



Hemant Sharma

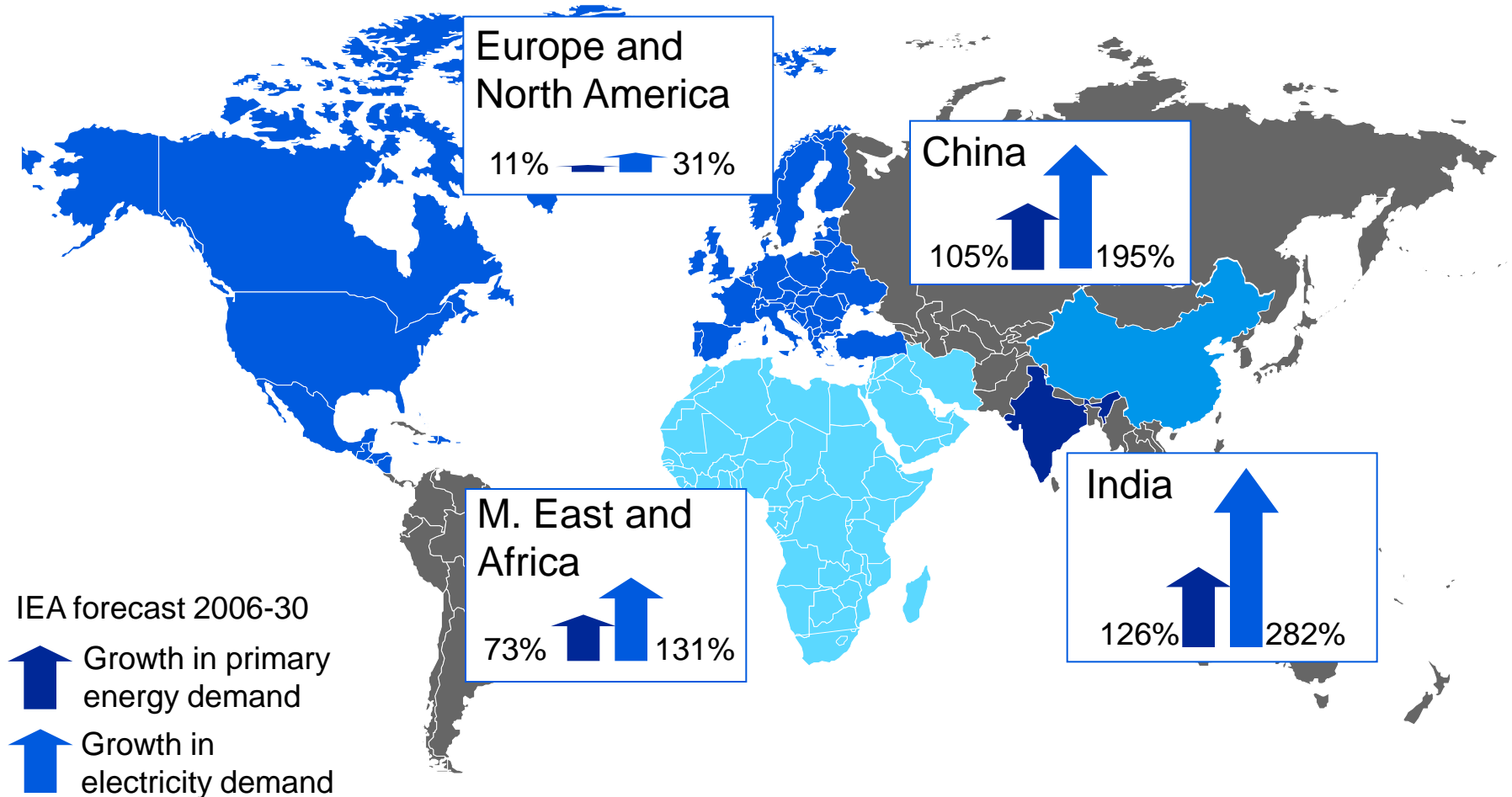
ABB Solutions for Energy Efficiency

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- Today's energy challenges
- Energy efficiency
 - Key technologies
 - Technologies in action
- What ABB is doing
- Summary

