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### Beyond Kyoto

In December, 195 countries from around the world signed the Paris Outcome, the agreement that will substitute The Kyoto Protocol

### Africa's Energy Sector Is Vital

Tina Joemat Pettersson, South Africa's Energy Minister, identifies challenges the continent has to face and opportunities it must take advantage of

### **Connecting For The Future**

The new millennium will be the renewable energy era, but middle eastern countries will remain key protagonists







# CESI Energy Journal

EDITORIAL COORDINATION CESI - Paolo Chighine Allea - Communication and Public Affairs

> EDITORIAL STAFF Agnese Bertello

CONTRIBUTORS

Gianluca Marini Domenico Villani

> TRANSLATIONS Aaron Maines

ART DIRECTION alleadesign - Gianluca Barbero

EJ – ENERGY JOURNAL CESI'S HOUSE ORGAN

Via Rubattino, 54 I-20134 Milan – Italy info@cesi.it www.cesi.it



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CESI is turning 60, a significant milestone. The company's history has developed around a much larger narrative – that of Italy itself – which today is set within an even grander story: that of the world at large.

We can read these stories in parallel; each influences the other. We know, and we can still see today when dealing with development in emerging countries, just how fundamental the energy sector is for growth in a given territory; how closely quality of life depends on the opportunity to enjoy access to safe, reliable, constant sources of energy.

For all of this, CESI's story is interwoven thread by thread with

Italian industrial development as a whole.

Six decades ago the need for a major research laboratory in the electric energy sector drove companies like Pirelli, Falck, Edison and Ansaldo to create an international laboratory. That's how, in the 1950s, the "X Laboratory" was brought to life, an institution that would later become CESI.

With the creation of ENEL, which became CESI's majority shareholder in 1964, this company's history opened another key chapter in its story. The following years were dense with change. Technology took remarkable strides forward. During the 1970s CESI launched

a project entitled the "1,000 kv's Project": a fundamental step forward in the history of research for the electric energy industry in Italy and the world at large. The 1990s saw the start of the grand renewable energy adventure, the challenge has become *development of innovative energy* accumulation systems applied to solar and wind technologies. This is precisely where CESI created its first projects in the sector. With the advent of the new century, CESI grew through the acquisition of other laboratories and companies (ISMES), expanding the reach of its research, production and services. HVDC became the new network technology, and CESI geared up to tackle this new market with the instruments, tools and skills it needed, picking up new laboratories for tests on high-, medium- and low-voltage electrical components, buying the dIPH laboratories in Berlin and the FGH GmbH laboratories in Mannheim in 2005. The world in which CESI was born – 1950s Italy, the Italian economic miracle, the rise of mass Shaping a Better Energy Future

production – no longer exists. It's now lightyears away: to us those years now appear crystalized in memory, comforting in their rigidity and slowness. Because from that moment forward, the world has only picked up speed, and the pace of change has continued to increase. Can we still recognize ourselves? At CESI, we can. We still see the original substance of our company, despite the changes that have affected and rippled through it. In fact, perhaps it was precisely these changes that highlighted our true talent: the ability to interpret change; to support and guide it. Given that this trend toward acceleration continues to rise, that complexity continues to increase, what can we say about the future? What other limits will we be called on to overcome? In this new issue of EJ, we take a closer look at revolutions that are already taking place and in which networks and renewables play the role of protagonist. In Paris, during COP21, mankind already determined that the transition to a decarbonized era can be pushed back no longer, as 188 countries

signed accords for the reduction of climate-changing emissions. Today generation and transmission technologies already enable us to best take advantage of the potential of renewable energies, transporting the electric energy they produce thousands of kilometers away in a quick, efficient manner. It is thanks to technologies developed in this sphere that today, for example, countries in the Middle East are setting up interconnection projects not only between different Gulf countries (already wellstructured from this point of view), but with Asia and Africa as well. The scenario in Latin America is in constant evolution. Chile recently approved a new energy policy, "Energia 2050," that aims first and foremost to provide complete energy coverage with 70% coming from renewable energy sources. This is a challenging, but achievable

years

commitment, considering that the number of sun hours and total sunlight that reaches the country is superior to that of the Saharan desert. Renewable energy growth in Chile is also of vital importance to support local mining industries, which are highly energy-intensive and account for 51% of Chile's total exports.

Colombia, where a new historical period of peace and political stability appears to have set in, is seeing extremely strong growth in energy demand, and is currently betting on hydroelectric sources to satisfy it. South Africa, as the South African Minister of Energy recently stated during SAIREC, intends to leave no link in the chain behind, continuing to pay close attention to development dynamics in play across the African continent.

Who would have thought all this was possible, just sixty years ago?

THE COMPANY'S HISTORY HAS DEVELOPED AROUND A MUCH LARGER NARRATIVE - THAT OF ITALY ITSELF - WHICH TODAY IS SET WITHIN AN EVEN GRANDER STORY: THAT OF THE WORLD AT LARGE



# Beyond Kyoto

### **Agnese Bertello**

ACCORDING TO EXPERTS THE PARIS OUTCOME, THE TREATY SIGNED IN PARIS THAT SUBSTITUTES THE KYOTO PROTOCOL, IS A "MIRACLE" EVEN IF "STILL MORE NEEDS TO BE DONE." NO ONE WAS EXPECTING TO ACHIEVE SUCH AN IMPORTANT ACCORD, BUT EVEN THIS CRUCIAL STEP DOES NOT MARK THE END OF THE ROAD. NOW IT'S UP TO INDIVIDUAL COUNTRIES TO ENACT CONCRETE POLICIES THAT TRANSLATE WHAT IS A SIGNIFICANT AMBITION INTO CONCRETE RESULTS.

The treaty signed in Paris is nothing short of an historic accord. Coming in the wake of numerous conferences that accomplished nothing more than to push any clear stance by governments back further, Paris brought a long-awaited concrete step. It was hailed as such not only by governments that signed the treaty and the media who celebrated the accomplishment, but also by the scientific community. Even the IPCC (International Panel for Climate Change), the organization that first brought the issue of climate change to the attention of the general public and governments, climatologists and scientists all over the world, has agreed that this treaty represents a fundamental turning point, even as its members underlined the areas where it still comes up short. "This Paris Outcome is going to change the world," stated Christopher B. Field, a leading American climate scientist and Co-Chair of Working Group II of the IPCC, in an interview with The New York Times. "We didn't solve the problem, but we laid the foundation."

This result can undoubtedly be attributed to French diplomacy and the extenuating efforts made over months leading up to the few, brief, tumultuous days of COP 21. But it can also be explained with a profound change in sensibilities and awareness in public opinion on these issues. This last element has undoubtedly been influenced by the global intensification of climate events with dramatic consequences, both directly and indirectly connected with global warming.

In the heart of the French capital, on 12 December 2015, after a night of intense lastminute talks, 195 countries from around the world signed the Paris Outcome. "It is a just, sustainable, dynamic, balanced and legallybinding accord," stated France's Foreign Minister, Laurent Fabius, as it put the Kyoto Protocol definitively to rest and opened up a path to policies aimed at establishing new, more concrete and more widely-adopted policies to adapt to and mitigate climate change.

