. Since the initiation of Public Art Installation Project in 2009, a total of 8 large-scale artworks featured with local characteristics and field spirits have been completed in Taichung Science Park. Two more landmark artworks are expected to be completed in Houli Science Park by Q2 in 2020.

To enable more people to appreciate the beautiful scenery of the science park, CTSP will further integrate the public artworks, creation concepts personally explained by the artists, aerial videos of the park's characteristic landscape, green beautification results and characteristics field buildings such as NEHS CTSP (Diamond Grade Green Building) and AI Robotics Hub and other materials with aesthetics into the content of Art Tour at CTSP- Surround View Digital Guide System to promote the results of the park business with technology.

With the virtual reality (VR) function of this 3D surround view digital guide system, the public can scan the QR Code through the internet or directly with their cell phones to appreciate the public art creation at CTSP and beautiful scenery as well as the internal space and on-site equipment in many places with characteristics as if they were really appreciating these places and artworks in person without the restriction of weather, time and space. The guide system also provides a smart map tour recommendation services, assisting the public with the planning of the route they are going to visit. Science park visitors can make use of the function of the interactive screen to operate the 3D 360-degree surround view and listen to the artists sharing their creation ideas.



Interface of the guide system



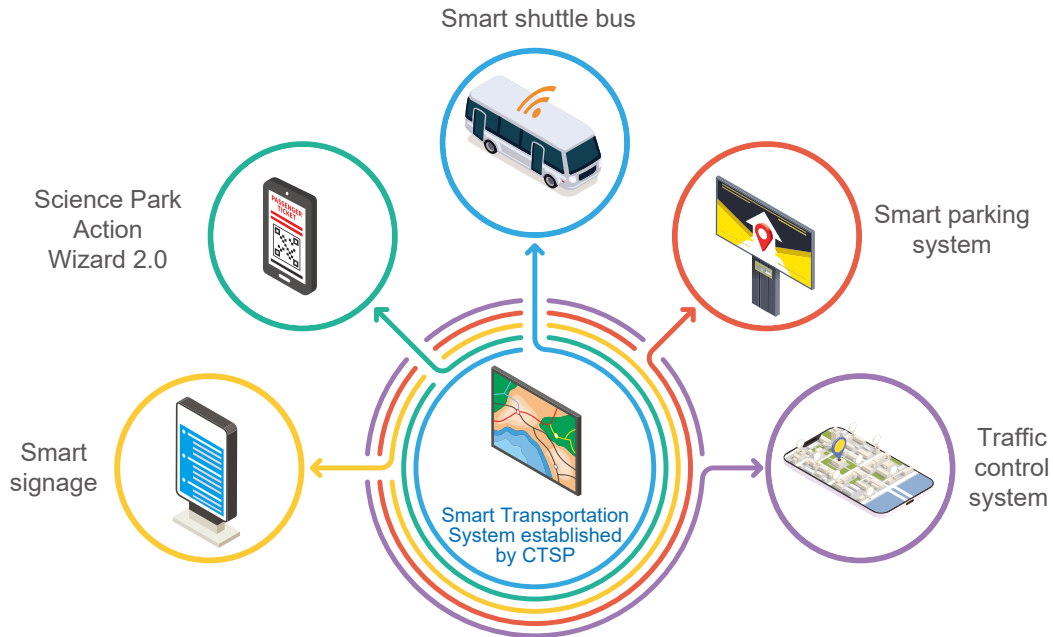
QR Code of Art Tour at CTSP

Science Park Customs Clearance e- Netcom System

The new custom clearance system for the import and export of customs clearance goods in the science park is online now. This further enhances the convenience and precision of park business to grasp the information of customs clearance. The message is transmitted in 3-in-1 format with the active message transmission module and the customs clearance system, constructing highly electronized science park service operations.

7.2.2 Smart Transportation System

CTSP Bureau has developed a smart transportation system in the science park with the management systems of traffic information, public transportation and parking, and the results are as follows.



Smart traffic information management system

- Establish the Science Park Intelligent Transportation Convenient Information System
- Establish Science Park Action Wizard 2.0



- QR code to download "Science Park Action Wizard 2.0"

- Provide the science park traffic information through the website and APP.
- The real-time traffic conditions can be viewed through the video surveillance system so as to make proper traffic management strategies to improve management efficiency.
- Push and broadcast information of real-time traffic conditions for pedestrians.
- As of December 2019, Science Park Action Wizard 2.0 has more than 46,000 downloads.

