

Markus Heimbach, Head of Business Unit Transformers, Transformer Days 2011

An introduction to BU Transformers

An introduction

ABB Group

A global leader in power and automation technologies






Leading market positions in main businesses



- 124,000 employees in about 100 countries
- \$32 billion in revenue (2010)
- Formed in 1988 merger of Swiss and Swedish engineering companies
- Predecessors founded in 1883 and 1891
- Publicly owned company with head office in Switzerland

How ABB is organized

Five global divisions

				
Power Products	Power Systems	Discrete Automation and Motion	Low Voltage Products	Process Automation
\$10 billion 32,600 employees (2010 revenues)	\$6.8 billion 17,500 employees	\$5.6 billion 25,600 employees	\$4.5 billion 20,300 employees	\$7.4 billion 27,100 employees

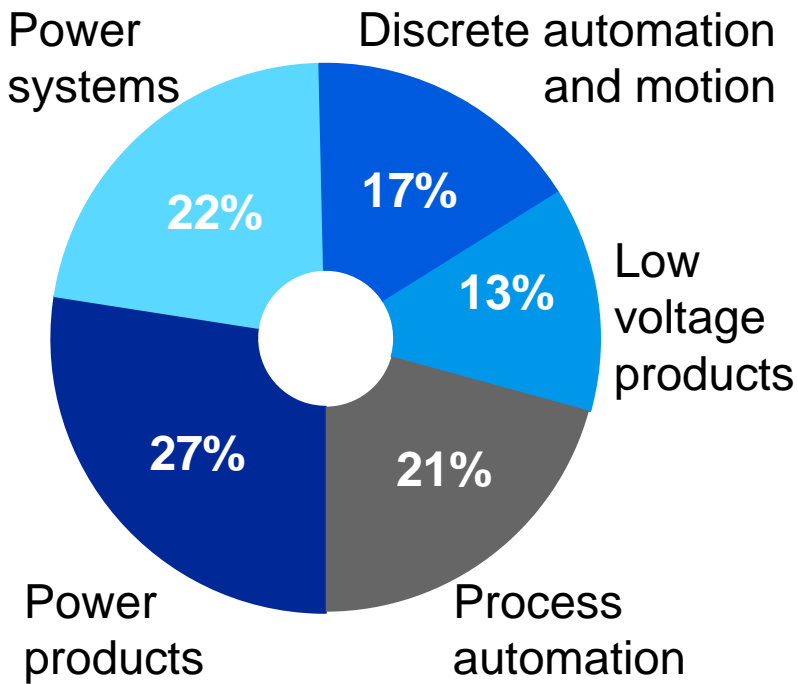
ABB's portfolio covers:

- Electricals, automation, controls and instrumentation for power generation and industrial processes
- Power transmission
- Distribution solutions
- Low-voltage products
- Motors and drives
- Intelligent building systems
- Robots and robot systems

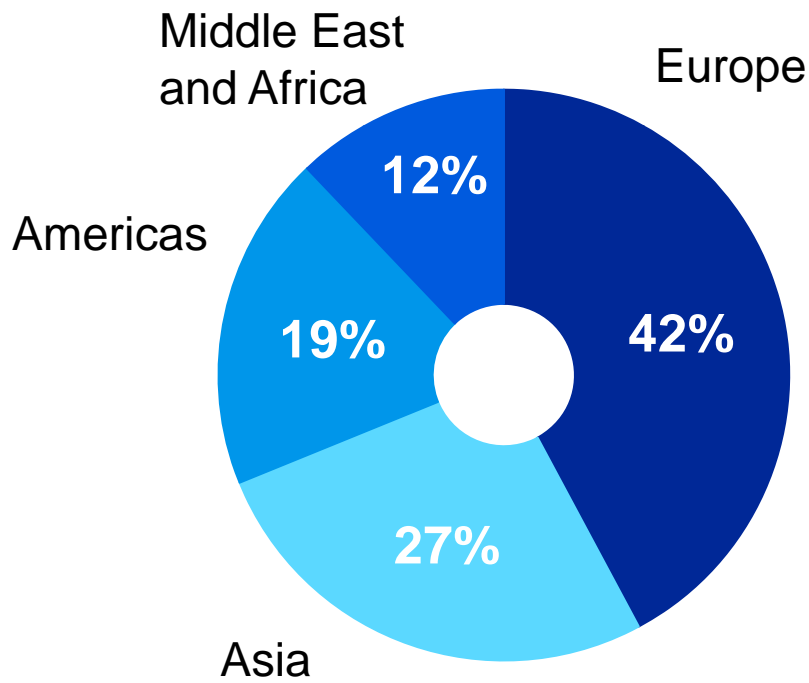
Well-balanced business and geographic portfolio