Today's energy challenge

Rising demand

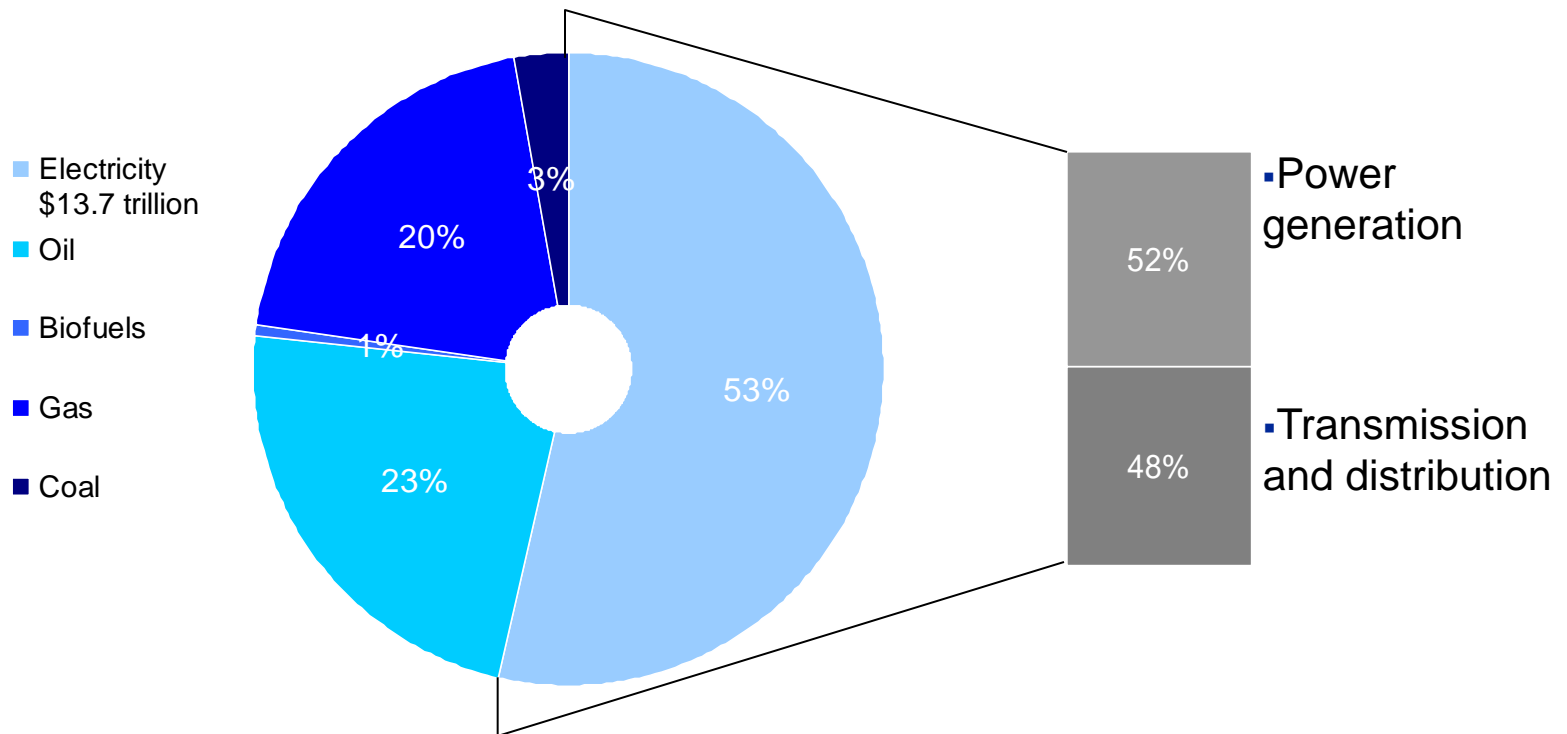


Investment in energy infrastructure 2008-30

Total investment: \$25.6 trillion

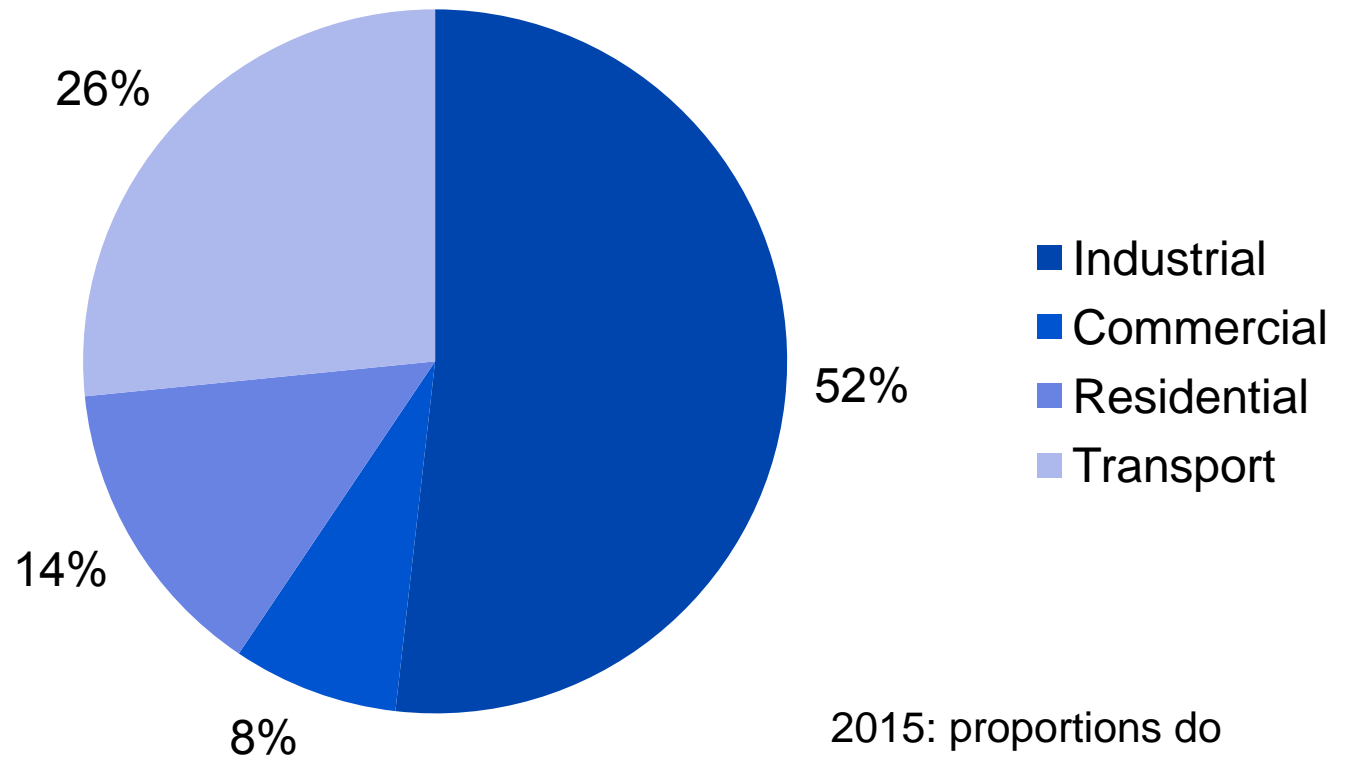
Cumulative investment under IEA Reference Scenario

