

Environment friendly technologies in Power Sector

Oleg VITER,
Marketing Director Russia and CIS

Moscow, 7th December, 2010

POWER

ALSTOM

- Introduction
- Energy efficiency in Conventional power sector
- Renewable energy solutions



Hydro Power Plants



**Steam Power Plants,
Gas Power Plants**



**Wind, Solar and
Geothermal 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**

Two directions:

- **Better use of resources** (fuel) by increasing efficiency of power equipment;
- **More renewable energies ?**
 - Current accessible renewable resources in Russia = about 24 bn tons of c.f.
 - Only 1% of electricity was generated in Russia in 2008 with renewable resources (without taking into account HPPs with capacity > 25MW) and only 3% of heat.

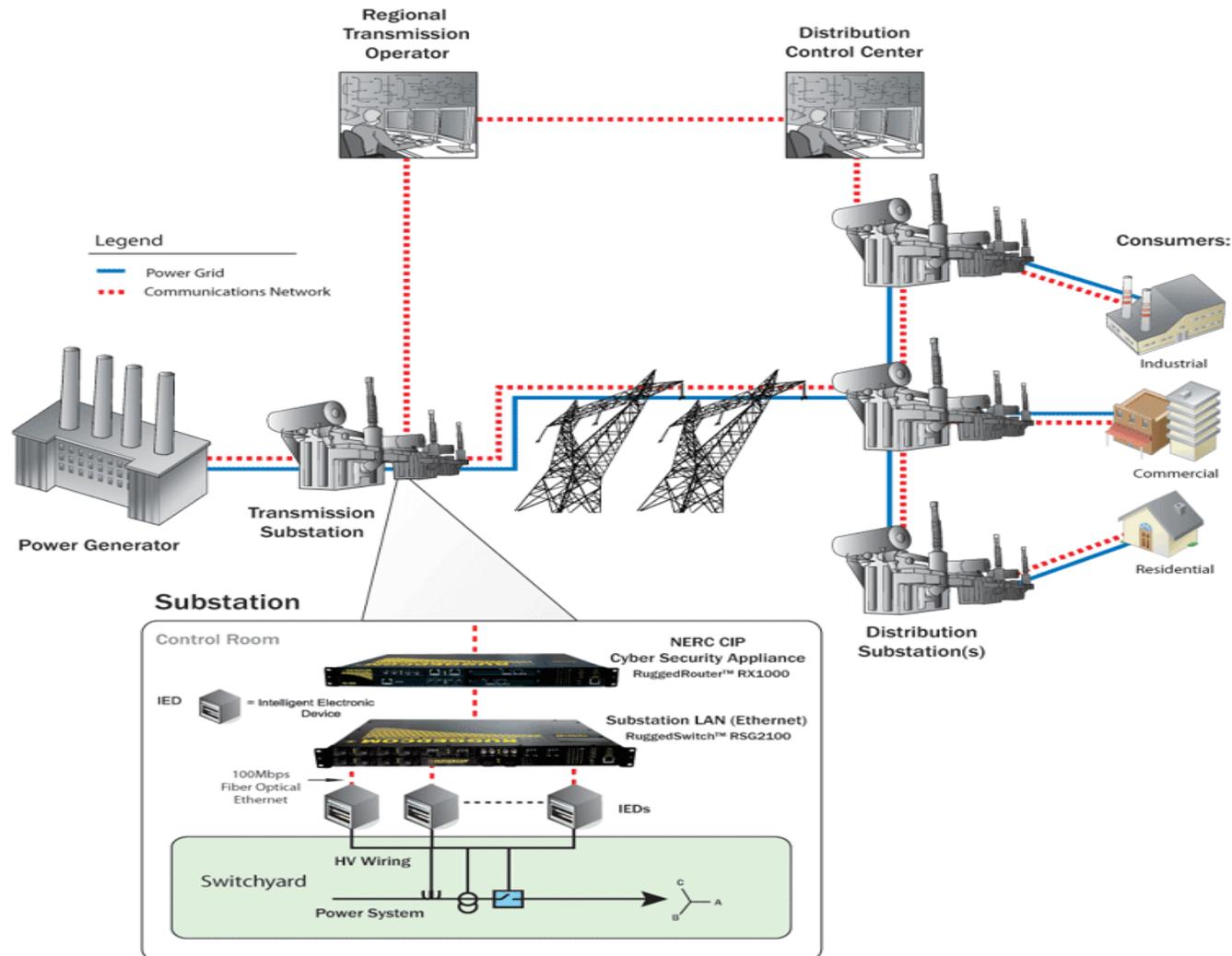




- **New build:**
 - **combined cycle** for gas plants (Efficiency > 55% vs current 35% in Russian gas fired IB) ; a combined cycle plant uses ~30% less fuel per kWh produced