Capturing growth opportunities, wherever they arise

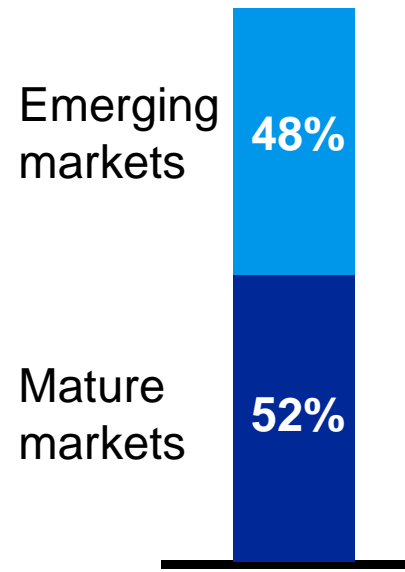
Orders by business field
% of total orders 2010 (non-consolidated)



Orders by region
% of total orders 2010



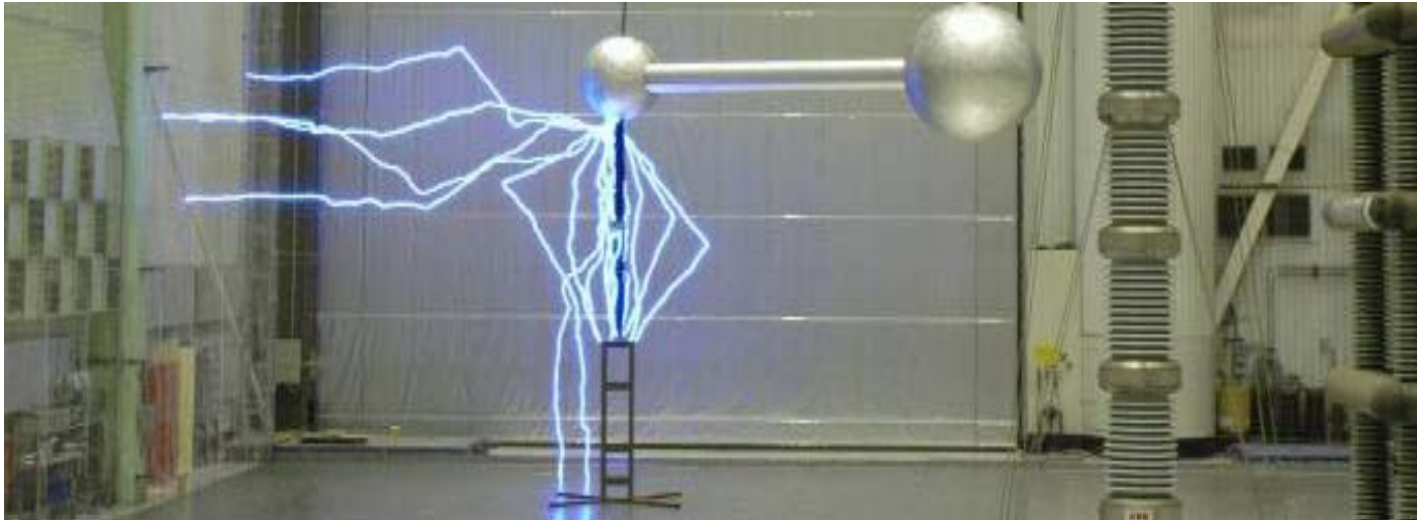
Share of employees
 2010



Innovation is key to ABB's competitive advantage

Leadership built on consistent R&D investment

* Comprises non-order related R&D and order-related development

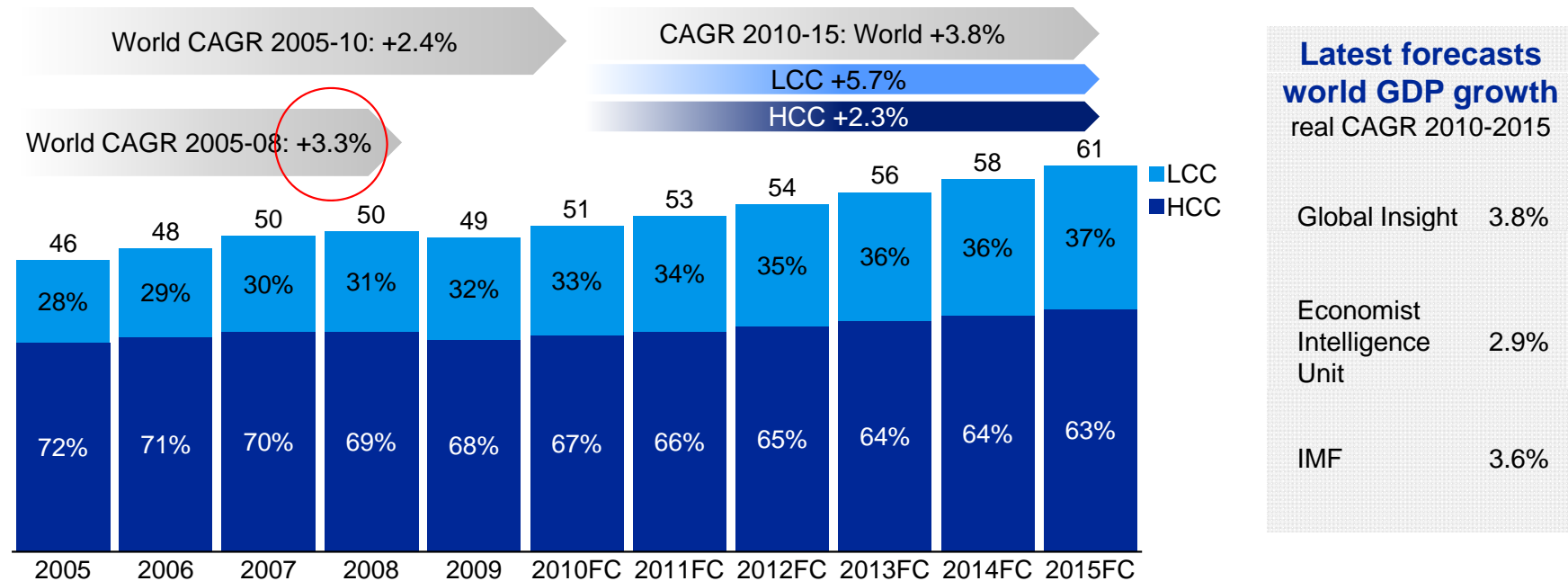


- More than \$1 billion invested annually in R&D*
- 6,000 scientists and engineers
- Collaboration with 70 universities
 - MIT (US), Tsinghua (China), KTH Royal Institute of Technology (Sweden), Indian Institute of Science (Bangalore), ETH (Switzerland), Karlsruhe (Germany), AGH University of Science and Technology (Poland)

