# Taiwan Power Company Sustainability Report

Light up the Green Future

2017

# Reporting Principles

This is the eleventh issue of the annual Sustainability Report published by Taiwan Power Company (Taipower). This year, the statistics and disclosures in the report have been compiled in accordance with the “Core” option of the G4 Guidelines of the Global Reporting Initiative (GRI). This report has been verified by SGS Taiwan to ensure that the report meets the requirements of both the Core Option of the GRI G4 and the GRI Electric Utilities Sector Disclosure guidelines, as well as the accountability principle standards (APS) in AA1000 (Type 1 Moderate Level).

The contents featured in this Sustainability Report have been compiled from data submitted by relevant units of Taipower. To ensure the accuracy of the report's contents and compliance with stakeholders’ expectations, a yearly editorial meeting is held upon the completion of the report’s initial draft in which all data-submitting units review the contents of the report and provide feedback. All contents of the report must be approved by the corresponding unit supervisor, the President and the Chairman before publication. As a result of the requirements of the Electricity Act, the ongoing transition of Taipower’s business departments, and the development of international green energy trends, Taipower’s 2017 Sustainability Report adopt “Light up the Green Future” as its theme. This will allow Taipower to present its intended responses to the government's green objectives and policies in Taiwan and ongoing trends emerging abroad, with Taipower’s future prospects as the focus for chapter layout and content presentation in this report.

## Period Covered by the Report

From January 1 to December 31, 2016 (For the sake of complete disclosure and comparability, the report also includes some historical data.)

## Scope of the Report

This report covers Taipower’s data and information regarding sustainability issues and achievements within the areas of economic management, social responsibility and environmental sustainability.

## Inquiries

In 2015, Taipower established a new administrative unit focused on Sustainable Development to communicate with stakeholders about the company's performance on sustainability issues (including issues of lower materiality such as “Contribution to Society,” which are not covered by this report). The company has also added an administrative section that deals with stakeholder relations. The section conducts information gathering through questionnaires in order to communicate with our stakeholders. The Sustainable Development section was revamped in 2017 in an effort to present more diverse and interactive contents to stakeholders. This report is also available in Chinese, and the full version of the Chinese report can be downloaded from Taipower’s website. In addition, the Information Disclosure section on Taipower’s website is updated regularly to provide the latest statistics on six major aspects of the company’s operations, including management, power generation, environment and so forth. The company is eager to receive any feedback regarding this Sustainability Report. Your input will enable Taipower to better meet your requirements and publish our next Sustainability Report in the third quarter of 2018. You can reach us by the following methods:

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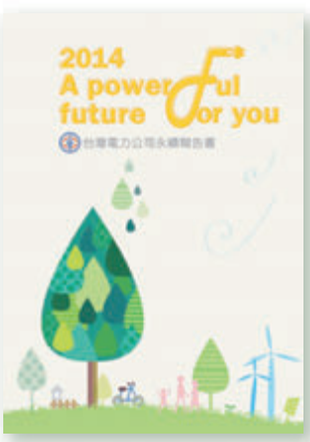
Sustainability Report 2016


Sustainability Report 2015




Sustainability Report 2014

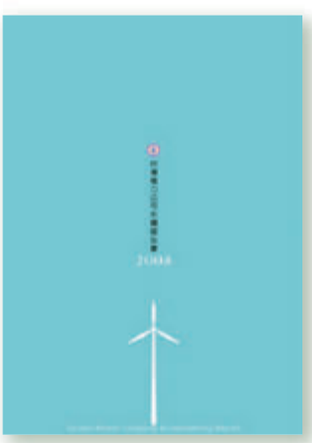

Sustainability Report 2013


Sustainability Report 2012


Sustainability Report 2011


Sustainability Report 2010


Sustainability Report 2009



Sustainability Report 2008


Sustainability Report 2007

# Statement from the Chairman

The year 2016 marks Taipower's 70th anniversary and bears special significance as the company considers its past and moves into the future. During the last 70 years, Taipower has accumulated experience and wisdom and has developed its talents through the company's efforts in developing various power generation technologies from scratch. This has been diligently accomplised with a spirit of professionalism and a down-to-earth commitment to overcoming various hardships and setbacks.The company has delivered safe and reliable power throughout Taiwan for 70 years and has a history of caring for the general public. The company makes a point of ensuring that "Taipower exists for your sake, each and every second," something that is evidenced every time a member of the public flicks a switch.

As for ushering in the future, with regards to current affairs in the international community, the Paris Agreement came into effect on November 4, 2016 and continues to promote low carbon emissions around the world. In keeping with this trend, the domestic power industry has also faced petitions for low-carbon emissions and nuclear-free homeland policies. At the same time, amendments to The Electricity Act were promulgated with a Presidential executive order on January 26, 2017 and will no doubt result in significant changes to Taipower's development for the foreseeable future. In facing these challenges, everyone at Taipower will unite as one to realize the government's policy of "Energy Transition – Green Energy First" for promoting low-carbon energy transition while creating a friendly environment to make way for grid-connectedgreen energy , so as to help Taiwan achieve the vision of nuclear-free and carbon reduction by fulfilling our goal of "Spreading love for a better future of green power."

On a related note, 2016 was a year of diligence and hard work as Taipower achieved significant gains in terms of governance, environment and social responsibility that are summarized as follows:

## Improving Operational Efficacy

Power generation and reliability are vital indicators of operational efficacy for a power company. In 2016, the thermal efficiency of our fossil-fuel power plants' gross Higher Heating Value (HHV) reached 39.14%, with net generation reaching 134.1 TWh. The average number of power interruptions also fell by a margin of 0.012 (compared with 2015) to 0.208 (times/-customers) in 2016. These results have been Taipower's most outstanding performance in past years and they reflect the joint efforts of our power generation, power transmission and power distribution units.

In the Getting Electricity Index in Doing Business 2017 (published by the World Bank), Taiwan was ranked 2nd among 189 economic entities worldwide for three years running and this reflects the success Taipower has achieved in the area of improving power accessibility. With regards to innovation, Taipower received 5 awards (1 gold medals, 1 silver medal and 3 bronze medals) at the Asian Power Awards 2016. These included the Energy Industry Gold Award, the Taiwan Corporate Sustainability Award, the Corporate Sustainability Award in Corporate Overall Performance and the "Social Inclusion Award" in the "Best Single Performance Award" category. These prestigious awards are illustrative of the recognition and industry acknowledgment that Taipower has received from society.

## Promoting Organizational Reform and Energy Transformation

On January 1, 2016, Taipower officially established four divisions: Power Generation, Nuclear Power, Transmission Systems, and Distribution and ServicesThrough this divisional structure, the company aims to raise cost awareness for all employees at Taipower and clarify the balance of payments. In light of the amendments to The Electricity Act, Taipower has established a Power Industry Liberalization Coping Strategies Task Force," with 6 subordinate task forces for Power Generation Coping Strategies," Power Distribution Coping Strategies," Transfer and Direct Supply," Power Dispatch," Accounting Separation and Resource and Transition Planning. These groups will be responsible for issues such as formulating measures for the liberalization of renewable energies, developing power transmission/transfer contracts and procedures, preparing to establish spin off holding companies, implementing accounting separation for the company, adjusting dispatch operations in response to renewable energy liberalization and so forth. In addition, the company has organized 16 employee communication seminars to adequately communicate and foster a consensus for organizational transformation within the company.

## Developing Creative Communication

In this new media era, the company has sought to close the gap between Taipower and the general public by initiating a "New Media Task Force" in 2015 to reshape the company's model of network media operations. This has been achieved by creating lively virtual characters with "human-like" personalities to deliver relevant information and to shape Taipower's corporate image so as to boost the company's capacity for external communications and information disclosure. In 2016, Taipower's Facebook page reached out to approximately 14.2 million users, which was double the number reached in 2015.

At the same time, Taipower has also stayed abreast of trends by organizing two hackathons in 2016 in the hopes of facilitating communication among different stakeholders concerned with energy issues. This will in turn improve the transparency of Taipower's information and through "open power information" and "collective intelligence" will boost the potential of power data analysis and innovative applications to formulate practical strategies for reducing peak load power consumption and ,ultimately, creating "open innovation" that is exclusive to Taipower.

## Deploying Power Services for Smart Grids

In addition to continuing to focus on improving existing grid reliability, Taipower will also be working towards smart grid construction in the hopes of building power grids that are more resilient and intelligent. Taipower will also continue to promote demand bidding and analyze customers' electricity consumption behavior through big data analysis in order to formulate smart power allocation strategies. In 2016, the company launched a disaster-proof micro grid in conjunction with distribution feeder automation to minimize the area of power outages caused by accidents. Taipower has completed the installation of smart meters for a total of 25,014 high-voltage households and 10,351 low-voltage households as the groundwork for future connections between users and terminals in order to facilitate transition towards smart power service.

## Building a Holistic Green Enterprise

In response to the mission of being friendly towards the environment and international trends towards low-carbon emissions, Taipower has committed itself to becoming a holistic green enterprise. Efforts have included increased investment in renewable energy and adjusting the power generation structure to 50% natural gas, 30% coal and 20% renewable energy. This structure is in response to the government's 2025 nuclear-free home initiative of 2016. Apart from actively introducing natural gas that produces less pollution and carbon emissions, Taipower has also been constructing the Xiehe LNG reception station, in addition to four more renewable energy construction projects that planned for 2017. In the next 15 years, the company expects to invest NT$ 400 billion in renewable power generation to bring the installed capacity for renewable power generation to 5.4GW (including hydro power). Furthermore, the company has also been working diligently to reduce air pollution from its coal-fired units by increasing the ratio of eco-friendly equipment investment so as to fulfill its corporate mission being environmentally friendly.

Looking ahead, Taipower's direction for future development in terms of its operations and management will focus heavily on transitioning from an organizational entity that executes government policies to a corporate entity that emphasizes efficiency and effectiveness; from a producer-oriented manufacturer to a consumer-oriented service provider." Coupled with the construction of a smart grid, Taipower will initiate policies that promote smart households, smart cities and smart power lifestyles and seek to develop a user-oriented smart lifestyle industry.." By considering consumers' perspectives, Taipower will provide customers with diverse, convenient and value-added services as well as innovative energy-saving solutions along the path of sustainable development.

Everyone at Taipower will work together as one to overcome the challenges presented by these power industry reforms and energy transitions. Taipower will place itself in the same boat as society and use its smart capabilities to provide reliable power. As a team, we will think outside the box and boost our competitive strengths. As a single entity, everyone at Taipower will strive to make the company the pride of Taiwan and to become a global leader in service quality, thereby setting a new milestone in the company's history as we head towards the next 70 years and usher in a new era for the power industry in Taiwan.

Chairman

# Contents

# Taipower's Transition and Transformation on its 70th Anniversary

Electricity is the mother of all industries. The history of a nation's power industry development is usually the epitome of its modern financial history. The name "Taipower Company" is practically synonymous with electricity in Taiwan. Ever since its inception in 1946, each step of Taipower's development had been closely related to major advancements in people's livelihoods and the development of domestic industrial sectors. Bound closely to Taiwanese people's lives, Taipower has gone through the different periods of Taiwan's economic prosperity. The company has not only gone through crises and contributed to miracles but also witnessed the changes that have taken place in Taiwan for the past 70 years.

Japanese colonial period

## A precursor to Taipower during the Japanese Colonial Period

After World War I, fledgling trade and commerce sectors in Taiwan began to thrive and the Taiwan Power Stock Company was established to start the Sun Moon Lake Hydroelectric Power Project. Prior to Taiwan's Retrocession, the company had completed 33 power plants with a total installed capacity of 320MW. In 1943, at its peak, the Taiwan Power Stock Company generated 1,200 GWh annually, with a peak load of 0.17 GW for more than 440,000 customers.

1946

## Establishment of Taipower in 1946

During World War II, Allied bombing and disasters such as typhoons and floods reduced the company's available capacity to 33MW. Coupled with the repatriation of the company's Japanese employees to Japan, Taiwan faced its first blackout crisis. At this crucial moment, Taipower Company was founded with the primary mission of stabilizing the power supply across the island. With the joint efforts of the late Sun Yun-Suan (Head Engineer of the Electrical and Mechanical Department at the time), Chinese engineers and students from Provincial Taipei Institute of Technology and Taiwan Provincial College of Engineering, 80% of Taiwan's power network was restored within 5 months.

1962

## The transition from hydropower to thermal power laid the foundation for Taiwan's economy

Taiwan's primary source of electrical power historically came from hydro power generation. However, in 1962, Taipower's thermal power generation exceeded its hydro power generation for the first time and thereafter changed the power system from "hydro power centered" to "equal emphasis on hydro and thermal power.." After the mid-1960s, Taiwan's industries grew rapidly, with power consumption dramatically increasing. Consequently, Taipower resorted to developing thermal power plants with high capacities and efficiency to accommodate the growing demand. The importance of thermal power generation became more apparent after the Dalin Power Plant went into operation in 1967. At this point, Taipower's power system shifted once again from its "equal emphasis on hydro and thermal power" to "thermal power centered, supplemented by hydro power." It was during the 1960s that Taiwan's power supply coverage reached 97% of the population..

Energy Crisis period

## Two energy crises that led to the diversification of energy

Due to the unpredictable situation in the Middle East, Taiwan was hit by two energy crises in 1973 and 1979. The government promptly responded by implementing many new energy policies. Apart from operating in conjunction with the "Taiwan Energy Policy," Taipower also promoted various energy-saving measures while carrying out power generation diversification policies. The company also commenced construction of nuclear power plants to ensure power supply reliability while reducing dependence on fossil fuels.

On November 16, 1977, Nuclear Power Plant No.1 officially began operation and the power plant when operating at full capacity was equivalent to all power plants at the time of Retrocession combined. Construction of Nuclear Power Plants No.2 and No.3 had also began at the same time. The commercial operations of the three nuclear power plants made significant contribution to the incredible growth of Taiwan's heavy industries.

1980s

## A slowdown in power development – stabilizing power through demand management

After the completion of construction and the commencement of commercial operations for the three nuclear power plants, Taiwan's reserve power supply reached a record height of 55.1 percent during the early 1980s. Given the ample supply of electricity and the growing awareness of the need for environmental protection among the general public, the development of power has since slowed down significantly. Additionally, public sentiment has rendered the promotion of new power development projects rather difficult. Towards the end of the 1980s, in addition to constructing large thermal power plants and developing ideal hydro power facilities, Taipower used measures such as time-of-use rates, interruptible rates, and energy-saving while encouraging cogeneration in an effort to balance power supply and demand. Taipower's power system has, in essence, entered a Demand Side Managementphase at this point in time.

1990s

## Power industry liberalization during the 1990s, with independently operated power plants

Beginning in the 1990s, power industry liberalization became a global trend. In light of the fast growing demand for power and the increasing difficulty of power development due to limited land space and a dense population, the government followed the trend and opened the door for independently operated power plants in order to speed up the process of power development. This marked the beginning of the Liberalized Power Industry era in Taiwan's power sector.

Late 90s

## Taipower embraces energy conservation and carbon reduction

In the 1990s, the drive for energy conservation and environmental protection became a significant force in the international community. With major agreements such as the "UNFCCC" (1992) and "Kyoto Protocol" (1997) emerging, governments around the world have gradually become more attentive to the control of carbon dioxide emission. As a result, room for the development of coal and fuel power generation shrank considerably. Consequently, Taipower adhered to the government's energy policy and expanded its Liquid Natural Gas (LNG) power generation.

Past 10 years

However, as of 2006, international petroleum fuel prices have soared and severely affected the operating environment for the power industry. Due to the lack of indigenous energy resources in Taiwan, in order to ensure the sustainable development of the power business, Taipower has sought to develop low-carbon power in terms of supply and aggressively pushed for energy conservation and improvements in power usage efficiency on the demand side.At this point, Taiwan's power industry entered an Energy-saving and Carbon Reduction period.

### In the face of sustainability challenges – evolving from an agency to a corporate entity

The decade between 2007 and2016 brought the toughest challenges to Taipower, yet. But along with adversity came the opportunity for reform. As a result of the obstacles to sustainability, such as public opposition to large-scale power generation projects, required policy, failure of existing electricity prices to reflect operating costs, and aging human resources, Taipower has sought to transform itself from a state-owned agency into a corporate entity that emphasizes efficiency and effectiveness through its management strategies and adjustments in its operating model. With the tireless efforts of its employees, Taipower managed to turn loss into profit in 2014, demonstrating its success in management reform. Furthermore, Taipower officially established its four business divisions in 2016 and made another critical step on its path towards organizational transformation.

## Great Future of Green Power

In reflecting on Taipower's transformation and evolution over the past 70 years, Taipower has been focused on three primary areas (company heritage, management reform and green action) in recent years in the hopes of building momentum from the 70 years of hard work and achievements the company has attained and transforming that momentum into an epoch-making power utility business group. Key points of transformation in the three areas are summarized below:

## Company Heritage

Having started out as an engineering and technology oriented business, Taipower has always had an engineering culture. For many years, the company upheld the values of responsible, professional, down-to-earth and diligent in its endeavors, thus contributing to Taiwan's decades of prosperity. The Taipower Family culture between supervisors, subordinates and peers has always been a fundamental that helped to consolidate Taipower as a company.

However, due to the nature of the power industry, it was inevitable that Taipower would neglect its development in terms of culture and humanities. The company suffered from obstacles in its operations and development due to its inadequacy in communicating with other parties and vying for support from the general public.

Therefore, Taipower has been focusing on the cultivation of its corporate culture by constantly encouraging its employees to be empathetic, to care about changes in the outside environment and to engage in communication with society. Only by appreciating the fact that humanity must coexist in harmony with the environment will we be able to reflect in depth and determine if each action and each decision we make carries positive meaning for the earth, humanity and a sustainable environment. This would help us to gradually shape our resolve, which would in turn support us in go forward towards the right path.

Looking towards the future, we will continue to pass on the spirit of Taipower and to be attentive to the need for social development while injecting elements of warmth and communication into our engineering culture. We will embrace openness, diversity, environmentalism and culture as we strive to improve information transparency and strengthen corporate governance while fostering relationships of mutual assistance and trust with all of our stakeholders so that Taipower earns the respect of society, thereby setting a sound foundation for Taipower's sustainable development.

## Management Reform

As a state-owned enterprise rooted in technological expertise and an engineering culture, ," the difficulty of reform is greater for Taipower than for most private enterprises. Changing employees' thinking and methods and planning Taipower's operations from the perspective of a corporate entity have become vital points in Taipower's management reform.

First and foremost, Taipower implemented an organizational structural reform. In order to transform from an agency to a corporate entity, Taipower redefined its core businesses of Power Generation, Power Transmission, Power Distribution, and Power Services into four major divisions of Power Generation, Nuclear Power, Transmission Systems, and Distribution and Services. Internally, accounting separation and the separation of grid functions began in order to foster cost awareness among employees while identifying relevant issues that each division may face. With the efforts and contributions of everyone at Taipower, the company officially transformed into a new power utility group with four main divisions in 2016.

Taipower has also dedicated itself to the development of communication methods and approaches that are driven by specific philosophies in order to change its former culture that fared poorly in the area of communication. This allows the company to present its diligent efforts to provide a reliable power supply in ways that would otherwise have been overlooked by Taipower employees. These measures have included revamping the official website, information disclosures and establishing Taipower TV as a channel for us to tell our stories. The company has also employed activities such as the Culture and Humanities Corridor and Internal-External Communication Platform conferences held to promote the company's sharing of its experiences in communication. These efforts have not only accentuated Taipower's new image as an open and tolerant company but have also changed employee perception of the company by rendering encouraging staff to be more proactive in

their engagements and communications with the society. Ultimately, this progress has reshaped Taipower's engineering culture into one that incorporates elements of culture and humanities.

Thanks to employee contributions to management reform, Taipower finally ended its eight consecutive years of deficit in 2014 and turned losses into profit, thereby returning the company to glory once more. For the foreseeable future, Taipower will face challenges such as financial deficits, fluctuation in fuel prices, tariff adjustments, addressing public opinions, controversy over nuclear energy, carbon-reduction issues, environmental protection, development of green energy, power technology development, the human resource gap and so forth. The company will adopt an open mindset while keeping in touch with the latest developments in order to prepare itself to overcome adversity at critical moments and soar towards greater heights.

## Green Action

In light of climate change, mitigating global warming while maintaining ideal air and water quality has become a generally accepted goal for the Taiwanese public. As Taipower's, mandate is to maintain a reliable power supply, the company is aggressively striving to achieve carbon-reduction targets through a two-pronged approach (i.e. both power supply side and power demand side) whilst implementing green innovations and eco-friendly measures to transform the organization into a green enterprise from the bottom up.

Faced with these challenges, Taipower established its Green Enterprise Creative Platform in 2014 and initiated a series of green action plans through active participation and brainstorming by participating units. Green actions, such as eco-friendly enzyme use, improvements in energy efficiency for old buildings, expansion of green purchases and construction of smart green communities, were launched into full swing. These measures were closely followed by the launch of Taipower's green grid, the transformation of the company's hydro power plants into ecological power plants, and the establishment of an Environmental Protection Strategic Platform in conjunction with demand-bidding and green power purchases. These measures reflect Taipower's resolve to become a green enterprise.

In addition, Taipower has adjusted its mission to "deliver the stable power required by society for diverse development in an environment-friendly manner at reasonable costs" in 2016, by incorporating environmentally friendly elements. This will help the general public and Taipower employees to better understand the changes in Taipower's thinking. Being environmentally friendly, developing renewable energy, introducing low-carbon emissions and low-pollution power facilities will all be key points in Taipower's future operations. The company will also be committed to the protection of ecology, the cultivation of green attitudes, the fulfillment of green lifestyles, the building of green supply chains and other developments for green enterprises so as to bring a brighter future to the land we live in.

Taipower has gone through 70 years of hard work and adversity together with Taiwan. We exist for the public good and have never taken a break. From day to night, from the past to the future, through reshaping our corporate culture, implementing management reform and promoting green actions, we shall continue to transform and evolve whilst protecting our natural environment as we accompany Taiwan in each and every memorable moment.

## 2016 Development Milestones

**January 2016**
Taipower officially transforms to a division organization

**February 2016**
Taipower's Steam Generator Chemical Cleaning Technology at Nuclear Power Plant No.3 received the Technology Transfer Award from the Electric Power Research Institute

**March 2016**
- In consideration of changes in the operating environment in recent years and shifting expectations from the general public, Taipower updated and adjusted its mission, vision and management philosophies
- Taipower received the outstanding award in the category of "Improved Quality of Working Life" for the first time in the Global HRD Awards 2016 from the International Federation of Training and Development Organizations.

**May 2016**
- Reserve capacity reached 1.64% - the lowest point in the past decade
- Minister of Economic Affairs announced the goal for renewable energy generation of 20% by 2025

**June 2016**
"Open Taipower" incident

**July 2016**
Instantaneous peak load reached a record-setting high at 36.2 GW

## August 2016

- Establishment of the Nuclear Power Plant No.1 Decommissioning Task Force
- Datan Power Plant rated as "Outstanding" for its participation in the 2016 National Critical Infrastructure Protection Drill.

## September 2016

- Received the Sports Activist Awards, including the Sponsorship Gold Medal, Long-Term Sponsorship Award, and Promotion Gold Medal.
- Received 1Gold Medal, 1 Silver Medal and 3 Bronze Medals in the Asian Power Awards
  - The "Application of Reverse Engineering to Repair Large Wind Turbine FRP Blades and Accident Analysis" proposed by the Taipower Research Institute received the Gold Medal Award for "Wind Power Project of the Year"
  - The "Countermeasures of Stress Corrosion Cracking on Steam Turbine Rotor Grooves at Hsinta Power Station Unit 1" proposed by the Department of Power Development received the Silver Medal Award for "Power Plant Upgrade of the Year"
  - The "Rehabilitation Project of the Chingshan Branch Plant of TaChia Hydro Power Plant" proposed by the Department of Construction received the Bronze Medal Award for "Hydro Power Project of the
  - Year"
    The "Banqiao Primary (161kV) Substation Reconstruction Project" proposed by the Department of Transmission Line and Substation Projects received the Bronze Medal Award for "Transmission &
  - Distribution Project of the Year"
    The "Real-Time Alarm and Emergency Processing System for Underground Cables" proposed by KaoPing Power Supply Branch received the Bronze Medal Award for "Smart Grid Project of the Year"

## October 2016

- Received an "Exercise Enterprise Certification" from the Sports Administration, Ministry of Education
- The Executive Yuan's version of "The Electricity Act" Amendment Draft was finalized on October 20 and submitted to the Legislative Yuan for review.
- According to the "Doing Business Report 2017" published by the World Bank, Taiwan was ranked 2nd worldwide for three consecutive years in the category of "Getting electricity," surpassing developed nations such as Germany, Switzerland and Hong Kong
- Received "Exceptional Award" (No.1) in the "Promotion of Employee Learning System Incentive Campaign by the Central Government for 2016" organized by the Ministry of Education

## November 2016

- Received the "2016 Taiwan Corporate Sustainability Award" of the Taiwan Institute for Sustainable Energy
  - "Gold Award" in the Energy Industry Group for "Corporate Sustainability Report Award"
  - "Corporate Sustainability Award" for "Corporate Overall Performance Award"
  - "Social Inclusion Award" in the "Best Single Performance Award"
- The Department of Personnel Administration received 1st place in the 2016 Personnel Administration Performance Evaluation for Business Organizations from the Personnel Department, Ministry of Economic Affairs
- The Hsinta Power Plant (Kaohsiung) set an example for cross-sector collaboration by offering warm water discharge to local aquaculture proprietors at no charge
- "16th Gold Medal for Public Works" from the Public Construction Commission, Executive Yuan:
  - Exceptional Facility Award for "Linkou Power Plant Renewal and Expansion Project – 345kV Gas and Accessory Equipment Construction" by the General Engineering Unit
  - Outstanding Civil Engineering Award for "Linkou-Dinghu 345kV Power Line #41~#43, #56 Dinghu E/S Cable Terminal Civil Construction and Accessory M/E Lump Sum Contract" by North District Construction Office
  - North District Construction Office Deputy Director Kuo Chao-Kun received the "First Prize in Category II – Personal Contribution Award"
- The Datan Power Plant received the Silver Award at the ROC Enterprise Environmental Protection Awards for 3 consecutive years, along with the "Honorary Award for Enterprise Environmental Protection – the highest honor bestowed upon selected enterprises for their contributions towards environmental protection
- NPP3 Machinery Section received the "QCQ National Competition Silver Tower Award" and "Most Innovative Improvement Award"
- The "FMR Suppression Device" independently developed by the Taipei Power Supply Branch Office had its patent application approved

## December 2016

Jianshan Power Plant received the "Outstanding Corporate Adopter Award" for its participation in the "Air Quality Purification Zone Outstanding Adopter Selection"

CH1

# Taipower and Sustainability

**Founded: May 1, 1946**
**Coverage: Taiwan, Penghu, Kinmen, Matsu areas**
**Headquarters: Taipei**
**Capital: TWD 330 billion**
**Stock: 96.92% government-owned, 3.08% privately-owned**
**Total assets: TWD 2,002.94 billion**
**Annual revenue: TWD 569.68 billion**
**Employees: 26,673**
**Customers: 13.82 million**
**Installed capacity: Taipower system: 42.13 GW (Taipower-owned: 32.22 GW)**
**Power generated and purchased: 225,793 GWh**
**Power sale: 212,531 GWh**

# 1.1 Taipower Profile

## 1.1.1 Introduction

Taiwan Power Company (Taipower) was established on May 1, 1946. It is a vertically integrated electrical power utility company. Its business scope includes generation, transmission, distribution and service of electricity. As a state-owned enterprise, Taipower is obligated to supply electricity as stipulated in the “Electricity Act..” Power sales accounted for 97.6% of Taipower’s revenue in 2016. As of 2016, the Taipower system (including independent power plants or IPPs) had a total installed capacity of 42.13 GW. Its main energy sources were comprised of thermal and nuclear power, combined with hydro and other forms of renewable energy. In terms of transmission and distribution, at the end of 2016, Taipower operated 608 transmission (sub) stations along 17,427 km of transmission lines and 364,947 km of distribution lines.

In light of the trends to pursue sustainable development and to develop the power market, Taipower has updated its corporate mission in recent years and has promoted organizational transformation by establishing four business divisions in January 2016. These include: Power Generation, Nuclear Power, Transmission Systems, and Distribution and Services. Through divisional operations under a group structure, each division shall operate independently and be responsible for its own profits or losses. By transforming Taipower from an agency to a highly efficient corporate entity, the company will improve its management efficiency, facilitate sustainable development, and become an exceptional power utility group that delivers excellent services to customers.

## Average Plant Availability in 2014-2016

| Unit | | Energy Type | Average Availability in 2014 (%) | Average Availability in 2015 (%) | Average Availability in 2016 (%) |
|---|---|---|---|---|---|
| Thermal | Steam power | Oil | 90.20 | 93.87 | 89.08 |
| | | Coal | 92.68 | 90.31 | 91.25 |
| | | LNG | 91.21 | 93.66 | ****73.52 |
| | Combined cycle | LNG | 89.44 | 89.43 | 90.26 |
| Nuclear | | Uranium | 92.00 | 75.26 | **67.83 |
| Hydro | | Hydro | 92.63 | 91.81 | 93.85 |
| Wind | | Wind | 93.81 | 89.49（*93.23） | 83.13（***88.20） |

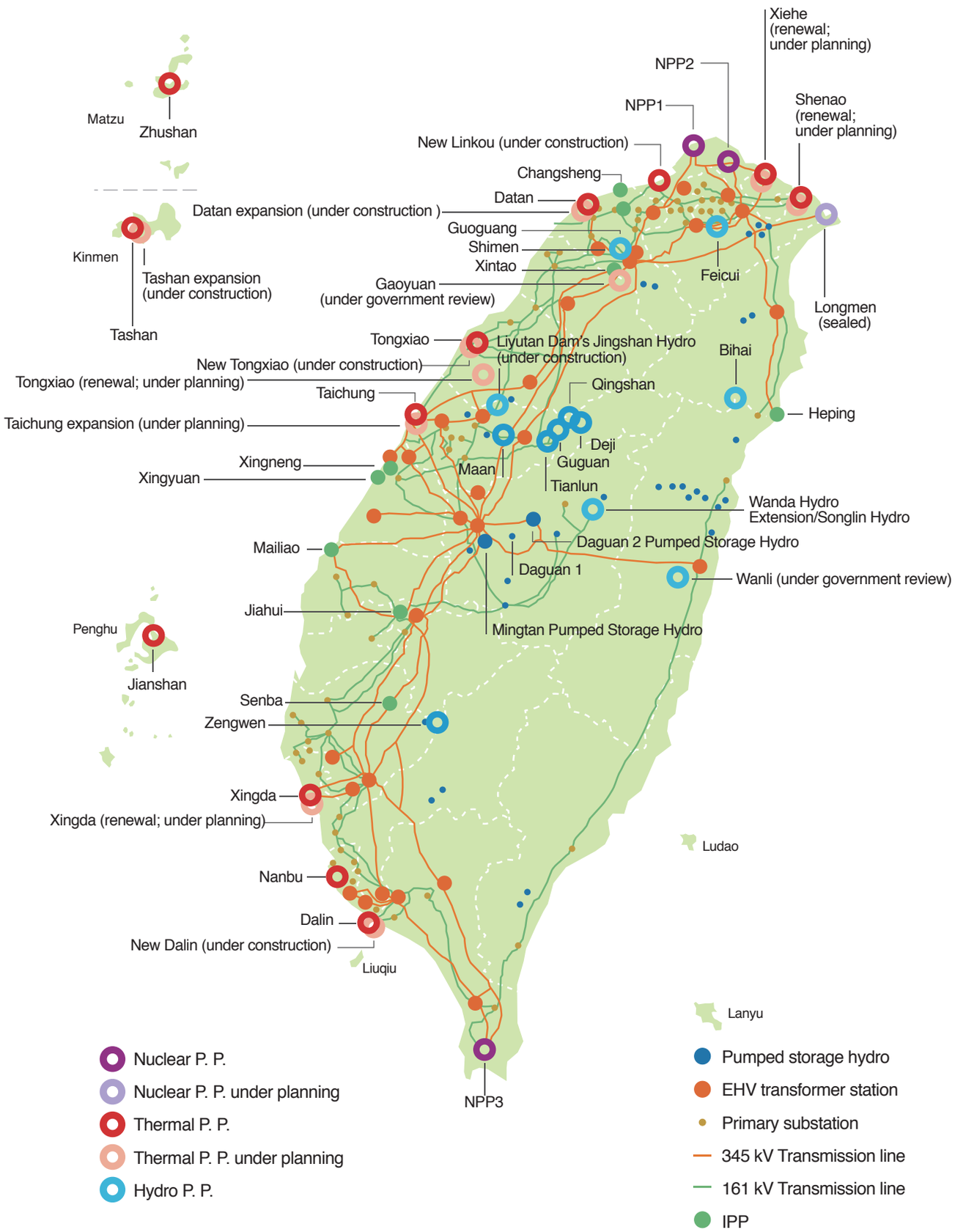
Note:
- Thermal Unit Availability = (1- Period Unit Impact on Power Supply/No. of Hours/Unit Max Net Output)
- Thermal Plant Average Availability = Σ (Unit Availability × Unit Max Net Output)/Σ Unit Max Net Output
- Nuclear Various Units Availability = Annual No. of Hours of Parallel Power Generation/Annual Total No. of Hours
- Hydro Unit Availability = (Operational Period + No. of Standby Hours) /Annual No. of Hours
- Hydro and Nuclear Power Plant Annual Availability = Arithmetic mean of Unit Annual Availability
- Wind Power Plant Annual Availability = No. Hours of Power Generation (including non-active hours)/Annual No. of Hours
- *Average availability excluding the wind power plants damaged by typhoons in 2015
- Due to the damage on the connecting hardware for the water channel of an atrium 10 fuel at nuclear power plant 1 Reactor 1 in 2015, the power plant was rendered non-operational for the entirety of 2015 and this has caused the decrease in average nuclear availability.
- **Due to the malfunctioning of arrester grounding in Reactor 2 at nuclear power plant 2, the power plant was rendered non-operational from May 16 2016 onward, resulting in the decrease in average nuclear availability.
- ***Figures in parenthesis factor into account the potential availability from the relocation and retrofit project of Taichung Wind Farm and the fire that damaged Wind Turbine No.31 in Changhua on April 28, 2016.
- ****Dalin No.5 and 6 were the only two steam powered LNG units in operation; apart from the scheduled tasks (i.e. major repair, occupational safety inspection), Dalin No.5 was due for BWCP inspection while gas content in the capacitor oil for Dalin No.6 became too high and caused the unit to operate at a lower capacity and thus leading to lower availability in 2016.

As a state-owned company, Taipower's business adheres to Act Governing the Management of State-owned Enterprises. Therefore, projects related Taipower units such as accounting, auditing, budgets, business planning, public utility rates, and long-term purchases and sales contracts must gain the approval of government authorities through the Ministry of Economic Affairs. It transmits related commands to other divisions, including the MOEA Bureau of Energy, Executive Yuan's National Development Council and the National Audit Office, etc.

In addition, Taipower must follow relevant regulations, under the Government Procurement Act, the Accounting Act, the Electricity Act, etc. In implementing organizational transformation, Taipower needs to consider restrictions imposed by regulations such as the State-owned Businesses Act, the Government Procurement Act, the Accounting Act, the Budget Act, and the Government Accounting Act, etc. As such, the promotion of any policy involves comprehensive consideration of all pertinent regulations.

In an effort to disseminate awareness of general knowledge of legal affairs and to boost employees' awareness for legal compliance, the Legal Affairs Office has made it a point of organizing multiple sessions of its "Practical Legal Issues: Case Studies and Solutions Seminar" at different units along with other legal affairs training initiatives. In addition, the Legal Affairs Office provides various legal consultation services in order to help with legal issues that different units may have encountered in their operations while ensuring that all employees abide by pertinent regulations.

## 1.1.2 Taiwan's Power Plants and Power Grid



# 1.2 Taipower Long-Term Value Creation and Sustainable Development Framework

As an integrated Electric Utility, Taipower is reshaped to four Division, the sustainable performance and function shows as below:

Value create from tangible and intangible assets

Taipower base on brand new corporate mission integrating the utility value chain. The self –function four Division cooperate effective group working, and providing friendly and stable electricity.

## Resources input

- Oil
- Coal
- Natural Gas
- Nuclear Fuel
- Hydro
- Solar
- Manufacturing Resources
- Human Resources
- Finacial Resources

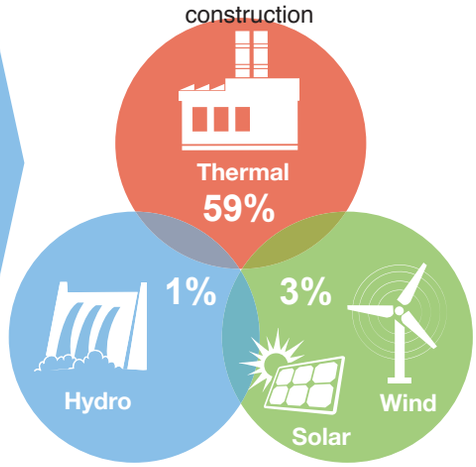
## Value Chain and Business model

### Power Generation

**Power Generation Division**

Response for hydro and thermal power, management, generation, maintain and construction

63%



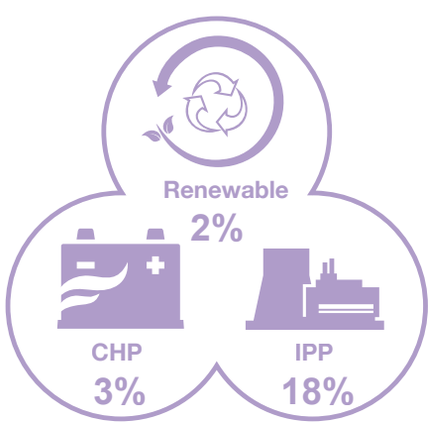

**Nuclear Power Division**

Response for nuclear power safety, system design and management, public communication, nuclear waste treatment, ect.

14%

**Electricity purchase**

23%

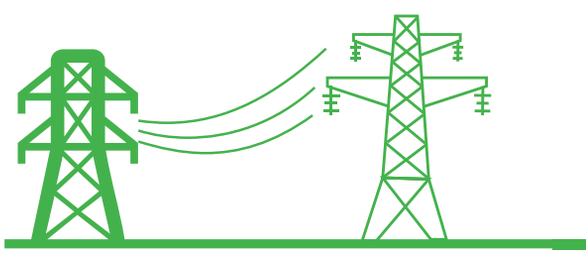



### Transmission

**Transmission System Division**

Response for electric grid construction, maintain and operation

| | |
|---|---|
| HV Transmission Line | 345KV |
| General Transmission Line | 161KV |
| Underground Transmission Line | 69KV |



608 substation

17,427circuit kilometers (CKM)

Taipower expect ourselves not only power provider, but also sustainable development of five-Pronged Business, and creating long-term value to become reliable world class utility

Taipower's five main role and Sustainable Development Goals

Power Transmission

Distribution and Service Division

Response for electricity purchasing, costumer service, grid planning, maintain and operation.

**21%** Building

**15.6%** Business

**55.1%** Industry

**8.3%** others

## Taipower Five-Pronged Business Strategy

### High Quality Power Service Provider

- Drive our organization's reform in response to the on-going liberalization of the power utility industry
- Meet different power needs for different customers
- Improve power supply stability and reliability
- Create different channels to interact with the customers
- Strengthen demand side management
- Strengthen customer relationship management, raise customer satisfaction

### High-Efficiency Power Utility Operator

- Adopt high-efficiency power generation equipment and technology
- Accelerate the upgrading of existing power plants
- Ensure safety of fuel supply and improve procurement performance
- Make effective use of IoT, enhance asset management
- Enhance operational management of hydro and thermal power plants
- Enhance nuclear power plant operation and safety performance
- Develop partnership relations with IPPs in Taiwan

### Adopting Smart Grids

- Become an indispensable power distributor
- Build a smart grid with capabilities for self-monitoring, self-diagnosis, maintenance, protection and recovery
- Utilize big data to better understand customers' usage behavior in order to provide value-added service that enables customers to use power in a smart way that reduces CO2 emissions
- Reduce average blackout time per customer, increase power supply reliability

### Agent of Environmental Friendliness

- Develop renewable energy and improve the safety of renewable energy into the grip
- Foster an attitude for sustainable and green lifestyle and focus on ecological preservation so as to create a friendly environment
- Increase low-carbon power generation to achieve carbon emission reduction so as to become a green enterprise
- Encourage the general public to cultivate habits of energy conservation, purchase green energy so as to facilitate power consumption efficacy

### Practitioner of Corporate Social Responsibility

- Focus on corporate governance and corporate ethics
- Promote corporate culture; expand public welfare activities and co-prosperity with communities around our power plants
- Build a safety culture that fosters initiative, mutual care and discipline
- Build diverse channels of communication with the society with an open mind in order to establish a win-win relationship of trust with the society

## Sustainable value creation

# 1.3 Taipower's Mission and Vision

With the ongoing changes that are taking place in the external environment, an inevitable wave of sustainable development has swept the world and brought about significant changes in the format of management and structure of business models for power industries. In response to these changes, Taipower revised the company's mission, vision and management philosophies in 2015 in order to guide the company's operations and change employee management mentalities so that Taipower can advance towards its goal of becoming an outstanding and sustainable power utility group.

## Taipower's Mission

**To deliver the stable power required by the society for diverse developments in an environment-friendly manner at a reasonable costs.**

Power is a crucial resource that is vital to the daily livelihoods of members of society and the development of various businesses. Maintaining a reliable power supply has always been a fundamental mission for Taipower. Guided by an open attitude, the company will include independent power generation, cogeneration and suppliers of renewable energy into the power supply system so that it can achieve the goal of delivering a reliable power supply at reasonable costs. As current energy industries rely on non-renewable resources for development, in an effort to facilitate environmentally friendly development, Taipower is committed to the active development of renewable energies while introducing clean energies that are low in pollution and carbon emissions. At the same time, given the existing trends in power industry development, Taipower will also be strengthening its customer relationship management. By taking into account factors such as the varying needs of residential and corporate customers, the company will deliver differentiated services through specific technologies and smart services, thereby enabling customers to lead "energized lifestyles of greater convenience".

Finally, facing the challenges that arise from the global trend toward sustainable development in the power market, Taipower will also be implementing organizational transformation to evolve from a state-owned business to a corporate organization with divisional structures. By cultivating the cost awareness of staff the company will enhance operational efficacy and, in so doing, will achieve its objective of establishing sustainable operations and management.

## Taipower's Vision

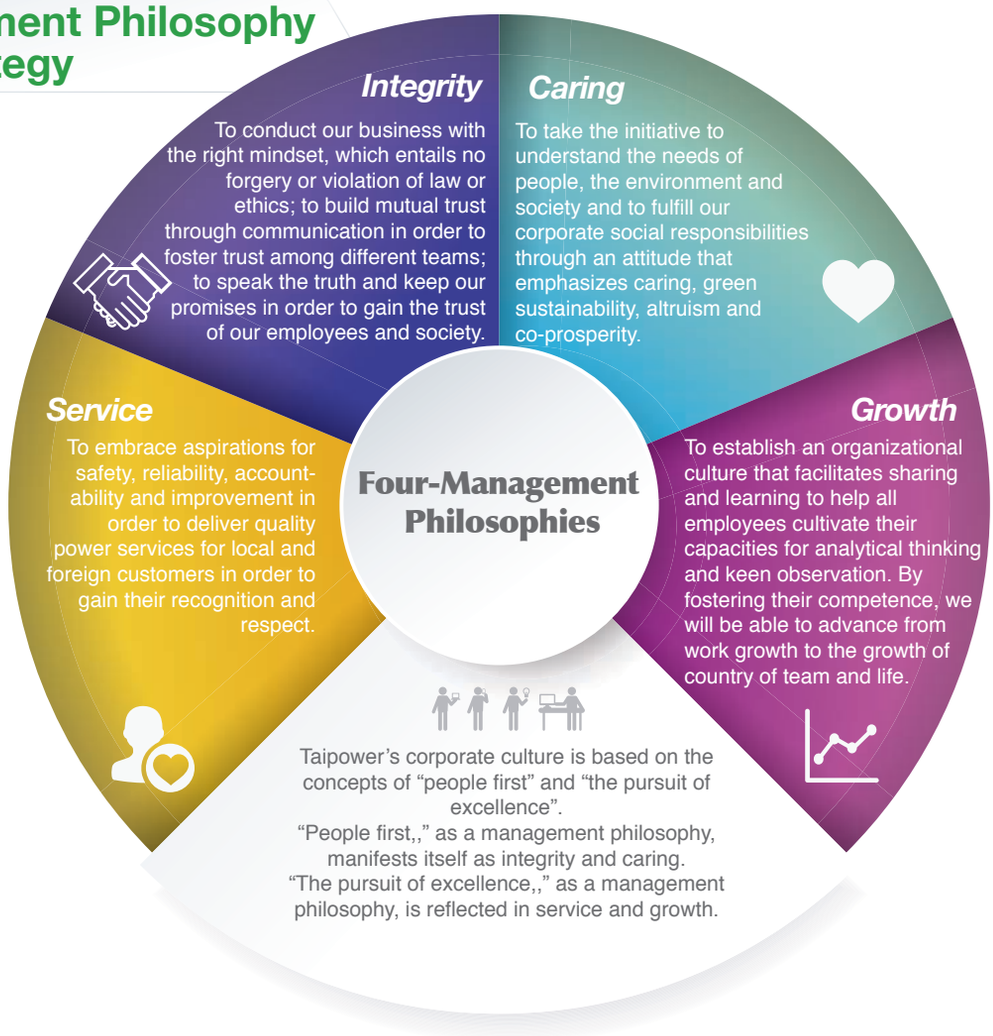
**To become a prestigious and world-class power utility group.**

**Excellence:** Taipower shall endeavor to strengthen its management efficacy and improve its management performance in order to compete with international benchmark power companies whilst constantly improving itself so that it may grow mutually with its customers and society as Taipower evolves to become an outstanding and sustainable power utility group.

**Trustworthy:** We firmly believe that earning the trust of society and our customers is the highest level of achievement that corporate management and a company may attain. We are tasked with passing down Taipower's existing spirit of "professionalism, down-to-earth diligence and responsibility." As we strive to provide reliable power supply, we will bear an "open, diverse, green and culture-oriented" attitude in dealing with corporate governance. Guided by philosophies of "integrity, caring, service and growth," Taipower will foster relationship of mutual assistance and trust with all stakeholders so that the company may become an inseparable partner in the lives of the general public.

**A world-class power utility group:** Despite being a state-owned enterprise, Taipower shall steer itself towards corporate/conglomerate operations in order to cultivate competitive advantage while capitalizing on all opportunities for development in order to extend its management advantages to emerging sectors of energy conservation and green energy. By collaborating with our business partners to cultivate offshore markets, we will be able to inject new energies into the growth to the company.

# 1.4 Management Philosophy and Strategy




Taipower's overall business strategy is annually reviewed and established. The strategy consists of elements for "Creating Value", "Reducing Costs", "Fulfilling Social Responsibility", "Improving Customer Service" and "Reengineering the Company.." These aspects of operations are reviewed and adjusted by a rolling system annually in accordance with changes in the business environment. Given the new corporate mission, vision and management philosophy Taipower adopted in 2016, the company has referred to the key performance indicators for international benchmark power industries in the establishment of its corresponding action plans and performance measuring indicators for the five areas of the business strategy. Through comprehensive planning, execution and control systems, Taipower will ensure precise and thorough execution of these strategies.

With the ongoing emergence of trends towards a low carbon economy and sustainable development, there is the potential for changes, such as amendments to "The Electricity Act" and the government's green energy policies, that will need to be addressed. As the primary power supplier in Taiwan, Taipower's power planning and management strategies in the future will put more emphasis on objectives such as energy conservation, green energy and low carbon emissions. Under the premise of delivering a reliable power supply, the company shall tackle challenges from both the power supply and demand ends in order to accomplish its goals of reduced carbon emission and fulfill its mandate of being an environment-friendly company and a leader in Taiwan's green future.

# 1.5 Corporate Sustainable Governance

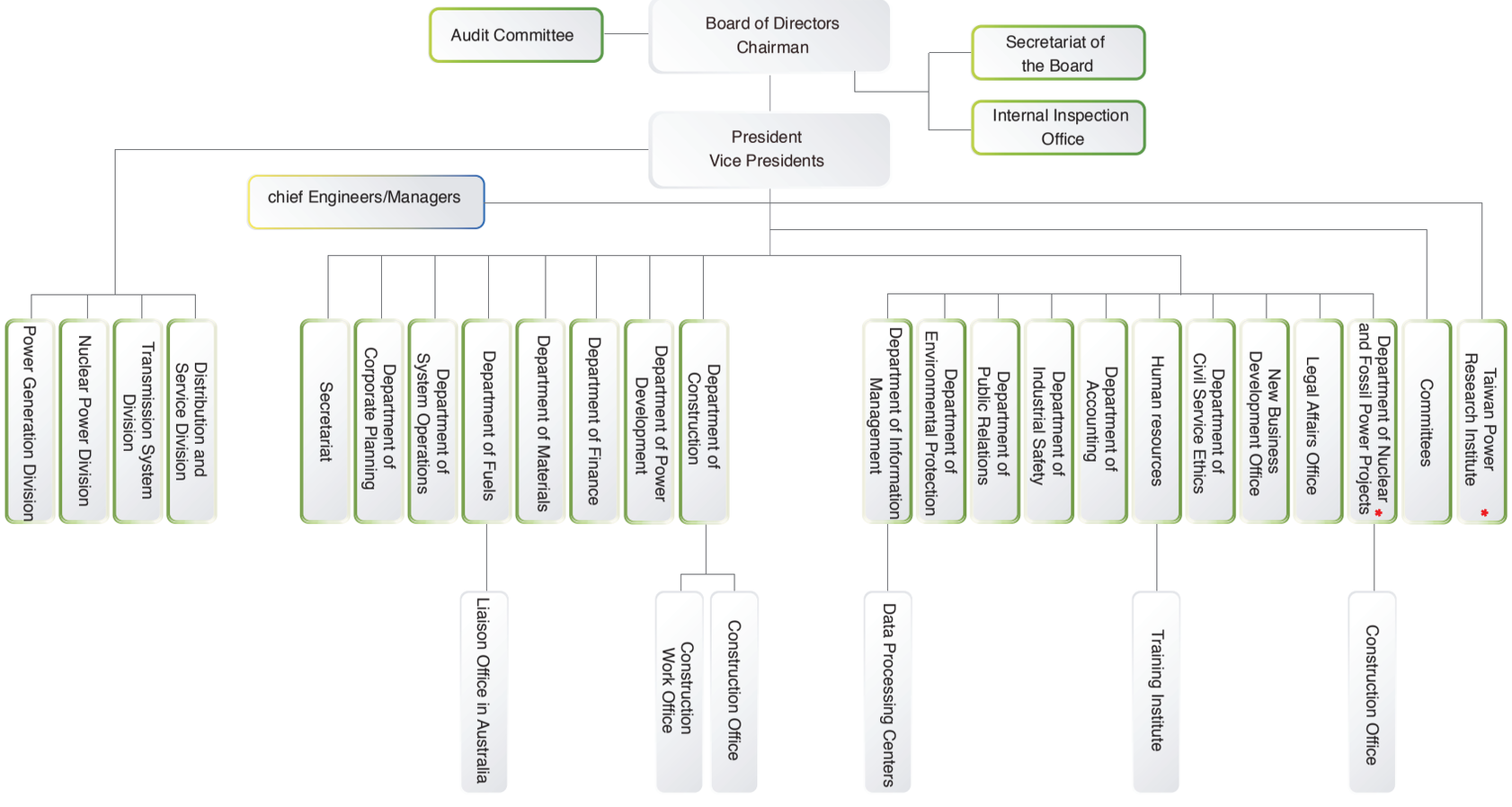
## 1.5.1 Corporate Governance

Taipower formally initiated its divisional structure on January 1, 2016. This entailed dismantling and restructuring of the company's existing units to achieve a business model that is akin to a holding group. Presently, Taipower consists of four major divisions of Power Generation, Nuclear Power, Transmission System, and Distribution and Services and leading by the headquarters, all of which report to the President and the Board of Directors (BOD). With this brand new structure, Taipower will usher in a new era of a liberalized power industry.

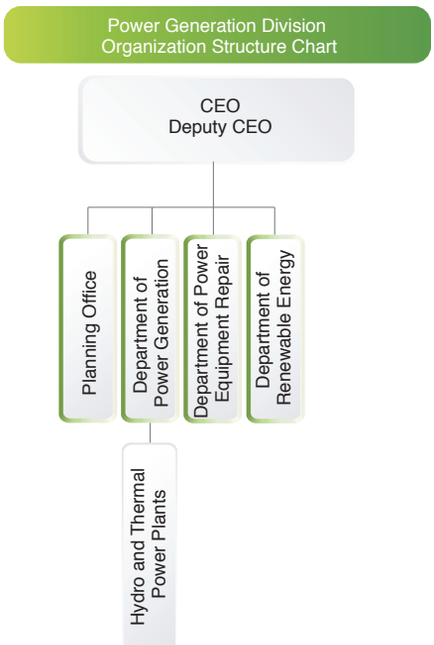
### Organizational Structure of Taipower

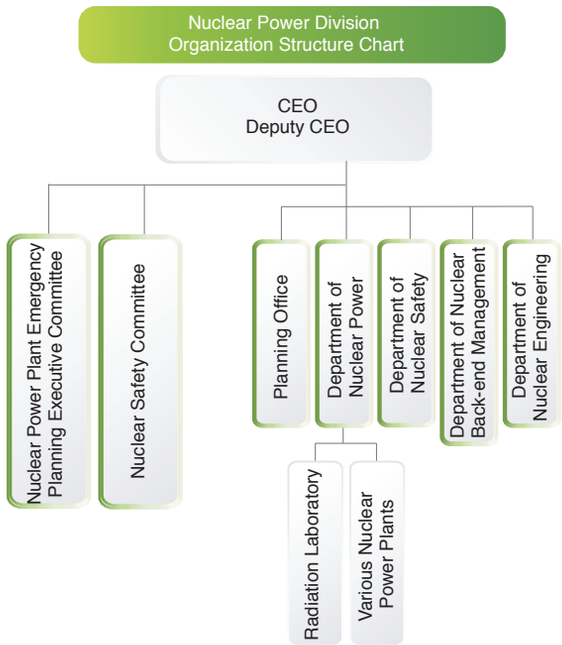
**Taiwan Power Company - Organizational Structure Chart**

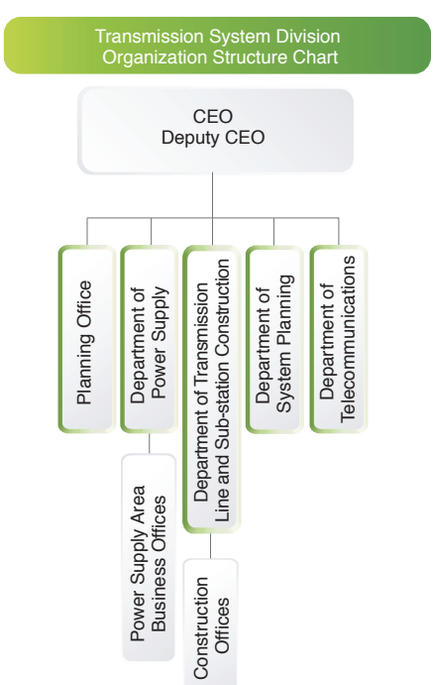
Revised on December 17, 2015

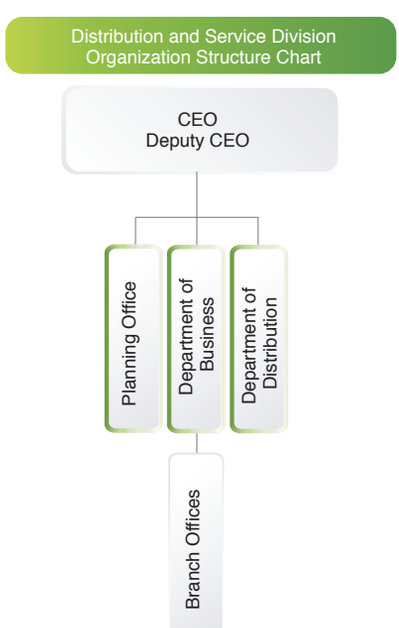



Note: * 1.denotes units that are not located at the headquarters.
2.Taiwan Power Research Institute reports to the President directly.



