



Renaico Wind Farm

La Araucanía Region, Chile

CRANE ACCESS ROADS

APPLICATION: In the Araucanía Region of Chile, forty-four 100 meter wind turbines were constructed to establish a new wind farm spreading over 2,965 acres in Renaico, located at about 8.08 miles (13 km) from the city of Angol. Access roads, internal roads, and working platforms were necessary for the construction of the wind farm, and foundation improvement was needed for the wind turbines.

THE CHALLENGE: All work was performed on a composite of soft clay and silty soils, in a limited time frame and with ground deformation restrictions. According to the European wind farm equipment suppliers, a subgrade with a shear strength of $C_u > 28.45$ psi (2.0 Kg/cm²) is required to support the wind farm turbines and equipment, but the natural subgrade had a $C_u = 3.56$ psi (0.25 Kg/cm²). In addition, temporary platforms to support the crane during the installation of the turbines required a $C_u > 35.56$ psi (2.5Kg/cm²).



Installation of Tensar TriAx160 reduced aggregate requirements of access roads

TENSAR® TRIAX® SOLUTION: More than 10.56 miles (17 km) of internal roads were built between the turbines that make up the wind farm. In addition, 44 temporary working platforms were built to support the crane during the installation of the wind turbines. Tensar TriAx geogrids reinforced both the roads and crane pads, resulting in significant savings in costly imported granular fill.

The temporary roads were designed for a 100kN axle force and a tire pressure of 100 psi (690 kPa); a total of 52,000 vehicle passes were considered for the construction period with a maximum rutting limit of 1.97 inches (50 mm).

The typical road section on which the crane circulated was made up of a mechanically stabilized layer (MSL) with Tensar TX160 geogrid and a 9.84 in (250 mm) aggregate base, on which another 7.87 in (200 mm) aggregate base layer was installed.

The typical crane working platform built for temporary support was made up of a MSL with TX160 and a 13.78 in (350 mm) aggregate subbase, and a second MSL consisting of TX160 and a 9.84 in (250mm) aggregate base on which another 7.87 in (200 mm) aggregate base layer was installed.

NORTH AMERICAN GREEN® SOLUTION:

Approximately 10,000 yd² of North American Green® Eronet® C125 was used on the slopes of the turbine platforms and on the access road slopes. Eronet C125 provided protection of the soil, reducing soil loss and enhancing the vegetation growth, which ensured that the native grasses and vegetation could take root.

PROJECT HIGHLIGHTS

Project:

Renaico Wind Farm

Location:

Ninth Region, La Araucanía, Chile

Installation:

February 2015 - November 2015

Product/System & Quantity:

Tensar® TriAx® TX160 Geogrid

496,000 square yards

North American Green Eronet® C125™

10,000 square yards

Geopier Rammed Aggregate Pier®

79 Piers per footing, depths ranging from 4 to 8m below bottom of footing

Owner/Developer:

ENDESA/Enel Green Power

Design Engineer:

ENDESA

General Contractor:

Global Energy Services

Materials Supplier:

Emin Sistemas Geotecnicos

TURBINE FOUNDATION

APPLICATION: Installation of the foundation for 44 wind turbines, each with a hub height of 311.68 ft (95m), which would generate a total energy capacity of 106 MW (2.4 MW for each wind turbine).

CHALLENGE: The subsurface consisted of soft cohesive soils with low bearing capacity, including sandy silts and silty clays of low to high plasticity.

GEOPIER® INTERMEDIATE FOUNDATION®

SOLUTION: Geopier Rammed Aggregate Pier® (RAP) elements were installed to increase the rotational stiffness and substantially decrease the differential settlement at the base of the foundations. The project management team evaluated an alternative solution based on concrete piles, which proved to be more expensive. The Geopier solution consisted of 79 RAP elements for each wind turbine, with effective lengths of 13.12-26.25 ft (4m to 8m) each, in order to reinforce the soft stratum underlying the foundations.



Installation of Geopier Rammed Aggregate Pier Elements



North American Green® EroNet® C125™ on a crane access road slope will provide erosion protection and vegetation establishment

For more information on Tensar TriAx Geogrids:

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