

## 4. Characteristics of Power Sources Utilizing New Energy Sources (Wind and Photovoltaic)

New energy sources including wind and photovoltaic power generation are drawing attention since these are expected to help us efficiently use our limited resources and address global warming issues. It is important to understand the characteristics of new energy and use it effectively because new energy does pose some problems.

### (1) Current status of wind power generation

#### Rapid increase in electric power production

The status of wind power generation in Japan is approximately 281.1MW as of the end of fiscal 2001, and is increasing rapidly due to the availability of large-sized windmills and the advent of wind farms. This is partially attributable to projects supported by New Energy and Industrial Technology Development Organization (NEDO) and power purchases by electric power companies under the terms for wind power generation contracts.

#### Generation cost varies depending on construction location and installation mode

Costs vary largely according to the installation location and mode

The cost of wind power generation varies widely depending on wind conditions at the installation location and the efficiency of maintenance and inspection costs (e.g. improved efficiency by concentrating the facilities in one location). The costs for a new, large-sized windmill (600kW-class) with an annual mean wind speed of 6-7m/s would be about 7-10yen/kWh, which leads to an assumption that this method of generation might be profitable under the right installation conditions.

#### Fluctuations in wind affect the quality of electricity

Power cannot be produced with wind power generation if there is no wind or if the wind is too strong. Changes in wind force also affect the quality of electricity generated (frequency and voltage). Quality electricity is very important for effectiveness. Wind power generation requires an electric power system of a certain size.

Kyushu Electric Power's wind power generation records

	Installed capacity (6 units) (kW)	Electric power production (kWh)	Capacity factor (%)
FY2000	1 750	3 572 238	23.3
FY2001	1 750	2 598 858	17.0

N.B. Additional plants of 1,500kW (300kW × 5 units) have been on trial run since fiscal 2001.

#### High expectations as an auxiliary power source in windy areas

Wind power generation is a clean power source with no CO<sub>2</sub> or SO<sub>2</sub> emissions, and its energy source is inexhaustible. It is essential to actively utilize wind power generation especially as an auxiliary power source in areas with strong, steady wind.

## (2) Current status of photovoltaic power generation

### Japan boasts the highest installed capacity in the world

Photovoltaic power generation in Japan accounts for approximately 317,000kW (tentative figure) as of the end of fiscal 2000. This is the highest total installed capacity in the world. The increase in the introduction rate for the past several years has been 150%, and it is largely due to the subsidy system for photovoltaic power generation offered by the national government.

### Generation costs need to be cut further

Photovoltaic power generation requires further cost reductions.

Thanks to technological developments over the past 25 years, production costs for solar cells have drastically decreased to 2% of their former cost. The cost for the residential system introduction has also been lowered to approximately 850,000 yen/kW. However, the cost of photovoltaic power generation is still 60 yen/kWh according to fiscal 2000 records, which is still expensive in comparison to electricity rates of a little over 20 yen/kWh for residential services. Further technological developments towards cost reductions are required.

### Weather affects power generation

With photovoltaic power generation, no power is generated at night, and only an extremely small amount of power can be generated on cloudy or rainy days. The power produced from this method is small compared to thermal or nuclear power generation, requiring a larger space in order to produce more electricity. For example, to produce electricity equivalent to that generated by a 1 million kW-class nuclear power station, a site equaling 1,900 Fukuoka Domes (1.3million m<sup>2</sup>) is required for photovoltaic power generation.

Kyushu Electric Power's photovoltaic power generation facility records

	Installed capacity (21units) (kW)	Electric power production (kWh)	Capacity factor (%)
FY2000	325	261 020	9.6
FY2001	325	253 072	9.5

N.B. Data regarding electric power production and capacity factors are for plants of 318kW (20 locations), which have instruments installed.

### Active utilization and enhancement of environmental awareness

Photovoltaic power generation is a clean and inexhaustible power source like wind power generation, and is expected to become an auxiliary power source through the installation of facilities on the roofs of public buildings, companies and residential homes. A photovoltaic power generation facility itself is excellent environmental educational material when installed at elementary schools and homes. It enhances energy conservation and environmental awareness through its electric power production display and data recording function, as well as through the sale of surplus power.

## (3) Measures by Kyushu Electric Power

The introduction of wind and photovoltaic power generation has steadily increased in Kyushu over the past several years in step with awareness of the environment, since these generation methods are clean and inexhaustible in nature. Kyushu Electric Power aims for further promotion of new energy sources through support for the Green Electric Power System, along with their installation within the company.