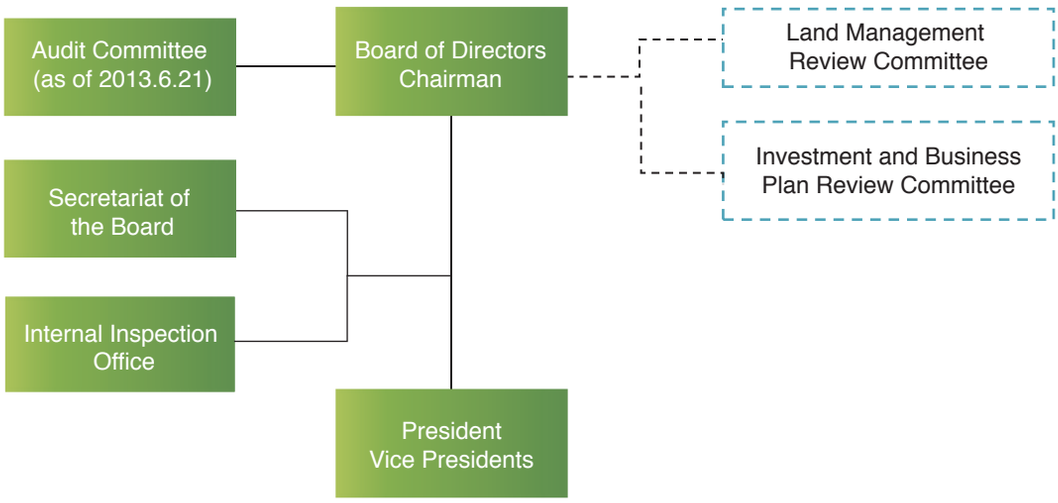




## Organization of the Board of Directors

According to Taipower regulations, the BOD consists of 15 directors, elected by a meeting of shareholders. In accordance with the provisions of the Securities and Exchange Act, the Board shall reserve three seats for independent directors, who make up the Audit Committee. The three independent directors are expected to contribute their expertise from different professional backgrounds and extensive experience in order to help the Board oversee Taipower's management and identify potential risks in management. The BOD elects five managing directors, including one independent director, from among its directors. The term of service for directors (including independent directors and managing directors) lasts for two years, and can be extended with subsequent terms. Pursuant to the Administrative Law of State-Owned Enterprises, no less than 1/5 of the seats on the Board shall be reserved for candidates representing the government's stake in the company and these candidates shall be recommended by unions with official requests from the competent authority in charge of state-owned enterprises. Thus, the fifteen directors of Taipower shall include five managing directors, three independent directors (two of whom serve as managing directors), and three directors representing labor interests. In addition, the Audit Committee (consisting of the three independent directors) was established as part of the board of director's election through a meeting of the shareholders meeting, held on June 21, 2013 to replace the company's auditors.

## The Taipower BOD consists of the following members:




### The list of directors

| Position | Name | Concurrent Position | Remarks |
|---|---|---|---|
| Board Chairman (Managing Director) | Chu Wen-Chen | Chairman of Taipower | Assigned by MOEA |
| President (Managing Director) | Chong Bing-Li | President of Taipower | Assigned by MOEA |
| Managing Director | Chang Tzi-Chin | Deputy Director of the Environmental Protection Agency | Assigned by MOEA |
| Managing Director (Independent Director) | Ma Kai | Economic advisor, Money Weekly; Chief Editor, Economic Daily | Nominated by MOEA |
| Managing Director (Independent Director) | Chen Hsin-Hung | Research Fellow, Director of the Second Research Division, ChungHua Institution for Economic Research | Nominated by MOEA |
| Director (Independent Director) | Tsai Yann-Ching | Professor, Department of Accounting, National Taiwan University | Nominated by MOEA |
| Director | Wu Tsai-Yi | President, Taiwan Research Institute | Assigned by MOEA |
| Director | Ma Hsiao-Kang | Professor, Department of Mechanical Engineering, National Taiwan University | Assigned by MOEA |
| Director | Lee Min | Professor, Department of Engineering and System Science, National Tsing Hua University | Assigned by MOEA |
| Director | Bien Tai-Ming | Professor, Department of Land Economics, National Chengchi University | Assigned by MOEA |
| Director | Chang Ssu-Lu (Female) | Professor, Institute of Natural Resources Management, National Taipei University | Assigned by MOEA |
| Director | Shih Chao-Hsien | Representative, Taipower Labor Union | Labor union representative sent by MOEA |
| Director | Lin Wan-Fu | Representative, Taipower Labor Union | Labor union representative sent by MOEA |
| Director | Liu Han-Tong | Representative, Taipower Labor Union | Labor union representative sent by MOEA |
| Managing Director | Hwang Jung-Chiou | | Resigned in August 2016 |
| Director | Yao Chiang-Lin | | Resigned in May 2016 |

Yao Chiang-Lin resigned in May 2016, the position has not assigned, there are 14 members in the board of directors

## Enhancing the Function and Effectiveness of the Board of Directors

The BOD takes responsibilities for establishing and maintaining the company's vision, determining the company's strategies, supervising management and being accountable to the stakeholders. As a state-owned enterprise, Taipower not only operates its own business but also plays the role of a public policy executor. Therefore, Taipower's BOD shall emphasize integrity in management and the objectives, strategies and management of sustainable governance. The following section will cover the operations of the BOD:

### Board of Directors operations

In 2016, the board was convened 13 times, with an average attendance rate of 89.7%. The records of monthly board meetings are available on Taipower's internal-net and its website as reference for Taipower employees and external stakeholders. Motions on tasks to be performed by respective divisions resolved during the meeting are also tracked accordingly.

### Board of Directors Project Review Meetings

The BOD has established a Land Review Committee and an Investment and Business Plan Review Committee. These committees are responsible for reporting important issues to the Audit Committee, such as acquisition and sale of land, large engineering and investment projects, operational budgets and so forth. They also provide suggestions to help the BOD in its decision making process. In 2016, the Land Review Committee was convened 11 times and the Investment and the Business Plan Review Committee also met 11 times.

### Managing Directors Meetings

In 2016, two Managing Directors' Meetings were convened, with an average attendance rate of 66.7%.

### The operation of Independent Directors and the Audit Committee

Taipower's Audit Committee is comprised of only independent directors that are serving on the BOD. The committee is responsible for the review and approval of the company's adjustments on its internal control statements, acquisitions and disposal of assets, major financial loans, appointments/dismissals of accounting or internal audit supervisors, financial reports and so forth. In 2016, the Audit Committee held six meetings in total.

Pursuant to the Securities and Exchange Act, should the independent directors raise objections or reservations in the BOD meetings, their objections/reservations should be duly noted in the records and published on the Market Observation Post System (MOPS)." In 2016, the independent directors did not raise objections/reservations in the BOD meetings and their average attendance rate was 87.2%. The independent directors actively participated in the operations of the Audit Committee and Review Committee and Taipower followed their suggestions in 2016 to strengthen the company's internal control system with regards to corporate governance by implementing three defense mechanisms for internal control, thereby enabling Taipower to win the prestigious first place award for corporate governance among state-owned businesses. This award reflects that the role the independent directors have played in diligently carrying out their functions and duties.

### Shareholders' Meeting Effectiveness

Taipower held a Shareholders Meeting on June 24, 2016 in accordance with the provisions of the Company Act and Taipower's Articles of Association. At the meeting the company provided the 2015 Business Report, the Audit Committee's 2015 Financial Statement, the 2015 Corporate Bond Report, the 2014 Closure of Accounts and Loss Compensation Report, the 2016 Partial Adjustments to Real Estate, Facilities and Equipment Durability Report, among other items, for discussion and admission.

### BOD Performance Evaluation

In order to improve Taipower's corporate governance and the efficiency of its BOD, Taipower established the "Taipower BOD 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 will perform a BOD performance assessment in accordance with the process and criteria prescribed in the outlined procedures and report the results of the assessment during the BOD meeting in March of the following year.

### Disclosing Corporate Governance Information

Information on the organizational structure and operations of the BOD (including the Audit Committee) is released on the Board of Directors section and the Corporate Governance section of the Taipower website. It is also incorporated in the 2017 Taipower Report to the Shareholders' Meeting and disclosed on the Market Observation Post System (MOPS).

## Continuing Education for Directors

In 2016, a total of 40 Taipower directors (including independent directors) took part in relevant training courses on corporate governance and completed a total of 143 hours of training. Courses covered topics such as environmental education, integrity management, corporate management, legal affairs, risk management, financial information and so forth.

## Planning of Future BOD Operations

To ensure improvements in the operational performance of the BOD, the following plans have been made for 2017:

### Improving directors' knowledge and understanding of Taipower's operations

In conjunction with the promotion of business and issues of significant concern to the general public, Taipower will arrange for 2~3 presentations during the monthly BOD meetings with a rolling review on monthly topics for the following year carried out once every six months. This will allow the management to make relevant preparations in advance in order to optimize meeting efficiency and productivity. Adjustments may be made at any time depending on the actual needs of the company's or as a result of changes on issues of substantial public concern.

In the near future, Taipower will continue to arrange for directors to visit/inspect the sites of the company's major projects in order to help them better understand the situation and progress of projects. In addition, the management will invite directors to participate in relevant taskforces to offer consultation on relevant issues and to raise directors' awareness of Taipower's operations and include their professional input in the decision-making process.

### Continual improvement of the performance evaluation system

Taipower shall keep abreast of the latest local and foreign trends in corporate governance so as to implement continual reviews of and improvements in the performance evaluation system for the BOD and its aforementioned committees in order to establish an ideal performance evaluation system, which in turn will boost Taipower's efficacy in corporate governance.

## Mechanism to Avoid Conflict of Interest

According to Taipower's BOD Meeting Regulations, directors are required to declare all conflict of interest related to their participation in BOD meetings. Any director who damages company advantage is barred from joining or even attending the discussion or voting regarding a matters in which the conflict exists, and is not allowed to represent an absent director in such vote. Prior to each BOD meeting, the aforementioned reminders on avoiding conflict of interest are stated in the meeting notification.

## Remuneration Policy

Taipower is a state-owned enterprise. Hence, the standards for remuneration of its directors (including the chairman) and managers (including the president) are set by the competent authorities, and reported to the shareholders.

# 1.5.2 Sustainable Development Mechanism

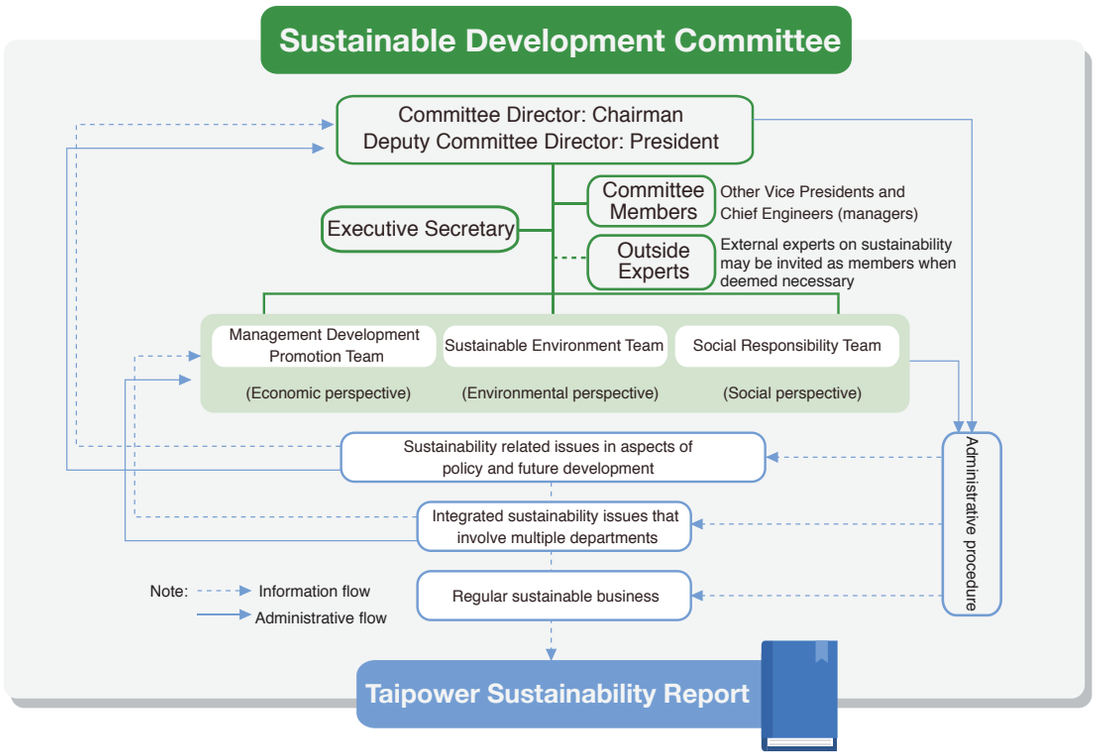
## Sustainable Development Committee

In 2009, Taipower established a Sustainable Development Committee (SDC) dedicated to the implementation of relevant sustainable development programs and initiatives. In 2015, the company reviewed the operations of the SDC and made appropriate adjustments to its structure and functions. With approval from the Chairman, the SDC promptly commenced its operation as follows:

### Sustainable Development Committee Structure

Effective from 2015, the Chairman serve as the director of the committee (instead of acting as the committee's advisor) and as the highest-ranking figure responsible for the committee. The Chairman will steer the company towards a path of sustainable development. The President will serve on the committee as the deputy director, along with a number of members on the committee to be appointed from among the company's various vice presidents and chief-engineers (from the management).

The Sustainable Development Committee has three subordinate teams: a Management Development Promotion Team," a Sustainable Environment Team and a Social Responsibility Team. Each of these teams is chaired by a vice president and is responsible for planning Taipower's direction for sustainable development and promotion of relevant matters of sustainable operations.



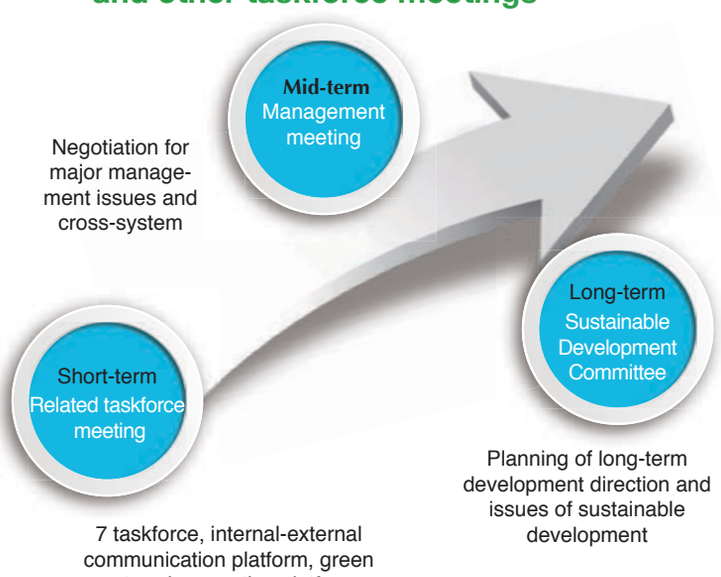

## Functions of the Sustainable Development Committee

Taipower has relegated responsibility for short-, mid-, and long-term strategic planning and the execution of relevant tasks to the SDC, Management Meeting and meetings of relevant taskforces. The responsibilities of these bodies and results of their operations in 2016 are shown in the table below.

| Strategic Category | Responsible Meeting | Responsibilities | Operational Performance in 2016 |
|---|---|---|---|
| Mid/Long-term strategy | Sustainable Development Committee | Planning of Taipower's long-term sustainable development direction and establishment of material | One meeting convened |
| | Management Meeting | Formulation and execution of Taipower's mid-term management strategies | 20 meetings held in total, with each meeting held once every fortnight |
| Short-term strategy | Related taskforce meeting / project platform | Formulation and execution of Taipower's short-term annual strategies | Non-periodic meetings of each taskforce |

The function of the Sustainable Development Committee (SDC) involves the formulation of long-term development strategies for Taipower and for steering the company towards the right path. Additionally the committee identifies critical issues related to sustainable development and offering feedback on the company's direction in management meetings in order to facilitate coordination and negotiations across multiple departments for the promotion of vital issues. In addition, the SDC is responsible for establishing concrete mid-term objectives and their corresponding strategies, action plans and solutions to achieve stated objectives to be incorporated into the "Future Management Strategies" report that is updated yearly. The report serves as a description of Taipower's overall strategies, objectives and sustainable development affairs and action plans and functions as a rolling reflection of Taipower's key plans for future development. After future management strategies have been adequately reviewed in management meetings, respective taskforces conduct short-term annual strategy and action plan formulation based on the future management strategies and then report their results periodically.

### Separation of function for the SDC and other taskforce meetings



## Operating Mechanisms of the Sustainable Development Committee

Through three promotional teams, the SDC is able to analyze changes in policy and the external environment that effect management development, environmental sustainability and social responsibilities. The results of these analyses are used as reference for the planning of Taipower's long-term direction for sustainable development and in identifying material issues in order to consolidate Taipower's annual performance in sustainable development. Under the guidance and supervision of the Chairman, the SDC is in charge of the review and feedback on relevant directions on sustainable development and material issues that are proposed by various vice presidents and external experts on sustainability.

The routine business of each team will be conducted by each unit following Taipower's administrative procedures. Holding meetings to discuss business that involves more than one unit, the conveners of the teams involved should realize the conclusions. Key issues concerning corporate strategy and future development should be submitted to the SDC for consideration.

## Key tasks for the SDC

**The Management Development Promotion Team**

The key tasks for the Management Development Promotion Team in the near future will include the planning of the company's management direction and promotion of management reform so that Taipower can fulfill its mission of becoming a world-class power utility group and embrace a management philosophy of pursuing excellence. With regards to management, through the establishment of Taipower's vision, philosophy and management structure, the team will formulate suitable management plans, which will guide Taipower towards diversified management. As for operations, the team will implement relevant plans for management improvement, power industry liberalization, organizational transformation and diversified management so as to strengthen Taipower's corporate operations.

**The Sustainable Environment Team**

The key tasks for the Sustainable Environment Team currently emphasize the shape of Taipower's green corporate image, facilitation of green energy and a low-carbon environment to allow for the actualization of Taipower's management philosophy of environmental friendly operations. Through consideration of green lifestyle elements, architectural energy conservation, green procurement, and environmental friendliness, the team shall establish a green, creative platform that will expand low-carbon energy, improve power transmission/distribution efficiency and boost grid technologies and carbon credit development to create a stable supply of low-carbon energy and a low-carbon environment.

**The Social Responsibility Team**

The key tasks for the Social Responsibility Team in the near future will emphasize consolidation of Taipower's corporate culture and contribution towards social charity to achieve company's "people first" management philosophy. For corporate culture, the team will strive to demonstrate Taipower's cultural qualities through focusing on humanities and employee care; as for social charity, the team will expand Taipower's involvement in social participation by taking the initiative to care for the general public in order to demonstrate Taipower's resolve in championing the values of social charity.

## Achievements through SDC Operations in 2016

In 2016, Taipower's SDC convened a meeting on August 29 to plan and discuss Taipower's mid/long-term management planning, relevant tasks and objectives and established performance indicators using a structure based on a balanced scorecard. During the meeting the SDC also discussed and proposed corresponding solutions regarding the potential direction of amendments for The Electricity Act and forecasting for the long-term power supply (refer to CH2.1.1 Driving Forces for Organizational Transformation).

In addition, Taipower has also completed the establishment of its "New Media Task Force," which is responsible for boosting the company's capacity for external communications through four major means: "A more human taste Facebook page," "A Taipower website that integrates numbers and stories," "A multimedia channel featuring diverse contents with attention to Taipower's expertise and facts" and "Big data analysis of public opinion." These actions will help to present the cultural side of Taipower to the public. The latest results of these initiatives were reported during the SDC meeting held on January 9, 2017 and acknowledged by the SDC, which instructed the task force to publish relevant, positive information in the future for the general public in a systematic manner to boost the general public's recognition of Taipower.

# Sustainable Development Strategy

Taipower's Future Business Strategy integrates the company's directions for sustainable development in the long run and sustainable development strategies for key issues as an extension of future scenarios for Taipower's development. The report also contains the company's long-term development priorities and action plans.

Taipower intends to transform itself from a power supplier to a high-efficiency power utility operator," a smart grid adopter," a high-quality power service provider," a practitioner of Corporate Social Responsibility and an environment-friendly actor in order to achieve our goal of sustainable operations.

In addition to Taipower's vision for sustainable corporate development, the company is also paying attention to vital issues of sustainability in the international community to ensure the company's promotion of sustainable development strategies is in line with the trend of global sustainable development. The five roles that Taipower intends to assume corresponded to 11 of the Sustainable Development Goals (SDGs) which were published by the United Nations (UN) in September 2015. Concrete plans and specific performance towards each SDG will be disclosed in later chapters.


UN's Goal: Ensure access to the necessary resources and basic services for economic development and livelihood for all
Consideration for Taipower's future development: continual improvement on the ease of accessibility for power service, stability and reliability and endeavor to ensure that remote areas and disadvantaged minorities have access to power services

UN's Goal: Maintain water resource quality and supply; improving the usage efficacy of water resources while reducing wastewater discharge
Consideration for Taipower's future development: continual promotion of footprint inventories for power generation and water usage and inspection of 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 for maintaining the quality of water resources in the proximity of power plants



UN's Goal: Increase the ratio of renewable power generation and ensure that reliable and affordable power service is accessible to all
Consideration for Taipower's future development: planning for various renewable energy developments, improvements in operational and energy efficacy while continuing to improve the ease of accessibility and availability of power

UN's Goal: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Consideration for Taipower's future development: achieve fully productive employment so that all employees, even younger ones and those with physical/mental impairments may be entitled to similar positions and wages. In addition to offering decent job opportunities, Taipower will facilitate improved safety in the work environment so as to safeguard labor rights



UN's Goal: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Consideration for Taipower's future development: improve power efficiency and recovery for basic power facilities and promote innovative development for environment-friendly technologies

UN's Goal: Make cities and human settlements inclusive, safe, resilient and sustainable
Consideration for Taipower's future development: Mitigate urban impact on the natural environment while focusing on the improvement on air pollution and reducing waste generation



UN's Goal: Use natural resources with greater efficiency and reduce the environmental footprint for generation activities
Consideration for Taipower's future development: to improve the overall energy efficiency and use of required resources for generation, transmission, and distribution in order to reduce the environmental footprint of the power supply

UN's Goal: Take corresponding actions to mitigate and adapt to changes caused by climate changes
Consideration for Taipower's future development: to actively participate in adaptation plans and mitigation actions while improving energy efficiency, developing renewable energies and enhancing existing power generation system's climate resilience



UN's Goal: Prevent and dramatically reduce marine pollution to protect the marine ecological system
Consideration for Taipower's future development: to construct ecological power plants that protect the surrounding ecological systems

UN's Goal: Protect the land, maintain ecological systems and promote biodiversity in development
Consideration for Taipower's future development: to construct ecological power plants that protect the surrounding ecological systems



UN's Goal: to promote corporate ethics and ensure the validity, accountability and transparency of corporate operation
Consideration for Taipower's future development: emphasize corporate governance, integrity management and information disclosure and ensure that various communication channels operate smoothly

## Taipower's Future Development Paradigm


### Adopter of smart grids

- Become an indispensable power distributor
- Build a smart grid with capabilities for self-monitoring, self-diagnosis, maintenance, protection and recovery
- Utilize big data to better understand customers' usage behavior in order to provide value-added services that enables customers to use power in a smart way that reduces CO2 emissions
- Reduce average blackout time per customer, increase power supply reliability

### High-efficiency power utility operator

- Adopt high-efficiency power generation equipment and technology
- Accelerate the upgrading of existing power plants
- Ensure safety of fuel supply and improve procurement performance
- Make effective use of IoT, enhance asset management
- Enhance operational management of hydro and thermal power plants
- Enhance nuclear power plant operational and safety performance
- Develop partnership relationship with IPPs in Taiwan

### High-quality power service provider

- Drive our organization's reform in response to the on-going liberalization of the power utility industry
- Meet different power needs for different customers
- Improve power supply stability and reliability
- Create different channels to interact with customers
- Strengthen demand-side management
- Strengthen customer relationship management, raise customer satisfaction

### Agent of environmental friendliness

- Develop renewable energy and improve the safety of renewable energy into the grip
- Foster an attitude for sustainable and green lifestyles and focus on ecological preservation so as to create a friendly environment
- Increase low-carbon power generation to achieve carbon emission reduction so as to become a green enterprise
- Encourage the general public to cultivate habits of energy conservation and purchase green energy so as to facilitate power consumption efficacy

### Practitioner of corporate social responsibility

- Focus on corporate governance and corporate ethics
- Promote corporate culture; expand public welfare activities and co-prosperity with communities around our power plants
- Build a safety culture that fosters initiative, mutual care and discipline
- Build diverse channels of communication with society with an open mind in order to establish win-win relationships of trust within society

## Sustainable Development Strategy Management Mechanism

Taipower's Future Business Strategy includes medium-term and long-term goals, strategies, action plans and implementation projects. To achieve these goals, Taipower adopts a systematic management approach by monitoring and managing these goals with a target system, where Key Performance Indicators (KPIs) are set and used to gauge and represent the efficacy of actions taken. Taipower reviews quarterly progress with KPIs set out to track the implementation of the Future Business Strategy, and a Conference on Tracking and Reviewing Subsystem Goals will be held to track, manage, and control KPIsas needed. Each business unit also converts and integrates these goals and KPIs into its own operating performance indicators. For every quarter and at the end of the year, these KPIs will be referenced to determine bonuses, which will serve as a means to control the implementation of various objectives and the integration of performance and bonus incentives.

In summary, Taipower takes its sustainable development very seriously and has incorporated it into its Future Business Strategy, which is created and implemented by units throughout the company. Final KPI scores are linked to performance scores, and a responsibility center manages and controls actions taken towards the set goals. Taipower is working to build consensus among its workforce in the hopes of inspiring all employees to work towards the company's future development and sustainable operations.

# 1.6 Stakeholders and Key Issues of Sustainability

## 1.6.1 Stakeholder Identification

Taipower places a heavy emphasis on listening to the voices of stakeholders and engaging with them. In 2014, a survey was conducted to identify the different groups of main stakeholders from the company's 34 business units in accordance with the five principles outlined in the "AA1000 Stakeholder Engagement Standards (2011)." This was done to ensure thorough coverage of all stakeholders that are relevant to different aspects of Taipower's operations. The main identified stakeholders are reviewed on a yearly basis for adjustments. Despite the organizational reform that took place in Taipower in 2016, the company remains a largely vertically integrated power utility group with no significant changes in its scope of business operations. As such, this report will use the same stakeholder groups that were established in previous reports.

| Main Stakeholder (Group) | Party |
|---|---|
| Board of directors | Directors |
| Shareholders | All shareholders |
| Employees | Employees, union |
| Partners | Contractors, IPP service providers, suppliers, technology exchange partners |
| Government/competent authorities | Ministry of Economic Affairs, Bureau of Energy, State-Owned Enterprise Commission, Environmental Protection Agency, Atomic Energy Council, Legislative Yuan, local government agencies |
| Public Office Holders | Legislators, village/township elected representatives |
| Media | Printed, electronic and online |
| Private organizations | Environmental conservation groups, enterprise associations, academic organizations |
| Customers | General and major customers |
| Residents/general public | Residents from surrounding communities, general public |

Stakeholders in different groups have different influences on Taipower's operations and varying concerns about issues of sustainability. The following section will cover the importance of different stakeholders to Taipower and communications with those groups for 2016.

## Taipower's Stakeholder Engagement Performance and Results for 2016

| Stakeholder Concerned | Materiality to Taipower | Key Issues of Concern | |
|---|---|---|---|
| Board of Directors | The BOD functions as the core of Taipower's operations and is responsible for leading the company towards sustainable management | Integrity and sustainable management<br>Organizational transformation and reform | |
| Shareholders | Maintaining the company's operational performance and safeguarding shareholders' rights are fundamental commitments for Taipower | Integrity and sustainable management | |
| Employees | Employees are the soul of Taipower; they shape Taipower's corporate culture and function as the company's groundwork for sustainable management | Organizational transformation and reform<br>Integrity and sustainable management<br>Facility safety<br>Occupational safety and health<br>Environmental footprint management<br>Nuclear power safety communication | |
| Partners | By working with partners such as contractors, IPPs, suppliers and technology exchange partners, Taipower strives to create value and offer high quality and reliable power services. At the same time, Taipower asks all collaborating partners to be compliant with pertinent occupational safety and health regulations in order to promote a sustainable value chain. | Supply chain management | |
| Government units/competent authorities | As a state-owned business, 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 so as to ensure the company's stable operation and power supply. | Organizational transformation and reform<br>Power supply stability and reliability<br>Electricity tariff rationalization<br>Nuclear power safety communication<br>Demand side management and power conservation<br>Response to national climate change policies<br>Renewable energy development | |

| | Channel of Communication and Frequency | Engagement Results |
|---|---|---|
| | •BOD meetings (monthly) and Project Review meetings<br>•Audit Committee meetings (at least once per quarter)<br>•Training for directors (including independent directors)<br>•Annual BOD performance assessments | •Convened 13 BOD meetings<br>•Convened 22 Project Review meetings<br>•Convened 6 Audit Committee meetings<br>•40 directors (including independent directors) participated in training courses on corporate governance, completing 143 hours of training<br>•Established the "Taipower BOD Performance Assessment Criteria" and conducted the BOD performance assessment for 2016 |
| | •Shareholders' meeting<br>•Taipower website and Market Observation Post System (MOPS) | •The shareholders' meeting was convened on June 24, 2016<br>•Relevant information is disclosed on the MOPS and in the corporate governance section of Taipower's website<br>•The corporate governance section of Taipower's website functions as a channel for the company to communicate its sustainable governance structure and performance |
| | •Sustainability Reports<br>•On job training<br>•Labor-management meeting<br>•Themed lectures and seminars<br>•Organized information session on amendments to the Electricity Act<br>•Inspection visits, project inspections, information security audits<br>•Quarterly internal self-evaluations<br>•On-site occupational safety inspections<br>•Occupational safety incident conferences<br>Occupational Safety and Health Commit- | •Organized 6 information sessions on The Electricity Act amendments<br>•Organized 5 themed lectures for high-ranking supervisors<br>•Organized 25 labor-management meetings and 1 major labor-management issue information session<br>•Organized 5 Procurement Risk and Anti-Corruption Seminars<br>•Organized 29 "Small Amount of Fee Reimbursement and Application for Government Servants" disciplinary and legal compliance training sessions<br>•Invited legal officers to give 23 presentations on civil service ethic laws<br>•Completed 66 inspection visits at different units, 31 project inspections and information security audits at 15 units<br>•Participated in the "22nd Nuclear Safety Exercise 2016" organized by the AEC |
| | •Routine / irregular audits<br>•Interviews and communication by phone with suppliers<br>•Annual meetings with suppliers to review contracts<br>•Internal and external communication meetings<br>•Education and training | •Annual meeting with fixed-term coal suppliers to review and discuss contracts (held between April ~ August)<br>•Held the quarterly "Taipower Materials Management and Control Task Force Meeting"<br>•Taipower has established fuel oil and natural gas supply contacts and preemptive warning system with CPC and convenes at least one meeting per year with CPC for fuel oil and one meeting per quarter for natural gas<br>•Audited a total of 61,433 contractor personnel and found 428 instances of violations<br>•Relevant power plants interview/communicate with coal ash processing service operators on a daily basis to monitor coal ash processing status |
| | •BOD meetings<br>•Correspondence<br>•Submission of various project progress reports<br>•Participation in relevant meetings and conferences<br>•Smart power generation and systems operation meeting | •Important issues to be reviewed during the monthly BOD meetings are submitted to the competent authorities in advance<br>•Submissions of power supply reliability data to the Bureau of Energy on a monthly basis<br>•Submissions of relevant data and participation in the State-Owned Enterprise Review Meetings when required by the government (irregular)<br>•Submitted 12 progress reports for "Smart Power Generation and Operation" and convened 4 "Smart Power Generation and Operation" meetings |

| Stakeholder Concerned | Materiality to Taipower | Key Issues of Concern | |
|---|---|---|---|
| Elected Officials | Through communicating with legislators, Taipower listens to the voice of the people, understands their needs and helps to promote relevant regulations. | Energy efficiency<br>Electricity tariff rationalization<br>Power plant decommissioning<br>Nuclear power safety communication<br>Renewable energy development | |
| Media | The media is Taipower's partner when it comes to communication with the general public. Through positive interaction with the media and building appropriate means of information delivery, Taipower will be able to help the general public foster the right awareness and understanding on the company's operations. | Stakeholder communication and information transparency<br>Nuclear power safety communication<br>Renewable energy<br>Power plant decommissioning | |
| Private organizations | Private organizations serve as a source of momentum that propels Taipower to grow. The urging of and interaction with the private sector has always driven Taipower to improve itself. | Nuclear power safety communications<br>Responses to climate change<br>Power plant decommissioning | |
| Customers | Maintaining customer relationship is the key to Taipower's sustainable management. After the market is liberalized through amendments to the Electricity Act, Taipower will need to place an increased focus on customer needs in order to stay competitive with potential competitors that emerge in the market. | Accessibility and availability of electricity<br>Demand side management and power conservation | |
| Residents/ general public | The key to the success of Taipower's major development projects and improvements in power supply lies in the maintenance of smooth communications with the general public. Striving for harmonious coexistence with residents from areas in close proximity to power plants is also a vital issue that Taipower needs to consider. | Electricity tariff rationalization<br>Environmental footprint management<br>Nuclear power safety communications<br>Renewable energy development | |

| | Channel of Communication and Frequency | Engagement Results |
|---|---|---|
| | •Participation in committee meetings at the Legislative Yuan<br>•Mediations, public hearings<br>•Offered relevant materials and information on the company's operations<br>•Visits to legislators | •Taipower's senior management (VP and higher) has participated in 19 sessions at the Legislative Yuan<br>•Various supervisors and employees from Taipower have taken part in a total of 650 mediations/public hearings and other events to provide relevant information<br>•Taipower's senior management (VP and higher) participated in a total of 69 meetings with Legislative Yuan committee members<br>•Communicated with committee members regarding issues such as power plant decommissioning/extension, disposal of nuclear fuel, power supply and demand and so forth |
| | •Press releases<br>•Media briefings<br>•Public hearings/information sessions<br>•Site/expert visits<br>•Taipower's corporate website<br>•Market Observation Post System (MOPS) | •In 2016, Taipower published a total of 113 press releases on issues relating to power supply and demand, environmental protection/conservation, renewable energy development, nuclear power, power disruption/restoration and so forth in an effort to provide prompt and immediate responses to the media. Taipower has also taken the initiative to give press releases to the media for further broadcasting/dissemination<br>•Regarding issues that have drawn significant public attention in recent years, Taipower has proactively released positive press releases (i.e. purchasing of green power and off-shore wind power generation and so forth) to demonstrate the company's active stance on the development of green energy and concrete actions that Taipower has taken to address domestic power supply and demand<br>•Taipower has taken steps to improve its public relations system by offering immediate responses and publicizing Taipower's key policies in response to issues that are closely related to people's livelihoods |
| | •Press releases<br>•Taipower's corporate website<br>•Sustainable development section on the corporate website<br>•Taipower TV | •Organized 120 group visits to the Longmen Power Plant (NPP4)<br>•Organized the "POWER2050 – Embracing a Better Future of Power:" Taipower's 70th Anniversary Symposium, attended by 280 scholars and experts<br>•Organized the "Truth of Fukushima Incident" Forum to address the general public's doubts about nuclear power safety<br>•Disclosed company's financial information and corporate governance status on Taipower's corporate website in the "Corporate Governance" section |
| | •Convene power supply meetings with ultra-high voltage customers<br>•Expert visits<br>•Education and training<br>•Electricity bills<br>•Customer opinion boxes<br>•Brochures (irregular) | •Established a comprehensive and tightly knit network of services with 24 branches and 269 service stations across Taiwan<br>•Organized four power quality management and improvement meetings for high-tech parks<br>•Held routine review meetings for power consumption plans submitted by ultra-high voltage customers each month<br>•Visited customers with consumption of over 100,000 kW to disseminate and promote the use of equipment with better energy efficiency so as to raise awareness for energy conservation. Taipower visited a total of 5,003 customers in 2016.<br>•Handled a total of 4,636 customer feedback emails<br>•Organized a total of 1,422 events in 2016 on energy conservation and effective use of household appliances while promoting the use of high-efficiency appliances. These events were attended by approximately 352,000 people.<br>•Offered community-based energy saving services and consultations in 200 communities<br>•Held the "Save Power and Get a Present from Taipower" campaign to promote energy conservation for four consecutive years |
| | •Irregular/routine communications with local residents<br>•Taipower FB page<br>•Relevant information disclosed on corporate website<br>•Organized nuclear exhibition centers and power plant visits<br>•Press releases | •Conducted 355 interviews/interactions between power plants and local residents<br>•Taipower's FB page reached out to approximately 14.2 million users in 2016<br>•The "Information Disclosure Section" of Taipower's website discloses information on the company's operations and electricity tariffs. In addition, Taipower has also setup an independent website on sustainable development as a channel to present the company's performance in sustainable development<br>•Disclosed the company's financial information and corporate governance status on Taipower's corporate website in the "Corporate Governance" section |

## 1.6.2 Key Material Issue of Sustainability Identification

In order to identify key issues that relate to sustainable operations and our stakeholders, Taipower uses the GRI G4 guidelines for material analysis so as to review and identify Key Issues of Sustainability for Taipower.Key Issues of Sustainability Identification Process

### Material Issue Identification Process

**Review and Identification**

- Review key sustainability issues from the previous year
- Review major domestic and foreign developments, such as the COP22 and amendments on pertinent domestic regulations
- Review contents including issues of Taipower management, power industry benchmark, internal/external stakeholder opinions and major news events
- Identified 30 material issues

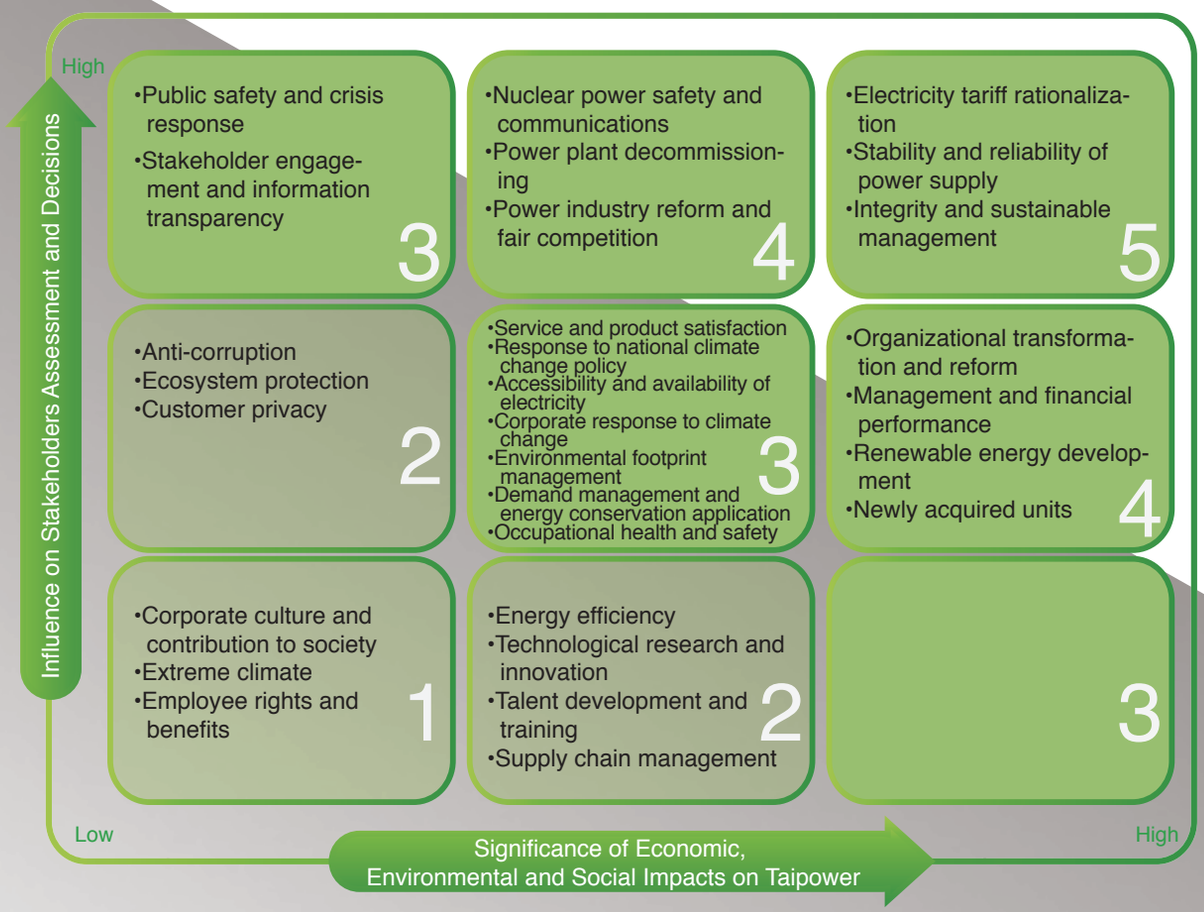
**Prioritization**

- To consider the extent of impact the issues could have on Taipower and different stakeholders, and have employees assess and rank the issues through survey

**Validation**

- Taipower's senior management to review and verify the Material Issue Matrix
- Determine the contents and structure of Taipower's Sustainability Report based on the results of the analysis

### 2016 Materiality Matrix



According to this matrix, issues that are identified within blocks 3-5 represent key issues. In this report a total of 20 significant issues were identified in total. Issues that are identified as falling below the risk tolerance line (blocks 1-2) are of relatively lower impact/influence.

Looking back on Taipower's operations in 2016 and the changes that have taken place in society as a whole, several key issues stand out. These include electricity tariff rationalization, the accessibility and availability of electricity and the integrity and sustainability of management practices. Although Taipower has already completed part of its task of dismantling its business units, recent amendments to the Electricity Act bring specific requirements to Taipower as a holding group, making organizational transformation and reform an important issue for Taipower once again. In 2016, Taipower faced six new issues, four of which were material issues, namely: "responding to national climate change policy;" "power plant decommissioning," which is derived from greater stakeholder concerns and the government's 2025 nuclear-free homeland policy; "newly acquired units for renewable energy and natural gas," which is derived from the low-carbon economy mandated by the Paris Agreement and amendments to the Electricity Act and, finally, issues of "power industry reform and fair competition" that Taipower will be facing in the future due to amendments to the Electricity Act.

This report includes detailed descriptions of the 20 material issues identified in the matrix. In addition, in light of Taipower's management style and the status of current affairs, this report also covers relevant information about five items that are not listed among the material issues. It also discloses information related to Taipower's Contribution to Society[1] and Occupational Health and Safety" sections of the sustainable development website. The corresponding GRI G4 aspects, boundaries and their respective chapters in this report are as follows:

1.Please see the "Contribution to Society" section on Taipower's Sustainable Development Website:http://csr.taipower.com.tw/tactics03_05_01.html
2.Please see the "Contribution to Society" section on Taipower's Sustainable Development Website:http://csr.taipower.com.tw/tactics03_05_01.html

| | Issue | Boundary | | | | Corresponding G4 and Electric Utilities Sector Specific Aspect | Corresponding Chapter and Section in this Report |
|---|---|---|---|---|---|---|---|
| | | Internal | External | | | | |
| | | Taipower | Suppliers | Customers | Communities and environment | | |
| Material Issues | Electricity tariff rationalization | V | | V | | Economic: Indirect Economic Impacts | 3.1 Promoting Operational Transformation |
| | Stability and reliability of power supply | V | V | | | Economic: Indirect Economic Performance, Availability and Reliability<br>Social: Access | 2.2 Enhancing Reliability of Power Supply<br>4.2 Smart Grid Deployment |
| | Integrity and sustainable management | V | V | | V | Standard Disclosures: Governance | 6.1 Integrity Management and Legal Compliance |
| | Organizational transformation and reform | V | | | | Taipower-specific issue that does not correspond directly to G4 Aspects | 2.1 Enterprise Re-engineering |
| | Management and financial performance | V | | | | Economic: Economic Performance | 3.1 Promoting Operational Transformation<br>3.2 Raising Procurement Performance |
| | Renewable energy development | V | | | V | Economic: Indirect Economic Performance, Availability and Reliability | 2.2 Enhancing Reliability of Power Supply |
| | Newly acquired units | V | V | | V | Taipower-specific issue that does not correspond directly to G4 Aspects | 2.2 Enhancing Reliability of Power Supply<br>5.5 Renewable Energy Development |
| | Nuclear power safety and communication | V | | V | V | Economic: Plant Decommissioning<br>Environmental: Effluent and Waste management<br>Social: Disaster/Emergency Planning and Response | 6.6 Enhancing Nuclear Communication |
| | Power plant decommissioning | V | | V | V | Economic: Indirect Economic Performance, Availability and Reliability | 2.2 Enhancing Reliability of Power Supply |
| | Power industry reform and fair competition | V | | V | | Taipower-specific issue that does not correspond directly to G4 Aspects | 2.1 Enterprise Re-engineering |
| | Facility safety | V | | | V | Social: Disaster/Emergency Planning and Response | 6.6 Enhancing Nuclear Communication<br>4.4 Enhancing Power Supply Infrastructure |
| | Service and product satisfaction | V | | V | | Social: Product and Service Label, Provision of Information | 2.4 Creating Customer Satisfaction |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Material Issues | Response to climate change | V | | | V | Environmental: Energy, Emissions | 2.2 Enhancing Reliability of Power Supply<br>5.2 Response to Climate Change<br>5.3 Renewable Energy Development |
| | Accessibility and availability of electricity | V | | V | | Economic: Indirect Economic Performance, Availability and Reliability<br>Social: Access | 2.3 Enhancing the Accessibility of Power Services |
| | Corporate response to climate change | V | | | | Standard Disclosures: Governance<br>Social: Disaster/Emergency Planning and Response | 2.2 Enhancing Reliability of Power Supply<br>5.2 Response to Climate Change<br>5.3 Renewable Energy Development |
| | Environmental footprint management | V | | | V | Environmental: Effluents and Waste, Water, Energy, Overall, Materials | 5.1 Renewable Energy Development<br>5.4 Pollution Prevention and Waste Management<br>5.5 Energy Management<br>5.6 Environmental Footprint |
| | Demand management and energy conservation application | V | | V | | Economic: Demand Management<br>Environmental: Energy, Products and Services | 4.1 Smart Grid Deployment<br>5.2 Response to Climate Change |
| | Occupational safety and health | V | V | | | Social: Disaster/Emergency Planning and Response, Occupational Health and Safety | 6.2 Building a Sound Working Environment |
| | Public safety and crisis response | V | | V | V | Social: Disaster/Emergency Planning and Response | 6.6 Enhancing Nuclear Communication |
| | Stakeholder engagement and information transparency | V | V | V | V | Standard Disclosures: Stakeholder Engagement<br>Environmental: Environmental Grievance Mechanisms<br>Labor Practices and Decent Work: Labor Practices Grievance Mechanisms<br>Human Rights: Human Rights Grievance Mechanism<br>Social: Local Communities, Grievance Mechanisms for Impacts on Society, Provision of Information | 1.5 Stakeholders and Material Issues of Sustainability<br>2.4 Creating Customer Satisfaction<br>5.4 Pollution Prevention and Waste Management |
| Non-Material Issues | Energy efficiency | V | | | V | Environmental: Energy, Emissions | 3.3 Raising Power Generation Efficiency |
| | Talent development and training | V | | | | Labor Practices and Decent Work: Training and Education | 6.2 Building a Sound Working Environment |
| | Anti-corruption | V | | | | Standard Disclosures: Governance | 6.1 Integrity Management and Legal Compliance |
| | Ecosystem protection | V | | | V | Environmental: Products and Services, Local Communities, Biodiversity | 5.4 Pollution Prevention and Waste Management |

# 1.7 Risks and Opportunities

Corporate management is bound to face the impacts of external risks and to be faced with various opportunities for development. Taipower is constantly seeking ways to enhance its capacity to effectively identify potential risk factors from external trends while searching for opportunities and creating effective response guidelines. In 2016, the Paris Agreement came into effect in much of the international community while domestically, Taipower faced the additional implementation of a nuclear-free homeland policy, amendments to the Electricity Act and other sustainable development trends.. As such, Taipower implemented a thorough risk management system to identify, prioritize and respond to potential internal and external risks whilst identifying and capitalizing on potential opportunities in order to use these situational shifts as turning points for Taipower's sustainable development.

## 1.7.1 Risk Management

### Risk Management Strategy

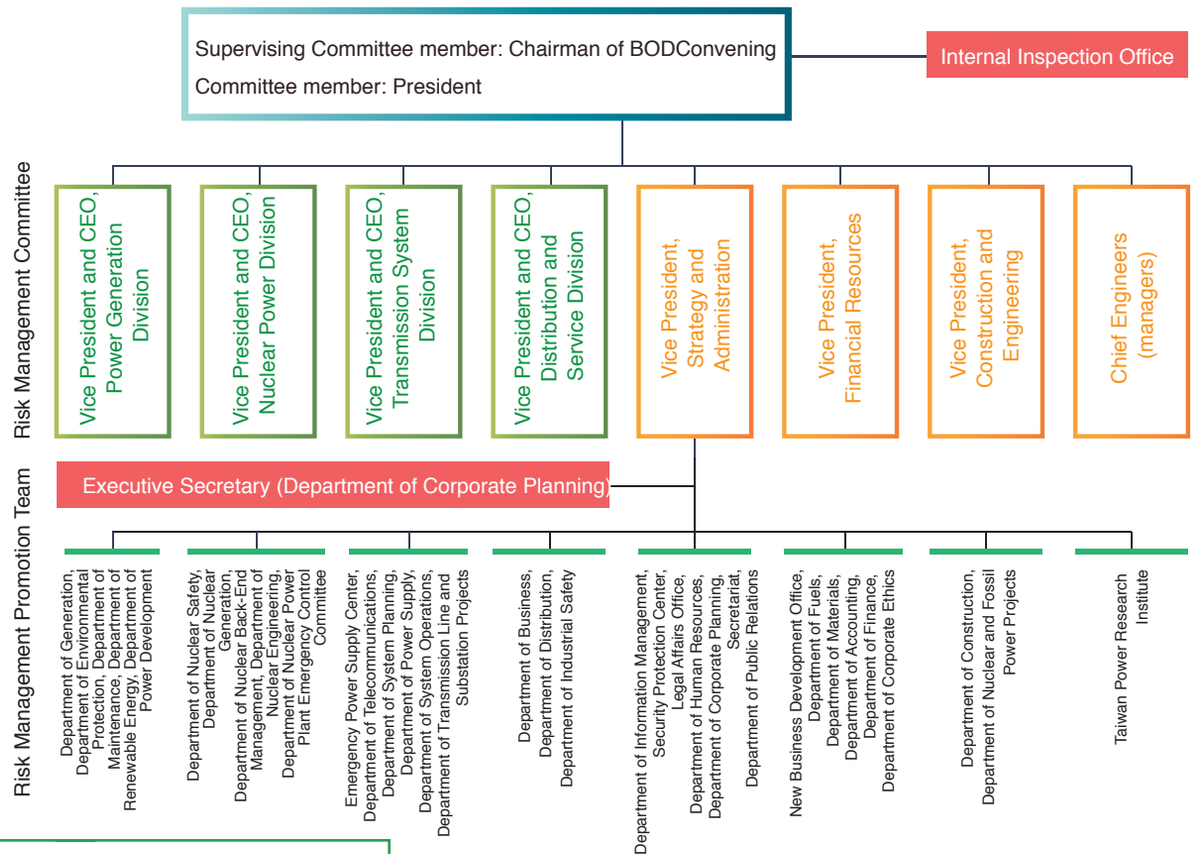
Taipower has established four risk management policies as a guideline for organizational risk management. They are as follows:

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

### Risk Governance

Under Taipower's risk governance framework, the Chairman and President function as aSupervising Committee member and a Convening Committee member respectively. The Risk Management Committee operates as a task force and comprises the CEOs and VPs from four major divisions along with VPs from Strategy and Administration, Financial Resources, Construction and Engineering and their Chief Engineers. The committee operates with subordinate risk management promotion teams from different units and is responsible for the identification of potential risks and the establishment of risk management policies and corresponding responses.

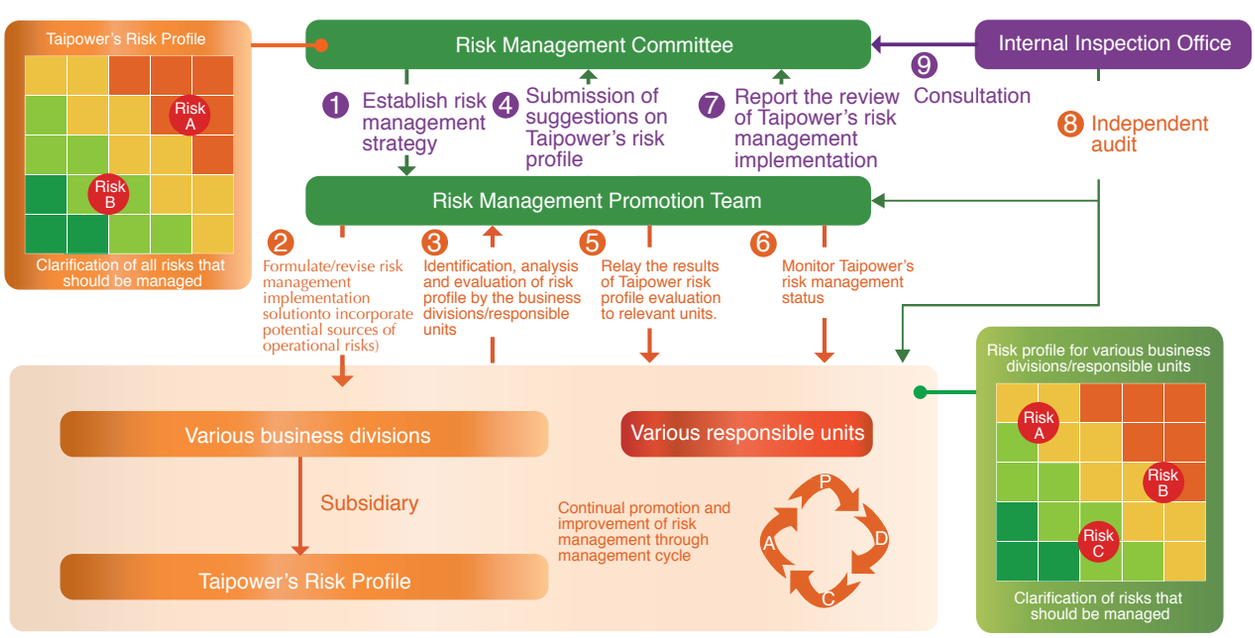
## Taipower's Risk Management Organizational Structure




## Risk Management Process

Taipower's risk management process begins with the Risk Management Committee's establishment of relevant risk management strategies. Subsequently, the Risk Management Promotion Team formulates corresponding risk management implementationsolutions, which are then printed in a brochure and delivered to various supervisory units. These materials are then used to identify the potential risks that Taipower may face. These units analyze and compile risk profiles for the company and submit the risk profiles to the Risk Management Promotion Team for consolidation into a company-wide risk profile. The risk profile is then submitted to the Risk Management Committee for review. After the review, the Risk Management Promotion Team will relay the results of the review to all supervisory units for risk management and control.

The Risk Management Promotion Team is also responsible for monitoring Taipower's overall risk management status and reporting periodically to the Risk Management Committee. The Internal Inspection Office carries out inspection visits to audit the implementation of the risk management plan. Each year, the Risk Management Promotion Team reports the results of risk control. That report is then reviewed by the Risk Management Committee.