Smart science park shuttle bus and e-shuttle bus

- Establish a wireless communication network environment
- Provide satellite positioning information of vehicles
- Provide Demand Responsive Transit System (DRTS)
- Provide e-shuttle bus services

- Free Wi-Fi on board, at the station and at the bus shelter, enabling uninterrupted mobile network.
- Public vehicle positioning information enables passengers to check the dynamic information of the shuttle bus online or through the APP.
- Schedule flexible routes and departure time to ensure the supply of services meets the users' needs and improve the efficiency of the public transportation during off-peak hours, reaching the effect of Door to Door transport, connecting the last mile for the users.
- In 2019, the number of passengers using CTSP shuttle bus amounted to 137,864, equivalent to the reduction of 137 tones of CO₂e emissions.
- E-shuttle buses do not emit CO₂ at all. It is a mobile vehicle with zero-emission, reducing 2,900 kg of CO₂e emissions every 10,000 km compared with gasoline vehicles.



Smart bus shelter

- Establish a dynamic information system for buses
- Establish a wireless communication network environment
- Set up the smart signage to provide the estimated arrival time of the science park shuttle buses and city buses to reduce the uncertainty and anxiety while waiting for the bus.
- Provide WI-FI services and wireless broadband internet access so that passengers waiting for the bus can surf the Internet.

Smart parking lot

- Establish a license plate recognition system
- Establish a parking space detection system
- Establish an automatic payment system
- License plate identification is used when entering the parking lot, and there is no need for ticket cards.
- The identification lamps are provided above the parking space to show whether the space is occupied or empty to reduce the time spend and exhaust gas generated by the vehicle while looking for a parking space.
- The self-service payment system also provides a car-finding system, providing information of the location where the car is parked.

▶▶ 7.3 Community Participation, Giving Back to the Local Place

Good Neighborly Relations- Friendly Neighborhood

To enable the local people to know more about the science park, the Bureau organizes good neighborly exchange visits in Taichung, Houli, Huwei, Erlin and Chung Hsin Science Parks to enhance exchanges between the park manufacturers and the neighboring communities. In 2019, various labor recreational and welfare activities were held, including 20 sessions of film appreciation at CTSP Cinema, the 3x3 basketball competition in Huwei Science Park, CTSP Softball Tournament and so on, promoting the physical and mental health of employees in the science park through these activities.



CTSP Softball Tournament



In 2019, the “Cleaning-up Our Homeland” event was organized, and park manufacturers, village chiefs and local residents were all invited to participate in the events of environmental clean-ups and beach clean-ups to work together and set an example for others to follow. In addition, to maximize the benefits of the Good Neighbor Programs, the clean-ups are always organized with the efforts in the contents such as recycling, greenification, energy conservation and carbon reduction, environmental education and even special folk activities on special holidays to attract more participants, making CTSP a good neighbor working with everyone in the surroundings. In 2019, a total of 7 events were held, with approximately 700 participants.



Group photo of the Cleaning-up Our Homeland Event

▼ 2019 Da'an Beach Cleanup Event





Health Risk Assessment and Epidemiological Survey

The Bureau makes health risk assessment of the science park in accordance with the four major assessment steps in the “Technical Guideline of Health Risk Assessment” proclaimed by the EPA. As of 2019, 4 health risk assessments have been carried out in Taichung Science Park, 4 assessment of Houli-Chising Science Park, and 1 of Erlin Science Park. Considering the operating needs of park manufacturers, 1 health risk assessment was carried out in Taichung Science Park and 1 in Chising Science Park due to the introduction of new manufacturers in 2020, and the changes of the EIA of the two science parks were made in accordance with Environmental Impact Assessment Act.

To take care of the community residents, the “Good Neighbors Health Care Project” in Cising Science Park has been carried out in Houli District and Da’an District since 2011, providing eligible residents with health checkups. In 2019, 39 sessions of advocacy were conducted, 626 phone interviews were made and 546 people received the health checkups. From 2011 to 2019, a total of 232 publicity sessions were held, 4,917 phone interviews were made and 3,406 health checkups were conducted.

In addition, after the operation of Cising Science Park, the epidemiological follow-up survey is conducted every 5 years. According to the second phase of EIA commitment of Cising Science Park, one additional survey was conducted in 2019, and the survey results would be tracked and compared with previous epidemiology. So far, the cumulative number of questionnaires surveyed and biochemical tests conducted was 1,453.



