CESI Energy Journal

Issue 06 - February 2015

Energizing Innovation

An interview with Patrizia Grieco, Enel Group Chairman

The Keys to Global Economic Recovery

Dilma Rousseff's speech during the G20 in Brisbane

Can Smart Grids Prevent Blackouts?

Looking for the ideal paradigm for transmission smart grids

06

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Trust the Power of Experience

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Contents

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Editorial

Salvatore Machì - Chairman, CESI
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By 2050, 70% of the world's population will live in urban areas. That's a total of roughly six billion people.
Whether they will be living in "urban agglomerations" or in actual cities is entirely up to us. It depends on our ability to reformulate the terms of an increasingly complex issue.
This is one of the greatest challenges facing the new century that lies before us. It will force us to conduct a Copernican revolution, as Maria Patrizia Grieco, Chairman of the Enel Group, rightfully points out in the interview she gave for this issue of our Energy Journal.

It's not hard to imagine the potential impact these megalopolises will have on the environment. In this issue of EJ, we address one of the most dramatic and urgent aspects of our changing world: hydrogeological instability.
Energy consumption issues need to be central to our thinking: mobility, building efficiency, integrated design of network infrastructures, integration of renewables, storage systems, organization of services, and the active involvement of citizens and users (who have now become "prosumers") are only some of the variables we need to bear in mind when defining the new face of our cities and guaranteeing a quality of life we want to continue to foster.

Innovative technologies can help us achieve these objectives.
Smart Grids are undoubtedly a key piece to this puzzle, and the elaboration of efficient paradigms fully involves all operators within the energy sector. Up until just a few years ago, the focus remained on distribution and smart metering devices; today the Smart Grid challenge has enveloped the entire electric system, from generation to transmission, distribution and ultimately the end consumer.

Sharing deep know-how and technological partnerships between different countries and international entities will be a decisive element if we are to deal with this transformation in an effective manner. With this in mind, the decision made during the most recent G20 in Brisbane to underwrite a series of principles for collaboration in the energy sector can be considered a crucial step. Leaders of the G20 put the need to develop open, transparent and competitive energy markets, thereby favoring the spread of innovative technologies, at the center of their focus.

Most importantly, this cooperation must be extended to developing and third world countries, clearly tomorrow's engine for global economic growth. That's where we need to concentrate our political and technological "intelligence."

LEADERS OF THE G20 PUT THE NEED TO DEVELOP OPEN, TRANSPARENT AND COMPETITIVE ENERGY MARKETS AT THE CENTER OF THEIR FOCUS.

| INTERVIEW |

Energizing Innovation

An interview with Maria Patrizia Grieco, Enel Group Chairman

IN THIS EXCLUSIVE INTERVIEW PATRIZIA GRIECO, ENEL GROUP CHAIRMAN, TALKS ABOUT THE GROUP'S ROLE IN THE GLOBAL ENERGY SCENARIO, FOCUSING ON THE MOST IMPORTANT CHALLENGES THE SECTOR HAS TO FACE AND DISCUSSING EUROPEAN ENERGY POLICY AND THE IMPORTANCE OF ACCELERATING CREATION OF A SINGLE ENERGY MARKET.
MOST IMPORTANTLY, SHE REMINDS US THAT KEEPING INNOVATION ALIVE MUST BE THE FUNDAMENTAL COMMITMENT OF OUR ERA.

Energy Journal: Discontinuity and change are two words that define your appointment as Chairman of Enel. How do these two words translate into strategic choices for Enel?

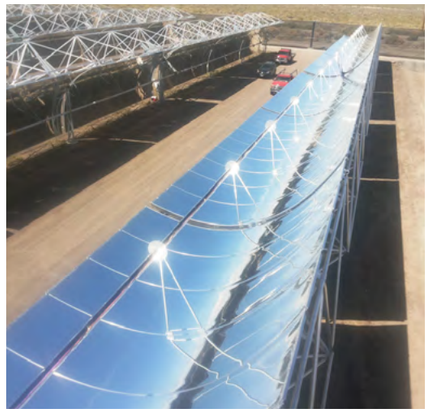
Patrizia Grieco: It has been almost six months I became Enel Group Chairman. The first few months of work have been an interesting journey during which I have mainly tried to listen to and understand the people working within the corporate structure, and I have gained the perception that there is widespread expertise and a true passion for the work here. This expertise and passion will both be necessary if we are to address the radical changes taking place throughout our industry: the development of renewable energy, our customers shifting from being simply electricity consumers to becoming prosumers, the need to develop new technologies and smart grids, the promotion of energy efficiency and electric mobility. Fully leveraging on the Enel Group's know-how will be key for staying competitive in more mature economies while at the same time ensuring our development in emerging markets, which today are the engine of the global economy and the new frontier for Enel's growth; this also means that we need to pay increasing attention to the customers of today and tomorrow.
The Group's new organizational structure, which was approved last July, was designed to help us achieve these targets, reducing complexity in both managerial actions and in assessing the drivers that create value. Based on a matrix of Business Lines and Geographical Areas, the structure will facilitate the pursuing and maintaining of the Group's technological leadership – ensuring operational excellence by disseminating the Group's best practices throughout the organization – as well as maximizing the quality of services offered to customers. Above all, the changes that lie before us must be sustainable and as such the global environment should be seen as an opportunity rather than a constraint: it is increasingly clear that the world, especially the world of energy, is moving in a direction in which both social and environmental sustainability needs to be key in shaping corporate strategies. A Group like Enel cannot exist without putting a targeted environmental preservation policy at the core of its business, as well as a policy that addresses the needs of the communities where we operate.
The same vision of social responsibility should also apply within our Group, increasing diversity of gender, age and culture while at the same time rewarding merit, which should be the only driver in staff selection and development.
Only this cultural change can lead to a truly meritocratic selection of talent. The promotion of diversity, in particular regarding age diversity and the generational shift, is key to the generation of innovating ideas. All this is crucially important in the sector that Enel operates in, which by its very nature needs to be both highly innovative and skill-oriented.

A GROUP LIKE ENEL CANNOT EXIST WITHOUT PUTTING A TARGETED ENVIRONMENTAL PRESERVATION POLICY AT THE CORE OF ITS BUSINESS, AS WELL AS A POLICY THAT ADDRESSES THE NEEDS OF THE COMMUNITIES WHERE WE OPERATE.

**EJ: Experts view the creation of a single, unified European energy market as a priority and a chance to give some impetus to the sector while also stimulating industrial growth.
Moving in this direction means investing in network infrastructure, which needs to be properly integrated, as well as coping with over-capacity in generation.
Do you believe that Europe is acting with the necessary determination?**

P. G.: The energy sector in Europe is emblematic of the contradictions of European politics and economics: the European energy sector has a huge potential for development, but also serious strategic issues that need to be solved.

*Maria Patrizia Grieco is the Chairman of the Board of Directors of Enel since May 2014.
Born in Milan in 1952, she graduated in Law at the University of Milan, started her career at the Legal and General Affairs of Italtel. In 1999 she was appointed General Manager of Italtel with the aim to work at reorganizing and repositioning the company. In 2002, she became Chief Executive Officer of the company. Later she joined Siemens Informatica as CEO and member of the global Executive Council. In 2006 she entered Value Partners as Partner and CEO of Group Value Team. Two years later she was appointed CEO at Olivetti where she also became Chairman in 2011. Currently she holds other positions such as director of Fiat Industrial, director of Anima Holding, member of the Steering Committee as well as of the General Council of Assonime. She also sits in the Board of Bocconi University.*



The scarcity of fossil fuels available on the Continent has created a long-lasting dependence on Russia and North Africa, creating instability of supply.

A UNITED, EUROPE-WIDE APPROACH IS NECESSARY IF WE ARE TO SUCCEED IN FULLY INTEGRATING RENEWABLE ENERGY SOURCES AND MANAGING OUR ELECTRICITY AND GAS NETWORKS MORE EFFICIENTLY

However Europe also enjoys both a well-balanced generation mix, top-notch technological skills and already widely interconnected networks. All the same, the lack of a European energy policy and the fact that a single energy market is yet to be put in place has made it impossible for each Member State to fully leverage on their energy resources and infrastructure, while also preventing those companies who operate in the sector from having a clear, homogeneous strategic framework. The latter will be key if we are to succeed in making the investments needed in order to replace obsolete generation plants, speed up the integration of renewable energy sources, and improve existing interconnections to make sure they are capable of ensuring that the internal energy market works correctly and efficiently.

It will be necessary for EU countries to accelerate the creation of a single energy market and free themselves from the national and local approach that has inspired energy policies up to now. They need to overcome the current mosaic of national legislative frameworks by rapidly harmonizing the regulatory system and by eliminating obstacles to the creation of an internal energy market.
A united, Europe-wide approach is necessary if we are to succeed in fully integrating renewable energy sources and managing our electricity and gas network more efficiently, both of which are key for energy security and the reduction of the cost of energy on the continent.
For a continent that is relatively resource-poor, betting on its future also means investing in the ability to innovate and in the ability to look ahead with courage and optimism.