## Risk Assessment - Considerations for Risk Identification

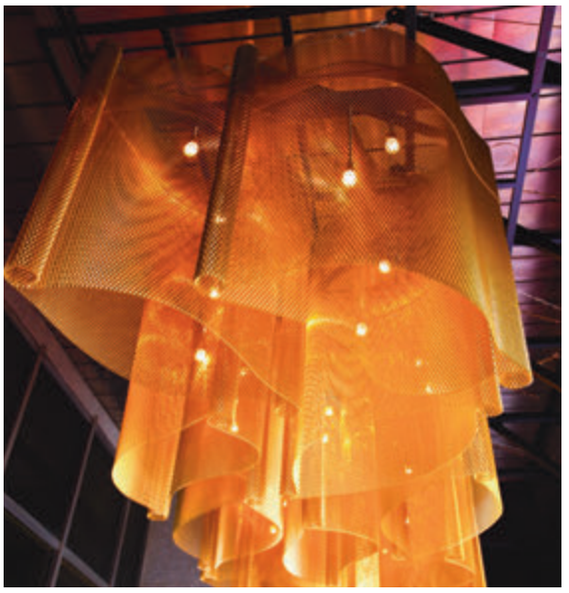
During the process of risk identification and risk profile analysis, Taipower will take the following factors into consideration:

- Issues that pertains to Taipower's stakeholders.
- Major issues that may affect the company's operations or safety.
- Major incidents stemming from new policies or undergoing changes.
- Incidents tracked by supervisory units.
- Timing of risk-related incidents. Risk items that may occur within 1-3 years shall be incorporated into Taipower's annual risk profile for control; medium-term (3-5 years) and long-term (5 years or later) shall be included in the company's Future Business Strategy and reported to the Sustainable Development Committee for relevant controls to be implemented.
- In addition to the aforementioned definitions of short, medium and long-term risk items, events that have a substantially increased likelihood of occurrence if not addressed within three years, should be included within the scope of the short-term risk management framework. The same principle applies to medium and long-term risks that are similar in nature. For instance, the amendment of the Electricity Act in 2016 waspromptly identified as a risk and classified as "Amendment of The Electricity Act affecting the company's sustainable management."

## 1.7.2 Risk Profile and Counter Measures

Taipower uses a risk profile to monitor potential risk items that the company may face. When the risk level of an incident falls below the risk tolerance line and remains in the L-zone (indicating risks with a low likelihood of occurance) in the risk profile for two consecutive years, the risk (with the exception of specific risk items/scenarios tracked by supervisory units or incidents that have drawn significant public attention) may be removed from the company's risk profile. Nevertheless, the responsible unit shall continue to monitor the risk item. If concrete evidence exists to prove that a risk item/scenario will not happen in the next three years, the risk may be removed from the company's risk profile. If an item has been found to have a risk level that is outside the L-zone in future risk assessments, the risk item should be incorporated into Taipower's annual risk profile once more. In addition, the risk management system should also be reviewed for fitness. The corresponding risk management implementation brochure should be revised if needed.

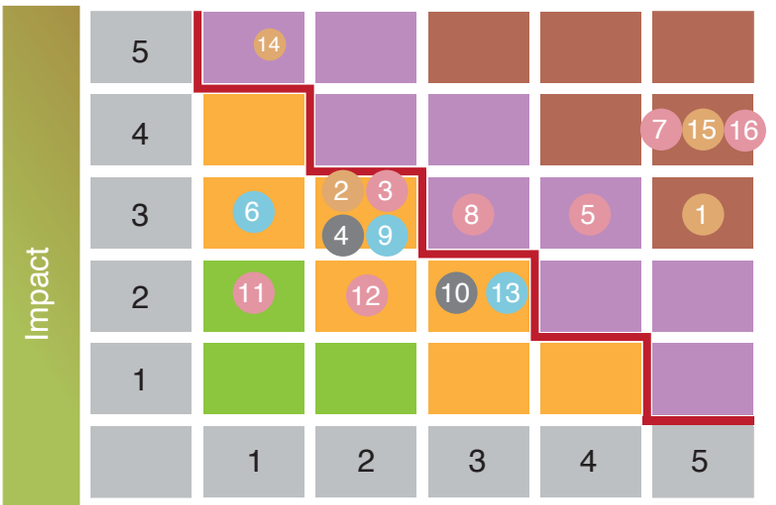
The risk profile for Taipower's sustainable management in 2016 is shown as below. Among the risks identified, "nuclear unit unable to operate," "hindered power plans" and "obstruction of grid construction" have been recognized as high risks items, while other high risks include "amendments of The Electricity Act" and "power supply shortage" and are correlated to the material issues identified in previous sections. It is therefore apparent that nuclear power and a stable power supply are issues that Taipower ought to carefully review and handle while not neglecting relevant risks from changes to the Electricity Act. Through adequate assessment and analysis of risks and sustainability issues, Taipower will enhance its capacity to reduce risks and capitalize on opportunities so as to achieve its vision of sustainable management.



Remark:1. ▬ represents the risk tolerance line

2.Definition of color ■very High ■High ■Medium ■Low

## Distribution




| Risk Category | Risk Identified by Taipower |
|---|---|
| Strategic and Financial Risk | 1 Accumulated losses affecting the company's financial structure<br>2 controversial from electricity price<br>14 Amendments th the Electricity Act affecting the company's sustainable management<br>15 Power plans hindered, affecting the company's power supply capabilities |
| Operational Risk | 3 An aging workforce impeding the passing on of<br>5 techniques<br>7 Power supply shortages affecting system stability and safety<br>8 A nuclear unit unable to operate, affecting power supply base load<br>11 Incidents of EHS resulting in asset loss and damage to<br>12 the reputation of the company<br>The company's information system hacked<br>16 The outbreak of labor-management disputes and employee protests |
| Legal Compliance Risk | 4 Obstruction to grid construction affecting grid power supply<br>10 Incidence of employee corruption |
| Environment and Climate Change Risk | Negative publicity having adverse impact on company image<br>6 Release of radioactive materials from nuclear power plants caused by natural disasters<br>9 Environmental issues having an adverse impact on the company image<br>13 Damage to power equipment caused by natural disasters |

## Risk scenario and responses for very high risk items

| High risk items | Risk scenario | Risk control measures |
|---|---|---|
| Accumulating losses affecting the company's financial structure | 1.Huge capital needed for power construction but self-owned capital is insufficient.<br>2.A tariff formula was not approved for continued promulgation, leading to the failure of the tariff to reflect the cost of power supply, thereby affecting the power industry's sustainable development.<br>3.An increase in tariff, but one limited by relevant mechanisms to restrict increased margin, resulting in the failure to reflect the cost of power supply.<br>4.Diminishment of the Nuclear Power Plant No.4 as an asset, resulting in substantial losses. | 1.Control project progress and relevant budget.<br>2.Disclosure of relevant information on Taipower's financial status and tariff in the "Information Disclosure Section" and "Tariff Disclosure Section" on the corporate website to appeal to the general public to acknowledge Taipower's tariff formula and support its implementation.<br>3.Proactively communicate with competent authorities and legislators to support the continued implementation of tariff formula.<br>4.Propose the establishment of a tariff stabilizing mechanism in the tariff formula.<br>5.Petition to the government for a commitment to plan a special budget to cover NPP4 assets in the event of NPP4 asset impairment to prevent Taipower from making a provision for substantial asset impairment. |
| Nuclear units unable to operate, affecting power supply base load | 1.NPP1 Reactor No.1 remained in EOC-27 major overhaul and is still inoperable, and thereby unable to generate power.<br>2.Spent fuel from NPP1 Reactors 1 and 2 could not be dry-stored and have affected the power plant's operations. If the transportation and storage of the first two containers cannot begin by April 2017, it will affect NPP1's operations.<br>3.Inspection and repair of NPP2 Reactor No. 2 have been completed. Once the application to resume operations has been approved, the reactor will resume operations and generate power. Until the approval has been granted, Reactor No.2 will remain inoperable.<br>4.The application to install additional storage racks in the cask loading pool at NPP2 had not been approved. Consequently, NPP2 will no longer be able to operate and generate power after July 2017. | 1.The initiation program for the unit has been prepared and is ready for immediate activation once the report is made at the Legislative Yuan.<br>2.Taipower has actively cooperated with requests from New Taipei City Government to carry out relevant corrective construction works at specific facilities in accordance with the Soil and Water Conservation Plan approved by the government in the hopes of receiving approval for the second change in design with compliance to the aforementioned plan.<br>3.The repairs on malfunctioning equipment at NPP2 have been completed, with the AEC report review and Legislative Yuan approval for Taipower's activation application pending.<br>4.Taipower has submitted an application to the AEC for a "Loading Pool Equipment Modification and Installation on the 3rd floor of the Fuel Building at NPP2.". This will involve the installation of four storage racks at the cask loading pool at NPP2. The racks will offer additional storage space for 440 fuel bundles from each reactor and will extend the two reactors' operations by 3 years prior to their decommissioning. |
| Power plans hindered, affecting the company's power supply capabilities | 1.Power plan to construct a fuel combined cycle unit at Datan Power Plant hindered.<br>2.Power plan to install a fuel combined cycle unit at Gaoyuan Power Plant hindered.<br>3.The two new units installed for Linkou Power Plant's expansion failed to commence commercial operations as scheduled.<br>4.The new unit installed for Tongxiao Power Plant's renewal and expansion plan failed to commence commercial operations as scheduled.<br>5.The new unit installed for Dalin Power Plant's renewal plan failed to commence commercial operations as scheduled.<br>6.Fishery compensation failed to go as planned for the Offshore Wind Power Generation Phase I Project, thus delaying project progress.<br>7.Scheduling conflict between Dock 5A and 5B renovation and construction at the Port of Taichung and Taipower's Offshore Wind Power Generation Phase I Project.<br>8.Construction bidding for the Offshore Wind Power Generation Phase I Project failed to close as scheduled.<br>9.Accidents in relevant construction projects that affected progress and Taipower's image. | 1.Taipower plans to adopt an "Act First and Reapply for Budget Later" approach for 2017 annual budget.<br>2.Host review and follow-up meeting on a weekly basis.<br>3.Formulate strategies to facilitate power reception, water reception and gas reception for 345kV within the given schedules.<br>4.Request partners setup task forces and fully commit to fast and thoroughly responding to the difficulties encountered. These task forces shall collaborate with Taipower's corresponding task forces and operate under existing management schemes to resolve relevant issues from both ends so as to complete boiler pressure tests as soon as possible.<br>5.Negotiate the terms of collaboration with the fishing industry and with local fishermen's association's regarding the "Commissioned Research Project for Windfarm Fishery Transition and the Construction of Friendly Environment".<br>6.Visit the Port of Taichung and Taiwan International Ports Corporation to negotiate the details on the dedicated dock for construction and scheduling for premises.<br>7.Taipower will refer to the construction schedules for Dock 5A and 5B renovations and lower structural factories in order to establish reasonable deadlines in the bidding documentation so as to make the terms more appealing to potential bidders. |
| Power grid construction hindered, affecting grid power supply | 1.Failure to incorporate Linkou－Dinghu 345kV power lines into the system as scheduled | 1.Should land owners reject the proposition for land use, if technically feasible, Taipower shall relocate lines or tower sites to facilitate land acquisition. |

| High risk items | Risk scenario | Risk control measures |
|---|---|---|
| Power grid construction hindered, affecting grid power supply | 2.Failure to incorporate Tongxiao－ Yihe 345kV power lines into the system as scheduled.<br>3.Failure to incorporate Taiwan－Penghu 161kV cable lines into the system as scheduled.<br>4.Failure to incorporate Dalin－Kaohsiung Harbor 345kV power lines into the system as scheduled.<br>Accidents in relevant constructions that affected progress and Taipower's image | 2.Proactively negotiation with Tongluo Township Office to finalize the terms for the undergrounding of "69kV Tongluo～Sanyi #10~#19 elevated line"<br>3.Taipower will continue to resort to different channels in order to arrange for the company's senior management to visit Yunlin County Magistrate Lee Chin-Yung to communicate the importance of the project and hopefully obtain approval for the construction as soon as possible.<br>4.Taipower shall make suitable arrangements for cable construction priorities and schedules to ensure continuous operation while avoiding waiting periods that would impact productivity.<br>5.Measure shall be taken to prevent occupational hazard from occurring on roads; additional actions and disseminations will be made to prevent vehicles from accidentally entering construction sites and facilities. |

## 1.7.3 Opportunity Management and Response

Risks and opportunities are two sides of the same coin. If we can monitor potential risks, we will be able to grasp opportunities. Through the comprehensive risk management system described in the previous section, Taipower is able to better appreciate and grasp the trends of sustainable development around the world and in turn to seek out potential opportunities for Taipower's further development. For instance, we have summarized the opportunities and financial impacts that climate change could bring by referring to publication by Task Force on Climate-related Financial Disclosures (TCFD) and utilizing the SDG Industry Matrix – Energy, Nature, Resources, Chemicals published by the UN to identify opportunities brought to the energy industry by the SDGs. We have sought out potential opportunities for development that Taipower may have when faced with changes in Taiwan's operating environment for power industries. Global trends in sustainable management and preliminary opportunities identified are listed below:

| Potential Opportunity | Reason | Counter-Measure | Corresponding SDGs |
|---|---|---|---|
| Amendments of The Electricity Act – Enabling power wheeling with renewable energy | Enabling renewable energy supplements is the first step in the reform of Taiwan's power industry. Not only that, it also ushers a brand new operating and service model for Taipower by enabling Taipower to make reasonable profit through power supplements. By integrating various private renewable energy supplemeny into the grid, we will be able to diversify the risk of power supplement stability. | Conduct "Formulation of regulations governing transmission and distribution for power supplements and contracts" and commission relevant studies on contract/regulation drafting for power supplements, power transmission rules, distribution fees and so forth while carrying out renewable energy grid integration technology researches. |  <br>Through power wheeling, we will be able to ensure that customers with needs for renewable energy could receive their power directly through Taipower. Through innovation and creativity, we shall construct the requisite infrastructure for renewable energy grid |
| Global development trends for renewable energy | With commitments from major global companies such as Apple and Google to increase renewable power generation, coupled with the latest developments in renewable energy technologies, Taipower can take advantage of the trend toward a nuclear-free homeland policy by preemptively venturing into the development and construction of renewable energy facilities so as to prepare for the open market and customers with green power demands in the future. | In the next 15 years, Taipower is looking to invest over NT$ 400 billion into renewable power generation to secure renewable power generation capabilities in Taiwan. |  <br>The development of renewable energy will assist everyone to acquire clean power while reducing carbon emissions and mitigating the impacts of climate change. |
| Smart IoT and big data development | As new and improved methods of big data analysis become available and with the maturation of smart meter and IoT technologies, Taipower will be able to achieve precise power supply and demand forecasts and incorporate relevant data into the company's demand-based bidding in the near future. Using real-time power consumption system analysis, the system will be able to automatically process potential system risks by effectively reducing the power consumption and lowering the risks of power rationing/grid disruption. | Adopt IoT LoRa wireless communication technologies. Complete Taipower's short/mid-term wind power generation smart prediction system construction. Launch smart meter installation for high/low-voltage customers. |  <br>Through smart power grids, we will be able to effectively improve the resilience of existing grids and mitigate the potential impact from extreme climate |

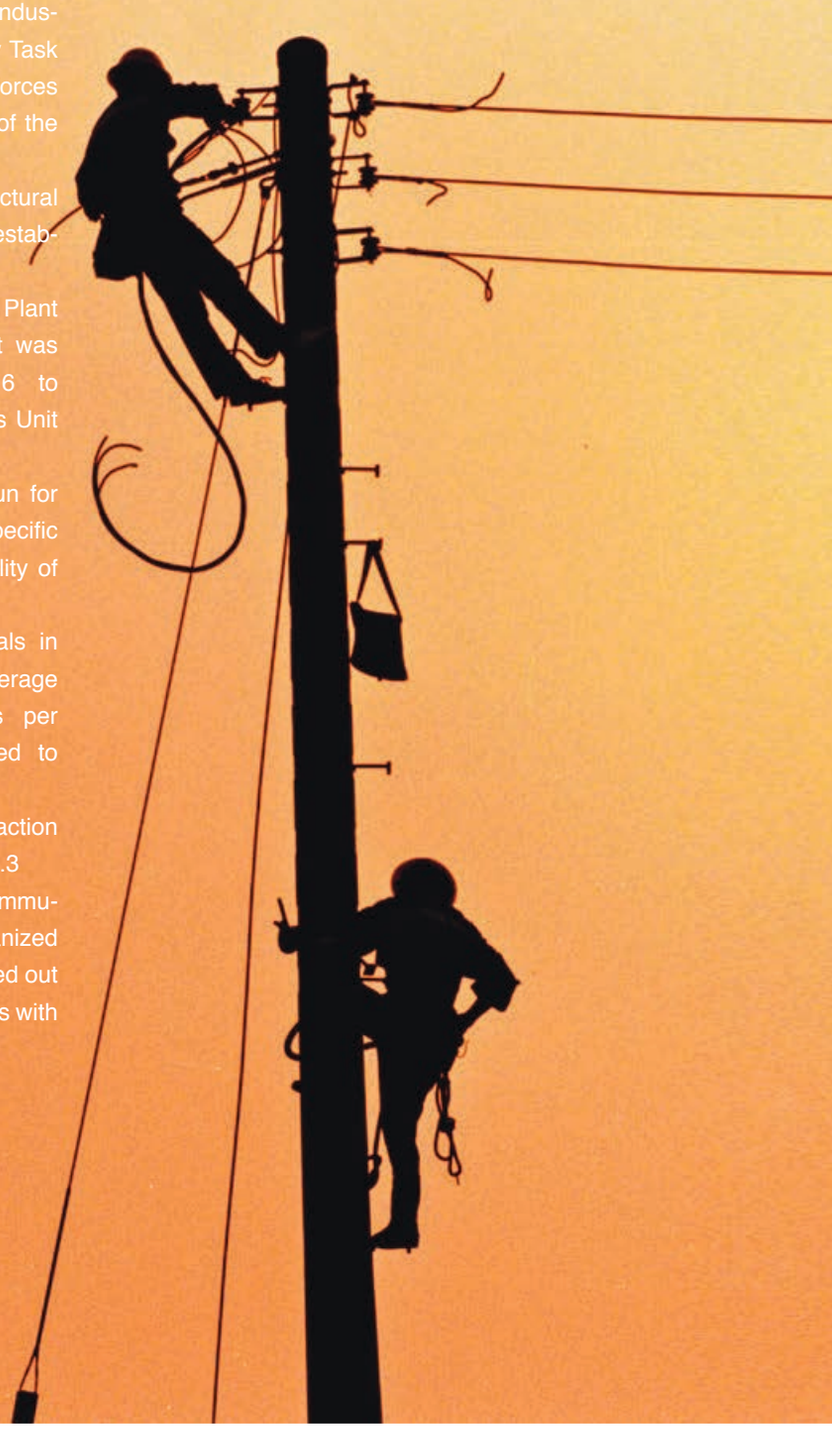
# High Quality Power Service Provider

## Role and Contribution

As a high-quality power service provider, Taipower is committed to satisfying customers' needs for power safety, a reliable power supply, and diverse generation demands. Through smooth and creative bi-lateral communication, we endeavor to facilitate mutual understanding between Taipower and its external stakeholders in order to provide power services that are more aligned to the customers' needs. At the same time, the maintenance and improvement of quality requires the organization to be engaged in constant innovation and reform in order to achieve efficient organizational transformation as well as to maintain its high quality power services despite an ever-changing, external environment.

## Performance highlights for this chapter

- Taipower established its "Power Industry Liberalization Coping Strategy Task force" with six subordinate task forces in response to the amendments of the Electricity Act
- The company completed a structural transition on January 1, 2016 by establishing four major divisions
- The license for the Linkou Power Plant Renewal and Expansion Project was renewed on October 6, 2016 to increase the capacity for Linkou's Unit No. 1
- The company launched a trial run for the "Power Grocery Store" in specific regions to improve the accessibility of power services
- The company surpassed its goals in power supply stability – The average number of power interruptions per customer per year was reduced to 0.208, a new record for Taipower.
- Taipower's customer satisfaction survey score for 2016 came to 95.3
- Taipower engaged in creative communications – The company organized two Hackathon events and reached out to approximately 14.2 million users with its Facebook page



CH2

| SDGs | Correlation to Taipower | Corresponding Chapters/Issues |
|---|---|---|
| 1 NO POVERTY | Taipower will continue to improve the accessibility, stability and reliability of power services and ensure that all users (including residents in remote areas and disadvantaged minorities) may enjoy equal access to power services | · High Quality and Reliable Power Supply<br>· Enhancing the Accessibility of Power Services |
| 7 AFFORDABLE AND CLEAN ENERGY | Increase the ratio of renewable power generation, operational and energy efficiency and ensure that all users will have access to affordable, reliable and clean power services | · High Quality and Reliable Power Supply<br>· Enhancing the Accessibility of Power Services<br>· Adjustments to Power Structure |
| 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | Improve the energy efficiency and recovery for fundamental power equipment; adopt clean technology and improve the infrastructure for a renewable energy grid to enhance grid resilience and reliability while facilitating innovative development of environmentally friendly technologies | · Future Prospects for Development of the Four Divisions<br>· Response to The Electricity Act – Adjustment to Grid Structure<br>· Transmission System Division – Fleshing Out Operational Functions |
| 16 PEACE, JUSTICE AND STRONG INSTITUTIONS | Emphasize corporate governance, integrity management and information disclosure while ensuring various communication channels operate smoothly; ensure that all relevant decisions at all levels are inclusive and representative | · Power Industry Liberalization Coping Strategy Task force |

## Solutions planned for the future

- Promote responses to the Electricity Act Amendments to overcome the five challenges to Taipower's management
- Promote low-carbon power – Taipower will invest over NT$ 400 billion in renewable power generation in the next 15 years
- Incorporate a customer group representative system to achieve the benefits of integrating power load shedding among customers through respective representatives.
- Construct two ultra-supercritical pressure coal-fired units of 600 MW capacities for the Shenao Power Plant Renewal and Expansion Plan
- In light of the growth in domestic power consumption and the government's "nuclear-free homeland" policy, Taipower will implement the Datan Power Plant Fuel Combined Cycle Unit Expansion Generation Plan
- Formulate and propose "Power Line Fortification for Disaster Prevention and Resilience Plan" to construct a distribution network that is resilient to the weather
- Plan and establish a system for big data analysis of public opinion to improve the precision of Taipower's external communications

## Sustainable Trends and Challenges

As a result of recent amendments to the Electricity Act, Taipower faces a drastic impact on its operations. How to respond topower structure transformation in the near future while preparing for the inevitable tough competition from the gradually liberalized market are issues that Taipower should consider while maintaining its high quality power service. Taipower continues to manage various aspects of its business: its operation model, customer demands, and public relations. Additionally, stability and resilience of the power grid under severe climate changes represent another crucial point in Taipower's delivery of high quality services. Taipower will also face the challenges of transforming into a holding company with a divisional structure and then becoming a globalized power utility group to achieve sustainable operations.

# 2.1 Re-engineering the Company

In response to the trend of power industry liberalization and the public's expectations, Taipower has endeavored to achieve the goals of improving overall management performance and enhancing its operations, while deliberating the functions and operating models of Taipower to promote corporate reengineering. In 2015, Taipower completed all preparations for its organizational transformation, including the "separation of generation and grid functions" and "accounting separation." On January 1, 2016, Taipower officially transformed into a divisional organization. Taipower will stay true to its management philosophy of pursuing growth as the company evolves from an "agency" to a "corporate entity." We shall seize each and every opportunity for change and gradually fulfill our vision of becoming a globalized power utility group.

## 2.1.1 Driving Force for Organizational Transformation

### External driving forces

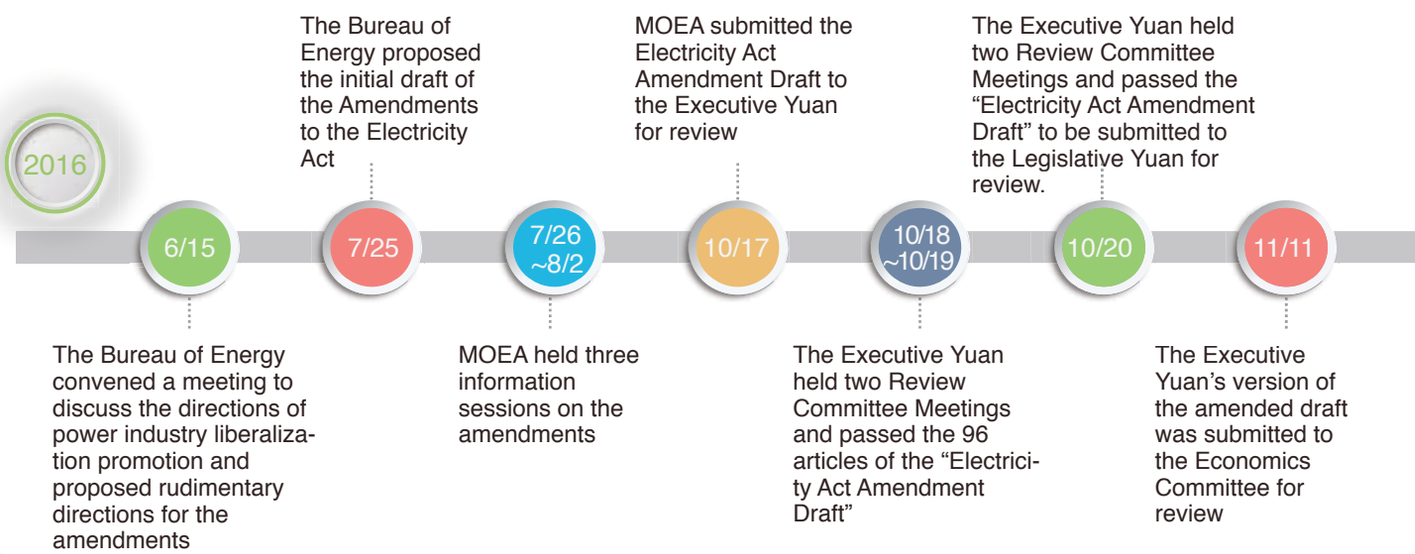
To correctly reflect international fuel prices, lower Taipower's accumulated losses, follow the international trend and promote power industry liberalization

### Internal driving forces

During its 70 years of operations, Taipower's organizational structure has grown gradually, with as many as 101 units. As such, resource management and integration have proven to be difficult. A functional organization structure with power concentrated at headquarters leads to slower management, decision-making and lower flexibility to adopt to changes

## Major External Driving Forces in 2016—The Passage of the Electricity Act Amendments

The Legislative Yuan completed the Electricity Act Amendments on January 11, 2017 and the entirety (97 articles) of the amended Electricity Act was published on January 26 with Presidential Decree Hua-Tsung No. 10600011591. The amendment process for the Electricity Act is presented in the following table:



## Blueprint of the Electricity Act Amendment (two-stage amendment)

**1st phase**

### 1~2.5 years after the amendment taken effect

- Liberalize the market and open access to renewable energy wheeling, distribution and sales
- Open access to traditional power industry in condition of exclusive sale rights for Taipower
- Open access to green power for all customers
- Accounting separation among different Taipower divisions

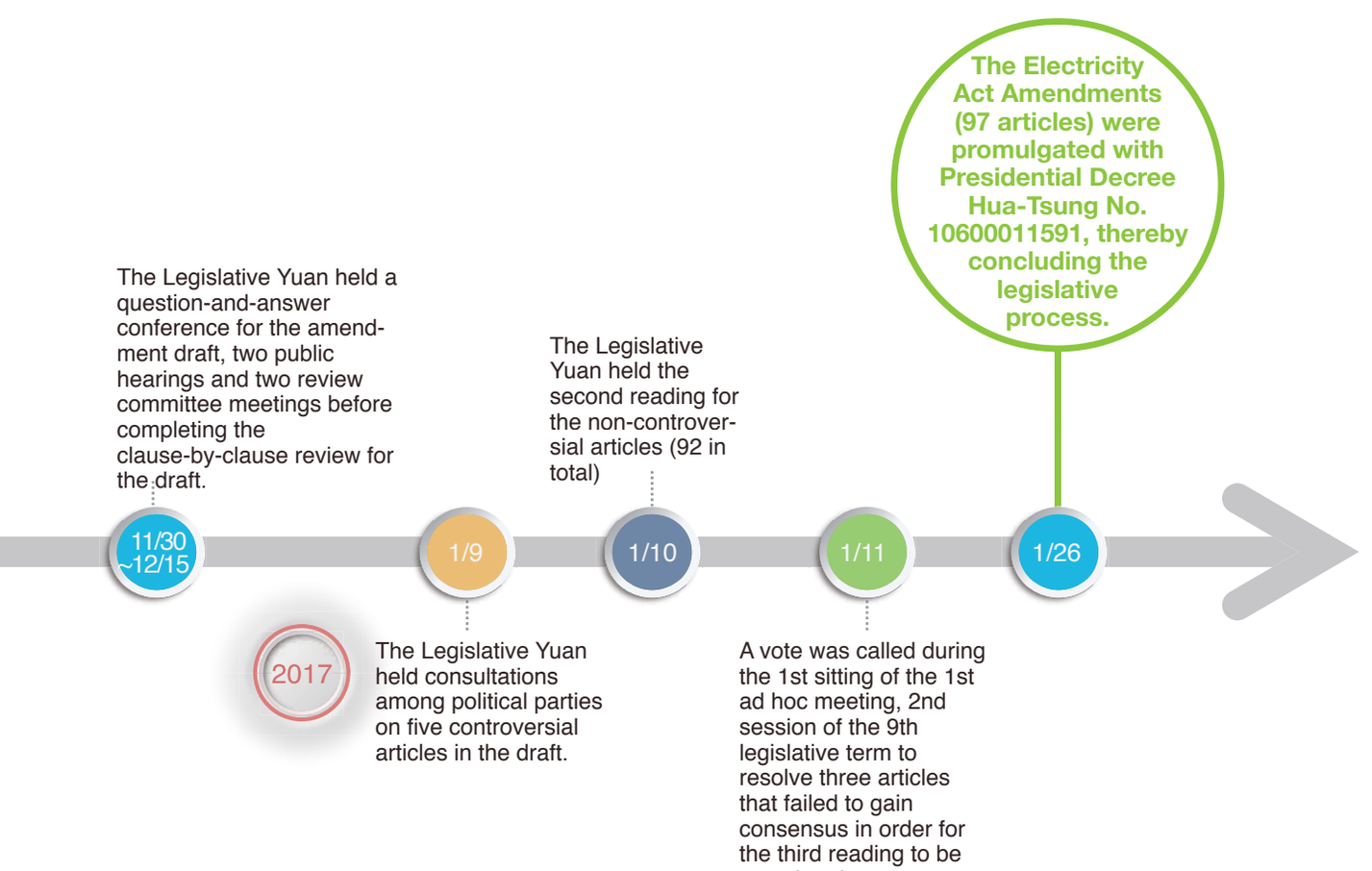
### 6~9 years after the amendment is in effect

- Taipower transforms into a holding company with two subordinate companies to handle power generation and power transmission and distribution respectively

**2st phase**

**Schedule TBD –** with supplementary management measures and regulations operating smoothly and after the stable development has taken place in the market

- Open access to wheeling and direct power supply for distribution for newly established traditional power generation facility operators (existing IPPs are still only permitted to sell power to Taipower)
- Liberalize general power distribution industry



## Impact of the Electricity Act Amendments on Taipower

Despite how few regulations changed in the Electricity Act Amendments, Taipower has taken the initiative to implement its accounting separation and the separation of generation and grid functions. It is scheduled to transform into a holding company within six to nine years following trends seen within the electricity liberalization development of other countries. Although Taipower has experience in corporate transformation, the company still faces five major management challenges to in conducting its corporate transformation, given the contents of the Electricity Act Amendments at this current stage and the numerous requirements to be stipulated in subsequent sub-laws and notices. The five major challenges are summarized as follows:

### Energy transformation – the challenge of energy structure

The focus of the Electricity Act Amendments has shifted from liberalization to energy transformation. At the present stage, direct supply and wheeling for traditional power industry has yet to be liberalized. Considering the 2025 nuclear-free homeland policy, completing relevant preparations for power plant de-commissioning, promoting power structure adjustments for gas and coal power generation under the premise of low-carbon power while ensuring an increase in LNG (liquified natural gas) generation and reliable power supply on top of ensuring sufficient reserve capacity in conjunction with the development of renewable energy: these aspects present a truly daunting challenge for Taipower. All the aforementioned tasks will be carried out simultaneously while also preventing short-term power shortages that may result in power rationing.

### Open access to green power – the impact on grid structure

Although the first phase of the amendment only provides for open access to renewable energy generation, this would lead to entirely new issues in power dispatch —Taipower must deal with the electricity load curve when taking renewable energy generation as first order to adjust its power dispatch principles. In addition, Taipower will also need to re-evaluate how it should calculate the pricing and rates for transmission/distribution along with power wheeling. The integration of separate and unstable renewable energy into the energy mix will also call for the improvement in grid integration technologies as well as reduction in the operating costs for power transmission and distribution equipment. As such, the integration of a smart grid and the promotion of distributed grid planning are some of the challenges that Taipower has to plan and respond to in advance.

### Liberalized market – the challenge of power business operations

As a state-owned company, Taipower loses the exclusive privilege to control the domestic power industry and thus power generation is no longer a public business, which means we must seek ways to maintain a high level of competitiveness and service quality while public utility rights (i.e. land expropriation, lease of state-owned forests) are revoked. Taipower must also adjust its strategies for power purchase/sales with collaborating independent power plants (IPPs) and instead become a globalized power utility group. This will entail venturing into the international market when the domestic market has become liberalized and saturated. Another aspect is the accounting separation for the power industry (i.e. being responsible for our own profits/losses).

### Accounting separation for power industry – being responsible for our own profits/losses

Taipower has already implemented its divisional system, the separation of grid functions, responsibilities and accounting separation. Taipower must make relevant planning for the transaction and cash-flow mechanism (i.e. charging for transmission services provided by the transmission/dispatch/sales company) among different divisions. Not only that, each division must also calculate rational profit and loss margins for itself to establish its respective performance management objectives to achieve a divisional structure that is truly accountable for its own profits/losses.

### Transformation to a holding company – the trials of reorganization

While the Electricity Act Amendments stipulated that Taipower shall transform itself into a holding company within six to nine years as required by the government, the preparations involved for such transformation are not only time-consuming but also complex in nature. This includes redefining the roles and functions of the parent company and subordinate companies, the formulation of a stage blueprint for future transformation, the transformation of relevant divisions into subordinate companies under the holding company, and the preparations involved for the headquarters to become the parent company. Furthermore, as a state-owned business, Taipower must also give thought to achieving effective communications with its employees during the transformation while also safeguarding their rights and striving for a less stringent form of the Administrative Law of State-Owned Enterprises, allowing Taipower to face competition and challenges in the future. These are the tests that Taipower is about to face and must gradually overcome.

## Taipower's Response

Facing these five aforementioned challenges, we are now undertaking the planning and preparation for complementary measures to transform our organizational structure and the holding company's trial operations, including:

### Promoting the separation of internal generation and grid functions

Since 2013, Taipower has been gradually defining the responsibilities and balance of payment among generation, transmission, distribution, and sales for each respective unit by promoting the "separation of internal grid functions" policy.

### Transforming into a divisional structure

Taipower officially transformed into a "divisional system" in January 2016 by defining its core business operations as divisions of Power Generation, Nuclear Power, Transmission System, and Distribution and Sales Division in response to the liberalization of the power market and the challenge of transforming itself into a holding company.

### Establishing relevant task forces to promote corresponding affairs

The president of the Taipower company held the sixth and seventh meetings for the "Electricity Act Amendment Response Task Force" in June and August 2016, respectively, to brief the task force on the Bureau of Energy's plans for the Electricity Act. The president also discussed issues such as Taipower's stance, opinions and suggestions with regards to the liberalization of the power industry and Electricity Act Amendments in order to formulate the company's proposition and suggestions regarding the amendments.

With the amendments in place, Taipower has adjusted its preparations in accordance with pertinent regulations and established its Power Industry Liberalization Response Task Force, which is headed personally by the Chairman with the Department of Corporate Planning functioning as the advisory unit. The task force has six subordinate task forces: "Power Generation Industry Response," "Power Distribution Industry Response," "Wheeling and Direct Supply," "Power Dispatch," "Accounting Separation," and "Resource and Transformation Planning." These task forces are responsible for carrying out relevant tasks concurrently. In 2016, the head task force held four meetings to discuss and plan the preparations to be made.

### Introducing R&D resources to commission research projects

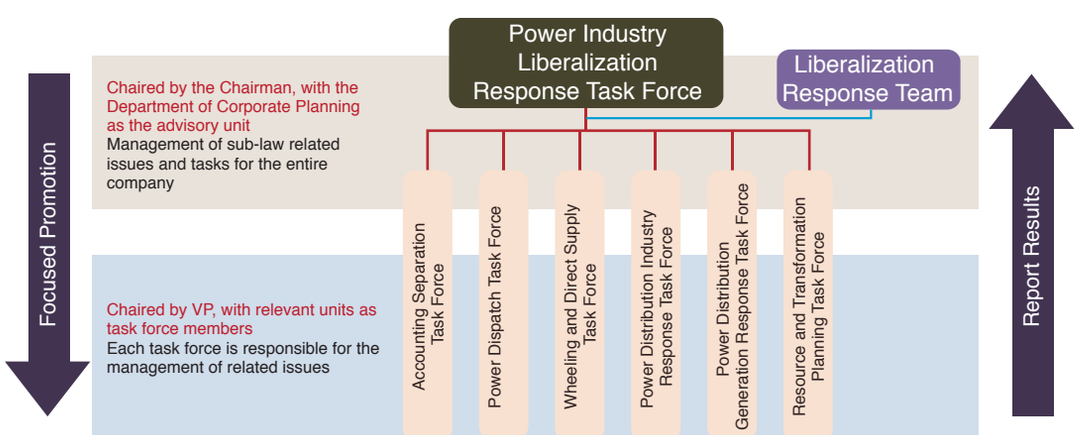
Presently, Taipower has launch the "Research on Taipower's Strategy, Response and Planning for Power Industry Liberalization" by commissioning seven separate studies (financial planning, wheeling contracts and regulations, power dispatch regulations, dispatch fee calculation, responding as a public power distributor, power plant operating model improvement and transformation of the HQ into the parent holding company) to external parties to facilitate the promotion of relevant affairs and tasks.

To help employees better understand the directions of the Electricity Act Amendments while fostering employee consensus, Taipower has already organized six communication seminars at the HQ for different divisions and systems. In addition to making specific project reports during key management meetings, Taipower will also take the initiative to arrange for various supervisors of different rankings to take part in relevant training while organizing island-wide information sessions in the future.

### Continuing to facilitate internal communication within the company

To help employees better understand the directions of the Electricity Act Amendments while fostering employee consensus, Taipower has already organized six communication seminars at the HQ for different divisions and systems. In addition to making specific project reports during key management meetings, Taipower will also take the initiative to arrange for various supervisors of different rankings to take part in relevant training while organizing island-wide information sessions in the future.

## Power Industry Liberalization Response Task Force–Organizational Structure and Responsibilities



## 2.1.2 Organizational Transformation Plan

### Promotion of a Divisional Organization

Taipower officially transformed into a divisional organization on January 1, 2016, with the headquarters functioning as an "investment center" that will only be responsible for establishing policies, coordinating the development and resources for each of the four respective divisions: Power Generation, Nuclear Power, Transmission System, and Distribution and Service. Each of these divisions—will function as "profit centers," which are managed as corporations. Theywill be responsible for autonomous management and their own profits/losses. The strategy, objective and performance evaluation system operations, and operation management for each plant/division shall be the responsibility of the respective division CEO.

### Separation of Responsibilities for the Four Divisions

#### Power Generation Division

Responsible for the operation, development, maintenance and management of hydro, thermal and renewable energy generation, the division will adopt Taipower's mission of environmental friendliness as its core value and endeavor to develop renewable energy, fulfill international carbon reduction commitments, and fill the gap of power generation in the absence of nuclear power generation. As for renewable energy, Taipower plans to increase solar power generation, wind power in both inland and offshore areas. Solar power generation will primarily be managed by the private sector while Taipower will independently develop the capital-intensive offshore wind power and large solar power units. As for the gap in non-nuclear power, the division will consider natural gas as its first choice to fill the gap due to its relatively lower carbon emissions.

#### Nuclear Power Division

Responsible for the safe operation of nuclear power generation, power plant design, management, communication with the public, handling of radioactive wastes and so forth, the nuclear power division will focus on five major directions for development in the future: 1) prioritize nuclear power safety; 2) manage relevant communications on existing nuclear power plants to prevent premature decommissioning; 3) preparation of extended decommissioning plans; 4) preserve the value of Longmen Power Plant assets; 5) handle the storage of nuclear wastes.

#### Transmission System Division

Responsible for the planning, design, construction and operations of a power grid as a vertically integrated business department. The division shall integrate engineering and operational personnel in the future and strive to preserve the core expertise of key personnel to prevent a shortage in qualified human resources. In the long run, the division's priority will rest on the liberalization of the power market and maintaining a safe, sustainable, and efficient power supply. The division shall endeavor to ensure the reliability of the company's power transmission network in response to the trends of power carrier services in the future.

#### Distribution and Service Division

Responsible for the sales and purchase of power, customer service, grid planning and construction, operations, maintenance, etc., this division will utilize big data on power consumption in the future to analyze customers' power usage behavior. In addition, the division will be involved in horizontal alliances through smart meter AMI to provide power diagnostic services for users to achieve smart lifestyles. Through the "operation of service locations across Taiwan" and "highly competent employees with expertise,," Taipower hopes to become the supplier and distributor of power with the greatest competitive edge.

## Benefits of Adopting a Divisional Structure

### Improve management efficacy in preparation for Taipower's transformation into a holding company

Task achievement has always been Taipower's priority. With the adoption of the divisional structure, each division will now function as a profit center to be accountable for its own profits and losses. This will motivate our employees to cultivate cost awareness and strive for reasonable investments in their daily operations and decision-making while being conscious of solutions to reduce costs to increase division profits and improve overall management efficacy.

### Earn the trust of competent authorities and the public to improve Taipower's corporate image

Through clear definition of the responsibilities and costs of power generation, transmission, distribution and sales divisions, Taipower's management shall become more transparent and systematic. This should enable Taipower to earn the trust and confidence of the public and competent authorities, thereby gaining the support of the tariff review committee members. At the same time, Taipower has not only complied with the competent authority's instructions to implement structural transformation but also responded to the public's expectations for the company to reform. Thus, Taipower is significantly improving its image.

### Strengthen resource integration in response to the separation of divisions within Taipower

Taipower's four divisions will collaborate on the basis of the transfer price principle. With the accounting separation between divisions, the collaboration between divisions will be able to more efficiently integrate the company's resources and boost Taipower's overall performance.

### Consolidate employees' work privileges

By improving its management competitiveness, Taipower will benefit from more stable profits, which in turn will enable the company to consolidate employees' work privileges, bonuses and benefits. For the employees, this offers greater security and results in boosted confidence in their careers and futures at Taipower. In addition, Taipower will allocate funding for bonuses as incentives to reward outstanding performance for each division in order to improve employees' productivity and satisfaction.

## Future Prospects for the Four Divisions

### Power Generation Division

Improve generation efficiency

To become more competitive and improve the management structure while cultivating new skills, Taipower will adjust the generation model for the Power Generation Division and expand the responsibilities and autonomy for each division in its management. At the same time, the company will actively promote the renewal of thermal units and adoption of renewable energy while developing strategic alliances with power generating operators/collaborating partners. In the future, Taipower will also promote talent training for various functional units in each division, including power plant PR and marketing talents along with the promotion of horizontal alliances and building comprehensive incentive schemes that will reward outstanding performance with bonuses.

### Nuclear Power Division

Maintain stable operation

The Nuclear Power Division will remain steadfast in its path towards the development of safe and stable operations while ensuring adequate communication and emergency response preparations to prevent existing nuclear units from operational disruption before their scheduled decommissioning. The division will operate in conjunction with the government's energy policies by completing its nuclear power plant decommissioning planning as well as assisting Taipower to maintain and protect its Longmen Power Plant assets.

### Transmission System Division

Refining management functions

To refine the management functions of the Transmission System Division, the division will devise power wheeling scenarios and establish wheeling rates while finalizing regulations and rules for direct power supply. In addition, the division will clarify the cost interfaces between generation, transmission, and dispatch in preparation for power wheeling services. The division will involve itself in constructing smart grids and analyze the demands for grid integration in response to the potential impact from renewable energy grid integration via the continued replacement of outdated equipment. Last but not least, the division will establish its Dispatch Regulation task force to formulate methods of estimation and planning.

### Distribution and Service Division

Enhance service efficacy

In an effort to enhance distribution line efficacy, the division will engage in the construction of regional micro grids and smart grids while introducing dispatch software to boost the division's capabilities in power analysis and operation maintenance. As for the improvement of its power distribution function, Taipower will strive to simplify the process of utility application and reduce the waiting time through procedural re-engineering and information technology. Moreover, Taipower will establish a dedicated green power purchase/distribution team to accommodate the supply and demand of green power distribution with the Electricity Act Amendments now in place. In the future, the division will analyze power usage behavior for customers to provide customized services and energy-saving solutions for customers to choose from.

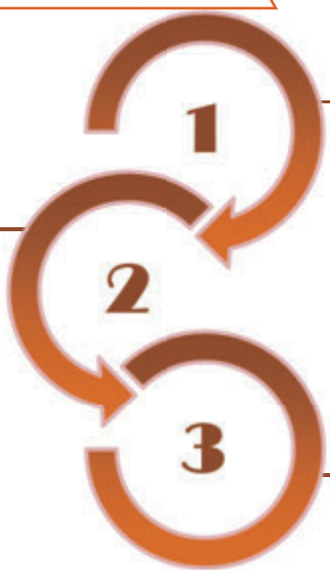
## Preparations for Organizational Transformation

The completion of the “separation of generation and grid functions” became the critical preparation for Taipower to initiate its divisional structure transformation. The process involves the clarification of duties and responsibilities for each plant/facility, power grid, and business division so that each unit will have a clear understanding of its responsibilities, duties, and roles within the organization. This will in turn assist all facilities/plants to better focus on operational management and ensure that all tasks are duly maintained and managed by the respective units. Taipower's other critical preparation involves the establishment of an accounting separation system, which clarifies cost incidences and facilitates the transparency of operational costs. This will aid employees by enhancing understanding of the generation of costs and cultivate cost awareness. For the contents of the accounting separation system and separation of generation and grid functions, please refer to the Sustainable Development Section on Taipower’s official website.

# 2.2 Enhancing Reliability of Power Supply

## 2.2.1 Adjusting the Energy Mix

### Function of Taipower's Power Development




#### 1st stage
**Supplier of electricity in Taiwan**

Since its initiation in 1946, Taipower has shouldered the responsibility of supplying power across Taiwan and engaged in long-term power development. At this stage, Taipower's system was essentially the power supply system for all of Taiwan.

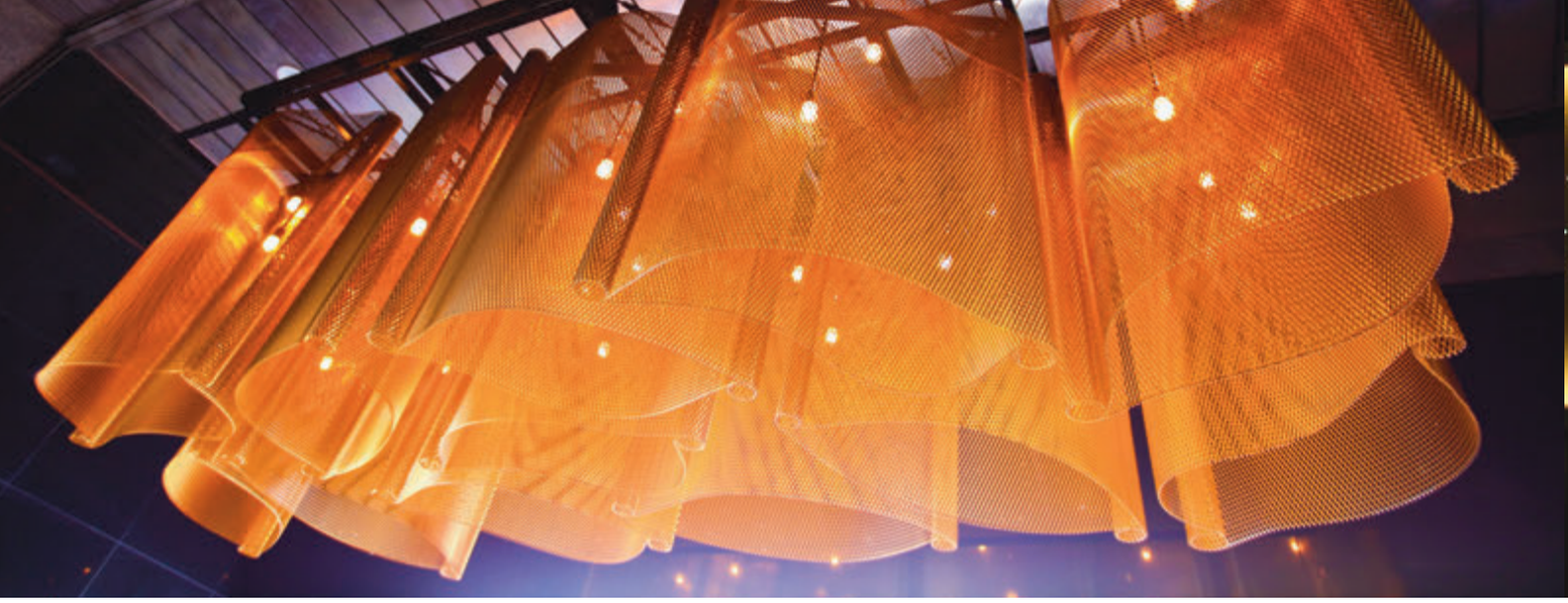
#### 2nd stage
**Purchasing power as supplementary generation**

- Energy Administration Act promulgated in 1980
- Cogeneration System Promotion Measures promulgated in 1988 for the promotion of cogeneration system construction
- In 1994, private operators were given permission to apply for the establishment of power plants
- Independent power plants were gradually introduced into Taipower's system between 1999-2009
- After 1970, in addition to Taipower's system, private contributions from cogeneration power plants and IPPs were gradually introduced into the system, thus lowering Taipower's ratio of power generation

#### 3rd stage
**Navigating into a low-carbon future with green power**

In conjunction with the government's vision for a nuclear-free homeland and the goal of adjusting the energy mix to 50% LNG, 30% coal, 20% renewable energy by 2025, Taipower will eagerly promote renewable energy and LNG generation so as to create a friendly environment for grid integration and facilitate energy transformation.

For a long time, Taipower's power generation structure has been constantly adjustment in accordance with the government's policies and the needs for economic development. The Electricity Act Amendment was promulgated by Presidential Decree in January 2017. Open access will be granted to the renewable energy generation industry and distribution industry as the power industry is gradually marketized. As such, Taipower will no longer be disclosing relevant power development solution statistics to the public in the future. In light of the government's policy to increase LNG usage, Taipower is actively promoting the construction of LNG reception stations and the procurement of LNG.



## Directions of Power Structure Adjustment

### Direction I: A nuclear-free homeland

In accordance with the “nuclear-free homeland” policy, the government plans to achieve an energy mix of LNG 50%, coal 30% and renewable energy 20% by 2025. And as such, Taipower will operate in compliance with the government’s energy policies and devise long-term solutions for power development. With the exception of nuclear power plants, which are due for decommissioning, Taipower will fully promote renewable energy generation in the future and emphasize LNG generation to create a friendly environment for grid integration while ensuring smooth energy transformation without compromising the power supply in Taiwan.

### Direction II: Toward low-carbon energy

In light of trends in international power industry development and domestic policies, Taipower is committed to delivering high-quality green energy and low-carbon energy. In the next 15 years, Taipower plans to invest NT$ 400 billion to achieve the objectives of increasing the installed capacity for renewable generation (including hydropower) to 5,400 MW by 2030, including 1,800 MW of offshore wind power, 600 MW of inland wind power, 1,000 MW of solar power, 100 MW of geothermal power, and 1,900 MW of hydropower by 2030. Furthermore, Taipower will increase the ratio of low-carbon generation by focusing on the development of various gas projects while actively promoting the construction of LNG reception stations in Taichung and Xiehe in order to ensure a sufficient supply of LNG and improve supply reliability.

### Direction III: Response to the Electricity Act Amendments

With the Electricity Act amendments in effect, we are gradually headed for a future of a “liberalized power industry.” However, the renewable energy generation industry at the early stages of open access due to the amendments and power consumption by specific units for self-use, the percentage of Taipower’s contributions to the national power generation system will decrease as a result. Consequently, the long-term power development plans that Taipower has followed will be unable to account for the actual power supply and demand across Taiwan. Nevertheless, Taipower will actively monitor the status of power generation planning in the private sector and collaborate with the private sector to achieve its low-carbon power goal.

## Improving Energy Mix—Short, Medium and Long-term Planning

### Short-term measures

Due to the high population density in Taiwan, acquiring land for power plants and cable connections has proven difficult. The challenge is further exacerbated by the "NIMBY" effect and overwhelming public concern about greenhouse gas emissions in recent years. With such daunting obstacles, the construction of power plants today will take more than ten years to complete. Consequently, the gap in power supply caused by the mothballing of Nuclear Power Plant NO.4 (NPP4) cannot be filled by simply increasing the sources of traditional thermal power in the short term. Taipower has therefore drafted the following measures to mitigate the risks of a power shortage:

- Strengthen load management measures (i.e. improving "interruptible rates" and "demand-based bidding measures" and so forth) to handle the growth in power consumption.
- External cooperation－launch the pilot run for a customer group representative system to integrate customer usage suppression and increase customer usage suppression potential through telecommunication technologies and the management experiences of third party energy service providers to supply reliable suppressed power capacity when there is high pressure on Taipower's power supply.
- Strengthen maintenance and repair of power generation units and optimize unit overhaul schedules to improve reliability.
- Expedite the progress of ongoing construction projects such as Linkou, Dalin, Tongxiao power plants for early commercial operations.

### Planning for medium-to-long term

Taipower's long-term power sources are planned and fine-tuned annually based on factors such as government forecasts of economic trends, the development of industrial structures, population growth, tariff pricing, climate conditions, etc. The company also relies on the opinions and forecasts of scholars and experts for planning purposes. With consideration to the Electricity Act amendments and the government's outline for power structure by 2025, Taipower's planning for medium-to-long term is as follows:

#### Full-fledged promotion of renewable energy development

According to the press release titled, "Towards the Goal of a Nuclear-Free Homeland by 2025—Promotion of New Energy Policy," published by the Executive Yuan on September 17, 2016, the government has proposed concrete measures for seven new energy policies and outlined the power generation structure target for 2025 with LNG at 50%, coal at 30% and renewable energy at 20%. Taipower shall comply with the government's energy policies and, with the exception of nuclear power plants that are due for decommissioning, Taipower will become a leader in green energy generation and actively promote renewable energy generation in the future. The company will purchase power from independent renewable power plant operators while emphasizing LNG generation to create a friendly environment for grid integration.

#### Accelerating plans for new energy generation

As most of the objectives for renewable energy development set by the government for 2025 fall under the category of intermittent energy, supplemental power from traditional thermal power plants will still be necessary. In response to the sealing of NPP4, along with the accelerated progress of a single cycle generation plant at Datan, Taipower has also been planning new Xiehe, Gaoyuan and Taichung LNG plants and the renewal and expansion of Shenao, Xingda and Dalin. If these plans proceed smoothly, the new power generating facilities would be ready for commercial operations starting from 2022. As most of the newly built LNG units rely on the completion of CPC's third LNG reception station, they will only be ready for operations by 2024 when the supply for LNG is secured. (For details on Taipower's generation projects, refer to the section on Long-Term Power Development)

#### Full promotion of energy conservation to mitigate power demand

Consensus on energy conservation was reached during the 4th Energy Conference in 2015, and as such, the government has already initiated its "New Energy Saving Project" in which the central government will work together with local governments to promote energy conservation to suppress the growth in power consumption. Regarding demand management, Taipower will promote more appealing time-of-use rates and energy-saving measures to mitigate power demand through expanded construction of AMI in the future.

