



SEMINARIO INTERNACIONAL

LAS ENERGÍAS RENOVABLES HOY

PERSPECTIVAS DE COLABORACIÓN ENTRE AMÉRICA LATINA Y EUROPA

*Sede de la Secretaría General de la Comunidad Andina
Av. Andrés Aramburú cdra. 4, San Isidro
Lima, 1 y 2 de Marzo de 2012*

**COMUNIDAD
ANDINA**



Apoyando



“Wind energy - clean, efficient and reliable power generation”

Renewable Energy Conference , Lima
1/2 March 2012

Sandra Parthie, Director EU Regulatory Affairs
01/03/2012

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Agenda

1st topic Alstom - technology offer

2nd topic Alstom in Latin America

3rd topic Wind energy and the grid

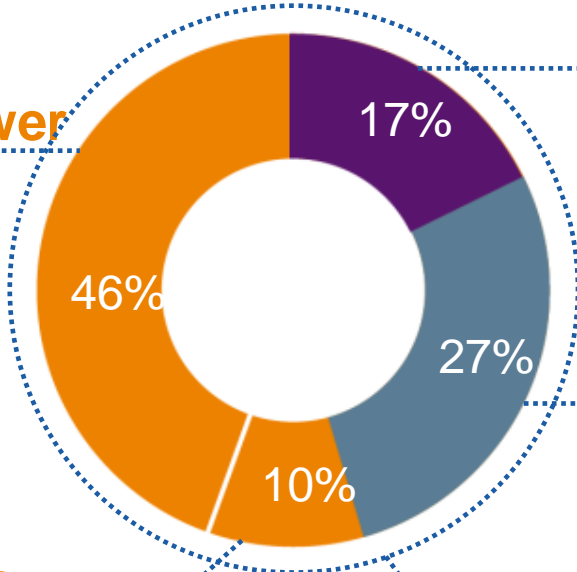
4th topic Key Messages

Alstom Group

3 main activities in 4 sectors



Thermal Power
9.7 €bn



Grid

3.6 €bn



Renewable Power
2 €bn

Transport
5.6 €bn



Total sales
2010/11:

20.9 €billion

Organisation as of 4 July 2011

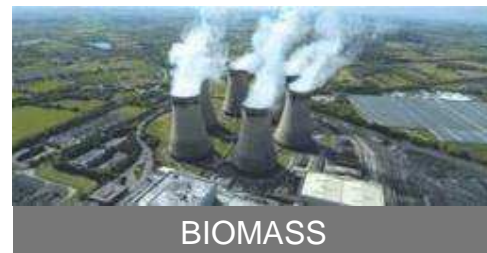
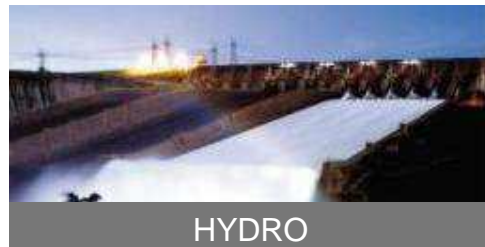
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Alstom Renewable Power