World economy expected to grow moderately by 2015, supported by strong demand from emerging countries

World GDP

in real USD trillion; source: Global Insight; Oct 2010



- World GDP to continue expansion to 2015; growth will reach 3.8% in 2010 but slow down to 3.3% in 2011 due to unwinding of stimuli and end of restocking.
- Emerging countries to continue increase their share in world GDP, with Asia being fastest-growing region; fiscal sustainability concerns to remain threat to growth in developed world.

Shift in the global balance of economic power

Same top 10 in 2015, but gap is closing fast

World GDP by country

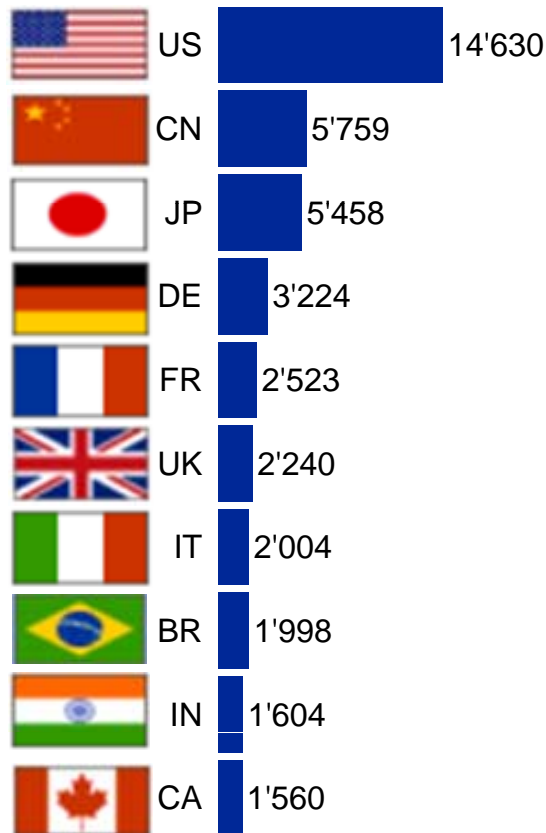
in real USD billion; source: Global Insight; Oct 2010

