

2007

Taiwan Power Company Sustainability Report

Integrity
Caring
Innovation
Service



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Our Commitment

Environmentally Responsible - Moving toward Sustainable Development

Ever since its establishment in 1946, Taipower has been focusing on providing stable and reliable electricity to meet the demands of the public and the industry. The structure of Taiwan's economy and society has changed over the last 60 years. Moreover, the trend of liberalization and privatization has posed various challenges for us. However, Taipower's role and missions at all times remain the same. As the market for electricity becomes even more open to competition, Taipower will no doubt be confronted with increasingly intense competition in the future and must strive to become a service-oriented company that puts its customers in the first place.

Since the Kyoto Protocol came into effect, energy conservation has been a fundamentally important policy of the government and also one of the main tasks that Taipower has been actively undertaking. We have strengthened our communication with the public, in the hope that everybody can clearly understand that energy resources are limited and we are now in an era of costly energy. Every one of us should value the use of energy resources and make it a habit to save energy. We, at Taipower, have plans in place for energy conservation. The headquarters, setting a good example, has mapped out a detailed plan to substantiate this policy and already obtained fruitful results. At the same time, our regional offices have been assisting the customers in promoting effective measures to increase energy efficiency. All together, Taipower is enthusiastic to create a culture of energy conservation company-wide.

In addition to energy conservation, Taipower, to implement the resolutions on the control of carbon dioxide emissions reached at the National Energy Conference, has continued the construction project of the 4th Nuclear Power station, developed schemes for the use of carbon-free energies such as wind power and solar power, and also built gas-fired power plants of low carbon emission in Datan. Each year, the ratio of the usage of natural gas in power generation is increased. We will continue to replace old thermal power units and construct new power units that are more efficient and environmentally friendly. We have adopted strategies to increase the efficiency of our power plants and maintain their best operating status. The Assessment

Group for Energy Conservation has been set up within Taipower to evaluate the operation of our existing power plants and to collect information on efficiency enhancement measures adopted by similar power plants in the United States and Japan. Hopefully valuable experience of our colleagues in the power industry can be used as a reference for the betterment of our existing plants.

'Putting our customers in the first place' and 'Pursuing excellence' are the essence of our corporate culture. Taipower believes in the value of 'integrity' and 'caring' when building up cordial and long-lasting relations with our employees, customers and shareholders, and winning recognition and support of the public. Our dedication to 'innovation' and 'service' help us increase operating efficiency, maximize customer satisfaction, fulfill our responsibilities for protecting environment, and ultimately move toward the goal of sustainable development.

Chairman - Edward K.M.Chen



Abstract

Taipower has been developing for one hundred years and went corporate on May 1 1946 some 60 years ago. Over this time, Taipower has done everything meticulously and has constantly supplied Taiwan's economy with the energy it has needed. Taipower has given Taiwan a plentiful and reliable source of electricity and has become an indispensable part of Taiwan's economic development and the daily lives of the Taiwanese people.

In the process of Taiwan's industrial development, Taipower has supplied stable, plentiful and reliable power and played a vital role in the creation of the country's economic miracle. Because electricity cannot be effectively stored in large amounts, power suppliers must install various types of generators, transformers and transmission and distribution lines of considerable capacity in order to meet the varying needs of users. As a state-owned power company and the sole supplier of electricity in Taiwan, Taipower shoulder the responsibility to meet the power demands for economic development and the needs of users. Over the years, Taipower has invested continuously in the development of energy sources and power lines in the hope to supply plentiful, stable and quality power in more economical ways.

Taiwan Power Company (Taipower)

Headquarters: No.242, Sec. 3, Roosevelt Rd., Taipei

Establishment: May 1, 1946

Net Property, plant and equipment: 1,319.7 billion NTD

Number of shareholders: 41,689

Operating revenues: 389.3 billion NTD

Operating expenses: 385.1 billion NTD

Total assets: 1407.6 billion NTD

Number of employees: 26,300

Energy Sales: 181.59 billion kWh

Energy Production: 196.57 billion kWh

Customers: 11,739 (Thousand)

Installed capacity: 37,371MW

Figures calculated up to December 2006



Social Responsibility and Service

Being a Good Neighbor - Helping with Local Development

Shine for Love

Building New Homes for Fish

Light and Hope

Harmonious Labor - Capital Relations

Heart to Heart

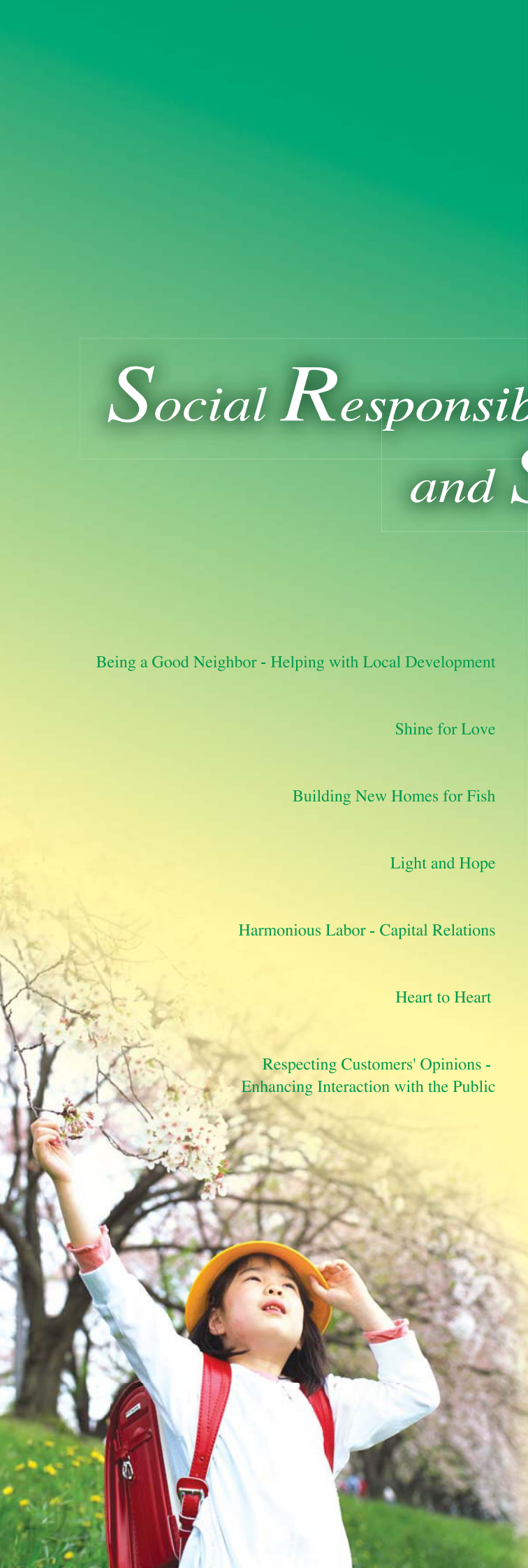
Respecting Customers' Opinions -
Enhancing Interaction with the Public

Being a Good Neighbor - Helping with Local Development

Creating Communities with Humanistic Values and Culture

Apart from its professional skills and basing our services to the community on 'Sincerity, Care, Innovation and Service' and taking social responsibility, in 2003, Taipower established the 'Advisory Committee for the Promotion of Electric Energy Development Allowances' (herein referred to as the Advisory Committee). The Advisory Committee's main purpose is to assist and care for communities and carry out social welfare work. From 2003 to 2006, the committee carried out 4,543 assistance projects and gave out approximately 11.4 billion in assistance funding. The committee's services are aimed at more than 390 organizations including city and county level governments in 18 areas surrounding Taipower power stations, 80 town offices, farmers' associations, fishery associations and schools. The committee has made many contributions to the construction of local public infrastructure, education, culture, the environment, health and hygiene as well as social welfare.

Apart from investing in community infrastructure, the Advisory Committee for the Promotion of Electric Energy Development Allowances has also invested in community education. From 2004, Taipower and Taitung Christian Hospital and Hualien Mennonite Hospital invited young indigenous students from Hualien and Taitung to carry out social welfare work in the Hualien/Taitung area over their summer vacations and






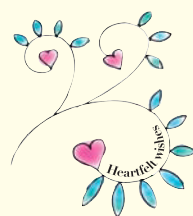
► Seeds of Hope Program

serve the disadvantaged. This plan is known as 'The Seeds of hope'. Apart from this, Taipower has set up study centers in communities. Taipower also has a chorus called 'The Culture Train' which tours Taiwan giving performances. These various activities clearly reflect the care Taipower has for culture and local communities.

For example, over their summer vacations, 40 indigenous students went back to their home of Taitung and became 'seeds of hope'; working at the Taitung Christian Hospital and Hualien Mennonite Hospital. They also helped out in hospitals in the community and in villages spreading the seeds of love to those who need love and care.

Care and Warmth for Neighbors

To coincide with Taipower's ideal of being a good neighbor, Taipower decorated and upkeeps the pedestrian underpass at Taipei City's Roosevelt and Xinsheng South Roads. Taipower has also set up study centers and public reading rooms. Taipower offers music appreciation classes to the blind to fill their lives with joy and the Taipower chorus 'The Culture Train' travels across Taiwan giving musical performances. 



Mennonite Social Welfare Foundation, Vice Executive Officer, Zheng Wenqi

A Small Force Can Greatly Change a Life

Some of the work-study students that took part in this program had never seen disabled elderly people before in their lives. The students quickly got used to the elderly and gave them massages and took them out to get some sun. From this simple interaction, their lives were changed forever: The work-study students' hard work gives the elderly a new sense of hope and new found energy. When the students use their native dialects to communicate with the elders of the villages, the students realize the importance of the native dialects that are becoming lost. The Seeds of Hope program reminds us that nobody should be overlooked and that everyone can help improve the life of others.

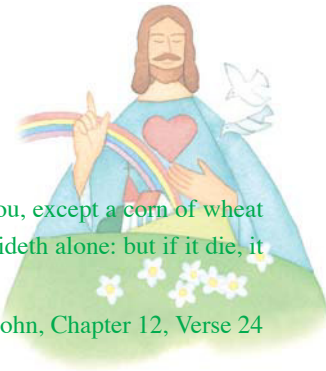


Shine for Love

Care for the Aged

"Verily, verily, I say unto you, except a corn of wheat fall into the ground and die, it abideth alone: but if it die, it bringeth forth much fruit".

---The Gospel of John, Chapter 12, Verse 24




When winter hits Taiwan for the first time each year, the Kernel of Wheat Foundation helps bring warmth to elderly people who live alone. Taipower gathers funds and man power and cooperates with Taitung's Kernel of Wheat Foundation as well as Taitung Christian Hospital to host 'Shine for Love' activities. These activities include group dinners with the elderly who live by themselves as well as accompanying them to buy goods for Chinese New Year. 'Shine for Love' also provides the elderly with services such as house repairs, haircuts and Chinese New Year house decorations.

Love is Everywhere

At a dinner organized for the elderly under the 'Shine for Love' plan, a local community bus and six tour buses picked up elderly community members and took them to the site of the dinner party. Almost 200 elderly people and 100 volunteers sat at 30 large banquet tables and enjoyed a meal together whilst watching singing and dancing performances. Sesame oil chicken noodles were served and hand-made by Taipower employees. In Taiwanese culture, sesame oil chicken noodles represent the idea of the elderly having fun and enjoying themselves.

After the meal, the elderly were accompanied by volunteers to a large shopping center where they purchased goods for use at Chinese New Year. This allowed the elderly to relive the joy of buying products for the New Year. All participants went home with a lot of things. Everybody said they enjoyed themselves and were moved by the experience. One 69-year-old dame said: "I have never been happier for all year!" Free haircuts were given to the elderly and this made them look full of energy and vigor. The home repairs offered were of even greater significance: An elderly woman of almost 80 who looks after her paralyzed husband had an electric door installed

in her home. After she pressed the button she said: "I will finally be able to weave again!" This elderly woman used to enjoy weaving in her spare time and with our help she will now have the energy to take it up again. It is easy to see the joy she received from our assistance.

Taipower will hold similar events in the future so that people who need our assistance are able to receive it. 

▶ Event time, location, audience and number of those who benefited

Activity	Time	Location	Number of those who benefited	Number of volunteers
Free haircuts	January 18 2006	Taimali, Jinlun	4	2
Group dinner	January 24 2006	Formosan Naruwan Hotel and Resort	91	55
Chinese New Year shopping	January 24 2006	RT-Mart	91	35



Seeds of Hope Program

Based on Taipower's motto of 'care', Taipower employees regularly host activities aimed at helping others. Taipower started the Seeds of Hope Program with Mennonite Hospital and the Taitung Christian Hospital. 20 young indigenous students were invited to take part in this program (preference was given to those from families with low incomes) and spend their summer vacation working for this program.

Indigenous students are often unable to complete their studies due to economic difficulties and this program is aimed at providing scholarships over summer vacations to students who take part. This program encourages indigenous students to participate in medical care work in their local communities. It is hoped that this will encourage these students to return to their home towns in the Taitung and Hualien areas to work and take care of those that need help.

Building New Homes for Fish

15,684 Artificial Fish Reefs Successfully Help Raise Fish

Artificial fish reefs are safe homes for fish in the rough ocean. Artificial fish reefs increase the number of fish in the ocean and this in turn helps fishermen who make livings by the sea.

Taiwan's fishing resources are decreasing day by day. Taipower understands deeply just how much people rely on the resources of the ocean. Taipower wishes to give back to the community, make local areas more prosperous, protect oceanic resources and meet our various social responsibilities. Over the past few years, Taipower has been very active in the cultivation and conservation of Taiwan's oceanic resources. In line with Taipower's beliefs on resource recycling and sustainable oceanic resources, Taipower has utilized used electric poles to build artificial fish reefs in ocean areas that surround our plants in order to enrich oceanic resources and encourage the growth of aquatic life. Over the last ten years, Taipower has set up 15,684 artificial fish reefs in ocean areas around our power plants. These efforts aimed at improving the oceanic environment and creating new resources have been well received by the public.

Fish Reefs made of Electric Poles -Beneficial in Many Ways

Artificial fish reefs help cultivate fish habitats and also protect fish. Artificial fish reefs offer a place of rest to fish in originally barren sandy areas. They also provide fish with places to search for food and environments to reproduce. These reefs have played an important role in increasing the number of fish such as grouper, perch, bream, Chevron Barracuda, Spanish mackerel, thornfish, lobster, crab, abalone and octopus.



► Fish reefs made of electric poles.

- Statistics on the number of artificial fish reefs Taipower has built from used electric poles over the last ten years

Year	Total number	Reef locations
1997	500	Pingtung Haikou, 2 nd fish reef in Fangliao
1998	1,900	Pingtung 3 rd fish reef in Fangliao, Taichung Wuchia, Chinshan Tiaoshih, Miaoli Waipu
1999	1,684	Pingtung Haikou, Kaohsiung Mito, Miaoli Paihsin, Taipei Linkou, Yilan Toucheng
2000	2,000	Taipei Danshui, Hualien Yanliao, Taichung Wuchia, Changhua Wangkung, Taoyuan Yungan
2001	1,600	Taipei Yehliu, Taoyuan Yungan, Miaoli Paihsin, Kaohsiung Linyuan
2002	1,600	Taipei Aoti, Taipei Danshui, Taichung Wuchia, Pingtung Haikou
2003	1,600	Taipei Aoti, Taoyuan Yungan, Miaoli Paihsin, Kaohsiung Linyuan
2004	1,600	Taipei Aoti, Taipei Danshui, Changhua Lukang, Pingtung Haikou
2005	1,600	Taipei Aoti, Taipei Shenoa, Taipei Danshui, Taoyuan Yungan Miaoli Paihsin, Taichung Wuchia, Changhua Lukang, Kaohsiung Linyuan
2006	1,600	Taipei Aoti, Keelung Tawulun, Taoyuan Yungan, Miaoli Tunghsio, Changhua Wangkung, Kaohsiung Linyuan, Pingtung Haikou, Penghu Hsianglu Island
Total	15,684	19 reef areas



A Perfect Example of how to Utilize Used Electric Poles

According to research, artificial fish reefs made from electric poles are better than standard concrete fish reefs in terms of surface area, porosity and volume. They cost half the price of traditional concrete fish reefs and are therefore better economically whilst also being better for the breeding of fish than traditional fish reefs. These are the reasons for Taipower choosing to make artificial fish reefs out of used electric poles. This has not only set a good example in the recycling of waste material but can also make Taipower's operations more readily accepted by the public whilst also contributing to the sustainable development of local fishing industries. This is another way Taipower shows its care and sincerity towards local communities.




Light and Hope

Wind Power Generation

To celebrate its 60th year anniversary (1946~2006), Taipower had a series of celebrations that included a 'Wind Power Photography Competition'. This was aimed at increasing the public's understanding of renewable energy and electric power infrastructure. Photos were taken of Taipower's Shihmen, Tayuan, Kuanyin, Tatan, Hengchun and Penghu Chuntun wind power farms.

The 'Wind Power Photography Competition' was highly competitive and consisted of 3,062 photos taken by members of the public and 847 photos taken by Taipower employees. This competition showed the efforts that Taipower has been making in the promotion of wind power. Each photo captured the beauty of the wind farms located on mountain tops or by the ocean. Each photo also had accompanying titles that complemented the photography. These beautiful photographs are the best way



that the government can promote the use of renewable energy whilst also showing the way in which wind farms can also be used as tourist attractions. 


Harmonious Labor - Capital Relations

Taipower has always placed a great emphasis on harmonious relations between employees and employers. Common goals are established between employees and employers at Taipower so that everyone works toward the same goals. This has helped spur Taipower's growth and will aid the sustainable management of Taipower.

Communication between Employees and Employers at Taipower

The various departments at Taipower regularly conduct meetings between employees and employers based on the rules and regulations in Taipower's Guidelines for labor-capital meetings. A total of 73 work units and their labor unions held 429 meetings in 2006. The meeting minutes from these meetings are sent to governing bodies for inspection as stipulated in related regulations. In addition, 130 recommendations and proposals in total from meetings between employers and employees are sent to General Management to help policy makers with their decisions.

