Il periodico dello sviluppo sostenibile

nuovaenergia

3-2017

editrice alkes

Kosisko:

"Shaping a revolution: building the digital plant of the future"

€ 12 / Anno XV / bimestrale / Abbonamento a 6 numeri Italia € 60 / Estero (UE) € 90 / ISSN 2036-8380 / Poste Italiane s.p.a.
Spedizione in Abbonamento Postale / D.L. 353/2003 (convertito in Legge 27/02/2004 n° 46) art. 1, comma 1, LO/MI

70003
9 772036 838001

THE MANAGING DIRECTOR OF ABB'S POWER GENERATION & WATER BUSINESS

Kosisko:

"Shaping a revolution: building the digital plant of the future"

di Davide Canevari from Houston (Texas)

It is hard to believe that 90 percent of the world's data has been generated over the past two years alone. A computer sold in 2017 has a thousand billion times more processing capacity than models manufactured in 1970. Today, kids carry smartphones in their pockets with more random-access memory (RAM) than NASA used for the Apollo 11 mission that took the first men to the moon. While we are bombarded daily with anecdotes and fun facts about big data, it's remarkable to consider the size and scope of the current 15 – or even 18 – figure revolution. And, just maybe, it could also explain why, today, digitalization is a trending topic for the energy sector. *Nuova Energia* interviewed Kevin Kosisko, Managing Director of ABB's Power Generation & Water business, at ABB Customer World in Houston to hear his views on digitalization trends in the energy sector.

The statistics on big data are staggering. Do you think the world's economy has experienced a change of similar magnitude before?

As a matter of fact, the examples you mentioned focus on one single aspect: the tremendous increase in computing capacity that has no parallel in the past. But the digitalization of knowledge is a much wider phenomenon whose scope

includes society and people's habits. Today we no longer browse through the pages of a printed encyclopedia. Whenever we want to know something, we google it. Also, we have different timing requirements; cycles have become shorter and demand is several orders of magnitude higher.

Do you think we are in the middle of a revolution or simply an evolution?

Giving a straightforward answer is not easy. Italy itself is proof that we may be experiencing an evolution. In the late 1990s, Enel began installing digital energy meters in Italian homes. While the 1990s was just the dawn of the Internet and the smartphone was in its infancy, the energy industry was an early adopter of the idea that a more interconnected world would improve our lives.

"Klaus Schwab, founder of the World Economic Forum, says that we are facing the Fourth Industrial Revolution, whose scope, geographical expansion, social and professional implications and disruptive impact on traditional business models are unprecedented"

How has this evolution shaped ABB?

We realize that we are going through a process of evolution that – albeit deep – is made possible by some striking technological advancements, such as high-speed Internet access.

I might add that in the past few years ABB has been among the first industrial companies to wholeheartedly embrace the technological evolution that grew into the Intranet of Things and went on to become a full-fledged industrial Internet of Things (IoT). Our ability to move quickly in this more interconnected world is born from our recognition that adopting strong software development practices was essential to our business survival and success. Our maturity in secure development life cycle in software provided us with a competitive advantage in IoT. Embarking on this digital journey early has enabled ABB to provide greater operational efficiencies to industry. For instance, we have already supplied our customers with 70 million connected devices and 70,000 digital control systems globally.

Some will still insist that the industrial IoT is nothing short of a revolution?

Absolutely! For example, Klaus Schwab, founder of the World Economic Forum, says that we are facing the Fourth Industrial Revolution, whose scope, geographical expansion, social and professional implications and disruptive impact on traditional business models are "unprecedented." And, he adds, we do not know what this will lead to in the future.

Until recently, the boundaries separating physics, biology and digital science were clear-cut and well defined, now they tend to

blur and sometimes overlap. All these aspects can be effectively combined under the term Industry 4.0 (used mainly in Germany and Italy) or Internet of Things (used mostly in the United States).

Could you give us an idea of the scale of this phenomenon?

In 2015, McKinsey estimated that IoT has a potential economic impact of $4-11 trillion a year by 2025. Those figures are clearly a rough estimate and cover a wide range. Yet, the top end of this estimate is equivalent to about 11 percent of the world economy! The expected growth rate is meteoric: 33 percent a year by 2021, to which we could add $3.7-10.8 trillion from mobile Internet and $1.7-6.2 trillion from cloud technology. While these reference points are economic, perhaps the most exciting aspect is how it will impact people's lives.

