



Project Profile: Cabeço Alto, Portugal

Project name:	Cabeço Alto Wind Farm.
Owner:	P.E.S.L.
Contractor:	Nordex Energy GmbH.
Power utility:	Electricidade da Portugal.
Installed capacity:	11,700 kW.
Wind turbine type:	N60/1300 kW.
Tower height and type:	60 m tubular tower.
Number of wind turbines:	9
Wind speed:	The 9 wind turbines are situated on a site with an estimated annual average wind speed of 8 m/s.
Site:	The site is located 10 kms from Montealegre near to the Spanish border.
Site description:	A mountainous region in the north part of Portugal, located 1,300 m a.s.l.
Wind turbine siting:	Cabeço Alto has 7 turbines placed in a row and another 2 turbines 800 ms away.
Building Period:	December 1999 until November 2000.
Grid connection:	August 2000.
Extent of delivery:	Turnkey project.
Calculated annual power output:	32,400,000 kWh.
Maintenance:	Nordex Energy GmbH.
Warranty period:	2 years.

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The Cabezo Alto Wind Farm is located in a mountainous region in the northern part of Portugal, at altitudes above 1,300 m. There are harsh weather conditions in this region with plenty of snowfall, fog and heavy rain during the winter.

Nordex supplied the wind farm on a turnkey basis. The scope of supply also included the detailed engineering project of all civil works and electrical installation, also involving the construction of control buildings and substations.

In this context a very careful architectural planning of the control buildings and substations was carried out in order to adapt the construction to the features of the local landscape and architecture.

P.E.S.L., S.A., the project developer and investor in the wind farm belongs to the ENERSIS group, one of the main players in the Portuguese market in the field of independent power producers from renewable energy sources.

Training of P.E.S.L. staff in Denmark took place as 3 Portuguese technical engineers from P.E.S.L. participated in a training program arranged by the Nordex Training Department.

During this comprehensive training the participants were introduced to the Nordex Safety Regulations as well as the Nordex maintenance and service system including the manuals and the Nordex Control software. Furthermore, the technical engineers spent some days carrying out maintenance on a N60/1300 kW wind turbine with Nordex Control software, and they participated in the erection of a N50/800 kW wind turbine.

