

# Alstom offer for Wind Power Plants

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**ALSTOM**

# Alstom Power Products & Services



**Hydro Power Plants**



**Steam Power Plants,  
Gas Power Plants**



**Wind Power Plants**



**Service and Operation & Maintenance  
for Plants & Equipment**



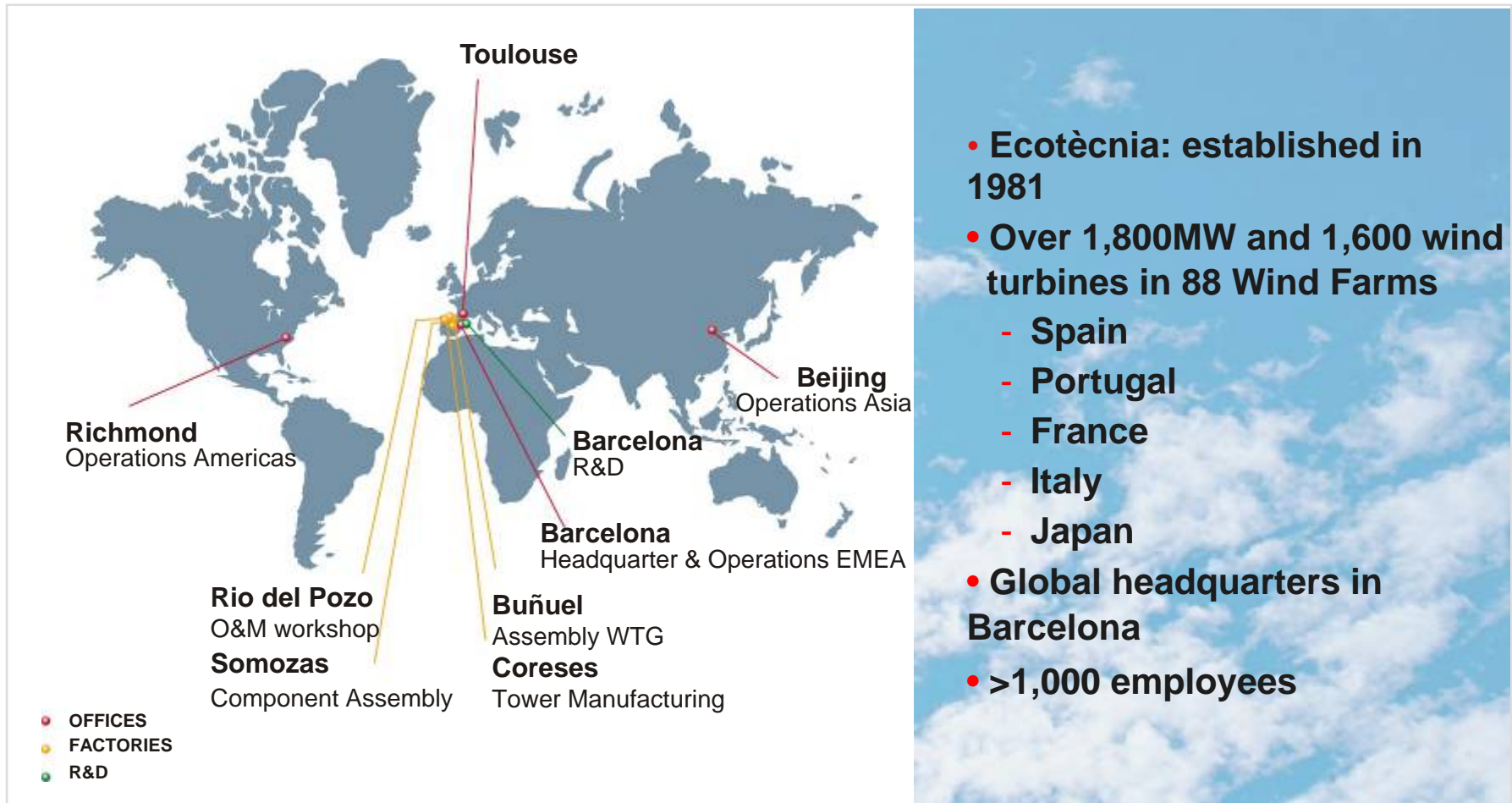
**Boilers,  
Heat Recovery Steam Generators,  
Air Quality Control Systems**