### "THIS PARIS OUTCOME IS GOING TO CHANGE THE WORLD," STATED CHRISTOPHER B. FIELD, A LEADING AMERICAN CLIMATE SCIENTIST, "WE DIDN'T SOLVE THE PROBLEM, BUT WE LAID THE FOUNDATION

### Key points in the treaty

One of the main reasons the accord was a success was the creation of a High Ambition Coalition: a large negotiating commission – composed of more than 100 countries, including "major emissions" countries like the

US, European Union, Canada and Australia, as well as emerging countries like Brazil and developing countries – that can strongly defend the integrity of the accord and drive it in the right direction. Input from scientists has always been clear and unanimous, identifying 2° Celsius as the maximum limit for temperature increase the planet is capable of sustaining with respect to the pre-industrial era. The Paris Outcome, on the other hand, indicates the commitment of governments to enact policies that contain the increase in temperature below this indicator, potentially lowering it to as much as 1.5° C., a target that the scientific community agrees will give the world greater guarantees for the survival of threatened island nations. The question remains: how will we get there?

### IN THE WAKE OF PARIS, NO FEWER THAN 188 COUNTRIES, WHICH ACCOUNT FOR 98% OF ALL GLOBAL EMISSIONS, HAVE TAKEN A STAND ON THE ISSUE

In order to make sure the highest number of countries agreed on the substance of the accord, it was extremely important to elaborate a model that would set shared responsibilities, while at the same time differentiating between the contributions each individual country is required to make with respect to the accumulation of greenhouse gases, from the industrial revolution through the present day. Already in the months leading up to the event, some were moving in the direction of identifying, though an autonomous, "bottom up" approach, selected as a free choice of individual countries, a series of nationallydetermined conditions (officially recognized as INDCs, or Intended Nationally Determined Conditions), through which each country established the means by which it would intervene to reduce CO<sub>2</sub> emissions produced domestically, setting specific targets. INDCs, in fact, can include quantitative objectives for 2030 – identifying a target annual reduction percentage (the parameter adopted by most developed countries), or a reduction in the intensity of GDP emissions (China, India), establishing quantitative objectives - or nonquantitative objectives, through the definition of specific policies and instruments – for each industrial sector.

This inherent flexibility made the protocol attractive, favoring involvement from most countries and a willingness to put everything it was in their power to provide out on the table: today, in the wake of Paris, no fewer than 188 countries, which account for 98% of all global emissions, have taken a stand on the issue, declaring national objectives and the tools they'll use to achieve them. It is a great leap forward, especially when considering that in 2013 no more than 35 countries adopted the Kyoto protocol, representing a mere 12% of all global emissions.

The INDCs must be reviewed and recalibrated every five years, taking into consideration the general evolution with respect to the proven effectiveness of emissions reduction and internal changes taking place in each individual





country. As far as this aspect is concerned, the countries have already shared and adopted minimum requirements for transparency in reporting and controls. Developing countries have always had a number of reservations concerning this theme, and in order to appease them it was necessary to add another key element to the talks: support and cooperation from the international community, in particular through technological cooperation efforts, as well as transferring technologies designed to mitigate the effects of climate change.

The accord allows developed countries to continue to supply an increasing amount of financial support to developing countries through a range of different financial instruments. The quota for financial aid established in Copenhagen – 100 billion USD per year through 2020 – was confirmed, and will have to be further redefined starting in 2025.

### The consequences of energy choices

The Paris Outcome prefigures a rapid decarbonization of societies around the world. In order to limit the rise in average global temperature to  $1.5^{\circ}$  C., the reduction of CO<sub>2</sub> gases will have to be quick and significant, and

can only be achieved through extremely clear, determinate and effective policies.

"One thing is clear is that in order to even aspire to 1.5° C. you need not only rapid decarbonization of the global economy by the middle of century, but you probably have to remove some carbon from the atmosphere, in particular afforestation on degraded lands, which is a win/win option anyway," stated Hans Joachim Schellnhuber, founding Director of the Potsdam Institute for Climate Impact Research and Chair of the German Advisory Council on Global Change, in an interview published in The Guardian.

THE PARIS OUTCOME PREFIGURES A RAPID DECARBONIZATION OF SOCIETIES AROUND THE WORLD. IN ORDER TO LIMIT THE RISE IN AVERAGE GLOBAL TEMPERATURE TO 1.5° C., THE REDUCTION OF  $CO_2$  GASES WILL HAVE TO BE QUICK AND SIGNIFICANT

Each individual country will need to translate this determination and these objectives into concrete choices that affect energy, production and infrastructure directly, and which are capable of truly jumpstarting the energy revolution called for in the Paris Outcome.

# Africa's Energy Sector Is Vital

### Tina Joemat Pettersson, Energy Ministry of South Africa Declaration at South African International Renewable Energy Conference

IN OCTOBER 2015 IN CAPE TOWN, MINISTERS AND GOVERNMENT REPRESENTATIVES FROM 82 COUNTRIES PARTICIPATED IN THE SOUTH AFRICAN INTERNATIONAL RENEWABLE ENERGY CONFERENCE WITH THE AIM OF UPSCALING AND MAINSTREAMING RENEWABLE ENERGY IN ORDER TO ACHIEVE A GLOBAL SUSTAINABLE ENERGY TRANSITION. TINA JOEMAT PETTERSSON, ENERGY MINISTRY OF SOUTH AFRICA, CLOSED THE EVENT WITH A SPEECH THAT IDENTIFIED CHALLENGES THE CONTINENT HAS TO FACE AND OPPORTUNITIES IT MUST TAKE ADVANTAGE OF.



The African continent has to face a myriad of challenges ranging from high levels of poverty and inequality, a lack of infrastructure, poor governance, relatively low skill levels and productivity at a time when energy is necessary to alleviate poverty and promote sustainable economic growth in the continent.

Many of these factors contribute to a business environment that people often consider difficult and costly to operate in. In sub-Saharan Africa, the epicenter of the global challenge is to overcome energy poverty. However I must say these challenges are surmountable and the benefits would be immense. Energy contributes to a better quality of life. To those who have it, modern energy unlocks access to improved healthcare, improved education, improved economic opportunities and even longer life. To those who don't, lack of modern energy is a major constraint on social and economic development. Africa's energy sector is vital to its development.

We must look at the whole renewable energy value chain, focusing on African continental interconnectivity, regulatory framework, technological innovation and financing mechanisms in an effort to unlock all the barriers and maximize the opportunities that come by harnessing natural resources that the world, and Africa in particular, is endowed with. The effective development of Africa's energy resources could unlock huge gains across the economy. But key questions remain. How quickly can modern energy be brought to the huge population currently deprived of it? How can existing and emerging wealthy countries maximize the value of their resources? What actions in the energy sector would unleash stronger economic and social

development in the African continent?

In order to meet the greenhouse gas reduction objectives and mitigate global warming, governments need to actively pursue low-carbon policies. Renewable energy has a major role to play in the energy mix during our respective journeys to lower carbon paths.

### WE MUST LOOK AT THE WHOLE RENEWABLE ENERGY VALUE CHAIN, FOCUSING ON AFRICAN CONTINENTAL INTERCONNECTIVITY, REGULATORY FRAMEWORK, TECHNOLOGICAL INNOVATION AND FINANCING MECHANISMS

We are following in the footsteps of Germany, China, USA, India and the United Arab Emirates. We are proud to be counted among those who have hosted the largest conference on renewable energy in the world. This has been a significant event – the first of its kind on African soil – and comes at a crucial time, when energy is a necessity to alleviate poverty and fast-track sustainable development in a climate-resilient manner. In South Africa, energy is a basic need.