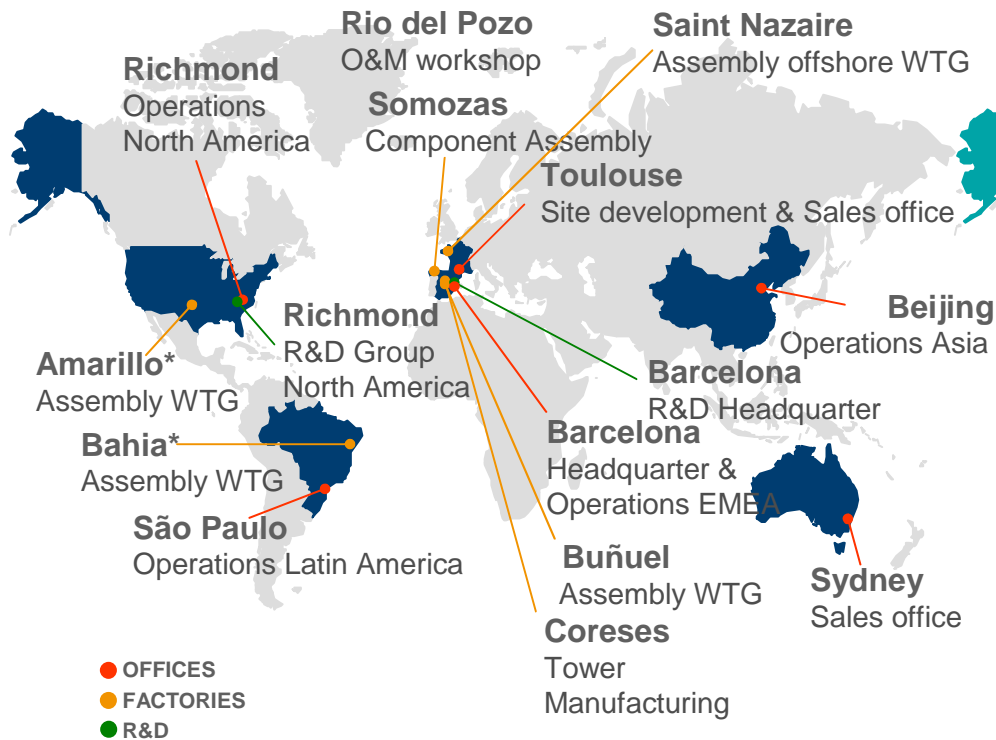
Technologies adapted to all renewable energy sources

- Most comprehensive range of renewable technologies
- World leader in hydropower
- World's broadest range of 3MW-class wind turbines

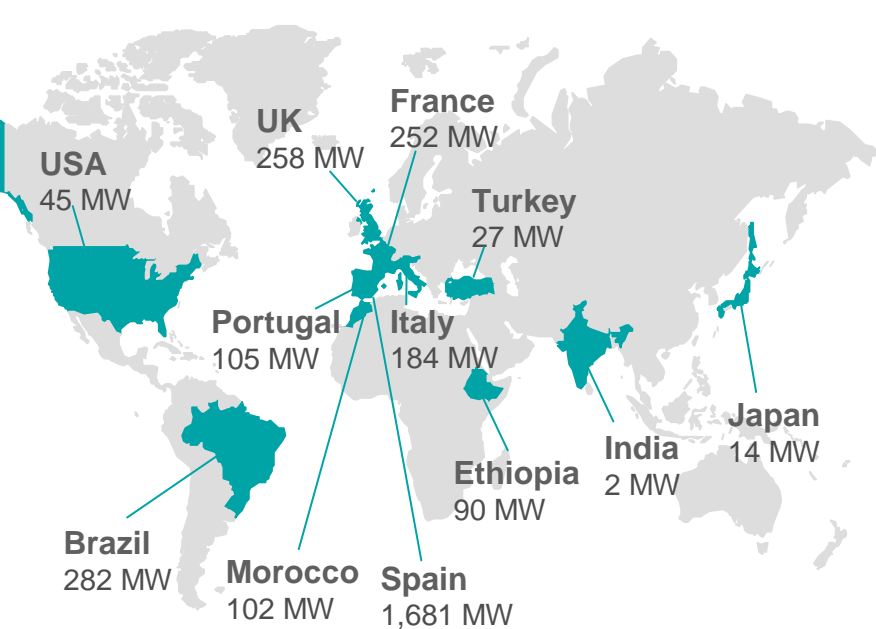


Alstom's Wind business International footprint

Global Presence



Wind References



* Assembly unit starting operation in 2011

Installed/Under Construction at August 31st, 2011

Over 3 000 MW and 2 200 wind turbines in 120 wind farms installed and under construction

Alstom Latin America – Presence



7600 employees in 27 Units

Alstom Wind in Latin America

Alstom is investing 20 million euros in its wind assembly plant in Brazil, which will have the capacity to produce each year turbines with a total of 300 MW power generating capacity.