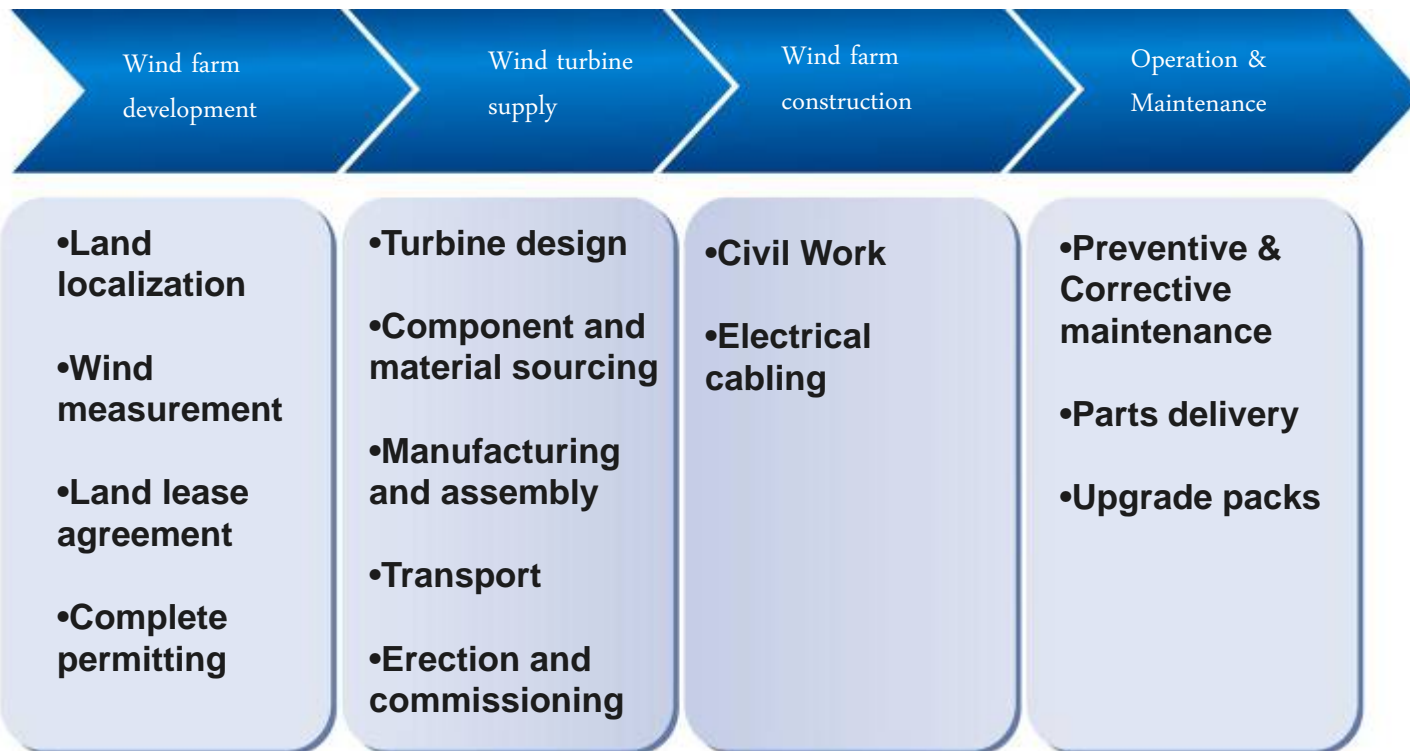
**Control Systems**



**Gas Turbines,  
Steam Turbines,  
Turbogenerators**

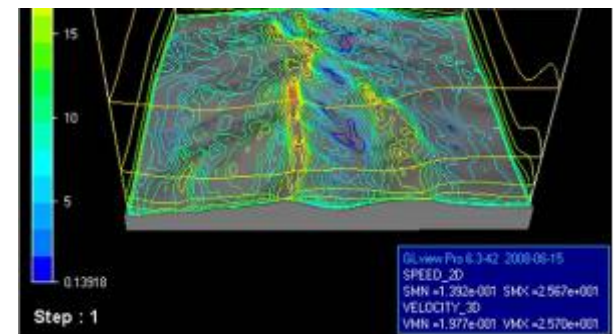
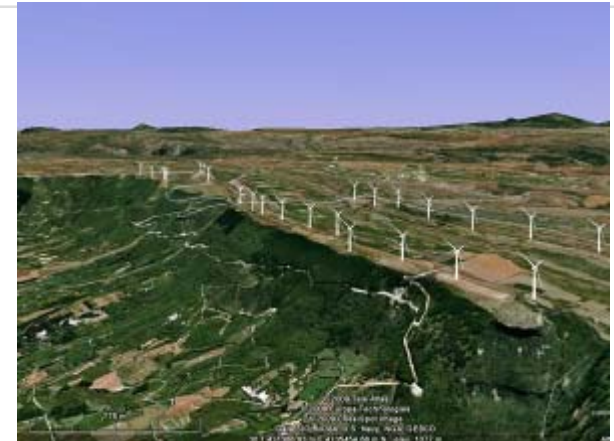