EJ: During the speech that you gave at the Aspen Institute Roundtable, *Smart Cities, Technologies and Sustainability. The challenge of Expo 2015*, you stressed that we need to completely overhaul our approach to designing the city of tomorrow. We need a Copernican revolution, and energy businesses should be directly involved in this change. What is Enel's proposal for smart cities? Can you tell us more about the project Enel will present at Expo 2015?

P. G.: In 1950 only 29% of the world's population lived in the major urban centers. Today this figure exceeds 50%. While our cities produce over 80% of global GDP, they consume approximately 75% of the energy produced for domestic use and account for roughly 60% of greenhouse gas emissions. This trend will surely continue in the future, and will be driven by the wave of expansion in emerging countries: forecasts for 2050 say that the world's cities will have 2.5 billion new inhabitants, while the number of people living in large urban areas is expected to reach almost 70% of the world's population.
That means that cities are an essential part of creating a more sustainable society, with their model of development inevitably influencing the future of our planet. The goal will be to integrate infrastructure, services and technologies in order to create smart cities that are designed to save energy and resources, support smart mobility, and optimize the flow of people, information and items through digital technologies that will increasingly influence the way people work, communicate, share information and learn.
Energy is one of the key elements in the shaping and implementing of this model: producing electricity from renewable energy sources, promoting electric mobility, rationalizing energy consumption are just some of the areas that need to be combined in order to shape an efficient, integrated urban ecosystem in which each citizen plays an active role and manages their own consumption, supplying the grid with the energy they produce.
The development of smart cities nevertheless requires a radical change, a true "Copernican revolution" in the world of electricity.
The increase in renewable energy generation in particular will mean far more productive plants and a shift from centralized to distributed generation, with energy moving not just in one direction, from the producer to the consumer, but in any and all directions, just like information in the age of the internet.
In order to fully leverage on the potential that distributed generation offers the distribution network also needs to turn into a smart grid that not only transmits and distributes electricity from power plants to customers, but also collects two-way energy flows – enabling producers and consumers to interact – calculates consumption demand in advance and adapts electricity production and consumption levels.
In this system meters are no longer mere measurers of energy consumption, but are communications terminals, smart meters capable of real-time communications with grid hubs, as well as with the domestic appliances we use in our homes. Meters are the basic infrastructure of a smart city as they transmit a great deal of information on consumption levels and patterns, and as such they contribute to improving the quality and efficiency of the grid service, while also making a number of energy efficiency measures possible at the same time.
The cities of the future face an additional challenge in the form of sustainable mobility: transport accounts for between 20% and 40% of a city's CO_2 emissions on average. Making urban transport electric is an opportunity for cities to significantly reduce their emissions and could potentially be a solution that combines protecting the environment with energy efficiency and economic sustainability.
Electronic meters, grid automation, electric mobility, the integration of renewable energy sources, energy storage systems, efficient street lighting and devices that control and regulate consumption are just a few of the elements that will help energy management in smart cities of the future. Enel will use them at EXPO 2015 to create a full-scale, intelligent mini-grid designed to optimize the use of energy within the exhibition space and area, making for a more sustainable EXPO.

THE DEVELOPMENT OF SMART CITIES REQUIRES A RADICAL CHANGE, A TRUE "COPERNICAN REVOLUTION" IN THE WORLD OF ELECTRICITY

**EJ: The complexity of what experts now refer to as the "energy trilemma" requires the sector to constantly increase its capacity to innovate not only in technology but also working processes. Enel has always been a cutting-edge company in this regard, but what areas of development does your company consider the most interesting?
How does the EnelLab project fit within the company's overall strategy for innovation and research?**

P. G.: We want to keep our commitment to innovation alive, and we aim to maintain an outstanding service for all of our customers.

Keeping up such a commitment requires the involvement of our entire value chain, from the digitalization of the distribution network to renewable energy sources, smart cities and the improvement of plant performance. To this end, innovative sectors such as smart technology, hybrid renewables, distributed generation, energy efficiency and micro generation are the areas in which we are most active.

SMART TECHNOLOGY, HYBRID RENEWABLES, DISTRIBUTED GENERATION, ENERGY EFFICIENCY AND MICRO GENERATION ARE THE INNOVATIVE SECTORS IN WHICH ENEL IS MOST ACTIVE

Moreover, the global landscape of innovation has undergone a radical change in size, players and processes. Today, we are witnessing a real paradigm shift where innovation in businesses is less and less frequently the result of activities carried out within one enterprise, but instead characterized by the opening of the enterprise to the outside world by exchanging know-how with research centers, universities, start-ups and public or private entities, hence facilitating technology transfer.
Therefore, we must overcome the model of a stand-alone industry with open innovation encouraging new types of collaboration between companies, research institutions, customers and citizens in general.
These kinds of collaboration are beneficial for both small/medium and large-sized enterprises. Small and medium-sized enterprises can indeed overcome their limited size and add flexibility through such collaborations while large enterprises can create a virtuous circle innovating business models, facilitating technology transfer and, at the same time, boosting new entrepreneurship.
The development of those best-in-class solutions also comes via an open innovation approach that is the basis of our programs for start-ups such as Enel Lab. Enel Lab does not have a financial aim, rather it is looking for companies that are able to anticipate new technology trends as well as having a strong strategic fit with Enel. Such a strategic fit ensures the highest level of commitment from our business units in collaborating with these companies and addressing real problems, creating a win-win situation for both Enel and the start-ups.

EJ: Energy issues are particularly important in emerging nations, where an intense growth in demand has run up against a need to limit emissions and the environmental impact of energy generation. Technological and strategic partnerships between industrialized countries – still the main owners of technical expertise – and developing countries can facilitate sustainability in their development. What role can a global company like Enel play within this arena?

P. G.: A major Group such as Enel has the obligation of ploughing new furrows for future prosperity by offering reliable, efficient and sustainable energy in all the countries it operates in. Sustainability is core to Enel's culture and helps a process of continuing improvement within the Group. Enel is committed to supporting local communities, protecting the environment and human safety and focusing on the development of both renewable energy and technically innovative projects.
Since January 2011 Enel has taken part in the Global Compact LEAD, a program launched by the United Nations Global Compact that brings together the top 56 companies for economic, social and environmental sustainability. Furthermore, since February 2013 Enel has also been member of the Global Compact LEAD's Steering Committee.
The Enel Group's Climate Strategy addresses the commitment to reduce emissions with action plans across each of the Group's sectors, from production to distribution, sales to end users and emissions rights trading. Currently, zero-emissions generation technologies represent over 46% of total generation, and compared to 1990, the baseline year for the Kyoto Protocol, the Enel Group's CO_2 emissions have fallen by 32%.
Over 2.3 million more people around the world now have access to electricity thanks to Enabling Electricity, an Enel program that has over 30 projects in 20 countries and which supports the United Nations' Sustainable Energy for All initiative.
Other sustainable energy initiatives include the Ecoelce and Ecoampla projects in Brazil and Ecochilectra in Chile, which target low-income residents who can pay their electricity bills by sorting their rubbish, a true innovative process launched by the Enel Group.
Customers who bring paper, plastic, glass and metal to the company's collection points will be given discounts on their bills according to the quantity and type of waste that they are able to bring.

ZERO-EMISSIONS GENERATION TECHNOLOGIES REPRESENT OVER 46% OF TOTAL GENERATION, AND COMPARED TO 1990, THE BASELINE YEAR FOR THE KYOTO PROTOCOL, THE ENEL GROUP'S CO_2 EMISSIONS HAVE FALLEN BY 32%

Enel's sustainability effort was acknowledged through the inclusion in main global indexes such as Dow Jones Sustainability World Index, the Dow Jones Europe Index, the STOXX Global ESG Leaders index and the FTSE4Good Index series.
Sustainability, as well as being core to Enel strategy, is becoming key to investment decisions taken within the wider financial community. Based on the latest figures from December 2013, SRI (Socially Responsible Investor) funds hold 15.6% of the Enel institutional shareholding in their portfolios, which roughly corresponds to 8% of the Company's free-float.

| TOP STORIES |

The Keys to Global Economic Recovery

Dilma Rousseff, President of Brazil

RECENTLY REELECTED BRAZILIAN PRESIDENT DILMA ROUSSEFF OUTLINED A SERIES OF KEY POINTS DURING HER NOVEMBER 2014 SPEECH AT THE G20 IN BRISBANE, INCLUDING A RETURN TO GROWTH THROUGH TARGETED, COORDINATED AND DETERMINED INTERVENTIONS; RENDERING ACCESS TO ENERGY AND EDUCATION UNIVERSAL IN ORDER TO SUPPORT DEMAND; AND REVIEWING THE DOHA ROUND ACCORDS IN ORDER TO FAVOR INTERNATIONAL TRANSACTIONS.

This G20 summit is important because it lays the groundwork for future interventions. All member countries have recognized we're experiencing a moment of weak growth, one that has fallen short of expectations, and which has spurred a series of consequences that need to be taken into account.