2000



World economy dominated by developed countries

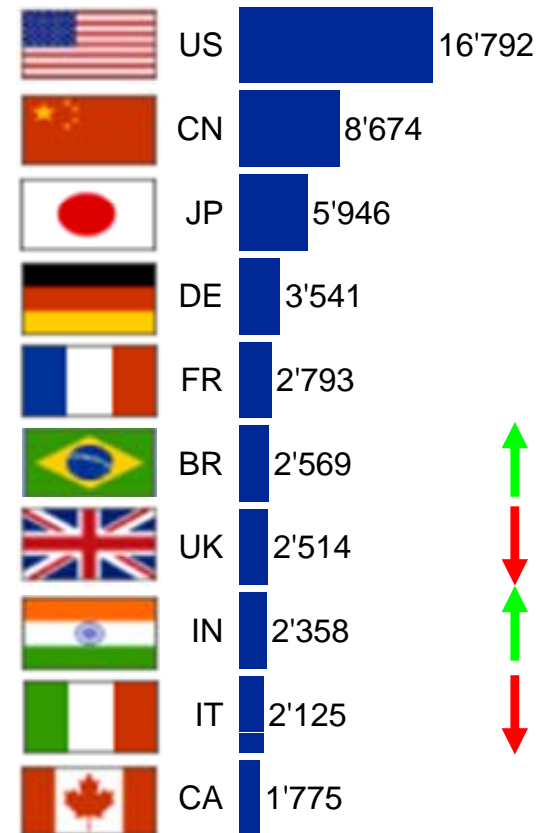
2010



CN has already entered Top 3, IN and BR within Top 10

Russia, Mexico, Korea getting close to top 10

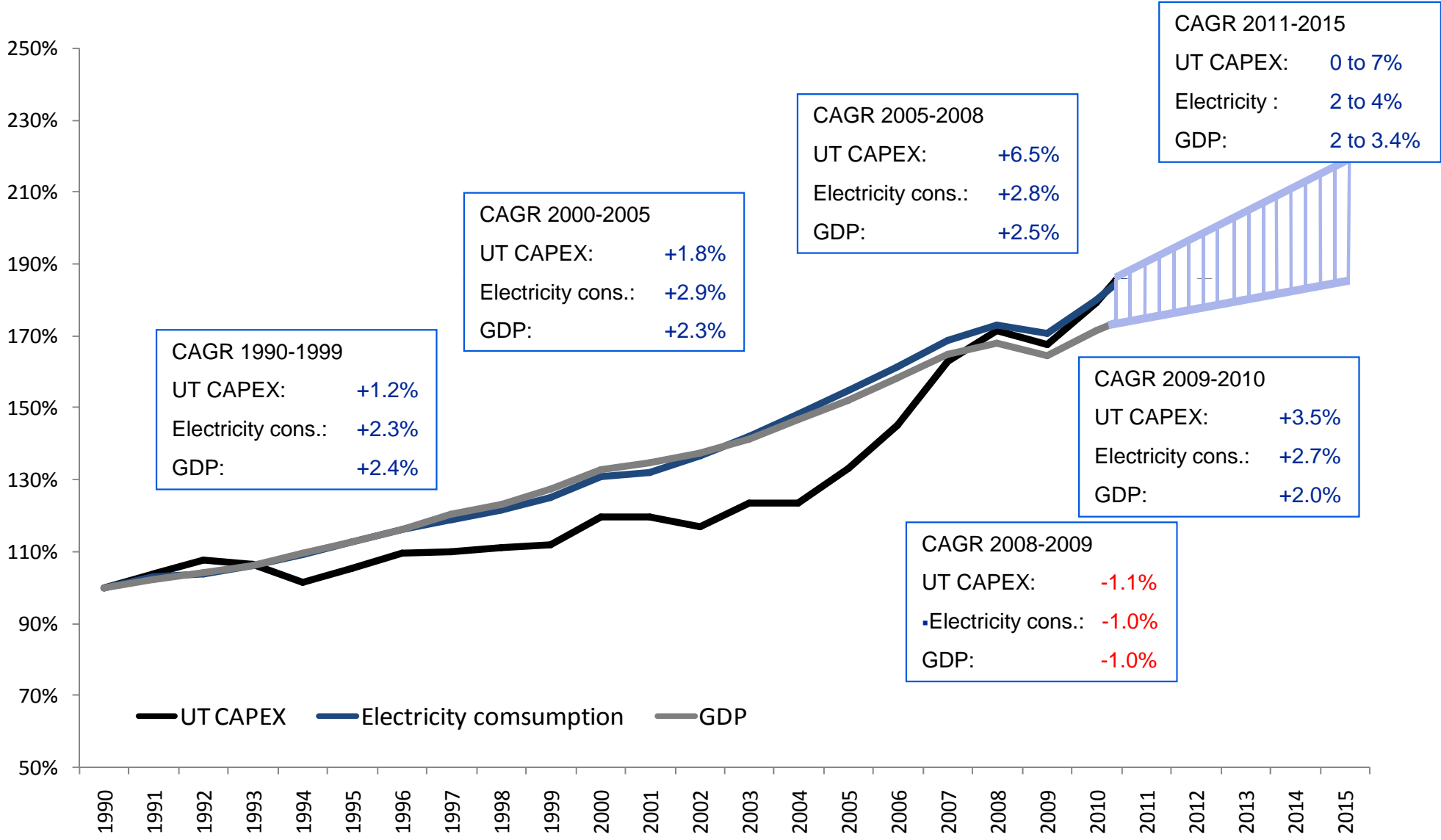
2015 FC




















BRIC represent 21% of world GDP (up from 17% in 2010)

Key indicators influencing the Power T&D Market

Utility CAPEX, Electricity consumption and GDP

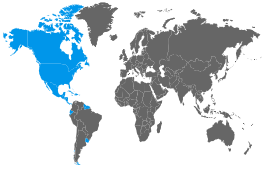


Despite the recent slowdown key market drivers for the power business are still intact

Major drivers	Europe	NAM	Middle-East	Emerging Markets
Electricity demand/ capacity build-up				
Grid Reliability and Efficiency				
Aging networks				
Power quality				
Renewable energies				

Regional and country overviews

Markets and market drivers



- **North America**

- Power: Aged infrastructure needs to be refurbished, focus on renewables
- Services and service outsourcing in both power and automation



- **Asia**

- China driven by power infrastructure development, prospect of the world's most modern power grid
- India growth on rural electrification plans and distribution systems



- **Europe**

- Need for interconnections and power grid upgrades
- Replacement and refurbishment
- Integration of renewables

