Smart Energy Generation & Collective Inheritance

Taiwan Power Company

2020 Sustainability Report

Reporting Principles

This is the 14th issue of the annual Sustainability Report of the Taiwan Power Company (hereinafter referred to as Taipower or the Company). The contents of this Sustainability Report have been compiled from data submitted by relevant units of the Company. The Company follows the GRI Sustainability Reporting Standards published by the Global Reporting Initiative (GRI) when compiling the report and disclosing information. This report has been verified by SGS Taiwan to ensure that the report meets the requirements of both the Core Option of the GRI Standards and the accountability principle standards (APS) in AA1000 (Type 1 Moderate Level).

In consideration of the changes in the economy and environment of Taiwan, as well as the three major development issues of innovative, smart, and stable supply, sustainable environmental engagement, and the enlivening of local cultural resources, the theme of the 2020 Taipower Corporate Sustainability Report is "Smart Energy Generation and Collective Inheritance." The theme is a response to the international green energy transition, the development of smart green power, and stability in the power supply. The six chapters of this report explore a series of topics in detail: sustainable operation, stable power supply, environmental sustainability, human resources, innovation, research and development (R&D), and social co-prosperity. The contents of these chapters illustrate Taipower's commitment to sustainable value creation through investing in various types of capital.

Period Covered by the Report

The report covers the period of January 1 to December 31, 2019 (For the sake of complete disclosure and comparability, the report also includes some historical data along with some for 2020. If there is any inconsistency during the reporting period, it will be further identified in the notes).

Scope of the Report

This report covers Taipower’s data and information regarding sustainability issues as well as the Company’s achievements within the areas of operational development, social responsibility, and environmental sustainability.

Contact Taipower

Taipower has established a Taipower Sustainable Development Website to fully explain its performance on and the implementation results for various sustainability issues. The Company has also introduced a stakeholder section and questionnaires in the hopes of facilitating smooth communication with its stakeholders. The Sustainability Report in both Chinese and English versions are provided on Taipower's website. In addition, the "Information Disclosure" section of Taipower's official website is updated regularly to provide the latest statistics on specific aspects of the Company's operations, including management, power generation, the environment and so forth. Taipower would like to welcome any feedback regarding this Sustainability Report. Your input will enable Taipower to better meet your expectations in our next Sustainability Report to be published in the third quarter of 2021. You are more than welcome to contact us through the following methods:

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Sustainability Reports

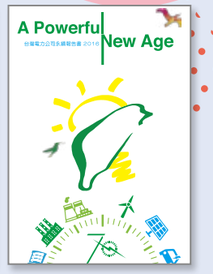
Published every August

2019

2018

2017

2016



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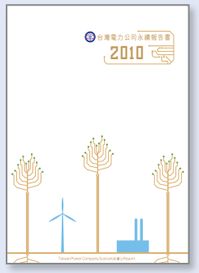

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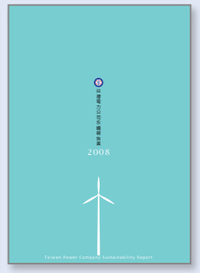

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Annual Sustainability Reports

Chairman's Statement

Despite the many challenges of 2019, the Taiwan Power Company, or Taipower, continued to stride steadily forward as the helmsman of the country's stable power supply. In recent years, the sustainability trend has become an unstoppable wave both domestically and globally. It has involved the active promotion of energy transition, a devotion to developing renewable energy, the fulfillment of corporate social responsibilities etc. As an indication of the Company's proactive approach, Taipower believes that "the right thing is not only a thing that needs to be done but a thing that needs to be done better." Thus, in addition to strengthening its business management, Taipower responds actively to external expectations. As such, Taipower has adopted "Smart Energy Generation and Collective Inheritance" as the main theme for its 2020 Sustainability Report, which lays a foundation for the sustainable electricity industry in the following four domains of sustainable development.

Developing Low-Carbon Electricity

Recently, Taipower has been cooperating with the government's green energy policy by promoting gas, reducing coal, and increasing green energy. The proportion of gas-fired power generated and purchased by Taipower in 2019 surpassed that of coal-fired power. This achievement was realized by utilizing a power dispatching model that prioritizes "green power first" and "eco-friendly dispatching." In addition, the emission reductions for existing coal-fired power units were significant, allowing Taipower to make a big step toward its goal of providing low-carbon electricity. Moreover, the active development of renewable energy is a major focus of our endeavors. The use of clean renewable energy has become a global trend. The launch of the Changhua Coastal Solar Power Plant is the best manifestation of Taipower's ability and determination to develop green energy. It is also a major milestone in the promotion of energy transformation and illustrates our aim of creating a win-win situation with power development and environmental sustainability.

Integrating Smart Technologies

As technology for telecommunications, artificial intelligence, and energy storage has continuously developed, Taipower has embraced the future by applying technological innovations, and gradually building an automated metering infrastructure (AMI), smart grids, integrated smart forecasting, dispatching, power restoration, and services.

Furthermore, as we have entered the information era and data has become an important resource, Taipower has worked to integrate its different departments, enhance its big data analysis and application capabilities, and is striving to develop new business models. The Company has also pursued smart innovation applications for smart circuit inspection and risk warning through the use of drones and robots. The Company also held its first AI Big Data Talent Development Camp in 2019. The camp sought to improve the utilization of AI and big data analysis technology, continue innovation and improvement, shake off the traditional image of the electric industry, and further the transformation of the Company into a smart electricity corporation that benefits the public.

Creating Social Momentum

Aside from providing energy, Taipower strives to create social momentum by combining electricity with art to create beautiful scenes for people to enjoy in their daily lives. In recent years, Taipower has promoted a number of art and cultural events, such as the "Light up 13 Layer Remains" sound and light art show on Mid-Autumn Festival, which sparked nostalgia for the mining history. Other events have included the "Power Zone-Transformer Box Science Exhibition" that was held on the Chianti Avenue Plaza to provide the public with an interpretation of electricity science and urban aesthetics. Furthermore, Taipower values the cultural inheritance of the electricity industry and has organized large exhibitions, including "Just Flow: Taiwan Electricity Cultural Assets Exhibition" to incorporate the spirit of cultural resource preservation into its corporate DNA. These efforts illustrate the great importance Taipower attaches to culture, art, and cultural and creative industries.

Collaborating and Coinheriting

Taipower was established more than 70 years ago. Throughout its history, the Company's human resources have always been its most important core asset for advancing technology and services. Since the electricity industry relies upon technologies that require highly skilled professionals, the company is heavily reliant on the inheritance of experiences embodied in its staff. In the face of challenges, such as organizational transformation and the transition to low-carbon electricity, human resources remain the cornerstone of future development. Therefore, in terms of talent cultivation, Taipower emphasizes "coaching as a method for inheritance and encouragement as a driver of inheritance." By organizing employee communication events, assistance programs, and sharing sessions for various units, Taipower advocates for employee care and growth to create a happy workplace that allows employees to keep devoting their best to the future of Taiwan's electricity industry as different generations fuse.

The following decade will be crucial for sustainable development and its influence. As one of Taiwan's most important state-owned enterprises, Taipower is committed to demonstrating its determination to promote the 2030 United Nations Sustainable Development Goals (SDGs). As such Taipower has prepared a sustainable development strategy blueprint for the next decade which outlines the Company's vision and a robust strategy that demonstrates our attitude and determination to prepare for future challenges in advance.

Finally, we appreciate your sustained recognition of our achievements in sustainable development. Taipower will continue to follow the global trend toward sustainable development and will carry forward in the spirit that "the more dedicated Taipower is, the more assured power users will have in their daily lives."

Chairman Wei-Fan Yang

Taipower's Value Chain and Operational Elements

Taipower is a vertically integrated power business group. The Company is committed to creating multifaceted value for stakeholders, and to providing the public with the electricity that is needed for its diverse development needs. Taipower bears the great responsibility of offering a stable power supply, implementing a green energy transition, and integrating the resource inputs associated with the six capitals in its value chain. These include generation, transmission, and distribution and sale of electricity. Throughout, Taipower continues to march towards its goal of becoming a sustainable, world-class energy group.

SDGs of Concern

7 AFFORDABLE AND CLEAN ENERGY

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

Eight Major Strategies

A stable power supply and reduction of carbon emissions

Promotion and construction of the power grid

Strengthening of key technologies

Improvement of financial efficiency

Transformation into a power utility group

Enhancement of workforce value

Implementation of improved occupational safety

Refinement of customer service

Resource Input

Financial capital

Capital: NT$330 billion

Total expenditures in 2019: NT$620.3 billion

Manufactured capital

Power plants in operation: 23
Total installed capacity of thermal power plants: 26,430 MW
Total installed capacity of nuclear power plants: 3,872 MW
Total installed capacity of renewable energy: 2,236 MW
Installed capacity of pumped-storage hydroelectricity: 2,600 MW
Installed capacity of cooperative IPP thermal power plants: 7,720 MW
Installed capacity of cooperative renewable energy providers: 4,920 MW
Total length of power transmission lines: 17,691 circuit kilometers (ckt-km)
Total length of distribution lines: 378,920 circuit kilometers (ckt-km)
Number of substations: 617

Natural capital

	2017	2018	2019
Coal (million tons)	28.975	29.009	27.443
Gas (million cubic meters)	14,113	14,085	13,371
Fuel oil (ML)	2,663	1,601	1,103
Nuclear fuel (10,000 pounds)	67.61	164.86	116.41

Recurrent expenditure on environmental protection NT$5.66 billion
Capital expenditure on environmental protection NT$5.23 billion

Human capital

Total number of employees: 27,606
Number of contracted workers: 1,076
Number of temporary workers: 130

Intellectual capital

Number of annual research projects: 375

R&D investment:
R&D investment: R&D expenditure of NT$5.3 billion in 2019 (including NT$4.4 billion for expenditure and NT$900 million for capital expenditure)

Social capital

Number of users: 14.38 million
Power development promotion and assistance fund: NT$2.985 billion
Capacity of demand response: 2,450 MW
Power supply partners: 9 private power plants, 49 cogeneration plants, and 26,129 entities that entered into renewable energy contracts

Generation

Power Generation Division

Providing services in operation, development, maintenance, and management of power generation by hydro, thermal, and renewable energy.

Power generation by Taipower owned facilities in 2019

Thermal power
140.6 billion kWh

Renewable energy
5.5 billion kWh

Pumped-storage hydroelectricity
3.2 billion kWh

Nuclear Power Division

The major elements for the management of nuclear power generation include safe operation, power plant design & management, public communication and the final disposal for radioactive

Waste nuclear power
31.1 billion kWh

Purchased electricity by sources

Amount of externally purchased power in 2019

Privately-owned thermal
39.4 billion kWh

Cogeneration
4.1 billion kWh

Renewable energy
8.5 billion kWh

Transmission

Transmission System Division

The major elements for the management of the power grid include planning, design, construction and operation.

Total length of power transmission lines:
17,691 circuit kilometers (ckt-km)

Total length of distribution lines:
378,920 circuit kilometers (ckt-km)

Number of substations:
617

Distribution and Service

Distribution and Services Division

The major elements for the Distribution and Service Division include managing the sale & purchase of electricity, customer services, building-operations and the maintenance of the power distribution network.

Total number of users: 14.38 million

The customer power consumption by percentage:

Industrial: 56%

Residential: 20%

Commercial: 16%

Other: 8%

Performance

- **Earnings before tax:** NT$18 billion
- **Income from electricity fees:** NT$572.8 billion

Corresponding Chapter **Taipower and Sustainability**

- **Net amount of generated and purchased power:** 232.5 billion kWh
  - Generated power: 180.5 billion kWh
  - Purchased power: 52 billion kWh
- **Total power sold:** 218.7 billion kWh
- **Facility utilization rate:** 84.5%
- **Line loss rate:** 3.86%

Corresponding Chapter **Stable Power Supply**

- **Greenhouse gas emissions:** 91,501 kt CO_2e
- **Air pollution emissions (kg/GWh):**
  - Particulate matter (PM) emissions: 14
  - Sulfur oxide (SOx) emissions: 125
  - Nitrogen oxide (NOx) emissions: 158

Corresponding Chapter **Environmental Sustainability**

- **Number of newly recruited employees:** 2,504
- **Total participants in education and training:** 66,484
- **Incidents of work-related injuries:** 3
- **Ratio of work-rated injuries:** 0.01%

Corresponding Chapter **Human Resources**

- **Number of research reports:** 192
- **Number of papers published:** 115
- **Number of patents/intellectual property cases:** 39

Corresponding Chapter **Innovation and R&D**

- **Level of customer satisfaction:** 96 points (out of 100)
- **Charity events:** 2,534

Corresponding Chapter **Social Co-Prosperity**

Sustainable Development Images and Content

Provider of Sustainable Power

Improve power generation efficiency, increase the proportion of clean and low-carbon energy, and take into account energy security and economic development, while actively promoting energy transition to provide stable and sustainable electricity based on environmental sustainability.

Leader of Smart Grid Development

Promote the construction of smart grids, strengthen the key telecommunication infrastructure, expand the application of big data and AI, and enhance the self-healing capacity of the system to ensure a stable power supply.

Provider of Services for Smart Living

Strengthen customer relationship management, improve customer satisfaction, make good use of new digital technologies to provide users with tangible services, improve energy-saving awareness and energy efficiency at the user end, and meet users' needs for diverse power options.

Agent of Environmental Friendliness

Protect the quality of the environment, optimize resource utilization, promote low-carbon measures, reduce carbon emissions, and respond to climate change comprehensively to cultivate ecological harmony and create sustainable environmental partnerships.

Practitioner of Corporate Social Responsibility

Promote humanism in business and establish a culture of disciplined work safety and a happy workplace. Engage the public through diverse, social, community events, enhance social care activities, and create co-prosperity.

Performance of Sustainability

Environment

- Protected air quality by voluntarily reducing loads and emissions ***1,183*** times
- Reuse rate of coal ash reached ***86.7%***
- Released the first ***Taipower Environmental White Paper***
- The first exhibition of a circular economy—***New Existence, Circular Manufacturing***—demonstrated to the public how Taipower uses the concept of circular economy and gave new life to power plant waste

Society

- The number of participants in education and training sessions reaching ***66,484***
- Employees obtained a total of ***5,711*** professional certifications
- Taipower's industrial safety and health expenditure is approximately NT$***367.54 million***
- The ratio of worker reinstatement after parental leave is ***100%***
- The score for customer satisfaction in 2019 was ***96*** points (out of 100)

Governance

- Net amount of generated and purchased power: ***232.5 billion*** kWh
- System Average Interruption Frequency Index was ***0.209*** times/household
- Formulated "***Taipower's Sustainable Development Plan***" and established short-, mid-, and long-term goals for sustainable development
- Won the Investment in People Award at the ***2019 Asia Responsible Enterprise Awards***
- Number 1 in the ***Corporate Governance Evaluation of state-owned enterprises*** for four consecutive years

Note: ⚡The list above denotes improved performances compared to the previous year.

Innovative ICT and Smart Power Supply

—— 2019 Taipower Information and Communications Month

Taipower is committed to the development of information technology. As information technology has rapidly evolved, the Company has introduced emerging information technologies and applied them to various power businesses. In recent years, Taipower has developed talent cultivation plans, established demonstration projects, and motivated employees to learn relevant knowledge and increase their understanding of the information and communications industry, particularly in popular information technology areas, such as the Internet of Things (IoT), 5G communication, big data, and AI. In 2019, an Information and Communications Month was launched, with the aim of closely integrating Taipower's business and the information and communications industry to create new possibilities for the development of the electricity industry.

The 5 Major Themes and 7 Exhibition Areas

Smart City Applications

- Smart parking
- Smart chargers
- Smart street lights

Power IoT

Information security protection of smart grids

Integrated application of blockchain and smart meters

A 5G communication-related equipment display

Taipower worked with the Industrial Technology Research Institute, Microsoft, International Trust Machines Corporation, Nokia, and FarEasTone to organize a month-long, public information and communications technology exhibition at the Taipower Headquarters. Through the display of models, a partial vision of the future smart city was outlined and explained to the public in an easy-to-understand way. In addition, a series of weekly events invited external experts to talk about the latest information technology developments, current status and future development trends for applications in various fields. These events enhanced employee and public understanding of information and communications. Taipower's various information business events were also arranged to demonstrate the Company's achievements in information technology applications in hopes that Taipower will continue to connect future trends and information technologies with its work to change the existing environment through innovative thinking and to incrementally move toward the goal of sustainable development.

2019 Series of Events

Opening ceremony of the event and the closing ceremony of the Electricite De France (EDF) training program

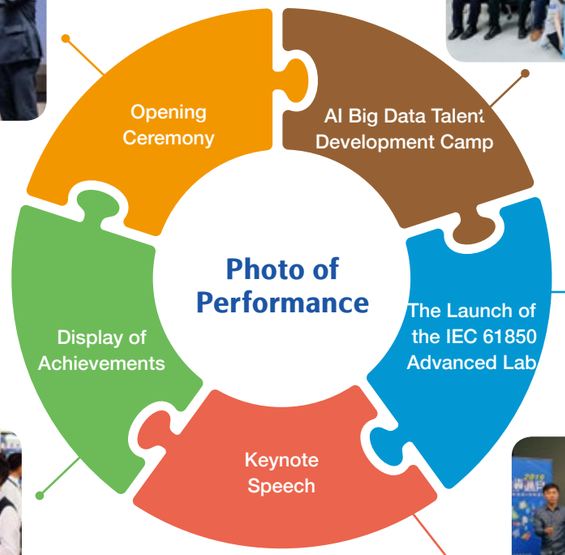
The development of a smart grid could bring about the benefits of power conservation and a stable power supply; thus, Taipower invited EDF to offer a training program on smart grids. The opening ceremony of the Information and Communications Month was held together with the closing ceremony of the smart grid training program, which highlighted the importance of information technology in power applications and served as a declaration of the start of the subsequent events.

Achievement presentation of the AI Big Data Talent Development Camp

In order to effectively cultivate AI and big data talent and to integrate training and employment, Taipower launched an internal power data application competition for the first time. Through the AI Big Data Talent Development Camp, it cultivated relevant talent and put relevant technologies into practice to solve various challenges faced by the electricity industry.

New information sharing seminars as well as communications applications and technology development seminars

The information topics of the exchange meeting included AI, big data, IoT, and information security. Senior executives from leading businesses in Taiwanese industry were invited to share the latest information trends. The seminars were mainly on the applications of smart grids and the development of communications to increase participant understanding of the connection between the electricity industry and information and communications.



Results

Taipower organized an Information and Communications Month for the first time. The Company also invited the Electricity Generating Authority of Thailand to Taiwan to celebrate this grand event. The event helped promote exchanges in this industry, and its relevant achievements have also been widely praised by the industry and academia, which specifically focused on the presentation of the achievements of the AI Big Data Talent Development Camp. The camp was also highly recognized by the Minister of Economic Affairs and ministers without portfolio. Taipower's overall corporate image has been enhanced as a result. In recent years, Taipower has actively adopted information, communication, and automation technologies to upgrade the existing power network and advance toward a smart and integrated power network. Through this event, Taipower has been driven to continue to introduce and apply various innovative information and communications technologies. Meanwhile, the event disclosed the interim results of the Company's efforts to the public so as to gain public understanding, trust, and support, thus further prompting Taipower to advance its technologies in support of Taiwan's industrial progress.

Display of achievements in the construction of distribution-level renewable energy management systems

An exhibition of achievements was held to briefly introduce the information and communications technology used in the distribution-level renewable energy advanced management system (DREAMS). The exhibition outlined system's operational model, its real-time collection of renewable energy power generation information, and a demonstration of its functionality, and encouraged discussion on the future direction of power grid promotion.

A series of events for the launch of the IEC 61850 Advanced Lab

In response to the development of smart grids, Taipower established an IEC 61850 Advanced Laboratory to develop an increasing number of smart grids applications and explained the laboratory's vision and strategic layout through in a keynote speech.

Power IoT exhibition and keynote speech delivered by minister without portfolio Audrey Tang

The overall structure of smart grids was demonstrated through the Power IoT to enhance employee understanding of the wireless communications system, and at the end of the event, minister without portfolio Audrey Tang was invited to talk about "Taiwan's Social Innovation Development Trends" and to explain how to pursue innovative development in various fields in order to achieve sustainable development goals.

Environmental Leadership and Sustainability Commitment

—— 2019 Taipower Environment Month

While ensuring a stable power supply, all units at Taipower put their belief of protecting the environment and ecology into practice. In 2019, Taipower released "Taipower Environmental White Paper" based on the goal of demonstrating the Company's "environmental leadership and sustainability commitment." Moreover, the Company set April as the "Taipower Environment Month" in line with Earth Day on April 22. A series of events related to environmental protection were organized, in which internal and external stakeholders were invited to participate to jointly develop a new environmental protection vision for power development in Taiwan.

Release of an environmentally friendly book entitled "Embracing Taiwan's Garden of Power"

Taipower visited front-line workers to record the process of realizing environmental friendliness in power generation, transmission, distribution, and sales of power. The story shows Taipower's continuous focus on the environmental impact of human activities with particular attention paid to climate change and local ecology.

Declaration of Taiwan Power Company's Signing of the Environmental White Paper

Taipower swore to uphold the Company's mission of "environmental friendliness" and to establish a development strategy and goals for corporate operation in terms of the environment as part of its vision of becoming a world-class power business group and its determination to become an all-round green enterprise. Through the formulation and disclosure of the environmental white paper, the Company demonstrated for the public how to draw up a blueprint for future environmental sustainability. It also hoped to build a bridge with the public, lay a foundation for environmental protection through its concerted efforts, and to work with Taiwan and the international community to create a beautiful environment together.

Book Recounting History

2019 Series of Events

White Paper Embraces the Future

Internal and External Promotion of Environmental Education

The board game workshop titled "Wind Chasing the Electricity Pursuit Summit" was introduced for schools

Taipower cooperated with Pley School to design and hold four workshops based on the model of the international climate summit, at which elementary school students were invited to act as policy makers in different countries, search for and study information about electricity and the environment, and then reach a consensus on energy conservation and carbon reduction after domestic discussions and international negotiations. Through the practice of thinking from other people's perspectives and communication, participants could think more deeply about how to strike a balance between electricity needs and the environment.

A children's theater show on the topic of marine environment

Taipower planned a children's theater show for elementary school students to present issues related to marine pollution, such as fish swallowing plastic bags and daily items being discarded at will. The show used live acting, which was then followed by an interesting question-and-answer session to deepen the audience's environmental awareness. With the ups and downs of the story, students felt pleasantly surprised, and the concept of marine ecological conservation was quietly imprinted on the minds of children.

Appreciation of the underwater 3D ecological film of "Garden of Eden of Fish"

Taipower's first, self-produced underwater 3D film entitled "Garden of Eden of Fish" had been screened in the Taipower Exhibit Center in Southern Taiwan for a long time. Despite this, the people of Northern Taiwan did not have the opportunity to view the film. Therefore, the 3D theater was specifically moved to the Taipower Headquarters during the Environment Month to show the film as it is presented in the Taipower Exhibit Center in Southern Taiwan. The film was screened with 3D glasses and the audience, both children and adults, were amazed by the splendid coral reefs and rich fish ecology at Kenting South Bay. The event furthered public appreciation of Taipower's emphasis on marine ecological conservation.

Seminar on Internal, Continuing Education Trends

In the Environment Month, a series of seminars were organized for Taipower's employees to discuss environmental issues, such as the "sustainable governance of the energy industry" and "low-carbon transformation and green innovation." These events sought to raise employee awareness of ecological conservation and in turn help them understand the importance of their work for the environment. It was hoped that this experience would lead employees to contribute to environmental friendliness through their work.

Taipower Environmental Pilot Sustainability Commitment

	1 Union	2 Reduction	3 Transformation
Meaning	Communication and engagement	Carbon reduction Emission reduction	Circularization Intellectualization Ecologization
6 major strategies	Expanding internal and external engagement	Responding to climate change Protecting environmental quality	Focusing on circular innovation Refining management systems Creating ecological inclusiveness

Results

The first "Environment Month" was wrapped up successfully on April 29, and the whole series of events reached 1,833 people. For Taipower, this was not the end point, but the starting point for the implementation of "environmental leadership and sustainability commitment." The subsequent implementation and execution were the cores of this event, and are goals that all Taipower's employees strive toward collectively. In the future, Taipower will periodically hold the "Environment Month" reflect upon its accumulated achievements, and to strive to convey its belief in environmental sustainability to the public in an innovative and diverse manner. Current environmental issues will be integrated, thereby expanding the engagement with the Company's internal and external stakeholders and creating a sustainable brand image for Taipower's "Environment Month." The events are expected to become key elements in Taipower's effort to become a green enterprise, on top of providing stable and high-quality electricity services.

Light Up 13 Layer Remains and Light Up the Impossible

"Lighting up 13 Layer Remains " was the first major effort in the history of Taiwan to adopt culture and art as a means of revitalizing polluted land. The project also created Taiwan's largest cultural landmark that employs a historical building. In the past, the important role of the 13 Layer Remains (also known as the Shuinandong Smelter) in Taiwan's mining industry could not displayed due to the pollution of the site. Today, in contrast, Taipower has lighted up the 13 Layer Remains, and in turn ignited possibilities for local rejuvenation in the Jinguashi area as well as the culture and history of Taiwan's mining industry, by achieving the following four goals:

Raising of cultural awareness

Re-lighting the century-old mining remains raises awareness of the local mining culture for both the local community and Taiwan as a whole.

Promotion of local rejuvenation

This project has helped develop night view attractions in the Shui-Jin-Jiu area, extending the stay of tourists at night, promoting local development, and allowing local youths to return to work in this community, enhancing local business development.

Reversal of the pollution stereotype

Through environmental monitoring, inspection rounds and maintenance, plant restoration, and the dismantling of asbestos tile pollutants the hazards of land pollution were mitigated. Moreover, with the creation of a public art piece that can be appreciated over long-distances, cultural resources were enlivened so as to reverse the public's stereotype about pollution in the local area.

Linkage to Shui-Jin-Jiu Mining Culture Corridor

The site was linked to other municipal historic sites, including the Gold Temple and the Crown Prince Chalet, to form a mining culture corridor.

The project of "Lighting up 13 Layer Remains" has reproduced the history of mining in the form of large public art piece, allowing the public to reacquaint itself with the beauty of this mountainous city and bringing new life to local development.

A Grand Event Put Together by Entities in Different Sectors
—2019 Mid-Autumn Festival Lighting Ceremony

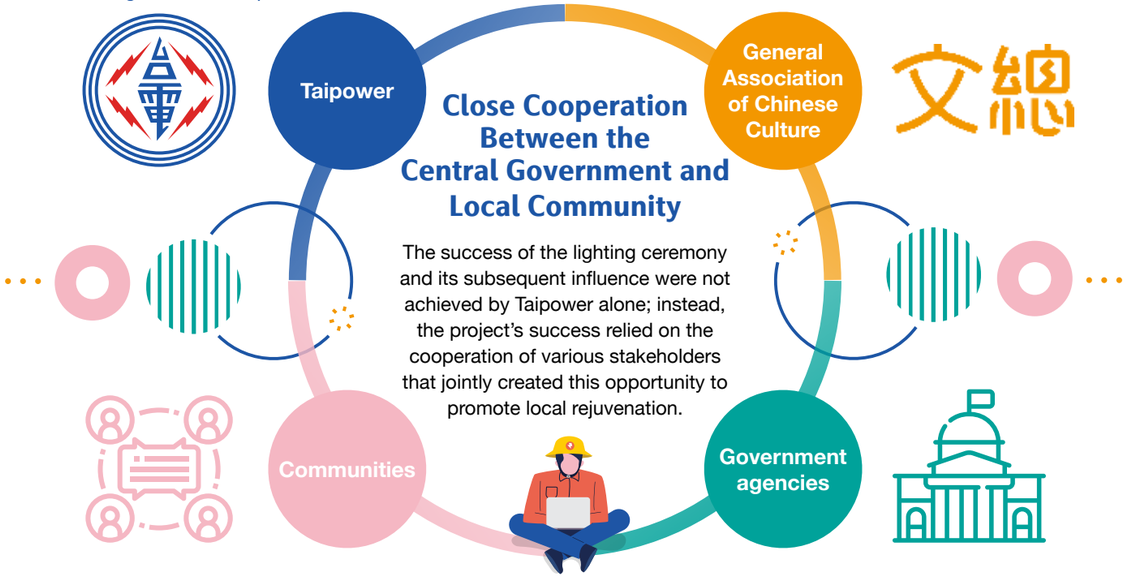
Lien Chou, a lighting design master who once led the lighting design of the Statue of Liberty in the US, was invited to design lighting while the artist Joyce Ho was invited to install the art for the project. On the night of the Mid-Autumn Festival, a time which symbolized family reunion in the ethnic-Chinese culture, the exhibit was introduced to the public with a lighting ceremony. During the lighting ceremony, the four seasons were displayed in order with a series of lights. In addition, the performance troupe "U-THEATRE" staged a performance with the theme of "Bright Island." The performance told the story of the sites historical and cultural heritage and invoked the depth of humanities to enhance the existing environmental beauty with the clever use of artistic creativity. The event conveyed the traditional strength and infinite tranquility of the rough site and attracted nearly 10,000 people on that day.

The project created a sensation beginning with the announcement of the public art project in March. Further news coverage focused on the signing ceremony that took place in mid-June, and on information that was broadcast through social platforms, the radio, tickers on cable TV from August to September. As a result, the project garnered a total of 214 pieces of media coverage by the end of October, and a total of more than 50,000 people browsed and watched relevant videos on digital live streaming platforms, the YouTube channel of the executing unit, and Taipower TV.

At present, the 13 Layer Remains are still lit up every night after the ceremony. With the lighting of spring, summer, autumn, and winter, diverse views are presented of the gentle and firm co-existence of the earth and sky.

Taipower cooperated with the central and local governments to effectively coordinate resources, sites, and various issues that arose, including applications pursuant to land pollution regulations, transportation, site rental, ground facility repair and relocation, and road repairs. The overall effort involved more than 20 central and local government departments and bureaus.

The General Association of Chinese Culture was responsible for the planning of software integration for this project, and its team conducted many on-site visits to overcome the unique terrain constraints and to gradually improve the software planning for this project.



Taipower continues to discuss follow-up development and benefits of the 13 Layer Remains lighting project with local non-profit organizations and opinion leaders.

The Keelung City Government strongly supported this event. In addition, the Northeast Coast National Scenic Area Administration and Tourism Bureau and the Ministry of Transportation and Communications provided assistance in promoting this event via push notifications. Their efforts significantly enhanced the effectiveness and reputation of the event.

Development of Sustainable Cultural Resources as the Next Step For Local Rejuvenation

The Gold Temple Renovation

The Gold Temple is a historic site in New Taipei City, that is also known as the Jinguashi Shrine. It was Taiwan's first completed Shinto shrine. Taipower has been renovating the Gold Temple by preserving the remains and protecting the pillars to prevent them from falling down. It is expected that the renovation will be completed by 2021 and an augmented reality (AR) experience will be added so that the public can visit the current site or use their mobile phones like time machines to experience the solemn atmosphere of the temple in the past.

The Crown Prince Chalet Restoration

In 2015, many parts of the study room and exterior walls of the Crown Prince Chalet were damaged by Typhoon Soudelor. As a result, Taipower has launched restoration work at the historical site. A budget of NT$50 million was allocated, and the work will be completed by 2023.

During the restoration of the Crown Prince Chalet, Taipower invited director Nien-Jen Wu, the son of a miner who was born in Ruifang, to produce an oral text for the Crown Prince Chalet, illustrating the history of the Crown Prince Chalet. In the future, it will be open to the public as an instrument for preserving the historical site and promoting it as a cultural asset.

Continuation of Local Development

The four-year public art project in the Jinshui area will come to an end in 2024. In the future, it is expected that the 13 Layer Remains, the Gold Temple, and the Crown Prince Chalet will be connected to develop a cultural asset travel trail, allowing visitors to see the beauty of all of the places at once. At that time, a landscape art festival will be held to allow more people to appreciate the beauty of the Jinshui area and to replace the former tourism model, in which the area's main attraction was the Gold Museum. It is hoped that starting with the 13 Layer Remains, the tourism and development of the entire Jinguashi area will be lit up.

Taipoiwer's Contributions to SDGs

SDGs	Connections between SDGs and Taipower	Related sections
6 CLEAN WATER AND SANITATION	Continual promotion of footprint inventories for power generation and water usage and inspection of the water usage status at various power plants to enhance water usage efficacy; Taipower will also ensure that wastewater discharged (including warm wastewater) is compliant with pertinent regulations to maintain the quality of water resources in the proximity of power plants.	3.4 Minimizing Environmental Impact
7 AFFORDABLE AND CLEAN ENERGY	Plan various renewable energy projects; improve operational and energy efficiency and continue to increase the availability and popularity of electricity.	2.2 Development of Renewable Energy 3.1 Strengthening Environmental Management 5.1 General Planning for Smart Grids 5.2 Action Plans for Smart Grids 5.3 R&D in Green Power
8 DECENT WORK AND ECONOMIC GROWTH	Achieve full, productive employment and decent work for all, including younger generations and those who are physically/ mentally challenged. Follow the principle of equal pay for equal work. Promote occupational safety and the protection of labor rights.	1.4 Corporate Transformation 1.7 Operational Performance 4.1 Human Resource Management Strategies 4.2 Enhancement Measures for Human Resources 4.3 A Sound Working Environment
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Improve the energy efficiency and resilience of power infrastructure. Promote the innovative development of eco-friendly technologies.	2.1 Planning for New Sources of Energy 2.2 Development of Renewable Energy 2.3 Providing Quality Electricity Service 2.4 Demand-Side Management 1.4 Corporate Transformation 3.1 Strengthening Environmental Management 3.2 Sustainability and Strategies for Low-carbon Electricity 5.1 General Planning for Smart Grids 5.2 Action Plans for Smart Grids
11 SUSTAINABLE CITIES AND COMMUNITIES	Reduce urban impact on the environment and focus on reducing air pollution and waste.	3.1 Strengthening Environmental Management 3.3 Reducing Use of Energy and Resources 3.4 Minimizing Environmental Impact 5.1 General Planning for Smart Grids 5.2 Action Plans for Smart Grids 5.3 R&D in Green Power
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Improve overall energy efficiency and resource requirements for generation, transmission, and distribution in order to reduce the environmental footprint of the power supply.	3.1 Strengthening Environmental Management 3.3 Reducing Use of Energy and Resources 3.4 Minimizing Environmental Impact 6.3 Strengthening Supplier Management
13 CLIMATE ACTION	Actively participate in adaptation projects and mitigation actions to improve energy efficiency, develop renewable energy and improve climate resilience in power generation systems.	2.1 Planning for New Sources of Energy 2.2 Development of Renewable Energy 2.3 Providing Quality Electricity Service 2.4 Demand-Side Management 3.1 Strengthening Environmental Management 3.3 Reducing Use of Energy and Resources 3.4 Minimizing Environmental Impact 5.1 General Planning for Smart Grids 5.2 Action Plans for Smart Grids 5.3 R&D in Green Power 6.3 Strengthening Supplier Management
15 LIFE ON LAND	Construct ecological power plants that protect the surrounding ecological systems.	3.4 Minimizing Environmental Impact
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	Emphasize corporate governance, integrity management and information disclosure. Ensure the smooth flow of communications and ensuring inclusive and representative decision-making at all levels.	1.2 Corporate Governance 1.5 Stakeholders and Material Topics 4.3 A Sound Working Environment 6.1 Integrity and Compliance 6.2 Stakeholder Communication and Engagement

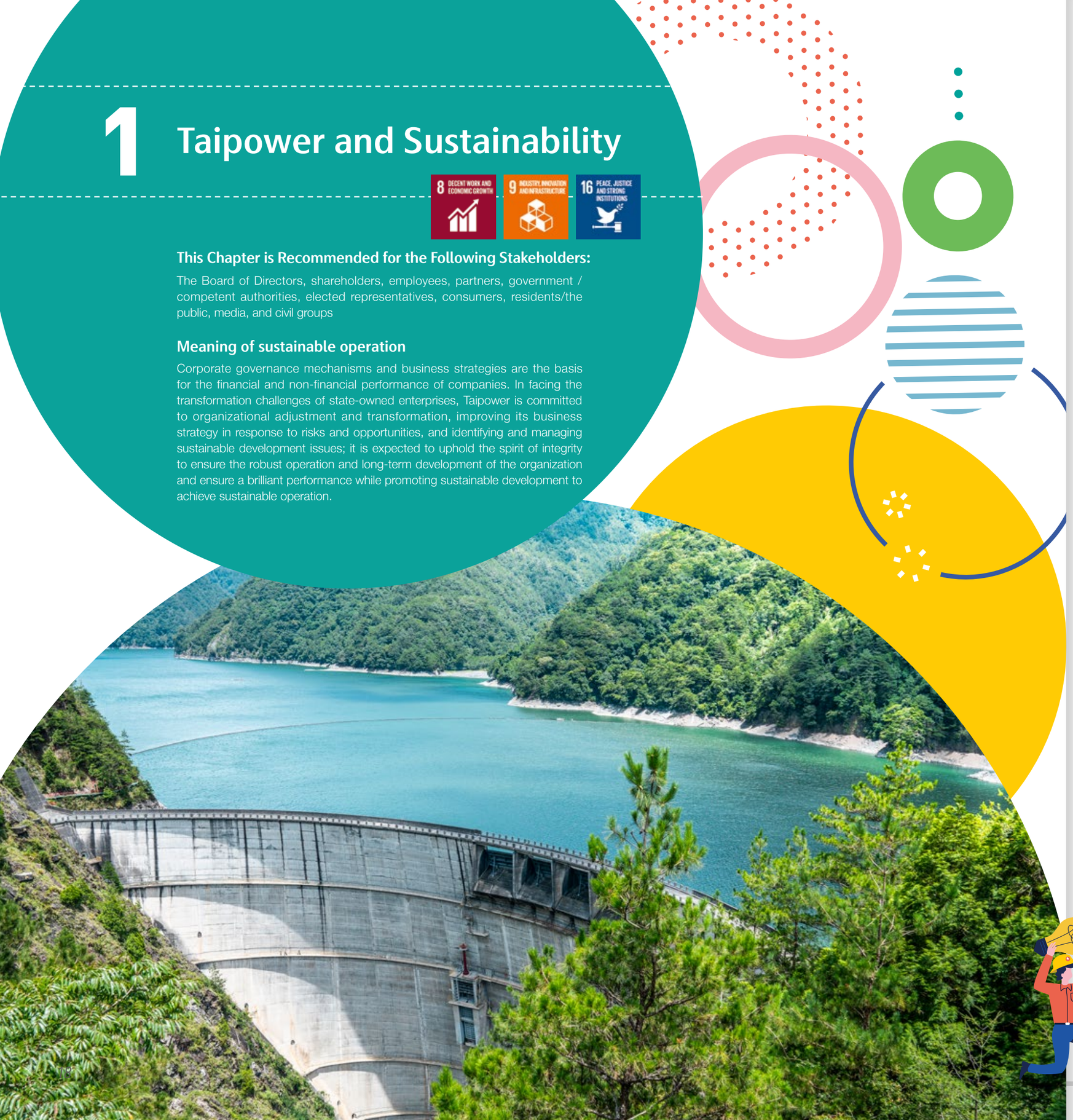
1 Taipower and Sustainability

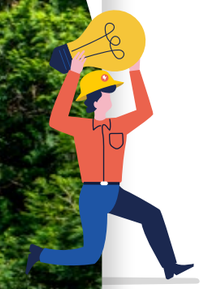
This Chapter is Recommended for the Following Stakeholders:

The Board of Directors, shareholders, employees, partners, government / competent authorities, elected representatives, consumers, residents/the public, media, and civil groups

Meaning of sustainable operation

Corporate governance mechanisms and business strategies are the basis for the financial and non-financial performance of companies. In facing the transformation challenges of state-owned enterprises, Taipower is committed to organizational adjustment and transformation, improving its business strategy in response to risks and opportunities, and identifying and managing sustainable development issues; it is expected to uphold the spirit of integrity to ensure the robust operation and long-term development of the organization and ensure a brilliant performance while promoting sustainable development to achieve sustainable operation.





Sustainable operation is mainly based on financial capital investment

As a state-owned power utility, Taipower has been the driving force behind Taiwan's economic development and continues to play a pivotal role in energy transition and government policy implementation. In this role, it is necessary to maintain a balance between reasonable electricity rates, quality and energy security. To this end, Taipower needs to maintain a stable corporate governance system and continually improve its financial efficiency. With sound financial capital utilization and investment planning, Taipower is able to establish a foundation for sustainable operations so that it can bear the responsibility of national energy planning and household energy use. Taipower does this while moving towards its goal of becoming a world-class power utility group.

Principle Investments

- Implementing sustainable business governance and planning through 8 general strategies for the future
- Establishing a Sustainable Development Commission (SDC) and held two Sustainable Development Commission meetings and 9 group meetings
- Planning three stages of corporate transformation and preparing to transform into a holding company by 2026
- Implementing risk assessment and response planning to ensure operational stability

Performance Highlights

- Formulated ***"Taipower's Sustainable Development Plan"*** and established sustainable development images, strategies and short-, mid-, and long-term targets
- Won the Investment in People Award at the ***Asia Responsible Entrepreneurship Awards in 2019***
- Ranked ***Number 1 in the Corporate Governance Evaluation*** of state-owned enterprises for four consecutive years
- ***91%*** average attendance rate for the Board of Directors and ***89%*** for independent directors at Board meetings

Future Plans

Taipower will continue to enhance its financial efficiency and keep cost and electricity rates reasonable by improving its operational efficiency, developing diversified businesses, improving the procurement performance of fuel and controlling operation and maintenance costs. In the future, Taipower will devote itself in transforming into a holding company and achieving its goal of becoming a prestigious world-class power utility group.

Awards and Recognition

Sustainable Governance

- The Investment in People Award at the ***Asia Responsible Entrepreneurship Awards in 2019***
- The Platinum Award at the ***2019 Taiwan Academy of Corporate Sustainability Awards***, a TOP50 Comprehensive Performance Award, a Circular Economy Leadership Award, and a Social Inclusion Award
- An Excellent Movie award at the ***2019 Taipei Golden Eagle Micro-Movie Festival*** along with awards for Best Original Script, Excellence in Cinematography, Excellence in Social Inclusion, and Excellence in Environmental Resources
- A series of awards from the Ministry of Education's ***Sports Administration in 2019***: a Sponsorship Award–Gold Class, a Sponsorship Award–Long-Term Sponsorship, and a Promotion Award Gold Class
- The Gold Award and Enterprise Contribution Award from the Ministry of Culture's "***14th Arts & Business Awards***"
- The ***2019 Taiwan Design Best100 Award – Inspirational Exhibition Award*** for Taipower's "Just Flow – 2019 Taipower Cultural Exhibition"
- ***The Outstanding Enterprise Award of the 16th National Brand Yushan Award*** by the Republic of China National Enterprise Competitiveness Development Association

Construction Management

- ***"Supporting Project - Environmental Upgrade of the Year," Silver Award for "Thermal Project - Coal Power Project of the Year," "Innovative Power Technology of the Year – Taiwan," and "Smart Grid Project of the Year – Taiwan"*** at Asia Power Magazine's 2019 Asian Power Awards
- ***The 19th Public Construction Golden Quality Award*** in the categories of facilities engineering and civil engineering by the Executive Yuan's Public Construction Commission
- A patented product was awarded the ***Bronze Award*** for ***Invention at the 2019 Taiwan Innotech Expo***

Operations Management

- Ranked number 1 by the Ministry of Economic Affairs' ***Corporate Governance Evaluation*** of State-owned Enterprises for four consecutive years
- The ***Best HRD Practice Outstanding Award*** at the 2019 ***IFTDO Global HRD Awards***
- The Excellence Award from the Ministry of Education's ***2019 Central Government Promotion of Employee Learning Systems*** for three consecutive years
- Ranked ***number 1*** in the Department of Personnel, MOEA's ***2019 Personnel Affairs Performance Evaluation*** of the Enterprises and Institutions Group
- The ***Learning Enterprise Award*** for ***Outstanding Organizational Learning Model*** from Taiwan Society for Organizational Learning
- Ranked ***number 9*** globally in the "Getting Electricity" category of ***Doing Business 2020*** published by the World Bank

1.1 Taipower Profile

1.1.1 Introduction

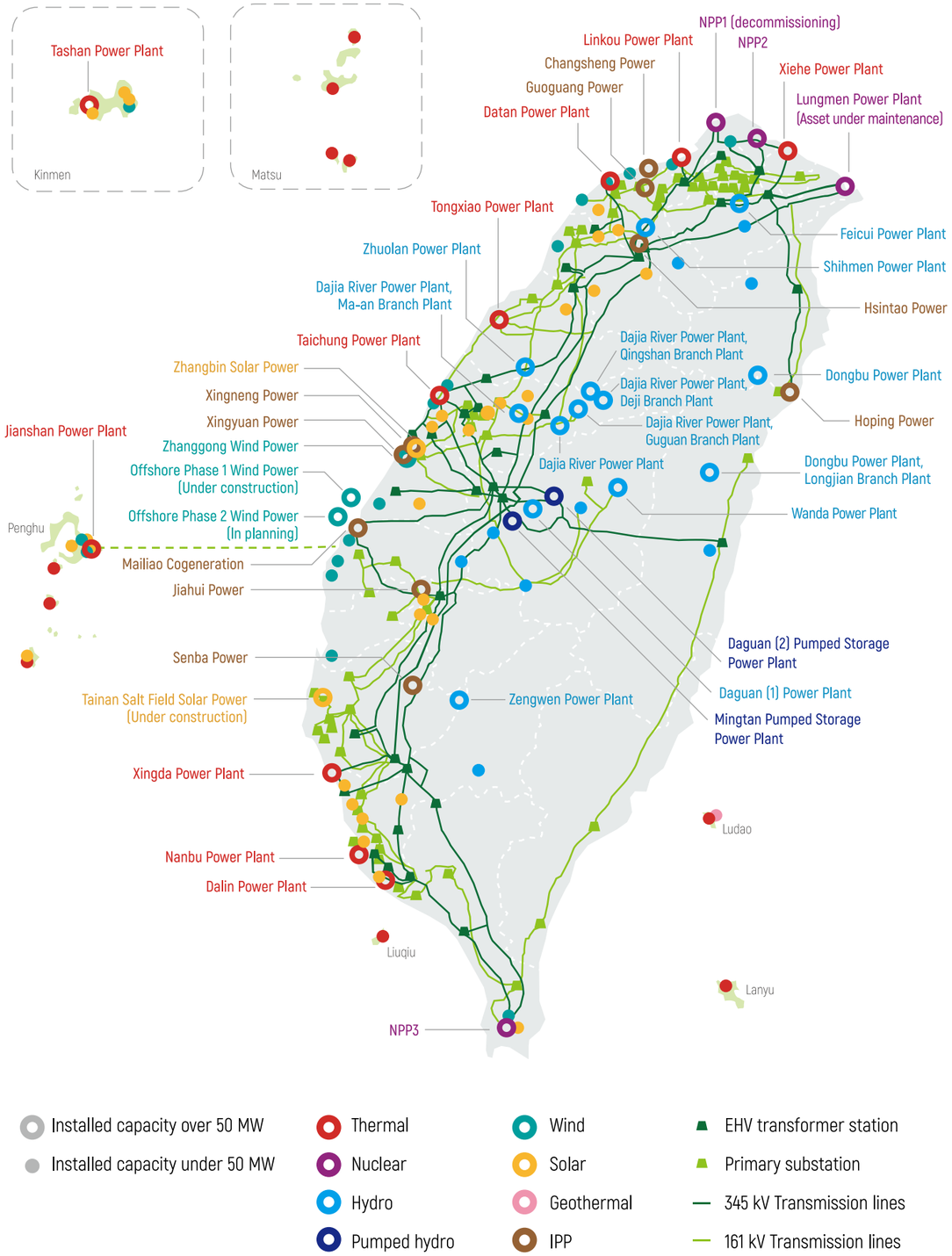
The Taiwan Power Company (Taipower), established on May 1, 1946, is a vertically integrated, state-owned enterprise engaged in the generation, transmission distribution, and sale of electricity. According to the Electricity Act, Taipower is responsible for supplying electricity. Of the total revenue in 2019, revenue from electricity sales accounts for 89%. As of 2019, the Taipower system (including independent Power Plants, IPPs) had a total installed capacity of 47.78 GW from different energy sources including hydro, renewable energy, thermal and nuclear. There were 617 substations operated by Taipower, 17,691 circuit kilometers of transmission lines, and 378,920 circuit kilometers of distribution lines.

Like much of the global power industry, Taipower is focused on the trend of sustainable development for the electricity market of the future. Taipower has revised its corporate mission in recent years and promoted organizational transformation. In January 2016, the Company established four business divisions, namely, the Power Generation Division, the Nuclear Power Division, the Transmission System Division, and the Distribution and Service Division. As a result, the headquarters and business divisions have adopted policy centralization and management decentralization, in an effort to transform from a government agency into a highly efficient enterprise. In the future, Taipower will abide by the requirements of the Electricity Act and transform into a holding company which aims to promote market competition, enhance business operation efficiency and promote corporate sustainability. This will allow Taipower to become a prestigious, world-class power utility group that provides its customers with the highest quality of services.

Founded	May 1, 1946
Coverage	Taiwan, Penghu, Kinmen and Matsu areas
Headquarters	Taipei
Capital	NT$ 330 billion
Stock	96.92% government-owned; 3.08% private owned
Total Assets	NT$2,075.64 billion
Operating Revenue	NT$595.11 billion
Employees	27,606
Customers	14.38 million
Installed Capacity	47.78 GW in the Taipower system (Taipower-owned: 35.14 GW)
2019 Power Generated and Purchased	232,472 GWh

Old East-West Line Transmission Towers

1.1.2 Taipower's Power Plants and Power Grid



1.1.3 Mission and Vision

The power industry is faced with an "energy trilemma," as it seeks to achieve three goals: energy quality, energy security, and environmental sustainability. In response to global climate change, domestic energy transition, and the competition resulting from the liberalization of the electricity market, Taipower revised its corporate mission, vision, and management philosophies in 2015. It is expected that these changes have headed Taipower in the right direction and that the employees will continue to hold positive attitudes at work allowing the Company to transform into an excellent and sustainable power utility group.

Our Mission

To supply stable and eco-friendly power at a reasonable cost to support economic and social development

- Power is a crucial cornerstone of people's daily lives and corporate growth. Thus, power reliability has always been a fundamental mission for the Company. We shall keep abreast of developing environmental, social, and technological trends to keep pace with the times, fulfill our responsibilities to the earth, and to provide the power necessary for society's diversified development needs at a reasonable cost.
- The energy industry takes resources from the Earth. The Company is committed to cherishing those resources and abides by environmental regulations, develops renewable energy with a proactive attitude, and is introducing low-carbon and low-pollution power sources. Moreover, Taipower is integrating power plants and maintaining ecological systems for local resources, cultivating green attitudes among employees, and establishing a green supply chain along with its partners to extend the influence of such actions into the broader society and advance toward becoming a green enterprise.
- With the improvement of living standards, people have higher requirements for power quality and services. We will strengthen customer relationship management and provide differentiated tangible services based on the needs of different consumers and enterprises through technology and smart applications to achieve a power-based life.
- In recent years, independent power producers, cogeneration plants, and renewable energy providers have joined the power system making power sources increasingly diversified. The Company will maintain an open attitude as it works with all its power supply partners and stakeholders to stabilize the power supply at a reasonable cost.
- In response to the challenges of the future electricity market, we will gradually transform ourselves from a government agency into an enterprise. This will increase the Company's cost consciousness and create enterprise value, in order to improve operating efficiency and pursue the sustainable operation of the Company.

Our Vision

To transform into a prestigious, trustworthy world-class power utility group

- Excellence: The management team leads all employees to achieve the goals of achieving excellence and sustainable development. Taipower will endeavor to improve its management and business performance in order to compete with international benchmark power companies while constantly improving itself so that it can grow along with its customers and society. This will allow the Company to evolve into an outstanding and sustainable power utility group.
- Trustworthiness: Earning the public trust has long been a top priority. As a company, Taipower maintains a professional, down-to-earth, diligent and responsible attitude. As the organization strives to improve its operations and the reliability of the power supply, it is seeking an open, diverse, green and culture-oriented attitude toward enhancing corporate governance. Guided by the philosophies of integrity, caring, service and growth, Taipower will build stakeholders relationships based on mutual assistance and trust to become an indispensable partner of the public.
- A world-class power utility group: Taipower will continue to aggressively develop its corporate and associated operations in order to cultivate competitive advantages and face the wave of electricity market liberalization. Taipower will capitalize on opportunities for business expansion into emerging sectors such as energy saving and green energy. Collaborating with business partners to enter offshore markets will also help the business grow.

1.1.4 Management Philosophy and Strategy

Management Philosophy

Taipower's corporate culture values **people first** in the **pursuit of excellence**.

"People first" conveys a sense of **integrity** and **caring**.

"In pursuit of excellence" conveys a sense of **service** and **growth**.

Integrity	To conduct business cleanly and without forgery or violation of laws and ethics; to build mutual trust within teams through communication; to be genuine and keep the promises in order to gain the trust of employees and of the public.
Caring	To take the initiative to understand the needs of people, the environment and society and to fulfill our corporate social responsibilities of caring, green sustainability, altruism and co-prosperity
Service	To supply safe and reliable power and to provide accountable and enhanced services that gain recognition from domestic and foreign customers.
Growth	To establish an organization with a knowledge sharing culture that helps staff develop critical thinking and keen observation. By facing challenges and improve problem-solving skills, we will be able to have growth in the workplace, in teams and in our lives.

Management Strategy

As a state-owned enterprise, Taipower must provide reliable power and be eco-friendly while implementing national energy policies that meet business and household needs. To achieve this, Taipower manages the development of green energy, the reduction of carbon emissions and the saving of energy while complying with the latest amendments to the Electricity Act. Taipower conducted a review of its current operations before analyzing and summarizing important factors affecting operations and setting 8 strategies as a direction for the next five years.

Following the establishment of the "overall strategy," the Chief Executive Officer of each business division/system or the Vice President will lead their employees to conduct joint discussions and develop action plans and concrete actions, in order to effectively implement the strategies in practice. Based on the classification of relevant contents and a balanced scorecard, 25 corporate goals were set, and the subsequent promotion will be incorporated into the Company's target and review systems for management and control. Under the framework of the Plan-Do-Check-Act (PDCA) corporate management cycle, annual, rolling adjustments and improvements will made to enhance Taipower's growth momentum as it moves toward sustainable operation.

Company Objectives

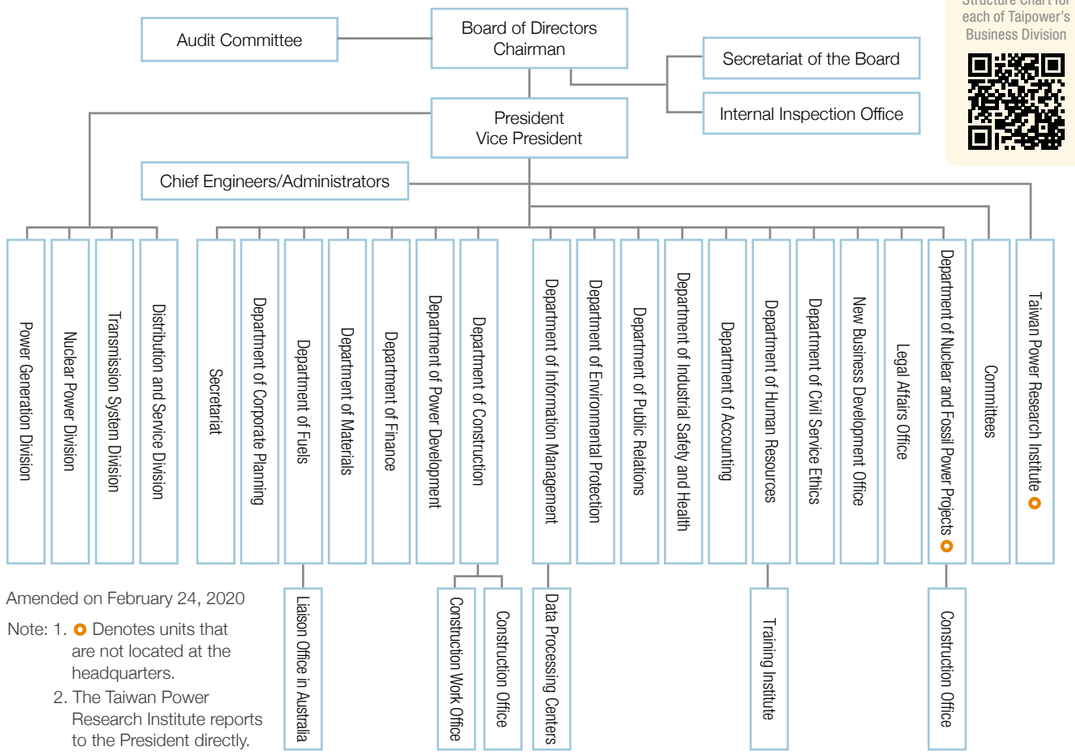
Dimension of Balanced Scorecard	Objectives
Finance	• Complying with the rate control mechanism and reach the annual earnings target • Controlling capital expenditure in the electricity industry • Improving the provision of fuels and materials and operational performance • Promoting new businesses and managing investments
Customers	• Improving Taipower's corporate image • Promoting demand response and energy conservation • Providing customers with value-added services
Internal Business Processes	• Implementing power source development plans • Ensuring the stable operation of power-generating units • Abiding by the mission of being environmentally friendly and achieving the vision of becoming a green enterprise • Ensuring the safe and stable operation of nuclear power plants • Researching and applying key technologies • Planning and establishing ancillary services and a capacity reserve trading pilot platform • Improving the resilience and power supply capabilities of the power grid • Promoting the application of the smart grid • Planning the transformation into a holding company with subsidiaries • Improving hazard identification knowledge and ability • Promoting virtual reality training for industrial safety • Strengthening contractor operational safety • Striving for occupational safety and health awards • Improving industrial safety performance • Promoting the decommissioning of nuclear energy units and the treatment and disposal of nuclear waste
Learning and Growth	• Developing and managing human resources and skill inheritance • Promoting employee care and growth • Strengthening talent cultivation and learning effectiveness

1.2 Corporate Governance

1.2.1 Organizational Structure

Currently, Taipower consists of 16 departments and offices along with four business divisions that include the Distribution and Service Division, the Transmission System Division, the Nuclear Power Division and the Power Generation Division. In addition, subordinate units and commissions such as the Taiwan Power Research Institute and the Department of Nuclear and Fossil Power Projects and have been established according to the needs of specific operations. In response to the most recent amendments to the Electricity Act, Taipower is planning to transform into a holding company consisting of 2 subsidiaries, namely, the Generation Company (Genco) and the T&D Co. with Retailer.