## Long-Term Power Development

In light of the continuous growth in power demand in the future and the fact that as much as 14,709 MW of installed capacity from large thermal units and nuclear units are scheduled for decommissioning between 2016~2027, Taipower has made the following plans for long-term power development:

### Generation project renewal and expansion plans

To facilitate a balanced regional power supply in Taiwan, improve generation efficiency and comply with the government's policy of low-carbon sustainability, Taipower has implemented a number of renewal and expansion projects in northern, central and southern Taiwan. Contents of Taipower's existing nuclear, thermal and hydro power projects currently under renewal and expansion are as follows (for details on renewable energy plans, please refer to "Section 5.3 Renewable Energy Development"):

| Type of power generation | Name of project | Description | Performance and status of implementation in 2016 |
|---|---|---|---|
| Nuclear power plant project | Nuclear #4 No.1 and No.2 Project | ●Construction of two single advanced Boiling Water Reactor Units of 1.35 GW each, with a combined annual power generation capacity of 19.3 TWh. As an alternative to coal-fired power generation, these units will reduce 16.2 million metric tons of CO2e per year.<br><br>●In accordance with the government's order that "Work on Reactor No.1 of NPP4 will be halted and safety inspections will be conducted; after that, the unit will be sealed and all operations of Reactor No.2 shall be halted," Taipower has made relevant preparations for the shutdown and sealing projects. On August 29, 2014, the Executive Yuan approved the shutdown and sealing implementation plans with the operations tentatively planned in 3 years and pending further instructions from the competent authority to take follow-up action. | ●To achieve the administrative target of a "nuclear-free homeland" by 2025, the government has explicitly instructed the sealing and non-operation of NPP4 and the policy has been resolved by the Legislative Yuan. As such, Taipower has reassessed and significantly changed its Longmen Power Plant Sealing Plant into "Longmen (NPP4) Power Plant Asset Maintenance and Management Plan" and proposed the plan to MOEA on November 21, 2016 to be submitted to the Executive Yuan. Per correspondence from MOEA dated January 26, 2017, the submitted proposal had already been approved by the Executive Yuan.<br><br>●The plan was formulated to preserve relevant equipment and assets at NPP4 at their maximum value. For 2017, the plan outlined Taipower's intention to maintain various equipment in operating condition with relevant maintenance, servicing and testing operations carried out on safety related structures, systems, equipment components at the lowest budget. These tasks shall be performed under the premise of maintaining asset quality during the period of extension to ensure that all structures, systems, equipment components remain in satisfactory conditions, with all quality records properly preserved and managed to ensure adequate preservation of NPP4 assets before follow-up action has been determined for the power plant. |
| Thermal power plant project | Dalin Power Plant Overhaul Project | ●Generators No. 1 and 2 that have been in operation for more than 46 years have been chosen for renewal and modification. Taipower will be installing two single ultra-supercritical pressure coal-fired units of 800 MW capacities that cost approximately NT$ 104 billion in investments.<br><br>●Generator No.1 is scheduled for grid integration on June 15, 2017 and commercial operation on Feburary 16, 2018. Generator No. 2 is scheduled for grid integration on December 15, 2017 and commercial operations on July 15, 2018. | ●Changes to the plan have already been approved on September 14, 2016.<br><br>●As of the end of 2016, construction progress was at 87.51%. |

| Type of power generation | Name of project | Description | Performance and status of implementation in 2016 |
|---|---|---|---|
| Thermal power plant project | Linkou Power Plant Renewal and Expansion Project | ●Taipower will be installing three single ultra-supercritical pressure coal-fired units of 800 MW capacities that cost approximately NT$ 152.5 billion in investments.<br>●Generators No.1, 2 and 3 are scheduled for commercial operations in August 2016, April 1, 2018 and July 1, 2019, respectively.<br>●As of the end of 2015, construction progress was at 68.95%. | ●Generator No.1 completed its full load test (running continuously for 96 hours) on May 30, 2016. Taiwan was hit by record-breaking high temperatures on May 31 and June 1 2016 (peak load period in summer) and when the system displayed a red alert for power supply, the generator operated at full load to prevent the crisis of power rationing. The license for Linkou Power Plant was renewed on October 6, 2016 to increase the capacity for Linkou Generator No.1 before the scheduled date.<br>●Generator No. 2 was also integrated into the grid on September 2, 2016. |
| | Tongxiao Power Plant Renewal and Expansion Project | ●In conjunction with the government's policy of prioritizing LNG generation, Taipower will be replacing the existing generators that have been in operation for more than 50 years. Taipower will be installing three gas combined cycle units of 892.6 MW capacities that cost approximately NT$ 79.557 billion after the lump sum has been subjected to a rolling review.<br>●Generators No.1, 2 and 3 are scheduled for commercial operations in July 2017, January 2018 and July 2018, respectively. | ●In the end of 2016, construction progress was at 54.38%. |
| | Datan Power Plant Combined Cycle Generation Unit Construction Project | ●In light of the growth in domestic power consumption and the government's "nuclear-free homeland" policy and given the uncertainty of nuclear unit operations and potential restrictions on coal-fired units due to environmental concerns, Taipower has planned to install multiple units of gas combined cycle at capacities between 2880-3168 MW (a total of 4 units, each with an estimated capacity of 792 MW) at the existing site<br>●The investment will come to approximately NT$ 110.5 billion, and the four units will be scheduled for commercial operations in July 2022, January 2023, July 2024 and January 2025, respectively. | ●Taipower planned to activate a portion of its energy transition plan by constructing LNG units to provide emergency power generation in the short term to accommodate the power demands for the peak summer season in 2017 and stabilize the power supply |
| | Shenao Power Plant Renewal and Expansion Project | ●To make up for the power gap in the north and stabilize regional power supply, Taipower has planned the installation of two single ultra-supercritical pressure coal-fired units of 600 MW capacities at the power plant<br>●The investment will come to approximately NT$ 104.9 billion. The two units are scheduled for commercial operations in July 2025 and July 2026, respectively. | ●Changes to the plan have already been proposed to MOEA for submission to the Executive Yuan on October 20, 2016. As the changes have yet to be approved by the Executive Yuan, information that has already been approved by the Executive Yuan shall take precedence. |
| Hydro power plant project | Liyutan Dam Jingshan Hydro Power Project | ●Installed one unit of mounted vertical axis Francis type turbine generator with 4MW installed capacity at Liyutan Dam in Miaoli | ●Preparations for turn-key contract out documentation, blue prints and relevant regulations. |

## Long-term power capacity planning

### System Installed Capacity Planning for 2016 through 2027 (in accordance with Taipower's Long-Term Power Development Plan 10510)

Unit: 10 MW

| Unit Type | End of 2015 | | New Capacity under Taipower | | | | Retired Capacity | End of 2027 | |
|---|---|---|---|---|---|---|---|---|---|
| | Capacity | % | Under Construction | Under Planning | Total | % | | Capacity | % |
| Pumped storage hydro | 260.2 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 260.2 | 5.2 |
| Renewable | 402.3 | 9.8 | 18.8 | 181.7 | 200.5 | 8.5 | 0.0 | 602.8 | 12.1 |
| Hydro | 208.9 | 5.1 | 0.4 | 0.9 | 1.3 | 0.1 | 0.0 | 210.2 | 4.2 |
| Other | 193.4 | 4.7 | 18.4 | 180.8 | 199.2 | 8.4 | 0.0 | 392.6 | 7.9 |
| Thermal | 2,926.8 | 71.3 | 669.9 | 1,487.9 | 2,157.8 | 91.5 | 956.5 | 4,128.0 | 82.7 |
| Coal | 1,069.7 | 26.1 | 400.0 | 120.0 | 520.0 | 22.1 | 210.0 | 1379.7 | 27.6 |
| Fuel oil | 332.5 | 8.1 | 2.1 | 1.1 | 3.2 | 0.1 | 320.3 | 15.4 | 0.3 |
| LNG | 1,524.5 | 37.1 | 267.8 | 1,366.8 | 1,634.6 | 69.3 | 426.2 | 2732.9 | 54.8 |
| Nuclear | 514.4 | 12.5 | 0.0 | 0.0 | 0.0 | 0.0 | 514.4 | 0.0 | 0.0 |
| Total | 4,103.7 | 100.0 | 688.7 | 1,699.6 | 2,358.2 | 100.0 | 1470.9 | 4,991.0 | 100.0 |

Note 1. Discrepancy in figures' decimal points is due to rounding

## Electricity Procurement Measures

The construction of new power plants has proven to be difficult, so Taipower has been procuring power from independent power plant (IPP) operators and qualified cogeneration operators to ensure a stable power supply. Taipower procured a total of 51.542 TWh in 2016, which constituted 22.8% of its total supply for the year (a decrease from 22.9% in the previous year). It has become an important power source in Taipower's system to reduce the ratio of fuel oil and LNG generation (both are costly), thereby reducing generation costs. Power procurement enables Taipower to achieve two objectives: 1) improve its energy mix, 2) enhance its management efficacy. Taipower's current power purchase structure is as follows:

- Independent Power Plant (IPP): by the end of 2016, nine private power plants have signed power purchase agreements (PPA) with Taipower, with an available capacity of 7,652.1 MW.
- Cogeneration: by the end of 2016, Taipower had contracts with 52 providers for a total installed capacity volume of 5,746.7 MW and a guaranteed peak capacity of 2041.7 MW.

With the passage of the Electricity Act Amendments in 2017, open access will be granted to the renewable energy generation industry in the future. As such, Taipower will also be making plans for collaboration models in hopes of drawing more low-carbon renewable energy to fulfill its corporate mission of being environmentally friendly.

## 2.2.2 High Quality and Reliable Power Supply

As a high-quality power service provider, the delivery of stable and safe power embodies the fundamental requirement of Taipower's services. Taipower has established comprehensive power supply reliability management mechanisms and created specific targets for power supply reliability indicators (average interruption duration and average frequency of power interruption) to manage and evaluate power supply performance so as to provide reliable and safe power to achieve that requirement.

## Power Supply Reliability Management Mechanism

| Management Mechanism | Measures | Actions Taken in 2016 |
|---|---|---|
| Periodic review and analysis | ●Routinely convened Electrical Facilities Incident Review Meetings<br>●Establish the "Transmission Line Lightning Hazard Prevention Management Plan" and the "Salt Corrosion Hazard Prevention Management Plan" on a yearly basis to prevent the likelihood of transmission line tripping caused by natural disasters<br>●Periodically review average interruption performance of the distribution system and analyze the causes of major outage incidents to formulate corresponding improvement measures and determine the optimum strategy for each incident | ●Monthly meetings were held to review the causes of electromechanical incidents in the previous month, and devise improvement strategies<br>●Implemented the monthly "one-time system electrical/mechanical incident preview meeting and follow-up reviews of subsequent system electrical/mechanical incidents"<br>●Each month, the Department of Power Supply supervises and audits each power supply branch on their "Annual Underground Transmission Line Accident Prevention Management Plan Performance" and organizes review meetings in January, April and October.<br>●Performed dissolved gas analysis for oil-filled cables in addition to the quarterly audit/supervision on "anomaly improvement." |
| Distribution feeder automation | ●Accelerated feeder automation engineering, feeder map updating, comprehensive management and control process for outages, repairs without planned power interruptions and so forth to reduce the scope, duration and frequency of repair-related power interruptions | ●By the end of 2016, there are 7,080 feeder automation circuit finished, which are 71.64% of the total automation circuit. |
| Risk management | ●For potential risk factors that could affect power supply stability and reliability, Taipower reviewed such factors on a yearly basis and incorporates the identified risks into risk management and control for the subsequent year to routinely track and review the results of relevant implementations<br>●Ensured due implementation of the "15 points" of excavation damage prevention for underground transmission lines and gradual implementation of the "5 stage" control while emphasizing hierarchical accountability to ensure power supply safety.<br>●Established the "TBM-SKY" table for underground transmission line maintenance and measurement system to preemptively detect potential vulnerabilities to achieve preventive control ahead of time | ●Organized monthly incident report drills to strengthen the response capability of on-duty staff<br>●Organized report drills at the beginning of each month in accordance with the "Science Park Power Emergency Response and Report Procedure" to strengthen the mechanism of the reporting system<br>●Completed the power supply reliability and safety risk exercises on June 1 and November 24 to improve employees' emergency response capabilities<br>●Organized four High-Tech Park Power Quality Management and Improvement Meetings to follow-up on the issues reported to ensure power supply quality in the facilities. |

| Management Mechanism | Measures | Actions Taken in 2016 |
|---|---|---|
| Personnel training | ●Organized regular education and training of distribution line maintenance staff and dispatcher to enhance their technical skills and maintenance capabilities.<br><br>●Organized monthly incident report drills to strengthen the response capability of on-duty staff | ●Fourteen on-the-job training sessions were held Taipower organized dispatch personnel status monitoring indicator and operation guide testing from May 1 through 31 to ensure that core expertise and know-how are passed down to new employees<br><br>●Held an operational safety training for electric operators on duty for ultra-high voltage users at Central Taiwan Science Park on April 14 for a total of 31 participants<br><br>●Held an operational safety training for electrical operators on duty for ultra-high voltage users at the Central Taiwan Science Park on July 14 for a total of 68 participants<br><br>●Held two operational safety training sessions for electrical operators on duty for ultra-high voltage users at the Central Taiwan Science Park for a total of 48 employees |
| Strengthen audit | ●Implement non-routine audit equipment operation evaluation and supervised each district office to improve their accident prevention and improvement plans<br><br>●Promoted the “designated area” system for staff responsible for the maintenance of underground transmission lines and improve upon patrol operations<br><br>●Implemented a range of underground transmission line maintenance in accordance with relevant procedures such as the “Transmission Line Patrol Operation Procedure,” “Electrical Test on Cable Over Sheath Operating Procedure” and “Underground Cable Spot Inspection Guidelines” | ●Responsible staff visited each power supply area in rotation on a monthly basis to perform the audit for “Annual Underground Transmission Line Accident Prevention Management Plan Performance,” up to a total of 12 audits throughout the year<br><br>●Implemented four “Follow-up on Dissolved Gas Analysis Anomaly for Oil-Filled Cable” audits<br><br>●Conducted power transmission equipment safety inspections at Hsinchun Science Park, Central Taiwan Science Park and Tainan Science Park and identified a total of 40 vulnerabilities, all of which have been rectified<br><br>●Implemented at least one off-line cleaning during the salt spray corrosion season and established insulator salt test points to carry out night insulator leakage observation. If necessary, mobile insulator cleaning shall be performed as well |

## Targets and Performance for Power Supply Reliability

| Performance \ Year | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Target | Performance | Target | Performance | Target | Performance | Target | Performance | Target | Performance |
| Average power outage duration (min/household·year) | Performance of forced outage | 13.894 | 13.331 | 13.469 | 13.141 | 13.290 | 12.713 | 12.731 | 12.321 | 12.711 | 12.223 |
| | Unexpected outage | 6.106 | 5.719 | 5.531 | 4.945 | 4.960 | 4.783 | 5.019 | 3.947 | 4.819 | 4.051 |
| | Total | 20.000 | 19.050 | 19.000 | 18.086 | 18.250 | 17.496 | 17.750 | 16.268 | 17.530 | 16.274 |
| System average interruption (times/household·year) | Performance of forced outage | 0.069 | 0.067 | 0.068 | 0.064 | 0.068 | 0.064 | 0.064 | 0.058 | 0.065 | 0.058 |
| | Unexpected outage | 0.221 | 0.230 | 0.212 | 0.200 | 0.222 | 0.200 | 0.216 | 0.163 | 0.216 | 0.150 |
| | Total | 0.290 | 0.298 | 0.280 | 0.264 | 0.290 | 0.264 | 0.280 | 0.220 | 0.280 | 0.208 |

Note: Average power outage duration (min/household·year) equals duration of system-wide power interruptions divided by total number of customers Average frequency of power interruptions (times/customer·year) equals number of system-wide power interruptions divided by total number of customers

In 2016, the average power interruption duration per customer came to 16.274 minutes per year, with the average power interruption frequency at 0.208 per customer per year. Both were achievements for Taipower and reflected the company's improvement in power supply quality and customer service.

In the future, Taipower shall continue to improve upon the reliability of this power supply. In addition to including science park outage and frequency of voltage dips as key items for routine inspection and follow up, Taipower will also enhance its underground cable excavation prevention system and management system that features tiered accountability. With the effects of global warming in recent years, extreme weather in different regions has resulted in increasing damage and losses,; thus, Taipower proposed the "Distribution Line Disaster Proof Resilience Enhancement Plan" in December 2016 to the State-Owned Enterprise Commission for approval. The plan outlined three major directives:

- Revision of power pole purchase regulations
- Apply various construction techniques to improve existing overhead lines, including pole foundation improvement, pole joining (併桿), reduced pole-planting distance, H pole, installation of branch lines, power pole replacement, pole position adjustment, change of installation method and so forth
- Implement disaster proof undergrounding for distribution lines; Taipower will lay approximately 463 km of underground distribution lines between 2017~2019 with a budget of NT$ 7.4 billion, which would be subjected to yearly rolling reviews during the project

Through the three aforementioned mechanisms, we hope to construct a distribution network that is climate resilient and can effectively mitigate losses in the event of disasters to improve the reliability of distribution system power supply and thereby deliver high-quality, reliable power service to customers.

## 2.3 Enhancing the Accessibility of Power Services

To fulfill Taipower's corporate social responsibilities and ensure the public's access to power services while making it easy for the public to apply for various power services, Taipower has established 24 branch offices and 269 service stations in Taiwan, Penghu, Kinmen and Matsu along with 9,781 feeder lines in these areas to achieve 99.99% power availability. Taipower also reviews the performance of its district offices on a yearly basis and convenes the "Distribution Technology Review Meeting" the following month to ensure continuous improvements to the accessibility, stability and reliability of power services. These measures fulfill the UN's sustainable development goals (SDG), which ensure that all users (including residents of remote areas and disadvantaged minorities) have equal access to needed power services.

### Power Grocery Store—Improving power service accessibility

The residents in remote mountain areas have difficulties accessing Taipower's Miaoli Branch Office for power service applications. To better serve customers in distant areas, the Miaoli Branch Office has launched the "Taipower's Power Grocery Store"—a Community Star Project to collaborate with local services, such as elderly day care centers, community organizations or village chiefs' offices by jointly establishing service locations to offer the local residents convenient services. For instance, the Miaoli Branch Office ran a trial of the "2016 interest-free loans for electricity fees" that involved donations and funds raised from charitable auctions to offer short-term loans for paying the electricity bills of customers who were temporarily unable to pay their bills due to an emergency. The Miaoli Branch Office has also utilized funds raised from auctions and worked with the Miaoli Electric Association to assist disadvantaged minorities by replacing their dated lines/devices. They created a friendly environment for power usage so that the elderly and those who required aid could use electricity without worry. The endeavor is not only true to Taipower's management philosophies of "Care" and "Service" but also ensures that all customers (including those living in remote areas and disadvantaged minorities) receive needed electricity services.

Services currently available from the trial run of the Taipower Grocery Store include:

1. Local applications for simplified procedures
   By collaborating with village chiefs in remote mountainous areas and day-care service stations for the elderly, Taipower provides blank applications with samples at nearby service stations and later dispatches personnel to collect said applications at service stations so that customers from remote areas can save time completing the simplified procedures application.
2. Reservation services for the elderly
   We offer reservations of simplified procedures (i.e. applications, electricity bill payment processing) for the elderly, the disabled or those with difficulty in filling out application forms.
3. Digital training for the elderly
   Through computer operation tutorials, our staff teach elderly customers how to fill out the electronic bill applications.
4. Periodic care
   Contact specific customers at service locations by phone periodically to offer services they may require.

### Offshore Power Accessibility

Taipower complies with the government mandate to provide electricity in Taiwan's offshore islands and does it in a way that establishes quality electricity supply services for offshore islands that are equivalent to those services available in Taiwan. Tariff rates are based on the regulations stipulated by the Offshore Development Act and the Subsidy Regulations on Losses of Electric Utility Operator for Offshore Islands. As of the end of 2016, the accumulated losses from the subsidies for Taipower came to NT$ 75.293 billion.

## Urgent Repairs and Rebuilding

### Management Guidelines

Taipower has a thorough system for disaster prevention and emergency response. Having established policies and regulations, including Disaster Prevention and Rescue Guidelines, Extreme Disaster and Handling Guidelines, Various Disaster and Emergency Reporting Procedures and Disaster Prevention and Emergency Response Standard Operating Procedures to serve as the basis for appropriate response, all units will be able to respond to natural disasters and major power accidents in an effective and timely manner. In addition, Taipower has a well-organized emergency response system in accordance with disaster prevention policies and regulations for prompt natural disaster responses.

**Management Guidelines and Implementation Responsibilities for Urgent Repairs after Disasters**

| Management Strategies and Improvement Measures | Time of Implementation | Implementation Unit |
|---|---|---|
| Convene “Extreme Disaster Prevention and Review Meetings” to review shortcomings in disaster prevention and repair operations in the previous year and items that require improvement while establishing the disaster prevention plan for the current year and verify details such as the disaster prevention and repair organization, the command and dispatch system and so forth | Each year in January and April | Branch offices in each district |
| Conduct various disaster prevention/repair training, education, drills and so forth to help employees become familiar with relevant disaster prevention/repair operations | Each year in May | Branch offices in each district |
| Inventory the disaster repair resources (including contractors) manpower, vehicles and equipment to ensure appropriate utilization | Each year in May | Department of Power Distribution |
| During the Pre-typhoon Preparation Meeting, Taipower will examine specific mountainous areas and offshore islands that may become inaccessible due to road blockage/disrupted ferry services due to the typhoon in accordance with the forecasts from the government (i.e. path of landing and intensity of typhoon) to make pre-emptive deployment of personnel, equipment and materials to perform prompt repair of power facilities and reduce losses from the disaster | | |
| Establish an “Emergency Response Team” and activate mutual support mechanisms when appropriate to rapidly deploy personnel and equipment for disaster repair and power restoration operations while responding to central/local government’s disaster rescue needs by setting up forward command posts to handle relevant response in close proximity. In addition, Taipower will also offer relevant information such as the disaster data, repair status and tasks requiring customer cooperation when needed as a reference to local government and leaders in order for appropriate measures to be taken and provide the needed assistance to shorten the disaster recovery period | During a disaster | Department of Power Distribution, branch office in each district |
| Taipower shall establish a forward disaster command post at various township/district offices in special municipalities and county governments to obtain a full grasp of the number of households without power and areas that have been blocked off. This reduces the need for surveying odd households while immediately verifying the areas with access cut off to improve the efficacy of recovery operations | During a disaster | Branch offices in each district |
| Strengthen distribution system hazard reporting and information sharing operations; organize various disaster and emergency quick reporting training sessions and carry out inspections without pre-warning to improve the speed of disaster reporting | All year round, without pre-warning | Department of Power Distribution |

To obtain external information and receive disaster updates, each branch office shall strengthen its communication with the local population and establish contact groups in accordance with the regional characteristics. Branch offices will access communication channels such as community contacts, telephone and fax numbers, and email addresses to closely monitor and verify households that still suffer from power outages so that branch offices can dispatch personnel to deal with the situation in the shortest time possible.

During a typhoon (before, during and after), each district office will publish no less than one local press release to remind the local population of disaster preparations, and to make people aware that, in the event of a power outage, they may report the outage through Taipower's 1911 customer service hotline or at Taipower's "Typhoon Power Outage/Recovery Information System" website.

## Accountability Fulfillment inExtreme Weather Conditions
## Responding to Drastic Weather and Power Supply Reliability

Global climate changes and the increasing intensity of typhoons in recent years have resulted in ever greater risks and led to substantial destruction and disaster damage from extreme weather in different regions. Over its 70 years of service, Taipower has taken the responsibility to ensure stable electricity supply in Taiwan and its human resources training for extreme weather. Taipower has become a vanguard and protector of citizens' daily livelihoods. In 2016, Taiwan was struck by Typhoon Nepartak (July 8), Typhoon Meranti (September 14) and Typhoon Megi (September 27), causing hundreds of overhead lines to loosen and numerous power poles to collapse. Consequently certain areas experienced massive power outages. In order to ensure prompt recovery of power supply, each district office mobilized its manpower (including contractors), vehicles and equipment to carry out electricity outage emergency repair within its service district, and the Department of Distribution promptly initiated the mutual support mechanism among branch offices.

Typhoon Meranti devastated southern Taiwan and the offshore islands in 2016 with intense wind speeds reaching 17 on the Beaufort scale. The powerful gales collapsed numerous power poles and cut off countless lines, heavily damaging power supply equipment across Taiwan. Meranti caused power outages for more than 1.1 million households in Taiwan, predominantly in the southern region. In light of the extensive damage, the Department of Distribution mobilized personnel from 17 district offices in northern, central and eastern Taiwan to provide support in the south. Kinmen also suffered significant power losses due to intense winds uprooting trees, which damaged power poles and lines. To restore power for the residents of Kinmen as quickly as possible, as well as dispatch personnel from Taiwan proper to Kinmen on September 15 to perform urgent repairs, Taipower coordinated with the Ministry of Defense to dispatch a C-130 transport aircraft to send additional personnel, equipment, and electric engineering vehicles to Kinmen on September 17. Freighters replaced those engineering vehicles which are too large to transport aid vehicles to Kinmen for electricity restoration operations. In responding to these situations, the private sector, government and military spared no effort to ensure the restoration of a reliable electricity supply.

# 2.4 Creating Customer Satisfaction

## 2.4.1 Diverse Channels for Engagement and Communication

As a provider of high-quality power services, Taipower has maintained ideal bilateral communications with the public through a variety of channels. In addition to publishing relevant Taipower information through our Sustainable Development Section, we have sought to collect relevant information from the public through customer service emails and other avenues to facilitate communication between Taipower and its customers, thus allowing us to improve our service quality with customer suggestions. To resolve any hindrances to services caused by language, culture and literacy-related issues, Taipower's customer service center offers its services in Chinese, Taiwanese and English so as to facilitate communication with different customer demographics.

**Taipower's channels for information disclosure and delivery**

- Taipower's website
- Taipower's Sustainable Development Section
- Taipower Green Net
- Taipower TV
- Electricity Bill
- Taipower Publication

**Channels for the Gathering of External Information and Suggestion**

- Customer Satisfaction Survey
- Customer Suggestion Email
- Letters of Request
- 1911 Customer Service Hotline
- Various District Service Stations

### Taipower's channels for information disclosure and delivery

#### Taipower Website

Starting in 2016, Taipower's website gradually incorporated elements of responsive web design (RWD) to accommodate the public's needs for multi-screen viewing. As for the information disclosure section, which generates the most views, Taipower will continue to provide the latest and most comprehensive information regarding the twenty-seven topics under Taipower's six dimensions of operations. In addition, Taipower will implement collective data management through its databases to improve the quality of digital information disclosure and offer greater convenience to the public for information searches in alignment with the p of open information.


http://www.taipower.com.tw

## Taipower Sustainable Development Website

The Taipower website was revamped in 2015 to emphasize its sustainability performance, “Taiwan Power Company Sustainability Report” (in Chinese and English) can be downloaded from our website, which also features relevant performances that have not been included in the report. The website also features a new search function for users to obtain information regarding sustainable development with greater ease along with a stakeholder questionnaire, which will allow Taipower to better understand the thoughts and opinions of stakeholders as a reference for the company’s operations. The Taipower sustainable development website is also linked to other related sites such as the Taipower Green Grid to enrich the content and diversity of the cor information disclosure.


http://csr.taipower.com.tw

## Taipower Green Net

Taipower Green Net was launched on March 31, 2015 for a trial run.The updated version of Taipower Green Net was officially launched on December 28, 2016. The website incorporates a number of features including text size adjustment, image and article downloads, toggle between full version and text-only version display, social media sharing, etc., in order to provide a better users experience and clearer site navigation. In terms of content, to fully present Taipower’s achievements in environmental projects, the updated version now features nine units compared to the original five in the trial version.

Since the end of 2016, Taipower Green Net has attracted a total of 118,831 visitors with 322,373 views. In the future, the website will not only continue to record the dedication of the Taipower staff to our environment and Taiwan but also share various green events to spread the passion and attitude of being eco-friendly to all corners of the company, thereby changing Taipower staff’s attitude towards work and their day-to-day behaviors. We hope such an approach will encourage the public to join us in creating a brighter tomorrow for our future generations.


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

## Taipower TV

Since May 1, 2013, Taipower TV has produced at least one video per day in a format that is suitable for online viewing. In addition to functioning as a record of Taipower's true stories that are filled with compassion and beauty, the service also serves a means for the public to better understand the company's operations. These videos have been viewed about one million times and referenced by the public media.


**Taipower TV website: http://tv.taipower.com.tw / or search for "Taipower TV" on Youtube**

## Taipower Electricity Bill

To promote energy conservation and carbon reduction awareness, in addition to displaying relevant data about power usage on electricity bills, Taipower added more information (i.e. CO2 emission, average power consumption by the same building or building in the same 5-digit postal code during the same period and power consumption category) to electricity bills in 2015. Furthermore, fuel costs will be updated along with adjustments in electricity pricing to encourage the public to manage its power consumption more wisely.

## Taipower Publications

In 2016, Taipower continued to release publications including the Monthly Journal of Taipower, Taipower's Bimonthly Heart-to-Heart and other similar journals to communicate with employees regarding important company policies and the direction of relevant developments while offering inspirational stories to nurture employees' personal growth. The publication of occupational competence materials, such as the Monthly Journal of Taipower's Engineering and the Nuclear Journal, serves as means for the company to introduce the latest technological developments as well as practical experiences to help employees achieve growth in their expertise. Taipower also publishes the Yuan magazine, which covers local history, classic stories, people, culture, and the power industry. It introduces the richness of Taiwan along with Taipower's management principles of "honesty, caring, service and innovation."

# Channels for the Gathering of External Information and Suggestions

## Channel to lodge complaints

The "Integrity Management and Legal Compliance" section under "CH6 Practitioner of Corporate Social Responsibility" presents information on corruption, anti-corruption and cases reported and investigated in 2016." For other complaints including environmental or human rights and social impact (such as the impact of Taipower's operations on local communities), the public can also use a variety of convenient complaint lodging channels provided by Taipower, in addition to sending letters:

| | |
|---|---|
| Service center | 1911 (toll-free, calls made from public phones not accepted, maximum call time of 5 minutes) |
| Customer opinion box | https://csms.taipower.com.tw/TPuser (the "Suggestion Mailbox" located at the top of Taipower's homepage) |

In 2016, Taipower received a total of twenty-nine complaints from the public relating to issues of the environment and nuclear power. Twenty-eight of these complaints were resolved and closed in 2016, with the remaining complaint resolved on January 6, 2017. With regard to complaints from the public, Taipower relays the complaint to the relevant unit depending on the nature of the complaint to ensure appropriate handling and response as well as professionalism.

## Customer Requests

To protect customers' rights, Taipower has established "Customer Request Handling Guidelines" to guarantee that customers' suggestions or requests are resolved in a fair and reasonable manner. After the requests and complaints have been received from different channels, the unit responsible for the situation shall create corresponding case files for management and follow-up on the status of the request/complaint.

In 2016, Taipower received a total of 1,108 customer requests; most of the requests were related to line relocation (248 requests; 22.4%) and power supply quality (186 requests; 16.8%).

### Number of Customer Requests in 2014-2016

| Year | 2014 | 2015 | 2016 |
|---|---|---|---|
| Incidents | 1,752 | 2,201 | 1,108 |

### Sources of Customer Requests in 2016

| Source | Letter | phone call | At the counter | Email | Total |
|---|---|---|---|---|---|
| Incident | 282 | 18 | 3 | 805 | 1,108 |
| Ratio | 25.4% | 1.6% | 0.3% | 72.7% | 100% |

## Visits to Customers

The company dispatches designated personnel to visit customers in order to improve Taipower's customer-oriented services. Through routine visits to high-voltage customers, village (borough) offices and national power industry associations, Taipower has delivered power consumption technical consultation services while gaining a better understanding of customers' needs and opinions to establish sound bilateral communications with customers. Moreover, customer opinions serve as the basis for improving customer services in the future. Taipower's key customer service performance for 2016 is as follows:

| Stakeholder concerned | Channels of communication | Achievements and outcomes in 2016 |
|---|---|---|
| Private organizations | phone call / visit by personnel | Made a total of 186 visits to national power industry associations |
| Customers(general and large customers) | · Telephone / visit by personnel<br>· Service hotline<br>· Suggestion mailbox | · Made a total of 38,641 visits to customers<br>· The 1911 customer service hotline received more than 2.39 million calls, with 91.8% of customer calls answered by service representative within 20 seconds<br>· Received a total of 4,636 mails in the customer suggestion mailbox |
| Residents/ public | | |

## District Service offices

As a provider of high-quality power services, Taipower has established a close-knit service network across Taiwan to offer over-the-counter applications for various power services and consultation services for customers. These service offices are also responsible for the construction and maintenance of power supply lines within their service area to accommodate customers' needs for power anytime. By offering speedy and convenient services, Taipower establishes channels of direct communication with customers and maintains a positive, interactive relationship with them.

To boost employees' service quality and professional skills as well as organize routine on the job training and establish performance reviews for the smooth promotion of relevant tasks assigned to the service stations, Taipower has established diverse channels such as the 1911 customer service center, online counter, and the development of Taipower e-Counter App to fulfill different customers' needs for a variety services. The placement of existing service locations and their functions are subject to organizational transformation and adjustments as deemed necessary by the company in response to new channel strategies and in light of the developments within new media, technologies and the power industry's liberalization.

## 2.4.2 Creative Communication

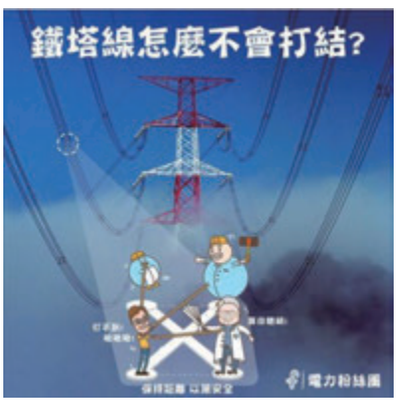
**facebook** Taipower Facebook Page

In 2015, Taipower initiated its “New Media Task Force” to promote a livelier and more enthusiastic way for disseminating information so as to boost the company’s capacity for external communication while at the same time giving Taipower’s a more personable image with an additional dash of humanity. After a year of effort and with the inclusion of art and statistics crew in 2016, Taipower began to adopt a more enthusiastic approach to its introduction of power related knowledge on its Facebook page. The creation of characters on the Facebook page helped to present Taipower’s creative and youthful side on social media, thereby enabling more users to be exposed to Taipower’s information.

Taipower’s Facebook page features themes such as power conservation or safe power use that are updated on a monthly or quarterly basis with content that ties in with current hot topics. In 2016, the number of Taipower’s Facebook page followers grew to 148,000 and accumulated 14.2 million views in 2016 (compared to approximately 6.4 million views in 2015). These figures aptly reflect the success that Taipower’s Facebook page administrators achieved in their creative communication and management.

Looking forward beyond 2017, Taipower will continue to manage the virtual characters we have created more buzz for our Facebook page with the goal of reaching out to 30 million views by 2017. In addition, Taipower will focus on building a rational statistical assessment model to analyze public opinion through big data analysis to improve Taipower’s awareness of the external environment. It also will provide more information that the public may need through creative communication.





Like

## Taipower Hackathon[1]

To establish smoother communication with the public, improve information openness, and transparency, Taipower has invited citizen groups related to energy and environmental protection issues along with fans of information science to establish a platform of communication with Taipower to discuss potential ways of making Taipower's data available on a regular basis. In the end, Taipower organized Hackathons to improve communication and find means of demonstrating Taipower's open philosophy. The goal is to help the public becomemore aware of Taiwan's current status in terms of power supply and demand while better understanding the needs of the public and Taipower's shortcomings so that appropriate improvements can be made.

In 2016, Taipower held two Datajams on August 3 and September 25 to pair up citizen groups and fans of information science; on August 7 and October 2, the company organized two Hackathons where representatives from citizen groups and Taipower took turns to speak and discuss the supply and demand for Taipower's open data.

The Hackathon held on August 7 attracted eight teams of contestants. After two rounds of inter-voting between the groups of contestants, "Power Usage Data and Daily Life Function Analysis" received the first prize and the team was awarded a prize of NT$ 20,000. The Hackathon held on October 2 witnessed the participation of 16 teams, with the "Practice Power-Saving Assisted Platform" team receiving the first prize and "Where's the Power?" receiving the second prize.

### Taipower Hackathon – Event Highlight



The 1st prize winner of the October 2 Hackathon was awarded to "PPAP"… no it's not the viral single with the same abbreviation; it stands for Practice Power-saving Assisted Platform and represents the attempt to resolve the issue of power shortage from a different perspective by reducing demand rather than increasing supply! Through an analysis of the household power consumption data from the six special municipalities, coupled with the monthly census report from each village (borough), the platform is able to present useful information such as a power consumption map, energy-saving rankings and so forth to locate "areas of high power-saving potentials." The second prize of the Hackathon was won by the "Where is the Power?" team that was comprised of data analysis engineers from ASUS. The team won their prize with the theme of "power consumption data visualization," which primarily utilizes relevant data such as Taipower's "Power Status for Today," regional power consumption and current power consumptions and so forth to present statistics including power consumption growth and energy use statistics for each county/city, supplemented with dynamic energy charts of different generation status of renewable energy, nuclear energy and so forth to portray Taiwan's status of energy use on the national level.

[1]Hackathon: a special event that involves a group of participants to collaborate intensively on a subject matter within a given time frame.

## 2.4.3 Customer Satisfaction

Each year, Taipower conducts customer satisfaction surveys through an external agency to find out the public's level of satisfaction and opinions on Taipower in terms of "service quality," "corporate image," "customer feedback handling" and "overall customer satisfaction," as required by the State-Owned Enterprise Commission of the MOEA,","." Results of the survey and feedbacks from customers are analyzed and reviewed for responsible units to draft improvement solutions to allow Taipower to satisfy customers' needs and expectations. Taipower sets a specific target for customer satisfaction scores on a yearly basis to manage and control its service quality. (For more details, refer to Chapter 3.1.1 Promoting Management Improvement)

### Target Group

- General customers: low-voltage users who had business contact with Taipower over the
- past year
  Medium-to-large customers: users with contracts of 100KW or more

### Period

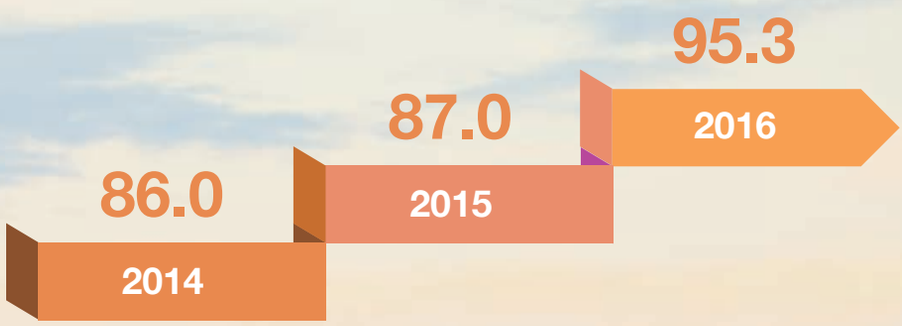
December 1 through December 10 2016

### Aspects Surveyed

- Service quality perception assessment
- Corporate image assessment
  Customer feedback handling assessment
- Overall customer satisfaction assessment

In 2016, Taipower scored 95.3 points in customer satisfaction surveys and achieved the target of scoring 85.9 points for customer satisfaction for the year. The dramatic increase in satisfaction with Taipower this year reflects the recognition and acknowledgment from customers for the services that Taipower has provided as a high-quality power service provider.

**Customer Satisfaction Scores in 2014-2016**



# High-Efficiency Power Utility Operator

## Role and Contribution

"Efficiency" is a critical issue and indicator that will determines whether Taipower can successfully transform from an agency to a corporate entity. As a "high-efficiency power utility operator," Taipower aims to improve efficiency in operations, procurement, and power generation -—in order to enable the company to deliver reliable power for diverse social developments with limited resource.

## Performance highlights for this chapter

- Implemented a balanced scorecard management system
- Achieved 100% of annual targets for heat consumption efficiency, coal-fired units, fuel combined cycle units, and thermal units
- Generated NT$ 39.609 billion of pre-tax income (215% of the annual target)
- Saved NT$ 1.2 billion on construction material procurement (261% of the annual target)
- Generated NT$ 42.85 million from fiber circuit rental (116% of the annual target)

CH3

| SDGs | Correlation to Taipower | Corresponding Chapters/Issues |
|---|---|---|
| 1 NO POVERTY | Continuously improve accessibility, stability, and reliability of power service, , and endeavor to ensure that all customers have access to power services, including those in remote areas and the disadvantaged minorities | · Tariff reductions<br>· Offshore island subsidies<br>· Fuel management (stable and reliable power) |
| 7 AFFORDABLE AND CLEAN ENERGY | Increase the ratio of renewable power generation, and operation and energy efficiency while ensuring that all customers have access to affordable, reliable and clean power | · Electricity tariff rationalization<br>· Thermal unit operational efficiency<br>· Nuclear unit operational efficiency |
| 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | Improve power efficiency and recovery for power infrastructure, adopt clean technologies, and improve infrastructure for renewable energy grid integration to enhance the resilience and reliability of the power grid while promoting innovative development for environmental-friendly technologies | |
| 12 RESPONSIBLE CONSUMPTION AND PRODUCTION | Improve the overall energy efficiency and decrease required resources for the overall generation, transmission, and distribution processes to lower the environmental footprint for power supply | |
| 16 PEACE, JUSTICE AND STRONG INSTITUTIONS | Emphasize corporate governance, integrity management, and information disclosure, and ensure that various communication channels operate smoothly while ensuring that all relevant decisions at all levels are inclusive and representative | · Land Vitalization Task force<br>· Coal Procurement Review Task force |

## Solutions planned for the future

- Integrate “Long-Term Financial Planning Taskforce” and “New Business and Re-invested Enterprise Planning Taskforce” into “Long-Term Financial and Reinvestment Planning Taskforce”
- Expand optical fiber line leasing to cloud IDC operators and cable TV operators
- Collaborate with the competent authorities to offer relevant information and suggestions on tariff formula definition with the Electricity Act Amendments to promote tariff rationalization
- Emphasize the upgrading of generation units and components at existing thermal plants, such as the core components of power plants in southern Taiwan and the internal components for high and medium pressure turbines in Taichung and Xingda Plants
- Adjust collaboration strategies and operating models with IPP operators in accordance with pertinent regulations that may come into effect

## Sustainable Trends and Challenges

In light of the reform in the power industry in Taiwan brought by Electricity Act Amendments and the globalization of the power industry, the improvement of Taipower’s management not only became an inevitable task but also emerged as a crucial challenge in its path towards becoming a world-class power utility group. Besides, ensuring that disadvantaged minorities have equal access to power services through innovative solutions without compromising Taipower’s performance in management and environmental protection is vital for Taipower’s sustainability.

# 3.1 Promoting Operational Transformation

## 3.1.1 Driving Operational Improvement

To mitigate the impact of soaring international fuel prices on Taiwan's domestic oil and power industry, the MOEA established the "Taipower and CPC Operation Improvement Taskforce" in early 2012 to assist with strengthening Taipower's financial structure. Taipower proposed its management improvement plan for 2012-2016 and conducted rolling reviews on relevant implementation performance and progress toward goal achievement.

To achieve its business improvement targets, Taipower established the following seven task forces: Coal Procurement Review, Land Vitalization, Materials Control, Long-Term Financial Planning and Capital Expenditure Control, Human Resources Development, Power Planning, and Power Industry Liberalization Coping Strategies. In addition to the internal members, external experts are occasionally appointed to provide their suggestions. Meetings are held periodically to improve Taipower's performance.

With due diligence from every employee, Taipower managed to achieve its improvement goals for 2016 as shown below:

| Item of Operational Improvement | 2012-2016 Target | 2016 Target | 2016 Result |
|---|---|---|---|
| Cost reduction | Reduce costs and increase revenues by NT$ 50 billion | Reduce costs and increase revenues by NT$ 13.4 billion | Reduction in costs and increase in revenues by NT$ 20.4 billion |
| Revenue Increase e | | | |
| Improvement in coal procurement performance | NT$ 21.4 billion saved | NT$ 5 billion saved | NT$ 5.7 billion saved |
| Reduce in or /slowing investments(1) | NT$ 172 billion | NT$ - 21.5 billion | NT$ - 8.2 billion |
| Decrease in fuel and mater materials in stock | NT$ 5.5 billion | NT$ 530 million | NT$ 1.26 billion |

Note: (1) Reducing costs and increasing revenues for the 7th transmission and sub-station project was originally scheduled for completion in 2015, and no budget was allocated for it in 2016. However, due to the adjustments to the project, the additional savings of NT$ 22.8 billion from 2014 and 2015 was allocated in 2016 (the 7th transmission and sub-station project had been approved by the Executive Yuan as of June 3, 2014. In addition, the power generation plan still maintained its reduced investments by NT$ 1.3 billion. As such, the reduced costs and increased revenues for 2016 came to NT$ 21.5 billion.

## Operational Performance Assessment System and Future Direction

In addition to improving various aspects of business performance through the seven taskforces, Taipower will rectify its management strategies and directions in accordance with major domestic and international trends. The Electricity Act Amendments were promulgated with a Presidential Decree on January 26, 2017, Taipower will therefore activate its corporate transformation strategy to actively respond to the changes in the power industry to enhance its management performance and competitive advantage. Furthermore, Taipower adopted a Balanced Scorecard strategic planning system to establish the company's developmental objectives and KPIs through four perspectives: financial performance, learning and growth, customer satisfaction, and internal control. The system will enable Taipower to focus on the improvement of short-term operational performance without neglecting the creation of its long-term value and non-financial performance.

### Taipower's Management Objectives and Performance Evaluation – Balanced Scorecard

| Perspective | Objective | Key Performance Indicator for 2017 |
|---|---|---|
| Financial | Improve cost structure<br>Increase business revenues<br>Improve financial efficacy | 1.Pre-tax income<br>2.Develop diversified businesses<br>3.Fuel procurement performance<br>4.Power purchase control<br>5.Operation and maintenance fee control |
| Customer | Improve quality and service<br>Strengthen the visibility of corporate citizenship<br>Enhance customer satisfaction | 6.Social communications<br>7.Customer satisfaction<br>8.Power supply reliability – period of forced outages<br>9.Energy operations performance |
| Internal Process | Lower operational costs<br>Create a zerooccupational-hazard environment<br>Shape Taipower's image as a green company<br>Improve overall productivity<br>Implement power industry reform and energy transformation | 10.Renewable energy generation<br>11.Major construction control<br>12.Improve unit operating performance<br>13.Response to the Electricity Act Amendments<br>14.Occupational safety performance<br>15.Nuclear safety performance – indicator signals<br>16.Greenhouse gas control performance<br>17.Energy saving performance<br>18.Promote green power tariff (no. of subscriptions) |
| Learning and Growth | Develop human resources<br>Benefits from R&D | 19.Enhance human resources<br>20.Significant R&D results (milestones and contributions)<br>21.Learning and growth performance |

## 2016 Key Performance Overview－Target and Result

The following table is a summary of KPIs derived from Taipower's Balanced Scorecards, including status of achievements in 2016 and respective target values for 2017.

| Dimension | | Key Performance Indicator | 2016 Target | | 2016 Performance | Target Achievement Rate | 2017 Target | |
|---|---|---|---|---|---|---|---|---|
| Financial | (1) | Pre-tax income (NT$ 100 million) | ≧ | 184 | 396.09 | 215% | ≧ | -130 |
| | (2) | Develop diversified businesses** Net profit from diversified businesses (NT$ 100 million) | | * | * | * | ≧ | 8.69 |
| | | Income from fiber circuit rental (NT$ 100 million) | ≧ | 0.32 | 0.43 | 134% | ≧ | 0.47 |
| | (3) | Fuel procurement performance Coal procurement performance (%) | ≦ | -6.7 | -11.8 | 100% | ≦ | -5.82 |
| | | Maintain sufficient coal inventory (no. of days) | | 30~34 | 32 | 100% | | 30~33.5 |
| | | Savings from procurement costs of operational materials (NT$ 100 million) | ≧ | 4.6 | 12 | 261% | | ** |
| | | Maintain sufficient material inventory (NT$ 100 million) | ≦ | 156.6 | 152.13 | 100% | ≦ | 168.69 |
| | (4) | Power purchase control IPP coal-fired fuel costs (100 GWh) | ≧ | 210.5 | 213.71 | 102% | ≧ | 207.23 |
| | | IPP fuel costs (100 GWh) | ≧ | 171.8 | 190.48 | 111% | ≧ | 177.05 |
| | | Co-generation power (100 GWh) | ≧ | 85.99 | 84.64 | 98% | ≧ | 65.95 |
| | (5) | Operation and maintenance fees (score/kWh) | ≦ | 37.68 | 35.24 | 100% | ≦ | 37.19 |
| Customer | (6) | Social Communication Nuclear Issues International Nuclear Issues Forum (events) | ≧ | 2 | 2 | 100% | | 2 |
| | | Communications and advocacy production (no. of types) | ≧ | 15 | 24 | 160% | ≧ | 15 |
| | | Communications with the public (events) | ≧ | 240 | 293 | 122% | ≧ | 180 |
| | | Power issues advocacy Campus issues advocacy (events) | ≧ | 110 | 118 | 107% | ≧ | 110 |
| | | Online issues advocacy (entries) | | * | * | * | ≧ | 24 |
| | | Media communications Positive news reporting (items) | ≧ | 72 | 83 | 115% | ≧ | 80 |
| | | Media conferences (events) | | * | * | * | ≧ | 4 |
| | | Open information activities(events) | | * | * | * | ≧ | 2 |
| | (7) | Customer satisfaction (score) | ≧ | 85.9 | 95.3 | 111% | ≧ | 80 |
| | (8) | Power supply reliability – period of forced outages (min/customer · year | ≦ | 17.530 | 16.274 | 100% | ≦ | 17.480 |
| | (9) | Energy operations performance network loss rate (%) | ≦ | 4.3 | 3.85 | 100% | ≦ | 4.35 |
| | | Economic dispatch performance (NT$/kWh) | ≦ | 1.49 | 1.43 | 100% | ≦ | 1.29 |

| Dimension | | Key Performance Indicator | 2016 Target | | 2016 Performance | Target Achievement Rate | 2017 Target | |
|---|---|---|---|---|---|---|---|---|
| Internal | (10) | Renewable energy generation<br>Hydro unit availability<br>(base load/peak load) (%) | Base load ≧94.08<br>Peak load ≧ 91.5 | | 96.84<br>91.78 | 103%<br>100% | Base load≧ 96.55<br>Peak load≧ 94.09 | |
| | | Wind unit annual availability (%) | ≧ | 93 | 88.2 | 95% | ≧ | 93 |
| | | Solar power generation | ≧ | 0.238 | 0.232 | 97% | ≧ | 0.235 |
| | (12) | Improve unit operating performance<br>Improve thermal plant operating performance<br>Heat consumption for coal-fired units (kcal./kWh) | ≦ | 2,371 | 2,370 | 100% | ≦ | 2,356 |
| | | Heat consumption for fuel combined cycle units (kcal./kWh) | ≦ | 1,917 | 1,914 | 100% | ≦ | 1,923 |
| | | Heat consumption for thermal units (kcal./kWh) | ≦ | 2,203 | 2,197 | 100% | ≦ | 2,207 |
| | | Improve nuclear power generation performance (excluding overhaul capacity factor) (%) | ≧ | 99.86 | 98.09 | 98% | ≧ | 98.88 |
| | (14) | Occupational safety performance<br>Occupational injury incidence rate | ≦ | 0.34 | 0.2 | 100% | ≦ | 0.29 |
| | | Occupational injury severity rate | ≦ | 81 | 7 | 100% | ≦ | 125 |
| | | Occupational injury incidence rate of contractors | ≦ | 0.32 | 0.63 | 51% | ≦ | 0.32 |
| | | Major occupational incidents of contractors | ≦ | 4 | 9 | 44% | ≦ | 5 |
| | (15) | Nuclear safety performance－<br>no. of indicator signals (events) | White lights≦ 3<br>Yellow light＝0<br>Red lights＝0 | | White lights≦3<br>Yellow light＝0<br>Red lights＝0 | 100% | White lights≦ 2<br>Yellow light＝0<br>Red lights＝0 | |
| | (16) | Greenhouse gas control performance<br>Total generation emission intensity (g/kWh) | ≦ | 532 | 520 | 100% | ≦ | 542 |
| | | Thermal unit emission intensity (g/kWh) | ≦ | 726 | 674 | 100% | ≦ | 728 |
| | (17) | Energy saving performance<br>Production power reduction (MWh) | ≧ | 5,073 | 5,485 | 108% | ≧ | 4,994 |
| | | Peal load capacity for demand-based bidding (GW) | * | | * | * | ≧ | 60 |
| | | Accelerate AMI deployment (units) | * | | * | * | ≧ | 70,000 |
| | (18) | Promotion of green power tariff (no. of subscriptions) | ≧ | 4,000 | 7,111 | 178% | ≧ | 10,000 |
| Learning and Growth | (20) | Significant R&D results<br>Amount contributed to research and development (NT$ 1 million) | * | | * | * | ≧ | 5,401 |
| | | Contribution to energy saving, carbon reduction and green power industry development<br>Research report (cases) | * | | * | * | ≧ | 20 |
| | | Thesis publication (articles) | * | | * | * | ≧ | 15 |

| Dimension | Key Performance Indicator | | 2016 Target | | 2016 Performance | Target Achievement Rate | 2017 Target | |
|---|---|---|---|---|---|---|---|---|
| Learning and Growth | | Milestone achievement rate for eight core businesses (%) | | * | * | * | | 100 |
| | | New venture customer satisfaction (%) | | * | * | * | ≧ | 90 |
| | (21) | Learning and growth performance Employee proposals (cases) | ≧ | 853 | 1,310 | 154% | ≧ | 815 |
| | | Proposal implementation rate (grade 6 and over) (%) | ≧ | 80 | 96 | 120% | ≧ | 80 |
| | | Average number of digital learning hours completed by employees (hours/person) | ≧ | 6 | 10.5 | 175% | ≧ | 6 |
| | | Average number of internal and external learning hours for employees (hours/person) | ≧ | 45 | 58 | 129% | ≧ | 45 |

Note:

1. * denotes new items added in 2017.
2. ** denotes items adjusted for 2017, with concise descriptions below:
   · "2 Asset Vitalization" adjusted to "Business Diversification."
   · "3.3 Savings from construction materials procurement (NT$ 100 million)" adjusted to "Financial Procurement Performance" with a target value of ≧ 11.59% for 2017.
3. Since (11) Major construction control, (13) Response to Electricity Act Amendments and (19) Improve human resources are qualitative indicators, they have not been included in this quantified performance table. For relevant contents, refer to CH4.2.1 Improving Transmission and Sub-station System, CH2.1.1 Driving Force for Organizational Transformation and CH6.2 Building a Sound Working Environment.

## 3.1.2 Strengthening Financial Management

### Long-term Financial Planning

To effectively utilize and allocate financial resources, Taipower established its Long-term Financial Planning and Capital Expenditure Control Taskforce, which established and implemented a management and control mechanism for the purchase of fixed assets with a three-step control: conducting budget control and establishing annual budget investment scales along with top-down resource allocation prior to purchase, controlling capital expenditure and establishing control schemes for tender surplus and interest revenue recovery during purchase, and activating a control mechanism for closing operations after purchase.

As the Long-term Financial Planning and Capital Expenditure Control Taskforce completed its mission in 2016, a dramatic impact on Taipower's financial planning occured as a result of Taipower's substantial accumulated losses(a debt ratio of 87% till the end of December 2015) and the significant interest expenses be covered each year, along with the uncertainty surrounding the fate of NPP4. Consequently, financial planning such as fund allocation, financing strategies, asset re-appraisal, risk-aversion, and so on remain pressing issues to be resolved.

Therefore, Taipower transformed the taskforce into a "Long-Term Financial Planning Taskforce" in 2016, and, as of the end of 2016, the taskforce had already convened 17 meetings. Responsible for the establishment of Taipower's capital expense control mechanism, the taskforce also analyzes issues such as total rear-end operating costs, rationalization of de-commissioning debt appraisal, ideal development models of green accounting for Taipower and so forth in greater depth.

Taipower achieved the following results in terms of capital expenditure control in 2016:

1. Reduced project investments: The under-utilized budget amounted to NT$ 34.3 billion, and interest revenues amounted to NT$ 1.6 billion as of December 2016.

2. With the budget control system, the taskforce established general-purpose building and facility projects to collect under-utilized budgets of up to NT$ 3 billion in 2016.

With Taipower as a divisional enterprise, it is crucial for the company's staff to improve their work experience and growth through learning in different divisions and departments. Taipower plans to combine its "Long-Term Financial Planning Taskforce" and "New Business and Reinvestment Planning Taskforce" into a "Long-Term Financial and Reinvestment Planning Team," with the "Long-Term Financial Planning Taskforce" and "New Business and Reinvestment Taskforce" as its subordinate units in 2017. This newly created team will be responsible for the overall planning and review of Taipower's finances and relevant re-investments to strengthen Taipower's financial allocation capacity.

## Boosting Fund-raising Capabilities

Besides effective allocation of existing financial resources, Taipower devotes itself to improving its fundraising capabilities. The company holds monthly meetings on cash flow estimation where rolling reviews of funding gaps serve to keep liquidity risks under control. Given reduced interest risks and fund costs, Taipower has the flexibly to leverage the spreads between long-term and short-term interest rates while ensuring that long-term and short-term funding are in line with the changes in the financial markets.

### Raising long-term funds

Taipower capitalized opportunities in the domestic capital market when capital was abundant and interest rates were low. Coping with changes in the bond market, Taipower raised funds through fixed-rate loans of NT$ 20.5 billion to avert future risks from rising interest rates in 2016. The company also made a loan of NT$ 31.5 billion at the medium-to-long-term floating-rate among banks through competitive bidding processes to bring down its borrowing rates. As a result, the company's average interest rates on current loans stood at 1.46% in 2016, lower than its putative budget interest rate of 1.54% as set by the Legislative Yuan.