We are committed to providing a long term solution to energy security across the continent, a continent where energy supply is limited. The renewable energy sector provides an opportunity to stimulate new local industries, new opportunities and empower people through direct and shared ownership with communities, while the renewable energy sector is developed from a local perspective.

South Africa is committed to greening its economy, shifting away from a heavy reliance on fossil fuels and a resource extraction

# Ms Joemat-Pettersson is the Minister of Energy of the Republic of South Africa.

She has been a member of the African National Congress (ANC) National Executive Committee (NEC) since December 2007. She holds a BA degree in Executive Management in Education from the University of Cape Town; a BA degree in English and History from the University of the Western Cape (UWC); and a Higher Diploma in Education from the UWC.

In 1992, In 1994, she became a member of the Northern Cape Provincial Legislature; and between 1994 and 1999, she was a member of the Executive Council for Education, Arts and Culture in the Northern Cape. In 2001, Ms Joemat-Pettersson was a trustee of the Desmond Tutu Diversity Trust; and from 2001 to 2004, she was chairperson of the Birch Education Trust; in 2003, she was a member of the Executive Council for Education; Chairperson of the Northern Cape Province Rehabilitation Trust in 2004; and she was chairperson of the ANC Financial Committee. Ms Joemat-Pettersson also served as chairperson of the Land Reform Coordinating Committee; chairperson of the ANC Economic Transformation Committee; trustee of Mosiuoa Lekota Children's Fund in 2005, and acting president of the Association of University English Teachers in South Africa. She was the Minister of Agriculture, Forestry and Fisheries of the Republic of South Africa from 11 May 2009 to 25 May 2014.



economy. Renewable energy offers a major opportunity to further develop our country into the lower-carbon and climate-resilient vision we set out in our National Development Plan. It has the potential to stimulate job creation, skill development and a broader local economy, as well as make a positive contribution to our national energy mix.

### THE SAIREC DECLARATION HAS BEEN ADOPTED, AND IT SHOULD BE EMBEDDED INTO THE COMMITMENTS MADE BY ALL AFRICAN COUNTRIES

As a country, we are working hard to make our development pathway more sustainable, and renewable energy is significant in the country's transition to a lower carbon economy and society. The Council for Scientific and Industrial Research has estimated our grid tied renewables make a R800 million net benefit contribution to the economy. In the first half of 2015, renewables were estimated to generate R4 billion in financial benefits.

Other renewable energy sources that we also need to take advantage of include:

- Landfill gas: South Africa has become a leader in this sector, and is currently looking to scale up its efforts.
- Anaerobic digestion to produce biogas: this is a young sector that has attracted a lot of interest for the role it plays in reducing organic waste disposed in landfills and reduces methane emissions from water treatment facilities.

We will certainly step up our efforts in entrenching the renewable energy paradigm. Early signs of this can be seen in our announcement of the establishment of a 1500 Megawatt solar park in the Northern Cape. Our work outlined in the Renewable Energy Status Report tells an emphatic account of the interventions made with respect to our policy trajectory, existing renewable energy landscape and the future we aspire for.

We are happy that the SAIREC Declaration has been adopted, and I challenge everyone to ensure that this declaration doesn't become the subject of a talk show: it should be embedded into the commitments made by all African countries.

### | SAIREC Declaration |

### SAIREC Declaration's Key Element

### 1.

We note that to make universal access a reality by 2030, 1.3 billion people – 621 million of which in the Sub-Saharan region - should be given access to electricity. The scale of the challenge requires that all approaches, including grid and off-grid solutions, are taken into account and adopted based on national appropriateness and efficiency principles. Rural and urban demands can best be met with a diverse technology mix that takes full advantage of sub-Saharan Africa's exceptional and sustainable solar. wind. geothermal, biomass and hydropower resources.

### 2.

We acknowledge the dynamic development that renewable energy has seen over the last years. Due to the rapid cost reduction of solar and wind energy in particular, in some markets renewable technologies have become the technology of choice.

### 3.

Africa is richly endowed with renewable energy resources. Nevertheless, the continent overall still faces the highest energy poverty in the world. With the support of financing, technology and institutional capacity building from developed countries and the private sector, Africa will be able to greatly social and environmental development using a diversity of renewable energy sources.

### **4**. Skills transfer and

development: In order to realize Africa's potential as a technological and industrial hub, it is imperative, with the help of regional resource assessment projects, to develop the necessary <u>skill b</u>ase to facilitate technology transfer, and to ensure that technologies are needsdriven and appropriate for local conditions including undertaking regional resource assessment projects.

### **5.** Research and

Development: We reaffirm the importance of investments in research, development and deployment (RD&D) and of international cooperation in RD&D for more cost-effective and advanced energy technologies.

### 6.

Regulatory Frameworks: Costs for renewable energy have already decreased significantly, yet sustainable energy will only become available to all if we continue to scale up both grid-connected and offgrid renewable energy deployment, setting in motion a virtuous cycle of cost-reduction followed by even more significant scaling up.

### 7.

We emphasize the role that a decentralized energy supply plays in the global energy transition, especially on the African continent. Off-grid and mini-grid systems, as well as hybrid systems for transition periods, play a crucial role in enabling access to energy through renewables in rural areas.

### 8.

Integrated planning: The energy sector does not operate in isolation; infrastructures such as power lines, pipelines, water and transport are interdependent. Integrated planning is critical to the sustainability and further development of our economies and societies.

### 9.

We urge an additional effort to promote sustainable cooking, which concentrates on the deployment of new, sustainable and efficient technologies for the supply of energy for cooking in rural Africa such as adapted biogas installations, improved cook stoves in combination with solar energy, new efficient technologies for charcoal production, programs for reforestation and sustainable forest management.

### 10.

Regional trade and energy resource development: We encourage enhanced support from development partners for scaling up regional energy trade and developing clean and renewable energy resources. We note the urgency to support regional strategies and complete key regional transformational projects that will secure sustainable, efficient and affordable energy supplies based on economies of scale and diversification of the energy mix at the power pool level and other associated structures.



# **Connecting for the Future**

### Gianluca Marini, Director Consulting, Solutions & Services Division CESI

THE NEW MILLENNIUM SEEMED DESTINED TO BE THE RENEWABLE ENERGY ERA, BUT NOT ALL THE TENETS OF THIS EPOCHAL REVOLUTION ARE DESTINED TO CHANGE: THE CENTRALITY OF MIDDLE EASTERN COUNTRIES IN ENERGY GEOPOLITICS, FOR EXAMPLE, WILL MOST LIKELY REMAIN THE SAME. THIS THANKS TO THE DETERMINATION WITH WHICH THESE COUNTRIES ARE CONDUCTING AN ENERGY TRANSITION, A "REVOLUTION" THAT APPEARS UNPRECEDENTED IN ITS REACH AND CHARACTERISTICS. THE GOVERNMENTS OF MIDDLE EASTERN COUNTRIES HAVE EXHIBITED FARSIGHTEDNESS AND A WILLINGNESS TO TAKE RISKS RATHER THAN "REST ON THEIR LAURELS," PROFOUNDLY CHANGING THE WAY THEY PRODUCE, DISTRIBUTE AND CONSUME ENERGY.