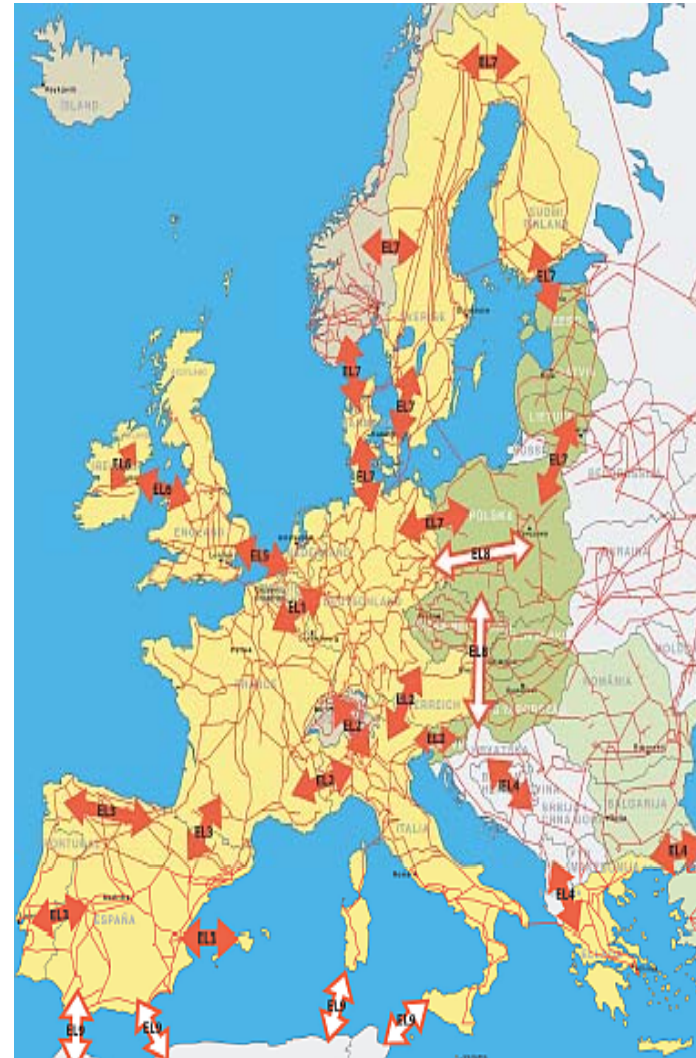


- **Middle East and Africa**

- Water infrastructure becoming increasingly important
- Diversification into downstream oil & gas, petrochemicals – electrification needed

European transmission investment Drivers

- Rising electricity demand
- Integration and accommodation of renewable energies
- More cross-border energy trade
- High regional electricity prices
- Energy security concerns
- Stability Improvement



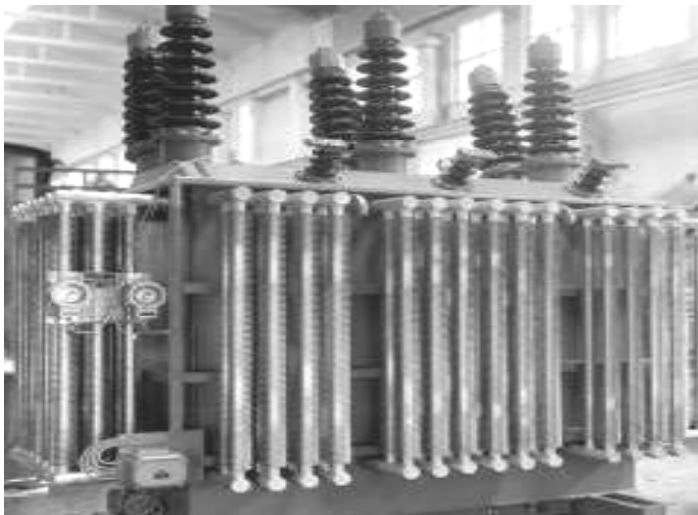
An introduction

Welcome to

BU Transformers

ABB's Transformers heritage

A long pioneering history



The combined experience of 700 years of transformer manufacturing

- Asea
- Ansaldo / Ital Trafo / IEL / OEL / OTE
- BBC
- GE, USA
- National Industri
- Strömberg
- Westinghouse
- And more

Business Unit Transformers



- Over \$5 billion orders
- Around 16 000 employees
- Global capabilities: 55 sites
- Global presence: revenues in more than 100 countries
- Complete range of power and distribution transformers, components and services
- Service organization in place for global customer support of all installed base
- Voltage range up to 1000 kV
- Homepage: www.abb.com/transformers

Global capabilities

55 transformer locations



Product portfolio

From components to service

Technology

Rated voltage

171 kV

Small Power Transformers

72.5 kV

Dry Type

36 kV

Liquid filled distribution



CORE TYPE



SHELL TYPE

10 MVA

40 MVA

63 MVA

Rated power

Four common technology platforms guaranteeing highest quality

Transformers

Complete portfolio – product offering

What ever you need
from our broad
portfolio ->
ABB is your “one-stop
shop” supplier

**Large medium
small power**

Generator step-up, network
coupling, shell, shunt reactors,
phase-shifting, HVDC, etc.



**Large medium
small
distribution**

1ph, 3ph, mineral, silicon, midel,
BioTemp[®], pole, pad, ground,
sub-sea, cooling, etc.



**Dry type
distribution**

Cast Coil, open wound,
RESIBLOC[®], vacuum pressure
impregnated, VP
encapsulated, etc.



**Industrial and
special**

AC furnace, DC furnaces, DC
electrolysis process (Al, Cl), AC
series reactors, etc.



IEC, ANSI and IEEE standards

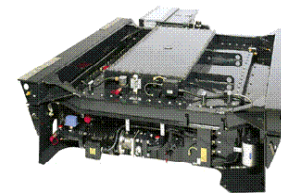
Transformers

Complete portfolio – product offering cont'd

What ever you need from our broad portfolio -> ABB is your "one-stop shop" supplier

Traction transformers

AC/DC operations, multi-systems, ground installations, rolling operations, etc.