### Raising short-term funds

Driven by the objectives of ensuring financial security while lowering capital costs, Taipower endeavored to seek new sources of funding, attempted to issue commercial papers and raised short-term bank loans by open tenders while prioritizing fund allocations based on relevant demands to secure lower-cost funding for operational uses. In 2016, Taipower raised a total of NT$ 157.41 billion in short-term loans and funds, issued NT$ 454 billion worth of commercial paper and managed to reduce the average annual interest for short-term loans to 0.48%, far lower than its putative budget interest rate of 0.7% as set by the Legislative Yuan.

## Improving Credit Ratings

In view of the fact that a new tariff formula had been approved by the Legislative Yuan in 2015 and that the sealing of NNP4 would not have a substantial impact on Taipower's profits, Taipower actively petitioned the Taiwan Ratings to adjust Taipower's outlook ratings from "negative" in the last two years to "stable," ending up with long-term twAAA and the highest domestic rating of twA-1+.

In October 2016, Standard and Poor also followed in the footsteps of Taiwan Ratings by adjusting Taipower's credit rating from "A+" to "AA-" and its outlook from "stable" to "positive."

# 3.1.3 Optimal Use of Diversified Businesses

Guided by the expansion strategy of "expanding in power business, strengthening asset revitalization, and exploiting derivative businesses," Taipower actively developed new businesses, including the activation of real estate, optical fiber rental, and turbine blade repair in hopes of strengthening the company's operations and creating value through the vitalization of various internal resources to build a sound foundation toward sustainable operations. In 2017, Taipower expects to realize NT$ 849 million revenues from its diversified businesses.

## Promoting Real Estate Activation

Due to changes in power automation, transportation, and relevant economic factors, a portion of Taipower's real estate is no longer required for power-related operations. As such, it's a Land Vitalization Taskforce was formed to take charge of asset vitalization. Headed by the President, the taskforce comprises supervisors from the New Business Development Office, the Departments of Finance, Accounting, Construction, Power Supply under the Transmission System Division, the Power Supply Branch, and the Department of Sales under the Distribution and Service Division. If necessary, the taskforce will invite the supervisor or CEO from the concerned units to participate in its meeting. To improve the performance for asset vitalization, the taskforce can also appoint real estate experts from the public sector, private sector, or academia as consultants in consultation meetings convened by the Chairman to obtain their input.

The Land Vitalization Taskforce is primarily responsible for the review of projects for land use, the promotion, supervision and review of land vitalization case planning, and solicitations through taskforce meetings. At present, the taskforce strives to achieve land vitalization through the push of leftover land mergers in urban areas, urban renewal, and large area land bidding to secure land surface rights. In 2016, the taskforce held one consultation meeting and four project meetings with the following results:

### Real estate rental

Temporary parking lot rental: generated combined annual revenues of TWD 307 million.
Income from annual rentals for other real estate came to NT$ 161 million.

### Promotion of educational/recreational affairs

The Taipower Hostels had an occupancy rate of 39.1% in 2016 and generated NT$ 23.64 million in revenues. Compared with that in 2015, the revenue fell by NT$ 270,000 (1%).

### Land development and utilization

In accordance with the government's policy for asset vitalization, urban renewal, and non-sale of large state-owned land, Taipower created superficies as the means of land development vitalization. In 2016, Taipower completed the following:

- "Joint Construction Project for the Vacant Lot on Guanghui Road in Muzha" submitted to the Board of Directors for approval on open tender.
- Adjustments made to the main project and details on "Northern Distribution Center Urban Renewal" and "Department of Maintenance Urban Renewal" in accordance with Taipei City Government's East District Gateway Development Project were submitted to the Board of Directors for review and approval so Taipower could sign a memorandum of understanding with the Taipei City Government.
- The proposal to draft an agreement to incorporate the vacant lot to the north of Daan Extra High Voltage Earthing Switches (E/S) in the urban renewal project undertaken by Shih-Da Construction Co., Ltd. was submitted to the Board of Directors for review and approved by the board.

In 2017, Taipower will continue to boost asset revitalization and appraise land that has low usage while planning the rental of properties such as dormitories and parking lots. Example of this are the supervision and inspection of the empty lot to the west of Wolong Sub-station and the temporary parking lot at Section 2 of Roosevelt Road, signing of the contract with a construction firm for the incorporation of the vacant lot to the north of Daan ES in an urban renewal project, and business solicitation for Guanghui Road in Muzha. Taipower is expected to generate NT$ 450 million from real estate rentals in 2017.

## Optical Fiber Line Leasing

Under the premise of maintaining a safe and stable power supply, Taipower strives to promote management model versatility and the development of domestic telecommunication infrastructure by launching an optical fiber leasing service. Through precise human resource planning, to prevent the creation of unnecessary organizational structure, Taipower not only improved the utilization of the company's existing experts in telecommunications to independently formulate business plans, for submission to the competent authorities, to carry out line leasing operations, but also implemented various services by strengthening the competence of relevant financial and accounting managers.

In 2016, Taipower completed an optical fiber line deployment between Daqingshui along Suhua Highway in Hualien and Renhe Substation, thereby filling the gap in the company's "Island-wide Optical Fiber System." The completion of the system strengthened Taipower's backbone infrastructure for internal communications, improved communication system reliability, and

optimized power dispatch and power supply quality control. Not only that, many digital communication service providers approached Taipower to apply for optical fiber line leasing, which in turn increased Taipower's non-operating revenues.

Taipower generated NT$ 42.85 million in revenues from optical fiber line leasing in 2016. Compared with the NT$ 27.93 million from 2015, the optical fiber line leasing revenues increased by approximately NT14.92 million, thus reflecting Taipower's success in the expansion of its business. The goal for Taipower in 2017 is to raise revenues to NT$ 47 million.

With regards to strategies for optical fiber line leasing in the future, in addition to drawing more Category 1 and 2 telecommunication service providers as customers, Taipower will also actively reach out to internet data center (IDC) operators and cable TV service providers while inventorying the newly established, dedicated optical fiber network for telecommunications and split the remaining lines and apply for network scale expansion to National Communications Commission (NCC). Meanwhile, Taipower will gradually establish turnover targets to ensure steady growth for its optical fiber line leasing business.

### Re-invested Enterprise

Since 1962, Taipower has participated in a number of private business investments in an effort to stay in line with relevant government policies. Targets of Taipower's investments have been power-related businesses, and the company also explored other investment items, including coal ash resource utilization, telecommunication asset revitalization, offshore wind power generation, offshore energy and minerals, construction of fleets, participation in international power utility maintenance, and a foray into the construction of offshore power plants and so forth.

Until the end of 2016, the company had interests through reinvestments in the Taiwan Stock Exchange Corporation Ltd., the Taiwan Co-generation Corporation Ltd., the Bengalla Mining Company Pty Ltd., and the Bengalla Coal Sales Company Pty. Ltd., which amounted for a total of NT$ 1.275 billion. In 2016, the income from these re-investments came to NT$ 221 million, representing a 17.37% return on investments.

## 3.1.4 Promoting Tariff Rationalization

To ensure a reliable power supply and the sustainable management of the power industry and for the sake of inter-generational justice, today's losses caused by unreasonably cheap rates should not be left to the future generations. This is the reason that Taipower has been pursuing tariff rationalization in the hopes of generating reasonable profits to cover the accumulated losses. A new pricing formula is need that provides a fair, open, and transparent mechanism for the professional review and setting of tariffs, and that also relieves Taipower's's policy burden.

Taipower drafted a "Tariff Formula Revision Proposal" in 2013, which was eventually reviewed and approved by the Legislative Yuan on January 20, 2015. According to the resolution, the new tariff formula shall be reviewed once every six months, with Taipower being responsible for drafting tariff review solutions. The Electricity Tariff Review Committee will review the proposed solutions and adjust the tariff to promptly reflect the latest trends in international fuel prices. Taipower's operational performance will also be taken into consideration to ensure reasonable reflection of the power industry's operational costs and achieve tariff rationalization.

### Objectives of Tariff Design

The electricity tariff should be set in a way that the sales revenue of electricity not only cover the operating costs for the power industry but also ensure reasonable profits are gained at a rate that allows sufficient funds for power related investments and construction.

### Tariff Formula and Operating Mechanisms of Tariff Review and Adjustment

Reviewed and approved by the Legislative Yuan on January 20 2015, the new tariff formula is as follows

$$\text{Average price per kWh} = \frac{\text{Fuel} + \text{Tax and Fees} + \text{Reasonable Profit} + \text{Depreciation + Interest} + \text{Personnel Expenses + Maintenance Fee + Other Operating Expenses} - \text{Income from Green Power} - \text{Other Operating Income}}{\text{Energy Sold}}$$

Note: Reasonable Profit = Base Rate X Return on Investment
Base Rate = (Replacement Value of Fixed Asset Currently in Use + Operating Fund) x Suitable Self-Owned Capital Rate (30%)
Operating Fund: NT$ 23.5 billion
Return on Investment: 3%~5% (with accumulated losses in place, the cap on the return on investment is 5% and the ROI will go towards covering the losses in full. Once the company made up for all its accumulated losses the ROI will be reduced to 3%)

Pursuant to the resolution of the Legislative Yuan, the new tariff formula shall be subject to review once every six months after two years of implementation. In addition, a cap on the tariff adjustment is also established(it can be no more than 3% in a six-month period and no more than 6% in each year). The Electricity Tariff Review Committee takes various factors of Taipower's operational performance into consideration and determines reasonable values for the tariff formula.

### Operations and Adjustments to the Tariff Formula

Taipower reduced the average tariff by 7.34%, 2.33% and 9.56% on April 1, 2015, October 1,2015, and April 1, 2016 respectively. However, per the resolution of the Electricity Tariff Review Committee Meeting on October 1, 2016, no adjustments to the tariff were made. Subsequently,, Taipower will continue to strengthen its information disclosure through open and transparent means to help the public better understand the state of tariff adjustments.

The aforementioned tariff adjustments were made primarily to reflect the decline in international fuel prices at the time and the effort put forth by all Taipower employees. With the adjustments to the tariff formula in place, as of the end of December 2016, Taipower's accumulated losses fell to NT$ 93.2 billion, with its debt ratio dropping to 85.28%. The change suggests that Taipower's financial status was gradually improving.

### Tariff Adjustments– Taipower's Communication and Engagement

Given the fact that the tariff formula reviewed and approved by the Legislative Yuan in January 2015 was due for another review in January 2017, Taipower actively reviewed and formulated suitable changes for the power formula and submitted its proposal to the competent authority and Legislative Yuan for multiple reviews and assessments. During this period, the company also proactively communicated with competent authorities and incorporated suggestions from relevant reviews in the revisions of the proposal submitted in October 2016.

The Executive Yuan notified the MOEA on December 14, 2016 to communicate with the Legislative Yuan first prior to proposal submission. The MOEA then notified Taipower on December 16, 2016 to prepare relevant materials and documentations for communication. Taipower followed the instructions from the MOEA and prepared relevant materials to be submitted to the MOEA

### Future Development for Tariff Adjustments

Pursuant to Article 49 of the Electricity Act Amendments, the tariff formula for publicly sold electricity shall be established by the competent central authority. In accordance with the schedule of the MOEA's Bureau of Energy, the new tariff formula shall be published within six months of the Presidential Decree, with a preview of the promulgated draft 60 days prior to the official announcement. Taipower shall work with the competent authority and actively provide relevant information and suggestions on formula establishment to facilitate the establishment of subsequent formulas and relevant mechanisms to achieve the objective of tariff rationalization.

## 3.1.5 Pursuing Relaxation of Policy Burdens

### Tariff Reductions

Taipower offers tariff reductions in accordance with pertinent laws and regulations. These reductions apply to electricity for public lighting, public water, electrified railways, educational institutions, farming, offshore islands, social welfare groups, and the disabled. In 2016, these reductions totaled NT$ 3.988 billion. In 2016, Taipower requested the State-Owned Business Commission to remind competent authorities to allocate the budget to cover tariff reductions . In response to the Electricity Act Amendments, Taipower will actively take part in relevant meetings concerning the Electricity Act and relevant regulations on tariff reduction to advocate for articles that work in Taipower's favor to relieve the policy burden on Taipower.

### Offshore Islands Subsidies

According to the Offshore Islands Development Act, the electricity tariff on Taiwan's offshore islands is set as an average of the rates on Taiwan proper. The losses incurred as a result are covered by the central government's budget. Despite this, Taipower has never received the subsidy . After appeal, the Executive Yuan convened the "Conference on the Policy Burdens of Taiwan Power Company, China Petroleum Company and Taiwan Water Corporation" in 2013 and passed the resolution that policy burdens must be gradually re-incorporated into the budgets of the competent authorities for various industries and domains. Each ministry and council must, within a period of ten years, progressively allocate funding in its budget to bear its fair share of the policy burden.

Nevertheless, with the new tariff formula officially implemented, the calculation of the average price has already taken all costs into account. As such, Taipower's losses from offshore islands are already covered, so the MOEA will have no budget for the subsidy from 2017.

As of the end of 2016, the accumulated losses from power supply to the offshore islands reached NT$ 75.293 billion. With a subsidy of NT$ 1.886 billion from the Ministry of Economic Affairs in 2016, the remaining deficit that has yet to be subsidized came to NT$ 71.796 billion.

### Renewable Energy Subsidies

In accordance with the Renewable Energy Development Act and the Regulations Governing Application and Approval of Renewable Energy Subsidies, and in line with the government-approved Calculation of price difference pay-back on renewable energy wholesale tariffs, Taipower recognized for the subsidy for Renewable Energy and was awarded NT$ 4.971 billion in 2016. Moreover, the government subsidized Taipower for the purchase and construction of renewable power generation units. The subsidy of NT$ 11 million will be recognized as company income in 2016.

**Governmental Subsidies in 2015-2016**

Unit: NT$ 100 million

| Subsidized Item | Amount in 2015 | Amount in 2016 |
|---|---|---|
| Subsidies of renewable energy | 37.28 | 49.71 |
| Subsidies of offshore islands electricity tariff loss | 10.73 | 18.86 |
| Subsidies of renewable energy generation equipment and construction | 0.11 | 0.11 |
| Other government subsidies | 0.03 | 0.02 |
| Total | 48.15 | 68.70 |

Note: While figures of Taipower's financial report have been determined based on the final audit accounts of the National Audit Office, the subsidies in 2016 have yet to be reviewed by the National Audit Office and are therefore reported by Taipower.

## 3.2 Raising Power Generation Efficiency

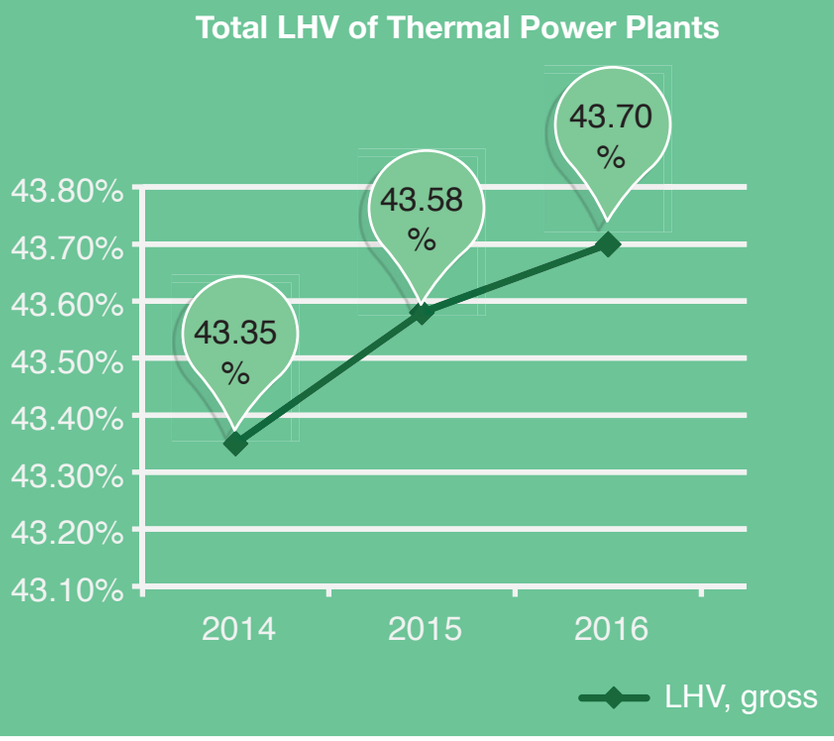
With the establishment of Taipower's four major divisions, operations relating to power generation are under the supervision of the Power Generation Division and Nuclear Power Division. The former is responsible for operational efficiency of the thermal and renewable energy units whereas the latter oversees the operating performance of nuclear units. To improve the resource and energy conversion is a crucial issue for Taipower.

### 3.2.1 Thermal Units' Operating Performance

To effectively manage thermal units' operations, Taipower created the "Key Component Maintenance Strategy" and maintenance guidelines for thermal units. Furthermore, Taipower built an operators' license system and a re-training system to ensure the stability of daily operations. To raise power generation efficiency and reduce generation costs while complying with the government's policy for energy diversification, energy conservation, and carbon reduction, Taipower also planned the replacement of old units with high-efficiency generation units. For example, the Linkou and Dalin plants (under construction) adopted high-efficiency super-critical pressure coal-fired units while the Tongxiao plant installed high-efficiency fuel combined cycle units. Upon completion, these new units will improve Taipower's overall energy efficiency and effectively reduce pollution.

Additionally, through various operations and maintenance measures to enhance the energy usage efficiency of existing units, the LHV Gross efficiency rates of thermal plants rose from 43.58% in 2015 to 43.70% in 2016. Taipower will continue to strengthen its participation in international collaboration to introduce relevant know-how and techniques for power and environmentally friendly technologies.

In the future, Taipower will emphasize the upgrade of generation units and components at the existing thermal plants. Currently, Taipower endeavors to upgrade the core components of power plants in southern Taiwan from 2016to 2018, the overall internal components for the high and medium pressure turbines in Taichung plant from2017 to2018, and Xingda plant from 2017 to 2018 to lift power generation efficiency.




### Xingda Plant Gas Turbine GT-51/52 Si3D blade upgrade improvement

Taipower upgraded the vanes and blades on rows 1 and 2 of the gas turbines to new blades (Si3D), which feature 3D aerodynamically optimized blades that reduce the use of cooling air and thereby improve overall unit efficiency. At the same time, the blades were constructed with advanced nickel-alloy heat resistant materials and finished in insulation coating to prolong their lifecycles.

- Replaced the row 1 and 2 vanes
- Replaced the retaining piston pin for row 2 vanes
- Replaced the U-rings for row 2 blades and vanes
- Replaced the L-ring for row 2 blades
- Replaced the retaining piston pin (asymmetrical damper) for row 2 blades.
- Sealing and re-drilling of cooling holes on row 2 vane carrier (52 holes → 48 holes).

Benefits of improvement

- The cost of parts, installation and assembly of blades on steam turbine Si3D, came to NT$ 42 million for all three units. Based on the results of efficiency tests, each GT unit is capable of improving single-cycle operating efficiency by approximately 0.76%. In other words, each GT unit should improve combined cycle operating efficiency by approximately 0.45%. Such improvements convert to roughly NT$ 150 million each year and as such offer greater results.
- Prior to the replacement, the unit load was at 85MW. With the upgraded blades, the unit load could be increased to 90MW.

## 3.2.2 Operating Performance of Nuclear Units

With regards to the improvement of operating performance of nuclear units and lowering their generation costs, Taipower's primary management measures include:

- Vulnerabilities of nuclear power plants were collected from their supervising units to be analyzed and reviewed.
- Safety outlooks and management during major repair work were strengthened

· Equipment improvement and renewal was enhanced

· Review unexpected events in the year and analyze methods of improvement

The net generation of nuclear power in 2016 reached 30,461 GWh, with the average utilization rate at 67.83% (note: excluding nuclear power plant no. 1, reactor 1 and nuclear power plant no. 2, reactor 2's non-operation due to political factors, the actual utilization rate would come to 91.61%). For the statistics on nuclear power generation and the utilization rate in the last decade, please refer to the "Information Disclosure" section on Taipower's website, under "Nuclear energy operations and performance." All nuclear power plants had a lower power generation performance in 2016, compared with that in 2015, primarily because of unexpected shut-downs in 2016. The details of these events are as follows:

· On March 10, 2016, the high-water levels in the reactor area of reactor No. 2 at nuclear power plant No. 1 tripped off the main generator and consequently caused the reactor to shut down.

· On May 16 2016, the lightning arrester of reactor No. 2 at nuclear power plant No. 2 malfunctioned and led to an emergency shutdown of the generator. Due to the contingent load reduction and shutdown inspection on the unit, the incident resulted in a loss of 5,390 GWh of power generated.

### Utilization Rate of Nuclear Power Plant between 2014 and 2016

Unit：%

| Year | Nuclear Power Plant No.1 | | | Nuclear Power Plant No.2 | | | Nuclear Power Plant No.3 | | | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| | Reactor 1 | Reactor 2 | Average | Reactor 1 | Reactor 2 | Average | Reactor 1 | Reactor 2 | Average | |
| 2014 | 91.22 | 90.02 | 90.62 | 98.91 | 92.45 | 95.68 | 97.23 | 82.19 | 89.71 | 92.00 |
| 2015 | 0 | 90.19 | 45.1 | 89.13 | 100.00 | 94.57 | 91.74 | 80.48 | 86.11 | 75.26 |
| 2016 | 0 | 96.58 | 48.29 | 90.85 | 27.88 | 59.37 | 88.80 | 96.46 | 92.63 | 66.76 |
| Accumulated utilization rate after commercial operation | 80.24 | 86.09 | 83.14 | 85.12 | 85.09 | 85.11 | 82.59 | 86.49 | 84.21 | 84.21 |

Note 1: Utilization rates of nuclear power plants = No. of hours of power generation per year/No. of total hours in that year

Note 2: Although the damage on the connecting hardware for the water channel on an atrium 10 fuel at nuclear power plant No.1 reactor 1 in 2015 had been repaired by February 2015, Legislative Yuan's Education and Culture Committee resolved on March 17 2015 that the Atomic Energy Council has to complete its report on the incident before Taipower may be permitted to apply for nuclear power plant no.1 to resume operations. Although the Atomic Energy Council had made numerous applications to present its report, the Education and Culture Committee did not include the report in its schedule. Consequently, nuclear power plant No.1 remained non-operational for the entire year of 2016.

Note 3: The generator in Reactor 2 at nuclear power plant No. 2 tripped on May 16 2016 due to lightning arrestor malfunction. All repair, inspection and testing on the unit had been completed on June 27 2016. Presently the Atomic Energy Council has yet to present a report on the incident to the Legislative Yuan and as such, the unit is still non-operational as of the writing of this report.

## 3.2.3 Renewable Energy

The following table shows Taipower's various renewable energy generation efficiencies in recent years. At present, Taipower's primary focus on renewable energy is set on expanding its total installed capacity and the company's main response to improving efficiency is to upgrade to newer units of higher efficiency. In the future, the improvement of renewable energy generation efficiency will be incorporated into Taipower's development considerations so that as it increases the total installed capacity for renewable energy, it will also improve generation efficiency. Because generation efficiency, or the utilization rate, for renewable energy units is correlated to the physical location and type of unit installed and because the designated site for renewable energy unit construction requires careful environmental impact analysis, Taipower will continue to assess feasible areas with potential for renewable energy generation and strive to improve overall renewable energy efficiency by increasing unit operational efficiency.

### Taipower 2014~2016 Average Availability of Renewable Energy

Unit：%

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| Wind power utilization rate (%) | 93.81 | 89.49 | 83.13 |
| Solar power capacity factor (%) | 15.66* | 15.80 | 14.50 |
| Hydro unit utilization rate (%) | 92.63 | 91.81 | 93.85 |

Note:

Annual wind power utilization rate = hours of unit operation (including standby)/total number of hours in the year

Solar power capacity factor= total amount of power generated in the year/installed capacity x total number of hours in the year

Hydro unit utilization rate = (hours of unit operations + hours in standby)/ total number of hours in the year

*Since the Longjing 2nd phase Solar Power Plant only started operations in August 2014, it was excluded from the capacity factor

# 3.3 Raising Procurement Performance

## 3.3.1 Fuel Control

Taipower adheres to the following strategies to ensure its fuel supply to power plants is stable, sufficient, timely, cost-effective, and of the required quality:

### Energy Supply Diversification

**Coal**

- Setting caps per country and per supplier for long-term coal contracts
- Investing in offshore mining operations

**LNG**

- Exclusive supply of LNG by CPC; efforts made to track CPC's source of supply
- CPC long-term contracts with Malaysia, Indonesia, Qatar, Australia, Paupa New Guinea, and the United States to achieve energy supply diversification

**Nuclear**

- Setting a cap of no more than 60% from a single uranium region or enterprise group
- Spreading out to 2~3 suppliers for subsequent processing services of conversion, enrichment and fabrication

### Fixed-Term Supply Contract

By signing various fixed-term contracts, Taipower can reduce the uncertainty in procurement and thus achieve a steady fuel supply.

**Coal**

- Fixed-term contracts at 70-80%, with the remaining achieved through spot contracts

**LNG**

- Signing fixed-term contract with CPC
- CPC long-term procurement contracts with foreign suppliers for a total annual volume of 9-12 milion tons

**Nuclear**

- Uranium procurement conducted through long-term contracts, supplemented with medium-to-short-term and spot contracts
- Uranium procurement made through long-term contracts, which comprises at least 50% of uranium supply
- Signing long-term contracts for all nuclear fuel enrichment services

**Fuel oil**

- Fuel oil procured from local suppliers through fixed-term contracts to guarantee supply safety

### Safe Inventories

**Coal**

- By law, coal inventory suffificient for 30 days
- Adopting 34 days of inventory as its target for 2016

**LNG**

- In accordance with the stipulations of the "Taipower and CPC Contract and Early-Warning Mechanism for LNG Supply and Demand," inventories of LNG kept at the Yongan and Taichung Plants at 50,000 and 80,000 tons, respectively
- Together with CPC, Taipower planning for corresponding responses in the event of accidents and established the terms of coordination both parties to abide by

**Nuclear**

- Safe inventory levels for uranium at three year's usage volume
- All units at the nuclear power plant with one batch of nuclear fuel component in the inventory

**Fuel oil**

- Fuel oil inventory in 2016 kept between 10-15 days
- Diesel inventory established in accordance with the specific supply and transmission conditions at various power plants

### Stable Coal Transportation

Taipower currently owns 6 coal carriers, which transported 8 million tons of coal or a 25% shipping ratio in 2016.

## Raising Fuel Procurement Performance

To ensure a steady fuel supply for power generation, Taipower actively liberalized procurement restrictions and coal sourcing to make bids more competitive. Also, by making good use of market fluctuations to procure coal, Taipower was able to reduce the cost of fuel procurement. Not only that, Taipower collaborates with the Taipower and CPB Business Improvement Taskforce of the MOEA to improve the company's fuel procurement performance.

For coal procurement, Taipower established its Coal Procurement Review Taskforce, with members consisting of personnel from its materials department, procurement regulation enforcement department, procurement department, legal affairs and so forth. Through various meetings with the participation of external experts and scholars on energy and economics, the taskforce is responsible for formulating flexible coal procurement strategies. In 2016, the committee held four meetings in response to market changes and completed the annual procurement plan, thus enabling Taipower to procure coal at a lower price (approximately NT$ 5.716 billion) than that in the Asia-Pacific Market of 2016, and achieving an improvement by 87% compared with the performance in 2015 and meeting the improvement target of NT$ 5 billion set by MOEA.

As for the procurement of natural gas, Taipower will spread out its sources of supply in the future and purchase LNG from the international market as directed by the MOEA. The purchased LNG would be distributed through CPC's natural gas receiving stations to Taipower's power plants to reduce the overall fuel procurement cost.

### Fuel Procurement Saving for Taipower in 2016

Unit: NT$ 100 million

| Item | Savings |
|---|---|
| Coal | 57.16 |
| Ocean freight of coal | 5.10 |
| Oil and diesel | 1.53 |
| Total savings | 63.79 |

# 3.3.2 Material Control

Taipower established its Material Control Taskforce in August 2012 to oversee the improvement of the system for material procurement and inventory management, and reviewed the outcomes of these management and control systems. Within a period of five years (from 2012 to 2016), the taskforce realized materials procurement savings of NT$ 4.65 billion (operational savings of NT$ 2.9 billion and inventory savings of NT$ 1.75 billion). Between 2012 and 2016, Taipower saved NT$ 4.096 billion on operational materials procurement and reduced its inventory to NT$ 2.705 billion, thus surpassing the targets of construction materials procurement cost reduction and inventory reduction for the five-year period by NT$ 2.9 billion and NT$ 1.75 billion respectively.

## Reducing Inventory

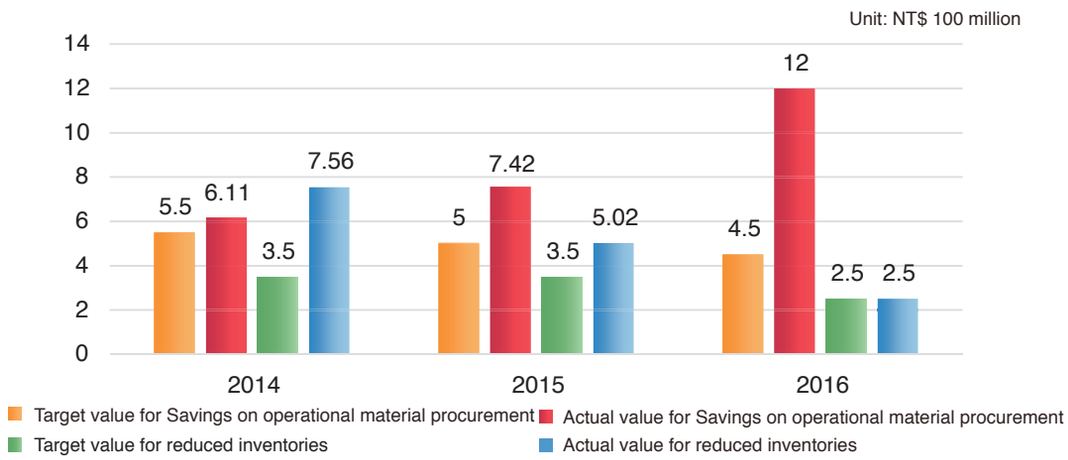
Through system design and Enterprise Resource Planning (ERP), Taipower improved the accuracy of its front-end fuel demand estimates. The company also used open contracts as a flexible delivery tool to optimize inventory reserves. In addition, to better management and control of inventories of special components and spare parts used in power plants and power generation turbines, every supervised department oversees its power plants to review the quantities of spare parts used for safety and overhaul purposes. The company reduced its inventory to NT$ 250 million in 2016 and achieved its annual target by 100%. As of the end of 2016, Taipower reduced its inventory by NT$ 2.705 billion.

## Reducing Material Procurement Cost

Under the premise of remaining compliant with pertinent procurement laws and regulations, Taipower established Key Performance Indicators (KPIs) for various procurements, such as price reduction and collective procurement performance to be adhered by all units. In accordance with collective procurement guidelines, Taipower selected items and assigned units to take charge of procurement for these items for the entire company, consequently reducing the number and overall cost of procurement. In 2016, the number of collective procurement items came to 2,446, with a contract amount of NT$ 9.838 billion that constituted 15.96% of the whole company's material procurement.

Taipower saved approximately NT$ 1.2 billion on construction material procurement costs and achieved the annual target of 267%. Taipower is expecting to increase the number of its collective procurement items in 2017 to approximately 3,000 after incorporating new units in collective procurement.

### Planned and Realized Procurement Savings from 2014-2016




## Company-Level Material Management

To enhance the effectiveness of its management and control, Taipower adheres to the principle of collective management, with regards to materials that are annually used in large quantities or in many units. These are selected and reviewed for collective requisition, procurement, inspection, and storage to decrease the costs of procurement, transportation, and storage.

In 2016, the total value of company-level materials came to NT$ 9.703 billion, with an average inventory of NT$ 2.259 billion and turnover rate of 4.30 times, higher than Taipower's operational materials turnover rate of 3.73 times. To support the upgrading of the company's grid, the expansion of distribution lines remained ongoing and the company continued its practice of inventory management and control. The value of Taipower's average inventory gradually fell from NT$ 3.074 billion in 2006 to NT$ 2.259 billion in 2016.

### Real Expenditure to Supplier in 2016

Unit: NT$ 1 million

| Item | Amount | Percentage |
|---|---|---|
| Engineering | 25,891 | 11.43% |
| Property | 176,193 | 77.82% |
| Labor | 24,338 | 10.75% |
| Total | 226,422 | 100% |

## Supplier Classification System

Under the premise of remaining compliant with the Government Procurement Act, Taipower promoted its supplier classification management and offered incentives such as exemption from inspection, reduced items of inspection, pre-payment and so forth to reward outstanding suppliers. The system encourages price competition among suppliers while reducing Taipower's procurement costs, resulting in a win-win situation for Taipower and its collaborating suppliers.

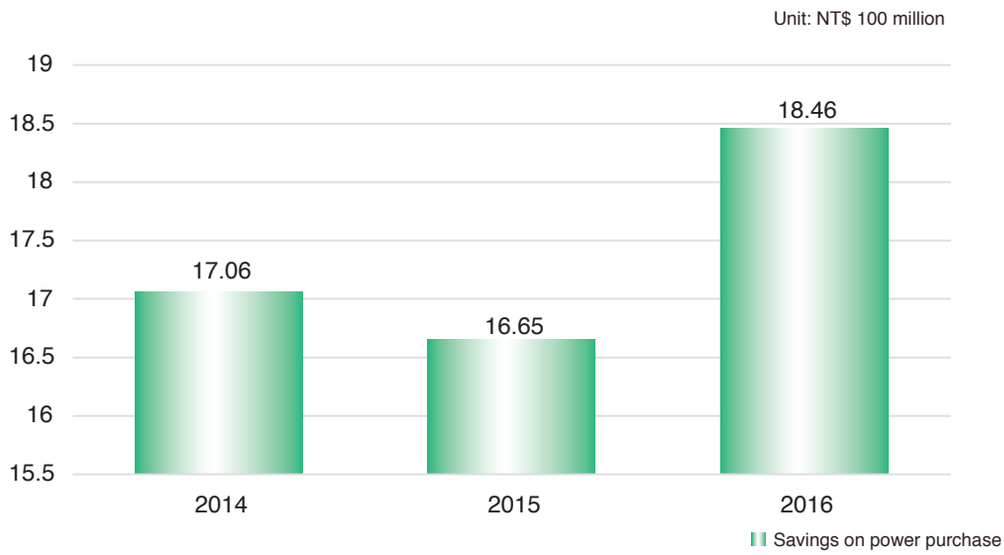
In 2016, Taipower established its "Company-Level Materials Supplier Classification Review Committee Organization and Review Standards" and "Company-Level Materials Supplier Classification Operating Standards" in addition to the "25kV XLPE power cable" (falling under Company-Level Materials Category I) supplier classification tender documentation revision and bidding procedures. The bid was closed on January 10, 2017 and is currently being fulfilled.

## 3.3.3 Procured Power

Following the rapid development of Taiwan's economy and the increasing demand for power, and given the growing difficulty of power development, the government permitted the private sector to operate power sources that Taipower had not yet developed in order to ensure a stable and reliable supply of power across the nation. Taipower complies with MOEA's "Operation Directions for Deregulated Power Supply Industry" and the "Private Power Plant Establishment Plan" in its IPP purchase and signing of contracts with IPP operators. To ensure stable operations and secure financing opportunities for IPPs, the duration of the contract is 25 years with terms that prescribe fixed rates for capital expenses in purchase prices. In addition, the contract also clearly defines periodic adjustment schemes for fuel costs, maintenance fees, and subsidies.

Despite the continuous decline of market interest rates since 1993, Taipower was not able to adjust its capital expenses in accordance with the falling interest rates due to contract restrictions. As such, Taipower attempted numerous negotiations with IPPs and sought the assistance of the Energy Bureau of the MOEA for mediation but failed to reach consensus with the IPPs to amend the terms of the contract. Consequently, Taipower filed a lawsuit and a complaint with the Fair Trade Commission. After the Legislative Yuan decreased the budget for power purchase, the IPPs yielded and agreed to resolve the dispute by amending the contract. In 2013, Taipower managed to amend contracts with 9 IPPs and adopted the status of power generation in 2011 and the market interest rate as the basis for calculation. In the future, Taipower will be able to reduce its power purchase expenditures by approximately NT$ 1.54 billion per year, amounting to a total of NT$ 24.9 billion during the span of the contract.

### Actual Annual Savings on Power Purchases from 2014 to 2016




Presently, the first IPP contract will expire in 2024, and two years prior to the contract expiry, the contract may be extended by agreement. Each contract extension may be no longer than five years. Considering the Electricity Act Amendments passed in January 2017, Taipower will make relevant adjustments to its IPP power purchase in accordance with pertinent regulations in the future.

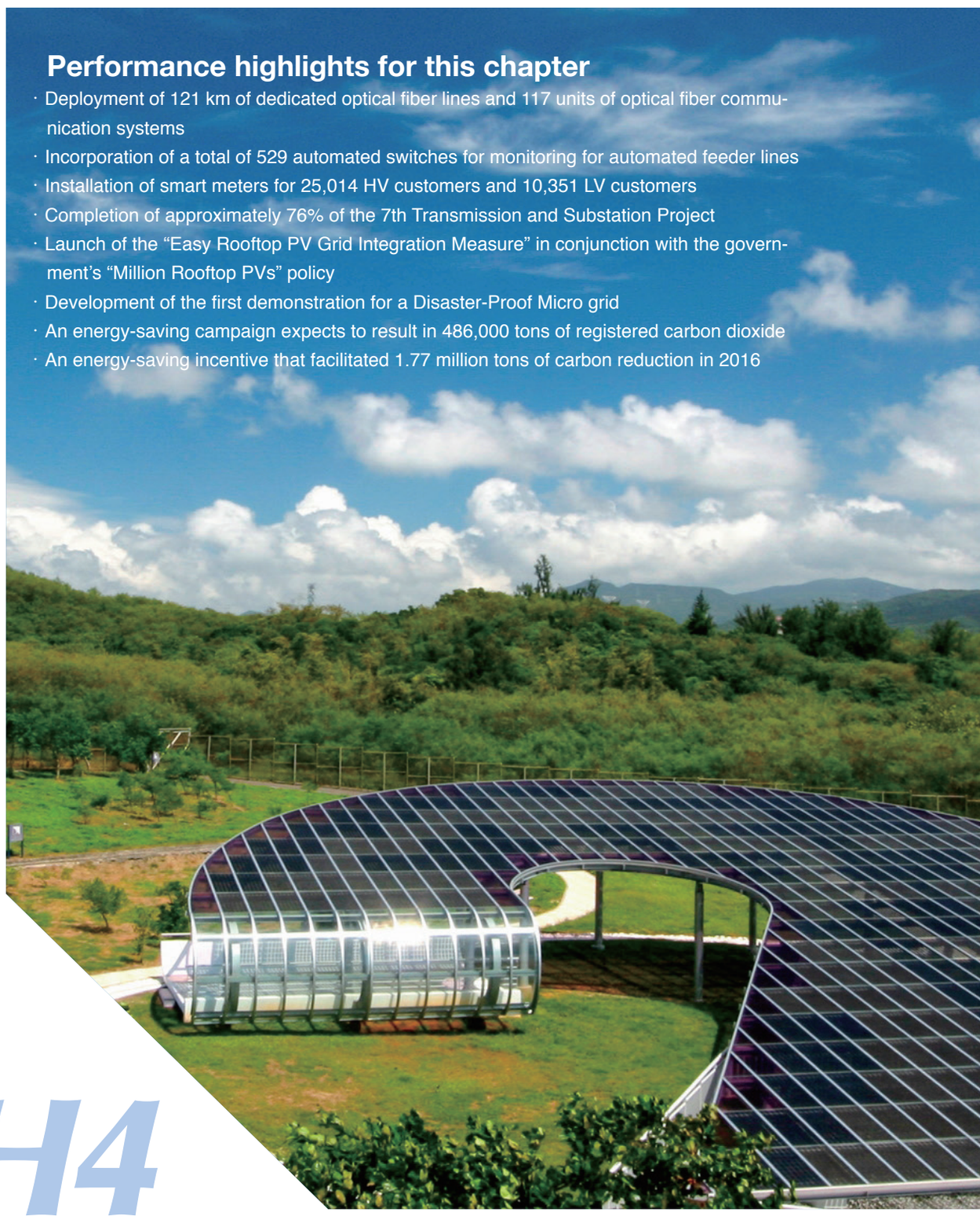
# Adopting Smart Grids

## Role and Contribution

One can learn a lot about Taiwan's economic development by simply looking at the history of the island's power industry. The Taiwan Power Company has embodied "electricity" in Taiwan and believes that "Taipower shall strive to contribute to ,"Taiwan,," and will accompany the island on its journey through the modernization, stablization, and intelligence of the power industry. Step by step, Taipower lead the development of electricity and the power grid in Taiwan. Following the trends of technological development and digitization, Taipower promotes the construction of smart grids in Taiwan whilst continuing to improve power supply reliability in order to become an indispensable power distributor in the country.

## Performance highlights for this chapter

- Deployment of 121 km of dedicated optical fiber lines and 117 units of optical fiber communication systems
- Incorporation of a total of 529 automated switches for monitoring for automated feeder lines
- Installation of smart meters for 25,014 HV customers and 10,351 LV customers
- Completion of approximately 76% of the 7th Transmission and Substation Project
- Launch of the "Easy Rooftop PV Grid Integration Measure" in conjunction with the government's "Million Rooftop PVs" policy
- Development of the first demonstration for a Disaster-Proof Micro grid
- An energy-saving campaign expects to result in 486,000 tons of registered carbon dioxide
- An energy-saving incentive that facilitated 1.77 million tons of carbon reduction in 2016



CH4

| SDGs | Correlation to Taipower | Corresponding Chapters/Issues |
|---|---|---|
| 7 AFFORDABLE AND CLEAN ENERGY | Increase the ratio of renewable power generation, operational and energy efficiency and ensure that all users have access to affordable, reliable, sustainable and modern power services | · Renewable energy policy<br>· Smart grid development |
| 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | Improve power efficiency and recovery for power infrastructures, adopt clean technologies, improve infrastructure for renewable energy grid integration to enhance the resilience and reliability of the power grid while promoting innovative development of environmental-friendly technologies | · Smart Grid Master Plan |
| 13 CLIMATE ACTION | Strengthen all disaster recovery capabilities for natural disasters and climate-related risks | · Strengthen the disaster resilience plan for grids |

## Solutions planned for the future

- Completion of short/medium-term wind generation smart forecast system and wind farm construction
- Introduction of LoRa wireless communication technology for IoT
- Promotion ofdemand-based bidding and Aggregators with regards to customersGrid integration with a capacity of 1.52GWwithin 2 years; long-term grid infrastructure to reach the target of 20GWby 2025
- Continuation of the development of a disaster-proof micro grid
- Promotion of the Northern Region's First Phase Power Grid Plan

## Sustainable Trends and Challenges

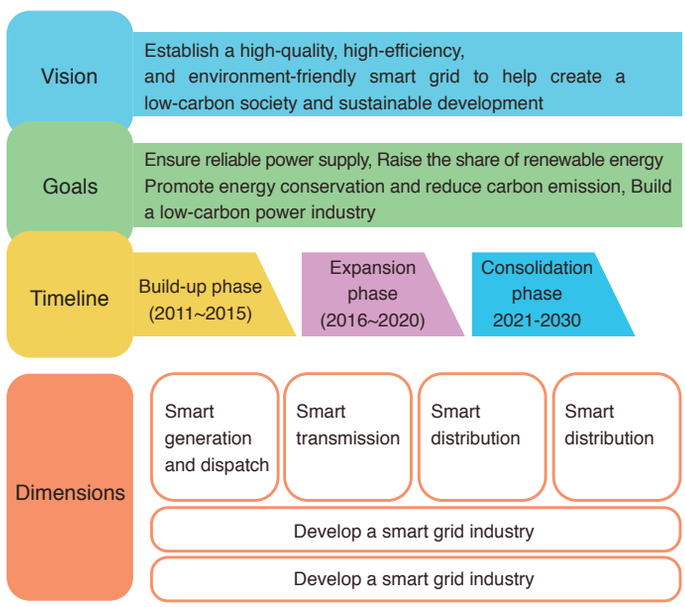
The current trend in the global power industry is to develop smart power. This allows energy providers to achieve more effective management and better system resilience. In recent years, Taipower hascontinuously worked to develop smart meter and smart grid technologies in addition to promoting management mechanisms such as demand-based management, time-of-use rates and so forth. With regards to these smart developments, Taipower has keptpace with the mainstream trends in the international community and built upon the Taiwan Power Research Institute's Research and Development resources in the hopes of ensuring effective promotion of relevant efforts, thereby propelling related industries and becoming the cornerstone of reliable power supply in Taiwan.

# 4.1 Smart Grid Deployment

The construction and prevalence of smart grid and smart meters will lead to a full-fledged activation of smart households, smart cities, and smart lifestyles. In addition to completing relevant infrastructures in the future, Taipower shall improve smart grid related management systems and application services by integrating information communication technologies such as big data, online apps and so forth. Taipower delivers diverse, convenient, innovative value-added services and energy-saving solutions for customer choice , thereby boosting its market competitiveness and making the company an indispensable power grid service provider.

## 4.1.1 Smart Grid Environment Construction

According to the blueprint of the “Smart Grid Master Plan” formulated by the Bureau of Energy and Taipower’s vision of “Building a high-quality, high-efficiency, and environmentally-friendly smart grid to help create a low-carbon society and a sustainable environment,” Taipower continues to promote the construction of a smart grid in Taiwan. The promotion of smart-grid programs is divided into three phases: a short-term introduction phase from2011 to2015, a medium-term growth phase from 2016 to2020, and a long-term consolidation phase from 2021to2030. These phases will see the promotion of smart generation and dispatch, transmission, distribution, and services. The National Smart Grid Master Plan aims at achieving the target of “ensuring power supply reliability, facilitating energy conservation and emission reduction, raising the use of green energy, and leading low-carbon industries.”




### Smart Grid Targets

| Target | Review Item | 2016 Target | 2016 Performance | Cumulative Target for 2020 | Cumulative Target for 2030 |
|---|---|---|---|---|---|
| Ensure power supply stability | SAIDI (min/customer · year) | ≦17.53 | 16.27 | 16 | 15.5 |
| | Line loss rate (%) | ≦4.3 | 3.85 | 4.54 | 4.42 |
| | Number of smart substation (station) | 55 | 55 | 303 | 583 |
| Promote green energy | Renewable resource (%) | 16 | 16 | 20 | 30 |

### Smart Generation, Transmission and Dispatch

To accelerate the construction of smart generation, transmission and dispatch grids in Taiwan, Taipower identified four major dimensions for smart power development: smart generation and dispatch, smart transmission, smart distribution and smart power services. Relevant measures taken include online ES monitoring, installation of CB status and discharge trend diagnostic systems, utilization of special protection systems for continual monitoring, relay system digitization, feeder line automation to minimize the area of outages resulting from accidents and so forth. These measures will allow Taipower to achieve real-time monitoring of power status, automated handling of situations and precise control of the power supply. .

| | CONTENT DESCRIPTION | KEY PROMOTION AND MANAGEMENT GUIDELINE | PERFORMANCE IN 2016 |
|---|---|---|---|
| SMART GENERATION AND DISPATCH | The target of promotion for smart generation and dispatch is “enhance usage efficiency.” | · Increase the ratio of renewable energy<br>· Improve power plant operational efficiency | · Completed the deployment of 121km of dedicated optical fiber lines and 117 optical fiber communication systems<br>· Developed a wind farm 1 to24 hour generation forecast system, which is capable of offering 6/48 hours of forecast at 95% confidence level<br>· Completed the study on the impact of massive renewable energy on reserve capacity when integrated with the grid.<br>· Constructed a reliable interconnected dispatch communication system.<br>· Conducted a study on testing IEC 61850 Standard communication protocol; completed the installation of a pilot IEC 61850 system at Xinshe Substation for trial run<br>· Complete short/medium-term wind generation smart forecast system and the construction of wind farms<br>· Complete the regional PV real-time generation assessment study. |
| | FUTURE PLAN | · Introduce LoRa wireless communication technology for IoT<br>· Complete planning for the Dinghu ES demonstration facility and promote to other substations. | |
| SMART TRANSMISSION | The development of smart transmission offers real time power system monitoring and analysis as well as assessment and handling in the event of system anomalies. | · Improve transmission efficiency<br>· Enhance transmission management | · Replacement of thermal insulated lines in specific regions<br>· Constructed a special protection system; incorporated an advanced malfunction distance measure function tab in the next-gen transmission equipment maintenance system for internal testing.<br>· Continued with the replacement of transmission protection relays and reached a 87% completion rate.<br>· Transmission line DTR monitoring and data analysis experiments. |
| | FUTURE PLAN | · Introduce LoRa wireless communication technology for IoT<br>· Complete planning for the Dinghu ES demonstration facility and promote to other substations. | |
| SMART DISTRIBUTION | This includes advanced distribution system feeder automation, distributed energy integration development and applications. | · Improve distribution safety and efficiency<br>· Strengthen distributed energy integration | · Feeder automation – as of 2016, a total of 529 new units of automation switches have been incorporated into monitoring.<br>· In conjunction with the “Penghu Smart Grid Demo Site Construction Plan,” Taipower increased the ratio of renewable energy in the power grid, and boosted grid troubleshooting capabilities. In addition, Taipower provided transparent power consumption information, facilitated interaction between customers and the grid, and reduced peak load.<br>· Announced the cost calculation for PV grid integration; completed the construction of Yunlin Branch Office PV smart inverter test site and incorporated DNP 3.0 communication protocol. Taipower also completed d autonomous voltage control at 3 PV sites and 24 PV sites were verified.<br>· Conducted a -real-time price study and assessed its feasibility. |
| | FUTURE PLAN | Demand-base bidding<br>1.Lengthen implementation period to January through December<br>2.Incorporate on-the-day notification system to boost response capability<br>3.Make the incentives more appealing, up to NT$ 12 per kWh.<br>4.Incorporate joint solution and make customer group application available.<br>Customer group representative system<br>1.Deliver 200 MW of reliable capacity; early notification (1-hour) before load reduction, each session lasts between 2~4 hours, up to over 100 hours per year for a trial period of 2 years.<br>2.Create groups of over 50 high voltage customers for official implementation in May 2017 | |
| SMART SERVICES | Advanced Metering Infrastructure (AMI) comprises smart meters, communication systems and meter information management systems. In addition to replacing manual meter reading, AMI can also support various dynamic tariffs and load management. AMI can be used to encourage customers to conserve energy while assisting Taipower in taking relevant | · Construct customer/terminal data<br>· Prospective customer service planning | · A total of 25,014 high voltage customers adopted AMI.<br>· Conducted “Low voltage AMI communication technology” and “Low voltage AMI meter development” studies. A total of 10,351 low voltage customers have adopted AMI.<br>· Expanded the allocated capacity for demand-based bidding<br>· In conjunction with the installation of smart meters for low voltage customers, Taipower added more applications to its low-voltage AMI customer service portal website. |
| | FUTURE PLAN | · 200,000 units of meters with new module.<br>· A control center for 1 million customers. | |

## 4.1.2 Smart Power and Dispatch

By effectively introducing renewable energy into the power generation structure through smart grids and central dispatch control centers, Taipower is able to immediately distribute non-storable energy to customers or to facilitate the exchange of power between areas with electricity shortages and surpluses to manage and match supply and demand.

### Incorporating Renewable Energy Generation

In conjunction with the government's million rooftop PV policy to facilitate the development of domestic renewable energy, Taipower officially implemented "Type III Renewable Energy Generation Equipment – Rooftop PV Equipment Grid Integration Fee Calculation" on July 9, 2015 and launched the "Rooftop PV Easy Grid Integration Measure" policy. In 2016, there were a total of 3,523 applications for PV integration, with a purchased capacity of 260MW. As of the end of 2016, the total purchased capacity totaled 910MW.To meet the government's goal of achieving a capacity of 1.52GWfrom PV generation within 2 years and the long-term target of 20GWby 2025, apart from formulating renewable energy grid integration management guidelines, constructing a renewable energy forecast system and improving grid construction to satisfy the demands of grid integration, Taipower must also improve its regional dispatch capabilities and ensure system reliability to overcome grid integration challenges.

#### Renewable Energy Grid Integration Management Guideline Planning

**Short-term**

Make existing bays available at substations to IPPs to connect to their facilities; coupled with relevant works such as distribution feeder line improvement, increasing the number of feeder lines to the main switch, Taipower would be able to maximize integrated grid capacities

**Medium-term**

Review existing power facility sites and strive to expand installed capacity; inventory relevant power equipment and make relevant planning for areas designated by the government in order to increase integrated grid capacity. If the integrated grid for the distribution system has already reached its maximum capacity, Taipower shall adopt alternatives such as expanding the main switch or deploy new feeder lines if the physical space at the substation permits such measures

**Long-term**

Enable IPPs to connect to the grid by constructing new booster stations, substations and transmission lines

#### Renewable Energy Generation System Roadmap

**2017**

Complete short/medium-term wind generation forecast system and the construction of wind farms. Conduct a Regional PV real-time generation assessment study

**2018**

Complete wind generation forecast system construction for the Taiwan inland wind farm
Application of a total solar irradiance (TSI) forecast in the PV generation forecast study

**2019**

Complete the wind generation forecast system construction of the demonstration offshore wind farm
Integrate numerical weather predictions in the development of PV generation forecast technology and studies

**2020**

Integration and construction of wind farm generation forecast systems for both the inland and offshore demonstration farms.
Development of short-term PV generation forecast technology and studies

## A Disaster-Proof Micro Grid

With regards to a disaster-proof micro grid, Taipower developed the first one at Fushan Tribe of Wulai in New Taipei City in 2016. Equipped with a 29 kW PV system, in the event of a natural disaster, the grid will be able to supply power for up to 14 days and prevent the area from suffering extended power outages. Since the project was designed for demonstration, it will require research institutions to assist in the establishment of equipment interface communication protocol and Taipower would need to coordinate local governments to incorporate evacuation facilities in remote townships into the public building rooftop PV network if the project were deployed officially This would enable Taipower to promote green energy and boost disaster prevention in remote townships by offering relevant planning and technical assistance.

# 4.2 Enhancing Power Supply Infrastructures

## 4.2.1 Improving Transmission and Substation System

### 7th Transmission and Substation System Improvement Plan

To meet the growing need for power and the corresponding increases in load as well as high levels of power equipment utilization while unable to supply power from nuclear sources to UHV users, Taipower is continuing the implementation of its 7th Transmission and Substation Project. This project will improve the supply capacity and quality of the transmission system. The sum of investment in the 7th Transmission and Substation Project comes to approximately NT$ 236.9 billion. The project will run from2010 to the end of 2021 and will include the completion of 103 new substations with a total capacity of 18,554 MVA and 1,966 circuit kilometers (CKM).

**Annual Completion Rates of the 7th Transmission and Substation Project for 2016**

| Item | 2016 Target | 2016 Performance | 2016 Completion Rate |
|---|---|---|---|
| Circuit construction (CKM) | 96.33 | 96.19 | 99.85% |
| Substation construction (MVA) | 376.97 | 450.19 | 119.42% |
| Budget depletion (NT$ 100 million) | 99.33 | 94.90 | 95.54% |

Note: Statistical data covers January through December 2016

**Accumulative Completion Rates of the 7th Transmission and Substation Project**

| Item | 2021 Target | 2016 Target | 2016 Performance | Overall Completion Rate |
|---|---|---|---|---|
| Circuit construction (CKM) | 1,966 .19 | 1,589.21 | 1,488.03 | 75.68 % |
| Substation construction (MVA) | 18,554 .15 | 12,980.48 | 13,997.25 | 75.44 % |
| Budget depletion (NT$ 100 million) | 2,368.71 | 1,633.79 | 1,596.25 | 67.39 % |

## Transmission System Planning Management

The stability of the transmission system is an issue of crucial concern for customers but has also always been an area in which Taipower has endeavored to improve. To ensure the smooth supply of power, Taipower established “line loss rate” as an indicator of transmission line status for the monitoring of power supply stability. At the same time, due to considerations for transmission system adaptability and wheeling capabilities in the event of emergencies, Taipower drafted distribution system planning guidelines and established the management target of “reducing feeder lines with currents exceeding 300A” as the basis for its distribution line performance evaluation.