> From Saudi Arabia to Qatar, different countries in the Middle East are adopting ambitious policies designed to develop energy production from renewable sources. From a European point of view, their targets and road maps are more than challenging. Qatar, it is worth remembering, possesses 15% of all global natural gas reserves, registering a production capacity of 159 billion cubic meters per year (125 million of which are destined for export).

BETTING ON RENEWABLES MEANS NOT ONLY CREATING LARGE FACILITIES FOR CENTRALIZED POWER PRODUCTION, BUT ALSO FAVORING THE DEVELOPMENT OF DISTRIBUTED GENERATION: A 360-DEGREE STRATEGIC APPROACH THAT LEAVES NO SINGLE TECHNOLOGICAL OPPORTUNITY BEHIND

> By 2030 Qatar intends to achieve an electric energy production rate from RES equal to 20% (1,800 MW of installed RES capacity). Saudi Arabia, a country that produces 10 million barrels of oil a day and is the second-largest oil producer in the world, has set even more ambitious energy goals for the same date: 54 GW, subdivided between thermodynamic solar (25 GW), photovoltaic solar (16 GW) wind power (9 GW) waste-to-energy (3 GW), geothermal (1 GW) and nuclear (17 GW). This

is an enormous leap forward, especially when considering that today most of the country's electric energy (43%) is produced using natural gas. These numbers are a mirage for any other country in the world.

Betting on renewables means not only creating large facilities for centralized power production, but also favoring the development of distributed generation. The numbers for distributed generation are undoubtedly less admirable, but the presence of these kinds of projects indicates a 360-degree strategic approach that leaves no single technological opportunity behind in the effort to capture and make available the enormous energy potential available.

The generation of renewables will feed internal consumption, which continue to grow, in particular in the residential sector, substituting energy production from natural gas in part. Here it's important to mention another sphere of innovation: the introduction of digital meters. Electronic meters are an important piece of the puzzle within this scenario, the principal element necessary for optimizing networks as well as an tool for actively managing energy consumption and rendering it more efficient. At the same time, smart meters can be considered a prelude to the age of home automation.



Tomorrow's efficient smart grid cannot help but start from smart meters, and the Middle Eastern market is capable of growing to an important size if we consider that the need for digital meters in that area stands somewhere between 10 and 15 million units.

# Infrastructures and interconnections that extend beyond the domestic market

A regional approach that extends beyond national borders and barriers is the best way to take advantage of the potential of renewables. In Europe Entso-e, the 2014 ten-year national development plan, calls for investments of 150 billion euro in cross border transmission projects by 2030. In Middle Eastern countries,

### TOMORROW'S EFFICIENT SMART GRID CANNOT HELP BUT START FROM SMART METERS. THE NEED FOR DIGITAL METERS IN THE AREA STANDS SOMEWHERE BETWEEN 10 AND 15 MILLION UNITS

the situation is favorable from this point of view: Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates and Oman are already interconnected via an energy network "backbone" capable of transmitting between 600 and 1,200 MW, although clearly any significant growth such as that hypothesized by the various countries' different strategic plans will require this interconnection to be further strengthened and rendered more efficient.



But the growth trends for the long term don't stop here. The objective is not merely to reinforce interconnection between Middle Eastern countries, but to extend them into other areas, opening up possible interconnections between Asia, North Africa and even the European Union.

### THE OBJECTIVE IS TO REINFORCE INTERCONNECTION BETWEEN MIDDLE EASTERN COUNTRIES, BUT ALSO TO EXTEND THEM INTO OTHER AREAS, OPENING UP POSSIBLE INTERCONNECTIONS BETWEEN ASIA, NORTH AFRICA AND EVEN THE EUROPEAN UNION

What we mentioned earlier is much more than a simple hypothesis: feasibility studies have already been conducted for some interconnection projects. For example, a study commissioned

from CESI in 2014 evaluated the possibility of establishing an interconnection network between Iraq, Jordan and Egypt. Already in 2008, CESI presented a feasibility study for a possible HVDC interconnection network between Egypt and Saudi Arabia. Opening an energy corridor between these two countries might also provide an opportunity to extend the network to Europe and Turkey as well. Looking further east there are possible connections with Pakistan, a country that is currently suffering from dramatic energy needs, and the GCCIA is actively involved with a preliminary study to this effect.

Today's technological innovations make taking best advantage of the potential of renewables wherever they're found, and transferring the sustainable energy they produce through a network of efficient, secure interconnections to where consumption is concentrated (generally far from energy production sites) look like a winning strategy. Similar regional interconnection projects are being developed and built in other parts of the world as well: for example, a similar project will develop connections between Israel, Cyprus, Crete and Greece. From there, connecting Italy, and through it other countries in Europe, will become a simple affair.

# Benefitting from (other people's) experience

Initiated roughly fifteen years ahead of schedule (at least as far as network development is concerned), and five to seven years ahead of RES penetration, today European countries and Italy in particular are capable of providing concrete expertise not only from a technological point of view, but at the level of energy policy, strategic planning and market regulations as well. Not by chance governments, authorities and research agencies across the Middle East are sifting through different European consulting companies to find the most reliable partners for their energy projects.

Europe's experience has taught us that an intense, rapid development must necessarily be augmented by equally aggressive development of the regulatory framework: all these aspects need to move forward together in a coherent, harmonic and integrated manner. Otherwise, these efforts risk losing steam and falling short of their objectives. The Italian case is a perfect example: rapid, intense development of RES penetration (which reached 40% of installed capacity in just a few years) took place during a phase in which the network was not yet ready to support it, and in Southern Italy this led to waste of roughly 11% of overall wind power production.

Concerning the penetration of renewables and the status of networks, plans and projects are currently proceeding at a noteworthy clip, while the market framework remains less well-defined. The expansion that this strategy delineates presupposes the creation of a new energy market, in which the rules for cross-border trading are harmonized between the different member countries. This problem is particularly acute when it comes to structured environments like the European market, which relies on the Emission Trading Scheme (ETS) mechanism. CESI has also addressed this issue, responding to a request from the League of Arabian States and putting forward a proposal for the realization of a cross-border trading scheme comparable to that which already exists in Europe.

EUROPEAN COUNTRIES AND ITALY IN PARTICULAR ARE CAPABLE OF PROVIDING CONCRETE EXPERTISE NOT ONLY FROM A TECHNOLOGICAL POINT OF VIEW, BUT AT THE LEVEL OF ENERGY POLICY, STRATEGIC PLANNING AND MARKET REGULATIONS AS WELL

It appears clear that we need a reform project that will progressively reduce the domestic economic aid packages currently weighing on the price of energy, promoting greater transparency about the costs of energy generation.

2030 is much closer than it seems: given the determination with which Middle Eastern countries are moving, it is becoming clear they will achieve their targets. In the meantime, we may well get an early "taste" of what the world will be in for in 2020, when the next World Expo opens in Dubai. Today, the theme of Dubai's event amounts to a tantalizing promise: "Connecting Minds, Creating the Future."