There is a great deal to be done if we want to foster economic recovery.
The crisis is real, and we must acknowledge this in order to intervene in a clear, shared and coordinated manner among member countries, focusing on demand.
The ability to recover demonstrated by the United States is an important signal. In order to return to growth, we need to focus on demand. It is impossible to imagine the global economy growing through cuts and restrictions, as the events that have unfolded in the EU have demonstrated. Reducing demand does not provide a path out of the crisis.
While the crisis has affected all countries, it must be pointed out that the phenomenon has been different for each individual nation, with different times, methods and effects. Emerging countries – China, Brazil, Russia, South Africa – have been hit more recently. Brazil in particular is currently registering a minor imbalance: our country has no gross debt nor net debt to the GDP. As our Minister of Finance, Aloizo Mercadante, has noted, Brazil will have to adjust spending, but not demand. Therefore we will intervene for spending that does not affect investments, or reduce the possibility for consumption. More than anything else, this will be a spending review designed to render government spending more efficient.
However, this doesn't mean we shouldn't plan actions and interventions that can support growth.

IT IS IMPOSSIBLE TO IMAGINE THE GLOBAL ECONOMY GROWING THROUGH CUTS AND RESTRICTIONS. REDUCING DEMAND DOES NOT PROVIDE A PATH OUT OF THE CRISIS

Employment continues to be crucial both economically and socially. This is true for developed economies as well as for other countries around the world, especially in Asia and Latin America.

Today Brazil can still boast high employment levels, and we hope this situation will become even more favorable for growth in upcoming years.The summit has concentrated on issues connected with international commerce, as well as the need for more liberalization than that set out during the Doha Round.

THE IMF REFORMS BRAZIL HOPES FOR, WILL RECONSIDER THE SHARES INDIVIDUAL COUNTRIES POSSESS WITHIN THE IMF, PROVIDING EMERGING COUNTRIES WITH VALUES THAT CORRESPOND TO THEIR REAL WEIGHT WITHIN TODAY'S GLOBAL ECONOMY

We want the treaties of the Doha Round to be reviewed again, and a more systematic work plan to be implemented. We believe that this is now possible thanks to the fact that one of the key obstacles to this development – the agreement between the United States and India – has been overcome.

We feel that an intervention in this sense can provide strong incentives for growth, as well as guarantee increases in production and trade.

Another key theme that emerged during the G20 summit was International Monetary Fund reform. This reform, as everyone knows, was planned already in 2010, but as of today has yet to be introduced.
The reforms we're hoping for will reconsider the shares individual countries possess within the IMF, providing emerging countries with values that correspond to their real weight within today's global economy.

Here, at the G20 summit in Brisbane, it became fully clear that there exists no other alternative: we must be able to guarantee that any new global equilibrium that includes emerging powers is reflected in their relationship with the International Monetary Fund.

| G20 Principles on Energy Collaboration |

Sharing a common understanding that the international energy architecture needs to reflect better the changing realities of the world energy landscape, we, the leaders of the G20 countries, agree to work together to:

1. Ensure access to affordable and reliable energy for all.

2. Make international energy institutions more representative and inclusive of emerging and developing economies.

3. Encourage and facilitate well-functioning, open, competitive, efficient, stable and transparent energy markets that promote energy trade and investment.

4. Encourage and facilitate the collection and dissemination of high quality energy data and analysis.

5. Enhance energy security through dialogue and cooperation on issues such as emergency response measures.

6. Rationalize and phase out inefficient fossil fuel subsidies that encourage wasteful consumption, over the medium term, while being conscious of the necessity to provide targeted support for the poor.

7. Support sustainable growth and development, consistent with our climate activities and commitments, including by promoting cost-effective energy efficiency, renewables and clean energy.

8. Encourage and facilitate the design, development, demonstration and widespread deployment of innovative energy technologies, including clean energy technologies.

9. Enhance coordination between international energy institutions and minimize duplication where appropriate.

Concerning energy, talks concentrated on the need to guarantee access to energy, and therefore the need to supply energy at reasonable prices.
Today Brazil can boast a positive electricity market: more than 99% of the nation's population has access to electric energy.
This doesn't mean that we should stop working in order to make sure even the remaining 1% can enjoy the same services.
But it's important to identify the right strategies. These are mostly people living in outlying locations, far from production centers and cities, and disconnected from the electric network.
We will have to respond their need by relying on alternative energy sources.
From this point of view, the situation in Brazil is decidedly positive when compared with other countries in the world, for example China, where there are vast areas for which access to modern forms of energy including electricity is not guaranteed.
During the G20 we also discussed education, which needs to be addressed as a fundamental economic issue, not merely as a social issue.

Education is a tool for social inclusion, but also an instrument for growth, for spreading progress across all levels of society.

TALKS CONCENTRATED ON THE NEED TO GUARANTEE ACCESS TO ENERGY, AND THEREFORE THE NEED TO SUPPLY ENERGY AT REASONABLE PRICES

Therefore we can say that the theme that emerged with the greatest force is universalization, understood in a transversal manner and in 360 degrees: whether we're talking about education or energy, we need to think from the point of view of universalizing processes. I fully support this approach, and believe it can provide extremely important economic benefits as well. I believe I can say that this is something Brazil has learned through direct experience.

This text is an extract of the press conference held by Dilma Rousseff during the closing ceremonies for the G20 summit held in November 2014. A video of the conference is available at: http://www.brasil.gov.br

| INDUSTRIES & COUNTRIES |

Toward an African Century

Agnese Bertello

THE AFRICAN CONTINENT IS COMPLEX, COMPLICATED AND FULL OF CONTRADICTIONS, BUT MANY BELIEVE IT HAS ENTERED A NEW CENTURY, ONE THAT HAS THE POWER TO CHANGE THE DESTINIES OF ITS MANY NATIONS. WELCOME TO THE AFRICAN CENTURY

Africa is home to 13% of the world's population, and the continent consumes 4% of the world's energy production. Analyzing the energy scenario on the African continent means coming to terms with this contradiction, as well as many others that characterize this part of the world: on one hand, Africa can boast raw material deposits and reserves, as well as extremely important alternative resources; on the other it is characterized by an infrastructural deficit and lack of planning and management. Today 620 million Africans lack access to modern energy for even their simplest primary needs.

ACCORDING TO MOST ENTREPRENEURS ON THE CONTINENT, THE UNRELIABILITY OF ELECTRIC SUPPLY IS AN EVEN MORE SERIOUS OBSTACLE TO GROWTH THAN PROBLEMS WITH ACCESS TO CREDIT, BUREAUCRACY OR CORRUPTION.

In recent years the situation has undoubtedly improved (overall growth in energy consumption has been 45% since 2000), but infrastructure modernization around the continent can't keep up with population growth. According to estimates provided by Africa Energy Outlook, even bearing in mind the positive results of initiatives currently being planned, the number of people who have no access to energy will remain quite high: in 2040 roughly 500 million people will continue to be without energy.

Inefficiency and Infrastructural Deficiency

But while this is undoubtedly the clearest and most dramatic element, the continent's contradictions don't end there. For the fortunate few who, especially in the main urban centers, are connected to the electric network and can take advantage of basic services, life remains anything but simple: African tariffs, as the WEC reminds us, are among the highest in the world, and loses are double the global average.
The system has shown it is so structurally unreliable that people are driven to the widespread use of reserve generators that run on gas or diesel fuel, ready to enter into service in order to substitute the network, regardless of more illuminated emission-control policies. A lack of effective maintenance services has quickly rendered what was already a rarely utilized distribution network obsolete.

According to most entrepreneurs on the continent, the unreliability of electric supply is an even more serious obstacle to growth than problems concerning access to credit, bureaucracy or corruption.
The possibility for the continent to escape poverty – as the more innovative forces in play around the continent are well aware – is directly connected with the availability of modern, dependable and reasonably priced energy sources.