Taiwan Power Company - Organizational Structure Chart



Organizational Structure Chart for each of Taipower's Business Division

Amended on February 24, 2020

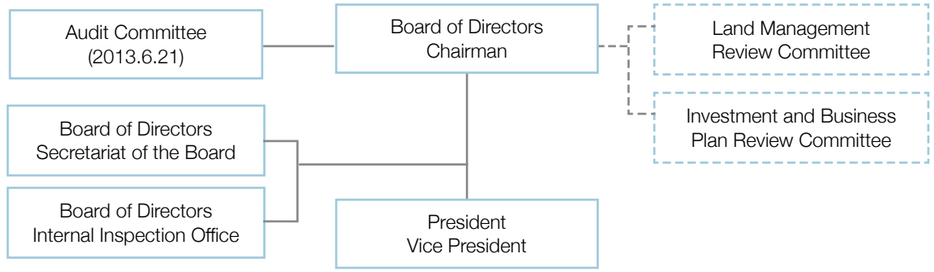
Note: 1. ⭘ Denotes units that are not located at the headquarters.
2. The Taiwan Power Research Institute reports to the President directly.

1.2.2 Board of Directors

The Structure of the Board of Directors

According to Taipower's Articles of Association, the Board of Directors consists of 15 directors that are elected at the shareholders' meeting. In accordance with the provisions of the Securities and Exchange Act, the Board shall reserve three seats for independent directors, who also make up the Audit Committee. The Board of Directors shall elect five managing directors from among the directors, and one of the elected shall be an independent director. The term of service for directors (including independent directors and managing directors) lasts for two years and each director is eligible for reelection. Pursuant to the Administrative Law of State-Owned Enterprises, at least one fifth of the directors of each state-run enterprise that represent state capital shall be recommended by the relevant labor union. Thus, Taipower's board includes five managing directors (one of whom serves as an independent director), three independent directors, and three labor directors that represent Taipower's employees. In addition, the Audit Committee (consisting of the three independent directors) was established as the result of a Board of Director's election during the shareholders' meeting held on June 21, 2013. The Audit Committee replaced the previously-existing position of Supervisors.

Board of Directors Organizational Structure Chart



Members of the 2019 Board of Directors

Title	Name	Concurrent Position	Remarks
Chairman (Managing Director)	Yang, Wei-Fuu	Chairman of Taipower	Reappointed
President (Managing Director)	Chung, Bin-Li	President of Taipower	Reappointed
Managing Director	Lin, Faa-Jeng	Chair Professor, Department of Electrical Engineering, National Central University	Reappointed
Managing Director	Chang, Tien-Chin	Professor, Institute of Environmental Engineering and Management, National Taipei University of Technology	Newly appointed
Managing Director (Independent Director)	Fang, Liang-Jyi	Member of the Atomic Energy Council, Executive Yuan	Reappointed
Director (Independent Director)	Hsu, Jyh-Yih	Professor, Department of Management Information Systems and Department of Applied Economics, National Chung Hsing University	Reappointed
Director (Independent Director)	Liu, Chi-Chun	Professor, Department of Accounting, National Taiwan University	Reappointed
Director	Liu, Pei-Ling (Female)	Distinguished Professor, Institute of Applied Mechanics and Director of Center of Innovation and Synergy for Intelligent Home and Living Technology, National Taiwan University	Reappointed
Director	Lin, Tze-Luen	Associate Professor, Department of Politics, National Taiwan University and Deputy CEO of the Office of Energy and Carbon Reduction, Executive Yuan	Reappointed
Director	Chiang, Ya-Chi (Female)	Associate Professor, Graduate Institute of Intellectual Property, National Taipei University of Technology	Newly appointed
Director	Cheng, Eng-Two	Head of the Third Division, State-Owned Enterprise Commission	Reappointed
Director	Chuang, Ming-Chih	Head of Planning Division, Bureau of Energy, Ministry of Economic Affairs	Newly appointed
Director (Labor Director)	Peng, Chi-Tsung	Inspector, Department of Power Supply, Taipower/ (Taiwan Power Labor Union Representative)	Newly appointed
Director (Labor Director)	Liao, Chan-Ping	Technical Specialist, Taitung Branch Office, Taipower/ (Taiwan Power Trade Union Representative)	Reappointed
Director (Labor Director)	Lu, Te-Sheng	Technical Specialist, Mingtan Power Plant, Taipower/ (Taiwan Power Trade Union Representative)	Newly appointed
Director	Kuo, Chao-Chung	Senior Technical Specialist, Department of Industrial Technology, Ministry of Economic Affairs	Previously Appointed
Director (Labor Director)	Huang, Lien-Chung	Taipower Technical Specialist/(Taiwan Power Labor Union Representative)	Previously Appointed
Director (Labor Director)	Tsuei, Kuo-Li	Taipower Technical Specialist/(Taiwan Power Labor Union Representative)	Previously Appointed

Note: 1. A general shareholders' meeting was held in June 2019 to re-elect directors. Currently, there are 15 directors.
2. The previously appointed directors retired in June 2019.

Function and Effectiveness of the Board of Directors

The Board of Directors bears responsibility for establishing and maintaining the vision of the Company, determining corporate strategies, supervising the management, and being accountable to the stakeholders. As a state-owned enterprise, Taipower not only operates its own businesses, but also plays the role of public policy executor. Therefore, Taipower's Board of Directors pays particular attention to the objectives, strategies, and management methods of ethical management and sustainable governance. The following section covers the operations of the Board of Directors:

Board of Directors Operations

In 2019, the Board convened 15 meetings, with an average attendance rate of 91% for all directors. The minutes of the monthly Board meetings are disclosed on both Taipower's intranet and official website. Meeting resolutions to be executed by respective divisions are recorded and their execution statuses are tracked.

Board of Directors Project Review Meetings

The Board of Directors has established Land Management Review and Investment and Business Plan Review Committees. Both committees are responsible for reviewing materials and/or important issues proposed by relevant departments in advance, such as land purchase or sale, major engineering investment plans, and the Company's operating budget; providing specific opinions to the Board before board meetings, and assisting the Board of Directors in making decisions. In 2019, the Land Management Review Committee convened seven meetings and the Investment and Business Plan Review Committee convened 11 meetings.

Managing Directors Meetings

Managing directors are required to assemble and exercise their powers as directors in accordance with pertinent regulations, the Articles of Association, shareholders' meeting resolutions and board meetings resolutions during recesses of the Board of the Directors. In 2019, five Managing Directors' Meetings were convened, with an attendance rate of 96% for all managing directors.

Operation of Independent Directors and the Audit Committee

Taipower's Audit Committee is comprised solely of the independent directors serving on the Board. The committee is responsible for the review and modification of the Company's internal control systems and their effectiveness, the acquisition and disposal of assets, the lending of funds, the appointment/dismissal of heads of finance, accounting, and internal audits, financial reports, etc. In 2019, the Audit Committee held six meetings in total.

Pursuant to the Securities and Exchange Act, when independent directors raise dissenting or reserved opinions at Board meetings, the said opinions shall be duly noted in the meeting minutes and published on the "Market Observation Post System (MOPS)." In 2019, independent directors had an average attendance of 89% and expressed no dissenting or reserved opinions. They actively participated in the operation of the Audit Committee and the Review Commission and performed their duties to assist with corporate governance.

Effectiveness of the Shareholders' Meeting

Taipower held its Shareholders' Meeting on June 21, 2019 in accordance with the provisions of the Company Act and Taipower's Articles of Association. The meeting was held to report to the shareholders, acknowledge and discuss specific matters with participants, as well as elections. The meeting also included the presentation of the 2018 Business Report, the Audit Committee's 2018 Financial Statement and Loss Appropriation Report, the 2017 Closure of Accounts and Loss Appropriation Report that was also reviewed and certified by the National Audit Office, the 2018 Partial Adjustments to Property, Plant and Equipment Durability Report, the 2019 Partial Adjustments to Property, Plant and Equipment Durability Report, and the 2018 Corporate Bond Report.

Performance Assessment of the Board of Directors

In order to improve Taipower's corporate governance and the efficacy of its Board of Directors, Taipower established a Board of Directors Performance assessment criteria in 2016 by referring to the Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies. At the end of each fiscal year, the Company conducts a performance assessment of its Board of Directors (including the Audit Committee) in accordance with the process and criteria prescribed in the procedure and reports the results of the assessment during the Board meeting in March of the following year. The performance assessment of the Board of Directors for 2019 has already been implemented in accordance with the pertinent regulations and the results were duly disclosed in the Board of Directors section of Taipower's official website.

With the guidance and supervision of the Board Directors, Taipower continued to strengthen its internal control systems for corporate governance in 2019 by implementing three defense mechanisms for internal control. This initiative led to Taipower being honored with the Number 1 ranking in the corporate governance evaluation for state-owned enterprises.

Disclosure and Transparency of Corporate Governance Information

Information on the organizational structure of the Board of Director and the Audit Committee as well as details of the operation of the Board are disclosed in the Board of Directors and Corporate Governance sections of Taipower's official website. The information was also added to the 2019 Taipower Annual Report to the Shareholders' Meeting and disclosed on MOPS.

Continuing Education for Directors

In 2019, a total of 53 directors (including independent directors) participated in corporate governance related training courses. Attendants completed a total of 167 training hours. The corporate governance topics of the courses, forums, and seminars included finance, risk management, sales, technology, legal affairs, management, and environmental protection, among other subjects.

Planning of Future Operations for the Board of Directors

To ensure improvement in the operational performance of the Board of Directors, the following plans have been made for 2020:

Continual enhancement of Directors' Communication with Management as well as Knowledge and Understanding of Taipower's Operations

In line with the execution of business initiatives or significant issues of public concern, Taipower will arrange 1 to 3 presentations during monthly board meetings with a rolling forecast review of monthly topics. Adjustments may be made to the presentation schedule at any time depending on actual operational needs. In the near future, Taipower will continue to arrange director visits/inspections at the sites of the Company's major projects, allowing directors to understand the actual situation. The management will also invite directors to participate in relevant task forces so they can offer consultation on relevant issues and in order to raise the directors' awareness of Taipower's operations and ensure their professional input is included in the decision-making process.

Continual Improvement of the Performance Evaluation System

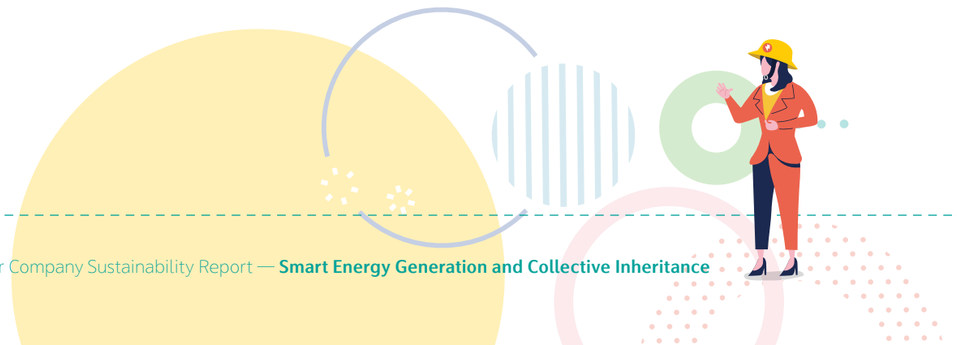
Taipower will keep abreast of local and global trends in corporate governance so as to implement continual reviews and improvements of its performance evaluation system for the Board of Directors and the aforementioned committees/commissions. This will help the Company move toward an ideal performance evaluation system, which in turn will boost Taipower's efficacy in corporate governance.

Mechanism to Recuse Conflicts of Interest

Pursuant to Taipower's Board of Directors Meeting Bylaws, directors are required to declare any conflicts of interest they may have regarding issues on the agenda for Board meetings. Directors must recuse themselves from participating in and voting on matters in which they have conflicting interest. The recused directors are also not allowed to represent other absent directors in such votes as their proxies. Prior to each Board meeting, reminders of these conflict-of-interest recusal rules are stated in meeting notifications. Taipower's "Organizational Rules for the Audit Committee" also has the same requirements for independent directors, and its meeting notices also contain reminders to avoid conflicts of interest.

Remuneration Policy

Taipower is a state-owned enterprise, and hence, the standards for remuneration of its directors (including the Chairman) are set by the competent authorities (i.e., the Ministry of Economic Affairs) and reported to the Shareholders' Meeting in the absence of a Remuneration Committee. Apart from monthly compensation, independent directors may not collect earnings distributions, year-end bonuses, or other forms of compensation. As directors designated by the labor union fall under the category of Taipower employees, their compensation is determined in accordance with the "Basic Principles of Employee Compensation Authorization for State-Owned Businesses" and the "Management Guidelines Governing Remuneration for Employees of Subordinate Units under the MOEA." They many not collect the remuneration paid to other directors. In 2019, the remuneration for Taipower directors (including the chairman, independent directors and labor directors) constituted 0.0789% of the Company's net income after tax.



1.3 Corporate Sustainable Governance

1.3.1 Sustainable Development Commission

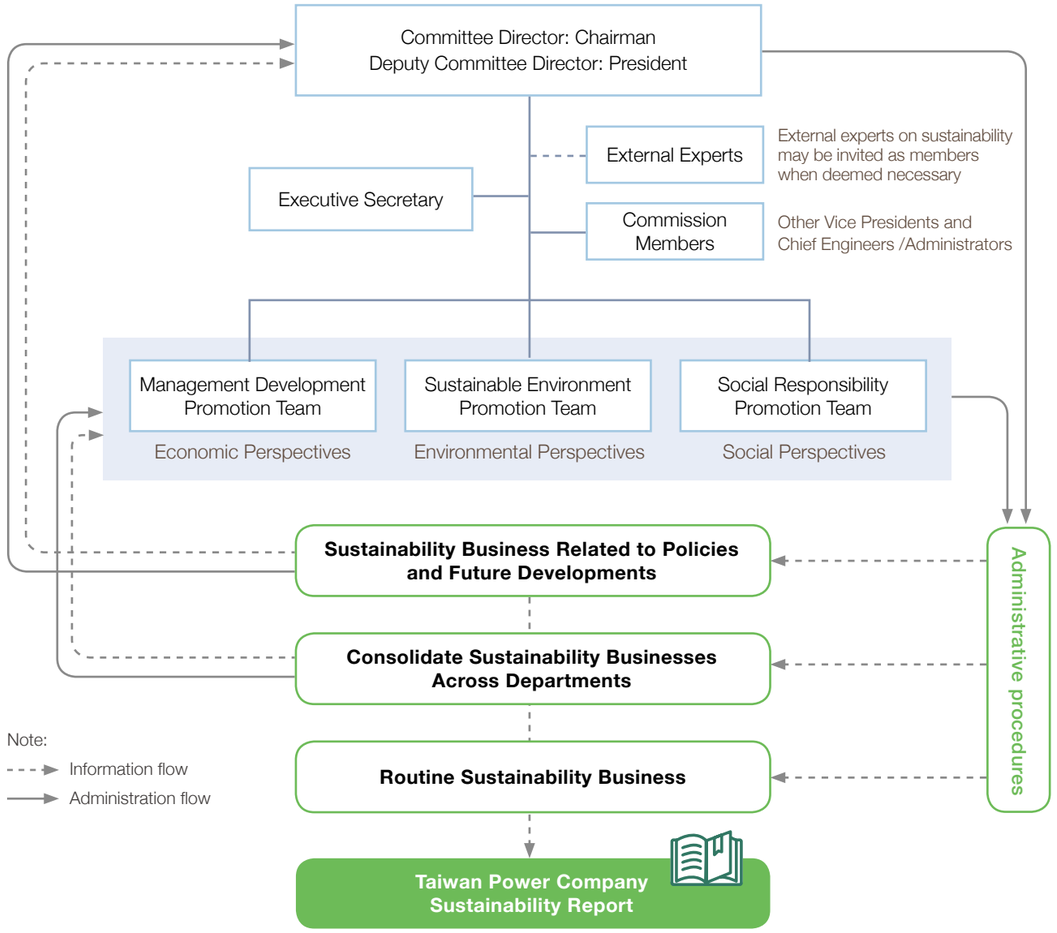
In 2009, Taipower established a Sustainable Development Commission (SDC) dedicated to sustainable development programs and initiatives. To ensure that the SDC are more aligned to Taipower's needs for sustainable development, adjustments will be made to its structure and functions after approval by the Chairman.

Sustainable Development Commission Structure and Formation

The Chairman is the person in charge of the SDC as it leads Taipower toward sustainable development. The President serves as the SDC's Deputy Director and the membership of the commission is composed of the Company's Vice Presidents and Chief Engineers (Managers). This ensures a top-down approach to sustainable development.

The SDC has three subordinate promotion teams: The Management Development Promotion Team, the Sustainable Environment Promotion Team, and the Social Responsibility Promotion Team. As coordinators, Vice Presidents are responsible for planning and promoting sustainable development.

Structure of Sustainable Development Commission



Operating Mechanisms of the Sustainable Development Commission

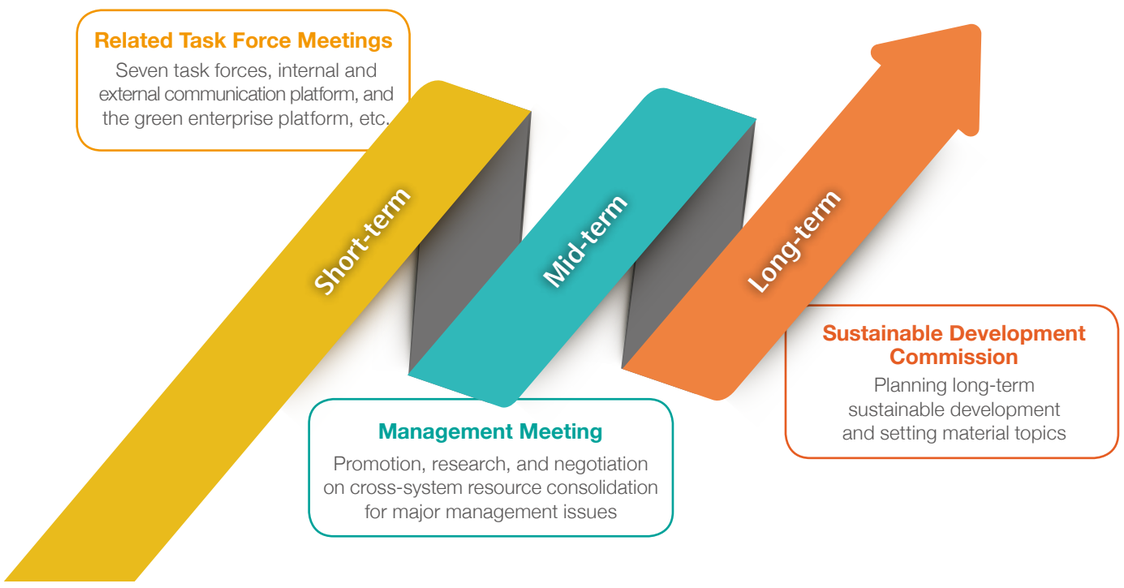
The SDC is responsible for making long-term development strategies and steering the Company on the right path by identifying material topics. The SDC reports on its strategies and plans in management meetings and annual business review meetings. These meetings aim to integrate resources across departments and assure effective negotiations over material topics. In addition, the SDC is responsible for setting specific mid-term objectives and their corresponding strategies, as well as action plans and solutions to achieve those objectives. These plans are incorporated into the annual Future Management Strategies Report which states Taipower's overall strategies and objectives as well as operational issues and action plans that concern sustainable development. The report also reviews the rolling plan for Taipower's future development. After future management strategies have been reviewed in management meetings, task forces carry out short-term annual strategic action planning and update their progress status regularly.

Task forces meetings, management meetings and the SDC are responsible for short, medium and long-term strategic planning and execution, respectively. Their responsibilities and performances in 2019 are shown below.

Strategic Category	Meeting Responsible	Responsibilities	Operational Performance in 2019
Medium/ Long-Term Strategy	Sustainable Development Commission	Planning long-term sustainable development and identifying material topics	1 meeting was held
	Management Meeting	Formulation and execution of mid-term management strategies	21 meetings were held (once every two weeks)
Short-Term Strategy	Related task force meeting/ project platform	Formulation and execution of short-term annual strategies	Irregular meetings held by each task force

In 2019, the SDC held meetings to discuss the following topics – Identifying Mission, Setting Targets, and Collaboration. For task forces, Taipower actively held 9 meetings for various task forces in 2019. Moreover, the five major dimensions of Taipower's sustainable development, namely "Provider of Sustainable Power," "Smart Grid Leader," "Service Provider for Smart Living," "Agent of Environmental Friendliness," and "Practitioner of Corporate Social Responsibilities" were adopted as the main pillars of promotion. Relevant departments were convened to communicate the Company's sustainable development promotion plans, examine the results of the sustainability highlight projects for the previous year, and further study the sustainable development strategies for each major image while confirming the corresponding SDGs, and establishing short-, mid-, and long-term quantifying targets. Through relevant meetings, the understanding and participation of various departments in the promotion of sustainable development of Taipower were enhanced effectively, which would help Taipower continue to deepen the integration of sustainable development and organizational operations.

Functions of SDC and Task Force Meetings



With three functional teams, the SDC is able to analyze changes in the external environment and policies. Based on this analysis, the SDC plans Taipower's long-term sustainable development and identifies material topics that will be reviewed and commented on by Vice Presidents and external experts. Under the guidance and supervision of the Chairman, the SDC also summarizes its annual achievements.

The routine business of each team is executed in line with Taipower's administrative procedures. When it comes to cross-department business, coordinators arrange meetings for discussions and conclusions in accordance with Taipower's bylaws. Key issues concerning corporate strategy and future development are also submitted to the SDC for resolution.

Key Tasks of the SDC

Management Development Promotion Team

The Management Development Promotion Team devotes itself to Management planning and reform. It assists Taipower to become a world-class power utility group and to pursue excellence. The group gives Taipower guidance and direction by establishing corporate vision and philosophy, management structure, and planning. In addition, the team carries out management improvements, power industry liberalization, organizational transformation, and diversified management so as to strengthen Taipower's corporate operations.

Sustainable Environment Promotion Team

The Sustainable Environment Promotion Team is committed to helping Taipower build a green corporate image, developing low-carbon energy, and fulfill its mission of being eco-friendly. The team formulates environmental policies, sets environmental goals, and takes measures to make the Company more eco-friendly.

Social Responsibility Promotion Team

The Social Responsibility Promotion Team has two primary roles. First, the team helps Taipower implement its principle of "putting people first" by enhancing company culture through cultural (e.g. the gallery) and employee care activities (e.g. Employees' Heart-to-Heart). Second, the team helps Taipower build corporate citizenship and make contributions to social charities by increasing social engagement.

1.3.2 Sustainable Development Strategies and Goals

In order to demonstrate Taipower's determination to promote the 2030 United Nations Sustainable Development Goals (SDGs) and establish a strategic framework for sustainable development, Taipower convened the Sustainable Development Commission in 2020 and invited external experts to jointly study and identify five primary goals that were most applicable to Taipower's sustainable operation. These are: "SDG7 Affordable and Clean Energy," "SDG9 Industry, Innovation and Infrastructure," "SDG11 Sustainable Cities and Communities," "SDG12 Responsible Consumption and Production," and "SDG13 Climate Action." Taipower then further analyzed its business strategies to identify the five major areas of future development and formulated various strategies for 2020, 2025, and 2030 respectively. The Company further established short-, mid-, and long-term targets for each business activity in a clear and quantifiable manner. This approach will allow the Company to continuously make improvements through annual rolling reviews of the sustainable development blueprint as a key work and plan to follow.

Taipower's Sustainable Development Plan

	SDGs	Strategy	Corresponding Targets	Short-term Goals (Until 2020)	Mid-term Goals (Until 2025)	Long-Term Goals (Until 2030)
Provider of Sustainable Power Improve power generation efficiency, increase the proportion of clean and low-carbon energy, and take into account energy security and economic development, while actively promoting energy transition to provide stable and sustainable power based on environmental sustainability	7 AFFORDABLE AND CLEAN ENERGY	Promote renewable energy power generation plans and expand the development of zero carbon energy	**The accumulated total capacity of Taiwan Power Company**	2,494MW	3,108MW	3,928MW
			Grid connection capacity of Taipower system	10,807MW	29,602MW	34,962MW
		Promote low-carbon energy gas-fired power generation plans to ensure a stable power supply	**Cumulative total capacity**	13,149MW	19,945MW	25,924MW
		Improve the power generation efficiency of traditional thermal power-generating units, reduce consumption of fossil energy through recycling, and improve the quality of the living environment	**The average power generation efficiency of Taiwan Power Company's own thermal power-generating units (excluding externally purchased power)**	Higher than 40%	Higher than 45%	Higher than 47%
	3 GOOD HEALTH AND WELL-BEING	Increase the proportion of self-produced energy (renewable energy) and maintain the long-term power supply in order to reduce risks to the energy supply chain in the fight against infectious diseases	**Self-produced (renewable energy) in the Taipower System Proportion of power generation**	7.1% (approximately 17.4 billion kWh)	19.6% (approximately 51.1 billion kWh)	24.1% (approximately 68 billion kWh)
	13 CLIMATE ACTION	Impact of climate change on the power supply side and adaptation	**Reliable power supply in extreme weather**	Collect the actual value of renewable energy power generation and extreme climate events in the past five years, and complete a quantitative assessment of the impact of climate change on renewable energy on the power supply side	Consider the impact of climate change on renewable energy on the power supply side, incorporate it into overall power supply development, and complete the evaluation and results of its impact on the reliability of the system power supply	Add new facilities, such as pumped-storage hydroelectricity or economically feasible large-capacity energy storage to power development plans to improve the reliability of power supply in extreme climate events
Leader of Smart Grid Development Promote the construction of smart grids, strengthen the key telecommunication infrastructure, expand the application of big data and AI, and enhance the self-healing capacity of the system to ensure a stable power supply.	7 AFFORDABLE AND CLEAN ENERGY	Increase the quantity of energy storage equipment built on company-owned sites, and expand rapid auxiliary services for procurement	**Cumulative storage capacity on owned sites**	Reaches 24MW (Self-built 9MW + purchased 15MW; rolling review)	Reaches 590MW (Self-built 160MW + purchased 430MW; rolling review)	Reaches 590MW (Self-built 160MW + purchased 430MW; rolling review)
	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Strengthen information security, build a cloud data center, and improve backbone/regional fiber communications capabilities	**Information security protection**	Complete the construction of 3 pilot sites that integrate all the operations offices in the six power supply regions in the Security Operation Center (SOC) for monitoring	Complete the security protection and intrusion detection systems (IDS) at 32 sites for all independent system operators and include them in SOC monitoring	Continue to improve the overall security protection capabilities of the smart grid
			Cloud data center construction	Build big data analysis and data sharing platforms	Complete the construction of two cloud data centers (Yuan-Hsin and Changhua), which can accommodate 600 cabinets	Complete the construction of the cloud data center (Taichung), which can accommodate 1,200 cabinets
		Promote applications of big data and AI in the operation and maintenance of information in transmission systems to reduce the System Average Interruption Duration Index	**System Average Interruption Duration Index**	Reduce to 16 (minutes/household・year)	Reduce to 15.7 (minutes/household・year)	Reduce to 15.5 (minutes/household・year)
Provider of Services for Smart Living Strengthen customer relationship management, improve customer satisfaction, make good use of new digital technologies to provide users with tangible services, improve energy-saving awareness and energy efficiency at the user end, and meet users' needs for diverse power options.	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Low-voltage AMI smart meter infrastructure	**Deployment of smart meters**	Complete the deployment of a total of 1 million	Complete the deployment of a total of 4 million	Complete the deployment of a total of 7 million after a rolling review of deployment benefits
	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Refinement of customer services	**Number of registered users of the eCounter app**	Reaches 300,000	Reaches 600,000	Reaches 900,000
			The number of transactions via new technology payment channels for each period	Reaches 330,000	Reaches 800,000	Reaches 1,200,000
			Cloud-based services	Complete function development for cloud payment system	Number of downloads of cloud payment receipts reaches 100,000	Number of downloads of cloud payment receipts reaches 300,000
			advanced value-added services to the high-voltage user service portal	Add at least 2	Add at least 4	Add at least 6
			Number of visits to the Power Consumption Examination Center website	Reaches 15,000	Reaches 20,000	Reaches 25,000

Agent of Environmental Friendliness

Protect the quality of the environment, optimize resource utilization, promote low-carbon measures, reduce carbon emissions, and respond to climate change comprehensively to cultivate ecological harmony and create sustainable environmental partnerships.

Practitioner of Corporate Social Responsibilities

Promote humanism in business and establish a culture of disciplined work safety and a happy workplace. Engage the public through diverse, social, community events, enhance social care activities, and create co-prosperity.

SDGs	Strategy	Corresponding Targets	Short-term Goals (Until 2020)	Mid-term Goals (Until 2025)	Long-Term Goals (Until 2030)
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Establishing a circular business model	The proportion of wastewater recycled at thermal power plants	73%	80%	85%
		Circular product supply model	Complete a manual on coal ash use for marine engineering	Complete at least 1 circular product supply model	Complete at least 3 circular product supply models
13 CLIMATE ACTION	Improve mitigation and adaptation capabilities	Net decrease of emission intensity of thermal power-generating units (greenhouse gases) from 2016	Decrease by 5.3%	Decrease by 15%	Decrease by 20%
		Climate adaptation action	Complete climate risk assessment for each generation, transmission, and distribution unit	Complete climate risk strategies and action plans for major transmission and distribution units	Complete the Company's overall climate risk assessment report and its communication
14 LIFE BELOW WATER	Conduct marine ecological restoration and coastal environment cleaning	Marine ecological restoration and conservation and marine pasture	Implement 1 project of marine ecological restoration and conservation and marine pasture research	Complete marine ecological restoration and selection of 1 site for the marine pasture	Complete the construction of 1 marine pasture around a power plant to facilitate marine ecological restoration
15 LIFE ON LAND	Ecological restoration and environmental maintenance in the areas around power facilities	Ecological integration plan at power facilities	Complete the inspection plan for ecological integration at power facilities, and put forward specific visions for ecological restoration and environmental maintenance in the areas around power facilities	Complete ecological integration plans in at least 3 sites around power facilities to promote ecological restoration and environmental maintenance at power facilities	Complete ecological integration plans in at least 5 sites around power facilities to promote ecological restoration and environmental maintenance at power facilities
1 NO POVERTY	Deepening of social care activities	Cumulative investments and number of people reached by social care activities	NT$600 million, 70,000 people	NT$3.6 billion, 450,000 people	NT$6.6 billion, 800,000 people
		Cumulative investments and number of beneficiaries of electricity discounts for disadvantaged groups	NT$87 million, 160,000 beneficiaries	NT$550 million, 1 million beneficiaries	NT$1 billion, 1 million beneficiaries
		Power Development and Assistance Fund's cumulative investments and number of benefited townships/districts	NT$2.5 billion, 100 townships/districts	NT$15 billion, 600 townships/districts	NT$27.5 billion, 1,100 townships/districts
4 QUALITY EDUCATION	Dissemination of accurate energy knowledge	Cumulative number of people reached by diversified energy education	500,000 people	3 million people	6 million people
		Cumulative number of people reached by online promotions	20 million people	120 million people	220 million people
11 SUSTAINABLE CITIES AND COMMUNITIES	Promote the preservation and rejuvenation of cultural assets in the electricity industry	Sharing of cultural assets in the electricity industry	Conduct more than 1,000 cultural relic inspections at relevant units in 2020 under the four major themes of nuclear energy, distribution technology evolution, sale (purchase) of electricity, and outlying island electricity industry	Complete inspections in each business unit by 2025, and inspect a cumulative number of at least 3,500 cultural relics	Launch an online database of historical relics in the electrical industry in 2028 to create a cultural resource sharing environment and research platform for the future, and continue to promote social communication and education about cultural power
		Cumulative number of events and participants in annual cultural asset themed exhibitions, forums, sharing sessions of book series and other related activities	5 events, 30 thousand participants	Over 15 events, 100 thousand participants	Over 25 events, 150 thousand participants
		Electricity industry cultural assets preservation sites		Launch a Taiwan Power Cultural Relic Research Center on the 4th floor of the D/S multi-purpose building in Wan-Lung in 2021 to promote the research and restoration of cultural relics	Launch the Yuan-Hsin Literature and History Library in 2026 to provide a professional site for the display and research, promotion and preservation of cultural assets by the parent company and its subsidiaries
					Establish permanent exhibition halls for cultural relics of the electricity industry in northern, central, southern, and eastern Taiwan in 2030 to strengthen the preservation of local cultural relics from `the electricity industry and to serve as the main medium for the Company's other types of exhibition venues (museum groups)
8 DECENT WORK AND ECONOMIC GROWTH	Improving occupational safety	Employee injury rate	≦ 0.22	≦ 0.15	≦ 0.1
		Contract labor injury rate	≦ 0.4	≦ 0.28	≦ 0.18
	Establish a happy workplace culture	Employee satisfaction with internal communication	≥55%	≥60%	≥65%
		Proportion of participation in each Employees' Heart-to-Heart assistance program (81 in total) to care for employees	≥37%	≥40%	≥50%

Taipower will follow this strategic blueprint and continue to exert its influence on various sustainability issues based on its recognition and implementation of the UN SDGs. In addition to the Sustainable Development Commission as a cross-system platform for communication and consensus building, the Sustainable Environment Promotion Team, the Social Responsibility Promotion Team, and the Management Development Promotion Team conduct comprehensive inspections and reviews of the Company's business activities and link them with the UN SDGs so as to integrate sustainable thinking into daily business activities, while motivating employees to improve continuously, so that corporate social responsibility will become the power behind Taipower's sustainable inheritance.

1.4 Corporate Transformation

1.4.1 Methods of Promoting Transformation

According to Article 6 of the Electricity Act, the Company must complete its transformation into a holding company with subsidiaries that include the Generation Company and the T&D Co. with Retailer in 6 years following the promulgation of the most recent amendments to the Electricity Act (though the electricity industry's regulatory authority may request a postponement from the Executive Yuan no later than January 2026). In order to implement the transformation, the Company established a Transformation Promotion Commission in 2017. The Chairman and the President acted as the Convener and the Deputy Convener of the Commission, respectively. The Commission also invited representatives from the Taiwan Power Labor Union to participate and conducts in-depth research and analyses, regularly tracking, and reporting of the results.

At present, the operations related to preparation for the transformation have been completed. In 2020, the Company begins work in the stage of assigning responsibilities by deliberating about the functional design for interactions between the holding company, its subsidiaries and financial distribution. To ensure a seamless business transition, the Company will run a trial operation once the group's overall system and operating procedures are completed.

Transformation preparation

- Complete the pilot planning research
- Establish the position of the holding company and its subsidiaries and their control modes
- Establish the functions and organizational structures of the holding company and its subsidiaries
- Start preparations for establishing subsidiaries
- Start the compilation and research for the demerger plans
- Research material topics concerning the transformation

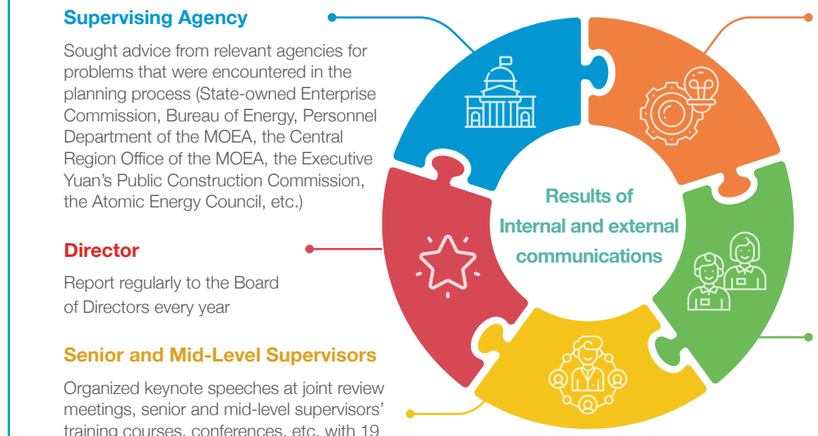
Assignment of responsibilities

- Inventory of businesses contained in the holding company and its subsidiaries and division of labor
- Design of organizational structure for the holding company and its subsidiaries / human resource allocation
- Assessment and planning for the financial situation of the holding company and its subsidiaries
- Design of overall systems and operational procedures for the conglomerate
- Completing the internal review processes for thetransformation plan and submission to the Ministry of Economic Affairs

Adjustments and supporting measures

- Submission of the transformation plan and the budget review process for thenewly established subsidiaries to the Ministry of Economic Affairs
- Trial run of operations mechanisms for the conglomerate
- Review and adjustments to the conglomerate system
- Prerequisites for establishing new subsidiaries
- Execute statutory procedures for the company's demerger

In order to ensure complete disclosure and communication with internal and external stakeholders during the transformation process, Taipower established a cross-unit transformation communication team in June 2018 and continues to cooperate and communicate with staff and the labor union internally. From 2018 to 2019, more than 100 transformation promotion seminar sessions were held. Externally, the Company has sent representatives to visit the supervising agency and competent authorities from time to time in order to explain the progress of the Company's transformation, the results of the inventory, and the challenges ahead.



From 2018 to 2019, more than 100 communication and promotion events and activities related to the transformation were held. Active communication is still ongoing.

1.4.2 Core Philosophies of Transformation

In facing an increasingly open market and the challenges that come with it, Taipower set two philosophies: "responsibility" and "preparing for competitiveness." These philosophies are intended to balance the demands and maximize the benefits of a stable power supply and a competitive market. In the future, these two philosophies will be core guideline as Taipower transforms into a power holding group.

Undertaking Responsibility

As a state-owned power utility group, Taipower will continue to play an important role in implementing government policies such as maintaining a stable power supply and completing the energy transition. The Generation Company and the T&D Co. with Retailer in the Taipower Group will strive to fulfill their statutory requirements with respect to the scopes of their businesses. The holding company will play the role of general manager, coordinating with and integrating the subsidiaries in order to complete the missions of the Taipower Group.

The three state-owned companies within the Taipower Group will be regulated by the relevant laws and regulations for state-owned enterprises, and must also meet supervising agency requirements. The holding company will be responsible for guiding, coordinating, and reporting on all business management affairs to top executives. The subsidiaries will conduct various businesses within their respective operational scopes under the supervision of the holding company.

Preparing for Competitiveness

Currently, the Electricity Act has fully allowed customers to purchase electricity from the renewable energy market. In the future, power generation and electricity retailing may become a competitive market. The Taipower Group must prepare to face the challenges of market competition by exploring new growth areas and consolidating its existing businesses. In order to efficiently operate, the holding company needs to execute a group strategy, resource allocation, and synergy consolidation, as well as to manage its subsidiaries with strategic management and control, while taking into account the Group's comprehensive efficiency and business flexibility.

The Generation Company will follow trends within the industry to create a competitive edge and strengthen its core technologies. The T&D Co. with Retailer will operate in the industries of transmission, distribution, and electricity retailing. The transmission and distribution utility businesses will be designed to act independently while focusing on cost awareness, operational control and maintenance expenses, and response to energy transition needs by actively constructing a smart grid that generates stable revenue. Although the electricity retailing market currently belongs to a publicly-owned business, it is still necessary to improve customer management and services, enhance the added value of the business through innovative applications, and cultivate competitiveness in order to overcome the challenges of further opening up the electricity retailing market in the near future.

1.4.3 Five Major Promotional Themes of Transformation

Taipower's transformation from a general electric enterprise to a power utility group is unprecedented in scale. Currently, the Company is mainly focusing on five transformation themes: the power generation industry, the transmission and distribution industry, the public sale industry, group management and subsidiary control models, and the group's financial model. Taipower is actively researching and planning for the transformation in the hopes of accomplishing a steady implementation.

01 The transformation of the power generation industry

As a state-owned enterprise, the Company's transformation of power generation will require the active development of renewable energy and natural gas power generation in accordance with the energy transition policy and the priorities set by the Electricity Act. Since the transformation will occur in an increasingly competitive business market, it is also necessary to plan ahead for operational efficiency, business development and business sales models.

02 The transformation of the power transmission and distribution industry

In consideration of the power grid's role as a public good, the transformation of power transmission and distribution must be designed to be independent and to ensure fair and equitable use of the power grid. For relevant direct/wheeling power supply, dispatch and ancillary services, Taipower will establish a user payment mechanism, designate reasonable rates, and maintain a stable power supply and reasonable cost targets through the construction of a smart grid and energy storage systems.

03 The transformation of the electricity retailing utility enterprise

As a public utility, the transformation of the Electricity Retailing Utility Enterprise will require Taipower to carry out power purchase combination planning and contract content negotiations pursuant to electricity carbon emission factors, statutory electricity reserve capacities, and final obligations to supply electricity as specified in the Electricity Act. In conjunction with the Energy Saving and Carbon Reducing Policy, Taipower will bolster its promotional work and related application services.

04 A holding company with subsidiaries

As it transforms into a holding company with subsidiaries, Taipower must account for both synergies and flexibility in business management when developing control modes. After the finalization of assigned responsibilities, planning must move towards a strategic management and control mode and a functional design for the holding company and its subsidiaries that entails business planning and organization, and human resources allocation. These must be considered from the perspectives of accountability, strategic planning, group management, and the establishment of synergies

05 Centralized financial management

With regards to group finance, it is necessary to properly plan the distribution of assets, liabilities, income and costs for the holding company and its subsidiaries with the objectives of unbundling and maximizing the value of the group. It is also necessary to conduct analysis and planning of the operation of cash flows, financial statuses, and fund management practices for the holding company and its subsidiaries, so as to guarantee the reasonable operation of the group and each company.

Results of 2019 Transformation Performance:

Company Structure

Taipower has completed the assignment of responsibilities for a total 19 departments in non-BU divisions. In 2020, the Company will gradually inventory its detailed operational procedures, divide responsibilities between the holding company and subsidiaries, and execute an organizational design, human resources, and transformation plan.

Finance

"The Handbook of Accounting unbundling Procedures for Transmission and Distribution Industries" and the "2018 Accounting Unbundling Report for Transmission and Distribution Industries were completed and approved by the Bureau of Energy on May 23, 2019 and October 22, 2019, respectively. Based on these principles, the Company will conduct its calculation and evaluation of the holding company and subsidiaries' assets, liabilities, income, and expenditures in an effort to maximize benefits to the group and to stabilize its financial status.

1.5 Stakeholders and Material Topics

1.5.1 Stakeholder Identification

Taipower has spared no effort in building mechanisms for developing mutual trust and communication with its stakeholders. A survey was conducted to identify the main groups of stakeholders from the Company's 34 business units in accordance with the five principles outlined in "AA1000 Stakeholder Engagement Standards (2015)." Taipower's significant stakeholder groups have been compiled to ensure thorough coverage of all stakeholders who are relevant to different aspects of the Company's operations. Reviews on a yearly basis are conducted and adjustments are made as necessary.

Stakeholders	Party
Board of Directors	Director
Shareholders	All shareholders
Employees	Employees and the union
Partners	Contractors, IPP service providers, suppliers, and technology exchange partners
Government/competent authorities	The Ministry of Economic Affairs, the Bureau of Energy, the State-Owned Enterprise Commission, the Environmental Protection Agency, the Atomic Energy Council, the Legislative Yuan, and local government agencies
People's representatives	Legislators and elected village/township representatives
Media	Printed, electronic, and online media
Private organizations	Environmental conservation groups, enterprise associations, academic organizations
Customers	General and large customers
Residents/general public	Residents from the surrounding community and the public

1.5.2 Identification of Key Material Topics

In order to identify issues that relate to sustainable operations and our stakeholders, the Company uses the GRI Standards for materiality analysis to review and identify issues relevant to Taipower. For sustainability issues this year, Taipower referred to the material topics in the energy and power, solar power, wind power, and biomass fuel industries in accordance with the Materiality Map which has been newly released by the Sustainability Accounting Standard Board (SASB) and took all these issues into account. Of all the questionnaires, 90 were filled out by Taipower employees (including 30 from top management), and the remaining 88 were filled out by other stakeholders. A total of 178 questionnaires were collected.

Identification Process for Material Topics

Review and Identification

- Review key sustainability issues from the previous year
- Review major domestic and international sustainability development and latest trends, such as SASB and domestic regulation amendments
- Review contents including issues of Taipower management, power industry benchmarks, internal/external stakeholder opinions and major news events
- Identified 27 sustainability issues

Evaluation and Prioritization

- Consider the extent of impact the issues could have on Taipower and different stakeholders through 60 employee questionnaires to determine the extent of impact on the economy, society and environment; 30 top management questionnaires to determine the materiality of each topic for business operations; along with 88 questionnaires that cover different categories of stakeholders to analyze the extent of impact of relevant issues on stakeholders concerning their assessments and decision-making

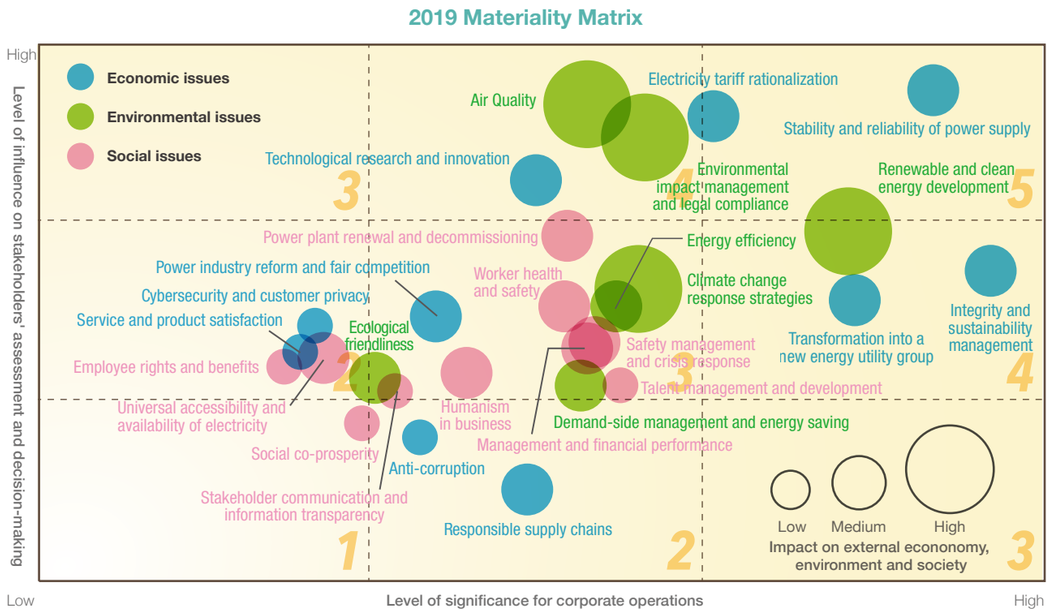
Validation

- Review and verification of the materiality matrix by Taipower's senior management
- Determine the contents and structure of Taipower's Sustainability Report based on the results of the analysis

Based on the process of identification illustrated above, and taking relevant trends and incidents into account, Taipower's list of material topics has been identified and adjusted as follows for this year's sustainability report:

Original Material Topics	New Material Topics	Reasons for Adjustments
Customer privacy (social aspect)	Cybersecurity and customer privacy (governance aspect)	Since reference is made to benchmark enterprises' efforts on cybersecurity, and in response to the smart grid developed by Taipower, the importance of cybersecurity for both Taipower and its customers is significantly increasing. Therefore, this issue will comprise relevant cybersecurity movements and will be re-categorized as a governance aspect.
Local social development	Social co-prosperity	Considering the close connection between the electricity industry and the development of local communities, the local social development topic has been integrated into social co-prosperity.

1.5.3 Identification Results of Material Topics



Through the materiality matrix, the Company has compiled a list of relevant sustainability issues that are weighted based on their significance to Taipower. All issues located in Block 5 (of the matrix) are classified as material topics regardless of the extent of their external impact (this is represented by the size of their bubbles); issues in Blocks 3 and 4 have medium or higher external impacts, while issues in Block 2 that have significant external impacts are also classified as material topics. A total of 17 issues have been identified within the scope of this report.

The material topics identified in Taipower's sustainability reports in recent years have faithfully recorded the changes in both domestic/international sustainability trends and pertinent laws. Examples include the stability and reliability of power supply, integrity and sustainability management, air quality, electricity industry reform and fair competition, etc. These are important operational policies that Taipower has proactively worked to implement in recent years. Additionally, the working environment of the power industry itself has certain risks. Consequently, safety management and crisis handling along with worker health and safety are emphasized by Taipower. Issues such as electricity tariff rationalization, the development of renewable and clean energy, and energy efficiency are covered in response to government policies and initiatives aimed at the reform of the power industry.

This report includes detailed descriptions of the 17 material topics identified in the matrix. In addition, in light of recent management and operations goals, the report also covers relevant information on 5 issues of secondary importance. The internal/external impact of these issues, the relevant GRI Standards, and their respective chapters are summarized as follows:

Topics	Location of incidence for economic / environmental / social impact						Relevant GRI Standards	Management policy and corresponding chapters
	Within Taipower	Business relationships: Partners	Business relationships: Customers	Other social relationships: Private organizations	Other social relationships: Government agencies	Other social relationships: Residents/ general public		
Material Topics								
Integrity and sustainability management	✓				✓		General Disclosures: Governance Economic: Anti-corruption Environmental: Environmental Compliance Social: Socioeconomic Compliance	1.1 Taipower Profile 1.2 Corporate Governance 1.3 Corporate Sustainable Governance 6.1 Integrity and Compliance
The reasonableness of electricity rates	✓				✓		Economic: Indirect Economic Impact	1.7 Operational Performance
Stability and reliability of power supply	✓	✓			✓		Economic: Indirect Economic Performance	2.1 Planning for New Sources of Energy 2.3 Providing Quality Electricity Service
Transformation into a new energy utility group	✓				✓		Taipower-specific Issues	1.4 Corporate Transformation
Technological research and innovation	✓	✓					Economic: Indirect Economic Performance	5.1 General Planning for Smart Grids 5.2 Action Plans for Smart Grids 5.3 R&D in Green Power
Power industry reform and fair competition	✓		✓		✓		Taipower-specific Issues	1.4 Corporate Transformation
Renewable and clean energy development	✓	✓		✓			Economic: Indirect Economic Impact Environmental: Emissions	2.2 Development of Renewable Energy 3.4 Minimizing Environmental Impact
Climate change response strategies	✓	✓		✓	✓		General Disclosures: Governance Economic: Indirect Economic Impact Environmental: Emissions, Energy	1.3 Corporate Sustainable Governance 1.6 Risks and Opportunities 3.1 Strengthening Environmental Management 3.2 Sustainability and Strategies for Low-Carbon Electricity
Environment impact management and legal compliance	✓	✓		✓	✓	✓	Environmental: Effluence and Waste, Energy Social: Local Communities	3.1 Strengthening Environmental Management 3.4 Minimizing Environmental Impact
Air quality	✓			✓	✓	✓	Environmental: Emissions	3.4 Minimizing Environmental Impact
Energy efficiency	✓		✓		✓		Environmental: Energy, Emissions	3.3 Reducing Use of Energy and Resources
Demand-side management and energy conservation	✓		✓				Economic: Demand-side Management Environmental: Energy	2.4 Demand-Side Management 3.3 Reducing Use of Energy and Resources
Eco-friendly	✓			✓	✓	✓	Environmental: Biodiversity	3.4 Minimizing Environmental Impact
Power plant renewal and decommissioning	✓				✓		Economic: Indirect Economic Performance	2.1 Planning for New Sources of Energy
Safety management and crisis response	✓				✓		Social: Local Communities	1.6 Risks and Opportunities 2.1 Planning for New Sources of Energy
Worker health and safety	✓	✓					Social: Occupational Health and Safety	4.3 A Sound Working Environment
Humanism in Business	✓			✓		✓	General Disclosures: Governance	6.4 Humanism in Business and Community Outreach

Topics	Location of incidence for economic / environmental / social impact						Relevant GRI Standards	Management policy and corresponding chapters
	Within Taipower	Business relation-ships: Partners	Business relation-ships: Customers	Other social relationships: Private organizations	Other social relationships: Government agencies	Other social relationships: Residents/ general public		
Non-Material Topics								
Management and financial performance	✓				✓		Economic: Economic Performance	1.7 Operational Performance
Accessibility and availability of electricity	✓				✓		Economic: Indirect Economic Performance	2.1 Planning for New Sources of Energy Providing Quality Electricity Service
Talent management and development	✓						Social: Labor / Management Relations, Benefits for Full-time Employees	4.1 Human Resource Management Strategies 4.2 Enhancement Measures for Human Resources 4.3 A Sound Working Environment
Stakeholder communication and information transparency	✓	✓	✓	✓	✓	✓	General Disclosures: Stakeholder Engagement Social: Operations Implemented with Local Community Engagement, Impact Assessments, and Development Programs	1.5 Stakeholders and Material Topics 6.2 Stakeholder Communication and Engagement 6.4 Humanism in Business and Community Outreach
Responsible supply chain	✓	✓					Environmental: Supplier Environmental Assessment Social: Supplier Social Assessment	6.3 Strengthening Supplier Management

Note: Only stakeholders who are directly impacted by economic, environmental and social factors are listed. Stakeholders who will not be directly impact by ESG have been omitted accordingly.

1.6 Risks and Opportunities

1.6.1 Risk Management

In 2018, many new issues arose to confront Taiwan's power industry. These included the Paris Agreement, amendments to the Electricity Act, and the adoption of 3 energy-related referendums. To avoid negative impact and find potential opportunities, Taipower committed itself to effectively addressing potential risks by identifying, ranking, and responding to potential internal and external risks with a sound risk management system.

Risk Management Policies

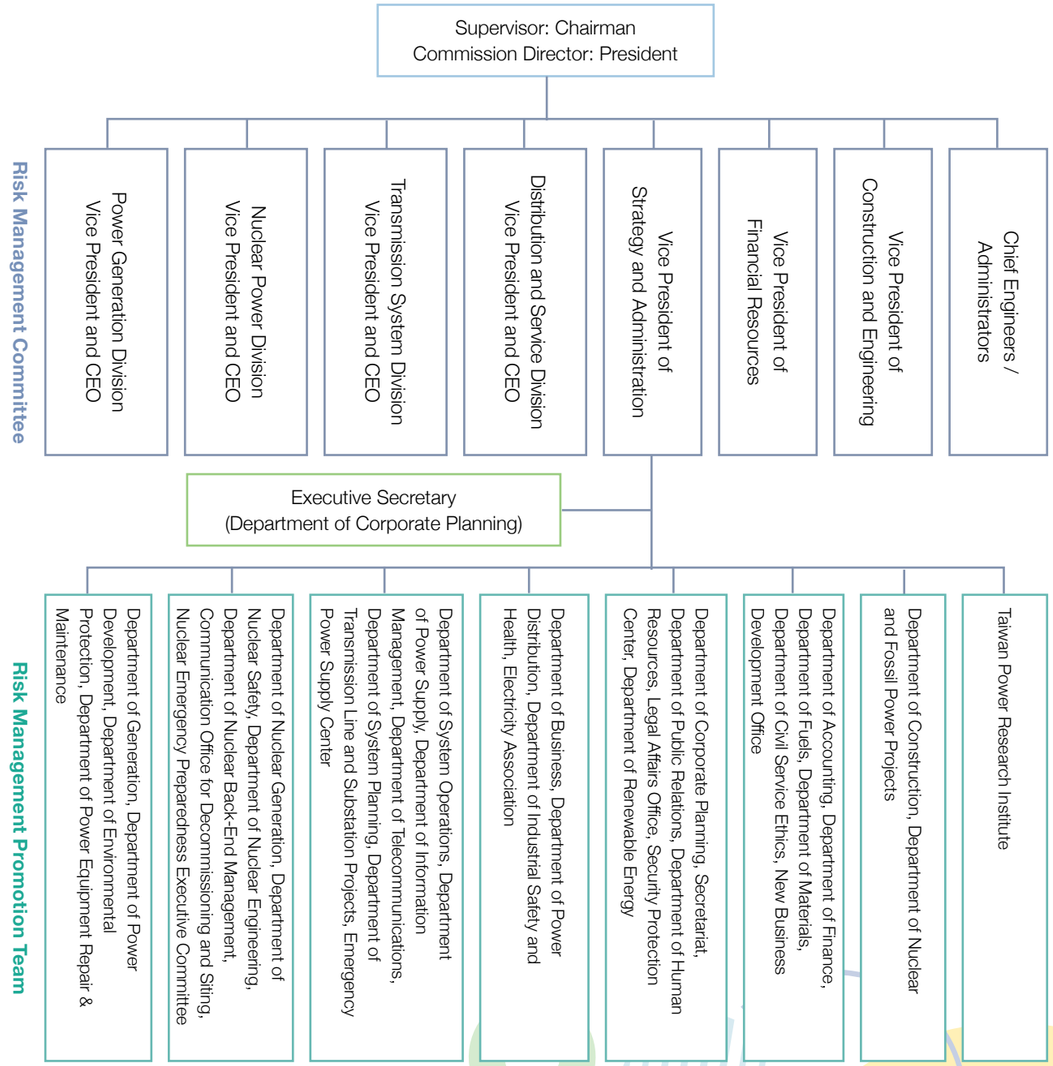
Taipower has established four risk management policies as guidelines for organizational risk management. They are as follows:

- Provide the necessary resources to establish, maintain and continually improve the effectiveness of the risk management system, and to reduce operational risks.
- Promote risk management organization and the implementation of risk assessment, risk management, risk monitoring, and risk communication.
- Ensure that employees have the ability to perform risk management, create a supportive work environment, and shape a risk-managing culture.
- Strengthen communication between staff and stakeholders, raise staff awareness of risk management, and thoroughly implement related policies.