Insulation and components

Bushings, tap changers, mechanical components, pressboard, Insulation materials, TEC®, etc.



Transformer Remanufacturing and Engineering Services

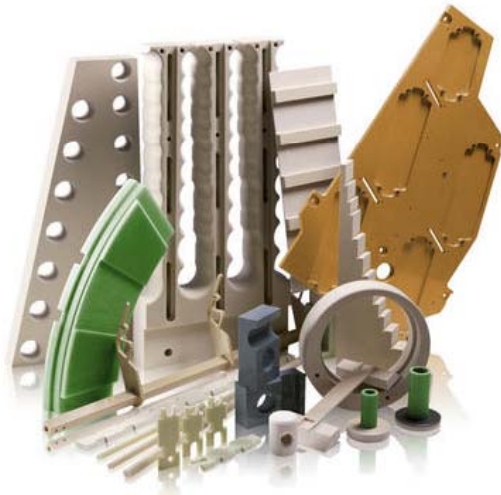
Engineering solutions, assessment, remanufacturing, TrafoSiteRepair™, advanced field services, installation and commissioning etc.



IEC, ANSI and IEEE standards

Transformer components

Insulation and components for transformers



- Pressboard
- Winding and Active Kits
- Transformer Bushings
- Tap Changers
- Diagnostic & Control Systems
- Protection & Preservation Systems
- Renewal Parts
- Insulation Materials
- Hollow Composite Insulators
- Distribution components