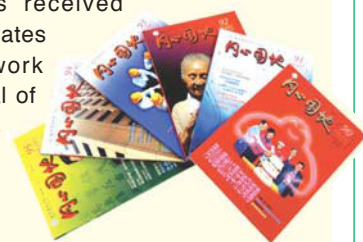
Because the amendments of Taipower's 'Privatization Plan' greatly affect the welfare of Taipower's employees, an explanatory meeting on the privatization plan was held on July 6, 2006. Taipower's various units met with labor union representatives from the power sector on major issues. Meetings are also held regularly between Taipower and labor unions on issues such as major company policies

and labor-capital relations. In 2006, 399 cases had meeting conducted on them including motions put forward by various labor unions as well as written recommendations on various cases that were sent from General Management. 



Staff Training and Welfare

According to health management regulations at Taipower, special medical examinations in 2006 were carried out by the Human Resources Departments of each unit at Taipower. The medical information gained from these examinations is filed by the Industrial Safety Department. In addition, in 2006 there were a total of 856 workers aged 50 years and over took part in medical examinations. In terms of employee training, each employee receives an average of 40.45 hours professional training each year where they are encouraged and assisted in obtaining licenses related to their work. In 2006, 2,084 employees received licenses or certificates related to their work and in 2006 a total of 43,288 employees received training.



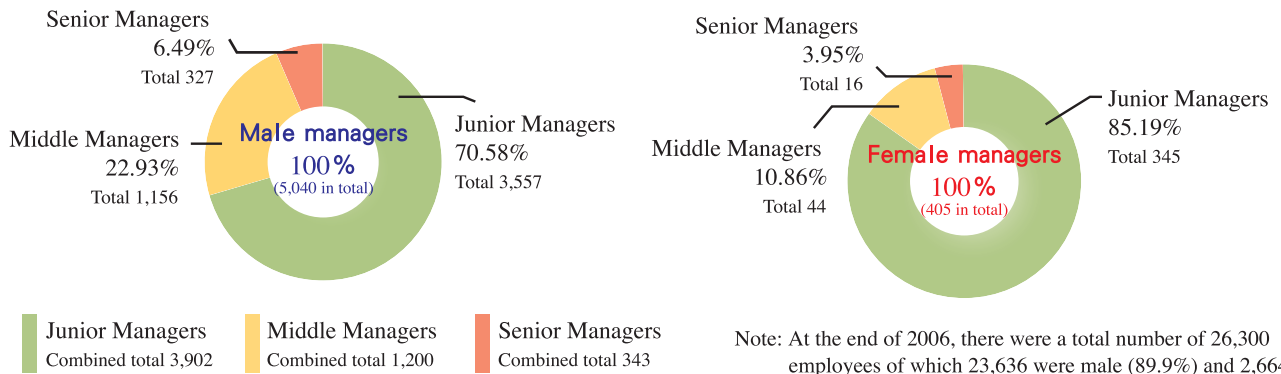
► Taipower held Interpersonal Relationship Growth Camp

► Numbers and ratios of workers from disadvantaged groups such as the disabled and indigenous peoples

2006	Staff with disabilities	Indigenous people
Number employed	647	144
Total number of staff	26,300	26,300
Ratio	2.46%	0.55%

Note: The number of workers from disadvantaged groups such as the disabled and indigenous people that Taipower employs is in line with the goals and regulations stipulated in the Disabled Employment Rights Protection Act and the Indigenous Peoples Employment Rights Protection Act.

► Ratio of male and female managers at the end of 2006



Note: At the end of 2006, there were a total number of 26,300 employees of which 23,636 were male (89.9%) and 2,664 were female (10.1%).

Note: Management consists of three levels (the ratio of male and female managers is 92.56% and 7.44% respectively).

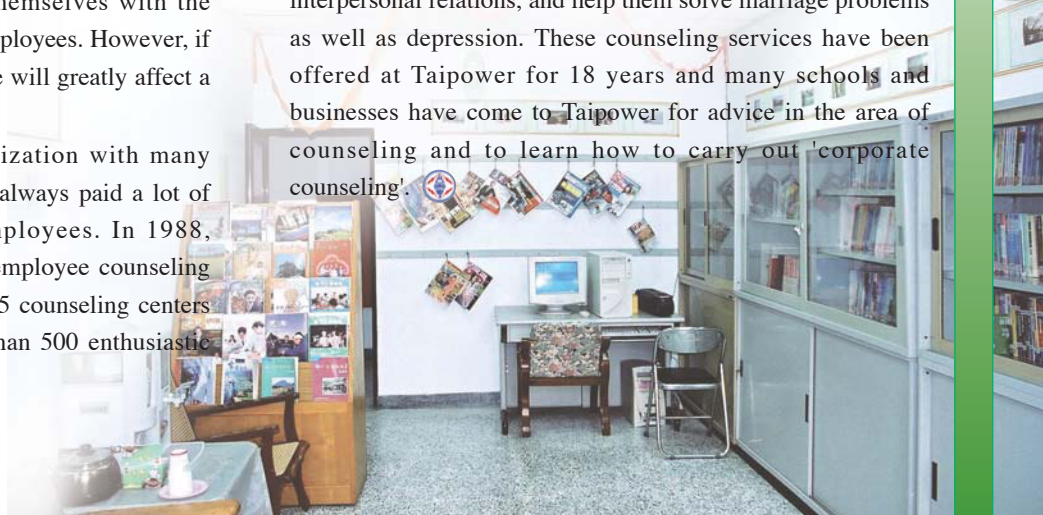
Heart to Heart

An Invisible Tendency

After the Labor Standard Law was passed in 1984, labor-capital disputes have become increasingly common and have drawn more concern from all aspects. However, most of the attention has been confined to the disputes themselves and have rarely looked at side of the employees. Companies normally focus on production and management and do not concern themselves with the physical and mental health of their employees. However, if problems in these areas do arise, these will greatly affect a company's productivity.

Taipower is a massive organization with many employees. Therefore, Taipower has always paid a lot of attention to the health of our employees. In 1988, Taipower established a 'System for employee counseling and guidance'. At present there are 75 counseling centers (named Heart to Heart) with more than 500 enthusiastic

staff members working as counselors. Each department at Taipower has their own counseling group complete with a counseling room that provides various printed and audio media about spiritual growth that employees can borrow. Counselors listen to employees, help them relax and help employees get over the stress of their jobs, improve their interpersonal relations, and help them solve marriage problems as well as depression. These counseling services have been offered at Taipower for 18 years and many schools and businesses have come to Taipower for advice in the area of counseling and to learn how to carry out 'corporate counseling'.



Respecting Customers' Opinions - Enhancing Interaction with the Public

In recent years, Taipower has been carrying out corporate transformations in the hope of becoming more of a service provider. In order to reach this goal, apart from carrying out customer satisfaction surveys each year, a mechanism for the handling of complaints has also been established. Such tools are used to gain a greater understanding of the needs of our clients and come up with more appropriate service strategies. In addition, members from different sectors of society are invited to Taipower to visit our power plants and transformer stations so as to give the public a greater understanding of Taipower and its operations.

Taipower regularly employs the services of external public relations companies to use quantitative phone interviews and qualitative focus interviews to carry out customer satisfaction surveys. The results of such surveys are used not only as a reference for improving the company's operations, but also as a way to understand the demands of clients better and provide the best solutions for our customers. Overall satisfaction for 2006 was 86.1% showing that our users are rather satisfied with our services.

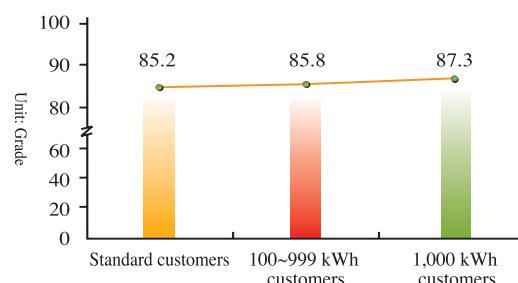
Communicating when dealing with complaints

Taipower has worked hard in the area of customer complaints. In 2006, 2,796 complaints were recorded (of which 2,034 were complaints received via e-mail). Most complaints related to area such as wiring changes (719 cases, 25.7%), bill collections (435 cases, 15.6%), quality of electricity (370 cases, 13.2%) and applications for electricity (256 cases, 9.2%). In cases where the fault was with Taipower, we offered solutions so long as the law permitted them and we had the necessary technology available. In cases where difficulties still existed, apart from trying to reach the bottom of the problem, explanations were also offered to the customers. In cases where the problem was due to problems at the customer end, we also provide detailed explanations and assistance to help customers solve their problems.

84 news releases, 76 media interviews


Based on Taipower's business ideals of 'Sincerity, Care, Innovation and Service', the principles of openness and transparency and providing customers with a diversified range of services, Taipower released a total of 84 press releases about topics such as the company's management, electric resource development, transmittance

► Survey into overall satisfaction 2006



and transformation tools, environmental protection, industrial safety, customer service, company finances and human resources planning. In addition, Taipower made 16 clarifications in response to mistakes in inaccurate media reports. Taipower also took 76 interviews with the media.

A total of 561,871 visits by the public to Taipower

In 2006, a total of 561,871 visits were made to Taipower by visitors from government organizations, civil representatives, schools of various levels, civil groups and foreign guests visited the various Taipower power plants, transformer stations, engineering stations and the Display Hall of 2nd Nuclear Power Station, the Taiwan Electricity Museum and the Lanyu Storage Plant. Visitors were received warmly by the colleagues at Taipower and were given a deeper understanding of the electric power industry in Taiwan. Information about the company was also made more available and transparent to the public. 



Blue sea and sky Display Hall of 2nd Nuclear Power Station

The Display Hall of 2nd Nuclear Power Station is located in Wanli Township. It is approximately 7,700 ping in size and is located at the northern coast scenic and tourism area. Looking off into the mountains and the ocean, the display hall has spectacular natural views, a large parking lot and first class infrastructure. Here, visitors can understand more about nuclear power whilst also observing beautiful natural scenery.

Taiwan Electricity Museum

Located on Xinwu Rd in Taipei County's Xindian, the Taiwan Electricity Museum showcases the history of electric power and its use in Taiwan. The museum features displays of thermal power and electric transmission and transformation systems as well as information on how electricity is related to food, clothing, accommodation, transportation, education and entertainment to show how electricity was behind the growth of the Taiwanese economy and the Taiwanese economic miracle.

Company Organization and Business Overview

Organizational Overview

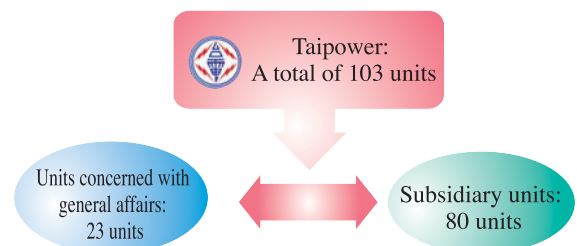
Future Developments for the Electric Power Industry
will Move towards Liberalization,
Diversification and Internationalization

Financial Information

Organizational Overview

The Taiwan Power Company is a state - owned under the Ministry of Economic Affairs. Apart from setting the Board of Directors and supervisors in line with the Company Act, organizational establishment and adjustments are carried out in line with the regulations of the Guidelines for the Organizational Establishment of Enterprises under the Ministry of Economic Affairs.

Taipower's management section has one president. According to related laws and regulations, the president carries out the decisions made by the Board of Directors and decisions made at Managing Director Meetings. There are eight vice presidents assisting the




president and five chief engineers that are responsible for Taipower's various construction projects.

Over the last 60 years, in order to keep up with our rapidly expanding business and meet the various demands of our clients, we have adjusted our organization into two categories. Departments responsible for planning and supervision are referred to as 'General Affairs Management'. These departments include 23 units such as the Secretariat and the Department of corporate Planning. There are also another six cross-department committees to meet different needs. As for subsidiary Departments, there are 80 units and include power plants, power supply branches, local branches and engineering departments.

Operations and Management

We are promoting the use of quality management system of international standard. We have established a

system for overall quality management, and have strengthened the functions of the Board of Directors and supervisors. We have planned an independent director and supervisor system. We have strengthened the internal auditing abilities of Taipower and made our operations and information more transparent. We have established a complete system for internal controls and have strengthened the development of target systems. We have used a responsibility center system to track how tasks are being carried out to fulfill target management. We encourage employees to improve their innovative skills and encourage them to come up with innovative proposals in areas such as work flow improvements, management system adjustments, quality enhancement and business mode innovations. 



Major Services: Power Generation, Transmission and Distribution

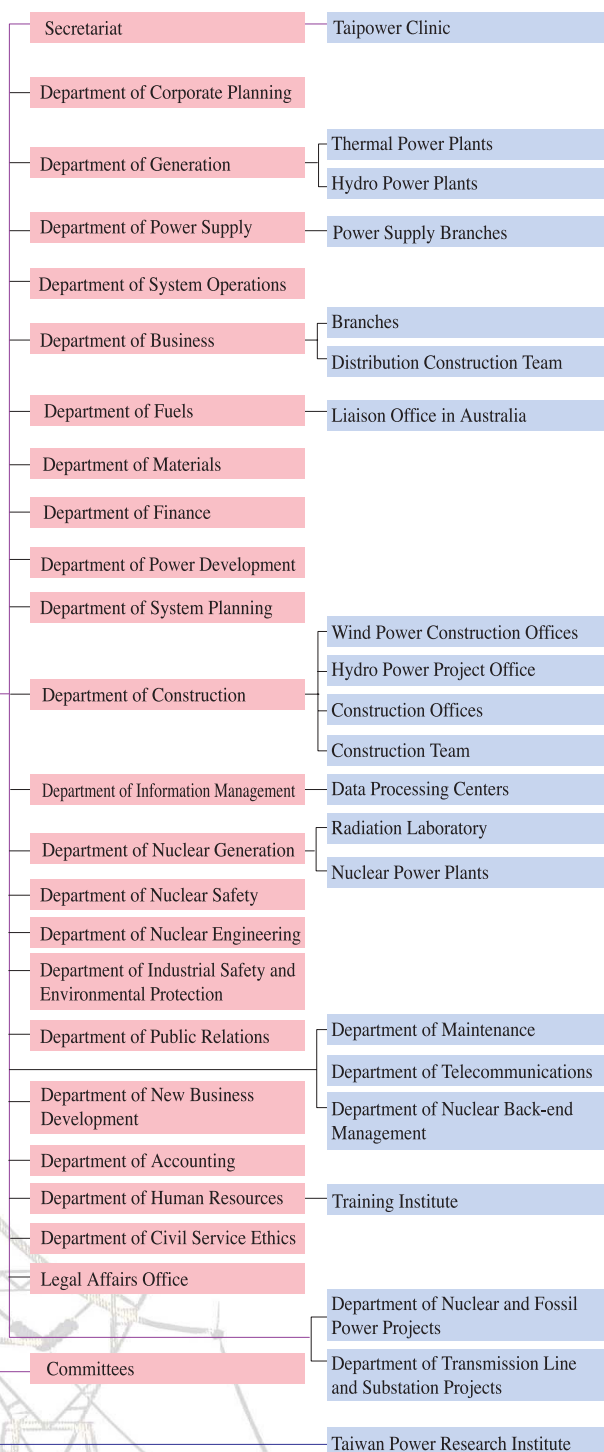
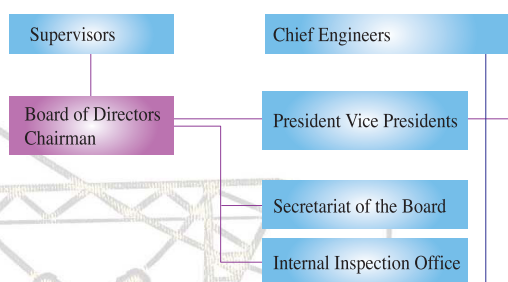
Taipower 's business operations include:

- Power generation, transmission and distribution.
- Design, construction and supervision of domestic and overseas power projects (excluding the services of construction contractor, architect, electrical engineer, electrical technician, and electrical contractor).
- Operation, maintenance, repair and manufacture of electric power machinery and equipment at home and abroad.
- Research and development, training, calibration, testing and other consulting services for power technology.
- Research and development, sales and design of power production by-products, including gypsum and fly ash.
- Sales and leasing of residential and commercial buildings built by contracted constructors.
- Leasing of industrial factories and buildings built by contracted constructors.
- Rentals of pipes, electric towers, electric poles and power equipment.
- Car parking services : H703100 real estate rental business.
- JZ99050 Agency services : G801010 Storage services; JA02051 : Electric meter repairs.

Future Developments for the Electric Power Industry will Move towards Liberalization, Diversification and Internationalization

Taipower is responsible for power development and energy supply, including generation, transmission, distribution and energy sale, to the 23 million people in Taiwan. Besides energy supply, Taipower is diversifying its services to other businesses and internationalization.

Organizational Chart of Taipower



Current Situation of the Electric Power Industry: A responsibility for Economic Development and Social Service

According to the Electricity Law, Taipower has an obligation to serve energy supply, including generation, transmission, distribution and energy sales, to the 23 millions people in Taiwan, and to load with the missions of national economic development and social services. At the end of 2006, total installed generation capacity in the Taiwan power system is 50,220MW. Taipower occupied 74.4% of which, 37,371MW, including 7,280MW from independent power producers (IPPs), which accounted for 14.5%. Until the government deregulated the IPP in 1995, nine IPPs with thermal power plants and two small hydro power plants have been established and are in operation. The 9 thermal power plants are Mailiao, Chengsheng, Xintao, Hepin, Guoguang, Jiahui, Xingyuan, where the hydro power plants are Beinan and Wushantou. The energy production from those IPPs is purchased by Taipower based on long-term contracts. As of December 2006, Taipower gave IPPs signed long-term contracts with guaranteed capacity in the peak load. Taipower also purchases the electricity from approximately 100 cogenerators and resell it to end-users.

These IPPs and cogenerators contributed extremely



► Shenao Power Plant



to stable power supply and system reliability in the Taiwan power system. However, soaring up oil and coal price in the international market have resulted in increasing generation cost in Taipower. The rising generation cost will undoubtedly have a large impact on Taipower's operating environment in the future.

Future Business Trends of the Electric Power Industry

1. Deregulation of the power sector

In order to deal with impacts of economic liberalization, political democratization and the changing social environment, the government announced the policy of deregulating the power sector and started the revising work of the Electricity Act in 1991. However, the draft of the Electricity Act, which proposed by the Executive Yuan, had been withdrawn by the Legislative Yuan from 1999 to 2001. The

draft of the Electricity Act proposed by the government in 2002 was passed the first reading process in the Legislative Yuan. But in the end of 2005, the draft was not able to be a law under the no consensus among the parties in the Legislative Yuan, which part of legislators worrying about the impacts of deregulation on the electricity tariff, service quality, stability and reliability of power supply, and concerning with impacts of deregulation on national economic development and social life. According to internal regulation of the Legislative Yuan, the draft of 2002 should be returned to the government for

resubmission.

