

2.3 Implementing Energy Transition

2.3.1 Promoting Power Transformation 203-2

Power Transition as a Response to Policy and Public Expectations

In alignment with the government's energy transition policy and public expectations, Taipower is prioritizing the development of renewable energy and gradually reducing coal consumption and carbon emissions through measures such as reducing the load on existing subcritical coal-fired units and constructing new gas-fired combined cycle units. The phased decommissioning of subcritical units is planned, while emergency backup generation facilities are also being prepared to address uncertainties in power supply and demand. The planning direction is outlined as follows:

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

Taipower's power development plan targets a reasonable reserve capacity of 15% to ensure reliability and stability in the power system. In 2024, the actual nighttime reserve margin was 11%. The annual power generation mix in 2024 was as follows: 33.4% coal-fired (including 2.3% from coal cogeneration), 47.3% gas-fired, 4.7% nuclear, 11.9% renewable energy, and 2.7% from other sources (fuel oil and energy storage).

To align with the government's 2030 energy mix targets—50% gas-fired, 30% renewable energy, and 20% coal-fired—Taipower is actively expanding renewable energy deployment and fostering a grid-friendly environment. At the same time, the Company is promoting a switch in fuel from coal to gas by developing additional in-house gas-fired combined cycle units and procuring power from independent gas-fired producers (IPPs). The phased decommissioning of subcritical coal-fired units at Hsinta and Taichung is also planned to support the transition.

● Short-Term Actions

Taiwan's dense population and limited land availability make it challenging to secure sites for power plants and transmission infrastructure. The not in my backyard (NIMBY) sentiment and public concern over greenhouse gas emissions further delay project progress. To reduce the risk of power shortages amid these uncertainties, the following short-term actions are being implemented:

- Optimize dispatch strategies by leveraging the characteristics of renewable energy.
- Strengthen demand-side management measures to suppress peak electricity demand.
- Ensure the stable operation of existing units and timely commissioning of new units under construction.

● Medium-Term Measures

Taipower continues to upgrade and replace conventional thermal power plants to enhance regional power supply balance and improve generation efficiency. In support of the government's low-carbon and sustainability goals, the Company is implementing a series of renewal and expansion projects across northern, central, and southern Taiwan, covering wind, solar, thermal, hydropower, and biomass energy sources.

Prioritize Renewable Energy Development and Create a Grid-Friendly Environment

Taipower is actively promoting the development of offshore and onshore wind power, solar photovoltaic, geothermal, and small/microhydropower systems. The Company is also working to improve grid interconnection conditions that create a grid-friendly environment and expand renewable energy deployment in collaboration with private sector partners.

Advance Low-Carbon Gas- Fired Power Projects and Construct LNG Terminals

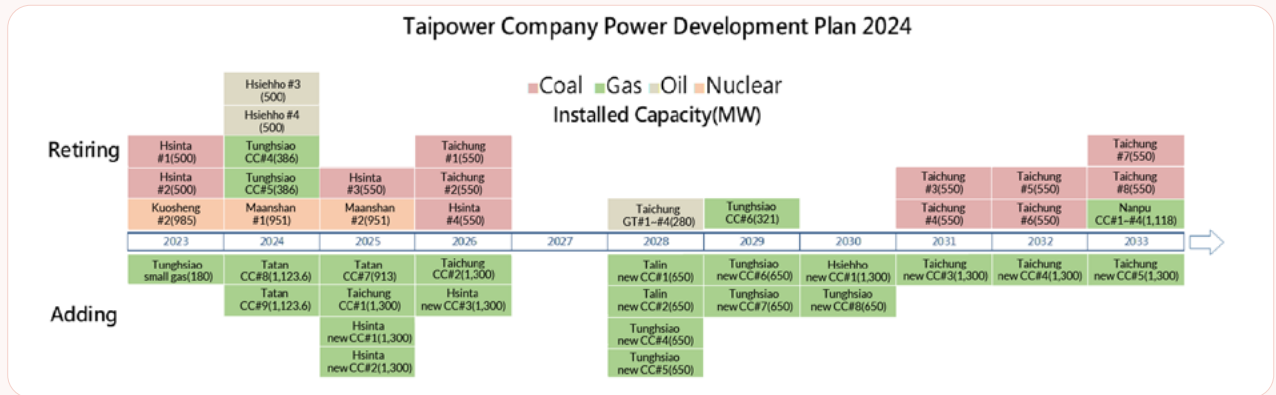
Taipower is actively replacing and expanding coal-fired capacity with low-carbon, gas-fired units. To ensure a stable gas supply, the Company is building LNG receiving terminals at Taichung Port and Keelung Port (for the Hsieh-ho Plant), and is cooperating with CPC Corporation to construct a third LNG terminal.

