



## Introduction

Wind power systems convert the movement of air to electricity by means of a rotating turbine and a generator. A typical utility-type wind turbine consists of a tubular tower, horizontal-axis, and a three-bladed propeller with variable pitch blades for speed control. These turbines range in size from 0.60 MW to 2 MW and are often grouped together to form wind farms.

Wind is the fastest growing form of renewable generation. In the U.S., wind turbine capacity exceeded 6,000 MW at the start of 2004. The booming U.S. market has been driven by a combination of growing state mandates, such as in Hawaii, and the federal Production Tax Credit (PTC). The PTC provides a 1.8¢/kWh incentive for electricity produced by wind.

## Potential for Kauai and KIUC

Wind energy is a mature renewable energy technology which can provide competitively priced electricity. Wind resources on Kauai are moderate with select areas having very good wind regimes. Wind regimes are rated from 1 to 7 with a Class 7 area having wind speeds in excess of 20 miles per hour. Class 4 sites and higher are usually considered economically viable. However, Class 3 may also be viable in Hawaii due to the high electric rates.

Generally, the best wind regimes are located on exposed ridgelines, particularly north of Hanapepe and Kalaheo in the south and around the Kalalau Valley in the northwest. There is a large region of moderate Class 3-5 winds stretching in a band across the southern portion of the island from Port Allen to Poipu.

Theoretically, wind could provide all of Kauai's electrical needs. However a more realistic near-term estimate is that wind could provide about 30 GWh/yr or about 6% of Kauai's needs. This is due to intermittency of wind, siting, access, and environmental issues. Further development of wind energy would require additional flexible generation, energy storage, and advanced load management.

## Cost

Capital costs for a typical 10 MW wind farm are between \$1,200 – 1,600/kW. This would result in a levelized cost of electricity of 4.4-5.7¢/kW. Substantially higher costs are necessary for wind projects that require upgrades to transmission and distribution lines.

## Advantages and Disadvantages

### Advantages

- mature, proven technology
- less expensive than conventional generation
- no emissions
- good potential on Kauai

### Disadvantages

- visual impact
- environmental impact (bird kills)
- intermittent, consequently will require storage or backup generation