The implementation of the Good Neighbors Health Care Project

Mutual Help and Protection- Water Environment Patrol Team

Being invited by the Environmental Protection Bureau of Yulin County, CTSP Bureau established the “Water Environment Patrol Team” at Huwei Sewage Treatment Plant in Huwei Science Park. In addition to providing professional environmental protection knowledge, experience and technologies, there is also a patrol team to guard the waters in the neighborhood to effectively grasp the changing trends of water quality in the rivers and water volume. Through the gradual accumulation of local river inspection experience, the patrol members’ environmental sensitivity can be enhanced. Any subtle changes in the river can be detected and notified immediately to curb illegal discharge or dumping by the industries and public, demonstrating the effect of close and good neighborly relations.

Environmental Education and Guided Tours

The Sewage Treatment Plant of the Taichung Science Park passed the EPA’s certification of Environmental Education Facilities in July, 2018. The certified course is on the “Concept of Water Resources” and “Treatment Process and Principle of a Sewage Treatment Plant” for elementary schoolchildren (5th-6th graders). Through lectures, games, models and life-like experiences, students participating in the course activities can understand the importance of water conservation, the process of sewage treatment and the role of the plants, leading students the right direction to think and conveying the functions of environmental protection and education of the sewage treatment plant. In 2019, we organized 17 sessions of the environmental education course experience events, 17 sessions of environmental education related visits and 22 sessions of general science park visits, and the total number of participants amounted to 1,627, effectively promoting the environmental education of water resources and the functions of environmental protection facilities in the sewage treatment plant. Furthermore, we also actively participate in related activities for the promotion of environmental education with our partners in the neighborhood. On January 17, we set up an environmental education experience booth for the Tai An Elementary School Science Play Day; on April 22, we set up an environmental education booth at the 422 Earth Day- Breathing with the Wild Forest Event held by the Environmental Protection Bureau of Taichung City; on September 7, we participated in the event of “2019 Environmental Protection of the Homeland and National Beach Cleanup” held by Da-an District Gui Ke Community Development Association; on December 24, we set up an environmental education experience booth at the Tai An Elementary School Christmas Challenges Activity. We continue to develop diversified partnership in the promotion of environmental education activities.

The Sewage Treatment Plant in Houli Science Park obtained the certification in February 2017, making it the first sewage treatment plant to obtain certification in Taichung City. It has accepted appointment visits since its operation. Through the implementation of environmental education, the local residents can be more aware of the role a sewage treatment plant plays, and at the same time, the education courses can take roots down to the primary and secondary education, not only achieving the effect of maintaining good neighborly relations but also implementing environmental education. CTSP Bureau actively promotes the certification of environmental education facilities of Houli Sewage Treatment Plant by inviting the neighboring elementary, junior and senior high school students to participate in the environmental education course projects and provides suggestions for improvement. In 2019, 6 sessions of environmental education courses and 12 general visits were conducted, with a total of 565 people visiting the treatment plant.

In addition, Huwei Sewage Treatment Plant obtained the certification in May, 2016. Students and faculty from the neighboring primary schools as well as the organizations or institutions in the neighborhood were invited to participate in the environmental education. A total of 10 sessions of the environmental education courses and 4 sessions of general visits were organized in 2019, with the number of participants reaching 573. What is more, the lessons plans were brought out to the neighboring communities and remote primary schools, enabling the public and primary school students to experience the educational education courses in the field. This outdoor field education activity was held 8 times, participated by 193 people in total.



Hou-Zong Senior High School- Environmental Education Course for junior high school students



Houli Primary School- Environmental Education Course for primary school students



Students from Chungsi Elementary School in Yunlin County experienced the environmental education course for primary school students



Personnel at Hushan Water Environmental Education Park – General public experienced the environmental education course



Yong An Elementary School in Xitun District, Taichung experienced the environmental education course



Environmental Protection Bureau of Taichung City Fun Outing in the Environmental Education Field- Magical Water World Event



Science Play Day of Tai An Elementary School in Xitun District, Taichung – Environmental education promotion



Environmental Protection Bureau of Taichung City 422 Earth Day- Breathing with the Wild Forest Event



Public Art – Inviting Public Participation

“Discover the Beauty of CTSP” photography contest was held in 2019. Through these photographs, the beauty of CTSP can be discovered, enhancing the participants’ understanding and experience of a diverse CTSP. In addition to the aesthetics of technological architectures, the faces of hardworking and diligent employees with the integration of the cultural customs in the communities and the ecological landscape in the science park, diverse scenery with the coexistence of technology, humanities and ecology is presented. More than 1,000 entries were submitted for the photography contest, and the themes include science park architecture landscape, ecology and environmental education in the science park, a member of CTSP, happy wedding dress and photogenic couples, parent-child relationships, families and so on.