Source: International Energy Agency, World Energy Outlook 2009



Industry is the largest global user of energy

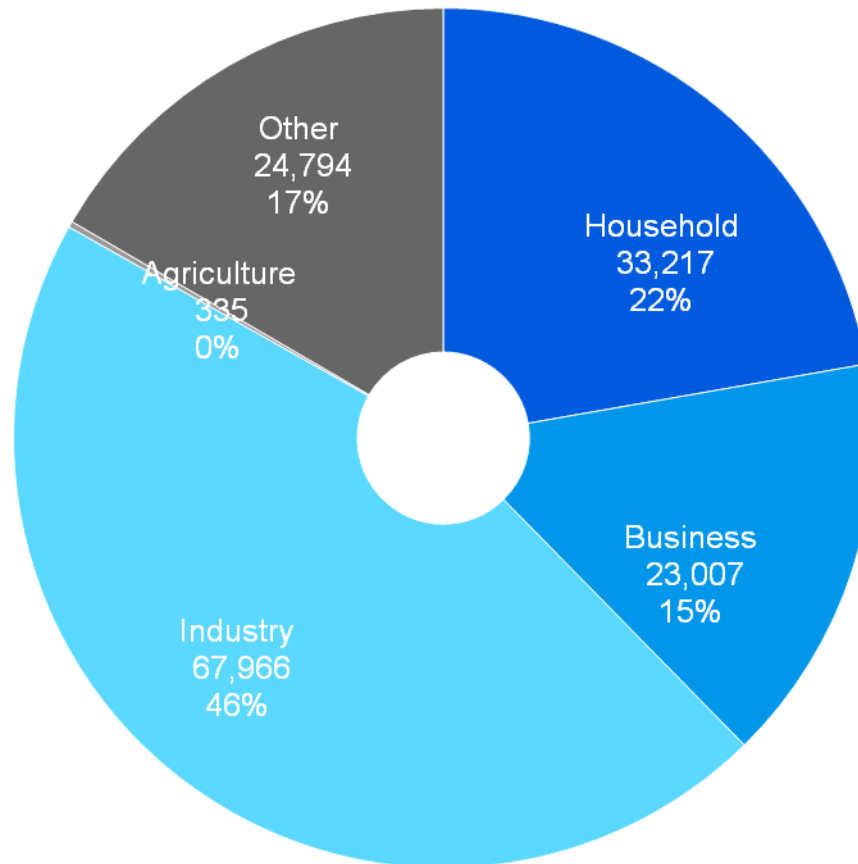
**2008 - Global Energy Demand By Sector
US EIA International Energy Outlook 2011**