Therefore, the Ministry of Economic Affairs (MOEA) resubmitted the new draft of the law on October, 13, 2005 to the Executive Yuan for reviewing based on the market structure of the draft of 2002. The Executive Yuan had finished the first reviewing after 17 times of internal meeting. The MOEA hope that the new draft will be passed by the Legislative Yuan in the end of 2007.

According to the new draft of the Electricity Act Amendment, the government will deregulate the sectors of generation, transmission and distribution and integrated utilities. The generation industries will be defined as non-utilities while the Transmission, distribution and integrated utilities will be



▶ Baha Power Plant (International cooperation)



▶ Tatan Power Plant

defined as public utilities. The Power Dispatch Center will be set up and is in charge of power dispatching and load forecasting under the monitoring of the MOEA. The generation companies can sell the electricity to their consumers through the way of bilateral contract and direct supply and wholesale energy to other generation companies and utilities except transmission utilities. The tariff of generation companies

is not regulated by the government. However, the

▶ **Taipower operation goals**

Item	2006 actual value	2007 target values	2016 target values from 2007 thru 2016	Average growth rates
Installed capacity	37,371 MW	39,340 MW	57,170 MW	4.3%
Transformer station capacity	124,106 MVA	151,623 MVA	205,428 MVA	4.2%
Transmission line length	326,482 ckt-km	329,966 ckt-km	364,887 ckt-km	1.2%
Energy Production	196.6 billion kWh	207.1 billion kWh	297.1 billion kWh	4.2%
Energy Sales	181.6 billion kWh	191.9 billion kWh	276.9 billion kWh	4.3%



Major Investment Goals

2006 plans include: Seven Hydro power plant projects such as the plant at Pihai, five thermal power plant projects such as two plans for the Tatan Combined-Cycle Power Plant as well as unit plans 1 and 2 for the Fourth Nuclear Power Station. In addition, another 5 projects are in planning and include maintenance and extensions on Shenao and Linkou power plants, the third stage of the construction of a coal ship, a wind power plant at Huhsi and a plan for a coal unloading dock at Kaohsiung port.

government will continuously regulate the tariffs of integrated, transmission and distribution utilities.

The integrated and distribution utilities have obligation to serve power supply for customers within their business areas. The more regulations are added in the draft, including the land acquisition process from the private sector and its compensation, reimbursement under transmission line uses and funds of R&D in electricity and back-end of nuclear waste disposal. The tariffs and regulation fee of utilities and the Power Dispatch Center will be regulated by the government.



'Maintenance Promotion Groups', 'Education and Leisure Promotion Groups' and 'Security Promotion Groups', in 2005 we established the 'Honduras Patuca 3 Hydro Power Plan' which included the establishment of the 'Advertising Promotion Center' and the 'Real Estate Promotion Center'. This was aimed at allowing Taipower to become involved in a more diversified set of business activities including education, recreation, security, construction and maintenance, advertising, real estate, information and communications.

In order to keep up with the trend of corporate globalization, Taipower has carried out technological exchanges with foreign organizations, promoted international technological cooperation and expanded the scope of international exchange. In addition, we have also improved our innovative abilities and have expanded our business by pursuing overseas investment and strategic alliances. Such efforts have seen Taipower's business become more international and have also increased our international competitiveness. 

2. Diverse, internationalized operations

In the short-term, our goal is to integrate our key power sources. Development will be based around power generation, transmission, distribution and other related areas. Gradually we will start to focus on upper stream and lower stream operations. Apart from establishing



Patents Successfully Applied for in the Last 3 years by Taipower

1. Combined ultra low frequency magnetic field barrier structure (new type 280530)
2. Device for hydrogen storage (new type 273668)
3. Road backfill material having better heat conductivity and electric cable conduit detection ability (new type 273578)
4. Aquatic breeding device (new type 243017)
5. A user-end, dynamic, two-way load control method and system for same (invention 237169)
6. Electric power management method using demand controller and management system for same (invention 190145)
7. Control system with air conditioning device controller and method for controlling the temperature of air-conditioner (invention 173893)

Financial Information

In 2006, Taipower recorded 389.3 billion NTD in revenue, 385.2 billion NTD in operating expenses, 4.1 billion NTD in operating profit, 8.5 billion NTD in non-operating income, and 15.5 billion NTD in non-operating expenses, and registered a pre-tax loss of 2.9 billion NTD for the year as compared to 1.2 billion NTD of profit in 2005. The increase in loss by 4.1 billion NTD was attributed mainly to the continued escalation of international oil and gas prices. Whilst Taipower adjusted the price of electricity by 5.8% starting July 2006 and tried to save money and reduce loss, a deficit still occurred.

Assets, Liabilities and Stockholder's Equity

Taipower's total assets were worth 1.4076 trillion NTD in 2006. Of these, fixed assets were worth 1.3197 trillion NTD accounting for 94% of total assets. Liabilities reached 849 billion NTD, 60% of total assets. Of these, long-term debts reached 653.3 billion NTD, 46% of total assets. Stockholder's equity was 558.6 billion NTD, 40% of total assets. Of this, capital stock was worth 330 billion NTD, 24% of total assets.

► Simplified Income Statement (Most recent 3 years)

Unit: New Taiwan Dollars in Thousands

Item	2004	2005	2006
Operating Revenue	349,816,104	366,587,773	389,264,170
Gross Profit	33,226,697	20,350,350	14,228,757
Operating Income	22,703,655	10,072,176	4,107,694
Non-operating Income and Gains	5,298,424	6,384,733	8,478,035
Non-operating Expenses and Losses	19,534,597	15,230,868	15,479,540
Profit before income tax from continuing operations (Losses -)	8,467,482	1,226,041	-2,893,811
Profit after income tax from continuing operations (Losses -)	7,095,074	2,154,347	-355,519
Cumulative Effect of Changes in Accounting Principle	—	—	137,507
Net Income (Net losses -)	7,095,074	2,154,347	-218,012
Earnings Per Share	0.22	0.07	-0.01

Note: The statement for 2004 thru 2005 was examined by the Ministry of Audit and reclassified by CPA. Statement 2006 examined by CPA.

► Simplified Balance Sheet (Most recent 3 years)


Units: New Taiwan Dollars in Thousands

Item	December 31 2004	December 31 2005	December 31 2006
Current Assets	45,974,918	43,513,531	51,051,757
Long-term Investments and Funds	4,249,818	3,628,701	3,587,355
Fixed Assets	1,223,859,637	1,270,990,575	1,319,742,236
Intangible Assets	5,643,779	5,907,505	6,180,702
Other Assets	22,679,478	22,458,930	2,7043,530
Total Assets	1,302,407,630	1,346,499,242	1,407,605,580
Current Liabilities Before Appropriation	194,485,910	170,899,313	189,972,679
Current Liabilities after Appropriation	194,485,910	170,899,313	189,972,679
Long-term Debts	585,201,777	611,371,284	653,314,705
Other Liabilities	10,774,543	5,275,456	5,740,228
Total Liabilities Before Appropriation	793,462,230	787,546,053	849,027,612
Total Liabilities after Appropriation	79,0462,230	787,546,053	849,027,612
Capital Stock	330,000,000	330,000,000	330,000,000
Capital Surplus	2,755,447	2,745,035	2,747,268
Retained Earnings Before Appropriation	67,809,748	69,964,094	69,746,082
Retained Earnings after Appropriation	67,809,748	69,964,094	69,746,082
Other Types of Owner's Equity	111,380,205	156,244,060	156,084,618
Total Stockholder's Equity Before Appropriation	511,945,400	558,953,189	558,577,968
Total Stockholder's Equity after Appropriation	511,945,400	558,953,189	558,577,968

Notes: 1. The statement for 2004 thru 2005 was examined by the Ministry of Audit and reclassified by CPA. Statement 2006 examined by CPA.

2. According to the revision of Commercial Accounting Law and amended Criteria for the preparation of Financial Reports by Securities Issuers, starting from 2006, items such as 'Revaluation Increment on Fixed Assets' and 'Accumulated Depreciation on Appreciation of Fixed Assets' that used to be calculated under 'Capital Surplus' are now classified under 'Equity Adjustment'.

Key Points for Management

Taipower's revenue grew by 6.19% in 2006. The operating margin was only 1.06%, down 1.69 percentage points from 2005's operating margin of 2.75%. The main reason for the low operating margin was that, although a 6.3 billion kWh increase in the volume of electricity sold and a slight increase in the price of electricity from July 2006 onwards caused sales to increase by 22.3 billion NTD, this was offset by the continuing rise in international oil prices and the 6.8 billion kWh increase in the volume of electricity supplied by co-generation plants which caused Taipower's expenditure on fuel and the purchase of electricity from co-generation plants to rise by 28 billion NTD compared to 2005. In the future, fuel prices are expected to remain high and the overall business environment will be tough. Taipower must continue to work hard to broaden our sources of income, reduce expenditure and become more efficient. We must also improve our core competencies and get involved in more diversified types of business to increase our markets and guarantee the sustainable management of Taipower. 

Environmental Management

Vision of a Sustainable Environment

ISO 14001 Environmental Management Standards

Environmental Cost Accounting

Air Pollution Control

Waste Reduction and Resource Reutilization

Energy and Resources Use

Industrial Safety and Health

Emergency Preparedness and Response

Environmental Impact Assessments

Eco - conservation

Vision of a Sustainable Environment

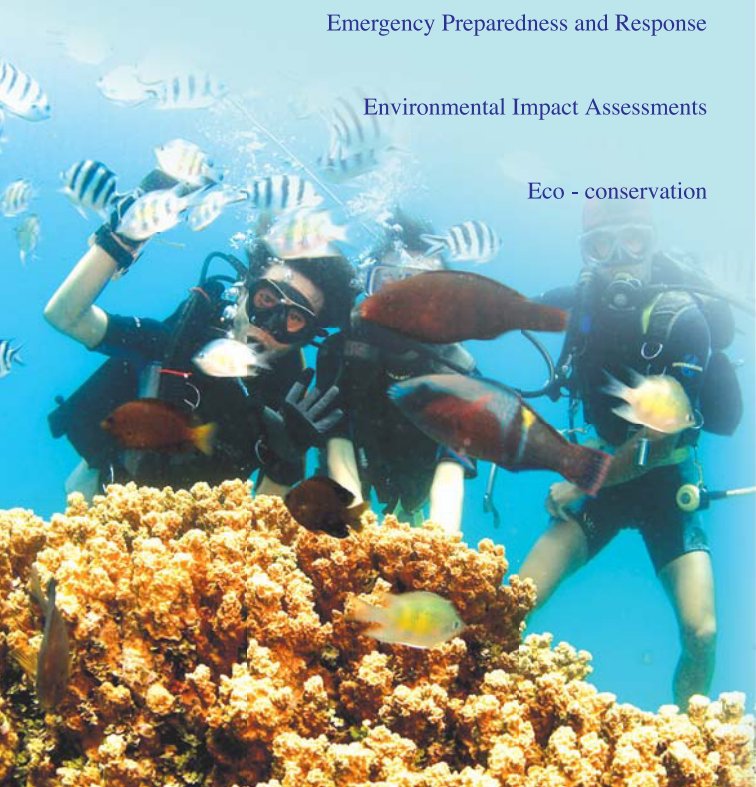
Electric power is the impetus behind the growth of an economy and is also an important resource in assuring a high standard of living. Taipower is in charge of developing and managing electric power in Taiwan. With attention on the environment growing globally, Taipower must continue to establish an image of being an environmentally friendly and sustainable company.

Environmental protection is a never-ending job. Environmental protection is not only aimed at assuring the cleanliness of the environment for this generation, but is also aimed at assuring the welfare of our future generations. At Taipower, we hope that every member of the society can understand our sincerity in the promotion of environmental protection and also hope that our efforts will continue to be supported and encouraged. In this way, we can continue on with our environmental protection work and create a more beautiful, cleaner world for tomorrow.


Environmental Protection Policy

With Taiwan's constant economic development, there is a constant demand for electric power. Taipower has the missions of "Satisfying the diverse needs of our users, increasing the nation's competitiveness and protecting the interests of our shareholders and employees".

Taipower also hopes to "become a renowned, world-class provider of electric power". Thus, Taipower has been working assiduously at improving our safety systems as well as at protecting the environment, the health of people and ecological conservation. In the future, we shall extend the sincerity we have for environmental protection to the welfare of our employees and shareholders, to supplier management, interaction with local communities, public welfare and other major areas. Environmental protection policy measures used by Taipower encompass the following elements:




Environmental Protection Policies

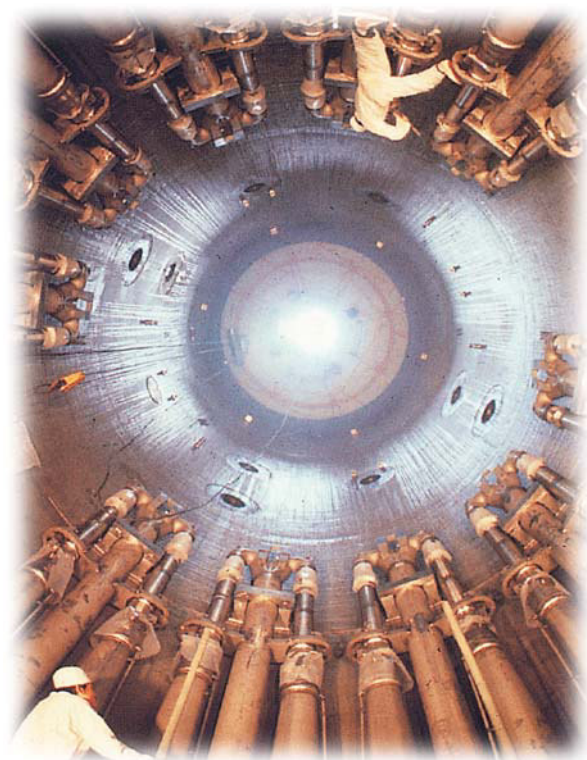
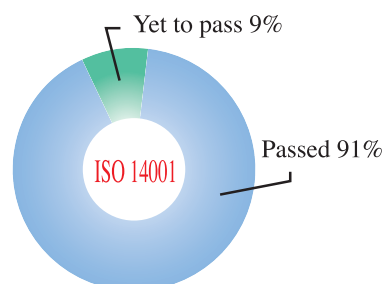
- Formulating policies that meet environmental protection regulations that are also in line with the carrying capacity of the environment.
- Environmental Impact Assessments are carried out to increase the environmental feasibility of our electric plans.
- Improving pollution control measures and maintaining the quality of the environment.
- Increasing public participation and strengthening advocacy.
- Paying attention to the quality of the environment and increasing the planning of tourist sites.
- Paying attention to ecological conservation and restoration.
- Establishing a complete environmental monitoring system.
- Focusing on social work for communities.
- Formulating responses for the handling of environmental pollution disputes.
- Training personnel in environmental protection and setting up complete environmental protection work groups.
- Promoting Environmental Management Standards (ISO 14001) 

ISO 14001 Environmental Management Standards

Since the ISO 14001 Environmental Management Standards were announced in September 1996, many public and private organizations in Taiwan and overseas that are concerned with environmental management and environmentally friendly business practices have promoted the use of ISO 14001. At present, there are more than 1,000 companies who have met ISO 14001 criteria and have been accredited. The main goal of the ISO 14001 standards is to encourage business to continue to improve the quality of the environment which will help increase the quality of companies, their image, decrease pollution and also help strengthen the competitiveness of companies.

In 1997, Taipower's Department of Industrial Safety and Environmental Protection started to encourage Taipower's various departments to establish an environmental management system. During the planning of this system, it was necessary to consider the characteristics of each department and the potential shocks this system would cause each department so as to ascertain which departments should implement the system first. Based on this principle, Taipower chose one (or several) units from departments such as power generation, engineering, maintenance, power supply and business to implement the ISO 14001 standards. Once these departments were certified for ISO 14001, the use of these standards was promoted in other units at Taipower. 

- ▶ The proportion of Taipower thermal and nuclear power plants that have passed ISO 14001 accreditation





ISO 14001 Environmental Management Standards

ISO 14001 is part of the ISO 14000 series of environmental management standards and provides an accreditation system for the environmental management systems of companies. ISO 14001 is an integral part of a company's environmental management capabilities as well as a company's trade and interaction with the public. According to statistical information, there were more than 110,000 companies around the globe who have been accredited for ISO 14001 at the end of 2005.

At Taipower, we started promoting ISO 14001 in our power plant in Taichung, Talin and Linkou and gradually expanded ISO 14001 to other units after this. By the end of 2006, 32 units had passed accreditation for ISO 14001. This not only decreased the impact we have on the environment but also made us more environmentally and economically efficient, helped us improve the way we think about environmental management and helped us establish a culture of environmental management.

The benefits that environmental management systems have brought Taipower

- Environmental management systems have increased the efficiency of Taipower's overall operations, lowered production costs and have helped Taipower give back to society.
- They have helped in the reduction of industrial waste materials by various units and have also helped decrease expenditure on waste material management.
- Helped establish Taipower's image of being a company who cares about environmental protection and the careful use of resources.
- Helped train staff in the use of environmental management systems.
- Discovered problems with pollution and helped in the research on and improvement of related technical issues.
- The risk of environmental accidents has been lowered through continued improvement and anti-pollution measures. This has helped increase Taipower's environmental efficiency as well as Taipower's competitiveness.