First prize of the “Discover the Beauty of CTSP” Photography Contest/ by Chao Ling-Ji, Technology and Leisure



Central Taiwan Science Park Bureau, Ministry of Science and Technology



► 7.4 Future Prospects

In 2019, CTSP has repeatedly achieved great results in turnover, number of employment and number of manufacturers. Looking at the future development trend in the technology industry, with the existing strength of the precision machinery industry, the promotion of the upgrade of the industrial technology and development of innovation and start-up are accelerating. We have set 4 major axes for the policy implementation in 2020.

- 1. Industrial Artificial Intelligence and Innovation Transformation**
Take inventory of the needs of park manufacturers and work with experts in academic and research field and industrial technology momentum to form an expert consultation and guidance platform to assist industries in the park to step toward the development of AI and further connect new start-up teams with international incubation systems to link international resources, creating a field space for innovation and entrepreneurship at CTSP. Continue to introduce start-up teams into the science park of the self-production base to facilitate the cooperative development with the park manufacturers and support these start-up teams to become park businesses.
- 2. Acceleration of Science Park Development and Attraction of Investment**
Accelerate the development of Erlin Science Park and the construction of the standard factory building in Huwei Science Park to make the park infrastructure complete and actively visit potential manufacturers to expand the investment attraction for Erlin and Chung Hsin Science Parks. Meanwhile, we also cooperate with the construction schedules of the plants of manufacturers to assist them with the construction project for operation as soon as possible.
- 3. Digital Transformation of Science Park Services**
Continue to introduce various smart technology management systems of water, disaster prevention water information and transportation to promote the intelligentization of the public services to optimize the efficiency of science park management. In the future, we will accelerate the deployment setting of 5G base stations to facilitate related 5G applications for park manufacturers (such as the drones, self-driving cars and so on), and provide various administrative assistance to promote the information and communication in the science park.
- 4. Creating a Sustainable Ecological Park**
The Bureau was honored with the TCSA's "Corporate Sustainability Report Award" in 2019. In the future, we will continue the concept of "the Unity of Production, Living, Ecology, and Life", complete the ecological assessment report review, obtain the Diamond Grade eco-community label, continue to promote the sustainable circulation of energy in the science park and combine with the public art project to construct an image at the entrance of the science park, creating an ecological park with humanities and technology. In terms of talent sustainability, the construction project for the expansion of the school buildings of NEHS CTSP is promoted. The enrollment of 7-12 graders in the bilingual department and the preparation of the enrollment of 1-6 graders in the bilingual department are conducted to attract high-tech manufacturers and talents at home and abroad to CTSP.



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Appendix

I:Verification statement

II:Global Reporting Initiative (GRI) Index

III:Sustainable Development Goals (SDGs) Index

IV:ISO26000 Guidance on Social Responsibility

V:United Nation Global Compact Index





Appendix I : Verification statement



INDEPENDENT ASSURANCE OPINION STATEMENT

Central Taiwan Science Park Bureau, Ministry of Science and Technology
2019 Corporate Sustainability Report

The British Standards Institution is independent to Central Taiwan Science Park Bureau, Ministry of Science and Technology (hereafter referred to as CTSP in this statement) and has no financial interest in the operation of CTSP 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 CTSP 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 CTSP. 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 CTSP only.

Scope

The scope of engagement agreed upon with CTSP includes the followings:

1. The assurance scope is consistent with the description of Central Taiwan Science Park Bureau, Ministry of Science and Technology 2019 Corporate Sustainability Report.
2. The evaluation of the nature and extent of the CTSP's adherence to AA1000 AccountAbility Principles (2018) in this report as conducted in accordance with type 1 of AA1000 Assurance Standard (2008) with 2018 Addendum assurance engagement and therefore, the information/data disclosed in the report is not verified through the verification process.

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

Opinion Statement

We conclude that the Central Taiwan Science Park Bureau, Ministry of Science and Technology 2019 Corporate Sustainability Report provides a fair view of the CTSP CSR programmes and performances during 2019. The CSR report subject to assurance is free from material misstatement based upon testing within the limitations of the scope of the assurance, the information and data provided by the CTSP and the sample taken. We believe that the 2019 economic, social and environmental performance information are fairly represented. The CSR performance information disclosed in the report demonstrate CTSP'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 CTSP'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 review of issues raised by external parties that could be relevant to CTSP's policies to provide a check on the appropriateness of statements made in the report.
- discussion with managers on approach to stakeholder engagement. However, we had no direct contact with external stakeholders.
- 24 interviews with staffs involved in sustainability management, report preparation and provision of report information were carried out.
- review of key organizational developments.
- review of the findings of internal audits.
- 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 GRI Standards is set out below:

Inclusivity

This report has reflected a fact that CTSP 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 CTSP's inclusivity issues.