Risk Management Structure

Under Taipower's risk management structure, the Chairman acts as a supervisor, the President acts as a commission director and a Risk Management Commission operates as a task force. The Commission is comprised of the CEOs and VPs from the four major divisions (Power Generation, Nuclear Power, Transmission System, and Distribution & Service) and three major systems (Strategic Administration, Financial Resources, and Construction & Engineering) that constituted Taipower. The Chief Engineers/Administrators are also members of the commission. The Commission operates through subordinate risk management promotion teams, which are comprised of first-tier units that are responsible for the identification of potential risks and the establishment of risk management policies and corresponding responses.

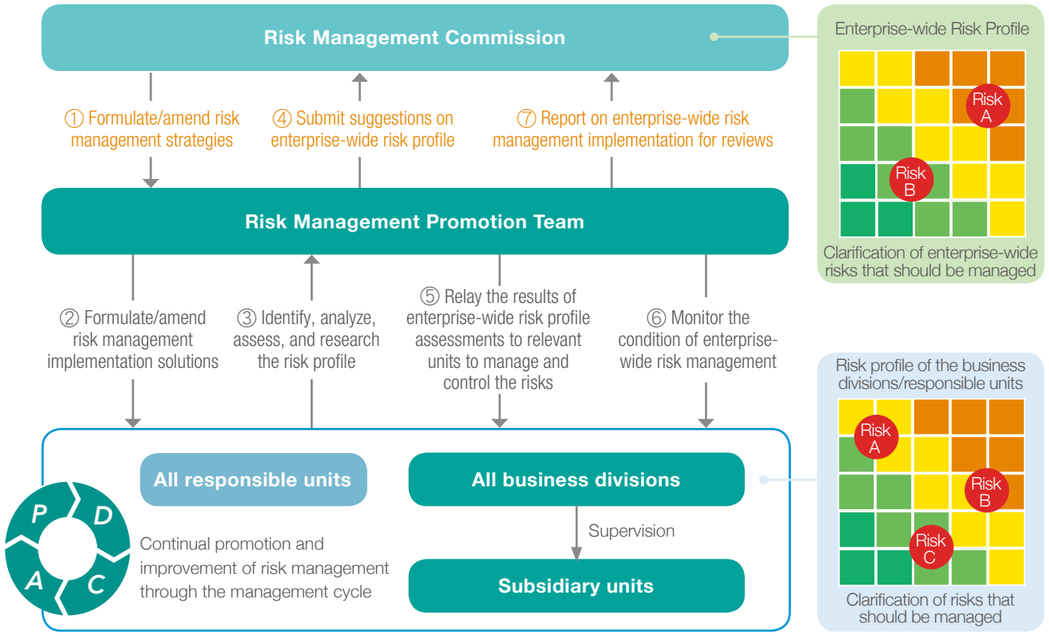
Taipower's Risk Management Organization Structure



Taipower's risk management process begins with strategies established by the Risk Management Commission. Subsequently, Risk Management Promotion Teams formulate corresponding risk management implementation solutions to be delivered to relevant first-tier units before they are analyzed and included in the Company's risk profiles. These risk profiles are then compiled by the Risk Management Promotion Team into a company-wide risk profile to be submitted to the Risk Management Commission for review. After the review, the Risk Management Promotion Team will relay the results of the review back to all supervisory units for risk control.

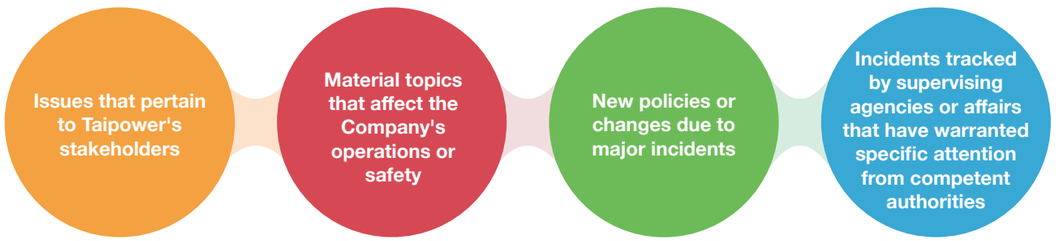
The Risk Management Promotion Teams are also responsible for monitoring company-wide risk management status and reporting periodically to the Risk Management Commission. Each year, the Risk Management Promotion Teams reports on risk handling and control results. These reports are reviewed by the Risk Management Commission. Risk management policies can be reviewed and revised depending on changes in the internal and external environments.

Risk Management Process



1.6.2 Risk Assessment - Considerations for Risk Identification

During the process of risk identification and profile analysis, Taipower will take the following factors into consideration:

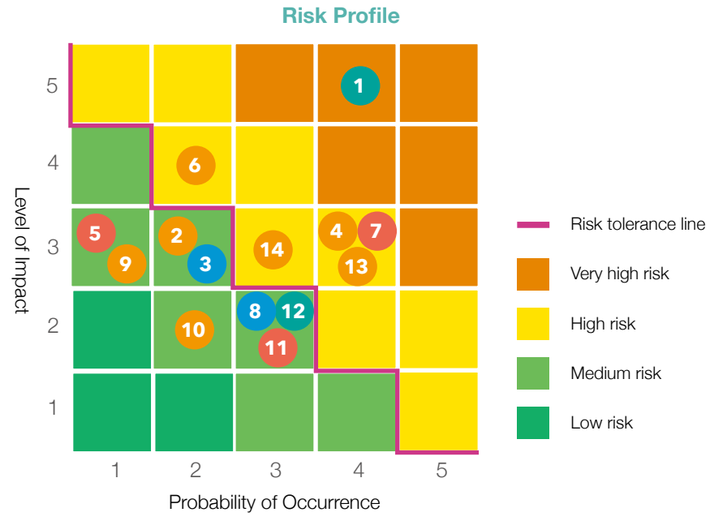


Risk Profiles and Counter Measures

Taipower uses its risk profile to monitor potential risks. When an incident is classified as an extremely high risk, it will be given top priority for rectification; high-risk incidents are the second ones to be fixed, and may require specific plans to be drafted and resources to be in place before they are handled. Risks at the medium level are simply monitored continually by the relevant departments. Low-level risk indicators are handled in accordance with the Company's general procedures.

The risk profile for Taipower's sustainable management in 2020 is shown below. Among the risks identified are the increasing accrual of losses, power supply shortages, workplace accidents, environmental protection issues, as well as renewable energy and power line projects that are behind schedule. These issues have been identified as high-risk items that Taipower has to handle with prudent planning. After identifying extremely-high and high-risk incidents, Taipower predetermines risk scenarios for the respective risks and manages them with adequate control measures to increase the effectiveness of prevention and response. Through this systematic assessment method and the analysis of risk and sustainability issues, Taipower is able to enhance its capacity to reduce risks and capitalize on opportunities so as to achieve its vision of sustainable management.

Risk Profile



Risk Category	Risk Identified
Strategic and Financial Risks	1. Accrual of losses resulting in greater impacts to the Company's operations 12. Power plans which were delayed, affecting the Company's power supply capabilities
Operational Risks	2. An aging workforce structure impeding the passing on of techniques 4. Power supply shortages affecting system stability and safety 6. Incidents of EHS resulting in asset loss and damaged reputation of the Company 9. Hacking of the Company's information systems 10. Outbreaks of labor-management disputes and employee protests 13. Progress of renewable energy construction falling behind, affecting the reputation of the Company 14. Progress of grid construction falling behind, affecting grid power supply
Legal Compliance Risks	3. Incidents of employee corruption 8. Negative publicity having an adverse impact on the image of the Company
Environment and Climate Change Risks	5. Natural disasters leading to accidents at nuclear power plants 7. Environmental issues having adverse impacts on the image of the Company 11. Natural disasters causing damage to power facilities

1.6.3 Opportunity Management and Responses

Risks and opportunities are two sides of the same coin. Through the comprehensive risk management system described in the previous section, Taipower is able to better understand and follow trends in order to seek out potential opportunities for the Company. Taipower refers to the World Energy Issues Monitor published annually by the World Energy Council (WEC) to learn about important issues in the energy industry and how they correspond with the material topics identified in the Taipower Sustainability Report every year. The Company also organizes SDG workshops, and responds to the potential development directions of the sustainable development goals. The aim is to look for possible development opportunities in the face of operational environment changes in Taiwan's electricity industry and among global sustainable business trends.

In order to effectively leverage the opportunities identified and create possibilities for development in ventures outside its main businesses, Taipower has amended Guidelines Governing New Venture Proposal Review and Promotion. A dedicated task force (the Long-term Finance and Investment Planning Task Force) reviews the Company's new venture ideas to speed up the review process and ensure that the contents of proposals are in line with the Company's business philosophy and strategy. Meanwhile, the task force also expands the scope of new business proposals and the eligibility of receiving rewards that promote innovative business opportunities within the Company. Following initial identification, the opportunities that have been recognized during the preliminary process are described below:

Issues and Potential Driving Factors	Measures	Responding to SDGs and Potential Directions
• Domestic and foreign enterprises hoping to increase the utilization of green energy to reduce global carbon emissions • Initiation of domestic offshore wind power development programs • Attention to domestic air pollution • The Renewable Energy Development Act	• Investing in renewable energy and its related technologies • Establishing a Taiwan International Wind Power Training Corporation Ltd. to create new value for Taipower • Researching the feasibility of promoting ESCO energy services and aiming to become a comprehensive energy service provider • Planning circular business models	**SDG7** **Affordable and Clean Energy** • Developing innovative energy services • Continuing to promote renewable energy plans • Developing energy storage technologies • Maintaining core nuclear technology and the usability of power plants • Investing in energy devices and technologies to improve air pollution caused by thermal power generation • Increasing the efficiency of power generating units • Promoting a circular economy
• Domestic and foreign enterprises hoping to increase the utilization of green energy to reduce global carbon emissions • Initiation of a Renewable Energy Certificate mechanism in Taiwan	• Aiming to reduce carbon emission coefficients to provide Low-Carbon Electricity • Investing in renewable energy and its related technologies • Investing in power conservation facilities and related applicable services • Increasing customer participation in demand response	**SDG13** **Climate Action** • Establishing specific goals and paths for reduction of emissions • Increasing the efficiency of power plants to reduce both carbon emissions and warm effluents • Continuing to develop renewable energy • Ensuring the usability of nuclear technology and power plants • Urging customers to invest in demand side management • Increasing investment in research on reusing and recycling carbon dioxide • Strengthening the resilience of all types of infrastructure in value chains • Continuing to be aware of and to master domestic and international development dynamics
• Amending the Electricity Act • Technological development in big data, AI, smart IoT, etc. • Infrastructure weakness caused by climate change	• Implementing the "Rules of Power Transmission and Distribution for Wheeling and Contract Signing," and conducting outsourcing research on contracts and rules of power transfer in the electricity industry, power dispatching regulations, and power dispatching fees • Engaging in technical research on renewable energy grid-connected services • Continuing to promote the smart grid to popularize smart meters. Plus, combining them with commercial applications	**SDG9** **Industry, Innovation, and Infrastructure** • Constructing smart grids, popularizing electricity meters, and combining business applications • Developing low-carbon emission techniques • Developing techniques for recycling solar panels • Independently developing nuclear energy decommissioning technologies and retaining core technical manpower and capabilities for nuclear energy in case of the need to respond to future changes in policies and international trends • Investing in more R&D manpower and expenses • Building up cross-departmental partnerships to invest in energy and other infrastructure that can assist in the R&D of innovative technology • Expanding participation in demand-side management

1.7 Operational Performance

1.7.1 Improving Financial Management

Strategy for Sustainable Financial Operations

Taipower was unable to persuade the Electricity Tariff Examination Council to increase the electricity tariffs in 2019. In consequence, the Company has been unable to shift the price of electricity to reflect operating costs and maintain reasonable profits. Instead, the Electricity Tariff Examination Council has decided that revenue from the sale of electricity will be supplemented through the electricity tariff stability reserve, and expense controls will be used on operations and maintenance to improve Taipower's financial sustainability. During the ongoing transitions in the areas of green energy, carbon reduction, and energy conservation, Taipower will strive to maintain a stable power supply and maintain its electricity rate rationalization and diversification strategy despite changes in the structure of power generation and sales, fuel price volatility, and uncertainty in electricity rates adjustments. It is hoped that multiple goals such as a reliable power supply, reduced carbon emissions, and ensuring financial stability will be achieved.

2019 Taipower Financial Performance Targets and Results

Aspect	Key performance index	2019 Target	2019 Performance	2020 Target
Finance	**Pre-tax income** (NT$100 million)	≧ 24	180	≧ 143
	Control of operations and maintenance expenses (cents/kWh)	≦ 39.41	40.04	≦ 32.93

Taiwan Financial Performance Targets and Results from 2017 to 2019 Unit: NT$ million

Year	Total Assets	Operating Revenue	Equity	Income Before Tax
2017	1,990,547	566,621	258,189	22,275
2018	2,028,132	587,327	288,619	30,037
2019	2,075,642	595,106	305,267	17,978

Note: Taipower is a state-owned enterprise, and its final accounts are subject to the review and certification by the National Audit Office according to law. At the time of publication, the actual performance for 2019 has not been reviewed and certified by the National Audit Office, and is thus reported according to the numbers reviewed and certified by certified public accountants. The numbers for 2018 are those of reviewed and certified final accounts, and are slightly different from those reported in the 2019 Sustainability Report.

The Reasonableness of Electricity Rates

Since Taipower must maintain a stable power supply that meets the consumptive needs of the public, the issue of reasonable electricity rate adjustment is important to the Company. The competent authority, in accordance with Article 49 of the amended Electricity Act, lays out a calculation formula and adjustment mechanism for the electricity tariff. The current formulas were announced on November 6, 2017. According to the regulations, the electricity tariff is reviewed every six months. During the review process, Taipower may devise a review plan for the electricity tariff, and then adjust the tariff after obtaining the approval from the Electricity Tariff Examination Council. This allows electricity prices to immediately reflect international fuel price volatility and Taipower's operational performance. The result will account for both costs and reasonable profits in order to achieve reasonable electricity rates.

Electricity Retailing Utility Enterprises' formula for determining the electricity tariff is described below:

$$\text{Average pricing of electricity per kWh} = \frac{\text{Expenditure on the purchase of electricity (including profit)} + \text{Expenditure on power transmission and distribution (including profit)} + \text{Service fee for power sales} + \text{Reasonable profit for the Electricity Retailing Utility}}{\text{Electricity sold (in kWh)}}$$

As noted above, the electricity tariff is reviewed and adjusted twice a year (generally, in April and October). The adjustments, whether increases or decreases, do not exceed 3% each time. However, when the cost of electricity supply continually rises or falls sharply, the Electricity Tariff Examination Council can adjust the electricity rate depending on the status of the electricity tariff stability reserve.

The first and second Electricity Tariff Examination Council meetings were held in March and September 2019, tariff adjustments of +6.48% and +9.24% were proposed respectively. However, considering the decline of energy prices, and to avoid the negative impacts of short-term electricity price fluctuation, the two meetings resolved not to adjust electricity prices. In 2019, the unadjusted electricity price failed to reflect the operating costs and a reasonable profit. Therefore, the first Electricity Tariff Examination Council meeting in 2020 passed a resolution to use the electricity tariff stability reserve to reimburse the loss.

Diversified Management and Strategies

As it faces the future possibility of an open electricity market, Taipower is adhering to an expansion strategy of "extending its original business in the electricity industry, strengthening asset revitalization, and entering spin-off businesses." Taipower's diversification strategy is based on four aspects of government policy, strategic consideration, financial infusion, and sustainable development. This allows the Company to realize its vision as a business group and create opportunities to develop different businesses. Currently, Taipower is actively creating a variety of new businesses. These include real estate revitalization, a fiber optic circuit bandwidth rental business, contracting other electricity equipment repair, and cultural and creative businesses. In 2019, these new ventures brought in more than NT$2.216 billion in revenue for Taipower.

Promoting Real Estate Revitalization

With the changes in power automation, transportation, and the economy, some of Taipower's properties are no longer in use. Therefore, Taipower has established a cross-departmental "Land Revitalization Task Force" to promote asset activation. The results of the projects executed in 2019 are as follows:

1. Cooperation with governments at all levels: Completed several urban renewal projects, including the revitalization of the Former Northern Storage and Transportation Center, the Department of Power Equipment Repair and Maintenance, and the Penghu-Magong Old Power Plant. In addition, planning was done on issuing tenders for the Kaohsiung Multi-Functional Economic and Trade Park Specific Trade Zone (III) Urban Renewal Business Implementation Project and the Jiaxing Street Dormitory Public Urban Renewal Project through the Kaohsiung City Government and the National Housing and Urban Regeneration Center respectively.
2. Leading tender projects: Completed the tender process for the Ren'ai Road Temporary Parking Space Co-Construction Project, and conducted pre-tender preparation for the Public Urban Renewal Project for the Southern Side of the Former Northern Storage and Transportation Center.
3. Participation in projects led by developers: The Urban Renewal Project for the 2nd Section of Xinyi Road was approved by the Taipei City Government. Two further urban renewal projects, namely the Temporary Parking Space in the 1st Section of Heping East Road and the Land used in barbershop at the Headquarters are currently under review by the Taipei City Government.

Real Estate Rental Business

In revitalizing an old house located on Taipei's Chaozhou Street, Taipower used the building's original, nostalgia-evoking elements. The house was decorated in a style commonly seen in Taiwan during the 1950s and 1960s. Then, in January 2019, the old house was "reborn" and now contains a light-food restaurant, office and other composite spaces. The space is also used to hold a series of cultural lectures for public that review the old memories of the community.

Promotion of Educational and Recreational Affairs

Taipower's Hotels had an occupancy rate of 33.9% in 2019. This number when excluding the training center hotels was 40.7%. The hotels yielded NT$ 24.88 million in annual revenue, excluding the additional NT$ 21.35 million generated by the training center hotels.

Promotion of Cultural and Creative Businesses

Taipower's cultural and creative businesses' core design concept is circular economics. In combining this idea and the cultural elements of the power industry, Taipower designs products bearing its logos, images, and symbols and then sells the products via online platforms. In 2019, the online sales volume reached to 5,800 units with a the total annual revenue of around NT$1.1 million. By interacting with consumers through product marketing, we will be able to present Taipower's corporate values and philosophy of cultural and creative development. Also, we will be able to establish a closer relationship with the public in daily life.

Meanwhile, in embracing reuse and recycling, Taipower cooperated with young creative design teams and studios to create products which bear Taipower images using coal ash along with waste cap and pin insulators.

Reinvestment Enterprises

As of the end of 2018, Taipower had five reinvestment ventures. These included the Taiwan Stock Exchange Corporation Ltd., Taiwan Cogeneration Corporation Ltd., the Bengalla Mining Company Pty. Ltd., and the Bengalla Coal Sales Company in conjunction with the Bengalla mine development project in Australia. The fifth reinvested venture is the newly established Taiwan International Windpower Training Corporation Ltd. Taipower invested a total of NT$ 1.295 billion and generated a total of NT$ 720 million in profits in 2019, with a rate of return of 25.07%.

In addition, in order to maintain a certain percentage of Taipower's own capacity, the Company is now assessing the feasibility engaging in a joint-venture with a private company to establish a shipping company with a private company, which will further ensure fuel supply security, stabilize shipping costs, and promote new business for the Company. In the future, Taipower will continue to expand its various new businesses in hopes of strengthening the Company's foundation for sustainable operations. Potential investment opportunities for Taipower include coal ash resource utilization, asset revitalization, overseas energy minerals and offshore wind power as well as participation in international power utility maintenance, construction of foreign power plants, and the operation of real estate businesses.

In the future, Taipower will dynamically adjust its diversity strategies and enhance the integration and utilization of company's resources in response to international energy trends and the progress of the Company's transformation. Steps could include strengthening linkages with power-related businesses and increasing the Company's innovative energy services, as well as exploring business opportunities in the international energy market. Taipower will continue to improve the Company's market competitiveness and consumer satisfaction, while responding to government policies for energy conservation, carbon reduction, and sustainable development.


Gas-fired Unit at DaTan Power Plant

1.7.2 Strengthening Operational Performance

In recent years, Taipower has actively been strengthening its operations through implementing goals and performance management, assessing its operational efficiency through balanced scorecards, and focusing on the four major dimensions of finance, customers, internal processes, and learning and growth. These indicators are reviewed annually to ensure the general objectives of operations are met.

Results of Balanced Scorecards

Dimension	Key performance indicators of 2019	2019 Target	2019 Actual Performance	Target Achieved	2020 Target
Finance	**1. Reinforcing cost consciousness**				
	Pre-tax income (NT$100 million)	≧ 24	265	✓	≧ 143
	Operations and maintenance fee (cent/kWh)	≦ 39.41	40.04		≦ 32.93
	2. Capital expenditure execution rate				
	Annual fixed asset investment plan (%)	≧ 95	97.39	✓	≧ 95
	General buildings and facilities plan (%)	≧ 95	97.62	✓	≧ 95
	3. Improving the supply of fuels, materials, and operational performance				
	Coal procurement performance (%)	≦ -4.96	-12.93	✓	≦ -4.91
	Maintain sufficient coal inventory (number of days)	30-35	37		30-35
	Ratio of collective asset procurement (%)	≧ 20	35.12	✓	≧ 24
	Ratio of asset procurement cost reduction (%)	≧ 15	15.33	✓	≧ 15
	4. Promoting business diversification and reinvestment				
	Increasing new businesses and reinvestment revenue (NT$100 million)	≧ 16	22.16	✓	≧ 19
Customers	**5. Customer satisfaction (score)**	≧ 86.5	96	✓	≧ 90.2
	6. Mobile payment services (10 thousand customers)	≧ 13	42.4	✓	≧ 34
	7. Promoting demand response and energy conservation				
	Reducing electricity demand during peak hours (10 MW)	≧ 70	150	✓	≧ 80
	Electricity saving plan achievement rate (%)	≧ 95	100	✓	≧ 95
Internal business processes	**8. Strengthening occupational safety consciousness and educational training**				
	Increasing employees' abilities to predict dangers (class)	4	4	✓	4
	9. Establishing a mobile CCTV monitoring control system	This item is a qualitative indicator. For details, please refer to Chapter 4.3 A Sound Working Environment			
	10. Establishing an employee health management system	This item is a qualitative indicator. For details, please refer to Chapter 4.3 A Sound Working Environment			
	11. Promotion of Accredited Healthy Workplaces				
	Assistance and consultation of participants in the Accredited Healthy Workplace	5	5	✓	Deleted
	Successfully obtained Badges for Accredited Healthy Workplaces (unit)	3	14	✓	Deleted
	12. Occupational safety performance				
	Occupational injury incidence rate	≦ 0.26	0.05	✓	≦ 0.22
	Occupational safety accident (frequency)	0	20		0
Internal business processes	**13. Major power development plan**	This item is a qualitative indicator. For details, please refer to Chapter 2.1 Planning for New Sources of Energy			
	14. Ensuring the stable operation of generation units				
	Hydro unit availability (base load/peak load) (%)	≧ 96.61/94.43	98.1/97.36	✓	Hydro unit ≧ 95.08
	Availability of coal-fired units (%)	≧ 97.60	98.04	✓	≧ 97.50
	Reduce heat consumption (kcal./kWh)	≦ 2,158	2,110	✓	≦ 2,138
	Number of maintenance overruns for generating units (excluding nuclear power) (time/year)	≦ 3	1	✓	≦ 3
	Wind unit annual availability (%)	≧ 93	92.19		≧ 92.5
	Solar power annual generation (100 million kWh)	≧ 1.25	1.47	✓	≧ 2.68
	15. Discharge coefficient (g/kWh)	≦ 672	587	✓	≦ 637
	16. Ensuring the safety and stable operation of nuclear power				
	Nuclear reactor trips (frequency)	≦ 1 (Total of all plants)	0	✓	≦ 1 (Total of all plants)
	Abnormal incidents caused by operational negligence (frequency)	≦ 3 (Total of all plants)	1	✓	≦ 2 (Total of all plants)
	Improving nuclear safety performance - nuclear safety performance indicator signals (frequency)	White lights ≦ 2 Yellow lights = 0 Red lights = 0	White lights = 0 Yellow lights = 0 Red lights = 0	✓	White lights ≦ 2 Yellow lights = 0 Red lights = 0
	17. Promoting the decommissioning of nuclear power generators as well as handling of nuclear waste	This item is a qualitative indicator. For details, please refer to Chapter 2.1 Planning for New Sources of Energy and Chapter 3.3 Minimizing Environmental Impact			
	18. Research and application of key technologies				
	Completing smart meter installation (units)	400,000	183,818		1.2 million
	Amount contributed to research and development (cost reduction + revenue increase) (NT$ 1 million)	≧ 5,601	6,921	✓	≧ 5,701
	Investment in energy saving, carbon reduction and green power industry research (NT$ 1 million)	≧ 3,140	3,477	✓	≧ 3,230
	Number of articles published at international forums and symposiums (article number)	≧ 10	22	✓	Deleted
	19 . Planning and construction of power interchange platforms	This item is a qualitative indicator. For details, please refer to Chapter 5.2 Action Plans for Smart Grids			
	20. Improving the resilience and power supply capabilities of the power grid				
	Power supply reliability – reduction of the average period of forced outages (min/household・year)	≦ 17.10	16.4875	✓	≦ 16.80
	Dispatching performance (%)	100 ≦ CPS ≦ 120	114.67	✓	100 ≦ CPS ≦ 120
	Line loss rate (%)	≦ 4.35	3.86	✓	≦ 4.30
	21. Enhancing dispatching of renewable energy and grid connections				
	Completion rate of green energy grid-connections (%)	≧ 90	98	✓	≧ 90
	22. Promoting the application of the smart grid				
	Introduction and construction of substations using IEC 61850 (number of substation)	11	12	✓	14
	23. Planning the transformation into a holding company with subsidiaries	This item is a qualitative indicator. For details, please refer to Chapter 1.4 Corporate Transformation			

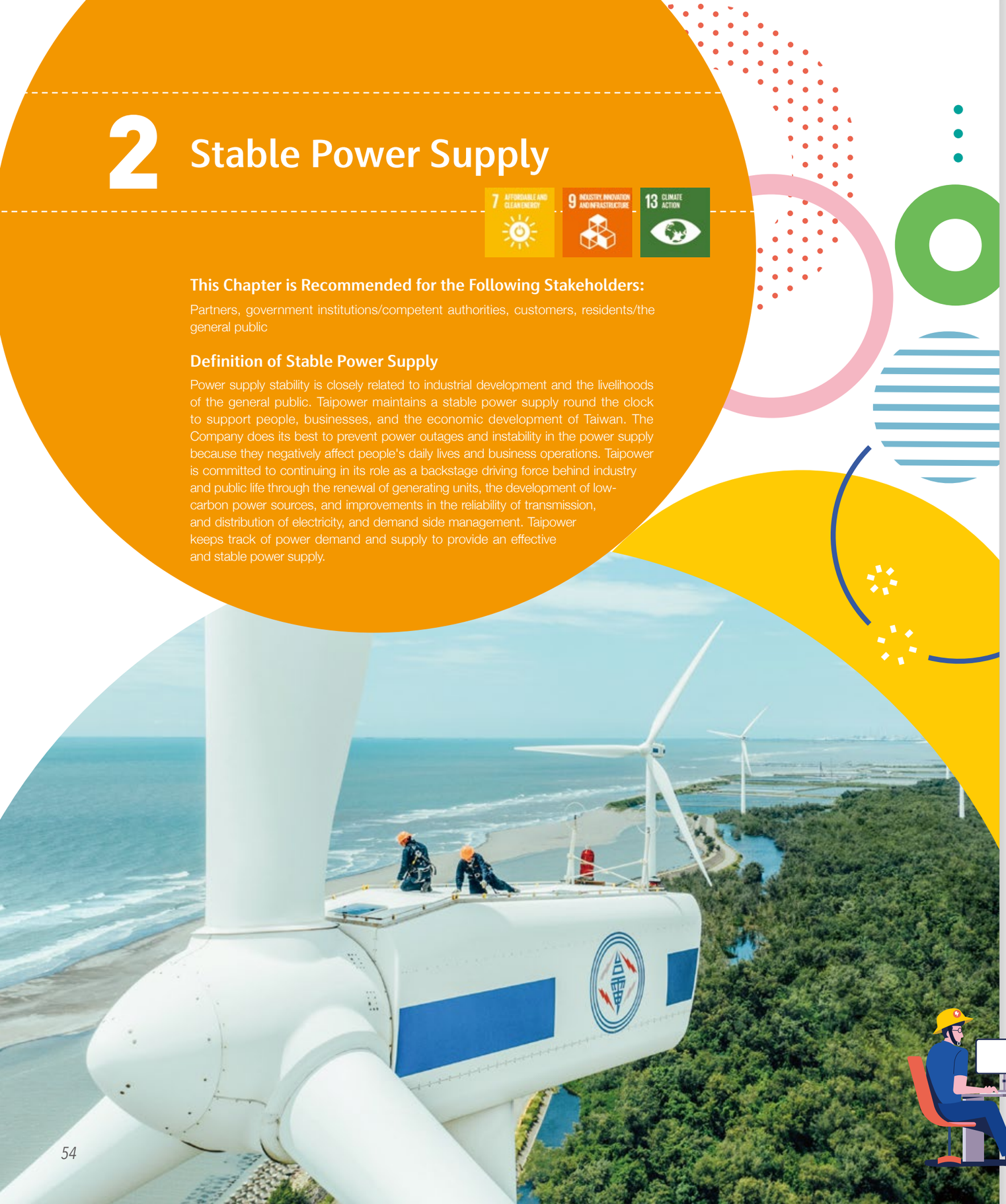
2 Stable Power Supply

This Chapter is Recommended for the Following Stakeholders:

Partners, government institutions/competent authorities, customers, residents/the general public

Definition of Stable Power Supply

Power supply stability is closely related to industrial development and the livelihoods of the general public. Taipower maintains a stable power supply round the clock to support people, businesses, and the economic development of Taiwan. The Company does its best to prevent power outages and instability in the power supply because they negatively affect people's daily lives and business operations. Taipower is committed to continuing in its role as a backstage driving force behind industry and public life through the renewal of generating units, the development of low-carbon power sources, and improvements in the reliability of transmission, and distribution of electricity, and demand side management. Taipower keeps track of power demand and supply to provide an effective and stable power supply.



Stable Power Supply Based on Manufactured Capital Investment

Taiwan's generating units, the power grid and power transmission and substation facilities are all vital assets that contribute to the stability of Taiwan's power supply. Investment planning for equipment capital management is crucial for Taipower as it faces external trends such as the push for energy transition, growing public awareness of environmental issues and the decommissioning of existing thermal and nuclear power plants. As a result, Taipower has prioritized three major directions for transition: the development of renewable energy, the promotion of low-carbon gas, and the renewal of coal-fired power units with ultra-supercritical (USC) generation units. These measures will stabilize the hardware capital of the electric system and provide a stable electricity source for the ongoing development of Taiwan's diverse society.

Main Investments

- Invest more than NT$418 billion in renewable energy from 2015 to 2030.
- Increase the resilience of the power grid by adopting a clustering design for important power plants, reducing equipment overload through grid improvement projects, and strengthening existing tower foundations, etc.
- Strengthen the transmission and substation system with the 7th Transmission and Substation Revision Project. Total investment in the project is expected to be NT$236.9 billion (to 2021), and the accumulated investment for the project as of 2019 is approximately NT$189.6 billion.
- Develop distribution feeder automation. A total of 970 automatic switches were installed on distribution feeders in 2019. This brings the accumulated number of monitorable, on-site automated switches to 25,020, and the number of automated feeders to 7,590. Through this development, the probability of successful malfunction detection has increased, thus minimizing the scope of power failures due to outage.
- The total length of the underground transmission cable is 3,457.6 kilometers.

Performance Highlights

- In terms of the proportion of overall power generation, ***gas-fired power generation surpassed coal-fired power generation for the first time***, showing the effectiveness of Taipower's energy transition
- In 2019, the System Average Interruption Frequency Index was ***0.209*** times/household, and System Average Interruption Duration Index was ***16.488*** minutes/household
- Newly added renewable energy plants include the Yongxing Wind Power Plant (9.2 MW) and the Changbin Solar Power Plant (over 99 MW). Changbin Solar Power Plant is currently ***the largest facility*** of its type in Taiwan.
- In 2019, the Taipower Wind Power Plant in Penghu and the Demonstration Optical Site in Taichung obtained ***16,303*** renewable energy certificates (almost ***50%*** of all certificates in the country)
- The gross thermal efficiency of thermal power plants has been increasing year by year, from 44.81% in 2018 to ***45.64%*** in 2019.
- The progress of thermal generating unit renewal projects is as follows: Linkou (96.15%), Dalin (99.07%), Tongxiao (99.33%), Datan (14.59%), Taichung (2%), Xingda (6%), and Xiehe (1.28%).

Future Plans

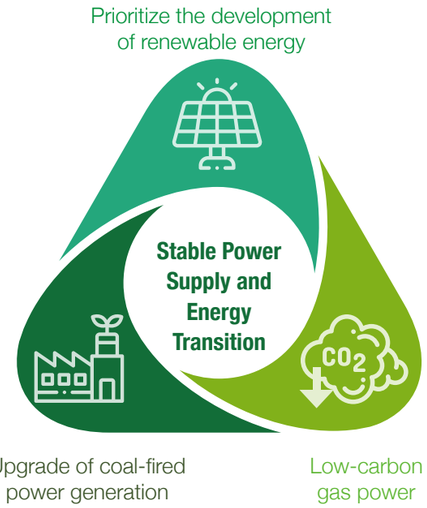
Climate change and economic development will drive many changes in the electricity industry. In addition to actively developing renewable energy, low-carbon gas and continuously renewing thermal power generation units on the supply side, Taipower is also promoting demand-side management through demand bidding, time-of-use (TOU) rates, power-saving service groups, community energy conservation campaign projects and conducting interviews with customers who consume more than 100 kW of electricity. Meanwhile, by maintaining a stable transmission system that provides the power demanded throughout the energy transition process, and the development of multiple energy sources, Taipower will continue to enhance its operational capabilities and market competitiveness.

2.1 Planning for New Sources of Energy

2.1.1 A Transition that Keeps Pace with the Times

Policies and Public Opinions Correspond to the Transition of Power Plants

Taiwan's energy transition policy is centered on reducing coal use, increasing gas use, and developing nuclear-free, green energy. The policy aims for the use of renewable energy and gas power generation as the main sources of power in the future. Assuming the various development projects for solar, wind and gas-fired power and their associated natural gas receiving terminals are completed on time, a reserve capacity of 15% and an operating reserve of 10% can be achieved and a stable power supply ensured. Following public referendums in 2019, Taipower launched a project to review its energy policies. That process led Taipower planning to prioritize the development of renewable energy, promote low-carbon gas power generation, partially upgrade coal-fired units into ultra-supercritical units, and adjust the proportion of various types of generation, to gradually achieve an energy transition without compromising the stable power supply.



Prioritize the development of renewable energy

Renewable energy is derived through distributed generation. Additionally, if the potential of renewable energy is to be achieved, private enterprises must participate in development along with Taiwpower. Consequently, Taipower actively promotes the establishment of renewable energy sources, such as off and onshore wind, solar, geothermal and micro-hydro power. The Company is also continually strengthening the power grid in order to create a friendly grid-connected environment that fully enables renewable energy development. Currently, various sites of large solar power plants are being proactively developed, and the generation capacity of solar power plants is expected to reach 20 GW in 2025. With regards to wind power, potential sites for the development of primary wind farms are exhausted, Taipower will continue to explore secondary wind farms, fish farms, and other areas as possible future sites. It is expected that wind power generation will reach 6.9 GW by 2025.

Actively promote low-carbon gas power generation projects

Since renewable energy typically results in intermittent power generation, it must be produced in conjunction with conventional thermal power in order to ensure a stable power supply. For Taipower, this necessity has created a need for spare thermal units. In order to meet that need, Taipower is expanding its low-carbon and high-efficiency gas plants through projects such as the Phase 2 renewal and expansion of the Tongxiao and Datan Power Plants, the renewal of the Xingda Power Plant, and the extension of generation capacity at the Taichung Power Plant.

Meanwhile, in order to ensure national energy security and the stability of the natural gas supply for the power plants, Taipower is pursuing low-carbon gas power generation projects and developing liquefied natural gas (LNG) receiving terminals in both the Taichung Port and at Xiehe. In addition, the CPC Corporation is constructing a third LNG receiving terminal.

Coal-fired units will be vital as spare units

The international trend in energy policy has been towards energy diversity. For Taiwan, which is overwhelmingly (98%) reliant on imported fuels and operates an independent power grid, a certain amount of coal-fired power generation will remain necessary throughout the process of energy transition, to ensure stable power supply, energy security and energy diversity. These factors, in addition to the need to reduce air pollution have led the Company's Linkou and Dalin Power Plants to introduce ultra-supercritical generation units and the latest environmental protection equipment. In the future, Taipower will conduct feasibility assessments on the replacement and decommissioning of existing coal-fired power plants as the reserve capacity margin incrementally increases. This approach will allow the duel goals of reducing air pollution emissions and ensuring stable power supply of the system can be achieved.

Short, Medium, and Long-Term Plans for Energy Transition

At present, in accordance with the government's energy policy, Taipower is continuing its transition to low-carbon power and the development of renewable energy. In 2019, Taipower's system had a reserve capacity margin of 16.8%. Its power generation structure consisted of 38.2% gas-fired, 37.3% coal-fired, 13.4% nuclear, 1.9% fuel oil, 6% renewable and 3.2% other (including pumped storage and cogeneration) energy. Taipower, then, has effectively achieved the government's target of a 15% reserve capacity and a stable power supply. Notably, the proportion of gas-fired power generation began to exceed that of coal-fired power generation in 2019. In the future, as gas-fired power generation projects are successively commercialized, gas-fired power generation will gradually move towards 50% of energy by 2025.

Short-Term Actions

Since Taiwan is small and densely populated, land for power plants and power lines is difficult to obtain. Additionally, there are major obstacles to constructing power plants and power lines from the Not-in-my-backyard (NIMBY) effect and the intense attention greenhouse gas emissions have drawn from the general public in recent years. Since that the construction of power plants takes a long time and existing nuclear and thermal plants are near mandatory decommission dates, it is impossible to make plans to acquire new traditional thermal power sources to replace those facing impending decommissioning. To lower the risk of power shortages, Taipower has planned the following responsive actions:

- Due to the continuous grid connection of renewable energy, the net load of the Company's power system during the day (the load after deducting solar and wind power) decreased, and the decrease in sunlight at the dusk caused the net load to increase. The Company plans to adjust its "Demand Response Load Management Measures-Plans to Reduce Electricity Consumption" in order to suppress electricity consumption during certain periods in order to meet the demands of the system.
- Continue to strengthen the maintenance of generating units and ensuring unit maintenance schedules are properly arranged to improve unit availability.
- Accelerate renewal and expansion projects at the Tongxiao, Datan, Xingda, Taichung, and Xiehe Power Plants.
- Assess the possibility of using units that are near to mandatory decommissioning as emergency backup units.

Wind power plants in Sihu Township, Yunlin County

Medium-Term Measures

In terms of supply-side management, Taipower will continue to promote the replacement of traditional thermal power plants, introduce high-efficiency units with advanced pollution prevention technologies to reduce pollution emissions, expand renewable energy development, and promote the self-built LNG Receiving Terminal projects at the ports of Taichung and Xiehe. The Company will also increase its power supply's capacity and reduce carbon emission intensity. In terms of demand-side management, Taipower will expand its installation of smart meters (AMI) to promote more efficient time-of-use rates and electricity-saving measures that will reduce electricity demand in the future.

Power Plant Renewal and Expansion Projects

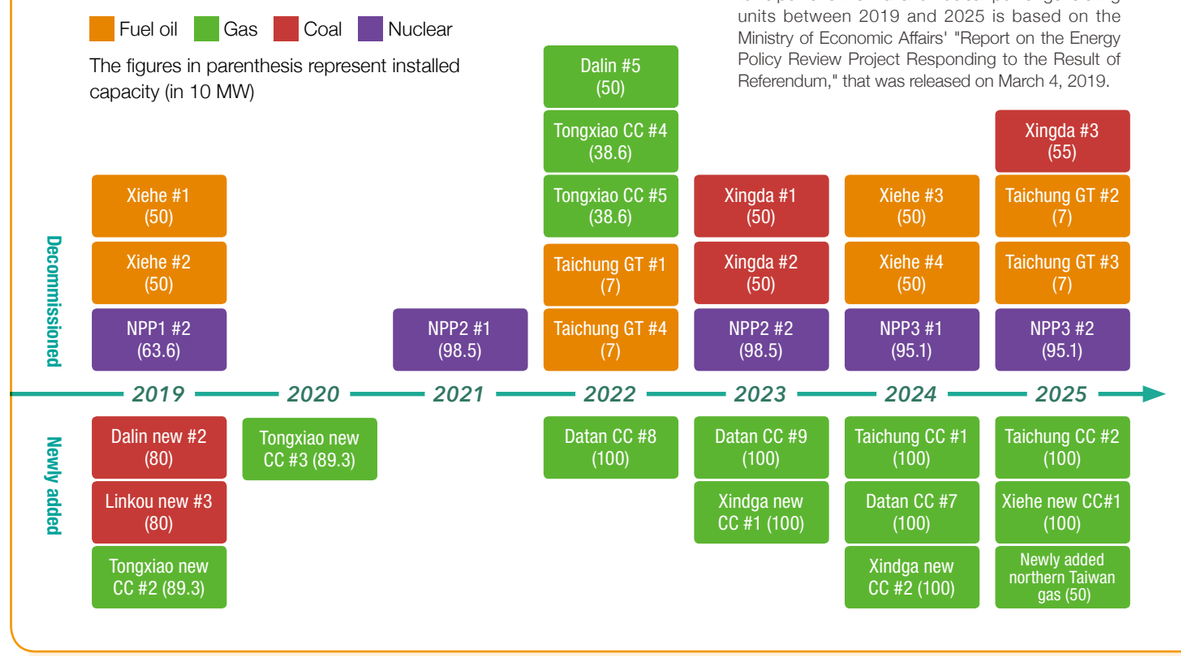
Type	Project Name	Project Capacity	Progress	Expected Benefits
Thermal power plant	Renewal and Expansion of the Linkou Power Plant	Renewal and expansion of three ultra-supercritical pressure coal-fired units, each of which has a capacity of 800 MW at the current plant site	Percentage of completion was 96.15% as of the end of December 2019	Supply power for the northern Taiwan region and increase the quality of power supply
	Renewal and Expansion of the Dalin Power Plant	Installation of two ultra-supercritical pressure coal-fired units, each of which has a capacity of 800 MW	Percentage of completion was 99.07% as of the end of December 2019	Strengthen power supply capabilities
	Renewal and Expansion of the Tongxiao Power Plant	Construction of three gas combined cycle units, each of which has a capacity of 892.6 MW	Percentage of completion was 99.33% as of the end of December 2019	Meet policy requirements by prioritizing the utilization of natural gas and strengthening the efficiency of thermal generating units as a whole
	Phase 2 of Renewal and Expansion of the Tongxiao Power Plant	Construction of six gas combined cycle units, each of which has a capacity of 440-550 MW	Approved for execution in mid-August 2019; as of the end of December 2019, the actual progress of the plan was 0.05%	
	Newly Constructed Gas Generating Units at the Taichung Power Plant	Installation of two gas combined cycle units, each of which has a capacity of 1-1.3 GW at the current plant site, bringing the total capacity to 2-2.6 GW. Construction of LNG receiving terminals, with five aboveground 160,000kL LNG storage tanks planned in the initial stage	Percentage of completion was 2% as of the end of December 2019	
	Renewal and Expansion of Gas Generating Units at the Xingda Power Plant	Renewal and construction of gas combined cycle units with the total capacity of 3-3.9 GW at the current plant site	Percentage of completion was 6% as of the end of December 2019	
	Expansion of the Datan Power Plant	Addition of three gas-fired combined cycle units to the existing plant with a total capacity of 3,160 MW	Percentage of completion was 14.59% as of the end of December 2019	Respond to the growth of domestic power consumption and the government's Nuclear-free Homeland policy. New generation units were acquired to ensure a stable power supply
	Renewal and Expansion of the Xiehe Power Plant	Installation of two gas combined cycle units, each of which has a capacity of 1-1.3 GW	Percentage of completion was 1.28% as of the end of December 2019	Conducted in concert with power plant decommissioning and provide power for customers in northern Taiwan. Plans call for upgrading and transformation into a gas-powered plant
Offshore wind power facility	Phase 1 of the Offshore Wind Power Project	Installation of a wind field whose total capacity is 109.2 MW. The site will be able to generate over 360 GW of power annually	Percentage of completion was 57.34% as of December 31, 2019. Scheduled for security dispatch by the end of December 2020	Develop Taiwan's R&D capability for offshore wind power and expand the employement of green energy devices
Hydropower plant	The Liyutan Reservoir of the Jingshan Hydropower Project	Installation of one vertical, Francis turbine hydraulic generation unit with a capacity of 4,013 kW at the Liyutan Reservoir in Miaoli. The annual capacity of power generation will be 13.886 GWh	Percentage of completion was 84.16% as of December 31, 2019. Scheduled to begin operation by the end of September 2020	Make use of the potential of hydropower and expand the application of renewable energy
	Phase 1 of the Island-wide Small Hydro Project	Installation of one vertical, Francis turbine hydraulic generating unit at the crossover pipe of the stone waterway. Installation of 12 bulb hydro turbine generating units at six sites including the access road along the south bank of the Jiji Weir. A total of 13 generating units will be installed with a total capacity of 16.605 MW and an annual power generation capacity of 74.6 GWh	Bidding was closed and contracts awarded in December 2019. The site is currently being processed with completion expected by June, 2023	Make use of the potential of hydropower and expand the application of renewable energy, as well as developing a distributed grid
	Phase 2 of the Island-wide Small Hydro Project	Installation of a total of four hydraulic generation units at three sites: the Shilin Weir, the Tianlun Dam, and Maan Houchi. The total capacity will be 1.894 MW and the annual power generation will be 9.473 GWh	The Qilai Outlet Small Hydro Project was cancelled. The process of calling for tenders for other projects is underway. Completion is expected by December 2021	

Long-Term Power Development

While the demand for electricity continues to grow, Taipower's thermal and nuclear power plants are nearing mandatory decommissioning. The Company must adhere to government's policies and consider internal and external environmental conditions when planning long-term power development projects to 2025 as follows:

Taipower Power Resource Planning from 2019 to 2025

Note: Information on decommissioning and new additions to Taipower's thermal and nuclear power generating units between 2019 and 2025 is based on the Ministry of Economic Affairs' "Report on the Energy Policy Review Project Responding to the Result of Referendum," that was released on March 4, 2019.

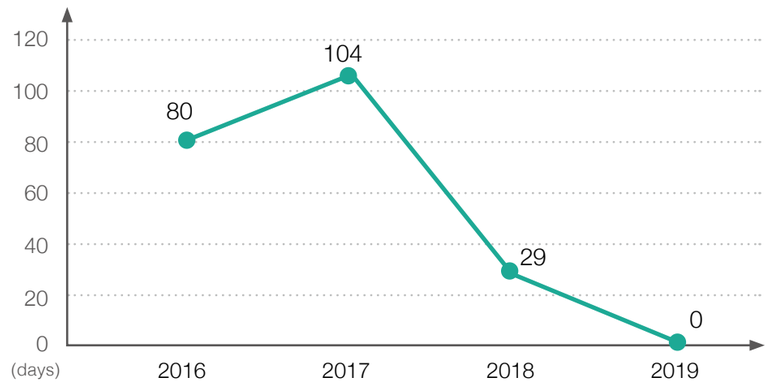


2.1.2 A Stable Power Supply and the Generation System

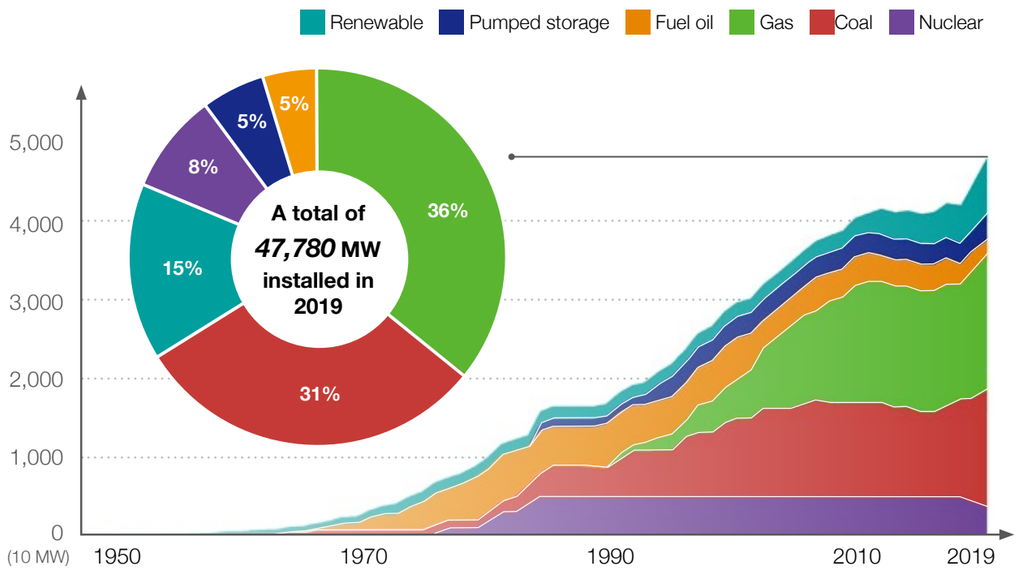
Stable Power Supply and Installed Capacity

In recent years, sustained economic growth and extreme weather have led to repeated record highs in Taiwan's electricity consumption. To ensure the stability of the power supply, Taipower continuously strengthens management, promotes power development plans, and brings new generating units online. In 2019, the operating reserve rate did not fall to less than 6% on any days. The number of days with a reserve capacity at less than 6% has continuously fallen for the past three year. In the future, Taipower will dedicate itself to maintaining this stable power supply.

The Number of Days Below 6% Reserve Capacity



Taipower's Installed System Capacity from 1950 to 2019



Total Amount and Composition of Power Generation from 2017 to 2019

	2017		2018		2019	
	100 GWh	Percentage	100 GWh	Percentage	100 GWh	Percentage
Net amount of power generation and purchase	**2,311**	**100.0%**	**2,333**	**100.0%**	**2,325**	**100.0%**
Amount of power generated	**1,805**	**78.1%**	**1,827**	**78.3%**	**1,804**	**77.6%**
Pumped storage hydro	33	1.4%	34	1.4%	32	1.4%
Thermal	1,503	65.1%	1,483	63.6%	1,405	60.4%
Nuclear	216	9.3%	267	11.4%	312	13.4%
Renewable energy	53	2.3%	43	1.9%	55	2.4%
Amount of purchased power	**506**	**21.9%**	**506**	**21.7%**	**520**	**22.4%**
Privately-owned thermal	405	17.5%	389	16.7%	393	16.9%
Renewable energy	60	2.6%	71	3.0%	85	3.7%
Cogeneration	41	1.8%	46	2.0%	42	1.8%

Note: The sum of the respective items may not match the total amount for the numbers are rounded to the nearest tenth.

In order to effectively manage the operation of thermal units, Taipower not only strengthened various operational maintenance strategies, but also established a licensing system and a training mechanism for operating personnel to ensure the stability of daily operations. Meanwhile, Taipower's main management measures for nuclear units include supervising the plants, pointing out operational weaknesses, and strengthening equipment improvement and renewal during overhauls, as well as reviewing the unplanned events in the current year.

Average Availability Rates for Power Plants from 2017 to 2019

Unit: %

Unit		Energy type	2017	2018	2019
Thermal	**Steam**	Coal	90.74	86.55	82.65
		Oil	89.43	89.01	93.83
		LNG	90.38	90.21	73.70
	Combined Cycle	LNG	90.81	87.62	88.00
Hydro		Hydro	96.61	95.58	96.84

Note: 1. Thermal Unit Availability = 1 - Period Unit Impact on Power Supply/No. of Hours/Unit Max Net Output
Thermal Plant Average Availability = Σ (Unit Availability × Unit Max Net Output)/Σ Unit Max Net Output
2. Hydro Unit Availability = (Operational Period + No. of Standby Hours)/Annual Number of Hours
Hydro Plant Annual Availability = Arithmetic Mean of Unit Annual Availability

Average Availability Rates for Nuclear Power Plant from 2017 to 2019

Unit: %

Year	NPP1		NPP2		NPP3	
	Reactor 1	Reactor 2	Reactor 1	Reactor 2	Reactor 1	Reactor 2
2017	- (Note 2)	41.76 (Note 3)	56.12 (Note 4)	- (Note 5)	99.12	80.17
2018	-	- (Note 3)	85.46	56.62 (Note 5)	87.70	92.07
2019	-	-	100.00	88.03	87.38	97.11

Note: 1. Utilization rates of nuclear power plants = Number of hours of power generation per year/Number of total hours in that year

2. The EOC-27 major overhaul of reactor 1 of the First Nuclear Power Plant (NPP1) began on December 10, 2014. Although the damage on the connecting hardware for the water channel on Atrium-10 fuel at the First Nuclear Power Plant's reactor 1 in 2015 had been repaired by February 2015, the Legislative Yuan's Education and Culture Committee resolved in mid-March 2015 that the Atomic Energy Council must complete its report on the incident before Taipower is permitted to apply for the First Nuclear Power Plant to resume operations. Despite the fact that the Atomic Energy Council has made numerous applications to the Education and Culture Committee to present the report to legislators, the Committee has not put the application on its agenda. Consequently, the First Nuclear Power Plant has remained non-operational since the incident, and the operating license of the reactor expired on December 5, 2018. The reactor is currently in the decommissioning process.
3. Reactor 2 of the First Nuclear Power Plant has been carrying out EOC-28 major overhaul work since June 12, 2017. However, due to a full spent fuel pool, the fuel rods in the core cannot be withdrawn and replaced with new fuel, thus it is no longer possible to generate electricity. The operation license of reactor 2 expired on July 15, 2019, while reactor operations were suspended.
4. Due to a full spent fuel pool, the fuel rods in the core of reactor 1 of the Second Nuclear Power Plant could not be withdrawn on November 30, 2016. After adding a fuel storage grid to the loading tank of the fuel plant's protective box (440 bundles of fuel storage space were added to each unit), the reactor was connected to the grid and resumed power generation on June 9, 2017.
5. Reactor 2 of the Second Nuclear Power Plant tripped on May 16, 2016 due to a failure of the lightning arrester on the generator. The power plant completed all maintenance and testing work on June 27, 2016. On June 13, 2016, the Education and Culture Committee of Legislative Yuan made an interim proposal, demanding the Atomic Energy Council provide a report to the Legislative Yuan before restarting reactor 2 of the Second Nuclear Power Plant. The units were approved by the Atomic Energy Council to apply for grid connection after major overhaul on March 27, 2018 and full load operation was reached on June 17. The units are currently in stable operation.

Increasing Reliability of Power Supply

Taipower has complete measures concerning power dispatch and can implement load limits when the power system is on the verge of breaking down due to outages, insufficient power supply caused by fuel shortages, facility overloads, or severely low voltages.

Load limits are categorized as either emergency load limits or planned load limits. The respective timing of these two types of load limit is:

- **Emergency load limits:**

  When the system has a power shortage due to sudden outage, equipment overload or a severely low voltage, a load limit needs to be implemented immediately. An emergency load limit may be executed in the following ways: (1) Automatic unloading of under-frequency relays; (2) Level 1 load limits; (3) Emergency rolling blackouts.

- **Planned load limits:**

  When a power shortage is predicted for the next day, a planned load limit is announced on the day before power rationing is implemented. The planned load limit may be executed in the following ways: (1) Industrial user power rationing; (2) Planned rolling blackouts.

In addition, Taipower has taken steps to ensure supply stability from the engineering and operational sides. The Company holds regular power supply bottleneck meetings, accident review meetings, and makes plans based on different natural disaster scenarios to reduce the chance of transmission lines tripping due to natural disasters.

Since Taiwan's offshore islands are not connected to the main island's power grid, ensuring a stable and reliable power supply is a challenging task. Nonetheless, Taipower has not neglected the needs or rights of island residents and provides electricity services that are equivalent to those available on Taiwan proper. To maintain this equality of service access, Taipower proactively works to improve the electric systems of offshore islands.

In Kinmen, the majority of power outages and blackouts have historically been caused by the arrangement of the switchyard buses at the Tashan Power Plant. The arrangement made units and lines too concentrated and, in consequence, the power plant was likely to experience a complete shutdown when accidents occurred. In view of this, Taipower held meetings to discuss methods of segmentation for the switchyard and other facility changes that would improve the power system for Kinmen. Subsequently, Taipower plans to organize generators and substations into different groups in terms of their operations. In consequence, future system outages will not cause a total blackout in the Kinmen area.