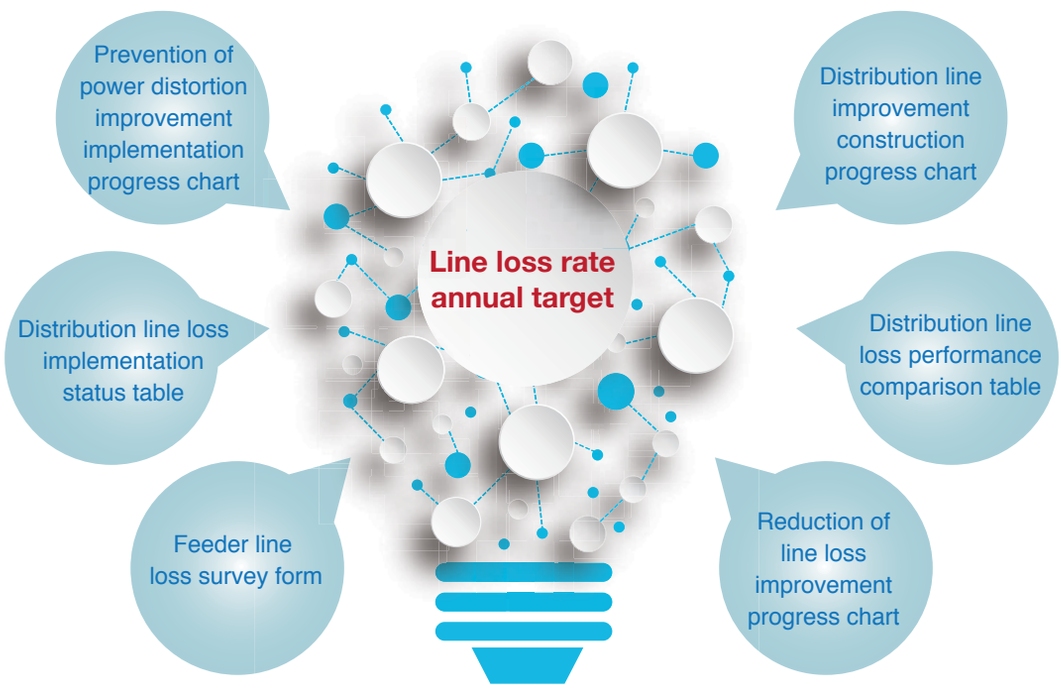
### Line Loss Rate between 2014 and2016

| Year | 2014 | 2015 | 2016 |
|---|---|---|---|
| Target | 2.15% | 2.10% | 1.99% |
| Performance | 1.97% | 1.97% | 1.94% |

### Implementation Performance for the Reduction of Feeder Lines with Currents Exceeding 300A

| Year | 2014 | 2015 | 2016 |
|---|---|---|---|
| Target | 234 | 234 | 234 |
| Performance | 196 | 184 | 184 |

### Distribution Line Loss Improvement Management Procedure




## Distribution and Sales System Improvement

In response to the global trends toward low pollution, eco-friendly energy and resource conservation, related governmental policies, Taipower's new substations were constructed to receive either green building certificates or green building labels. This has helped the company achieve various greening and waste-reduction objectives. For instance, Taipower's P/S modification project in Miaoli, for the distribution system, obtained green building certification by meeting the required scores for five indicators for "green," "water preservation," "energy-saving," "indoor environment" and "water resources in 2016. To ensure prompt reporting to the competent authorities and supervisors under the distribution system via different communication tools in the event of disasters and incidents so as to monitor relevant disaster information and boost post-disaster recovery capabilities, Taipower establishes "Taipower Transmission System Division Engineering Unit and Branch Construction Office Disaster and Emergency Response Standard Operating Procedure." These will allow Taipower to achieve fast and effective coordination between relevant departments. The SOP enhances Taipower's emergency response system by decreasing losses from disasters.

# 4.2.2 Maintaining Power Supply Reliability

## Improving Power Supply Reliability through Smart Systems

Smart systems, in addition to achieving more precise demand forecasts, make new levels of system administration reform possible. With automated systems, Taipower will be able to stay updated on the latest situations and respond promptly to minimize the extent of impact and ensure reliable power supply. In light of the demand for smart grid development and the Bureau of Energy's "Smart Grid Master Plan," Taipower accelerates the pace of feeder automation installation to improve power supply quality. In addition, Taipower has adopted automated switches to replace traditional manual switches in order to allow for the remote operation of switches. This allows for a smart system with encompasses the automation of feeders and the enabling of malfunction detection and remote operation of automatic line switching. This makes it possible to isolate an area of incident in the shortest possible time and to restore power supply in the unaffected areas, thereby minimizing the overall area of power outage. Presently, Taipower is promoting feeder automation in industrial areas, major urban areas and regions where repair would be difficult in order to effectively reduce the area and duration of power outage, consequently improving power supply reliability.

In response to the anticipated growth in power grid load in northern Taiwan by 2019, Taipower has launched its first regional project, the "North Region First Phase Power Grid Plan," to address the bottleneck of power supply. The project is expected to accommodate the regional power demand for the "Taipei Far Eastern Telecom Park," "Fuzhou Public Housing," the "Jiangcui North-side Development Project," and the "Bade Urban Plan". With prospective planning for future power demands and with the support from smart infrastructure, Taipower shall be able to achieve its long-term goal of delivering a reliable power supply.

### Distribution Feeder Automation Installation between 2014 and2016

| Performance indicator \ Year | 2014 | 2015 | 2016 |
|---|---|---|---|
| Automated feeder lines | 6,870 lines | 6,899 lines | 7,080 lines |
| No. of automated switches | 533 new units | 555 new units | 529 new units |

Taipower will continue to promote distribution feeder automation in the future and to raise the target values for feeder line construction by going from 300 units per year to 400 units. In addition, Taipower will annually review the locations of installation to improve the existing feeder line structure, thereby accomplishing the goal of becoming an adopter of smart grids.

## 4.3 Demand Management

### 4.3.1 Demand Response Measures

Taipower has practiced load management for more than 30 years and taken on the responsibility of ensuring a stable power supply across Taiwan. Demand management involves the use of price incentives to change customer power consumption behavior so as to ensure power supply stability while reducing peak loads. Measures that Taipower has implemented so far include: seasonal rates, time-of-use rates, ice storage central air-conditioning system off-peak electricity use, central air conditioner duty cycling load control measures, electricity use reduction measures, demand-based bidding and so forth. To promote Taiwan's power stability in the long run, smart power forecasting is expected to play a vital role. According to the consensus on energy conservation reached during the 4th Energy Conference in Taiwan, the government has initiated a "New Save Power Campaign" for the central and local governments to cooperate in the promotion of energy conservation in the hopes of reducing the growth in annual power consumption.

In the future, Taipower will boost the scale of AMI construction and further integrate statistics and research to promote more beneficial time-of-use rates and energy saving measures.

## Load Management

### Power Demand Response Measure

| Measure | | Description | Applicable Customer | Results |
|---|---|---|---|---|
| Implementing "Time-of-Use Rates" since 1979 | | Reflect the cost of electricity during different time periods. Encourage off-peak hour electricity use to reduce peak load. | Optional for gauge lamp and low voltage customers; Applicable to all high voltage customers | Reduced the daily peak load in 2016 by an estimated 3,830 MW |
| Launched "Residential/Commercial Customer Simple Time-of-Use Rate" in 2016 | | In order to provide more diverse rates for residential/commercial customers, Taipower has used pricing indicators as a reminder for customers to reduce power use during peak hours so as to achieve the goal of reducing peak load. | Available for customers in residential housing and proprietors of small stores | |
| Demand-Response Load Management Measures | Implementing "Central Air Conditioner Duty Cycling Load Control Measure" since 1991 | Rotation of central air-conditioning system with 60 mins on and 15mins off. Rotation of package air conditioning system with 22 mins on and 8 mins off. | Non-productive customers (i.e. office buildings, schools and so forth) | |
| | Implementing "Interruptible Rates" since 1987 | Provide reduced rates to mitigate peak load and transfer to off-peak hours. | 100kW customers and schools (depending on the contract; factories, educational institutions, etc.) | Daily peak load reduced by 918 MW in 2016 on July 28 |
| | Implementing "Demand-Based Bidding Measure" since 2015 | Through the customer-declared feedback pricing method, Taipower bestows more autonomy to customers so as to inspire their power-consumption mitigation potentials and to improve system load, thereby mitigating the demands for new power development and reducing the risks of power shortages. | Customers of high-voltage or higher power demand | |
| | Implementing "joint solution" as a new demand-based bidding measure in 2017 | Enable customers to apply for demand-based bidding as groups | Customers of high-voltage or higher power demand | |
| | Refined demand-based response measures and constructed demand-based bidding platform in 2016 | The demand-based bidding platform was constructed on April 27, thereby offering customers functions such as electronic bidding process, open disclosure of bidding information, online quotation and so forth | Participants in relevant demand-based bidding | |

**Applied Capacity for Peak Load from 2014 to 2016**

| Year | Applied capacity for peak load (in GW) |
|---|---|
| 2014 | 2.43 |
| 2015 | 1.75 |
| 2016 | 1.93 |

### Demand-based bidding

Since the launch of demand-based bidding in 2015, Taipower has achieved moderate success. In 2016, Taipower began screening potential target customers more aggressively, establishing project teams, visiting energy-intensive associations and actively promoting the measure, leading to a gradual monthly growth in the number of customers applying for demand-based bidding and the number of applications. As of December 2016, Taipower had up to 824 customers applying for demand-based bidding in a single month, with a monthly peak load reduction capacity at 950 MW; in the month of peak load (July), the applied capacity reached 530 MW.

In addition, Taipower completed the construction of a demand-based bidding platform in April 2016. The platform was designed to make it easier for customers to participate, receive quotations and obtain relevant bidding information. Starting from July 1, customers could visit the “High-voltage customer service portal website” to access features such as customer information, power management, demand-based response load management measures and calculations and so forth. As of the end of 2016, a total of 6,662 customers have registered at the website. We look forward to drawing more customers in the future to participate in demand-based bidding so that we could reduce investments and operating costs for peak load through smart management.

In the near future, Taipower will continue to promote demand-based bidding in 2017 through means of lengthening implementation duration, improving response capabilities, sweetening price incentives, creating new demand-based bidding solutions and improving standard of measurement, while attempting to reduce load during peak periods by Aggregator. The target of demand-based bidding promotion for 2017 has been set at 600 MW.

### Time-of-Use rate

In an effort to provide more diverse pricing options while increasing the subscriptions for time-of-use pricing, Taipower launched “Simple time-of-use pricing for residential and commercial customers” in October 2016 for residential households and small businesses . Through the use of pricing signals, Taipower expects to achieve the goal of reducing peak load.

## 4.3.2 Energy Saving Incentives

Taipower introduced energy-saving incentives in July 2008. The incentive package has been renewed four times to promote energy-conservation awareness and retain customer’s drive to save energy. The current energy-saving incentives were introduced in August 2014 and apply discounts to customers’ actual power consumption (NT$0.6 per kWh). The incentive translates to a minimum discount of NT$84 or the calculated amount, whichever is higher. The minimum incentive is raised to NT$100 for handicapped customers. An energy-saving campaign expects to result in 486,000 tons of registered carbon dioxide

## Energy Saved by the Energy-Saving Incentive and Discounts in the Last Three Years

| Year | Electricity Saved (100 GWh) | Money Saved (NT$ 100 million | CO2 Emission Reduced (10,000 metric tons) | Equal to Annual CO2 Absorption for Daan Forest Park (no.) |
|---|---|---|---|---|
| 2014 | 35.5 | 47.9 | 187 | 5,066 |
| 2015 | 47.4 | 36.4 | 250 | 6,764 |
| 2016 | 33.6 | 27.5 | 177 | 4,795 |

Note: Calculations is made based on the national electricity emission factor of 528g/CO2e/kWh published by the EPA in 2015 and the annual CO2 absorption of Daan Forest Park at 370 metric tons, which has been taken from a report published by the Bureau of Energy in 2011.

To make energy-saving incentives more interactive, the energy-saving incentive will be paired in conjunction with Taipower's 2017 "Protect the Earth through Power Conservation and Carbon Reduction" lucky draw and contest by introducing the "Receive More from Your Summer Energy-Saving Incentives". Customers who register to be part of the event may receive an additional NT$ 0.2 (i.e. from NT$ 0.6 to NT$ 0.8) for their summer energy-saving incentive so as to encourage the general public to participate in energy conservation during the summer and contribute to the cause. Taipower wishes more members of the public would join the in energy-conservation and carbon reduction efforts as a way to care for the planet.

## Community-based Energy Saving

In response to the government's policy for carbon reduction, Taipower offers free community services by sharing relevant tips and experience on saving energy to promote effective energy saving techniques and the use of high energy efficiency products in addition to suggestions on power usage for public facilities. In 2016, Taipower held a total of 200 events and drawn 9,298 participants.

### 「Save Power and Get a Gift from Taipower」- Energy Conservation for All in 2016

In an effort to promote energy conservation and carbon reduction while encouraging the general public to cut down on power usage, Taipower has organized a variety of interactive events such as energy-saving lucky draw, online contests, energy-saving contest for small and medium enterprises, energy-saving sketch competition for municipal junior high schools and so forth in order to help the general public become more aware of the importance of energy conservation and pay more attention and focus to issues such as carbon reduction and environmental protection. Taipower wishes to promote energy conservation as a popular trend that would appeal to all citizens to do their part for energy conservation, carbon reduction and protection of the natural environment.

In 2016, in addition to an "energy conservation lucky draw," "contest," "energy saving promotion for summer," "sketch competition for municipal junior high schools," "energy saving competition for small and medium enterprises," Taipower organized new events including the "Energy Conservation Lucky Draw and Competition for Family and Friends" and a "Demand-Based Bidding Raffle and Contest" for customers that usually consume significant amounts of power on a regular basis. Statistics show that close to 170,000 customers participated in the energy conservation lucky draw.

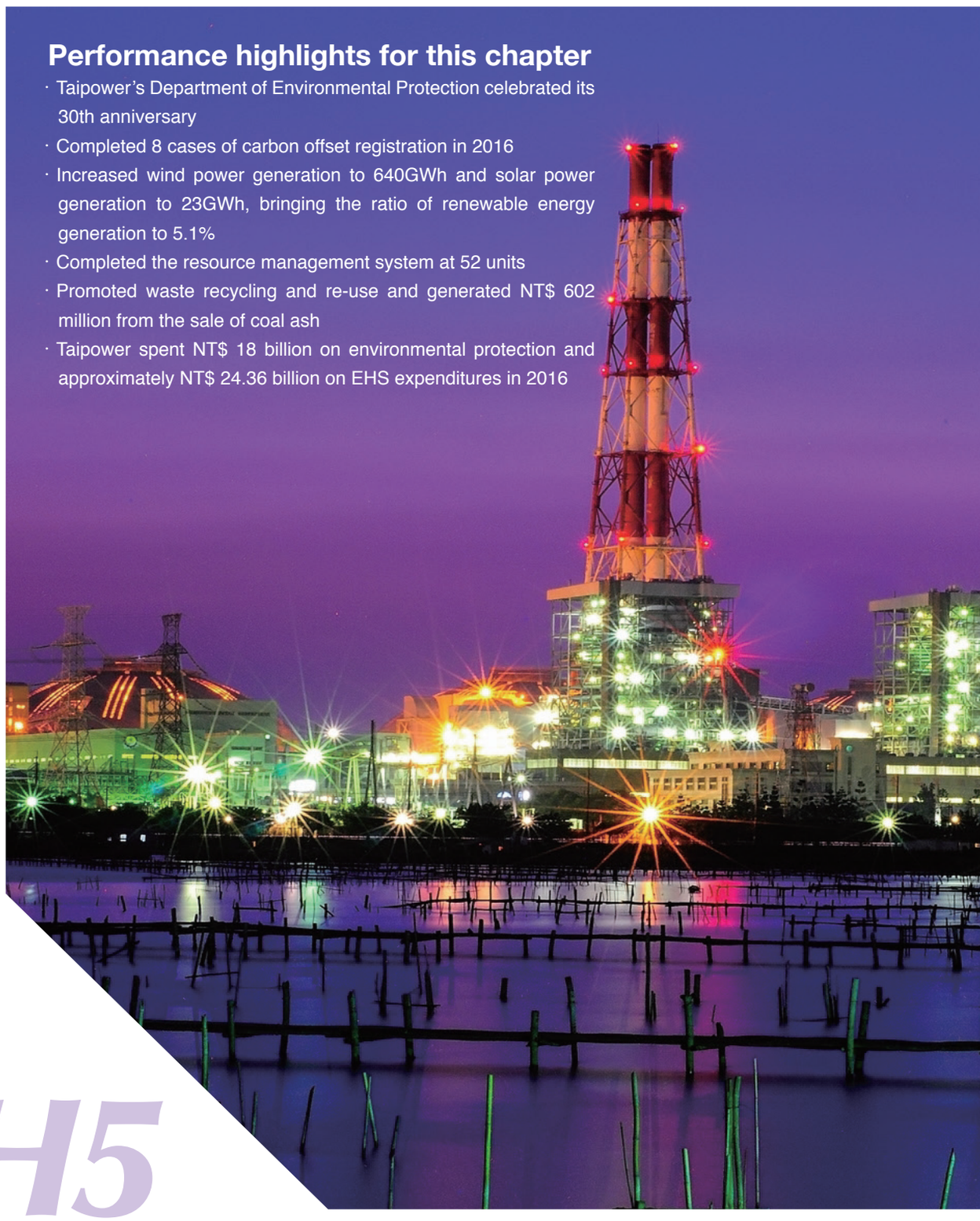
# Agent of Environmental Friendliness

## Role and Contribution

For many years, Taipower has been devoted to environmental protection and has expressed this by continuing communicating with the public, conducting prudent assessments, decreasing its impact on the environment, ensuring information transparency and reducing its environmental footprint.Taipower was the first corporation in Taiwan to establish a dedicated department for environmental promotion, which celebrated its 30th anniversary in 2016. This is yet another reflection of the contributions that Taipower has made towards sustainable environmental development in the past.

## Performance highlights for this chapter

- Taipower's Department of Environmental Protection celebrated its 30th anniversary
- Completed 8 cases of carbon offset registration in 2016
- Increased wind power generation to 640GWh and solar power generation to 23GWh, bringing the ratio of renewable energy generation to 5.1%
- Completed the resource management system at 52 units
- Promoted waste recycling and re-use and generated NT$ 602 million from the sale of coal ash
- Taipower spent NT$ 18 billion on environmental protection and approximately NT$ 24.36 billion on EHS expenditures in 2016



CH5

| SDGs | Correlation to Taipower | Corresponding Chapters/Issues |
|---|---|---|
| 6 CLEAN WATER AND SANITATION | Continue to promote footprint inventory for power generation and water usage and inspection of water usage status at various power plants to enhance water usage efficiency; 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 the power plants | · Adopt stricter effluence standards<br>· Zero wastewater discharge targets<br>· Water footprint inventories |
| 11 SUSTAINABLE CITIES AND COMMUNITIES | Mitigate urban impact on the natural environment while focusing on the improvement of air pollution and reducing waste generation | · Air pollution management<br>· Waste management |
| 12 RESPONSIBLE CONSUMPTION AND PRODUCTION | Improve the overall energy efficiency and reduce the required resources for overall generation / transmission / distribution in order to reduce the environmental footprint from power supply and cut down waste generation through the prevention, reduction, recycling and re-use of resources | · Improve power generation efficiency |
| 13 CLIMATE ACTION | Actively participate in adaptation planning and mitigation actions while improving energy efficiency, develop renewable energies and enhance the climate resilience and adaptability of existing power generation systems | · Climate change adaptation planing<br>· Flood simulation analysis for extreme weather incidents<br>· Climate change adaptation research program by Taipei Power Supply Branch |
| 15 LIFE ON LAND | Protect, maintain and promote sustainable development of ecological systems within the territory; construct ecological power plants that protect the surrounding ecological systems to prevent the loss of bio-diversity | · Promote ecologically friendly power plants |

## Solutions planned for the future

- Formulate corresponding measures in response to Electricity Act Amendments
- Continue to improve upon thermal power generation efficacy
- Promote offshore wind power generation
- Promote Solar Power Project Phases 3 and 4
- Carry out climate change adaptation research for distribution systems

## Sustainable Trends and Challenges

In recent years, the issue of climate change has received significant attention around the world. Incidentally, climate change not only has an impact on businesses but is also a source of significant uncertainties. As such, Taipower actively proposed relevant response plans. It has also made adjustments to the assessment of generation and distribution projects and promoted renewable energy while cutting down on high-CO2 emitting generation.With regards to the concern of potential air pollution from thermal power generation, Taipower shall continue to improve its internal control of air pollution while strengthening its communications with the public to achieve a “win-win” situation by ensuring a reliable power supply and protecting the environment.

## 5.1 Environmental Protection 30 – Department of Environmental Protection's 30th Anniversary

2016 coincided with Taipower's 70th anniversary and the 30th anniversary of the company's Department of Environmental Protection. To celebrate the special occasion, Taipower held a "Department of Environmental Protection's 30th Anniversary Forum" on June 1 2016 at Taipower's headquarters to pay tribute to the efforts from Taipower and what the department has made towards protecting our natural environment in the past. Taking on the missions of protecting the natural environment in Taiwan and developing power for the nation, Taipower shall take actions that respond to the public's expectations of the company in the future.

### 01 The beginning of environmental protection operations

- Taiwan saw a transformation of its society during the 80s, and as the economy grew, the public's awareness of the need for environmental protection has grown and more attention was paid to environmental protection
- The environmental pollution near the Linkou Power Plant became a concern for the public
- The EPA promulgated new emission standards for air pollution in 1986
- Due to power demands and the urgent need to promote thermal power plans in Taichung and Suao whilst relevant environmental protection affairs have yet to be addressed, Taipower established its Department of Environmental Protection in 1986 to respond to the concerns of the general public. The Department is responsible for relevant EIA operations and carrying out relevant improvements/installations for pollution prevention facilities

### 02 Active involvement in pollution prevention

- Active involvement in the improvement and prevention of air pollution, wastewater, noise/vibration, effluent pollution and so forth. Measures taken include fuel fired unit air pollution improvement plans, PCB waste treatment and so forth
- With the legislation of EIA, Taipower has duly implemented an environmental impact assessment as required and listened to the people's voice on relevant environmental issues to carry out EIA with a professional and responsible attitude
- To reassure the public regarding its concerns about the Taichung Thermal Power Plant, Taipower signed an agreement with four environmental protection organizations in four municipalities in central Taiwan to conduct parallel monitoring in 1988. More than 20 years have passed since then and Taipower has continued to engage in rational communications with all parties involved, thereby setting a fine example and framework for commissioning private environmental organizations to conduct parallel monitoring for a state-owned enterprise.
- Taipower launched its ISO 14001 environment management system in 1997, with all subordinating units completing the system's construction and operation. Taipower has received an environmental protection award for its endeavor
- Transitioned from pollution prevention to active contribution by focusing on coral reef preservation while promoting power facility greening

### 03 Promotion of green enterprise and environmental friendliness

**Climate change mitigation and adaptation**

- In 2010, Taipower established its GHG Taskforce to take charge of GHG emission inventory, reduction of carbon footprint, climate change adaptation, carbon rights management and so forth
- Active increase in renewable energy generation ratio to promote green energy with the target of reaching 0.5kg CO2e per kWh of power generated
- Started the reporting of energy conservation and carbon reduction promotion in 2011 to promote GHG emission reduction through power supply and demand management

**Promote a friendly environment and become a green enterprise**

- Eco-friendly measures: beach clean-up, re-forestation, fingerlings release, building artificial reefs
- Promote green enterprise activities: Blue Bay Coral Sea, Taipower Car Free Day, Waterfowl Paradise, Carbon Neutrality Project, ecological power plants

## 5.2 Ensuring Environmental Management

### 5.2.1 Environmental Impact Assessment Management

Taipower's facilities and operations may impact local communities through water pollution, air pollution, soil pollution, noise,

waste, toxic pollution, land subsidence or radioactive pollution. In addition to natural resources, these types of pollution can also impact human society. And as such, Taipower will always conduct comprehensive research beforehand, propose relevant environmental management plan and hold public hearings and reviews to prevent and mitigate the impact of our development activities on the environment. Not only that, Taipower has also presented its success in pollution prevention and waste management through open and transparent means.

During the developmental phase, it is inevitable for power facilities to create specific burdens on the environment and surrounding communities. And as such, Taipower has taken necessary steps to minimize the impact of its development on the environment and surrounding communities through a framework of pre-development assessment and communication, post-assessment improvement on relevant plans and continual monitoring during construction. The framework is illustrated as shown below:


**In 2016, Taipower engaged in communication with residents, and achieved the following EIA results:**

| Development Project | Environmental Impact Assessment Achievement |
|---|---|
| NPP1 Decommissioning Project | Pursuant to the resolution reached in the EIA Committee Review held in May 2016, a second phase environmental impact assessment needs to be carried out. And as such, Taipower held the "NPP1 Decommissioning Project Phase 2 EIA Open Session" on September 3 to present the contents and items of the 2nd phase of the EIA to relevant government agencies, local district offices, public authorities, village chiefs and the public. The event also served as an opportunity for Taipower to listen to residents' opinions and concerns regarding the project. |
| Gaoyuan Fuel Combined Cycle Generation Project | Regarding the fuel combined cycle unit at Lungtan ES, Taipower held an open session on the drafting of the Environmental Impact Statement for Gaoyuan Fuel Combined Cycle Generation Plan on October 5, 2016 to present the contents and items of the EIA to the stakeholders involved. The event also served as an opportunity for Taipower to listen to residents' opinions and concerns regarding the project. |
| Taixi Wind Power Generation Project | To achieve the targets set by the government's policy for green power, Taipower has planned to install four units of wind turbine along the edge of the Taixi Reclaimed Land Windbreak Forest and held the open session on the drafting of the Environmental Impact Statement for Taixi Wind Power Generation Project on October 12, 2016 to present the contents and items of the EIA to the stakeholders involved. The event also served as an opportunity for Taipower to listen to residents' opinions and concerns regarding the project. |
| Datan Power Plant Fuel Combined Cycle Unit Expansion Project | In conjunction with the government's new energy policy to increase the use of LNG to accommodate the public's power demands, Taipower has planned to install additional units at Datan Power Plant to bring the total installed capacity to 2880±10% MW. Taipower held the open session on the "Datan Power Plant Fuel Combined Cycle Unit Expansion Project" prior to the construction on December 5, 2016 to present the contents of the project, status of the environment and relevant environmental protection measures to the residents. The event also served as an opportunity for Taipower to listen to residents' opinions and concerns, which would serve as references for Taipower's future projects. |
| Offshore Wind Project Phase 2 | To achieve the targets, set by the government's policy for green power, Taipower has planned to install wind turbines with a total installed capacity of 900 MW in the offshore area of Changhua County. Taipower has specifically avoided the main habitat of Chinese white dolphins, Hanbao wetlands and the preservation area for mud shrimps in the selection of the project site. The open session on the drafting of the Environmental Impact Statement for Offshore Wind Project Phase 2 was held at Uni-Resort Lukang on December 20, 2016 to present the contents and items of the EIA to the stakeholders involved. The event also served as an opportunity for Taipower to listen to residents' opinions and concerns regarding the project. |

## 5.2.2 Air Pollution Management

In recent years, the hazards of smog have caused significant concern within the public. As a response, Taipower implemenedvarious plans to optimize the company's management of air pollution and lowered thermal generation loads during smog hazards to alleviate the public's concern for relevant health risks.

For the treatment of sulphur oxide (SOx), nitrogen oxide (NOx), and particulate pollutants (PM), Taipower controlled the air pollutant emissions from each power plant by opting to use low ash, sulphur, and nitrogen fuels and by switching to energy from clean burning (LNG). Moreover, Taipower installed a Continuous Emission Monitoring System (CEMS) on the chimney of each thermal power plant to determine the concentration of pollutants in the smoke discharged. These installations also enable Taipower to keep relevant equipment operating at optimal conditions and to reduce the discharge of pollutants in the smoke to minimal level, even to the point of surpassing the legal requirements.

### Major Air Pollutant Actual Value and Legal Requirements in 2014 - 2016

| | PM(kg/GWh) | | SOX(kg/GWh) | | NO X(kg/GWh) | |
|---|---|---|---|---|---|---|
| | Actual value | Legal requirement | Actual value | Legal requirement | Actual value | Legal requirement |
| 2014 | 27 | 145 | 305 | 842 | 312 | 442 |
| 2015 | 26 | 96 | 315 | 652 | 307 | 410 |
| 2016 | 22 | 67 | 306 | 587 | 308 | 416 |

### Smog Solutions

The smog that has often struck between October and April in recent years, has caused substantial concern from the public and poses a threat to public health. Since thermal power generation is still the primary source of power in Taiwan, the public associates thermal power generation with escalating air pollution. Therefore, Taipower has been working diligently to optimize its thermal power plant emission controls and prevent air pollution.

When $PM_{2.5}$ exceeded the safe concentration in Taichung on November 8, 2015, Taipower took the initiative to reduce the load for the coal-fired units in Taichung for the very first time. The decision was made as a proactive effort to be environmentally friendly when relevant regulations have yet to be finalized. Considering that smog hazards typically occur during the off-peak seasons in terms of power consumption in Taiwan, Taipower has arranged for a portion of its coal-fire units to go through annual repairs during this period to reduce emissions. In addition, Taipower has also followed the "Response Principles and Reporting Mechanism for Incidence of High $PM_{2.5}$ Pollution" approved by the MOEA to prioritize gas unit generation in the event of severe $PM_{2.5}$ pollution. If an incident coincided with high power demand, thereby making load reduction at coal-fired power plants unfeasible, eco-friendly load reduction would be carried out in early hours on the following morning instead to reduce the burden on the environment. Between 2015~2016, based on the reporting mechanism, Taipower resorted to LNG generation in place of the Taichung Power Plant on 15 instances and additionally utilized load reduction in as many as 31 instances at the Xingda Power Plant. This had not only enabled Taipower to improve its corporate image but also made it possible to maintain a reliable power supply.

Currently, Taipower has established its response principles for high PM2.5 pollution incidents in Taichung City. In the future, if EPA forecasts were to predict three consecutive days of PM2.5 indicator at level 10 and above in central Taiwan, the Taichung City Government would notify power plants in Taichung so that they could take relevant steps before reporting to Taipower HQ for environmental-friendly measures and generation load reduction safety assessments. Without compromising power supply safety, Taipower would then implement coal-fired unit load reduction at the Taichung Power Plant as a response to exceeding a concentration of PM2.5 in central Taiwan.

# 5.2.3 Waste Management

## Waste Management System

In addition to the Waste Disposal Act, Taipower established a “Coal Ash Resource Reuse Promotion Taskforce” in 2015 to take charge of the research into 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 closeout strategies and implementation of coal ash and gypsum, review of existing coal ash sales regulations at power plants, promotion of green label certification for fly ash and gypsum products and planning of relevant incentive schemes to encourage all units to increase their fly ash concrete use. Contents relating to nuclear waste are covered in the chapter on nuclear power communications.

## Re-use of Industrial Waste

### Re-use of coal ash

Taipower has encouraged its engineering units to reuse fly ash in civil construction, where it is used to fill trenches. This raises the volume and utilization rate of fly ash and reduces the environmental burden. In 2016, coal ash production was at 2.217 million tons, of which 1.703 million tons, or 76.8%, was reused. The total sales revenues came to NT$ 602 million.

### Re-use of gypsum

To improve air quality, coal-fired power plants are outfitted with flue gas desulfurization installations, which remove sulfur oxides from flue gas. Limestone slurry is then used to create gypsum through the chemical process of absorption, neutralization, oxidation and crystallization. The resulting raw gypsum ($CaSO_4 \cdot 2H_2O$) can be re-used by local cement makers and fire-retardant board makers. Taipower produced approximately 519 thousand tons of gypsum in 2016.

### Bidding for industrial waste

Other industrial wastes, such as waste wires and cables, and metal scraps are re-used through waste disposal contractors that aquire the materials through an open bidding process. In accordance with government regulations, bidding contractors must be qualified Industrial Waste Processors and perform their reuse operations according to regulations to reduce the environmental risks involved in waste treatment. As Taipower had less construction projects in 2016, the quantity of bidding for industrial waste decreased by approximately 5.48% compared to 2015. In addition, as prices for raw materials declined in 2016, the amount from distribution and sales of waste cable sales for the year turned out to be the lowest in Taipower’s history.

**Coal Ash Sales Quantity and Amount**

| Item | 2014 | 2015 | 2016 |
|---|---|---|---|
| Coal ash production volume (thousand tons) | 2,065 | 2,007 | 2,217 |
| Coal ash bidding volume (thousand tons) | 1,668 | 1,628 | 1,848 |
| Coal ash bidding price (NT$ 100 million) | 4.14 | 4.06 | 6.02 |
| Waste wires, cables and metal scrap bidding volume (thousand tons) | 6.53 | 5.24 | 4.95 |
| Waste wires, cables and scrap metal bidding price (NT$ 100 million) | 9.58 | 6.41 | 5.33 |

# 5.3 Energy Resource Management

The need for information transparency has drawn external stakeholders' attention, and so, Taipower established a company-wide material flow management system for a total of 52 units covering hydro, thermal, nuclear, supply and distribution systems from 2009 through 2016 for the rapid control of raw material utilization, pollutant emissions, recycling, and sales of by-products, based on the concept of balancing inputs and outputs. The system has been duly tracked to offer insights into usage efficiency and improvement. Thus, it enables Taipower to reduce and optimize the use of materials and resources.

## 5.3.1 Energy Management

### Energy Management System Construction

In building on the experience of constructing the energy management system at the Datan Power Plant, Taipower carried out a series of events including training, energy reviews, energy-saving diagnostics, formulation of action plans and relevant discussions at Xingda Power Plant in 2016. The power plant was successfully accredited with the energy management system certification from BSI in December.

With regards to energy management at Xingda Power Plant, equipment including a boiler fan, gas turbines, and steam units consumed a proportionally higher percentage of energy. Through the formulation of an action plan and implementation of energy-saving measures, the power plant is expected to save 43,690MWh of power annually. Coupled with a follow-up measurement plan, it is possible to achieve effective supervision and measurement of critical characteristics such as main energy usage so as to improve the target of continual improvement.

### Power Plant Efficiency Improvement

Power consumption is defined as the power consumed for the operation of generation units. In principle, the power consumption of new units is identified upon installation. As units age, their power consumption will gradually increase. Nevertheless, through skillful operation, repair and maintenance, their power consumption can be kept under control.

#### Thermal Generation

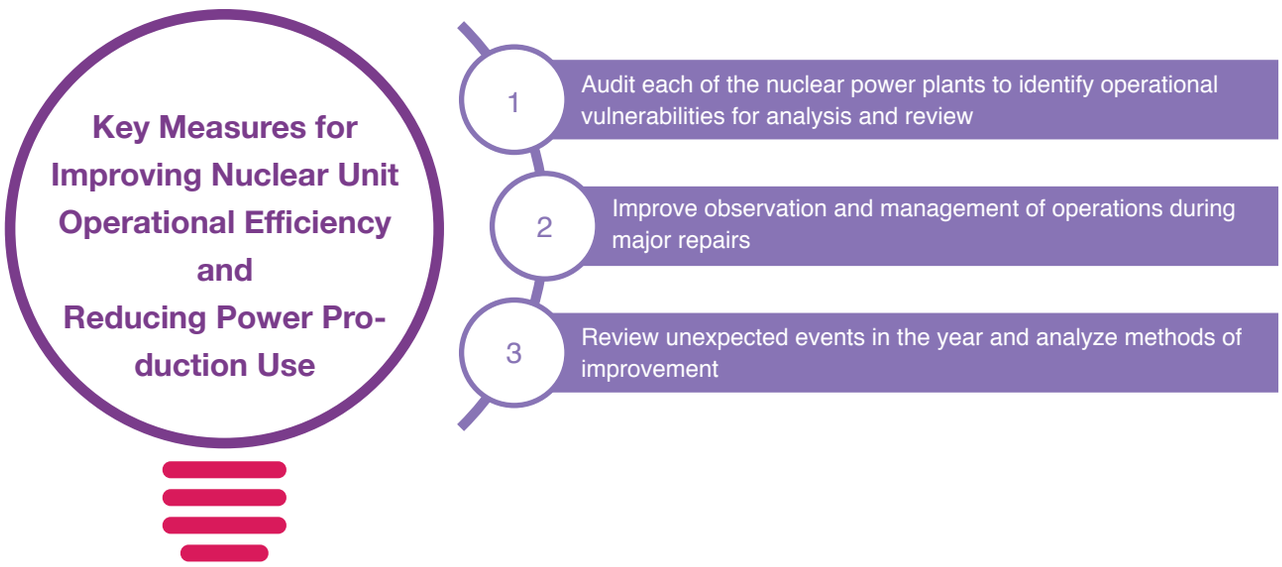
Taipower manages power consumption and set specific targets, which may not exceed the average of the lastthree years. This, coupled with the government's policies, means Taipower will gradually phase out its older units that are due for decommissioning while introducing high-efficiency generation units. In addition, through the improvement of various operations and maintenance measures, Taipower aims to improve the energy usage efficiency for existing units and equipment. In recent years, Taipower's thermal plants have diligently worked to improve their efficiencies and strengthen international exchanges and collaborations to introduce power generation and eco-friendly technologies.

**Production Power Use by Thermal Power Plants in 2014-2016**

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| Power consumption (GWh) | 48.43 | 46.59 | 50.27 |
| Power consumption target (%) | ≦ 4.09% | ≦ 3.97% | ≦ 3.60% |
| Actual power consumption (%) | 3.86% | 3.56% | 3.62% |

### Nuclear Power Plants

The power conservation target for nuclear power consumption reduction has been set at 0.2% (for periods of non-major repair) and 0.01% (during major repairs). To achieve better power conservation targets, Taipower has implemented power conservation promotion, control measures, and power equipment replacement at each nuclear power plant.




**Nuclear Power Plant Production Power Use Conservation Targets and Performance in 2014-2016**

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| Target (MWh) | 3,388.57 | 3,438.17 | 3,511.64 |
| Performance (MWh) | 23,945.10 | 2,002.47 | -19,970.86 |

Note: In 2016, two causes were attributed to the failure of Taipower's nuclear power plants to achieve their production power use conservation target: 1) due to the lightning arrester malfunction in reactor no.2 at NPP2, the reactor has been shutdown since May through the end of the year. Consequently, the reduction in power generation has excluded the anticipated volume after June 28. Given the substantial reduction in power generated for May and June, NPP2 was unable to meet its annual target. 2) Due to powerful typhoons such as Megi and Meranti in the summer, the units were subjected to load reduction/desynchronization, leading to reduced generation and affected the actual performance.

## 5.3.2 Water Resources Management

### Water Inventory and Management

### Water consumption

Taipower sets targets for water use and footprints for thermal power plants to achieve water resource management. The water consumption of thermal power plants in recent years is shown in the table below:

**Thermal Power Plant Water Consumption and Target**

| Item | 2014 | 2015 | 2016 | 2016 efficiency target | 2016 efficiency performance |
|---|---|---|---|---|---|
| Running Water Use (10,000 tons) | 1,109 | 1,041 | 1,081 | ≦85 tons/GWh | ≦80.3 tons/GWh |
| Well, River, and Sea Water Use (10,000 tons) | 37.6 | 6.3 | 6.7 | | |
| Total Water Use (10,000 tons) | 1,146.6 | 1,047.3 | 1,087.7 | | |

### Water footprint inventory

Since 2015, Taipower has continued to implement a water footprint inventory by examining the status of water usage at various power plants and improving water use efficiency. In 2016, Taichung, Mingtan and NPP3 were audited for the water footprint inventory, with the performances validated by TUV with certifications.

**Taipower's Water Footprint Inventory**

| Power Plant | Water Footprint Coefficient ($m^3/H^2O^e$) | Date of Certification |
|---|---|---|
| Taichung | 0.06736 | 2016/11/17 |
| Mingtan | 2.458 | 2016/12/05 |
| NPP3 | 0.005574 | 2016/12/09 |

## Wastewater Treatment and Control

Pursue the goal of zero wastewater discharge, Taipower promotes rainwater collection (power plants and dormitories) and wastewater reuse projects to reduce the use of tap water inside its power plants. In addition, Taipower recycles wastewater from power generation as much as possible, and tracks its wastewater recycling rate monthly. The wastewater surplus is discharged in accordance with the "Water Pollution Control Act" and its regulations through approved outlets. The quality of the effluent is monitored by a certification body commissioned for the purpose. As for radioactive liquid wastes, in addition to complying with the water pollution laws and regulations mentioned above, Taipower complies with the "Ionizing Radiation Protection Act" and its related enforcement rules and regulations. Radioactive liquid waste must first be treated through a radioactive waste processing system. Small quantities that cannot be recycled must be filtered and analyzed by random sampling to ascertain that the radiation dose of the radioactive waste is compliant with the norms before it can be discharged. Otherwise, the waste must be sent to a concentrator where it is heated and reduced into a solid state and stored in barrels.

Regarding the management of warm wastewater from nuclear power plants, Taipower has drawn up operational procedures for its nuclear power plants in accordance with the Effluent Standards. These operational procedures clearly stipulate that the discharge port must be 500 meters from the exit point of the plant, and one meter below the water surface, while the temperature difference between the effluent and the surface water must not exceed 4°C, and must never exceed 42°C. All nuclear power plants have installed temperature sensors and monitoring alerts at their wastewater outlets in the sea. Whenever the temperature of the effluent water approaches the limit values, response measures are taken in accordance with the power plant's operational procedures to reduce the temperature of the effluent.

### Xingda Power Plant provides warm wastewater to Yongan Aquaculture Production Zone

Due to climate changes in recent years, Taiwan has experienced spells of unusually low temperatures during winter. While local aquaculture proprietors have prepared for winter seasons, incidents of aqua products dying due to low water temperatures have occurred yearly, with local aquaculture proprietors suffering from losses. In light of the ample quantity of warm wastewater discharge from Xingda Power Plant, appropriate use of the discharge could be made to help local aquaculture businesses fight the cold spells and mitigate potential losses. Therefore, the Kaohsiung City Government's Marine Bureau has collaborated with Taipower to help local aquaculture businesses use the warm wastewater discharge.

Based on the water temperature data recorded at Xinda Power Plant's discharge outlets, the water discharged from the power plant typically fell between 30-34 degrees Centigrade. Compared to the water temperature at 12-14 degrees Centigrade in the area during winter, the warm discharge from Xingda Power Plant can be used to increase the water temperature. Since the warm wastewater from Xingda Power Plant falls under Type A water classification and can be used for aquaculture purposes, the discharge can be used to help local aquaculture businesses reduce their losses in winter and in turn facilitate local industrial development.

In the future, Taipower will install relevant equipment on a vacant lot near the power plant to contain the warm wastewater discharge. While such equipment offers less economic value, it still accrues benefits by improving the infrastructure of the production zone, which will in turn accelerate the long-term development of the local economy while boosting the area's capacity to adapt to climate changes. Therefore, Taipower will consider the possibility of providing more facilities in the future for long-term promotion.

## Wastewater Re-use

Due to excessive salt concentrations in wastewater from the flue gas desulfurization (FGD) process, the recycled water in 2016 was unusable and therefore not included in the total waste water quantity. The main wastewater recycling applications are boiler sealing, demineralizing water, and containing coal dust. Unrecyclable water is treated in accordance with regulatory standards before it is discharged into receiving waters, such as the ocean and rivers. All discharge into the receiving waters is approved by the local environmental protection units and complies with the applicable effluent standards. The total water recycling rate for thermal plants in 2016 came to 17.96%.

### Thermal Power Plant Wastewater Re-Use

Unit: 1000 tons

| Item | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| Re-use of rainwater | 15.29 | 16.84 | 17.68 | 18. 97 |
| Re-use of wastewater | 142.44 | 157.20 | 158.98 | 176.47 |

## 5.3.3 Non-Production Resource Management

In 2016, Taipower continued the implementation of the Executive Yuan's "Four Savings Projects for Government Agencies and Educational Institutions." The company's target is to reduce consumption of power and oil by 1% and water by 2%, respectively, each year. By stimulating all branches and power plants to save energy and reduce emissions, Taipower has been tracking the usage of energy (water, electricity and oil) monthly while implementing annual evaluations to identify units with outstanding performances.

### Taipower Offices' Non-Production Power Consumption in 2014-2016

| Item | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| Consumption (kWh) | 125,093,482 | 122,455,054 | 122,875,980 | 121,647,220 |

### Taipower's Measures for Non-Production Resource Management

| Item | Company-wide performance | Taipower's Water, Electricity, Fuel and Paper Conservation Measures for 2016 |
|---|---|---|
| Saving water | 113 MWh | · Active use of the recovery system for rainwater for watering plants and cleaning floors; additional plans will be made for the collected rainwater to be used for flushing toilets.<br>· Planned for the renovation of washrooms on all floors by installing dual-flush toilets, urinals with flush sensors and faucets equipped with water-saving nozzles and so forth. |
| Saving power | 1.4 GWh | · Kept indoor temperature between 26-28°C and installed circulating fans on the ceiling of each floor to increase occupants' comfort while reducing water-chiller load.<br>· Adopted computerized operations for elevators in the building with energy-saving modes; some elevators will not operate during off-peak periods during office hours, off-hours and holidays. In addition, a power recycling unit has also been installed on elevators at Taipower HQ to recycle power generated during elevator operations to be used by the building's power system.<br>· Relevant power-consuming equipment in the building has been incorporated into the central monitoring system for scheduled operation with power-saving modes (i.e. automatically cutting off power to water coolers during off-hours and holidays to save power from equipment in standby)<br>· Replaced the chillers for existing air-conditioning systems to new energy-saving AC models, with routine cleaning and maintenance of the air-conditioning systems in conjunction with the company's peak load reduction policy to reduce air-conditioner use, thereby saving substantial amounts of power. |
| Saving fuel | 20 kl | · For meetings in Taipei City, employees are encouraged to use public transportation to reduce the use of company cars.<br>· Reservations for company cars or vans were merged if the destinations and times were close together.<br>· Company cars were centrally deployed and regularly maintained to reduce idle time to minimum. |
| Saving paper | | · Taipower encouraged all units to switch to an online document approval system to handle official documents and correspondence of simple cases/reference purposes. |

# 5.4 Response to Climate Change

With the Paris Agreement taking effect at the end of 2015, the risks and impact of climate change to civilization have gradually become more apparent. Nations and enterprises alike have become conscious of the fact that corresponding responses ought to be made. In 2015, the “Greenhouse Gas Reduction and Management Act” was promulgated in Taiwan. The legislation covered climate change response guidelines and development principles. As the primary supplier of power in Taiwan, Taipower has also proactively taken corresponding actions to mitigate and adapt to climate changes in the hopes of helping Taiwan to reduce GHG emission while enhancing power supply resilience to ensure Taiwan’s sustainable development despite climate change.

## 5.4.1 Mitigating Climate Change

Power generation facilities operated by Taipower have been the primary sources of GHG emission in Taiwan. And as such, Taipower plays a vital role in the reduction of GHG emission in Taiwan and has taken on relevant responsibilities by promoting projects and transformation in recent years to achieve climate change mitigation through means of improving energy efficiency, promoting energy-conservation, developing renewable energy and so forth. The EPA is scheduled to promulgate Regulations for Periodic Regulatory Goals and Approaches to Greenhouse Gas Emissions in 2017 and Taipower will promote relevant mechanisms in accordance with the guidelines established by the government.

### GHG Inventory

Taipower’s main sources of GHG emissions include thermal power generation, coal yards, transportation vehicles, insulation gas used for switch gears, freezers and air-conditioning facilities. The GHG emission volumes disclosed in this report are all from Scope I emission volumes. To prevent repetitive calculation of Taipower’s GHG emission, the inventory will focus on Taipower’s Scope I emission volume only, without accounting for Scope II emissions.

### Greenhouse Gas Emission by Taipower in Past Years

Unit: Thousand tons of $CO_2e$

| Gas Type | $CO_2$ | $CH_4$ | $N_2O$ | $SF_6$ | HFC | Total |
|---|---|---|---|---|---|---|
| 2012 | 84,206 | 75 | 314 | 186 | 59 | 84,840 |
| 2013 | 81,682 | 65 | 300 | 147 | 58 | 82,252 |
| 2014 | 84,896 | 70 | 322 | 121 | 18 | 85,427 |
| 2015 | 85,361 | 175 | 293 | 118 | 20 | 85,967 |
| 2016 | 90,447 | 223 | 300 | 78 | 12 | 91,060 |

### Greenhouse Gas Emission from Thermal Power Generation

Unit: Thousand tons of $CO_2e$

| Item | 2014 | 2015 | 2016 |
|---|---|---|---|
| Oil-fired units | 5,035 | 7,915 | 7,725 |
| Gas-fired units | 22,337 | 24,523 | 25,906 |
| Coal-fired units | 57,005 | 52,938 | 56,833 |
| Total | 84,377 | 85, 376 | 90,464 |

### Management and the Reduction of $SF_6$

Most of Taipower’s generation facilities (including switchyards, substations and distribution lines) use $SF_6$ for switchgear

equipment insulation, with the quantity of equipment being large and varied. And as such, Taipower has asked its subordinate units to effectively reduce $SF_6$ escape through proper operation, maintenance and management of relevant generation equipment and achieved precise control of $SF_6$ use and emission with its $SF_6$ reporting and management information system. For $SF_6$ in lower concentrations, Taipower has also requested that responsible units recycle the gas in empty cylinders for storage and delivery to the Taiwan Power Research Institute for refining before being transferred to relevant units for reuse. This helps to increase the life span of $SF_6$ and reduce greenhouse gas emissions.

### Emission offset outcome

With the Greenhouse Gas Reduction and Management Act in effect, Taipower has offered offset registration in accordance with the Regulations Governing Greenhouse Gas Emission Offset Program Management by screening power development projects and major improvement projects with notable carbon reduction benefits as candidates for carbon emission offset application. Once registration has been approved, Taipower performs relevant validation procedures before submitting offset credits to the EPA.

As of the end of 2016, Taipower has submitted a total of 12 carbon offset applications to the EPA, 8 of which have been approved by the EPA and could receive a combined total of 3.394 million tons of offset credit within the next 7~10 years. For details on these projects, refer to Taipower's Sustainable Development website (at crs.taipower.com.tw). Since offset project plan registration and credit application approval were dependent on whether EPA convened relevant reviews, Taipower will assess and establish specific targets for offset confirmation and validation targets for the year based on EPA's review status for the previous year before submitting the targets to the chair of the carbon credit management taskforce for approval. The approved targets will then be included as review items for Taipower's green energy and low-carbon promotion reporting with periodical follow-up on the latest implementation status, so as to ensure that relevant measures have been duly implemented.

## 5.4.2 Adapting to Climate Change

Due to radical changes in global climate, the risks of extreme climate events have been steadily on the rise with the frequency and scale of natural disasters gradually increasing. Thus, preparations should be made for the potential impact of climate change in the future to mitigate damage to power facilities and minimize the impact of power shortage risks for the nation, businesses and private assets. Taipower has devised two strategies for the adaptation to climate change:

### Organization of the "Climate Change Adaptation Plan of Power Facility

Starting in 2010, Taipower began actively participating in the "Climate Change Adaptation plan of Power Facility" organized by the Bureau of Energy by completing impact analysis of climate change, vulnerability assessments and even flood simulation analysis and disaster potential mapping for Xingda, Datan, Mingtan, Jianshan, Dalin Power Plants and distribution systems.

In 2015, Taipower chose the Tongxiao Power Plant as the target for assessment while implementing flood simulation and constructing a disaster response decision-making system at Taichung Power Plant. In 2016, the Tongxiao Power Plant was once again selected for "Climate Change Adaptation Planning," Zhongliao E/S was chosen for "Climate Change Risk Assessment and Rainfall Induced Landslide Potential Simulation" and the Datan Power Plant was selected for "Extreme Weather – Flooding Simulation Analysis" in the hopes that relevant findings would be useful for future adaptation planning.

After the planning and construction of adaptation capacity, Taipower will focus on formulating the most suitable solutions for adaptation and priorities for implementation based on the analyses of financial, technological and investment benefits.

### Promotion of climate change adaptation research

Starting in 2013, Taipower launched a two-year "Taichung Power Plant Climate Change Adaptation Research project," which was completed in May 2015. The plan screened four critical climate impacts and their corresponding risk assessments for various facilities in order to create a list of high-risk facilities that require immediate improvements. Based on the possibility of occurrence, the identified high-risk facilities were categorized as either "unbearable" or "bearable." Facilities categorized as "unbearable" were included in the list of prioritized items that require immediate adaptive actions to be taken; facilities categorized as "bearable" had corresponding short, medium and long-term adaptation measures formulated based on their respective costs. After completing power plant system adaptation case studies, Taipower initiated climate change adaptation research for the Taipei Branch Office to assess the Taipei region distribution system's adaptive capacities when facing extreme weather.

After completing the power plant and transmission system adaptation case studies, Taipower initiated research for its transmission system in 2016 and scheduled research in the order of "generation, transmission, and distribution" system adaptation so as to respond pre-emptively to climate changes and improve system resilience.

# 5.5 Renewable Energy Development

In light of the development in renewable energy around the world and the increasing investments in the domain, coupled with the renewable energy policies of Taiwan, Taipower began its development of wind power generation as early as 2002 and launched its solar project Phase 1 in 2008. After the government promulgated the “Renewable Energy Development Act” in 2009, Taipower established its Department of Renewable Energy in 2011 to take charge of the entire process of planning, tendering, construction supervision and operational maintenance.

## 5.5.1 Impact of Amendments to the Electricity Act

With amendments to The Electricity Act in 2016, open access will be given to renewable energy generation and electricity retailing so customers can buy renewable power from more diverse channels. The amendments have certainly had significant impacts on the domestic development of renewable energy. Relevant concessions for renewable energy are summarized as shown in the diagram below. Taipower will begin the formulation of strategies in 2017 to maintain its competitiveness and promote the development of renewable energy in Taiwan.

**The Scope of the New Electricity Act as Related to Renewable Energy**


Presently, the MOEA is aggressively promoting the policy of establishing aa nuclear-free homeland by 2025 and has set a new target to increase the ratio of renewable energy generation to 20% by that year. As of the end of 2016, the ratio of renewable energy generation (including hydro, wind power, solar power, waste and landfill gas, biomass and, etc.) came to approximately 5.1% (an increase from 4.2% in 2015) out of Taipower’s power generation as a whole, with the ratio of installed capacity at roughly 10.3% (up from 9.8% in 2015) as Taipower gradually moves forward towards the given target.

## Renewable Energy Promotion Targets for the Government and Taipower

| | Government's Target | | | | Taipower's Target | | | |
|---|---|---|---|---|---|---|---|---|
| Time | 2020 | | 2025 | | 2025 | | 2030 | |
| Item of promotion | Capacity (MW) | Generation (GWh) | Capacity (MW) | Generation (GWh) | Capacity (MW) | Generation (GWh) | Capacity (MW) | Generation (GWh) |
| Hydro power | 2,100 | 47 | 2,150 | 48 | 1,813 | 44.5 | 1,896 | 46.5 |
| Inland wind power | 1,200 | 29 | 1,200 | 29 | 443 | 10.8 | 593 | 1487 |
| Offshore wind power | 520 | 19 | 3,000 | 111 | 710 | 23 | 1,804 | 58.5 |
| Solar power | 8,776 | 110 | 20,000 | 250 | 674 | 8.3 | 1,024 | 12.6 |
| Geothermal power | 150 | 10 | 200 | 13 | 50 | 2.6 | 100 | 5.3 |
| Fuel cell | 22.5 | 2 | 60 | 5 | - | | | |
| Biomass energy | 768 | 56 | 813 | 59 | - | | | |
| Total | 13,537 | 273 | 27,423 | 515 | 3,690 | 89.7 | 5,417 | 137.2 |

# 5.5.2 Status of Renewable Energy

## Inland Wind Power

Taipower has continued to promote Phase 5 of its Wind Project and obtained the MOEA's approval on October 6, 2016 to install 18 units of 2 MW wind turbines in locations including the Changhua Coastal Industrial Park, and the Yongxing (Changhua), Taixi (Yunlin) and Budai (Chiayi) ports with a total installed capacity of 36 MW. These units are scheduled to begin commercial operation in 2020.

## Offshore Wind Power

To effectively promote offshore wind power generation, Taipower established its Offshore Wind Power Construction Office in August 2016 to take charge of offshore wind farm construction and project inspection/supervision. Taipower's phase 1 wind power demonstration site is situated off the coast of Fangwan Township, in Changhua County, 7.2 kilometers away from the nearest shoreline. The planned total installed capacity for the project will fall between 108~110 MW and the project has already been approved by the Executive Yuan as of March 31, 2015. In 2016, all relevant documentation related to power industry operation has been prepared with the sole exception of the Coast Usage Management Plan that has yet to be reviewed and approved by the Ministry of Interior. With all construction tender documents completed in 2016, the project will be ready for contracting out once public tender viewing has been completed in 2017.