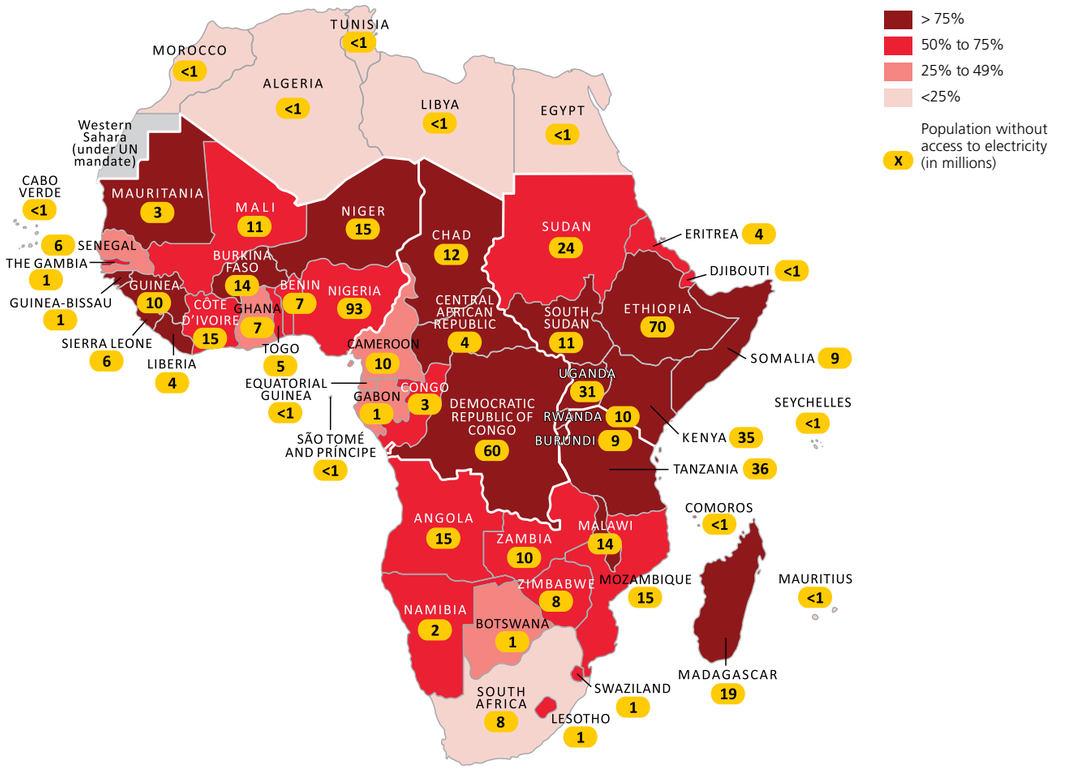
Wasted Resources

Sun, wind, geothermal, biomass, water: Africa can boast extremely important renewable resources. Hydroelectric is the most well developed sector, but although it accounts for one-fifth of all electricity generation, at present only 10% of its true potential is being put to use. The Democratic Republic of Congo, and to a lesser extent Mozambique, Ethiopia and Guinea, can boast the continent's most important hydroelectric resources. While solar energy is booming in North Africa and wind power is gaining ground in Morocco, Egypt and South Africa, in Eastern Africa, and in Kenya and Ethiopia in particular, geothermal energy is accounting for the most significant growth.

HYDRORLECTRIC ACCOUNTS FOR ONE-FIFTH OF ALL ELECTRICITY GENERATION, AT PRESENT ONLY 10% OF ITS TRUE POTENTIAL IS BEING PUT TO USE

There is an evident waste factor in fossil fuels: roughly 30% of all the oil and gas discovered over the past five years is concentrated in sub-Saharan Africa. Nigeria is the largest producer of crude oil in the region. Yet unfortunately even in this case, the data reveals a situation that is seriously

Share of population without access to electricity



REBIRTH IS POSSIBLE, BUT IN ORDER FOR IT TO GET UNDERWAY DRASTIC AND TIMELY INTERVENTIONS WILL BE REQUIRED

compromised by theft, corruption and lack of controls and regulation. According to official estimates, every day roughly 150,000 barrels of crude oil (for a total value of five billion dollars per year) are stolen. This figure alone would be enough to finance energy access for every man, woman and child in Nigeria by 2030.
There is an equally significant waste factor for natural gas. The total volume of gas burned through gas flaring equals the volume of gas consumed throughout the entire sub-Saharan region. Roughly 1,000 billion cubic meters of gas have been burned over the years. Nigeria remains the primary producing country for gas, but recent gas reserves discovered offshore in Mozambique and Tanzania make these countries serious candidates as well.

The African Century?

Despite this complicated political, financial and infrastructural reality, in a recent report dedicated to the continent the WEC went so far as to call the 21st century the "African Century." Experts believe a rebirth is possible, but in order for it to get underway drastic and timely interventions will be required, focused in three key spheres:

- investments, especially from private and international capital;
- regional integration and cooperation;
- efficient management of resources and earnings, favoring the use of primary resources currently destined for export on a national level.

Therefore integration of projects for energy development at the regional level and the creation of network infrastructures represent key elements. There has been an increase in these kinds of initiatives over recent years. The African Union Commission, NEPAD agency and the African Development Plan have

created PIDA, or Program for Infrastructural Development in Africa, which outlines the main directives for infrastructural development to be conducted through 2040. As far as energy is concerned, PIDA concentrates on the need to reinforce exchange and interconnection within the continent's macro-regions (Western, Eastern, Southern and Central African Power Pools).

Reinforcing interconnections, relying on technologies that currently guarantee the best reliability over long distances and reduce losses to a minimum, like HVDC, would provide a number of different advantages, including: reducing kwh costs through a strong economy of scale and the implementation of large-scale projects that can be used by more than one country; redefinition of the area's energy mix, with reciprocal support between countries with strong fossil fuel potential and others with strong renewables; and an increase in access to modern energy services.

The IRENA Agency has also underlined the importance of initiating these kinds of projects, proposing in particular the creation of Clean Energy Corridors that will crisscross and reconnect different regions throughout the continent, from Ethiopia to South Africa. Several of these projects are already being developed: the first HVDC line is being built between Kenya and Ethiopia (1,068 kilometers for a total 2,000 Mw of transmission capacity); a second HVDC line will connect Zambia, Tanzania and Kenya. Similar projects are being studied within the Western African Power Pool as well.

THE PIDA ENERGY OUTLOOK FORECASTS AN INCREASE IN DEMAND BY 2040 FROM 590 TWH TO 3,100 TWH, INSTALLED CAPACITY WILL GROW FROM 120 GW TO 700 GW

The PIDA Energy Outlook forecasts an increase in demand by 2040 from 590 TWh to 3,100 TWh, as well as a rise in installed capacity from 120 GW to 700 GW. But in order to achieve these forecasted results, the continent will require investments of around 43 billion dollars per year, five of which will have to be dedicated specifically to investments in network infrastructures. It is a truly challenging objective for a continent that – with the exception of China, which is making enormous investments across Africa – continues to prove relatively unreliable for most international investors.

| CESI as Pan-African Technical Partner |

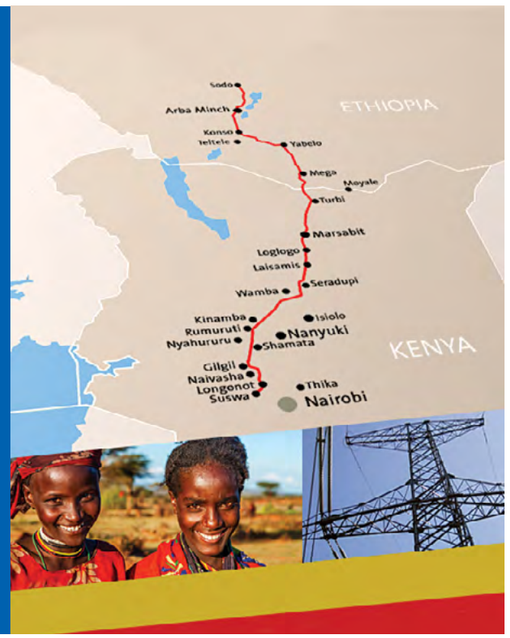
Africa is growing fast and so are its power needs. In order to strengthen growth in this corner of the world, it is fundamental to build an interconnection system that allows energy-efficient transmission from one country to another, reducing losses and permitting cost savings.

Integration between markets and economic regions (Western African Power Pool, WAPP; Eastern African Power Pool, EAPP) is already underway, and CESI is involved in two of the most interesting projects currently under construction.

In 2013, CESI was selected as technical consultant for the Power System Interconnector Project between Ethiopia & Kenya, a project designed to build Africa's largest energy highway, making it possible to send hydroelectric energy from Ethiopia to Kenya through HVDC technology.

With 1,040 km and 500 kV HVDC bipolar overhead transmission lines, this interconnection will increase power supply and reduce the cost of electricity in Kenya. At the same time it will generate additional revenues for Ethiopia through the export of electricity to Kenya. The infrastructure is expected to be finalized by the end of 2016 and is worth roughly 12 million Euro.

More recently CESI won an international tender announced by WAPP for a consultancy project that aims to enhance regional electricity interconnections, financed by the World Bank.
The goal is to improve grid stability. In order to achieve this, the project explores several different interventions: reviewing operating procedures; updating protection and control system settings; and adding systems capable of controlling inter-area oscillations.