At the same time, Taipower is also working on the power grid in the Penghu area to ensure a sufficient power supply and an increase in the availability of electricity. A new, primary substation in Penghu has been completed. A second line of the Taiwan-Penghu submarine cable is also being added, and upon its completion, some units of the Jianshan Power Plant will be decommissioned and converted into a standby power role.

The second line of the Taiwan-Penghu submarine cable will integrate the Penghu system into the grid of Taiwan proper. In consequence, the proportion of grid-connected renewable energy in Penghu will be greatly increased, and the area's surplus electricity will be sent back to Taiwan. Through the integration of these systems, Penghu will be provided with stable and abundant power, which will help increase its electricity penetration rate.

Facing the Challenges of Natural Disasters

Natural disasters are a great challenge for Taipower's operations. In terms of internal management, Taipower has a complete emergency response system for disaster prevention, with policies and regulations already in place. These are embodied in documents such as the "Disaster Prevention and Rescue Guidelines," the "Unusual Disaster Prevention and Treatment Guidelines," the "Fast Report Procedures for Disasters and Emergencies," and the "Standard Operation Procedures for Disaster Prevention and Emergency Response." Together, these policies allow all units to respond effectively and quickly to natural disasters and major power supply accidents. Taipower also regularly provides educational training on various disaster warnings and conducts random checks to improve the timeliness of disaster reporting.

When typhoons affect Taiwan, Taipower's external response includes daily, local press releases from the Company's branch offices during the early, middle, and late stages of the storm's impact. These press releases strengthen awareness of disaster prevention and help the public prepare for the disaster. Customers are invited to contact Taipower's customer service hotline in the event of blackouts. The special hotline 1911 or the "Power Outage Inquiry and Notification System" on our official website can also be used for reporting power outages. In addition, in order to be aware of the external information and responses to disasters, the branch offices in each district continue to strengthen the establishment of contact mechanisms with local stakeholders on an ongoing basis by establishing a variety of real-time communication channels through social media community groups, telephone and fax lines, or e-mails. Each branch office tailors its approach based on regional characteristics to ensure more comprehensive control and to confirm the power recovery status of users in its respective region and handle any incident as soon as possible.

Smart Inspection with Unmanned Aerial Vehicles (UAV)

Traditional, manual inspection methods are often limited by terrain, environment, and other factors. To overcome these issues and improve the effectiveness of inspections, Taipower employs advanced technology through its transmission line fault location system combined with a geographic information system. The range of the accident site can be accurately marked and displayed on the electronic map with a coordinate positioning method. Since the affected section can be visualized, personnel in charge of transmission inspection are able to swiftly locate the accident site in far less time. In the future, Taipower will introduce UAV-assisted transmission line inspection by using historical data and up-to-date images to assist in the analysis and detection of relevant transmission equipment through AI technology. This method is going to comprehensively improve the efficiency and effectiveness of inspection operations, and allow outage sources to be located even more swiftly.

Ensuring Nuclear Power Safety

To ensure the safety of nuclear energy operations and to protect the general public and the environment from the harmful effects of ionizing radiation, the President of Taipower issued a "Nuclear Energy Operation Safety Statement Policy," which provides information on relevant standards, self-assessments, the promotion of management systems, prevention of potential hazards, and the goal of pursuing excellent safety operations. Since the equipment of each nuclear power unit is subject to different conditions, such as special geographic conditions and historical or possible natural disasters including earthquakes, tsunamis, typhoons, tornadoes, floods, each facility will be evaluated in detail to provide defense-in-depth thinking in order to respond to any sudden accident.

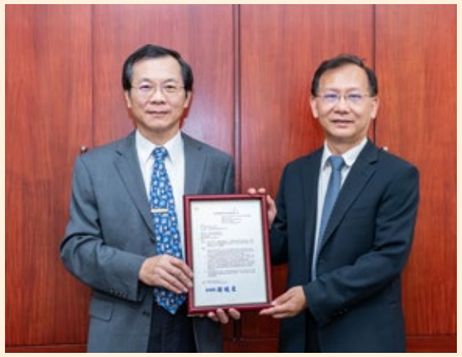
Defense-in-Depth

The 1st defense	The 2nd defense	The 3rd defense	The 4th defense
Prevention	**Mitigation**	**Emergency Preparedness**	**Ultimate Response Guidelines (URG) are prepared for the units**
Evaluation and prevention in advance based on various extreme conditions	Disaster mitigation is executed to prevent leakage of radioactive materials from the nuclear power plant	Protective actions are taken to reduce radiation exposure outside the nuclear power plant	A design to cope with the basic impacts of earthquakes and tsunamis and "Process of Ultimate Response Guidelines (URG) for Units" are drawn up

In addition, Taipower has joined the United States' Nuclear Procurement Issues Committee (NUPIC) organization and regularly participates in meetings to obtain audit information from manufacturers that nuclear power plants procure from in order to ensure the quality and safety of equipment and components. Taipower also follows the Enforcement Rules for the Nuclear Materials and Radioactive Waste Management Act, and submits reports on radioactive waste treatment, storage, final disposal as well as an annual report on operations, radiation protection, and environmental radiation monitoring to the competent authority in order to ensure the proper disposal of nuclear waste and promote nuclear energy safety.

Decommissioning of the First Nuclear Power Plant

The decommissioning permit for the First Nuclear Power Plant became effective on July 16, 2019, and the decommissioning plan is being carried out in four phases. These include: an 8 year decommissioning transitional phase, a 12 year phase of dismantling the plant, 3 years of detection on the final state of former plant site, and 2 years of former plant site recovery. The total length of the decommissioning process will be 25 years. Although there is still fuel in the core of the reactor, Taipower has given priority to ensuring the safety of the reactor core and is actively carrying out decommissioning preparations that can be performed the fuel is removed.



2.2 Development of Renewable Energy

Promoting Renewable Energy

Taipower promotes renewable energy through all-round action. In addition to actively developing renewable energy devices and sources to realize its goal of becoming the largest green corporation in the country, the Company also strives to create a connection-friendly grid environment that can respond to future demand when green power is mass produced. Goals include: Continuing to promote Phases 2 to 5 of the Photovoltaic Project, Phase 5 of the Wind Power Project, the low-carbon Island Wind Power Project in Penghu, Phases 1 and 2 of the Offshore Wind Power Project, the Green Island Geothermal Generating Unit Pilot Project, Phase 1 of the Geothermal Energy plan at Renze and Tuchang in Yilan County, and the Small Hydropower Project. These projects make full use of natural resources to reduce dependence on fossil fuels and are solid foundations of the government's energy transition policies.

At present, Taipower plans to continue its investment in renewable energy development until at least 2030. It is expected that by 2030, the Company will have increased offshore wind power generation by 900 MW, solar power generation by 800 MW, onshore wind power by 400 MW, and geothermal power by 8 MW, for a total of 2,100 MW. If the 1,900 MW generated from hydropower is included, Taipower's renewable energy capacity will have reached a target of 4,000 MW in 2030.

Time	Government's target				Taipower's target			
	2020		2025		2020		2025	
Item of promotion	Capacity (MW)	Power generated (100 GWh)	Capacity (MW)	Power generated (100 GWh)	Capacity (MW)	Power generated (100 GWh)	Capacity (MW)	Power generated (100 GWh)
Hydropower	2,100	64	2,150	66	1,800.6	44	1,813	44.5
Onshore wind power	814	19	1,200	28	312	8	370	9
Offshore wind power	976	35	5,738	207	109	0.95	409	8.4
Solar power	6,500	81	20,000	256	280	2.68	500	6.6
Geothermal power generation	150	10	200	13	0	0	2	0.08
Fuel cells	22	2	60	5	-	-	-	-
Biomass energy	768	38	813	43	-	-	-	-
Total	**11,331**	**249**	**30,161**	**617**	**2,502**	**56**	**3,094**	**69**

Note: The sum of the respective items may not match the total amount for the numbers are rounded to the nearest tenth.

Promotion Performance of Taipower's Cooperation with the System of National Renewable Energy Certification

At the direction of to the Bureau of Standards, Metrology and Inspection, Taipower developed a renewable energy certification system. By 2019, Taipower's Penghu Zhongtun Wind Power Station and the Taichung Demonstration Solar Power Field had both obtained a total of ***16,303*** renewable energy certifications, accounting for approximately half of the 32,433 total of issued certifications.

Current Status of Renewable Energy

Taipower continues to play a leading role in the shift to green power as it works to lay the foundation for the implementation of green energy policy. One of the major roles the company plays is ensuring grid-connection demand will be met as the mass production of green power becomes possible. In addition to hydropower generation, which has a century of history, the Company has also devised a complete development plan in recent years for wind power and solar power generation. It has also invested in research and development in emerging fields such as geothermal and biomass energy. To fully utilize natural resources and reduce dependence on fossil fuels, Taipower promotes the following renewable energies:

Current Status of Renewable Energy

Hydropower

Taipower started the development of hydropower nearly a century ago. By the end of 2019, the installed capacity had reached 2,090 MW (including IPP), accounting for about half of the total capacity of renewable energy.

Wind power

Since 2000, Taipower has been committed to wind power development. By the end of 2019, the Company had completed the Zhongtun Wind Power Demonstration Project, Phases 1 to 4 of the Wind Power Generation Project (with Phase 5 partially completed), the Huxi Wind Power Project in Penghu, and the Jinsha Wind Power Project in Kinmen. Currently, there are 17 wind farms and 177 turbines, with a total installed capacity of approximately 310 MW.

Solar power

In 2008, Phase 1 of the Solar Power Project began, and a large number of solar power systems have since been built. By the end of 2019, a total of 26 solar farms had been completed, including Phase 3 of the solar power project - Changbin Solar Power Plant 100 MW, which is the largest solar power field in Taiwan. The capacity of the entire system is approximately 124 MW. Taipower continues to promote Phases 2, 4, and 5 of its solar power generation projects and Phase 1 of its small-scale renewable energy power generation initiative. In response to the government's promotion of a solar power generation zone for large-capacity ground-based solar power generation, the industry is currently concentrating on grid connection while continuing to implement the distribution-level reinforcement of the power grid project that will be required for renewable energy grid integration.

Further efforts are aimed at the short, medium, and long-term model plans for the promotion of designated zones:

- Short-term plan (within 1 year): Adjustment of existing distribution lines, reinforcement or addition of lines to the main transformer
- Medium-term plan (1-3 years): Expansion of the main transformer in the substation and construction of new distribution lines
- Long-term plan (more than 3 years): Construction of the new booster station, providing operators with options of 69 kV or 161kV connections

Geothermal power generation

The pilot project for the Green Island geothermal generating unit and Phase 1 of geothermal power generation at Renze and Tuchang in Yilan.

Distribution of Taipower's Renewable Energy

Status of Taipower's Renewable Energy Development

	Deployments	Installed capacity (MW)	Generation in 2019 (GWh)	Number of households accommodated
Wind power	169 units across 17 sites	299.04	752.32	208,978
IPP wind power	-	-	1,065.57	295,992
Solar power	26 sites	123.577	147.16	40,879
IPP solar power	-	-	3,815.45	1,059,847

Note: 1. This calculation is based on Taipower's open data statistics which are derived from average monthly power consumption for a typical residential customer at 300 kWh per month and 3,600 kWh per year.
2. Six collapsed wind turbines at the Port of Taichung and two at Shihmen have been deducted from the calculation of installed capacity.

Committed to the efficiency of renewable energy

In order to improve the efficiency of renewable energy power generation, Taipower conducts regular inspections for prevention and maintenance that reduce the unit failure rate. The Company also selects parts that use materials with low-carbon footprints to reduce environmental impact. By strengthening the maintenance of ventilation and air-conditioning equipment in renewable energy power plants, and by installing energy-saving control equipment the power consumption of plants has been reduced. At present, Taipower's land-based power plants have set a goal of achieving a basic availability rate of 93% in the future and a capacity factor of 30%. In the future, Taipower will actively build on its technical management capabilities and improve its wind energy forecasting system to reduce the failure rate. By building a wind farm big data analysis system, the Company will be able to track the health status of wind turbines, diagnose fault signs and optimize maintenance schedules. As for solar power plants, Taipower has started to handle the procurement and replacement of spare large-scale converters in order to reduce the time of converter failure and non-power generation, and thus to improve operational performance.

Average Availability Rates of Renewable Energy from 2017 to 2019

Unit: %

	2017	2018	2019
Availability ratio of wind power (%)	93.02	93.83	92.19
Capacity factor of solar power (%)	15.11	15.05	13.85
Average availability ratio of hydropower units (%)	95.07	Base load ≧ 98.26 Peak load ≧ 97.69	Base load ≧ 98.10 Peak load ≧ 97.36

Note: 1. Annual Wind Power Availability Rate = Unit Generating Hours (Including Standby Hours) /Annual Number of Hours
2. Solar Power Capacity Factor = Annual Power Generation of Units / Device Capacity * Year-Round Hours
3. This capacity factor does not include Phase 2 of the Longjing Solar Power Plant site, as it only started power generation in August, 2014.
4. Hydro Unit Availability = (Operating Time + Standby Time) /Annual Hours

The Changbin Solar Power Plant: Taiwan's largest ground-mounted solar power plant

Taipower continued to promote renewable energy with concrete actions by replacing the planned Changgong Thermal Power Plant with the Changbin Solar Power Plant. Covering an area of 134 hectares, it is currently the largest solar power plant in the country. The capacity of the solar power plant is over 99 MW, and the annual amount of power generation is about 130 million kWh, which can supply electricity for 35,000 households. The estimated amount of carbon reduced by the site is 68,350 metric tons. By closely tracking the progress of the contractor and ensuring continuous, high-quality communication with the Changhua County Government, the license issuance process was accelerated, and interconnected power generation started 5 months earlier than expected. The power plant was officially completed in mid-October 2019.

Current Status of Renewable Energy Grid-Connection

Taipower cooperates with the government to promote the development of renewable energy. While prioritizing the safe operation of the power grid and in consideration of financial prudence, the Company has adopted an open attitude in examining international technologies and development trends as it adjusts its grid connection strategy to meet the grid connection demands of renewable energy. A total of 128MW of offshore wind power was added to the system by the end of 2019. It is estimated that the target for offshore wind power grid connection in 2020 will be 976MW, and the target for 2025 will be 5.7GW. The number of applications for various types of solar power plants and the accumulation of capacity are listed as follows (dated on February 6, 2020)

Case status		Cases (number)	Capacity (MW)
Accepted cases	Under review and without approval (A)	3,633	5,953.8
	Approved but haven't signed a contract (B)	5,267	9,475.94
	Have signed a contract but haven't connected to the grid (C)	32,093	5,178.42
	Subtotal (=A+B+C)	**40,993**	**20,608.16**
Grid-connected cases		**30,557**	**4,122.02**

Strategies for Grid Connection

Taipower set short, medium and long-term policies for activating the renewable energy grid-connection improvement project. In the short-term, the Company plans to expand eight substations, replace two lines, and build one new switching station. A step-up transformer will also be installed in the electrical room at one of Taipower's wind farms. A total of 12 ongoing projects are currently being implemented. For the medium and long-term, Taipower is continuing to conduct a rolling review based on land development scenarios. These are inventoried by the Bureau of Energy to track improvement progress and alleviate bottlenecks in the grid connection of small-capacity renewable energy sources.

Short-term (within 1 year)

Adjustment of existing distribution lines, reinforcement or addition of lines to the main transformer

Medium-term (1-3 years)

Expansion of the main transformer in the substation and construction of new distribution lines

Long-term (more than 3 years)

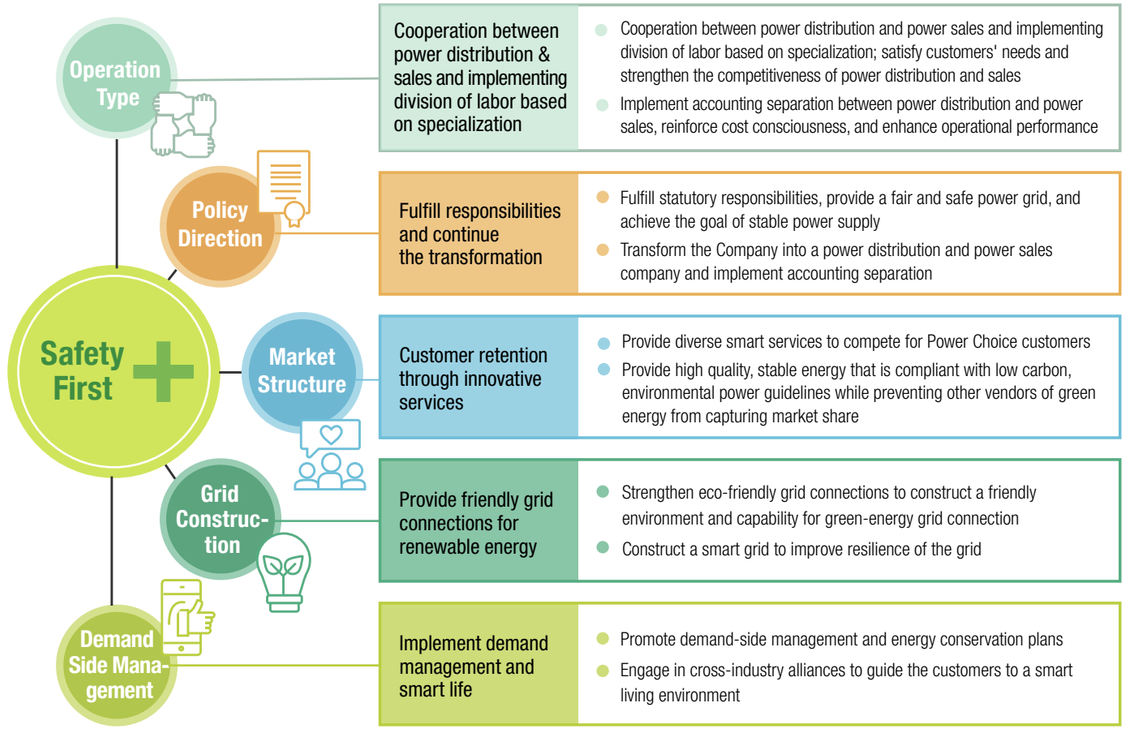
Construction of the new booster station, providing operators with options of 69kV or 161kV connections

To ensure the transparent disclosure of information, Taipower established a "Renewable Energy Application Case Progress Inquiry System." The system allows the general public to make inquiries. The Company also developed a "Visualization Query System for Grid-Connected Feeder Capacity" to guide developers to establish power plants in areas where the grid-connected capacity is still abundant. Taipower actively promotes renewable energy development projects such as wind power, solar power, geothermal, and small hydropower, and provides a friendly grid-connected environment for private industry to apply for green energy power generation equipment. Our action is moving toward the government's goal of 20% renewable energy by 2025.

2.3 Providing Quality Electricity Service

2.3.1 A Robust Transmission and Substation System

To ensure the stability of household and industrial electricity, Taipower undertakes comprehensive planning and management of the power grid, transmission, substations, and distribution systems. Looking to the future, the company will embrace five aspects in developing the next generation of stable power supply and distribution. The five aspects include: Cooperation between power distribution and power sales and implementing division of labor based on specialization, fulfilling responsibilities and continuing the transformation, customer retention through innovative services, providing friendly grid connections for renewable energy, and implementing demand management and smart living.



Improving the Accessibility of Electricity

In order to comply with The Electricity Act and exercise social responsibility by maintaining the rights and interests of the people through a stable power supply, Taipower has established 24 branch offices and 268 service centers in Taiwan, Penghu, Kinmen, and Matsu. These units cooperate with local public construction authorities (on issues like road development and land planning) and make public applications for setting up power supply facilities that will increase the availability of power supply. The Company also regularly holds review meetings on timely power supply to improve the availability, stability, and reliability of power services. This spirit of these initiatives aligns with the UN's sustainable development goals and ensures that people can obtain equality and the right to access electricity.

Currently, a few remote areas are without electricity. Due to the limited access (e.g., hiking trails), construction equipment and engineering vehicles (e.g., excavators, boom trucks, engineering trucks) cannot reach these sites. Moreover, pole construction is difficult in these areas and may increase the risk of causing serious damage to local ecological environments and natural landscapes. Despite this, the national power supply's availability rate has reached more than 99.99%. As of January 2020, Taipower had built 610 distribution-level substations and 10,097 feeders.

Meanwhile, stable access to electricity is important in building a comprehensive industrial environment for Taiwanese enterprises. For this reason, Taipower has discussed mechanism that could accelerate the power supply review process. With a focus on the newly added ultra-high voltage power service for three major investment plans (the Action Plans to Welcome Taiwanese Businesses in Mainland China to Return and Invest, the Action Plan for SMEs to Accelerate Investment, the Action Plan for Accelerating Investment for Taiwanese Enterprises that Choose to Stay) the updated mechanism will shorten the reviewing time to 1 month.

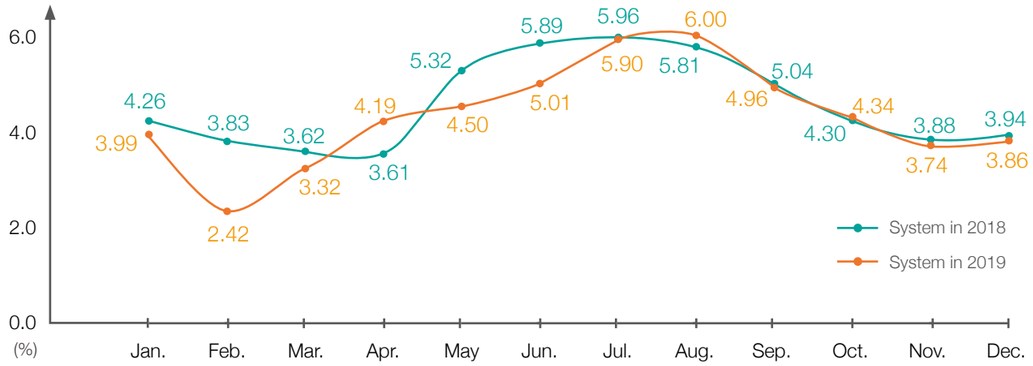
Strengthening the Infrastructure of Power Grid

The grid is a connective hub between the power generator and the customer. A sound power grid can effectively reduce the probability of power outages and maintain the quality of power supply. Over the years, Taipower has built a dense network around the country to ensure that people have the ability to use electricity conveniently. Regular maintenance of related facilities is also an important part of stable power supply. Taipower will continue to promote plans that increase the power grid's resilience and replace old facilities and lines. The Company will also promote grid projects in a timely manner to maintain a high-quality supply of electricity.

As Taiwan moves towards integrating intermittently generating renewable energy sources into the grid, the stability of the system and the power supply of the whole country could potentially be affected. Taipower is committed to researching grid-connected dispatching systems and strategies, and building related systems, such as an integration platform that supplies power generation information.

Overall Taiwan has a very stable power supply. The average number of power outages in 2019 was only 0.209 per household, and the average duration of power outages was 16.488 minutes per household. Over the past decade, Taipower has greatly improved the quality of power supply, customer service, and its own corporate image. In the future, in response to factors such as extreme global climate change, insufficient reserve capacity, the unstable characteristics of renewable energy, and the aging of existing transmission and transformation facilities, Taipower will continue to strengthen line maintenance and equipment improvements to reduce accidental power outages and ensure power supply quality. The Company will also continue to implement its power grid strengthening plan to improve the reliability of power supply and respond to the expectations of the general public.

Line Loss Rate in 2018 and 2019 (% accumulated in a month)



Note: 1. The line loss rate in December 2018 was +5.37%. This represents an increase of 0.62% over the same period the year before (when the rate was +4.75%). This was due to the net electricity purchase amount increasing by 0.84% compared to the same period last year (153 million kWh, because the temperature in December in Taiwan was higher than in the previous year), and the power sold increased by 0.47% (79 million kWh, because the power sold included part of the electricity consumption of users in November, as well as the fact that the number of days of meter reading decreased, resulting in only a slight increase in the power sold).

2. The accumulated line loss rate from January to December 2019 was 3.86%, a 0.08% decrease over 3.94% in the previous year. From January to December, the net amount of electricity generated and purchased decreased by 0.35% (-816 million kWh) from the same period last year, and the power sold decreased by 0.17% (-381 million kWh). This was due to load decay, increased renewable energy, and reduced power transmission from other regions to the north (due to the initiation of operation of the Linkou #3 unit and the increase in the output of the Second Nuclear Power Plant's units compared with that of the previous year, effectively suppressing the power transmission from other regions to the north).

3. The meter reading factor was caused by inconsistencies between the period of power generation or purchase and the period of power sale. For customers that require high-voltages, AMIs have been fully deployed, with the result that the power consumption period is consistent with the statistical period. However, for the low-voltage users, Taipower currently designates 16 meter reading days per month. Moreover, meter reading is executed region by region on rotation and for meter-rated lighting customers, meter readings are performed every other month. In consequence, the meter reading factor is essentially a lagging indicator of power sold. Despite this, historical data suggests that the statistical estimates of line loss rate as presented annually are typically accurate.

Power Supply Reliability Results from 2017 to 2019

	2017	2018	2019
System Average Interruption Frequency Index (SAIFI) (times/household • year)	0.212 (Note 1)	0.227	0.209
System Average Interruption Duration Index (SAIDI) (minutes/household • year)	16.898 (Note 2)	16.187	16.488

Note: 1. Results exclude the impact of the large-scale outage on August 15, 2017. The outage was mainly due to an interruption of the gas supply from the CPC Corporation. As a result, Taipower was not held responsible. The actual average number of outages per household (including the outage on August 15) was 0.553 (times/household • year).

2. Results exclude the impact of the large-scale outage on August 15, 2017. The outage was mainly due to an interruption of the gas supply from the CPC Corporation. As a result, Taipower was not held responsible. The actual average duration of power outages per household (including the outage on August 15) was 32.572 (minutes/household • year).

Strengthening Power Transmission and the Substation System

In response to economic growth, Taipower continued to strengthen the overall power grid through power transmission and substation projects, reinforcement of transmission capacity for the main line system, and optimization of the power supply capacity for ultra-high voltage, large-scale customers. The Company also sought to complete its construction projects as scheduled while maintaining their quality. Important construction projects are listed in the table below:

Important Power Transmission and Substation Construction Projects

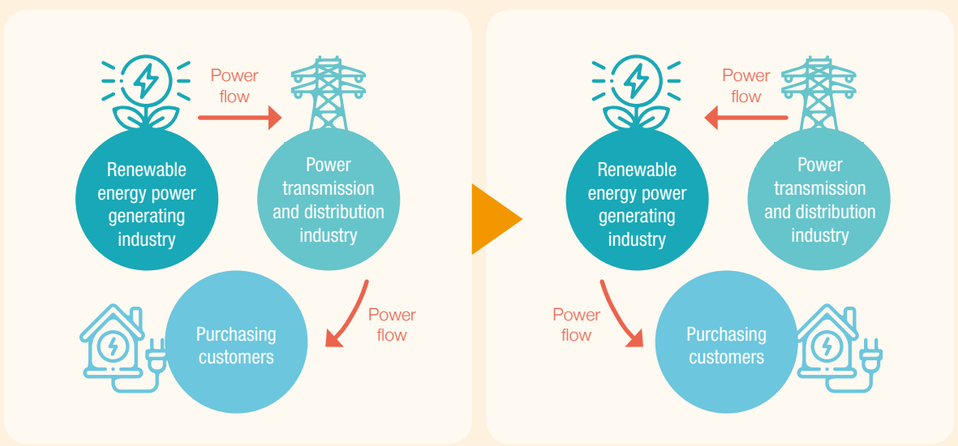
- Promote the **Seventh Power Transmission and Substation Revision Plan** (2010.1-2021.12) to meet the demands of load growth, provide grid connections for newly added power sources, and ensure the grid is safe and reliable while reducing the loss rate for the transmission system.
- Promote the **Banqiao Primary Substation Renovation Plan** (2014.1-2020.12) to increase the power supply capacity of the region, improve the quality of supply, promote local prosperity and economic growth, balance regional development, and promote the overall prosperity of the country.
- Promote the **Northern Region's Power Grid Project's Phase 1** (2016.1-2026.12) to meet the regional development load demands of New Taipei and Taoyuan Cities, improve the stable operation of the power system in Yilan in order to meet the load requirements of Hualien and ultra-high voltage customers such as the Asia Cement Corporation.
- Promote the **Northern Region's Power Transmission and Substation Project's Phase 2** (2019.1-2028.12) to meet the development demands of the northern region. The construction of multi-objective substations (Huajiang, Bancui and Yucheng Substations) will also revitalize the surrounding area.
- Promote the **Central Region's Power Transmission and Substation Project's Phase 1** (2019.1-2026.12) to meet load demands and improve the stability and reliability of the power supply in central Taiwan. The project also plans to increase the number of transmission-grade terminal facilities and distribution feeders to facilitate the future connection of renewable energy into the grid.
- Promote the **Complete Renovation of the Substation Project's Phase 1** (2019.1-2034.12) to rectify maintenance difficulties at older, existing substations (that have resulted from wildlife, salt, and fog) and maintain a stable and reliable power supply. This project is a response to government policies promoting renewable energy, smart grid construction and multi-objective substations. During the renovation, space for additional bays will be reserved for future expansion.
- Promote grid strengthening for the **Offshore Wind Power Project's Phase 1** (2018.1-2025.12) to meet offshore wind power grid connection requirements and government policy goals.
- Promote the **Southern Taiwan Science Park Ultra High Voltage Substation Expansion Plan** (2019.1-2025.12) to strengthen the power supply capacity of the Tainan and Southern Taiwan Science Parks, provide abundant, high-quality, safe, stable and reliable power for the high-tech industry within those parks, promote competitiveness and economic prosperity, improve national income and living standards, and enhance the public's satisfaction with the government's performance.
- Promote the **Southern Region's Power Transmission and Substation Project's Phase 1** (2021.1-2030.12) to meet load demand and solve the power supply bottleneck in southern Taiwan. The project also plans to increase the number of transmission-grade terminal facilities and distribution feeders to facilitate the future connection of renewable energy into the grid.
- In response to the demand for renewable energy grid connections, the Company reported the need for new expansions of substation and line replacement projects.

Designing a Platform and System for Power Wheeling and Direct Supply

Taipower's work in designing a platform and system for power wheeling and direct supply won two awards at the "Asian Power Awards 2019." These included the "Innovative Power Technology of the Year" and "Smart Grid Project of the Year" awards.

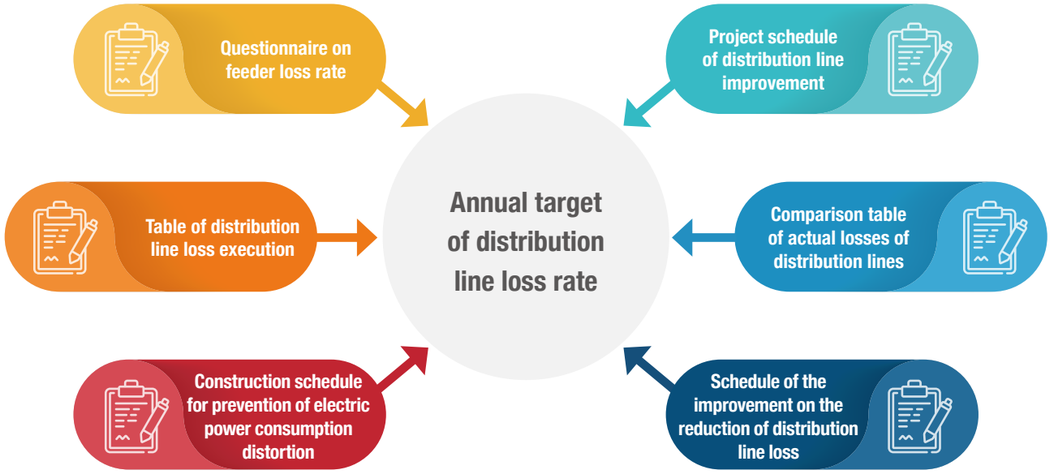
Taiwan promulgated amendments to the Electricity Act in January 2017 to initiate the country's electricity liberalization reform. In order to reduce the impact of the reform on the existing system, the initial stage is to implement a "green power first" policy to liberalize the trade of green power and provide customers with power options. By referring to the practices of various countries and in accordance with the country's energy industry structure, Taipower has formulated operation specifications for power wheeling and the direct supply of grid-tied renewable energy with its "Electric Power Wheeling and Direct Supply Platform." The platform is dedicated to the operation of the new service.

The power supply-end of "power wheeling" (as shown in the picture below) transmits power to the customer-end through a transmitting utility. The power supply-end for the direct supply of grid-tied renewable and the customer are connected by privately-owned lines that supply power. Through the platform's design, the issue of renewable energy having intermittent power generation characteristics is solved. When there is excess power or insufficient power supply, Taipower is responsible for maintaining the stability of power supply as an electricity retailing utility enterprise. The Electric Power Wheeling and Direct Supply Platform is expected to be equipped with AMI smart meters to accurately measure the amount of power generation and power consumption every 15 minutes to accurately provide diversified electricity sales channels to electricity enterprises, as well as to meet the demands of industry. The three major functions of the platform include: contract management, power consumption amount settlement and utility rate calculation. These functions will allow for the realization of electricity liberalization in the future. The new platform and service serve to implement national policies to encourage more companies to join the green energy industry, in order to achieve the goal of energy transition.

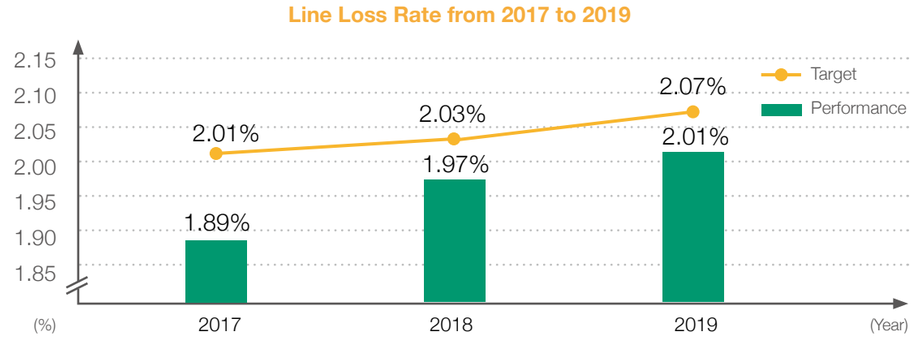


2.3.2 Increasing the Reliability of Power Distribution

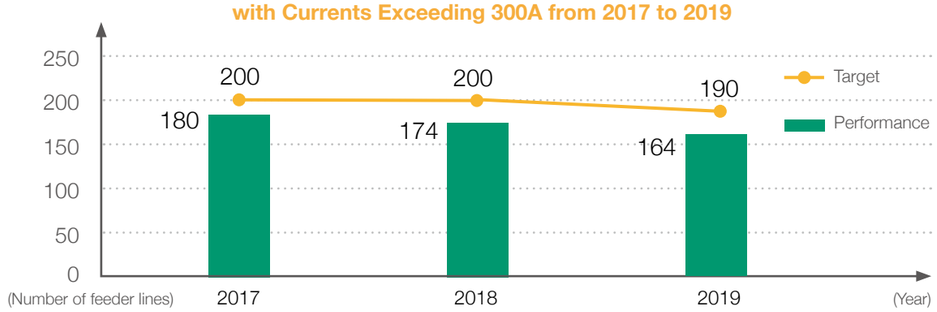
To minimize the cost of generation, increase the supply, and ensure a smooth supply of power, Taipower established a line loss rate target for transmission lines as an indicator for monitoring power supply reliability. For the power distribution and sales systems, branch offices are asked to make improvement plans for line improvement and preventing electricity loss, based on target values for the "distribution line loss rate" assigned by the power dispatching office. Additionally, in consideration of the transmission system's adaptability and wheeling capabilities in the event of emergencies, Taipower has also drafted distribution system planning guidelines and established a management target of "reducing feeder lines with currents exceeding 300A" as a basis for distribution line performance evaluation.



Line Loss Rate from 2017 to 2019



Implementation Performance for the Reduction of Feeder Lines with Currents Exceeding 300A from 2017 to 2019



In order to avoid regional power outages as a result of typhoons, Taipower proposed a "Power Line Fortification for Disaster Prevention and Resilience Plan" in 2016. The plan called for the removal of existing overhead distribution lines and the establishment of underground pipelines and cables in order to meet the needs of the general public.

Completion of the aforementioned plan was prioritized in high-risk areas including places where typhoons have caused poles to fall, windward areas, and regions dramatically affected by power outage. The operation plan of building 463.64 km of underground feeders, which was set to take place from 2017 to 2019, was completed on schedule. The total length of underground feeders built during the said three years was 499.03 km, with an execution rate of 107.63%. This operation plan obtained the approval of the State-owned Enterprise Commission, Ministry of Economic Affairs and was declassified from monitoring and inspection on January 13, 2020.

In response to the energy transition and the move to a new- generation of power supply systems, Taipower has accelerated the automation of distribution feeders. Automated distribution feeders not only help to improve the quality of the power supply, but can also be used for fault detection and the remote control of on-site automatic line switches allowing outages to be quickly isolated thus decreasing the interval and range of power failures. Feeder automation has been applied to industrial areas, vital metropolitan areas and remote areas that are not accessible to repair. In the future, Taipower will continue to promote distributed feeder automation and raise the target value of feeder construction.

Distribution Feeder Automation Installations from 2017 to 2019

Performance	2017	2018	2019
Feeder Automation (No.)	7,316 lines	7,354 lines	7,590 lines
Switch Automation (No.)	552 new units	963 new units	970 new units

Utility poles in Yuli Township, Hualien County

2.4 Demand-Side Management

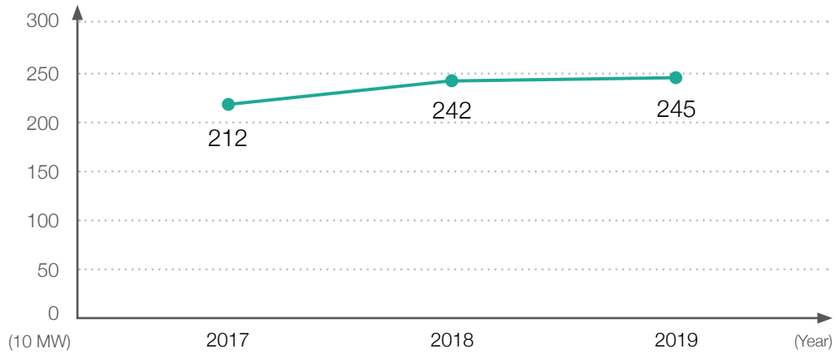
In recent years, the demand for electricity in Taiwan has continued to grow, but setting up power generation units has become increasingly difficult. Meanwhile, the frequency of abnormal weather has increased while the power supply has become increasingly tight. Therefore, Taipower is actively promoting power demand-side management, through the implementation of various demand-response load management measures, promoting multiple time-of-use (TOU) rates, organizing power-saving incentive activities and power-saving awareness campaigns to guide customers in managing their electricity use. It is hoped that these measures will create a beneficial situation for the power utility industry, the general public, and the environment.

In terms of power-saving, the Company continued to plan and hold power-saving promotion activities in 2019. Taipower brought the public closer through different forms of activities and increased the media exposure and discussion of its events with multiple marketing channels and prominent issues in order to enhance the public's awareness of saving electricity. In July 2019, energy diagnostic centers (Taipei West Branch Office, Taichung Branch Office, Kaohsiung Branch Office) were established in northern, central and southern Taiwan, and an operation standard manual, an instrument operation manual, and a past case handbook were compiled. As of the end of December 2019, 20 energy diagnostic services had been completed. In the future, ESCO practical training will continue to be carried out, and talent training will be conducted in cooperation with professional institutions to improve energy diagnostic technology and improve overall service quality.

Demand-Side Management Measures

Measure		Description	Applicable Customers	Results
Time-of-Use Rates		Reflect the cost of electricity during different time periods. Encourage off-peak hour electricity use to reduce energy consumption at peak hours	Optional for Meter Rate Lighting and low-voltage customers; applicable to all high-voltage customers	Reduced the daily peak load in 2019 by an estimated accumulation of 4,000 MW
Seasonal Rates		An electricity price system that reflects the difference in power supply costs in different seasons, which also guides users to reduce the peak electricity consumption in summer.	All users are eligible with the exception of street lights, traffic lights, etc.	
Demand-Response Load Management Measures	**Central Air Conditioner Duty Cycling Load Control Measures**	Rotation of central air-conditioning system with 60 minutes on and then 15 minutes off. Rotation of packaged air conditioning system with 22 minutes on and then 8 minutes off to reduce peak load	Non-productive customers (e.g. office buildings, schools)	
	Power Consumption Reduction Measures	Provide reduced rates as incentives to encourage customers to reduce electricity use during peak hours and to transfer usage to off-peak hours, to reduce system peak load	Either (super) high-voltage customers of more than 100 kW of capacity as specified in their contracts or schools (Depending on contract contents, such as factories, educational institutions)	Daily peak load reduced by 1,120 MW on the peak load day of 2019 (July 17)
	Demand-Based Bidding Measures	Through feed-back pricing decided by the customers, Taipower grants more autonomy to customers to attain their power-consumption mitigation potential and improve system loads, thereby mitigating the demand for new power development and reducing the risks of power shortages	Regular power users above high voltage	

Demand Response Load Management Measures Applying for Reduction of Capacity



Demand-Based Bidding

Since 2015, Taipower has been promoting a plan to let customers decide the feedback price of electricity if they reduce their electricity consumption and can compete with other customers and Taipower generators. If their electricity consumption is actually reduced after winning the bid, the electricity fee deduction can be obtained according to the quotation. There are three types of plans: reliable, economical, and joint types. By asking customers to self-report feedback prices, they are given more autonomy and are encouraged to actively suppress electricity consumption and peak loads. In 2019, Taipower adjusted the upper limit of the monthly reduced power consumption hours from January to April bidding demands, from 36 hours to 72 hours. In addition, in order to cope with the increase in the amount of solar power generation, the planned reduction of power consumption measures will be postponed the power reduction period to respond to the peak load caused by the decrease of solar power generation in the dusk.

Time-of-Use Rates

In order to reasonably reflect the power supply costs of the system during different time periods, and to encourage customers to reduce electricity consumption during peak hours, Taipower has been implementing time-of-use rates since 1979. Ten types of time-of-use rates have been implemented for various types of customers over the last 40 years. In recent years, rates have been in line with the adjustment of electricity prices. The ratio of peak hour rates over off-peak hour rates has been continuously expanded to strengthen incentives for the general public to better manage their power use.

In order to increase interaction with the general public and encourage increased effectiveness and self-reliance in saving electricity, power-saving incentives were introduced into the registration mechanism in 2018. As participants sign up through the official website, the customer service hotline, or over the counter, they receive a reward of NT$0.6 per kWh saved in electricity. The "Power is Point" app was launched in the same year to allow people to participate in various energy-saving and educational activities and collect points. Points may be used to redeem prizes and participate in sweepstakes, etc. The goal is to promote the concept of saving electricity within the public and to form a culture that is in the habit of saving electricity.

In 2019, Taipower's power-saving results were substantial. The power-saving performance of 2019 is equivalent to reducing the carbon dioxide adsorption of 2,062 Daan Forest Parks. The 2019 performance was a slight increase over the performance of 2018.

Power Savings Reward Performance in 2019

Year	Amount of saved electricity (100 million kWh)	Reward amount for saving electricity (NT$100 million)	Carbon dioxide emission reduction (10,000 metric tons)	Equivalent to the CO_2 adsorption capacity of the number of Daan Forest Parks in one year
2017	44.9	35.4	239	6,464
2018	13.2	9.9	71	1,908
2019	14.3	11.7	76	2,062

Note: 1. Based on the electricity emissions coefficient of 533 grams CO_2e/kWh of 2018 announced by the Bureau of Energy, Ministry of Economic Affairs in June 2019 and the Bureau of Energy's 2011 report that the absorption capacity of one Daan Forest Park is 370 metric tons of CO_2 per year.

2. The performance of 2018 and 2019 power-saving rewards uses the statistical data of customers who completed the online registration of power-saving rewards (3.34 million in 2018 and 3.95 million in 2019), which is different from the statistical data of all customers in 2017.

Power-Saving Service Team

In December 2018, Taipower established Power-Saving Service teams in each branch office that visited 500 high-voltage customers every month. Using AMI data analysis for high voltage customers and a simple questionnaire on equipment diagnosis (e.g., air conditioning facilities, motors, and lighting facilities), Taipower is able to assist them with controlling their power use, checking for potential electricity savings, and promoting demand response measures to maintain a stable power supply. Taipower's Power-Saving Service Teams visited 6,294 customers in 2019 and are expected to potentially save 97.76 million kWh of electricity.

Community Energy Saving Campaigns

To motivate individuals and communities to save energy, Taipower pulls out all the stops when holding campaigns, advocating for various energy-saving techniques and promoting knowledge – as in the case of high-efficiency and energy-saving LED lighting. A total of 1,524 information sessions took place in 2019 and were attended by approximately 298,000 participants.

Visits to Customers Consuming More Than 100 kW of Power

Taipower began visiting customers consuming more than 100 kW of power, and visited a total of 5,616 customers in 2019. The initial visit and re-visit processes have been established on a preliminary basis. It is expected that through regular visits, the overall efficiency of energy-saving services will be improved, and the Company plans to continue to pay attention to the power use of large-volume customers and seek ways to help them save power.

3 Environmental Sustainability

This Chapter is Recommended for the Following Stakeholders:

Partners, government institutions/competent authorities, citizen journalists, and residents

Implications of Environmental Sustainability

The operation of an enterprise is bound to have an impact on the environment. Despite this, the question of how to maximize positive impacts while minimizing negative impacts is an issue that the energy industry must face. As the economy develops, Taipower must continue to pursue cleaner energy and move towards a low-carbon transition. In facing a future that includes carbon pricing, the Company aims to work together with the society and other enterprises to seek more energy-efficient operating methods to achieve environmental sustainability.

Environmental Sustainability is Mainly Based on Natural Capital Input

The power utility industry relies on natural resources to generate electricity. With the increase of energy demand and diversification of power generation sources, Taipower's need for various natural resources will also increase. Therefore, Taipower must appropriately control its use of raw materials by improving power transmission efficiency, and controlling emissions in order to maximize resource utilization efficiency while striking a balance between the needs of the country, society, the general public and the environment to protect the environment in Taiwan.

Principal Investments

- In 2019, an Environmental White Paper was published as the Company's highest-level environmental policy
- Taipower's actionable short, medium, and long-term goals and related plans for stationary, mobile, and fugitive pollution sources were established respectively
- In order to improve power generation efficiency and reduce carbon emissions, the planning of thermal power plants was focused on gas-fired power generation, while ultra-supercritical units are introduced to coal-fired power plants to improve energy efficiency
- Communication with stakeholders was actively conducted to explain environmental assessments and procedures for projects that may impact local environments and communities
- Power facilities that are friendly to the local environment were developed, and environmental education that enhances community and public awareness of Taipower was conducted

Performance Highlights

- Taipower's greenhouse gas emissions in 2019 totalled ***91.5 million*** tons of CO_2e
- The amount of air pollution released by Taipower between 2016 and 2019 ***declined year by year*** while consistently remaining lower than the regulatory maximum values
- A total of ***97 thousand*** tons of rainwater and ***2.61 million*** tons of wastewater were recycled for utilization in plants during 2019
- In 2019, the output of coal ash was 2.39 million tons, with 2.07 million tons recycled for a re-utilization rate of ***86.7%***
- "***The Birth of Circular Manufacturing***," Taipower's first special exhibition on the circular economy, showed the public how Taipower has embraced the concept by giving new life to waste generated by power plants
- To protect air quality, Taipower implemented autonomous load reduction and emission reduction a total of ***1,183*** times in 2019

Future Plans

According to the plan outlined in the Environmental White Paper, Taipower will reduce its impact on the environment and enhance its efficiency in utilizing various resources, while investing in circular economic activities and ecological conservation. The Company will also strengthen its international exchanges and cooperation. By adjusting its energy structure, increasing the proportion of natural gas energy, and strengthening pollution prevention and use of control equipment as a response to the air quality and climate concerns of the general public, the intensity of greenhouse gas emissions from thermal power generating units will be reduced by 20% and air pollutant emissions will be reduced by 50% by 2030. In addition, at least five power facilities will have ecologically inclusive projects constructed to fulfill the Company's eco-friendly commitments.

3.1 Strengthening Environmental Management

3.1.1 Environmental Policy and Goals

As the trend towards environmental responsibility matures, Taipower as a public utility must constantly strive to balance the necessity of maintaining power quality and security with the public demand for eco-friendliness and sustainability. Finding a functional balance between these competing priorities is an essential element of the Company's mandate to provide stable power for the diversified development of society in a friendly environment and at a reasonable cost and its corporate vision of transforming into a prestigious, trustworthy world-class power group. As such, the Company plans its long-term development path by considering major environmental issues and development trends in the energy industry, as well as the international outlook for a transition to carbon neutrality by 2050 and the timeline of achieving the United Nations' Sustainable Development Goals (SDGs) by 2030. To provide transparency in these efforts, Taipower maintains its Chairman-signed and Board-approved environmental policies for public review. For details of Taipower's environmental policy, please scan the QR Code:

Taipower's Environmental Policy

In April 2019, Taipower officially released its "Environmental White Paper" to disclose the Company's six major strategies for environmental protection. Correspondingly, the paper developed 12 strategic dimensions as a foundation for Taipower's subsequent efforts to promote environmental sustainability. In addition to ambitious goals and forward-looking action plans, Taipower will integrate its business divisions to increase engagement (internal and external), reduction (carbon and emissions), and creation (smart, ecological and circular). The Company will also create eco-friendly power generating facilities through multiple channels and by building comprehensive green, eco-friendly, sustainable, and inclusive enterprise systems for power generation, transmission, distribution and sales. Please visit the following web page for the full text of Taipower's Environmental White Paper:

Taipower's Environmental White Paper

Unfolding the White Paper's Six Major Strategies and Twelve Strategic Dimensions

Taipower's Development Pathway for Environmental Friendliness

Six Major Strategies	Twelve Strategic Dimensions	Contemporary		Future
Responding to climate change	Promoting mitigation procedures Increasing adaptive capability	Constructing response capabilities	A climate-resilient enterprise	Working toward carbon neutrality
Protecting environmental quality	Managing air pollutant emissions Strengthening water saving and control of materials	Strengthening the response to air pollution	Pollution control benchmarks	Near-zero emissions
Focusing on circular innovation	Establishing a circular business model Improving efficiency of resource utilization	Consolidation of resource management	Resource efficiency multiplication	Materializing a circular economy
Refining management systems	Integrating environmental management systems Developing smart management	Consolidation of business division systems	Implementing integrated management	Becoming an international benchmark company
Creating ecological inclusiveness	Managing biodiversity Planning the fusion of facilities and ecology	Perfecting ecological assessment	Creating ecological values	Environmental co-prosperity
Expanding internal and external engagement	Delivering information on electricity and the environment Leading the energy transition	Ensuring an unimpeded engagement mechanism	Perfecting partnership	Expanding environmental dynamics

Specific Content of the Strategies and Dimensions

Strategy	Strategy dimension	Specific content of the strategy
Respond to climate change	Promote mitigation procedures	Control and reduce greenhouse gas emissions from Taipower's business operations, invest in renewable energy, research carbon reduction technologies, establish electricity service models with lower carbon emissions, and other management practices for inventory, assessment, setting of science-based targets (SBT), and strengthening the energy efficiency of buildings, etc. Through these methods, the goal of reducing carbon emissions can be achieved.
	Increase adaptive capabilities	Strengthen the resilience of power facilities against extreme weather, reduce the impact of natural disasters and changes in energy demand on Taipower.
Protect environmental quality	Manage air pollutant emissions	Continue to reduce air pollutant emissions and establish integrated management capabilities in assessment, forecasting and dispatching.
	Strengthen water saving and control of materials	Reduce the water footprint of power generation, evaluate more effective methods of water use and recycling, create positive environmental influence, and continuously manage and reduce the environmental impact of radioactive nuclear back-end waste.
Focus on circular innovation	Establish a circular business model	Evaluate and establish Taipower's circular value creation plan so that circular economics become the new direction for business partnerships and development.
	Improve efficiency of resource utilization	Assess recycling opportunities for waste generated by Taipower to improve the recycling ratio, reduce the resource demands of operations, and extend the life cycles of equipment or resources to obtain the benefits of resource efficiency improvement.
Refine management systems	Integrate environmental management systems	Integrate the environmental management systems of all Taipower's facilities and systematically control overall environmental input and output.
	Develop smart management	Strengthen environmental management and monitoring with new technologies and software enhanced through digitalization and artificial intelligence (smart grids, smart meters, the Internet of Things, etc.), to reduce the impact of business operations on the environment.
Create ecological inclusiveness	Manage biodiversity	Inventory the ecologies surrounding power facilities and engage in relevant ecological conservation programs.
	Plan the fusion of the facilities and ecologies	Introduce the design of environmental and ecological integration to promote the symbiosis of electricity facilities and the environment.
Expand internal and external engagement	Deliver information on electricity and the environment	Continue to communicate with internal and external stakeholders (including the general public, students, and suppliers) on issues related to the environment within the power utility industry and raise the general public's awareness of Taipower's green actions.
	Lead the energy transition	Continue to lead and promote initiatives and activities related to low-carbon energy transition to accelerate the development of low-carbon energy in Taiwan.

Setting up Short, Medium and Long-term Environmental Strategies

In order to implement its environmental strategy, Taipower will allocate responsibility for the implementation of each strategic aspect to specific, business divisions in accordance with each unit's relevance and materiality. Each of the four business divisions, namely Power Generation, Nuclear Power, Transmission System, and Distribution & Service, as well as the construction system will develop its own corresponding short, medium, and long-term goals and action plans. This proactive approach illustrates Taipower's intention of becoming both a world-class and eco-friendly power group.

Strategy	Key strategy dimension	Short-term goal (by 2021)	Medium-term goal (by 2025)	Long-term goal (by 2030)
Respond to climate change	Promote mitigation procedures	Net emission intensity of thermal power generating units will be reduced by ***7%*** compared to 2016	Net emission intensity of thermal power generating units will be reduced by ***15%*** compared to 2016	Net emission intensity of thermal power generating units will be reduced by ***20%*** compared to 2016
Protect environmental quality	Manage air pollutant emissions	Air pollution emission intensity will be reduced by ***30%*** compared to 2016	Air pollution emission intensity will be reduced by ***40%*** compared to 2016	Air pollution emission intensity will be reduced by ***50%*** compared to 2016
Focus on circular innovation	Establish a circular business model	Inventory of potential circular materials and feasibility trials of developing business models	Implement a "circular resource supply model"	Establishment of a complete circular economic system
Refine management systems	Develop smart management	Coverage of smart management and service reaches ***52%*** (Including the cumulative installation of smart meters in 1.5 million households, covering 69% of countrywide total power consumption information)	Coverage of smart management and service reaches ***65%*** (Including the cumulative installation of smart meters in 3 million households, covering 81% of countrywide total power consumption information)	Coverage of smart management and service reaches ***82%*** (Including the completion of the installation of smart meters in 6 million households following feasibility assessments, covering 85% of countrywide total power consumption information)
Create ecological inclusiveness	Plan the fusion of the facilities and ecologies	Plan and construct at least ***one*** ecologically inclusive plan for a power facility	Plan and construct at least ***three*** ecologically inclusive plans for power facilities	Plan and construct at least ***five*** ecologically inclusive plans for power facilities
Expand internal and external engagement	Deliver information on electricity and the environment	Annual environmental protection information reporting in the power utility industry reaches ***480 thousand*** people	Annual environmental protection information reporting in the power utility industry reaches ***700 thousand*** people	Annual environmental protection information reporting in the power utility industry reaches ***750 thousand*** people

Note: Please refer to Chapter 5, “smart grid,” for information on refining management systems. Please refer to Chapter 6, “stakeholders communication and engagement,” for information on expanding internal and external engagement

Implementing Environmental Impact Assessments

Taipower's facilities and operations may impact local communities through water, air, soil and noise pollution as well as through the creation of vibrations, odors, waste, toxic substances, land subsidence and radiative contamination or through damage to natural resources, the landscape and society, the culture or the economy. Therefore, Taipower has taken necessary steps to minimize the impact of its development on the environment and surrounding communities through a framework of pre-development assessments and communications, post-assessment improvements and continual monitoring during construction.

3.1.2 Environmental Accounting

In 2008, Taipower implemented an environmental accounting system (EAS) which requires employees to input environmental accounting codes for specific tasks or activities such as purchase requisitions, purchasing, reimbursements and so forth through their business or accounting systems. All operations are managed and compiled by Taipower's EAS in order to compute the costs of environmental protection, occupational safety and health for each unit. Promulgated in 2019, Taipower's new EAS has two major parts: capital expenditure (depreciation and amortization of fixed assets related to environmental protection) and recurring expenses (reimbursement of environment-related expenses). The expenses of both major categories are collected and imported into the EAS. A mechanism for improving the EAS was completed in 2019, which facilitated reimbursements by colleagues and more accurate assessments of investment made by Taipower in environmental protection. According to statistics, in 2019, the Company's environmental protection capital expenditure is approximately NT$5.23 billion, and its recurrent environmental protection expenditure is approximately NT$5.66 billion. The major improvements in environmental accounting made by Taipower in 2019 are as follows:

Aligned with the management goals of environmental protection

With reference to the international environmental accounting standards, Taipower connected with actual environmental management goals, and changed its accounting method by calculating environmental expenditures only. The new version of the accounting principle preferentially removes industrial safety and health expenditures and adds renewable energy expenditures. The goal is to directly align Taipower's EAS with the environment category, thus Taipower can focus on environmental protection issues.

