# **LEON VILJOEN**

Chief Executive Officer ABB ZA

IoT & Expansion in Africa









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### **IoT** and expansion in Africa

Leon Viljoen, MD, ABB South and Southern Africa



### ABB: the pioneering technology leader

What (Offering)	Pioneering technology		
	Products 58%	Systems 24%	Services & software 18%
For whom (Customers)	Utilities	Industry	Transport & Infrastructure
	~35% of revenue	~40% of revenue	~25% of revenue
<b>Where</b> (Geographies)		Globally	
	Asia, Middle East, Africa 38%	Americas 29%	Europe 33%
	~\$35 bn revenue	~100 countries	~132,000 employees

### **Progressively building ABB's reputation**

#### Solar Impulse





Iconic activities to push the ABB brand and have a visible, global impact



### ABB ranks #8 on Fortune Magazine's list of companies that are "changing the world"



From our record-setting electric vehicle (EV) charging solutions for cars and buses to microgrids, the integration of solar, wind and other renewable energies into local power systems, our sponsorship of the ABB FIA Formula E Championship series, and more, we are proud to be making a difference to address the needs of our customers and the world.

### What is the Fourth Industrial Revolution?

Pace of change

In the years ahead, essential infrastructure, such as the power grid and the water supply, as well as industry and our transport networks, will increasingly be controlled and operated by autonomous systems.

On the one hand, this will bring tremendous benefits in terms of avoiding outages and shortages, and freeing-up humans from dull, dangerous and degrading work.

On the other, the workforce and society as a whole will have to adapt to a new industrial landscape, where people work alongside robots and machines.







**3rd** 



Computer & Automation

Cyber Physical Systems, networks, Al

Mechanisation. Steam and Water Power

1st

Mass production, Assembly lines, electricity

### Setting a new standard of positioning ABB

ABB and Formula E partner to define roadmap of electric mobility



New "ABB FIA Formula E Championship" brings together global leader in electric vehicle fast charging with world's first fully electric international motorsport class

Natural fit at the forefront of the latest electrification and digital technologies

Raise awareness of electric vehicles as a realistic and desirable alternative to fossil fuel vehicles

### Why e-mobility is the future

### Cost

#### Light duty vehicles, transit buses, fleet vehicles

- Maintenance
- Unlike internal combustion engines, electric drive trains have few moving parts.
- Durability, reliability and low maintenance have been well-tested

#### • Fuel

- Electric Power Research Institute (EPRI) estimates cost of electricity, per mile driving, is one-third less than fuel.
- Electricity rates are much less volatile than fuel

Combination of fuel and maintenance costs bring the Total cost of ownership (TCO) of EV's below ICE vehicles, despite the higher purchase price.

#### **Environmental impact**

#### Air quality

Transition to electric drive could improve air quality and reduce petroleum consumption

#### Reduce greenhouse gas emissions

Electrification is the key tool for de-carbonizing transportation

EV's get cleaner over time as power supply becomes more sustainable and less carbon-intensive

#### Corporations increasingly focused on emissions

Regulation of CO2 increasing

Companies are pricing the costs of complying into investments and business decisions

### Why e-mobility is the future

#### Future Technology Enabler

Most manufacturers developing autonomous vehicles opt to use EV's as a platform:

- EV's are "drive-by-wire" easier than mechanical linkages for computers to control. Large batteries make EV's capable of supporting the power-hungry sensors and control systems needed for autonomous driving
- As fuel economy and emissions requirements increase, EV's boast lower operating costs and TCO
- Particularly important for fleet operators who's vehicles spend every minute they can on the road
- In the case of ridesharing, the evolution toward autonomous vehicles will create a use case that demands the lower cost profile and higher reliability that EV's offer

### Public and commercial car charging – use cases

Charging service should match charging application and demand

Public and commercial EV Charging						
Home	Work	Commercial	Highway			
4-22 kW (AC)	20 kW (DC)	50 KW (DC)	150 to 350kW+(DC)			
4-16 hours	1-3 hours	15-60 min	5-20 min			
		TESCO				

### **Bus & Truck charging**

Charging service should match charging application and demand

Electric Bus and Truck Charging				
Overnight Charging	Opportunity Charging			
50 - 150 kW (DC)	150 to 600kW (DC)			
2-8 hours	5-15 min			

### eBus and heavy vehicle charging: 50 kW - 450 kW

Overnight and on-street opportunity charging



### Automated connection system

- High power DC transfer to bus
- Wireless communication to bus
- Based on:
  - EN/IEC 61851-23
  - ISO/IEC 15118 • OPPcharge

compatible

- Industrial quality power cabinet
- 150kW, 300kW & 450 kW modular
- Redundancy per each 150kW module
- 200-920 VDC
- Galvanic isolation
- Remote management

#### Charge power 150-450 kW (3-10 min)



### **EV Charging Infrastructure**



### Technology for pollution-free e-rickshaws in Jabalpur / India

e-rickshaws charge with solar power through a Smart City Mission pilot



Providing critical technology through solar inverters for solar powered charging stations for e-rickshaws at four locations in Jabalpur.

