Alstom to provide Renova Energia with 2.2 GW of wind energy capacity, one of the biggest onshore contract worldwide.

Renova Energia - Brazil
ECO 100 platform wind farm

Country: Brazil
Project: Renova frame agreement and Zeus complex
Customer: Renova Energia
Scope: Supply and commissioning of ECO 100 platform with POWEROF3™ concept
Electrical output: 2,230 MW
Commercial operation: Starting from 2015

Renova frame agreement and Zeus complex, located in Bahia state, will be equipped with nearly 800 wind turbines (ECO 100, 110 and 122).

The partnership between Alstom and Renova covers one of the biggest projects in the global onshore wind market. The agreement includes the supply and commissioning of ECO 100 platform onshore wind turbines, with POWEROF3™ concept.

The turbines, each between 2.7 MW and 3 MW power capacity, will represent at least 2,230 MW of new wind power generation capacity in the country.

These turbines will be manufactured in Alstom’s plant in Caraça, in the state of Bahia in Brazil. Alstom has committed to establish a wind cluster in Bahia, in partnership with other companies for the production of the main components of the turbines.

POWEROF3™
This concept combines up to three wind turbines of the ECO 100 range within the same site, according to the specific wind conditions found in the different locations of the wind farm. This approach ultimately increases the capacity factor of the project by up to 20% for a lower cost of energy.

CUSTOMER PROFILE
Renova Energia is one of Brazil’s leading renewable energy companies with 1.95 GW of sold capacity. It was founded in 2001 and has since grown to be the main reference in Brazil’s renewable sector. Since 2009 the company is acting predominantly in wind power projects, owning the largest installed wind complex in Latin America.

HARNESSING BRAZIL’S POWER POTENTIAL
The Brazilian wind power potential is estimated at 300 GW. The energy expectation is to contract 2 GW per year until 2020 (nearly enough to power São Paulo, South America’s largest city) and to produce 10% of its electricity from wind at the beginning of the next decade, against 3% currently. At the end of 2014, the country will have 5.4 GW of installed power capacity, representing 4.1 % of energy matrix.

PROJECT HIGHLIGHTS
- The wind farms will provide clean energy for more than 3,000,000 people
- First project including POWEROF3™ unique concept
# Technical Specifications

<table>
<thead>
<tr>
<th>Operating Data</th>
<th>ECO 100</th>
<th>ECO 110</th>
<th>ECO 122</th>
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<tbody>
<tr>
<td>Wind turbine class (IEC)</td>
<td>IA</td>
<td>15-IA</td>
<td>IIIB-III</td>
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<tr>
<td>Rated power</td>
<td>3.0 MW</td>
<td>3.0 MW</td>
<td>2.7 - 3.0 MW</td>
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<tr>
<td>Cut-in wind speed</td>
<td>3 m/s</td>
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<tr>
<td>Rated wind speed</td>
<td>12 m/s</td>
<td>11.5 m/s</td>
<td>10.0 - 10.5 m/s</td>
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<td>Cut-out wind speed (10 min)</td>
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<td>Instant cut-out speed (3s)</td>
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<table>
<thead>
<tr>
<th>Rotor</th>
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<tr>
<td>Rotor diameter</td>
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<td>Swept area</td>
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<tr>
<td>Rotor yaw</td>
<td>up wind</td>
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<tr>
<td>Blade length</td>
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<tr>
<td>Speed range</td>
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<tbody>
<tr>
<td>Tower height</td>
<td>50 m</td>
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</table>

# For a Higher Energy Yield

The ECO 100 platform is amongst the most proven multi-megawatt platforms in the market place with over 3,500 MW installed or under construction worldwide.

**ECO 100 Platform - track record**
More than 400 MW installed & operating, and 200 operating years achieved (dec. 2013)

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**Clean Power Clear Solutions™**

**Reducing Cost of Electricity**

+20% capacity factor by using Powerof3™

**Lowering Environmental Footprint**

9,000 tonnes of CO2 saved every year with one ECO 100

**Increasing Flexibility & Reliability**

90% of non-torque loads reduced, increasing reliability thanks to Alstom PURE TORQUE® technology

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