

About this Report

Statement from the Chairman

Annual Recognition and Awards

CH1 Taipower and Sustainability

— CH2 Provider of Sustainable Power

- 2-1 Building Resilient Electricity
- 2-2 Improving Power Supply Stability
- 2-3 Implementing Energy Transition
- **CH3** Agent of Environmental Friendliness
- **CH4** Leader of Smart Grid Development
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- **CH6** Practitioner of Corporate **Social Responsibility**

Appendix

2.2 Improving Power Supply Stability

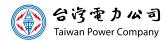
2.2.1 A Stable Power Supply and Generation System

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Material Top	pic: Stability and Reliability of Power Supply
Policy	 Maintain a robust energy structure and power grid, and continue providing stable and reliable power services to users through smart grid upgrades, low-carbon transition, precise demand control, and nationwide energy-saving promotion.
Management Approach	To enhance the stability and reliability of the power supply, Taipower has adopted the following three management strategies: • Equipment Maintenance: Implement preventive maintenance and improve weak points in generation units to ensure stable operation. • Personnel Training: Focus on core technologies and safety culture to strengthen operational discipline and prevent human error. • Risk Management: Apply multi-level controls, conduct stringent reviews of highrisk tasks, and reduce incident rates.
Action Plans	Strengthen the transmission network Construct, renew, and expand power plants Reduce national power outage time
Actual Performance in 2024	 Under the 7th Transmission and Substation Project, 24.56 circuit-km of transmission lines and 52.79 MVA of substation capacity were completed, with an overall cumulative progress rate of 96.54%. Completed replacement of 33 aging towers, 44.87 km of ground conductors, and 42.415 circuit-km of oil-filled cables. The national power outage time (SAIDI value) was 15.831 minutes per household per year. Completed 23 new, upgraded, or expanded substations, totaling 5,540 kVA; and completed 56 new or expanded lines, totaling 286 circuit-km. The reserve margin during the 2024 evening peak was 11%.
Targets for 2030	 Complete three major hub node distribution projects and related long-term plans between 2027 and 2032. Achieve a 15% reserve capacity ratio to ensure system stability during peak demand periods. Submit progress milestones for tower, ground wire, and oil-filled cable replacements in periodic meetings. Continuously improve the distribution system through feeder automation, voltage regulation, secondary substation upgrades, and grid enhancements for renewable energy integration. Vegetation trimming and infrared inspections were also continued. Continue to reduce the national power outage time (SAIDI value).

Material Topic: Energy Efficiency

Policy	 Implement energy-saving measures and continuously promote energy efficiency through education and advocacy, with a focus on improving the generation efficiency of thermal and renewable energy units.
Management Approach	 Hydropower and Thermal Power Plants: Promote energy-saving projects through equipment upgrades and operational mode adjustments. Renewable Energy Management: Establish operation and maintenance systems and develop 48-hour solar and wind power forecasting to enhance unit performance. Demand-Side Management: Use time-of-use electricity pricing to guide users to adjust consumption habits and reduce supply costs. Energy-Saving Technologies: Apply advanced technologies to improve equipment efficiency and reduce energy consumption.
Action Plans	 Improve the average efficiency of in-house thermal power units (excluding purchased power) Reduce the line loss rate Increase the share of generation from clean fuels (renewables and natural gas) Increase the share of self-produced renewable energy in total system generation
Actual Performance in 2024	 The average generation efficiency of in-house thermal power units (excluding purchased power) exceeded 42.22% The system-wide line loss rate was 2.93% The power generation mix was 33.4% coal-fired (including 2.3% cogeneration), 47.3% gas, 4.7% nuclear, 11.9% renewable energy, and 2.7% from other sources (fuel oil and pumped storage) The share of self-produced renewable energy in the system was11.9% (approximately 30 billion kWh)
Targets for 2030	 Achieve an average generation efficiency of over 47% for inhouse thermal power units (excluding purchased power) Conduct annual rolling reviews of the system-wide line loss rate (Refer to the T-SDGs target of 4.21%). Reach a generation mix of 50% gas, 20% coal, and 30% renewable energy Increase the share of self-produced renewable energy in the system to 24.1% (approximately 68 billion kWh) Double energy efficiency and achieve a 20% reduction in net GHG emission intensity compared to 2016



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Stable Power Supply and Installed Capacity

In response to record-breaking electricity demand in Taiwan, Taipower remains committed to ensuring a stable power supply. The Company continues to enhance generation capacity through the commissioning of new units, the grid integration of renewable energy, the implementation of time-of-use (TOU) pricing, demand response programs, and nighttime peak demand measures. These efforts have maintained a peak reserve margin above 8% and improved overall system stability through refined dispatch strategies for conventional units. For nuclear power plants, Taipower conducts ongoing reviews of operational vulnerabilities, strengthens oversight during major maintenance periods, implements equipment upgrades, and evaluates unplanned incidents each year to ensure safe and stable plant operations.