2015: proportions do not change, total quantity is greater

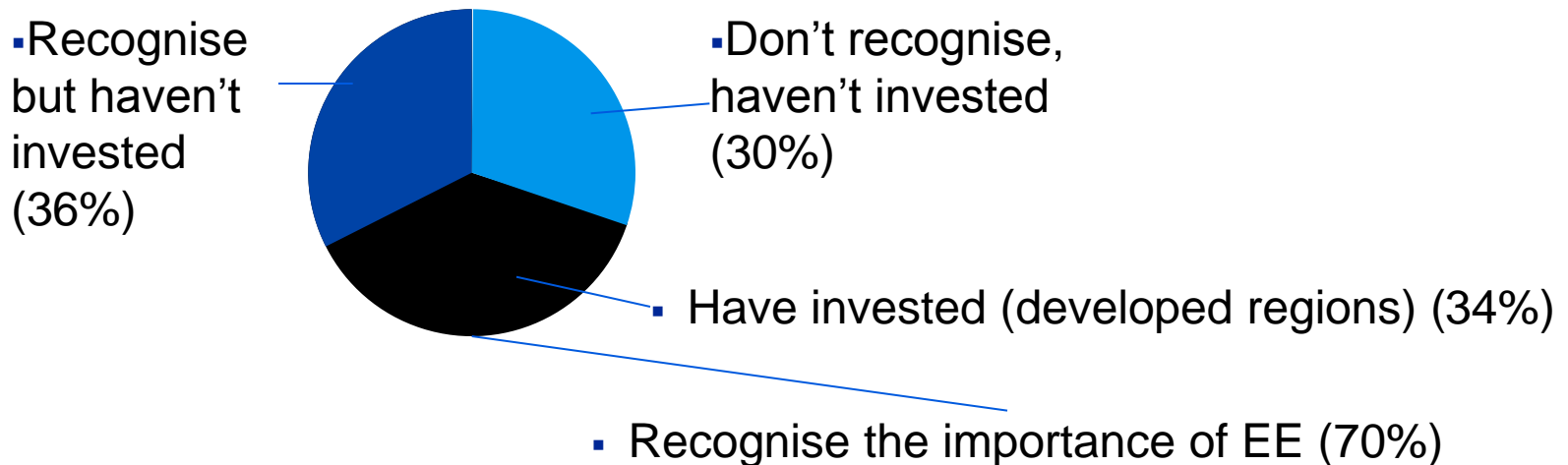
Electricity Consumption by User – Thailand (2010)

Total Electricity consumption = 149,319 GW/Hour



Energy efficiency in industry Commitment

- Over 70% of managers recognise the importance of EE
- Only 40% have invested globally
- Only 21% have invested in the US
- **Only 34% have invested in developed regions**



- **66% of industry in developed regions has yet to realise energy efficiency**

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The case for energy efficiency

Fast and cheap: technology is already available

“Improving energy efficiency worldwide is the fastest, the most sustainable and the cheapest way to reduce greenhouse gas emissions and enhance energy security.”

(Final statement of G-8 summit, Germany, June 2007)

“On average, an additional dollar invested in more efficient electrical equipment, appliances and buildings avoids more than two dollars in investment in electricity supply.”