Prepare Emergency Backup Capacity to Address Supply and Demand Uncertainty

With over 96.67% of Taiwan's energy resources being imported, and global energy policy trends emphasizing diversification, Taipower is maintaining emergency backup power capacity and continuously optimizing dispatch and management strategies to ensure grid stability in the face of unpredictable demand or climate-related events.

● Long-Term Power Development

1. In light of rising electricity demand and the phased decommissioning of existing generating units, Taipower has developed a long-term power development plan through 2033. This plan aligns with the government's energy transition policy and considers both internal and external environmental factors. The development roadmap is illustrated in the figure below.
2. In support of Taiwan's 2050 net-zero target, Taipower is actively increasing the share of renewable energy while adopting a "gas-for-coal" strategy as a bridge in the transition to net zero. According to the power development plan, all newly added generation capacity will be gas-fired. In parallel with the accelerated deployment of gas-fired projects, subcritical coal-fired units at plants such as Hsinta and Taichung are scheduled for phased decommissioning. This strategy helps balance the goals of improving air quality and maintaining a stable power supply.



Remark: According to Report of the assessment to energy referendums on Jul 15th, 2024 by the MOEA.

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Promoting Vehicle Electrification and Decarbonization

In response to the government's electric vehicle (EV) policy and the growing domestic EV market, Taipower has shifted from a passive power facilitator to an active participant, formulating the following strategies:

Short Term	Medium to Long Term
- Established an EV charging demonstration site at the Taipei Regional Office to simulate scenarios such as public charging stations, commercial buildings, and multi-unit housing, incorporating Energy Management System (EMS) technology for smart charging control. - Since March 1, 2022, newly constructed multi-unit residential buildings have been approved to use dedicated meters for EV charging. For existing buildings, phased installation using dedicated metering is recommended. - Users are encouraged to adopt EMS-based charging to shift usage to off-peak hours, helping to reduce peak load and electricity costs.	- Introduce EV-specific Time of Use (TOU) rates, Demand Response events, ancillary service signals, and load capacity commands to verify system compatibility for charging control, Vehicle-to-Grid (V2G) operations, and communication interfaces. - Develop a travel pattern-based forecast model for public charging infrastructure, serving as a reference for future grid strengthening in response to rising EV electricity demand.

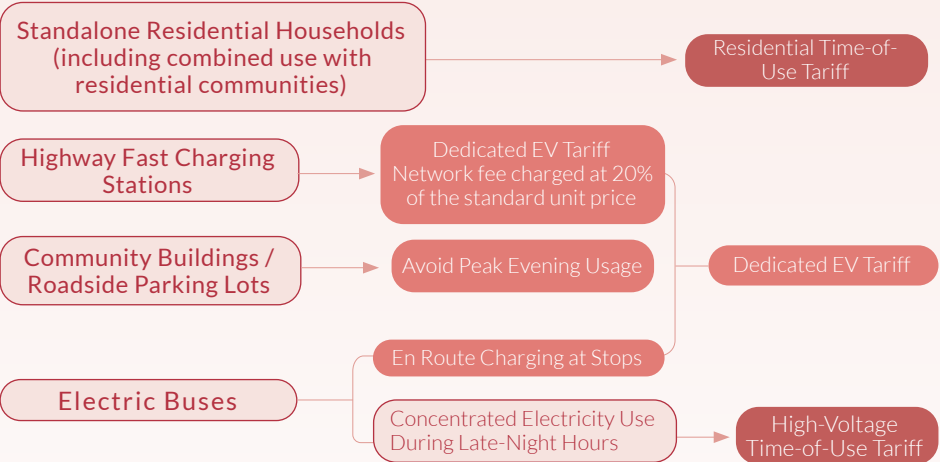
To help the public better understand electricity-related information for electric vehicles, Taipower has produced a range of multimedia materials—such as educational videos and brochures. 24 regional offices across Taiwan have established dedicated EV service desks to provide consultation services to the public and charging service providers. Employees at these offices have also been mobilized to engage with local governments, associations, vendors, community management committees, and other stakeholders to promote awareness of EV electricity use.

Through public land tenders and partnerships with private operators, Taipower facilitated the installation of 57 charging guns between 2021 and 2024.

To meet the enhanced requirements of the Distribution-level Renewable Energy Advanced Management System (DREAMS), Taipower's Department of Distribution completed system acceptance testing in January 2025. This included the deployment and integration of monitoring systems at five EV charging stations across northern, central, and southern Taiwan. System management interfaces and function modules were developed to support the expansion and optimization of charging station management systems.