In-house technology

Comem Group portfolio

Accessories for power and distribution transformers

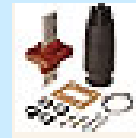
Air dehumidifiers



Buchholz relays



**Bus-bar insulators
BT and PIAS type**



**Combined bushing insulators
CRS 60 kV 3150 A**



Oil level indicators



**Plug-in bushings
PPQ & PPS type**



Polymeric bushings 1kV 250A



Porcelain bushing insulators



Pressure relief valves



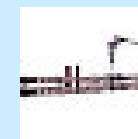
**R.I.S. (Integrated Safety
detector)**



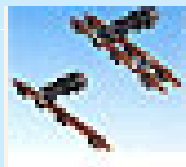
Tap changers AT type



Tap changers MT type



Tap changers TKC type



**Temperature control units "MB
103"**



**Winding and oil temperature
indicators**



Product highlights

New products, solutions and concepts

Transformers are all around us in different applications

Wherever you are, transformers are near by

1

Traction and distribution transformers

2

Distribution transformers

3

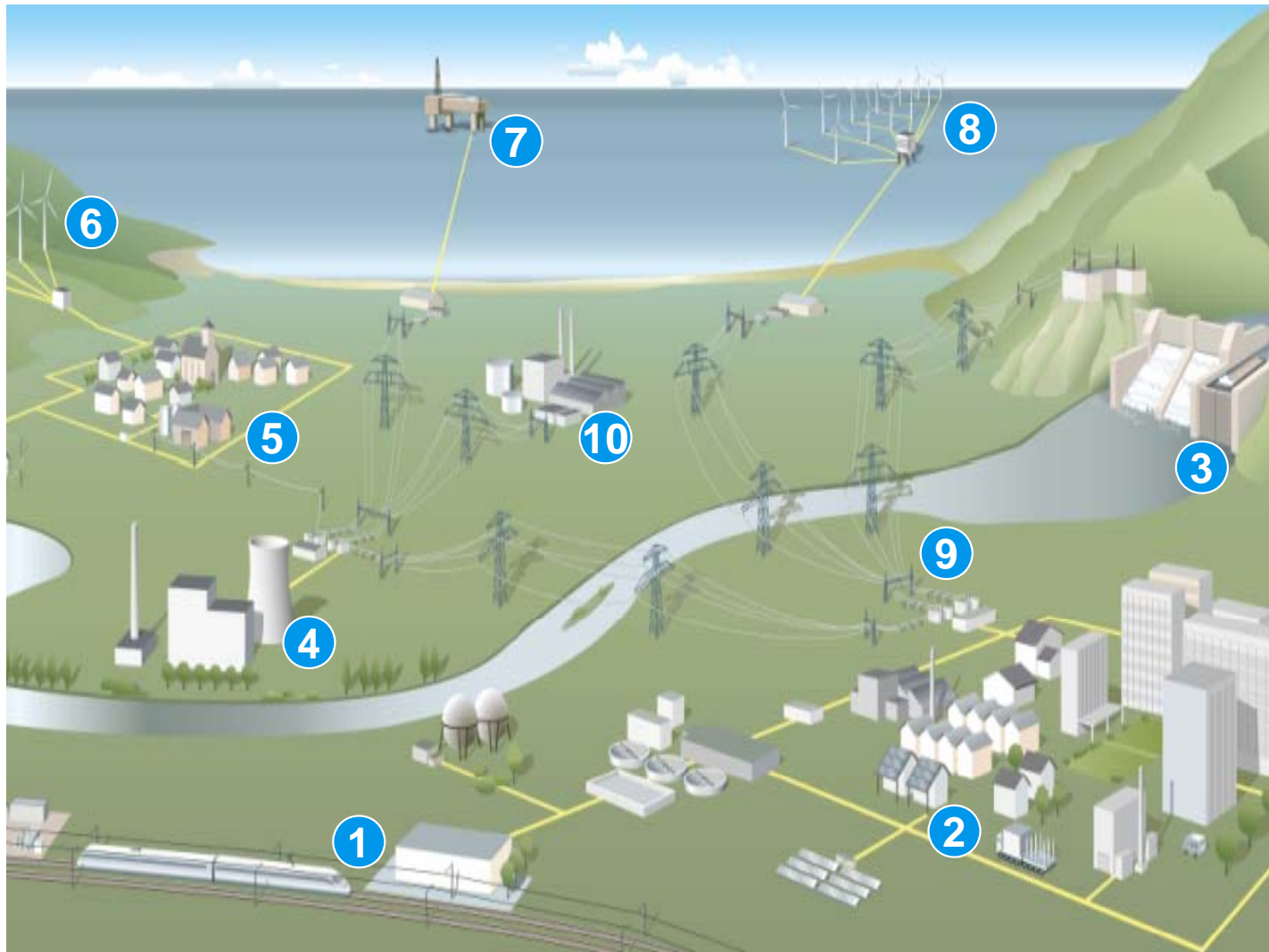
Power and distribution transformers

4

Power transformers

5

Low sound emitting transformers



6

Dry type distribution transformers

7

Subsea transformers

8

Dry type distribution transformers

9

Power and distribution transformers

10

Power transformers

Product highlights

New transformer concepts



- **Vacuum type on-load tap-changers**
 - Up to 300,000 operations
- **800 kV UHVDC (Ultra High Voltage DC transformer)**
 - For record total transmission capacity of 6.4 GVA
- **800 kV DC bushings**
- **Subsea transformer**



- ABB is the only manufacturer of underwater transformers, which are specially designed to ensure reliable power for equipment on the sea floor; the latest is an efficient 50 kV performer that can thrive in depths up to three kilometers.

- **TrafoSiteRepair™**
 - Up to 800 kV & 600 MVA