- Potential for **300 GW** wind energy
- expected to reach **46 GW** of total installed wind capacity by **2025** with a 12.6% compound annual growth rate of yearly installations



Brazil – Latin America Headquarters

Alstom Wind in Latin America

The wind sector represents one of the areas of largest growth among current infrastructure projects in Latin America.

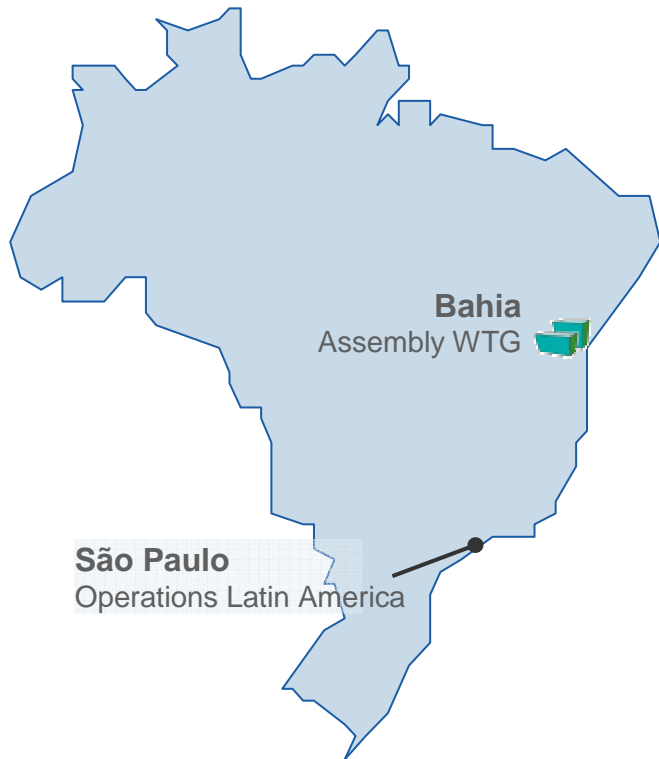


Our technology development is focused on improving availability, increasing the efficiency of energy conversion, and lowering construction and maintenance costs.

Our integration and control solutions offer the ability to manage renewables within a complex fleet.

Our offer: Availability, efficiency, integration and control solutions

Alstom's Wind business Footprint in Brazil – LAM



Bahia plant

- Activity: nacelle assembly
- Initial annual capacity: 500 MW
- **Workforce: 150 direct, 500 indirect jobs**
- Start up: November 2011



First nacelles assembled in Brazil in H2 2011

Alstom's Wind business References in Brazil – LAM



* WF – Bahia State

Brotas Complex

- 95 MW – 57 x ECO 86
- PAC on H2 - 2011
- Customer:

ENGEVIX



First wind farm under installation

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Alstom's Wind business - Projects LAM



ODEBRECHT ENERGIAS ALTERNATIVAS S.A.