► Table of units in Taipower who have been accredited for ISO 14001

Number	Name of unit	Date accredited responsible for accreditation	Organization	Number	Name of unit	Date accredited responsible for accreditation	Organization
1	Taichung Power Plant	1998.10.09	The Bureau of Plant, Metrology and Inspection (BSMI)	17	Taipei City District Office	2003.10.24	BSMI
2	Talin Power Plant	1998.12.14	BSMI	18	3 rd Nuclear Power Station	2004.01.16	BSMI
3	Linkou Power Plant	1999.05.12	BSMI	19	Yunlin District Office	2004.08.06	BSMI
4	Hsiehho Power Plant	1999.06.01	SGS	20	Tungshiao Power Plant	2005.03.31	BSMI
5	1 st Nuclear Power Station	1999.07.09	BSMI	21	Taitung District Office	2005.04.18	BSMI
6	Tainan District Office	1999.11.01	BSMI	22	Yilan District Office	2005.08.31	BSMI
7	Hoping Construction Department	1999.12.02	SGS	23	Tungbu (Eastern) Power Plant	2005.12.29	BSMI
8	Kaohsiung/Pingtung Power Supply Branch	1999.12.03	BSMI	24	Fengshan District Office	2005.12.03	BSMI
9	Takuan Power Plant	2000.06.22	BSMI	25	Southern Region Construction, Office, Department of Transmission Line and Transformer Construction	2006.03.24	BSMI
10	Nanpu (Southern) Power Plant	2001.03.02	BSMI	26	Central Region Construction Office, Department of Transmission Line and Transformer Construction	2006.05.19	BSMI
11	Hsinta Power Plant	2001.04.13	BSMI	27	Northern Region Construction Office, Department of Transmission Line and Transformer Construction	2006.05.05	BSMI
12	2 nd Nuclear Power Station	2001.07.26	NSF	28	Wanjung Construction Department	2006.08.09	BSMI
13	Mingtian Power Plant	2001.09.13	BSMI	29	Taichung District Office	2006.10.04	BSMI
14	Pumped Storage Construction Office	2002.12.13	BSMI	30	Peinan District Office	2006.10.20	BSMI
15	Pingtung District Office	2003.01.09	BSMI	31	Chiayi / Nantou Power Supply Branch	2006.12.20	BSMI
16	Department of Maintenance	2003.04.25	BSMI	32	Hualien / Taitung Power Supply Branch	2006.12.22	BSMI

Note: 1. SGS stands for SGS Far East Ltd., Taiwan.

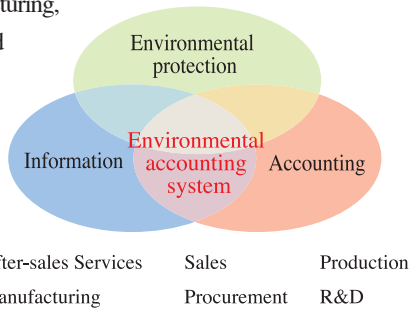
2. NSF stands for NSF International Strategic Registrations.

Environmental Cost Accounting

Taipower is one of Taiwan's major state owned enterprises and fulfilling social responsibility is one of Taipower's most important goals. However, air pollution, noise and water pollution are unavoidable during the process of supplying electric power. Apart from Taipower's original investments in technology and equipment, effective environmental management tools and an environmental management accounting system must be established in order to protect the environment. By using complete information on the environment and finances, we will be able to reach our goal of sustainable management.

Theories on the environment are mainly concerned with aspects of the external environment a company must protect. In a broader sense, theories on the environment can include employee working environments as well as industrial safety and health. Environmental accounting is a new knowledge area concerned with the environment and accounting.

Industries in the past were concerned with maximizing profit. They placed emphasis on equipment and technology necessary for production and less emphasis on business management systems. Financial information was only used to gain a glimpse of how a company was performing. In the future, industries will be under pressure from the various international environment standards that are currently in use. Apart from maximizing profit, companies will have to become capable of sustainable management. One of the goals of environmental protection is to establish a company capable of having sustainable after sales service, sales, production, manufacturing, procurement and research and development. Therefore, apart from striving for growth, we at Taipower are



► Diagram of environmental accounting system



Environmental Management Accounting

Environmental management accounting is also known as green accounting. Environmental management accounting is a systematic way of turning environment related activities (such as environmental protection, industrial safety and health) into financial or accounting information. With this information as a base, management methods are used to solve environmental problems and obtain sustainable management of a company. In the future, various environmental protection laws will have to be followed. These laws will place certain restrictions on us and greatly raise our environmental costs. Therefore, clear figures on environmental costs must be gained in order to truly understand the real costs of our operations.

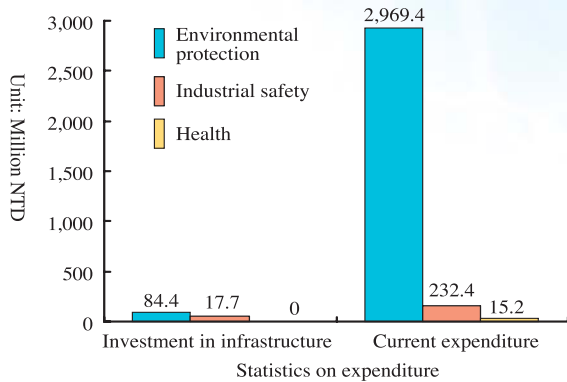
also working assiduously in environmental protection and is taking responsibility for the effects our operations have on the environment.

Organization of Environmental Accounting at Taipower

At Taipower, the use of an environmental accounting system must be integrated into the whole of our organization if it is to become a professional and effective mechanism. For example, when environmental accounting was introduced at the Hsinta power plant, the convener of the task group for environmental accounting was the vice president of Taipower's department headquarters. The vice president was then responsible for integrating the other first-level departments, including the Department of Accounting, the Department of Information Management and the Department of Generation. The Department of Industrial Safety and Environmental Protection oversaw the whole project.

After first introducing the environmental accounting system in 2003 at Hsinta power plant, the system was gradually introduced to another eight thermal power plants and in 2006, current expenditure for equipment investments in environmental protection, industrial safety and health at thermal power plants was organized.

► Statistics on expenditure at nine thermal power plants in 2006 expenditure



► Comparison of the price of electricity and consumer expenditure in recent years in Taiwan

Item	2001	2002	2003	2004	2005	2006
Average price of household electricity kWh (NTD)	2.54	2.54	2.51	2.49	2.51	2.57
Consumer Price Index (CPI) (from January 2005-December = 100)	100	99.80	99.52	101.13	103.46	104.08
Average monthly use of electricity per household (kWh)	297	305	316	313	328	321
Average monthly expenditure on electricity per household (NTD)	754	775	793	779	823	825
Electricity expenditure and its ratio of on consumer expenditure per household (%)	1.45	1.49	1.54	1.46	1.47	1.92

► Statistics of the major costs at nine Taipower thermal power plants

Unit:Millions NTD

	Linkou	Shenao	Nanpu	Talin	Hsinta	Taichung	Tungshiao	Hsiehho	Chienshan	Total
E1 Business operation costs	78	36	21	43	784	849	578	124	31	2,544
E2 Costs involved in linking upstream and downstream suppliers and clients	0	1	0	1	4	1	0	0	0	7
E3 Managerial costs	9	8	7	9	11	1	20	14	0	79
E4 Research and development costs	0	0	0	0	2	0	0	3	0	5
E5 Social activity costs	0	0	1	0	4	11	1	2	6	25
E6 Losses and compensation costs	0	0	0	0	0	0	0	0	0	0
E7 Official fees and taxes as well as other expenses like carbon tax	17	120	0	114	70	59	0	132	10	522
Total	104	165	29	167	875	921	599	275	47	3,182

Affordable and Stable Electricity Supplies

After several energy crises, Taiwan's household electricity prices started to be calculated by a progressive rate. Over the last six years, there has not been a significant change in the cost of electricity kWh. In 2006, the price of electricity increase slightly by 2.3% which is low and stable when compared to the increase in the consumer price index over the last six years. Following increases in household electricity use, the average amount of money spent on electricity each month by households has went from 754 NTD in 2001 to 825 NTD in 2006. Even though households are consuming more, there was only a 1.92% increase in the money spent on electricity by families. This shows that Taiwan's electricity prices are stable and that although users are using more electricity, prices have not risen accordingly.

Compared to other nations, electricity in Taiwan is less expensive. However, electric power costs have fluctuated in recent years due to soaring international fuel prices and large increases in fuel expenditure and the cost of buying electricity.

► Comparison of electricity prices between Taiwan and other countries of the world

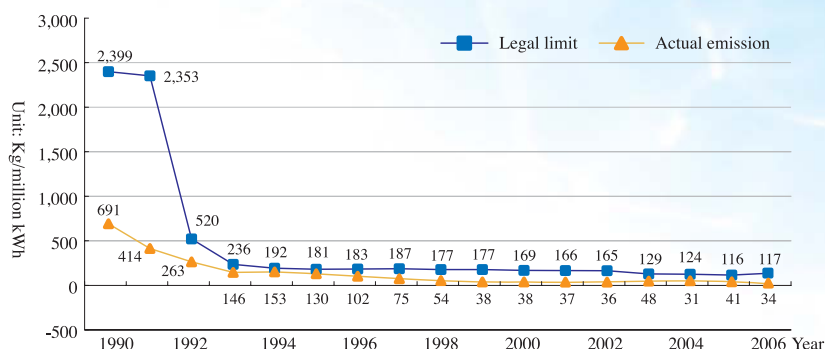
Unit: NTD

Household electricity				Industrial electricity			
Country	Average price of electricity (NTD/kWh)	Country	Average price of electricity (NTD/kWh)	Country	Average price of electricity (NTD/kWh)	Country	Average price of electricity (NTD/kWh)
Indonesia	1.8857	Finland	3.8926	Norway	1.3833	Spain	2.6701
Malaysia	2.0333	New Zealand	4.3430	France	1.6085	Switzerland	2.6701
Norway	2.2841	Switzerland	4.4716	United States	1.8015	Slovakia	2.7616
Thailand	2.4836	Slovakia	4.5360	Malaysia	1.8423	Singapore	2.7863
Taiwan	2.5933	France	4.5360	Taiwan	1.8573	Mexico	2.8310
South Korea	2.9228	Philippines	4.6601	Indonesia	1.9170	Hong Kong	2.8642
United States	3.0240	United Kingdom	4.7933	New Zealand	1.9302	Hungary	3.0883
Mexico	3.1205	Hungary	4.8255	South Korea	1.9335	Portugal	3.1527
Singapore	3.2267	Spain	4.9542	Thailand	2.2051	Ireland	3.1848
Czech Republic	3.4100	Austria	5.5976	United Kingdom	2.2391	Austria	3.2813
Hong Kong	3.7048	Portugal	5.7906	Poland	2.2519	Turkey	3.4422
Turkey	3.7961	Ireland	6.4018	Finland	2.2519	Philippines	3.9459
Poland	3.8926	Japan	6.5111	Czech Republic	2.6058	Japan	4.8310

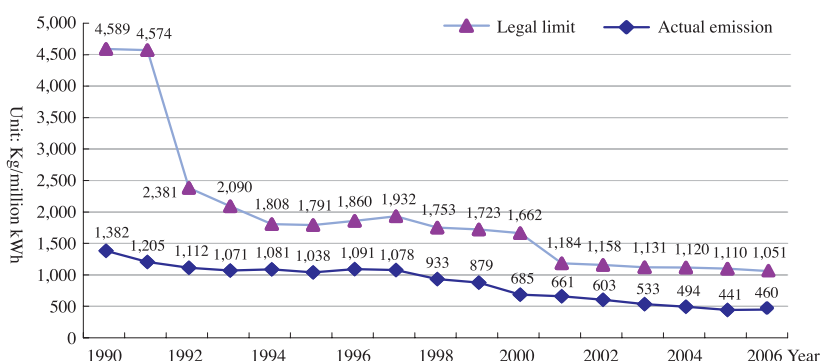
Note: 1.Information Source: Statistics from the Energy Information Administration (EIA), United States.

2.Taiwan's average electricity prices are based on the actual 2006 values after the price of electricity was changed on July 1 2006.

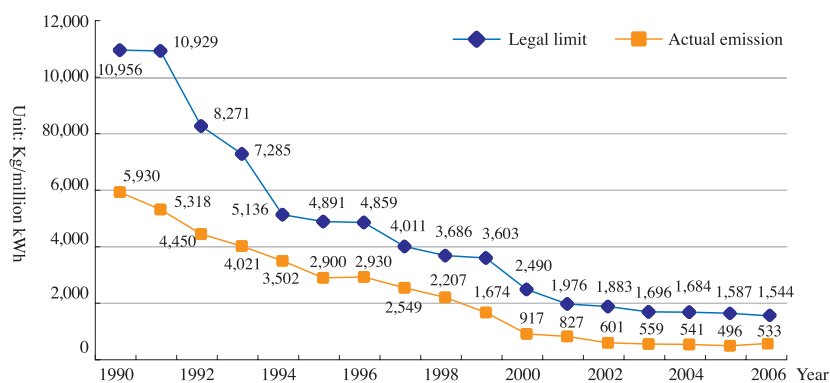
▶ Performance in environmental improvement of Particulate Pollutants



▶ Performance in environmental improvement of Sulfur Oxides



▶ Performance in environmental improvement of Nitrogen Oxides



Air Pollution Control

In terms of air pollution, Taipower is doing two things: monitoring the quality of the air and bringing in air pollution controls for construction work and general operations. Starting from 1988, Taipower has completed work on air quality monitoring systems in areas around thermal power plants. This allows us to keep track of the air quality near our power plants at all times.

The figures obtained from our monitoring stations must be recorded because they are an important reference material when looking at air quality. Monitoring results for 2006 are shown in the following table 'Report on environmental and air quality in areas nearby Taipower thermal power plants in 2006'.

▶ Report on environmental and air quality in areas nearby Taipower thermal power plants in 2006

Location	Number of monitoring stations	Sulfur Dioxide (ppb)	Nitrogen Dioxide (ppb)	Small suspended particles PM10 (ug □ m ³)
Shenao	4	4.0-11.8	7.8-9.8	45.3-64.3
Hsiehho	3	5.7-7.7	10.8-16.6	33.5-63.0
Linkou	8	3.2-6.2	11.3-16.5	49.7-92.4
Tunghsiao	8	3.8-8.4	12.0-16.8	52.2-93.2
Taichung	11	4.8-8.0	12.2-20.9	49.4-77.8
Hsinta	6	3.2-5.7	16.0-17.9	74.2-79.5
Nanpu (Southern Plant)	3	8.4-8.6	25.4-27.7	78.0-79.6
Talin	6	8.6-11.7	19.8-24.1	76.0-81.1
Chienshan	3	3.1-4.0	4.6-5.4	44.5-47.9

Note: The various values shown in this table are yearly averages of Taipower's thermal power plants gained from environmental and air quality monitoring stations.

The Emission of Pollutants

From 1988, Taipower installed continuous monitoring apparatuses for flue gas emissions on all chimneys of our thermal power plants in order to measure the amount of pollution in the air. This allowed our anti-pollution equipment to work at the most efficient state and helped us minimize the amount of pollutants we emit into the air.

▶ Report on air pollution by Taipower thermal power plants in 2006

Name of power station	Number of units	Sulfur Oxides (ppm)	Nitrogen Oxides (ppm)	Particle pollutants (mg/Nm ³)
Shenao	3	271-285	171-179	23-24
Hsiehho	4	159-176	110-127	14-26
Linkou	3	2-41	21-189	3-16
Tunghsiao	6	0.3-1.9	16-69	6-10
Taichung	10	18-43	41-91	3-13
Hsinta	9	0-81	19-170	1-17
Nanpu (Southern Plant)	4	—	16-21	—
Talin	6	0.3-144	27-141	0-15
Chienshan	12	147-167	192-591	28-41

Note: The various values shown in this table are yearly averages obtained from the generating units at Taipower's thermal power plants.

Improving Technology to Release Emissions

In recent years, the public has been demanding better quality air. Taipower has been working assiduously in this area and has been carrying out various projects aimed at improving air quality. Taipower's measures have not only met related rules and regulations, but have also met the commitments required by Environmental Impact Assessments. We have also established a series of anti-air pollution measures that can be carried out in three ways including changing to different fuels, controlling combustion and installing equipment that can be used to fight pollution after the burning of resources has taken place.

1.Strategy for dealing with Particulate Pollutants

This involves using low ash fuels with suitable



combustion methods and improving existing dust collectors and installing new ones (fuel units must also have putty reduction equipment).

2.Strategy for dealing with Sulfur Oxides

This involves using low sulfur fuels with Flue Gas Desulphurization (FGD) equipment and increasing the number of natural gas units.

3.Strategy for dealing with Nitrogen Oxides

This involves using low nitrogen fuels with improved combustion methods (for example dampers, low nitrogen oxide burners, flue gas recycling) and installing high efficiency selective catalytic reduction equipment.

Constant Improvements

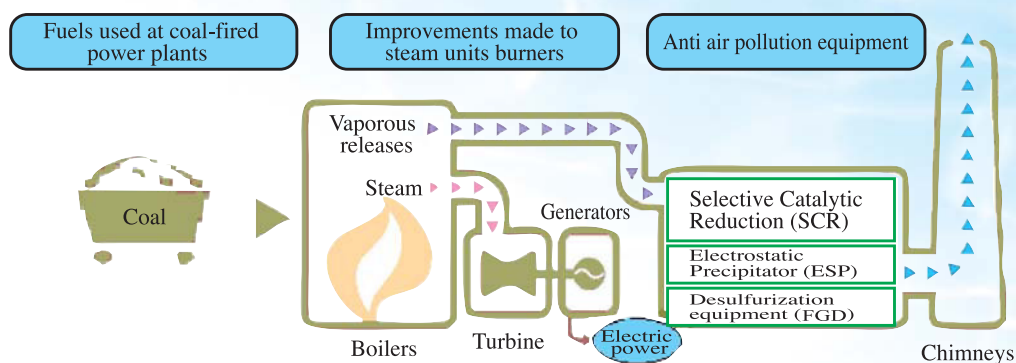
As of June 2005, a project which included 11 sub-projects aiming at improving air quality by reducing emissions of sulfur oxide and nitrogen oxide from 18 steam units at five of our power plants was completed. A total of 13.2 billion NTD was put into these projects. Considerable improvements were made to air quality after the projects were completed and put into use.

After our power plants implemented the various projects aimed at improving air quality and lowering pollution, the average emission of air pollutants per unit in 2006 was better than in 1989 when the Suggestions for Improvements to be made in air pollution at Taipower Thermal Power plants was made. Such results clearly show the improvements we have made at Taipower in lowering pollution and improving air quality. Emission concentration of particulate pollutants, sulfur oxide pollutants and nitrogen oxide pollutants from unit chimneys are all below the amounts allowed by the law. We are also decreasing emissions considerably each year.

Setting up Goals - Our Own Hopes and Wishes

The annual targets set forth by Taipower each year take into consideration care for the society and environmental effects. This year we made target plans to reach for emissions based on actual emission levels from last year. We also hope that we can improve our self management capabilities.

