Wind Energy to serve everyone needs

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VESTAS Mediterranean
VALUE CHAIN - Wind. It means the world to us.
Vestas product portfolio

Currently Vestas can provide its customer with the widest range of products in the market, both when it comes to sizes (from 0.85 MW up to 3.0 MW) and also for different site conditions, such as wind pattern, temperature, grid requirements,...

<table>
<thead>
<tr>
<th>IEC Classification</th>
<th>Long term average wind speed at hub height (m/s)</th>
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</thead>
<tbody>
<tr>
<td>IEC I</td>
<td>Up to 10 m/s</td>
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<tr>
<td>IEC II</td>
<td>Up to 8.5 m/s</td>
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<tr>
<td>IEC III</td>
<td>Up to 7.5 m/s</td>
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</tbody>
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While all other parameters in the standard are at their maximum levels... to say, density, turbulence intensity, extreme windspeed, inflow angles, wind shear,...

IEC classification comes from the standard IEC 61400-1
Being there for 30 years means we have faced almost it all when it comes to wind…

Really cold places…

…and really hot ones

Easty to access sites…

…and extremely complex ones

Very big offshore windfarms…

…and small isolated ones as well
The power curve of the wind turbine gives you the power the turbine can produce.

Product of the wind turbine power curve and site wind regime gives the annual energy yield of the site.

V100 2.0
8,4 m/s
k=1.9

8.8 GWh

Means the annual consumption of more than 1200 households.

Means the annual consumption of more than 1000 households.
THE COST OF WIND VS. OTHER ENERGY SOURCES
Apart from Geothermal*, wind energy is the most competitive in terms of Cost-of-Energy amongst renewable energy sources.

Q3 2009 Levelised Cost of Energy: $/MWh

Source: New Energy Finance, 2009
GROWTH IN WIND TURBINE EFFICIENCY

Wind turbines are both growing in size and efficiency, as well as decreasing in price.
25 years ago, this was 3000 kW:

Today one turbine produces 3000 kW

• VESTAS HAS MULTIPLIED ITS TURBINES OUTPUT 100 TIMES
SUMMARY OF WHY WIND

- **Cost of Energy**: Wind energy is COMPETITIVE compared to the traditional energy sources in most of the new emerging markets like HFO or DIESEL distributed generation.

- **Scalability**: Wind energy can follow gradually the economic development of the emerging country much better than other energy sources that require much higher upfront investment cost to be financially viable, like coal or gas-fired power plants.

- **Abundance**: Almost all countries have wind areas where the installation of wind power plants makes sense.

- **Rapid ramp-up**: Many of the new emerging countries experience periods of rapid growth that should be matched with its power capacity.

- **Local energy, non-dependency on external power sources**: many of the new emerging countries are DEPENDENT ON EXTERNAL UNRELIABLE SUPPLIES.

- **Clean energy**: many emerging countries suffer from high contamination levels. Wind energy would contribute to improve their air quality, decrease CO2 emissions and clean their image of high polluters.

- **Benefit from Kyoto protocol initiatives**: a better business case for the shareholders will attract local and foreign investments in the countries’ infrastructure.

- **Complementarity**: In many cases, wind energy represents a perfect alternative to other intermittent energy sources like hydro or solar energy. This is the case of Brazil, where the dry season

- **No fuel infrastructure is needed**: unlike gas-fired or hydro power plants, wind energy only requires the electrical grid setup.

- **Less water consumption**: Unlike thermal or hydro power plants, wind energy consumes very little water resources, which can be a key issue given that many of the new emerging markets have water scarcity issues.

- **Green jobs and industrial development**: Wind energy contributes to regional development and creates jobs.
AN HISTORIC MILESTONE - April 2011 Wind Turbine Generator in Cabo Verde
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Thank you for your attention