- **Ecotècnia: established in 1981**
- **Over 1,800MW and 1,600 wind turbines in 88 Wind Farms**
  - Spain
  - Portugal
  - France
  - Italy
  - Japan
- **Global headquarters in Barcelona**
- **>1,000 employees**



Expertise across the entire value chain

- Offering:
  - Site identification and assessment
  - Grid connection permits
  - Complete permitting
- Benefit to customer:
  - Accelerated project pipeline
  - Support during Project Development phase
- Organization:
  - Experts providing wind farm development services
  - investigating new countries



Expertise across the entire value chain

- Offering:
  - Wind turbine with ALSTOM PURE TORQUE™ concept
  - Transport
  - Installation & Commissioning
- Benefits to customers:
  - Higher reliability
  - ECO80 platform: ease of transport and assembly
  - ECO100 platform: higher energy yield
- Organization:
  - Design and execution teams
  - Assembly plants in Spain
  - Tower manufacturing plant



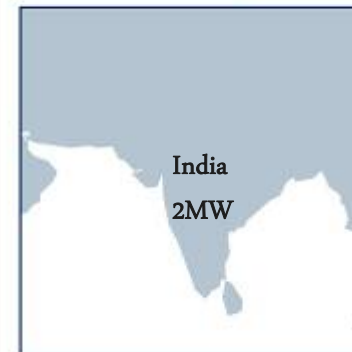
Over 25 years experience in wind turbine supply

Development

**WT Supply**

Construction

O&M



**Strong references in Southern Europe**

- Offering:
  - Civil works
  - Electrical infrastructure (cable laying, substation)
- Benefits to customers:
  - Minimize interfaces
- Organization:
  - Construction team
  - Contract with civil contractors



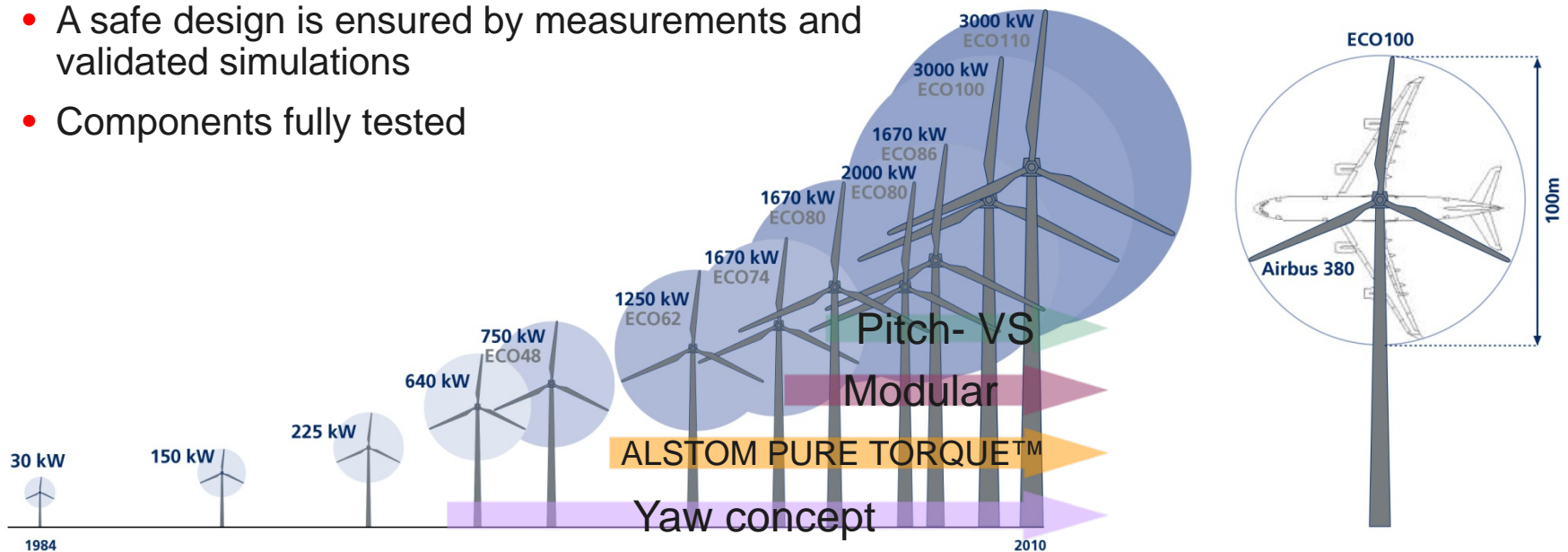
Ability to handle civil and electrical work contracts