► Overview of measures used at Taipower coal-fired power plants to prevent air pollution




► Data on the emission of air pollutants by Taipower thermal power plants

Performance in environmental improvement (air pollutants)						
Item	2001	2002	2003	2004	2005	2006
Particulate Pollutants (Kilograms/million kWh)	37	36	48	51	41	34
Sulfur Oxides (Kilograms/million kWh)	827	601	559	541	496	533
Nitrogen Oxides (Kilograms/million kWh)	661	603	533	494	441	460

► Improvements made in the emissions of air pollutants by Taipower thermal power plants

Emissions of air pollutants made by units at Taipower (Kilograms/million kWh)	1989	2006	Rate of reduction (%)
Sulfur Oxides	6,323	533	91.6
Nitrogen Oxides	1,503	460	69.4
Particulate Pollutants	745	34	95.4

Amongst the indexes used by Taipower for making improvements and becoming more environmentally friendly, particulate pollutants per million kWh of electricity produced dropped from 37 kilograms in 2001 to 34 kilograms in 2006. This is way below the 116 kilograms allowed by the law. Sulfur Oxide emissions per million kWh of electricity went from 827 kilograms in 2001 to 533 kilograms in 2006. Nitrogen Oxide emissions went from 661 kilograms per million kWh of electricity in 2001 to 460 kilograms in 2006. These are all considerable reductions and clearly demonstrate the resolve Taipower has to improve the environment and become more environmentally friendly, the hard work we have carried out as well as our commitment to meeting our social responsibilities. 



Waste Reduction and Resource Reutilization

It is inevitable that various types of waste will be produced during the process of power generation and supply, such as the coal ash produced in thermal power plant and, in the past, transformers that contained PCBs. It is thus vitally important to implement effective planning for waste reduction and recycling, and to implement them in such a way that power plant operations are not adversely affected. By doing so, an important contribution can be made towards ensuring the sustainability of the earth's resources, and towards the maintenance of environmental quality.

Coal Ash

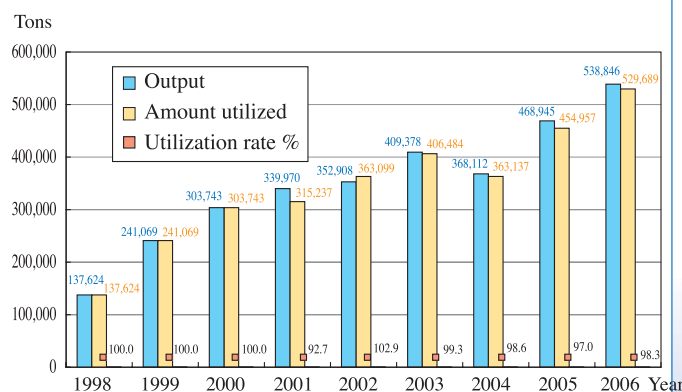
Coal ash from thermal power plant is a major component of Taipower waste stream. Coal ash comprises fly ash and bottom ash. Fly ash can be used as a partial substitute for cement because of its pozzolanic properties. In the construction industry in Taiwan, fly ash is used primarily in ready-mixed concrete to enhance the strength and density of concrete in the late stage. Taipower has set up an ash-recycling program to push for more effective integration of ash resources, establishment of marketing channels, establishment of processing plants, and the development of a wider range of uses for coal ash. The objectives of this program are two-fold: to prevent the coal

ash disposal problem from undermining the operation of power plants, and to tap new sources of income for the company. After many years of effort, the vast majority of the coal ash produced by Taipower's coal-fired power plants of Taipower is already being recycled as illustrated in the figure - Taipower Coal Ash Generation and Reutilization over the Years.

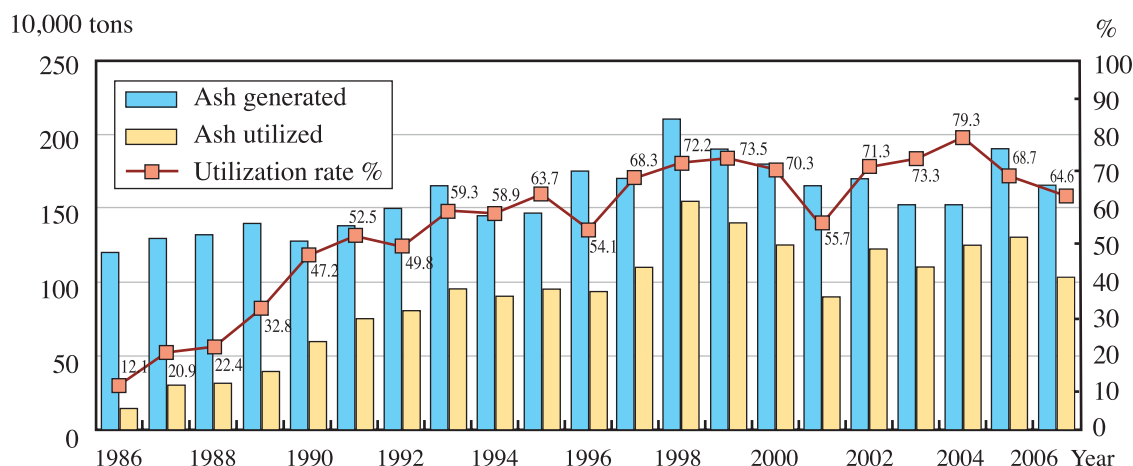
Gypsum

The sulfur contained in the coal used in coal-fired power plants is converted into sulfur oxide during the combustion process, and is then emitted with the flue gas. To comply with the national environmental standards, reduce the emission of sulfur oxides in flue gas, and improve air quality, Taipower has installed exhaust desulfurization facilities at three major coal-fired power plants, namely Linko, Taichung and Hsinta, which use

► Taipower's Gypsum Output, Amount Utilized and Utilization Rate Over the Years




► Taipower's Coal Ash Generation and Reutilization Over the Years



limestone slurry to transform sulfur oxides in flue gas into gypsum. The gypsum by-product produced by Taipower is sold to local cement makers and fire resistant board makers.

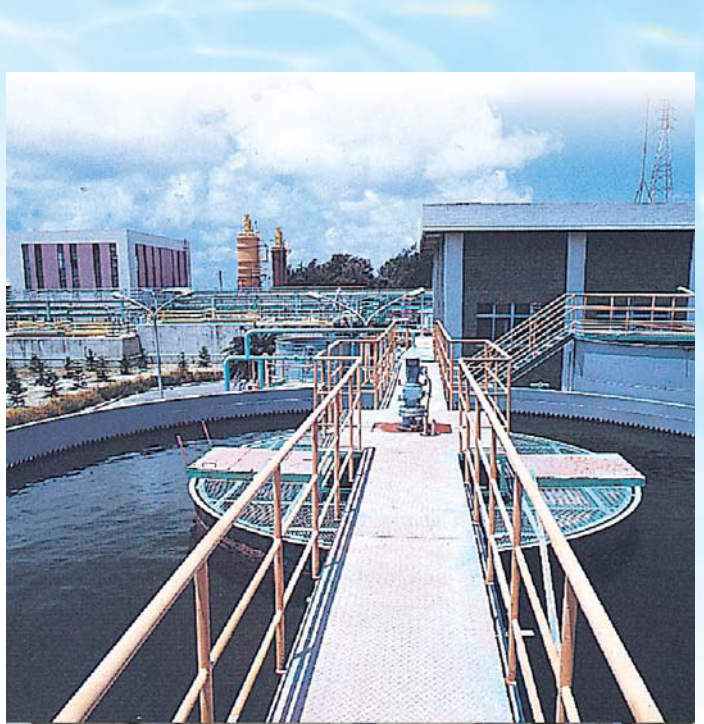
PCB Waste

Over the concern that insulating oil in pin-rod type transformers purchased by Taipower prior to 1983 might be contaminated with PCB, Taipower would test all retired transformers for the presence of PCB and clean them up according to the prevailing environmental regulations if PCB is found. Between August 2001 and the end of 2006, we have cleaned up 7,228 PCB-contaminated transformers that weigh in total 1,524 tons. 



National Enterprise Environmental Protection Award

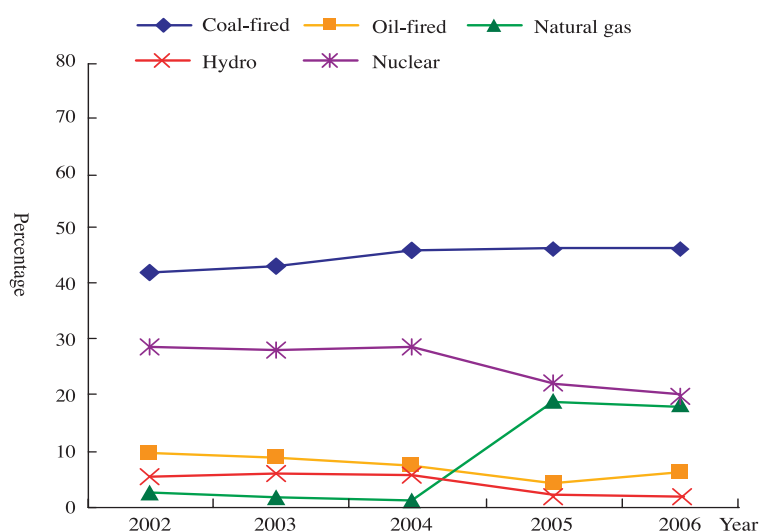
In the efforts to achieve effective utilization of resources and address the environmental pollution problem, Taipower set up a Waste Reduction Advisory Team in 1993 to plan and promote industrial waste reduction and participation in environmental contests. In 2006, the Hsinta Power Plant was one of the recipients of the Environmental Protection Administration's 15th Annual Enterprises Environmental Protection Award of the Republic of China, in recognition of its impressive achievements in environmental management system implementation, process improvement, pollution prevention, energy conservation and waste reduction. The Hsinta Plant's managers had an audience with the President, who commended them for their efforts.



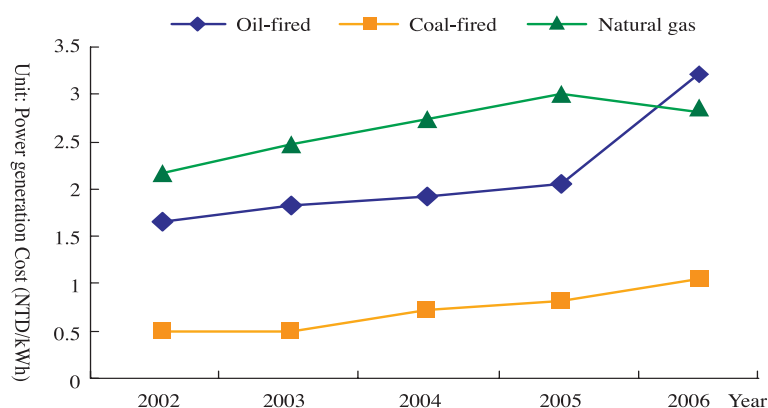
Energy and Resources Use

According to Taiwan's Energy Statistical Data Book, the installed capacity of Taipower's gas-fired generators rose from 4.20% of nationwide power generation capacity in 1900 to 14.95% by 2006, growing nearly 260%. Over the same period of time, the shares of oil-fired and nuclear power generation declined markedly, while the shares of coal-fired and hydro-power generation dropped modestly.

► Power Generation of Various Forms as a Percentage of Total Installed Capacity, 2002~2006



► Cost Trends of Coal-fired, Oil-fired and Natural Gas Power Generation, 2002~2006



Fuel Prices vs. Electricity Price

According to Taipower's cost analysis in 2006, fuel cost accounted for 77.74% of the cost of power generation, suggesting the conspicuous influence of fuel prices over the price of electricity. Given that the costs of power generation vary significantly, cost factor becomes a prime consideration in the subsequent adjustment of power generation structure.

Take the example of fossil fuels, including coal, oil and natural gas, the costs of power generation by taking into the fuel cost alone for Taipower were NT\$1.03/kWh, NT\$3.32/kWh, and NT\$2.89/kWh for coal, oil and natural gas respectively in 2006, indicating the considerable high costs of gas and oil-fired generation as compared to coal-fired generation.

Leader in Energy Conservation Efforts

Taipower generated and purchased altogether 196.57 billion kWh of electricity in 2006, an increase of 3.6% from 2005. Pumped Storage generation amounted to 3.9 billion kWh or 2.0% of the total; thermal generation reached 150 billion kWh or 76.3% of the total; nuclear generation amounted to 38.32 billion kWh or 19.5% of the total; renewable energy amounted to 4.33 billion kWh or 2.2% of the total; purchases from hydro, cogeneration and IPPs combined amounted to 47.72 billion kWh or 24.3% of the total. The share of renewable energy increased by 4.9% from the year before, indicating its potential and importance in future energy production.

As Taiwan's leading power supplier, Taipower has the obligation and responsibility for stable power supply and public education of energy conservation. In promoting internal energy conservation, Taipower has established the "Guidelines for Promotion of Energy Conservation" and "Guidelines for Review of Energy

Conservation" to track the monthly power, water and oil consumptions, and openly commends departments with outstanding performance each year. Taipower also raises employees' awareness to energy conservation through events such as "Energy Conservation Day" to build a corporate culture of conservation. For 2006, Taipower conserved 104 million kWh of electricity, 144,500 liters of oil, and 435,700 tons of water, that in combination was equivalent to 26,000,000 liters of oil and saved NT\$72

million in energy expenses.

Energy Supply Management

Taipower adopts a generator efficiency enhancement strategy. Aside from keeping generating units in optimum working condition, Taipower procures new units that employ the best available technology and upgrades existing units to enhance the generation efficiency.

Energy Demand Management

Taipower also actively promotes public awareness and acceptance to energy conservation in the hope to reduce energy consumption via "demand-side management." Actions currently taken by Taipower include:

- Holding large energy conservation events to catch the attention of the public.
- Widely distributing printed promotional materials on energy conservation.
- Producing printed and electronic ads and propagating through mass media.
- Setting up energy conservation showroom at business outlets.
- Setting up toll-free energy conservation hotline to provide professional counseling service.
- Stepping up visit to large energy users to provide professional counseling service.
- Advising users with less than 80% power to upgrade their equipment

Rainwater Recovery

Precipitation in Taiwan averages 2,500 mm a year, which is considered abundant. But due to uneven distribution of rainfall in both time and space, usable river runoff amounts to only 18%. Given Taiwan's dense population and well-developed industrial installations, the country's average available water yield is only one seventh of the world average, which turns Taiwan into a water stressed country.


Rainwater retention and utilization is a substitute water source that does not consume energy. It is also pollution-free, easy to access, free of water right dispute, and provides fine quality of water. Overall, it is an economical and practical water development option. The rainwater system collects water from rooftops and grounds. It is a multi-purpose system that can replenish water supply for households, industrial zones, and fire fighting, and help reduce the peak load of cities during a flood.

Zero Discharge of Wastewater

Being conscientiously aware of the importance of water resources, Taipower has been committed to the efforts of water conservation and pursuing the goal of "zero discharge of wastewater." In action, Taipower embarks on rainwater collection and wastewater reutilization projects, including collecting rainwater in plant compounds and analyzing wastewater suitable for recovery to cut down the use of tap water for power plant operations. Taipower's 2005 target plan formulated at the end of 2004 also included the installation of rainwater recovery facilities, the Taichung and Tunghsiao Power Plants Rainwater Recovery Facilities Plan (proposed under government directive, which entails integrated planning for the recovery of rainwater around plant compound and in dormitory area, and domestic and industrial water), implementation of rainwater recovery at new establishment (e.g. Datan Power Plant), and evaluation of installed rainwater recycling facilities at Hsinta Power Plant.

Take the example of Hsinta Power Plant, in 2006, its wastewater treatment system for generating units recycled 76.84% of wastewater (about 350 tons a day, excluding FGD wastewater), and its domestic wastewater treatment system recycled 86.65% of wastewater (about 37 tons a day). Rainwater collected in the plant compound averaged 418 tons a day. The water recycled from generating units and boilers totaled 222,930 tons, representing 8.89% of the plant's water consumption for the year.