Total Amount and Composition of Power Generation

	2022		2023		2024	
	Billion kWh	%	Billion kWh	%	Billion kWh	%
Amount of Power Generated	188.3	75.1%	174.5	71.1%	172.1	68.4%
Pumped Storage Hydro	3.1	1.2%	3.0	1.2%	3.1	1.2%
Thermal	156.0	62.2%	149.7	61.0%	152.4	60.6%
Nuclear	22.9	9.1%	17.2	7.0%	11.7	4.6%
Renewable Energy	6.3	2.5%	4.6	1.9%	4.9	1.9%
Amount of Purchased Power	62.5 ^{Note}	24.9%	71.0 ^{Note}	28.9%	79.4 ^{Note}	31.6%
Privately-Owned Thermal	43.7	17.4%	45.3	18.5%	48.0	19.1%
Renewable Energy	15.3	6.1%	19.7	8.0%	25.1	10.0%
Cogeneration	3.4	1.4%	5.9	2.4%	5.9	2.4%
Purchased Power from Storage (Battery)	0.0	0%	0	0%	0.3	0.1%
Net Amount of Power Generated and Purchased	250.7	100.0%	245.5	100.0%	251.4	100.0%

Note: Figures may not add up to totals due to rounding. No round-off adjustment has been made.

Average Availability Rates for Power Generating Units

Unit		Energy Type	2022	2023	2024
		Coal	85.71	85.79	86.52
Thermal	Steam	Oil	89.67	86.19	94.29
Thermal		LNG	94.09	90.40	90.32
	Combined Cycle	LNG	89.49	90.44	90.57
Hydro		Hydro	95.37	96.77	96.67

Note: 1. Availability of thermal power units = 1- (Power output affected by unit during the period \div Hours during the period \div Maximum net output of the unit)

Average availability of thermal power plants = Σ (Unit availability \times Unit maximum net output) $\div \Sigma$ Unit maximum net output

2. Availability of hydro units = (Operating hours + Standby hours) ÷ Total hours in a year

3. Annual availability of hydropower plants = Arithmetic average of unit availability within the plant

Average Availability Rates for Nuclear Power Plants

Unit: %

Year	NP	PP1	NP	P2	NPP3	
rear	Reactor 1	Reactor 2	Reactor 1	Reactor 2	Reactor 1	Reactor 2
2022	-	-	-	88.95	87.64	99.67
2023	-	-	-	80.83	99.36	88.49
2024	-	-	-		98.08	86.98

Note: 1. Annual availability of nuclear units = Annual grid-connected hours ÷ Total hours in a year 2.Reactor 1 of NPP1. Reactor 1 of NPP2, and Reactor 1 of NPP3 have been decommissioned in July 2019, March 2023, and July 2024 respectively. Only Reactor 2 of NPP3 remains operational. 3.The Fourth Nuclear Power Plant (NPP4) has never entered commercial operation and is currently under asset management by Taipower.



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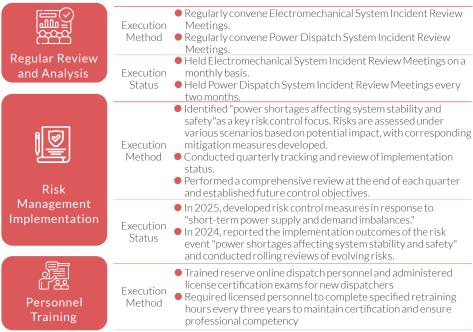
Improve Power Supply Reliability

Taipower is committed to enhancing the efficiency of power system management, with a key focus on increasing the availability of generation units. This is achieved through preventive maintenance, regular inspections, and continuous improvements that address identified weaknesses, thereby reducing the risk of malfunctions.

To further enhance power quality and service stability, Taipower established the Task Force on Power Quality Management and Improvement for Industrial and Export Processing Zones, which conducts regular inspections of power lines and promptly addresses anomalies. The Company also implements a user engagement mechanism to handle customer feedback effectively. By holding regular meetings with major electricity users, Taipower strengthens communication and continuously improves service quality.