Project; **108MW**, 40 ECO122 2,7MW in Rio Grande do Sul, Brazil. PAC Primo 2014

Oleoplan S.A

Project; **27MW**. 10 ECO122 2,7MW in Rio Grande do Sul, Brazil. PAC Mid 2014



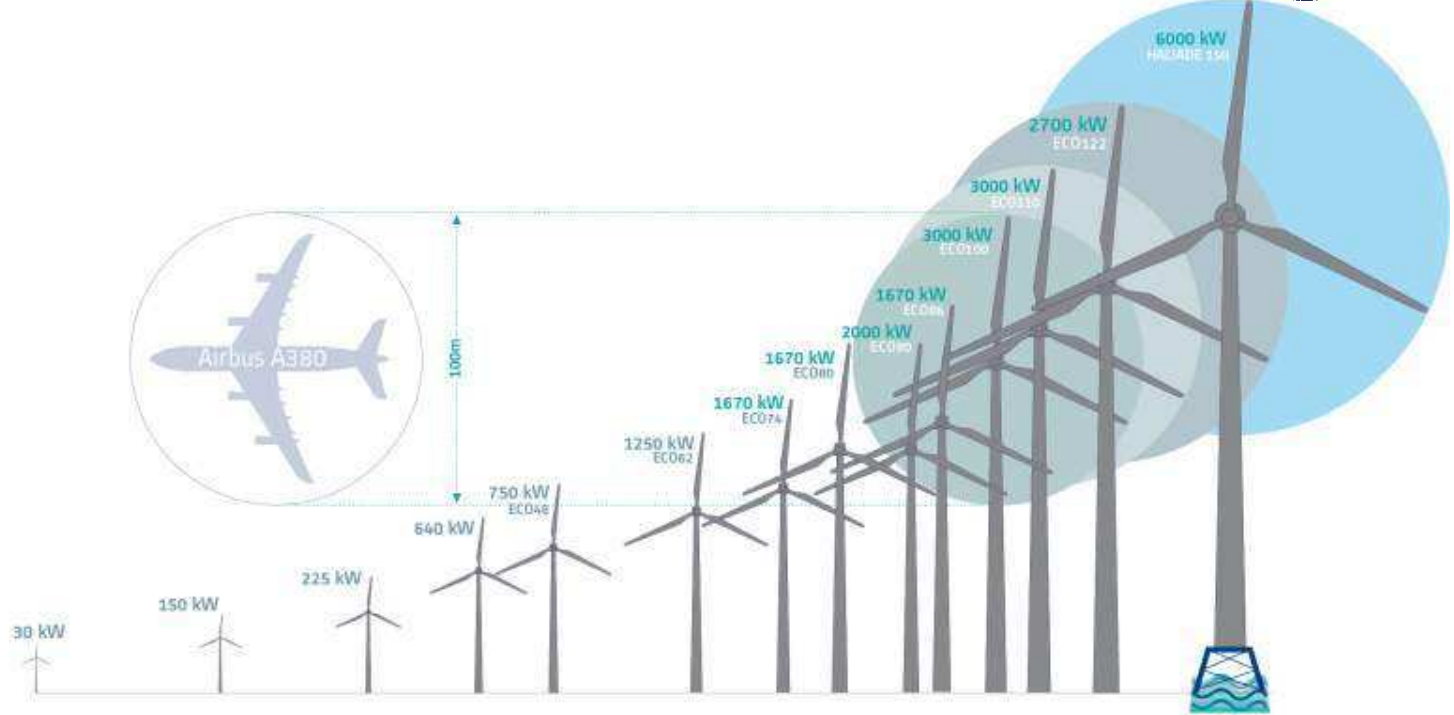
Brasventos

Rei dos Ventos Complex
186 MW – 112 x ECO 86,
PAC mid 2012

ISOLUX Ingenieria S.A.

Project; **51MW**, 17 ECO100
3,0MW in Chubut, Argentina.
PAC Ultimo 2013

Alstom's Wind business Product platform evolution



30 years of experience in wind technology

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Alstom's Wind Turbines

Broad product portfolio



ECO 80 platform: for complex terrains

- Power 1.67MW
- Rotor Ø 80, 86m
- Status ECO 74/80: ca 1 800 MW
ECO 86: ca 320 MW



ECO 100 platform: higher energy yield

- Power 3MW range
- Rotor Ø 100m, 110m, 122m
- Status >200,000 operating hours
ECO 100: ca 320 MW
ECO 110: ca 30 MW
ECO 122: first unit 2012