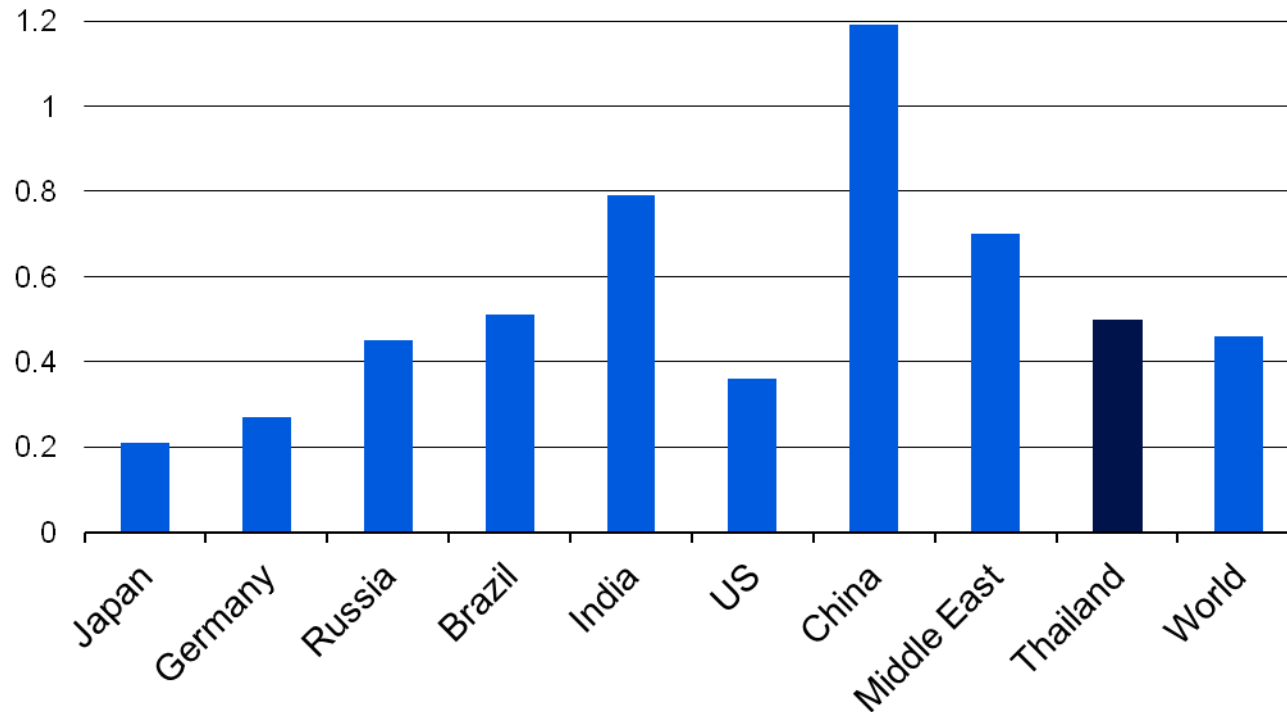
(International Energy Agency's World Energy Outlook, Nov. 2006)

Electricity used to produce \$1 of GDP

An economic and environmental improvement potential

Electricity consumption per \$1 of GDP

Source: International Energy Agency, Key World Energy Statistics 2009



Key technologies

Process automation



- Monitoring and managing industrial and utility plants
- Thousands of instruments measure temperature, pressure, flow etc. around plant and feed data into control system for central management of plant
 - Systems run closer to peak efficiency to reduce waste
 - Higher output and quality per unit of energy used

Key technologies

HVDC and FACTS



- HVDC (high-voltage direct current)
 - About 7-8% of electrical power is lost to heat during transmission and distribution
 - Raising transmission voltage by a factor of 2 can theoretically reduce electrical losses by a factor of 4
- FACTS (flexible alternating current transmission systems)
 - Increase capacity of transmission lines, reducing need to build new infrastructure
 - Improve voltage quality

Key technologies

High-efficiency motors



- About two-thirds of electricity consumed by industry is used to run electric motors
- Cost of buying a motor is ca. 3% of its lifetime cost: energy consumption is ca. 94% (and rest is maintenance)
- An 11-kW High Efficiency ABB motor can save 33.6 MWh, corresponding to 1.1 metric tons of CO₂, in one year of operation*
- A single pulp and paper factory can have 2,000 motors running continuously

