


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.