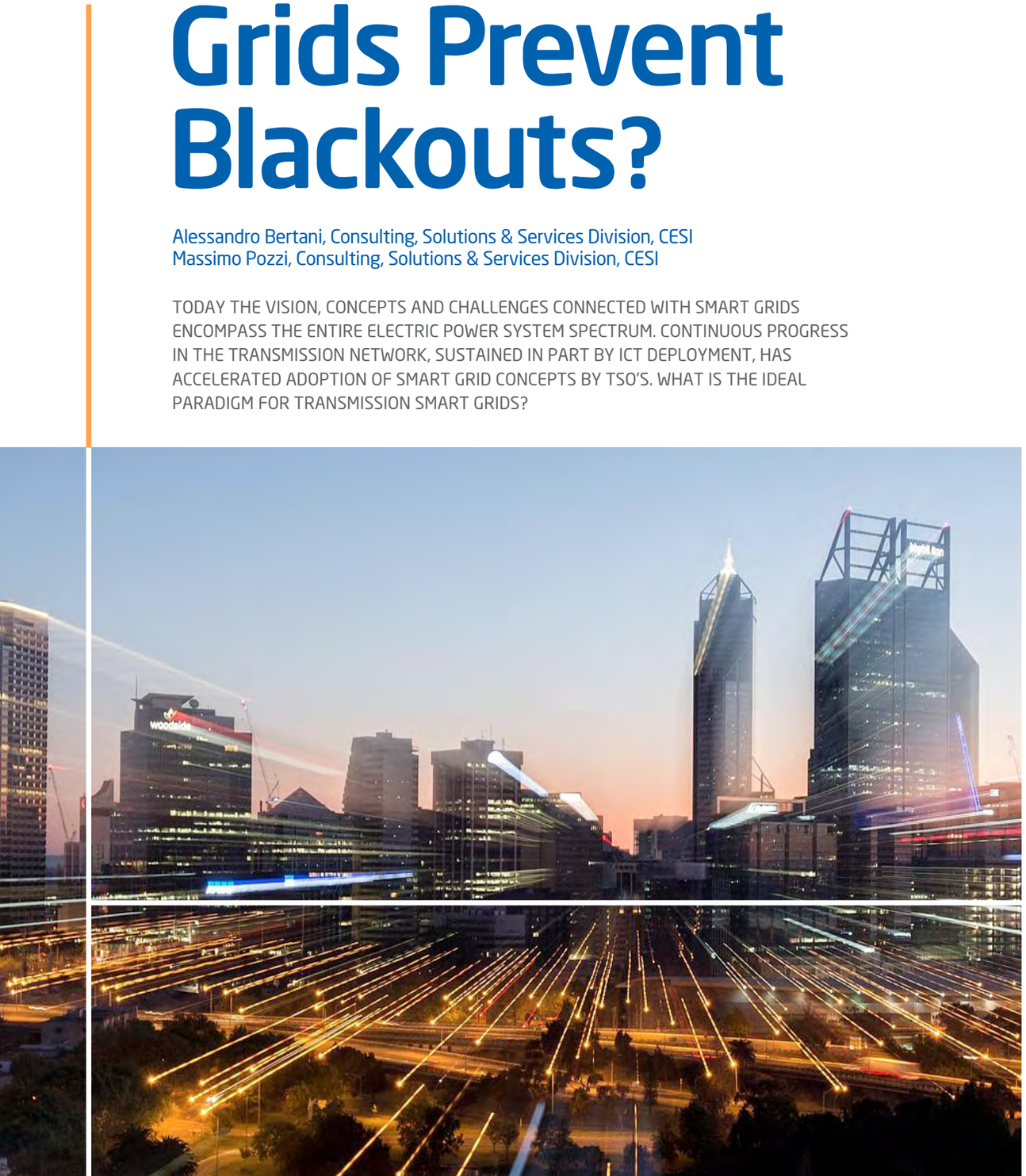


| IDEAS & VISION |

Can Smart Grids Prevent Blackouts?

Alessandro Bertani, Consulting, Solutions & Services Division, CESI
Massimo Pozzi, Consulting, Solutions & Services Division, CESI

TODAY THE VISION, CONCEPTS AND CHALLENGES CONNECTED WITH SMART GRIDS ENCOMPASS THE ENTIRE ELECTRIC POWER SYSTEM SPECTRUM. CONTINUOUS PROGRESS IN THE TRANSMISSION NETWORK, SUSTAINED IN PART BY ICT DEPLOYMENT, HAS ACCELERATED ADOPTION OF SMART GRID CONCEPTS BY TSO'S. WHAT IS THE IDEAL PARADIGM FOR TRANSMISSION SMART GRIDS?



There are a number of root causes for the partial or total blackouts that have occurred worldwide in recent years, including transmission adequacy problems versus increased electrical consumption, control and protection of ageing technology, unpredictable renewable source penetration, the effects of unbundling and market distortion, as well as a lack of coordination between system operators.

Large disturbances in 2003 and 2005 in the US and Europe, as well as in the US and Brazil in 2011, were not as dramatic as the repeated blackouts that occurred in Northern India in 2012. It may appear surprising that the frequency and consequences of third millennium incidents are on the rise, despite the proliferation of literature for Smart Grid concepts and the availability of modern, advanced and reliable technological solutions.

Both small and severe blackouts are typically initiated by minor, local causes. But they often have cascading effects due to significant, more intrinsic problems, jeopardizing system security and leading to partial or total system collapses, the social repercussions of which are unfortunately all too familiar. Within this framework, what are the possible lessons for improving operational security? Which kind of coordinated action plans, hopefully involving all the necessary stakeholders, have to be put in place? What are the best Smart Grid paradigms for filling the existing operational gaps, choosing the most suitable functional and technological solutions on the market?

Today the vision, concepts and challenges inherent to Smart Grids encompass the entire electric power system spectrum, starting from generation plants, passing through transmission and distribution networks and extending to the final use of delivered energy. Most of the initial Smart Grid focus was devoted to distribution and committed to Advanced Metering Infrastructures (AMI) and Demand Response Systems (DRS), aimed at increasing the consumer's active participation in network operation, and more recently driven by digital communications and advances in control.

Technical improvements in monitoring, protection, analysis and control for transmission networks have continued to develop, accompanied by periodic breakthroughs in transmission capacity. Power electronics have played an important role by enabling High Voltage Direct Current (HVDC) links and a variety of Flexible AC Transmission System (FACTS) enhancements. This continuous progress, sustained in part by ICT deployment, spontaneously introduced Smart Grid paradigms for some transmission system operators.

As presented in professional publications, the visions and priorities of Smart Grids for transmission platforms are quite similar: they all highlight objectives like "sustainability, efficiency, security and reliability," considering them attainable through approaches that include "integration, monitoring, control, communication and coordination."

WHAT ARE THE BEST SMART GRID PARADIGMS FOR FILLING THE EXISTING OPERATIONAL GAPS, CHOOSING THE MOST SUITABLE FUNCTIONAL AND TECHNOLOGICAL SOLUTIONS ON THE MARKET?

An attempt to substantiate and objectify the ideal paradigms and concepts behind Smart Grids for transmission can be delineated into the following four-item agenda:

Defining Smart Models
This framework focuses on modeling network elements and gathering precise data for these models so that the resulting simulation tools will provide an effective representation of electric system behavior. The availability of such reliable simulation tools is helpful in a variety of different contexts, including improving operators' know-how and awareness, planning and operational off-line studies, advanced security on-line analysis and restoration plans.

Designing Smart Controls
This framework focuses on advanced applications to be inserted in load dispatching centers and remote supervisory and control systems, aimed at enhancing regulation and protection features. Keywords for these applications are Security Assessment, Dispatching Optimization, Transient Security Constrained Optimization, Dynamic Line Rating, Phasor Measurements and Hierarchical Regulations.

FOUR ISSUES OUTLINE THE IDEAL PARADIGM FOR SMART GRIDS

Implementing Smart Processes
This framework focuses on data mining and visualization issues, as well as on standardization and interoperability advantages in network operation, addressing topics relevant to both power plant and control center levels.
It has developed through modern solutions for sharing data and applications, for example the use of XML language, the Enterprise Service Bus, Service Oriented Architecture, the Common Information Model and the Inter Control Center Communications Protocol.

Making use of Smart Assets
This framework focuses on advanced network devices based on power electronics like HVDC and FACTS, renewable generators and storage systems to be integrated into the network. New and traditional components must incorporate business intelligence and become part of the best practices for advanced asset management and equipment maintenance.

In CESI's experience, it is essential that any transmission system operator conceive its own Smart Grid vision and roadmap, defining a coordinated action plan for testing its consolidated practices, even when said practices have already been guaranteeing reliable network operation for years. Only a custom-tailored and well-defined roadmap will allow a transmission system operator to initiate a coordinated series of development projects that can guarantee advanced operation of the high voltage system for the future. Failing to identify, define and follow this roadmap will undoubtedly cost an operator more than any eventual investments required to put it into place.

IT IS ESSENTIAL FOR A TSO TO CONCEIVE ITS OWN SMART GRID VISION AND ROADMAP, SETTING AN ACTION PLAN FOR TESTING ITS CONSOLIDATED PRACTICES

| INDUSTRIES & COUNTRIES |

The Value of Certification

A conversation with Fiorenzo Bregani, Head of Certification, Testing & Certification Division, CESI

FOLLOWING EXPONENTIAL GROWTH IN THE 1970S AND 1990S, TODAY'S CERTIFICATIONS MARKET IS IN FLUX, WITH BOTH TECHNICIANS AND EXPERTS QUESTIONING THE REAL VALUE OF CERTIFICATIONS. AS A CONSEQUENCE THE CERTIFICATION BODY IS THE HEART OF THIS PROCESS. TOMORROW'S CHALLENGE WILL BE THE "GLOBAL CONFORMITY ASSESSMENT APPROACH" AS LAUNCHED BY THE WTO.

There was a time when all one needed in order to determine the inherent quality of something was a sharp eye and common sense. But that was back when the world was a much smaller and far less wide-ranging place, not the globalized reality we live in today.
Today, in order to determine if something is high quality, we rely on third party bodies to verify whether or not a product really possesses the characteristics and qualities it claims to have; qualities that we want and for which we are willing to spend.
These concepts become increasingly complex and refined when, instead of this or that product intended for mass consumption, the focus is on technological products, services and processes. But the fundamental reasoning underpinning certification remains the same.