 - **ultra supercritical technologies** for steam (coal) plants (Efficiency up to 44-47% from current 35%)



- Use of the “smart grid”:





- **Modernization of existing steam power plants:**

- Gas fired: large-scale **repowering** of steam turbine plants
- Coal fired plants : **boiler and Steam turbine retrofits** (partial modernization) aimed at efficiency increase



- Alstom possesses the full range of air quality control systems and pioneers CO2 capture technologies for the future.
- We can assist in making studies and expertizing in environmental and CO2 compliance for new industrial and power plants to let from the conceptual design and layout take into account future trends and requirements for the industries.



Alstom Power Products & Services



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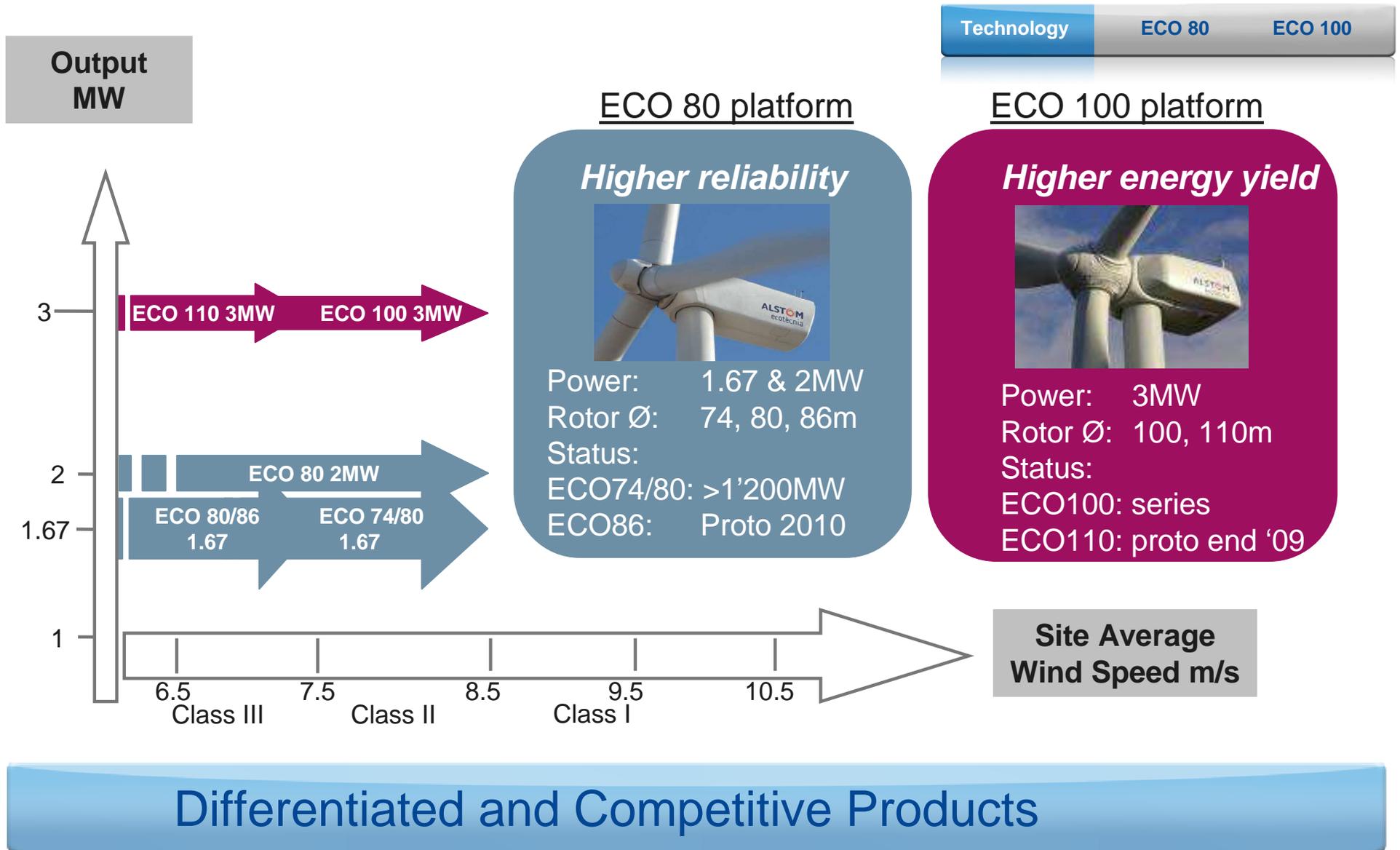