Benefit Analysis

- Investment in generating unit wastewater recovery equipment: NT\$8,114,285 (date completed: 2000.02.10); amount of water recycled in 2006: 127,890 tons; cumulative amount of water recycled from 2000 to 2006: 618,975 tons.
- Investment in domestic wastewater recovery equipment: NT\$500,000 (date completed: 2003.03.28; amount of water recycled in 2006: 13,616 tons; cumulative amount of water recycled from 2003 to 2006: 36,387 tons.
- Investment in rainwater recovery equipment: NT\$41,523,810 (date completed: 2002.12.15; amount of water recycled in 2006: 155,753 tons; cumulative amount of water recycled from 2004 to 2006: 362,577 tons.
- Boiler water recovered in 2006: 95,010 tons.
- Cost Saving Analysis: (calculated by NT\$11.5 per ton of water) 

Project	2006 performance (tons)	Savings in water charges (NT\$)
Recovery of generating unit wastewater	127,890	1,470,735
Recovery of domestic wastewater	13,616	156,584
Recovery of rainwater	155,753	1,791,160
Recovery of boiler water	95,010	1,092,615
Total	392,269	4,511,094

Water Conservation Performance of Hsinta Power Plant

Project	Water consumption			Economic benefit		
	Before improvement (M ³ /month)	After improvement (M ³ /month)	Water conserved (M ³ /year)	Savings (NT\$/year)	Investment (NT\$)	Payoff period (months)
Wastewater reutilization	294,000	240,000	648,000	7,452,000	8,614,285	13.8
Rainwater reutilization (estimated)	—	—	584,000	6,716,000	41,523,810	74.2

Note: 1USS = 34NT\$



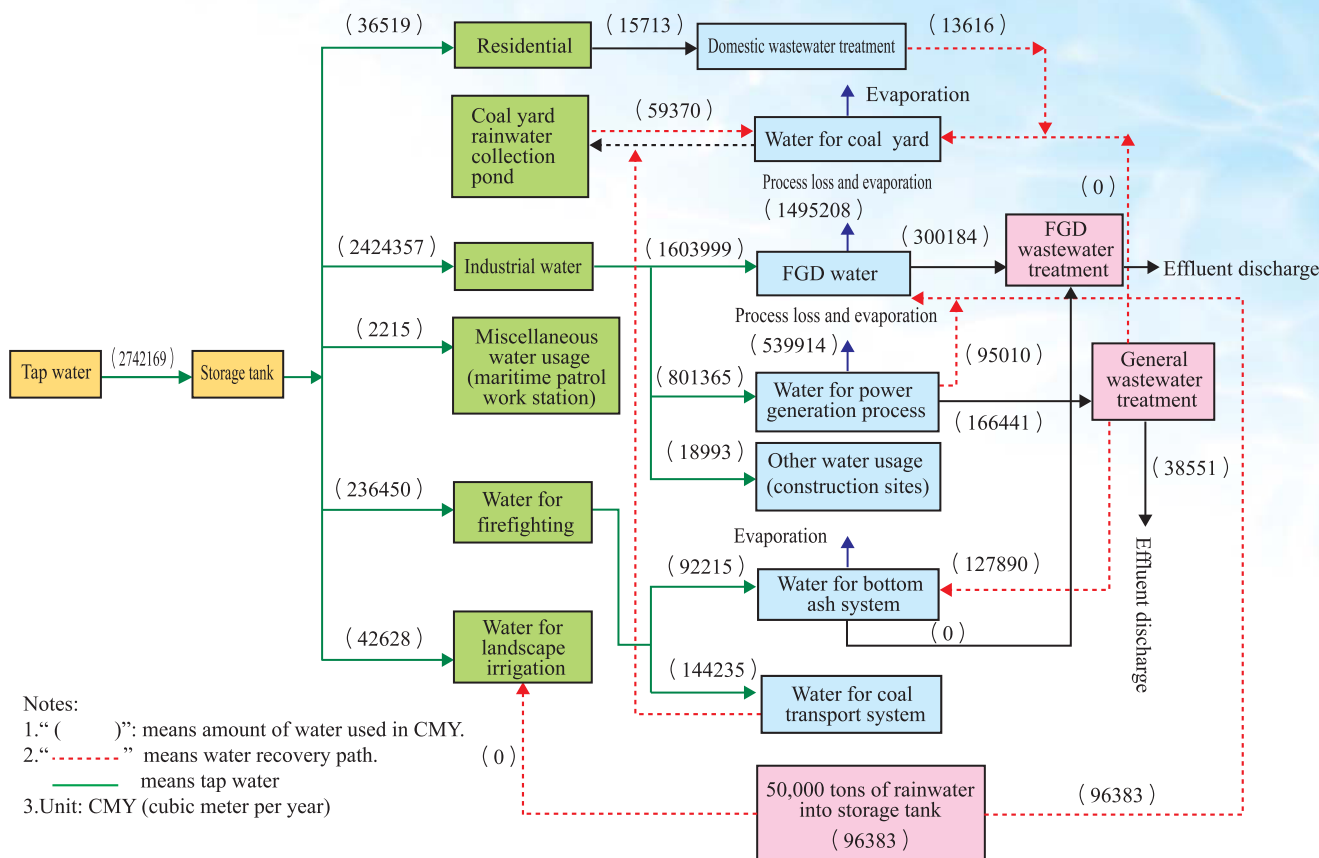
Excellence in Water Conservation



The Hsinta Power Plant was named outstanding unit in water conservation by the Water Resources Agency, Ministry of Economic Affairs in 2003. This affirmation is a boost to the morale of Taipower in the work of water conservation and sets higher expectations of Taipower's future undertakings in wastewater recovery and rainwater reutilization.



► Hsinta Power Plant's Water Consumption in 2006



- Notes:
1. “ () ”: means amount of water used in CMY.
 2. “ - - - - ” means water recovery path.
 3. Unit: CMY (cubic meter per year)



Water Conservation


Hsinta Power Plant's water conservation efforts and equipment management achieved the following results in 2006:

- Discharged boiler water was used by FGD equipment, saving 524 tons/day of tap water.
- Treated wastewater from generating units, general wastewater, and combined cycle wastewater recovered totaled 456 tons a day, of which, 252 tons/day were supplied to SSC system, and 204 tons/day were sent to the water pond of coal yard for treatment and reutilization.
- 37 tons/day of recovered domestic wastewater were supplied to coal yard for sprinkling purpose.
- The rainwater collection equipment has been installed, which is expected to save 426 tons/day of water for use by FGD system, coal yard sprinkling, landscape, and toilets.
- Ditches and sump tanks are installed for rainwater collection throughout the plant compound. The use of automated control system facilitates the water conservation efforts.
- Instrument control protection device is installed for the recycled water tank of boiler SSC system.

Industrial Safety and Health

Electricity is indispensable in modern life, also a requisite for commercial and industrial activities. Economic prosperity and improvement in quality of life are dependent on stable power supply. In the past fortyish years, Taipower has been able to ensure adequate and reliable power supply for the development of Taiwan's industries. We invest as much as possible to protect the safety and health of the hardworking employees of Taipower company.

Taipower aims for zero accident, but invariably experiences some incidents of work accident each year. Taipower's frequency-severity indicator (FSI) was 16.19 in 2004, which dropped to 11.51 in 2005, and went further down to 5.55 in 2006, showing an improvement in industrial safety performance.

To minimize occupational hazard, Taipower has been advising all units to establish the prevention-based OHSAS 18001, the International Occupational Health and Safety Management System. The Taichung and Mingtan power plants passed the OHSAS 18001 certification in 2005. Another six units, Department of Maintenance, Linkou Power Plant, Tunghsiao Power Plant, 2nd Nuclear Power Station, Kaohsiung-Pingtung Power Supply Branch, and Radiation Laboratory were certified in 2006. 



The Benefits of Being OHSAS 18001 Certified

- Reduce the chance of accident.
- Reduce the work stoppage time and associated expenses.
- Demonstration of compliance.
- Demonstrate to shareholders the company's commitment to work safety and health.
- Demonstrate conformity with world trends.
- Have a new channel to communicating with new clients and business partners.
- Better manage the current and future safety and health risks.
- Reduce the cost of public liability insurance.



Emergency Preparedness and Response

Electricity is indispensable in modern society. Even transient power outage could cause tremendous inconveniences to life and result in heavy loss for businesses. Taipower is the lifeline of country's power supply. Aside from maintaining the operations of its power equipment and facilities, it is imperative for Taipower to take precautions against emergencies and be prepared for disasters and reconstruction.


The most common emergency event in line of Taipower's works is associated with transmission lines. Transmission lines are installed in high mountains or along the coast, or passing through riverbanks and steep slopes to link power poles, pylons, and substations into a power grid. Damage to any of those facilities in earthquake, typhoon, flood, debris flow, salt pollution or accident could disrupt power supply to subscribers and result in serious consequences.

To put a comprehensive transmission line disaster prevention and mitigation system in place by stressing prevention, response and restoration, and for the planning and execution of disaster prevention and mitigation operations, Taipower has established a set of standards for

emergency preparedness and response, which aims to raise employee awareness to disaster prevention and mitigation, reduce losses, and moreover, safeguard the lives and properties of the people.

Aside from transmission line emergency described above, emergency events also include all kinds of disasters, such as natural disaster, production accident, occupational safety and health disaster, environmental accident, labor management issue and other events of serious nature. Taipower also has a Nuclear Power Plant Emergency Plan in place in case major incident occurs at the nuclear power plant. The responsible unit for handling occupational safety and health disaster and environmental accidents is the Department of Industrial Safety and Environmental Protection. The other departments are responsible for handling emergencies associated with departmental business, including disaster prevention education and training, emergency preparedness and response.

Classification of Disasters

In the event of an emergency, Taipower will rapidly and accurately determine the type of disaster, and set up an emergency response team and determine rescue manpower and grade of mobilization by the severity of disaster and extent of damage. Emergencies and disasters are classified according to the Classification of Disasters and Response Measures below. 

► Classification of Disasters and Response Measures

Type	In-charge Unit	Grade	Description	Response Measures
Public gas and oil pipeline disaster	Ministry of Economic Affairs and Taiwan Power Company	Time for the establishment of a Central Disaster Response Center	By estimation, more than 15 people are injured, dead or missing, or more than 1km ² of land is polluted, or social wellbeing is affected.	Establishing Central Disaster Response Center and MOEA Emergency Response Team
	Commission of National Corporations and Taiwan Power Company	Grade A disaster	More than 10 people are injured, dead or missing and the situation continues to deteriorate that cannot be effectively controlled.	Notifying Executive Yuan, National Disaster Prevention and Protection Commission, Government Information Office, and National Fire Agency
	Commission of National Corporations and Taiwan Power Company	Grade B disaster	More than 5 people are injured, dead or missing and the situation continues to deteriorate that cannot be effectively controlled.	CNC and Taipower establishing emergency team
	Taiwan Power Company	Grade C disaster	Not reaching grade B scenario and the situation under control.	Taipower undertaking emergency response
Transmission line disaster	Ministry of Economic Affairs and Taiwan Power Company	Time for the establishment of a Central Disaster Response Center	By estimation, more than 15 people are injured, dead or missing, and more than 10 primary substations (including distribution substations) have power outage, normal power supply is not expected to be restored within 48 hours, and the situation continues to deteriorate that cannot be effectively controlled.	Establishing Central Disaster Response Center and MOEA Emergency Response Team
	Commission of National Corporations and Taiwan Power Company	Grade A disaster	By estimation, more than 10 people are injured, dead or missing, and more than 10 primary substations (including distribution substations) have power outage, normal power supply is not expected to be restored within 24 hours, and the situation continues to deteriorate that cannot be effectively controlled.	Notifying Executive Yuan, National Disaster Prevention and Protection Commission, Government Information Office, and National Fire Agency
	Commission of National Corporations and Taiwan Power Company	Grade B disaster	By estimation, more than 5 people are injured, dead or missing, and more than 10 primary substations (including distribution substations) have power outage, normal power supply is not expected to be restored within 24 hours, and the situation continues to deteriorate that cannot be effectively controlled.	CNC and Taipower establishing emergency team
	Taiwan Power Company	Grade C disaster	Not reaching grade B scenario and the situation under control.	Taipower undertaking emergency response

Environmental Impact Assessments

As a responsible corporate citizen and for long-term business development, Taipower gives equal emphasis on economic development and environmental protection. When undertaking power projects, Taipower complies with the environmental impact assessment requirements in the pursuit of sustained development.

Environmental Impact Assessment (EIA) Process

If environmental impact assessment is required for a development project, the developing unit shall undertake EIA in the planning stage, and prior to permit application, submit the EIA report to the environmental authority for

review through the designated industry authority. If the environmental authority determines that stage 2 EIA is not required and gives its approval, the developing unit should hold a public presentation. If the review concludes that the project might have major impact on the environment that a stage 2 assessment should be conducted, the developing unit shall display the EIA report at an appropriate site in the vicinity of the development site for public perusal, and hold a public presentation after the required display period expires. Then the environmental authority will invite scholars, experts, representatives from relevant agencies, and local residents to join the site inspection and hold a public hearing. The public hearing record together with the draft of EIA report will be submitted to the environmental authority for review. The designated industry authority will decide whether to issue a permit for the development project based on the review result.

► Environmental Impact Assessment Work in 2006

Supervisory Work of 4th Nuclear Power Station Environmental Protection Committee

*Periodically produce a report (once every three months) on the status of environmental protection of 4th Nuclear Power Station (including the status of implementation based on the results of EIA review and checklist for implementation status of environmental impact mitigation measures) and related meeting data (including responses to the views of the Environmental Protection Committee and briefing data) for examination by EPA and committee members.

EIA Supervision and Follow-up Audit

Taipower conducted EIA follow-up audit of four projects in conjunction with the EPA and Commission of National Corporations under MOEA:

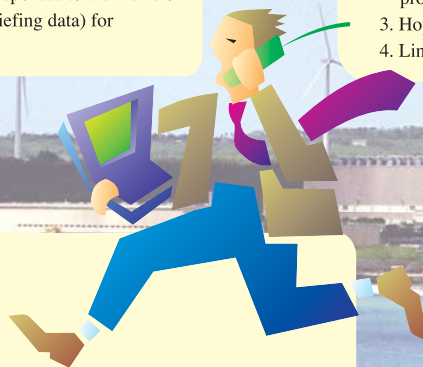
1. New Wuchien tunnel and Lisai Creek water diversion project.
2. Penghu Jianshan Thermal Power Plant expansion project (units 5 ~ 12).
3. Hoping Creek Bihai Hydro power generation plan.
4. Linkou Power Plant Phase II project.

Ongoing EIA Projects:

1. EIA report on units 2 and 3 of the Linkou Power Plant expansion project.
2. EIA draft for units 1 and 2 of Changgong Thermal Power Plant.
3. Environmental analysis report on mid-term storage of spent nuclear fuel of 1st Nuclear Power Station and change reference table.
4. Preliminary EIA study on 2nd Nuclear ~ Hsiandu 345kV line passing Yangmingshan National Park.
5. Preliminary EIA study on Hsiandu ~ Yangming 161kV No. 11 pylon.
6. EIA report on Talin Power Plant upgrade project.
7. EIA report on Kaoyuan combined cycle power project.
8. EIA report on Wankong and Yonghsing wind power project.
9. EIA report on Chingshan plant of Tajia Creek Power Plant restoration project.

Approved EIA Reports:

1. EIA report on Linkou Power Plant expansion project.
2. EIA report on Shenao Power Plant expansion project.
3. EIA report on Yunlin Sihua wind power project.
4. Reference table for changes made to the wastewater recovery project of Datan gas-fired power project.




Current Status of Environmental Impact Assessment (EIA) Operation

For development projects involving new power and nuclear energy facilities, Taipower will draw up a comprehensive assessment plan and undertake detailed planning with respect to pollution control regulations, nature protection regulations, landscaping, historic site, socioeconomic impact and impact mitigation. If environment is a key issue in the development project, Taipower will enlist the service of professional institutions to conduct related studies to render the assessment results more objective and thorough.

To make sure the development project also accommodates public needs and the EIA report truthfully

reflects the impact of project on surroundings, humanity, ecology, society and economy, Taipower will usually consult extensively the views of government agencies, scholars, experts, people's representatives, non-government organizations, and residents within the project area in the evaluation stage.

As of year-end 2006, Taipower have had 46 projects that have passed the review of environmental authority and 40 projects that have passed the review of analysis report on the difference of environment impact. Taipower has also been keeping its promises made in the environmental review in the execution of each project and received good comment from the environmental authority in the follow-up audit. 

► Planning and Study Projects Undertaken in 2006

Type	Project name	Objectives
Air quality and pollution control	Air quality dissipation simulation study for Tunghsiao Power Plant expansion project and Kaoyuan gas-fired combined cycle power project	Providing data necessary for the feasibility study report on Tunghsiao Power Plant expansion project and Kaoyuan gas-fired combined cycle power project
	Air pollutant increment simulation study for Talin Power Plant upgrade project	Providing data necessary for the feasibility study report on Talin Power Plant upgrade project
	Air quality dissipation simulation and NOx emission limits analysis study for Green Island generating unit replacement project	Providing data necessary for the planning of Green Island generating unit replacement project
	Coal ash disposal plan for Talin Power Plant upgrade project	Proposing coal ash disposal plan for the reference of development unit of Talin Power Plant upgrade project
Ocean pollution control	Cooling water discharge dissipation study for Tunghsiao Power Plant expansion project	Proposing cooling water discharge plan for the feasibility and EIA study of Tunghsiao Power Plant expansion project
	Cooling water discharge dissipation study for Talin Power Plant upgrade project	Proposing cooling water discharge plan for feasibility study and environmental review of the Talin Power Plant upgrade project
Hydro-ecological study	Phase III study under the Lishi Creek (upstream of Chuoshui creek) research- grade fish conservation project	Undertaking the Lishi Creek (upstream of Chuoshui creek) eco study and fish conservation project as reference for plant operation
	Study on the river eco-resources of Nan-ao-nan Creek	Providing data necessary for the feasibility and EIA study of Chongyue Hydro power project
	Study on the bird ecology in Changhua coastline area	Investigating birds in Changhua coastline area to assess the impact of wind turbines on bird ecology
Others	2005 Penghu Jianshan Power Plant wind breaks monitoring	Understanding the growth of wind breaks in the neighborhood before and after the operation of Jianshan Power Plant as reference for plant operation
	Short-term beach nourishment monitoring along Yenliao Coastline	Monitoring the variation of beach after the short-term beach nourishment work at Yenliao to determine whether to continue the beach nourishment

Eco - conservation

Fish resources along Taiwan's coastline are diminishing, and Taipower realizes people's reliance on ocean resources. For the sake of giving the local residents something back, bringing prosperity to the local communities, protecting ocean eco-environment and fulfilling its duties as a corporate citizen, Taipower has been actively involved in the work of cultivating and restoring fish resources along Taiwan's coastline in recent years. With firm belief in resources recycling and reutilization and sustained operation of the fishing industry, Taipower undertakes activities including artificial reef reutilization, coral restoration, hatchery-reared fry release, and beach cleanup to enrich fishing resources and restore marine ecology.

Recreating the Magnificent of Ocean-Coral Restoration

Coral reefs are a part of ocean ecosystem richest in biodiversity that provide food sources and habitats for a wide variety of marine organisms. The bioresources fed by coral reefs are widely utilized by humans and other organisms.

In fulfilling its social responsibility and putting its enthusiasm and care for marine ecology into action, Taipower has been proactive in stopping the worsening of coral bleaching and speeding up the restoration and reconstruction of coral colonies in the attempt to save this fragile yet complex ecosystem from demise and even extinction.

Fish Swimming in the Water-Fry Release

In supporting government's fisheries policy of extending the cultivation and restoration of fishing resources and enacting Taipower's belief in giving back to the local communities, Taipower has been collaborating with the fishing administrations in the work of fry release in the hope to replenish fishing resources that will benefit the fishermen.

Besides enriching the fishing resources in the sea areas near the nuclear power plants, rivers in central Taiwan are the primary hub for Taipower's hydro-power generation. But those rivers have long been under the ravage of abusive fishing practices that severely traumatizes the ecosystem and depletes the freshwater fishing resources. In the efforts to upkeep the river basin

ecology, Taipower has been carrying out fry breeding and release in the streams since the power plant starts operation to help maintain ecological balance and fulfill its responsibility of protecting the natural ecosystems.

Taipower also carries out fry breeding and release in reservoirs, including Techí and Sun Moon Lake every year. Aside from taking step-by-step approach to restoring power plants damaged by earthquakes and typhoons, Taipower also performs soil preservation in line with government's call for forest restoration and carry out pertinent fry release in the efforts to restore the natural ecosystems of rivers.