*operating 8,000 hours a year

Key technologies

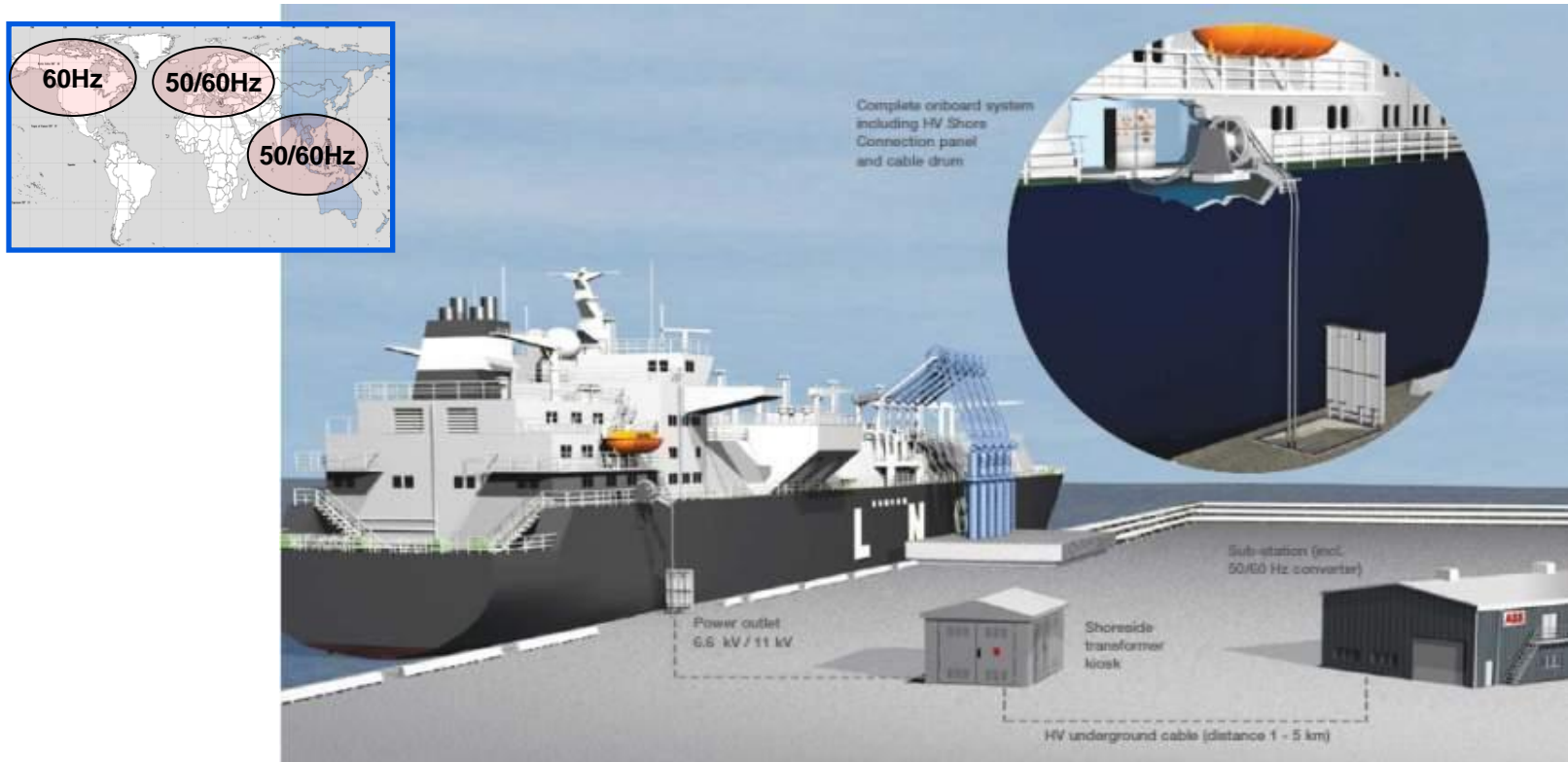
Variable-speed drives



- A drive can reduce energy consumption by as much as 50% for motors running pumps, fans or conveyors
- Alternative is often to let motor run at full speed and “throttle” output (which is like controlling a car’s speed by braking while other foot is still on accelerator)
- Less than 10% of motors worldwide are equipped with a variable-speed drive
- ABB’s installed base of drives saved about 140 million tons of CO₂ emissions in 2008

Smart Grid components

Shore to ship power supply



- Regulations seek to reduce port emissions
- ABB solution enables connection of any ship type to any port grid, 50 and 60 Hz
- ➔ Benefits: Lower emission of CO₂, NO_x, SO_x, PM, Noise reduction

Key technologies

Building automation



- Technology monitors human activity and weather to control:
 - lighting; shutters; heating; ventilation and air conditioning; security and surveillance; energy management
- Energy consumption for lighting in buildings can be reduced by up to 30%
- Energy consumption for heating and ventilation can be reduced by up to 20%

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What ABB is doing: a history of action

Saving energy

- 1998-2003: Greenhouse gas emissions cut by 1% pa
- From 2006: Rolling program to cut energy use by 5% per manufactured unit every two years