Optimized accounting codes

The new accounting method merges and adds codes based on environmental protection categories. The optimized environmental accounting coding method helps employees identify the correct code more intuitively when filling in reports, reducing the chance of false information and omissions.

Improved the calculation method with a refined definition of cost unit

In the past, the environmental protection costs of Taipower's turnkey projects were not included in environmental accounting. As a result, the Company's efforts at investing in environmental protection could not be reflected in the environmental accounting. The new EAS rectifies this with the inclusion of the costs of turnkey projects in the calculation of environmental accounting. The cost centers under each unit are divided into environmental and non-environmental cost centers based on the responsibilities of each department.

An environmental protection cost center is essentially a unit for which the main business or function is highly related to environmental protection. When employees of these cost centers make application for purchases, procurement, or reimbursement, all expenses incurred should be recognized as environmental accounting expenses. If the unit is not defined as an environmental cost center, its employees must individually determine whether an expense is related to environmental protection or now when applying for purchases, procurement, or reimbursements. When a relevant environmental protection expense is incurred, employees must fill in the appropriate environmental accounting code.

Reduced human input errors and engaged in regular debugging

In the past, the HR expenses and water and electricity bills calculated by the EAS relied on each unit to report the ratio of HR expenses and water and electricity bills related to environmental protection for the unit. There was no standard calculation method and follow-up tracking was not available, subsequently creating a potential risk. In 2019, HR expenses and water and electricity bills were connected to environmental protection cost centers. Since the business of these units is related to environmental protection, the system directly imported the accounting information into calculations. After adjustments of statistical principles in environmental accounting, the system's functions are refined. For example, capital expenditures are now applicable to environmental asset code recognition methods, and environmental cost center judgments are automatically assessed by the back end system to avoid errors caused by human judgment.

In addition, the optimization of statistical principles also designed and planned for the periodic output of abnormality reports. The system is set to automatically send a list of abnormalities every half a month to remind employees to make corrections to mistakenly filed obsolete codes by a set deadline. Through the mechanisms of debugging and auditing, the rates of omissions and errors are reduced.

3.2 Sustainability and Strategies for Low-Carbon Electricity

3.2.1 Toward the Goal of Low-Carbon Electricity

The global energy industry is committed to improving energy efficiency and reducing carbon emissions in order to reduce its impact on the environment. In response to these global trends, Taipower is developing high-efficiency power generation technologies and continues to increase its proportion of renewable energy sources in terms of power generation. The Company is striving to provide low-carbon electricity to Taiwanese society. Currently, Taipower's main sources of greenhouse gas emissions include thermal power generation, coal yards, oil-consuming equipment such as vehicles and engines, insulation gas used for switch gears, freezers and air-conditioning. The Company conducts an annual inventory and internal audit, with external verification through third-party institutions, of its thermal greenhouse gases. The scope of the inventory covers greenhouse gas emissions for Taipower and its thermal (coal, oil, and gas-fired) power generating units and is disclosed in this report.

In order to achieve the goal of reducing carbon emissions, large-scale thermal power generating units are being upgraded and rebuilt to improve their power generation efficiency. The Company is also working to develop renewable power generation through plans that include hydropower, on and offshore wind farms, solar power sites, geothermal power plants, and the construction of related energy storage systems. This work simultaneously includes investment in research on carbon reduction technologies (such as through carbon capture and storage technology, and the establishment of carbon reduction technology parks and experimental device demonstration projects) and a lower carbon electricity service model (that includes continuous promotion of demand response plans for enterprises and customers, the development of ESCO energy technology services and energy-saving diagnostic demonstration service centers). Other actions include the use of management methods, such as inventory, assessment, setting science-based reduction targets, and strengthening buildings' energy efficiency to achieve carbon reduction.

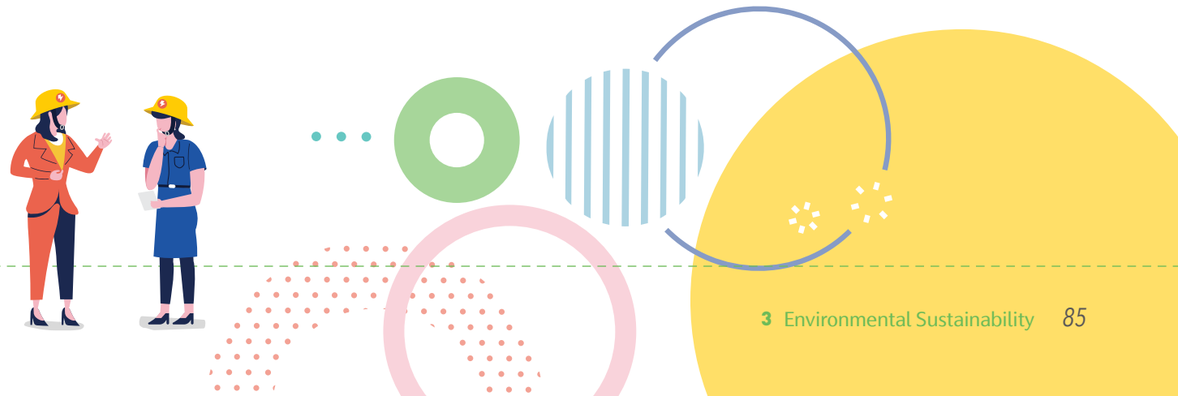
Taipower's Short, Medium and Long-term Carbon Reduction Goals

Short-term Goals (by 2021)	Medium-term Goals (by 2025)	Long-term Goals (by 2030)
Thermal unit emission intensity will be reduced by ***7%*** compared to 2016	Thermal unit emission intensity will be reduced by ***15%*** compared to 2016	Thermal unit emission intensity will be reduced by ***20%*** compared to 2016

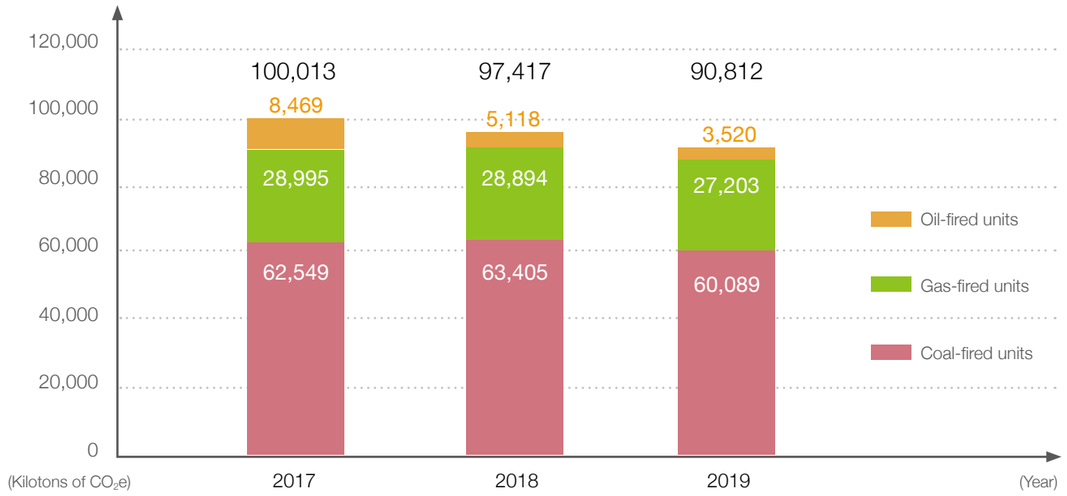
Taipower's Greenhouse Gas Emissions from 2017 to 2019

Unit: Kilotons of CO_2e

Type of Gas	CO_2	CH_4	N_2O	SF_6	HFC	Total
2017	100,042	262	330	75	12	**100,721**
2018	97,531	254	327	133	18	**98,263**
2019	90,823	250	306	104	18	**91,501**



Greenhouse Gas Emissions from Taipower's Thermal Power Generation Units from 2017 to 2019

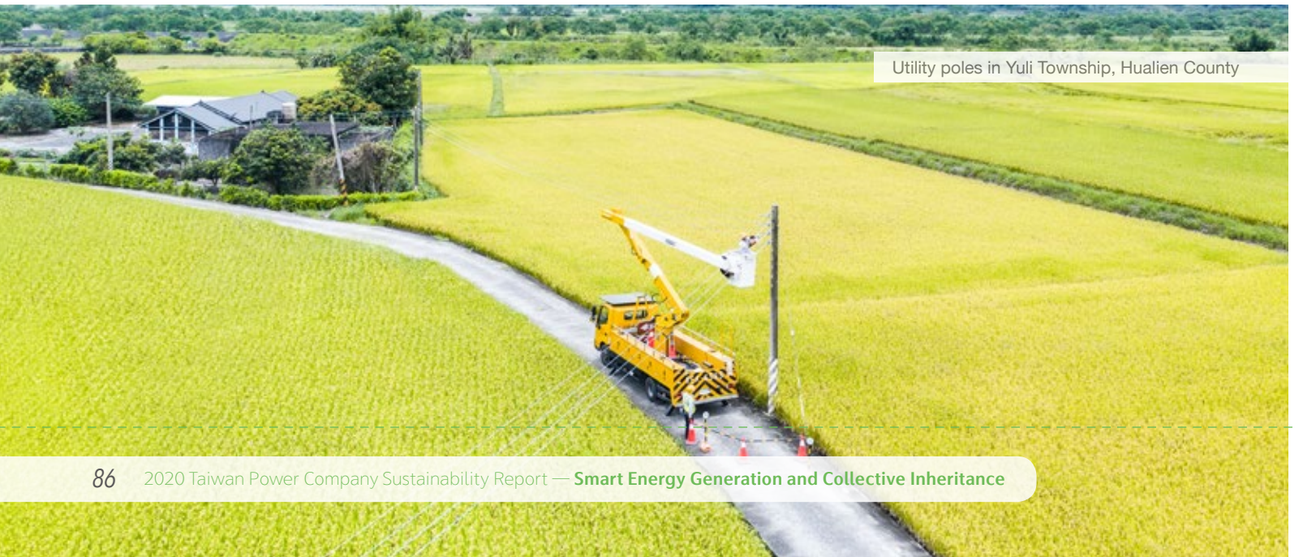


3.2.2 Climate Change Adaptation

Taipower's generation, transmission and supply systems are located in mountains and along shores and river basins. As a result, these facilities face unknown direct challenges from climate change. To mitigate potential impacts, Taipower engages in proactive "adaptation" in terms of the strength of power plants by reinforcing the protective abilities of hydro and thermal power plants as well as transmission and distribution systems. This is being done to reduce environmental impact and put more effort into achieving sustainability.

Starting in 2010, Taipower began actively participating in the "Climate Change Adaptation Strategies and Counseling for Energy Departments" program organized by the Bureau of Energy. This required the completion of adaptation action plans for the power generation systems at the Xingda, Datan, Mingtan, Jianshan, Dalin and Tongxiao power plants along with climate change impact analysis and vulnerability assessments for the transmission and distribution systems. In addition, a reflective risk assessment of power-generating facilities has been done on the "Climate Change Adaption Platform for Energy" established by the Bureau of Energy.

In 2014, a research project on the climate change adaptation of the Taichung Power Plant and the operation office of the Taipei Power Supply Area was launched. Starting in 2019, a Kaohsiung District Sales Office Climate Change Adjustment Research Project was launched. Currently, an Analysis Report on Climate Impacts and Damage Potential has been completed, and an assessment on the degree of hazard and vulnerability has been carried out. The aforementioned research plan will serve as an example during future parallel deployment to all units of the transmission or distribution system.



Utility poles in Yuli Township, Hualien County

3.3 Reducing Use of Energy and Resources

3.3.1 Use of Fuels

In order to be more environmentally friendly, Taipower uses low-ash, low-sulfur and low-nitrogen fuels. Company policy seeks to stabilize the use of coal, and gradually shift to gas. This will help to ensure that coal-fired power plants are able to maintain their operating permits while new and renewed gas-fired units and facilities are constructed, ensuring the power supply is stabilized, energy requirements are met and pollutant levels in fumes generated by thermal power remain lower than legally required levels.

Taipower's Use of Fuels from 2017 to 2019

	2017	2018	2019
Coal (million tons)	28.975	29.009	27.443
Gas (million cubic meters)	14,113	14,085	13,371
Fuel oil (thousand kiloliters)	2,663	1,601	1,103
Nuclear fuel (ten thousand pounds)	67.61	164.86	116.41

In order to reduce emissions in line with regulatory requirements, power plants need to add environmental protection equipment and facilities. Coal quality must also meet the requirements of being high in calorific value, low in ash and low in sulfur content. Since coal from mines in different countries has different properties, power plants usually blend coal from multiple sources to adjust their content ratios. For example, the ash content of Australian coal is about 15% higher than average while the ash content of Indonesian coal is about 5% lower. With proper blending, ash levels can be reduced to meet power plants coal ash level requirements. Similarly, blending allows calorific values and sulfur contents to meet requirements. Taipower has added additional quality requirements for its coal procurement. For example, the Company has decided to reduce the ash content of its Indonesian coal from 11% to 8% and sulfur from 1.1% to 0.9%. Further restrictions on mercury content have been imposed. While Taipower exercises strict control of emissions from power plants in the downstream of its supply chain, the Company works even harder to deliver on its commitments on upstream areas of its supply chain. (Please refer to Chapter 6.3.1 for information on Taipower's management and performance in fuel procurement)

3.3.2 Increasing Energy Efficiency

Management of Productive Resources

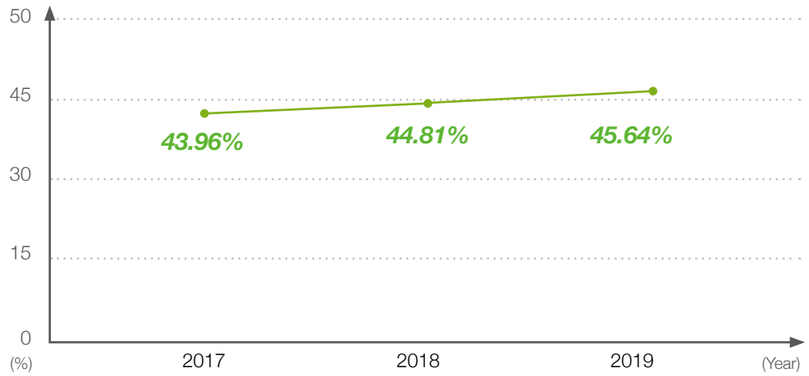
Starting in 2015, Taipower implemented an Energy Management System at its different power plants. The system received certification from the British Standards Institution (BSI) in 2015 and in 2016 for Datan and Xingda Power Plants, respectively. For 2017, Taipower continued to expand on its past experiences and implemented the at the Nanbu, Dajia River and Daguan Power Plants with personnel from its Department of Environmental Protection. Taipower organized training, conducted energy reviews, performed energy-saving diagnostics, formulated action plans and organized discussions. These efforts were recognized with BSI and SGS certifications of power plants in 2017. In addition, in response to the new version of the Environment Management System published by International Organization for Standardization (ISO) in 2018, system transition tasks were proactively executed internally in Taipower by holding training sessions for seed personnel, sending employees to business units to teach their colleagues how to use the new version of the system and engaging in energy reviews, editing documents, and training on internal auditing, etc. Six units at Taipower, namely the Taichung, Datan, Xingda, Nanbu, Dajia River, and Daguan Power Plants, obtained certification for the new Environment Management System in 2019.

Thermal Power Generation

Taipower endeavors to manage power production quantities and to set specific targets for power use. These targets may not exceed the averages for the most recent three years. To achieve this ongoing improvement, Taipower is gradually phasing out its older generations of units that are due for decommissioning while introducing new, high-efficiency units.

In addition, operations and maintenance measures have been introduced to enhance the energy efficiency of existing units. As a result, the gross efficiency of lower heating values (LHV) at thermal plants rose from 44.81% in 2018 to 45.64% in 2019. As it seeks to continuously increase the efficiency of power generation, Taipower will continue to strengthen its international exchanges and collaborations in order to increase knowledge and introduce new technologies.

Efficiency of Thermal Power Plants (LHV, gross)



Production Power Use by Thermal Power Plants from 2017 to 2019

	2017	2018	2019
Power consumption (Twh)	55.27	55.62	54.94
Power consumption target (%)	≦ 3.60%	≦ 3.58%	≦ 3.64%
Actual average power consumption (%)	3.55%	3.62%	3.76%

Non-Production Resource Management

In 2019, Taipower continued to promote energy and oil conservation in conjunction with the Executive Yuan's "Energy Conservation Project for Governmental and Educational Institutions." The Company set an annual target of consuming less energy and oil than in the previous year. Taipower has also been promoting water conservation in accordance with the MOEA's "Normalized Action Plan for Water Conservation." Reductions are achieved by encouraging all branches and power plants to save energy and reduce emissions. Taipower's goal in 2020 is zero growth in the consumption of electricity. Taipower also tracks its monthly usage of energy (along with water, electricity, and oil) and has implemented annual evaluations to identify units with outstanding performances.

Non-Productive Power Consumption in Taipower Offices from 2017 to 2019

	2017	2018	2019
Total amount of consumption (kWh)	122,155,603	121,432,142	119,688,877

Results of Non-Production Resource Management

Taipower's Water, Electricity, Fuel and Paper Saving Measures for 2019

Saving paper

- Continued to implement paper-reduction measures such as electronic official document exchanges and online approvals, with the performance index reaching 70% and 75%, respectively.
- Encouraged colleagues to print on both sides of paper.

2.28 million sheets of paper

Saving water

- Cooperate with the "Normalized Action Plan for Water Conservation." Actively promote the installation of water-saving equipment in office spaces, construction sites, and staff dormitories, and replace old water-consuming equipment. Strengthen water-saving awareness through campaigns for all departments, water management, inspections on leaking pipeline facilities, rainwater recycling, etc.

Not Achieved

Saving power

1,743,265 kWh

- Cooperating with the "Energy Conservation Project for Governmental and Educational Institutions." The office spaces of all departments shall actively promote the replacement of old energy-consuming equipment (e.g., air-conditioning, lighting, etc.) to improve power efficiency. For example, LED lighting in the headquarters building was completely renovated in 2019.
- Kept indoor temperatures between 26-28°C and installed circulating fans on the ceilings of each floor to increase occupant comfort while reducing air conditioning.
- Adopted computerized operations for elevators in buildings with energy-saving modes; some elevators do not operate during off-peak periods of office hours, off-hours and holidays.
- The energy-consuming equipment in all office spaces is operated in an energy-saving manner. For example, the power supply of water dispensers is cut off automatically during off-hours and holidays to save standby power.
- For offices with a high consumption of energy, such as the headquarters building, the electricity consumption of equipment and the building is analyzed by the Energy Management System and the effectiveness of energy conservation management will be strengthened.

Saving fuel

- Carpooling measures are promoted in vehicle dispatching, and vehicle maintenance and inspection are strengthened to improve fuel mileage.
- Prepare a budget to accelerate the replacement of old fuel-consuming vehicles.

Not Achieved

This year, water and fuel saving targets were not achieved, primarily as a result of a large increase in on-the-job training sessions, which increased water consumption at training centers to increase sharply. In addition, power plants such as Datan, Taichung, and Xiehe increased their water consumption due to construction use, the stationing of construction personnel in the Taipei District, and pipeline leakage in the Hsinchu District. Taipower will strengthen its water-saving actions in staff dormitories, improve water management for construction projects, replace of old water-consuming equipment and patrol to curb water consumption. The Company looks forward to achieving its water-saving goals next year.

The failure to meet the fuel-saving target is mainly a consequence of construction sites in the northern and southern regions and at offshore wind farms. In order to cooperate with the relevant inspection and survey traffic, the traffic volume increased greatly. In the future, car-sharing measures and vehicle maintenance will be strengthened to reduce fuel consumption and the speed of replacing old vehicles will accelerate with a view to achieving the fuel-saving goals next year.

3.4 Minimizing Environmental Impact

3.4.1 Response Measures to Air Pollution

In response to the current public concern about air quality, Taipower has established an actionable air pollution management strategy for stationary, mobile, and fugitive sources of emissions. The Company is also gradually implementing air quality guarantees through short, medium, and long-term goals and planning. Through the transformation of the power generation structure, thermal power generation has mainly been transformed from coal to gas-fired. Coal-fired units are gradually being replaced by ultra-supercritical units with better power generation efficiency. Older combined gas cycle units are also gradually being replaced by new units that have better generation efficiency. These actions along with various other measures have helped achieve the goal of reducing air pollutant emissions. According to the Environmental white Paper, the short, medium, and long-term goals of air pollution improvement are as follows:

Strategy	Key strategy dimension	Short-term goal (by 2021)	Medium-term goal (by 2025)	Long-term goal (by 2030)
Protect environmental quality	Manage air pollutant emissions	Air pollution emission intensity will be reduced by ***30%*** compared to 2016 ▶	Air pollution emission intensity will be reduced by ***40%*** compared to 2016 ▶	Air pollution emission intensity will be reduced by ***50%*** compared to 2016

With regards to public concerns about smog in recent years, Taipower is actively managing air quality issues through various planning and management methods. In addition to reducing the load of thermal power generation during periods of poor air quality, no persistent organic pollutants (POPs), volatile organic compounds (VOCs), or harmful air pollutants (HAPs) are emitted. Meanwhile, Taipower is dealing with sulfur oxides (SOx), nitrogen oxides (NOx), and particulate pollutants (PM). To specifically control the air pollutant emissions generated by the operation of each power plant, Taipower chooses to either source low ash, low sulfur and low nitrogen fuels, or replace the fuel with cleaner energy (i.e., natural gas). The Company has also installed continuous monitoring equipment for flue gas emissions on the chimneys of various thermal power plants to monitor the concentrations of pollutants. This approach maintains equipment performance in its best state, minimizes the emission of pollutants in flue gas, and ensures that pollutants remain below regulatory value requirements. The emissions of major air pollutants by Taipower in 2019 were far below the regulatory requirements, and emission continues to fall when compared with past years.

Actual Major Air Pollutant Values and Legal Requirements from 2017 to 2019 Unit: Kg/GWh

	PM		SO_x		NO_x	
	Actual value	Legal requirement	Actual value	Legal requirement	Actual value	Legal requirement
2017	25	52	269	458	270	394
2018	20	45	182	364	222	310
2019	14	47	125	331	158	283

The Company will have invested a total of NT$70.2 billion between 2015 to 2024, and is expected to reduce 398 tons/year of particulate matter, 7,118 tons/year of sulfur oxides and 15,460 tons/year of nitrogen oxides.

Management of Stationary Emission Sources

Short-term response: Coal-fired unit loads are reduced during periods of poor air quality and the dispatching of gas-fired units is prioritized

Since 2015, the Company has implemented load reductions at coal-fired power plants in order to improve air quality, provided there will be no impact on power supply safety. In addition, since November 2017, Taipower has been acting in accordance with the Emergency Response Procedure for Air Quality Deterioration that the EPA amended on June 9, 2017. When the Environmental Protection Agency releases a red warning (AQI>150), the Company undertakes friendly load reductions. Further voluntary load reductions and related measures are implemented if more than one-third of all monitoring stations in the monitored area reach the Level 1 air quality warning, provided there is no risk of negatively impacting power supply stability. In 2019, load and emission reduction operations were executed 1,183 times.

Principles of Load Reduction in Response to Air Pollution Grading

Load reduction actions	Criteria	Planning
Friendly load reduction	The air quality index (AQI) forecast for the following day is published each day at 4:30 PM on the Taiwan EPA's Air Quality Monitoring Network website. "Friendly" load reductions are initiated if the AQI forecast reaches the red level early warning or higher (i.e., AQI >150).	Provided there will be no impact on power supply safety, Taipower arranges for coal-fired power plants in the designated zones and upwind areas to implement load reduction during off-peak hours at night (i.e., between midnight and 7:00 AM).
Voluntary load reduction	When one-third or more of air monitoring stations in various areas have reached the red alert early warning, on the EPA's Air Quality Monitoring Network website, voluntary load reductions are initiated.	Provided there will be no impact on power supply safety, Taipower arranges for coal and oil-fired power plants in the designated areas to implement load reduction.
Mandatory load reduction	When the air quality index reaches its worst level (i.e., AQI > 200, 300, or 400), mandatory load reduction occurs.	Each power plant reduces emissions as stipulated in the Emergency Response Procedure for Air Quality Deterioration to reduce actual daily emission by 10, 20 or 40%.

Load Reductions due to Air Pollution in 2019

All power plants in Taiwan	Frequency of load reduction	Amount of load reduction (10 MWh)		
		Annual overhaul (maintenance)	Non-annual overhaul (maintenance)	Total
Friendly load reduction	735	414,224.3	429,862.2	844,086.5
Voluntary load reduction	448	181,737.4	88,129.1	269,866.5
Total	1,183	595,961.7	517,991.3	1,113,953

Medium-term action: Adopt end-of-pipe reductions and adhere to emission standards for gas-fired generating units

Medium-term actions have included conducting a comprehensive inventory of existing control equipment, planning and setting up high-efficiency air pollution control equipment, and making use of overhaul periods to improve the function of control equipment. In addition, the performance of control equipment will be improved as much as possible through operations, and the introduction of more advanced and efficient air pollution control equipment which is installed at new power plants or during equipment upgrades at existing power plants. In order to ensure information transparency, continuous automatic monitoring of instruments for flue gas emissions is available to the general public. At present, the inventory statistics for air pollution improvement at Taipower's existing generation units are as follows:

Air Pollution Control and Improvement Plan

Air pollutant	Preventing measures
Particulate pollutants (PM)	• Install a highly efficient electrostatic precipitator (EP) with a dust removal efficiency of 99.8% • Build a dust-proof grid around the coal yard and configure a regular sprinkler system • Use closed facilities for transportation and unloading coal, frequently compact coal piles and clean roads • For long-term storage coal piles, use chemicals to stabilize the surface, and plant windbreaks around them so that coal dust will not escape
Nitrogen oxide (NOx)	Install low NOx burners (LNB) and selective catalytic reduction (SCR) equipment
Sulfur oxide (SOx)	Install flue-gas desulfurization (FGD) equipment to remove more than 95% of sulfur oxide

Inventory of Air Pollution Improvement at Taipower's Power Plants

Name of the power plant	Content of improvement plan	Amount to be reduced (tons/year)	Budget (NT$100 millions)	Schedule (year)
Xiehe Power Plant	Use fuel oil containing sulfur less than 0.3%	SOx: 2,000	55	Procurement and utilization started in 2018
Datan Power Plant	Units Number 1 to 6 went through the renewal of low NOx burners (LNB), and Units Number 3 to 6 went through the addition of selective catalytic reduction (SCR) equipment	NOx: 2,401	82.5	2018~2022
Taichung Power Plant	Improvements to and upgrades of air quality control systems (AQCS) were implemented on Units Number 1 to 4	TSP: 61 SOx: 503 NOx: 2,154	92.69	2017~2019
	During the overhauls of Units Number 5 to 8, performance was improved for electrostatic precipitators (ESP), coal pulverizers and low NOx burners (LNB)	TSP: 78 NOx: 2,277	34.5	2018~2022
	A feasibility study of air pollution control equipment (AQCS) improvement for Units Number 5 to 10 was conducted for a comprehensive evaluation	TSP: 247 SOx: 6,615 NOx: 5,888 Note: The reduction results from the improvements to Units Number 5 to 8 during the overhaul period are deducted	145.6	From March 2022 to the end of February 2025
	Built two A-frame indoor coal bins	TSP: 12	140	2021~2014 Completed
Xingda Power Plant	The catalyst layer of the selective catalytic reduction (SCR) equipment for Units Number 1 and 2 was increased to three layers from the original two layers	NOx: 281	1	2017~2018
Nanbu Power Plant	Units Number 1 to 4 went through a renewal of core elements and low NOx burners (LNB)	NOx: 360	67	2016~2019
Dalin Power Plant	Unit Number 5 went through combustion adjustment. Unit Number 6 went through a renewal of its low NOx burner (LNB)	NOx: 719	4	2018~2019
Taipower's total investment in response to air pollution and its expected results		TSP: 398 SOx: 9,118 NOx: 14,080	622.9	

Long-term action: Management shift in power sources from "mainly coal with supportive gas" to "mainly gas with supportive coal"

In accordance with the national energy policy, the proportion of renewable energy will be increased, but the thermal power generation structure will also be changed. The thermal shift can essentially be described as a move from "mainly coal with supportive gas" to "mainly gas with supportive coal." According to the power development plan, coal-fired units (ultra-supercritical units) are used in the completed Linkou and Dalin Projects, while new gas-fired units are being added in other projects, such as those at Xiehe, Datan, Taichung, and Xingda. After the completion of the industrial and commercial conversion of the newly constructed gas-fired units at the Taichung and Xingda Power Plants, some existing coal-fired units will be decommissioned or converted to standby units, so that stable power supply can be taken into account while overall air pollution emissions can be effectively reduced. The current emission concentration of the Linkou and Dalin Power Plants is close to the level of air pollutant emission standards for gas-fired combined cycle units.

Management of Mobile Emission Sources

According to Environmental Protection Administration analysis, mobile sources account for about 30% to 37% of the total domestic PM2.5 pollution. If mobile pollution sources are classified, the largest source is diesel trucks, accounting for 11.2% to 16.8%. Heavy-duty diesel vehicles that are classified as Phases 1 and 2 of the emission standards will be replaced according to the policy of the Executive Yuan's Environmental Protection Administration. It is estimated that each old large diesel vehicle that is eliminated can reduce PM2.5 emissions by about 67 kg per year. Heavy-duty diesel vehicles that are classified as Phase 3 of the emission standards will be equipped with diesel particulate filters to reduce pollution. It is estimated that each Phase 3 diesel vehicle will reduce its PM2.5 emissions by about 10 kg per year. In 2019, the total number of improved Phases 1 and 2 vehicles was 137, reducing PM2.5 by a total of 9,179 kg; the total number of improved Phase 3 vehicles was 158, reducing PM2.5 by a total or 1,580 kg.

Management of Fugitive Emission Sources

According to the survey conducted by the Environmental Protection Agency, construction sites or other sources of pollution (including original and derived PM2.5 pollution) accounted for 2.5 to 4.5 percent of emissions. Since 2016, Taipower has actively promoted environmental protection in its various construction projects. Corresponding actions have effectively reduced dust at construction sites. Taipower has also begun working on a green, environmental construction site system and assessment plans. In accordance with the Management Regulations for Construction Project Air Pollution Control Facilities, the Company has strengthened its cleaning of routes where trucks travel and recorded the whole process; dust-proof nets were installed on exposed surfaces and two additions (a car wash and an artificial, high-pressure water column) were set up at site entrances and exits for dust suppression. In terms of management, the Company strengthened its on-site manpower to conduct supervision, verification, and management of environmental protection. Close contact was also maintained with site management personnel and contractors through monitoring systems and instant messaging software. In the planning stage, new construction projects require the quantification of environmental protection costs to the greatest extent possible within the budget and the establishment of sound systems for implementation. In 2018, the Department of Environmental Protection announced "Promotion and Management Guidelines on Environmentally Friendly Measures for Green Construction Sites." The guidelines outline environmental aspects of site management and require environmental protection management personnel to be in place for project contracts that reach the audit amount. For these projects, environmental protection management personnel must be full-time and have obtained the qualification of Class B Air Pollution Control or above. Pollution prevention and control facilities must also be provided in the form of itemized prices, requiring contractors to implement environmentally friendly measures to reduce air pollution and pollutant emissions of construction projects.

Expected Results of Overall Air Pollution Improvement

Through source management and end-of-pipe reduction, it is estimated that between 2016 and 2025, overall air pollution emissions will be reduced from approximately 100,000 tons to 65,000 tons, a reduction of 35%. This means power generation will no longer inherently be a significant source of air pollution emissions. Moreover, the decoupling of power generation and air pollution need not inhibit a secure power supply in order to implement environmental protection. As a result, actual air pollution targets will need to be reviewed in due course.

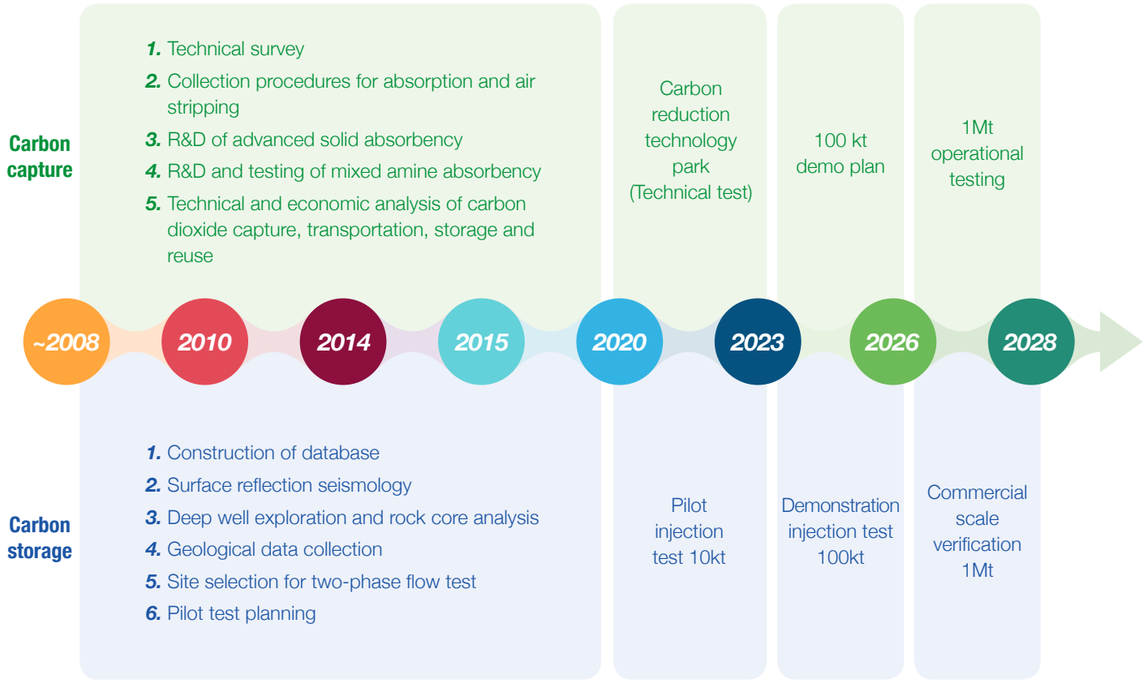
Future Planning - Development of Carbon Capture Technology

The technology of Carbon Capture, Utilization and Storage (CCUS) refers to the separation and collection of carbon dioxide emissions from large power plants, steel plants, chemical plants, etc., where the captured carbon dioxide can be reused (and direct utilized: e.g., Enhanced Oil Recovery, high-concentration carbon dioxide biological breeding, or be

pressurized and made into the air in the fire extinguisher or dry ice, etc.; indirect utilization: e.g., conversion to methanol, methane, and other chemical raw materials) or stored in geological structures to avoid emissions into the atmosphere. When developing carbon capture technology, Taipower conducts four dimensions of development, namely, the capture, transportation, reuse, and storage of carbon dioxide. After the carbon dioxide emitted by a power plant is collected, it is transported to a factory for reuse or stored deep underground in order to avoid the emission of carbon dioxide into the atmosphere. This technology can reduce the carbon emissions of power plants by about 85-90%.

In order to allow CO2 to be safely stored underground for an extended period of time, a complete monitoring system is required to monitor the distribution of CO2 underground at any time. The monitoring items track things like the carbon dioxide concentration of the atmosphere and groundwater, the carbon dioxide flux of the soil, the concentration and pressure of injection wells, as well as microseisms and earthquakes. In order to develop stable and safe carbon capture technology, Taipower launched a research project in 2008 that will run until 2028. The establishment of a carbon reduction technology park at the Taichung Power Plant is expected to conduct the verification of relevant technology. Meanwhile, the project is continuing to carry out research on the reuse of carbon dioxide and the analysis of the injection ability and safety of geological storage in the strata.

Development of Carbon Capture and Storage



3.4.2 Effluent Management

Wastewater Reuse

As it embraces water conservation, Taipower has actively pursued a goal of zero wastewater discharge. Rainwater collection (at power plants and dormitories) and wastewater reuse projects have been promoted to reduce the use of tap water inside power plants through comprehensive planning.

Through the utilization of various water-saving measures, the wastewater recovery results for 2019 are as follows (Note that the flue gas desulfurization, FGD, wastewater is not reused as it contains a high salt content which is likely to cause equipment corrosion and soil salinization. As such it is not included in the calculation of wastewater volume).

Reuse of Rainwater

Rainwater storage and utilization essentially provides an alternative water source. It is an economical and practical water source model because it does not consume energy or cause pollution. Moreover, it is easily accessed and does not create conflicts over water rights. Stored rainwater can be used as a supplementary source for household water supplies, an alternative water source for industrial areas or it can be stored for fire prevention. The storage of rainwater also reduces the load of peak water flow in urban areas.

According to the "Challenge 2008: National Development Plan" approved by the Executive Yuan, rainwater recycling is a key element of water resource planning and utilization. In line with these government policies, Taipower installed rainwater recovery systems in the Linkou, Tongxiao, Taichung, and Xingda Power Plants. In 2019, a total of 96,557.9 tons of rainwater were recovered for reuse in the plants.

Thermal Power Plant Wastewater Reuse

Unit: Tons

	2017	2018	2019
Reuse of effluents and wastewater from processes and boiler blowdowns	2,023,704.5	2,172,782.9	2,605,645.9
Reuse of rainwater	133,176.1	230,087.3	96,557.9

3.4.3 Waste Management

Waste Management System

In accordance with Taiwan's "Waste Disposal Act," Taipower established a "Coal Ash Resource Reuse Promotion Taskforce" in 2015. The taskforce was charged with the research and promotion of coal ash use. The taskforce was later expanded to become a "By-product Resource Reuse Promotion Taskforce," which is primarily responsible for coordinating cross-unit collaboration to formulate by-product resource reuse optimization strategies and response solutions, including phase-out strategies for coal ash and gypsum. As part of this mandate, the taskforce reviews existing coal ash sales regulations at power plants, promotes green label certification for fly ash and gypsum products and plans incentive schemes to encourage all units to increase their fly ash reuse.

Nuclear energy waste management handling is determined by the material's radioactivity. Low-level radioactive waste is currently stored in facilities' centralized storage plants, while high-level radioactive waste is currently stored with dry cask storage. In the future, both low and high-level radioactive waste will be stored together in a final disposal facility. For the treatment, storage, and disposal of high- and low-level radioactive nuclear waste, Taipower has planned short, medium, and long-term solutions.

Storage and Disposal Process of Radioactive Waste

	Short-term	Medium-term	Long-term
Storage/disposal process for low-level radioactive waste	Before 1996, waste was sent to Orchid Island's Low-level Radioactive Storage Yard for temporary storage. Since 1996, waste has been temporarily stored in the low-level radioactive storage vaults of the power plants.	After medium-stage temporary storage facilities are completed in the future, the waste will be transported to the said facilities for storage.	The waste stored in the temporary storage facilities will be transported to the final disposal facility.
Storage/disposal process for high-level radioactive waste	After being moved from the reactor core to spent nuclear fuel pools for cooling, wastes are stored with the dry cask storage, which is the mainstream method of storage around the world.		

Utilization of Industrial Waste

Utilization of Coal Ash

Taipower has encouraged its engineering units to use fly ash in civil construction projects to fill trenches. This raises the volume and utilization rate of fly ash and reduces its environmental burden. In 2019, coal ash production was at 2.39 million tons, of which 2.07 million tons, or 86.7%, was reused.

Utilization of Desulfurization Gypsum

To improve air quality, coal-fired power plants are outfitted with desulfurization installations which remove sulfur oxides from flue gas. Limestone slurry is then used to create gypsum through the chemical processes of absorption, neutralization, oxidation and crystallization. The resultant desulfurization gypsum ($CaSO_4 \cdot 2H_2O$) can be used by local cement and fire-retardant board makers. Taipower produced approximately 355 thousand tons of desulfurized gypsum in 2019.

Bidding for Industrial Waste

Other industrial wastes, such as waste wire and cables, as well as metal scraps generated during Taipower's operations are recycled by waste disposal contractors that acquire the materials through an open bidding process. In accordance with regulations, bidding contractors must be qualified Waste Disposal Organizations and perform their operations according to regulations to reduce the environmental risks involved in waste treatment.

3.4.4 Circular Economy

Circular economics have received significant attention from the government recently and some businesses have already picked up on this innovative concept and initiated reforms in energy resource utilization. Taipower has been actively engaging in circular economic assessment and planning for Zero Waste Generation. The Company promotes circular economic activity through the use of the Taipower's Material Flow Management Information System. The system screens out products/wastes with large outputs, and combines the information with the opinions of scholars and related units at Taipower. After analyzing risk mechanisms and referring to domestic and foreign practices, a representative list of key materials for the circular economy is produced. After further screening, the Company evaluates business models for the introduction of the key materials into the circular economy.

The current business model for the planning of various key materials includes five action plans: the Regional Resource Recycling and Reusing Model for Inorganic Products, the Product as a Service Model, the Circular Resource Supply Model for Biomass Power Generation, the Product Life Extension Model for Usable Property, and the Industrial Symbiosis Model. Based on the Environmental white Paper, Taipower is formulating circular economy strategies and short, medium, and long-term goals.

Strategies of the Circular Economy and Short, Medium, and Long-Term Goals

Strategy	Key strategy dimension	Short-term goal (by 2021)	Medium-term goal (by 2025)	Long-term goal (by 2030)
Focus on circular innovation	Establish a circular business model	Inventory of potential circular materials and feasibility trials of developing business models	Implement a "circular resource supply model"	Establishment of a complete circular economic system

A TPCreative Special Exhibition: The Birth of Circular Manufacturing

In 2019, Taipower created TPCreative, a new online e-commerce brand. By bringing new life Taipower's business waste, the brand helps the general public understand the in-depth issues of a circular economy. TPCreative has been selling circular economy products such as soot coasters, insulator bonsai pots, lamp holders, and cup sleeve brooches. It simultaneously planned a special exhibition on "The Birth of Circular Manufacturing." The exhibition shows the general public how Taipower is going deep into its power plants all over Taiwan to collect industrial waste, research material characteristics and redesign waste in order to create an emerging, circular economy business model. When conveying the process of business development, TPCreative emphasizes the sustainable concept of being environmentally friendly.

The exhibition is divided into three areas: texture reconstruction, material reconstruction, and electricity in our daily lives. All the manufactured products in the exhibition areas, including booths and exhibition stands, are mostly designed through circular economies. For example, the exhibit's table corners are taken from the brackets of power transmission equipment, the lamps are made from plaques on utility poles, and there are badge holders made from recycled canvas. In creating The Birth of Circular Manufacturing special exhibition, 11 groups of designers/brands were invited to produce in design works. Through continuous cooperation with local designers, Taipower is integrating the concept of the circular economy into daily life, and finding new value in seemingly useless waste.

TPCreative Official Website

3.4.5 Power Facilities Coexisting with Ecology

Taipower is committed to minimizing its negative impact on the surrounding environment during operations and to maximizing its positive influence on society and the broader environment. In addition to the neighborly activities conducted by each power plant, Taipower organizes beach cleanups, juvenile fish (fry) releases, green area adoptions and the construction of artificial reefs. The Company also continues to implement environmental education programs, and rigorously assess environmental factors before power plant or unit expansions take place. Moreover, the Company engages in intensive communication with local stakeholders and ensures legality and compliance for all construction projects these efforts are undertaken to benefit three parties: society, environment, and Taipower.

Taipower's Environmental Policy - Short, Medium, and Long-Term Goals for Ecological Inclusiveness

Strategy	Key strategy dimension	Short-term goal (by 2021)	Medium-term goal (by 2025)	Long-term goal (by 2030)
Create ecological inclusiveness	Plan the fusion of the facilities and ecologies	Plan and construct at least ***one*** ecologically inclusive plan for a power facility	Plan and construct at least ***three*** ecologically inclusive plans for power facilities	Plan and construct at least ***five*** ecologically inclusive plans for power facilities

Taixi Wind Turbines - Bat Nest Boxes

Taipower is cooperating with the policies and regulations of the National Energy Conference, Renewable Energy Development Plan and Renewable Energy Development Act to actively develop the rich wind energy resources along the western coast of Taiwan. When four wind turbine units were located along the windbreak on the reclaimed land in Taixi, Yunlin County, the installation of the wind turbines affected the ecology of the local bats. To remediate the situation, Taipower launched a "Bat Nest Box Project." The project is a habitat compensation plan to evaluate the ecological impact before, during, and after the construction of additional wind turbines. Small wooden bat nest boxes were built, and through monthly monitoring, the Company was able to observe which boxes were actually used by bats before the operation of units began. In addition, Taipower continues to observe the impact of wind turbines on bats. In addition to providing benefits of habitat compensation, the project is also expected to reduce the direct impact of wind turbine operation on bats.

The Dajia River Power Plant - Culture and History Coexists with Ecology

The Baileng Dajia River Power Heritage Museum was established within the Dajia River Power Plant to give visitors a glimpse of the history of electricity development in the area. Visitors can also view a valuable machinery planning map from the Japanese era. Moreover, power generation information on each power plant is available in real time at the museum. In addition, the museum provides a representation of the evolution of remote control automation at the Dajia River Power Plant through concise charts and graphs. Various types of unit models employed during the construction of each plant can also be seen in the museum. The museum not only shows the integrity of Taipower's preservation of cultural and historical data, but also allows the general public to see the power plants' efforts in green energy generation and ecological conservation.

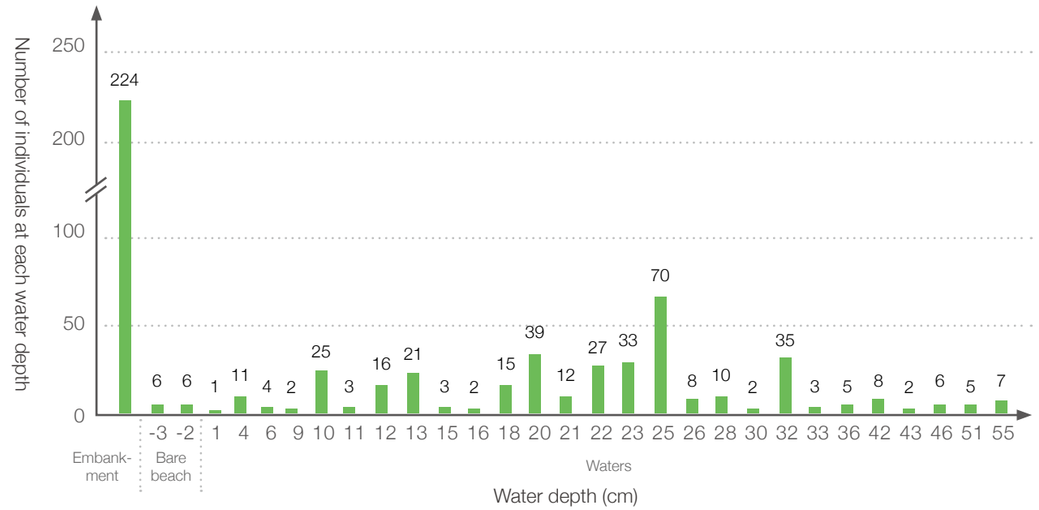
Linkou and Nanbu Power Plants - Algae Cultivation and Carbon Fixation

In order to plan and develop microalgae cultivation technology that is suitable for thermal power plants, Taipower built microalgae photosynthetic reactor cultivation facilities in the Linkou and Nanbu Power Plants. The facilities allow for algae cultivation and carbon fixation that reduces carbon dioxide emissions. Subsequently, elements found in the cultivated algae, such as Fucodian and chlorophyll, can be extracted for use as ingredients in healthy foods, biotechnological skin care products or feeds. The remaining algal residue can be used as biofuel to replace the use of fossil fuels in thermal power plants and thereby reduce greenhouse gas emissions. Through the integration of carbon fixation and innovative technology, resources can be recycled continuously, starting from production materials, through manufacturing, to recycling after use. This process maximizes benefits and implements the concepts of circular economy and environmental protection.

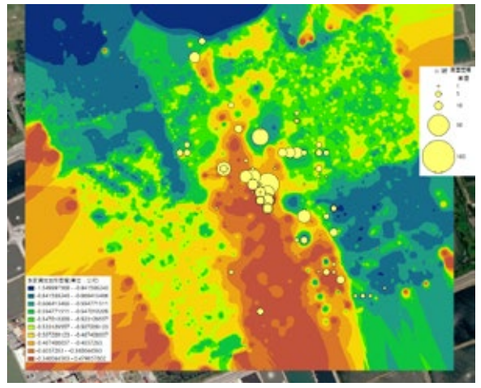
Ongoing Ecological Research, Operation and Management of the Yong'an Wetland

Ecological conservation research at the Yong'an Wetland has been ongoing since 2014. The research content has focused on topics such as carrying capacity of the habitat, bird cluster structures, utilization models of habitat land, intra-regional flight modes, mangrove plant restoration and replanting, water depth and the management of habitats where birds gather, water depth preferences, investigations and analysis of terrestrial vegetation, the interactions between terrestrial birds and vegetation and research on rare plant populations (*Najas browniana* Rendle and *Ruppia maritima*) and habitat types. The rich research results of the ecological conservation undertaken at the Yong'an Wetland have played a key role in the compilation of several studies and reports including the "Review Procedure of Yong'an National Wetland of Importance," the "Environmental Impact Assessment of Xingda Gas-Fired Turbine Renewal and Reconstruction Plan," and the "Proposal on the Conservation and Utilization of Yong'an Wetland of Importance (Local Level)." The research results also induced the Xingda Power Plant to modify its renewal plan by taking ecological conservation in industrial development into consideration. This in turn reduced and mitigated the environmental impact of the power plant through scientific management. Currently, the Yong'an Wetland is the only scientifically managed wetland among the 82 nationally important wetlands designated by the Ministry of the Interior. All the research on the Yong'an Wetland has been completed solely by the Taipower Ecological Research Team. The success of the team has clearly illustrated Taipower's ability and determination to achieve balance between the economy and the environment.

The Utilization Status of Each Water Depth for the Black-Faced Spoonbills



The relationship between the distribution of black-faced spoonbills and the terrain at the location of the planned power generation facility



The Planned Location of Power-Generating Facilities: Bird species hotspots/Bird quantity hotspots

Lanyang Micro Hydropower - Floating Power Plant

The Lanyang Hydropower Plant has successfully developed run-of-the-river micro hydropower equipment. By erecting this equipment at the water outlet of the Lanyang Power Plant, the water released by the power plant is used again to produce electricity. Since the equipment moves up and down with the water level and does not affect the water flow, it can also be called a floating power plant. This power-generating device is currently a micro device that can generate approximately 5 kWh per hour, but as its scale increases, its power generation capacity will also increase. The current plan is to continue to promote and develop this approach.

4 Human Resources

This Chapter is Recommended for the Following Stakeholders:

Employees, partners, government institutions/competent authorities

Implications of Human Resources

People are the fundamental element in the operation of an enterprise. A sound human resource layout leads to effective cooperation within the organization allowing it to achieve long-term strategic goals. In recent year, Taipower has worked to overcome the challenge of personnel shortages caused by a wave of retirements. It has also continuously worked on improving talent management policies for recruitment, training and development, utilization and retention, The Company has also introduced new technologies and action plans to enhance its education, training, occupational safety, health measures and talent cultivation. Moreover, it has taken steps to strengthen employee and contractor rights protection to create a healthy and happy workplace and improve human resource management.

Human Resources Are Mainly Based on Human Capital Investment

Talent is the cornerstone of an enterprise's sustainable development. Since the power utility industry is a highly specialized one, recruitment, training & development, utilization and retention of talent requires comprehensive human resource planning and implementation. As Taipower is currently in the midst of a retirement boom, increased numbers of experienced, senior staff are departing as they reach mandatory retirement ages. To address the challenges of succession and passing down essential knowledge at all levels of the Company, Taipower must actively cultivate talent through effective planning in training. Taipower must also retain talent through the practical assignment of job duties, in-depth employee care, excellent welfare policies, and the cultivation of a strong talent pool. Indeed, much effort is directed at these issues so as to achieve the goals of maintaining the excellent quality and stability of the power supply.

Principle Investments

- A complete system of recruitment, training & development, utilization and retention with clear recruitment, promotion, and training channels to assist employees in finding the most suitable positions and paths for development.
- Formulate employee performance evaluation guidelines and continue to establish a performance-oriented reward system to improve overall management and team performance.
- Strengthen the review and improvement of Taipower's occupational safety management
- Engage in the cultivation of athletic talent: Taipower sponsors six teams, including baseball, volleyball (both men and women), badminton, soccer, and basketball teams, and plays an important role in sports development. Among Taiwan's state-owned enterprises, Taipower is arguably the one most supportive of ball sports

Performance Highlights

- Number of participants in education and training sessions reached ***66,484***
- Taipower employees have obtained ***5,711*** certificates in related professional fields
- Taipower's occupational health and safety expenditures are at approximately NT$***367,540 thousand***
- The Company reinstated ***100%*** of employees following parental leaves
- For public construction projects with values of more than NT$200 million, ***real-time image inspection systems*** are required to effectively control and record the current occupational safety situation with the goal of ***zero occupational incidents***

Future Plans

In response to the future organizational transformation, Taipower will continue to focus on the development and training of talent in order to support the transformation of the Company. Taipower will provide colleagues with workplace development resources, corresponding compensation guarantees and retirement care. In terms of industrial safety, Taipower will continue to improve its management of occupational safety and pursue a goal of zero occupational incidents, thus creating a friendly, safe and happy workplace for employees.

4.1 Human Resource Management Strategies

Human Resource Policies

All Taipower employees are paid at levels above the national minimum wage. The Company is currently experiencing the retirements of numerous senior staff, and must continue to hire new talent so that core expertise and know-how are passed down to new employees. Taipower makes good use of multiple recruitment channels to employ talent that meet the needs of business development and operations, as well as taking on internal and external challenges and enhancing the value of human resources. Each human resource action plan and its performance results will be incorporated into a rolling review by the "Human Resource Development Task force" and its working groups, or into key assembly or management meetings. In aiming to realize each goal, the Company will develop corresponding actions and management changes, so that Taipower can effectively attract outstanding staff, cultivate professional talent, and achieve its human resource management goals for recruitment, training & development, utilization and retention.

Taipower's Human Resources Recruitment, Training and Development, Utilization, and Retention Strategies

Recruitment

- Balanced and rational human resource planning and systematic appointments
- Recruitment of diverse personnel to satisfy human resource demands; increase recruitment channels through staff exams, contract staff exams, scholarships for undergraduate and graduate students, vocational school scholarships, high school, vocational school and industrial-school cooperation programs, and promoting temporary staff to permanent staff positions

Training & Development

- Fortify essential techniques in each division and promote core operations
- Develop an innovative talent nurturing model and improve organizational learning performance
- Promote supervisor succession plans at the company level (for all divisions) and build a talent bank
- Utilize online resources to promote lifelong learning
- Strengthen the rationality of allocation, development and application for human resources

Utilization

- Effective distribution and management of personnel appointment budgets
- Improve the personnel system to make human resources deployment flexible and effective
- Implement job rotation and performance evaluations
- Make effective use of statistical analysis to provide a supervisory decision-making reference
- Enhance the performance of division-level human resource departments

Retention

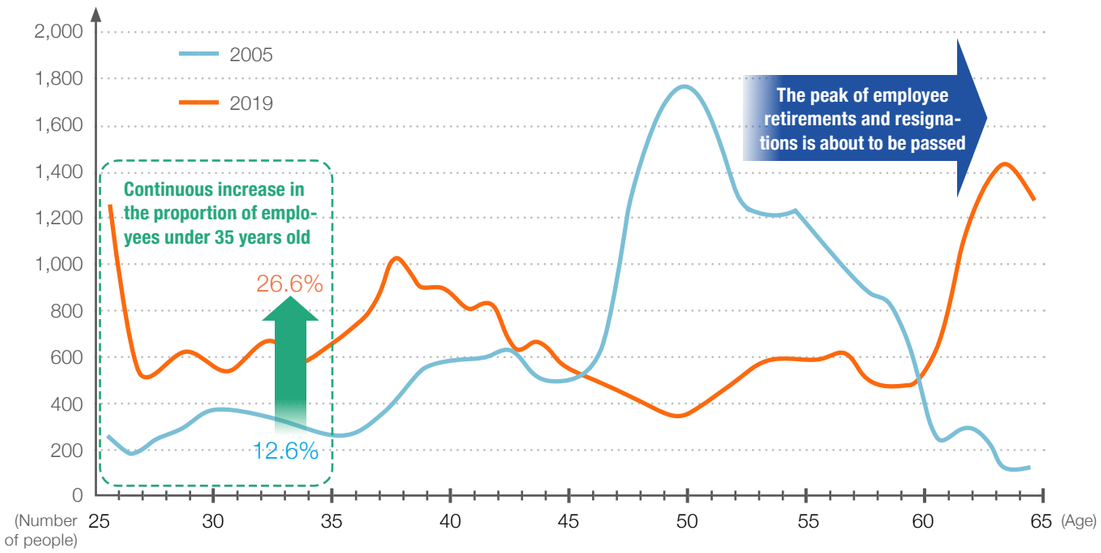
- Provide employees with public health insurance, subsidies for medical expenses incurred for injuries caused when executing job duties and health checkups through welfare policies
- Establish labor education courses and implement recreational activities so that employees can adjust their lives for the sake of their physical and mental health

In facing comprehensive human resource challenges, Taipower will manage its human resources through holistic planning, conduct active manpower inventory, make advanced plans, deepen its thinking on talent pool management, improve its test system, and recruit the most suitable talent for the Company. Also, continuous adjustments will be made in accordance with organizational changes. In addition, it is necessary for Taipower to connect Taiwan's vocational education system with the Company to cultivate a talent base for the power utility industry, to add new businesses in response to environmental changes, to accurately select talent for each professional field, to accelerate the cultivation of internal talent, to relax restrictions on seniority when registering for internal promotion examinations, and actively organize talent selection activities.