Bringing Back the Beauty of Coasts-Beach Cleanup

The handsome coastal areas are Taiwan's unique leisure resources. Taipower heeds the environmental protection work in the stages of power plant construction and operation. We also care about improving the overall environment of the country. Thus since 1994, power plants along the coast synchronously initiate the beach cleanup activity every year to advocate the importance of environmental protection. The beach cleanup activities are also participated by local residents, government and public interest groups. Thus they help close the distance between Taipower and the local community. Moreover, they enhance Taipower's corporate image as an enterprise that cares about environmental protection, cherishes natural environment, and actively fulfills its social responsibilities.

Luxuriant Green-Tree Planting

In response to the call for greening our environment and to reduce the emissions of greenhouse gases, Taipower has been engaging in extensive tree planting and greenery works that bring about large green area at Taichung and Datan power plants. In 2006, 45,000m² of vacant lot at Taichung Power Plant were planted with trees. So far, Taipower's greenery work covers 185 hectares of land. According to the statistics of Taiwan Paper Industry Association, every hectare of forest can adsorb 12 ~ 15 tons of carbon dioxide. Thus Taipower's greenery work has helped reduce 2,220~2,775 tons of carbon dioxide. 🌳



Global Warming and Greenhouse Gas Control

Greenhouse Effect and Kyoto Protocol

Current Status of Taipower's Greenhouse Gas Emission

Greenhouse Gas Emission Control Strategies

Research and Development of Renewable Energy Technologies

Greenhouse Effect and Kyoto Protocol

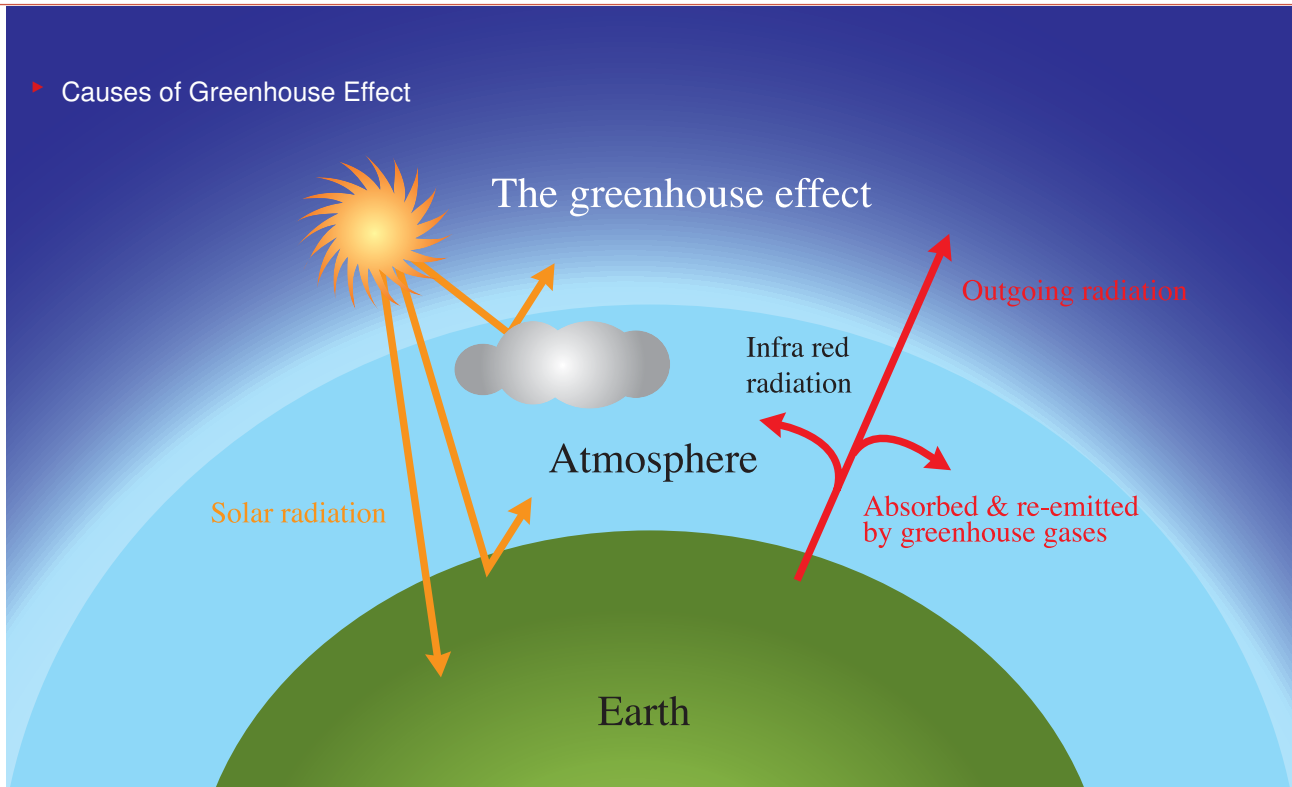
Since the industrial revolution, petrochemical fuels have been used massively in the economic activities of mankind. As a result, the concentrations of carbon dioxides and other greenhouse gases in air rise sharply, leading to several increasingly conspicuous phenomena, including global warming, rising sea level and drastic climate change around the world. These phenomena have caused increasingly negative impact on planet earth, such as water resources, crops, natural ecosystems, and human health.

In the concerted efforts to suppress greenhouse gas emissions, the United Nations passed the United Nations Framework Convention on Climate Change (UNFCCC) in the 1992 Earth Summit to declare global control of greenhouse gas emissions. In order to implement the work of emission control, in the third conference of the parties to the UNFCCC held in Kyoto Japan in December 1997, the members passed the binding Kyoto Protocol to define the responsibility of industrial nations in greenhouse gas reduction.

While the global economy took off with sustained growth in the 1990s, the carbon dioxide emission by the majority of developed countries also grew and stayed farther away from the reduction target. The United States and Australia have not ratified the Protocol out of



▶ Causes of Greenhouse Effect



economic reasons. Germany is able to reduce the use of energy as the former East Germany underwent economic transformation after the unification. United Kingdom is able to effectively control its emission of carbon dioxide due to massive use of natural gas for power generation and replacing coal-fired power with nuclear energy. The Japanese government plans to achieve the reduction target through carbon sink, emissions trading, development of nuclear energy and renewable energy, improved energy efficiency, and other flexible mechanisms provided under the Protocol. But the outlook is not optimistic.

In the current international political situation, Taiwan is unable to join the UNFCCC and hence not bound by the

Kyoto Protocol. However, with carbon dioxide emission accounting for 1% of world emission, Taiwan is expected to be under considerable international pressure to take actions. Thus in the second national energy conference held by the government in June 2005, the participants were assigned the mission of drafting an energy policy that accommodates both the current status in the country and the latest trends of Kyoto Protocol. Taiwan relies heavily on imports to meet its energy demand (up to 98%) and energy-consuming manufacturing accounts for a bulk of its industrial structure. Average citizens also lack a strong sense of energy conservation. These situations are adverse to the efforts to cut down greenhouse gas emissions.



Kyoto Protocol

- Countries are required to reduce their emissions 5.2% below their 1990 baseline over the 2008 to 2012 period.
- At least 55 signatory countries ratify the Protocol.
- At least 55% CO₂ emissions by UNFCCC Annex I parties' 1990 standards.
- The Protocol enters into effect in 90 days after the two conditions above are met.
- Russian President Putin signed the Kyoto Protocol on November 5, 2005, and the Protocol takes effect on February 16, 2005.




What are the Greenhouse Gases?

Greenhouse gases include primarily carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), Sulfur hexafluoride (SF₆), perfluorinated compounds (PFCs), and Hydrofluorocarbons (HFCs).

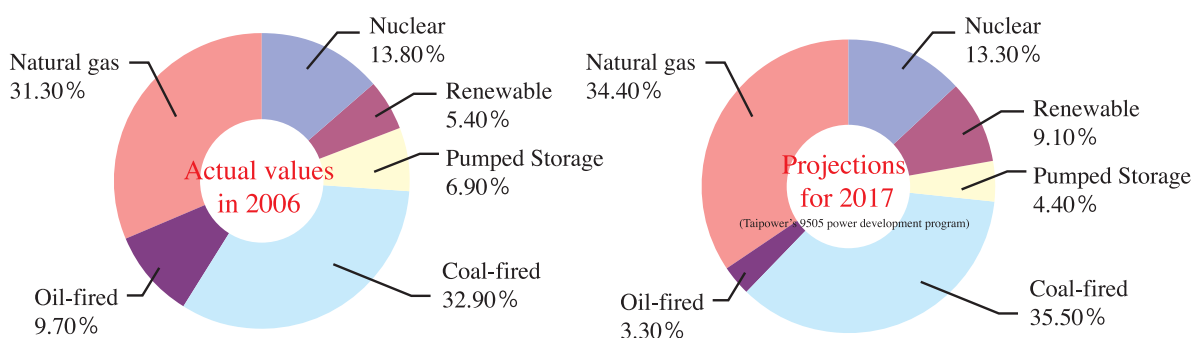
What is Global Warming Potential (GWP)

Global warming potential is a measure of how much a given mass of a substance is estimated to contribute to global warming as compared to the same mass of CO₂. For example, by setting the GWP value of CO₂ as 1, the heat absorbed by CH₄ is 23 times that of CO₂. Thus the GWP of CH₄ is 23. The heat absorbed by NO₂ is 296 times that of CO₂. Thus the GWP of NO₂ is 296. The warming effect of greenhouse gases varies depending on the type of gas. But as the content of CO₂ in atmosphere is far greater than the other gases, it is the biggest culprit in greenhouse effect.

As the principal power supplier in the country, Taipower has the inescapable duty to join in the efforts of greenhouse gas control. On the other hand, Taipower is a state-run enterprise and obliged to propose power development plans in conjunction with the national energy policy to meet the growth of power demands. Carbon dioxide is a by-product of burning fossil fuels. Currently there are no commercially viable CO₂ recovery or control technologies. While the development of carbon-free and low-carbon energy is confined in Taiwan, we are left with little choice but to use thermal power to fill the gap in

power supply as we strive to sustain economic growth. Under the circumstances, carbon dioxide emission is expected to increase. After evaluating the current status and all kinds of constraint factors, Taipower has come up with a greenhouse gas control initiative and various action plans, which will be adjusted in line with the development at home and abroad as well as the change of national policy, for example, the adjustment of nuclear energy policy, promulgation of greenhouse gas reduction regulations, and the maturing of carbon dioxide control technology. 

► Installed Capacity of Taiwan's Power System by Forms of Energy




Current Status of Greenhouse Gas Emissions by Taipower

Power supply infrastructure is critical to economic development. In the past ten years along with economic growth and changing consumption structure, power demands rose. Thermal power is the major source of energy supply in our current power generation system, which produces large amount of CO₂ in the process of combustion. To assess the benefit of emission reduction efforts, it is necessary to first take a greenhouse gas (GHG) emissions inventory.

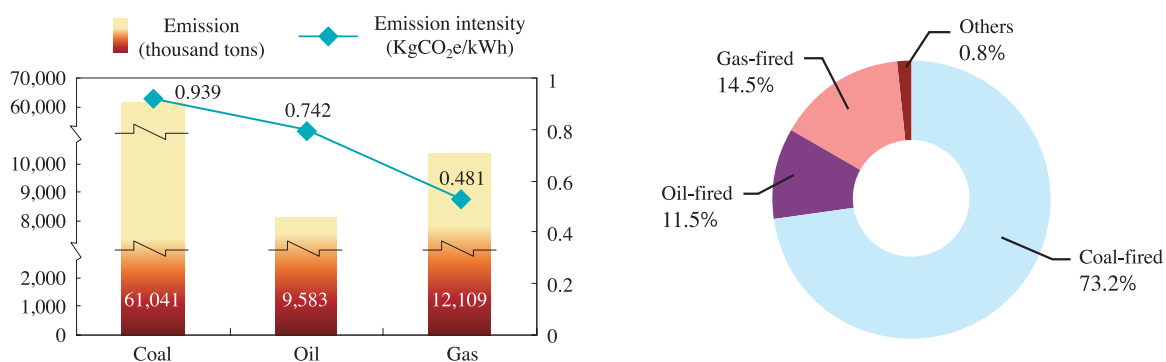
Taipower's thermal power plants were constructed in different periods in line with the country's power demands. The type of generating units, fuel and operating methods used by each thermal power plant differ. As a result, GHG emissions by each thermal power plant varies.

For the GHG emissions inventory work, Taipower's Department of Industrial Safety and Environmental Protection set up a Greenhouse Gas Inventory Taskforce in 2004. Furthermore in 2005, the Greenhouse Gas Information Management System was established to

facilitate the reporting of GHG emissions by different units.

The GHG emissions of power industry include dissipation from coal yard, motor vehicles, small engines, gas-guzzling equipment, power switches, SF₆ dissipation, and dissipation of coolant in air conditioning system. The GHG inventory taken in 2006 found annual emissions of 83,389 tons, of which, emissions from thermal power generation accounted for 99.2%. 

▶ Taipower's CO₂ Emissions from Different Fuels and Emission Intensity in 2006



Emission Intensity

$$\text{Kg-CO}_2\text{e/kWh} = \frac{\text{kg-CO}_2\text{e}}{\text{Electricity generated (kWh)}}$$

- CO₂ emission intensity is defined as the CO₂ equivalent emitted for every kWh of electricity generated.
- Emission intensity is used to determine whether the GHG reduction policy achieves the desired effect.
- The CO₂ emission intensity of Taiwan's electric sector by the estimation of Bureau of Energy, MOEA was 0.62 Kg-CO₂e/kWh in 2005.

Greenhouse Gas Emissions Control Strategies

Electric industry, like steel, cement and petrochemical industries, is an energy intensive infrastructure industry. By the estimation of Environmental Protection Administration (EPA), GHG emissions by the top 30 enterprises in Taiwan represent 90% of emissions by the industrial sector. As the economy grows and power consumption increases every year, the electric industry becomes the top GHG emitter. To reduce the risk associated with GHG emissions and to enhance the corporate image as an environmentally conscientious enterprise, Taipower has been actively promoting all kinds of initiatives relevant to GHG reduction.

Taipower's Greenhouse Gas Control Strategies

In consideration of the situations at home and abroad and in reference to the practices of power companies in advanced nations, Taipower has formulated a GHG control initiative which includes 7 strategies and 13 action plans. Detailed execution plans for respective action plan will be drawn up in the future.

Analysis of Constraint Factors

1. Energy policy

In compliance with government's "non-nuclear homeland" energy policy, Taipower is gradually lowering the share of nuclear energy in its power supply scheme, which thus rules out the non-GHG emitting nuclear fuel as a tool for GHG reduction.

2. Stability of renewable energy supply and inadequate natural gas supply

Some forms of energy, such as wind power and solar energy, are dependent on climate conditions, thus making them unreliable sources of power supply and unsuitable for the development of high-tech industries as in the case of Taiwan where stable power supply is a prerequisite. On the other hand, we have not been able to sign long-term natural gas supply contracts with natural gas producing countries. According to the forecast of China Petroleum Corporation, Taiwan's LNG supply will be short by 660,000 tons in 2007 and by 2,000,000 tons in 2008. Under the circumstances, If Taipower plans to rely on renewable energy or natural gas for power generation to reduce carbon dioxide emission, the country will be faced with energy security problem. Any future planning of Taipower to expand the use of natural gas for power generation must take into account climate stability and adequate natural gas storage facilities.

3. Restriction of electricity rates adjustment

Based on the current electricity rates, the decommissioning of nuclear power plants, the extended use of natural gas or renewable energy, the import of carbon capture and storage know-how, or the imposition of energy tax in the future will drive up the costs of Taipower. If the electricity rates stay unchanged, it will have severe impact on the operation of Taipower, keep us from using electricity rates as a tool to suppress the growth of power consumption or from having adequate funds to bring in new carbon dioxide control technologies.

Planning

The work of GHG reduction must also take into consideration economic development, environmental protection and energy security. The control initiative promoted by Taipower at the present stage encompasses: developing renewable energy, energy conservation, and using natural gas and high-efficiency supercritical coal-

► Taipower's GHG Control Strategies






fired generating units. Under the constraint conditions and supply-side control, we project that our carbon dioxide intensity can be maintained under 0.53kg/kWh by 2016.

In the efforts of GHG reduction, Taipower is implementing various measures throughout the company. However, these efforts call for the cooperation of everybody as we strive for a beautiful living environment and better future.

Outlook

1. Taipower will step up the GHG inventory technique in conjunction with the implementation of validation system by the government in the future, and publish greenhouse gases report at an opportune time.
2. Taipower will implement its greenhouse gases control

strategies and action plans, including improving the efficiency of energy use, promoting energy conservation, and conducting research in new forms of energy, renewable energy, and recovery and reutilization of carbon dioxide.

3. Taipower will watch closely the development of Kyoto Protocol and gather information on the current status of emission trading in the international community to avoid any international sanction and ensure sustained development.
4. Taipower will support government in demand-side management so as to cut down the output of supply-side.
5. Taipower will call the government's attention to energy prices and market mechanism when it sets reduction targets. 

► **Greenhouse Gases Control Strategies and Action Plans**

Control strategy	Action plan
1. Supply-side management	1. Adopting the best available technology for new generating units. 2. Improving the average efficiency of thermal power generating units. 3. Increasing the share of natural gas power. 4. Increasing the share of renewable energy.
2. Demand-side management	5. Promoting energy conservation to reduce power load.
3. Improving power transmission and distribution system	6. Improving transmission and distribution efficiency and reducing line loss. 7. Stepping up SF ₆ control to cut down its dissipation.
4. Management, supervision and verification	8. Speeding up the acquisition of know-how for establishing the GHG management system. 9. Creating the environmental accounting system.
5. Research and development	10. Developing the technologies for GHG reduction and renewable energy.
6. Increasing plantation	11. Continuing the planting and greenery work.
7. Domestic/international cooperation	12. Signing cooperation MOU with government agencies. 13. Participating in domestic/international reduction programs.




Research and Development of Renewable Energy Technologies

Taiwan's limited energy resources have rendered the country heavily dependent on imports to meet its energy needs. Increased environmental awareness has made people more cognizant of the need to develop additional domestic energy sources and make more use of environmentally friendly "green" energy. The government has already formulated a national renewable energy strategy for Taiwan; Taipower is playing an important role in the implementation of this strategy through its R&D and energy source development activities.