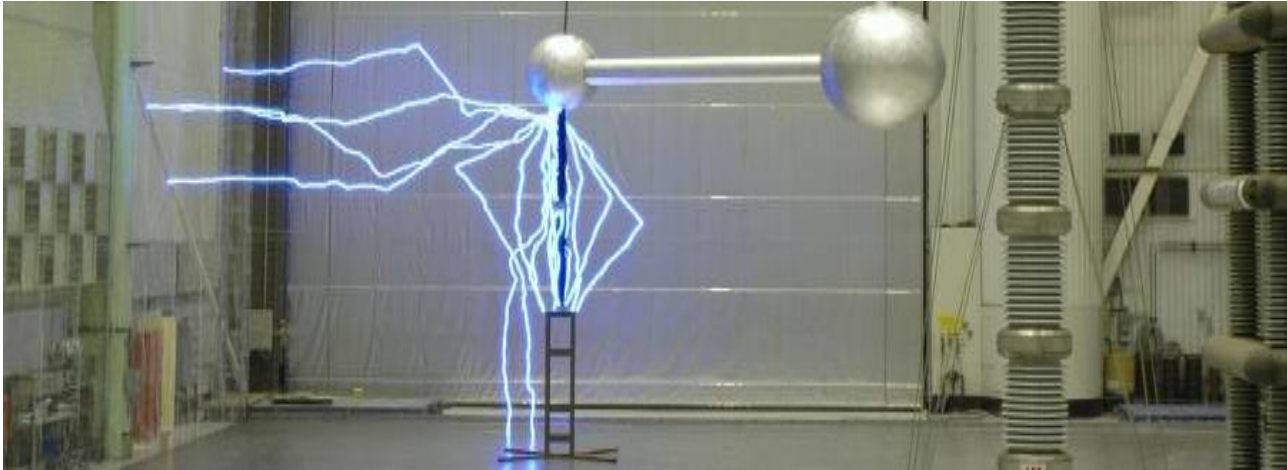
Pioneering environmentally conscious design

- 1991-1993: audit of impact of manufacturing processes
- From 1994: implementation of environmental management systems
- From 1998: focus on environmental performance of products over their life cycle
- today: >50% of research efforts aimed at increasing energy efficiency

Innovation is key to ABB's competitive advantage

Leadership built on consistent R&D investment

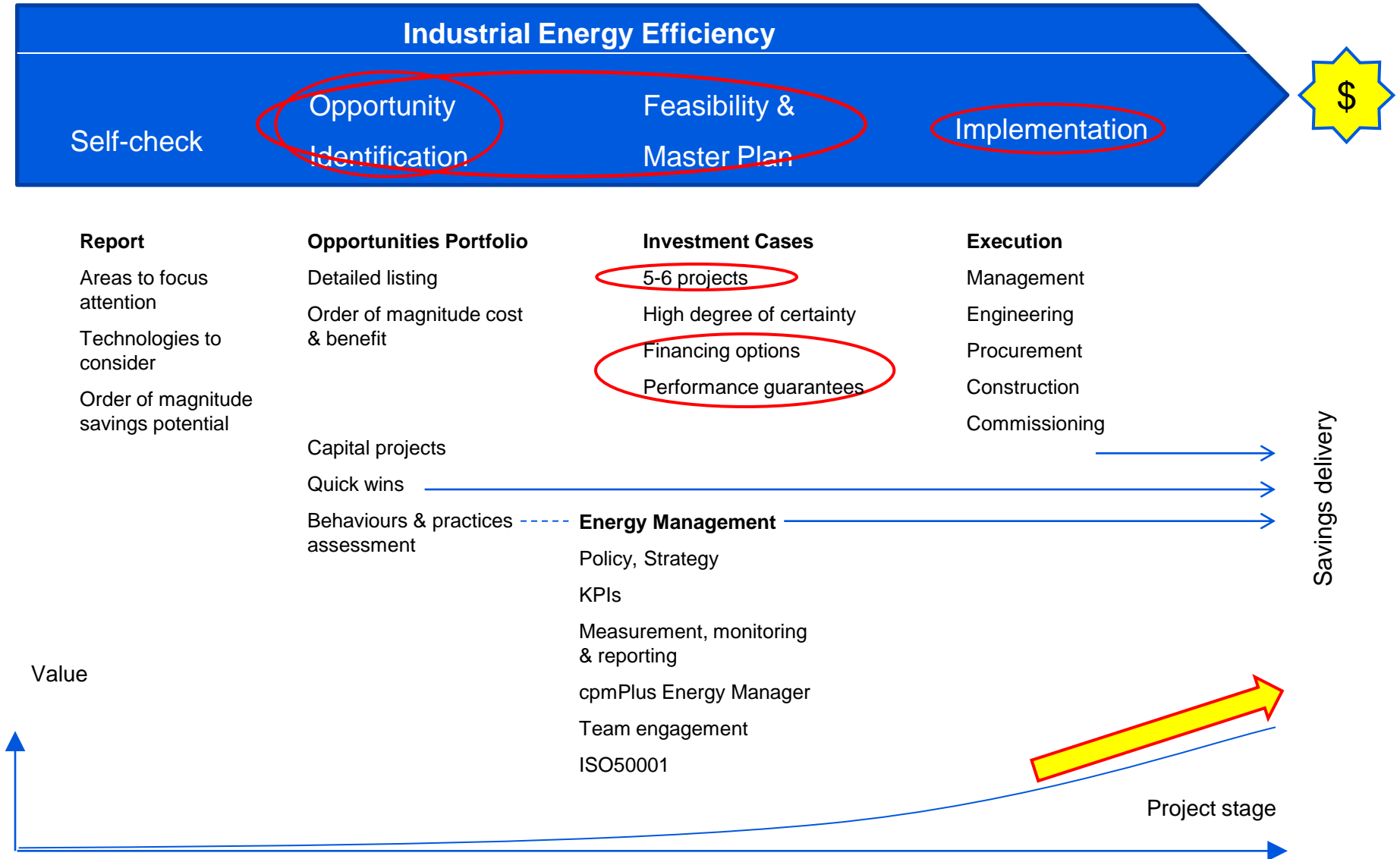
* Comprises
non-order
related R&D and
order-related
development