### | INDUSTRIES & COUNTRIES |

# Surfing and Sunbathing for Terawatts

### **Agnese Bertello**

CHILE DOESN'T BELIEVE IN HALF-MEASURES. THE COUNTRY'S NEW ENERGY STRATEGY FOR 2050 IS BETTING HEAVILY ON RENEWABLES AND ENERGY EFFICIENCY. SUN AND SEA MAY WELL PROVIDE THE MOST IMPORTANT SUPPORT FOR REDUCING COSTS IN AN AREA THAT IS VITAL FOR THE COUNTRY'S ECONOMY: EXTRACTION MINING. THIS KIND OF MINING CONSUMES A GREAT DEAL OF ENERGY, AND RENEWABLES WOULD REDUCE ITS ENVIRONMENTAL IMPACT.



A strip of land stretching for 4,300 kilometers and no more than 200 kilometers wide, with the Andes mountain chain behind and the Pacific Ocean stretching out in front... Chile's natural landscape is among the most original in the world, and is the country's fortune, providing a vast range of natural elements. Minerals beneath the earth's surface have fueled the wealth that this country has relied on for years as the main source of its economic strength: roughly one-third of Chile's GDP is linked to mining. Copper is Chile's primary breadwinner, given that the country can boast roughly 28% of the world's copper reserves, but the country also has large reserves of iron, manganese, lead, zinc, gold, silver and lithium, as well as numerous other rare minerals.

Today however, in addition to underground riches, Chile's fortunes for the future are connected to two particular "open-air mines": sea and sun. The country can boast an exceptional energy potential; just consider that in the span of one year, Chile receives up to 2,380 hours of sunlight, with a sun ray percentage superior to that of the Saharan desert. This permits Chile to embark on a new energy strategy and leave decades of expensive dependence on oil imports behind.

During the first months of 2016, Chile presented a new national energy strategy document – Energia 2050 – designed to lead the country toward a green future in which energy production is based primarily on renewable energy sources. The document identifies the energy sector as the country's main engine for development, underlining the centrality of themes like safety and reliability of supply, respect for the environment and the reduction of environmental impact, energy efficiency and educating consumers. Safe, accessible, inexpensive and green: these are the characteristics that will necessarily distinguish Chile's future energy production. According to the Chilean President Michelet, Chile "is a mature country, now capable of tackling major challenges. We've set a series of ambitious objectives, which is precisely what we wanted, unless we decide to ignore our current responsibilities. Therefore we need to get to work starting now."

The outlook is positive, not only given the enormous energy potential at Chile's disposition, but also because Energia 2050 was crafted within an atmosphere of convergence and sharing: elaboration of the final draft of the document took place over 18 months through a series of innovative modalities that involved both stakeholders and private citizens, articulating a multiplicity of moments for debate that allowed those involved to discuss and analyze measures, needs, critiques, studies and technical research conducted by experts.

### TODAY HOWEVER, IN ADDITION TO UNDERGROUND RICHES, CHILE'S FORTUNES FOR THE FUTURE ARE CONNECTED TO TWO PARTICULAR "OPEN-AIR MINES": SEA AND SUN

### What are the objectives?

In order to understand the extent of the change the document will bring, it's important to share some key contemporary data. Chile's energy is based primarily on oil (32.9%), most of which is imported (95%). Oil is followed by coal (24.4%), biomass (23.7%) and hydroelectric power (6.4%). Today, renewable energy sources account for less than 1% of Chile's energy consumption. In 2014, electric energy production was primarily thermal (41% coal, 11% gas), and only subsequently hydroelectric (34%).

Starting from this base line, Energia 2050 calls for the country to achieve, over the course of the next thirty years, a quota of electric energy produced from renewable energy sources of no less than 70% of total consumption.

The sources will mix solar, as well as wind, geothermal and well-established hydroelectric facilities, while at the same time guaranteeing 100% of the population continuous, highquality supply and service. In other words, access must not only be universal, but safe and economical as well. The energy strategy sets the maximum threshold for interruption of service allowed

in any one given area of the country at maximum one hour per year. Chile also intends to keep energy costs contained, relying on connections between the first three countries in the OECD area, resulting in a lower end cost for electric energy.



From an environmental point of view, the document calls for full respect of the international COP21 accords, as well as capping CO<sub>2</sub> emissions.

### CHILE SET UP UNDOUBTEDLY CHALLENGING COMMITMENTS THAT CAN ONLY BE ACHIEVED IN A GRADUAL, PROGRESSIVE MANNER

The document addresses the theme of energy efficiency head-on. One of the document's main objectives is the realization of new, energy-efficient buildings equipped with intelligent energy control and management systems, as well as plans to bring only devices and home appliances that can boast high efficiency standards to market. These are undoubtedly challenging commitments that can only be achieved in a gradual, progressive manner, and there is room to rework the actions designed to help achieve them along the way. One important intermediary step is set for 2035, the year by which other specific objectives will have to be met. The overall contribution of renewables to the country's electric power generation, for example, will have to have increased to 60%, while utilities will have to be able to guarantee a maximum limit for service interruption of no more than four hours per year. The general strategy sets a number of other high-value targets for 2035 as well, for example completion of SINEA, the Andean electric energy interconnection system, which will create a network between Andean countries (Chile, Peru, Bolivia, Colombia and

Ecuador). It sets the target that 100% of all public transportation vehicles must respect established energy efficiency criteria; and 100% of all "energy intensive" industries – for example the mining sector, vital for the Chilean economy – must adopt efficient energy consumption management strategies.

### Solar for mines

When it comes to reducing energy consumption in industrial production environments, development and renewable energy sources are moving in concert. One of the country's most interesting new developments concerns the use of solar energy to power mining activities. Chile is currently developing off-grid photovoltaic energy parks in order to power mining activities located in remote areas of the country, significantly reducing extraction costs. This project is joined by two others that combine energy storage solutions for projects that wed different hybrid energy production sources, for example solar and diesel.

Cochilco, Chile's national commission for the mining sector, estimates that energy represents more than 8% of the sector's operating costs. According to an official document presented in January 2016 at the Adolfo Ibanez University, energy demand in the mining sector will grow by an additional 53.3% by 2026. According to estimates, energy consumption for copper extraction activities in Chilean mines will reach 34.1 terawatts per hour. In order to meet this level of demand, Chile's electric energy production capacity will have to rise to 1.717 MW by the end of this year.

### More than simply sunlight...

While solar energy has now become a consolidated technology, and taking advantage of the sun's energy power has become a certainty, today Chile is taking the lead towards another, more experimental and innovative area: sea energy. According to a study conducted by Banco Interamericano on the development of marine energy resources available along the country's Pacific Ocean coastline, wave power offers an energy potential of roughly 160 GW; nearly ten times the installed electric capacity. Marine energy is the youngest technology among different renewable sources, and the attention the sector is attracting at a global level is considerable, but for the moment the most important step is to conduct research and run experimental projects designed to perfect marine energy technology.