"Enhanced flexibility, increasing complexity, new business models and the need to retain operational knowledge (due to an aging workforce in many parts of the world) are some of the drivers of digitalization in the power generation. Our industry is facing an unprecedented change of scale and pace"

Now let's talk specifically about power generation. What form does the digital revolution/evolution take in this sector?

Enhanced flexibility, increasing complexity, new business models and the need to retain operational knowledge (due to an aging workforce in many parts of the world) are some of the drivers of digitalization in our industry. More generally, just like other industrial businesses, power generation is facing an unprecedented change of scale and pace. This change came from the power transmission business and the way it operates infrastructure, which eventually triggered business changes that are just as big in power generation. The need for intelligent management systems to handle demand and supply is growing exponentially which, in turn, calls for generation systems to have digital technologies capable of carrying out performance monitoring, diagnostics, predictive maintenance, asset protection and optimization.

Could you estimate what this shift could mean in economic terms to the power generation industry?

Let's look at this from a global perspective. The sheer scale of our industry is impressive. From now until 2025, more than 3,200 power plants will be constructed, with an invest-

The digital power plant
Image courtesy of ABB - All rights reserved

ment value equal to $980 billion. Let's make a conservative estimate on the potential economic savings from automating routine plant management tasks. Suppose that digital technologies could save $1 million per year per plant by making plant management more efficient. In total, this would be like unlocking $3.6 billion per year through the adoption of digital industrial technologies. This means that huge resources could be allocated with different modalities and for different purposes. And if we consider that the same benefits achievable in newly built plants could be extended to existing plants, we can easily see how massive the change is.

Which brings us back to the "revolutionary" rather than "evolutionary" nature of this transformation, especially for the power generation sector.

Indeed, this is no small change. We are talking about plants that were originally designed to behave reactively but are operating in a proactive manner. They no longer just respond to commands entered by an operator, but are getting smarter and capable of self-learning processes where they know what's right for the plant at all times. They know, for example, when it is more convenient to carry out maintenance or how to operate more efficiently during transient modes, like starting up a unit for the morning's peak demand period.

It may be worth repeating what order of magnitude we are speaking of.

A total of 7,000 GW of power generation capacity installed worldwide and an estimated growth of 300 GW per year in the medium term. If we include decommissioning, we are close to reaching 7,800 GW in operation already in 2020.

Let's dig deep into some other sectors that are in some respects connected to the world of energy. Perhaps we could start with mining.

The mining sector is going through a crisis of epic proportions. On a global scale, productivity decreased by 33 percent between 2004 and 2013. This is an average annual decline of 3.9 percent. We have started to see a reversal of this trend only in the past two years, but much is still to be done. Geological uncertainties, complex operations, the challenges of underground mining, the ongoing changes in the morphology

"The order of magnitude of the power generation industry is tremendous. A total of 7,000 GW of power generation capacity installed worldwide and an estimated growth of 300 GW per year in the medium term. If we include decommissioning, we are close to reaching 7,800 GW in operation already in 2020..."

of individual extraction sites that "evolve" as digging goes on and, subsequently, also in the type of technology employed – all of this makes mining an ideal sector for digitalization. Indeed, mining operations require the handling of hundreds of variables and thousands of gigabytes of data at each production site.

But despite that...

As mentioned earlier, it is still an unexplored sector. For example, it was calculated that a widespread penetration of digital technologies in underground mines could generate savings of $7 billion annually. Analysis shows that for a company like ABB, besides power generation, the sectors that hold the greatest *digitalization value creation potential* are mining, chemicals, automotive and oil and gas. Their potential development rates are higher than those of wind and solar power. Let me add that we are seeing a great number of successful start-ups worldwide in the mining and oil and gas sectors. These new technology companies address planning, analysis, safety management, predictive maintenance, monitoring, sensor systems, recovery optimization, platform management, and so on. These start-ups are increasingly interfacing with the sector's long-established big companies.

"Plants that were originally designed to behave reactively are now operating in a proactive manner. They are getting smarter and capable of self-learning processes. They know, for example, when it is more convenient to carry out maintenance or how to operate more efficiently during transient modes"

Speaking of oil and gas...

What I can tell you is that market analysts agree that over the next 7-10 years, thanks to digital technology, the value chain in upstream will be completely different than it is today, especially with regard to exploration, field development and production, but also operations and maintenance.