Respond to Manpower Shortage

Taipower's workers require highly professional skill sets. Therefore, the current wave of retirements has had a great impact on daily operations. In order to successfully navigate this challenge, in recent years Taipower has continuously implemented manpower structural improvement measures and focused on cultivating the experience of power utility professionals. Consequently, Taipower has managed to cope with the impact of numerous job handovers and the passing on of valuable experience. As one can see in the picture below, the current peak of retirements will gradually slow down making the ongoing transfer of knowledge more important than ever.

Shift in Taipower's Human Resource Structure



Strengthen External Recruitment

- Extra-quota recruitment to speed up the renewal of human resources
- Provide scholarships to attract talent

Apply Future Vacancy Plans in Advance

- Since total employee numbers must remain consistent, Taipower has initiated a future vacancy plan to cover the years from 2012 to 2022. Vacancies appear after retirements but the plan allows the cultivation and development of expertise in new employees in advance

Adjust Division Manpower According to Time Sequences

- Implement rolling reviews on the quality of each business unit/system business at different points in time, and set allocation principles for new employees
- Each division/system may properly plan recruitment categories based on core technological items defined by an inventory done each year to meet business needs

Perfect Talent Cultivation and Mentor Systems

- Each division/system/unit should engage in regular reviews and define its respective core technologies
- Establish digital curricula for core technologies
- Perfect mentoring systems
- Implement training refinements

4.2 Enhancement Measures for Human Resources

4.2.1 Human Resource Training

The professional nature of work at Taipower has made it necessary for the Company to respond to changes in the internal and external environment by effectively cultivating future talent. Taipower has built a complete talent training system, systematically cultivating outstanding talent and constantly improving its training systems as well as the hardware and software of employee care. The following are descriptions of each core task:

Skill Training System

Recently recruited technicians need to receive long-term, intensive training at Taipower's Training Institutes. They are then sent to their respective units for further training. With the assistance of a mentor provided through a mentorship system, they continue to develop their professional skills after entering the workplace. Taipower actively promotes a licensing system through license training classes and has formed the most solid human resources support force in the power utility business. In order to implement this training system and provide appropriate professional training venues, Taipower has four training centers throughout the country, namely the Wulai Training Institute, the Linkou Nuclear Energy Training Institute, the Guguan Training Institute, and the Kaohsiung Training Institute. The training institutes have different positions and missions, and actively carry out training programs required for the future development of the Company's operations. The licenses that new employees can study to obtain are in areas such as occupational safety, power distribution, nuclear power, power generation, power transmission and supply, operational maintenance, and general machinery. Taipower's business needs are covered by these types of certifications, and the certification system also encourages employees to continue to develope their own complete capabilities.

A total of 5,711 professional certificates were obtained by Taipower employees in 2019 and more than 80,000 certificates are held by current employees. The Training Institute also cooperates with various government agencies to plan and develop national-level technician certification categories for the core technical fields of the power utility industry. Employees can participate in training and be certified directly at the training units.

Cultivating Technology Talents

Taipower's Training Institute shoulders the primary responsibility for on-the-job training and preparation of new employees throughout the entire company. It will also serve as a starting point for Taiwan's power utility talent in the coming decades. The Institute actively promotes information technology to provide trainees with technological experience and effective user habits. The application of technology to training and development is aimed at promoting the growth of the organization and employees. Current major planning projects include (1) e-schoolbags: training courses are digitalized and put online, (2) integrating diverse web-based information and promoting blended learning, (3) developing virtual reality (VR) simulation training courses to promote training experiences, and (4) establishing instant survey feedback and discussion platform app, as well as continuing to improve the quality and relevance of training. After the development goals of each project are finalized, pilot training courses will be introduced and then gradually promoted to expand the effect.

Through the development of the facilities at the Training Institute, a large number of highly professional training courses are being improved. The introduction of technological changes the learning experience is, in turn, promoting different learning processes and habits. In terms of teaching, instructors can use technology to assist students by monitoring their learning dynamics, and then give feedback and adjust their teaching to make it more effective. Students can make good use of online resources for preview and review. They are not limited to specific teaching materials, but draw relevant information from multiple sources and also achieve quick and easy learning through video clips. It is expected that these resources will strengthen the lifelong learning, sense of professionalism, and spirit of achieving excellence among Taipower's employees.

The Results of Education and Training

Taipower's has been investing in the education and training of its highly professional workforce for years to allow staff to respond to changes in the internal and external environment. The results of these efforts are as follows:

Statistics on Taipower Training

Training type	Training item		2019 No. of participants
Development training	New dispatch personnel orientation training		783
	Fundamental development training		1,375
	Total		**2,158**
On-the-job training	Professional training	Organized by the Training Institute	11,743
		Organized by other units	49,030
		External training	1,498
	Total		**62,271**
Manager training	On-the-job training for managers		1,576
	Cultivation training for managers		472
	Total		**2,048**
Cooperative education	Recommendations for graduate school	Master's degree programs	7
	Total		**7**
Total			**66,484**

4.2.2 Employee Performance Evaluation Policy

All employees who have been officially appointed (hired) by Taipower and meet specific requirements (excluding professional chief engineers, VPs and personnel of higher ranks) are subject to performance evaluations as required by Taipower's employee performance evaluation regulations. Supervisors of different ranks are expected to evaluate their subordinates' performance in seven major categories: professional competence, work performance, team spirit, work attitude, conduct, capacity for management, and leadership talent. Corresponding grades and performance bonuses are then awarded to each employee within a given period.

In the future, Taipower will continue to develop its performance-oriented reward mechanism to enhance employee engagement and job performance. Currently, the main considerations for promotion are as shown in the following figure. For units or employees who work hard, instant rewards and benefits are given in the form of monetary prizes. This has increased cohesion among employees and encouraged all units to actively promote the Company's operating policies so as to improve operational performance and achieve a sense of honor for their teams.

Performance Management by the Responsibility Center

- Reasonably distribute bonuses based on employee contributions and performance
- 40% of the total performance bonus is allocated as each unit's efficiency bonus and is distributed according to the performance grades of the responsibility center

Instant Reward Mechanism

- 2% of the total performance bonus is allocated to the business unit head as distributable bonuses
- 50% of incentive bonuses are given as immediate rewards by the Chairman, President, and Vice Presidents
- 50% of incentive bonuses are distributed according to various procedures and principles, or allocated by supervisors

4.3 A Sound Working Environment

4.3.1 Occupational Health and Safety

In addition to the cultivation excellent human resources, maintaining occupational safety is key to sustainable development. Avoiding safety incidents and reducing the impact of accidents on power stability through the suspension of units is listed as one of Taipower's 8 major business strategies within Taipower's five-year plan (2019-2023). The placement of this goal as a top-level, company-wide strategy illustrates Taipower's determination to implement a safe and healthy workplace.

Occupational Safety and Health Management System

As of the end of 2019, the Company has completed the establishment and verification of 51 related units of the Taiwan Occupational Safety & Health Management System (TOSHMS) in accordance with Article 12-2 of the Regulations on Occupational Safety and Health. The Company will continue to accept re-verification or tracking by certification institutions on an ongoing basis. In addition, in response to the International Organization for Standardization's announcement of the Occupational Safety and Health Management System (ISO45001) in December 2018, the Department of Industrial Safety and Health planned the subsequent conversion of the occupational safety and health management systems of all departments. As of early 2020, 8 departments have completed the system conversion. The new management system will cover employees in all workplaces, including hydro and thermal power plants, nuclear power plants, construction sites, district sales offices, operational offices in power supply areas as well as contractors and volunteers (including self-employed workers).

Graded Risk Assessment, Management and Control

Through the following graded industrial safety risk management and control mechanism, the following identification and risk assessment of occupational hazards was implemented to minimize risks.

- In order to make the work safety risk classification of each unit reasonable and fair, the "Regulations of Occupational Safety Risk Classification for Subsidiary Units" were formulated. The regulations are used to calculate classifications based on risk ratios that are themselves based on the number of employees in each unit, the number of projects, types of equipment and characteristics of each project. In consideration of differences in management methods and responsibilities with regards to occupational safety, the risk classifications of employees and contractors are calculated separately for the risk classification requirements in occupational safety for subsidiary units. Occupational safety risks are classified into three levels: A, B, and C. Level A is of high risk, Level B is of moderate risk, and Level C is of low risk.
- In order to strengthen occupational safety management in the delivery of contracted projects, the Company implements risk assessments for occupational safety, counsels contractors to implement independent management, and effectively implements various safety and health measures to prevent occupational disasters. Taipower has specifically formulated the "Taipower Risk Assessment Guidelines for Occupational Safety for the Delivery of Contracted Construction Projects." Contracted projects are assessed based on their safety risks and classified into three levels: A, B, and C. Level A is of high risk, Level B is of moderate risk, and Level C is of low risk.
- According to Article 3 of the "Counseling Guidelines for Taipower Contractors' Occupational Safety and Health," before the start of construction, each unit shall request from the employer of the bidder or the person in charge of the workplace, etc., an occupational safety management report (including a risk assessment) specifying the plan for construction. If there are changes in construction personnel, site environment, construction methods, and use of machinery, the risk assessment and hazard identification must be re-executed, and the implementation of management changes carried out. Experts and scholars may be invited to review the risk assessment reports submitted if necessary.

Taipower has stipulated a set of "Occupational Safety Accident Handling Procedures," which contain the regulations and procedures for workers to report occupational hazards and dangerous conditions. In the event of an accident, they must notify the relevant management unit within one hour, and report to the local labor inspection institution depending on the situation. When the workers believe that they are in a working condition that may cause harm or illness, they can leave if they wish and be free from punishment. Taipower also revised its relevant management guidelines to aggravate the punishment mechanism by referring to the "Summary Table of Occupational Safety and Security Clauses" and the "List of Awards and Punishments Concerning the Hierarchical Responsibility and Delegation of Industrial Safety and Operational Accidents". These guidelines are applicable to the Ministry's subordinate enterprises, and promote a punishment mechanism for supervisors to mitigate the impacts which may derive from the related hazards and risks.

Safety and Health Management Policies

Taipower's expenditures on occupational health and safety came to NT$367.54 millon in 2019. The Company adheres to the principle of lives and occupational safety first, ensures personnel and operational safety, and pursues the goal of zero occupational incidents to create a safe, healthy, and friendly workplace. Additionally, to minimize the occupational injuries of contractors, Taipower optimizes items related to safety and health management in its construction contracts and actively assists and supervises contractors in establishing and implementing their own occupational safety management mechanisms. Taipower requires each contract organizer to provide notice of all hazards in the workplace before construction begins. The Company also requires contractors to carry out toolbox meetings (TBM) and on-site kiken yochi (KY, hazard prediction) training and to take photos to keep records for future reference before any operation starts. In 2019, 723 briefings were held on the occupational safety and health for contractors, with a total of 29,384 people participating.

For construction contractors, Taipower has incorporated guidelines on contractor safety and health into its contracts. Public construction projects with values of more than NT$200 million are required to set up real-time image inspection systems to effectively control and record the situation on work sites. In terms of management, during construction planning, relevant departments and occupational safety departments are called in to perform risk assessments and hazard identification to ensure personnel and operational safety.

Taipower also launched a procurement project for "Building a Virtual Reality (VR) Simulated Education and Training Course" and "Building a Health Management System." With immersive digital virtual reality, the Company can assist its colleagues with learning about potential harm during work, and hopefully correct their attitudes and behaviors with regards to occupational safety. In addition, professional integration and statistical analysis of health inspection data are used as a reference for disease prevention, health management, and tracking the improvement of employees who have higher health risks. It is expected that these two cases may avoid the occurrence of occupational disasters in real life and create a friendly and healthy workplace.

Dimensions of Occupational Safety Management and Bases

Dimension	Management Method	Management Bases/Practices
Regulatory	Training	• Procedures for training and utilization of occupational health and safety personnel from affiliated units
	Auditing and supervision	• Management enforcement of procedures through inspections by supervisors at all levels
	Operation safety	• Enforcement procedures for operational safety standards • Enforcement procedures for consultative organization in joint operations
	Personal protective equipment management	• Management procedures for personal protective health and safety equipment
	Incident handling	• Occupational safety accident handling procedures • Guidelines for assisting employees in handling industrial incidents
	Reward and punishment	• Procedures for punishments for practitioners Violating health and safety regulations • Procedures for rewards for practitioners engaged in excellent health and safety performance
	Contractor management	• Procedures for health and safety counseling • Procedures for fines concerning health and safety contract violations • Compulsory training due to health and safety contract violations
Onsite Execution	Before job task starts	• Industrial safety communications and hazard notifications • Pre-work training workshops • Review lists of operational personnel
	Job task in progress	• Health and Safety check-ins for operating personnel • Executing TBM-KY and making records • Implementing automatic inspections • Auditing health and safety measures
	Operation equipment and machinery inspection	• Regular inspections and confirmations of machinery • Dedicated notebooks or files for inspection records • Building coordination and control mechanisms

Taipower's occupational injuries in the past ten years may be categorized into three major types: contact with high temperatures, electric shocks, and falls. Further investigations suggest that most injuries are caused by a series of factors: not executing or implementing risk assessments, workers not following procedures during tasks or lacking crisis awareness, three basic tenets of occupational safety not being implemented on site, changes in management, failure to comply with standard operation procedures when working, failure to use protective equipment, lack of horizontal contact, and failure to properly control entry and exit of personnel, etc. Therefore, the improvements Taipower aims to make are as follows:

Future Improvement Strategies and Methods for Occupational Safety

Strengthen the system	• Amending relevant management procedures for punishment mechanisms • Promoting collective punishment for supervisors • Adding to and amending safety construction procedures
Manage procurement	• Occupational safety assessments are listed as a necessary requirement for the most advantageous bid or the lowest bid that passed the selection standards for procurement, and improving the weight of occupational safety assessments • A risk assessment report shall be submitted during bidding processes
Implement training and education	• Pre-service training and drills • Implementing qualification training • Organizing awareness campaigns • Change the method to interactive teaching for the education and training of hazard identification
Increase the level of punishment	• Violators' class (re-education) • Increasing the penalty limits for first-time offenders • Progressively increasing fines
Remove those who violate the rules	• Suspending construction once hazardous situations occure • Elimination mechanism for personnel violating the rules • Elimination mechanism for vendors violating the rules
Implement controls	• Engineer safety early warning system tracking management • Auditing supporting manpower • Strengthening industrial security checks • Entry and exit control for key personnel • Strengthening the management of personal protective equipment and machinery facilities • Handling review mechanisms • Change management
Third-party auditing NEW	• Identifying risk items and blind spots through self-checking mechanism of occupational health and safety organized by external experts
Occupational Safety Care Platform NEW	• Provide a platform for employees to fill in the errors they have found in the construction projects of each unit (as the method of public supervision of the projects of Public Construction Commission, Executive Yuan)

Occupational Health Services

In order to prevent occupational injuries and illnesses and to protect workers' physical and mental health, Taipower has formulated a "Taipower Labor Health Service Plan" in accordance with the Rules for Labor Health Protection. The plan covers labor health risk assessments, physical and health examination data processing, and assessments and management for laborers with high health risks. The plan is a reference for all units when formulating their labor health service plans.

Regular health checkups are held for current employees. Those under the age of 40 will be examined every 5 years, and those aged 40 to 65 will be examined every 2 years (more frequently than the 3 years stipulated by the law). Those over the age of 50 are encouraged to do health checkups and are given subsidies. Checkup results are sent to occupational safety departments for tracking. Existing employees who engage in hazardous operations are regularly scheduled to participate in special health checkups to establish health management data, and are then classified into Levels 1 to 4 for health management based on their health reports.

Taipower has 44 unit that employ full-time nursing staff to engage in health management, and a total of 50 units hire contract doctors. A further 8 units hire contract nursing staff to assist with on-site health services, implement health management, and enhance employees' physical and mental health. Medical staff of on-site health services can assist the Company in various ways, including:

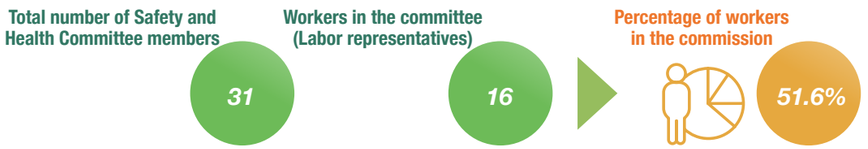
- **Analysis and evaluation of health checkup results**
- **Assisting employers in determining proper divisions of labor**
- **Assessments and case management for high-risk laborers**
- **Maternal health care**
- **Prevention of work-related diseases**

In addition to the traditional occupational hazards of the workplace, workers also face other health hazards such as performance pressure, long working hours, working in shifts, and psychological pressure. In response to the increase in overwork, musculoskeletal disorders, and other emerging occupational diseases, prevention plans for ergonomic hazards, ailments induced by exceptional workload, and wrongful physical or mental harm in the workplace are formulated to control non-traditional occupational hazards.

The Organization of Occupational Safety and Health

Taipower's "Occupational Health and Safety Committee" is comprised of 31 members, with 1 member acting as the committee chairman and 1 as the deputy chairman. The chairman is the President of Taipower, and the deputy chairman is the Deputy Vice President who supervises the department in charge of occupational health and safety. At least 7 of the committee members are supervisors from the departments of the Secretariat, Power Generation, Power Supply, Business, Power Distribution, Construction, Nuclear Generation, Industrial Safety and Health, Human Resources, Accounting and Power Equipment Repair. Other members include the heads of designated construction units, occupational safety and health personnel, medical practitioners engaging in labor health service, and representatives of the Taiwan Power Labor Union (labor union representatives are required to occupy 1/3 or more of the total seats on the committee).

Percentage of workers (whose work or workplace are subject to organizational control) in a formal safety and health committee composed of labor and management:



The duties of the commission include making recommendations on the safety and health policies formulated by employers, to review, coordinate, and make recommendations on matters related to safety and health. The Occupational Health and Safety Commission of each unit meets once every 3 months; the commission of the Headquarters meets once every 2 months (more frequently than the once every three months required by the Regulations on Occupational Safety and Health). The President and his designated proxy have decision-making power over the commission's proposals.

Taipower provides workers' occupational safety and health-related information on various occasions and through various methods (such as e-mail, employee forums, posters, or slogans, etc.). Workers can make proposals related to the system of occupational safety and health to the Occupational Safety and Health Committee for discussion and deliberation. Workers can also fill out proposed improvement measure recommendations for the units they have seen via the Occupational Safety Care Platform.

Employee Education and Training

In order to promote occupational safety awareness, Taipower provides corresponding education and training based on the nature and duties of employees. In addition to general education and training on safety and health, the introduction of the TOSHMS management system, fire drills and first aid training, Taipower provides special training for relevant operators, foremen, supervisors, and safety assessment personnel, such as training for high-pressure gas and other dangerous equipment operations to avoid occupational hazards. There are three ways of conducting training: entrusting external training institutions, conducting training at Taipower's training centers, or through training programs organized by various affiliated units. A total of 53,958 people have undergone training in the aforementioned safety and health subjects. In 2019, Taipower provided 7 employee training or testing programs to contractors, with a total of 21 contractors participating in the training.

Occupational Safety Performance

In accordance with Taipower's "Occupational Safety Accident Handling Procedures," employee/contractor accidents are reported to Taipower within one hour and responsible personnel file an accident report. Accident reports serve as the basis for the compilation of relevant statistics and analytical reports for the occupational safety management of all units. This information is then used to minimize the likelihood of further occupational accidents. In addition, responsible personnel should notify local labor inspection agencies within eight hours of the occurrence of the occupational accident. After an accident has occurred, investigation of the cause and case review are conducted as required by regulations in conjunction with an administrative liability review and disciplinary actions that are taken to prevent similar accidents from happening in the future.

The main causes of injury for Taipower's workers include traffic accidents, arc discharges, collapsed objects, electric shocks, and falls. The statistics of work-related injuries for employees and contractors in 2019 are as follows:

Statistics of Serious Work-related Injuries in 2019

Worker category	Gender	Total number of work days	Total number of work hours	Number of deaths caused by occupational injuries	Rate of death caused by occupational injuries	Number of severe occupational injuries	Rate of severe occupational injuries	Number of recordable occupational injuries	Rate of recordable occupational injuries	Number of false alarms	Rate of false alarms
Employees	Male	6,062,186	48,497,488	1	0.004	8	0.03	9	0.03	4	-
	Female	1,033,240	8,265,924	0	0	0	0	0	0		-
	Total	7,095,426	56,763,412	1	0.003	8	0.02	9	0.03	4	0.01
Construction contractors	Total	4,833,068	38,664,546	5	0.020	12	0.06	17	0.08	2	0.01

Note: 1. Total number of work days: The actual number of work days for employees
2. Total number of work hours: The actual number of work hours for employees
3. Rate of death caused by occupational injury = (Number of deaths caused by occupational injury/Total hours worked) × 200,000 (refers to the rate per 100 employees based on 40 working hours per week for 50 weeks per year)
4. Rate of severe occupational injury (excluding deaths) = (Severe occupational injuries/Total hours worked) × 200,000
5. Rate of recordable occupational injuries = (Number of recordable occupational injuries/Total hours worked) × 200,000
6. Construction contractors didn't compile their total person-work hours according to the gender this year, the data is therefore unavailable. The statistical method for this item will be improved in the future.

Analysis and Statistics of Injuries in 2019

Type	Total	Contact of objects with great temperature difference	Hit by falling objects	Falls	Rolled into machinery	Electric shocks	Object collapses	Others
Employees	3 cases: causing 1 death and 2 disabilities	0%	0%	33%	0%	67%	0%	0%
Contractors	17 cases: causing 7 deaths and 12 disabilities	18%	12%	18%	18%	6%	24%	6%

Note: Harm rate of the disaster type = Number of casualties of the disaster type/Number of casualties of the entire year x 100%

4.3.2 Implementing a Happy Workplace

Employee Benefit Policy

Major Employee Benefits and Care

Resources for diverse workplace growth
- Provide holistic training resources
- Ensure employees achieve capabilities required for their careers

Compensation guarantees
- Compensation system is open and transparent
- Complete and performance-based reward system

Retirement care
- Establish a comprehensive retirement care system, and set up web pages specifying relevant rights and information about retirement; hold farewell activities for retirees to help them adapt to retirement in a timely manner

Diverse protection
- Provision of public employee insurance, labor insurance, and National Health Insurance
- Medical expense subsidies for injuries caused when executing job duties
- Health examinations
- Recreational activities

In the future, Taipower will continue to improve its welfare policies through diversified health care measures and rich employee self-improvement activities. It will also continue to cooperate with other related units (such as the Taiwan Power Labor Union, TPC Employee Welfare Committee and all branches) to hold educational activities across regions, counties, or cities, to enhance and protect employee welfare.

Health Care of the Employee

Taipower Headquarters entrusted the doctors of Taipei Pojen General Hospital to visit the Company for health consultations and assessments for employees for 3 hours per day, 6 days per month. In addition to substantive medical and health services, Taipower also established the Healthy Workplace Promotion Group to carry out disease prevention and health promotion activities, including holding health seminars, fitness testing, cancer screening, sports clubs, providing sports equipment and venues. Various medical devices including body fat monitors, scales, sphygmomanometers, and automatic external defibrillators (AED) were purchased. The aim of these actions was to encourage employees to put their own health first when devoting themselves to their work.

Taipower introduced and built a set of electronic, professional, functional health management systems which can be used by employees for personal health management and by the Company as well. Through professional integration and statistical analysis of health examination data, the results will be used for disease prevention, health management, and tracking of employees who are likely to have health-related issues. This will help the Company create a friendly and healthy workplace environment.

The Taipower Headquarters also organized a number of special keynote lectures and health exam activities to help colleagues cultivate health awareness. In 2019, 7 lectures were held; the topics covered overwork prevention and breastfeeding knowledge for professional women, with a total of 524 people participating. Screening for four cancers (colon cancer, oral cancer, cervical cancer, and breast cancer) was held as well, with a total of 285 people participating. A total of 174 people participated in the fitness testing activities.

Physical and Mental Care of Employees

Taipower focuses on the physical and mental health of its employees. The power utility industry requires staff to have both sound physical and mental health in addition to relevant skills. To address issues of personal health, the Heart-to-Heart program was founded in December 1988. Additionally, positions for part-time employee assistance staff have been established, and an employee assistance system has been set up.

In order to assist colleagues in solving physical and mental difficulties and to achieve a "mutually beneficial operation" of humanistic management, Taipower imitated the "Volunteer Teacher Chang" model by setting up Heart-to-Heart programs in various units as "employee assistance programs (EAPs)." The programs adopts a dual-process model, namely, "internal settings" ("Heart-to-Heart program" participants as part-time employee assistants) and "external professional resource links" (special assistants and institutions). In addition to planning activities such as special lectures, book clubs and frontline employee seminars, the program provides personal consultation services and consultation referral services for 8 hours per person per year. These consultations are paid for by the Company. The consultations cover the psychological aspects of mind, body and soul, and also provides diversified assistance, such as legal and financial consultation.

The Heart-to-Heart program has been in place for 31 years. Its services cover all parts of Taiwan. Through 640 employee assistance staff, Heart-to-Heart has integrated various resources from inside and outside the Company and used the employee assistance program to establish a self-help support system that translates into specific actions. The goal of the program is to increase employee engagement and enhance organizational competitiveness by helping individuals with physical and mental health and creating a healthy and friendly working environment. Heart-to-Heart has recently expanded its offer of support to employee's family members and the general public. The program is the most effective component of Taipower's efforts to provide stability to its employees.

Maternal Health Care Services

Taipower's Health Promotion Office offers services to assist with maternal health care. The Company has initiated maternal health care programs for female employees that offer support from conception to one year after delivery. The Company initiates maternal health care when it is informed that an employee is pregnant. Occupational Health and Safety personnel assess the safety of the employee's work environment and medical professionals in the Health Promotion Office begin assessments of whether pregnant employee's work responsibilities should be adjusted or whether appropriate protective measures should be taken during the pregnancy. The Company also has breastfeeding rooms in appropriate places to facilitate continued breastfeeding of employee's children.

Parental Leave Application and Reinstatement Rate

Item	Male	Female	Total
Number of employees eligible for parental leave in 2019	2,154	525	2,679
Actual number of employees that applied for parental leave in 2019	28	108	136
Number of reinstated employees after parental leave in 2019	18	50	68
Reinstatement rate in 2019	100%	100%	100%
Number of employees reinstated after parental leave in 2018 that have been working continuously for a year	19	71	90
Retention rate in 2019	86.36%	100%	96.77%

Note: 1. The "number of employees eligible for parental leave in 2019" was calculated based on the number of employees who had had maternity or paternity leave within the last four years (2016-2019).

2. The calculation method of "reinstatement rate in 2019" = Number of reinstatements in 2019 / Total number of people who should be reinstated in 2019.

3. The calculation method of "retention rate in 2019" = Number of employees reinstated after parental leave in 2018 that have been working continuously for a year since / Total number of reinstatements in 2018.

Labor-Management Communication and Collective Bargaining

Taipower attaches great importance to the voices and needs of all its professional partners. The Company provides channels for expressing diverse opinions, and actively responds to relevant suggestions to continuously create a labor-management environment that makes employees feel satisfied and builds trust in the Company.

Communication Performance

Communication channels	2019 Performance
Labor-management conferences	11 labor-management conferences were held at company and sub-system levels; interaction and communication between labor and management took place in the meetings
Keynote speeches	Taipower held 14 keynote speeches for high-ranking supervisors to continuously communicate with employees about the Company's policies; interaction and communication between labor and management took place in the meetings
Training	Various training courses are provided for employees on an ongoing basis so that staff can acquire vocational skills and communicate with the Company
Intranet websites	In order to strengthen internal communications and website management, Taipower has amended and announced management operational guidelines on its website and message board. If the employees have doubts or experience misunderstandings about the Company's policies or regulations within the online discussion area, the unit in charge should immediately resolve the doubts of its colleagues

Negotiations on Collective Agreement

On October 24, 2013, Taipower and the Taipower Labor Union (TLU) signed a Collective Bargaining Agreement (CBA). The agreement calls for annual meetings to implement or clarify articles of the signed CBA. To safeguard employees' rights, in accordance with Article 41 of the CBA, Taipower is required to communicate with the TLU regarding the creation, reorganization, and merger of units in advance. In 2019, 12 consultative meetings were held.

Number and Ratio of Employees Covered by the Collective Agreement

Item	2017	2018	2019
Total employees	26,734	26,962	27,606
Percentage of employees that are union members	26,408 (98.8%)	26,599 (98.7%)	26,866 (97.3%)

Note: Percentage of employees that are union members = Employees who have joined the union / Total employees in 2019

Results and Implementation Status of the Grievance Complaint System

Taipower's "Guidelines for Processing Matters of Grievance Concerning Working Personnel" help deal with issues that cannot be resolved through the Company's administrative system. The guidelines cover the following:

- Employees who must adjust their job duties or be transferred to other departments, units, or regions due to personal or family reasons.
- Employees who have been going through major changes or crises in their families that require Company involvement.
- Employees who are not satisfied with the Company's systems and measures, or those who have filed complaints regarding contracting and oversight of construction projects, financial and procurement matters, or hand-over inspections.
- Investigations and handling of other complaints.

Grievances and complaints filed by employees shall be handled by the "Working Personnel Difficulty and Grievance Matter Processing Team" of the employee's unit. If the team is unable to handle the case or if the outcome is not acceptable to the employee involved, he or she may file a complaint to the "Working Personnel Difficulty and Matters of Grievance Processing Committee."

4.3.3 Structure of Human Resources

Employment Categories

All Taipower employees are full-time; the Company has not hired any part-time or foreign employees.

Total Number of Employees and the Ratio of Male/Female Employees from 2017 to 2019

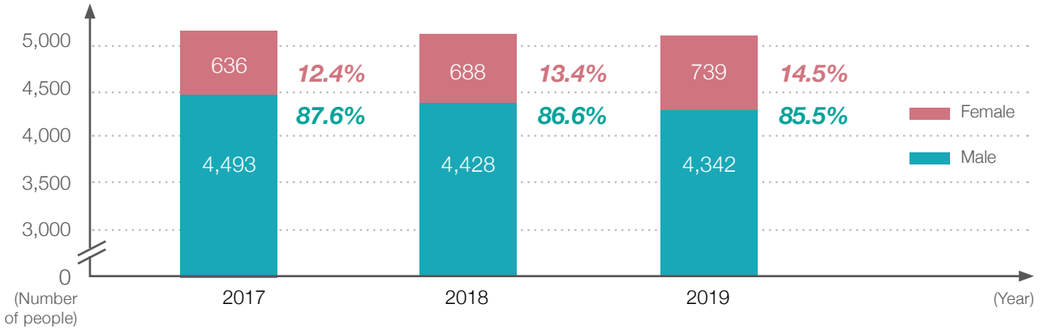
		2017		2018		2019	
Total employees		**26,734**		**26,962**		**27,606**	
Local employees	**Male**	23,183	86.7%	23,160	85.9%	23,586	85.4%
	Female	3,551	13.3%	3,802	14.1%	4,020	14.6%
Direct personnel	**Male**	21,526	80.5 %	21,647	80.3%	21,621	78.3%
	Female	1,938	7.2 %	2,068	7.7 %	2,214	8.0%
Indirect personnel	**Male**	1,657	6.2%	1,513	5.6%	1,965	7.1%
	Female	1,613	6%	1,734	6.4%	1,806	6.6%

Note: 1. The cut-off date for the statistics was the end of December 2019.
2. Direct employees are personnel who fall under the category of technical, sales and marketing employees at onsite departments; indirect employees are personnel responsible for administrative support, including document processing, business affairs, general affairs, and accounting, etc.
3. Decimal points have been rounded off.
4. Total employees = Direct personnel + Indirect personnel

Number, Age, and Gender Distribution of Employee Recruitments/Departures

		2017		2018		2019	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
Number of new employees		**1,608**		**1,812**		**2,504**	
Age	**Under 30**	818	191	895	284	1,349	271
	Between 31-50	414	166	448	172	666	204
	Over 51	14	5	12	1	14	0
	Total	**1,246**	**362**	**1,355**	**457**	**2,029**	**475**
Number of departing employees		**1,543**		**1,600**		**1,864**	
Age	**Under 30**	105	27	127	37	178	42
	Between 31-50	118	82	109	112	124	115
	Over 51	1,117	94	1,143	72	1,301	104
	Total	**1,340**	**203**	**1,379**	**221**	**1,603**	**261**

Number and Gender Ratio of Taipower Supervisors from 2017 to 2019



Note: 1. Based on Taipower's definitions, frontline management includes: section supervisors, deputy captains, station masters, plant managers, duty officers, service center officers, and service station officers.
2. Middle-level management includes: plant managers, directors, team chiefs, planning engineers, deputy central dispatch directors, deputy directors, managers, assistant managers, and duty managers.
3. Senior management includes: the chairman of the board, the president, the chief engineer, the chief administrator, division directors, plant managers, center directors, station directors, division deputy directors, plant assistant managers, center deputy directors, station deputy directors, executive secretaries, central dispatching supervisors, general supervisors, director's secretaries, chief inspection officers, chief executive officers, deputy chief executive officers, and subdivision directors.

Outsourced Human Resources

As of the end of December 2019, Taipower human resources that were outsourced to sub-contractors were separated into two categories: manual dispatched labor and manual and service contract labor. Taipower's outsourced human resources numbers in 2019, in which no significant changes were seen, are as follows:

Manual dispatched labor *130*

Manual and service contract labor *1,076*

Note: 1. Manual dispatched labor refers to work performed by outsourced personnel located at Taipower and therefore subject to the supervision of relevant units. Staff in these positions are used to fulfill business needs for engineers with technical expertise and administrators with management expertise in procurement and contract management.
2. Manual and service contract labor refers to tasks such as cleaning, janitorial services, document processing, call center agents, drivers and so forth.
3. The statistics above do not include outsourced workloads (Definition of outsourced workload: Except for manual and service contract labor outsourcing, the outsourcing procurement, such as manual labor, technical services, facilities operation and maintenance, implemented in any other way).
4. The cut-off date for the statistics was the end of December 2019.
5. Taipower ceased to employ manual dispatched labor starting from 2020.

5 Innovation and R&D

This Chapter is Recommended for the Following Stakeholders:

Partners, government institutions/competent authorities, customers, residents/general public

Implications of Innovation and R&D

The rise of artificial intelligence (AI) along with changes brought by information and communications technology (ICT), big data analytics, blockchain, cloud technology and other innovations have overturned the business models of the past and completely changed many industrial applications. Although Taipower is not among the first companies to bear the brunt of these shifts, the Company needs to keep up with the times by introducing relevant technologies, improving management efficiency, and increasing operational effectiveness. The Company aims to provide stable power and become a key promoter of the green-power related industry by embracing technological changes and promoting smart grids, smart power development systems, and continuously investing in green power research and development.

Intellectual Capital Is the Foundation of Innovation and R&D

Intellectual capital consists of intangible, knowledge-based assets, including plans, systems, procedures, and related agreements. To implement low-carbon power, Taipower invests in smart grids and engages in comprehensive planning. By promoting smart grid action plans related to smart generation and dispatch, smart transmission, smart distribution, and customers of smart services, both the supply and demand sides are covered by Taipower's investment in intellectual capital. The Company is committed to R&D and innovation and transforming itself into leader in the a low-carbon power industry.

Principal Investments

- Taipower plans to install a total of 1 million AMI smart meters and a complete information management systems for our customers by 2020.
- In preparation for smart grid development, Taipower set up 170 kilometers of optical cables and 755 optical fiber communication systems while providing 781 communication circuits.

Performance Highlights

- Continued promotion of the ***Kinmen Smart Grid*** and building of an energy storage test system and an energy management system (EMS) to improve the stability of power supply.
- Built a ***visualized interactive GIS application for solar power and power grid land*** use to guide external experts to develop renewable energy in places with potential grid connections. This is helping to achieve the balanced regional development of power grids.
- Installed a total of ***400,000*** low-voltage ***AMI smart meters*** for smart device customers by the end of 2019.
- Taipower's performance on the international Smart Grid Index (SGI) also made remarkable progress in 2019. Among the 75 power companies being rated, Taipower's performance improved by ***26.79%*** and its global rank rose to 39 making it an ***SGI 3-Star Power Company***.

Future Plans

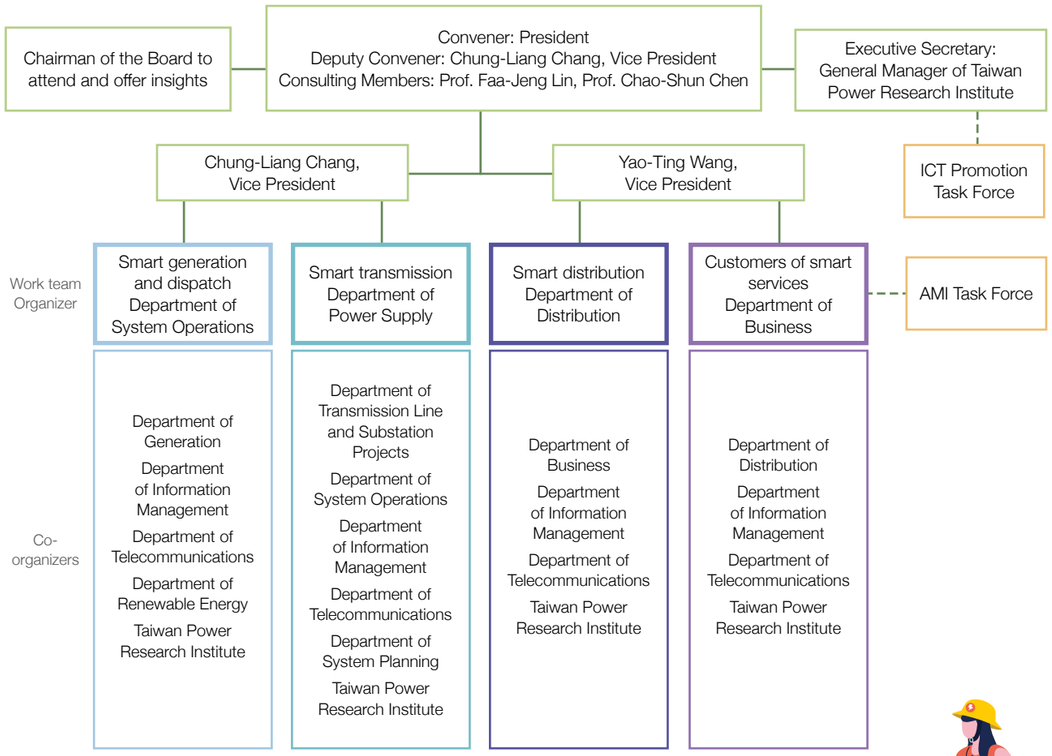
In response to the challenges and opportunities brought by renewable energy, Taipower will continue to focus on smart grids and green power innovation and R&D in the future. In keeping with its three-stage smart grid development plan, related facilities will be gradually built for power generation, dispatch, transmission, distribution, sales, etc. Regarding green power, Taipower will continue to invest in the research and development of renewable energy forecasting systems and to maximize the effectiveness of renewable energy, as it gradually achieves its goal of energy transition. Taipower is also working to fulfill the government's policy objectives. In the short term (2020), the Company will focus on enhancing operational flexibility, developing a stable power supply network with high renewable energy penetration, and strengthening the flexible dispatching capabilities of the power grid supply, demand, and accident handling. In the mid-term (by 2025), the Company will focus on strengthening the resilience of the power grid in response to the climate change and to building a safe and highly adaptable power grid. In the long term (by 2030), the Company will implement power utility industry reform, increase its use of low-carbon energy, commit itself to the development of a safe and reliable power grid, and promote open and transparent information and fair market transactions.

5.1 General Planning for Smart Grids

Smart grids are vital for energy and industrial transformation and for new economic development. To build an effective and stable smart grid, Taipower will strive to achieve three major goals: (1) control the amount of renewable energy generation and reduce the impact of intermittent power generation; (2) enhance grid resilience, strengthen the integration of power transmission and distribution systems, improve its capabilities of disaster prevention and troubleshooting, and reduce power outage times; and (3) increase system effectiveness and employ load management as a method to strengthen customer participation opportunities.

At present, the goals of developing a smart grid are prioritized as follows: (1) respond to the challenges of connecting renewable energy to the grid; (2) strengthen the resilience of existing facilities to improve power supply quality in response to the aging equipment and extreme weather; and (3) encourage customers to participate in power saving to increase the operating efficiency of the power system. The Executive Yuan initiated a Smart Grid Master Plan in 2012. Taipower is highly concerned about the implementation of the smart grid. As such, the President has convened and organized a Smart Grid Task Force. The person in charge of the Smart Grid Task Force is the President, and relevant units are regularly convened to hold meetings and review the different circumstances of ongoing plans and discuss future plans.

Smart Grid Task Force



Targets and Timeline for Taipower's Smart Grid

According to the Executive Yuan's Smart Grid General Planning Project, Taioiwer must ensure a stable power supply, promote energy conservation and carbon reduction, and increase the use of green energy. The Company has divided work on the smart grid into four aspects based on their characteristics: smart generation and dispatch, smart transmission, smart distribution, and customers of smart services. The project was initiated in 2011 and will be promoted in three phases over the next 20 years.

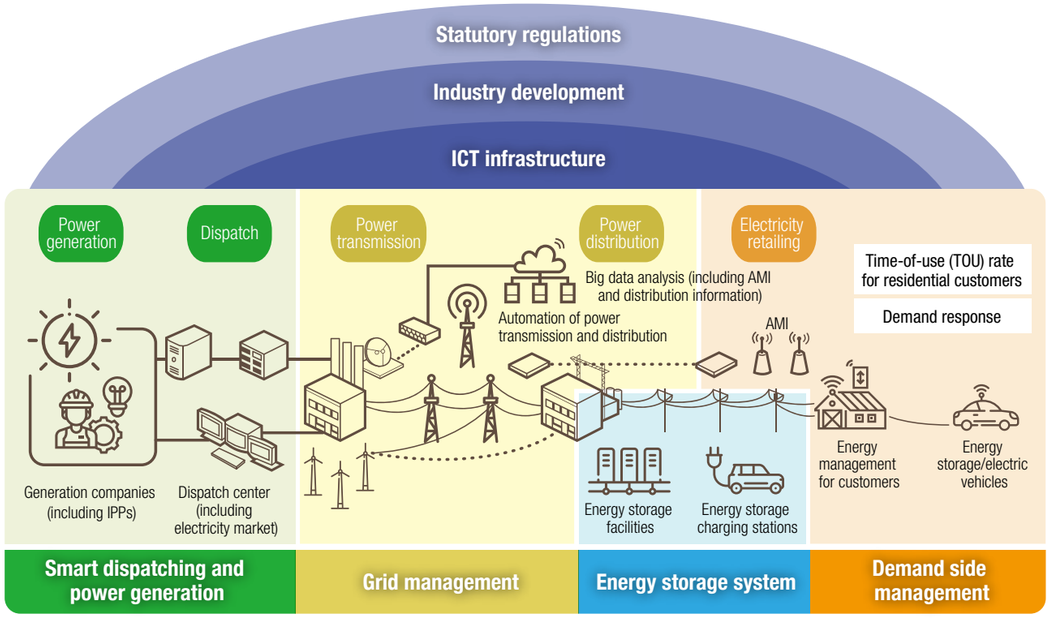
Target and Timeline of Taipower Smart Grid

Aspects	Build-Up Stage (2011-2015)	Expansion Stage (2016-2020)	Consolidation Stage (2021-2030)
Smart Generation and Dispatch	• Introduce the IEC61850 standard communication protocol • Build a reliable and interconnected dispatch communication system • Strengthen information integration and various functions of the dispatch control platform	• Dispatch renewable energy connected with the grid on a large-scale • Demonstrate advanced equipment asset management • Dispatch demand response • Implement an incentive system for renewable energy development	• Build adjustable speed operation control systems for pumped storage power plants • Promote advanced equipment asset management • Assess and apply advanced power generation technology • Optimize the dispatching platform through review and renewal. • Research large-scale energy storage systems
Smart Transmission	• Execute a pilot program for a Special Protection System (SPS) • Digitize protective relays • Assess advanced protection technologies (e.g., a Wide Area Measurement System (WAMS) and an Advanced Power Transmission Malfunction Distance Measurement System)	• Renew heat-resistant wires • Build reactive power device control (RPDC) • Continue to renew protective relays • Monitor the dynamic thermal rating (DTR) of the network	• Construct smart substations • Asset management in equipment • Assess and apply Flexible Alternating Current Transmission Systems (FACTS)
Smart Distribution	• Automate distribution (an increase of 500 spots per year) • Construct smart substations • Research condition-based maintenance (CBM) • Review the mechanisms of demand response and electricity rates	• Strengthen the mapping system of distributed networks • Strengthen information management of the distribution system by employing data from smart meters • Research integration and application of the Common Information Model (CIM) standard	• Manage renewable energy grid connection capacities • Develop regional energy storage systems
Customers of Smart Services	• Build high/low-voltage automated metering infrastructure (AMI) • Research information system security	• Demonstrate demand response • Research and discuss an electricity rate system that reflects power supply costs and offers incentives for saving electricity • Review the control objects and methods of demand response	• Promote household-level distributed power and energy storage management systems

In response to the needs of the energy transition, amendments to the Electricity Act, and the effects of the great blackout incident of August 15, 2017, Taipower has, after much work, developed a plan consisting of seven major themes, including smart generation and dispatch, grid management, energy storage systems, demand side management, statutory regulations, industry development, and ICT infrastructure. In the future, Taipower will gradually complete various action plans in accordance with the seven major themes to facilitate the development of smart grids in a holistic manner. In addition, based on the goal of stable power supply that includes 20% renewable energy by 2025, Taipower will learn from the development trends of international power grids, upgrade real-time monitoring and protection equipment of its power grid, and apply advanced technologies such as AI, big data and ICT technology to achieve the goals of power supply stability, energy security, a green economy, and environmental sustainability, while implementing the policy objectives of the energy transition.

5.2 Action Plans for Smart Grids

Taipower's smart grid action plan is being implemented in conjunction with the "Smart Grid General Planning Project (Approved Amendment)" approved by the Executive Yuan on March 27, 2020. The original smart grid general planning project was based on the six major aspects of technology-oriented grid construction (namely: smart generation and dispatch, smart transmission, smart distribution, customers of smart services, smart grid industry, and the environmental aspects of smart grids, etc.) The future planning of smart grid strategies will be problem-solving oriented and focus on the system integration of smart grid functions. Structural reform was conducted after examining the existing issues of the power system, the Company has divided its smart grid system integration into seven major areas.



The seven areas of system are: (1) smart generation and dispatch, (2) grid management, (3) energy storage system, (4) demand side management, (5) ICT infrastructure, (6) industry development, and (7) statutory regulation.

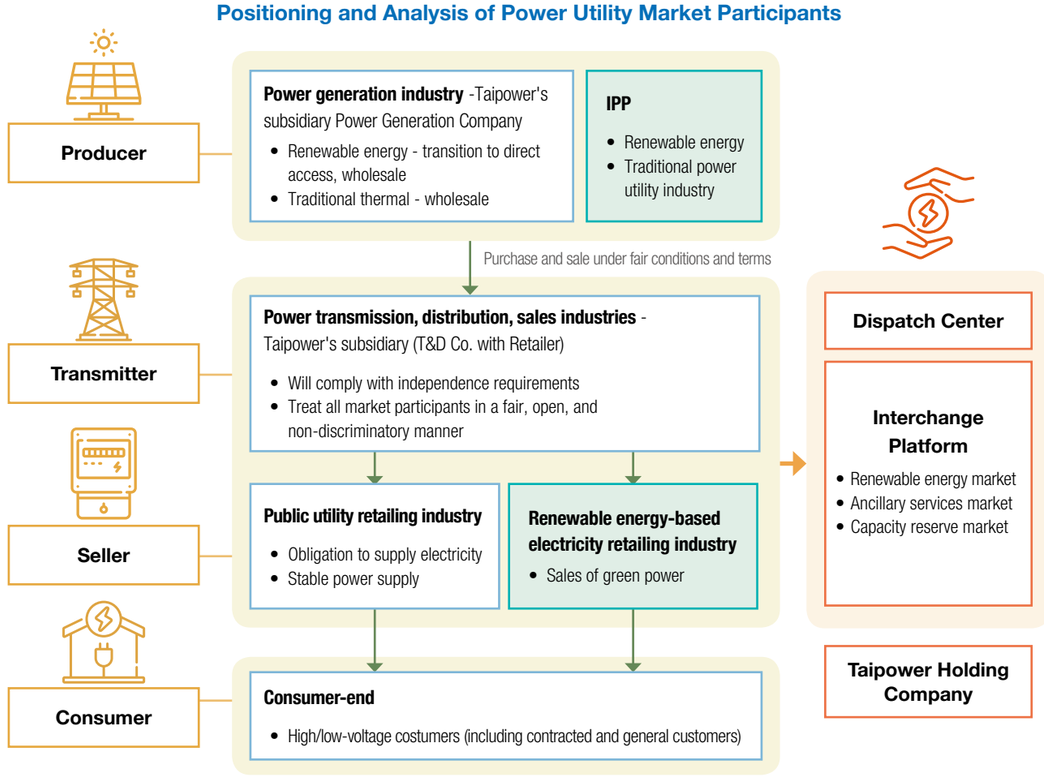
5.2.1 Smart Generation and Dispatch

For energy transition to occur, the existing generation equipment and power grid must be upgraded and enhanced to allow for real-time monitoring of power generation in different types of power plants. As the main promotion goal for smart generation and dispatch is to increase effective use of power; the major directions of its promotion are increasing the ratio of grid-connected renewable energy and increasing the operational efficiency and reliability of power plants to ensure a sufficient amount of renewable energy can be connected to the grid. Due to the weather conditions, renewable generation is not as stable as traditional power generation. Therefore, it's necessary to build a monitoring system and combine information collected from smart meters through Big Data analysis to improve power generation forecasting. Together, these initiatives can reduce the uncertainty brought about by renewable power generation. In addition, the Company is optimizing the dispatch of pumped storage units with the grid connection of renewable energy, while increasing the spinning reserve and supplemental reserve combined with smart meters for demand side management, energy storage batteries, etc. This will ensure a stable power supply and respond to smart grid communication demands.

Amendments to the Electricity Act aimed at opening the market will increase the share of power generated by external sources year by year. Consequently, effective management and dispatching will be increasingly important issues that are closely tied to the development of smart grids. Through the transition, Taipower will pursue ongoing renewal of its existing coal-fired units. To mitigate failures and decrease inspection times caused by furnace abnormalities during this process, the Company will introduce a real-time monitoring system.

To balance these challenges, Taipower has developed a series of key working items that create an optimal energy management system. Specifically, these items include the integration of renewable energy generation and an information management platform, an electricity market trading platform, and a big-data monitoring system for coal-fired units. The total amount of investment in these key working items will be NT$1.742 billion.

Positioning and Analysis of Power Utility Market Participants



Introducing a Distribution-Level Renewable Energy Advanced Management System (DREAMS)

In response to the possibility that the proportion of renewable energy may continue to increase in the future, the Company is seeking to put the real-time generation information of renewable energy under its control so the dispatch the power generating units can be done in real time and the balance between supply and demand can be maintained. To achieve this, Taipower has developed a Distribution-Level Renewable Energy Advanced Management System (DERAMS). For plants over 100 kW, the solar power generation system collects real-time power generation information for the plant; for plants of less than 100kW, smart meters are used to periodically transmit the information back to the management system database for real-time power generation estimations. The aggregated power generation information can be uploaded to renewable energy data collection workstations by the Department of System Operations for dispatchers to make electricity generation estimates and dispatching decisions.

Through the aforementioned investment, Taipower expects to deepen its understanding of the real-time generation of renewable energy, increase the accuracy of its day-ahead/hour, and ensure the stability of the power grid system when the ratio of renewable energy generation reaches 20% in 2025. The Company will complete the construction of a trial platform for electricity trading in 2020. The completion of formal construction will be complete in 2025, establishing a trading mechanism for the electricity market. Foreign monitoring indicators will be introduced, and maintenance plans for key components will be established to ensure stable power supply.

5.2.2 Grid Management

The main goal of grid management is to strengthen the resilience of the power grid. As the ratio of renewable energy generation increases year by year, transmission and distribution grids and related information need to be integrated to ensure a stable power supply, enhanced transmission efficiency, and "increased safety of transmission. Taipower has developed its monitoring of transmission equipment statuses to ensure operational safety and achieve the goal of preventive maintenance. Taipower is also expected to invest NT$17.47 billion in this project for data planning and maintenance of the power transmission system, and planning of system feeder automation. In order to ensure smooth communication on the power grid in the event of an accident on the transmission line, Taipower has formulated the following action plans:

Establishment of the smart, real-time, online analysis for prevention and maintenance at the Nanke E/S regional substation

Through the establishment of a dissolved gas analysis (DGA) monitoring system, the Company gained the ability to perform real-time monitoring of H_2, CO, and water contents in its transformers. If abnormal gas levels are detected, an alarm will be sent so field personnel can be sent to the site as soon as possible. During downtime, the normal operation levels of a transformer can be judged by its gas trends chart. This helps to avoid the accidental power failure of transformers and achieves the goal of preventive maintenance. At present, a demonstration system has been established in the Nanke E/S. In the future, it will also be horizontally extended to the operational offices of each power supply region. The integration of information between various systems of the power supply units will facilitate subsequent big data analysis.

Replacement of transmission system protection relays

Transmission system protection relays are being replaced. The goals of this measure are to enhance the accuracy of relay action and system transient stability, reduce the number of power outages, and shorten power outages. By 2019, 95.29% of replacements were completed.

Research on a smart fault positioning system for transmission lines

Fault intervals can be displayed by digital relays, and outage points can be positioned through calculation and analysis. Geographic Information Systems (GIS) can then be used to help maintenance personnel trace the route of the lines. This allows the location of the outage point to be found even faster and inspection times may be shortened.

Establishment of a Special Protection System (SPS)

When necessary, a SPS takes immediate inputs and cuts-off of related equipment (such as units, lines, compensating equipment, and load). Among the power plants, the Maanshan Nuclear Power Plant and Tongxiao Power Plant have completed the construction of their SPSs.

Taipower will also continue to integrate information to strengthen its transmission and distribution asset management, adopt international information and communication standards (e.g., IEC 61850), and promote the application of feeder automation. Through the feeder automation upgrade plan, the Company will strengthen its AMI and distribution management system with the assistance of the distribution map information and AMI information.

Introduction of IEC 61850 technology

In order to tackle the challenges above, Taipower will gradually import automation equipment (such as IEDs, Gateways, etc.) that conforms to the international telecommunications standards (IEC 61850) for substations so that it can achieve the real-time exchange of operating information between the power transmission equipment in substations. This will facilitate future integration with other application systems. By replacing the equipment to the IEC 61850 standard, the requirement for a functioning smart grid to enable "a partial power grid to automatically process partial power grid abnormality" will be achieved. Taipower completed the initial research on operation and protection in 2019 and plans to complete the introduction of IEC 61850 in 17 substations and GOOSE applications in 14 substations in 2020. The Company is expected to complete the aforementioned IEC 61850 deployment strategy in numerous phases in 2020. The program is expected to reduce the scope of power outages during special circumstances.

Addition and incorporation for monitoring of automatic line switches

By building up a monitoring platform for the management of transmission equipment assets and conditions, the Company engages in data collection, integration and big data analytics. This will allow for preventive maintenance and the avoidance of accidents. In addition, the introduction of a self-regulating function in smart inverters will also help to stabilize feeder voltages. As Taipower increases its feeder automation deployment year by year, information from the renewable energy and smart meter systems will become increasingly integrated through the establishment of an advanced distribution management system (ADMS). Together, these initiatives will allow for the accurate identification of accident points and accelerate the recovery of power supply for customers, from 50 minutes of outage time to only 5.5 minutes.

Distribution automation

In line with the overall plan for the smart grid, the distribution system continues to promote feeder automation projects, with the goal of gradually including all customers into the automatic feeder to further improve the efficiency of distribution feeder automation and improve the reliability of the power supply. A total of 9,500 automatic switches will be added and incorporated into monitoring from 2020 to 2027.

5.2.3 Energy Storage System

Renewable energy generation is intermittent and variable. Moreover, solar photovoltaic power, for example, does not have an inertia response capacity like traditional units do. With the heavy use of renewable energy, additional reserve capacity is required to resolve generation increase needs. Currently, this capacity mainly relies on the resources of traditional units to respond to these needs. In the future, Taipower will actively develop energy storage systems to reduce the impact of renewable energy on the system and enhance the stability of the power supply. Energy storage systems possess fast frequency control capabilities, which can help stabilize the system frequency. As the scale of renewable energy grows year by year, the role of energy storage systems will inevitably become more important. However, current energy storage batteries are expensive, and thus Taipower should prioritize building battery equipment to stabilize the system while improving its construction, operation and maintenance capabilities for battery equipment. Taipower has initially planned an ancillary service system for energy storage levels and will make use of technological developments such as renewable energy device quantities, system control resources, and power generation forecasting to complete the construction of energy storage systems. In 2020, the Company has planned to build an offshore island micro-grid system demonstration site on Wang'an Island, Penghu, and has initially evaluated the installation of facilities for solar power generation (over 30 kW), small wind power generation (approximately 30kW) and energy storage systems (500kW/50kWh), etc. It will continue to promote the development of local renewable energy and expand energy storage capacity in numerous stages. In addition, Taipower will build an energy storage system on its own site on the island of Taiwan and establish an ancillary service participation mechanism in the future to assist system frequency modulation and rapid response to accidents. The Company is scheduled to self-build 160MW (including demonstration site) by 2025, and to purchase ancillary services of 430MW, bringing the total to 590MW (please refer to the table below for details). In the future, we will review relevant construction plans and procurement needs using the rolling planning method in line with the speed of renewable energy construction to ensure a stable power supply. The current energy storage system plan from 2019 to 2025 is as follows:

Unit: MW

	2019	2020	2022	2025
Constructed by Taipower	5	8	38	160
Ancillary Services	-	15	64	430
Total	**5**	**23**	**102**	**590**

The future energy storage system will be satisfied by means of construction and ancillary services. At present, Taipower expects to build an energy storage system from its own site, construct the 160MW energy-storage-as-ancillary-service, and establish an ancillary service participation mechanism pursuant to the speed of renewable energy deployment and the system backup demand for stable power supply. Related procurement needs are reviewed by using the rolling planning method to ensure stable power supply.