### ENERGY DEMAND IN THE MINING SECTOR WILL GROW BY AN ADDITIONAL 53.3% BY 2026. ENERGY CONSUMPTION FOR COPPER EXTRACTION ACTIVITIES IN CHILEAN MINES WILL REACH 34.1 TERAWATTS PER HOUR

Chile has taken the lead in this race to clean aqua-energy through the creation of MERIC, a Marine Energy Research and Innovation institute, as well as through collaboration with international, primarily European partners (like Enel Green Power). Energia 2050 may be ambitious, extensive and farreaching, but there's no guarantee it will have to be rewritten, unless the country decides to include even more challenging objectives as it bets everything on a wealth of sun and sea!

![](_page_20_Picture_9.jpeg)

### | FACE TO FACE |

# An Absolutely Promising Country

An interview with Bruno Riga, Generation Manager and Director, EMGESA, and Domenico Andreis, Engineering & Environment - ISMES Division Director, CESI

TODAY, COLOMBIA IS REGISTERING IMPRESSIVE GROWTH RATES. CURRENT ESTIMATES CALL FOR A ROUGHLY 50% INCREASE FOR ELECTRIC ENERGY BY 2028. THEREFORE, IN SPITE OF ITS COMPLECATED CONTEXT, COLOMBIA IS AN INCREASINGLY INTERESTING MARKET BOTH FOR ENERGY PRODUCERS AND FOR COMPANIES THAT SUPPORT THE ENERGY BUSINESS.

Bruno Riga

Domenico Andreis

![](_page_21_Picture_6.jpeg)

What are the new challenges in terms of development and business in South America, and what kind of structural and organizational approach is required in order to deal with them effectively?

### **Bruno Riga**

EMGESA is a Colombian company that was established in 1997 and is dedicated to energy production and sales in non-regulated markets. The company is part of the Enel Group through Enersis.

Colombia is a country that can boast the highest potential for development in South America; completion of peace accords with Colombia's armed revolutionaries (the FARC) will bring stability and security, attracting additional foreign investments.

Trends show the demand for electric energy is rising. Current estimates call for a roughly 50% increase by 2028, and the Colombian government has detailed a transmission infrastructure investment plan for the period from 2013 to 2027 worth over two billion USD. Simply put, Colombia is an increasingly interesting market both for energy producers like us, and for companies like CESI that support the energy business. In Colombia, energy supply is based primarily on hydroelectric sources, therefore the priority is guaranteeing reliable, constant energy production. Another important issue is sustainability: the country's energy development plan, though still not formally adopted, calls for empowering production while maintaining a high level of sustainability. For EMGESA, environmental and social responsibility remain paramount, far more than simple footnotes for good business. They are central themes in the company's "mission." EMGESA intends to play a proactive role as an authoritative interlocutor working alongside government institutions in order to handle sustainability issues in an integrated, systematic manner.

By joining the Enel Group, EMGESA has taken an opportunity to take advantage of experience the company has matured alongside its historical partners like CESI in Italy, Spain and the rest of Europe, where countries have had more time and opportunity to address these themes.

![](_page_22_Picture_0.jpeg)

#### **Domenico Andreis**

Generally speaking South America, and Colombia in particular, presents extremely complicated contexts, though characterized by impressive growth rates. Consider Chile and Colombia. Chile grew by 5% every year starting in 2010; Colombia registered a growth rate of 4.5% during the same period. Furthermore, in Colombia people are witnessing a progressive stabilization of the country, in particular through peace accords established with the FARC, making the Colombian market that much more appealing for investments. This trend has been underway in electric energy production for several years now, during which period ENDESA purchased Emgesa, and Brookfields purchased ISAGEN Given the increase in demand for electric energy, the Colombian government has enacted an investment plan for transmission infrastructures for the 2013-2017 valued at over 2 billion USD.

### COLOMBIA REGISTERED A GROWTH RATE OF 4.5% IN 2010 AND BECAME ONE OF THE MORE APPEALING MARKET FOR INVESTMENTS

Therefore the outlook is absolutely promising, and forecasts call for an increase in investments, especially in the energy and infrastructure sectors.

Furthermore, I believe that Colombia possesses all the requisites it needs to quickly become an extremely interesting market for companies like ours, dedicated to supporting the business of electric energy producers and companies specialized in infrastructural engineering. CESI can boast an elevated standing in this market, and can easily become a key player for providing appropriate support to those agencies and institutions that choose to invest in these markets.

Colombia is one of the Latin American countries with highest development potential. What positioning have your companies achieved in this country? What are your projects for the future?

**B.R.:** Currently, with a separation of just 200 GWh, EMGESA is the second-largest producer in Colombia, with roughly 21% market share. EMGESA is one of the two big players in the country in terms of electric energy production. Today the company can boast an installed capacity of approximately 3,500 MW, thanks in part to completion of the El Quimbo hydroelectric plant. Its status as a private company but with partially public capital places a double responsibility on EMGESA: in part toward investors; but first and foremost toward the population and territory in which we operate. On the other hand, our multinational size requires us, from the stakeholder's point of view, to act as an entity which, for size and importance, must guarantee the highest standards of development both in terms of production and in terms of social and environmental commitment. It is precisely this awareness of the company's dual role that led us to invest in order to consolidate production through the assessment and improvement of power plants currently in our portfolio. There remain margins for improvement, and we must implement technological solutions that permit us to elevate our production level in terms of both quality and quantity.

![](_page_23_Figure_9.jpeg)

### **EMGESA's Hydroelectric power plants in Colombia** (installed capacity in Mw)

![](_page_24_Picture_1.jpeg)

Our goal is to optimize the environmental management of all production sites (water management, ash and waste management, coal management) that currently present margins for improvement.

There is no lack of growth opportunities, but it will take considerable effort if we are to achieve our objectives.

**D. A.**: Colombia can boast one of the highest development potentials among South American countries, as well as truly interesting future investment rates. CESI, thanks to its expertise and high standing, is in a position to excel in this new market and help its clients along their path to productive growth. The Enel Group in particular, through its subsidiary Emgesa, is currently undertaking important investment plans designed to help it maintain its leadership position in that country's electric energy production market. Emgesa (part of the Enel Group through Enersis) is currently the second-largest electric energy producer in Colombia, with a market share of roughly 21%. Within this environment CESI, leveraging its inherent skill set, intends to provide consulting services and assist its clients in this new challenge, first and foremost in the fields of engineering/hydropower and the environment. Plans enacted by CESI call for establishing a desk at Emgesa's headquarters in Colombia so that the companies can work closely with one

another, and CESI can help its client resolve problems, create synergies and provide added value. Establishment of a permanent desk will make it possible for CESI to develop a deeper understanding of the difficulties inherent to this market, as well as carefully evaluate new market opportunities.

### COLOMBIA IS TAKING AN INNOVATIVE APPROACH TO WEDDING INDUSTRIAL DEVELOPMENT, QUALITY-OF-LIFE AND SUSTAINABILITY

In recent years legal and social sensitivity to environmental themes and their relationship with industry has changed significantly. What impact does this have on a country like Colombia? What differences are encountered there with respect to the European panorama?

**B.R.:** Colombia is undoubtedly one of the most beautiful countries in the world from a naturalistic point of view; over many years an intense focus on the country's mineral resources has modified vast areas of its national territory.

Colombia is an emerging country, one that is taking an innovative approach to wedding industrial development, quality-of-life and sustainability.

![](_page_25_Picture_1.jpeg)

The country's environmental sensibilities are growing rapidly. In December 2015, Colombia attended COP21 in Paris, ultimately identifying four strategic interventions that can be made along the path to creating and consolidating environmental awareness.