Electric Vehicle Charging Options



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2.3.2 Diversified Development of Renewable Energy and Low-Carbon Gas-Fired Power Generation

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Material Topics: Renewable Energy Development and Low-Carbon Gas-Fired Power Generation

Policy	●In support of the government's 2050 net-zero emissions policy, Taipower is advancing toward short-term low-carbon and long-term zero-carbon goals. The Company actively promotes the deployment of offshore and onshore wind power, solar photovoltaics, geothermal power, and small/micro hydropower. Zero-carbon renewables and low-carbon gas-fired generation are prioritized as the main energy sources, while the use of outdated coal-fired units is being scaled down. Taipower also closely monitors international developments in emerging energy technologies and introduces them when appropriate. In parallel, efforts are being made to strengthen grid infrastructure and create a grid-friendly environment to facilitate private-sector renewable energy development, thereby maximizing renewable energy expansion.
Management Approach	●Taipower continues to implement grid enhancement projects at the distribution level to support renewable energy integration in coordination with government-designated solar photovoltaic zones. The Company is committed to expanding renewable energy and promoting clean energy sources with low air pollutant emissions.
Action Plans	●Expand installed capacity of carbon-free renewable energy and low-carbon gas-fired generation. ●Increase capacity for renewable energy grid connections.
Actual Performance in 2024	●Installed capacity of renewable energy: Accumulated total of 2,557.04 MW (excluding equity investments) ●Grid-connected renewable energy capacity: 20,425.60 MW
Targets for 2030	●Align with the government's 2030 energy mix target of 50% gas, 30% renewables, and 20% coal. ●Complete feasibility studies for long-duration battery energy storage systems (BESS), and submit proposals to the government in accordance with energy policy and grid resilience needs. ●Plan and conduct 5% ammonia blending demonstration trials at Dalin and Linkou Power Plants by 2030. ●Continue supporting renewable energy projects in achieving grid connection, contributing to the government's goal of 20 GW in solar PV integration. ●Renewable energy installed capacity: Accumulated total of 4,522.3 MW ●Renewable energy grid-connected capacity: 41,718 MW

Vision and Development Goals

Taipower is promoting renewable energy based on three strategic pillars-grid-friendly integration, demonstration leadership, and system stability-with the ultimate goal of maximizing renewable energy development.

- Grid-Friendly Integration:Strengthen grid infrastructure and provide sufficient feeder capacity to facilitate the growth of installed renewable capacity, ensuring that privately developed renewable systems can be smoothly connected to the grid.
- Demonstration Leadership:In addition to ongoing investment in solar, onshore, and offshore wind power, Taipower is advancing high-tech and forward-looking demonstration projects. The Company actively collaborates with industry, government, and academia to promote renewable energy development through outreach, education, and technological leadership.
- System Stability:To address the intermittent nature of renewable generation, Taipower maintains system stability and security by employing smart generation and dispatch, demand-side management, and energy storage technologies-thus enabling a higher penetration rate of renewables.

In line withnational policies, Taipower will continue to increase the share of renewable energy in its power mix and actively pursue the research and development of emerging renewable sources as it strives to deliver lower-carbon, more sustainable electricity to users across Taiwan.

Development Strategies and Action Plans

- Gas-Fired Generation Program:Expand self-owned gas-fired units and procure power from independent power producers (IPPs) that use natural gas.
- Carbon Capture and Storage (CCS): Conduct a preliminary feasibility study on carbon capture and storage at the Linkou Power Plant.
- Energy Storage:Currently conducting a feasibility assessment of long-duration energy storage facilities, focusing on three commercially available electrochemical battery technologies:lithium-ion, sodium-sulfur, and vanadium redox flow batteries.
- Ammonia Blending Power Generation:Plan to conduct 5% ammonia blending demonstration tests at the Dalin and Linkou Power Plants by 2030.

Promoting Renewable Energy Through Diversified Development Approaches

- 1.In-House Development:In addition to continuing to install renewable energy facilities on Taipower-owned land and rooftops, the Company will evaluate the feasibility of leasing land from the National Property Administration and industrial parks to develop solar, onshore wind, and geothermal power projects.
- 2.Collaborative Development: Drawing on international models, Taipower will expand renewable energy deployment by forming strategic alliances with developers through reinvestments and equity partnerships to participate in offshore wind block development.
- 3.Forward-Looking Demonstration and Leadership: Taipower plans to collaborate with international geothermal developers and introduce advanced geothermal technologies, while also exploring partnerships with domestic developers. These initiatives aim to encourage broader private sector participation and support the government in accelerating geothermal development and scaling up capacity.