- **TrafoSiteTesting™**
 - Up to 500 kV (applied voltage)
 - Up to 90 kV (induced voltage)
 - Up to 2 MV (impulse voltage)

Energy efficient and green solutions for a better world

Technology trends reflecting environmental needs



EcoDry family – dry type transformers

- Highest efficiency dry type transformer for industrial and utility applications reducing no load loss by 2/3 and load loss by 1/3



The green liquid filled distribution transformer program

- Energy efficient products and solutions for lower CO₂ emissions
- The amorphous metal distribution transformer is one concept of the green program with up to 60% lower no load losses.



Biotemp®

- A natural ester-based dielectric, biodegradable insulating fluid made out of sunflower seeds
- A complete and sustainable solution for both distribution and power transformers associating environmental friendliness (high biodegradability), safety (superior fire resistance), and efficiency (high overload capacity)



Ultra low sound emitting transformers

- 20-25 decibels dB(A) below conventional noise specifications
- dB(A) reduction without use of sound panels or sound enclosures

Offshore technology development steps

From platform to platformless developments

Technological leaps

YESTERDAY
Gravity based platforms for drilling and production

TODAY
Floating production and subsea systems

TOMORROW
Seabed separation, extended wellstream transfer to onshore plant

Smedvig

University of Stavanger

Part IV

From platform to platformless developments

Carita, Banten, Indonesia
13 December 2005

Prof. dr. Arnfinn Nergaard
University of Stavanger
Smedvig Offshore

Vaasa Harbor Subsea Transformer Test



- Ormen Lange Pilot Transformer, 20 MVA 132/22.5 kV
- Weight 60 t

**Power and productivity
for a better world™**

ABB