### FROM A REGULATORY STANDPOINT, OVER RECENT YEARS THE COLOMBIAN GOVERNMENT HAS BEEN PUSHING HARD TO ADOPT MORE SEVERE ENVIRONMENTAL STANDARDS

The country is committed to creating a fund for peace and sustainable development; to accord for a program designed to slow down deforestation; to the drafting of a protocol that will make it possible to access the funding necessary to manage and oversee its nature parks; and to begin using refrigerators that do not contribute to increasing our planet's temperature (devoid of greenhouse gases).

From a regulatory standpoint, over recent years the Colombian government has been pushing hard to adopt more severe environmental standards, following examples in the US and Europe, in order to verify which best practices it can adopt in keeping with the country's social and economic realities.

The strategic challenge we are facing, as one of the country's most important electric energyproducing realities, is we need to be ready for the probable new operating conditions once Colombia starts applying the regulations and international directives coming from the environmental sphere.

D. A.: In recent years Colombia's national awareness and environmental sensibilities have grown considerably, prompting the country to raise its regulatory standards and, last December, participate in COP21 in Paris. Environmental sensibility is becoming one of the key parameters in the country's sustainable development process, creating opportunities for those environmental consulting companies capable of supplying added value and key support to local energy production entities. Within this framework, CESI can leverage the overall experience it has matured in Italy and Europe, where the company was a precursor in environmental monitoring, environmental modelling and hydrogeological modelling for infrastructures. CESI's experience is available to help other countries align with an avant-garde and innovative legal panorama, paying particular attention to respecting the environment and safeguarding human life.

CESI intends to take advantage of this opportunity, a reality that will allow it to become deeply familiar with those countries where the company can make a positive contribution.

Over the course of their long histories, the Enel Group and CESI have matured leadership levels of experience and are held in high regard, especially when it comes to handling environmental management issues.

The Enel Group and CESI initiated particular collaborative efforts in Latin American countries. Can CESI help support the Enel Group in its efforts to address new challenges in Colombia?

B.R.: During my experiences in Italy, I've had a chance to get to know CESI and the supporting role it plays in both environmental and civil spheres. I'm also aware of the contribution CESI made in Chile for a number of environmental themes that were extremely important for the Bocamina facility. For this reason, I'm convinced that CESI can be a valid partner, not only thanks to the know-how the company can provide, but first and foremost for the professionalism and vast experience of its people. CESI can play an important role in pursuing these objectives – targets we cannot afford to miss – not only in environmental terms (impact studies, monitoring and managing noise, evaluating and managing emissions, optimizing the water treatment process, etc.), but also in technical and engineering spheres (optimizing the use of hydroelectric resources, implementing remote-controlled monitoring systems, reservoir management, etc.).

ENEL BROUGHT ITS ITALIAN AND EUROPEAN EXPERIENCE TO BEAR IN CHILE, COLOMBIA AND THE REST OF THE WORLD THANKS TO A PROGRESSIVE PROCESS OF INTERNATIONALIZATION, AND CAN NOW GUARANTEE HIGH LEVELS OF SAFETY AND INNOVATION IN POWER FACILITIES

D.A.: CESI, as I mentioned earlier, possesses a number of skills that have already been put to good use by the Enel Group in recent years. First and foremost, Enel brought its Italian and European experience to bear in Chile, Colombia and the rest of the world thanks to a progressive process of internationalization, and can now guarantee high levels of safety and innovation in power facilities.

Within this context, CESI can undoubtedly become a technical point-of-reference, as well as a reliable partner for maintaining high operating standings, especially when it comes to issues connected with the environment and civil engineering.

A number of collaboration efforts concerning important themes have already been activated in countries around South America, including Chile and Brazil, and soon a number of support activities will be up and running in Colombia as well.

These activities have made it possible to set up a proactive channel for the local population and public administration, presaging a virtuous circle that will make it possible for energy production companies to become players at once informed about pertinent issues and recognized by all the various stakeholders.

We hope to further increase our collaboration efforts in the area, building ever-stronger ties for new, challenging and innovative projects, integrating CESI's experience and techno-scientific capabilities with local realities purchased by the Enel Group and building a working collaboration for civil and environmental issues. | IDEAS & VISION |

# Easter Eggs and Independent Tests

### Domenico Villani, Director Testing and Certification Division, CESI

RECENTLY, AND SURPRISINGLY, TESTING AND CERTIFICATION THEMES HIT THE HEADLINES. CUSTOMERS EXPECT PRODUCTS TO CONFORM TO SPECIFIC REQUIREMENTS, AS WELL AS TO STANDARD LEVELS AND CODES. PRODUCTS NEED TO BE TESTED BY AN INDEPENDENT LABORATORY THAT IS ABLE TO DETERMINE ITS CHARACTERISTICS BASED ON SHARED STANDARDS AND PRECISE TECHNICAL SPECIFICATIONS. BUT WHICH CHARACTERISTICS SHOULD A REALLY INDEPENDENT LABORATORY GUARANTEE? ETHICAL VALUES PLAY KEY ROLES.

Chocolate is my sweet of choice whenever I need to cheer up. During this time of year I get dazzled by beautifully decorated chocolate Easter eggs.

In computer language, the term "Easter egg" refers to a secret response that occurs as a result of a hidden set of commands. The outcome can vary from a simple, unexpected joke or picture to a serious section of software modifying the nature and value of the expected result. We never like to hear bad news, but a few months back we were all astonished to discover that car makers intentionally programmed diesel engines to activate certain emissions controls only during emissions testing, or about so-called "longlife" light bulbs that don't last anywhere near as long as some producers claim. Articles from European newspapers have revealed a number of cases where products, services and industrial sites with certificates from Technical Inspection Associations, or TÜVs, were clearly not living up to the standards for which they had been certified.

### THROUGHOUT THE WORLD TODAY, CUSTOMERS SEEK REASSURANCE THAT THE PRODUCTS, MATERIALS OR SERVICES THEY PURCHASE MEET THEIR EXPECTATIONS IN TERMS OF PERFORMANCE, SAFETY AND DATA SECURITY