THE CERTIFICATION SECTOR EXPERIENCED BOOM TIMES IN THE 1970s, FOLLOWED BY A SECOND SIGNIFICANT PERIOD OF GROWTH TWENTY YEARS LATER

The boom in certifications
Initially companies proceeded internally through a "homologation" process designed to verify the reliability or lack thereof of the products it purchased and inserted into its production cycle. The first improvements for this process arrived during the 1970s: the concept of product "quality" began to spread through the world's new consumer society; citizens and companies became aware of the need to guarantee and demonstrate quality.
The certification sector experienced boom times, followed by a second significant period of growth in the certification market twenty years later, during the 1990s, when the focus of certification expanded beyond products to include services, management systems, processes and people.
During the 1990s the ISO 9001 quality certification for company management systems became a well-known and widely recognized reality. First created as an elite certification designed to evaluate a company's "overall quality," guaranteeing its credibility and efficiency, over time certification spread rapidly across the globe in a relatively uncontrolled manner. In some ways, its popularity diminished the standard's inherent value: today everything is certifiable and everything is certified, but not everything can boast the same value.

The globalization of certification
In today's "global" era, the certification market was forced to adapt to the times. International exchanges have intensified; raw materials, semi-finished and finished products all move back and forth from one country to the next. This made the effort to extend guarantees and certainties a pressing need, and the agency charged with overseeing this process is the WTO, or World Trade Organization, the sole international organization regulating the global rules of trade between nations.
Its main function is to ensure that trade flows as smoothly, predictably and freely as possible. There is a need to prove that an exported product meets foreign regulations, and non-transparent and discriminatory regulations can become effective protectionist tools.
The WTO governs conformity assessment through the Agreement on Mutual Recognition in Relation to Conformity Assessment, signed at the beginning of this century.
The conformity assessment is the demonstration that specified requirements relating to a product, process, system, person or body are fulfilled.
The political agreements achieved within the WTO's framework require infrastructures around technical agreements, and the WTO's TBT (Technical Barriers to Trade agreement) is currently the best way to avoid unnecessary obstacles to trade.

How does certification work?
Within this general framework, it's important to understand what certifying a given product really means in concrete terms. In order to do this, let's start with the key role in this process: certifiers.

THE CERTIFIER'S INDEPENDENCE AS A THIRD PARTY IS WHAT GUARANTEES THE QUALITY OF ITS INPUT

A certifier is first and foremost a technical expert for the product, system or service up for certification. Furthermore – and this is a certifier's defining element – this figure is a third party with regards to the other players involved (producer and purchaser).
The certifier's independence as a third party is what guarantees the quality of its input.
"A good certifier is one that manages to guarantee high technical competence, its own

| Testing, Inspection and Certification |

CESI Group is the European market leader for testing and certifying electromechanical components, and is one of the most important players in the world at the international level.

Conformity Assessment (CA) of products and operational processes is a mandatory requirement for international manufactures and utilities that want to play an active role in the market.

CESI is a globally recognized CA agency, acting as an accredited testing laboratory for the ISO IEC 17025 international standard, as well as an accredited certification and inspection agency for the international ISO IEC 17065 & ISO IEC 17020 standards.

Certificates and reports emitted by the CESI Group are recognized internationally by utilities and electromechanical manufacturers, and CESI is cofounder of the STL (Short-Circuit Testing Liaison). On the strength of the unique experience gathered managing and improving its own laboratories, CESI offers top level accredited testing and related services, covering all stages from design to construction supervision and commissioning.
The CESI Conformity Assessment process refers to the CESI-HV certification scheme for high voltage electrical equipment, as well as to the CESI-LV certification scheme for low voltage electrical equipment. Recently the CESI-GC certification scheme was launched for CA of green energy market components and systems.

CESI is one of the few certification agencies in the world that can offer their customers a combination of testing in its own laboratories (CESI Group platforms) and certification activities. The technical and professional synergies achieved through this combination enable CESI to deliver top quality service. Furthermore, CESI inspectors can boast unique skills and experience matured over numerous years of certification activities conducted for manufacturers in every country in the world.
CESI also certifies management systems (Quality, Environment, Health & Safety, Energy, Social Responsibility, etc.) according to international standards (ISO 9001, ISO 14001, BS OHSAS 18001, ISO 50001...), operating through its CSQ brand.

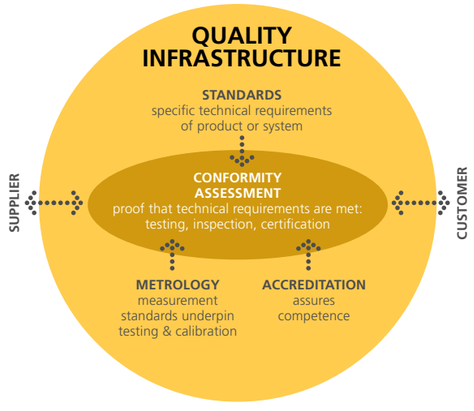
third party status and independence, and at the same time help its client improve the quality of its products or services," explains Bregani, on staff with CESI's Testing & Certification department. "Technical knowledge of products or processes, especially those with advanced technologies, united with familiarity with the applicable technical standards and regulations by law, becomes the key element for success."
Today's certification market is increasingly crowded with new players ranging from global entities operating worldwide, at times with business volumes totaling in the billions of euro, to small local and sector-focused agencies. In any case, all these different players can boast "certification body" status and have the right to emit certifications.

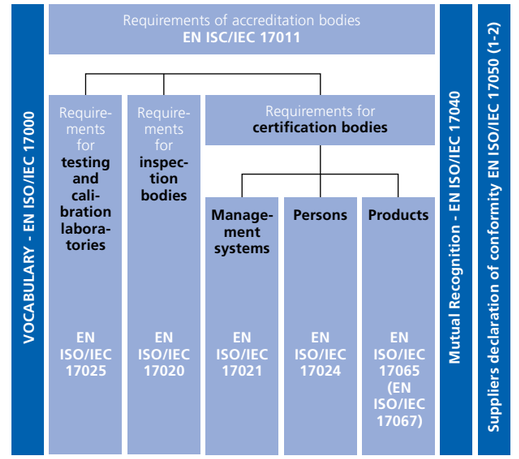
THANKS TO DOCUMENTARY ASSESSMENT AND ANALYSES, AUDITS, INSPECTIONS AND LAST BUT NOT LEAST, TESTING CONDUCTED IN SPECIALIZED LABORATORIES, THE CERTIFIER VERIFIES THAT A GIVEN PRODUCT, MANAGEMENT SYSTEM OR SERVICE CONFORMS WITH THE RELEVANT PARAMETERS

Which certification for which objective?
Thanks to documentary assessment and analyses, audits, inspections and last but not least, testing conducted in specialized laboratories, the certifier verifies that a given product, management system or service conforms with the relevant parameters.

In some cases, when these parameters have been established at a governmental or international level, and especially for mass consumer goods with regards to health, safety and the environment, the certification amounts to a conditio sine qua non: it is required by law and must be both respected and documented.
In other cases, although such certification may not be required, it is regarded within the market as an independent document demonstrating a minimum quality standard, without which it is impossible for the product to compete.
In other cases the purchaser requires that determinate results (different from those set by law, or which integrate them) be certified.
In other words, the company purchasing a good, system or service requires the supplier to demonstrate that its product meets expectations and needs, and is willing to pay for the certification service (conducted as always by a third party specialist) in order to obtain said guarantees. This is normally what takes place in the electromechanical sector, especially with innovative and/or high technology components, for which characteristics and performance ratings obtained in testing laboratories increasingly play a revealing and discerning role.

Who certifies the certifiers?
In 2008 the European Union adopted regulation no. 765/2008, which requires every member state in the EU to establish an accreditation body, in other words an organization that controls all certification bodies operating within that country, overseeing their work. In Italy, this accreditation body is Accredia, in turn monitored by international organizations like the EA (European Accreditation) and the IAF (International Accreditation Forum).
Accredia and other accreditation bodies like it have the power to conduct inspections and controls that regularly result in comments, observations or declarations of non-conformity that can result in revocation of an individual body's right to certify.
The accreditation bodies must accept a strict and transparent system for evaluation among equals (peer evaluation), and must undergo such evaluation on a regular basis.
In a free, increasingly open market that encompasses countries with less demanding oversight traditions, certification can play a real role as guarantor, protecting the way the market itself functions, honest competition and the end user.
"Protecting the value of certification, making sure it is not perceived as a heavy, imposed tax, or that it become a factor of market distortion rather than an element providing guarantees and protecting market solidity, has become fundamental.
All the more so in a society in which the need to guarantee quality, safety, environmental compatibility, social responsibility and so forth is constantly on the rise," says Bregani.
"For this reason, today accreditation bodies are increasing oversight of certifiers, characterized by a high level of specialization and technical competencies. These competencies are kept up-to-date and require high performance independent laboratories within which specific product tests and verifications can be conducted."