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Current Status and Progress of Renewable Energy Development

To meet the growing demand for grid integration as green power production expands and to support Taiwan's energy transition policy, Taipower launched Phase I of the Green Energy Project in 2021. The project aims to develop a total installed capacity of 115 MW in renewable energy systems-primarily solar photovoltaics and onshore wind-between 2022 and 2027.

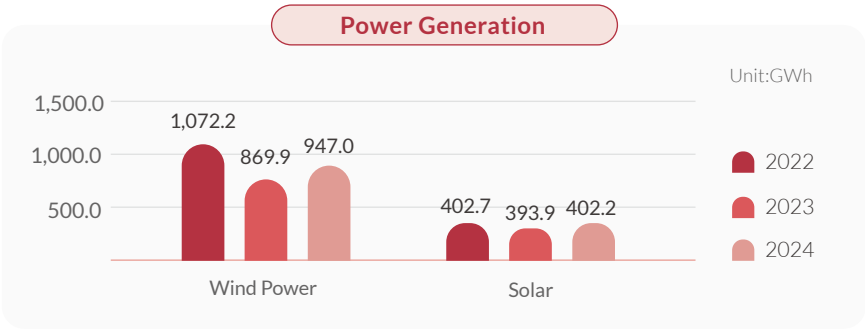
By the end of 2024, Taipower's total installed capacity reached 57,923 MW, with thermal power accounting for 58.6% and renewable energy increasing to 35.3% of the total capacity.

Renewable Energy Generation Status in 2024

Type of Project / Program	Deployments	Installed Capacity (MW)	Annual Generation (GWh)	Estimated Households Supplied ²
 Hydropower	90	1,826 ¹	3,536	982,000
 Wind Power	28sites, 203 units	439	947.0	263,000
 Solar Power	62 sites	291	398.1	112,000
 Geothermal Power	1 sites	0.84	3.0	841

Note1:Hydropower includes only conventional hydro generation.

2:Based on data published by Taipower, published data, the average household uses about 300 kWh per month, or approximately 3,600 kWh annually.



Taipower will continue to serve as a pioneer in the renewable energy sector.In addition to its nearly century-long legacy of using hydropower, the Company has established comprehensive development plans for wind and solar power in recent years. Taipower is also actively investing in the research and development of emerging energy sources, such as geothermal and biomass energy. The current status of renewable energy projects promoted by Taipower is summarized as follows:

Current Status of Renewable and Low-Carbon Energy Development in 2024


Hydropower

Phase 1 of the Small Hydropower Project includes 7 sites and 13 units (16.5 MW); commenced commercial operation in August 2024.


Onshore Wind Power

Since 2000, 27 wind farms with 182 turbines have been built, totaling approximately 338 MW by the end of 2024.


Offshore Wind Power

Phase 1 (109.2 MW) began operation at the end of 2021 off the coast of Fangyuan, Changhua County.
Phase 2 is under construction and scheduled for grid connection in 2026.




Solar Power

Launched in 2008; the total installed capacity reached 290.7 MW by the end of 2024, including 150 MW in Tainan Salt Fields and 100 MW in Changbin, Changhua County.




Geothermal Power

- Expanded the Renze Geothermal Power Plant in Yilan County and continued exploration of geothermal resources in Guguan and Yilan.
- Signed a Memorandum of Understanding (MOU) with an international team to jointly develop geothermal resources in The Datun Volcanic Group.
- Collaborated with landowners and developers through public solicitations to invest in geothermal power plant construction.




Marine Energy

Wave data collected and offshore feasibility assessed near Green Island (2023–2024); results will guide future development.


Biomass Power Generation

Focus on CFB technology with units of 10–25 MW. Taipower continues to monitor global trends and collect technical information.

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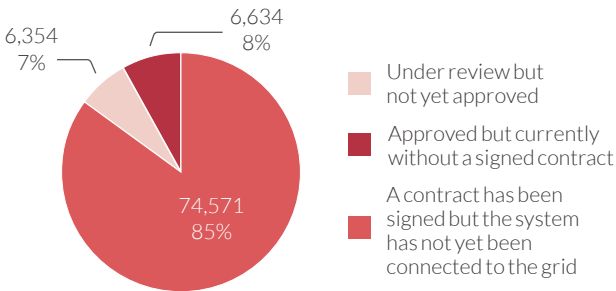
The Current Status of Renewable Energy Grid
Connections

To support the government's renewable energy development policies, Taipower has adjusted its grid connection strategy based on emerging technologies and the latest international development trends, while ensuring grid operational safety and taking its own financial and operational conditions into account. These efforts aim to meet the growing demand for renewable energy grid connections. The cumulative number of cases and the installed capacity for various types of solar photovoltaic systems is shown in the table below (as of December 31, 2024).