Offshore platform: new 6MW generation

- Power 6MW
- Technology Direct Drive PMG
- Status Prototypes: 2011-2012
Preseries: 2013
Series: 2014

Product portfolio to optimise production to site conditions

ECO 122 – 2.7MW

Turning low wind sites into new business opportunities

A **unique combination** of high power and high capacity factor

- Rotor diameter 122m
- Nominal power 2.7MW

Certification:

- Class S (cIII av. & cII extreme)

Key benefits

- Higher Capacity Factor
- Land optimization: up to 25% yield compared to 1.5 – 2 MW turbines
- CAPEX optimization: 10=15% lower balance of plant cost

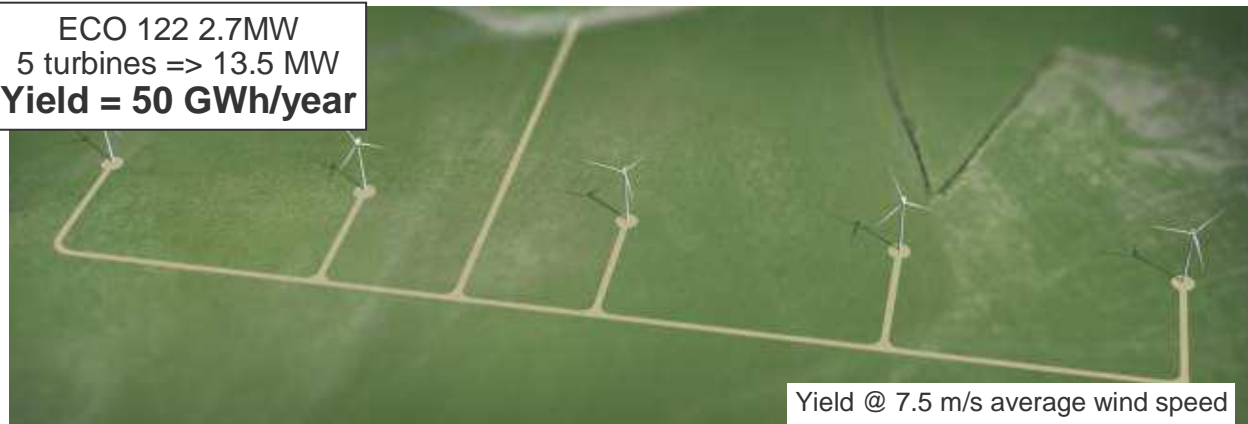
ECO 122 – 2.7MW Land optimisation

- Wind farms using ECO 122 produce about 25% more electricity than wind farms using 1.5 - 2MW wind turbines on the same piece of land

1.5-2 MW turbine
6 turbines => 11 MW
Yield = 40 GWh/year



ECO 122 2.7MW
5 turbines => 13.5 MW
Yield = 50 GWh/year



Yield @ 7.5 m/s average wind speed



Fewer wind turbines and higher yield

Areas of expertise for onshore – EPC capabilities

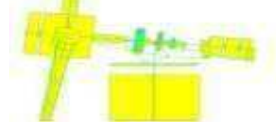
Wind farm development

Wind turbine supply

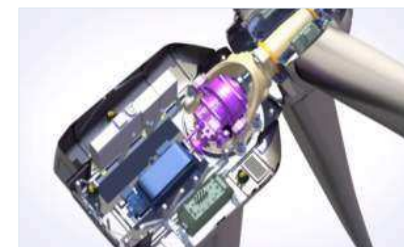
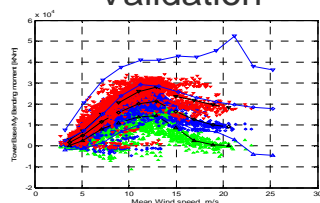
Wind farm construction

