

## Africa's First Experimental Wind Test Sites

In order to highlight the use of wind energy, an experimental wind test site has been installed in a desert farm on the trade wind blown Atlantic coast. When built in 1994, the farm's main production of greenhouse-grown vegetables, tomatoes and melons were originally destined for off-season high value export markets. These products are currently supplying the region's growing local and regional markets.

The farms electricity needs were supplied by two diesel generators and a wind turbine was added to the system.

A U.S. manufactured 50 kW Atlantic Orient wind turbine was connected into a small 5500 volts distribution grid. Two 50 kW diesel generators provided the backup power, and the surplus off-peak wind power production supplied a variable speed driven ice making plant. The ice production has a high local market value due to the fishing activity in the region.

When installed and entering operation, the 50 kW Atlantic Orient wind turbine was at that time considered to be among the very first of its category on the continent. It now looks obsolete, as the rated power of wind turbines have increased significantly since. For this hybrid Wind/Diesel system however, the capacity utilized in these wind regimes proved to be more than enough.

Indeed, wind power penetration rates achieved when the system was up and running was close to 70% and the control system, which had never been tested outside experimental conditions required several upgrades and modifications.

The main difficulty there lied in the stability of the mini-grid system and a lot of electronics controlling modular resistive dump loads had to be progressively added in the overall control system.

Besides enhancing the systems performance through highly flexible smart grid technologies, a replacement of resistive dump loads -generating essentially wasted heat- by electrochemical loads could open new perspectives into the integrated use of the abundant wind resource of the region.

Whereas electrolysis processes enhance the access to wind energy, their generated by-products are of high value. This aspect of wind stabilization could be particularly relevant when integrated to support the local industrial processing of natural resources.