The government convened Taiwan's first National Energy Conference in May 1998. One of the major goals announced during the Conference was to have new energy sources account for 1~3% of Taiwan's energy supply by 2020. The Bureau of Energy, Ministry of Economic Affairs formulated development targets for each type of renewable energy. In the case of electricity generation, the objective was for renewable energy sources to account for 10% of Taiwan's total installed electricity generating capacity by 2020. In the Statute for Renewable Energy Development (Draft) passed by the Executive Yuan in August 2002, it sets out government incentive for up to 6,500MW of renewable energy, which further affirms government's resolve to push for the development of renewable energy. The Statute also defines renewable energy as solar energy, biomass energy, geothermal heat, ocean energy, non-pumped storage hydro and other sustainable forms of energy approved by the central competent authority.

Taipower has been evaluating the applications of different forms of renewable energy and identified a few

items with greater development potential for investigation and research, including small hydro, wind power, photovoltaic, ocean thermal gradient, and wave energy. Taipower views small hydro power generation as conventional power resources and has been developing it on a continual basis. Wind power generation is a less costly approach at the present stage and a development focus. The other forms of renewable energy are in nascent stage of development with piecemeal projects. Renewable energy is susceptible to the influence of weather. Its power generation is largely unstable. Thus except for hydro power with reservoir or detention pond, geothermal and biomass energy, the other forms of renewable energy can only serve as auxiliary power source.

Taipower's installed capacity of renewable energy (including conventional hydro power) at the end of 2006 amounted to 2,007,000kW, accounting for 5.4% of system capacity; its net peaking capacity totaled 1,013,000kW, accounting for 2.7% of net peaking capacity of the system. 

	Current Status	Future Prospect
Wind power	<p>1.Taipower has installed eight wind power generators with total installed capacity of 4,800kW at Zhongtun penghu since sep. 13, 2001.</p> <p>2.In coordination with the Ten years Wind Power Development Program, Taipower carried out Phase 1 Wind Power Project in early 2003, and has installed 32 generators with total installed capacity of 42,960kW at Shihmen, Hengchuan, Datan and Guanyuan by Dec. 2006; the other 28 units with installed capacity of 56,000kW are scheduled for commercial run before the end of 2007.</p> <p>3.The Phase 2 Wind Power Project was embarked in early 2005. A total of 62 wind turbines with total installed capacity of 124,000kW are planned for installation.</p>	Under the Ten years Wind Power Development Program, Taipower plans to install at least 200 wind turbines or 300,000kW capacity of wind power in the next ten years in predominantly areas along the western corridor of Taiwan with rich wind energy resources.
Solar energy	Taipower starts gathering sunshine and meteorological data at Hengchuan and Penghu in 1993 and 1999 respectively to prepare for feasibility study of plant construction at a later date.	Taipower will vigorously promote the photovoltaic system. So far, Taipower has set up a 20kWp photovoltaic model system at the Taipei Shulin Power Research Institute and Taipei Branch office.
Geothermal energy	There are close to 100 hot spring areas in Taiwan showing the sign of geothermal heat, but only 26 places with theoretical reserve of 1 million kW have development potential. If two technological bottlenecks-high acidity and low steam content of geothermal heat can be surmounted, the development of geothermal power generation will have a better prospect in Taiwan.	In support of the development plan of Ilan Government, Taipower provides geothermal generating units for its Ching-Shui project free of charge and renders assistance to its Ching-Shui Geothermal Power Project. Ilan Government plans to proceed with the project by BOT.
Biomass energy	Taiwan has two sources of biomass energy-refuse incineration and biogas. The former is best represented by the operation of Neihsu Incineration Plant. The total installed capacity of generating units at Neihsu Incineration Plant and other incineration plants amount to 547,600kW. With grants from the Council of Agriculture and Department of Agriculture and Forestry, the research of biogas utilization began with anaerobic treatment of hog excretions. Kaohsiung Lida Livestock Co. has established an excretion treatment system for 200 hogs and uses the biogas generated for burning and power generation.	The biogas power generation systems of landfills in Taipei (Shangzhuku, Fudekang), Taichung (Wen Shan), and Kaohsiung (Shi Ching Fu) with total installed capacity of 21,800kW have tied in to the Taipower system. Taipower has committed to purchase electricity generated by the biogas systems and plans to extend the project to other cities.

Nuclear Power and Sustainable Management

Operation and Management


Environmental Protection

Spent Nuclear Fuel Management

Nuclear Safety

Emergency Plan for Nuclear Accident

Operation and Management

The three operating nuclear power plants of Taipower are assigned the duty of base load supply. With total installed capacity of 5,144,000kW, the three nuclear power plants generated 38.32 billion kWh of electricity in 2006, accounting for 19.5% of nationwide power generation. Taipower has another power plants, the 4th Nuclear Power station, dubbed the "Lungmen Project" under construction. Taipower's nuclear plant operation ranks at the upper intermediate level in performance as compared to nuclear installations in other countries. In 2006, Taipower recorded on average 4 incidents/plant, 2.3 violations/plant, and 0.3 times of automatic emergency shutdown/unit. Such records are on a par with those of advanced countries. The output of low-radioactive solid waste of Taipower's nuclear plants in 2006 was 54.5 flasks/unit, the best record over the years. 



The Burden-Laden Fourth Nuclear Project

The Executive Yuan announced the suspension of 4th nuclear station construction in October 2000 and subsequently announced the resumption of construction in February 2001. In support of long-term economic development and diversified energy policy, the 4th nuclear power station upon its completion will help achieve the goal of providing quality, affordable and reliable energy. The first generating unit of 4th nuclear station is slated for commercial run in 2009.

► 1st, 2nd and 3rd Nuclear Power Plants At a Glance


Plant	1 st Nuclear		2 nd Nuclear		3 rd Nuclear	
Address	Chian Hua Tsun, Shihmen Hsiang, Taipei County		Guo Shen Tsun, Wanli Hsiang, Taipei County		Hengchuan Township, Pingtung County	
No. of units	2 (636,000kW each)		2 (985,000kW each)		2 (951,000kW each)	
Nuclear reactor						
○ Manufacturer	GE		GE		Westinghouse	
○ Model	BWR		BWR		PWR	
○ Container vessel	GE MARK-I		GE MARK-III		LARGE DRY TYPE	
○ Max. core power	1,775MWth per reactor		2,894MWth per reactor		2,785MWth per reactor	
Turbine						
○ Manufacturer	Westinghouse		GE		GE	
○ Turbine model	TC4F-40"		TC4F-44"		TC4F-44"	
○ Generator model	Hydrogen-cooled		Hydrogen-cooled		Hydrogen-cooled	
○ Installed capacity	636MWe per unit		985MWe per unit		951MWe per unit	
Construction						
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
○ Commencement date	1971.12	1971.12	1975.08	1975.08	1978.04	1978.04
○ Commercial operation	1978.12	1979.07	1981.12	1983.03	1984.07	1985.05



Environmental Protection

The construction and operation of nuclear power plant invariably impact the surrounding environment and ecosystems. It is also an issue of public concern. Thus Taipower has set up a Radiation Laboratory at the site of 1st Nuclear station, and in accordance with the requirements set forth in Environmental Radiation Detection Rules, has set up sampling stations around nuclear power plants according to the local meteorological characteristics, hydrology, population and distribution to

detect direct radiation, and radiation in air, water, biological samples, soil and nearshore sand. The radiation dosages detected are far below the legal limit (<1%) and within the normal range of natural radiation.

In the monitoring of cooling water discharged from nuclear plants, Taipower enlists the service of academic institutions to conduct long-term monitoring, and finds that cooling water discharged by respective nuclear plants meets the "effluent" standard, that is, water temperature at the discharge point shall not exceed 42°C, and difference with the temperature of surface water at 500M from the point of discharge is not more than 4°C. 

► 2006 Monitoring and Sampling Analysis

Unit: No. of sample

Plant	Direct gamma radiation	Air sample	Dust fall	Water sample	Biological sample	Cumulative effect	Total
1 st Nuclear	43,949	1,720	12	326	97	79	46,183
2 nd Nuclear	43,769	1,186	12	328	81	88	45,464
3 rd Nuclear	43,701	1,728	12	492	158	90	46,069
4 th Nuclear	35,175	336	12	408	176	58	36,165

► Nuclear Plant Cooling Water Discharge Monitoring


Water temperature	1 st Nuclear	2 nd Nuclear	3 rd Nuclear	Legal limit
Point of discharge	Summer 32°C	Summer 32°C	Summer 31°C	42°C
	Winter 22°C	Winter 22°C	Winter 21°C	
Difference with water at 500M from point of discharge	Δ T < 4°C	Δ T < 4°C	Δ T < 4°C	Δ T < 4°C



Raising Fish with Cooling Water Discharge

In reference to the practice of nuclear power plants in Japan, Taipower uses the cooling water discharged by the nuclear power plants to raise Malabar-reef cod and red tilapia. This undertaking helps remove people's concern over water discharge from nuclear plants and builds a bridge of interaction with the public by offering a venue for people to go fishing and release fish.

Spent Nuclear Fuel Management

Low-radioactive wastes produced by the nuclear power plants are incinerated, compacted or solidified and placed in steel flasks before they are shipped to storage facility and put under rigorous control. The output of solidified nuclear waste from nuclear power plants has been dropping by the year and totals 327 flasks in 2006, which is a record low and indicates the success in Taipower's waste reduction efforts. 



▶ Flasking solid low-radioactivity waste

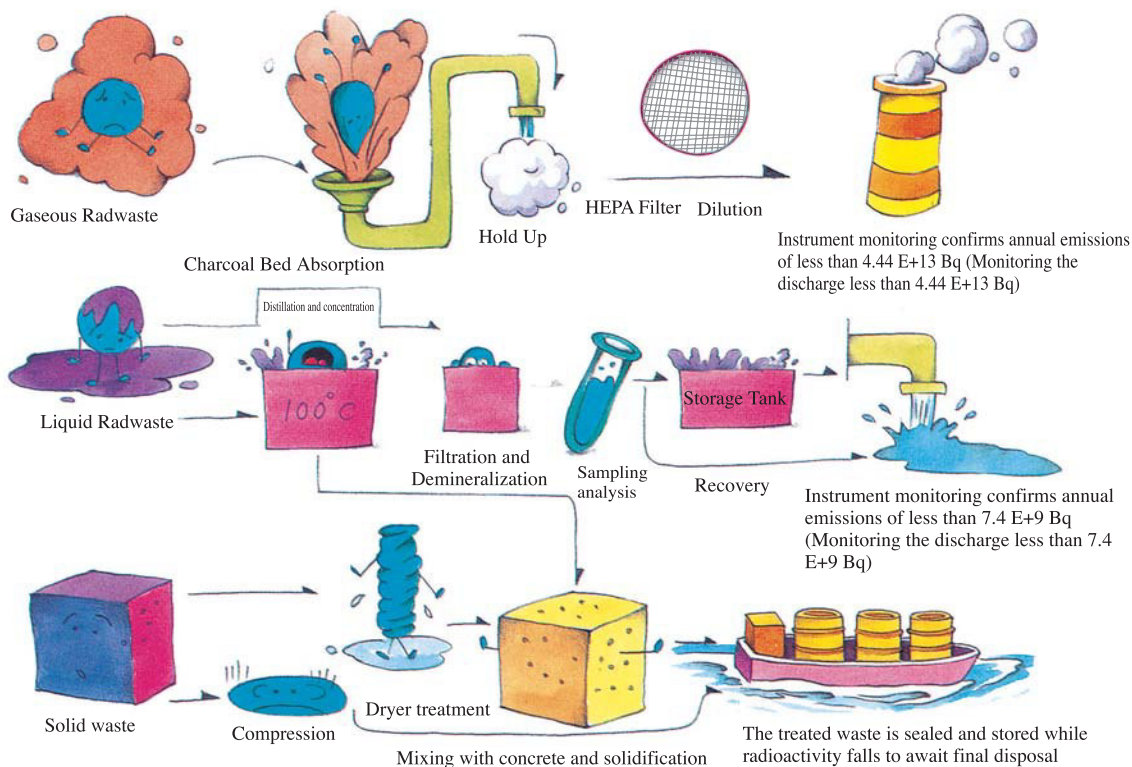


▶ Ditch bucket operation at Lanyu nuclear waste storage facility



▶ The modern-day waste storage container at 1st Nuclear Power Station

▶ Processing Procedures for Low-level Radioactive Waste



Nuclear Safety

The "Rating Criteria for Nuclear Safety Performance" (performance indicators) is designed to illustrate the safety of nuclear power plant so as to ensure public safety. Green light represents no safety significance; white light means low-level safety significance; yellow light means medium-level safety significance; and red light represents high-level safety significance. The inspectors of Atomic Energy Commission (AEC) would visit the nuclear power plants to examine the statistical findings of performance indicators and inspect safety operations, and publish the findings on AEC website.



"Rating Criteria for Nuclear Safety Performance" (Performance Indicators)

Indicator	Plant Unit	1 st Nuclear		2 nd Nuclear		3 rd Nuclear	
		1	2	1	2	1	2
Initiating Event	Unplanned Scrams per 7,000 Critical Hours (Automatic or Manual)	●	●	●	●	●	●
	Unplanned Scrams with Loss of Normal Heat Removal	●	●	●	●	●	●
	Unplanned Power Changes per 7,000 Critical Hours > 20% Rated Power	●	●	●	●	●	●
Mitigating System	Safety System Unavailability, High Pressure Injection System/High Pressure Core Spray System (HPIC/HPCS)	●	●	●	●	●	●
	Safety System Unavailability, Reactor Core Isolation Cooling System/Auxiliary Feed Water System (RCIC/AFW)	○	●	●	●	●	●
	Safety System Unavailability, Residual Heat Removal System (RHR)	●	●	●	●	●	●
	Safety System Unavailability, Emergency AC Power System (EDG)	●	●	●	●	●	●
Barrier	Safety System Functional Failures	●	●	●	●	●	●
	Reactor Coolant System Activity	●	●	●	●	●	●
	Reactor Coolant System Identified Leakage	●	●	●	●	●	●

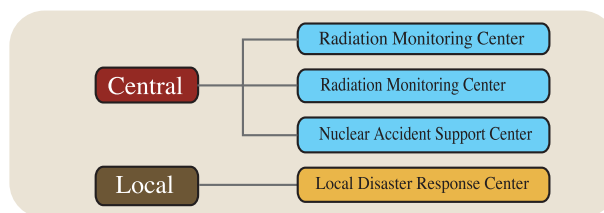
Note: ● No safety significance ○ Low-level safety significance ● Medium-level safety significance ● High-level safety significance

Emergency Plan for Nuclear Accident

Pursuant to the Nuclear Accident Emergency Response Act promulgated in July 2005, in the event of a nuclear accident, the central government will set up a Central Disaster Response Center, a Radiation Monitoring Center, and a Support Center, and the local government will set up a Local Disaster Response Center to be in charge of related affairs. The three operating nuclear power plants of Taipower conduct in-plant drill every year

and take turns holding nuclear safety exercise to illustrate the preparedness and mobilization capability of various units in emergency response to nuclear accident in the hope to bring damages to the minimum.

Organizational Chart for Nuclear Accident Response



Instructions for members of the public in the event of an accident at a nuclear power plant



Remain indoors, or within a concrete structure. Stay calm. Use the TV or radio to obtain the latest information about the accident, and wait for further instructions.



Medical personnel should be on standby to help members of the public take protective measures and to provide medical treatment as needed.



Evacuation of power plant personnel and members of the public is directed by the police or military police.

- If you are a holidaymaker or tourist visiting the plant, if you have your own means of transport then leave the area immediately. Follow the evacuation instructions given by the police or military police.
- The area affected by an accident at a nuclear power plant would not extend beyond a 5-kilometer radius of the plant.

Glossary of Electricity Terms

- **Amount of electricity supplied:** Amount of electricity supplied = net amount of electricity generated + amount of electricity purchased - electricity used by pump storage.
- **Amount of electricity generated:** It usually refers to net electricity generated. Net electricity generated = gross electricity generated - in-plant electricity consumed
- **Installed capacity (generating unit capacity):** The installed capacity of the generating units of power plant. The installed capacity of the system is the sum of installed capacity of all power plants.
- **Power system (power grid):** A network of electric power lines linking up the power plants to transmit and distribute power to users.
- **Base load generating unit:** A generating unit capable of operating steadily over a long period of time with low variation cost.
- **Unit thermodynamic efficiency:** The value indicating whether the generating unit uses the thermal energy of fuel efficiently; higher thermodynamic efficiency means more efficient use of fuel by the generating unit.
- **Commercial run:** A new generating unit joining the operation of power grid after completing all kinds of tests and acquiring necessary licenses.
- **Tie-in:** The state of a generating unit linking up with the power grid.
- **Time-of-use rates:** The electricity rate system that sets rates based on the cost of supply which varies at different hour.
- **Trip:** The phenomenon of power supply interruption due to equipment failure that leads to the activation of protection switch (e.g. circuit breaker).
- **Induction:** The condition of electric shock to human body upon contact with an electric energy source or due to the pass-through of electric current.
- **Ash pond:** Of the coal ash generated by a coal-fired power generation plant, part of it is utilized and the remaining is used to build in a manner of embanking into an artificial pond to precipitate the ash and prevent it from flowing into seawater to pollute the ocean. Such artificial pond is called ash pond.
- **Clean energy (green energy):** It refers to energy that is less polluting to the environment, such as wind power, solar energy, natural gas, biogas, and fuel cell.
- **Renewable energy:** Energy that comes from the nature and can be used repeatedly.
- **Wind Farm (wind park):** An area with abundant wind power resources and dense installation of wind turbines to turn into a scenic spot that also generates power.
- **Geothermal power generation:** A method of power generation using steam produced by geothermal heat.
- **Co-generation:** An energy supply system that generates steam and electricity at the same time and offers the underlying benefits of enhanced energy use and economic interest and reducing environmental pollution.
- **Environmental radiation monitoring:** Measuring direct radiation and radiation in air, water, biological samples and nearshore sand in consideration of the major path of radiation exposure and eco-environment to understand the distribution and accumulation of radioactive substance in the environment surrounding a nuclear facility and ensure that the environmental radiation people are exposed to is below the legal limit.
- **Radioactive waste:** Also called " nuclear waste" , it refers to waste with radioactivity or contaminated by radioactive substance.
- **Scram:** An action of the nuclear reactor protection system that prompts the control rod to rapidly and totally insert into the reactor core. If the generator is tied in to the power system and in supply mode at the time, it will trip and stops power supply.