Could you provide some context for the industrial sector too?

Given the complexity of the subject matter and the vast number of possible applications, I will start with an anecdote. In 1908, the revolutionary Model T by Ford came in just one color and Henry Ford himself said he believed that in 10 years half of the cars circulating worldwide would be derived from that single original Model T. In 2016, Ford launched its F-150 pick-up, which comes in 16 different types of configuration – color, engine, et cetera – totaling 600,000 possible variations, all manufactured in one plant located in Michigan.

Only a digital factory can deal with this type of manufacturing challenge. Indeed, according to Intel a modern, Web-connected plant can generate (and handle) a quadrillion bytes of

data a day, the equivalent of 160 million books. I should like to mention a further point. A recently published Accenture survey, entitled *The New Energy Consumer: Unleashing Business Value in a Digital World,* points out that before changing things on the demand-side, digital technology changed how we consume goods and services and how we as consumers engage with suppliers. The expectations of consumers, stemming from their personal use of digital technology, has also impacted their expectations of technology and user experience in the industrial and energy sectors as well.

Has digitalization changed the expectations and behavior of energy consumers?

The previously mentioned Accenture survey highlighted profound differences – that are already visible today – in the way digital and non-digital consumers behave: 41 percent of digital consumers say they trust their energy provider to help them optimize their energy consumption, versus 31 percent of non-digital users; 42 percent of digital consumers indicate they would be willing to recommend their energy provider, versus 13 percent of non-digital users; and 80 percent of digital consumers say they would participate in an energy management program, compared to 59 percent of non-digital users.

Both types of consumers turn the lights on by pressing a switch…. and yet their profiles are so sharply different!

It must be added that 41 percent of those interviewed believe their digital experience with energy providers was more difficult than with other types of providers, the telecommunication sector included. But there is more. Digital consumers' interest in ancillary products and services complementing the mere sale of kilowatt-hours or cubic meters of gas is on the rise; hence, the need for modern utilities to expand their offering.

What should utilities add to their portfolio?

These could include adjacent areas like products supporting energy efficiency (e.g. LED lights), building automation, generation/back-up/storage systems, auditing services, integrated electricity/gas/water supply contracts, and so on.

How is it that a highly technological sector such as energy is still not capable of keeping pace with the Fourth Industrial Revolution?

However strange this may sound, if we were to draw a curve representing the level of digitalization of business activities, oil and gas and utilities are at the low end, slightly above agriculture, metals, mining and road and rail logistics. They are at the same level as the automotive and chemical industries, but far below retail, the banking and insurance sectors, and media. Not to mention information and communication technology! So, the energy industry has only taken a few tiny steps towards full-fledged digitalization to date. In 2015, the US Industrial Internet of Things technology market recorded a turnover of "only" $300 million, compared to $11 billion of products for life-cycle management and more than $90 billion for industrial automation.

"Leveraging our deep knowledge of our customers' businesses and our vast installed base – 70 million connected devices and the more than 70,000 control systems installed worldwide – our new, recently launched ABB Ability™ portfolio combines our conventional range of solutions with digital services that cover multiple market segments"

Against this background, what is the role of ABB?

Leveraging our deep knowledge of our customers' businesses and our vast installed base – the already mentioned 70 million connected devices and the more than 70,000 control systems installed worldwide – our new, recently launched ABB Ability™ portfolio combines our conventional range of solutions with digital services that cover multiple market segments, thus strengthening our pioneering role in the fourth energy and industrial revolutions.

What's more, digitalization is not only a solution we offer our customers; we ourselves believe in it, so much so that at ABB it has become a company must-have.

With a view to ensuring the ongoing development and innovation of control technologies, we want to bring the new digital-physical plant to life – a plant capable of shortening the distance between physical and digital reality, becoming an intelligent being that can perform new functionality. Our goal is to create value by evolving our digital technologies, penetrating deeper into the world of data analysis and digitalization. We want to make plants capable of safely and securely self-updating, making independent decisions, forecasting production needs. We want to make them prepared to respond and capable of protecting data and information.

ABB has recently announced several global agreements. Would you tell us about them?