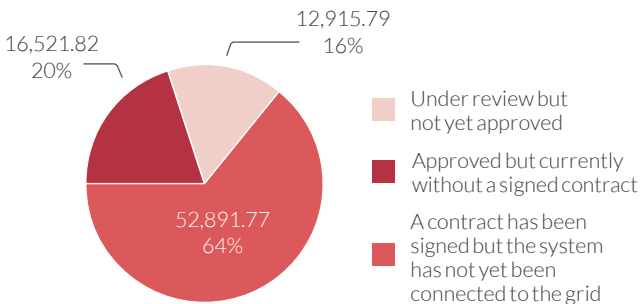
Accumulated Number of Cases and Installed Capacity
of Various Types of Solar Power (as of December 31,
2024)

Case Status	Number of Cases	Installed Capacity (MW)
Grid-Connected Cases	71,581	14,270
Official Power Purchase Cases	60,538	11,660.78

Solar Power Accepted Cases (Number)



Solar Power Accepted Capacity(MW)



Challenges and Response Strategies

Renewable energy is subject to weather and seasonal variability, resulting in intermittent and unpredictable generation. To address these challenges, Taipower is implementing a diversified strategy to support the growth of renewables-encompassing solar, wind, and emerging technologies such as floating offshore wind, geothermal, and marine energy. In line with government policy, Taipower ensures investment certainty through 20-year fixed power purchase agreements, provides a grid-friendly integration environment, and advances grid and energy storage infrastructure to resolve intermittency issues and increase the share of renewables in the energy mix.

Smart Operations and
Generation Forecasting

- 1.Operation and Maintenance (O&M) Management System:Taipower is developing an O&M management system to track equipment failures, maintenance schedules, and repair activities. By leveraging data analytics, the system helps reduce downtime, shorten repair cycles, and improve overall equipment availability.
- 2.Generation Forecasting System:Taipower has independently developed a forecasting system for solar and wind power generationthat provides48-hour ahead predictive data to support grid dispatching and system planning.

Average Availability Rates of
Renewable Energy

	2022	2023	2024
Availability Rate of Wind Power (%)	92.10	88.17	88.11
Capacity Factor of Solar Power (%)	16.16	15.83	15.99

Note:1.Annual Wind Power Availability Rate = Unit Generating Hours (Including Standby Hours)/Annual Number of Hours
2.Solar Power Capacity Factor = Annual Power Generation of Units/Device Capacity * Year-Round Hours

Grid Enhancement and Renewable Energy Integration

- 1.Grid Enhancement Projects: A total of 46 grid reinforcement projects have been planned. Of these, 33 projects have been completed or partially completed thereby increasing renewable energy grid capacity by 6.05 GW. The remaining 13 projects are in progress and are expected to add an additional 5.775 GW of grid capacity.
- 2.Decentralized Installation and Tiered Grid Access: Large-scale renewable projects are connected to the transmission system, while small-scale projects are connected to the distribution system, ensuring optimal utilization of feeder capacity.
- 3.Shared Substation Model: Private developers construct shared substations to integrate projects located in fishery-solar co-location zones and on non-arable land. This model improves transmission efficiency and accelerates the grid connection process.
- 4.Preventing Feeder Capacity Hoarding: Since July 2018, Taipower has implemented measures such as capacity reviews, connection fee payments, and application deadlines to prevent non-committed applications from occupying feeder capacity and to reduce project queuing.
- 5.Relaxing Feeder Connection Limits: Based on actual operating conditions, feeder capacity limits and transformer reverse-flow conditions have been reassessed and expanded to enhance overall grid hosting capacity.

Exploring Emerging Renewable Energy Technologies

Forward-Looking Geothermal Technology	Taipower is conducting geothermal exploration in Gengziping, Shenao, and Lile under its 2035 development plan. International technology references and feasibility assessments are being used to evaluate future development potential.
Offshore Wind Farm Development	In line with the Energy Administration's 100 MW floating wind demonstration policy, Taipower surveyed waters 30-90 meters deep from Taoyuan to Pingtung to assess generation potential, technical risks, and regulatory conditions. Development strategies for self-building and joint ventures are being formulated.
Guguan Geothermal Project	Following the Renze project, Taipower and CPC are drilling and testing in Guguan to verify geothermal resources and evaluate power generation potential.