The chosen site for the phase 2 wind power project is the No.26 potential site as announced by the Bureau of Energy and is located off the coast of Lukang and Fangwan Townships, in Changhua County. Feasibility research for the project was initiated in 2016 and preliminary planning will involve the installation of single unit wind turbines of 8 MW, with a total installed capacity at approximately 900 MW. Environmental Impact Assessmnet (EIA) of the project is expected for completion and approval by the end of 2017, to be followed by reporting to the competent authority in 2018.

## Solar Power

Taipower has spared no effort in its promotion of solar power generation, with its initiation of the sequential “Brilliant Rooftop” project that involves the promotion of solar power generation in different phases. Details of the project are summarized as shown in the diagram below.

**Phase 1 2008~2016**
- Installation at the ponds in Taichung Longjin, Taichung Power Plant and Xingda Power Plant
- Completed with a total of 18 MW installed capacity

**Phase 2 2017~2020**
- Installation on the rooftops of buildings owned by Taipower: Kaohsiung Substation, Yenchao Warehouse and so forth
- Reserved site that has yet to be developed: large land surface system such as Cigu in Tainan
- The total installed capacity will reach 11 MW

**Phase 3 2017~2019**
- Utilize the reserved site for Changhua Thermal Power Plant Project that has been put on hold
- The installed capacity is expected to reach 100 MW

**Phase 4 2018~2020**
- Collaborate with Taiwan Water Corporation for the installation of water surface solar power facility
- The installed capacity is expected to reach 11 MW

**Phase 5**
- Develop 300 MW of installed capacity in the salt fields of Jiangjyun District in Tainan

**Phase 6**
- Continue to utilize lands, unused sites for substations, decommissioned nuclear power plants and so forth

■ Relevant planning for collaboration with the Taiwan Water Corporation for solar power generation: Solar Power Project Phase 4 (2018~2020).
- ▶ The Taiwan Water Corporation will provide the rooftops of idle buildings on its premises or vacant lots, water bodies in reservoirs and so forth for Taipower to conduct preliminary studies to analyze the feasibility of constructing solar power systems. If suitable sites are found, both parties will negotiate the terms for land lease.
- ▶ Taipower will lease 8 water bodies in reservoirs from the Taiwan Water Corporation for the construction of solar power systems and be responsible for their routine operation and maintenance.

■ Taipower and the Changhua County Government signed a letter of intent in December 2016 and jointly declared plans to construct a series of green energy buildings in Changhua County to accelerate the development of the local green energy industry. Presently planned in Changhua County are Taipower’s Solar Power Project Phase 3, Wind Power Project Phase 5, and Offshore Wind Power Phase 1 with other projects scheduled for development in the future.

## Geothermal Power

Pursuant to the “Directions Governing the Application for Geothermal Power Generation Experimental Project Application” promulgated by the MOEA in 2015, Taipower submitted its application for the “Ludao Geothermal Unit Experimental Project.” The project was approved and scheduled for completion in 2019. Taipower has signed a cooperation agreement with the Industrial Technology Research Institute (ITRI) for the project whereby Taipower will be responsible for the drilling of the well and production capacity testing while ITRI will provide the Rankine Cycle Low-Temperature Unit that it independently developed to complete the experimental project. In 2016, geological and geophysical investigations into the designated site for the project were completed and Taipower will complete the drilling for at least one experimental well in 2017.

### Renewable Energy Development in the end of 2016

| Status of renewable energy development | Deployments | Installed capacity (MW) | Generation in 2016 (GWh) | No. of households accommodated |
|---|---|---|---|---|
| Wind Power | 16 power plants with 169 units | 294 | 646 | 179,000 |
| IPP Wind Power | - | - | 801 | 223,000 |
| Solar Power | 16 power plants | 18 | 23 | 6,400 |
| IPP Solar Power | - | - | 1,045 | 290,000 |

Note: Calculation is based on the average monthly power consumption for a typical residential customer at 300 kWh per month and 3600 kWh per year.

### Carbon Reductions Achieved Through Renewable Energy Generation in 2016

| Type of Renewable Energy | | Generation (GWh) | Carbon Reduction (Thousand tons) | Reforestation (Thousand hectares) |
|---|---|---|---|---|
| Taipower | Wind | 646 | 341 | 34 |
| | Solar | 23 | 12 | 1.2 |
| IPP | Wind | 801 | 423 | 43 |
| | Solar | 1,045 | 552 | 56 |
| Total | | 2,515 | 1,328 | 134.2 |

Note: Carbon reduction by reforestation is calculated based on a study commissioned by the Forestry Bureau. According to this study, as of 2010, each hectare of forest absorbs 9.9 metric tons of carbon dioxide per year. Carbon reduction is derived from the amount of renewable energy generation X electricity emission factor. Electricity emission factor is calculated based on 0.528kg CO2/kWh published by the Bureau of Energy in 2015.

## 5.5.3 Green Power Purchase

In conjunction with the “Pilot Program for Voluntary Purchase of Green Power” implemented by the MOEA in 2014, and to facilitate further promotion in 2017 by changing the pilot program into an administrative project for continued implementation, Taipower launched a number of relevant services including the processing of applications for green power subscription, issuing of green power purchase certificates and so forth. These measures are intended to boost the general public’s environmental protection awareness and enhance their understanding of renewable energy. In order to promote green power purchases, different units at Taipower have established specific green power promotion targets and encouraged major local corporations/organizations as well as collaborated with up and downstream suppliers and various entities to purchase green power. Through different media campaigns and events featuring celebrities and renowned organizations, Taipower has sought to promote green power adoption with concrete actions to support the cause of energy-conservation and carbon reduction.

For 2016, Taipower’s target was to increase the number of green power subscription customers to 4,000 but the company managed to convince 7,111 customers to become subscribers, contributing a total of 270,280,400 kWh of green power, with actual amount purchased amounting to 265,179,247 kWh. The pre-tax revenue from green power purchases totaled NT$ 267,671,848.

## 5.5.4 Future Renewable Energy Development Plan

“Energy transition and Green energy priority” is the policy that the government has been aggressively promoting. As such, Taipower will adhere to the policy by actively involving itself in relevant development while creating an environment for the integration of eco-friendly green energy into the grid so as to achieve the government’s vision for a nuclear-free homeland and carbon reduction as Taipower propels the development of a domestic green power industry.

Taipower is planning to invest NT$ 400 billion over the next 15 years to achieve the objectives of generating 1,800 MW of offshore wind power, 1,000 MW of solar power, 600 MW of inland wind power and 100 MW of geothermal power by 2030. If all relevant projects are completed as scheduled, Taipower will increase its green power generation by 8.4TWh compared to 2016 and by 2025, Taipower’s annual contribution of green power will reach 8.97 TWh, which is equivalent to 17.42% of the national generation capacity (for Taipower and IPPs combined) at 51.5 TWh with a carbon emission reduction of roughly 4,736,000 metric tons. This would be a substantial advance towards the sustainable development objectives of a friendly environment and low-carbon power.

**Active Development**

- Emphasize the development of facilities involving higher technological levels
- Introduce generation of deep geothermal energy and marine energy
- Increase green power installed capacity to 1.8 GW by 2025 and 3.5 GW by 2030 (both excluding hydro power)

**Friendly Grid Integration**

- Plan for renewable energy distribution lines for the next decade
- Improve the grid for solar power and expand the integrated grid capacity
- In conjunction with the development of offshore wind power in Changhua County, a portion of the lines were replaced with high capacity lines
- Simulate the demand that can be fulfilled by the newly constructed Changhua Booster Station, Changhua No.1 and Yongxing Switch for offshore wind power

## 5.6 Environmental Footprints

### 5.6.1 Environmental Footprints of Taipower Operation

**Power Purchased 51,740 GWh**

Thermal power generation 46,430 GWh
Renewable energy generation 5,410 GWh

**Total power transmitted to customers 212,530 GWh**

**Power Generated 174,043 GWh**

Nuclear power plants 30,461 GWh
Thermal power plants 134,113 GWh
Pumped storage hydro power plants 3,281 GWh
Renewable energy power plants 6,190 GWh

**INPUT**

Energy consumed for generation

Coal 26.16 million tons
Natural gas 12,609 million $M^3$
Heavy oil 2430 thousand KI
Light oil 130 thousand KI
Uranium fuel ($U_3O_8$) 2,033 thousand pounds

Water Use
Water consumed by thermal power plants 10.878 million tons

Company-wide office energyusage

Power consumption 112.8 GWh
Oil consumption 1,192 KI
Water use 1,279 thousand KI

**OUTPUT**

Gas emissions

$CO_2e$: 91,063 thousand tons
$SO_x$: 41,038.6 metric tons
$NO_x$: 41,306.8 metric tons
PM: 2,950.2metric tons

Waste cables: 4,950 Metric tons

By-products from power generation:

Coal ash 2,217 thousand tons
Gypsum 519 thousand tons
Low-level radioactive waste 175 barrels
Used nuclear fuel 51.83 metric tons (210 rods)

## 5.6.2 Environmental Accounting

In August 2003, Taipower established its environmental accounting system (EAS) and developed an EAS information platform to be integrated with Taipower's existing accounting operations and information system. This allowed all units to complete their expense reimbursement and collect materials in a timely manner. The system will effectively transform environment-related activities (including environmental protection, occupational safety and health) into financial or accounting information. As of the end of 2007, the system was in use in all Taipower units. All environmental expenditures from 2014-2016 are listed below:

### Environmental Expenditure 2014-2016

Unit: TWD billion

| | Environmental Protection | Occupational Safety | Health | Total |
|---|---|---|---|---|
| 2014 | 142 | 48.0 | 12.3 | 202.3 |
| 2015 | 183 | 56.6 | 13.1 | 252.7 |
| 2016 | 180 | 50.4 | 13.2 | 243.6 |

As a state-owned enterprise, Taipower is bound to specific corporate social responsibilities and policy burdens. In the future, the development of Taipower's green accounting system will continue to promote the write-off of environmental accounting expenses and personnel training on environmental accounting. Additionally, Taipower will identify potential environmental issues that the company may face in the future and gradually increase the depth and width of its environmental accounting system. With relevant information and data from green accounting, Taipower will be able to engage in positive communication with the public and help the public better appreciate the efforts that Taipower has made towards environmental protection.

# Practitioner of Corporate Social Responsibility

# CH6

## Role and Contribution

Taipower aspires to fulfill its corporate social responsibilities in various ways. Through legal compliance and management best practices , Taipower offers comprehensive employee benefits to cultivatetalent. It also continues to strengthen its supplier management in the hopes of incorporating more participants to accomplish corporate socially responsible performance. The issue of nuclear power has been a crucial topic that Taipower has sought to communicate about with its stakeholders over the years, and the company has established relevant guidelines on nuclear power safety and nuclear wastes to communicate with the public. Given the government's vision of achieving "nuclear-free homeland" by 2025, Taipower shall shoulder the responsibility of being the front runner in the promotion of relevant policies.

## Performance highlights for this chapter

- Ranked no.1 in corporate governance among state-owned enterprises in 2016
- Continual improvement of Taipower's internal management and control system with three lines of defense
- A total of 61,459 Taipower trainees took part in relevant training
- Saved approximately NT$ 8.9 billion on fuel management
- Saved approximately NT$ 1.2 billion on construction material procurement, surpassing the annual target by 267%.
- The six generators at Nuclear Power Plants No.1, No.2 and No.3 generated a total of 30.461 TWh of power

| SDGs | Correlation to Taipower | Corresponding Chapters/Issues |
|---|---|---|
| 8 DECENT WORK AND ECONOMIC GROWTH | Achieve fully productive employment so that all employees, even the younger employees and those who are physically and mentally challenged-may be entitled to similar positions and wages. In addition to offering decent job opportunities, Taipower will facilitate improved safety in the work environment so as to safeguard labor rights | · Achieve full compliance with the “People with Disabilities Rights Protection Act “ and “Indigenous Peoples Employment Rights Protection Act”<br>· Improve the working environment |
| 16 PEACE, JUSTICE AND STRONG INSTITUTIONS | Emphasize corporate governance, integrity management and information disclosure and ensure that various communication channels operate smoothly | · Integrity management<br>· Anti-corruption guidelines<br>· Internal inspection system |

## Solutions planned for the future

- Continue to promote relevant management measures on material conservation and establish specific targets
- Plan for the classification of suppliers for “distribution transformer” procurement
- Ensure adequate planning for the handling of nuclear wastes and decommissioning operations and seek breakthroughs in nuclear back-end operations
- Improve upon Taipower’s nuclear power safety culture and ensure safe and stable unit operations to boost operational performance
- Reduce outsourced human resources and prioritize utilization of Taipower’s own manpower in light of nuclear power plant decommissioning
- Continue to promote five-year operation plans for nuclear power
- Improve upon existing mechanisms for experience feedback and inspection to reduce operational errors by employees

## Sustainable Trends and Challenges

Communication with stakeholders has always been perceived as an important task by Taipower. The company has taken upon itself the responsibility of becoming the benchmark in corporate social responsibility among domestic corporations through integrity management. Taipower is well aware of the profound influence it has on society and continues to improve whilst satisfying the public’s expectations and promoting government policies. As we celebrate our 70th anniversary, Taipower shall transform and take on a brand-new identity to actively engage in interaction and communication with the public. Through platforms of multimedia and the internet, Taipower shall close the gap between itself and the public and proactively disclose pertinent information. In response to the government’s vision of achieving a nuclear-free homeland by 2025, Taipower will not only improve upon power plant decommissioning planning to ensure reliable power supply and nuclear power safety but also disclose information to prevent the public from doubts about nuclear safety.

# 6.1 Integrity Management and Legal Compliance

## 6.1.1 Integrity Management

To accomplish the goal of “authentic leadership and autonomous management” outlined in Taipower’s integrity management philosophy, Taipower promotes ethics codes and optimizes its internal control mechanisms while ensuring legal compliance and fulfilling its corporate social responsibilities.

### Ethical Code

| Personnel | Procurement personnel | Management |
|---|---|---|
| All Taipower employees shall abide by laws and regulationssuch as the Ethics Code for Personnel under the Ministry of Economic Affairs and Directions on Lobby Registration and Checks for Executive Yuan and its Subordinate Agencies.” Any employee who requires clarification on any ethics issue or has legal compliance related questions regarding a particular case may consult specialists from Taipower’s integrity unit, with full protection of their rights and interests. | Taipower’s procurement personnel shall abide by the company’s Ethical Guidelines for Procurement Personnel, and the Points of Attention for Interaction between Procurement Personnel and other Businesses.” Taipower offers frequent training to its procurement personnel to help them perform their duties in compliance with pertinent laws, with a clear conscience and in a manner that is fair and honest without giving, asking, or expecting any favors. Taipower has also established its Anti-Corruption Office 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. | In order to ensure clearly defined rules governing the administrative liability of personnel involved in fraud/bribery, managing supervisors of said employees shall also be held accountable so as to facilitate the development of Taipower’s integrity management. |

### Internal Risk Control

The goal of internal control and inspection is to assist Taipower’s BOD and management to inspect and review theinternal control deficiencies and gauge the company’s operational efficacy. By offering timely suggestions of improvement, Taipower will be able to ensure effective operation for its internal control system by providing the bases for rectifying issues with its internal control system. In 2016, Taipower made tour of inspections at 66 units and conducted information security audits of 15 units and 31 project inspections.

#### Improve the quality of internal control self-evaluation implemented by units

Since 2015,Taipower has conducted quarterly and yearly self-evaluations in all units.

#### Establish internal control system platforms for all units

To enhance the efficiency of the quarterly self-evaluation by all units, the process shall be implemented online through the platform for the supervisory units/responsible personnel to verify the access tothe platform.

#### Revise the job descriptions of unit supervisors and responsible personnel

Duties and responsibilities shall be included in the job descriptions for unit supervisors and responsible personnel to enhance the design, implementation and control of the internal control system.

#### Tour of Inspection

Taipower’s internal control and inspection operations were adjustedin 2016. The Internal Inspection Office (under the BOD) now takes factors such as risk characteristics, items of concern to the management and nature of business operations of the unit to be audited into consideration before determining the audit items prior to the inspection visit. In addition,key inspections focus on value creation, cost reduction, fulfillment of corporate social responsibilities, improving customer service, promotion of corporate reform and so forth.

#### Implement cross-system joint-inspection

Along with thetours of inspection, Taipower conducted workshops with units to assist them in identifying issues of cross-system

implementation and resource integration.

### Implement an internal control system promotion seminar

Taipower organized a 3-day training session for all personnel responsible for internal control and invited experts to host the training so as to improve the trainees' knowledge and implementation of internal controls, thereby helping them to become more competent in the task.

### The internal audit unit to took the initiative to request that all units strengthen their internal control operations

In addition to implementing routine inspections, the internal audit unit is also responsible for paying close attention to the company's internal control operations and has taken the initiative to request all units to strengthen their internal controls.

## A Benchmark of Internal Control for State-Owned Enterprise – System Innovation

In 2016, Taipower received the prestigious recognition as No.1 in corporate governance amongst all of the state-owned businesses in Taiwan. The recognition acknowledged Taipower's efforts in the improvement of its internal control system with a score of 99 points. Under the instruction of independent director Ma Kai, the Internal Inspection Office continued to improve upon its internal audit operations in 2016.

### Paving the way for innovation and planning－Design of the Internal Control System

In regards to the design of the internal control system, as requested by the independent director, Taipower established its "Directions on Tiered Inspection" along with the "Internal Control Self-Evaluation and Inspection Report Analysis Search Platform" and "Directors' Occupational Safety Inspection Platform" With the establishment of divisional enterprises, new audit and inspection operations have been planned for the divisions with relevant internal control SOPs thoroughly reviewed and edited to accommodate Taipower's new organizational structure. With regards to audits and inspections for the Taiwan Power Research Institute, the approval authority for follow-ups on various inspection/audit report improvements has also been elevated to the President.

### In-depth study and full implementation– Three lines of defense for internal control


To ensure effective promotion of internal control performance for all units, Taipower has been promoting self-evaluation for all internal units in a top-down manner along with the 2016 Selection of a Unit with Outstanding Internal Control Performance to give suitable awards and incentives to the best performing unit and the three units that have achieved the most improvement.

Taipower has expanded the scale of its "Internal Control System Promotion Seminar" and updated three courses on internal controls on its online academy. In addition to the existing courses, Taipower also included contents on internal training in the 2016 Orientation Camp to help new employees foster concepts and understanding the subject matter. Taipower actively works with other the internal inspection offices of public and private organizations such as the Taiwan Sugar Company, CPC, CSC, and Test Rite Group to learn from others and encourage self-reflection. For 2017, Taipower will continue to host its "Internal Control Practices Workshop" to fortify the company's three lines of defense for internal control.

## Corruption Regulation Dissemination & Training

### Strengthen procurement risk management to prevent fraud and embezzlement

Five “Procurement Risk and Anti-Corruption Seminars” were held at the Taipei Power Supply Branch, the Hsintao Power Supply Branch, the Taichung Power Supply Branch, the Gaoping Power Supply Branch and the Chianan Power Supply Branch. Through bilateral communication, procurement units will have a better awareness of potential fraud and abide by pertinentregulations on anti-corruption so as to establish appropriate ethics and practices for procurement.

### Organization of the “Low Value Fee Reimbursement and Application for Government Servants” disciplinary and legal compliance training

To help Taipower employees foster correct ideas about small fee reimbursements, such as overtime payd and travel expenses, Taipower held training sessions at the Taitung and Penghu Branch Offices. In addition, other civil service ethics units have also made use of opportunities at various gatherings and assemblies to promote the dissemination of relevant regulations on “Low Value Fee Reimbursement and Application for Employees.” A total of 29 trainings were heldwith 1,516 participants.

### Organization of the “AE Personnel Project Legal Compliance Advocacy” Lecture

To help AE personnel gain better understanding of the risks of corruption and foster the right attitudes for handling relevant affairs with honesty, lectures featuring custom-tailored contents were held at the Department of Construction, Central Taiwan Construction Office, Northern Taiwan Construction Office, Department of Renewable Energy, Southern Taiwan Construction Office, Department of Nuclear and Fossil Power Projects and Longmen Power Plant to emphasize the importance of project related legal compliance. A total of 174 employees attended the lectures.

### Case studies

In 2016, a total of 23 presentations on civil service ethic laws were held by various units at Taipower, with judges invited to address a total of 2,127 participants. With bidders that took part in Taipower’s tenders last year as the targets, Taipower commissioned an external party to carry out a civil service ethics questionnaire for suppliers on the status of Taipower’s civil service ethics. The results showed that 99.75% of Taipower’s employees were clean of corruption, thereby aptly reflecting Taipower’s performance in anti-corruption.

## Complaint Mechanism for Unethical or Illegal Conduct

In the event of a breach of ethics or illegal conduct, employees must immediately notify their supervisors. The public and business partners may also use our ethics hotline, email, or contact the ethics officer of the department concerned, to report the case and provide relevant information. Our ethics reporting channels are as follows:

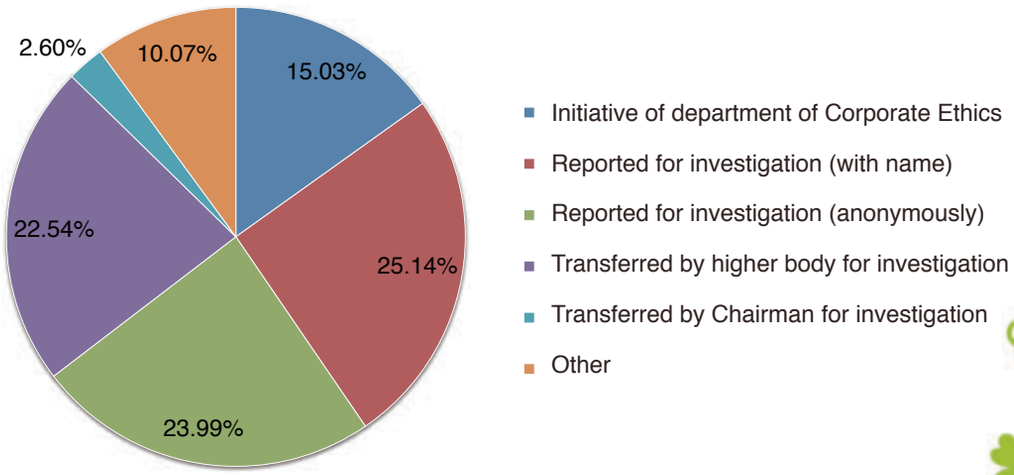
| | |
|---|---|
| **Telephone** | **(02) 2366-7364** |
| **Fax** | **(02) 2368-1674** |
| **Email** | **d0570302@taipower.com.tw** |

In addition, regarding unethical or illegal conduct related to procurement, Taipower has established internal and external reporting mechanisms. The company’s tender documents also feature a notice stating, “The tenderer may report any unlawful situation in our company’s tender process to the Investigation Bureau of the Ministry of Justice, MOEA’s procurement Audit Unit, PCC’s Central Procurement Audit Unit and the Agency against Corruption, the Investigation Department (Team, Desk) of the location of the tender-issuing unit of Taipower is the point of entry of such a report” to inform the reporter regarding the organizations to approach.

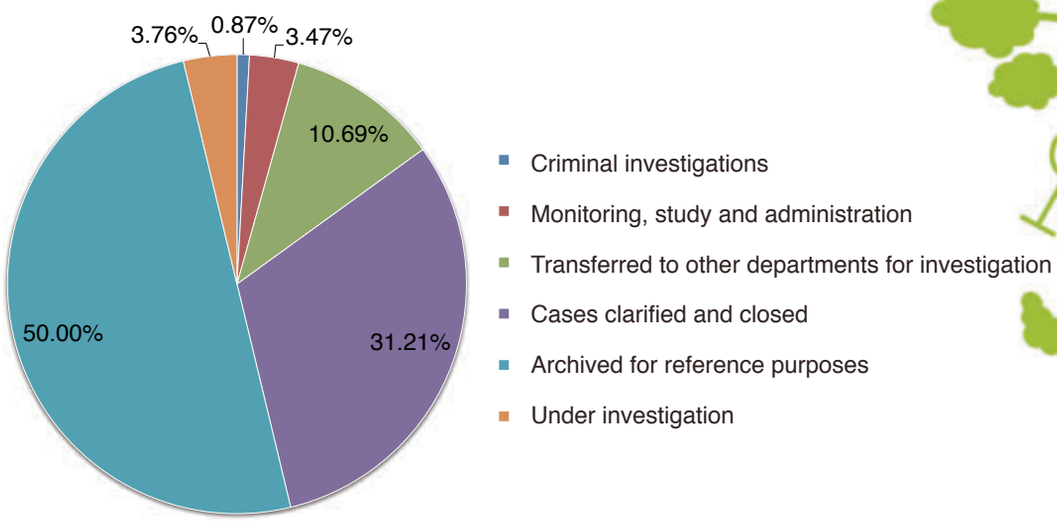
## Cases Investigated in 2016

A total of 346 ethics related cases were closed in 2016. The figure below shows the breakdown of the sources of the cases and reflects the fact that anonymous reports still contributed a significant percentage of the cases filed at 23.99%. The nature of such reports often lacked a means of verification and thus affected the results of investigations. Such reports may have stemmed from external competing interests or misunderstandings from inadequate communication by responsible units, thereby driving some individuals to use Taipower’s reporting channels as a way of venting their dissatisfaction.

## Sources of Corporate Ethics Cases in 2016




## Handling of Corporate Ethics Cases in 2016




Two Taipower employees were charged in 2016 for violations of pertinent regulations:

1. A storekeeper at the power plants failed to provide the correct quotations as required by the SOP and was indicted by the New Taipei District Prosecutors Office for misuse of public power.
2. An inspection personnel from one of Taipower's construction offices allegedly demanded bribery from the contractor for an electric steel tower project and was indicted by the Nantou District Prosecutors Office.

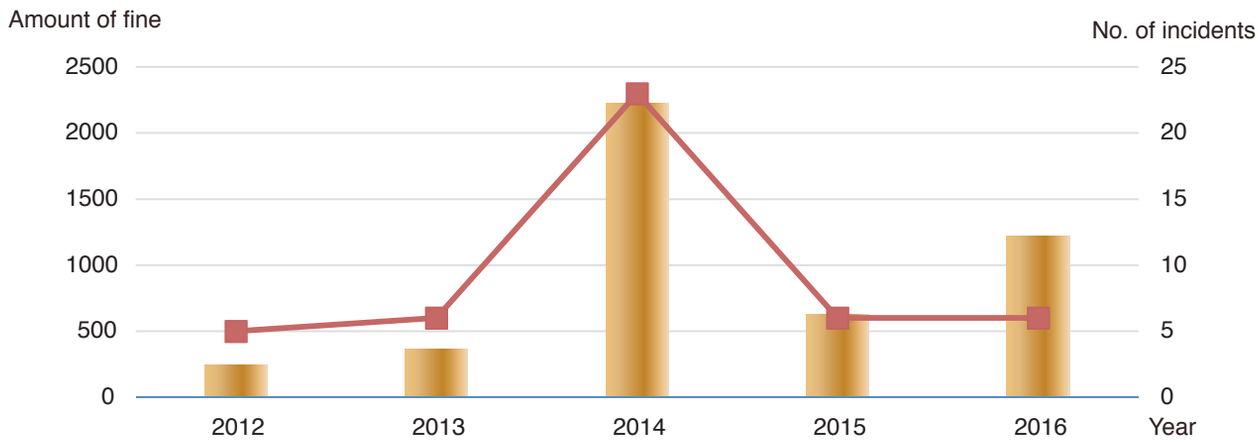
In 2016, the final verdict was given for one case of bribery that took place in 2014. A procurement personnel accepted a bribe from a contractor and was promptly dismissed by the company when the bribery was discovered. For his acceptance of the bribe and intentional concealment of the monetary gain from the criminal behavior, the personnel was sentenced to 9 years and 6 months of imprisonment and stripped of his civil rights for 3 years. The final verdict was given in October 2016 and Taipower dismissed the personnel in accordance with regulations. Taipower has strengthened anti-corruption dissemination and implemented specific prevention measures.

# 6.1.2 Legal Compliance

## Penalization for Environmental Incidents

Taipower takes its impact on the environment seriously and has specific controls for the number and value of fines paid as penalization for pollution and environmental incidents.. In 2016, Taipower's target for penalized environmental incidents was set to below 15 incidents with a total fine of no more than NT$ 2.46 million. Taipower had 6 penalized environmental incidents in 2016, with fines totaling NT$ 1.22 million, thereby meeting its annual target.

## Number of Incidents Violating Environmental Protection Laws and Regulations in the Last Five Years




| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Fine (in NT$ 1,000) | 246 | 368 | 2230 | 630 | 1220 |
| No. of penalized incidents | 5 | 6 | 23 | 6 | 6 |

To ensure that Taipower fulfills its mission of promoting environmental friendly development, the company has conducted thorough reviews of the incidents of environmental law violation and proposed the following measures:

### A system for supervision and control

- Increase unannounced inspections and supervision of environmental protection procedures.
- Conduct thorough reviews of EIA conclusions and the pledges that have been approved. Request that all responsible units carry out relevant tasks in accordance with said conclusions and pledges.
- Strengthen inspection, guidance, management and control related to environmental protection.

### Education and training

- Offer more training sessions on compliance with environmental regulations and investigations.
- Arrange for environmental protection related personnel to participate in training provided by EPA representatives.
- Each unit shall foster and strengthen its interaction with the competent environmental protection authorities and auditors while participating in relevant training sessions provided by the competent authorities to enhance employees' knowledge of environmental related laws and regulations.

### Supplier Management

- In contractor selection, bidders' environmental protection capacities and organization shall be taken into consideration.
- As a precautionary measure, the penalties (fines) prescribed in the Guidelines on Fines for Breaching the Contract Violation of Environmental Protection Regulations shall be increased for Taipower's suppliers.

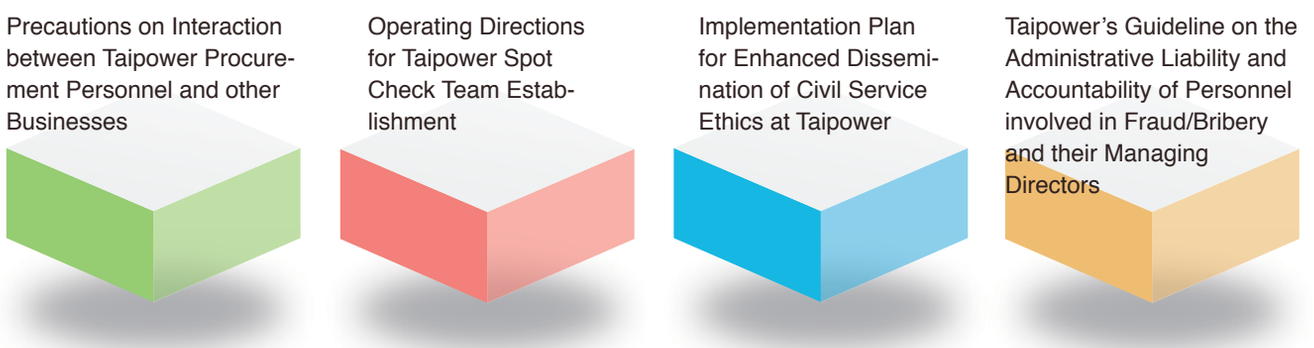
### Other responses and measures

- Ensure synergy and coordination between Taipower's environmental management system and actual operations while strengthening the company's environmental protection regulation compliance audits.
- In the absence of environmental protection related departments in various management divisions, consideration shall be made for the establishment of a designated department or position.
- Pursue quotations on environmental protection facilities and ensure due implementation.
- Implement environmental protection law reviews and projects for the analysis of penalized environmental incidents.
- Encourage employees at various facilities to participate in EPA legal dissemination seminars.
- Parallel development of penalized environmental incidents for the year.
- Promptly carry out air pollution improvement in existing units.
- Shorten the timeline for the rectification of environment-related problems at construction sites.

## Anti-Corruption Measures

Integrity management and legal compliance are the fundamental that the company operates by. In accordance with specific policies and measures from the “National Integrity Building Action Plan” promulgated by the Executive Yuan, Taipower has adhered to the “MOEA’s Implementation Plan for the National Integrity Building Action Plan” by implementing, planning and promoting various civil service ethics. Taipower shall continue to shoulder its responsibilities of promoting integrity management and improve upon its risk control while promoting transparency and openness to prevent conflicts of interests. Additionally, Taipower will continue to stay abreast of public sentiments and the latest international trends to set an example for other public enterprises, thereby encouraging the public to take part in building consensus for transparency and zero-tolerance for corruption.

### Taipower’s Anti-Corruption Regulations




Taipower referred to the Ethics Code for Personnel under the Ministry of Economic Affairs in its establishment of “Precautions on Interaction between Taipower Procurement Personnel and other Businesses” to serve as a concrete and clearly defined guideline that governs the nature of interaction between Taipower’s procurement personnel and suppliers with potential conflicts of interest while helping procurement personnel to maintain their professional and ethical images. Taipower shall continue to improve its training on civil service ethics and disseminations of conflict of interest aversion practices for employees in accordance with the “Implementation Plans on Enhancing Civil Service Ethics Dissemination at Current Stage.” In addition, the Department of Civil Service Ethics compiled “Stories of Civil Service Ethics” in 2016 and distributed the publication to all Taipower units in the hopes of inspiring employees to abide by ethical standards .

## Product Responsibility

Taipower's main product is electricity. Electricity prices follow relevant government laws, regulations, and policy directives. Additionally, Taipower handles customer information and electricity payments in arrears and the suspension of electricity supplies in accordance with the Personal Data Protection Act and the Electricity Act. Staff are instructed and supervised to follow these laws and regulations to prevent branch employees from unintentionally leaking private customer information, Taipower has clearly laid out corresponding methods of verifying applicants identities and checking their identifications for all inquiries pertaining customers’ personal information. This includes personal inquiries by customers, inquiries made by representatives on the behalf of customers, personal visits, telephone (or fax) contacts, and online inquiries (or printouts). In 2016, Taipower had no violations relating to the provision of products or services.

# 6.2 Building a Sound Working Environment

## 6.2.1 Human Resource Management

With the establishment of four business divisions in 2016, Taipower has identified the “Improvement of Human Resources” as its overall target in 2016. In addition, Taipower has also promoted its “Planning and Promotion of Divisional Development-Oriented Human Resources Strategies and Action Plans” for the policy of selection, appointment, nurturing and retention. The targets for specific phases (as shown in the table below) were achieved in 2016.

| Overall Target | Target at Different Phase | Date of Completion |
|---|---|---|
| Improve human resource – planning and promotion of divisional development-oriented human resource strategies and action plans | Formulation of divisional development-oriented human resource strategies and action plans by the HQ. | 2016.1.13 |
| | Formulation of concrete implementation plans, including data collection, statistical analysis and other details such as system innovation, and regulation revision by the headquarters. All details were reported and discussed at Human Resource Development Taskforce Meetings, with corrections made to strategies, action plans and implementation plans in accordance with meeting resolution. | 2016.8.12 |
| | Review and report on the implementation outcomes of human resource strategies and action plans for 2016. | 2016.12.13 |

## Human Resource Policy

In conjunction with the company's development, Taipower will improve upon the selection, appointment, nurturing and retention of human resources while strengthening generational leadership and communication to create organizational value and boost employee productivity.

### Four Aspects and Principles of Human Resource Policy

**Selection**

- Balanced and rational human resource planning and systematic appointment
- Diverse personnel recruitment to satisfy human resource demands; increase the channels of talent recruitment

**Appointment**

- Improve upon rationalization of human resource deployment, development and utilization
- Effective distribution and management of the personnel appointment budget
- Improve upon existing personnel management system to make human resource utilization more flexible and effective
- Implement job rotation and performance evaluation
- Make effective use of statistical analysis so that it can serve as a reference for supervisors in their decision-making process
- Enhance the performance of division human resource departments

**Nurturing**

- Fortify the heritage of essential techniques at each division and promote core operations
- Develop innovative talent nurturing model and improve organizational learning performance
- Promote supervisor succession plans at the company level (including all divisions) and build a talent bank
- Utilize online resources to promote lifelong learning

**Retention**

- Promote harmony in the divisions and enable employees to enjoy their work
- With the implementation of divisional structure, Taipower shall strengthen its existing channels of communication to shape the culture of sharing
- Keep the wage system fair and balanced while amplifying the the effectiveness of relevant bonuses to facilitate the deployment of the divisions
- After the implementation of the division system, Taipower will offer benefits that are more aligned to employees' needs
- Promote recreational activities; strike a balance between work and recreation to make Taipower a happy company and improve employee satisfaction
- Improve care and aid for retired employees

Taipower formulated corresponding action plans for each strategic goal. A total of 48 action plans (22 highlights) have been drafted, along with specific details on the implementation method, research direction, targets and schedules for each action plan mapped out with specific deadlines for the planned solutions. Important items would be gradually introduced to the rolling review by the "Human Resource Development Taskforce" or key meetings such as the assembly or management meetings to resolve issues pertaining to human resource development while improving the company's human resources. For more information about employee development and benefits at Taipower, please go to Taipower's Sustainable Development website and refer to the sections on "Human Resource Structure" and "Employee Rights and Benefits."

### Employee Performance Evaluations

All employees who have been officially appointed (hired) by Taipower and meet specific requirements (excluding expert head engineer, VPs and personnel of higher ranking) shall be 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 aspects: "professional competence," "work performance," "team spirit," "work attitude," "conduct," "capacity for management," and "leadership talents" and award corresponding grades to each employee being evaluated within the given deadline so that Taipower may award performance bonuses according to the result of performance evaluations.

### Talent Development in 2016

In 2016, Taipower made concrete action plans for specific HR-related issues such as improving its human resource statistical analysis, utilizing big data, planning and establishing the company's "Outstanding Technical Master Award," building the W3 internal communication webpage, improving the performance of its deployment platform, reinforcing the relationship between Taipower and its employees, reviewing new human resource allocation and utilization, and identifying the highlights of competence competition demonstrations. Not only that, in conjunction with the company's transformation to a divisional structure, Taipower has invited planners from each division to incorporate ideas of corporate management to further refine its HR system through rolling correction. The 4th update of Taipower's W3 intranet was completed on May 30 2016 with the new feature of "advanced search" along with the construction of the "HR Affairs and Employee Rights Resource Map" page to help Taipower employees better understand the company's HR management and improve the serviceability of Taipower's HR operations.

## 6.2.2 Human Resource Structure

### Employee Categories

All Taipower employees are full-time. There are no fixed-contract or open-contract personnel, nor foreign nationals.

| Year | | 2014 | | 2015 | | 2016 | |
|---|---|---|---|---|---|---|---|
| Total employees | | 26,533 | | 26,659 | | 26,673 | |
| Local employees | Male | 23,414 | 88.2% | 23,387 | 87.7% | 23,280 | 87.3% |
| | Female | 3,119 | 11.8% | 3,272 | 12.3% | 3,393 | 12.7% |
| Direct personnel | Male | 21,898 | 82.5% | 21,909 | 82.2% | 21,680 | 81.3% |
| | Female | 1,642 | 6.2% | 1,771 | 6.7% | 1,807 | 6.8% |
| Indirect personnel | Male | 1,516 | 5.7% | 1,478 | 5.5% | 1,598 | 6.0% |
| | Female | 1,477 | 5.6% | 1,501 | 5.6% | 1,586 | 5.9% |

Note: As distinguished by work nature, "technical" and "operations" in work nature are classified as direct manpower, and "management" in work nature is classified as indirect manpower.

## Sub-contractors

For sub-contractors, Taipower's outsourced human resources are separated into "manual dispatched labor" and "manual and service contract labor" based on the nature of the tasks performed. In 2016, the numbers of Taipower's sub-contracted personnel was as follows:

| Type of employment | No. |
|---|---|
| Manual dispatchedlabor | 213 |
| Manual and service contract labor | 1,037 |

Note:
1. Manual dispatchedlabor refers to manual labors performed by outsourced personnel dispatched at Taipower and aid therefore subject to the supervision of relevant units. It is used to fulfill business needs through hiring engineers with technical expertise and managers 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. Among the outsourced manual and service contract labor personnel, approximately 31% were male and the remaining 69% were female.
3. The statistics above do not include work load.

## Average Age, Seniority and Level of Education Distribution

| Year | 2014 | | 2015 | | 2016 | |
|---|---|---|---|---|---|---|
| Average Age | 49.39 | | 48.8 | | 48.07 | |
| Average Seniority | 25.28 | | 24.34 | | 23.26 | |
| Level of Education | No. of employee | Ratio | No. of employee | Ratio | No. of employee | Ratio |
| Graduate School | 4,257 | 16.04% | 4,700 | 17.63% | 5,048 | 18.92% |
| University | 8,191 | 30.87% | 8,660 | 32.48% | 9,228 | 34.6% |
| Vocational High School | 7,033 | 26.51% | 6,648 | 24.94% | 6,180 | 23.17% |
| Senior High School | 6,420 | 24.2% | 6,113 | 22.93% | 5,779 | 21.67% |
| Junior High School | 503 | 1.89% | 443 | 1.66% | 365 | 1.37% |
| Elementary School | 129 | 0.49% | 95 | 0.36% | 73 | 0.27% |

# Ensuring Employment Equality in Pursuit of Sustainable Management

## Gender Equity

The recruitment of all personnel at Taipower isgoverned by a clearly–defined and consistent system of administration and employees are never be subjected to different standards of evaluation because of gender differences. Not only that, Taipower also offers relevant equipment and takes relevant measures in accordance with pertinent regulations such as the Act of Gender Equality in Employment. The company also reports periodically to competent authorities to submit the latest employee gender distribution and statistics while offering information on events or disseminate policies to employees.

## Equality for the Disadvantaged Minorities

Taipower actively protects the rights of disadvantaged minorities to equal employment opportunities Accordingly with regards to the hiring and recruiting of employees with physical and mental challenges and indigenous people in accordance with "People with Disabilities Rights Protection Act" and "Indigenous Peoples Employment Rights Protection Act" to ensure proactive employment.

In 2016, Taipower was asked to recruita total of 764 personnel withphysical and mental challenges butactually recruited 852 people or 11% beyond the requirement. In addition, Taipower was required by law to recruit 4 employees of aborigine ethnicity in 2016 but actually recruited 5, with an excess recruiting percentage of 25%. The company takes the employment of aboriginals and personnel with physical and mental challenges-seriously, and accordingly, provides such applicants with a boost in written/entrance test scores of 10% to 15%.

| Category of Hired Personnel | 2014 | 2015 | 2016 |
|---|---|---|---|
| Total no. of personnel with physical and mental challengesrecruited | 790 | 770 | 764 |
| Total no. of personnel with physicall and mental challengesrecruited (weighted) | 922 | 883 | 852 |
| Percentage of excess recruitment of personnel with physical and mental challenges | 16% | 14% | 11% |
| Total required number of aboriginal personnel recruitment | 4 | 4 | 4 |
| Total number of aboriginal personnel recruited | 5 | 5 | 5 |
| Percentage of excess recruitment of aboriginal personnel | 25% | 25% | 25% |

## 6.2.3 Labor-Management Communication Channels

In an effort to boost the performance of human resource development and improve the efficacy of HR utilization, Taipower has established its “Human Resource Development Taskforce” with the intention of creating comprehensive HR development strategies and solving issues of practical operations to improve the company’s management performance. In addition, Taipower has set up a team under the taskforce to foster consensus by meeting at least once per month to discuss issues that relate to the improvement of human resource development. Excluding declarative and reiterative issues, the team had reached a total of 195 resolutions by the end of 2016 and completed 188 of the resolutions to achieve a completion rate of 96%.

### Communication Performance

| Communication Channels | 2016 Performance |
|---|---|
| Labor-management meetings | 25 labor-management meetings were held at company and subsystem levels in 2016. |
| Information and discussion sessions | 1 information session on major labor-management was held<br>6 information sessions on Electricity Act Amendments were held. |
| Entry-level employee meetings | 193 entry-level employee communication meetings were held in 2016, where unit supervisors communicated with entry-level employees and listened to their concerns. |
| Thematic presentations | To enable high-ranking supervisors to continue their communication with employees on the company’s latest policies, Taipower held 5 thematic presentations in 2016. |
| Training | The “Counseling Skills for Supervisors and Subordinates” course was officially launched on Taipower’s Online Academy in January 2016. Taipower sent out official notifications on March 10 to all supervisors to go through the materials of the course, which focuses on the personal counseling between supervisors and their subordinates, particularly on situations involving promotion, punishment/reward, evaluation or dissatisfaction with work. Through one-on-one counseling, employees will be able to alleviate their negative feelings. |
| Intranet | The company added a new section on “Power industry liberalization” to serve as a platform for the exchange of opinions regarding Electricity Act Amendments for reference purposes in the future. The forum also enabled employees to seek clarifications on any doubts they may have regarding company policies and regulations. All relevant inquiries have been promptly clarified by responsible units to prevent potential misconceptions from spreading. |

### Group Agreement Negotiations

On October 24, 2013, Taipower and the Taipower Labor Union (TLU) signed a Collective Bargaining Agreement (CBA), with meetings held annually 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 2016, 12 consultative meetings were held and since outsourced personnel are not Taipower’s employees, the terms of the group agreement negotiation do not apply to them.

#### Employees Covered by the Collective Bargaining Agreement

| Item | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| Total employees | 26,629 | 26,533 | 26,659 | 26,673 |
| union members | 25,954（97.5%） | 26,064（98.2%） | 26,284（98.6%） | 26,391（98.9%） |

## Grievance Complaint System

Taipower's "Working Personnel Difficulty and Grievance Matter Processing Guidelines" helps employees solve issues that cannot be solved through the company's administrative system. The Points cover the following:

1. Adjustment of tasks, and transfer to another division, unit, or district, for personal or family reasons.
2. Company support in the event of major changes in the family.
3. Handling queries and complaints regarding the company's system, measures, contracting and oversight of engineering work, financial and procurement matters, and hand-over inspections.
4. Investigation and handling of other complaints.

In accordance with regulations, grievances and complaints filed by employees shall be handled by the "Working Personnel Difficulty and Grievance Matter Processing Team" of the employee's respective unit. If the team is unable to handle the grievance or if the outcome is not acceptable to the employee involved, he or she may then file a complaint to the "Working Personnel Difficulty and Grievance Matter Processing Committee." All employee grievances filed in 2016 had been processed by their respective units.Therefore, the "Working Personnel Difficulty and Grievance Matter Processing Committee" did not convene any meeting in 2016.

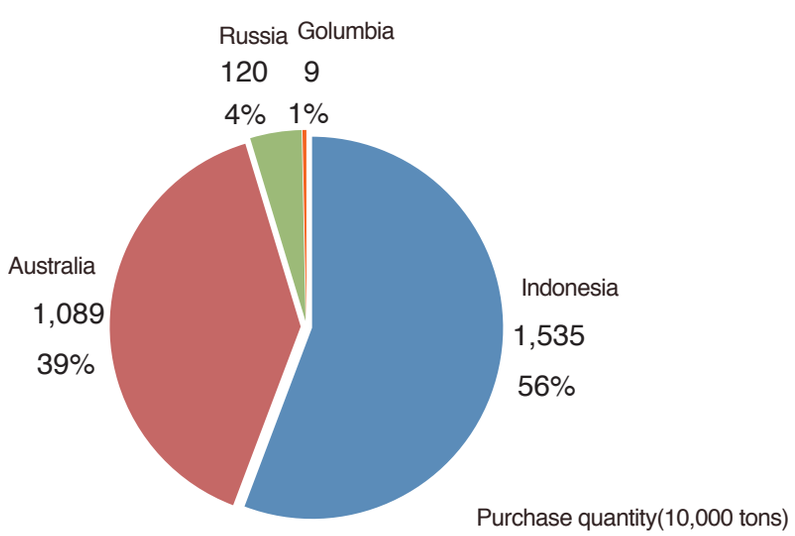
# 6.3 Supplier Management

## 6.3.1 Fuel Suppliers

### Coal Procurement

For coal procurement, Taipower established its inter-departmental "Coal Procurement Review Taskforce" to formulate versatile coal procurement strategies to ensure adequate supply of quality coal to all coal-fired power plants under the requirements of environmental protection. In 2016, Taipower purchased a total of 27.53 million tons of coal. Presently, Taipower owns and operates 6 coal carriers that annually transport approximately 8 million tons of coal, accounting for 25% of Taipower's shipping ratio. Pursuant to pertinent regulations, Taipower is required to maintain a sufficient coal inventory for 30 days of operation. Given the premise of ensuring supply safety and taking various factors into consideration, Taipower adopted a practice of maintaining 34 days of inventory as the basis of its coal inventory target for 2016.

**The Ratio of Coal Procurement from Different Regions in 2016 and Total Procurement Quantity**



In 2016, Taipower's list of qualified regular consisted of 43 qualified vendors, including 22 in Australia, 14 in Indonesia, 2 in China, 2 in Russia, 1 in South Africa, 1 in the United States, and 1 in Canada. In addition, three new vendors were added to Taipower's list of qualified vendors in 2016 and the company has dispatched designated personnel to carry out on-site inspections at their mines. Four of the qualified vendors in the list failed to update on the lifespan of their mines and as such have been removed from the list.

### Fuel Oil and Natural Gas Suppliers

Taipower currently purchases fuel oil and natural gas from the CPC and Formosa Petrochemical Corporations. Both are contractors with supply capability and also conform to the relevant governmental laws and regulations. Fuel oil inventory in 2016 was kept between a 10-15 day supply, while diesel inventory was established in accordance with the specific supply and transmission conditions at various power plants.

### Nuclear Fuel

The procurement of nuclear fuel involves the purchase of uranium and subsequent processing services of conversion, enrichment and fabrication. Procurement is primarily conducted throughlong-term contracts (uranium long-term contracts must comprise no less than 50% of Taipower's uranium supply), supplemented with medium-to-short-term and spot contracts. All nuclear fuel processing services are procured via long-term contracts and Taipower maintains 3 years' worth of safe inventory. In light of the government's nuclear-free homeland policy, Taipower has stopped all its uranium procurement.

## 6.3.2 Suppliers of Materials and Equipment

To enhance the effectiveness of its management and control, Taipower adheres to the principle of centralized management for materials that are used in large quantities and by many units, which are selected and reviewed for centralized requisition, allocation and inventory control for the sake of greater benefits.

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

| | | | |
|---|---|---|---|
| "Regulations Governing the Review of Suppliers Website" are published on Taipower's website | Suppliers file online requests for review | Taipower conducts reviews based on "Suppliers' Manufacturing Capabilities through On-site Inspection and Documentary Screening" | Interim inspection rules: In accordance with the "Standard Norms for Company Materials" and in view of the nature of the products concerned, semi-finished products for instance, three samples may be taken for inspection. If a sample fails to meet the standards, the supplier must improve the entire batch and perform a second inspection |

Procurement of electrical equipment (such as cables and gas-insulated switchgear) must comply with pertinent government policy such as the "Power Equipment Localization Policy." Therefore, important components must be produced, assembled or cut in domestic factories. Taipower will evaluate supplier bids on this aspect. In the case of switching to domestically-produced cables, Taipower currently procures 100% of its cables from domestic suppliers. Taipower has a total of 942 material procurement tenders, with total bid amount approximately at NT 15.1 billion; approximately NT$ 14.8 billion of the bid amount is attributed to local procurement, roughly equivalent to 98%.

## 6.3.3 Power Suppliers

To ensure a steady supply of power across Taiwan while improving the economic vigor and versatility of the private sector, the government has lifted its restriction on private power development and adopted Taipower's avoidable costs of self-power generation as the basis for its pricing principles. Due to the Electricity Act's Amendments, to maintain reliable power supply, Taipower will continue to sign contracts with IPPs for power purchase with priority given to green power. To encourage supply and demand diversification, the government has also opened the doors to renewable energy generation and sales industries and Taipower will no longer be the sole purchaser of green power. In addition to having new competitors in the business, Taipower must also monitor its carbon emission factor and reserve capacity.

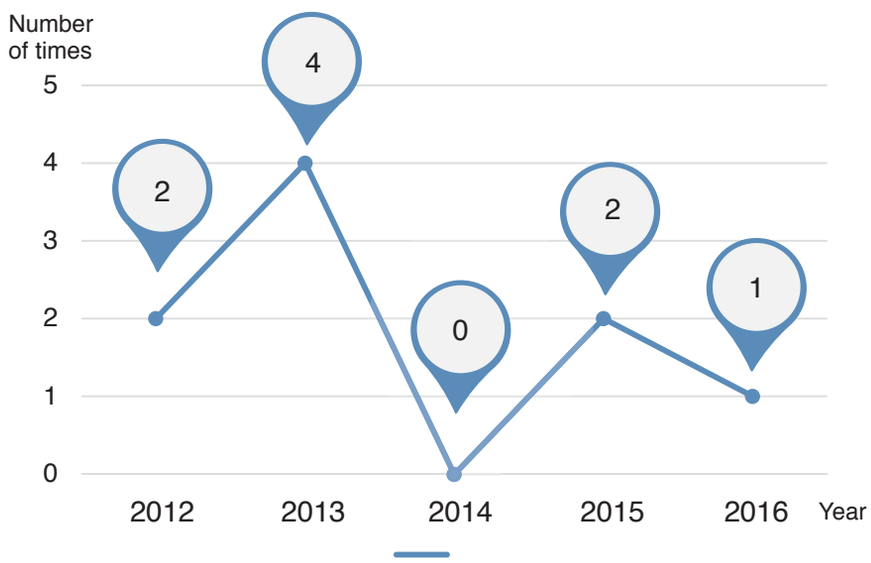
Taipower's power procurement is based on pertinent regulations such as the "Directions Governing the Deregulation of the Power Industry," "Deregulating Private Power Plant Solution" and "Application Information for Power Plant Construction" for the appraisal process. The MOEA's Preparatory Taskforce is responsible for the preliminary review and phases 1 and 2 involve the comparison of tariff pricing, while phase 3 involves the screening of winning bidders based on a first-come, first-serve review of announced prices. For IPP operators that have performed poorly or resulted in risks for Taipower, penalties will be imposed in accordance with the contract or the poor performance may even result in contract termination. In 2017, Taipower made no plans to find new IPP suppliers. On a related note, due to the halted construction of FPG's Changhua Plant in 2016, Taipower estimated a reduction of peak period power purchase by approximately 65 GWh and cogeneration power purchase by 643 GWh for the entire year of 2017.

By the end of 2016, Taipower had contracts with 9 IPPs, 52 co-generation power providers and a total of 11,906 contracts for renewable energy (including solar power, wind power, hydro power and others). Taipower purchased a total of 40,164 GWh and 2,857 GWh of power from IPPs and renewable energy suppliers in 2016 and will procure approximately 38,600 GWh of power from IPPs in 2017. No IPP contract is due for expiry in 2017 and the earliest contract expiry will take place in 2024.

## 6.4 Enhancing Nuclear Communications

In 2016, the six generators at Nuclear Power Plants 1, 2, and 3 generated a total of 30.461 TWh of power, with an average capacity factor of 67.83% and one unexpected automatic emergency shutdown. The number of unexpected automatic emergency shutdowns in recent years is shown in the figure below.