The reflux: a return to homologation?
The certification market is currently experiencing what can be considered a reflux phase, in other words a return to the past, when companies arranged for verification and homologation processes for the products they acquire be conducted in-house in order to determine their value.
This is a direct response to the proliferation of certificates which, when all is said and done, do not correspond to the real performance of the products they certify.

THE CERTIFICATION MARKET IS CURRENTLY EXPERIENCING WHAT CAN BE CONSIDERED A REFLUX PHASE, IN OTHER WORDS A RETURN TO THE PAST

As things stand today, some purchasers prefer to go back to exerting direct control over what they acquire.
But even though they follow such approach, the companies prefer anyway to entrust the necessary testing and controls to those independent certifiers that can guarantee the appropriate specialized skillsets.
This approach is increasingly adopted by companies with high technological content, for which quality standards, performance levels and market requirements are fast-paced and quickly evolving. It is an efficient path to follow, one that reflects both the critical moment this market is experiencing and the inherent willingness to spend for quality value, not simply for a paper certificate. So a branded certification body, even when entrusted directly by the utility, is the real key of success in matching user needs and supplier products in a global frame of trust.

Flooding Europe

Giuseppe Paolo Stigliano, Head of Structural & Civil Engineering
Engineering & Environment, ISMES Division, CESI

TORRENTIAL RAINS AND DOWNPOURS DEVASTATED EUROPE OVER THE COURSE OF 2014. RECENT STUDIES DEMONSTRATE THAT THESE KINDS OF PHENOMENA MAY DOUBLE BY 2050, FOR AN ESTIMATED 23 BILLION EURO IN COLLATERAL DAMAGES. PREVENTION IS OF PARAMOUNT IMPORTANCE IN ORDER TO LIMIT THE SOCIAL COSTS OF THESE EVENTS, AND MUST BE PLANNED IN A STRATEGIC MANNER.

From a climatic point of view, 2014 was an *annus horribilis* for Europe: torrential rains, thunderstorms and downpours cost numerous human lives and caused damage in the millions of euro in France, Spain, Italy, Germany, Austria, Romania, Hungary, Serbia, Croatia and the Czech Republic…
This atmospheric turbulence cannot be viewed as a rare event, but as an expression of trends already underway and due to climate change, which in densely populated and heavily industrialized territories – where human activity has significantly modified the original geographic terrain – all too often produces situations of profound emergency.

THE ATMOSPHERIC TURBULENCE THAT EUROPE EXPERIENCED IN 2014 CANNOT BE VIEWED AS A RARE EVENT, BUT AS AN EXPRESSION OF TRENDS ALREADY UNDERWAY DUE TO CLIMATE CHANGE

This fear was confirmed in a recent study conducted on natural climate change. Coordinated by researchers at the Institute for Environmental Studies in Amsterdam, a study entitled "Increasing stress on disaster-risk finance due to large floods" conducted the first full evaluation of torrential rain risk in Europe, providing forecasts as far ahead as 2050. In 2013 alone, extreme rain – which affected mostly central Europe and England – caused damage for an estimated 12 billion euro, and by 2050 these kinds of weather phenomena may increase by an average factor ranging from once every sixteen to once every ten years, affecting more than one nation at the same time.
The study underlines several aspects in particular: the profound interdependence of European fluvial systems, and the need to intervene in order to strengthen protection measures in all watersheds, thereby reducing future costs. Prevention, therefore, is the primary path to follow. These interventions must be organized taking into account a transnational plan to reduce risks, and correctly calibrated in each nation.
Europe is well aware of the economic risks associated with these events, and has elaborated a shared directive dedicated specifically to flooding. This directive, sent to all member states, calls for the definition of national plans for managing flood risks.
Italy is a perfect case in point. Instability in the terrain rendered extreme by recent extraordinary meteorological events, both due to their nature and to the effects they've had on urban systems and communities, have turned into a serious emergency.

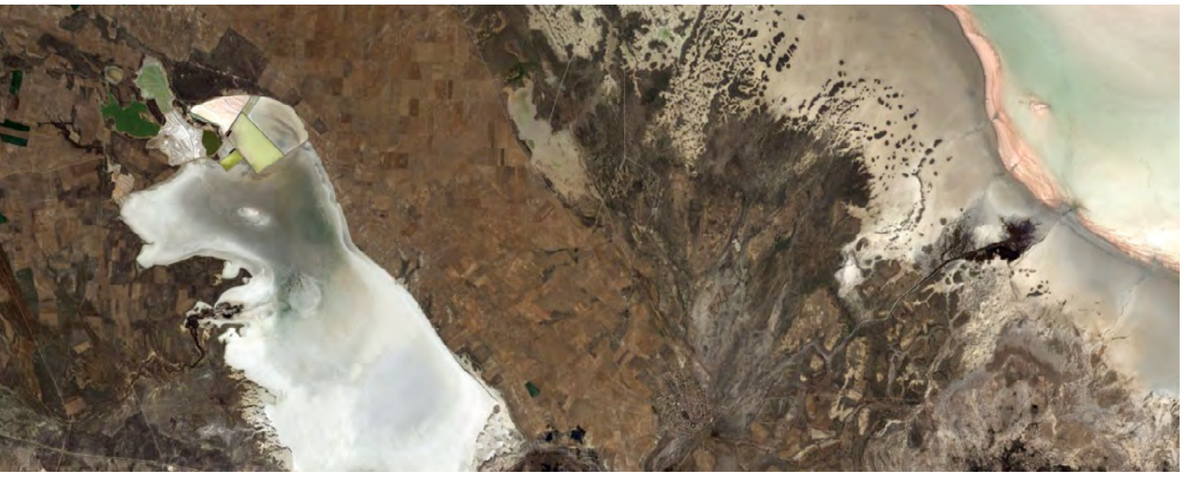
This is due to failed prevention both in terms of structural interventions (building works that might mitigate the effects of inclement weather) and non-structural interventions (territorial and waterway maintenance; delocalizing at-risk activities).

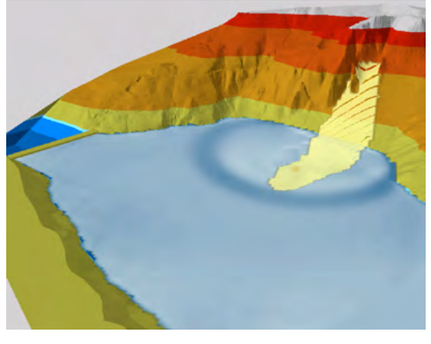
STATISTICALLY 70% OF ALL LANDSLIDES TAKE PLACE IN ITALY, BUT ITALIANS HAVE BOTH THE KNOWLEDGE AND THE TOOLS THEY NEED TO DEAL WITH THE SITUATION

In order to set up an intervention plan, first those parties responsible for overseeing Italy's eight national river basin districts – working together with regional government agencies – must adopt the best tools necessary for developing an accurate assessment of the current situation. This assessment, based on objective technical criteria (including environment, territorial safety, and engineering) must make it possible to identify clear priorities, evaluate alternative designs and select buildable works upon which to focus available resources. While it's true that statistically 70% of all landslides take place in Italy, it is equally true that the country can vaunt an impressive range of information for its territories: Italians have both the knowledge and the tools they need to deal with the situation. What's missing is the ability to apply these technical solutions.

An innovative approach is the best way to proceed

The kinds of interventions useful for reducing hydrogeological instability can be subdivided into three macro-categories: those designed to mitigate flood risk; those designed to mitigate landslide risk; and those designed for urban sewage treatment and river and lake clean up operations.
This article presents a Multi-criteria approach based on the "weighting method" for the reduction of various different target functions (to be minimized or maximized) into one single function.





In order to assign these coefficients, which will be allocated to the various objectives, we'll apply the "Analytical Hierarchy Process," which defines weights to be used in the analysis, based on their relative importance, both of the areas and of the targets, provided by institutional (and non-institutional) decision makers, who may even belong to categories defined by conflicting interests.
The next step is an analysis based on "compromise programming", aimed to identify those design solutions closest to ideal, which may not necessarily belong in the group of feasible solutions. In this manner one can create a classification within which a definitive choice of the interventions to be carried out can be made, based on available funds.

Defining criteria

The criteria upon which decision making processes can be structured on a territorial basis belong to areas that can be quite different from one another: design (construction time and risks); economics (cost and extent of compensation for local authorities); environment (the presence of protected areas, areas with special qualities, realization of ancillary infrastructures, waste, etc.); as well as social; political; and administrative.
Defining these criteria in detail for each application area represents the first and most important activity to be addressed.

Evaluation of analysis results

The evaluation process should involve decision makers and all stakeholders.
This approach makes it possible to create consensus for design choices, as well as build an evaluation framework within which evaluation criteria and values are shared and appropriately weighted and harmonized.
In this manner the methodology can define ratings for buildable projects, as well as identify design solutions closest to ideal, creating a ranking for a definitive choice for the projects to be realized based on real, actual economic resources.