5.2.4 Demand-Side Management

The main objectives of demand side management are to respond to the increasing share of renewable energy in the country each year, reduce power demands and suppress peak power consumption to strengthen the resilience of the power grid, and stabilize the balance between power supply and demand. Taipower will continue to implement smart meter infrastructure, develop AMI big data analysis and value-added applications, improve power consumption visualization and customer interaction functions, and guide users to voluntarily save energy. The Company is expecting to invest NT$46.4 billion in smart meters and communication modules between 2019 and 2030. Meanwhile, the Company will implement measures aimed at strengthening demand-side management, promoting user participation, reducing peak loads, and employing dynamic electricity rates and adjustments to the rate structure to encourage customers to change their modes of consuming electricity. Additionally, Taipower will focus on potential customers who may engage in saving energy as it deploys smart meters. By the end of 2018, 200,000 low-voltage smart meters had already been installed, with a further 3 million to be in service by the end of 2024. As of the end of 2019, a total of 28,784 high-voltage AMIs and 403,404 low-voltage AMIs have been installed.

Deployment of Smart Meters (AMI)

The Company has completed the deployment of high voltage AMI smart metersl in 2014 (controlling 60% of the country's electricity consumption information). In keeping with the goals of the Executive Yuan's "Smart Grid General Planning Project," the Company plans to complete the deployment of low-voltage AMI smart meters to a total of 1 million households in 2020 (cumulatively controlling 69% of the country's electricity consumption information) and a total of 3 million households by 2024 (cumulatively controlling 81% of the country's electricity consumption information).

AMI Deployment Goal

Medium-term	Long-term
By 2024, a total of ***3 million*** low-voltage AMI smart meters will be deployed, and ***81%*** of the country's electricity consumption information will be under control.	To maximize benefits, 3 million AMI smart meters will be deployed to households by 2024. Following ongoing rolling reviews deployments may be made to as many as ***6 million*** households by 2029 bringing ***85%*** of the country's electricity consumption information will be under control.

Data application of smart meters (AMI)

The Company established a high-voltage customer service portal to provide heavy electricity users with value-added services such as visualized power consumption information and trial calculations of electricity consumption (including load information, electricity comparisons with other companies of the same industry, two-stage/three-stage time-of-use rate trial calculations, contract capacity trial calculations, electricity overconsumption warnings, abnormal electricity notifications, short-term electricity load forecasts and warnings, daily load pattern analysis, demand response measures trial calculations, etc.). The portal assists customers in voluntarily managing their energy consumption and encourages them to participate in demand response measures. The Company has also established a low-voltage AMI customer service portal information service to provide lower-voltage customers with power consumption information, visualized power consumption analysis charts, comparisons with regional customer information, and to encourage customers to voluntarily save electricity.

Introduction of dynamic electricity pricing

At present, Taipower employs time-of-use rates. By reflecting the differences in power supply cost at different times and setting prices according to the differences between peak hours and off-peak hours, the Company is able to provide customers with correct price signals, promote system load balancing and improve the effective consumption of power. Currently, all types of customers can choose their time-of-use rates. In the future, AMI will provide information on real-time electricity consumption, which will enable Taipower to design a more flexible and dynamic time-of-use electricity pricing plan that meets the demands of the power system, prompts customers to control their energy consumption according to price signals, and to flexibly guide the general public in adjusting electricity consumption and reducing their electricity bills. The plan will also suppress peak loads and help stabilize the power supply.

Demand response measures

Demand response provides electricity bill deductions as an incentive measure to guide customers to change their electricity consumption habits at a specific times, which will make peak and off-peak loads more balanced and slow the need for developing increased power supplies by stabilizing the power supply. A series of eight plans have been launched. These include plans for planned bidding, unplanned bidding, and demand bidding. In the future, AMI will provide information on real-time electricity consumption and improve demand response plan design. Adjusting the time frame of electricity consumption suppression in conjunction with the increase of grid-connected renewable energy will provide more, flexible resources for the electric system. Meanwhile, reviewing and trial execution of a variety of demand response plans are also being implemented.

In line with the schedule for AMI deployment and reviews of the current demand response measures, the plan will be diversified; from slow to fast response times. The plan can be divided into monthly operation planning, day-to-day economic scheduling, same-day economic scheduling, and 15 minutes or less response times, etc. These diversified response measures increase the participation in terms of flexible dispatch in the electricity system. In 2019, participation in response measures reached 2.4 GW, with a long-term target of 3.0 GW by 2030.

5.2.5 ICT Infrastructure

Sound ICT infrastructure is an indispensable part of smart grids. However, the bandwidth utilization rate of the existing fiberoptic communication system cannot meet the demands of telecommunication for the future smart grid. Since smart grids are reliant on ICT, security issues cannot be ignored, either. To meet the applied communication demands of the smart grid for applications such as monitoring systems, smart substations, the ICT system, renewable energy, distribution feeder automation switches, and high/low-voltage AMI, Taipower will build a wired large-bandwidth optical fiber network. The network will provide closed, secured, and real-time power communication, conduct rolling reviews on the actual Internet Protocol (IP) broadband Network and power the Internet of Things (IoT) communication service needs of each unit. As of January 2020, there are 108 EHV (extra-high voltage) customers (above 69 kV) of AMI who use Taipower's own optical fiber network. In line with the development of smart power generation and dispatching, Taipower continued to strengthen the communication systems of power plant substations, distribution substations and service stations in 2019, adding 172 kilometers of optical fiber cables and 740 sets of equipment to protect relay stations, dispatch lines and feeder automation, as well as other systems. This has helped to facilitate operation monitoring, prevention of tripping, and load balancing of the entire grid.

In response to the government's expansion of renewable energy development policies, maintain the stability of power system and to protect the security of the power grid with the addition of renewable energy, Taipower's circuit leasing business opened to renewable energy companies at the end of 2019. The Company inventoried its newly-built, dedicated, optical fiber network and planned to split the remaining optical fiber. The Company subsequently applied to National Communications Commission (NCC) to increase the network's scale, and paid increased attention to related market developments. The Company developed business opportunities, expanded revenue, and proactively employed advanced wireless communication technology to execute a trial project on the feasibility of establishing a power IoT communications system. The project also evaluated the appropriate time for the service's introduction.

In the future, Taipower is expected to launch a trial run of its smart grid information security plan, include it in the monitoring at the security monitoring center, and continue to improve the overall security protection capability of the smart grid. The Company expects to complete 32 dispatching centers at all levels, promote its smart grid data application plan, upgrade the backbone/regional optical communication system, and introduce the power IoT communication system by 2025.

5.2.6 Industry Development

The construction and renewal of the grid will promote the upgrading of domestic industries, open opportunities in the international market, and persuade manufacturers to participate. Taipower encourages economic development and will collaborate with relevant manufacturers to collect international market information and find overseas cooperation opportunities. Taipower will inventory the domestic power market's demand, transform and upgrade the industry, establish industry chains for domestic products and system services, and promote domestic industrial participation in domestic and international power utility markets.

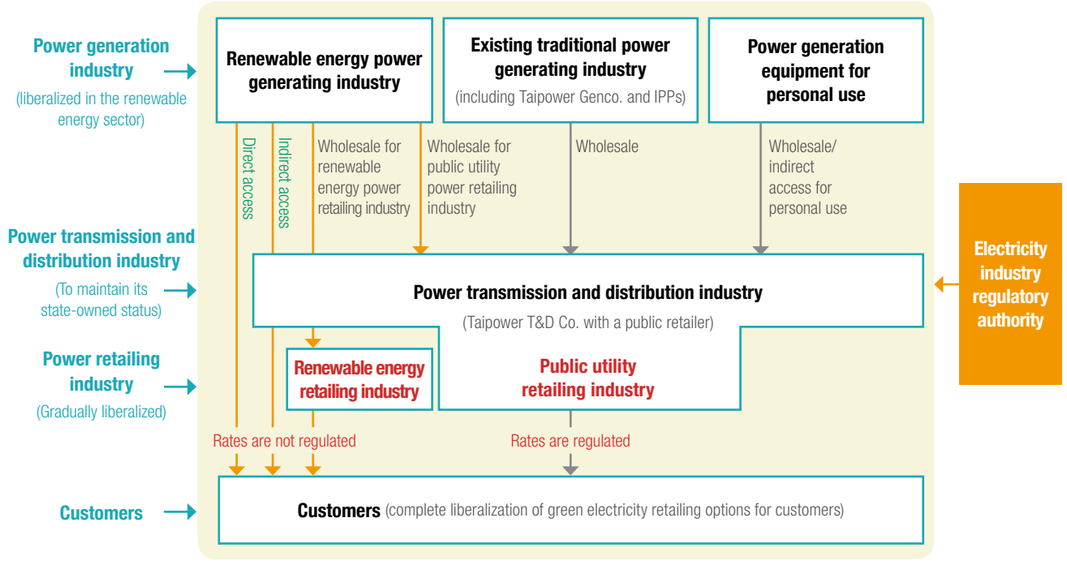
Construction and renewal are expected to provide a total of NT$650 billion of output value by 2030, and drive industrial participation and the long-term development of the smart grid industry:

	2020	2022	2025	2030
Output value of smart grid products and applications	Reach NT$30 billion	Reach NT$35 billion	Reach NT$43 billion	Reach NT$53 billion
Accumulated output value	NT$220 billion	NT$290 billion	NT$400 billion	NT$650 billion

5.2.7 Statutory Regulations

The development of a smart grid is, in part, a response to the reform of the utility industry and the liberalization of the power market. As such, the successful completion of smart grids will require planning that establishes future market mechanisms. The additional need for cooperation with renewable energy providers and the policy prioritization of green energy makes this planning and regulatory work increasingly urgent. In the face of future changes to power grids, the Company must also keep pace with changing demands for human resources and quality improvements.

Structural Diagram of the Future Power Market



In response to the challenges mentioned above, Taipower will amend its Guidelines for Renewable Energy Interconnection Technology and its Guidelines for Power Dispatching in accordance with the Renewable Energy Development and the Electricity Act. Meanwhile, training on newly added or amended regulations for renewable energy (including those concerning energy storage equipment and data opening) will be arranged by Taipower's Human Resources Department. The department will adjust and improve on the current guidelines based on existing regulations, and relevant development tasks will be planned in accordance with the government's agenda.

5.3 R&D in Green Power

Taipower continuously promotes low-carbon power generation. However, in the process of promotion, it faces potential challenges and impacts as it introduces various renewable energy sources. Taipower is working to achieve the goals of a stable power supply, an effective energy transformation, and sustainable operation through research and development. The Company also aims to meet the demand for electricity usage from the general public and strengthen its competitiveness of energy development.

Construction and application of the Kinmen Smart Grid Energy Storage Testing and Energy Management Systems (EMS)

Kinmen has suitable conditions for renewable power generation based on wind and solar power. With the promotion of the government's energy transformation policies, renewable energy in Kinmen is booming. Taipower is continuing construction in Kinmen in hopes of developing a smart power network that meets international standards and transforms the island into a low-carbon society with sustainable development and a stable power supply.

Kinmen has a small power system, and the proportion of renewable energy power generation is relatively large. Maintaining the stable and reliable operation of the system is an important task for the Company in Kinmen. As of April 2020, Taipower has installed large wind turbines in the Kinmen area with a capacity of 4 MW and has developed a grid-connected solar power capacity of approximately 9 MW.

In addition, Taipower is introducing a large-scale energy storage test systems in Kinmen in two phases. The use of an energy storage system will make the power system more stable and serve as an important reference for the planning and construction of Taiwan's energy storage system. After the energy storage system became operational, the power system's operation and dispatch became more flexible, but it also became more complicated. To reduce the burden on dispatchers and reduce the likelihood of human error, an energy management system (EMS) was built at Kinmen's Tashan Power Plant. The system is expected to integrate the real-time operating data from multiple diesel generators with user load, renewable energy power generation, and energy storage system information. This will allow it to estimate the system's operating status for the next 24 hours. The system also aims to assist system dispatchers by finding possible fault scenarios in advance and using artificial intelligence algorithms to provide relevant countermeasures.

The Taiwan Power Research Institute has completed the construction of a lithium battery energy storage test system (2MW) in the Kinmen power system. System applications include functions such as smoothing renewable energy power generation fluctuation, system frequency adjustments, and system online instant rescues. The energy management system uses real-time operation information integration, renewable energy power generation forecasting, load forecasting and operation dispatching to achieve the development goal of transforming Kinmen into smart low-carbon island.

The Kinmen Area Renewable Energy and Energy Storage System

Visualized Interactive GIS Application for Lands of Solar Power and the Power Grid

To cooperate with the government's green energy policy, Taipower actively works to maintain power quality, power grid security, and increases the number of grid connections for distributed energy resources (DER) in the distribution system. It also seeks to guide external stakeholders to develop renewable energy in places where the number of grid connections is large. The plan is to achieve balanced regional development and power grid balance, as well as to reduce the cost of strengthening the power grid.

The system is based on an open geographic map and information platform and integrates a general version of an electronic map of Taiwan. It displays the information about potential land for solar power, power grid lines and grid-connectable capacity for solar power in a visualized and interactive manner. Its goal is to give an overview of potentially suitable land for solar power, a complete picture of those sites and grid capacities.

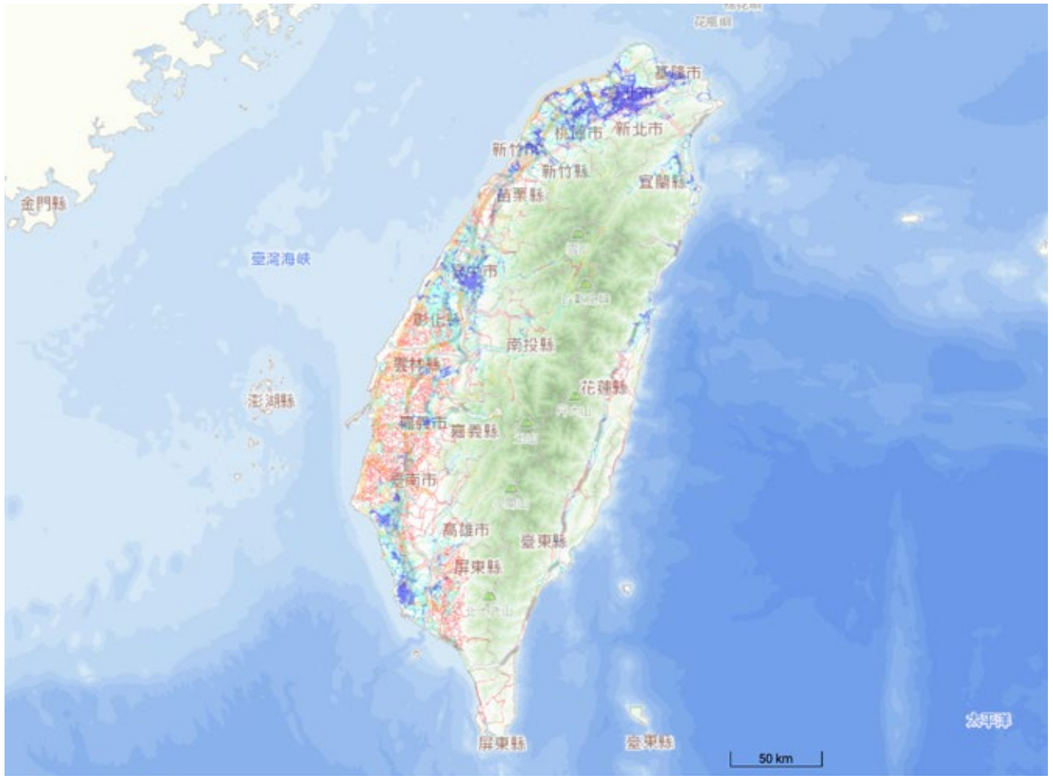
The calculation results of the maximum hosting capacity of each section are integrated into the Geographic Information System (GIS), and the grid-connectable capacity of the sections of each feeder is presented by color on the map.

In order to provide people with a more intuitive understanding of the grid-connectable capacity of each of Taipower's feeder sections, the system regularly retrieves topological information on the current power distribution equipment for each of Taipower's branches, and then simplifies this information to obtain the required data structure for calculating the grid-connectable capacity. This is then integrated into the system center to be used as the basis of the calculation.

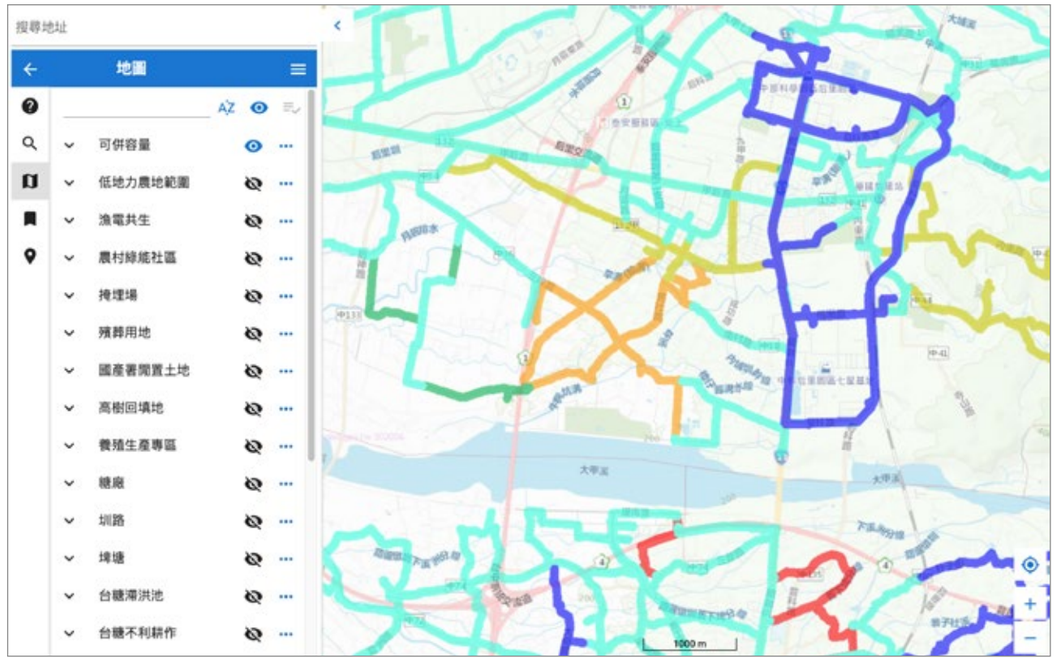
The system was officially launched on January 1, 2019 and can be found on the official website of Taipower (website: http://hcweb.taipower.com.tw/). It provides information on the grid-connectable capacity in the feeder sections, the land areas of the potential sites for solar power generation inventoried by the Bureau of Energy, and the range of wild bird protection areas according to the Wild Bird Society. It is expected that the system will allow its users to flexibly choose areas of interest and view them through multiple overlapping layers, thereby increasing their willingness to apply to generate renewable energy.

Distributed Energy Resources (DER) Capacity Map

Screen showing all feeders in Taiwan



Information display on the hosting capacity of feeders



- Hosting capacity ＜ 5000 and Hosting capacity ≦ 10000 (kW)
- Hosting capacity ＜ 2000 and Hosting capacity ≦ 5000 (kW)
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- Hosting capacity ＝ 0 (kW)

6 Social Co-Prosperity

This Chapter is Recommended for the Following Stakeholders:

Partners, government institutions/competent authorities, elected representatives, the media, non-governmental organizations, customers, residents/general public

Implications of Social Co-Prosperity

Taipower's operating sites, which are located in all corners of Taiwan, are constantly interacting with internal and external stakeholders through multiple channels. In consequence, the Company's influence on society cannot be underestimated. To strengthen its partnership with society and to foster coexistence and co-prosperity, Taipower continues to operate under the principles of honesty and integrity within its organization, as it jointly establishes a responsible value chain with its suppliers, and as it actively communicates and engages with external stakeholders. Starting from its core function as an electricity enterprise, the Company is promoting green education and the preservation of cultural assets, as well as investing in community services to achieve social co-prosperity.

Social Co-prosperity Is Mainly Based on Social and Relationship Capital

Taipower's corporate culture of pursuing integrity and compliance through feedback from the general public is the driving force behind the Company's operations and progress. Therefore, through integrity management, Taipower has actively established a relationship of positive, bilateral engagement with the general public. This has allowed the Company to accumulate social capital and created sustainable competitiveness. Through strategic communication with stakeholders, in-depth management of partners and investment in culture, art, sports, and public welfare activities, Taiwan's cultural and social energy is strengthened, and Taipower establishes a deeply rooted reputation for corporate social responsibility.

Principal Investments

- Implemented three inner control defense mechanisms to ensure integrity management
- Strengthened the transparency and readability of official website information, operated a Facebook fan page, a Green Net website, a YouTube channel and other social media accounts. Continued to operate the 1911 customer service hotline, the online service counter, and the Taipower e-counter app.
- Established stable communication mechanisms with partners and implement inspection and screening mechanisms
- Invested a total of NT$1.15 million in art bank painting rental activities and performances in 2019

Performance Highlights

- Taipower's 1911 customer service hotline has received approximately ***1,946 thousand*** calls; ***96.72%*** of incoming calls have been answered by designated personnel within 20 seconds
- The customer satisfaction score in 2019 was ***96.0*** points
- In 2019, a total of ***286,000*** green procurement cases with a value of NT$ ***417 million*** were handled
- Taipower's preservation and promotion of cultural heritage won the Gold Award and Corporate Contribution Award at the Ministry of Culture's ***Arts & Business Awards***.
- In 2019, the ***"Just Flow" special exhibition on a century of hydropower and cultural heritage*** was held and attracted a total of 76,340 visitors
- In 2019, the ***"Power Zone," a popular science exhibition on transformer boxes***, was held and attracted more than 45,000 visitors
- In 2019, the ***"Taipower D/S ONE," immersive experience exhibition hall*** dedicated to renewable energy, was opened

Future Plans

Taipower will continue to engage in communication, disclose necessary information in an open and transparent manner, meet the expectations of stakeholders, and eliminate other concerns about the environment and nuclear safety. At the same time, the Company will continue to build on long-term contracts that stabilize the supply of raw materials for suppliers and maintain safety stock. As it invests in social welfare, Taipower will continue to promote vital elements of Taiwanese society such as culture, art, and sports under the premise of fostering long-term development.

6.1 Integrity and Compliance

6.1.1 Integrity Management

Taipower believes in integrity management and has made a conscious effort to adhere to the principle of "authentic operation and autonomous management." This has led the Company to promote a series of codes of ethics and to optimize its internal control mechanisms while ensuring legal compliance and fulfilling its corporate responsibilities.

Ethical Code

All personnel	All Taipower employees shall abide by laws and regulations such as the "Ethics Code for Personnel under the Ministry of Economic Affairs" and "Directions on Lobby Registration and Checks for the Executive Yuan and its Subordinate Agencies." Any employee who requires clarification on any ethical issue or has legal compliance-related questions may consult specialists from Taipower's Department of Civil Service Ethics, with full protection of their rights and interests.
Procurement personnel	Taipower's procurement personnel abide by the Company's "Ethical Guidelines for Procurement Personnel," and the "Points of Attention for Interaction between Procurement Personnel and other Businesses." The Company offers frequent training to its procurement personnel to help them perform their duties in compliance with pertinent laws in a manner that is fair and honest without giving, asking, or expecting favors. Taipower has also established an Anti-Corruption and Legal Affairs Office to offer consultation services. The Company emphasizes fair and open procurement processes so as to improve procurement efficiency, performance and quality.
Management	Taipower maintains clearly defined rules for the governance of administrative liability. Both personnel involved in fraud/bribery and their managing supervisors will be held accountable to facilitate the development of stricter integrity management.

Anti-corruption Measures

As a state-owned enterprise, integrity management and legal compliance are the most fundamental principles that Taipower operates by. In accordance with specific policies and measures from the "National Integrity Building Action Plan," Taipower has implemented the planning and promotion of various ethics-related tasks and integrated them with a consensus on anti-corruption within the private sector, as the Company employs the highest integrity standards for itself.

In order to implement "management by walking around" the Department of Civil Service Ethics has set up a plan for the integrity supervision of the business administration every year. The Department visited each unit and conducted on-the-spot checks, case file investigations and comprehensive seminars to check the implementation of civil service ethics within each unit. The aforementioned tasks were conducted in order to correct mistakes found in previous projects, improve performance, and demonstrate the integrity of institutions. In 2019, a total of 20 units were inspected, and civil service ethics units in most departments have effectively implemented tasks related to the civil service ethics. Taipower began its adjustment from the administrative information system: the anti-corruption mechanism is now integrated into the corresponding program implementation to prevent corruption incidents through the system.

In addition, according to the Company's Integrity Work Plan, an annual integrity risk assessment is conducted. In 2019, 84 units were evaluated (including the Headquarters) – an evaluation rate of 100%. Through integrity risk assessments, a material corruption risk was identified by Taipower – essentially, employees could have had improper contact with vendors during the process of procurement performance management, leading to unreliable final project acceptances and corruption cases involving employees and vendors.

Taipower holds an Ethic Conference once a year. The conference is responsible for the planning of the Integrity Work Plan, as well as the consultation, supervision and evaluation of the implementation of ethical operations. For the details on the conference, please refer to Taipower's official website > Announcements > Information Disclosure > The Ethic Conference.

Taipower's Anti-corruption Regulations

- Precautions on Interactions between Taipower Procurement Personnel and Other Businesses
- Established Operating Directions for Taipower Procurement Spot Check Teams
- Implementation Plan for the Enhanced Dissemination of Civil Service Ethics at Taipower
- Taipower's Guidelines on Administrative Liability and Accountability of Personnel and Their Managing Directors Following Involvement in Fraud or Bribery

For the major work item of "Preventing Improper Business Banquets and Entertainment," Taipower established an "Implementation Plan for Preventing Improper Business Banquets and Entertainment" in 2016, and proposed the following specific preventive measures:

01 Implementing penalties specified on contracts
02 Improving the business execution environment
03 Promoting laws and regulations concerning ethics and integrity among suppliers
04 Promoting anti-corruption laws and regulations
05 Carrying out a staff rotation mechanism
06 Strengthening investigations and early warnings from personnel of the Department of Civil Service Ethics
07 Verifying and reviewing the responsibilities for breaching laws and regulations
08 Pushing supervisors at all levels to be vigilant
09 Encouraging colleagues to be honest and ethical

The implementation time span of this plan is 4 years. Since its implementation in 2016, the cases of improper business banquets at Taipower have been significantly reduced, and the number of registrations for employees before attending business banquets and other forms of entertainment has increased from 61 in 2015 to 105 in 2019. It is obvious that the promotion and publicity of the plan have helped the Company to create the atmosphere of being honest and ethical in work, and the concept that "employees must report before participating in business banquets and entertainment" is gradually taking root among Taipower employees.

Promotion of Anti-corruption Campaigns

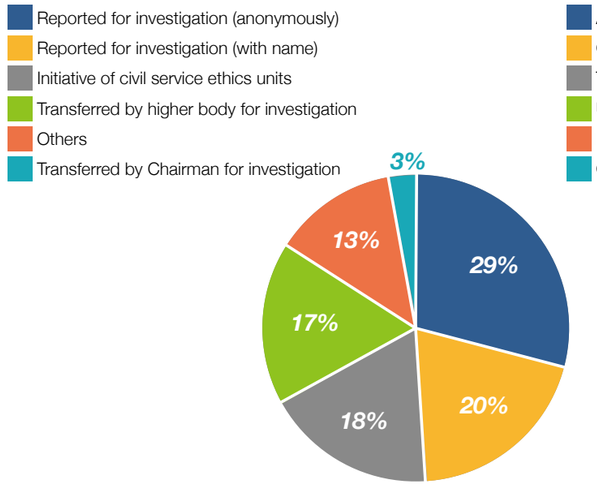
Taipower actively conducts anti-corruption advocacy for employees and suppliers, enhances correct understanding of the ethics and laws among relevant personnel, and consolidates an anti-corruption consensus between Taipower and suppliers to prevent corruption. The training sessions held in 2019 included an "Ethics and Integrity Promotion Symposium for New Employees," "Ethics and Integrity Promotion Symposiums for Electricity Application" in various district offices, and inviting suppliers and procurement personnel to participate in the "2019 Ethics and Integrity Symposium for Suppliers." Together with the Ministry of Economic Affairs, the Company held a supplier symposium, titled, "Promoting Industry Development and Enhancing Administrative Effectiveness: Breaking down the Myths of Abusing Public Power for Private Profit and Providing Excellent Service to the General Public." Additionally, Taipower arranged 1-2 hours of promotion courses on ethics and integrity awareness during on-the-job training courses (including training courses for supervisors at all levels). A total of 112 related events were held, with about 7,047 employees participating – accounting for 25.5% of all employees of Taipower.

In addition, online courses through the Taipower E-Learning system were provided, including a series of courses in ethics and integrity. These included: "Avoidance of Conflict of Interests for Public Officials," "Treatment of Gifts and Property Received by Employees," "Liabilities of Malfeasance for Employees," "Treatment of Suppliers' Invitations to Business Banquets and Entertainment," and "Treatment of Illegal Lobbying." The Company launched awareness campaigns and asked employees to complete these online courses.

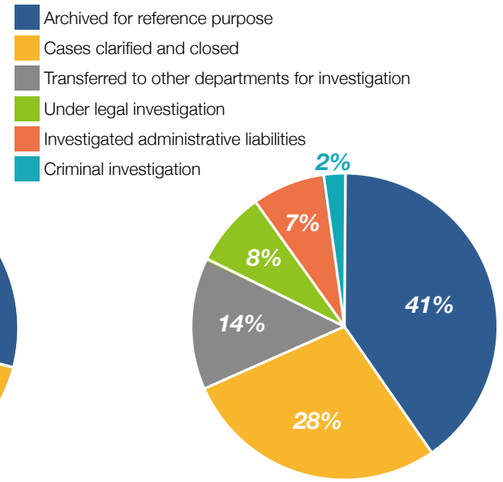
Cases Investigated in 2019

A total of 335 ethics-related cases were closed in 2019. The figures below show the breakdown of cases by source. The figures illustrate the fact that anonymous reports still contribute to a significant percentage (29.25%) of cases filed. Nevertheless, all reports that include concrete and verifiable information or data are handled in a prudent and unbiased manner, regardless of whether they are submitted by anonymous or named sources.

Sources of Corporate Ethics Cases in 2019



Handling of Corporate Ethics Cases in 2019



Cases in Which Employees Are Charged with Regulatory Violations

In 2019, one legal case took place at Taipower. In that case an employee was prosecuted pursuant to the Anti-Corruption Act for enabling a contractor to embezzle oil by falsely filling out weighted notes.

In 2019, Taipower had no cases of affirmed conviction for alleged bribery. There are two cases currently under investigation:

1. An administrator of a power plant, who is responsible for material management and record keeping, was prosecuted on charges of abusing public power for private profit because the said administrator failed to adhere to procurement regulations in the process of accepting completed work and valuations. In 2019, the Supreme Court revoked the original judgment and the case was sent back to the Taiwan High Court for re-trial.
2. A supervision engineer of a construction office was involved in accepting illegal benefits from a contractor. On April 18, 2019, the New Taipei District Court ruled in the first instance that the accused was found not guilty as the said person is not a civil servant defined in the Criminal Code of the Republic of China. The prosecutor appealed and the Taiwan High Court is currently hearing the case.

In response to the incident involving the receipt of bribes from suppliers by employees of the Xingda Power Plant in order to assist in oil theft, Taipower immediately pursued the administrative responsibilities of the employees and their supervisors involved in the case, and implemented awareness campaigns on ethics and integrity among new employees of the Xingda Power Plant after 2011. After the prosecution of the case, Taipower conducted anti-corruption operations by engaging in a comprehensive review of the causes, processes and the current status of the Xingda Power Plant, and proposed recommendations to prevent similar incidents from happening again. In view of the illegal acts involved by Yong Yo Chuan Freight Co., Ltd., Taipower has sent official letters to the civil service ethics departments of all thermal power plants and ordered them to carefully investigate whether there have been other instances of contracting Yong Yo Chuan Freight Co., Ltd. In addition, the Company supervised the Tongxiao Power Plant to preserve its creditor's prestation as soon as possible and claim compensation from Yong Yo Chuan Freight Co., Ltd.

Internal Risk Control

In accordance with the Financial Supervisory Commission's Regulations Governing Establishment of Internal Control Systems by Public Companies and the Enforcement Rules for Internal Inspection of National Corporations under the Ministry of the Economic Affairs, Taipower's Internal Inspection Office of the Board of Directors devised and executed an Annual Inspection Plan in 2019. Inspected items included internal control management and self-regulatory mechanisms, risk management processes, the effect and efficiency of major operational project targets, information, communications, and reporting, compliance with relevant laws and regulations, along with required items from the Board of Directors/Audit Committee and requests by higher authorities for revisions and other matters.

Taipower's 2019 Annual Inspection Plan employed the Company's Department of Civil Service Ethics as one of the patrol inspection units. In addition, when units were inspected, the civil service ethics section of that unit was included in the scope of the inspection and used to audit the actual implementation of the operation so as to achieve three effective lines of defense.

Three Lines of Defense for Internal Auditing and Control

In 2019, patrol inspections took place at 51 units. There were also an additional 29 special project inspections. The Company then completed an annual internal control system self-assessment report. The scope of assessment included all of Taipower's operating units. This allows the Board of Directors and the President to assess the effectiveness of the Company's overall internal controls through the report. The report also served as the primary basis for the Company's 2019 Annual Internal Control System Statements. Future improvements in internal auditing are proposed as follows:

Strengthening inspections for preventive management and increasing the value of inspections

The auditing process will coordinate with the Company's key businesses in the areas of industrial safety, environmental protection, smart grids, project progress, organizational transformation and other goals. All units will be helped with preventive management and improving operational efficiency. It is also necessary for the auditors to actively provide consulting services to all units, to create a win-win situation that increase the value of auditing.

Assisting to strengthen all departments' attention to internal controls

The Company will implement a rotation of senior auditors in the Internal Inspection Office of the Board of Directors and managers of various departments so that the auditors will be able to maintain familiarity with the Company's businesses, and to promote an understanding of internal controls among the managers of various departments when they rotate back to their original positions after having gained knowledge of internal control practices. Also, internal control education and training sessions will continue to be implemented.

Expanding auditing expertise in response to organizational transformation

The auditors continue to take relevant internal audit courses, aimed at improving their auditing skills in order to facilitate the smooth transformation of the Company's reorganization into a parent company with several subsidiaries.

6.1.2 Compliance

Taipower is a state-owned public utility, and the Company operates under the mandate of the Administrative Law of State-Owned Enterprises. As a result, the establishment of Taipower's organization, accounting, auditing, budgeting, business planning, utility rates, and long-term purchase and sale contracts must be approved by the competent authorities, in this instance the Ministry of Economic Affairs. Specifically, the Ministry's State-owned Enterprise Commission is responsible for supervising and managing the various operations at Taipower, as well as communicating other directives from other ministries, such as the Ministry of Economic Affairs itself, the Bureau of Energy, the National Development Council, or the National Audit Office. The implementation of corporate policies must comprehensively consider the provisions of various laws and regulations and their impact on policy development.

Legal Compliance and Awareness Campaigns

In an effort to boost employee awareness of the Company's legal affairs and to ensure compliance, the Legal Affairs Office has made a point of organizing multiple sessions of a Practical Legal Issues – Case Studies and Solutions Seminar at different units. The Office also arranges other legal affairs training events each year. In addition, the Legal Affairs Office provides various legal consultation services in order to help with the legal issues that different units encounter in their operations to ensure that all employees abide by the pertinent regulations.

Administrative Sanctions for Labor Issues

In 2019, Taipower received a total of four administrative sanctions for labor issues, including 3 cases of labor penalties that fall within scope of this report (i.e., sanctions were received by the Taipower Company, not other related, legal entities). All three of these cases have seen administrative appeals rejected, but are currently in the administrative litigation process. Penalties in two of the cases were NT$20,000 and while the penalty in the third case was NT$50,000. At present, the relevant penalties have been reviewed, and strategies have been proposed to reiterate the Company's position and practices.

Administrative Sanctions for Industrial Safety

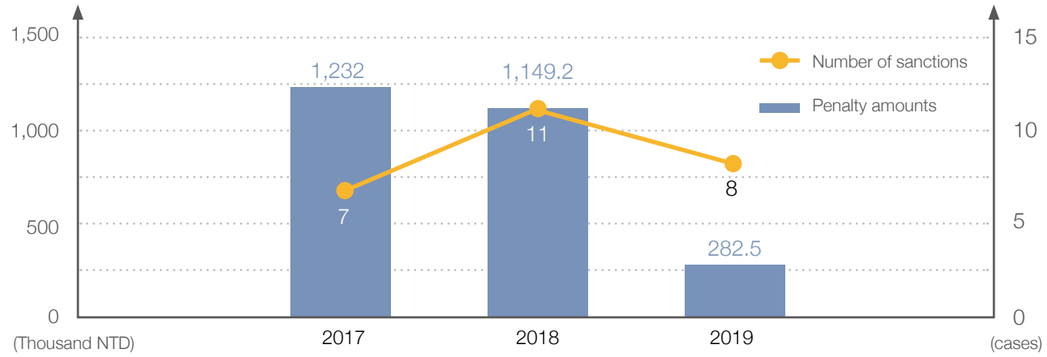
In 2019, Taipower received a total of zero administrative sanctions for industrial safety. In the future, the Company will continue its awareness campaigns, relevant protective measures, related simulation exercises, as well as its promotion of a safety culture and the enhancement of "management by walking around" when dealing with high-risk tasks.

Administrative Sanctions on Environmental Protection Issues

The number of administrative sanctions and the total amount of penalties in 2019 were both less than in 2018 (except in instances where fines were due to government policies). The current regulatory environment has resulted in many amendments to laws and regulations and an increase in the intensity and severity of law enforcement. Moreover, the Company is currently launching a series of major power facility development projects. As such, Taipower's ability to maintain its level of compliance in 2019 is a great achievement. Environmental penalties are not only likely to be negatively evaluated by the general public but also seriously affect the Company's image; they also adversely impact the Company's operations. Therefore, the following proactive actions in environmental protection will be continued to effectively curb environmental penalties and maintain the Company's image:

- Construct an environmental management system, implement self-management, and track and improve items that do not meet the standards.
- Inspections on environmental protection for on-site operations without prior notice.
- Training and inspections in order to strengthen awareness of environmental protection regulations.
- Annual discussions on cases of environmental protection violations.
- Assist in the construction of indoor coal bunkers and the improvement of wastewater treatment plants.
- Promote the setting of prices for individual environmental protection facilities and request implementations.
- Implementation of the "Green Environmental Protection Construction Site System Promotion and Investigation Evaluation Plan" to guide the Company's engineering units to avoid violations of environmental protection regulations on their construction sites. Promotion of institutional aspects such as publicity, and on-site inspections to reduce environmental protection penalties.
- Establish a cross-unit joint inspection team for on-site inspection.
- Strengthen the implementation of supervision in environmental protection for high-risk units.

Number of Sanctions and Penalty Amounts



Note: The number of penalties has excluded policy-related penalties. The statistics for the past three years are as follows:
In 2017, there were 3 policy-related fines and the amount of fines was NT$2,300 thousand.
In 2018, there were 7 policy-related fines and the amount of fines was NT$3,589 thousand.
In 2019, there were 17 policy-related fines and the amount of fines was NT$105,089 thousand.

Product Responsibility and Personal Information Protection

Taipower's main product is electricity. Electricity prices are set in accordance with government laws, regulations, and policy directives. Moreover, Taipower handles all customer information, electricity payments in arrears and suspension of electricity service in accordance with the Personal Data Protection Act and the Electricity Act. Taipower conducts an annual inventory of personal data files and systems, reviews necessary fields and revises relevant business regulations. For the confidentiality of customer-related data, Taipower has formulated a confidentiality mechanism and operations method according to different objects, and also abides by the regulations on the handling of personnel data by various units to ensure the protection of customer personal data related to business execution. For example, in order to avoid violating regulations with data leaks of customer's personal information by service personnel that are not aware of relevant regulations, Taipower has stipulated handling procedures to check the identification of applicants or to verify their IDs when the personal data of customers themselves or their entrusted persons are involved during the power consumption inquiry process. These inquiries may be made through face-to-face encounters, via telephone, fax, by online query, or by printing out the results of such queries. For important databases, Taipower has established a database activity monitoring system to audit and protect data through real-time monitoring and event analysis, and then reporting of abnormal records to the maintenance department for review and inspection every month. The results of the quarterly review in 2019 were all normal. There were no violations of laws or regulations due to the provisions and use of these products and services.

Information Security Protection Plan

The six major promotion areas of Taipower's smart grid include "Information and Communication Infrastructure," with the goal of improving data quality, analysis and application, and ensuring the safety of information systems and program control systems. Taipower has established an "Information and Communication Security Policy" and an "Information and Communication Security Promotion Group" for managing the policy. Taipower promotes the information security protection plan based on the " National Cyber Security Program of Taiwan (2017-2020)" formulated by the Executive Yuan. The main promotion directions and performance results include: critical infrastructure field trials, planning of smart grid information security protection, construction of external joint defense mechanisms and the signing of a memorandum of understanding (MOU) for joint defense cooperation in information security. Please refer to the special issue of this report for the contents of "Taipower Information and Communication Month" in 2019.

6.2 Stakeholder Communication and Engagement

6.2.1 Stakeholder Communication Performance

Stakeholder Communication Results

Taipower communicates with stakeholders through multiple channels and pays close attention to stakeholder voices. In addition to listening and collecting suggestions on the sustainable development of Taipower, the Company will appropriately incorporate feedback into its management measures and operational behavior optimization. The Company actively responds to the appeals and expectations of its stakeholders.

Issues of Concern	Frequency and Methods of Engagement	Engagement Results
Board of Directors The Board of Directors functions at the core of Taipower's operations and is responsible for leading the Company towards sustainable management.		
• Integrity and sustainable management • Transformation into a new energy utility group • Management and financial performance	• One monthly Board meeting and functional committee review meetings • At least one Audit Committee meeting every quarter • Training for directors (including independent directors) • Annual performance assessment for the Board of Directors	• Convened 15 Board meetings • Convened 18 functional committee review meetings • Convened 6 Audit Committee meetings • 53 directors (including independent directors) participated in training courses on corporate governance and completed 167 hours of training • Performance for 2019 was evaluated in accordance with the "Performance Evaluation Guidelines for Boards of Directors" and the results are available on Taipower's official website
Shareholders Maintaining the Company's operational performance and safeguarding shareholders' rights are fundamental commitments for Taipower.		
• Integrity and sustainable management • Management and financial performance	• Shareholders' meetings • Taipower's official website and Market Observation Post System (MOPS)	• The annual shareholders' meeting was convened on June 21 • Relevant information is disclosed on the MOPS and the corporate governance/shareholders section on Taipower's official website
Employees Employees are the soul of Taipower; they shape Taipower's corporate culture and function as the groundwork for the Company's sustainable development.		
• Transformation into a new energy utility group • Integrity and sustainable management • Safety management and crisis response • Workers' health and safety • Stakeholder engagement and information transparency	• On-the-job Training • Labor-management meetings • Themed lectures and seminars • Organized information sessions on corporate transformation	• Organized orientation training for 2,158 new employees, on-the-job training at the Training Institute and in all units of the Company, as well as external training for 64,326 participants • Organized 11 labor-management meetings • Organized 17 information sessions on corporate transformation
Partners Taipower must share its social responsibilities with its partners and screen its partners based on the principle of sustainability.		
• Supply chain management • Workers' health and safety • Environment impact management and compliance • R&D of technology and in innovation	• Routine/ad hoc audits • Interviews and communication with suppliers by phone • Annual meetings with suppliers to review contracts • Internal and external communication meetings Education and training	• Organized one supplier conference • Held a total of 1,172 inspections of various types of industrial safety inspections, and a total of 6,364 violations were identified. • Number of trainees in safety and health-related education and training: 53,985(Taipower employees + contractors)
Government/Competent Authorities As a state-owned enterprise, government policies have a substantial impact on Taipower's operations and development. As such, the Company is committed to maintaining adequate communications with the government to ensure stable operations and power supply.		
• Power supply stability and reliability • Electricity tariff rationalization • Stakeholder engagement and information transparency • Renewable and clean energy development • Power industry reform and fair competition	• Board of Directors meetings • Official correspondence • Submission of reports on the progress of various projects • Participation in relevant meetings and conferences • Smart power generation and dispatching dimensional meetings • Project communication meetings	• Important issues to be reviewed during the monthly Board meetings are submitted to the competent authorities in advance • Submission of power supply reliability data to the Bureau of Energy on a monthly basis • Submission of relevant data and participation in the State-Owned Enterprise Review Meetings when required by the government (ad hoc) • Submission of 12 progress reports for "Smart Power Generation and Operation" and convened four "Smart Power Generation and Operation" dimensional meetings • Organized 6 power system stability and reliability team meetings • Participated in periodic "Small Hydro and Renewable Energy Development Strategic Platform Meetings" organized by the Water Resources Agency • Participated in the small hydro-related conferences organized by government agencies and legislators (ad hoc) • Participated in the "Discussion of Responsibility Clarification for the Promotion of Major Projects for MOEA Subordinate Units Meeting Memo" held by the State-owned Enterprise Commission on January 16
Elected Representatives Through communicating with elected representatives, Taipower listens to the voice of the people, understands their needs and helps to promote relevant regulations.		
• Air quality • Energy efficiency • Power plant renewal and decommissioning • Stakeholder engagement and information transparency • Renewable and clean energy development • Safety management and crisis response	• Participation in committee meetings at the Legislative Yuan • Coordination meetings and public hearings • Offered relevant materials and information on the Company's operations • Hosted visiting legislators	• Taipower's senior managers (VPs and higher) participated in 33 committee meetings at the Legislative Yuan in 2019 • Supervisors and employees from Taipower have taken part in a total of 1,089 coordination meetings and public hearings organized by the staff of legislators, and have provided relevant documents in 2019 • Taipower's senior managers (VPs and higher) participated in a total of 132 communication sessions with legislators in 2019

Issues of Concern	Frequency and Methods of Engagement	Engagement Results

Media

The media is Taipower's partner when it comes to communicating with the general public. Through positive interaction with the media and building appropriate means of information delivery, Taipower will be able to foster awareness and help the general public understand the Company's operations.

- Stakeholder engagement and information transparency
- Transformation into a new energy utility group
- Renewable and clean energy development
- Environment impact management and compliance
- Power supply stability and reliability

- Press releases
- Printed materials
- Public hearings/information sessions
- On-site visits/visits by designated personnel
- Taipower's corporate website
- Market Observation Post System (MOPS)

- In 2019, Taipower published 79 press releases and 61 immediate clarifications on issues related to power supply, demand, renewable energy development, new power source projects, environmental protection, and major emergencies in order to provide prompt and immediate information to the media. Taipower has also taken the initiative to issue press releases to the media for further dissemination of information.
- Regarding issues that have drawn significant public attention in recent years, Taipower has proactively released positive press releases (i.e., promoting renewable energy, energy-saving measures, conservation of power-related historical artifacts, and recruitment of new employees, etc.) to demonstrate the Company's active support of the energy transition, the development of green energy, and the transition of the power utility industry.
- Taipower has taken steps to improve its spokesperson system by offering immediate responses and publicizing Taipower's key policies in response to issues that are closely related to the livelihoods of members of the general public.

Private Organizations

Private organizations serve as a source of momentum that propels Taipower to grow. The urging of and exchanges with the private sector have always driven Taipower to improve itself.

- Stakeholder engagement and information transparency
- Climate change response strategies
- Air quality
- Energy efficiency
- Power plant decommissioning and renewal
- Development of humanistic spirit
- Development of local communities

- Organized information sessions
- Initiated visits
- Participation in relevant forums and activities
- Taipower's corporate website
- Taipower publications

- Visits based on the needs of the project
- Publish Taipower Journal monthly
- Participates in 89 energy related institutes

Issues of Concern	Frequency and Methods of Engagement	Engagement Results

Customers

Maintaining customer relationships is the key to Taipower's sustainable operation. After the market is liberalized in response to the amendment of the Electricity Act, Taipower must focus more on customer needs in order to stay competitive with potential competitors that emerge in the market.

- Power supply stability and reliability
- Accessibility and availability of electricity
- Electricity tariff rationalization
- Demand side management and power conservation

- Convened power supply meetings
- Visits from designated personnel
- Education and training
- Electricity bills
- A customer opinion mailbox
- Brochures and pamphlets (ad hoc)

- Established a comprehensive and tightly knit network of services with 24 branch offices and 268 service stations across Taiwan to communicate directly with customers
- Organized annual power quality management and improvement meetings for high-tech parks, industrial areas and export processing zones on a yearly basis
- Held routine review meetings for power consumption plans submitted by ultra-high voltage customers each month
- Offered community-based energy saving services and consultations in 691 communities
- Visited customers with consumption of over 100 kW to disseminate information and promote the use of equipment with better energy efficiency to raise awareness of energy conservation; Taipower visited 5,616 customers in 2019
- Handled a total of 4,748 customer feedback e-mails
- Taipower's 1911 customer service hotline has received approximately 1.946 million calls; 96.72% of incoming calls have been answered by designated personnel within 20 seconds
- Designated personnel delivered customer services a total of 40,749 times
- Organized a total of 1,524 events in 2019 promoting energy conservation and the effective use of high-efficiency household appliances; these events were attended by approximately 298,000 people
- The power-saving service groups visited 6,294 customers in 2019
- Held awareness campaigns to promote energy conservation for eight consecutive years

Residents/The General Public

The key to the completion of Taipower's major development projects and improvements to the power supply lies in the maintenance of smooth communications with the general public. Striving for harmonious coexistence and sharing credit for accomplishments with residents from areas in close proximity to power plants is also a vital issue that Taipower needs to consider.

- Electricity tariff rationalization
- Environment impact management and compliance
- Safety management and crisis response
- Air quality
- Stakeholder engagement and information transparency
- Development of humanistic spirit
- Development of local communities

- The Taipower Facebook page
- Relevant information disclosed on the corporate website

- Taipower's Facebook page reached out to approximately 18 million users in 2019
- The "Information Disclosure Section" of Taipower's website discloses information on the Company's operations and electricity tariffs. In addition, Taipower setup an independent website on sustainable development as a channel to present the Company's performance in sustainable development
- Disclosed financial information and corporate governance information in the "Corporate Governance Section" of Taipower's website

Material External Communication Policy

Media Communications

Taipower actively releases complete news materials for media reporting. Releases show specific actions taken by the Company in response to government policies and social expectations. In the case of issues of concern, emergencies, such as those related to nuclear energy, regional blackouts, and major incidents, Taipower promptly clarifies misunderstandings through the issue of press releases and "real-time clarifications" when necessary. In addition, Taipower actively arranges media interviews, such as the lighting ceremony of the "Light up 13 Layer Remains" event, the "Just Flow" special exhibition on the cultural heritage of power generation, and the "Taipower D/S ONE" energym (energy + gym) and other media materials to attract more media reports. This is an effective method to shape the Company's corporate image.

Communication with Elected Representatives

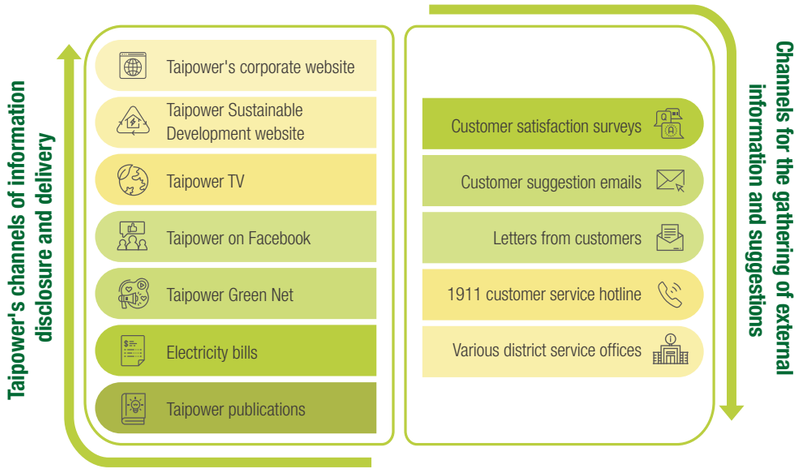
Elected representatives are on the front line of the Company's communications with the public about policy directions and planning. Taipower actively defends its policy positions by responding promptly to questions proposed by legislators and attends legislative committee meetings, public hearings, and press conferences related to energy issues. These measures allow the Company to explain current policies and related practices, and to achieve bidirectional communication. Additionally, Taipower actively establishes contact with each legislator as soon as possible, pays visits to the legislators who are concerned with power-related issues, and assists in the handling of cases related to Taipower's operations. This is done with the aim of establishing good relationships based on mutual trust and assistance so that the Company can respond effectively in situations of crisis management. Through various types of engagements, Taipower gains understanding of the concerns held by elected representatives and can quickly explain problems, express a willingness to cooperate and outline difficulties in order to develop the best plans for handling situations and achieving win-win outcomes.

Communication with Customers and the General Public

Taipower actively maintains honest communication with its customers and the general public. Being open and transparent is a matter of principle. Through the Company's various district offices and diverse media channels (as shown in Chapter 6.2.2), the public can express opinions in a quick and effective manner. At the same time, Taipower can actively establish an image of positive corporate citizenship. In recent years, Taipower has actively sought to communicate about issues in advance. This generally entails the release of information related to company actions and performance in business, environment and society, so that the general public can engage in deeper interactions with Taipower and establish sustainable social relations.

6.2.2 Diverse Channels for Engagement and Communication

Taipower places great emphasis on issues of concern to the general public. Through diverse channels, the Company maintains bilateral communication with its customers, and improves service quality by following customers' suggestions. In addition, to facilitate customer inclusion, Taipower has made an effort to resolve all service hindrances caused by language, culture and literacy-related issues. Taipower's customer service is now available in Mandarin Chinese, Taiwanese and English to cater to customers' power service needs in the language of their preference.



Multiple Information Delivery Channels

Taipower's official website is the Company's main portal for information communication. Within the website, the most-viewed Information Disclosure section provides the latest and most comprehensive Taipower information for the public within six aspects and 29 themes. In 2019, coal consumption, continuous monitoring of emission values, and the AQI trends measured in areas neighboring the Taichung Power Plant were added to the section to provide the general public with a better understanding of the correlation between thermal power plants and air quality. In addition, through continuous improvement of data charts and adherence to an open data principle, Taipower has improved the quality of data disclosures and the convenience of searching for valuable information.

Taipower's Corporate Website

https://www.taipower.com.tw

Taipower also delivers information for different purposes through several other communication channels as follows:

Sustainable Development Website

The section showcases Taipower's sustainable development strategy and latest news, ESG public information disclosure.

https://csr.taipower.com.tw/tc/index.aspx

Taipower on Facebook

The Facebook page promotes knowledge related to electricity, power saving and safety, pushes service and event information, and responds to controversial topics and disputes in real time.

https://www.facebook.com/TaiwanPowerCompany/

Taipower TV and YouTube Channel

The YouTube channel records the story of Taipower so that the general public can understand the Company's business promotions and planning. Both function as an audio-visual database for Taipower's external communications

http://tv.taipower.com.tw

Youtube: TaipowerTV

Taipower Green Net

The website uses lively and interactive web pages to share information related to green energy and environmental friendliness with the general public, as well as activities and news concerning environmental education

http://greennet.taipower.com.tw/

Taipower Electricity Bills

The electricity bills specify basic information such as the amount of electricity consumed and fees, information on multiple payment channels, and reminders to voluntarily reduce electricity consumption

6.2.3 Creating Customer Satisfaction

Customer Management

District Service Offices

Taipower has established a closely-linked service network across Taiwan that offers over-the-counter applications for various power and consultation services. These service offices are responsible for the construction and maintenance of power supply lines within their service areas and for accommodating customers' needs with speedy and convenient responses. They are also responsible for the establishment of direct communication and the maintenance of good interactions with customers.

Customer Feedback Channels

Taipower has established diverse channels such as the 1911 customer service hotline, online counters, and the Taipower e-Counter App to meet different customers' needs for a variety of services.

Customer Feedback Channels

A "customer feedback mailbox" was established on the corporate website to provide a smooth and effective feedback channel for the immediate processing of customer opinions, thereby improving service quality and satisfying customer demands.

A total of ***4,731*** letters from customers were handled in 2019.

The 1911 customer service hotline was set up to provide 24/7 service. Services include electricity bill and business inquiries, the acceptance of applications for electricity utilization and power line and equipment repair.

Around 1.946 million calls were received. A full ***96.72%*** of the calls were answered within 20 seconds by designated personnel.

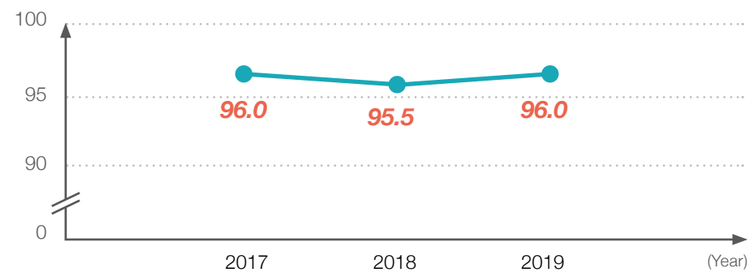
In order to strengthen customer-oriented services, Taipower provides dedicated services to customers using high-voltages, national trade associations and village/neighborhood offices so as to maintain good communications with customers.

