

Small Wind Mills in Peruvian Coast

Wind energy is not unknown in Peru. Several types of small wind battery chargers and wind pumps have been installed there since the 1970's.

Peru is located on the Pacific coast of South America. The Andes mountain chain crosses the country from north to south, and almost one-third of the country's land is covered by the Amazon rain forest. However, the main cities are located in the valleys that cross the more than 2000 km of narrow coastal desert. Lima, the capital city, is located on the coast and has 7 million inhabitants, almost one-third of the total population.

The total power-generating capacity installed in Peru is about 4,000 MW, of which 3,250 MW is hydro and the remaining is thermal, fuelled by oil. The hydro energy is coming from waterfalls in the highlands, far from the main demand points. The electricity consumption is less than 600 kWh per capita, and no more than 50 % of the population has electricity. The growth of the GDP, due to the successful economic program of the Government, creates demands for more energy. The increased need is to be met, in the short term, by new thermal power plants.

The Ministry of Energy and Mines has a National Electrification Plan that promotes sustainable energy for the middle- and long terms. According to that goal, over the last two years, it has been financing a number of renewable-energy projects in small and large applications, for grid connected as well as isolated systems in rural areas, in order to improve the availability of electricity. Some wind measurement studies have shown that the coast of Peru has

significant wind energy resources. **There are several places with 6 m/s annual average wind speed, and some with over 8 m/s.**

The latter case applies to Malabrigo, which has 8.7 m/s annual average wind speed. Malabrigo is a port located 600 km north of Lima, near the Trujillo City, the location of the first successful grid-connected wind turbine in Peru. It is a Danish MICON Wind Turbine, with a rating of 250 kW, hub height of 30 m, three-bladed rotor of 28.8 m diameter, and radio remote control system. This project was financed by the Ministry of Energy and Mines (MEM), supervised by Centro de Conservacion de Energia y del Ambiente (CENERGIA) on behalf of the MEM, and carried out by MICON Argentina S.A.

In Spanish, Malabrigo means "the place where you can't keep warm because you are not able to keep your coat and hat on" This place is very popular with summer surfers, since the strong winds produce large waves. Malabrigo has 1,614 households (7,653 inhabitants). There was a diesel generator set installed there to which 49,3 % of the households were connected, but most of time the genset was off because of the lack of fuel and "they used to have no electrical service". For many years, Malabrigo has waited for connection to the grid. Now, a 34.5-kV line 17 km long has been installed for the wind turbine connection, and the Malabrigo people's dream has come true.

The Ministry of Energy and Mines is interested in promoting more sites for wind farms on the coast, due to the wind energy available and the need for electricity. Wind power is a good alternative source of energy for the big coastal cities. It would reduce the fuel consumption of existing thermal power plants. The wind farms could support the grid during dry seasons, improving the reliability of the system. Like Malabrigo, many other towns could be connected to the main grid if they took advantage of their wind resources. Their potential net contributions of

wind-generated power could attract the grid to them. Otherwise, they remain isolated, since they cannot finance the connection themselves.

CENERGIA, Centro de Conservacion de Energia y del Ambiente, is a non-profit organization whose main shareholders include the Ministry of Energy and Mines, Electroperu (National Power Company), Petroperu (National Petroleum Company), the SNI (National Society of Industries) , and COFIDE (National Development Bank). The mission of CENERGIA is to achieve sustainable development in the energy sector. The main activities are training, advertising, and studies.

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