We have signed a strategic partnership with Microsoft to help industrial customers empower the digital transformation in business sectors like robotics, marine and ports, electric vehicles and renewable energy. By selecting Microsoft Azure as the cloud for our integrated connectivity platform, we give our customers access to an enterprise-grade cloud infrastructure that benefits from billions of dollars of ongoing investment. Also, we signed a collaboration agreement with IBM, designed specifically for customers in the transport, utilities, manufacturing and smart grid sectors. Thanks to ABB Ability™, IBM Watson Internet of Things' capabilities enable customers in these segments to carry out real-time cognitive analysis. Last year at Power-Gen Asia, we held a conference entitled *The power of data – how global technology trends are revolutionizing the power generation industry*, which formalized our operational philosophy in this field. Barely a year later, I believe I can say the (r)evolution has really begun.

BUILDING THE DIGITAL PLANT OF THE FUTURE

A MODERN, WEB-CONNECTED PLANT CAN GENERATE

1,000 Terabytes

OF DATA A DAY

=

160 million books

THE ABB INSTALLED BASE

70 million

CONNECTED DEVICES

THE POTENTIAL ECONOMIC IMPACT OF IOT

$4-11 trillion

A YEAR BY 2025

>70,000

CONTROL SYSTEMS INSTALLED WORLDWIDE

$1.7-6.2 trillion

BY CLOUD TECHNOLOGY

GROWTH RATE:

33 percent

A YEAR BY 2021

4-11 percent

OF THE WORLD ECONOMY

POTENTIAL ECONOMIC SAVINGS FROM ADOPTION OF DIGITAL INDUSTRIAL TECHNOLOGIES

$3.6 billion

PER YEAR

3,200

POWER PLANTS UNDER CONSTRUCTION (2017-2025)

$980 billion

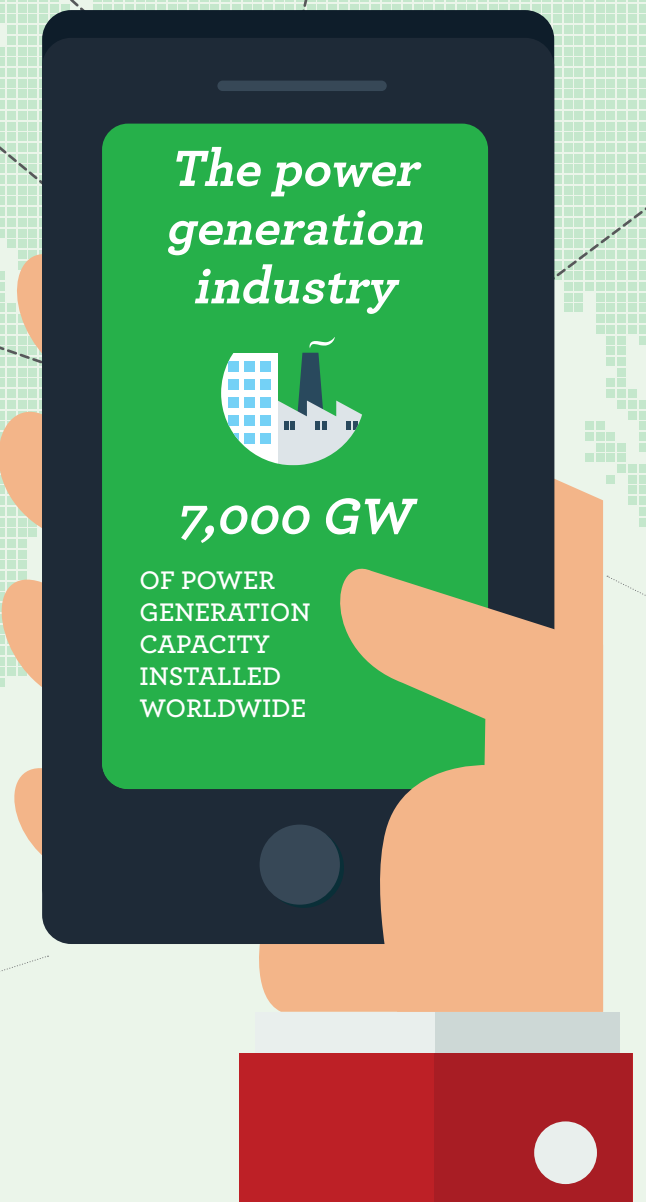
OF INVESTMENT

300 GW/year

OF GROWTH (ESTIMATED)

7,800 GW

IN OPERATION BY 2020



Sources: ABB