AS ESTABLISHED BY THE EU, BY THE END OF 2015 EACH EUROPEAN CONTRY SHOULD APPROVE A PLAN FOR FLOOD RISK MANAGEMENT

A working hypothesis: the Tagliamento River

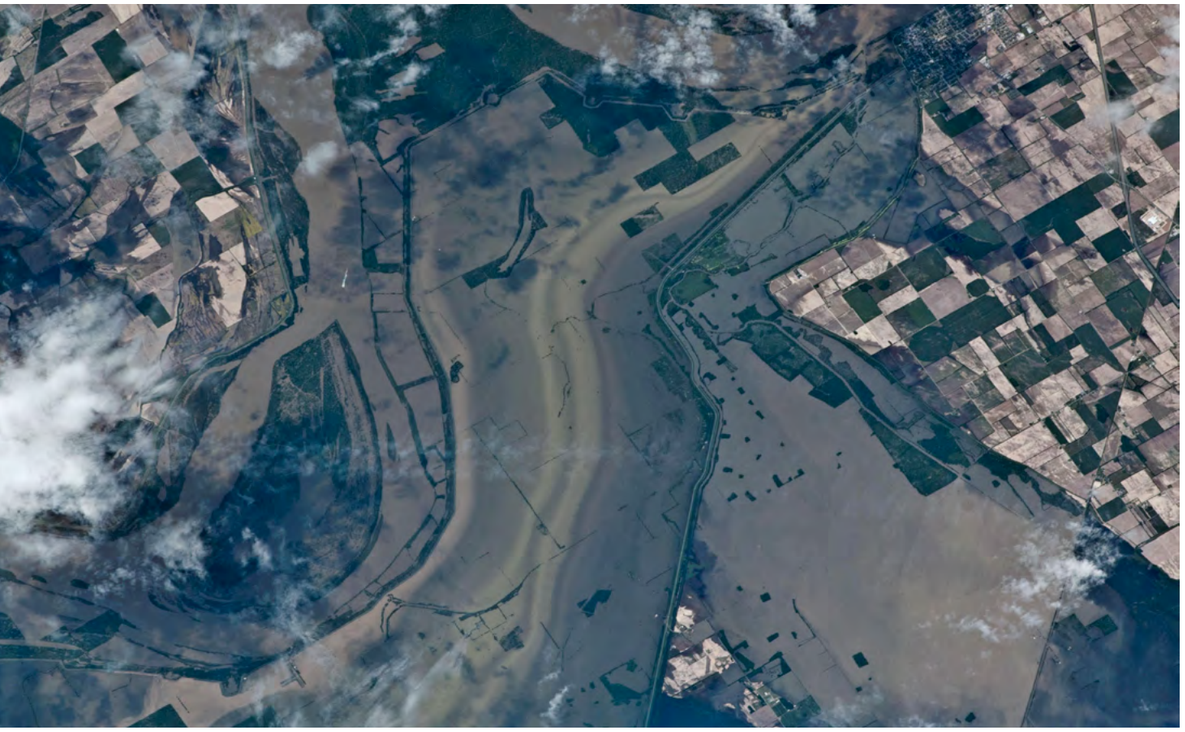
Initially, the methodology described here above could be applied to a test case, and subsequently extended to all of Italy's national river basin districts in order to define priority action areas for planned interventions.
One potential test case is the Tagliamento River basin. This river is one of the "major" water problems in northeastern Italy, along with the Piave, Livenza and Brenta-Bacchiglione Rivers.

While the flood of 1966 and the Florence flood remain particularly dramatic chapters in Italian history, flooding in this river has caused significant damage in recent years as well.

AN INCLUSIVE APPROACH AND SHARED CONSTRUCTION OF AN EVALUATION FRAMEWORK IS FUNDAMENTAL TO OVERCOME IMPASSES DUE TO THE PRESENCE OF MULTIPLE AND OFTEN CONFLICTING INTERESTS

In 2000 Italy's river basin authority adopted a plan to defend the middle and lower Tagliamento by building three retention basins downstream of Pinzano that could, in the event of flooding, contain tens of millions of cubic meters of river water, reducing the river's peak to 4,000 mc/s. The plan was never put in place, despite the fact that there were sufficient funds to build the first of the three basins, because of opposition from landowners located on the righthand bank of the Tagliamento downstream from Pinzano. In subsequent years a number of other projects that were not specifically designed to resolve the water defense issues inherent to this territory were completed.

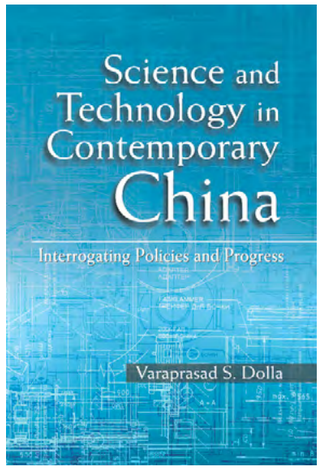
Recently urgent upkeep operations for the Tagliamento were conducted, but as of today the issue of the river's longstanding flood problems has yet to be adequately resolved. Today the river basin authority is working to reformulate intervention hypotheses that can provide flood solutions for the Tagliamento, and these will become part of the Plan for Flood Risk Management that, as established by the EU, must be approved no later than 2015.
In the case of the Tagliamento River, the analysis methodology for design alternatives that CESI has developed could effectively support decision makers and stakeholders in repositioning intervention priorities based on an urgent need to establish effective, shared solutions for the flood risks threatening the territory.
An inclusive approach and shared construction of an evaluation framework (working together to define objectives, criteria and relative importance) would make it possible to overcome the kinds of impasses that were created in the past due to the presence of multiple and often conflicting interests in play within the river basin area.



| REVIEW |

Science and Technology in Contemporary China. Interrogating Policies and Progress

Varaprasad S. Dolla,
Cambridge University Press



The following select data for 2010 gives us a glimpse into the Chinese accomplishments in S&T. China's Gross Expenditure on Research and Development (GERD), a key indicator of S&T development, was about 179 billion US dollars, trailing just behind the US. China published about 45,000 scientific research articles and, thus, figured among the top five.

Though multinational companies (MNCs) play a key role, China is now the largest high-technology exporting country with a volume of about 350 billion US dollars. Moreover, some segments of its space, agricultural, and industrial technologies are approaching the levels of the ones in the advanced countries.
These impressive indicators signify the unfolding of a new phenomenon of paradigm shift from 'made in China' to 'invented and innovated in China'.

This book is an imperative to revisit and interrogate the nature and scope of Chinese Science and Technology policy and progress.

The text is divided into three parts.
The first part considers both the macro and micro issues pertaining to Science and Technology policy in general and also of the policiy in particular.
The second part highlights the historical narrative of Chinese Science and Technology policy as it has a key role in the evolution of contemporary Science and Technology architecture.
The third part discusses three focal components of the Chinese Science and Technology system each representing state, society and international systems - the organizational structure representing the state; the research system representing society; and technology acquisition representing the international system with serious implications for China.

www.cambridge.org

Biography

Varaprasad S. Dolla is Associate Professor in Chinese studies at the School of International Studies, Jawaharlal Nehru University. His research interests include science and technology, innovation, unification and domestic politics in China. Currently he teaches graduate courses on Chinese history and science and technology. He was an ASIA (Asian Studies in Asia) Fellow at Peking University, Beijing, in 2004. A recipient of Nehru Memorial and University Grant Commission Scholarships, he has presented papers at the University of California, Berkeley, the University of Southern California, and the Global Network for Economics of Learning, Innovation, and Competence Building Systems (GLOBELICS) in Beijing. He has published research articles in national and international journals including the Journal of International Affairs, the Journal of Science and Technology Policy of China, International Studies and China Report.

Middle East Electricity

Date > 2-4 March 2015
Venue > Dubai, UAE
http://www.middleeastelectricity.com/en/Home/

The Middle East Electricity conference brings together key decision makers from over 100 countries to discuss issues connected with Test & Certification requirements.
CESI will hold technical speeches during the event and host guests in its booth. CESI's Middle East offices are headquartered in Dubai, demonstrating the area's fundamental importance for company strategy.

Hannover Messe

Date > 13-17 April 2015
Venue > Hannover, Germany
http://www.hannovermesse.de/home

CESI, along with its German subsidiaries FGH and IPH, will participate with a branded booth at the Hannover Messe, confirming the company's strong strategic interest in the European market.
Hannover Messe is the largest international event of its kind, boasting participation from over 6,000 international companies.
CESI professionals will be on hand to discuss issues connected to Test & Certification requirements.

Environment Wardship Roundtable

Date > April 2015
Venue > Rome, Italy
http://www.civita.it/

CESI's Engineering and Environment Division will bring together key decision makers and important professionals from institutions and international companies to share best case histories, discussing environmental stewardship and ways to manage hydrogeological risks.

Shaping a Better Energy Future

CESI is a leading global technical consulting and engineering company with over 50 years experience in several areas including: Transmission and Interconnections, Smart Grids, Power Distribution, Renewables, Testing, Certification and Quality Assurance. CESI also develops and manufactures advanced multi junction photovoltaic solar cells for both space and terrestrial (HCPV) applications.

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