Operation & Maintenance

Concept



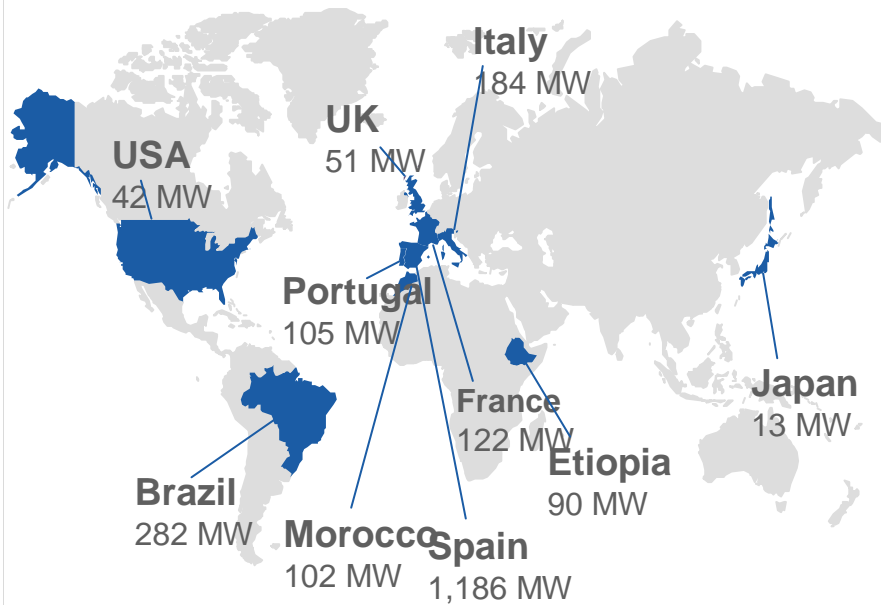
Validation



Through expertise reducing CoE across the entire value chain

ECO 80/ 100 Platform References

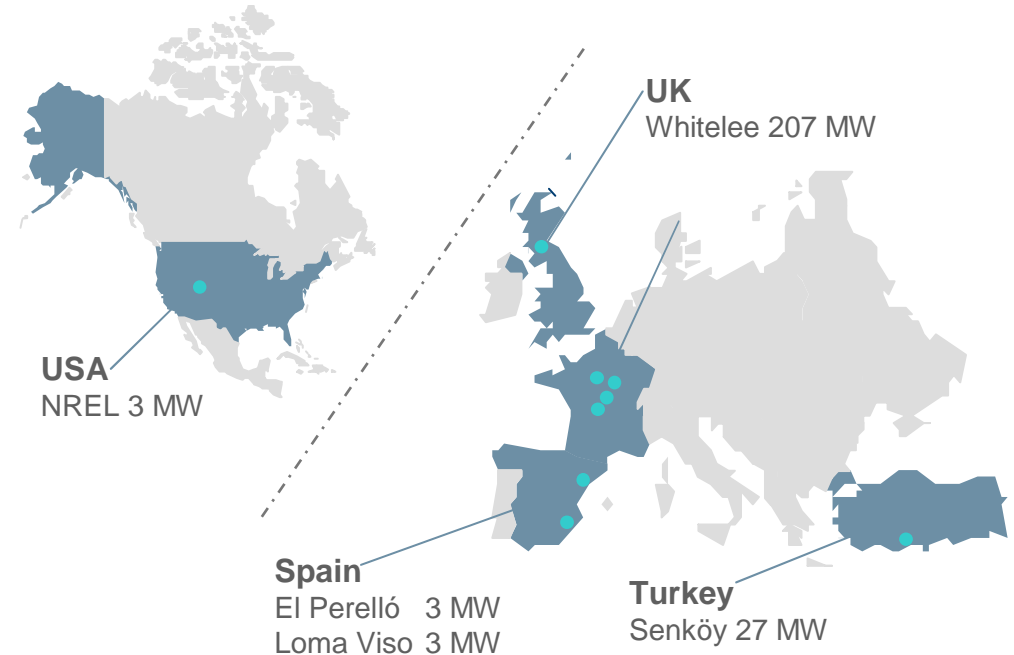
ECO 80 Platform References



Installed/Under Construction at August 31st, 2011

>2100 MW installed or under construction

ECO 100 Platform References



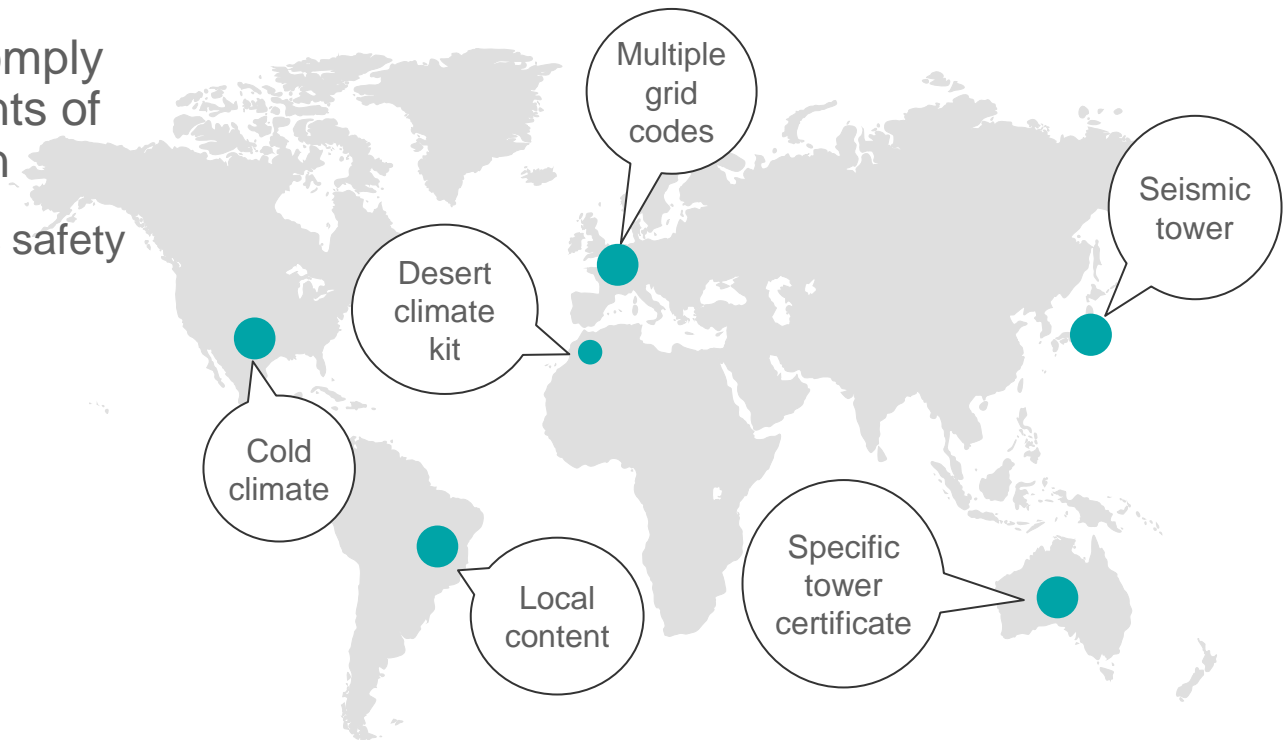
Installed/under construction at August 31st, 2011

>350MW references installed or under construction

Country customisation

EXAMPLES OF ALSTOM CUSTOMISATIONS

- Alstom wind turbines comply with specific requirements of each country and region
 - ✓ Environment, health & safety
 - ✓ Grid code
 - ✓ Certification
 - ✓ Individual component adaptation:
 - Generator
 - Converter
 - Transformer
 - Switchgear
 - Tower
 - Foundation
 - ✓ Transport and logistics