Global presence

- More than \$1 billion invested annually in R&D*
- 6,000 scientists and engineers
- Collaboration with 70 universities

Performance Improvement



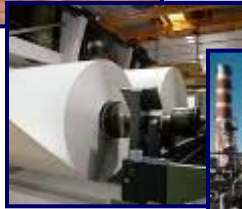
ABB's energy efficiency solution

Our expertise

- Web-based self-check check-up tool
- Site-based opportunity identification assessment
- Behaviours and practices assessment
- Metering surveys
- cpmPlus energy manager
- ISO 50001
 - Gap analysis
 - Policy and strategy
 - Energy management system design
 - System implementation
 - Team development and coaching
- System surveys
 - Boiler fingerprint
 - Direct heating
 - Steam distribution
 - Process cooling
 - Refrigeration
 - HVAC
 - Compressed gases
 - Materials handling
 - Pumps and fans
 - Electrical distribution
 - Motors and drives
- Operator, supervisor and manager training
- New plant design review

ABB's energy efficiency solution

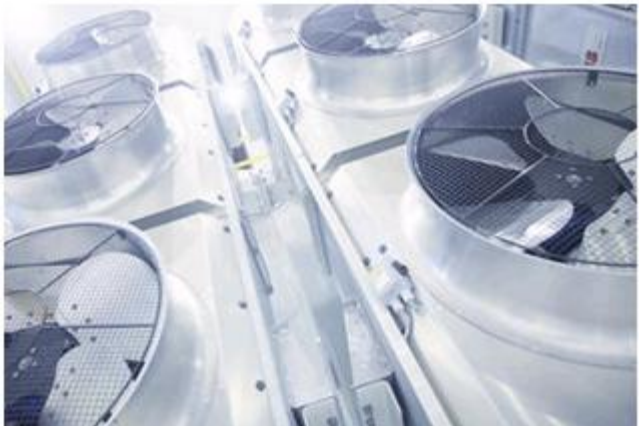
Our expertise



Delivering Energy Savings across Industry Sectors

- Primary & Secondary Aluminium
- Iron & Steel Integrated Mills
- Oil & Gas - Processing
- Pharmaceuticals
- Pulp & Paper Mills
- Industrial Chemicals
- Food & Drink Manufacturing
- Oil & Gas - Refineries

Summary



- Today's challenge is to cut link between GDP growth and consumption, and between consumption and emissions
- Improving energy efficiency is the cheapest and fastest option
- There is huge potential to reduce energy waste all along energy chain.
- ABB has leading technology at each step
- By reducing energy losses, ABB technology:
 - Mitigates demand for new power generation
 - Makes better use of natural resources
 - Makes industry more efficient and competitive

Let's build the future together

Power and productivity
for a better world™