Taipower also maintains a comprehensive mechanism for power dispatching and reliability management, with specific action plans and current practices outlined below.

Power Dispatch and Reliability Management Mechanism



Taipower uses SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index) as key indicators of power supply reliability. In 2024, the SAIDI was 15.831 minutes and the SAIFI was 0.209. Through continued implementation of the Distribution System Resilience Program, the number of distribution-related outages decreased by nearly 25% compared to 2022. Moving forward, Taipower will further promote Feeder Automation Systems to achieve "fewer outages and faster restoration," minimizing the public impact of power disruptions.

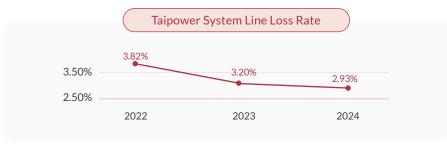
Power Outages Attributable to Non-Taipower Causes

- 1. Construction Restrictions: Road repaving projects limit excavation, requiring approval before repair crews can begin work during outages, thereby extending restoration time.
- 2. Coordination with Public Infrastructure Projects: Power supply is affected by the need to expand or relocate electrical equipment to accommodate MRT construction, sewer systems, and road widening projects.
- 3. External Factors: Outages caused by lightning strikes, abnormal customer-side equipment, and other unforeseen incidents.
- 4.Gas Supply Issues: Shortages in gas supply affect power generation, resulting in outages.
- 5.Independent Power Producer (IPP) Incidents: Trips in IPP or cogeneration units trigger under-frequency load shedding, leading to power outages.

Power Reliability and Performance

		2022		2023		2024	
		Target	Performance	Target	Performance	Target	Performance
The average duration of outages (minutes / household · year)	Working blackout	12.176	11.298	12.103	11.292	12.063	11.325
	Outage blackout	4.424	3.638	4.398	3.933	4.337	4.506
	Total	16.6	14.936 (91.285) ^{Note}	16.5	15.225	16.4	15.831
The average number of outages (times / household · year)	Working blackout	0.064	0.057	0.065	0.056	0.065	0.055
	Outage blackout	0.196	0.124	0.195	0.130	0.195	0.154
	Total	0.26	0.181 (0.467) ^{Note}	0.26	0.186	0.26	0.209

Note: The major outage incident on March 3, 2022, significantly impacted the annual averages. Excluding this incident, the 2022 average outage duration per household was 14.936 minutes, and the average number of outages was 0.181 times.





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Safeguarding Power System Security

Protective relays are essential safety components in the power system. They detect anomalies and isolate faulted areas to maintain system stability. Taipower employs a dual-main protection design, combining well-functioning hardware and optimized coordination settings to enhance system reliability and safety, improve power quality, and reduce maintenance costs.

To strengthen system protection, Taipower is pursuing both defense-in-depth and real-time dynamic defense strategies. These includes accelerating the replacement of aging digital relays, developing a relay data return and push notification system, and implementing a real-time dynamic simulation system. These efforts aim to expand protection coverage and prevent large-scale blackout incidents.



Guidelines and Planning for Power Plant Construction, Renewal, and Expansion Material Topic:Power Plant Renewal and Decommissioning

Policy

• In response to the decommissioning of existing units and the long-term growth in electricity demand, Taipower is enhancing the overall operational performance and competitiveness of its power plants. while reducing emissions of carbon dioxide and sulfur oxides. Nuclear power plant decommissioning is being carried out in accordance with the "Regulations for Implementation of the Nuclear Reactor Facilities Control Act."

Approach

- Planning and execution of new power plant projects, renewal, expansion, and decommissioning
- Ensuring proper radiation protection, management of spent nuclear fuel and radioactive waste, environmental radiation monitoring, and project governance to safeguard public health and environmental safety

- Power generation equipment improvement projects, and the renewal, expansion, and addition of gas-fired combined cycle and energy storage units
- Implementation of decommissioning works for the Chinshan Nuclear Power Plant (NPP1), and preparatory tasks for the Kuosheng and Maanshan Nuclear Power Plants (NPP2 and NPP3)

- Accelerated progress on the renewal, expansion, and addition of gas-fired combined cycle units
- Continued implementation of decommissioning and dismantling work for NPP1, and preparatory efforts for NPP2 and NPP3, in accordance with the decommissioning schedule

• In line with the government's policy of promoting natural gas as a bridging energy source during the energy transition, Taipower plans a net increase of approximately 17.86 GW in gas-fired generation capacity between 2024 and 2033.