Communication and dedicated services were provided to customers a total of ***40,749*** times.

Customer Satisfaction

In 2019, Taipower undertook a survey of its general, medium and large-sized customers. The scope of the survey included the services, the corporate image of Taipower, customer feedback, and overall customer satisfaction. The survey was conducted from October 29 to November 15. The result shows that the Company has maintained customer satisfaction scores above 90 points for three consecutive years. This reflects the fact that Taipower's quality of service has been broadly acknowledged by the general public.

Customer Satisfaction Scores from 2017 to 2019



In the future, Taipower will continue to follow the Ministry of Economic Affairs' Implementation Plan to improve service efficiency, plan customer service-related operations and strengthen communication with customers to make services even better.

6.2.4 Participation in External Organizations

The power utility industry requires a high level of professionalism and its related technologies change and advance swiftly. To keep pace, Taipower actively participates in major technology and exchange organizations and maintains communication with 89 institutions. They include industry players, associations and academic organizations such as the Business Council for Sustainable Development of Taiwan (BCSD-Taiwan), the Chinese National Association of Industry and Commerce, Taiwan (CNAIC), the Industrial Safety and Health Association (ISHA) of the R.O.C., the Taiwan Wind Industry Association (TWIA), the Taiwan Cogeneration Association, the Employer Committee of the Chinese National Federation of Industries (CNFI) and the Taiwan Association of Energy Service Companies (TAESCO). The focuses of these interactions include energy transition, clean energy, technology, sustainable governance, the energy economy, and occupational health and safety.

6.3 Strengthening Supplier Management

Taipower's supplier management processes adhere to the pertinent regulations. Suppliers must satisfy all environmental, social and other legal requirements for all services and materials they provide. The Company uses these regulatory criteria to select appropriate partners during the tendering and evaluation process. Additionally, suppliers are required to sign a statement of compliance with environmental and social performance management.

6.3.1 Fuel Suppliers

Fuel Control

Taipower adheres to four strategies to ensure its fuel supply is stable sufficient, timely, cost-effective and capable of providing for the needs of its power plants. These strategies include energy supply diversification, fixed-term supply contracts, safe inventories, and stable coal transportation. These strategies help ensure the safety and stability of the power supply.

Energy Supply Diversification

LNG	Coal	Nuclear
• The supply of LNG is exclusively provided by CPC; efforts will be made to track CPC's sources of supply • CPC has long-term contracts with sources from Malaysia, Indonesia, Qatar, Australia, Papua New Guinea and the United States to ensure energy supply diversification	• Setting caps on coal originating from each country of origin and supplier for regular contracts • Investment in offshore mining operations	• Spreading out nuclear fuel processing across 2-3 suppliers

Fixed-term Supply Contracts

By signing various fixed-term contracts, Taipower is able to reduce uncertainty in procurement and achieve a steady fuel supply.

LNG	Coal	Fuel oil	Nuclear
• Signing a fixed-term contract with CPC • Taipower plans to independently construct LNG receiving stations at the Taichung and Xiehe power plants and to independently import LNG to be used by some of the newly constructed gas units	• Fixed-term contracts at 70-80%, with the remainder achieved through spot con-tracts	• Fuel oil is procured from local suppliers through fixed-term contracts to guarantee security o supply	• Given that current long-term contracts and inventories are sufficient to accommodate demand, uranium procurement has been sus-pended • Signing long-term contracts for all nuclear fuel enrichment services

Safe Inventories

LNG	Coal	Fuel oil	Nuclear
• In accordance with the stipulations of the "Taipower and CPC Contact and Early Warning Mechanism for LNG Supply and Demand," Taipower urges CPC to maintain LNG inventories of more than 80,000 and 50,000 tons ready for dispatch to the Yong'an and Taichung Plants. • Together with CPC, Taipower has planned corresponding responses in the event of accidents and established terms of coordination that both parties should abide by	• The law requires that coal inventory must be sufficient for at least 30 days of the average daily amount consumed in the previous year • Taipower has adopted 35 days of inventory as its planning basis for 2020. The company regards "one day" of inventory as the average daily usage of coal for 2019	• The operating reserve for fuel oil is 120,000 ± 40,000 kiloliters • The diesel inventory is established in accordance with the specific supply and transmission conditions at each power plant	• The safety stock for uranium is set at three year's volume of use • All units at nuclear power plants require one batch of nuclear fuel component in inventory

Stable Coal Transportation

Taipower currently owns six coal carriers, which transported 6.82 million tons or 24.21% of coal shipped in 2019. The self-management of coal transportation ensures fuel supply and dispatching.

Fuel Procurement

Natural Gas Procurement

For the procurement of natural gas, Taipower will spread out its sources of supply in the future. Apart from purchasing LNG from CPC, Taipower also plans to construct its own LNG receiving stations at the Taichung and Xiehe power plants and has obtained the government's approval to purchase LNG from the international market to be used by newly constructed gas units at the Taichung, Tongxiao and Xiehe power plants. This not only enables Taipower to have greater autonomy in its sourcing of LNG in order to reduce the overall cost of fuel procurement but also works to Taipower's advantage for power dispatching and provides system characteristics that increase LNG supply stability and safety.

Currently, CPC is the most important supplier of gas for Taipower. As such, its influence on the stability of the power supply should not be underestimated. Consequentially, Taipower has been actively engaged in establishing a functionally linked mechanism with CPC.

Mechanism of Gas Supply between Taipower and CPC

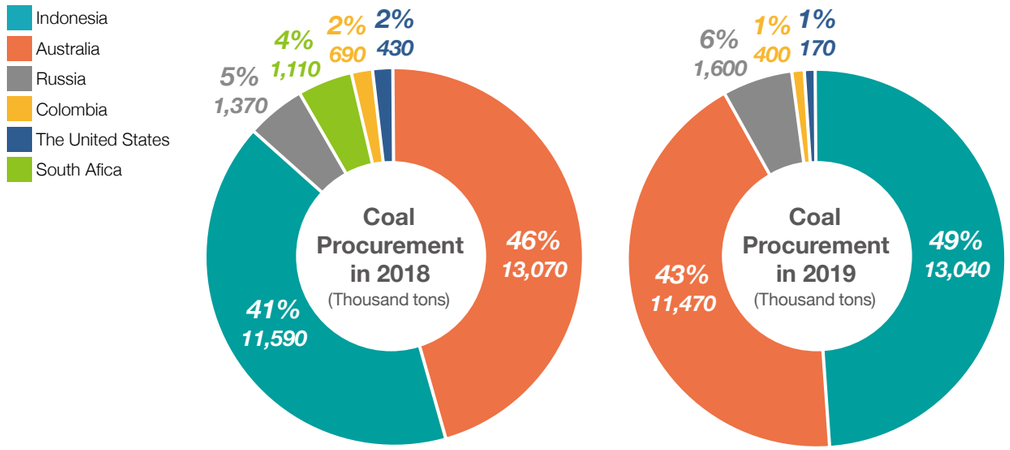
Frequency	Means of communication
Annually	• Each year before the end of May, Taipower sends revised data to CPC if monthly estimates for gas consumption in the second half of the year require revision. • Each year before August 20, Taipower sends CPC the monthly estimates of total gas consumption and the maintenance schedules for all gas units for the following year. • Each year before the end of October, Taipower informs CPC by official document of any revisions to its monthly estimates of total gas consumption.
Quarterly	• Both parties take part in a quarterly supply coordination meeting to discuss relevant issues on LNG usage.
Monthly	• Each month prior to the 10th, Taipower faxes a "Daily LNG Requirement Table" for the subsequent month to the CPC. In turn, CPC is required to verify its "45-day/90-day shipping schedule" with international suppliers prior to the 15th of each month. This will ensure that appropriate dispatching is performed in accordance with Taipower's requests.
Daily	• CPC updates its "LNG usage and inventory notice" by no later than 10:30 a.m. every day (including holidays) through fax or email. • Prior to 4:00 p.m. on each work day, Taipower faxes its "Daily LNG consumption estimates for the next fortnight" to CPC. If the gas usage for the next fortnight affects LNG supply and the shipping schedule cannot be changed, CPC will contact Taipower and ask for appropriate adjustments to the daily estimates on LNG usage for the following two weeks. • Should CPC's gas pipeline construction affect the normal LNG supply for Taipower, CPC will try to schedule construction during holidays and send notice to Taipower in advance so that Taipower can make relevant adjustments without compromising power supply safety.
Under special circumstances	• As Taipower is responsible for supplying power to CPC's Yong'an and Taichung LNG storage systems, in the event of power outage/rationing that will affect the supply of LNG, Taipower will coordinate with CPC first to make optimal arrangements.

Coal Procurement

For coal procurement, Taipower has established a Coal Procurement Review Taskforce, with membership consisting of personnel from the materials, procurement regulation enforcement, procurement and legal affairs departments. Through various meetings with external energy and economic experts and scholars, the taskforce formulates flexible coal procurement strategies and ensures an adequate supply of quality coal to all coal-fired power plants within the limitations of environmental protection.

In addition, by revising procurement regulations for sources of coal, Taipower has improved the competitiveness of tenders, the flexibly of buyer's options in terms of amounts agreed in every fixed-term contract, and its executed spot procurement strategies to reduce fuel procurement costs and improve fuel procurement performance. Compared with average coal purchase prices in the Asia-Pacific region, Taipower's coal procurement approach has reduced expenditures by NT$9,293 million.

Coal Procurement from Different Regions and Total Procurement Quantities for 2018 and 2019



Fuel Supply

In terms of fuel (including fuel oil and diesel), Taipower currently purchases fuel oil from CPC and diesel from CPC and the Formosa Petrochemical Corporation. Both contractors have supply capabilities and adhere to the relevant governmental laws and regulations. Fuel oil and diesel inventories are established in accordance with the specific supply and transport conditions at various power plants.

Nuclear Fuel

The procurement of nuclear fuel involves the purchase of uranium and subsequent processing services for conversion, enrichment, and fabrication. In light of the government's nuclear-free homeland policy, Taipower has stopped all uranium procurement due to the fact that the current inventory will be sufficient for the operation of nuclear power plants until their decommissions. Additionally, the service of nuclear fuel processing has been provided by long-term contracts.

6.3.2 Suppliers of Materials and Equipment

Review and Procurement Standards for Taipower Suppliers

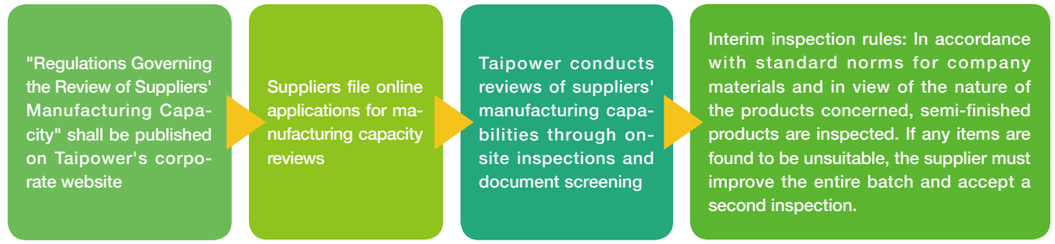
Supplier review standards are pursuant to the government procurement act

In order to ensure the quality of materials, maintain power supply safety, and improve procurement efficiency, Taipower reviews the bidding documents of suppliers in keeping with the Government Procurement Act. If the Company has doubts about the contents of the documents provided by suppliers that participate in the bidding, it may notify the said suppliers and ask them to provide further information. The procurement of electrical equipment (such as cables and gas-insulated switchgear, etc.) must also comply with pertinent government policies such as the "Power Equipment Localization Policy." This essentially means that important components must be produced, assembled, or cut in domestic factories. Taipower evaluates supplier bids on this basis. In 2019, Taipower received a total of 3,351 domestic material procurement tenders from 1,199 suppliers, with a total bid value of approximately NT$112.5 billion. The bid value for selective tendering, which came from 155 suppliers, came to roughly NT$28.5 billion and constituted approximately 25% of Taipower's total procurement of property. The bid value for items that fell under the purview of the localization policy came to approximately NT$15.1 billion and made up roughly 13% of Taipower's total procurement of property.

Process of screening the list of selective tendering materials, equipment and qualified suppliers of Taipower

In order to improve the effectiveness of management and control, Taipower has adopted the principle of centralized management. Where the utilization of equipment is frequent and numerous units intend to use the said equipment, the overall consideration of supply and demand must be reserved and the application of purchase, procurement, final acceptance, storage and transportation of equipment should be handled in a unified manner so as to save costs.

Taipower has established a list of qualified material and equipment suppliers, who are screened according to the following process



Regarding the mechanism for supplier selection, Taipower has drawn up the "General Principles of Reviewing Suppliers' Manufacturing Capacity of Equipment in Selective Tendering." To be included on the list of qualified manufacturers that can participate in tendering, suppliers must obtain a "Certificate of Manufacturing Capacity," and must provide a list relevant equipment belonging to the company, an independent inspection report, an incoming material inspection, an independent inspection form, and maintenance plans, etc. In addition, the manufacturer's quality management system must be certified by the relevant local professional institutions to ensure the supplier meets execution capability and quality safety standards.

Supplier Evaluation and Audit

Taipower conducts supplier evaluations based on the "Application Guidelines of Re-assessment of Electrical Equipment." Suppliers with Certificates of Manufacturing Capacity must conduct re-assessments before the expiration dates of their validity periods (up to 3 years) to maintain their qualifications.

Through the re-evaluation process, Taipower conducts a comprehensive evaluation of suppliers' manufacturing capacities, quality management systems, manufacturing equipment and lists of equipment which require inspection, suppliers of components or raw materials, delivery conditions in the most recent three years, and improvement measures for misusing equipment. Suppliers that meet the requirements shall be issued Certificates of Manufacturing Capacity. When suppliers do not meet the requirements, they can propose improvement measures within a limited period of time. Suppliers that fail to propose improvement measures without valid reasons are required to re-apply for their Certificate of Manufacturing Capacity.

In 2019, Taipower strengthened its auditing operations for material suppliers. Among the 155 qualified selective tendering suppliers, 31 were chosen to be re-reviewed. The ratio of suppliers being re-reviewed for supplier risks accounted for 20%*. In addition, the Company conducted inspections during the manufacturing process and on-site audits of suppliers a total of 456 times.

Note: The ratio of suppliers being re-reviewed for supplier risks accounted for 20% of the 155 selective tendering suppliers, which accounts for 2.4% of the 1,290 domestic and foreign suppliers (1,199 domestic and 91 foreign).

Taipower's Green Procurement and the Sustainable Use of Waste Assets

In 2019, Taipower handled 286,000 EPA green procurement cases, with a purchase value of about NT$417 million.

In addition, in order to promote the sustainable use of resources and create positive value, some scrapped assets that could still be used were put up for online auctions as "second-hand goods." This constituted a new method of waste disposal for Taipower. The method saves administrative costs, increases revenue and accelerates the disposal of scrap. Since 2016, the policy of selling off scrapped assets has been fully promoted by the Company within all units. According to statistics, by the end of December 2019, the Company completed 2,751 online auctions with transaction amounts reaching NT$80,021,116. A total of 80 units participated in the online auctions. The average selling price was about 2.12 times higher than the base price, demonstrating the enthusiasm Taipower employees feel for environmental protection and recycling.

Holding the Materials Supplier Conference

The Department of Materials held a material suppliers conference at the Taiwan Power Company Training Institute in Linkou on April 24, 2019. The conference was presided over by Vice President Lin, and invited Pei-Li Chen, Secretary General of the Industrial Development Bureau, MOEA and Taipower President Bin-Li Chung to attend and provide insights. The agenda of the conference included the development of localization policies for Taiwan's power utility industry, the business opportunities and challenges of the Company's power grid construction and the Taipower Grid Strengthening Program, the digital transformation of Taipower's supply chain and new supply models, the sharing of industry upgrade prospects by representatives from the Taiwan Electrical and Electronic Manufacturers' Association and the Taiwan Electric Wire & Cable Industries Association. Valuable opinions and lively discussions between the attendees from Company and suppliers provided practical insights, which helped Taipower strengthen its supply chain partnerships and lay the foundation for building a sustainable supply chain.

6.3.3 Power Suppliers

To ensure a reliable power supply while improving the economic vigor and versatility of the private sector, the government has lifted restrictions on private power development and adopted Taipower's avoidable costs for self-power generation as a basis for its pricing principles. According to the announcement from the Ministry of Economic Affairs that allowed for the establishment of private power plants, Taipower may purchase thermal electricity generated by independent power producers (IPPs). The Ministry of Economic Affairs first conducts qualification reviews, and qualified operators then submit their electricity prices for bidding. Taipower then signs a contract with the winning bidder.

For the purchase of electricity generated through cogeneration and renewable energy, the procedure is governed by the Enforcement Rules of the Cogeneration System and the Renewable Energy Development Act. Taipower is obligated to purchase the electricity wholesale, without having to follow a bidding procedure as outlined in the Government Procurement Act. Now, following the promulgation of amendments to the Electricity Act, the Ministry of Economic Affairs will no longer permit privately-owned power plant license applications. The power supply capacity of Taipower will be announced by the electricity industry's regulatory authority to assess the power supply. When there is demand for electricity, the procurement procedure will be initiated. The contract will be reviewed and the starting price for bidding will be set. Then public bidding will be handled following the provisions of the Government Procurement Act. A public meeting will be held to explain the bidding process to the suppliers who are interest in bidding, and then bidding will be closed and finalized after a qualification and specification review, as well as bargaining and comparing prices.

By the end of 2019, Taipower had contracts with 9 IPPs, 49 co-generation power providers and a total of 26,129 contracts for renewable energy (including solar power, wind power, hydro power and others). Taipower purchased a total of 52,029 GWh of power from IPPs in 2019 and will purchase an estimated 53,822 GWh from IPPs in 2020. In order to increase dispatch flexibility in 2019, Taipower also communicated with stakeholders on issues such as the adjustment of limits for power generation as specified in contracts and the enhancement of the reserve margin. Negotiations were also completed and contract revisions made with two IPPs to increase the total power purchase capacity by 46.9 MW.

6.4 Humanism in Business and Community Outreach

The power industry has promoted domestic industrial and economic development. In addition to supplying energy to Taiwan, Taipower has created a tangible historical architecture and intangible collective memories for Taiwan. In line with Taiwan's pursuit of social development and cultural awareness, the Company has integrated cultural preservation and creative thinking into a development-oriented growth model, promoting humanism in business, public welfare and the building of a cultural corporate image.

6.4.1 Cultural Investment

To fulfill Taipower's commitments to preserving a historical inheritance and sustainable operations, the Company has committed itself to the development of a broader understanding of Taiwan's power utility industry by injecting diversity into society and promoting the use of value-added knowledge. To achieve this, a "Cultural Heritage Preservation, Operation, and Maintenance Project" was launched. The project sought to examine the cultural heritage of the Company beyond its physical buildings. Vice President Hong-Chou Lee acts as the convener of Important Cultural Artifacts and Heritage Preservation, Operations, and Maintenance Project Meetings. These meetings examine, preserve and display cultural artifacts and documents related to Taiwan's power utility industry. In September 2017, a Division of Historical Documents and Materials was established within the Secretariat to administer the preservation of cultural heritage to promote resource sharing and activation, and to fulfill the Company's corporate social responsibilities.

In order to research, preserve and communicate about Taiwan's power utility industry, the Company will undertake a phased development. Current policy calls for "collection and research first, and display and education later." The intention is to provide new value to cultural and historical artifacts and data through inventorying them as historical objects. The project is expected to achieve three goals: (1) preserving cultural heritage; (2) assisting in cultural and historical research; and (3) strengthening social communication. In 2017, the open, public art space in the Taipower Headquarters building was renovated, and the Company won the Ministry of Culture's 13th Arts & Business Awards. In 2019, Taipower once again brought home the Gold Award and a Corporate Contribution Award from the Arts & Business Awards for its achievements on the "preservation of cultural assets and promotion of cultural and art performance."

Conservation of Cultural Heritage

Taipower possesses a wealth of cultural heritage related to the power utility industry. As this heritage is a valuable public, cultural asset, Taipower will shoulder its corporate social responsibility by conducting in-depth studies and the promotion of this legacy. The main action plans for the future are as follows:

Gradually complete the puzzle of Taipower's culture and history

Taipower continues to plan the implementation of an inventory of cultural heritage at various power-generating sites, to compile essays on the history and culture of Taipower and to organize related events such as special exhibitions on cultural heritage, book launch activities, symposiums, etc. The goal is to record and understand the historical contexts and pathways of the century-long development of Taiwan's power utility industry for future generations. In 2019, a number of themes were selected to direct efforts. These included "Hydropower on Xindian River," "Hydropower in Eastern Taiwan," "Taipower's Sports Teams," and "Taipower's File Documents and Business Development." In total 1,389 documents and relics were archived. The selected themes for 2020 are the evolution of power distribution technology, the business of purchasing electricity (sale), the power utility industry on the outlying islands, and nuclear power generation.

Promote societal communication and education with the power of culture

Taipower uses its research and cultural archives as a medium for communication and history education. It also uses these resources to drive the development of relevant cultural and creative industries, promote experiential education and to offer both schools and the general public opportunities to get close to cultural relics and to engage with topics related to the power utility industry. In this way, the Company can communicate with the general public through culture, and act out its corporate social responsibility.

Build a digital collection and share it with the general public

Taipower plans to establish a library dedicated to the culture and history of the power utility industry. The library will include an online database, which will be accessible to the general public for viewing the fruitful results of the Company's cultural asset inventory as it expands to various arenas of the power utility industry. This initiative will make it easier for

the general public to see the Company's emphasis on and efforts in the preservation of cultural assets. Additionally, Taipower intends to create a resource-sharing environment and a research platform for culture while continuing to promote social communication and education with its cultural power.

Localization and Revitalization

The preservation of cultural assets is a bridge that links the past to the future. As such, Taipower continues to maintain and repair its cultural assets, to revitalize historical sites important to the development of the power utility industry, and to encourage the power utility industry to connect its cultural and historical archives with social resources. The Company also promotes the co-prosperity with local communities and helps the general public rediscover the culture of Taipower. Integrating an awareness of the historical development of the local power utility industry with the economic, social and humanistic interactions that link local communities and organizations will help to strengthen local identities. Taipower has established local cultural archive exhibitions and made them available to the general public through a prior reservation system. This provides local communities with educational arenas and museums that activate the promotion, inheritance and deepening of local knowledge. Significant endeavors in 2019 are as follows:

- The old buildings at power plants were revitalized to build local cultural museums. The Mugua River Cultural Archives and Ecological Hall, for instance, opened in September 2019. It displays hydropower models, precious old photos, maintenance tools, equipment and other cultural relics. The facility was then listed by the Hualien County Cultural Affairs Bureau as one of the local heritage museums.
- In coordination with the Open Day of National Monuments, power plants were opened to the general public for one-day tours with curation that introduced the unique features of the sites. Tourists were invited to enjoy both the cultural history of the power utility industry and the ecological environment.
- The local cultural museums regularly changed exhibitions throughout the year. Moreover, efforts were made to cooperate with local schools to provide outdoor teaching activities. Other activities were held to attract other public organizations and groups of all levels to visit the halls.
- In the Jinguashi area, Taipower initiated an art project entitled, "Light up 13 Layer Remains." The project combined culture and art to revitalize a former industrial site and to transform historical buildings into international cultural landmarks. The project also used creativity to drive local revitalization. Specific details of the project can be found in a special section of this report.

Taipower will continue to cooperate with local communities to promote the preservation of cultural heritage and local revitalization in the following ways:

- Continue to push various local government units to preserve, maintain, and repair cultural heritage sites such as monuments and historical buildings and to devise activation plans for those sites. Invite local cultural and historical workers and the general public to participate in the preservation of cultural heritage. Through exchanges and dialogues in multiple arenas, it is possible to strengthen cultural identity and promote the preservation of cultural heritage for sustainable operation.
- Enrich the software and hardware content of the local cultural museums. Use those museums as bases to connect local cultural and historical groups with community organizations. Use each arena as a means of developing local understandings of the historical context of the power utility industry so that the public can appreciate the value of preservation, maintenance, educational display, and value-added applications. In addition, by connecting local cultural museums in the northern, central, southern, eastern and other regions of Taiwan, the cultural resources of each museum can be integrated. Curated exhibitions, as well as experiential activities and educational activities can be used to develop and activate local economies and tourism.

Professional Curation and Activities

Through professional curation and interdisciplinary cooperation, exhibitions can be enriched and deepened in their interpretation of power utility culture assets. This is achieved through the combination of humanistic heritage, aesthetic creativity and educational significance in order to translate information on professional power generation technology to the daily lives of the general public. It also allows Taipower to convey the cultural value of its brand and values. In 2019, three special cultural exhibitions, namely "Just Flow," "Inheritance and Prospects," and "Reminiscing with Documents and Archives" were held. The total number of visitors was approximately 100,000.

Promoting Cultural Heritage with Diverse Exhibitions and Forums

Just Flow: A Special Exhibition on the Cultural Heritage of a Century of Hydropower

Taipower Journal
Issues 682 and 683

The theme of the Just Flow exhibition is hydropower, which was also Taiwan's first source of power generation. The goal of the curators was to create a comprehensive sensory interactive experience. The nine exhibition areas showcase a century of hydropower history. More than 100 precious power generation objects are exhibited onsite. The total number of visitors to the Taichung, Nantou, and Tainan exhibitions reached 76,340. The exhibition was later moved to Xiangshan Visitor Center in Nantou and the National Museum of Taiwan History in Tainan to extend the value and benefit of the exhibition.

Inheritance and Prospects: A Special Exhibition of Taipower's Sports Teams' Culture and Archives

The theme of the exhibition was the role of Taipower in uplifting sports standards and rooting in grassroots sports. The exhibition gathered the brilliant achievements of the six sports teams of Taipower over the past 70 years. In addition, a series of books titled "Walk on in the Shimmering Light," were published. The books focus on Taipower's sports teams. Through large-scale installation art and new media Interactive technology, the exhibition allows visitors to dig into the historical development of each sports team and go through exciting historical sports events onsite. During the exhibition, Taipower athletes acted as exhibition tour guides and the exhibition welcomed a total of 3,000 visitors. The education was widely praised by schools and the general public.

Taipower Journal
Issue 683

Exhibition: Reminiscing with Documents and Archives

This exhibition focused on the Company's document processing and file management system. The exhibit curates the files and cultural archives to illustrate the transforming process of Taipower's document and archive preservation. The exhibition also aims to reenact the process of continuous improvement in Taipower's file management system. Special book presentations and keynote lectures on the topic of documents and archives were held to encourage people to come to see the special exhibition.

Dialogue between Footprints and Buildings: A Cultural Heritage Forum

With the theme of preserving cultural heritage related to water, experts from industry, government and academia were invited to discuss the historical value of Taipower's hydropower facilities in Taiwan's "water" culture by means of keynote speeches and seminars. The forum helped Taipower's colleagues learn more about Taipower's cultural heritage and consolidate the consensus of heritage preservation.

TPCreative: A Circular Economy Brand

The TPCreative brand was formally launched in 2019. With the circular economy as the core concept of the brand, TPCreative continues to cooperate with professional designers, who use waste materials generated during the power generation process and combined with elements of Taipower's identity to explore the feasibility of developing cultural and creative products. The display and sale of creative products allow the general public to see different aspects of Taipower, narrowing the distance between the Company and the general public and thereby enhancing the Company's corporate image. The promotion results for 2019 are as follows:

January

In January, an e-commerce platform was established and the sale of cultural and creative products officially began.

April

In April, Taipower cooperated with the Golden Horse Fantastic Film Festival to jointly launch "Under the Manhole Cover" (a ceramic fly ash coaster product). The product was launched through a joint-merchandise plan for the 2019 Film Festival to increase the brand's level of media exposure.

Participation in April's "2019 Creative Expo Taiwan" successfully sparked discussion and interest in power generation materials for the general public who visited to appreciate the exhibition. The Company communicated with a number of other participating design brands to increase cooperation opportunities for the joint development of cultural and creative products.

June

July

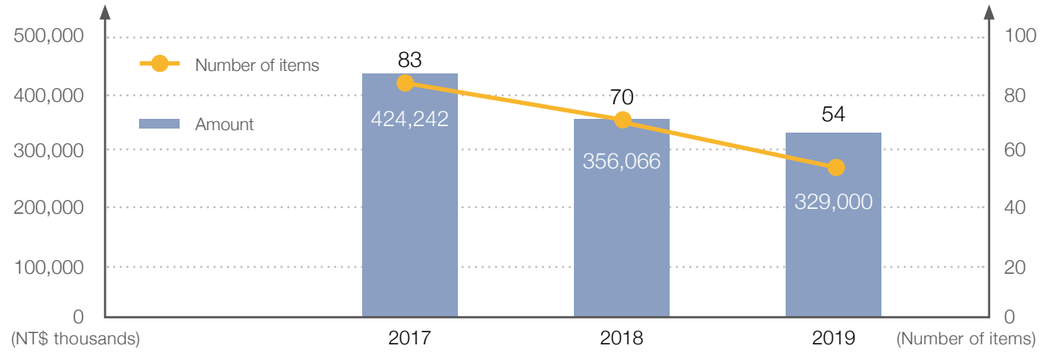
August

From June to August, a two-month exhibition named "The Birth of Circular Manufacturing" was held at the Taipower Art Gallery. The exhibition showcased the material collection, experimental testing process, and performance results of using waste materials to create new products. During the exhibition period, several lectures and workshop activities were completed. Through diversified methods of reaching the audience, the goal of conveying the brand's management philosophy has been achieved.

Investment in Cultural and Art Activities

Taipower has spared no effort in its support of literary and artistic activities. The Company regularly supports the art and cultural industries in Taiwan in a number of ways. From 2015 to 2019, the Company invested in art bank painting rental activities and performances to constantly encourage young, Taiwanese artists and performers. Through professional exhibitions, the overall atmosphere of the office space has improved and the thinking of staff has been subtly influenced and upgraded from the inside out. As the arts and humanities enter our institutions, the general public can engage in art exchanges as it walks into Taipower's buildings.

Statistics on Painting Rentals



Exhibition Activities

		2017	2018	2019
Art Gallery	**Number of exhibitions**	9	5	5
	Amount (NT$)	3,137,400	323,350	310,000
Exhibition and Activities in the Grand Hall	**Number of exhibitions**	29	26	18
	Amount (NT$)	698,011	877,439	518,747

6.4.2 Management of Charitable Activities

Taipower actively encourages its employees to participate in volunteer and community service work to fulfill the Company's social responsibilities and to enhance its corporate image. Taipower holds numerous public welfare activities of various sizes. In 2019, there were a total of 2,534 events and instances of investment with 8,942 people participating for a total of 46,925 hours.

Over the years, Taipower has placed great emphasis on service to society. One of the Company's most notable efforts is the "Taipower Volunteer Service Team" which has been operating for many years. At present, the volunteer group's activities mainly focus on the four major themes of energy conservation and carbon reduction services, community services, social and humanistic care and environmental protection. The group is typically of service at events organized by local authorities near local Taipower locations.

Promotion of Popular Science Education on Energy

Taipower actively promotes education and communication about energy science, renewable energy, and environmental knowledge. In following the Environmental White Paper's strategy of "Expanding internal and external engagement," the Company sets short, medium, and long-term goals for "transferring environmental information on electricity." By 2030, it is estimated that the information and communications on the topic of environmental protection within the power utility industry will be reaching 750,000 people per year. Please refer to the special section of this report for more details on the 2019 "Taipower Environment Month" project.

A Fun, Interactive Special Exhibition Experience to Promote Knowledge of Green Energy

Power Zone: An Exhibition on the Popular Science of Transformer Boxes

Co-organized by Taipower and the Department of Cultural Affairs, Taipei City Government, Power Zone is Taiwan's first exhibition with a transformer box theme. The exhibition teaches visitors about electricity through sensory experiences and interesting popular science, and lets the audience get a clearer understanding of power equipment and the transformation of transformer boxes. It also passes on urban aesthetic education. The exhibition won critical acclaim and attracted more than 45,000 people in a mere three weeks.

Taipower Journal Issue 684, "Design x Sustainability: The Birth of Taipower's First Green Arena Brand,"

Power Zone FB fanpage

Taipower D/S One: An Exhibition Hall on Renewable Energy

Taipower has built the first renewable energy exhibition hall in the country. Taking the Company's "green, wisdom, future" slogan as the brand concept, Taipower created an energym (energy + gym), a six-axis VR robot and an energy maker space with an immersive experience of "technology, creativity, interaction, and craftsmanship." The trial operation started in December 2019 and was highly praised by the general public and the media, as they called the place "the most interesting exhibition hall in Taiwan!"

Taipower Journal Issue 684, "Aesthetics x Electricity: The Last Mile of Power Transmission - Special Exhibition on the Popular Science of Power Zone of Transformer Boxes"

Taipower D/S One: Website/FB fanpage

Major Public Welfare Activities and Sponsorship Investments

As a driving force in Taiwan's economic development, Taipower has become a long-term partner in local development through its care for and investment in local communities. To respond effectively to community needs, Taipower formulates Neighborly Work Auditing Plans in accordance with the Company's Neighborly Work Guidelines. Moreover, implementation of subsidy (donation) assistance programs is audited along with handling procedures and whether expected goals and outcomes have been achieved. The results of these audits serve as a reference for the future approval of subsidy (donation) programs. With a focus on providing assistance for local public welfare activities, Taipower works to promote emergency relief, economic support for low-income households, welfare for the elderly and the disabled, education and culture, and to strengthen its good interactions with local communities, promote harmonious relationships between Taipower and local residents, and successfully complete the construction of power-related projects to achieve co-prosperity. The total number of neighborhood work cases in 2019 was 4,396, and the total amount donated for these cases was approximately NT$114.32 million.

In order to promote the smooth development and operation of power-related affairs and facilities and to improve the welfare of residents living near power generation and transmission facilities and substations, Taipower has specifically established the "Promotion of Power Development and Operation Assistance Fund" and formulated "Execution Guidelines for the Promotion of Power Development and Operation Assistance Fund." The aims of the fund are: (1) to assist the municipalities, county (city) governments, township (town, city, district) offices, agricultural associations, fishermen's associations, public high schools and vocational high schools, junior high schools, elementary schools, and domestic non-profit organizations approved by the competent government authorities, (2) to engage in improving the social welfare of residents or the construction of public facilities in the surrounding areas; (3) to engage in affairs such as educational, cultural, and sports activities, as well as scholarships for students from low-income families, emergency relief, care for low-income households with physically and mentally challenged members, local folk festivals, religious fairs and ceremonies and cleanups after events, construction of basic infrastructure or promotion of industrial development, etc. A total of NT$2,985 million was invested in neighborhood work in 2019.

Taipower-Assisted Public Welfare Activities

Power Supply Stability Plan for Mask Factories: The Best Support for the National Mask Production Team

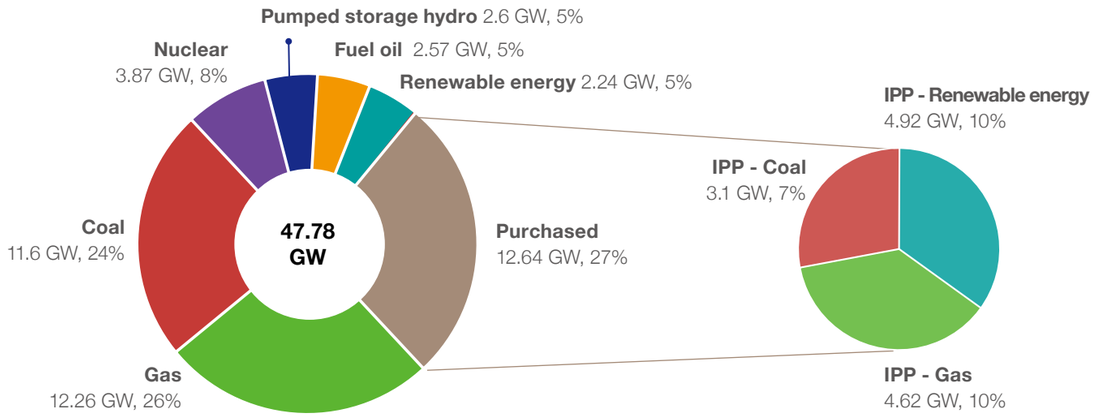
During the COVID-19 pandemic, mask production became a key, frontline material topic for disease prevention. Taipower launched the "Power Supply Stability Plan for Mask Factories" in February 2020, dispatching more than 18 district offices/departments and 1,000 employees to look after the power supplies of nearly 100 mask factories in Taiwan and to assist in line inspection, equipment maintenance and the improvement of operations, preparation of emergency repair plans for power supply, and the establishment of a dedicated hotline to address potential power consumption problems from the factories. In addition, in order to waive the industry from the extra electricity charges due to increased production capacity, Taipower also provided mask factories with electricity fee reductions. Taipower used its expertise to ensure that the power supply for the daily production of more than 10 million masks was secure; this measure was the Company's strongest support measure for essential pandemic prevention.

The 30th Annual 30-Minutes Satiety Charitable Banquet for The Poor

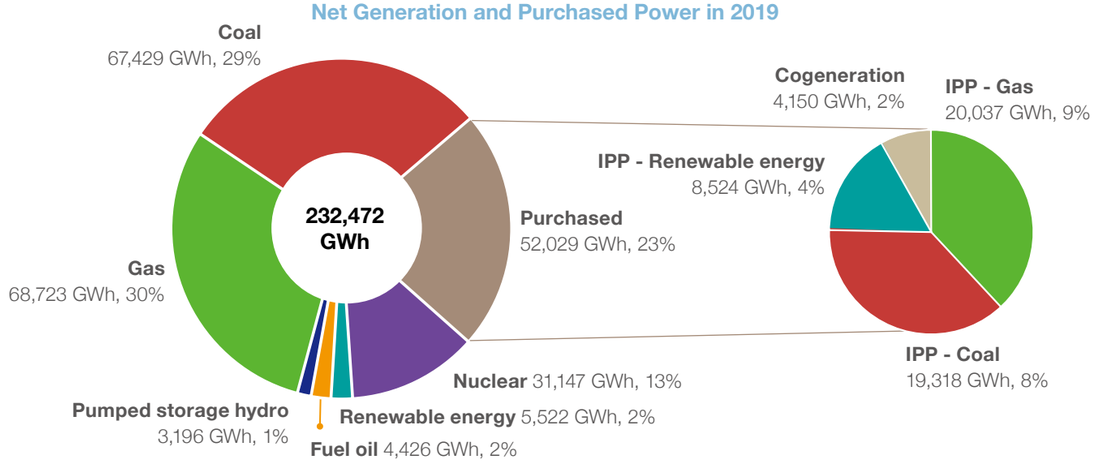
On Lunar New Year's Eve in 1991, the founder of the banquet event, Mr. Ching Tsao, walked by Longshan Temple in Wanhua District, Taipei, and saw many homeless people starving and freezing in the cold wind. He urgently called 10 volunteers and had them make 30 lunch boxes and distributed them to the homeless people nearby. This is how the 1st Banquet for The Poor began. In 2019, as the 30th Annual 30-Minutes Satiety Charitable Banquet for The Poor approached, the Genesis Social Welfare Foundation invited Taipower's Volunteer Service Team from the Company's headquarters to assist. The Volunteer Service Team attracted 20 current employees and 5 retired employees to participate in the event. A total of 2,200 tables were set up during the event, which means that 22,000 people in need received help through the event in 2019. Through this experience, the volunteers gained a greater understanding of the value of working to benefit others. They also actively implemented the Company's business philosophy, fulfilled its social responsibility to care for those in need, and enhanced the Company's corporate image.

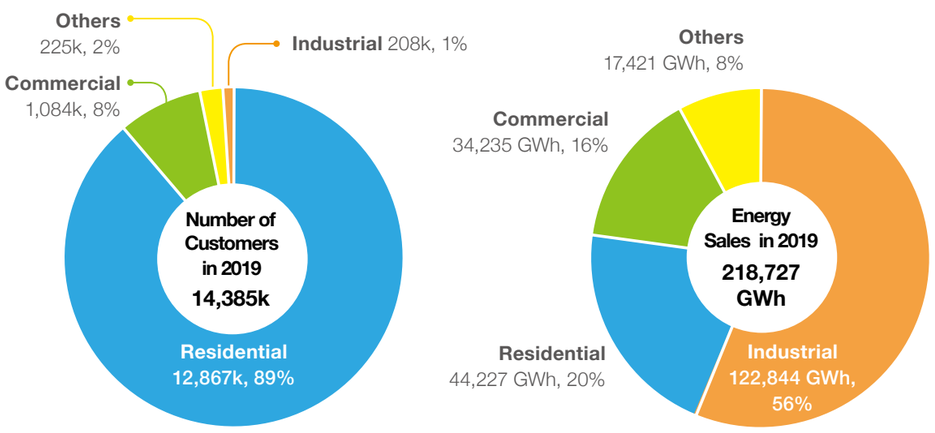
Appendix | Corporate Highlights

Installed Capacity in 2019

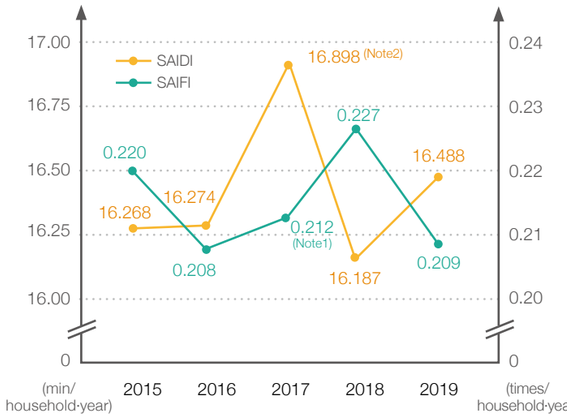


Net Generation and Purchased Power in 2019

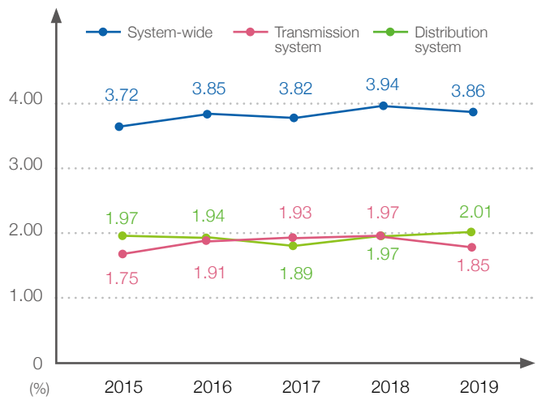




System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) from 2015 to 2019



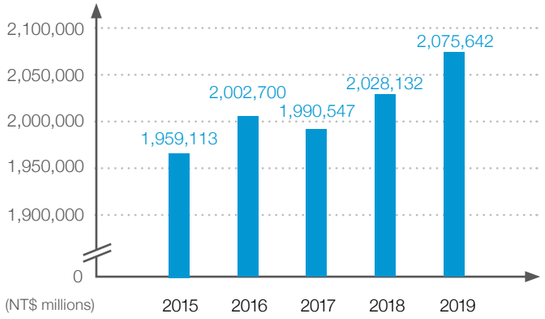
Line Loss Rate from 2015 to 2019



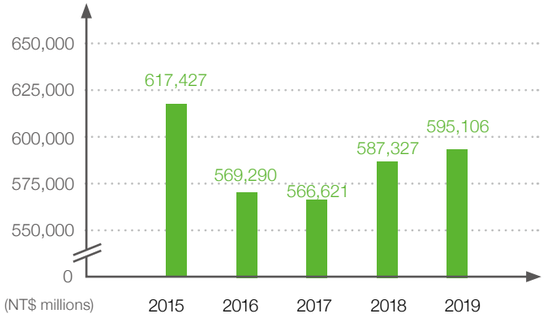
Note: 1. Data excludes the impact of the large-scale blackout on August 15, 2017. The blackout was mainly due to the interruption of the gas supply of the CPC Corporation, and Taipower was not held responsible. The blackout total average effect added an additional 0.553 (times/household·year).

2. Data excludes the impact of the large-scale blackout on August 15, 2017. The blackout was mainly due to the interruption of the gas supply of the CPC Corporation, and Taipower was not held responsible. The blackout total average effect added an additional 32.572 (minutes/household·year).

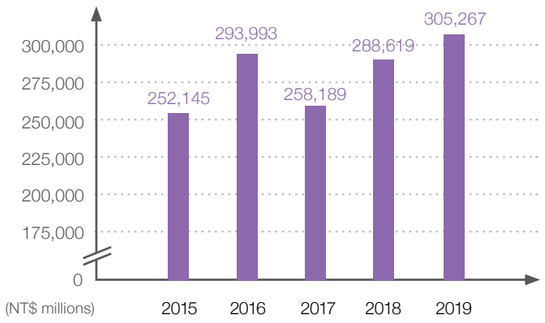
Total Assets



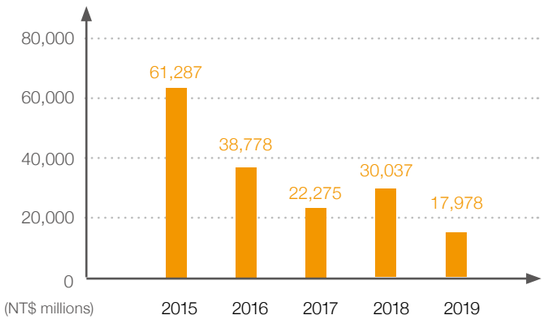
Operating Revenue



Stockholders' Equity



Net Profit/Loss Before Tax



Note: Figures above have been audited by CPAs using the IFRS that was adopted in 2013.
As a state-owned enterprise, figures in Taipower's financial report are based on the final audit accounts of the National Audit Office.
As such, the aforementioned figures of Taipower's assets in 2018 are slightly different from those in the 2019 Sustainability Report.

Appendix | Financial Performance

Taiwan Power Company – Balance Sheet

Unit: NT$ thousands

Assets	December 31, 2019		December 31, 2018	
	Amount	%	Amount	%
Current Assets				
Cash and cash equivalents	2,631,598	-	3,262,922	-
Notes receivable	73,250	-	116,926	-
Accounts receivable	39,745,846	2	39,343,319	2
Other receivables	19,786,933	1	11,187,077	1
Inventories	41,668,655	2	43,935,812	2
Prepaid expenses	4,737,942	-	2,262,966	-
Other current assets	203,158	-	244,438	-
Total of current assets	**108,847,382**	**5**	**100,353,460**	**5**
Non-current Assets				
Financial assets measured at FVTOCI	1,941,675	-	1,821,530	-
Investment accounted for by the equity method	2,429,007	-	2,405,655	-
Property, plant and equipment	1,583,502,236	76	1,571,819,564	78
Right-of-use assets	10,464,159	1	-	-
Investment-based real property	7,796,369	-	7,627,256	-
Intangible assets	374,102	-	376,788	-
Deferred income tax assets	5,621,676	-	6,793,336	-
Nuclear back-end fund	344,589,204	17	327,117,463	16
Other non-current assets	10,075,716	1	9,816,849	1
Total of non-current assets	**1,966,794,144**	**95**	**1,927,778,441**	**95**
Total assets	**$ 2,075,641,526**	**100**	**$ 2,028,131,901**	**100**

Liabilities and Stockholders' Equity

Current liabilities				
Short-term debts	95,452,691	5	117,344,907	6
Short-term notes and bills payable	166,378,812	8	141,172,774	7
Accounts payable	33,517,735	2	33,320,170	2
Contracts payable	21,727,307	1	33,693,832	2
Other payables	43,651,823	2	41,019,322	2
Lease liabilities - current	1,335,642	-	-	-
Long-term liabilities due within one year and corporate bonds payable	128,243,683	6	107,493,611	5
Other current liabilities	5,201,301	-	3,338,340	-
Total current liabilities	**495,508,994**	**24**	**477,382,956**	**24**
Non-current liabilities				
Corporate bonds payable	338,538,390	17	336,027,051	17
Long-term loans	375,090,278	18	359,565,741	18
Liabilities reserve	456,078,526	22	474,014,652	23
Deferred income tax liabilities	56,367,509	3	56,363,449	3
Lease liabilities - non-current	8,580,316	-	-	-
Long-term construction payables	4,003,543	-	1,006,114	-
Long-term deferred revenue	421,523	-	521,687	-
Net defined benefit liabilities	29,601,912	1	29,168,421	1
Other non-current liabilities	6,183,968	-	5,463,115	-
Total non-current liabilities	**1,274,865,965**	**61**	**1,262,130,230**	**62**
Total liabilities	**1,770,374,959**	**85**	**1,739,513,186**	**86**
Stockholders' Equity Attributable to the Company				
Ordinary share capital	330,000,000	16	330,000,000	16
Losses to be compensated	(26,387,622)	(1)	(42,925,256)	(2)
Other equity	1,654,189	-	1,543,971	-
Total stockholders' equity	**305,266,567**	**15**	**288,618,715**	**14**
Total liabilities and shareholders' equity	**$ 2,075,641,526**	**100**	**$ 2,028,131,901**	**100**

Taiwan Power Company – Statements of Comprehensive Income

Unit: NT$ thousands

	2019		2018	
	Amount	%	Amount	%
Operating revenue				
Sales of electricity	572,847,610	96	569,857,473	97
Other operating revenue	22,258,810	4	17,469,863	3
Total operating revenue	**595,106,420**	**100**	**587,327,336**	**100**
Operating costs	576,707,306	97	564,406,985	96
Gross profit	18,399,114	3	22,920,351	4
Operating expenses				
Marketing expense	11,153,502	2	9,493,221	2
Administrative expense	1,917,159	-	1,856,709	-
Research and development expense	4,383,906	1	4,103,827	1
Expected credit impairment loss (gain)	140,879	-	(42,178)	-
Total operating expenses	**17,595,446**	**3**	**15,411,579**	**3**
Net operating margin	803,668	-	7,508,772	1
Non-operating income and expenses				
Interest income	4,591,225	1	4,378,217	1
Recovery of the tariff stabilization reserve	30,942,755	4	37,298,566	6
Other income and losses	1,736,602	-	106,337	-
Financial costs	(20,364,282)	(3)	(19,543,785)	(3)
Expected credit impairment (loss) gain	(18)	-	(3,064)	-
Share of corporate profit or loss recognized using the equity method	267,673	-	291,592	-
Total non-operating income and expenses	**17,173,955**	**2**	**22,527,863**	**4**
Net profit before tax	17,977,623	2	30,036,635	5
Income tax expenses (benefits)	1,230,788	-	(509,668)	-
Net profit of the reporting period	**16,746,835**	**2**	**30,546,303**	**5**
Other comprehensive income:				
Items that will not be reclassified subsequent to profits or losses				
Remeasurement of defined benefit plans	(256,006)	-	(2,366,501)	-
Unrealized valuation loss (gain) on investment in an equity instrument measured at FVTOCI	120,141	-	51,882	-
Share of other comprehensive income recognized using the equity method	(4,996)	-	719	-
Income tax relevant to items that will not be reclassified	37,384	-	500,291	-
Total of items that will not be reclassified subsequently to profits or losses	**(103,477)**	**-**	**(1,813,609)**	**-**
Items that may be reclassified to profits or losses				
Share of other comprehensive income recognized using the equity method	5,107	-	6,952	-
Income tax relevant to items that may be reclassified	(613)	-	(834)	-
Total of items that may be reclassified subsequent to profits or losses	**4,494**	**-**	**6,118**	**-**
Other comprehensive income for the reporting period	**(98,983)**	**-**	**(1,807,491)**	**-**
Comprehensive income or losses for the reporting period	**$ 16,647,852**	**2**	**$ 28,738,812**	**5**
Earnings per share (NT$)	**$ 0.51**		**$ 0.93**	

Taiwan Power Corporation Employee Compensation and Benefits

Unit: NT$ thousands

	2019	2018
Post-employment benefits		
Defined contribution plans	646,838	641,826
Defined benefit plans	1,577,361	1,444,233
Post-employment benefits	**2,224,199**	**2,086,059**
Other employee benefits		
Payroll expenses	19,922,894	20,173,322
Directors' compensation	4,133	4,004
Insurance costs		
Labor and civil servant insurance premiums	937,128	931,329
National Health Insurance premiums	1,133,785	1,129,580
Others	11,958,284	12,037,398
Other employee benefits	**33,956,224**	**34,275,633**
Total employee compensation and benefits	**$ 36,180,423**	**$ 36,361,692**
Summarized by functions		
Operating costs	30,577,796	30,802,633
Operating expenses	5,602,627	5,559,059
Total employee compensation and benefits	**$ 36,180,423**	**36,361,692**

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Assurance Statement

SGS

ASSURANCE STATEMENT

SGS TAIWAN LTD.'S REPORT ON SUSTAINABILITY ACTIVITIES IN THE TAIWAN POWER COMPANY's CORPORATE SOCIAL RESPONSIBILITY REPORT FOR 2020

NATURE AND SCOPE OF THE ASSURANCE/VERIFICATION

SGS Taiwan Ltd. (hereinafter referred to as SGS) was commissioned by Taiwan Power Company (hereinafter referred to as TPC) to conduct an independent assurance of the Corporate Social Responsibility Report for 2020 (hereinafter referred to as CSR Report). The scope of the assurance, based on the SGS Sustainability Report Assurance methodology, included the sampled text, and data in accompanying tables, contained in the report presented during on-site verification (2020/05/20~2020/06/04). SGS reserves the right to update the assurance statement from time to time depending on the level of report content discrepancy of the published version from the agreed standards requirements

The information in the TPC's CSR Report of 2020 and its presentation are the responsibility of the management of TPC. SGS has not been involved in the preparation of any of the material included in TPC's CSR Report of 2020.

Our responsibility is to express an opinion on the report content within the scope of verification with the intention to inform all TPC's stakeholders.

The SGS protocols are based upon internationally recognized guidance, including the Principles contained within the Global Reporting Initiative Sustainability Reporting Standards (GRI Standards) 101: Foundation 2016 for accuracy and reliability and the guidance on levels of assurance contained within the AA1000 series of standards and guidance for Assurance Providers.

This report has been assured using our protocols for:

- AA1000 Assurance Standard (2008) Type 1 evaluation of the report content and supporting management systems against the AA1000 Accountability Principles (2008) at a moderate level of scrutiny; and
- evaluation of the report against the requirements of Global Reporting Initiative Sustainability Reporting Standards (100, 200, 300 and 400 series) claimed in the GRI content index as material and in accordance with.

The assurance comprised a combination of pre-assurance research, interviews with relevant employees, superintendents, CSR committee members and the senior management in Taiwan; documentation and record review and validation with external bodies and/or stakeholders where relevant. Financial data drawn directly from independently audited financial accounts has not been checked back to source as part of this assurance process.

STATEMENT OF INDEPENDENCE AND COMPETENCE

The SGS Group of companies is the world leader in inspection, testing and verification, operating in more than 140 countries and providing services including management systems and service certification; quality, environmental, social and ethical auditing and training; environmental, social and sustainability report assurance. SGS affirm our independence from TPC, being free from bias and conflicts of interest with the organisation, its subsidiaries and stakeholders.

The assurance team was assembled based on their knowledge, experience and qualifications for this assignment, and comprised auditors registered with ISO 26000, ISO 20121, ISO 50001, SA8000, RBA, QMS, EMS, SMS, GPMS, CFP, WFP, GHG Verification and GHG Validation Lead Auditors and experience on the SRA Assurance service provisions.

VERIFICATION/ ASSURANCE OPINION

On the basis of the methodology described and the verification work performed, we are satisfied that the information and data contained within TPC's CSR Report of 2020 verified is accurate, reliable and provides a fair and balanced representation of TPC sustainability activities in 01/01/2019 to 12/31/2019.

The assurance team is of the opinion that the Report can be used by the Reporting Organisation's Stakeholders. We believe that the organisation has chosen an appropriate level of assurance for this stage in their reporting. In our opinion, the contents of the report meet the requirements of GRI Standards in accordance with Core Option and AA1000 Assurance Standard (2008) Type 1, Moderate level assurance.

AA1000 ACCOUNTABILITY PRINCIPLES (2008) CONCLUSIONS, FINDINGS AND RECOMMENDATIONS

Inclusivity

TPC has demonstrated a good commitment to stakeholder inclusivity and stakeholder engagement. A variety of engagement efforts such as survey and communication to employees, customers, investors, suppliers, CSR experts, and other stakeholders are implemented to underpin the organization's understanding of stakeholder concerns. For future reporting, TPC may proactively consider having more direct two-ways involvement of stakeholders during future engagement.

Materiality

TPC has established effective processes for determining issues that are material to the business. Formal review has identified stakeholders and those issues that are material to each group and the report addresses these at an appropriate level to reflect their importance and priority to these stakeholders.

Responsiveness

The report includes coverage given to stakeholder engagement and channels for stakeholder feedback.

GLOBAL REPORTING INITIATIVE REPORTING STANDARDS CONCLUSIONS, FINDINGS AND RECOMMENDATIONS

The report, TPC's CSR Report of 2020, is adequately in line with the GRI Standards in accordance with Core Option. The material topics and their boundaries within and outside of the organization are properly defined in accordance with GRI's Reporting Principles for Defining Report Content. Disclosures of identified material topics and boundaries, and stakeholder engagement, GRI 102-40 to GRI 102-47, are correctly located in content index and report. For future reporting, it is recommended to have more descriptions of TPC's involvement with the impacts for each material topic (103-1), and how efforts were given to mitigate the impacts. When reporting on goals and targets for each material topic, the expected results are suggested to be set, if applicable, with quantitative objectives.

Signed:
For and on behalf of SGS Taiwan Ltd.

AA1000
Licensed Assurance Provider
000-8

David Huang
Senior Director
Taipei, Taiwan
29 June, 2020
WWW.SGS.COM

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Taiwan Power Company is always working to power your lives.