Materiality

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

Responsiveness

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

Impact

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

GRI Sustainability Reporting Standards (GRI Standards)

CTSP 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 CTSP's social responsibility and sustainability topics.

Assurance level

The moderate 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

The CSR report is the responsibility of the CTSP'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.



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2020-06-29

Peter Pu, Managing Director BSI Taiwan

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Appendix II : Global Reporting Initiative (GRI) Index

The following content has been verified by an independent third-party and the result is published in the independent assurance report in Appendix I.

"*" indicates major aspects while "•" indicates external verification.

GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
Organizational Profile						
GRI102 General disclosure 2016 :Core	102-1	Name of the organization	•	About This Report	04	
	102-2	Activities, brands, products, and services	•	1.1 Introduction of Central Taiwan Science Park	20	
	102-3	Location of headquarters	•	1.1 Introduction of Central Taiwan Science Park Editorial Committee	20 158	
	102-4	Location of operations	•	1.1 Introduction of Central Taiwan Science Park	20	
	102-5	Ownership and legal form	•	1.1 Introduction of Central Taiwan Science Park	20	
	102-6	Markets served	•	1.1 Introduction of Central Taiwan Science Park	20	
	102-7	Scale of the organization	•	1.1 Introduction of Central Taiwan Science Park 2.1.1 Composition of Employees	20 37	
	102-8	Information on employees and other workers	•	2.1.1 Composition of Employees	37	
	102-9	Supply chain	•	2.2.4 Supplier Management	50	
	102-10	Significant changes to the organization and its supply chain	•	About This Report	04	
	102-11	Precautionary Principle or approach	•	2.2.3 Internal Control 5.1.1 Risk Management Policy	48 95	
	102-12	External initiatives	•	About This Report	04	
	102-13	Membership of associations	•	3.1.2 Enhancing International Links and Exchanges	62	
Strategy						
GRI102 General disclosure 2016 :Core	102-14	Statement from senior decision-maker	•	Message from the Director-General	06	
	102-15	Key impacts, risks, and opportunities	•	Message from the Director-General	06	
Ethics and Integrity						
GRI102 General disclosure 2016 :Comprehensive	102-17	Mechanisms for advice and concerns about ethics	•	2.2.2 Anti-corruption	47	

GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
Governance						
GRI102 General disclosure 2016 :Core	102-18	Governance structure	•	1.1 Introduction of Central Taiwan Science Park	20	
	102-40	List of stakeholder groups	•	1.2 Interaction with Stakeholders	24	
	102-41	Collective bargaining agreements	•	2.1.2 Employee Compensation and Benefits	42	
	102-42	Identifying and selecting stakeholders	•	1.3.1 Identification of Material Topics	28	
	102-43	Approach to stakeholder engagement	•	1.2 Interaction with Stakeholders 1.3.1 Identification of Material Topics	24 28	
	102-44	Key topics and concerns raised	•	1.3.2 Value Chain and Goals of Material Topics	30	
Report Profile						
GRI102 General disclosure 2016 :Core	102-45	Entities included in the consolidated financial statements	-	-	-	CTSP is a government agency, and it does not contain entities included in the consolidated financial statement.
	102-46	Defining report content and topic Boundaries	•	1.3.2 Value Chain and Goals of Material Topics	30	
	102-47	List of material topics	•	1.3.1 Identification of Material Topics	28	
	102-48	Restatements of information	•	About This Report	04	
	102-49	Changes in reporting	•	About This Report 1.3.1 Identification of Material Topics	04 28	
	102-50	Reporting period	•	About This Report	04	
	102-51	Date of most recent report	•	About This Report	04	
	102-52	Reporting cycle	•	About This Report	04	
	102-53	Contact point for questions regarding the report	•	About This Report	04	
	102-54	Claims of reporting in accordance with the GRI Standards	•	About This Report	04	
	102-55	GRI content index	•	About This Report	04	
	102-56	External assurance	•	About This Report	04	



GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
Topic-specific disclosure: 200 series (Economic topics)						
*Economic performance (Industrial upgrading)						
GRI 103 Management approach of Economic Perfor- mance (Industrial upgrading) 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 3 Promotion of Innovation-driven Industries	30 56	
	103-2	The management approach and its components	•	Chapter 3 Promotion of Innovation-driven Industries	56	
	103-3	Evaluation of the management approach	•	Chapter 3 Promotion of Innovation-driven Industries	56	
GRI 201 Disclosure of Economic Perfor- mance 2016	201-1	Direct economic value generated and distributed	•	1.1 Introduction of Central Taiwan Science Park	20	
	201-2	Financial implications and other risks and opportunities due to climate change	•	Special Column- Responding to Climate Change- A Sustainable, Disaster-free and Safe Science Park	100	
	201-3	Defined benefit plan obligations and other retirement plans	•	2.1.2 Employee Compensa- tion and Benefits	42	
	201-4	Financial assistance received from government	•	1.1 Introduction of Central Taiwan Science Park	20	
Market Presence						
GRI 202 Disclosure of Market Presence 2016	202-1	Ratios of standard entry level wage by gender compared to local minimum wage	•	2.1.2 Employee Compensa- tion and Benefits	42	
	202-2	Proportion of senior management hired from the local community	•	2.1.1 Composition of Em- ployees	37	
*Indirect Economic Impacts (Infrastructure in the park)						
GRI 103 Manage- ment approach of Indirect Economic Impacts (Infra- structure in the park) 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics 7. Safeguarding for the Re- alization of a Better Future	30 128	
	103-2	The management approach and its components	•	7. Safeguarding for the Re- alization of a Better Future	128	
	103-3	Evaluation of the management approach	•	7. Safeguarding for the Re- alization of a Better Future	128	
GRI 203 Disclosure of Indirect Economic Impacts 2016	203-1	Infrastructure investments and services supported	•	7.1 Park Construction 7.2 Local Life	131 133	
Procurement Practices						
GRI 204 Disclosure of Procurement Practices 2016	204-1	Proportion of spending on local suppliers	•	2.2.4 Supplier Management	50	

GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
*Anti-corruption						
GRI 103 Management approach of Anti-corruption 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 2 Integrity and Transparent Governance of CTSP	32 34	
	103-2	The management approach and its components	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
	103-3	Evaluation of the management approach	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
GRI 205 Disclosure of Anti-corruption 2016	205-1	Operations assessed for risks related to corruption	•	2.2.2 Anti-corruption	47	
	205-2	Communication and training about anticorruption policies and procedures	•	2.2.2 Anti-corruption	47	
	205-3	Confirmed incidents of corruption and actions taken	•	2.2.1 Legal Compliance 2.2.2 Anti-corruption	46 47	
Anti-competitive Behavior						
GRI 206 Disclosure of Anti-competitive Behavior 2016	206-1	Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	•	2.2.1 Legal Compliance	46	
*Start-ups						
GRI 103 Management approach of Start-ups 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 4 A Cradle for Excellent Talent Cultivation	30 78	
	103-2	The management approach and its components	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	
	103-3	Evaluation of the management approach	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	
Topic-specific disclosure: 300 series (Environmental topics)						
*Energy						
GRI 103 Management approach of Energy 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 5 Sustainability- Actions of Advanced Deployment	30 92	
	103-2	The management approach and its components	•	Chapter 5 Sustainability- Actions of Advanced Deployment	92	
	103-3	Evaluation of the management approach	•	Chapter 5 Sustainability- Actions of Advanced Deployment	92	
GRI 302 Disclosure of Energy topics 2016	302-1	Energy consumption within the organization	•	5.2 Energy Resource Management at CTSP	105	



GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
GRI 302 Disclosure of En- ergy topics 2016	302-3	Energy intensity	•	5.2 Energy Resource Man- agement at CTSP	105	
	302-4	Reduction of energy consumption	•	5.2 Energy Resource Man- agement at CTSP	105	
*Water and Effluents (Water conservation in the park)						
GRI 303 Management approach of Water and Effluents (Water conservation in the park)	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 5 Sustainability- Ac- tions of Advanced Deploy- ment	30 92	
	103-2	The management approach and its components	•	Chapter 5 Sustainability- Ac- tions of Advanced Deploy- ment	92	
	103-3	Evaluation of the management approach	•	Chapter 5 Sustainability- Ac- tions of Advanced Deploy- ment	92	
	303-1	Interactions with water as a shared resource	•	5.2 Energy Resource Man- agement at CTSP	105	
	303-2	Management of water discharge- related impacts	•	6.1.3 Management of Wastewater	117	
GRI 303 Disclosure of Wa- ter and Effluents topics 2018	303-3	Water withdrawal	•	5.2 Energy Resource Man- agement at CTSP	105	
	303-4	Water discharge	•	6.1.3 Management of Wastewater	117	
	303-5	Water consumption	•	5.2 Energy Resource Man- agement at CTSP	105	
Biodiversity						
GRI 304 Disclosure of Biodiversity topics 2016	304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	•	6.2.2 Ecological Survey	126	
*Emissions (the overall emissions of the park)						
GRI 103 Management approach of Emis- sions (the overall emissions of the park) 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 6 Accountability- Environmental Management Behavior	30 110	
	103-2	The management approach and its components	•	Chapter 6 Accountability- Environmental Management Behavior	110	
	103-3	Evaluation of the management approach	•	Chapter 6 Accountability- Environmental Management Behavior	110	

GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
GRI 305 Disclosure of Emissions topics 2016	305-1	Direct (Scope 1) GHG emissions	•	6.1.2 Air Pollution and GHG Management	115	
	305-2	Energy indirect (Scope 2) GHG emissions	•	6.1.2 Air Pollution and GHG Management	115	
	305-4	GHG emissions intensity	•	6.1.2 Air Pollution and GHG Management	115	
	305-5	Reduction of GHG emissions	•	6.1.2 Air Pollution and GHG Management	115	
*Effluents and Waste						
GRI 103 Management approach of Efflu- ents and Waste 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 6 Accountability- Environmental Management Behavior	30 110	
	103-2	The management approach and its components	•	Chapter 6 Accountability- Environmental Management Behavior	110	
	103-3	Evaluation of the management approach	•	Chapter 6 Accountability- Environmental Management Behavior	110	
GRI 306 Disclosure of Ef- fluents and Waste topics 2016	306-1	Water discharge by quality and destination	•	6.1.3 Management of Wastewater	117	
	306-2	Waste by type and disposal method	•	6.1.4 Waste Management and Recycling	120	
	306-3	Significant spills	•	2.2.1 Legal Compliance	46	
	306-4	Transport of hazardous waste	•	6.1.4 Waste Management and Recycling	120	
	306-5	Water bodies affected by water discharges	•	6.1.3 Management of Wastewater	117	
*Environmental Compliance						
GRI 103 Management approach of Environmental Compliance 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 2 Integrity and Transparent Governance of CTSP	30 34	
	103-2	The management approach and its components	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
	103-3	Evaluation of the management approach	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
GRI 307 Disclosure of Environmental Compliance top- ics 2016	307-1	Non-compliance with environmental laws and regulations	•	2.2.1 Legal Compliance 2.2.4 Supplier Management	46 50	



GRI Category/ Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/ remark
*Stable Energy Supply						
GRI 103 Management approach of Stable Energy Supply 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 6 Accountability-Environmental Management Behavior	30 110	
	103-2	The management approach and its components	•	Chapter 6 Accountability-Environmental Management Behavior	110	
	103-3	Evaluation of the management approach	•	Chapter 6 Accountability-Environmental Management Behavior	110	
Topic-specific disclosure: 400 series (Social topics)						
Employment						
GRI 401 Disclosure of Employment topics 2016	401-1	New employee hires and employee turnover	•	2.1.1 Composition of Employees	37	
	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	•	2.1.1 Composition of Employees 2.1.2 Employee Compensation and Benefits	37 42	
Training and Education						
GRI 404 Disclosure of Training and Education topics 2016	404-1	Average hours of training per year per employee	•	2.1.3 Staff Training	42	
	404-2	Programs for upgrading employee skills and transition assistance programs	•	2.1.3 Staff Training	42	
	404-3	Percentage of employees receiving regular performance and career development reviews	•	2.1.2 Employee Compensation and Benefits	42	
Diversity and Equal Opportunity						
GRI 405 Disclosure of Diversity and Equal Opportunity 2016	405-1	Diversity of governance bodies and employees	•	2.1.1 Composition of Employees	37	
Non-discrimination						
GRI 406 Disclosure of Non-discrimination 2016	406-1	Incidents of discrimination and corrective actions taken	•	2.1.4 Employee Rights and Care 2.2.1 Legal Compliance 4.3.1 Protection of Labor Rights in the Park	44 46 84	
Freedom of Association and Collective Bargaining						
GRI 407 Disclosure of Freedom of Association and Collective Bargaining 2016	407-1	Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	•	2.1.4 Employee Rights and Care	44	