Note: Decommissioning-related information is disclosed on the Taipower website and the official Nuclear Backend Operations Portal.

Taipower's power development plans are guided by the core principle of stabilizing the power supply as part of Taiwan's energy transition policy. The Company is consequently "increasing gas, reducing coal, expanding renewables, and phasing out nuclear," and conducts rolling reviews of national power supply and demand. New generation capacity is planned based on electricity demand growth and the retirement schedule of existing units to ensure supply stability. Taipower is also actively adding gas-fired combined cycle and energy storage units to reduce coal dependence and maintain a reasonable reserve margin, thereby ensuring sufficient electricity to support economic development.

Taipower is currently implementing major gas-fired combined cycle unit projects at Tunghsiao, Tatan, Hsinta, Taichung, Dalin, Tunghsiao Phase II, Hsieh-ho, and Taichung Phase II. Project progress is monitored through regular and ad-hoc project meetings and on-site inspections. Contractors are actively supervised to accelerate construction and ensure timely, highquality completion.





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Power Plant Renewal and Expansion Projects in 2024

Project **Progress Expected Benefit**



Gas-Fired Combined Cycle Unit Renewal, Expansion, and **Addition Projects**

Tunghsiao (99.96%), Datan (99.27%), Taichung (54.23%), Hsinta (83.90%), Hsieh-ho (35.15%), Tunghsiao Phase II (26.26%), Dalin (31.35%)

NPP1 completed the

Annual coal consumption for power generation is expected to decrease from over 38 million metric tons in 2017 to approximately 26 million tons by 2026.



Nuclear **Power Plant** Decommissioning dismantling of transmission towers, lines, and gas turbines, and began hot testing of the dry storage facility on October 23, 2024. NPP2 commenced construction of its dry storage facility on December 31, 2024. The NPP3 decommissioning plan has passed review by the Nuclear Safety Commission and is currently undergoing environmental impact assessment.

Decommissioning progresses according to established plans. ensuring safe and orderly transition of nuclear facilities



Phase I - Small Hydropower Development Nationwide

Commercial operation scheduled for August 2024.

Total installed capacity of 16,553 kW with an estimated annual generation of 74.6 GWh.



New Hydropower Development **Projects**

Planning is underway for the Guangming Pumped Storage Project on the Daija River. with commercial operation expected by 2037. The Wanli Hydropower Project underwent surveys and feasibility assessments in 2024.

Guangming and Wanli projects will provide a combined installed capacity of 580 MW and 49 MW. with expected annual generation of 767 GWh and 170.1 GWh, respectively.

Challenges in Power Plant Renewal, Construction, and Decommissioning

Power plant renewal and decommissioning face increasingly stringent regulatory requirements and high development costs linked to necessary community consultations. Taipower seeks to ensure smooth project execution by complying with relevant regulations, strengthening stakeholder communication, and implementing comprehensive planning.

Regulatory Constraints

During the feasibility study phase, all applicable regulations are identified and necessary licenses and development permits are integrated into the project schedule to minimize delays and extra costs. In addition, power plant renewal projects must comply with the Environmental Protection Administration's Best Available Control Technology (BACT) and Best Available Technology (BAT) standards. As emissions regulations tighten, Taipower will adopt advanced international technologies to improve efficiency and reduce long-term operational costs.

Community Engagement

Power plant renewal projects often draw public attention from local communities and environmental groups. To reduce disputes and related development costs, the following measures are used:

- Engage with local governments and elected officials: Establish constructive relationships early to reduce differences in opinion.
- Hold information sessions and public hearings: Present the environmental benefits of the renewal project to local authorities, community leaders, and residents to enhance public support.
- Strengthen communication platforms: Use social media to build transparent, two-way communication channels.
- Host site visits: Allow the public to witness the operation of low-emission, low-carbon equipment firsthand to foster understanding and gain support for successful project implementation.