Throughout the world today, customers seek reassurance that the products, materials or services they purchase meet their expectations in terms of performance, safety and data security. Generally, customers expect products to conform to specific requirements, as well as to standard levels and codes. Most of these products are needed in critical sectors. But many are required in our daily lives as well, and deviations in specified performances can seriously and negatively affect our existence. The Transmission and Distribution sector and Energy Industry have to dedicate extensive resources to trying to avoid power supply disruptions. Any interruption to energy supply can have a huge impact on individuals, businesses and communities. Designers, engineers, users and operators of electrical equipment, systems and networks can find reliable support in the standards and testing specifications for the acceptance of electrical power equipment and systems. These are a valid tool for indicating the required tests on newly-installed power systems and apparatuses prior to energizing, in order to ensure that the installation and equipment comply with specifications and intended uses as well as with regulatory and safety requirements. By looking at data of physical testing and certification collected over years, we calculated that the test failure percentage of components is between 25% and 50%. Moreover, the failure rate is as high today as it was 20 years ago, despite major steps forward in innovative technologies and materials used. This confirms that physical type testing is as important today as it was in the past. Positive or negative test outcomes of power equipment can be easily determined, and due to changes the world of energy is currently experiencing, minimizing risks is more fundamental now than ever before. This also means that the product needs to be tested by an independent laboratory that is able to determine its characteristics based on shared standards and precise technical specifications. Acceptance tests are not manufacturer factory tests. An increasing number of manufacture laboratory organizations are looking at the "selfcertification" model for test inspections and third-party witnesses and auditors. Manufacturing organizations may also use laboratory accreditation to guarantee that testing of their products by their own in-house laboratories is done correctly. This approach cannot be defined "independent," and generally it is not acknowledged, even though it is still used. The manufacturer or supplier can benefit by choosing a technically competent and independent laboratory, minimizing the risk of producing or supplying an unreliable product. Furthermore, market access for the product is facilitated thanks to a genuine "set of trust" factors qualified by test report documents and certificates issued by truly independent "quality enablers" recognized all over the world. Independent laboratories are recognized globally through a system of international agreements. This recognition helps reduce costs for manufacturers and exporters whose products or materials are tested in accredited laboratories, reducing or eliminating the need for retesting in the importing country. Throughout the world many countries rely on a process called Laboratory Accreditation as a means of determining technical competence. Laboratory Accreditation uses criteria and procedures specifically developed to determine technical competence. Specialist technical assessors conduct a thorough evaluation of all factors in a laboratory that affect the production of test or calibration data. Criteria are based on internationally accepted ISO/IEC 17025 standards, used for evaluating laboratories internationally. Laboratory accreditation bodies use this standard specifically to assess factors relevant to a laboratory's ability to produce precise, accurate test and calibration data, including technical competence of staff, validity and adequacy of test methods, traceability of measurements and calibrations to national standards.

Today these values are no longer sufficient for evaluating a laboratory, as a series of new parameters like logistic management, customer care and independence have gained relevance in the evaluation of a testing service. These aspects are currently being examined by the main accreditation institutions tasked with evaluating a proper definition.

### CERTIFICATION INSTITUTIONS HAVE A RESPONSIBILITY TO ENSURE THE CERTIFICATES THEY ISSUE ARE VALID: EASTER EGGS, MALWARES, BACKDOORS AND OTHER TRICKS ARE PART OF A DEFICIENCY IN GIVING THE RIGHT ANSWER TO USERS

Economics play a central role in the decision many companies make whether or not to perform Type Tests through independent laboratories, or conduct quality and safety tests in internal facilities or, worse yet, simply request a paper certificate from entities that do not own appropriate testing facilities. These businesses may well be better-off financially by securing the services through an independent lab, despite the costs, rather than setting up potentially risky paper certificates and thereby damaging the value of their product. The main disadvantage of paper certification is that the certificate is only as good as the data supplied. If the product is not built as specified in the design, it will not perform as predicted. Regardless of the industry, certification institutions have a responsibility to ensure the certificates they issue are valid: Easter Eggs, Malwares, Backdoors and other tricks are part of a deficiency in giving the right answer to users and the community in terms of the performance and safety of products and systems. Here again, ethical values like impartiality, fairness and confidentiality play key roles, given the important role played by certifying bodies in the overall quality of very high value projects.

![](_page_28_Picture_5.jpeg)

### | REVIEW |

LESTER R. BROWN with JANET LARSEN, J. MATTHEW RONEY, and EMILY E, ADAMS

THE GREAT

TRANSITION

Shifting from Fossil Fuels to

Solar and Wind Energy

# The great transition. Shifting from fossil fuel to solar and wind energy

Lester R. Brown with Janet Larsen, J. Matthew Roney, Emily E. Adams W. W. Northon & Compton

### Lester R. Brown Biography

ciate Professor in Chinese studies at the Brown earned masters degrees in agricultural economics from the University of Maryland and in public administration from Harvard University. In 1964, he became an adviser to Secretary of Agriculture Orville Freeman on foreign agricultural policy. In 1966, the Secretary appointed him Administrator of the department's International Agricultural Development Service. In early 1969, he left government to help establish the Overseas Development Council.

In 1974, with support of the Rockefeller Brothers Fund, Lester Brown founded the Worldwatch Institute, the first research institute devoted to the analysis of global environmental issues. While there he launched the Worldwatch Papers, the annual State of the World reports, World Watch magazine, a second annual entitled Vital Signs: The Trends That are Shaping Our Future, and the Environmental Alert book series.

In May 2001, he founded the Earth Policy Institute to provide a vision and a road map for achieving an environmentally sustainable economy. In November 2001, he published Eco-Economy: Building an Economy for the Earth, which was hailed by E.O. Wilson as "an instant classic." His most recent book is The Great Transition: Shifting from Fossil Fuels to Solar and Wind Energy.

He is the recipient of many prizes and awards, including 25 honorary degrees, a MacArthur Fellowship, the 1987 United Nations' Environment Prize, the 1989 World Wide Fund for Nature Gold Medal, and the 1994 Blue Planet Prize for his "exceptional contributions to solving global environmental problems." In 2012, he was inducted into the Earth Hall of Fame Kyoto THE SHIFT FROM FOSSIL FUELS TO RENEWABLE ENERGY SOURCES IS NOT ONLY UNSTOPPABLE, BUT WILL HAPPEN MUCH FASTER THAN ANYONE EXPECTED

The great energy transition from fossil fuels to renewable sources of energy is under way.

As oil insecurity deepens, the extraction risks of fossil fuels rise, and concerns about climate instability cast a shadow over the future of coal, a new world energy economy is emerging. The old economy, fueled by oil, natural gas, and coal is being replaced with one powered by wind, solar, and geothermal energy. The Great Transition details the accelerating pace of this global energy revolution. As many countries become less enamored with coal and nuclear power, they are embracing an array of clean, renewable energies. Whereas solar energy projects were once smallscale, largely designed for residential use, energy investors are now building utility-scale solar projects. Strides are being made:

some of the huge wind farm complexes under construction in China will each produce as much electricity as several nuclear power plants, and an electrified transport system supplemented by the use of bicycles could reshape the way we think about mobility. In the U.S., states such as Iowa and South Dakota are procuring large amounts of electricity from wind farms, while others, such as Massachusetts, have a firm deadline for going off-grid. Such a transition from one source of power to another is not without precedent; after all, it was only 150 years ago that the first oil well was drilled. By carefully analyzing policies and practices already in place around the world, Brown and his team of researchers demonstrate that new energy sources will be commonplace sooner than we think

http://www.earth-policy.org/

![](_page_30_Picture_0.jpeg)

### **Shaping a Better Energy Future**

CESI is a leading global technical consulting and engineering company with 60 years of 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.

With an annual turnover of more than €120 million, CESI operates in more than 40 countries around the world, with a total network of 1,000 professionals. The company's key clients include Governmental Institutions, Regulatory Authorities, major Utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), Power Generation companies, Manufacturers, Financial institutions and International electromechanical and electronic manufacturers. CESI is a fully independent joint-stock company with main premises located in Milan, Berlin, Mannheim, Rio de Janeiro, Dubai, Abu Dhabi and Washington DC.

### www.cesi.it Milan • Berlin • Mannheim • Rio de Janeiro • Dubai • Abu Dhabi • Washington DC

![](_page_31_Picture_4.jpeg)

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