As the sun hits the solar panels at the charging station, generating the direct current (DC) energy, the ABB inverters convert that power to the alternating current (AC) used in charging the e-rickshaws.

The solar panels are also connected to the state grid to feed in additional power generated through net metering. The inverters come with Wifi connectivity for remote monitoring and centralized billing provisions in the future.

### The new Era of Manufacturing

Digitalization is a key enabler for making the factory of the future a reality



### The factory of the future is smart, connected and already here



The factory of the future is about much more than robots. It is about sensors that connect devices and machines to the internet to monitor their condition and improve the performance of a production line, creating substantial cost savings.

- vertical integration of the supply chain
- fully automated manufacturing processes
- connecting the shop floor to the board room
- creating highly flexible production systems.

Smart, connected factories are the future of manufacturing

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ABB was instrumental in kick-starting the second and third industrial revolutions and is leading its customers into the Fourth, where machines and factories are connected and increasingly autonomous and self-learning. The factory of the future is already here.



### **Benefits of Digitalization along the Value Chain**

Leveraging Potentials in the Factory of the Future. Today!

#### **Engineering & Build**



Efficiency & Optimization

#### Commissioning



Faster Issue Resolution & Quicker Start-up

Improved Uptime & Asset Optimization

**Operations** 

#### Maintenance



Fleet Visualization & Predictive Scheduling

Proactive, user-friendly Intelligence for better Manufacturing Decisions



### +110 years commitment and investment to Africa

Solid installed base, strong, experienced local team across the continent - ready for the next level



**ABB** presence in Southern Africa

#### Offices

Angola - since 1994 Botswana - since 1994 Democratic Republic of Congo - since 2008 Kenya - since 1994 Mauritius - since 1998 Mozambique - reopened in 2012 Namibia - since 1990 Rwanda - since 2011 South Africa - since 1907 Tanzania - since 1993 Uganda - since 2002 Zambia - since 1950's Zimbabwe - since 1960





### Reason for expanding into Southern Africa Context

### Outlook

Energy & 4<sup>th</sup> Industrial Revolution are transformational for the world

They hold out the prospect of faster development and economic growth in Africa

New technologies offer a rapid and effective means to:

- electrify off-grid communities, improve grid reliability and reduce power transmission losses;
- address the mismatch between regional supply and demand;
- support an economic transformation that encourages entrepreneurship, builds domestic markets, and creates work and career opportunities.
- Making use of renewable energy resources to make a quantum leap in providing access to electricity

### **Reason for expanding into Southern Africa**

Context

### Strengths

**Most youthful population:** By 2034, working age population is expected to reach 1.1 billion workers, more than either China or India

**Solid economic fundamentals:** Sub-Saharan growth has held up despite fall in oil and commodities prices: 4.4 percent in 2010-2015, compared with 4.1 percent for the previous decade

## Continent is rich in natural resources and is especially well endowed with renewable energy sources:

- Largest solar energy potential 80% of world's untapped hydro power
- Largest geothermal potential Significant wind power potential

### **Strengths**

The continent has an expanding **urban middle class** with growing purchasing power:

 Urban populations expected to increase by 24 million per year until 2045, compared with 11 million in India and 9 million in China (UN population).

Africans are **embracing communications and digital technologies** at an increasing pace:

- number of **fixed and mobile phone lines** per 1,000 people increased from 3 in 1990 to 736 in 2014;
- number of **internet users** per 1000 people increased from 13 in 2005 to 167 in 2015

## Challenges in expanding into Southern Africa

#### Weaknesses

#### **Political & financing**

- Link between Economy and Political stability much stronger than in developed countries
- Corruption and changing / interpretation of laws

#### Infrastructure:

- Lack of access to electricity (600 million people have no access to electricity – Single biggest obstacle to growth and development)
- Weak industrial base

#### Weaknesses

#### **Skills shortages:**

 This also due to a lack of industry and low number of large companies No Fortune 500 companies in Africa compared to 7 each in Brazil and India with similar GDP and 98 in China. Large Companies at Extreme ends 50% ZA and 20% North Africa

Intra-regional trade costs are highest in developing world and 50 percent higher than in east Asia