GRI Category/Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/remark
Child Labor						
GRI 408 Disclosure of Child Labor 2016	408-1	Operations and suppliers at significant risk for incidents of child labor	•	2.1.1 Composition of Employees 2.2.1 Legal Compliance	37 46	
Forced or Compulsory Labor						
GRI 409 Disclosure of Forced or Compulsory Labor 2016	409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	•	2.1.4 Employee Rights and Care 2.2.1 Legal Compliance 4.3.1 Protection of Labor Rights in the Park	44 46 84	
Rights of Indigenous Peoples						
GRI 411 Disclosure of Rights of Indigenous Peoples 2016	411-1	Incidents of violations involving rights of indigenous peoples	•	2.2.1 Legal Compliance	46	
Human Rights Assessment						
GRI 412 Disclosure of Rights of Human Rights Assessment 2016	412-2	Employee training on human rights policies or procedures	•	2.1.3 Staff Training	42	
*Local Communities						
GRI 103 Management approach of Local Communities 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics 7. Safeguarding for the Realization of a Better Future	30 128	
	103-2	The management approach and its components	•	7. Safeguarding for the Realization of a Better Future	128	
	103-3	Evaluation of the management approach	•	7. Safeguarding for the Realization of a Better Future	128	
GRI 413 Disclosure of Local Communities 2016	413-1	Operations with local community engagement, impact assessments, and development programs	•	7.1 Park Construction 7.2 Local Life	131 133	
Public Policy						
GRI 415 Disclosure of Public Policy 2016	415-1	Political contributions	•	2.2.1 Legal Compliance	46	
Marketing and Labeling						
GRI 417 Disclosure of Marketing and Labeling 2016	417-1	Requirements for product and service information and labeling	•	2.2.1 Legal Compliance	46	



GRI Category/Material Aspects	No.	GRI Index	External Verification	Chapter and Section	Page	Omit/remark
Customer Privacy						
GRI 418 Disclosure of Customer Privacy 2016	418-1	Substantiated complaints concerning breaches of customer privacy and losses of customer data	•	5.1.2 Management of Information Security	97	
*Socioeconomic Compliance						
GRI 103 Management approach of Socioeconomic Compliance 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 2 Integrity and Transparent Governance of CTSP	30 34	
	103-2	The management approach and its components	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
	103-3	Evaluation of the management approach	•	Chapter 2 Integrity and Transparent Governance of CTSP	34	
GRI 419 Disclosure of Socioeconomic Compliance 2016	419-1	Non-compliance with laws and regulations in the social and economic area	•	2.2.1 Legal Compliance	46	
*Labor Management Relations in the Park						
GRI 103 Management approach of Labor Management Relations in the Park 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 4 A Cradle for Excellent Talent Cultivation	30 78	
	103-2	The management approach and its components	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	
	103-3	Evaluation of the management approach	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	
*Promotion of Safe Workplace						
GRI 103 Management approach of Promotion of Safe Workplace 2016	103-1	Explanation of the material topic and its Boundary	•	1.3.2 Value Chain and Goals of Material Topics Chapter 4 A Cradle for Excellent Talent Cultivation	30 78	
	103-2	The management approach and its components	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	
	103-3	Evaluation of the management approach	•	Chapter 4 A Cradle for Excellent Talent Cultivation	78	

Appendix III: Sustainable Development Goals (SDGs) Index

Item	Sustainable Development Goals	Chapter and section	page
Goal 1	End poverty in all its forms everywhere	Active Implementation of Sustainable Development Goals (SDGs)	11
Goal 3	Ensure healthy lives and promote well-being for all at all ages	Active Implementation of Sustainable Development Goals (SDGs) 7.3 Community Participation, Giving Back to the Local Place	11 136
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.	Active Implementation of Sustainable Development Goals (SDGs) 2.1.3 Staff Training 4.4.2 Self-production Base for Incubation of Innovation	11 42 90
Goal 5	Achieve gender equality and empower all women and girls	Active Implementation of Sustainable Development Goals (SDGs) 4.3 A Workplace at Ease	11 84
Goal 6	Ensure availability and sustainable management of water and sanitation for all.	Active Implementation of Sustainable Development Goals (SDGs) 5.2 Energy Resource Management at CTSP 6.1.3 Management of Wastewater	11 105 117
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all.	Active Implementation of Sustainable Development Goals (SDGs) 5.2 Energy Resource Management at CTSP	11 105
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.	Active Implementation of Sustainable Development Goals (SDGs) Chapter 4 A Cradle for Excellent Talent Cultivation	11 78
Goal 9	Build resilient infrastructure, promote inclusive and Sustainable industrialization and foster innovation.	Active Implementation of Sustainable Development Goals (SDGs) Chapter 3 Promotion of Innovation-driven Industries Chapter 4 A Cradle for Excellent Talent Cultivation	11 56 78
Goal 10	Reduce inequality within and among countries	Active Implementation of Sustainable Development Goals (SDGs) 4.3 A Workplace at Ease	11 84
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Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	Active Implementation of Sustainable Development Goals (SDGs) 6.2.2 Ecological Survey	11 126
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