Nationwide, Step-by-Step Coal Reduction Through Gas Expansion

New Tunghsiao Gas Units Creating the conditions for major coal reductions at Taichung Power Plant

Coal consumption was reduced by 6 million metric tons from 2014 to 2023

New Datan Gas Units Replace coal-fired capacity following Mailiao decommissioning After the Mailiao coal units retire, further 5 million metric tons of coal reduction expected by 2026

New Hsinta Gas Units

Add gas capacity before decommissioning aging

Four coal units are approaching 40 years of operation and scheduled for phase-out

New Taichung Gas Units — Phase I Two new units, each generating 7 billion kWh annually 7 billion kWh to fill the supply-demand gap, and 7

billion kWh to meet tech sector growth



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2.2.2 A Robust Transmission and Distribution System 3-3 203-1 203-2

Improving Accessibility of Electricity **Services**

In fulfilling its responsibility under the Electricity Act to uphold the rights of individuals to access a stable power supply, Taipower has established 24 branch offices, 24 service centers, 260 local service stations (as of December 31, 2024), and 2 customer service call centers. The Company continues to expand its infrastructure in coordination with local public works and new service applications to enhance accessibility and ensure equal access to electricity services.

Taiwan has achieved a 100% national electrification rate. Only a few remote locations remain unconnected due to inaccessibility-where access routes are mountain trails. equipment cannot be transported, or ecological and landscape conservation concerns restrict construction. Taipower continues to optimize its power service network to meet electricity needs nationwide.

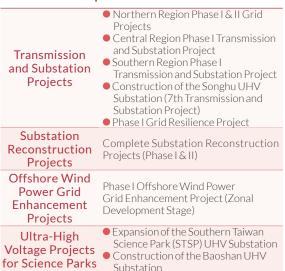
Ongoing Implementation of the Distribution System Resilience **Program**

The power grid serves as the critical link between generation and consumption. Grid resilience is essential to reducing outage risk and ensuring power quality. Taipower has established an extensive nationwide grid and continues to enhance it through regular maintenance and equipment renewal to ensure system stability.

From 2018 to 2022, Taipower implemented a Distribution System Resilience Programwhich focused on improving distribution lines, replacing secondary substation equipment, expanding feeder automation, and constructing smart substations. As a result, the number of system incidents fell from 15,264 in 2017 to 8,140 in 2022 (a 47% reduction), while the average annual outage duration per household also dropped from 4.0870 minutes to 3.347 minutes (an 18% reduction), significantly enhancing supply stability.

To build on these improvements, Taipower launched a Five-Year Distribution System Upgrade Program to run between 2023 and 2027 Key initiatives of the program include distribution optimization, full feeder automation, undergrounding for disaster prevention, feeder voltage upgrades, replacement of aging equipment, enhancement of renewable energy integration, and the implementation of preventative improvement measures—all aimed at strengthening power quality and system resilience.

Power Grid Construction Projects Implemented in 2024



Enhancing Power Distribution Reliability

To reduce power generation costs and improve supply capacity, Taipower's distribution system follows line loss rate targets set by the Department of System Operations. Each branch office establishes improvement plans to reduce line losses and prevent power distortion. Considering system adaptability and load transfer capabilities during outages. Taipower has also developed distribution system planning guidelines and adopted a management target to reduce the number of feeders with currents exceeding 300 amps, which serves as a benchmark for feeder performance. The Department of Distribution and the regional branches regularly convene Power Supply Reliability Enhancement Meetings and High-Voltage Outage Review Meetings to assess distribution system outage

performance, analyze the causes of major incidents, and develop corrective actions. As part of ongoing risk management, potential factors affecting system stability and reliability are reviewed annually and included in the following year's risk control plans.

Taipower also conducts regular on-the-job training for distribution maintenance and dispatch personnel to enhance technical skills and operational effectiveness. Audit operations have been strengthened through irregular inspections of equipment performance, while each regional office is supervised in executing preventive and corrective action plans to minimize risks associated with human error or improper operation.

In response to Taiwan's energy transition and the development of next-generation power supply systems, Taipower has accelerated the deployment of feeder automation, moving toward fully automated and intelligent distribution networks. This approach not only improves power supply quality, but also enhances real-time fault detection. By remotely operating automated switches on site, fault areas can be quickly isolated to minimize the scope of outages. In 2024, 66% of automated feeders restored power to non-fault downstream areas within 5 minutes after mainline incidents. By the end of 2024, more than 35,000 automated switches were under monitoring, and the number of automated feeders reached 9,784-achieving a penetration rate of approximately 96%. Full feeder automation is expected to be completed by 2025.

Distribution Feeder Automation Performance

Performance Indicator	2022	2023	2024
Cumulative Number of Automated Feeders	8,384 lines	9,045 lines	9,784 lines
Number of New Automated Switches	2,180 units	2,670 units	2,862 units
Proportion of Incidents Restored Within 5 Minutes (Downstream Area)	49%	57%	66%