**Gas Turbines,
Steam Turbines,
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Alstom Wind Current Footprint

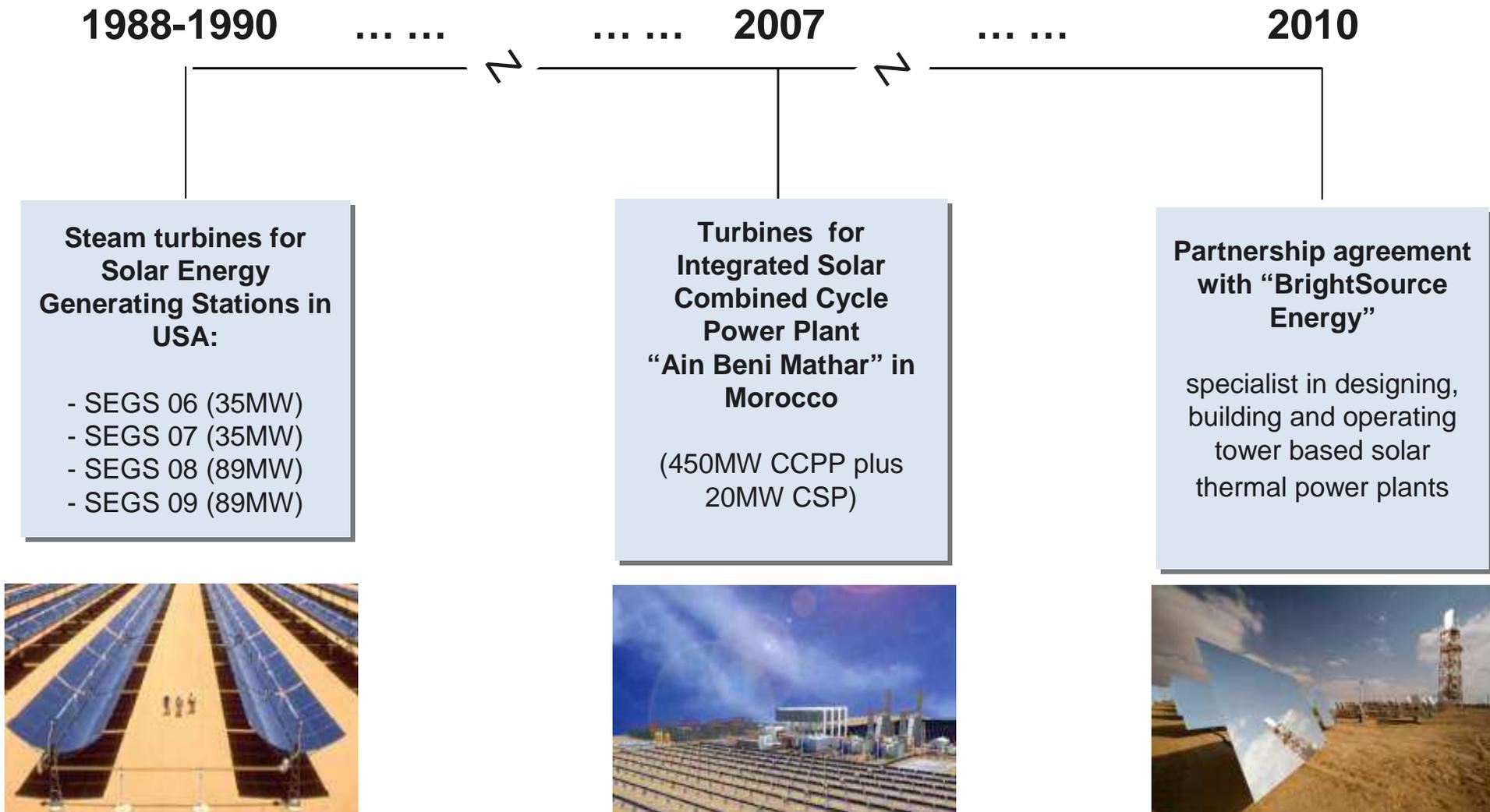


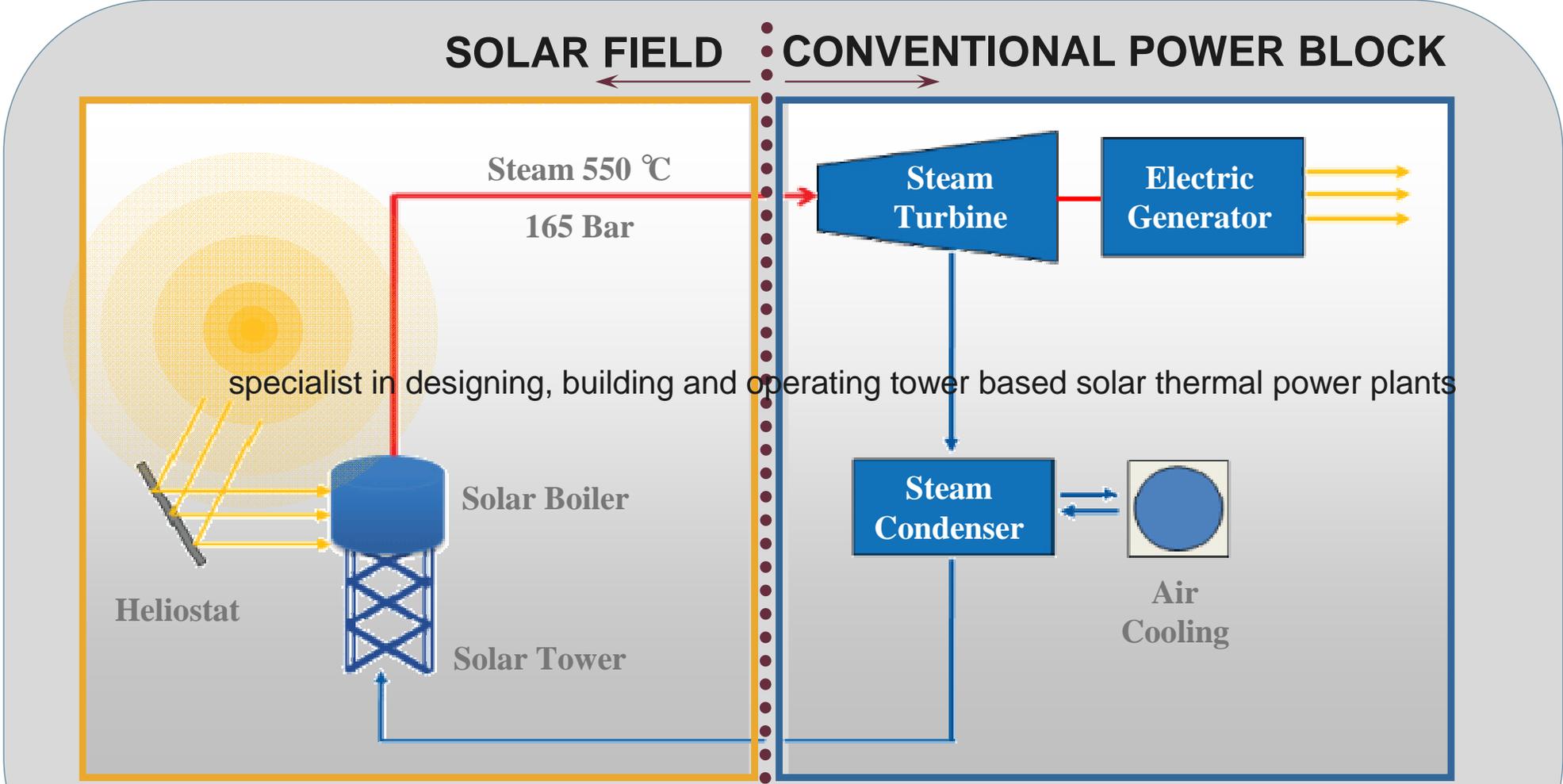
- **Ecotècnia: established in 1981**
- **Over 1,800MW and 1,600 wind turbines in 88 Wind Farms**
 - Spain
 - Portugal
 - France
 - Italy
 - Japan
- **Global headquarters in Barcelona**
- **>1,000 employees**