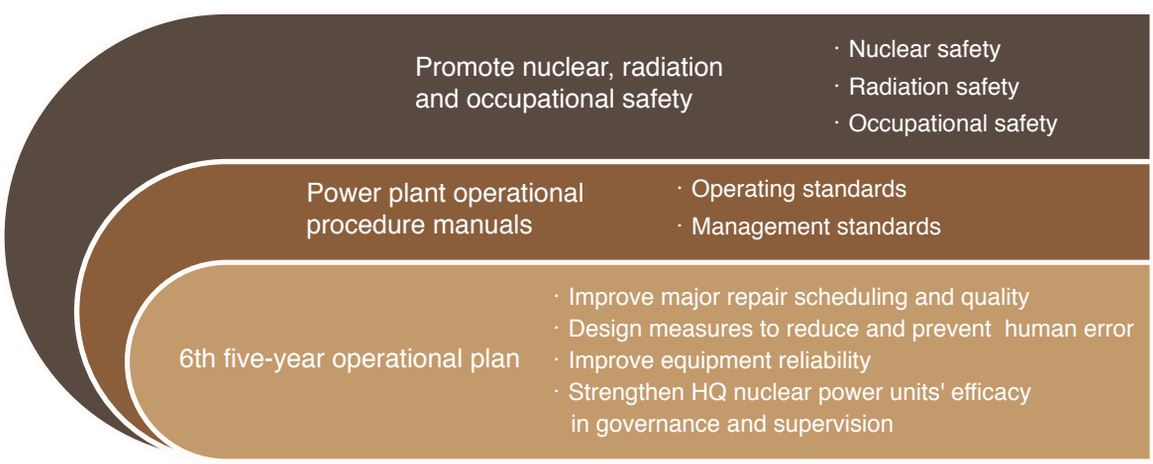
**No. of Automatic Emergency Shutdowns at Nuclear Power Plants in the Past Five Years**




### 6.4.1 Nuclear Safety and Crisis Response

#### Planning for Nuclear Safety

**Taipower Nuclear Safety Planning Framework**



## Status of Nuclear Power Plant Annual Repairs

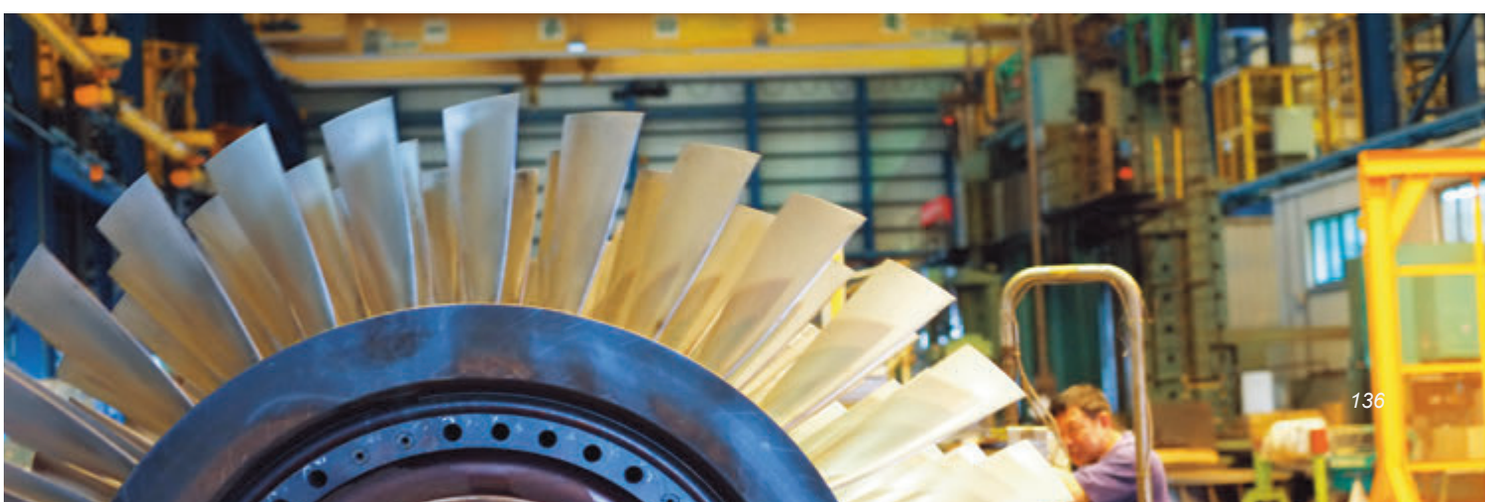
| | From start to end | Description |
|---|---|---|
| NPP1 Reactor No. 1 | From March, 2015 | Regarding the damage to the connecting hardware for the water channel of an atrium 10 fuel, the Legislative Yuan had yet to approve AEC's application to report at the Legislative Yuan by the end of 2016. Consequently, the reactor remains inoperable. |
| NPP2 Reactor No.2 | April ~ May, 2016 | The generator was de-synchronized on April 12 and later re-synchronized on May 16 for the first time when major repair was completed. However, the re-synchronization caused the lightning arrester to malfunction and tripped the generator. By June 27, all inspection and testing operations at NPP2 had been completed. Nevertheless, the unit may only be re-activated after AEC has presented its report to the Legislative Yuan. And as such, the reactor remained inoperable as of the end of 2016. |
| NPP3 Reactor No.1 | October ~ November, 2016 | The generator was de-synchronized on October 11 and re-synchronized for the first time when major repair was completed on November 18. |
| NPP2 Reactor No.1 | From November, 2016 | The proposal for the installation of fuel rack is currently under review by AEC |

The AEC gave the green light for the assessment of Taipower's nuclear safety control for all nuclear power plants in operation in 2016. In an effort to resolve the public's concerns on nuclear power safety and enable them to better understand nuclear power generation, Taipower produced a series of communication and advocacy materials, including printed brochures, handbooks, large hanging scrolls and so forth to highlight various protective measures. Taipower took these measures to boost the public's understanding of safety features at the Longmen Power Plant. In addition, Taipower revised its existing nuclear power advocacy materials to provide the latest information. Taipower has also produced publications for the "POWER2050 – the Future of Electricity Summit Forum".

## Emergency Response Mechanism


With regards to protective measures for the public, Taipower collaborated with the competent authority, the AEC, to formulate suitable action plans in conjunction with annual exercises and drills to ensure adequate response capabilities in the event of a disaster. The goal for the emergency response mechanism is to ensure stable and safe operation of power plants while ensuring zero operational hazards through the construction of a sound emergency response mechanism. By helping personnel to familiarize themselves with response skills, Taipower will be able to minimize the extent of damage during disasters and reduce losses to the lowest level.

Nuclear power plants in Taiwan feature comprehensive safety considerations and have multiple layers of diverse, built-in protection measures. Accordingly, the likelihood of accidents is slim. However, preparation is prudent, and so, Taipower established its "Taipower Nuclear Reactor Facility Emergency Response Guiding Principles" in accordance with the Nuclear Emergency Response Act as the basis of emergency response operations to be carried out by the Nuclear Power Plant Emergency Response Execution Committee and respective emergency response organizations at the nuclear power plants.



## Emergency response mechanisms at the nuclear power plant

| | | |
|---|---|---|
| Regular preparation | Implementing exercises in accordance with emergency response plans | · The Nuclear Power Plant Emergency Response Committee staff receive routine training in accordance with their given duties in emergency response and to keep their expertise updated. The emergency response training includes general training biannually, and annual specialist training. |
| | Implementing response plan drills | · Every nuclear power plant conducts a drill annually. Taipower, central and local governments, military, police and medical units all participate in nuclear safety exercises that are by turn held at different nuclear power plants. In addition to the competent authority, Taipower also invites professionals and scholars to form an evaluation group to assess exercises on each response measure to make the emergency response plan more effective.<br>· In 2016, the “22nd Nuclear Safety Exercise” was held with two emergency drills organized at Nuclear Power Plants 1 and 2 in June and October respectively. |
| | Establishing emergency response readiness performance indicators | · Each nuclear power plant conducts emergency response readiness KPIs and reports quarterly to AEC as a part of the control measures of nuclear safety regulatory organization to ensure the readiness of nuclear units. Related KPIs include:<br>· Drills/exercise performance.<br>· Participation in drills of the emergency response organization.<br>· Reliability of the warning and reporting system. |
| Response to accident | Adopting emergency response measures | · In the event of a nuclear accident, nuclear power plants shall comply with the relevant procedures and perform specific rescue operations.<br>· Taipower Establish the Central Disaster Response Center for Nuclear Accident, Nuclear Accident Radioactive Monitoring Center, Nuclear Accident Disaster Response Center and Nuclear Accident Support Center pursuant to the “Nuclear Emergency Response Act” to jointly carry out various rescue operations, to keep the public safe, and to effectively control the accident and the neighboring residents and environments stand to be jeopardized. |
| Post-accident recovery operation | Damage appraisal and recovery measures | · After verifying the cause of a nuclear accident and performing all emergency response measures and confirming it is irrelevant to a nuclear accident, the emergency response center will be dismissed.<br>· After receiving the notification from the Nuclear Accident Recovery Measure Promotional Commission, Taipower assigns tasks to different units to evaluate facility damage and recovery/restoration of the facilities and neighboring environment.<br>· The Emergency Control Chief evaluates the status of the power plant before issuing the order to set up the plant recovery team and commence the recovery operations. |

## Nuclear Power Plant Decommissioning Planning

In light of the government's goal of achieving a nuclear-free homeland by 2025, Taipower has been actively appraising and planning the decommissioning of power plants to gradually change Taiwan's power structure without compromising power supply reliability and nuclear power safety. As the licenses for operation for NPP1 and NNP2 are approaching expiry, Taipower has initiated its power plant decommissioning planning to satisfy the requirements for minimizing the generation of radioactive waste from decommissioning operations, ensuring facility stability and meeting the conditions for final disposal. Not only that, Taipower has also established its "Radiation Characteristics Investigation Team" and "Systematic Chemical Decontamination Team" in the decommissioning plan toimprove decontamination techniques from the source while increasing the quantity of releasable wastes and reducing the generation of radioactive wastes. Taipower will develop high integrity containers that can last for 100 years to meet the requirements for final disposal.

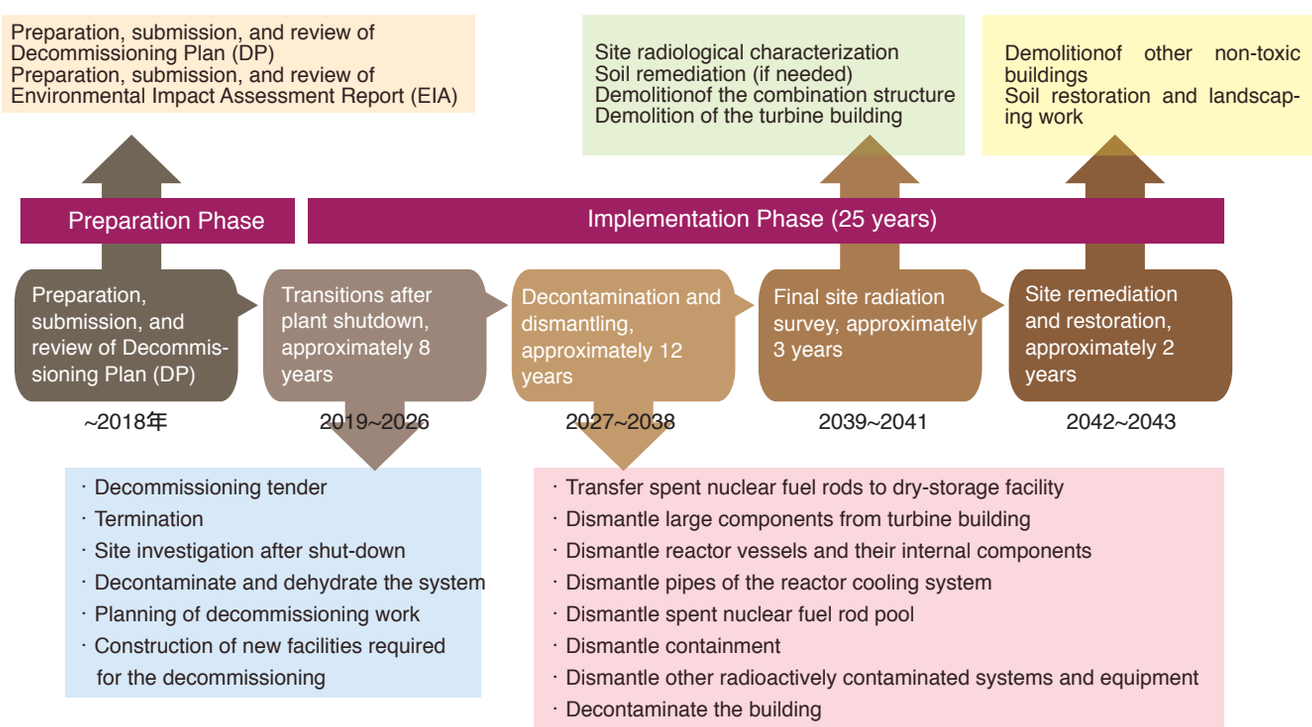
According to the "Nuclear Reactor Facilities Regulation Act," the phase out of a nuclear power plant shall be completed since its operation has to befully terminated in 25 years, including the demolition of the facilities. The operator must propose a decommissioning plan 3 years before the permanent shut-down of nuclear reactor facilities.

Pursuant to this law, Taipower began planning for the decommissioning of Nuclear Power Plant No.1, giving due consideration to "the feasibility of technology," "decommissioning safety," "cost-efficiency," and "needs in actual operation." A comprehensive investigation was conducted to ensure that the decommissioning will proceed under optimum arrangements and in full compliance with applicable laws and regulations. The decommissioning plan was submitted to AEC in November 2015.

### Decommissioning process and progress

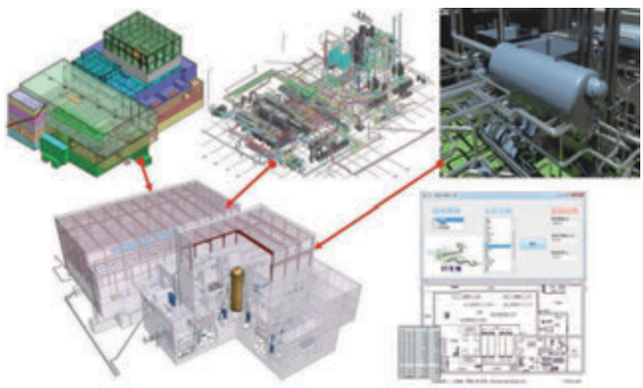
To execute the decommissioning plan, Taipower established an official decommissioning unit under Nuclear Power Back-end Operations Department , coordinated cross-departmental work associated with the decommissioning plan of NPP1 in 2012, and actively participated in international organizations such as the Electric Power Research Institute (EPRI) and the Co-operative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installation Decommissioning Projects (CPD) of the Nuclear Energy Agency, the specialized agency within the Organization for Economic Co-operation and Development (OECD) to work with advanced nations, visit power plants in various stages of decommissioning, and collect decommissioning reports for reference purposes.

#### Planning of NPP1 Decommissioning Process




Taipower's current decommissioning activities include establishing a quality assurance program, developing a quality assurance manual,completing strategic analysis and planning (including operation scheduling, organization and human resource planning) to design the radiological site characterization for the NPP1 site (by using the methods outlined in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM; NUREG-1575) of the United States Nuclear Regulatory Commission (USNRC) to confirm the scope and extent of residual radioactive and hazardous substances), mapping out the decommissioning operation while calculating estimates of radioactive waste volumes; creating a decommissioning information management system (ongoing), and building a 3D model of the entire facility (ongoing).


### Decommissioning information management system



## Decommissioning cost and sources of funding

The dismantling and decommissioning costs of nuclear power plants are estimated at NT$ 67.5 billion: Nuclear Power Plant No.1: NT$ 18.2 billion, Nuclear Power Plant No.2: NT$ 24.2 billion, and Nuclear Power Plant No.3: NT$ 25.1 billion, excluding the final treatment of dismantled materials. Based on the user-pay principle, Taipower has been funding nuclear energy back-end operations since 1987 with approval from the Executive Yuan. By theend of January 2017, the fund had accumulated NT$ 322.609 billion. In addition, every five years or whenever there are major changes in technology, regulations or the scale of nuclear power generation, Taipower will recalculate the total cost of nuclear back-end operations along with the recalculation of the rate of assessment for nuclear power generation to ensure that funds for back-end operations are sufficient.

## Land reuse after decommissioning

The residual radiation of the site after decommissioning will meet the standards for reuse. With the exception of the restricted area (including the temporary storage facility for radioactive wastes prior to the completion of the final storage facility), the remaining land will be used for power utility related purposes, such as the construction of power facilities.

# 6.4.2 Response to Nuclear Safety Incidents

The International Nuclear Event Scale (INES) categorizes nuclear safety events into 7 levels depending on the severity of the incident. In 2016, no INES level safety events occurred at Taipower's nuclear power plants nor had there been nuclear safety concerns where the common international inspection standards would be applicable. Nevertheless, the lightning arrester on reactor No. 2 at NPP2 did  malfunction. The incident was caused by the deterioration of the lightning arrester at the output terminal of the generator in May when the unit was restarted after a major repair that began in April 2016. The malfunction led to single-phase instantaneous grounding and caused the steam turbine generator to trip and become de-synchronized. Although the repairs on the lightning arrester have been completed as of June 27, 2016, the unit may only be re-activated after AEC's application to present a report on the incident to the Education and Culture Committee at the Legislative Yuan is approved.

# 6.4.3 The Issue of Nuclear Power Plant No.4

With regards to the fate of NPP4, the government's policy of achieving a nuclear-free homeland by 2025 and its stance of keeping NPP4 unsealed and inoperable has been clearly defined.Therefore, Taipower adhered to the resolutions reached by the Legislative Yuan to re-assess and substantially modify its Longmen Power Plant Sealing Plan, changing it to the "Longmen (NPP4) Power Plant Asset Maintenance Management Plan."

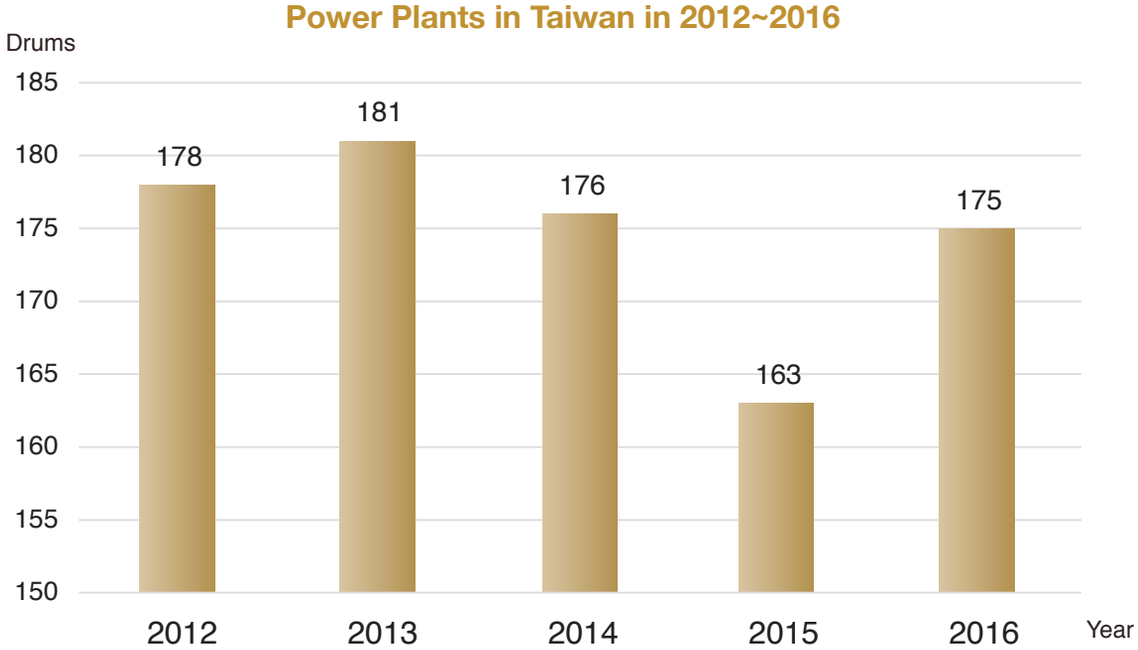
In 2017, Taipower will operate in accordance with the principle of preserving assets and equipment at their maximum value by implementing the most efficient means of maintaining all equipment to keep them operable. Steps will be taken to ensure that all safety related structures, systems, equipment, and components are adequately maintained and tested to the standards of total quality assurance. Taipower will protect and secure NPP4's assets until decisions are made by the competent authorities.

Stakeholders who expect to find out more about NPP4 can visit Taipower's website to peruse the information on the backgrounds and overviews of power plants and their latest operational status', along with the efforts and achievements that Taipower has undertaken to enhance nuclear power safety. To actively promote communication with the public, Taipower has held a total of 172 information sessions at various government agencies, private businesses and college/university campuses in addition to 121 visits at the power plants to engage residents and students in deep communication. Through field trips and on-site visits, visitors are able to learn more about Taiwan's nuclear power plants and gain a better understanding of nuclear power generation and safety.

## 6.4.4 Nuclear Waste Disposal

The low-level radioactive wastes generated by nuclear power operations can be incinerated, compressed or solidified for proper storage in zinc-coated barrels. Under Taipower's strict control, the total solid wastes from all nuclear power plants totalled 175 barrels in 2016 (lower than the five-year average). To boost the effectiveness of radioactive waste reduction at nuclear power plants, in addition to achieving the objectives of three, five-year operating periods (1989-2003), "low-level radioactive waste reduction" was introduced as a key performance indicator starting in 2004. The objective of the 6th five-year operating period (2014-2018) involves the control of solidified waste, dry waste and particulate resin generation. Each nuclear power plant established a "Low-Level Radioactive Reduction Implementation Plan" so a dedicated taskforce could promote relevant tasks.

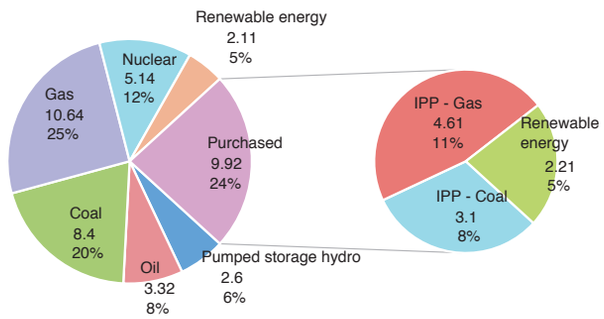
**Drums of Low-Level Radioactive Solidified Waste from Nuclear Power Plants in Taiwan in 2012~2016**



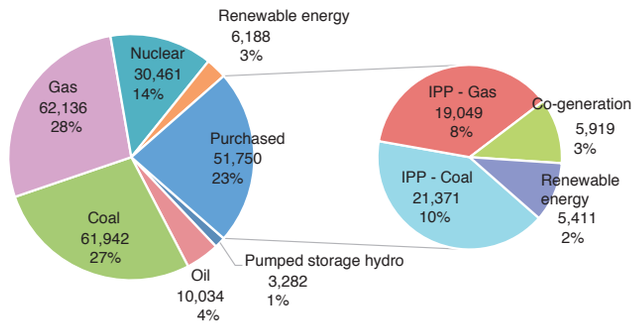

# Appendix

## Corporate Highlights

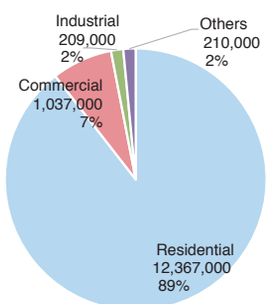
### 2016 Installed Capacity (42.13 GW) Breakdown



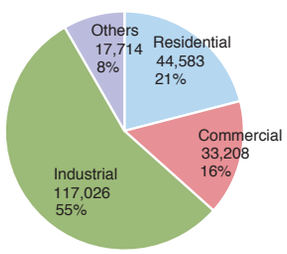

### 2016 Net Generation and Purchased Power (225,793 GWh) Breakdown



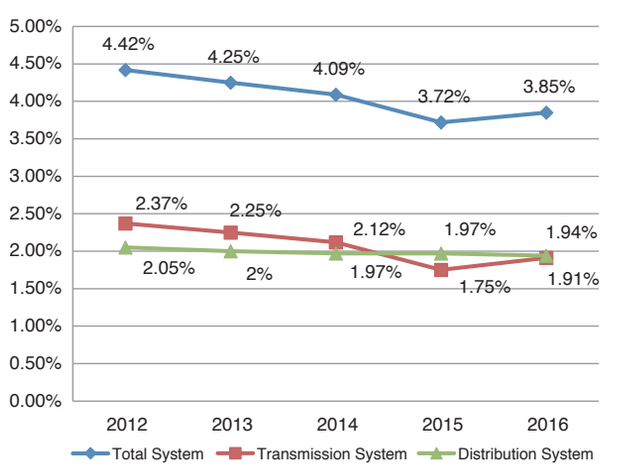

### No. of customers in 2016 (13,823,000)



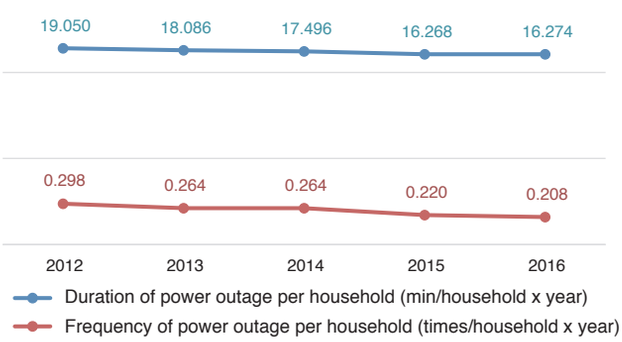

### Sales in 2016 (212,531 GWh)



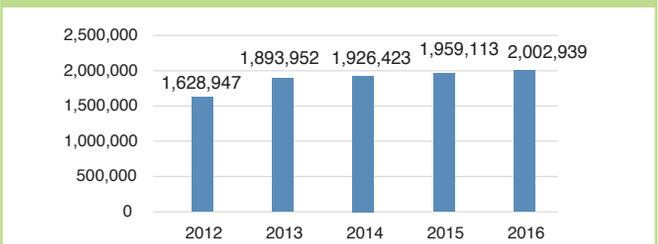

### Line Loss Rate in 2012-2016



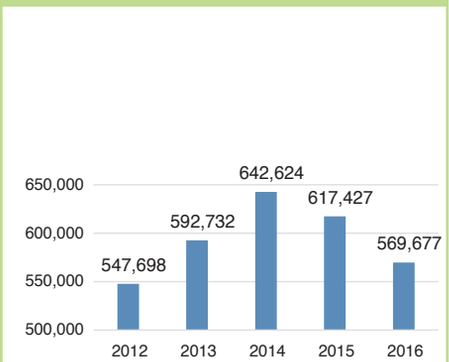

### Duration and Frequency of Average Power Outage from 2012 to 2016



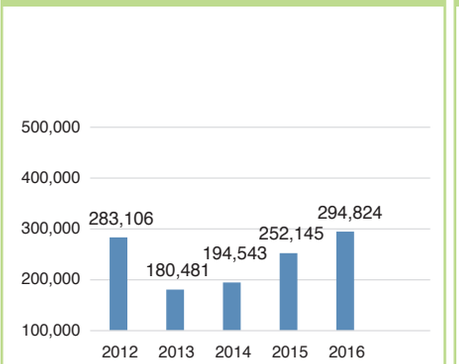

### Total Assets (NT$million)



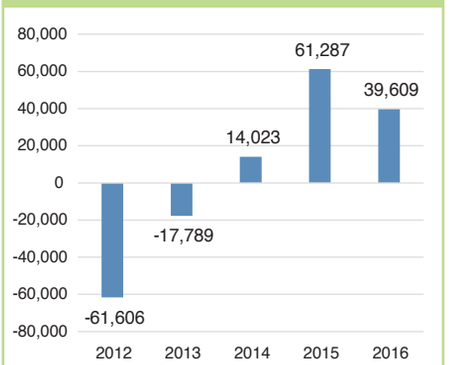

### Operating Revenue (NT$ million)




### Stockholders' Equity (NT$ million)




### Gain / Loss before Income Tax (NT$ million)




Note: Figures above have been audited by accountants using the ROC GAAP established in 2012 and the IFRS established in 2013. As a state-owned enterprise, figures of Taipower's financial report have been determined based on the final audit accounts of the National Audit Office. As such, the aforementioned figures of Taipower's assets in 2015 are slightly different from those in the 2016 Sustainability Report.

# Financial Performance

## Taiwan Power Company – Balance Sheet as per December 31 2016 and December 31 2015

Unit: TWD 1,000

| | 2016.12.31 | | 2015.12.31 | |
|---|---|---|---|---|
| Assets | Amount | % | Amount | % |
| Current assets | | | | |
| Cash and cash equivalents | $3,818,073 | - | 1,951,967 | - |
| Notes receivable, net | 170,032 | - | 154,199 | - |
| Accounts receivable,net | 38,340,722 | 3 | 42,042,444 | 2 |
| Other receivables | 6,364,544 | - | 5,379,185 | - |
| Inventories | 34,172,588 | 2 | 32,719,350 | 2 |
| Prepaid expenses | 2,297,839 | - | 1,706,728 | - |
| Other current assets | 153,910 | - | 178,600 | - |
| | 85,317,708 | 5 | 84,132,473 | 4 |
| Non-current assets | | | | |
| Financial assets carried at cost | 79,204 | - | 79,204 | - |
| Investments accounted for by the equity method | 2,248,554 | - | 2,276,986 | - |
| Property, plant and equipment | 1,564,515,283 | 78 | 1,572,944,516 | 81 |
| Investment-based real property | 15,128,556 | 1 | 14,941,114 | 1 |
| Intangible assets | 421,355 | - | 461,869 | - |
| Deferred income taxes | 7,795,216 | - | 3,750,862 | - |
| Nuclear back-end fund | 321,987,727 | 16 | 275,239,742 | 14 |
| Other non-current assets | 5,445,798 | - | 5,286,604 | - |
| | 1,917,621,693 | 95 | 1,874,980,897 | 96 |
| Total assets | $2,002,939,401 | 100 | $1,959,113,370 | 100 |

| | 2016.12.31 | | 2015.12.31 | |
|---|---|---|---|---|
| Liabilities and Stockholders' Equity | Amount | % | Amount | % |
| Current liabilities | | | | |
| Short-term debts | $53,368,331 | 3 | 71,313,487 | 4 |
| Short-term bills payable, net | 184,794,870 | 9 | 160,233,466 | 8 |
| Accounts payable | 31,009,217 | 2 | 29,485,917 | 2 |
| Contract payable | 37,402,473 | 2 | 40,319,899 | 2 |
| Other payables | 72,056,936 | 4 | 57,653,431 | 3 |
| Current portion of long-term debts | 118,851,388 | 6 | 112,184,751 | 6 |
| Other current liabilities | 2,763,102 | - | 2,587,140 | |
| | 500,246,317 | 26 | 473,778,091 | 25 |
| Non-current liabilities | | | | |
| Bonds, net of current portion | 346,231,362 | 17 | 391,752,950 | 20 |
| Loans, net of current portion | 332,595,290 | 17 | 353,882,274 | 18 |
| Liabilities reserve | 438,193,884 | 2 | 397,614,748 | 20 |
| Reserve for land value increment tax | 56,165,452 | 3 | 56,176,002 | 3 |
| Long-term contract payable | 3,448,558 | - | 4,441,826 | - |
| Deferred income | 657,602 | - | 777,070 | - |
| Net confirmed benefit debt | 25,221,241 | 1 | 23,221,350 | 1 |
| Others | 5,356,112 | - | 5,323,790 | - |
| | 1,207,869,501 | 60 | 1,233,190,010 | 62 |
| Total liabilities | 1,708,115,818 | 86 | 1,706,968,101 | 87 |
| Stockholders' Equity Attributable to the Company | | | | |
| Ordinary share capital | 330,000,000 | 16 | 330,000,000 | 17 |
| Losses to be compensated | (35,197,045) | (2) | (77,879,305) | (4) |
| Other interests | 20,628 | - | 24,574 | - |
| Total stockholders' equity | 294,823,583 | 14 | 252,145,269 | 13 |
| Total liabilities and stockholders' equity | $2,002,939,401 | 100 | $1,959,113,370 | 100 |

## Taiwan Power Company – Statements of Income from January 1 to December 31 of 2015 and 2016

Unit: TWD 1,000

| | 2016 | | 2015 | |
|---|---|---|---|---|
| | Amount | % | Amount | % |
| Operating revenues | | | | |
| Sales of electricity | $555,958,536 | 98 | 605,662,757 | 98 |
| Other operating revenues | 13,718,245 | 2 | 11,764,158 | 2 |
| Total operating revenues | 569,676,781 | 100 | 617,426,915 | 100 |
| Operating costs | 503,921,139 | 88 | 525,975,149 | 85 |
| Gross profit | 65,755,642 | 12 | 91,451,766 | 15 |
| Operating expenses | | | | |
| Marketing | 6,444,092 | 1 | 7,240,578 | 1 |
| General and administrative | 2,268,517 | - | 2,616,297 | - |
| Research and development | 3,909,285 | 2 | 3,188,651 | 1 |
| Total operating expenses | 12,621,894 | 3 | 13,045,526 | 2 |
| Operating net profit | 53,133,748 | 9 | 78,406,240 | 13 |
| Non-operating income and expenses | | | | |
| Income from interests | 4,067,176 | 1 | 3,912,909 | 1 |
| Other benefits and losses | 1,220,758 | - | (623,275) | - |
| Financial cost | (19,004,312) | (3) | (20,650,828) | (4) |
| Share of corporate profit or loss recognized using the equity method | 191,764 | - | 241,564 | - |
| Total operating income and expenses | (13,524,614) | (2) | (17,119,630) | (3) |
| Pre-tax net profit | 39,609,134 | 7 | 61,286,610 | 10 |
| Minus: Income tax payments (returns) | (3,750,569) | - | (2,359,038) | - |
| Net profit of reporting period | 43,359,703 | 7 | 63,645,648 | 10 |
| Other comprehensive income: | | | | |
| Items that will not be reclassified subsequently to profit or loss | | | | |
| Remeasurement of defined benefit plans | (965,233) | - | (7,297,182) | (1) |
| Share of other comprehensive income recognized using the equity method | (3.871) | - | (22) | - |
| Relevant income tax for items that will not be reclassified | 291,661 | - | 1,240,524 | - |
| Total of items that will not be reclassified subsequently to profit or loss | (677,443) | - | (6,056 , 680) | (1) |
| Items that may be reclassified subsequently to profit or loss | | | | |
| Share of other comprehensive income recognized using the equity method | (4,484) | - | 14,490 | - |
| Relevant income tax for items that may be reclassified subsequently to profit or loss | 538 | - | (1,067) | - |
| Total of items that may be reclassified subsequently to profit or loss | (3,946) | - | 13,423 | - |
| Other comprehensive income of the reporting period | (681,389) | - | (6, 043,257) | (1) |
| Total comprehensive profit or loss of the reporting period | $ 42,678,314 | 7 | $57,602,391 | 9 |
| Earnings per share (NT$) | | $ 1.31 | | $ 1.93 |

## Taiwan Power Corporation Employee Compensation and Benefits in 2016 and 2015

Unit: TWD 1,000

| **Employment retirement benefits** | 2016 | 2015 |
|---|---|---|
| Defined contribution plan | 633 ,473 | 645,559 |
| Defined benefit plan | 1,307,386 | 8,254,503 |
| | 1,940,859 | 8,900,062 |
| Other employee benefits | | |
| Payroll expenses | 20,581,634 | 20,910,694 |
| Insurance costs | 1,966,417 | 2,004,113 |
| Other | 11,536,430 | 11,741,281 |
| | 34,084,481 | 34,656,088 |
| **Total** | 36,025,340 | 43,556,150 |
| Total of functional expenditure | | |
| Operating costs | 30,673,261 | 36,996,044 |
| Operating expenses | 5,352,079 | 6,560,106 |
| **Total** | 36,025,340 | 43,556,150 |

# GRI G4 Index
# General Standard Disclosures

| Indicator | Indicator Description | Corresponding Chapter and Section | Page |
|---|---|---|---|
| | Strategy and Analysis | | |
| G4-1 | Statement from the most senior decision-maker of the organization about the relevance of sustainability to the organization and the organization's strategy for addressing sustainability. | Statement from the Chairman | P3 |
| G4-2 | Description of key impacts, risks, and opportunities. | Statement from the Chairman<br>1.7.2 Risk Profile and Counter Measures | P3<br>P39 |
| | 組織概況 | | |
| G4-3 | Name of the organization. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-4 | Primary brands, products, and/or services. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-5 | Location of the organization's headquarters. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-6 | Number of countries where the organization operates, and names of countries where either the organization has significant operations or that are specifically relevant to the sustainability topics covered in the report. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-7 | Nature of ownership and legal form. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-8 | Markets served (including geographic breakdown, sectors served, and types of customers/beneficiaries). | Corporate Highlights<br>1.1.1 TAIPOWER PROFILE | p141<br>P12 |
| G4-9 | Scale of the organization. | 1.1.1 TAIPOWER PROFILE | P12 |
| G4-10 | Total workforce by employment type, gender, employment contract and region. | 6.2.2 Human Resource Structure | P130 |
| G4-11 | Percentage of employees covered by collective bargaining agreements. | 6.2.3 Labor -Management Communication Channels | P132 |
| G4-12 | Describe the organization's supply chain. | 6.3 SUPPLIER MANAGEMENT | P133 |
| G4-13 | Significant changes during the reporting period regarding the organization's size, structure, ownership, or its supply chain. | 2.1.1Driving Force for Organizational Transformation | P45 |
| G4-14 | Explanation of whether and how the precautionary approach or principle is addressed by the organization. | 1.7.2 Risk Profile and Counter Measures<br>4.2.2 Maintaining Power Supply Reliability | P39<br>P98 |
| G4-15 | Externally developed economic, environmental, and social charters, principles, or other initiative to which the organization subscribes or endorses. | No such situation to report. | |
| G4-16 | Memberships in associations. | Disclosure on Taipowe CSR Website | |
| | Identified Material Aspects and Boundaries | | |
| G4-17 | List all entities included in the organization's consolidated financial statements or equivalent documents. | Taipower does not have the integrated Financial Report. The scope of this report covers only the scope of Taipower. | |
| G4-18 | Explain the process for defining the report content and the Aspect Boundaries, and how the Reporting Principles have been implemented. | 1.6.2 Material Issue Identification | P33 |
| G4-19 | List all the material Aspects identified in the process for defining report content. | 1.6.2 Material Issue Identification | P33 |
| G4-20 | For each material Aspect, report the Aspect Boundary within the organization. | 1.6.2 Material Issue Identification | P33 |
| G4-21 | For each material Aspect, report the Aspect Boundary outside the organization. | 1.6.2 Material Issue Identification | P33 |
| G4-22 | Explain the effect of any restatements of information provided in previous reports. | Corporate Highlights | P141 |
| G4-23 | Significant changes from previous reporting periods in the Scope and Aspect Boundaries. | No such situation to report. | |
| | Stakeholder Engagement | | |
| G4-24 | List of stakeholder groups engaged by the organization. | 1.6.1 Stakeholder Identification | P28 |
| G4-25 | Basis for identification and selection of stakeholders with whom to engage. | 1.6.1 Stakeholder Identification | P28 |
| G4-26 | Organization's approach to stakeholder engagement, including frequency of engagement by type and by stakeholder group. | 1.6.1 Stakeholder Identification | P28 |
| G4-27 | Key topics and concerns that have been raised through stakeholder engagement, and how each organization has responded to those key topics and concerns, including through its reporting. Report the stakeholder groups that raised each of the key topics and concerns. | 1.6.1 Stakeholder Identification | P28 |
| | Report Profile | | |
| G4-28 | Reporting period. | REPORTING PRINCIPLES | P1 |
| G4-29 | Date of most recent previous report. | REPORTING PRINCIPLES | P1 |
| G4-30 | Reporting cycle. | REPORTING PRINCIPLES | P1 |
| G4-31 | Contact point for questions regarding the report or its contents. | REPORTING PRINCIPLES | P1 |
| G4-32 | Report the 'in accordance' option the organization has chosen, and the GRI Content Index for the chosen option. | GRI G4 Index | P144 |
| G4-33 | Policy and current practice with regard to seeking external assurance for the report. | Assurance Statement | P148 |
| | Governance | | |
| G4-34 | Report the governance structure of the organization, including committees of the highest governance body. Identify any committees responsible for decision-making on economic, environmental and social impacts. | 1.5.1 Corporate Governance<br>1.5.2 Sustainable Development Mechanism | P19<br>P23 |
| G4-35* | Process for delegating authority for economic, environmental and social topics from the highest governance body to senior executives and other employees. | 1.5.2 Sustainable Development Mechanism | P23 |

| | | | |
|---|---|---|---|
| G4-36* | Whether the organization has appointed an executive-level position or positions with responsibility for economic, environmental and social topics, and whether post holders report directly to the highest governance body. | 1.5.2 Sustainable Development Mechanism | P23 |
| G4-37* | Processes for consultation between stakeholders and the highest governance body on economic, environmental and social topics. | 1.5.2 Sustainable Development Mechanism | P23 |
| G4-38* | The composition of the highest governance body and its committees. | 1.5.2 Sustainable Development Mechanism | P23 |
| G4-39* | Report whether the Chair of the highest governance body is also an executive officer (and, if so, his or her function within the organization's management and the reasons for this arrangement). | 1.5.1 Corporate Governance | P19 |
| G4-40* | Nomination and selection processes for the highest governance body and its committees, and the criteria used for nominating and selecting highest governance body members. | 1.5.1 Corporate Governance | P19 |
| G4-41* | Processes for the highest governance body to ensure conflicts of interest are avoided and managed. | 1.5.1 Corporate Governance | P19 |
| G4-42* | The highest governance body's and senior executives' roles in the development, approval, and updating of the organization's purpose, value or mission statements, strategies, policies, and goals related to economic, environmental and social impacts. | 1.5.1 Corporate Governance<br>1.5.2 Sustainable Development Mechanism | P19<br>P23 |
| G4-45* | The highest governance body's role in the identification and management of economic, environmental and social impacts, risks, and opportunities. | 1.5.2 Sustainable Development Mechanism<br>1.7.1 Risk Management | P23<br>P37 |
| G4-46* | The highest governance body's role in reviewing the effectiveness of the organization's risk management processes for economic, environmental and social topics. | 1.5.2 Sustainable Development Mechanism<br>1.7.1 Risk Management | P23<br>P37 |
| G4-47* | The frequency of the highest governance body's review of economic, environmental and social impacts, risks, and opportunities. | 1.5.2 Sustainable Development Mechanism<br>1.7.1 Risk Management | P23<br>P37 |
| G4-48* | Report the highest committee or position that formally reviews and approves the organization's sustainability report and ensures that all material Aspects are covered | REPORTING PRINCIPLES | P1 |
| G4-49* | The process for communicating critical concerns to the highest governance body. | 1.5.1 Corporate Governance<br>6.2.3 Labor-Management Communication Channels | P19<br>P132 |
| | Ethics and Integrity | | |
| G4-56 | Describe the organization's values, principles, standards and norms of behavior such as codes conduct and codes of ethics. | 6.1.1 Integrity Management | P123 |
| G4-57* | The internal and external mechanisms for seeking advice on ethical and lawful behavior, and matters related to organizational integrity, such as helplines or advice lines. | 6.1.1 Integrity Management | P123 |
| G4-58* | The internal and external mechanisms for reporting concerns about unethical or unlawful behavior, and matters related to organizational integrity, such as escalation through line management, whistleblowing mechanisms or hotlines. | 6.1.1 Integrity Management | P123 |
| | Electric Utilities Sector Disclosures - Organizational Profile | | |
| EU1 | Installed capacity (MW), broken down by primary energy source and by regulatory regime. | Corporate Highlights | P141 |
| EU2 | Net energy output broken down by primary energy source and by regulatory regime. | Corporate Highlights | P141 |
| EU3 | Number of residential, industrial, institutional and commercial customer accounts. | Corporate Highlights | P141 |
| EU4 | Length of above and underground transmission and distribution lines by regulatory regime. | 1.1.1 TAIPOWER PROFILE | P12 |
| EU5 | Allocation of $CO_2e$ emissions allowances or equivalent, broken down by carbon trading framework. | Not applicable as Taiwan does not have a carbon emission trading system at present. | |

# Specific Standard Disclosures

| Aspect | Indicator | Indicator Description | Corresponding Chapter and Section | Page |
|---|---|---|---|---|
| | | Economic | | |
| Economic Performance | DMA | Disclosure on Management Approach | 1.4 Management Philosophy and Strategy | P18 |
| | G4-EC1 | Direct economic value generated and distributed (EVG&D) separately at country, regional or market level, including revenues, operating costs, employee wages and benefits, payments to providers of capital, payments to government (by country), and community investments | Corporate Highlights<br>FINANCIAL PERFORMANCE | P141<br>P142 |
| | G4-EC2 | Risks and opportunities posed by climate change that have the potential to generate substantive changes in operations, revenue or expenditure | 1.7.1 Risk Management<br>5.4.2 Climate Change Adaptation | P37<br>P114 |
| | G4-EC4 | Financial assistance received from government | 3.1.5 Pursuing Relaxation of Policy Burden | P83 |
| Indirect Economic Impacts | DMA | Disclosure on Management Approach | 3.1.4 Promoting Tariff Rationalization<br>2.2 ENHANCING RELIABILITY OF POWER SUPPLY | P82<br>P52 |
| | G4-EC7 | Development and impact of infrastructure investments and services supported | 2.2ENHANCING RELIABILITY OF POWER SUPPLY<br>4.2 ENHANCING POWER SUPPLY INFRASTRUCTURES | P52<br>P96 |
| | G4-EC8 | Significant indirect economic impacts, including the extent of impacts | 3.1.4 Promoting Tariff Rationalization | P82 |
| Procurement Practices | DMA | Disclosure on Management Approach | 6.3 SUPPLIER MANAGEMENT | P133 |
| | G4-EC9 | Proportion of spending on local suppliers at significant locations of operation | 6.3 SUPPLIER MANAGEMENT | P133 |
| Availability and Reliability | DMA | Disclosure on Management Approach | 2.2 ENHANCING RELIABILITY OF POWER SUPPLY | P52 |
| | EU10 | Planned capacity against projected electricity demand over the long term, broken down by energy source and regulatory regime | 2.2.1 Adjusting the Energy Mix | P52 |

| | | | | |
|---|---|---|---|---|
| Demand-Side Management | DMA | Disclosure on Management Approach | 4.3 DEMAND MANAGEMENT | P99 |
| Plant Decommissioning | DMA | Disclosure on Management Approach | 6.4.1 Nuclear Safety and Crisis Response | P135 |
| System Efficiency | EU11 | Average generation efficiency of thermal plants by energy source and by regulatory regime | 1.1.1TAIPOWER PROFILE<br>3.2 RAISING POWER GENERATION EFFICIENCY | P12<br>P84 |
| | EU12 | Transmission and distribution losses as a percentage of total energy | Corporate Highlights<br>4.2.1 Improving Transmission and Substation System | P141<br>p96 |
| Environmental | | | | |
| Materials | DMA | Disclosure on Management Approach | 3.1.1 Driving Operational Improvement<br>6.3 SUPPLIER MANAGEMENT | P75<br>P133 |
| | G4-EN1 | Materials used by weight or volume | 5.6.1 Environmental Footprints of Taipower Operation | P119 |
| Energy | DMA | Disclosure on Management Approach | 5.3 ENERGY RESOURCE MANAGEMENT | P109 |
| | G4-EN3 | Energy consumption within the organization | 5.3 ENERGY RESOURCE MANAGEMENT | P109 |
| | G4-EN6 | Reduction of energy consumption | 3.2RAISING POWER GENERATION EFFICIENCY<br>5.3 ENERGY RESOURCE MANAGEMENT | P84<br>P109 |
| | G4-EN7 | Reductions in energy requirements of products and services | 4.3 DEMAND MANAGEMENT | P99 |
| Water | DMA | Disclosure on Management Approach | 5.3 ENERGY RESOURCE MANAGEMENT | P109 |
| | G4-EN8 | Total water withdrawal by source | 5.3 ENERGY RESOURCE MANAGEMENT | P109 |
| | G4-EN9 | Water sources significantly affected by withdrawal of water | No such situation to report | |
| | G4-EN10 | Percentage and total volume of water recycled and reused | 5.6.1 Environmental Footprints of Taipower Operation | P119 |
| Emissions | DMA | Disclosure on Management Approach | 5.4.1 Climate Change Mitigation | P113 |
| | G4-EN15 | Direct greenhouse gas (GHG) emissions (Scope 1) | 5.4.1 Climate Change Mitigation | P113 |
| | G4-EN16 | Direct greenhouse gas (GHG) emissions (Scope 2) | 5.4.1 Climate Change Mitigation<br>(To avoid recalculating the GHG emissions, Taipower monitor and control the data of scope 1 emission and do not inventory the scope 2 emissions). | P113 |
| | G4-EN18 | Greenhouse gas (GHG) emissions intensity | Please refer to the government information platform - Taiwan Power Company _ greenhouse gas emission factor. | |
| | G4-EN19 | Reduction of greenhouse gas (GHG) emissions | 5.4.1 Climate Change Mitigation | P113 |
| | G4-EN20 | Emissions of ozone-depleting substances(ODS) | No such situation to report | |
| Effluents and Waste | DMA | Disclosure on Management Approach | 5.2.3 Waste Management | P108 |
| | G4-EN22 | Total water discharge by quality and destination | 5.3.2 Water Resources Management | P110 |
| | G4-EN23 | Total weight of waste by type and disposal method | 5.2.3 Waste Management | P108 |
| | G4-EN24 | Total number and volume of significant spills | No such situation to report | |
| | G4-EN25 | Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally | No such situation to report | |
| Products and Services | DMA | Disclosure on Management Approach | 6.1.2 Legal Compliance<br>4.3.1Demand Response Measures<br>5.2 ENSURING ENVIRONMENTAL MANAGEMENT | P126<br>P99<br>P105 |
| | G4-EN27 | Extent of impact mitigation of environmental impacts of products and services | 4.3.1Demand Response Measures<br>5.2 ENSURING ENVIRONMENTAL MANAGEMENT | P99<br>P105 |
| Compliance | DMA | Disclosure on Management Approach | 6.1.2 Legal Compliance | P126 |
| | G4-EN29 | Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations | 6.1.2 Legal Compliance | P126 |
| Overall | DMA | Disclosure on Management Approach | 5.2 ENSURING ENVIRONMENTAL MANAGEMENT | P105 |
| | G4-EN31 | Total environmental protection expenditures and investments by type | 5.6.2 Environmental Accounting | P120 |
| Supplier environmental assessment | DMA | Disclosure on Management Approach | 6.3 SUPPLIER MANAGEMENT | P133 |
| | G4-EN33 | Significant actual and potential negative environmental impacts in the supply chain and actions taken | 6.3 SUPPLIER MANAGEMENT | P133 |
| Environmental Grievance Mechanisms | DMA | Disclosure on Management Approach | 6.1.1 Integrity Management | P123 |
| | G4-EN34 | Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms | 6.1.1 Integrity Management | P123 |
| Labor Practices and Decent Work | | | | |
| Labor/ Management Relations | DMA | Disclosure on Management Approach | 6.2.1Human Resource Management<br>6.2.3 Labor-Management Communication Channels | P128<br>P132 |
| | G4-LA4 | Minimum notice periods regarding operational changes, including whether these are specified in collective agreements | 6.2.3 Labor-Management Communication Channels | P132 |
| Supplier Assessment for Labor Practices | DMA | Disclosure on Management Approach | 6.3 SUPPLIER MANAGEMENT | P133 |
| | G4-LA15 | Significant actual and potential negative impacts for labor practices in the supply chain and actions taken | 6.3 SUPPLIER MANAGEMENT | P133 |
| Labor Practices Grievance Mechanisms | DMA | Disclosure on Management Approach | 6.2.3 Labor-Management Communication Channels | P132 |

| | | | | |
|---|---|---|---|---|
| | G4-LA16 | Number of grievances about labor practices filed, addressed, an resolved through formal grievance mechanisms | 6.2.3 Labor-Management Communication Channels | P132 |
| Human Rights | | | | |
| Freedom of Association and Collective Bargaining | DMA | Disclosure on Management Approach | 6.2.3 Labor-Management Communication Channels | P132 |
| | G4-HR4 | Operations and suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated or a significant risk, and measures taken to support these rights | No such situation to report | |
| Supplier Human Rights Assessment | DMA | Disclosure on Management Approach | 6.3 SUPPLIER MANAGEMENT | P133 |
| | G4-HR11 | Significant actual and potential negative human rights impacts in the supply chain and actions taken | 6.3 SUPPLIER MANAGEMENT | P133 |
| Human Rights Grievance Mechanisms | DMA | Disclosure on Management Approach | 6.2.3 Labor-Management Communication Channels | P132 |
| | G4-HR12 | Number of grievances about human rights impacts filed, addressed, an resolved through formal grievance mechanisms | 6.2.3 Labor-Management Communication Channels | P132 |
| Society | | | | |
| Local Communities | DMA | Disclosure on Management Approach | 5.2.1 Environmental Impact Assessment Management | P105 |
| | G4-SO1 | Percentage of operations with implemented local community engagement, impact assessments, and development programs | 5.2.1 Environmental Impact Assessment Management | P105 |
| | G4-SO2 | Operations with significant actual or potential negative impacts on local communities | 5.2.1 Environmental Impact Assessment Management | P105 |
| | EU22 | Number of people physically or economically displaced and compensation, broken down by type of project | No such situation to report | |
| Compliance | DMA | Disclosure on Management Approach | 6.1.2 Legal Compliance | P126 |
| | G4-SO8 | Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with laws and regulations | No such situation to report | |
| Supplier Assessment for Impacts on Society | DMA | Disclosure on Management Approach | 6.3 SUPPLIER MANAGEMENT | P133 |
| | G4-SO10 | Significant actual and potential negative impacts on society in the supply chain and actions taken | 6.3 SUPPLIER MANAGEMENT | P133 |
| Grievance Mechanisms for Impacts on Society | DMA | Disclosure on Management Approach | 6.1.1 Integrity Management<br>6.2.3 Labor-Management Communication Channels | P123<br>P132 |
| | G4-SO11 | Number of grievances about impacts on society filed, addressed, an resolved through formal grievance mechanisms | 6.1.1 Integrity Management<br>6.2.3 Labor-Management Communication Channels | P123<br>P132 |
| Disaster/Emergency Planning and Response | DMA | Disclosure on Management Approach | 6.4.1 Nuclear Safety and Crisis Response<br>2.3 ENHANCING THE ACCESSIBILITY OF POWER SERVICES | P135<br>P61 |
| Product and Service Labeling | DMA | Disclosure on Management Approach | 6.1.1 Integrity Management<br>6.1.2 Legal Compliance | P123<br>P126 |
| | G4-PR4 | Total number of incidents of non-compliance with regulations and voluntary codes concerning product and service information and labeling, by type of outcomes | No such situation to report | |
| | G4-PR5 | Results of surveys measuring customer satisfaction | 2.4.1 Diverse Channels for Engagement and Communication | P65 |
| Compliance | DMA | Disclosure on Management Approach | 6.1.2 Legal Compliance | P126 |
| | G4-PR9 | Monetary value of significant fines for non-compliance with laws and regulations concerning the provision and use of products and services | No such situation to report | |
| Access | EU28 | Power outage frequency | Corporate Highlights<br>2.2 ENHANCING RELIABILITY OF POWER SUPPLY | P141<br>P52 |
| | EU29 | Average power outage duration | Corporate Highlights<br>2.2ENHANCING RELIABILITY OF POWER SUPPLY | P141<br>P52 |
| | EU30 | Average plant availability factor by energy source and by regulatory regime | 2.2ENHANCING RELIABILITY OF POWER SUPPLY | P52 |
| Provision of Information | DMA | Disclosure on Management Approach | 2.4.1 Diverse Channels for Engagement and Communication | P65 |

**Non-core indicator, the voluntary disclosure of GRI G4 indicators for Taipower

# ASSURANCE STATEMENT

## SGS TAIWAN LTD.'S REPORT ON SUSTAINABILITY ACTIVITIES IN THE TAIWAN POWER COMPANY's CORPORATE SOCIAL RESPONSIBILITY REPORT FOR 2017

### 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 2017 (hereinafter referred to as CSR Report). The scope of the assurance, based on the SGS Sustainability Report Assurance methodology, included the text, and data in accompanying tables, contained in this report. The information in the TPC's CSR Report of 2017 and its presentation are the responsibility of the governing body and the management of TPC. SGS has not been involved in the preparation of any of the material included in TPC's CSR Report of 2017.

Our responsibility is to express an opinion on the text, data, graphs and statements 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 (GRI) Sustainability Reporting Guidelines (2013) 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:

- evaluation of content veracity at a moderate level of scrutiny for TPC and moderate level of scrutiny for subsidiaries, and applicable aspect boundaries outside of the organization covered by this report;
- AA1000 Assurance Standard (2008) Type 1 evaluation of the report content and supporting management systems against the AA1000 Accountability Principles (2008); and
- evaluation of the report against the Global Reporting Initiative Sustainability Reporting Guidelines (G4 2013).

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, EICC, 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 2017 verified is accurate, reliable and provides a fair and balanced representation of sustainability activities in 01/01/2016 to 12/31/2016.

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 G4 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, government agency, 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 GUIDELINES (G4 2013) CONCLUSIONS, FINDINGS AND RECOMMENDATIONS**

The report, TPC's CSR Report of 2017, is adequately in line with the GRI G4 Core Option. The material aspects 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 aspects and boundaries, and stakeholder engagement, G4-17 to G4-27, are correctly located in content index and report. Disclosures on Management Approach components for other material aspects, such as goals and targets, may be further enhanced in next report.

**Signed:**
**For and on behalf of SGS Taiwan Ltd.**

**David Huang, Director**
**Taipei, Taiwan**
**29 June, 2017**
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