Alstom's wind turbines are customised to meet specific market requirements

Environmental packages

- **Standard Version**

- Operating temperatures: -10°C to +40°C
- Standstill temperatures: -20°C to +50°C

- **Cold Climate Version**

- Operating temperature: down to -30°C
- Standstill temperature: down to -40°C
- Heaters ensure that the temperature in control cabinets, nacelle, hydraulic oil and gearbox oil are within operating conditions
- Special steel, special oil grease

- **Desert Climate Version**

- Operating temperature: up to +45°C
- Standstill temperatures: up to +50°C
- Nacelle dust insulation
- Improved cooling capacity
- Blades sand protection



Effective operation in the most demanding climate conditions

Areas of expertise for offshore + Grid



+ grid design

+ Substation design and construction

+ Electrical infrastructure commissioning

Market standard scope distribution model

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Haliade 150 – 6MW

New generation offshore turbine

Haliade 150

- Robust
- Simple
- Efficient

Alstom, a solid partner for large offshore wind projects

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Haliade 150 - 6MW

Efficient - High yield and low weight

Alstom and LM Wind Power to develop a highly efficient 150m rotor diameter with 73.5m blades



Best in class technology to help bring down the Cost of Energy of offshore wind

Haliade 150 - 6MW

Efficient - High yield and low weight

High Energy Yield

Current generation 6MW turbine

Alstom Haliade 150 - 6MW

+15% annual energy production

Alstom Grid, world leader in wind farm connections

You can count on Alstom Grid to provide you with proven, reliable and innovative solutions.

SERVICE

REAL-TIME ENERGY MANAGEMENT

TURNKEY SUBSTATIONS HVAC-HVDC ONSHORE-OFFSHORE

TURNKEY SUBSTATIONS

HV-MV PRODUCTS

NETWORK STUDIES

FACTS

Alstom Wind – Our Mission: Deliver Projects

Capability to deliver projects with expected energy production in due time with the right and expected quality

- wide range of renewable power solutions, including new technologies
- Focus on technologies, products and services, with EPC capabilities
- broad geographical reach

Customers are not only buying Wind Turbines but an Energy Generating Business

Key messages

Wind needs clear, long-term policy framework.

- Investment in clean technology: over \$300 trillion by 2050 – (IEA)
- Streamlining of approval activities, clear requirements and standards
- Public policy and funding to share risk with the private sector
- Feed-in tariffs and fiscal incentives, adopting aggressive renewable targets
- Innovate financial instruments – e.g. CDM or an Energy Investment Fund
- Policy stability and a plan for grid integration
- Cross-border transmission - MERCOSUR /SIEPAC

www.alstom.com

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Sandra PARTHIE

- La señora Sandra Parthie es directora de los Asuntos de Regulación Europea en Alstom. Anteriormente, fue directora del gabinete de Jo Leinen, presidente del Comité Medioambiental del Parlamento Europeo. En ambos casos, participó de manera importante en la política europea de las energías renovables tras, entre otros, la directiva europea sobre el tema. También se desempeñó como presidente del Secretariado del Mar Báltico y ha sido docente en la Universidad Christian-Albrechts de Kiel, Alemania.
- Contacto : sandra.parthie@transport.alstom.com
- Alstom, resultando originalmente de la fusión entre las compañías generales de electricidad del Reino Unido y de Francia, ahora es uno de los líderes mundiales en terreno de energía eléctrica. Ha sido una empresa en punta en la puesta al mercado de las tecnologías renovables de generación de electricidad.
- La sede del grupo Alstom se ubica en Levallois-Perret, en Francia. Tiene en Bruselas una representación para la Unión Europea.
- Mayor Información en <http://www.alstom.com>



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La Corporación Andina de Fomento y la Cooperación Regional para los Países Andinos dan las gracias a los expositores por haber compartido su peritaje, al público por su presencia y a todas las personas que trabajaron para que este acontecimiento tuviera el éxito que conoció.

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