Alstom Solar Thermal

Building product portfolio & expertise





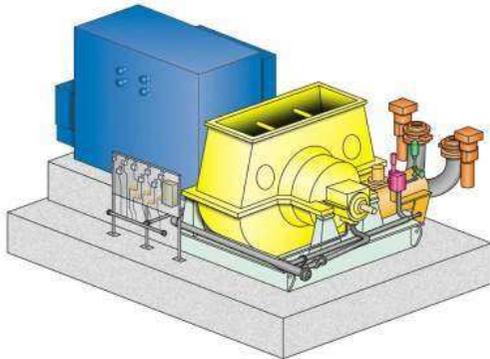
An integrated power plant solution

Geothermal Plant

Key Components: Steam Turbine & Generators

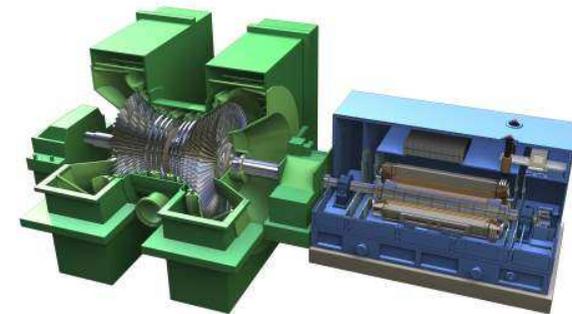


Single Flow 25 MW



- Direct drive turbine
- Single flow
- Vertical exhaust
- 25 MW (Nominal)

Double Flow 50 MW



- Direct drive turbine
- Double flow
- Lateral exhaust
- 50 MW (Nominal)

Air-cooled generator



- Pressurized container
- Improved stator sealing to reduce corrosion caused by hydrogen sulfide (H₂S) and carbon dioxide (CO₂)
- Up to 150 MVA for 50Hz, and 90 MVA for 60Hz
- Air-cooled for easy maintenance with high reliability

Geothermal Plant

References: Worldwide



Lahendong

Perusahaan Listrik Negara, Indonesia

1 x 20 MW

COD: 2001

Scope

- **Power Island and ...**
- Project management
- Mechanical BOP
- Engineering and site supervision



Las Tres Virgenes

CFE, Mexico

2 x 5.5 MW

COD: 1998

Scope

- **Power Island and ...**
- HV substations
- Project management
- Mechanical BOP
- Engineering and site supervision

Geothermal Plant

References: Worldwide



La Bouillante

CFG (BRMG), EDEV (EDF), French W Indies

1 x 5 MW

COD: 1980

Scope

- **Power Island and ...**
- Construction of power plant
- Engineering
- Manufacturing
- Purchasing
- Sub-contracting
- Construction and Commissioning



Wairakei

Contact Energy Limited, New Zealand

Units 1+2: 2 x 6.5 MW

Units 3-10: 8 x 11 MW

Units 11-13: 3 x 30 MW

COD: 1958

Scope

- **Power Island and ...**
- Engineering
- Implementation
- Erection and commissioning

Global supplier of geothermal plants with a dedicated business unit and in-house design capabilities

**Thank you for your
attention !**