- Offering:
  - O&M contracts during warranty period, extensions beyond warranty period
  - Preventive, corrective and predictive maintenance, remote monitoring, helpline and spare parts
  - Several O&M service packages from basic to comprehensive scope
- Benefits to customers:
  - Ensures highest reliability
  - Optimize O&M costs
- Organization:
  - Over 25 years supplying top-quality O&M services worldwide



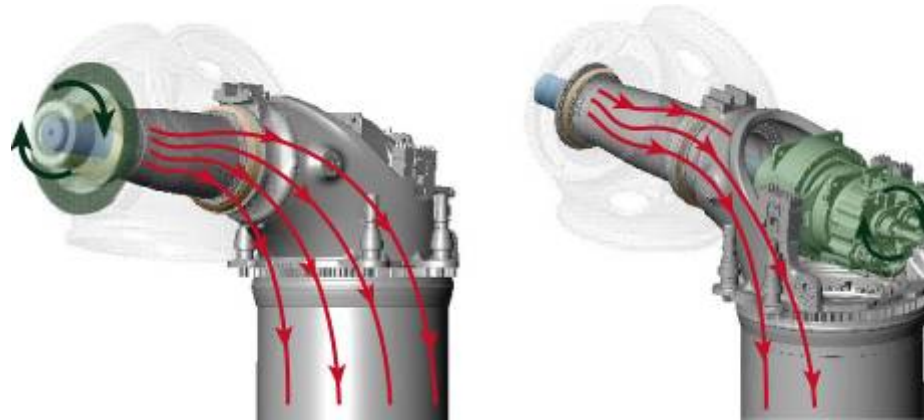
Several service packages to fit project requirements

- Over 1,600 wind turbines of different generations are in operation
- Concepts are coming from a track record in challenging sites
- A safe design is ensured by measurements and validated simulations
- Components fully tested



Build on the experience of previous WT generations

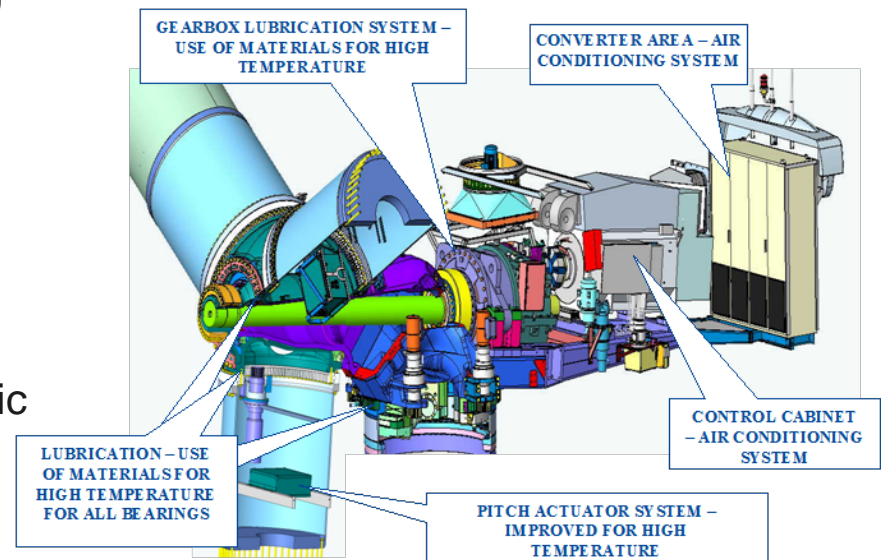
## A unique rotor support concept protecting the gearbox from deflection loads



- The hub is resting on a large cast frame on two bearings, transferring all wind deflection loads (red arrows) directly to the tower
- The shaft is connected to the front part of the hub and inserted inside the large casted frame, transferring only the torque (green arrows) to the gearbox

Transmitting pure torque to the gearbox for higher reliability

- Standard wind turbine operating temperatures:  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  according to IEC
- Cold Climate Version extends the operating temperature down to  $-30^{\circ}\text{C}$ . The wind turbine design temperature is  $-40^{\circ}\text{C}$ .
- Heaters ensure that the temperatures in the control cabinets, nacelle, the hydraulic Oil and Gearbox Oil are within their operating conditions
- Kit for desert climate conditions designed to operate at ambient temperatures up to  $45^{\circ}\text{C}$ .

