Power Systems
On the growth path
Power Systems
Key performance indicators and highlights

- Biggest orders in history - large orders supported by base order growth
- Strong double-digit growth in service business
- Cable business back on track
- Well positioned for future growth
  - Record order backlog; tender backlog remains high
  - R&D continues to drive technology and innovation
## Market trends

- **Economic growth**
  - Need for more electricity / capacity

- **Climate change challenge**
  - Renewables
  - Energy efficiency
  - Demand management

- **Higher reliability of power supplies**
  - Stronger and smarter grids
  - Improve / upgrade existing grid

- **Urbanization / mobility**

- **Water gets higher visibility**

## Key opportunities for ABB

**Power generation**
- Traditional and renewable (solar, wind, hydro)

**Integration of renewables**
- HVDC; cables; semiconductors

**Reinforcing the grid: capacity / reliability**
- FACTS; substations; storage

**Smarter power networks**
- Control and automation; software

**Mobility**
- Railways / metros

**Water**
- Pumping stations; desalination plants

**Service; asset management; consulting**
Renewables solutions
Solar: PV, CSP and CPV

**Photovoltaic (PV)**
- Optimized, high efficiency modular solutions
- Proven track record ~250 MW; 40 PV plants

**Concentrated solar power (CSP)**
- 35% stake in Novatec; co-operation on turnkey projects
- Cost-effective and efficient Linear Fresnel-based direct steam generation (500°C)
- Highest yield per m² land

**Concentrated photovoltaic (CPV)**
- Significant stake in Greenvolts with exclusive marketing and sales agreement
- Outstanding solar electrical efficiency with triple-junction cells and dual-axis trackers
- Prefabricated / tested “plug and play” system
Transportation solutions
Railway and shore-to-ship power

Rail
- Traction power supply for metros and urban rail in India, Brazil, Poland
- Turnkey transmission, distribution, auxiliary and traction substations
- Efficient and seamless management of power network
- Space saving; high operational performance and productivity

Shore-to-ship power
- Clean, reliable power from shore for onboard systems of berthed vessels
- Reduction of greenhouse gasses, noise emissions and vibrations
- Flexible, simultaneous supply with two frequencies to match vessel requirements
HVDC technology
A key transmission enabler

Connecting remote hydro power
Xiangjaba-Shanghai, Itaipu, 3Gorges

Offshore wind connections
Borwin 1, Dolwin 1+2,

Power from shore
Troll A, Valhall platform

Cross border interconnections
NorNed, EWIC, Skagerrak, NordBalt, Estlink
Ultra high voltage direct current link order in India
$900-million order is a technology first

- Transmitting remote hydro power from multiple stations more than 1,700 km
- Capable of supplying enough electricity to serve 90 million people
- Highest-ever converter capacity at 8,000 MW
- World’s 1st UHVDC link with three converter stations
  - Two “sending” stations convert from AC to DC for transmission
  - One “receiving” station in Agra converts back into AC for distribution to end users
HVDC power highways
From joining the dots to connecting the lines

Europe  China  Desertec
ABB’s unique position in HVDC
In-house converters, semiconductors, cables

Essential components of HVDC transmission systems

- **R&D, consulting, simulation**
- **Converters/breakers**
- **High power semiconductors**
- **HV cables**

**Conversion of AC to DC and vice versa**
- *New simulation/test lab Sweden*

**Silicon based devices for power switching**
- *~$200mln investment Switzerland*

**Transmit large amount of power below ground and sea**
- *~$90mln US; $400mln Sweden*
Power and productivity for a better world™