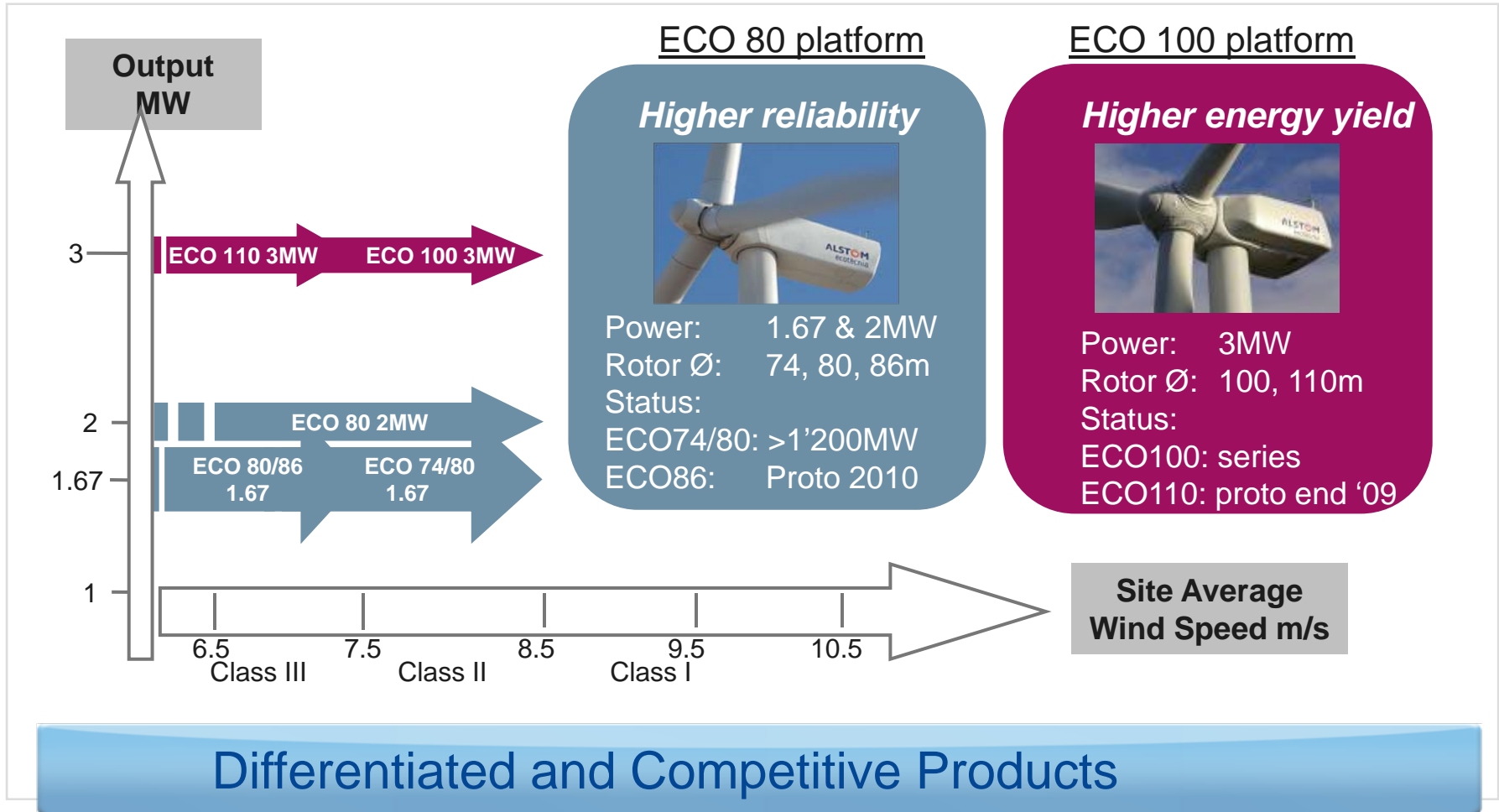


Effective operation in the most demanding climate conditions

Technology

ECO 80

ECO 100



Thank you for your attention

